THE FUNCTION CODES

This chapter explains the purpose, appearance, and use of the functional command codes. After you’ve studied this chapter, you should be able to make full use of the quick reference chart provided on the inside back cover of this manual. In addition, Appendix M provides a listing of the codes, in the same order as the reference chart, with a short description and decimal (10-base) and hexadecimal (16-base) equivalents.

The format of these descriptions is as follows:

PURPOSE: Tells what the function code accomplishes.

FORMAT: Shows the correct format for the control sequence, giving both the alphanumeric and ASCII code sequences.

REMARKS: Details how the command is used.

EXAMPLE: Shows BASIC program segment to demonstrate the use of the command.

COMMANDS USED TO CONTROL PRINT STYLE

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

Font Style Controls

PURPOSE: Select the standard character set.

FORMAT: ESC “5”

CHRS$(27) CHRS$(53)

REMARKS: This command causes the printer to cancel the italic character set and select the standard character set.

EXAMPLE: LPRINT CHRS$(27);CHRS$(53);
Purpose: Select the italic character set.

Format: ESC "4"
CHR$(27) CHR$(52)

Remarks: This command causes the printer to select the italics character set.

Example: LPRINT CHR$(27);CHR$(52);

Purpose: Select the international character set.

Format: ESC 7 n
CHR$(27) CHR$(55) CHR$(n)

Remarks: This command causes the printer to select the international character set as shown below:

- $n = 0$: USA
- $n = 1$: England
- $n = 2$: Germany
- $n = 3$: Denmark
- $n = 4$: France
- $n = 5$: Sweden
- $n = 6$: Italy
- $n = 7$: Spain

Example: LPRINT CHR$(27); CHR$(55); CHR$(4)

...selects the international character set for France.

Font Pitch Controls

Purpose: Set the print pitch.

Format: ESC "B" n
CHR$(27) CHR$(66) CHR$(n)

Remarks: After this command is sent to the printer, subsequent printing is done: in pica (10 characters per inch) if $n = 1$; in elite (12 characters per inch) if $n = 2$; in condensed (17 characters per inch) if $n = 3$.

Example: FOR N = 1 TO 3:
LPRINT CHR$(27);"B"; CHR$(N);
FOR I = 32 TO 112: LPRINT CHR$(I): NEXT I
LPRINT: NEXT N

...prints out a selection of print in each of the three print pitches.
The Function Codes

PURPOSE:  *Set the print pitch to condensed print.*

FORMAT:  

SI
CHR$(15)

REMARKS:  A single-character command to cause the printer to shift into condensed print mode. This command is cancelled by the transmission of the DC2 code CHR$(18).

PURPOSE:  *Cause the printer to print in double-width mode.*

FORMAT:  

SO or ESC “W” 1
CHR$(14) or CHR$(27) CHR$(87) CHR$(1)

REMARKS:  After this code is sent, subsequent data are converted to 5 CPI, 12 CPI pitch is converted to 6 CPI, and 17 CPI is converted to 8.5 CPI. The SO command is cancelled by the transmission of the DC4 code CHR$(20) or by the CR code CHR$(13). The ESC “W” 0 code will also cancel this command, causing the printer to print in normal mode.

EXAMPLE:  

LPRINT CHR$(14)
LPRINT “Double-Width Mode”
LPRINT “Standard-Width Mode”
prints the first line in double-width mode and the second line in standard width since the carriage return transmitted by the first LPRINT cancels the double-width mode.

PURPOSE:  *Set the print pitch to condensed print mode.*

FORMAT:  

ESC SI
CHR$(27) CHR$(15)

REMARKS:  Same as the SI code. Please refer to the SI code.

PURPOSE:  *Cause the printer to print in enlarged mode.*

FORMAT:  

ESC SO
CHR$(27) CHR$(14)

REMARKS:  Same as the SO code. Please refer to the SO code.
PURPOSE: *Set the print pitch to pica-sized mode.*

FORMAT: DC2
CHR$(18)

REMARKS: A single-character command to cause the printer to shift into pica-sized mode. This command is cancelled by the transmission of the ESC B 2 code, or ESC B 3, or SI code.

PURPOSE: *Cause the printer to print in normal mode.*

FORMAT: DC4
CHR$(20)

REMARKS: A single-character command to cancel the SO code.

**Special Print Modes**

**PURPOSE:** *Print characters in double-strike printing mode.*

**FORMAT:**
ESC "G"
CHR$(27) CHR$(71)

**REMARKS:** When the ESC “G” code is transmitted to the printer, subsequent characters are printed in the double-strike mode. The double strike is cancelled when the ESC “H” code is sent to the printer — CHR$(27) CHR$(72). When in double strike, the characters are printed once, then the paper is moved up 1/144 inch and the characters are reprinted. Shifting in and out of double-strike on the same line will cause the line to slant slightly. The double-printing mode can be used with any other print-style commands.

**EXAMPLE:**
LPRINT CHR$(27);"G";
"This is double-strike print"
LPRINT CHR$(27);"H";
"This is standard print"

**PURPOSE:** *Print in emphasized printing mode.*

**FORMAT:**
ESC “E”
CHR$(27) CHR$(69)
REMARKS: When the ESC “E” code is sent to Gemini, all subsequent characters are printed in the emphasized print mode. The emphasized print code is cancelled by sending an ESC “F” code to the printer — CHR$(27) CHR$(70). Emphasized printing can only be used with the normal pica and double-width pica characters (10 CPI and 5 CPI) and cannot be used with sub/superscripts. The emphasized print mode can be combined with double-strike mode.

Special Printing Effects

**Print characters with underline.**

**PURPOSE:**

**FORMAT:**

ESC “-” 1
CHR$(27) CHR$(45) CHR$(1)

**REMARKS:**

When the ESC “-” 1 code is sent to the printer, all subsequent characters are printed with an underline. The underline mode is cancelled by the ESC “-” 0 code — CHR$(27) CHR$(45) CHR$(0).

*Print in superscript mode.*

**PURPOSE:**

**FORMAT:**

ESC “S” 0
CHR$(27) CHR$(83) CHR$(0)

**REMARKS:**

When the ESC “S” 0 command is received by the printer, the subsequent characters are printed in superscript mode. While in superscript, the normal bidirectional print mode is cancelled and the unidirectional print mode is invoked. Superscripts may be used with the italic font and in pica, elite, and compressed pitches. They may not be used in double-width print mode or with emphasized printing mode. Superscripts are always printed in double-strike. Superscript mode is cancelled by sending the ESC “T” code CHR$(27) CHR$(84). This code also cancels the unidirectional print mode, but does not cancel the double-strike printing mode.
PURPOSE: *Print in subscript mode.*

FORMAT: ESC "S" 1

CHR$(27) CHR$(83) CHR$(1)

REMARKS: When the ESC "S" 1 command is received, subsequent characters are printed in the subscript style. See the remarks for superscript mode for additional information.

EXAMPLE: FOR I = 48 TO 122
LPRINT CHR$(I);CHR$(27);"S";CHR$(0);
  CHR$(I);CHR$(27);
  "T";CHR$(27);"S";CHR$(1);CHR$(I);
  CHR$(27);"T"
NEXT I

...prints the upper and lowercase characters in normal superscript and subscript style.

PURPOSE: *Print in unidirectional printing mode.*

FORMAT: ESC "U" 1

CHR$(27) CHR$(85) CHR$(1)

REMARKS: When the ESC "U" 1 code is sent to the printer, all subsequent lines are printed in unidirectional printing mode. This mode is invoked by the super/subscript mode and by the graphics mode. Unidirectional printing is useful in printing tables and charts and ensures that columnar numbers and other characters are in alignment. The ESC "U" 0 code is sent to the printer to cancel unidirectional printing and return to the faster (standard) bidirectional printing mode.

EXAMPLE: LPRINT "Bidirectional printing"

FOR I = 1 TO 10: LPRINT TAB(25);"$1.29 I":
  NEXT I
LPRINT "Unidirectional printing";
  CHR$(27);"U";CHR$(1)
FOR I = 1 TO 10:
  LPRINT TAB(25);"$1.29 I": NEXT I
LPRINT CHR$(27);"U";CHR$(0);
The Function Codes

COMMANDS USED TO CONTROL VERTICAL POSITION OF THE PRINT HEAD

These commands are used to control or move the paper relative to the location of the print head. Moving the paper "up" has the effect of moving the print head "down" the page.

Line Feed Controls

PURPOSE: *Advance the paper by one line (line-feed command).*

FORMAT: 

```
LF
CHR$(10)
```

REMARKS: The line feed is set to 1/6 inch if DIP switch 1-5 is "on" upon "power up" or printer reset. If DIP switch 1-5 is "off" the line feed will be 1/8 inch. The size of the line feed can be changed using the codes listed below. When DIP switch 2-4 is "on," a line feed is automatically generated when the printer receives a CR code CHR$(13).

PURPOSE: *Change the line feed to a pre-set value.*

FORMAT: 

```
ESC "n"
CHR$(27) CHR$(m)
```

REMARKS: When this command is sent to the printer, the size of the line feed is changed according to the value of "n" (CHR$(m)).

- For "n" = "0" (m = 48), successive line feeds become 1/8.
- For "n" = "1" (m = 49), successive line feeds become 7/72.
- For "n" = "2" (m = 50), successive line feeds become 1/6.

EXAMPLE: 

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

...changes the line-feed size to 1/8 inch, then causes a carriage return and line-feed commands to be sent to the printer.

129
PURPOSE: Change the line feed to \( n/72 \) inches.

FORMAT: ESC "A" \( n \)

CHR$(27) CHR$(65) CHR$(n)

REMARKS: When this command is transmitted to the printer, successive line-feed commands cause the printer to advance the paper \( n/72 \) inch. The value of \( n \) must be between 1 and 127.

EXAMPLE: LPRINT CHR$(27);"U";CHR$(1);
CHR$(27);"A";CHR$(6);
FOR J = 1 TO 66: FOR I = 1 TO 80
LPRINT CHR$(239);: NEXT I:
LPRINT: NEXT J

...causes the printer to fill a page with dots by using the special block-graphics character and setting the line feed to 1/12 inch.

PURPOSE: Change the line feed to \( n/144 \) inches.

FORMAT: ESC "3" \( n \)

CHR$(27) CHR$(51) CHR$(n)

REMARKS: When this command is sent to the printer, successive line feeds are set to \( n/144 \) inches. The value of \( n \) must be between 1 and 127.

PURPOSE: Send a one-time-only line feed of \( n/144 \) inches.

FORMAT: ESC "J" \( n \)

CHR$(27) CHR$(74) CHR$(n)

REMARKS: When this code is sent to the printer, it causes the paper to be advanced by \( n/144 \) inches. The value of \( n \) must be between 1 and 127. This command does not change the size of the existing line-feed value.

Form Feed Controls

PURPOSE: Advance the paper to the next top of form (TOF).

FORMAT: FF

CHR$(12)
The Function Codes

REMARKS: When this command is received by the printer, it causes the paper to be advanced to the top of the next page or form. The initial top of form is set upon power "on." The default value of the page is set to 66 lines, but can be changed using the ESC "C" n and the ESC "C" 0 n code.

PURPOSE: Change the setting of the page (form) to n lines.

FORMAT: ESC "C" n
CHR$(27) CHR$(67) CHR$(n)

REMARKS: When this code is received, the length of the page is set to n lines. The value of n should be between 1 and 127.

PURPOSE: Change the setting of the form length to n inches.

FORMAT: ESC "C" 0 n
CHR$(27) CHR$(67) CHR$(0) CHR$(n)

REMARKS: When this code is received, the length of the page is set to n inches. The value of n must be between 1 and 32.

PURPOSE: Change the line location of the header (first line) of the form.

FORMAT: ESC "R" n
CHR$(27) CHR$(82) CHR$(n)

REMARKS: This command is used to change the location of the first line on the next page or form. The location of the first line is given by the value of n, and must be between 1 and 16. The default value set upon "power up" or printer reset is n = 1.

PURPOSE: Set and enable the skip-over perforation feature.

FORMAT: ESC "N" n
CHR$(27) CHR$(78) CHR$(n)
REM NARKS: When this command is received, the skip-over perforation feature is activated. This feature causes the printer to skip to the next page or form, when the number of lines left on the page is equal to n. If n = 0, the skip-over form feature is deactivated. The value of n should be between 0 and 255.

EXAMPLE: LPRINT CHR$(27);"C";CHR$(88);  
CHR$(27);"0";  
LPRINT CHR$(27);"R";CHR$(8);  
CHR$(27);"N";CHR$(16);  
... these commands allow you to print 64 lines per page. The first line starts 1 inch from the top, and the last line ends 2 inches from the bottom of the page. The line spacing is 1/8 inch.

PURPOSE: Cancel the skip-over perforation feature.

FORMAT: ESC "O"
CHR$(27) CHR$(79)

REM NARKS: When this command is received, the skip-over perforation set by “ESC N n” code and the line location of the header of the form set by “ESC R n” code are cancelled.

Vertical Tabs

PURPOSE: Advance paper to the next vertical tab.

FORMAT: VT
CHR$(11)

REM NARKS: When this command is received, the paper is advanced to the next vertical tab position. The vertical tab positions are set upon “power up” or printer reset to lines 6, 12, 18, 24, 30, 36, 42, 48, 54, and 60. The vertical tab positions can be changed using the ESP “P n..n 0 code.

PURPOSE: Change the position of the vertical tabs.

FORMAT: ESP “P” n1 n2 n3...0
CHR$(27) CHR$(80) CHR$(n1) CHR$(n2)  
CHR$(n3)...CHR$(0)
The Function Codes

REMARKS: When the ESC "P"...code is sent to the printer, the existing vertical tab positions are cancelled. The new vertical tabs are set to line n1, n2, n3, etc. The CHR$(0) character is used to end the command. The value of n should be between 1 and 255, and n1 should be less than n2, n2 less than n3, etc.

EXAMPLE: LPRINT CHR$(13);CHR$(27);"P";CHR$(15); CHR$(30);CHR$(0);
FOR I = 1 TO 2: LPRINT CHR$(11);
I: NEXT I

...advances the paper to the top of form and prints the numeral 1 on line 15 and the numeral 2 on line 30.

PURPOSE: *Send a one-time-only vertical line feed of n lines.*

FORMAT: ESC"a"n
CHR$(27) CHR$(97) CHR$(n)

REMARKS: When this command is sent, it causes the paper to be advanced n lines vertical feed. Value of n must be between 1 and 127. This command does not change the present vertical tab.

EXAMPLE: LPRINT CHR$(27);CHR$(97);CHR$(15)

...causes the paper to advance 15 vertical lines.

COMMANDS TO CONTROL THE HORIZONTAL POSITION OF THE PRINT HEAD

These commands are used to control the horizontal position of the print head.

PURPOSE: *Return the print head (carriage) to the next print position.*

FORMAT: CR
CHR$(13)
REMARKS: When this command is sent, the print head moves to the next print position. If DIP switch 2-2 is set to "off," this carriage return command also causes the printer to empty the print buffer. If DIP switch 2-4 is set to "on," the command causes a line-feed command to be inserted after the carriage-return code.

PURPOSE: Set the left-hand print margin.
FORMAT: ESC "M" n
CHR$(27) CHR$(77) CHR$(n)
REMARKS: After this command is sent to the printer, successive carriage return codes will cause the print head to return to the n print position. The value of n should be between 1 and 255. The maximum number of print positions on an 8-inch-wide form is 80 for 10 CPI characters, 96 for 12 CPI, and 136 for 17 CPI. For the Gemini-15X the maximum number of print positions is 136 for 10 CPI, 163 for 12 CPI, and 233 for 17 CPI.

PURPOSE: Set the right-hand print margin.
FORMAT: ESC "Q" n
CHR$(27) CHR$(81) CHR$(n)
REMARKS: After this command is sent to the printer, attempting to print beyond the n print position will cause the printer to automatically perform a line feed and return before printing the remainder of the line. The value of n should be between 1 and 255.

PURPOSE: Move the print head to the next horizontal tab location.
FORMAT: HT
CHR$(9)
REMARKS: When the HT command is received, the print head is moved to the next horizontal tab
position. Upon power “on;” the horizontal tab locations are set to columns 10, 20, 30, etc.

**PURPOSE:** Set the horizontal tab positions.

**FORMAT:**

```
ESCC "D" n1, n2, n3 . . . 0
CHR$(27) CHR$(68) CHR$(n1)
CHR$(n2) . . . CHR$(0)
```

**REMARKS:** When the ESC “D” . . . command is sent to the printer, the existing horizontal tab positions are cancelled. The new horizontal tab positions are set to print column n1, n2, n3, . . . The maximum number of horizontal tabs is 255. The CHR$(0) code must be at the end of this command. The value of n1 must be less than n2, n2 must be less than n3, etc.

**EXAMPLE:**

```
LPRINT CHR$(27);"M";CHR$(5);CHR$(27);
"Q";CHR$(70);
LPRINT CHR$(27);"D";CHR$(10);CHR$(30);
CHR$(0)
```

. . . sets the left-hand margin at print column 5, sets the right-hand margin at print column 70, and sets the two horizontal tab positions: one at print column 10, and the other at print column 30.

**PURPOSE:** Move the print head back one space.

**FORMAT:**

```
BS
CHR$(8)
```

**REMARKS:** When the BS code is sent to the printer, the print head is shifted one print column to the left. The BS code can be used to overprint characters.

**PURPOSE:** Send a one-time-only horizontal tab of n columns.

**FORMAT:**

```
ESCCb n
CHR$(27) CHR$(98) CHR$(n)
```

135
REMARKS: This command enables the print head to shift $n$ columns to the right. The value must be between 1 and 127. This does not change the present horizontal tab.

EXAMPLE: LPRINT CHR$(27);CHR$(98);CHR$(45)
...shifts the print head 45 columns to the right.

COMMANDS USED TO CONTROL GRAPHICS

PURPOSE: Print low-resolution (normal-density) graphics.

FORMAT: ESC "K" $n1$ $n2$ $m1$ $m2$...
CHR$(27)$ CHR$(75)$ CHR$(nl)$ CHR$(n2)$
CHR$(m1)$ CHR$(m2)$...

REMARKS: This command selects the 60-dots-per-inch, column-scan, bit-image graphics mode. The number of columns to be printed is given by $n1 + 256 * n2$. There must be $n1 + 256 * n2$ characters following $n2$. These characters determine which pins are fired according to the explanation found in Chapter 6 for dot graphics.

PURPOSE: Print high-resolution (double-density) graphics.

FORMAT: ESC "L" $n1$ $n2$ $m1$ $m2$...
CHR$(27)$ CHR$(76)$ CHR$(nl)$ CHR$(n2)$
CHR$(m1)$ CHR$(m2)$...

REMARKS: This command selects the 120-dots-per-inch graphics mode. See remarks for the ESC "K"...code for additional details.

PURPOSE: Print high-resolution (double-density) graphics with double speed.

FORMAT: ESC "y" $n1$ $n2$ $m1$ $m2$...
CHR$(27)$ CHR$(121)$ CHR$(n1)$ CHR$(n2)$
CHR$(m1)$ CHR$(m2)$...
The Function Codes

REMARKS: This command selects the 120-dots-per-inch graphics mode but with double the print speed. See ESC “K”...code for additional details.

PURPOSE: Print quadruple-density graphics.
FORMAT: ESC “z” n1 n2 m1 m2...
CHR$(27) CHR$(122) CHR$(n1) CHR$(n2) CHR$(m1) CHR$(m2)...
REMARKS: This command selects the 240-dots-per-inch column scan bit image graphics mode. See ESC “K”...code for additional details.

COMMANDS USED FOR MACRO INSTRUCTION

These commands are used to control the macro instruction.

PURPOSE: Define the macro instruction.
FORMAT: ESC “+”...RS
CHR$(27) CHR$(43)...
REMARKS: When this code is sent to the printer, the existing macro instruction is cancelled. The new macro instruction is set. The maximum number of instruction bytes is 16. The RS(CHR$(30)) character is used to end the command.

PURPOSE: Select the macro instruction.
FORMAT: ESC “!”
CHR$(27) CHR$(33)
REMARKS: When this code is sent to the printer, the macro instruction set by “ESC +...RS” code is selected.

COMMANDS USED TO DOWNLOAD CHARACTERS

These commands are used to control the download characters. For details, please refer to Chapter 8.
**Purpose:** Define the download character into RAM.

**Format:**
- ESC "*" 1 n1 n2 m1 m2...
  - CHR$(27) CHR$(42) CHR$(1) CHR$(n1)
  - CHR$(n2) CHR$(m1) CHR$(m2)...

**Remarks:** When you define the download character, character patterns (m1 m2...) are inputted with 9 bytes into RAM after transmitting the “ESC * 1” code, “n1” as designating position to be written, and “n2” as the descender data. The value of n1 must be between 32 and 126. The value of n2 must be “1” when the character is to be shifted two dots downward, and “0” when it is not shifted.

---

**Purpose:** Copy the fonts in character ROM into download RAM.

**Format:**
- ESC "*" 0
  - CHR$(27) CHR$(42) CHR$(0)

**Remarks:** When this command is received, the fonts in character ROM are copied into the download character RAM.

---

**Purpose:** Select the download character set.

**Format:**
- ESC "$" 1
  - CHR$(27) CHR$(36) CHR$(1)

**Remarks:** This command causes the printer to select the download character set. Download character sets cannot be intermixed with other character sets on the same line.

---

**Purpose:** Cancel the download character set.

**Format:**
- ESC "$" 0
  - CHR$(27) CHR$(36) CHR$(0)

**Remarks:** This command causes the printer to cancel the download character set and select the standard ASCII character set.
OTHER FUNCTION CODES

PURPOSE:  Control the value of the eight bits of data sent to printer.

FORMAT:  ESC " > " or ESC " = " or ESC " # "
CHR$(27) CHR$(62) or CHR$(27) CHR$(61) or
CHR$(27) CHR$(35)

REMARKS:  These codes are used to control the value of
the eighth bit of the data that is sent to the
printer. After the ESC " > " code is received by
the printer, all subsequent data is processed
with the eighth regarded as set to 1. The ESC
" # " code is used to cancel the ESC " > "
code. After the ESC " = " code is received,
all subsequent data is processed with the
eighth bit regarded as set to 0. The ESC " # "
code is used to cancel the ESC " = " command.
These codes are provided to allow users with a
7-bit interface to access the special characters
whose ASCII code is greater than 127. These
codes should be used to transmit printer
function codes. ESC " > " only functions with
the DIP switch number 2-3 set to " on, " for a
7-bit interface.

PURPOSE:  Delete the last character sent to the printer.

FORMAT:  DEL
CHR$(127)

REMARKS:  When the CHR$(127) code is sent to the printer,
it causes the printer to delete the last
character it received, with the exception of
function codes.

PURPOSE:  Put the printer in "online" mode.

FORMAT:  DC1
CHR$(17)

REMARKS:  This code cancels the DC3 code and puts the
printer back in the "online" mode.
PURPOSE: Put printer in "offline" mode.

FORMAT: DC3
CHR$(19)

REMARKS: When this code is sent to the printer, Gemini assumes the "offline" mode. All subsequent characters and control codes sent to the printer are disregarded. The only control code that is processed is CHR$(17)(DC1), which cancels CHR$(19), and puts the printer back "on line."

PURPOSE: Activate the Gemini "buzzer."

FORMAT: BEL
CHR$(7)

REMARKS: When the CHR$(7) code is sent to Gemini, the result is that the built-in buzzer "beeps" for one-fourth of a second. The buzzer function can be temporarily deactivated by sending an ESC "Y" 0 (CHR$(27) CHR$(89) CHR$(0) control code) to the printer. After the ESC "Y" 0 code is received, the CHR$(7) no longer causes the buzzer to "beep." The buzzer can be reactivated by sending an ESC "Y" 1 (CHR$(27) CHR$(89) CHR$(1) code) to the printer.

PURPOSE: Allow printing even though the "paper-out" detector indicates Gemini is out of paper.

FORMAT: ESC "8"
CHR$(27) CHR$(56)

REMARKS: When the ESC "8" function code is sent to Gemini, the signal from the "paper-out" detector is disregarded. This code allows you to print on a single sheet. If the "paper-out" signal were not disregarded, Gemini would stop printing part way down the single sheet because the printer would "think" it's out of paper. The "paper-out" signal can be restored by sending an ESC "9" function code (CHR$(27) CHR$(57)).
The Function Codes

PURPOSE: Regard the signal from the "paper-out" detector.

FORMAT: ESC "9"
        CHR$(27) CHR$(57)

REMARKS: When this code is sent to the printer, the signal from the "paper-out" detector is restored.

purPOSE: Initialize the printer conditions.

FORMAT: ESC "@"
        CHR$(27) CHR$(64)

REMARKS: When this code is sent to the printer, the conditions of the printer are initialized.
MAINTENANCE

The purpose of “maintenance” is to maximize the life of your Gemini. Toward that end, the best maintenance is “preventive.”

The Gemini printer is a well-engineered peripheral, and it serves as a valuable information-handling tool when used correctly. Part of using Gemini correctly is paying attention to the operating environment. Chapter 1 outlines the suggested considerations for keeping that environment clean.

Periodic cleaning of the exterior and interior of your printer will help keep Gemini going for years. How often you need to clean depends on how “dirty” the operating environment is.

CLEANING GEMINI

Exterior cleaning: When dust, grease, or other material accumulates on the outside of your printer, wipe the external surfaces of the case carefully with a clean cloth moistened with alcohol.

*Note:* Exercise the utmost care not to wet the electronic parts and machine body.

Interior cleaning: Remove dust and dirt from the internal mechanism by gently using a soft brush. Be very careful not to damage the electronic parts or wiring circuit.

To clean the interior of Gemini, you should remove the upper casing, as described below.

REMOVING THE UPPER CASING

*Warning:* Unplug your Gemini before removing the upper casing.

When you need to set Dip Switch number 1 or change other parts of the printer, the upper casing must first be removed. Figure 10-1 shows the position of the three screws that hold the upper casing in place on the Gemini-15X. Figure 10-2 shows the location of the two screws that do the same for the Gemini 10-X. In both cases, the mounting screws are Phillips-head types.
To replace the fuse, turn the power switch "off". Just to be on the safe side, make sure you unplug the power cord from the power source. Then remove the platen knob, take out the mounting screws, and remove the upper casing. To remove the upper casing, place your fingers on the inside front of the printer with your thumbs pressing on the outside front of the lower casing. Gently pull the upper-casing front toward you until it pops free. Set the upper-casing front on end (next to the printer) so that the short wires attached to the control panel remain connected.

After removing the casing, check the fuse, which is located on the fuse board near the power switch. The fuse is a commonly used type, with a metal strip suspended in a glass and metal case. If the strip is broken, the fuse is "blown."

If the fuse is blown, replace it with a BELL's 5MT1.25 (1.25A, 125V) "slo-blo" type fuse, or equivalent for 120V version, or a 630mA/250V "slo-blo" type fuse for 220V/240V version. Just slip the old fuse out and snap the replacement fuse into place in the two clasps (as shown in Figure 10-3).

Figure 10-1. Three mounting screws hold the Gemini-15X upper casing in place.
Figure 10-2. Two mounting screws hold the upper casing in place on the Gemini-10X.

After replacing (or just checking) the fuse, re-attach the upper casing (reversing the procedure described above) and insert the mounting screws and the platen knob. (Refer to Figure 1-6 in Chapter 1 for an "exploded view" of Gemini-10X with its upper casing removed.)

You probably need to replace the fuse when all of the following four statements apply to your situation:

- the printer won't operate,
- the power-on lamp isn't lit on the control panel,
- you are sure that the power switch is "on", and
- the printer is connected to a power source.
Replacing a fuse is simple, but make sure you use the correct type fuse.

REPLACING THE PRINT HEAD

When you replace the print head, start by removing the ink ribbon. You might want to refer to Figure 10-4 as you follow these steps:

**Warning:** The print head will be hot during operation and soon afterward, so be careful not to burn yourself.

1. Extract the head cable from the head connector. (Hold down the head cable board while performing this disconnection.)

2. Remove the two clamping screws from the print head.

3. Detach the print head.
4. Place the new print head in position, and attach it with the clamping screws. Apply "screw lock" (an adhesive) to the heads of the screws.

5. Insert the head cable tightly into the head connector. (Be sure the connection is a good one, otherwise it may cause problems.)

Figure 10-4. Replacing the print head by yourself is easy, quick, and avoids downtime.
PERIODIC INSPECTIONS

To keep Gemini in tip-top shape, you should make the following inspections every six months (under normal use). Expressed another way, you should "check under the hood" every half-million lines of printing. Here's what to check:

Maintenance Check List

☐ Clean the print head and sensor peripherals with a soft brush.

☐ Check the various screws and make sure they are tight. If they aren't, tighten them with a screwdriver.

☐ Rotate the platen, and check for possible damage. If the platen is worn or uneven, replace it.

☐ Remain alert to "abnormal" operating sounds. Strange noises can signal strange conditions, and the earlier you recognize and fix a problem, the better.

☐ Perform Self-Testing and check the movement of each mechanism.
Notes
The Interface Board

You need to acquire and install an Apple interface board (also called a "card") and a connecting cable. Your Gemini dealer can answer any questions you have about the board or its installation in slot number 1. Star Micronics, Inc. has created the grafstar™ intelligent interface especially for you Apple II Plus or Apple Ile computers.

The Connecting Cable

Use the Apple, Centronics compatible, parallel I/F cable, modified to ground the 8th bit, or use a cable supplied by your Gemini dealer.

Setting the DIP Switches

Because Apple uses a seven-bit interface, set DIP switch number 2-3 to the "on" position. Because BASIC supplies a line feed at the end of each line, turn DIP switch number 2-4 to the "off" position (unless you want to generate "double-spaced" output, in which case turn number 2-4 "on"). Switch number 2-1 can be set to either position.

Switch number 2-2 should be set to "off" if you want Gemini to print every time it receives a CR code; set number 2-2 to "on" if you wish to have the carriage return ignored and to print only when the buffer is full.

The Use of Basic

In this manual, we used the BASIC programming language to illustrate how to control the codes that manipulate Gemini's operations. In our sample programs, the CHR$ function is used to send control codes to the printer. Unfortunately, this function is not supported by Apple Integer BASIC. However, with the aid of the follow-
ing notes, you should be able to run all the sample programs presented in this manual if you use Applesoft BASIC.

Applesoft BASIC uses the PRINT command to send information to both the screen and the printer.

The PR #1 command sends the information only to the printer (when the printer interface is in slot number 1), and the PR #0 command sends the information only to the screen.

Therefore, you should use:

```
PRINT CHR$(4) "PR #1"
PRINT
```

instead of the LPRINT command. In addition, use:

```
PRINT CHR$(4) "PR #0"
PRINT
```

instead of the PRINT command.

The Apple video display is 40 columns wide. If you want the print mode to print more than 40 columns, you need to send an additional command code:

```
PRINT CHR$(4) "PR #1"
PRINT CHR$(9) "255N"
PRINT
```

This message allows Gemini to print a line of any length. This is particularly important when sending bit-image graphics to Gemini.

The CHR$(9) (or function code HT, which moves the print head to the next tab position) and CHR$(13) (or function code CR for a carriage return) codes cause problems when used in both the Gemini escape-function code sequences and in the graphics mode. Avoid using these codes if possible.

The printer interface card does not allow us to send ASCII codes greater than 127. If you try to send these codes, the interface sets the eighth bit to zero. The result, for example, is that PRINT CHR$(239) would be received by the printer as PRINT CHR$(111); that is, 239 - 128 = 111. Gemini provides the ESC ">" function code to allow 7-bit interface users to overcome this problem. See Chapter 9 for a discussion of this problem.

Apple users (and other 7-bit interface users) should also be aware of the difference between 7-bit and 8-bit interface graphics. See Chapter 6 for a discussion on this topic.
Apple II Plus

Pin Configurations

The following chart shows the pin-outs for Gemini-10X and Gemini-15X printers and the Apple II Plus, using a parallel interface board.

<table>
<thead>
<tr>
<th>Gemini-10X/15X</th>
<th>Parallel</th>
<th>Apple Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>25. SG</td>
<td>1. SG</td>
<td></td>
</tr>
<tr>
<td>26. SG</td>
<td>2. SG</td>
<td></td>
</tr>
<tr>
<td>27. SG</td>
<td>3. SG</td>
<td></td>
</tr>
<tr>
<td>1. STROBE</td>
<td>4. STROBE</td>
<td></td>
</tr>
<tr>
<td>28. SG</td>
<td>5. N/C</td>
<td></td>
</tr>
<tr>
<td>2. D1</td>
<td>6. D1</td>
<td></td>
</tr>
<tr>
<td>3. D2</td>
<td>7. D2</td>
<td></td>
</tr>
<tr>
<td>5. D4</td>
<td>9. D4</td>
<td></td>
</tr>
<tr>
<td>6. D5</td>
<td>10. D5</td>
<td></td>
</tr>
<tr>
<td>7. D6</td>
<td>11. D6</td>
<td></td>
</tr>
<tr>
<td>10. ACK</td>
<td>14. ACK</td>
<td></td>
</tr>
<tr>
<td>29. SG</td>
<td>15. SG</td>
<td></td>
</tr>
</tbody>
</table>

Note: If you purchased a Star Micronic's "intelligent" Apple Interface Board, it comes complete with the cable. Just plug it in, and it's ready to go!

Program Listings

4 REM **
5 REM ** PRINTING EFFECTS PROG. **
6 REM **
10 PR1 1: PRINT CHR$ (9) + "132N": PRINT
20 ESC$ = CHR$ (27);LF$ = CHR$ (10);FF$ = CHR$ (12);CR$ = CHR$ (13)
30 PICAO = ESC$ + "B" + CHR$ (1);ELITE$ = ESC$ + "B" + CHR$ (12);COMP$ = ESC$ + "B" + CHR$ (3)
40 SPRS = ESC$ + "S" + CHR$ (0);SUB$ = ESC$ + "S" + CHR$ (1);CANS$ = ESC$ + "T"
50 ITALIC$ = ESC$ + CHR$ (52)
55 STND$ = ESC$ + CHR$ (53)
60 WIDE$ = CHR$ (14);CMIDE$ = CHR$ (20);PRSET$ = ESC$ + "0"
70 EMPH$ = ESC$ + "E";CEMPH$ = ESC$ + "E";DBLS$ = ESC$ + "G";CDBLS$ = ESC$ + "H"
80 PRINT PRSET$;ESC$;"R"; CHR$ (15);FF$
90 FOR I = 1 TO 2
100 IF I = 1 THEN PRINT WIDE$;" GEMINI STANDARD TYPE STYLES";CWIDE$ ;LF$  
110 IF I = 2 THEN PRINT ITALIC$;WIDE$;" GEMINI ITALIC TYPE STYLES";  
PRINT CWIDE$;LF$;LF$  
120 PRINT ESC$;'?': FOR N = 1 TO 40: PRINT CHR$ (231);: CHRI (232):: NEXT  
N: PRINT ESC$:"=": PRINT  
130 PRINT " 17 CPI 12 CPI 10 CPI 8.5 CPI 6 CPI  
5 CPI"  
140 PRINT ESC$;'=': FOR N = 1 TO 80: PRINT CHR$ (241);: NEXT N: PRINT  
150 MIS = " ABC";M2$ = "Y" + CHR$ (120);M3$ = "Y" + CHR$ (121)  
160 FOR J = 1 TO 4  
170 IF I = 2 THEN PRINT ITALIC$;  
180 IF J = 1 THEN PRINT COMPS;"NORMAL"  
190 IF J = 2 THEN PRINT COMPS;"DOUBLE STRIKE"  
200 IF J = 3 THEN PRINT COMPS;"EMPHASIZED"  
210 IF J = 4 THEN PRINT COMPS;"DOUBLE STRIKE"  
220 FOR K = 1 TO 6  
230 IF K = 1 THEN PRINT COMPS;  
240 IF K = 2 THEN PRINT ELITE$;  
250 IF K = 3 THEN PRINT PICA$;  
260 IF K = 4 THEN PRINT COMPS;WIDE$;  
270 IF K = 5 THEN PRINT ELITE$;WIDE$;  
280 IF K = 6 THEN PRINT PICA$;WIDE$;  
290 IF J = 2 THEN PRINT DBLS$;  
300 IF J = 3 THEN PRINT EMPHS;  
310 IF J = 4 THEN PRINT DBLS$;EMPH$;  
320 PRINT MIS;SPRS;M2S;CANS$;SUBS;M3S;CANS$;CDBLS$;  
330 IF K > 3 THEN PRINT CWIDE$;  
340 NEXT K  
345 IF J = 2 THEN PRINT LF$;  
350 IF J = 4 THEN PRINT ESC$;"A";CHR$ (8);LF$;COMPS;" ";CHR$;"EMPH ASIZED";  
360 PRINT PRSET$  
370 NEXT J  
380 PRINT  
390 NEXT I  
400 PRINT FF$; PRINT CHR$ (9) + "BON"; PR$  
410 END  

Figure A-7 is the font styles program (refer to Figure 5-1) amended for the Apple II computer.
5 BL$ = "
7 LI$ = "---------------------------------------"
10 HOME: DIM A$(22,40)
20 HOME: X = 1: Y = 1
30 GOSUB 150: VTAB X: HTAB Y: PRINT **;1
40 GET B$
50 IF B$ = CHR$ (5) THEN HOME: END
60 IF B$ = CHR$ (18) THEN HOME: GOSUB 200: GOTO 20
70 IF B$ = CHR$ (16) THEN GOTO 210
90 IF B$ = CHR$ (4) THEN GOSUB 130: GOTO 40
100 VTAB X: HTAB Y: PRINT B$: A$(X,Y) = B$: Y = Y + 1
110 IF Y = 40 THEN A$(X,Y) = CHR$ (13): PRINT CHR$ (7);: X = X + 1: Y = 1: GOTO 40
120 VTAB X: HTAB Y: PRINT **; : GOTO 40
130 VTAB X: HTAB Y: PRINT **; Y = Y - 1: IF Y = 0 THEN Y = 1: PRINT CHR$ (7);
135 A$(X,Y) = **
140 VTAB X: HTAB Y: PRINT **; : RETURN
150 VTAB 24: HTAB 1: INVERSE: PRINT " ^PRINT";
160 VTAB 24: HTAB 10: PRINT "^DELETE";
170 VTAB 24: HTAB 19: PRINT **RESTART**;
180 VTAB 24: HTAB 29: PRINT **EXIT**
185 NORMAL
187 VTAB 22: HTAB 1: PRINT LI$;
190 RETURN
200 VTAB 10: HTAB 10: PRINT "PLEASE STAND BY**; FOR I = 1 TO X; FOR J = 1 TO 40: A$(I,J) = **; NEXT J: NEXT I: RETURN
210 REM
220 PR$: I: PRINT CHR$ (27);"@": PR$ 0
230 HOME: VTAB 24: HTAB 1: INVERSE: PRINT "COMMAND"; HTAB 10: PRINT " PPRINT";
240 HTAB 17: PRINT "RETURN"; NORMAL
250 SET B$
260 IF G$ = "P" THEN GOSUB 310
270 IF G$ = "C" THEN GOSUB 320: GOTO 230
280 IF G$ = "R" THEN GOSUB 300: GOTO 30
290 GOTO 250
300 HOME: FOR I = 1 TO X; FOR J = 1 TO 40: VTAB I: HTAB J: PRINT A$(I,J); NEXT J: NEXT I: RETURN
310 PR$ 1
315
311 PRINT CHR$ (9);"4ON"
312 FOR I = 1 TO X: FOR J = 1 TO 40
313 PRINT A$ (I, J);: NEXT J: NEXT I
314 PR0 0
315 VTAB 24: HTAB 30
317 RETURN
320 VTAB 24: HTAB 1: PRINT BL$;
330 REM
340 VTAB 24: HTAB 1: INVERSE : PRINT "E) ESC";
350 HTAB 8: PRINT "C) CHR$"; HTAB 16: PRINT "Q) END COMMAND";
355 NORMAL
360 GET G$
370 IF G$ = "E" THEN 60SUB 420: GOTO 400
380 IF G$ = "C" THEN 60SUB 530: GOTO 400
390 IF G$ = "Q" THEN GOTO 410
400 GOTO 360
410 RETURN
420 I = 0: VTAB 22: HTAB 4: PRINT "ESC ";
430 GET G$
440 IF G$ = CHR$ (13) THEN 480
450 PRINT G$;
455 IF I > 0 THEN 470
460 PRINT " *
470 S$(I) = G$; I = I + 1: GOTO 430
480 IF I > 2 THEN FOR J = 1 TO I; D$ = D$ + S$(J);: NEXT J; ST$ = CHR$ (27 + S$(O) + CHR$ (VAL (D$))); D$ = ""
490 IF I = 2 THEN ST$ = CHR$ (27) + S$(O) + CHR$ (VAL (S$ (1)))
500 IF I = 1 THEN ST$ = CHR$ (27) + S$(0)
510 PR$ 1: PRINT CHR$ (9);"4ON"; PRINT ST$; ST$ = ""; PR$ 0: FOR J = 1 TO I; S$(J) = ""; NEXT J; I = 0
520 VTAB 22: HTAB 4; PRINT BL$; RETURN
530 VTAB 22: HTAB 2: PRINT "CHR$ "; ST$ = ""
540 GET G$
550 IF G$ = CHR$ (13) THEN 570
560 PRINT G$; ST$ = ST$ + G$; GOTO 540
570 VTAB 22: HTAB 2: PRINT BL$;
580 PR$ 1: PRINT CHR$ (9);"4ON"
590 PRINT CHR$ (VAL (ST$)); ST$ = ""; PR$ 0; RETURN

Figure A-2 is the word processing program (refer to Figure 5-4) amended for the Apple II computer.
Figure A-3 is the vertical spacing program (refer to Figure 6-5) amended for the Apple II computer.

```basic
5 PR# 1
10 PRINT TAB(30); "HIGH RESOLUTION VERTICAL SPACING"
15 PRINT TAB(30); "USING THE ESC 3N CONTROL CODE"
20 FOR I = 1 TO 30
25 IF I = 7 THEN GOTO 110
26 IF I = 9 THEN GOTO 110
30 IF I = 13 THEN GOTO 110
40 M = INT (144 / (6 + I)); IF M < 2 THEN M = 2
50 PRINT CHR$(27);CHR$(51);CHR$(I);
50 FOR J = 0 TO M
60 IF J = M - 1 THEN PRINT I; ";/144 INCH SPACING"
70 PRINT TAB(30):
80 PRINT TAB(30):
90 FOR N = 1 TO 40; PRINT CHR$(27);"";CHR$(241);CHR$(27);"=";NEXT N; PRINT
100 NEXT J
110 NEXT I
120 PRINT CHR$(27);"0"
130 PR# 0; END
```

Figure A-4 is the dot graphics program presented in Chapter 6 (the one that puts a smile on your paper) amended for the Apple II computer.

```basic
10 PR# 1
20 PRINT CHR$(27);"\";CHR$(27);"A";CHR$(6);
30 FOR LI = 1 TO 2
40 PRINT CHR$(27);"\";CHR$(114);CHR$(0);
50 FOR SPACE = 1 TO 100
55 PRINT CHR$(0);: NEXT SPACE
60 FOR COLM = 1 TO 14
70 READ C; PRINT CHR$(C);: NEXT COLM
80 PRINT
90 NEXT LI
100 DATA 14,16,34,64,78,78,64,64,78,78,64,34,16,14
110 DATA 224,16,232,68,34,18,18,18,18,34,68,232,16,224
120 PRINT CHR$(27);"0"
130 PR# 0
140 END
```

Figure A-4 is the dot graphics program presented in Chapter 6 (the one that puts a smile on your paper) amended for the Apple II computer.
10 PR# 1
20 PRINT CHR$ (27);">";
30 PRINT CHR$ (163); CHR$ (161); CHR$ (27); "A"; CHR$ (6)
40 PRINT CHR$ (162); CHR$ (160); CHR$ (27); "2"
50 PRINT CHR$ (27); "="; PR# 0; END

Figure A-5 is the circle program presented in Chapter 7 amended for the Apple II computer.

10 PR# 1
30 PRINT CHR$ (32); CHR$ (27); CHR$ (163); CHR$ (27); "A"; CHR$ (6)
40 PRINT CHR$ (160)
50 PRINT CHR$ (27); "="
60 PR# 0; END

Figure A-6 is the tilde program presented in Chapter 7 amended for the Apple II computer.

1 PR# 1
10 PRINT TAB (20); "W"
15 PRINT TAB (20); CHR$ (27); "">"; CHR$ (164); CHR$ (27); "="
20 PRINT TAB (17); "M";
25 PRINT CHR$ (27);">"; CHR$ (166); CHR$ (27); "=";
30 PRINT CHR$ (166); CHR$ (27); "">"; CHR$ (167); CHR$ (27); "="; "E"
35 PRINT TAB (20); CHR$ (27);">"; CHR$ (165); CHR$ (27); "="
40 PRINT TAB (20); "E"
45 PR# 0; END

Figure A-7 is the map program presented in Chapter 7 amended for the Apple II computer.
Figure A-8 is the "Wy" program (refer to Figure 7-1) amended for the Apple II computer.
Figure A-9 is the boat program (refer to Figure 7-2) amended for the Apple II computer.
2090 R1 = ANG * 6.28 / 360
2100 R2 = (ANG + 150) * 6.28 / 360
2110 X1 = RAD * COS (R1) + 10; Y1 = RAD * SIN (R1) + 10
2120 X2 = RAD * COS (R2) + 10; Y2 = RAD * SIN (R2) + 10
2130 GOSUB 4000
2140 NEXT ANG
2150 BITX(39,0) = 4
3000 REM SEND BIT IMAGE MAP TO PRINTER
3005 PR$ = ""
3006 PRINT CHR$ (9);"255N"
3010 PRINT CHR$ (27);"A";CHR$ (6)
3015 PRINT CHR$ (13)
3020 FOR ROW = 0 TO 11
3025 PRINT CHR$ (27);"K";CHR$ (119);CHR$ (1)
3050 FOR COL = 1 TO 75
3055 FOR LL = 1 TO 5
3060 PRINT CHR$ (BITX(COL,ROW));
3065 NEXT LL
3070 NEXT COL
3080 PRINT
3090 NEXT ROW
3100 PRINT
3102 PR$ = 0
3110 END
4000 REM DRAW A LINE FROM X1,Y1 TO X2,Y2
4010 XL = X2 - X1; YL = Y2 - Y1
4020 NX = ABS (XL / XFAC); NY = ABS (YL / YFAC)
4030 IF NX < NY THEN NX = NY
4040 NSX = INT (NX + 1)
4050 DX = XL / NSX; DY = YL / NSX
4060 FOR I = 1 TO NSX
4070 X1 = X1 + DX; Y1 = Y1 + DY
4080 GOSUB 5000
4090 NEXT I
4100 RETURN
5000 REM PLOT A POINT AT X1,Y1
5010 XX = X1 / XFAC; YY = Y1 / YFAC
5020 COL = INT (XX) + 1
5030 ROW = INT (YY / 6)
5040 XITX = INT (YY - (6 * ROW)) + 1
5042 POKE 250,BITX(COL,ROW)
5044 POKE 251,MASKX(XITX)
5046 CALL 24576
5050 BIT$(COL,ROW) = PEEK (252)
5060 RETURN

Figure A-10 is the graphics program (refer to Figure 7-4) amended for the Apple II computer.

10 PRINT CHR$ (4); “PR#1”
20 REM *** DEFINE PARAGRAPH SYMBOL IN PLACE OF THE @ SYMBOL
30 PRINT CHR$ (27); CHR$ (42); CHR$ (11); CHR$ (64); CHR$ (0); CHR$ (6); CHR$
 (25); CHR$ (0); CHR$ (25); CHR$ (118); CHR$ (25); CHR$ (0); CHR$ (127); CHR$
 (0);
40 REM *** SELECT DOWNLOADABLE CHARACTERS
50 PRINT CHR$ (27); CHR$ (36); CHR$ (11);
60 REM *** PRINT OUR NEW SYMBOL
70 PRINT “@@@@”

Figure A-11 is the downloading paragraph symbols program (refer to Figure 8-2) amended for the Apple II computer.

5 PRINT CHR$ (4); “PR#1”
10 REM *** DEFINE COPYRIGHT SYMBOL IN PLACE OF A © SYMBOL
20 PRINT CHR$ (27); CHR$ (42); CHR$ (11); CHR$ (64); CHR$ (0); CHR$ (28);
 CHR$ (34); CHR$ (73); CHR$ (20); CHR$ (65); CHR$ (20); CHR$ (65); CHR$
 (34); CHR$ (20);
30 REM *** SELECT DOWNLOADABLE CHARACTERS
40 PRINT CHR$ (27); CHR$ (36); CHR$ (11);
50 REM *** PRINT OUR NEW SYMBOL
60 PRINT “COPYRIGHT © 1983”

Figure A-12 is the downloading copyright program (refer to Figure 8-4) amended for the Apple II computer.

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Apple II Plus

5 PRINT CHR$(4);"PR#l"
10 REM *** COPY CHARACTERS INTO RAM
20 PRINT CHR$(27);CHR$(42);CHR$(0);
30 REM *** DEFINE COPYRIGHT SYMBOL IN PLACE OF ©
40 PRINT CHR$(27);CHR$(42);CHR$(1);CHR$(64);CHR$(0);CHR$(28);
    CHR$(34);CHR$(73);CHR$(20);CHR$(65);CHR$(20);CHR$(65);CHR$(
    34);CHR$(20);
50 REM *** SELECT DOWNLOADABLE CHARACTERS
60 PRINT CHR$(27);CHR$(36);CHR$(1);
70 REM *** PRINT OUR NEW SYMBOL
80 PRINT "COPYRIGHT © 1983"

Figure A-13 is the downloading program presented in Figure 8-5 amended for the Apple II computer.

5 PRINT CHR$(4);"PR#l"
10 REM *** COPY CHARACTERS INTO RAM
20 PRINT CHR$(27);CHR$(42);CHR$(0);
30 REM *** DEFINE COPYRIGHT SYMBOL IN PLACE OF THE © SYMBOL
40 PRINT CHR$(27);CHR$(42);CHR$(1);CHR$(64);CHR$(0);CHR$(28);
    CHR$(34);CHR$(73);CHR$(20);CHR$(65);CHR$(20);CHR$(65);CHR$(
    34);CHR$(20);
45 REM *** DEFINE COPYRIGHT SYMBOL IN PLACE OF THE © SYMBOL
50 PRINT CHR$(27);CHR$(42);CHR$(1);CHR$(38);CHR$(1);CHR$(28);
    CHR$(34);CHR$(73);CHR$(20);CHR$(65);CHR$(20);CHR$(65);CHR$(
    34);CHR$(20);
55 REM *** SELECT DOWNLOADABLE CHARACTERS
65 PRINT CHR$(27);CHR$(36);CHR$(1);
70 REM *** PRINT OUR NEW SYMBOL
80 PRINT "COPYRIGHT ©1983""

Figure A-14 is the downloading program presented in Figure 8-6 amended for the Apple II computer.
5 PRINT CHR$ (4); "PRll"
10 REM *** DEFINE MACRO TO BE EMPHASIZED AND EXPANDED TEXT
20 PRINT CHR$ (27); CHR$ (43); CHR$ (27); "E"; CHR$ (27); "M"; CHR$ (1); CHR$ (30)
30 REM *** ISSUE MACRO COMMAND AND TRY PRINTING
40 PRINT CHR$ (27); CHR$ (33)
50 PRINT "EMPHASIZED AND EXPANDED BY MACRO"

Figure A-15 is the macro-commands program (refer to Figure 8-7) amended for the Apple II computer.
The Interface

The best way to hook up your Atari to your Gemini is with the Universal/Atari Parallel Interface by Star Micronics. It comes complete with its own cable. You may also use an Atari 850 interface; pin-outs to build a cable for the 850 are listed in this Appendix.

Setting the DIP Switches

Turn DIP switch number 2-3 and 2-4 “off” on your Gemini, and position switch number 2-1 as you wish.

DIP switch number 2-2 should be set “off” if you want Gemini to print every time it receives a CR code; set the switch to “on” if you wish to have the carriage return ignored, allowing for printing only when the buffer is full.

The Use of BASIC

Atari BASIC is somewhat different from the Microsoft BASIC used in this manual. If you do not have the Microsoft BASIC cartridge for your Atari, the following discussion will help you understand the modification necessary for the programs given in this manual. Then you may simply type in the amended programs listed at the back of this appendix.

Send a program listing to the Gemini using a LIST “P” command instead of LLIST (as shown in the sample programs in this manual).

All character-string variables must be dimensional if you are using Atari BASIC. The maximum length of a string is 99 characters.

If you use Atari BASIC, ending the LPRINT command with a semicolon causes Atari to insert spaces in the line until it reaches
40 characters in length. To avoid this problem, you must remember another form of the print command. Instead of

   LPRINT  CHR$(27); "5";

you need to open a device port, using the OPEN statement:

   10 OPEN #7,8,0,"P"

Note: #7 tells the Atari to open file number 7, the #8 tells it that you are using file number 7 as an output device; 0 is not used, and the "P" assigns the device to the printer.

Once the file is assigned, you would use the following statement:

   PRINT #7; CHR$(27);"5";

At the end of your program, you need to purge the printer buffer and close the file. Use the following statements:

   PRINT #7
   CLOSE #7

Because Atari uses codes 0-31 for its graphics characters, you may want to add 128 to the ASCII control codes. For example, send CHR$(141) instead of CHR$(13) for a carriage return. As another example, send CHR$(155) instead of CHR$(27) for the start of an escape-function code sequence.

The Atari BASIC does not support the BASIC tab function. If you have further questions, the first step to finding the answer is to consult your Atari user's manual.
Pin Configurations

The following chart shows the pin-outs for Gemini-10X and Gemini-15X hooked up to the Atari 400/800, using the 850 module parallel interface.

<table>
<thead>
<tr>
<th>Gemini-10X/15X</th>
<th>Parallel</th>
<th>Atari (850)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. STROBE</td>
<td>1. STROBE</td>
<td></td>
</tr>
<tr>
<td>2. D1</td>
<td>2. D1</td>
<td></td>
</tr>
<tr>
<td>3. D2</td>
<td>3. D2</td>
<td></td>
</tr>
<tr>
<td>5. D4</td>
<td>5. D4</td>
<td></td>
</tr>
<tr>
<td>6. D5</td>
<td>6. D5</td>
<td></td>
</tr>
<tr>
<td>7. D6</td>
<td>7. D6</td>
<td></td>
</tr>
<tr>
<td>8. D7</td>
<td>8. D7</td>
<td></td>
</tr>
<tr>
<td>16. SG</td>
<td>11. SG</td>
<td></td>
</tr>
<tr>
<td>32. ERROR</td>
<td>12. FAULT</td>
<td></td>
</tr>
<tr>
<td>11. BUSY</td>
<td>13. BUSY</td>
<td></td>
</tr>
<tr>
<td>9. D8</td>
<td>15. D8</td>
<td></td>
</tr>
</tbody>
</table>

Following are the program listings amended for the Atari computer. Figure B-2 is a new word processing program similar to the one presented in Chapter 5, but without the use of the single character input function, which the Atari computer does not have. The basic idea of the program is the same; you can input 22 strings of text and each string can be up to 80 characters long.

After typing your text, you can get into command level by entering the word “COM” and hitting Return. In command level, you will have a menu at the top of your screen. From this point, everything works like the word processing program in Chapter 5. You have the option of “ESC” “CHR$” to send codes to the printer; and after that, you can print your text or return to the first level to enter more text.
Program Listings

5 DIM M1$(5),M2$(5),M3$(5)
10 OPEN #4,8,0,"P"
20 PRINT #4;CHR$(27);"*";CHR$(27);"R";CHR$(15);
30 FOR I=1 TO 2
40 IF I=1 THEN PRINT #4;CHR$(14);" GEMINI STANDARD TYPE STYLES";CHR$(18)
50 IF I=2 THEN PRINT #4;CHR$(14);CHR$(27);" 4";" GEMINI ITALIC TYPE STYLE";CHR$(18)
60 FOR N=1 TO 40:PRINT #4;CHR$(231);CHR$(123);:NEXT N:PRINT #4
70 PRINT #4;" 17 CPI 12 CPI 10 CPI 8.5 CPI 6 CPI 5 CPI"
80 FOR N=1 TO 80:PRINT #4;CHR$(241);:NEXT N:PRINT #4
90 M1$=" ABC"
92 M2$="X";M2$(LEN(M2$)+1)=CHR$(120)
94 M3$="Y";M3$(LEN(M3$)+1)=CHR$(121)
100 FOR J=1 TO 4
110 IF I=2 THEN PRINT #4;CHR$(27);" 4";
120 IF J=1 THEN PRINT #4;CHR$(27);" B";CHR$(3);"NORMAL ";
130 IF J=2 THEN PRINT #4;CHR$(27);" B";CHR$(3);"DOUBLE STRIKE ";
140 IF J=3 THEN PRINT #4;CHR$(27);" B";CHR$(3);"EMPHASIZED ";
150 IF J=4 THEN PRINT #4;CHR$(27);" B";CHR$(3);"DOUBLE STRIKE ";
160 FOR K=1 TO 6
170 IF K=1 THEN PRINT #4;CHR$(27);" B";CHR$(3);
180 IF K=2 THEN PRINT #4;CHR$(27);" B";CHR$(3);
190 IF K=3 THEN PRINT #4;CHR$(27);" B";CHR$(1);
200 IF K=4 THEN PRINT #4;CHR$(27);" B";CHR$(3);CHR$(14);
210 IF K=5 THEN PRINT #4;CHR$(27);" B";CHR$(2);CHR$(14);
220 IF K=6 THEN PRINT #4;CHR$(27);" B";CHR$(1);CHR$(14);
230 IF J=2 THEN PRINT #4;CHR$(27);" 6 ";
240 IF J=3 THEN PRINT #4;CHR$(27);" 6 ";
250 IF J=4 THEN PRINT #4;CHR$(27);" 6 ";
260 PRINT #4;M1$;CHR$(27);" S";CHR$(0);M2$;CHR$(27);" S";CHR$(1);M3$;
265 PRINT #4;CHR$(27);" T ";CHR$(18);
300 IF K=3 THEN PRINT #4;CHR$(18);
310 NEXT K
320 IF J=4 THEN GOSUB 500
340 PRINT #4;CHR$(27);" B"
350 IF J=2 THEN PRINT #4;CHR$(10);
360 NEXT J
370 FOR M=1 TO 5:PRINT #4;NEXT M
390 NEXT I
400 CLOSE #4
Figure B-1 is the font styles program (refer to Figure 5-1) amended for the Atari computer.

```
410 END
500 PRINT #4:CHR$ (27):"A":CHR$ (9):CHR$ (10):
510 PRINT #4:CHR$ (27):"B":CHR$ (3):
520 PRINT #4:"+":CHR$ (13):"EMPHASIZED ";
530 RETURN

5 DIM A$(80),B(22,80)
6 DIM C(22),D$(10),E$(10),F$(10),S(10)
7 N=1
10 GRAPHICS 0
15 GOSUB 2000
20 INPUT A$
25 IF A$="STOP" THEN 160
26 IF A$="COM" THEN 500
30 GOSUB 1000
40 GOTO 20
100 IF N=1 THEN 160
105 FOR I=1 TO N-1
110 FOR J=1 TO C(I)
120 PRINT CHR$(B(I,J));
130 NEXT J
140 PRINT
150 NEXT I
160 END
500 REM
505 GRAPHICS 0:PRINT "ENTER YOUR COMMAND........"
507 PRINT "P)RINT D)UIT E)SC C)HR$"
509 PRINT "-----------------------------"
510 INPUT D$
520 IF D$="E" THEN GOSUB 700
530 IF D$="C" THEN GOSUB 600
540 IF D$="Q" THEN GOTO 7
545 IF D$="P" THEN GOSUB 800
550 GOTO 500
600 REM
605 PRINT "ENTER YOUR CODE CHR$( )";
610 INPUT L
```
620 OPEN 4,8,0,"P"
630 PRINT 4,CHR$(L)
640 CLOSE 4
650 RETURN
700 REM
710 PRINT "ENTER YOUR ESC CODE";
720 INPUT E$ 
725 J=1
730 FOR I=1 TO LEN(E$)
732 X=ASC(E$(I)); IF X=32 THEN 740
735 S(J)=X; J=J+1
740 NEXT I
750 OPEN 4,8,0,"P"
751 IF J=2 THEN 760
752 AS=2
755 K=VAL(E$(AS,J-1))
760 PRINT 4,CHR$(27);CHR$(S(1));
770 PRINT 4,CHR$(K)
780 CLOSE 4
790 RETURN
800 REM
803 IF N=1 THEN 870
805 OPEN 4,8,0,"P"
810 FOR I=1 TO N-1
820 FOR J=1 TO C(I)
830 PRINT 4,CHR$(B(I,J));
840 NEXT J
850 PRINT 4
860 NEXT I
865 CLOSE 4
870 RETURN
1000 REM
1010 FOR J=1 TO LEN(A$)
1020 B(N,J)=ASC(A$(J))
1030 NEXT J
1040 C(N)=LEN(A$)
1045 N=N+1
1050 RETURN
2000 REM
2010 PRINT "YOU CAN TYPE UP TO 22 STRINGS AND ",
2020 PRINT "EACH STRING CAN BE 80 CHARACTERS" 
2030 PRINT "LONG. TYPE 'COM' TO GOTO COMMAND"
2040 PRINT "LEVEL...AND 'STOP' TO GET OUT"
2050 PRINT "-----------------------------------------------------"
2060 RETURN

Figure B-2 is the word processing program (refer to Figure 5-4) amended for the Atari computer.

5 DIM A$(30), B$(12)
10 OPEN #4,8,0,"P"
20 A$=""
25 B$=""
30 PRINT #4;A$;"HIGH RESOLUTION VERTICAL SPACING"
35 PRINT #4;A$;"USING THE ESC 3 N CONTROL CODE"
40 FOR I=1 TO 30
50 IF I=13 THEN 140
60 M=INT(144/(#11));IF M<2 THEN M=2
70 PRINT #4;CHR$(27);CHR$(51);CHR$(I);
80 FOR J=0 TO M
90 IF J=M-1 THEN PRINT #4;I;"/144 INCH SPACING";B$;:GOTO 110
100 PRINT #4;A$;
110 FOR N=1 TO 40:PRINT #4;CHR$(26);:NEXT N:PRINT #4
120 NEXT J
130 NEXT I
140 PRINT #4;CHR$(27);"0"
150 CLOSE #4
160 END

Figure B-3 is the vertical spacing program (refer to Figure 6-5) amended for the Atari computer.

10 OPEN #4,8,0,"P"
20 PRINT #4;CHR$(27);"@";CHR$(27);"A";CHR$(6)
30 FOR LINE=1 TO 2
40 PRINT #4;CHR$(27);"K";CHR$(14);CHR$(0);
50 FOR SPACE=1 TO 100
55 PRINT #4;CHR$(0);:NEXT SPACE
60 FOR COLM=1 TO 14
70 READ C:PRINT #4;CHR$(C);:NEXT COLM
80 PRINT #4:NEXT LINE
90 DATA 14,16,34,64,140,140,128,128,140,140,64,34,16,14
100 DATA 224,16,232,68,34,18,18,18,34,68,232,16,224
110 PRINT #4;CHR$(27);"0"
120 FOR I=1 TO 5:PRINT #4:NEXT I
130 CLOSE #4
140 END

Figure B-4 is the dot graphics program presented in Chapter 6 (the one that puts a smile on your paper) amended for the Atari computer.

10 OPEN #4,B,0,"P"
20 PRINT #4;CHR$(163);CHR$(161);
30 PRINT #4;CHR$(27);"A";CHR$(6)
40 PRINT #4;CHR$(162);CHR$(160);
50 PRINT #4;CHR$(27);"2"
60 CLOSE #4:END

Figure B-5 is the circle program presented in Chapter 7, amended for the Atari computer.

10 OPEN #4,B,0,"P"
20 PRINT #4;"W";CHR$(163);
30 PRINT #4;CHR$(27);"A";CHR$(6)
40 PRINT #4;CHR$(160)
50 CLOSE #4:END

Figure B-6 is the tilde program presented in Chapter 7 amended for the Atari computer.

10 OPEN #4,B,0,"P"
20 PRINT #4,"W";CHR$(13);
30 PRINT #4,"*";CHR$(164);CHR$(13);
40 PRINT #4,"W";CHR$(166);CHR$(32);CHR$(167);"E";CHR$(13);
50 PRINT #4,"*";CHR$(165);CHR$(13);
60 PRINT #4,"$"
70 CLOSE #4
80 END

Figure B-7 is the map program presented in Chapter 7 amended for the Atari computer.

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Figure B-8 is the "Wy" program (refer to Figure 7-1) amended for the Atari computer.
Figure B-9 is the boat program (refer to Figure 7-2) amended for the Atari computer.

2 GRAPHICS 0
3 PRINT " ";PRINT " ";PRINT " 
4 PRINT " THIS PROGRAM TAKES ABOUT" 
5 PRINT " 4 MINUTES TO RUN, PLEASE" 
6 PRINT " TURN ON YOUR PRINTER AND " 
7 PRINT " STAND BY ............" 
8 PRINT " ";PRINT " ";PRINT " 
10 FOR I=1536 TO 1553 
20 READ 0 
30 POKE I,0 
40 NEXT I 
50 DATA 104,104,133,205,104,133,204 
60 DATA 104,5,205,133,213,104,5,204 
70 DATA 133,212,96 
100 REM MICRO- PLOT 
110 DIM BIT(76,12),MASK(6) 
120 DIM A8(76) 
130 DIM B8(10) 
132 FOR J=0 TO 11 
133 FOR J=1 TO 76 
134 BIT(J,1)=0 
135 NEXT J 
136 NEXT I 
1000 REM SET PROGRAM CONSTANT 
1010 MASK(1)=64:MASK(4)=8 
1020 MASK(2)=32:MASK(5)=4 
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1030 MASK(3)=16:MASK(6)=2
1040 XL=20:LY=20
1050 XFAC=72/LX:YFAC=75/LY
2000 REM PLOT CURVE
2010 LET RAD=9
2020 X1=19:Y1=10
2030 FOR ANG=0 TO 360 STEP 10
2040 R1=ANG*6.28/360
2050 X2=RAD*COS(R1)+10
2055 Y2=RAD*SIN(R1)+10
2060 50SUB 4000
2070 NEXT ANG
2080 FOR ANG=0 TO 360 STEP 15
2090 R1=ANG*6.28/360
2100 R2=(ANG+150)*6.28/360
2110 X1=RAD*COS(R1)+10
2115 Y1=RAD*SIN(R1)+10
2120 X2=RAD*COS(R2)+10
2125 Y2=RAD*SIN(R2)+10
2130 50SUB 4000
2140 NEXT ANG
2090 REM SEND BIT IMAGE TO PRINTER
3005 OPEN #4,8,0,"P"
3010 PRINT #4;CHR$(27);"A";CHR$(6)
3020 FOR ROW=0 TO 11
3040 PRINT #4;CHR$(27);"*";CHR$(119);CHR$(1);CHR$(4)
3050 FOR COL=1 TO 75
3054 RE=INT(BIT(COL,ROW))
3060 PRINT #4;CHR$(RE);CHR$(4)
3065 NEXT LL
3070 NEXT COL
3080 PRINT #4
3090 NEXT ROW
3100 PRINT #4;CHR$(27);"A";CHR$(12)
3105 PRINT #4,"*";PRINT #4,"
3110 CLOSE #4
3150 END
4000 REM DRAW A LINE FROM X1,Y1 TO X2,Y2
4010 XL=X2-X1:YL=Y2-Y1
4020 NX=ABS(XL*XFAC):NY=ABS(YL*YFAC)
4030 IF NX<NY THEN NX=NY
4040 NS=INT(NX+1)
4050 DX=XL/NS
4055 DY=YL/NS
4060 FOR I=1 TO NS
4070 X1=X1+DX:Y1=Y1+DY
4080 GOSUB 5000
4090 NEXT I
4100 RETURN
5000 REM PLOT A POINT AT X1,Y1
5010 XX=X1*XRFAC:YY=Y1*YRFAC
5020 COL=INT(XX)+1
5030 ROW=INT(YY/6)
5040 XIT=INT(YY-ROW*6)+1
5050 A1=BIT(COL,ROW)
5060 A2=MASK(XIT)
5070 BIT(COL,ROW)=USR(1536,A1,A2)
5080 RETURN

Figure B-10 is the graphics program (refer to Figure 7-4) amended for the Atari computer.

10 DIM E$(5)
20 REM DEFINE ESCAPE CHARACTERS
25 E$=CHR$(27)
30 OPEN 4,B,0,"P"
35 REM DEFINE PARAGRAPH SYMBOL IN PLACE 0
40 PRINT 4;E$;CHR$(42);CHR$(1);CHR$(64);CHR$(0);CHR$(6);
45 PRINT 4;CHR$(9);CHR$(0);CHR$(9);CHR$(118);CHR$(9);CHR$(0);
47 PRINT 4;CHR$(127);CHR$(0)
50 REM SELECT DOWNLOADABLE CHARACTERS
60 PRINT 4;E$;CHR$(36);CHR$(1)
70 REM PRINT OUR NEW SYMBOL
80 PRINT 4;"$$$$$$$$$
90 CLOSE 4:END

Figure B-11 is the downloading paragraph symbols program (refer to Figure 8-2) amended for the Atari computer.
Figure B-12 is the downloading copyright program (refer to Figure 8-4) amended for the Atari computer.

Figure B-13 is the downloading program presented in Figure 8-5 amended for the Atari computer.
10 DIM E$(5)
15 OPEN #4,8,0,"P"
20 REM DEFINE ESCAPE CHARACTERS
25 E$=CHR$(27)
27 REM COPY CHARACTERS TO RAM
28 PRINT #4;E$;CHR$(42);CHR$(0)
35 REM DEFINE COPYRIGHT SYMBOL IN PLACE 8
40 PRINT #4;E$;CHR$(42);CHR$(1);CHR$(64);CHR$(0);CHR$(28);
45 PRINT #4;CHR$(34);CHR$(73);CHR$(20);CHR$(65);CHR$(20);
47 PRINT #4;CHR$(65);CHR$(34);CHR$(20)
49 REM DEFINE COPYRIGHT SYMBOL IN PLACE 8
50 PRINT #4;E$;CHR$(42);CHR$(1);CHR$(38);CHR$(1);CHR$(28);
55 PRINT #4;CHR$(34);CHR$(73);CHR$(20);CHR$(65);CHR$(20);
57 PRINT #4;CHR$(65);CHR$(34);CHR$(20)
59 REM SELECT DOWNLOADABLE CHARACTERS
60 PRINT #4;E$;CHR$(36);CHR$(1)
70 REM PRINT OUR NEW SYMBOL
80 PRINT #4;"#";CLOSE #4;END

Figure B-14 is the downloading program presented in Figure 8-6 amended for the Atari computer.

5 DIM E$(5)
10 REM DEFINE ESC CHARACTER
20 E$=CHR$(27)
30 OPEN #4,8,0,"P"
40 PRINT #4;E$;CHR$(43);E$;"E";E$;"W";CHR$(1);CHR$(30)
50 REM ISSUE MACRO COMMAND
60 PRINT #4;E$;CHR$(33)
70 PRINT #4;"EMPHASIZED AND EXPANDED BY MACRO"
80 CLOSE #4;END

Figure B-15 is the macro-commands program (refer to Figure 8-7) amended for the Atari computer.
The Connecting Cable

Star Micronics, Inc. has created a special Centronics parallel interface especially for your VIC-20 and C-64 computers. It is called the **Universal/Commodore Parallel Interface**.

If you haven't already done so, contact your Gemini dealer about obtaining and installing the interface device and cable.

Setting the DIP Switches

The only DIP switch that must be set in one position or the other is switch number 2-3, which must be “off” on your Gemini. Switch number 2-2 should be set to “off” if you want Gemini to print every time it receives a CR code; set the switch “on” if you wish to have the carriage return ignored and printing only when the buffer is full.

The Use of BASIC

We recommend the use of Commodore’s Advanced BASIC Program. If you encounter difficulty in running the programs presented in this User’s Manual, consult the documentation that supports the Advanced BASIC Program for Commodore.
Program Listings

30 PC$=E$+"B":CHR$(11):EL$=E$+"R":CHR$(2):CM$=E$+"P":CHR$(3)
40 SP$=E$+"S":CHR$(0):SB$=E$+"S":CHR$(1):CS$=E$+"T"
50 IT$=E$+CHR$(52)
60 WD$=CHR$(14):CM$=CHR$(20):PS$=E$+"B"
70 EM$=E$+"E":CM$=E$+"F":DB$=E$+"G":CD$=E$+"H"
80 OPEN 4,5:PRINT#4,PS$;E$:"R";CHR$(15)
90 FOR I=1 TO 2
100 IF I=1 THEN PRINT#4,WD$;" GEMINI STANDARD TYPE STYLES";CM$;LF$;
110 IF I=2 THEN PRINT#4,IT$;WD$;" GEMINI ITALIC TYPE STYLE"
115 PRINT#4,CM$;LF$
120 FOR N=1 TO 40:PRINT#4,CHR$(251):CHR$(132);:NEXT N:PRINT#4;PRINT#4
130 PRINT"17 CPI 12 CPI 10 CPI 8.5 CPI 6 CPI 5 CPI"
140 FOR N=1 TO 80:PRINT#4,CHR$(241);:NEXT N:PRINT#4
150 MSG$(1)=" ABC":MSG$(2)=" Y":CHR$(120):MSG$(3)=" Y":CHR$(121)
160 FOR I=1 TO 4
170 IF I=2 THEN PRINT#4,IT$;
180 IF J=1 THEN PRINT#4,CM$:"NORMAL ";
190 IF J=2 THEN PRINT#4,CM$:"DOUBLE STRIKE ";
200 IF J=3 THEN PRINT#4,CM$:"EMPHASIZED ";
210 IF J=4 THEN PRINT#4,CM$:"DOUBLE STRIKE ";
220 FOR K=1 TO 6
230 IF K=1 THEN PRINT#4,CM$;
240 IF K=2 THEN PRINT#4,EL$;
250 IF K=3 THEN PRINT#4,PC$;
260 IF K=4 THEN PRINT#4,CM$;WD$;
270 IF K=5 THEN PRINT#4,EL$;WD$;
280 IF K=6 THEN PRINT#4,PC$;WD$;
290 IF J=2 THEN PRINT#4,DB$;
300 IF J=3 THEN PRINT#4,EM$;
310 IF J=4 THEN PRINT#4,DB$;EM$;
320 PRINT#4,MSG$(1);SP$;MSG$(2);CS$;SB$;MSG$(3);CS$;CD$;
330 IF K=2 THEN PRINT#4,CM$;
340 NEXT K
350 IF J=4 THEN PRINT#4,ES$;"A":CHR$(9):LF$;CM$;" +":CM$;"EMPHASIZED ";
360 PRINT#4,PS$;
365 IF J=2 THEN PRINT#4,LF$;
Figure C-1 is the font styles program (refer to Figure 5-1) amended for the Commodore computer.

```
10 DIM A$(22,40)
20 PRINT CHR$(147);X=0;Y=0;Z=1024
30 GOSUB 150:POKE 2+X*40+Y,ASC(C$)
40 GET B$:IF B$=""THEN 40
50 IF B$=CHR$(5) THEN PRINT CHR$(147);END
60 IF B$=CHR$(18) THEN GOSUB 200:GOTO 20
70 IF B$=CHR$(16) THEN GOTO 220
80 IF B$=CHR$(13) THEN GOSUB 700:GOTO 40
90 IF B$=CHR$(4) THEN GOSUB 130:GOTO 40
100 B=ASC(B$):IF B$>64 THEN B=B-64
110 POKE 2+X*40+Y,B;A$(X,Y)=B$;Y=Y+1
120 IF Y=40 THEN A$(X,Y)=CHR$(13);X=X+1;Y=0:GOTO 40
130 POKE 2+X*40+Y,ASC(C$);GOTO 40
140 IF Y=40 THEN A$(X,Y)=CHR$(13);X=X+1;Y=0:GOTO 40
150 A$(X,Y)=""
160 POKE 2+X*40+Y,ASC(C$);RETURN
170 GOTO 190:PRINT D ELETE R EST ART E XT":
180 F=1984:GOSUB 800
190 RETURN
200 PRINT CHR$(147);M$="PLEASE ST AND BY":
210 FOR I=0 TO 4;FOR J=1 TO 40;A$(I,J)=":";NEXT J:NEXT I
220 OPEN 4,4,S:PRINT #4,CHR$(27);"*:CLOSE4
230 PRINT CHR$(147);M$="C OMMAND P RINT R ES T A R T E XT":F=1984:GOSUB 800
```

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250 GET S$: IF S$="" THEN 250
260 IF S$="F" THEN GOSUB 310
270 IF S$="C" THEN GOSUB 320: GOTO 230
280 IF S$="R" THEN GOSUB 300: GOTO 30
290 GOTO 250
300 PRINT CHR$(147): GOSUB 900: RETURN
310 OPEN 4, 4, 5: CMD$ = ""
320 FOR I = 0 TO X: FOR J = 0 TO 40
330 PRINT A$(I, J);: NEXT J
340 NEXT I: PRINT 14: CLOSE 4: RETURN
350 IN$ = "": F = 1984: GOSUB 800
360 M$ = "E) ESC C) CHR D) END COMMAND": F = 1984: GOSUB 800
370 ST$ = ""
380 GET G$: IF G$ = "" THEN 360
390 IF G$ = "E" THEN GOSUB 420: GOTO 400
400 IF G$ = "C" THEN GOSUB 530: GOTO 400
410 IF G$ = "Q" THEN GOTO 410
420 GOTO 360
430 RETURN
440 L = 0: M$ = " ESC ": F = 1910: GOSUB 800
450 F = 1915
460 GET G$: IF G$ = "" THEN 430
470 IF G$ = CHR$(13) THEN 480
480 M$ = 6$: "F: F + 2: GOSUB 800
490 S$(L) = 6$: L = L + 1: GOTO 430
500 IF L = 2 THEN GOSUB 500:
510 GOTO 410
520 M$ = "": F = 1910: GOSUB 800: RETURN
530 M$ = "CHR ": F = 1910: GOSUB 800: ST$ = ""
540 F = 1916
550 GET G$: IF G$ = "" THEN 540
560 IF G$ = CHR$(13) THEN 570
570 M$ = 6$: F = F + 2: GOSUB 800: ST$ = ST$ + G$: GOTO 540
580 M$ = "": F = 1910: GOSUB 800:
590 OPEN 4, 4, 5: PRINT #4, CHR$(VAL(ST$)) PRINT #4, CHR$(VAL(D$)) PRINT #4, ST$ = CHR$(27) + S$(0) + CHR$(VAL(D$)) RETURN
600 REM
610 FOR J = 1 TO L: D$ = D$ + S$(J): NEXT J
620 ST$ = CHR$(27) + S$(0) + CHR$(VAL(D$))
Figure C-2 is the word processing program (refer to Figure 5-4) amended for the Commodore computer. NOTE: The only way to move the cursor around on the Commodore computer is to use the screen memory map. We can specify the location on the screen and then “POKE” the character into memory. Because of this limitation, we had to use “POKE” instead of “PRINT” statement for the Commodore computer. However, when we “POKE” characters into screen memory, the color will be light so you must make sure that the background color on your screen is dark.
Figure C-3 is the vertical spacing program (refer to Figure 6-5) amended for the Commodore computer.

Figure C-4 is the dot graphics program presented in Chapter 6 (the one that puts a smile on your paper) amended for the Commodore computer.
Figure C-5 is the circle program presented in Chapter 7, amended for the Commodore computer.

```plaintext
10 OPEN4,4,5:CMD4
20 PRINT CHR$(163);CHR$(161);"A";CHR$(6)
30 PRINT CHR$(27);CHR$(160);
40 PRINT CHR$(162);CHR$(160);
50 PRINT CHR$(27);"2"
60 PRINT4:CLOSE4:END
```

Figure C-6 is the tilde program presented in Chapter 7 amended for the Commodore computer.

```plaintext
10 OPEN4,4,5:CMD4
20 PRINT TAB(1);CHR$(163);CHR$(27);"A";CHR$(6)
30 PRINT CHR$(160);
40 PRINT#:CLOSE4
50 END
```

Figure C-7 is the map program presented in Chapter 7 amended for the Commodore computer.

```plaintext
10 OPEN4,4,5:CMD4
20 PRINT TAB(20);"N";CHR$(13);
30 PRINT TAB(20);CHR$(164);CHR$(13);
40 PRINT TAB(19);"W";CHR$(166);CHR$(32);CHR$(167);"E";CHR$(13);
50 PRINT TAB(20);CHR$(165);CHR$(13);
60 PRINT TAB(20);"S"
70 PRINT#:CLOSE4
```
Figure C-8 is the "Wy" program (refer to Figure 7-1) amended for the Commodore computer.
120 NEXT K
130 PRINT CHR$(27);"@"
140 PRINT$4:CLOSE4
150 END
200 DATA 224,224,224,224,224,224,224,224,224,224,245,224,224
210 DATA 224,224,224,224,224,224,224,224,224,224,252,239,245,224,224
220 DATA 224,224,224,245,224,224,224,252,239,245,224,224
230 DATA 224,224,252,245,224,224,252,239,239,245,224,224
240 DATA 224,252,239,245,224,252,239,239,245,224,224
250 DATA 252,239,239,245,252,239,239,245,245,224,224
270 DATA 239,239,239,239,239,239,239,239,239,239,239,239
280 DATA 253,239,239,239,239,239,239,239,239,239,239,251,224

*Figure C-9 is the boat program (refer to Figure 7-2) amended for the Commodore computer.*

50 PRINT CHR$(147)
60 FOR I=1 TO 5:PRINT ";":NEXT I
70 PRINT "THIS PROGRAM TAKES ABOUT TWO MINUTES"
80 PRINT "TO RUN, SO PLEASE TURN ON YOUR PRINTER"
90 PRINT "AND STAND BY........................."
100 REM MICRO-PILOT
110 DIM BITZ(76,12)
1000 REM SET PROGRAM CONSTANTS
1010 MASKZ(1) = 64 : MASKZ(4) = 8
1020 MASKZ(2) = 32 : MASKZ(5) = 4
1030 MASKZ(3) = 16 : MASKZ(6) = 2
1040 LX = 20 : LY = 20
1050 XFAA = 72/LX : YFAA = 75/LY
1200 REM PLOT CURVE
1210 X1 = 19 : Y1 = 10
1220 FOR AN6 = 0 TO 360 STEP 10
1230 R1 = AN6*6.28/360
1240 X2 = R1*COS(R1)+10 : Y2 = R1*SIN(R1)+10
1250 GOSUB 4000
1260 NEXT AN6
2080 FOR ANG = 0 TO 360 STEP 15
2090 R1 = ANG*6.28/360
2100 R2 = (ANG*150)*6.28/360
2110 X1 = RAD*COS(R1)+10 : Y1 = RAD*SIN(R1)+10
2120 X2 = RAD*COS(R2)+10 : Y2 = RAD*SIN(R2)+10
2130 GOSUB 4000
2140 NEXT ANG
2150 REM SEND BIT IMAGE MAP TO PRINTER
2160 OPEN 4,4,5
2170 PRINT#4, CHR$(27) "A" CHR$(6)
2180 FOR ROW = 0 TO 11
2190 PRINT#4,CHR$(27);"*"CHR$(119);CHR$(1);
2200 FOR COL = 1 TO 75
2210 FOR LL = 1 TO 5
2220 PRINT#4,CHR$(BIT%(COL,ROW));
2230 NEXT LL
2240 NEXT COL
2250 PRINT#4, '*
2260 NEXT ROW
2270 PRINT#4 : CLOSE4
2280 END
2290 REM DRAW A LINE FROM X1,Y1 TO X2,Y2
2300 XL = X2 - X1 : YL = Y2 - Y1
2310 NX = ABS(XL*XFAC) : NY = ABS(YL*YFAC)
2320 IF NX < NY THEN NX = NY
2330 NSZ = INT(NX+1)
2340 DX = XL/NSZ : DY = YL/NSZ
2350 FOR I = 1 TO NSZ
2360 X1 = X1 + DX : Y1 = Y1 + DY
2370 GOSUB 5000
2380 NEXT I
2390 RETURN
2400 REM PLOT A POINT AT X1,Y1
2410 XX = X1 * XFAC : YY = Y1 * YFAC
2420 COL% = INT(XX)+1
2430 ROW% = INT(YY/6)
2440 XIT% = INT(YY - ROW% * 6) + 1
2450 BIT%(COL%,ROW%) = BIT%(COL%,ROW%) OR MASK%(XIT%)
2460 RETURN

Figure C-10 is the graphics program (refer to Figure 7-4) amended for the Commodore computer.
10 REM DEFINE ESCAPE CHARACTER
20 ESC$=CHR$(27)
30 REM DEFINE PARAGRAPH SYMBOL IN PLACE @
35 OPEN4,4,5:CMD4
40 PRINT ESC$;CHR$(42);CHR$(1);CHR$(64);CHR$(0);CHR$(6);
45 PRINT CHR$(9);CHR$(0);CHR$(9);CHR$(118);CHR$(9);CHR$(0);
47 PRINT CHR$(177);CHR$(0)
50 REM SELECT DOWNLOADABLE CHARACTERS
60 PRINT ESC$;CHR$(36);CHR$(1)
70 REM PRINT OUR NEW SYMBOL
80 PRINT "COPY RIGHT @ 1983"
90 PRINT@4:CLOSE4:END

Figure C-11 is the downloading paragraph symbols program (refer to Figure 8-2) amended for the Commodore computer.
10 REM DEFINE ESCAPE CHARACTER
20 ESC$=CHR$(27)
22 OPEN4,4,5:CMD4
24 REM COPY CHARACTERS TO RAM
25 PRINT ESC$;CHR$(42);CHR$(0)
30 REM DEFINE COPYRIGHT SYMBOL IN PLACE @
35 PRINT CHR$(34);CHR$(73);CHR$(20);CHR$(65);CHR$(20);
40 PRINT CHR$(34);CHR$(34);CHR$(20)
50 REM SELECT DOWNLOADABLE CHARACTERS
50 PRINT ESC$;CHR$(36);CHR$(1)
60 REM PRINT OUR NEW SYMBOL
80 PRINT "COPY RIGHT @ 1983"
90 PRINT#4:CLOSE#4:END

Figure C-13 is the downloading program presented in Figure 8-5 amended for the Commodore computer.

10 REM DEFINE ESCAPE CHARACTER
20 ESC$=CHR$(27)
22 OPEN4,4,5:CMD4
24 REM COPY CHARACTERS TO RAM
25 PRINT ESC$;CHR$(42);CHR$(0)
30 REM DEFINE COPYRIGHT SYMBOL IN PLACE @
35 PRINT CHR$(34);CHR$(73);CHR$(20);CHR$(65);CHR$(20);
40 PRINT CHR$(34);CHR$(34);CHR$(20)
49 REM DEFINE COPYRIGHT SYMBOL IN PLACE OF %
50 PRINT CHR$(42);CHR$(1);CHR$(38);CHR$(1);CHR$(28);
55 PRINT CHR$(34);CHR$(73);CHR$(20);CHR$(65);CHR$(20);
67 PRINT CHR$(65);CHR$(34);CHR$(20)
59 REM SELECT DOWNLOADABLE CHARACTERS
60 PRINT ESC$;CHR$(36);CHR$(1)
70 REM PRINT OUR NEW SYMBOL
80 PRINT "COPY RIGHT @ 1983"
90 PRINT#4:CLOSE#4:END

Figure C-14 is the downloading program presented in Figure 8-6 amended for the Commodore computer.
10 REM DEFINE ESCAPE CHARACTER
20 ESC$ = CHR$(27)
30 REM CONNECT TO PRINTER
40 OPEN 4, 4, 5: CMD 4
50 PRINT ESC$; CHR$(43); ESC$; "E"; ESC$; "M"; CHR$(1); CHR$(30)
60 REM ISSUE MACRO COMMAND AND TRY PRINTING
55 PRINT ESC$; CHR$(33)
70 PRINT "EMPHASIZED AND EXPANDED BY MACRO"
80 PRINT#4: CLOSE 4
90 END

Figure C-15 is the macro-commands program (refer to Figure 8-7) amended for the Commodore computer.
The Interface Board

Install the IBM parallel interface board according to the directions that accompany the product, which you can obtain from your Gemini dealer or from an IBM salesperson.

Use the Gemini cable provided by your dealer or use cable information at the end of this appendix.

Setting the DIP Switches

DIP switches 2-3 and 2-4 should be turned "off" on your Gemini, and the other two may be set according to your operational requirements.

Switch 2-2 should be set "off" if you want Gemini to print every time it receives a CR code; set it "on" if you wish to have the carriage return ignored and printing only when the buffer is full.

The Use of BASIC

All the example programs provided in this User's Manual are written in BASIC for the IBM Personal Computer. You may run them in IBM Microsoft BASIC or in IBM Microsoft Advanced BASIC (BASICA).

Pin Configurations

The following chart shows the pin-outs for the Gemini-10X and Gemini-15X, interfaced with the IBM Personal Computer, using a parallel interface board.
<table>
<thead>
<tr>
<th>Parallel</th>
<th>IBM 25-Pin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gemini-10X/15X</strong></td>
<td><strong>IBM 25-Pin</strong></td>
</tr>
<tr>
<td>1. STROBE</td>
<td>1. STROBE</td>
</tr>
<tr>
<td>2. D1</td>
<td>2. D0</td>
</tr>
<tr>
<td>3. D2</td>
<td>3. D1</td>
</tr>
<tr>
<td>4. D3</td>
<td>4. D2</td>
</tr>
<tr>
<td>5. D4</td>
<td>5. D3</td>
</tr>
<tr>
<td>6. D5</td>
<td>6. D4</td>
</tr>
<tr>
<td>7. D6</td>
<td>7. D5</td>
</tr>
<tr>
<td>8. D7</td>
<td>8. D6</td>
</tr>
<tr>
<td>10. ACR</td>
<td>10. ACR</td>
</tr>
<tr>
<td>11. BUSY</td>
<td>11. BUSY</td>
</tr>
<tr>
<td>12. PAGE END</td>
<td>12. PAGE END</td>
</tr>
<tr>
<td>13. SELECT</td>
<td>13. SELECT</td>
</tr>
<tr>
<td>14. AUTO END</td>
<td>14. AUTO END</td>
</tr>
<tr>
<td>15. ERROR</td>
<td>15. ERROR</td>
</tr>
<tr>
<td>16. SG</td>
<td>16. SG</td>
</tr>
<tr>
<td>17. INITIATE</td>
<td>17. INITIATE</td>
</tr>
<tr>
<td>18-25. SELECTION</td>
<td>18-25. SELECTION</td>
</tr>
<tr>
<td>32. ERROR</td>
<td></td>
</tr>
</tbody>
</table>
The Connecting Cable

Use the cable available from your Gemini dealer, or you can make your own cable according to the pin configuration chart below.

Setting the DIP Switches

Turn switches 2-3 and 2-4 to the “off” position on your Gemini, and set switch 2-1 as you like. Switch 2-2 should be set “off” if you want Gemini to print every time it receives a CR code; set it “on” if you wish to have the carriage return ignored and printing only when the buffer is full.

The Use of BASIC

All the sample programs provided in this user’s manual will run “as is” using Microsoft BASIC. If you are a first-time user, you should start with the CPM software and reset the “printer” configuration from “serial” to “Centronics.” Then load MBASIC and go for it.

When you want to change the number of columns in printing, substitute

\[
\text{WIDTH LPRINT 132 (or any acceptable number)}
\]

instead of

\[
\text{WIDTH “LPT # 1”;132 (as used by IBM-PC).}
\]

Pin Configurations

The following chart shows the pin-outs for Gemini printers and Osborne, using a parallel interface.
<table>
<thead>
<tr>
<th>Gemini-10X/15X</th>
<th>Osborne 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. D1</td>
<td>1. D0</td>
</tr>
<tr>
<td>6. D5</td>
<td>2. D4</td>
</tr>
<tr>
<td>3. D2</td>
<td>3. D1</td>
</tr>
<tr>
<td>7. D6</td>
<td>4. D5</td>
</tr>
<tr>
<td>4. D3</td>
<td>5. D2</td>
</tr>
<tr>
<td>8. D7</td>
<td>6. D6</td>
</tr>
<tr>
<td>5. D4</td>
<td>7. D3</td>
</tr>
<tr>
<td>1. STROBE</td>
<td>11. STROBE</td>
</tr>
<tr>
<td>11. BUSY</td>
<td>15. BUSY</td>
</tr>
<tr>
<td>16. SG</td>
<td>16. SG</td>
</tr>
</tbody>
</table>
Program Listings

10 WIDTH LPRINT 255
20 E$=CHR$(27);LF$=CHR$(10);FF$=CHR$(12);CR$=CHR$(13)
30 PC$=E$+"R"+CHR$(1);EL$=E$+"B"+CHR$(2);CM$=E$+"B"+CHR$(3)
40 SP$=E$+"S"+CHR$(0);SB$=E$+"S"+CHR$(1);CS$=E$+"T"
50 IT%=E$+CHR$(32)
60 WD$=CHR$(14);CM$=CHR$(20);PS$=E$+"R"
70 EM$=E$+"E";CE$=E$+"F";DB$=E$+"G";CD$=E$+"H"
80 LPRINT PS$;E$;"R";CHR$(15)
90 FOR I=1 TO 2
100 IF I=1 THEN LPRINT WD$;" GEMINI STANDARD TYPE STYLES";CM$;LF$;
110 IF I=2 THEN LPRINT IT$;WD$;" GEMINI ITALIC TYPE STYLE";
115 LPRINT CM$;LF$
120 FOR N=1 TO 40:LPRINT CHR$(231);CHR$(232);:NEXT N
130 LPRINT" 17 CPI 12 CPI 10 CPI 8.5 CPI 6 CPI 5 CPI"
140 FOR N=1 TO 80:LPRINT CHR$(241);:NEXT N
150 MSG$=(1)=" ABC";MSG$=(2)="X"+CHR$(120);MSG$=(3)="Y"+CHR$(121)
160 FOR J=1 TO 4
170 IF I=2 THEN LPRINT IT$;
180 IF J=1 THEN LPRINT CM$;"NORMAL ";
190 IF J=2 THEN LPRINT CM$;"DOUBLE STRIKE ";
200 IF J=3 THEN LPRINT CM$;"EMPHASIZED ";
210 IF J=4 THEN LPRINT CM$;"DOUBLE STRIKE ";
220 FOR K=1 TO 6
230 IF K=1 THEN LPRINT CM$;
240 IF K=2 THEN LPRINT EL$;
250 IF K=3 THEN LPRINT PC$;
260 IF K=4 THEN LPRINT CM$;WD$;
270 IF K=5 THEN LPRINT EL$;WD$;
280 IF K=6 THEN LPRINT PC$;WD$;
290 IF J=2 THEN LPRINT DB$;
300 IF J=3 THEN LPRINT EM$;
310 IF J=4 THEN LPRINT DB$;EM$;
320 LPRINT MSG$=(1);SP$;MSG$=(2);CS$;SB$;MSG$=(3);CS$;CD$;
330 IF K<3 THEN LPRINT CM$;
340 NEXT K
350 IF J=4 THEN LPRINT E$;"A";CHR$(B);LF$;CM$;" **;LF$;"EMPHASIZED";
360 LPRINT PS$
365 IF J=2 THEN LPRINT LF$;
Osborne

370 NEXT J
380 FOR M=1 TO S; LPRINT LF$; NEXT M
390 NEXT I
400 END

Figure E-1 is the font styles program (refer to Figure 5-1) amended for the Osborne computer.

5 CLR$=CHR$(26)
10 PRINT CLR$: DIM A$(22,52); X=1: Y=1
15 S$=CHR$(27)+CHR$(61)
17 DEF FNL$(X,Y)=S$+CHR$(X+32)+CHR$(Y+32)
20 PRINT CLR$; X=1; Y=1
30 GOSUB 150: PRINT FNL$(I,Y);;
40 B$=INKEY$: IF B$="" THEN 40
50 IF B$=CHR$(5) THEN PRINT CLR$: END
60 IF B$=CHR$(18) THEN PRINT CLR$:GOSUB 200: GOTO 20
70 IF B$=CHR$(16) THEN GOTO 210
80 IF B$=CHR$(13) THEN GOSUB 700: GOTO 40
90 IF B$=CHR$(4) THEN GOSUB 130: GOTO 40
100 PRINT FNL$(X,Y);; PRINT B$: A$(X,Y)=B$; Y=Y+1
110 IF Y=59 THEN A$(X,Y)=CHR$(127); PRINT CHR$(13); X=X+1; Y=1; GOTO 40
120 PRINT FNL$(X,Y);; PRINT ""; GOTO 40
130 PRINT FNL$(X,Y);; PRINT ""; Y=Y-1; IF Y=0 THEN Y=1; PRINT CHR$(1)
135 A$(X,Y)=""
140 PRINT FNL$(X,Y);; PRINT ""; RETURN
150 PRINT FNL$(22,2);
160 PRINT "PRINTER ^D)ELETE ^RIESTART ^E)XIT";
190 RETURN
200 PRINT FNL$(10,20); "PLEASE STAND BY";
205 FOR I=1 TO X: FOR J=1 TO 50: A$(I,J)=""
206 NEXT J: NEXT I: RETURN
210 REM
220 LPRINT CHR$(27); "E"
230 PRINT CLR$; PRINT FNL$(23,2);
235 PRINT "COMAND"; PRINT FNL$(23,11);
240 PRINT "PRINT"; PRINT FNL$(23,10); "RETURN";
250 G$=INKEY$: IF G$="" THEN 250
260 IF G$="P" THEN GOSUB 310
270 IF G$="C" THEN GOSUB 320:GOTO 230
280 IF G$="R" THEN GOSUB 300:GOTO 30
290 GOTO 250
300 PRINT CLR$;FOR I=1 TO 1;FOR J=1 TO 50
302 PRINT FNL$(I,J);:
304 IF A(I,J)=CHR$(13) THEN 308
306 PRINT A(I,J);:
308 NEXT J;NEXT I
309 RETURN
310 FOR I=1 TO 5;FOR J=1 TO 50:PRINT A(I,J);
312 NEXT J:PRINT "NEXT I:RETURN
320 PRINT FNL$(23,1);:PRINT " Esc ";
340 PRINT FNL$(23,2);:" E) End Command ";:ST$="
350 PRINT FNL$(23,10);:" C) CHR$ ";
355 PRINT FNL$(23,20);:" Q) END COMMAND ";:ST$="
360 G$=INKEY$;IF G$="" THEN 360
370 IF G$="E" THEN GOSUB 420:GOTO 400
380 IF G$="C" THEN GOSUB 530:GOTO 400
390 IF G$="Q" THEN GOTO 410
400 GOTO 360
410 RETURN
420 I=0:PRINT FNL$(20,4);:PRINT "Esc ";
430 G$=INKEY$;IF G$="" THEN 430
440 IF G$=CHR$(13) THEN 480
450 PRINT G$;
460 PRINT " ";
470 S$(I)=G$;I=I+1:GOTO 430
480 IF I>2 THEN GOSUB 800
490 IF I=2 THEN GOSUB 850
500 IF I=1 THEN ST$=CHR$(27)+S$(0)
510 LPRINT ST$;ST$="":FOR J=1 TO I;S$(J)="
512 NEXT J;I=0
520 PRINT FNL$(20,4);:PRINT STRING$(20,"
521 RETURN
530 PRINT FNL$(20,4);:" CHR$ ";:ST$="
540 G$=INKEY$;IF G$="" THEN 540
550 IF G$=CHR$(13) THEN 570
560 PRINT G$;ST$=ST$+G$;GOTO 540
570 PRINT FNL$(20,4);:PRINT STRING$(10,"
580 LPRINT CHR$(15);ST$="":RETURN
700 REM
198
710 A$(X,Y)=D$
720 PRINT FNL$(X,Y);"\n"
730 X=X+1;Y=1;
740 PRINT FNL$(X,Y);"\n";RETURN
800 FOR J=1 TO 1:D$=D$+S$(J);NEXT J;
810 ST$=CHR$(27)+S$(0)+CHR$(VAL(D$)+D$="
820 RETURN
850 ST$=CHR$(27)+S$(0)+CHR$(VAL(S$(1))
860 RETURN

Figure E-2 is the word processing program (refer to Figure 5-4) amended for the Osborne computer.

10 LPRINT TAB(30);"HIGH RESOLUTION VERTICAL SPACING"
20 LPRINT TAB(30);"USING THE ESC 3 N CONTROL CODE"
30 FOR I=1 TO 30
40 IF I=13 THEN GOTO 130
50 M=INT((I44/I));IF M<2 THEN M=2
60 LPRINT CHR$(27);CHR$(S$);CHR$(I)
70 FOR J=0 TO M
80 IF J=M-1 THEN LPRINT I;"/144 INCH SPACING";GOTO 100
90 LPRINT TAB(30);100 FOR N=1 TO 40;LPRINT CHR$(241);NEXT N;LPRINT ""
110 NEXT J
130 NEXT I
140 LPRINT CHR$(27);"@"
150 END

Figure E-3 is the vertical spacing program (refer to Figure 6-5) amended for the Osborne computer.
10 LPRINT CHR$(27);"E";CHR$(27);"A";CHR$(6)
20 FOR LI=1 TO 2
30 LPRINT CHR$(27);"K";CHR$(114);CHR$(0);
40 FOR SPACE=1 TO 100
50 LPRINT CHR$(0);:NEXT SPACE
60 FOR COLN=1 TO 14
70 READ C;LPRINT CHR$(C);:NEXT COLN
80 LPRINT :NEXT LI
90 DATA 14,16,34,64,140,140,128,128,140,140,64,34,16
100 DATA 224,16,232,68,34,18,18,18,34,68,232,16,224
110 LPRINT CHR$(27);"B";
120 LPRINT :LPRINT :LPRINT
130 END

Figure E-4 is the dot graphics program presented in Chapter 6 (the one that puts a smile on your paper) amended for the Osborne computer.

10 LPRINT CHR$(163);CHR$(161);
20 LPRINT CHR$(27);"A";CHR$(3);
30 LPRINT CHR$(162);CHR$(160);
40 LPRINT CHR$(27);"2"
50 END

Figure E-5 is the circle program presented in Chapter 7, amended for the Osborne computer.

10 LPRINT TAB(2);CHR$(163);CHR$(27);"A";CHR$(6)
20 LPRINT CHR$(160)
30 END

Figure E-6 is the tilde program presented in Chapter 7 amended for the Osborne computer.

10 LPRINT TAB(20);"W";CHR$(13)
20 LPRINT TAB(20);CHR$(164);CHR$(13)
30 LPRINT TAB(18);"W";CHR$(166);CHR$(132);CHR$(167);"E";CHR$(13)
40 LPRINT TAB(20);CHR$(165);CHR$(13)
50 LPRINT TAB(20);"S"
60 END

Figure E-7 is the map program presented in Chapter 7 amended for the Osborne computer.
Figure E-8 is the "Wy" program (refer to Figure 7-1) amended for the Osborne computer.
Figure E-9 is the boat program (refer to Figure 7-2) amended for the Osborne computer.

10 PRINT CHR$(26)
20 PRINT "":PRINT "":PRINT ""
30 PRINT "THIS PROGRAM TAKES ABOUT TWO"
40 PRINT "MINUTES TO RUN, PLEASE TURN"
50 PRINT "ON YOUR PRINTER AND STAND BY"
100 REM MICRO-PLDT
110 DIM BITX(75,12)
1000 REM SET PROGRAM CONSTANTS
1010 MASKX(1)=128:MASKX(4)=16
1020 MASKX(2)=64:MASKX(5)=8
1030 MASKX(3)=32:MASKX(6)=4
1040 LX=20:LY=20
1050 XFAC=72/LX:YFAC=75/LY
2000 REM PLOT CURVE
2010 RAD=9
2020 R1=19:Y1=10
2030 FOR ANGX=0 TO 360 STEP 10
2040 R1=ANGX*.28/360
2050 X2=RAD*COS(R1)+10:Y2=RAD*SIN(R1)+10
2060 GOSUB 4000
2070 NEXT ANGX
2080 FOR ANGX=0 TO 360 STEP 15
2090 R1=ANGX*.28/360
2100 R2=(ANGX+15)*.28/360
2110 X1=RAD*COS(R1)+10:Y1=RAD*SIN(R1)+10
2120 X2=RAD*COS(R2)+10:Y2=RAD*SIN(R2)+10
2130 GOSUB 4000
2140 NEXT ANGX
3000 REM SEND BIT IMAGE MAP TO PRINTER
3010 LPRINT CHR$(27);"A";CHR$(6)
3020 FOR RONX=0 TO 11
202
Figure E-10 is the graphics program (refer to Figure 7-4) amended for the Osborne computer.
Figure E-11 is the downloading paragraph symbols program (refer to Figure 8-2) amended for the Osborne computer.

```
60 LPRINT ESC$;CHR$(36);CHR$(1)
70 REM PRINT OUR NEW SYMBOL
80 LPRINT "@@@@@@@@"
90 END
```

Figure E-12 is the downloading copyright program (refer to Figure 8-4) amended for the Osborne computer.

```
10 REM DEFINE ESCAPE CHARACTER
20 ESC$=CHR$(27)
30 REM DEFINE COPYRIGHT SYMBOL IN PLACE OF @
40 LPRINT ESC$;CHR$(42);CHR$(1);CHR$(64);CHR$(0);CHR$(28);
45 LPRINT CHR$(34);CHR$(73);CHR$(20);CHR$(65);CHR$(20);CHR$(65);
47 LPRINT CHR$(34);CHR$(20)
50 REM SELECT DOWNLOADABLE CHARACTERS
60 LPRINT ESC$;CHR$(36);CHR$(1)
70 REM PRINT OUR NEW SYMBOL
80 LPRINT "COPY RIGHT @ 1983"
90 END
```

Figure E-13 is the downloading program presented in Figure 8-5 amended for the Osborne computer.

```
10 REM DEFINE ESCAPE CHARACTER
20 ESC$=CHR$(27)
24 REM COPY CHARACTERS TO ROM
25 LPRINT ESC$;CHR$(42);CHR$(0)
30 REM DEFINE COPYRIGHT SYMBOL IN PLACE OF @
40 LPRINT ESC$;CHR$(42);CHR$(1);CHR$(64);CHR$(0);CHR$(28);
45 LPRINT CHR$(34);CHR$(73);CHR$(20);CHR$(65);CHR$(20);CHR$(65);
47 LPRINT CHR$(34);CHR$(20)
50 REM SELECT DOWNLOADABLE CHARACTERS
60 LPRINT ESC$;CHR$(36);CHR$(1)
70 REM PRINT OUR NEW SYMBOL
80 LPRINT "COPY RIGHT @ 1983"
90 END
```

Figure E-13 is the downloading program presented in Figure 8-5 amended for the Osborne computer.
Figure E-14 is the downloading program presented in Figure 8-6 amended for the Osborne computer.

Figure E-15 is the macro-commands program (refer to Figure 81-7) amended for the Osborne computer.
The Connecting Cable

Use the cable supplied by your Gemini dealer for your TRS Model II or Model III computer. No interface kit is required for these models.

Setting the DIP Switches

Set switch number 2-3 to the “off” position on your Gemini. You may set switch number 2-1 in either position, at your option.

Switch number 2-2 should be set “off” if you want Gemini to print every time it receives a CR code; set to “on” if you wish to have the carriage return ignored and printing only when the buffer is full.

The TRS-80 computer does not automatically send a line feed at the end of a line. If you want to insert a line feed (when, for example, listing a program), turn DIP switch number 2-4 to the “on” position.

The Use of BASIC

The Model II computer may need to be initialized to properly run the sample programs in this user’s manual. From BASIC, type:

```
SYSTEM "FORMS"
```

and respond to the questions asked by the computer. Then, type:

```
Q
```

and the system will correctly route LPRINT commands to your Gemini.
The TRS-80 Microsoft BASIC is quite similar to the Microsoft BASIC used in the demonstration programs. The only exception is the width commands, which are explained in the documentation accompanying the TRS-80 Microsoft BASIC programs. You may also refer to the amended program listing at the back of this Appendix.

**Pin Configurations**

The following chart shows the pin-outs for Gemini printers and the TRS-80 Models I and II with expansion interface.

<table>
<thead>
<tr>
<th>Parallel</th>
<th>Model I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gemini-10X/15X</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>STROBE</td>
</tr>
<tr>
<td>2.</td>
<td>D1</td>
</tr>
<tr>
<td>3.</td>
<td>D2</td>
</tr>
<tr>
<td>4.</td>
<td>D3</td>
</tr>
<tr>
<td>5.</td>
<td>D4</td>
</tr>
<tr>
<td>6.</td>
<td>D5</td>
</tr>
<tr>
<td>7.</td>
<td>D6</td>
</tr>
<tr>
<td>8.</td>
<td>D7</td>
</tr>
<tr>
<td>9.</td>
<td>D8</td>
</tr>
<tr>
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<td>19. ACK</td>
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<tr>
<td>21. BUSY</td>
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</table>
Program Listings

10 POKE 16427,255
30 PC$=E$+'B'tCHR$(1):ELS=E$t"B'tCHR$(2):CM$=E$+'B'+CHR$(3)
40 SP$=E$+'S'+CHR$(0):SB$=E$+'S'+CHR$(1):CS$=E$+'T'
50 IT$=E$+CHR$(52)
60 WD$=CHR$(14):CM$=CHR$(20):PS$=E$+'B'
70 EM$=E$+'E':CE$=E$+'F':DB$=E$+'G':CD$=E$+'H'
80 LPRINT PS$;E$;'R';CHR$(15);
90 FOR I=1 TO 2
100 IF I=1 THEN LPRINT WD$;" GEMINI STANDARD TYPE STYLES";CM$;LF$;
110 IF I=2 THEN LPRINT IT$;WD$;" GEMINI ITALIC TYPE STYLE";
CM$;LF$
120 FOR N=1 TO 40:LPRINT CHR$(123);CHR$(232):NEXT N:LPRINT
130 LPRINT " 17 CPI 12 CPI 10 CPI 8.5 CPI 5 CPI"
140 FOR N=1 TO 80:LPRINT CHR$(241);NEXT N:LPRINT
150 M1$=" ABC";M2$="X"+CHR$(120);M3$="Y"+CHR$(121)
160 FOR J=1 TO 4
170 IF J=1 THEN LPRINT M1$;
180 IF J=1 THEN LPRINT CM$;"NORMAL ";
190 IF J=2 THEN LPRINT CM$;"DOUBLE STRIKE ";
200 IF J=3 THEN LPRINT CM$;"EMPHASIZED ";
210 IF J=4 THEN LPRINT CM$;"DOUBLE STRIKE ";
220 FOR K=1 TO 6
230 IF K=1 THEN LPRINT CM$;
240 IF K=2 THEN LPRINT EL$;
250 IF K=3 THEN LPRINT PC$;
260 IF K=4 THEN LPRINT CM$;WD$;
270 IF K=5 THEN LPRINT EL$;WD$;
280 IF K=6 THEN LPRINT PC$;WD$;
290 IF J=2 THEN LPRINT DB$;
300 IF J=3 THEN LPRINT EM$;
310 IF J=4 THEN LPRINT DB$;EM$;
320 LPRINT M1$;SP$;M2$;CS$;SB$;M3$;CS$;CD$;
330 IF K>3 THEN LPRINT CM$;
340 NEXT K

208
Figure F-1 is the font styles program (refer to Figure 5-1) amended for the TRS-80.

5 CLEAR 2000
7 CS=CHR$(179)
10 CLS: DIM A$(16, 62)
20 CLS: X=0: Y=0
30 GOSUB 150: PRINT @X$64tY, CS;
40 B$=INKEY$: IF B$="": THEN 40
50 IF B$=CHR$(64) THEN CLS: END
60 IF B$=CHR$(31) THEN CLS: GOSUB 200: GOTO 20
70 IF B$=CHR$(9) THEN GOTO 210
80 IF B$=CHR$(13) THEN A$(X, Y)=B$: PRINT @X$64tY, "": X=X+1: Y=0: PRINT @X$64tY, CS: GOTO 40
90 IF B$=CHR$(8) THEN GOSUB 130: GOTO 40
100 PRINT @X$64tY, BS;: A$(X, Y)=BS; Y=Y+1:
110 IF Y=62 THEN A$(X, Y)=CHR$(13): X=X+1: Y=0: GOTO 40
120 PRINT @X$64tY, CS: GOTO 40
130 PRINT @X$64tY, "": Y=Y-1: IF Y<0 THEN Y=0:
140 A$(X, Y)=": PRINT @X$64tY, CS: RETURN
150 PRINT @I$64+0, " -- BACK SPACE -- " PRINT "CLEAR" RESTART @ EXIT": RETURN
200 PRINT @I$64+20, "PLEASE STAND BY":
205 FOR I=0 TO X: FOR J=0 TO 62: A$(I, J)=": NEXT J: NEXT I
206 RETURN
210 REM
220 LPRINT CHR$(27); "*"
230 CLS: PRINT @I$64+2, "COMMAND PRINT RETURN";
250 G$=INKEY$: IF G$="": THEN 250
260 IF G$="P" THEN GOSUB 310
270 IF G$="C" THEN GOSUB 320: GOTO 230
280 IF G$="R" THEN GOSUB 300: GOTO 30
290 GOTO 250
300 CLS: FOR I=0 TO X: FOR J=0 TO 62
400 END
Figure F-2 is the word processing program (refer to Figure 5-4) amended for the TRS-80.
70 IF J = M-1 THEN LPRINT I;"/144 INCH SPACING ";:GOT 90
80 LPRINT TAB(30);
90 FOR N = 1 TO 40 : LPRINT CHR$(241); : NEXT N : LPRINT
100 NEXT J
110 NEXT I
120 LPRINT CHR$(27);'@':END

Figure F-3 is the vertical spacing program (refer to Figure 6-5) amended for the TRS-80.

10 RESTORE
20 LPRINT CHR$(27);"@":CHR$(27);"I"
30 FOR LI = 1 TO 2
40 LPRINT CHR$(27);"K":CHR$(114):CHR$(0);" 
50 FOR SPACE = 1 TO 100: LPRINT CHR$(0);" 
60 FOR COLM = 1 TO 14:READ C: LPRINT CHR$(C);":NEIT COLM
70 LPRINT : NEXT LI
80 DATA 14,16,34,64,140,140,128,128,140,140,64,34,16,14
90 DATA 224,16,232,68,34,18,18,18,34,68,232,16,224
100 LPRINT CHR$(27);"@":LPRINT: LPRINT

Figure F-4 is the dot graphics program presented in Chapter 6 (the one that puts a smile on your paper) amended for the TRS-80.

10 LPRINT CHR$(163):CHR$(161):CHR$(27):"A":CHR$(6)
20 LPRINT CHR$(162):CHR$(160):CHR$(27):"2"
30 END

Figure F-5 is the circle program presented in Chapter 7, amended for the TRS-80.

10 LPRINT TAB(1):CHR$(163):CHR$(27):"A":CHR$(6)
20 LPRINT CHR$(160)
30 END

Figure F-6 is the tilde program presented in Chapter 7 amended for the TRS-80.
Figure F-7 is the map program presented in Chapter 7 amended for the TRS-80.

```
10 LPRINT TAB(20);"N";CHR$(13);TAB(20);CHR$(164);CHR$(13);TAB(16);"W";CHR$(166);CHR$(32);TAB(22);CHR$(167);"E";CHR$(13);TAB(20);CHR$(165);CHR$(13);TAB(20);"S"
15 END
```

Figure F-8 is the "Wy" program (refer to Figure 7-1) amended for the TRS-80.

```
5 LPRINT CHR$(27);"U";CHR$(1)
10 LPRINT CHR$(27);"A";CHR$(6);CHR$(15)
15 FOR K = 1 TO 3
16 LPRINT CHR$(27);"B";CHR$(K)
17 RESTORE
20 FOR J = 1 TO 9
30 FOR I = 1 TO 12
40 READ A
50 LPRINT CHR$(A)
60 NEXT I
70 LPRINT
80 NEXT J
90 DATA 239,224,224,224,239,224,224,224,224,224,224,224
91 DATA 239,224,224,224,239,224,239,224,239,224,224,224
92 DATA 239,234,239,233,239,224,224,239,233,239,224,224
93 DATA 234,233,224,234,233,224,224,224,239,224,224,224
94 DATA 224,224,224,224,224,224,224,239,224,224,224,224
100 LPRINT CHR$(27);"*":END
```
60 NEXT I
70 LPRINT
80 NEXT J
90 DATA 224,224,224,224,224, 224,224,224,245,224,224
91 DATA 224,224,224,224,245,224, 224,245,224,224,224
92 DATA 224,224,224,224,224, 224,224,224,224,224
93 DATA 224,224,224,224,224, 224,224,224,224,224
94 DATA 224,224,224,224,245, 224,224,245,224,224
95 DATA 224,224,224,224,224, 224,224,224,224,224
96 DATA 224,224,224,224,224, 224,224,224,224,224
97 DATA 224,224,224,224,224, 224,224,224,224,224
98 DATA 224,224,224,224,224, 224,224,224,224,224
99 LPRINT :NEXT K
100 LPRINT CHR$(27);"*";END

Figure F-9 is the boat program (refer to Figure 7-2) amended for the TRS-80.

10 CLS:PRINT "":PRINT "":PRINT ""
20 PRINT "THIS PROGRAM TAKES ABOUT 4 MINUTES TO RUN"
30 PRINT "PLEASE TURN ON YOUR PRINTER AND STAND BY"
100 DIM BITS(76,12)
110 MASK$(1)=128:MASK$(4)=16
120 MASK$(2)=64:MASK$(5)=8
130 MASK$(3)=32:MASK$(6)=4
140 LX=20:LY=20
150 XFAC=72/LX;YFAC=75/LY
1000 REM PLOT CURVE
1010 RAD=0
1020 X1=19;Y1=10
1030 FOR ANG=0 TO 360 STEP 10
1040 R1=ANG*.28/360
1050 X2=RAD*COS(R1)+10;Y2=RAD*SIN(R1)+10
1060 GOSUB 3000
1070 NEXT
1080 FOR ANG=0 TO 360 STEP 15
1090 R1=ANG*.28/360
1100 R2=(ANG+150)*.28/360
1110 X1=RAD*COS(R1)+10;Y1=RAD*SIN(R1)+10
1120 X2=RAD*COS(R2)+10;Y2=RAD*SIN(R2)+10
1130 Gosub 3000
1140 Next
2000 Gosub 5000
2010 Lprint Chr$(27);"*";Chr$(6)
2020 For Row=0 to 11
2040 Lprint Chr$(27);"*";Chr$(119);Chr$(1);"K"
2050 For Col=1 To 75
2060 For Ll=1 to 5
2070 Lprint Chr$(BITX(Col,Row));
2080 Next;Next;Lprint;Next;Lprint;
2090 End
3000 Rem draw a line from X1,Y1 to X2,Y2
3010 Xl=X2-X1;Yl=Y2-Y1
3020 Nx=Abs(Xl*FAC);Ny=Abs(Yl*FAC)
3030 If Nx<Ny Then Nx=Ny
3040 NSz=Int(NX+1)
3050 Dl=Xl/NSz;Dy=Yl/NSz
3060 For I=1 To NSz
3070 XI=XI+Dl;YI=YL+DY
3080 Gosub 4000
3090 Next I
3100 Return
4000 Rem plot a point at X1,Y1
4010 Xi=Xl*FAC;Yi=Yl*FAC
4020 Col=Int(Xi/6)
4030 Row=Int(Yi/6)
4040 XITz=Int(Yi-(6*Row))+1
4050 BITX(Col,Row)=BITX(Col,Row) or MASKz(XITz)
4060 Return
5000 For I=0 to 11;For J=1 to 75
5010 If BITz(J,I)=12 Then BITz(J,I)=14
5020 Next;Next;Return

Figure F-10 is the graphics program (refer to Figure 7-4) amended for the TRS-80.

10 Rem Define the escape character
20 ESC$=Chr$(27)
30 Rem Define paragraph symbol in place of @
40 Lprint ESC$;Chr$(42);Chr$(1);Chr$(64);Chr$(0);Chr$(6);Chr$(9);Chr$(0);
Figure F-11 is the downloading paragraph symbols program (refer to Figure 8-2) amended for the TRS-80.

```plaintext
10 REM DEFINE THE ESCAPE CHARACTER
20 ESCS=CHR$(27)
30 REM DEFINE COPYRIGHT SYMBOL IN PLACE OF @
40 LPRINT ESCS;CHR$(42);CHR$(1);CHR$(64);CHR$(0);CHR$(28);CHR$(34);CHR$(73);CHR$(20);CHR$(65);CHR$(20);CHR$(65);CHR$(34);CHR$(20)
50 REM SELECT DOWNLOADABLE CHARACTERS
60 LPRINT ESCS;CHR$(36);CHR$(1);
70 REM PRINT OUR NEW SYMBOL
80 LPRINT "COPY RIGHT @ 1983"
90 END
```

Figure F-12 is the downloading copyright program (refer to Figure 8-4) amended for the TRS-80.

```plaintext
10 REM DEFINE THE ESCAPE CHARACTER
20 ESCS=CHR$(27)
24 REM COPY CHARACTERS TO RAM
25 LPRINT ESCS;CHR$(42);CHR$(0)
30 REM DEFINE COPYRIGHT SYMBOL IN PLACE OF @
40 LPRINT ESCS;CHR$(42);CHR$(1);CHR$(64);CHR$(0);CHR$(28);CHR$(34);CHR$(73);CHR$(20);CHR$(65);CHR$(20);CHR$(65);CHR$(34);CHR$(20)
50 REM SELECT DOWNLOADABLE CHARACTERS
60 LPRINT ESCS;CHR$(36);CHR$(1);
70 REM PRINT OUR NEW SYMBOL
80 LPRINT "COPY RIGHT @ 1983"
90 END
```

Figure F-13 is the downloading program presented in Figure 8-5 amended for the TRS-80.
10 REM DEFINE THE ESCAPE CHARACTER
20 ESC$=CHR$(27)
24 REM COPY CHARACTERS TO RAM
25 LPRINT ESC$;CHR$(42);CHR$(0)
30 REM DEFINE COPYRIGHT SYMBOL IN PLACE OF ©
40 LPRINT ESC$;CHR$(42);CHR$(11);CHR$(64);CHR$(0);CHR$(28);CHR$(34);CHR$(73);CHR$(20);CHR$(65);CHR$(20);CHR$(65);CHR$(34);CHR$(0)
44 REM DEFINE COPYRIGHT SYMBOL IN PLACE OF ®
45 LPRINT ESC$;CHR$(42);CHR$(11);CHR$(38);CHR$(1);CHR$(28);CHR$(34);CHR$(73);CHR$(20);CHR$(65);CHR$(20);CHR$(65);CHR$(34);CHR$(20)
50 REM SELECT DOWNLOADABLE CHARACTERS
60 LPRINT ESC$;CHR$(36);CHR$(11)
70 REM PRINT OUR NEW SYMBOL
80 LPRINT "Elelelelelelelelelelelelelelelelele" 
90 END

Figure F-14 is the downloading program presented in Figure 8-6 amended for the TRS-80.

10 REM DEFINE ESCAPE CHARACTER
20 ESC$=CHR$(27)
30 REM DEFINE MACRO TO BE EMPHASIZED AND EXPANDED TEXT
40 LPRINT ESC$;CHR$(43);ESC$*"E";ESC$*"W";CHR$(1);CHR$(30)
50 REM ISSUE MACRO COMMAND AND TRY PRINTING
60 LPRINT ESC$;CHR$(33)
70 LPRINT "EMPHASIZED AND EXPANDED BY MACRO"
80 END

Figure F-15 is the macro-commands program (refer to Figure 8-7) amended for the TRS-80.
This appendix serves the needs of Gemini's first-time users. On the following pages, you will learn what to look for when initially opening the box containing your new printer. In addition to learning what the pieces are, you'll gain instruction in how the pieces fit together. Specifically, this appendix will show you how to remove the packing and attach the paper-handling accessories.

CHECKLIST FOR FIRST OPENING THE BOX

When you first open the shipping/purchase carton for your Gemini printer, you should find the following items:

CHECKLIST FOR YOUR NEW GEMINI

- one Gemini printer
- one paper guide (a smaller metal rack)
- one paper separator (a metal rack)
- one roll-paper holder (a formed metal bar)
- one holder shaft (a long plastic cylinder)
- one ink ribbon (mounted on two spools)
- one spare fuse (small, glass & metal)
- one user's manual (this one, right here)
WHAT THE PARTS LOOK LIKE

Figure G-1 shows these items for the Gemini-10X, and Figure G-2 presents them for the Gemini-15X.

Legend:  
a. printer  
b. printer cover  
c. paper guide  
d. paper separator  
e. roll paper holder  
f. holder shaft  
g. ink ribbon  
h. spare fuse  
i. user's manual

Figure G-1. The Gemini-10X packing list.
REMOVING THE PACKING FROM INSIDE THE PRINTER

Your Gemini came to you nestled in foam plastic cushions. Packing material was also placed inside your printer to secure the print head and platen during shipping. Figure G-3 identifies the packing material that you need to remove from inside Gemini prior to operation.
Figure G-3. The Gemini-10X (shown here) and the Gemini-15X both use a cardboard form to secure the print head, cardboard inserts to secure the platen from jostling around.

Note: Be sure you remove all the cardboard packing, before using your Gemini.

First, you need to remove the cardboard packing shown in Figure G-3.

Note: You might want to save these packing materials, in case you move, or in case you need to ship your Gemini printer.

After you remove the platen-securing packing, while your printer is turned "off," turn the platen knob to roll out the sheet of paper that is wrapped around the platen (to protect the "out of paper" sensor).
REMOVAL OF THE “FIXING” SCREWS

When your new printer arrives, there are two screws that “fix” the internal chassis to the external frame. This is similar to “fixing” screws on many phonographic turntables. You need to remove these screws to allow the chassis to “float” on its internal shock absorbers made of rubber-like soft plastic.

To remove the fixing screws, you first need to get to them. Turn your printer over and set it on a pillow or fabric-covered surface. (This is to keep from “skinning” the top of your printer while you make this quick adjustment.)

As shown in Figure G-4, remove the two packing screws. Figure G-4 illustrates the bottom of the Gemini-15X, which has a slot for feeding sprocket paper through the printer’s underneath (called “bottom pass”). If you have a Gemini-10X the underside of your printer will not look exactly like the Gemini-15X but there are only two screws that can be removed, so you can’t go wrong. 

*Note:* You should save the screws, too. It’s a good idea to tape the saved screws together, perhaps with a note indicating what they are for. In the excitement of getting your new Gemini up and running, it’s easy to lose the fixing screws. Plus, you will want to re-position these screws if you ever ship your printer.

*Figure G-4. Turn your printer over and place it on a padded cushion, then remove the two “fixing” screws with a Phillips-head screwdriver.*
ATTACHING THE PAPER SEPARATOR AND GUIDE

After you have removed the fixing screws, turn your printer back over so it's right-side-up.

In Chapter 2, you'll learn how to install the ribbon, set the print head gap, and load three types of paper. Those three types of paper are:

- Individual sheets (such as stationery)
- Sprocket-fed computer fanfold paper
- Rolls of paper

For individual sheets of paper, you don’t need any of these paper-feeding attachments. However, for sprocket-fed paper, you need to attach the paper separator and paper guide, as shown in Figures G-5 and G-6.

Note: To insert these paper-feeding accessories, insert one side, then gently bend back the other protruding end until it slips into place.

Figure G-5. The paper guide and paper separator are inserted in the notches (right and left) indicated for one side in this illustration of the Gemini-10X
Figure G-6. For the Gemini-15X the paper guide and separator are wider because the Gemini-15X is wider than the Gemini-10X. But these accessories attach in the same manner on both printers.

Another note: Be sure you don't get these racks in upside down. When you are finished, they should look like the Gemini's illustrated in Chapter 2 (Figures 2-4 through 2-6, and 2-8 through 2-13).

The purpose of these racks is to uniformly feed the paper (roll-type or sprocket-fed) between them and into the printing unit. Thus, you should keep these racks free from obstacles such as paper clips or pencils.
ATTACHING THE ROLL PAPER HOLDER & SHAFT

Roll paper requires another accessory in addition to the paper separator and paper guide just introduced. As shown in Figure G-7 (for the Gemini-10X) the hooks of the holder should be inserted in the two holes on the undercarriage on the back side of the printer. (On the Gemini-15X the identical holder attaches in the same manner, but instead of in the middle, toward one side — away from the electrical plug.)

The paper holder is the rack that holds the roll of paper, much the same as some types of paper-towel dispensers. The roll of paper is placed on a holder shaft (as shown in Figure G-8).

Figure G-7. The roll-paper holder is attached to the back of the printer — in the center for the Gemini-10X and away from the electrical plug for the Gemini-15X.
Getting Started

Figure G-8. The holder shaft is inserted in the roll of paper, which is then mounted on the roll-paper holder, as shown in Figure G-9.

Figure G-9. Side-view of the Gemini printer, showing the three paper-feed accessories in place.

This concludes your introduction to the items contained in the Gemini printer package. Now you should turn to the beginning of this manual.

Chapter 1 will explain the basic parts of the printer. Chapter 2 will show you how to load the paper and the ink ribbon. Chapter 3 introduces the Gemini Self-Test. Chapter 4 shows you how to connect Gemini to your computer (supported by Appendices A through F, which are responsive to specific computer systems). Chapter 5 is a “quick course” in putting Gemini to work for you. The remaining chapters and appendices provide specialized and technical information. If you have a question, consult the index and the table of contents.
## ASCII CODE CHARTS

### Standard ASCII Character Set

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Note: The ASCII character set includes a variety of symbols and characters, each corresponding to a specific code. The table above provides a visual representation of these characters, with their hexadecimal and decimal values.
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<td>OFF OFF ON</td>
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<td>ON ON OFF</td>
<td>ESC 7 4</td>
<td>France</td>
<td>£ à à § § é è é í</td>
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<td>OFF ON OFF</td>
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<tr>
<td>ON OFF OFF</td>
<td>ESC 7 6</td>
<td>Italy</td>
<td>§ § ö é ù à ö è</td>
<td></td>
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</table>
| OFF OFF OFF      | ESC 7 7   | Spain       | @ i Ñ Ñ í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í í
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<td>124</td>
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234
Character Styles

224 225 226 227

228 229 230 231

232 233 234 235

236 237 238 239

240 241 242 243

244 245 246 247

248 249 250 251

252 253 254

237
Gemini User's Manual
## FUNCTION CODE SUMMARY

<table>
<thead>
<tr>
<th>Control Code</th>
<th>Decimal</th>
<th>Hexadecimal</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUL</td>
<td>0</td>
<td>00</td>
<td>Used to terminate tab setting programming of ESC-D and ESC-P.</td>
</tr>
<tr>
<td>BEL</td>
<td>7/135</td>
<td>07/87</td>
<td>Buzzer sounds for ¼ second when this code is input. Input of “ESC Y 0” code negates BEL code. Input of “ESC Y1” makes BEL code effective.</td>
</tr>
<tr>
<td>BS</td>
<td>8/136</td>
<td>08/88</td>
<td>Buffer data is printed by this code and this code shifts the print start position to left side by one character space.</td>
</tr>
<tr>
<td>HT</td>
<td>9/137</td>
<td>09/89</td>
<td>Moves the print head to the next tab set position.</td>
</tr>
<tr>
<td>LF</td>
<td>10/138</td>
<td>0A/8A</td>
<td>One line paper feed is done by an input of LF code after buffer data is printed.</td>
</tr>
<tr>
<td>VT</td>
<td>11/139</td>
<td>0B/8B</td>
<td>Feed paper to the next VT position where programmed by “ESC P nn...n NUL.” Default value is set every 6 lines.</td>
</tr>
<tr>
<td>FF</td>
<td>12/140</td>
<td>0C/8C</td>
<td>Paper is fed to the print start line on next page by preset program (header line) after buffer data is printed.</td>
</tr>
<tr>
<td>CR</td>
<td>13/141</td>
<td>0D/8D</td>
<td>CR code causes printout of buffer, and if DIP switch 2-4 (auto line feed) is in “on” position, CR and 1 line is fed automatically.</td>
</tr>
<tr>
<td>SO, ESC SO</td>
<td>14/142</td>
<td>0E/8E</td>
<td>Turns on double-width character print mode. This mode is cancelled by using DC4 or CR.</td>
</tr>
<tr>
<td>SI, ESC S1</td>
<td>15/143</td>
<td>0F/8F</td>
<td>Turns on compressed mode (17 CPI). This mode cancelled by using DC2.</td>
</tr>
<tr>
<td>DC1</td>
<td>17/145</td>
<td>11/91</td>
<td>This code causes printer to be selected.</td>
</tr>
<tr>
<td>DC2</td>
<td>18/146</td>
<td>12/92</td>
<td>Cancels SI-mode.</td>
</tr>
<tr>
<td>DC3</td>
<td>19/147</td>
<td>13/93</td>
<td>This code causes printer to be deselected.</td>
</tr>
<tr>
<td>DC4</td>
<td>20/148</td>
<td>14/94</td>
<td>Cancels SO-mode.</td>
</tr>
<tr>
<td>RS</td>
<td>30/158</td>
<td>1F/9E</td>
<td>This code ends the macro instruction.</td>
</tr>
<tr>
<td>DEL</td>
<td>127</td>
<td>7F</td>
<td>Delete last character input to buffer.</td>
</tr>
</tbody>
</table>
## Function Code Summary

<table>
<thead>
<tr>
<th>Control Code</th>
<th>Decimal</th>
<th>Hexadecimal</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESC</td>
<td>27/155</td>
<td>1B/9B</td>
<td>This code used for expansion control codes.</td>
</tr>
<tr>
<td>ESC #</td>
<td>35</td>
<td>23</td>
<td>Accepts 8th bit &quot;as is&quot; from host CPU.</td>
</tr>
<tr>
<td>ESC * 0</td>
<td>42 0</td>
<td>2A, 30</td>
<td>Copies fonts in character ROM into download RAM</td>
</tr>
<tr>
<td>ESC * 1</td>
<td>n1 n2 m1 m2</td>
<td>2A, 31 n1 n2 m1 m2</td>
<td>This code defines the download character into RAM</td>
</tr>
<tr>
<td>ESC $ 0</td>
<td>36 0</td>
<td>24,30</td>
<td>Cancels the download character set.</td>
</tr>
<tr>
<td>ESC $ 1</td>
<td>36 1</td>
<td>24,31</td>
<td>Selects the download character set</td>
</tr>
<tr>
<td>ESC-1</td>
<td>45 1</td>
<td>2D 01</td>
<td>All data after this code is printed with underlining.</td>
</tr>
<tr>
<td>ESC-0</td>
<td>45 0</td>
<td>2D 00</td>
<td>Cancels &quot;ESC-1&quot; underline mode.</td>
</tr>
<tr>
<td>ESC 0</td>
<td>48</td>
<td>30</td>
<td>This code changes line feed length to 1/8&quot;.</td>
</tr>
<tr>
<td>ESC 1</td>
<td>49</td>
<td>31</td>
<td>This code changes line feed length to 7/72&quot;.</td>
</tr>
<tr>
<td>ESC 2</td>
<td>50</td>
<td>32</td>
<td>This code changes line feed length to 1/6&quot;.</td>
</tr>
<tr>
<td>ESC 3 n</td>
<td>51 n</td>
<td>33 n</td>
<td>This code changes line feed length to n/144&quot;. The value of n can be from 1 to 127.</td>
</tr>
<tr>
<td>ESC 4</td>
<td>52</td>
<td>34</td>
<td>This code selects character ROM set of italic characters.</td>
</tr>
<tr>
<td>ESC 5</td>
<td>53</td>
<td>35</td>
<td>This code cancels ESC 4.</td>
</tr>
<tr>
<td>ESC 7 n</td>
<td>55 n</td>
<td>37 n</td>
<td>This code selects the international character set.</td>
</tr>
<tr>
<td>ESC 8</td>
<td>56</td>
<td>38</td>
<td>This code enables printing even though paper &quot;out&quot; sensor switch is &quot;on.&quot;</td>
</tr>
<tr>
<td>ESC 9</td>
<td>57</td>
<td>39</td>
<td>Cancels &quot;ESC 8&quot; mode.</td>
</tr>
<tr>
<td>ESC =</td>
<td>61</td>
<td>3D</td>
<td>This code sets 8th bit to logic-0.</td>
</tr>
<tr>
<td>ESC &gt;</td>
<td>62</td>
<td>3E</td>
<td>This code sets 8th bit to logic-1.</td>
</tr>
<tr>
<td>ESC @</td>
<td>64</td>
<td>40</td>
<td>Software &quot;Reset&quot; command, re-initialize all parameters to the power &quot;on&quot; condition.</td>
</tr>
<tr>
<td>ESC !</td>
<td>33</td>
<td>21</td>
<td>This code selects the macro instruction.</td>
</tr>
<tr>
<td>ESC a n</td>
<td>97 n</td>
<td>61 n</td>
<td>This code sends a one-time-only vertical feed of n lines.</td>
</tr>
<tr>
<td>ESC b n</td>
<td>98 n</td>
<td>62 n</td>
<td>This code sends a one-time-only horizontal tab of n columns.</td>
</tr>
<tr>
<td>ESC A n</td>
<td>65 n</td>
<td>41 n</td>
<td>This code changes line feed length to n/72&quot;. Value of n can be from 1 to 127.</td>
</tr>
<tr>
<td>Control Code</td>
<td>Decimal</td>
<td>Hexadecimal</td>
<td>Function</td>
</tr>
<tr>
<td>--------------</td>
<td>---------</td>
<td>-------------</td>
<td>----------</td>
</tr>
<tr>
<td>ESC B 1</td>
<td>66 1</td>
<td>42 01</td>
<td>Sets 10 CPI.</td>
</tr>
<tr>
<td>ESC B 2</td>
<td>66 2</td>
<td>42 02</td>
<td>Sets 12 CPI.</td>
</tr>
<tr>
<td>ESC B 3</td>
<td>66 3</td>
<td>42 03</td>
<td>Sets 17 CPI.</td>
</tr>
<tr>
<td>ESC C n</td>
<td>67 n</td>
<td>43 n</td>
<td>Sets form length to n lines. Value of n can be from 1 to 127.</td>
</tr>
<tr>
<td>ESC C 0 n</td>
<td>67 0 n</td>
<td>43 30 n</td>
<td>Sets form length to n inches. Value of n can be from 1 to 32.</td>
</tr>
<tr>
<td>ESC D nn...n NUL</td>
<td>68 n n 0</td>
<td>44 n n 00</td>
<td>Clears current tab set and sets new tabs. Value of n is acceptable 1 to 255. (In case of 7-bit interface, 1 to 127.)</td>
</tr>
<tr>
<td>ESC E</td>
<td>69</td>
<td>45</td>
<td>Selects emphasized print mode.</td>
</tr>
<tr>
<td>ESC F</td>
<td>70</td>
<td>46</td>
<td>Cancels emphasized print mode.</td>
</tr>
<tr>
<td>ESC G</td>
<td>71</td>
<td>47</td>
<td>Selects double strike print mode.</td>
</tr>
<tr>
<td>ESC H</td>
<td>72</td>
<td>48</td>
<td>Cancels double strike print mode.</td>
</tr>
<tr>
<td>ESC J n</td>
<td>74 n</td>
<td>4A n</td>
<td>One-time line feed of n/144&quot;</td>
</tr>
<tr>
<td>ESC K n1 n2</td>
<td>75 n1 n2</td>
<td>4B n1 n2</td>
<td>480 dots pitch of bit-image-column-scan mode is selected. Number of columns are determined n1 + n2 x 256.</td>
</tr>
<tr>
<td>ESC L n1 n2</td>
<td>76 n1 n2</td>
<td>4C n1 n2</td>
<td>960 dots pitch of bit-image-column-scan mode is selected. Number of columns are determined n1 + n2 x 256.</td>
</tr>
<tr>
<td>ESC M n</td>
<td>77 n</td>
<td>4D n</td>
<td>Sets LH-margin. Value of n can be up to maximum number of CPI. But in case of a 7-bit interface, up to 127.</td>
</tr>
<tr>
<td>ESC N n</td>
<td>78 n</td>
<td>4E n</td>
<td>Sets skip-over perforation to n lines.</td>
</tr>
<tr>
<td>ESC O</td>
<td>79</td>
<td>4F</td>
<td>Resets skip-over perforation to zero lines.</td>
</tr>
<tr>
<td>ESC P nn...n NUL</td>
<td>80 n n 0</td>
<td>50 n n 00</td>
<td>Sets VT positions (vertical tab); default is every 6 lines.</td>
</tr>
<tr>
<td>ESC Q n</td>
<td>81 n</td>
<td>51 n</td>
<td>Sets RH-margin. Value of n can be up to maximum number of CPI. But in case of a 7-bit interface, up to 127.</td>
</tr>
<tr>
<td>ESC R n</td>
<td>82 n</td>
<td>52 n</td>
<td>Sets header line position. Value of n can be from 1 to 16.</td>
</tr>
<tr>
<td>ESC +...RS</td>
<td>43, 30</td>
<td>2 B, 1 E</td>
<td>Defines the macro-instruction</td>
</tr>
<tr>
<td>ESC S 0</td>
<td>83 0</td>
<td>53 00</td>
<td>Superscript mode is selected.</td>
</tr>
<tr>
<td>ESC S 1</td>
<td>83 1</td>
<td>53 01</td>
<td>Subscript mode is selected.</td>
</tr>
<tr>
<td>ESC T</td>
<td>84</td>
<td>54</td>
<td>Cancels &quot;ESC S&quot; and &quot;ESC U&quot;.</td>
</tr>
<tr>
<td>ESC U 1</td>
<td>85 1</td>
<td>55 01</td>
<td>Selects uni-directional print mode.</td>
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<tr>
<td>ESC U 0</td>
<td>85 0</td>
<td>55 00</td>
<td>Cancels uni-directional print mode.</td>
</tr>
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</table>
## Function Code Summary

<table>
<thead>
<tr>
<th>Control Code</th>
<th>Decimal</th>
<th>Hexadecimal</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESC W 1</td>
<td>87 1</td>
<td>57 01</td>
<td>Double-wide pitch print mode is selected.</td>
</tr>
<tr>
<td>ESC W 0</td>
<td>87 0</td>
<td>57 00</td>
<td>Cancels “ESC W 1” mode.</td>
</tr>
<tr>
<td>ESC Y 1</td>
<td>89 1</td>
<td>59 01</td>
<td>Enables buzzer.</td>
</tr>
<tr>
<td>ESC Y 0</td>
<td>89 0</td>
<td>59 00</td>
<td>Disables buzzer.</td>
</tr>
<tr>
<td>ESC y n1 n2 m1 m2</td>
<td>121 n1 n2 m1 m2</td>
<td>79 n1 n2 m1 m2</td>
<td>Prints dual-density graphics with double-speed.</td>
</tr>
<tr>
<td>ESC z n1 n2 m1 m2</td>
<td>122 n1 n2 m1 m2</td>
<td>7A n1 n2 m1 m2</td>
<td>Prints quadruple-density graphics.</td>
</tr>
</tbody>
</table>
Parallel Interface Specifications

The Gemini-10X and Gemini-15X printers have the following operational specifications:

**Parallel Interface Specs**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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<tbody>
<tr>
<td>Data transfer rate</td>
<td>1,000 to 6,000 CPS</td>
</tr>
<tr>
<td>Synchronization system</td>
<td>Via externally supplied STROBE pulses</td>
</tr>
<tr>
<td>Handshake</td>
<td>ACK and BUSY signals</td>
</tr>
<tr>
<td>Logic level</td>
<td>Compatible with TTL level</td>
</tr>
</tbody>
</table>

The Connector Signals and Their Functional Descriptions

To understand the “mating” of Gemini with your computer, let’s consider the function of the pins and the signals they convey. Figure N-1 provides a summary of the signals.

Pin 1 carries the STROBE pulse signal, which is normally kept at a high level (after the signal goes low, the data is read). Pins 2 through 9 carry the data, in 7-bit or 8-bit bytes. When the data is “1,” the signal level is high, and the level goes down when the data is “0.”

Pins 10 and 11 carry the “handshake” signals: ACK and BUSY. ACK is a pulse signal with a pulse-width of approximately 9 microseconds, which is generated when the data is received. When this pulse signal has been completed, the next data acceptance is permitted. BUSY is a signal at DC level that indicates the operating condition of the printer. When this signal goes low, the next data acceptance is permitted.

Pin 12 is the PAPER END signal connector. This DC signal is normally low, and goes high when there is a “no-paper” condition. (Note: DIP switch number 2-1 also controls the paper-empty status.)

Pin 13 connects another output DC signal, this one for indicating when the printer is online.
### Parallel Interface Information

<table>
<thead>
<tr>
<th>Pin no.</th>
<th>Signal name</th>
<th>I/O</th>
<th>Function</th>
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<tbody>
<tr>
<td>1</td>
<td>STROBE</td>
<td>Input</td>
<td>Reads in the data</td>
</tr>
<tr>
<td>2-9</td>
<td>DATA 1-8</td>
<td>Input</td>
<td>Communicates bytes of data</td>
</tr>
<tr>
<td>10</td>
<td>ACK</td>
<td>Output</td>
<td>Acknowledges receipt of data</td>
</tr>
<tr>
<td>11</td>
<td>BUSY</td>
<td>Output</td>
<td>Indicates receptiveness to more data</td>
</tr>
<tr>
<td>12</td>
<td>PAPER END</td>
<td>Output</td>
<td>Notifies that you're out of paper</td>
</tr>
<tr>
<td>13</td>
<td>SELECTED</td>
<td>Output</td>
<td>Online mode indicator</td>
</tr>
<tr>
<td>14</td>
<td>N/C</td>
<td>—</td>
<td>(unused)</td>
</tr>
<tr>
<td>15</td>
<td>N/C</td>
<td>—</td>
<td>(unused)</td>
</tr>
<tr>
<td>16</td>
<td>SIGNAL GND</td>
<td>—</td>
<td>Signal ground</td>
</tr>
<tr>
<td>17</td>
<td>CHASSIS GND</td>
<td>—</td>
<td>Frame ground</td>
</tr>
<tr>
<td>18</td>
<td>+5VDC</td>
<td>Output</td>
<td>External +5VDC Power (max. 50ma)</td>
</tr>
<tr>
<td>19-30</td>
<td>Twisted-pair returns for Pins 1-12</td>
<td>—</td>
<td>Return signals, conveyed by twisted-pair cable</td>
</tr>
<tr>
<td>31</td>
<td>INPUT PRIME</td>
<td>Input</td>
<td>Resets printer: clears buffer and initializes</td>
</tr>
<tr>
<td>32</td>
<td>ERROR</td>
<td>Output</td>
<td>Indicates offline mode</td>
</tr>
<tr>
<td>33</td>
<td>EXT GND</td>
<td>—</td>
<td>External ground</td>
</tr>
<tr>
<td>34-35</td>
<td>N/C</td>
<td>—</td>
<td>(unused)</td>
</tr>
<tr>
<td>36</td>
<td>N/C</td>
<td>—</td>
<td>(TTL high level)</td>
</tr>
</tbody>
</table>

Figure N-1. The parallel interface signals and their names, pins, I/O classifications, and functional summary.
The groundings are provided by three pins. Pin 16 is the signal ground, 17 is the chassis ground, and pin 33 is the external ground. Pin 18 carries 5 volts of direct current.

Twisted-pair return signals for pins 1 through 12 are conveyed by pins 19 through 30, respectively.

Pin 31, INPUT PRIME, carries the signal for resetting the control logic. When this signal goes low, the printer is initialized and the memory buffer is cleared. Another output signal, ERROR, is carried by pin 32. When Gemini is off-line or disabled by an abnormal state, the ERROR signal goes low.

Pins 14, 15, 34, 35, and 36 are unused.

<table>
<thead>
<tr>
<th>Signal Name</th>
<th>Circuit Example</th>
</tr>
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<tbody>
<tr>
<td><strong>Input</strong></td>
<td></td>
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<tr>
<td>DATA 1-8</td>
<td>4.7 kΩ 74LS compatible</td>
</tr>
<tr>
<td>STROBE</td>
<td>4.7 kΩ 100Ω 470pF 74LS compatible</td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td></td>
</tr>
<tr>
<td>BUSY, ACK</td>
<td>4.7 kΩ 74LS compatible</td>
</tr>
</tbody>
</table>

*Figure N-2. Sample circuit for parallel interface.*

*Figure N-3. Data-transfer timing chart for parallel interface.*
Parallel Interface Information

Notes
This chart shows the code numbers in decimal, hexadecimal, and binary form.

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Binary</th>
<th>Hexadecimal</th>
<th>Decimal</th>
<th>Binary</th>
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GLOSSARY

**Alternating current (AC)** is the type of electricity used in household wiring. It's called "alternating" because the electrical flow rapidly alternates in direction.

**Alphanumeric** is a character that is a letter of the alphabet, a numerical symbol (a numeral), or any other symbol in a set of characters.

**American Standard Code for Informational Interchange (ASCII)** is a widely accepted system for using the numerals 0 through 127 to represent alphanumeric and symbolic characters.

**Beginner's All-purpose Symbolic Instruction Code (BASIC)** is a computer language found on personal computers and used (with some variations) for most small-computer programs.

**Binary** is a term that, in a general sense, pertains to a choice or condition in which there are two possibilities. Specifically, it is used relative to computers to refer to the binary mathematical numeration system involving only two digits: one and zero. Computers code data in binary.

**Bit** is the building block of computer memory that represents one of two values: zero or one, yes or no, on or off. A bit is a binary digit (0 or 1) that is grouped into a 7-unit or 8-unit entity called a byte, which conveys data in a computer system.

**Byte** is the standard unit for measuring computer memory that consists of a grouping of adjacent binary digits (such as 00000111 to represent the quantity “7”), which are manipulated as a unit by the computer. A byte can represent one character.

**Buffer** is a temporary storage area that is used to balance the difference between the operating speed of your computer and Gemini. The standard buffer capacity of Gemini is 816 bytes, with an optional capability of over 8,000 more bytes.

**Capacitor** is an electrical device that usually consists of layers of conducting and nonconducting materials, used to store energy and to regulate electrical charges.

**Cathode ray tube (CRT)** is the display screen on your microcomputer.

**Central processing unit (CPU)** is the information-processing “traffic cop” of the printer. The CPU receives data from the interface circuit (from your computer) and transfers that data to the print-head circuitry.

**Character** is the word for a representative symbol (such as the letter “A” or the numeral “5” or the “$” sign), which conveys all or part of an idea. The Gemini printers offer 96 standard ASCII characters, 96 italic characters, 64 special characters, 32 block graphic characters, 96 downloadable characters as well as 88 foreign characters.
**Glossary**

*Characters per second (CPS)* is a measurement of printing speed, like miles per hour for an automobile. The Gemini printers have a print speed of 120 CPS at 10 characters per inch (CPI).

*Chip* is a small integrated circuit that is made from multiple layers of silicon and other materials, which conducts electricity in a manner that renders the device capable of handling computer-logic tasks.

*Computer* is a device that can automatically process and execute a sequence of mathematical or logical operations.

*Computer language* is the set of software instructions understood by the computer that allows the user to communicate human ideas through electronic devices.

*Data* is a collection of factual information, converted to a form (coding) that allows it to be stored, transmitted, and manipulated by computers and their peripherals.

*Diode* is a semiconductor, such as the light-emitting diode (LED) that is each lamp on the printer's control panel.

*Direct current (DC)* is electrical current that flows in one direction (“directly”), such as with devices powered by flashlight batteries. The Gemini power unit converts the input AC power into voltages of $+5V$ DC (which is used as a power supply for the CPU, ROM, and RAM), $+8V$ DC (used to hold the positions of the motors and as a power supply to reset the timing circuit), $+24V$ DC (used to drive the solenoids of the print head, and the motors).

*Down-Loading* (Down-Loadable Character Sets) is the ability to transfer programmed character codes from a computer to a receptive peripheral device (Gemini-10X/15X) that contains storage RAM for such “down-loading” of specially created symbols.

*Dual In-line Package (DIP) switch* is a set of “microswitches” that allows you to quickly convert your machine to perform important functions.

*Dump* is a term for copying a storage file from the computer onto a line printer or other peripheral device.

*Escape character* is the signal sent from your computer to Gemini, via your pressing the *ESC* key on the keyboard, that initiates one of the escape-function codes that control some of the printer's key operating parameters. In BASIC, sending *CHR$(27)*, which is the code for ESC, initiates one of the ESC function control commands.

*File* is a collection of related records that are treated as a single set of data for purposes of storage, retrieval, and transmission.

*Form Feed (FF)* is a paper-advancing function that is initiated by pressing the FF button on the control panel while the printer is in the “local” mode. FF advances the paper around the platen and stops at the first line of the next page. FF may also be activated through software control.
Glossary

**Fuse** is an electrical safety device consisting of a metal wire (within a glass tube) that melts and interrupts the circuit when the amperage exceeds a predetermined point.

**Hardware** is the set of tangible parts of a computer system: the computer, printer, and other peripherals — everything in a computer system except the information contained in that system.

**Input/Output (I/O)** is the exchange of data between the computer and the printer. For example, your Gemini takes input from the computer in the form of data; when it cannot accept any more for the time being, Gemini sends output in the form of a “BUSY” signal, telling the computer to wait.

**Interface** is the common boundary (physical connection) between two hardware items (such as your computer and Gemini) or between two systems. The interface permits the transfer of data and intelligent communication.

**Hexadecimal** is the mathematical numeration system with a base of 16 (compared with 2 in the binary system and 10 in the decimal system). Appendix I presents the hexadecimal and decimal equivalents for the ASCII coded characters.

**K** stands for kilobyte, specifically 1,024 bytes. Computer memory is often expressed in terms of K.

**LED**, see Diode.

**Line Feed (LF)** is a paper-advancing function that is initiated by pressing the LF button on the control panel of your Gemini. When this button is depressed, the paper advances one line; when this switch is held down, consecutive paper-feeds result for as long as the button is depressed.

**Local** defines a condition in which the communication link between the printer and the computer has been interrupted and the printer is not on-line. The on-line control panel button is used to switch the printer between being local and on-line with the computer.

**Macro instruction** is the ability of a peripheral device (Gemini-10X/15X) to accept a single control code to do the work of a multi-command series of codes.

**Main memory** refers to the electronic circuits that are instantaneously available to the computer, circuits containing storage of the software and data currently being used.

**Microprocessors** are the “brains” of the personal computer. The most commonly used types, each about the size of a stack of three dimes, are the 8080, Z-80, and the 6502.

**Megabyte** is equivalent to 1,024 kilobytes of memory. Note: Because computers work with binary numbers, K equals $2^{10}$ (or 1,024) bytes, rather than a thousand bytes as “K” would imply; similarly, a megabyte equals $2^{10}$ K.
Off-line is a condition in which your printer can relate to itself but is unable to communicate with your computer.

On-line is a condition in which the printer is interfaced with the computer and is ready to receive data transmission.

Parallel transmission is a type of interface in which each byte of data is transmitted from the computer to the printer, arranged so that each bit is sent on a separate wire, side-by-side (in "parallel").

Peripheral is any device used by a computer to communicate, including printers, monitors, and disk drives.

Random Access Memory (RAM) is an array of semiconductor switches that stores information in the form of bits. RAM storage changes as the printer performs its tasks. The RAM is the main memory that the user can alter and might be called the "Read/Write Memory." In the Gemini printers, the RAM consists of 816 bytes of storage for data transferred from the interface circuit to the print head circuit.

Read is to obtain data from a computer storage media or from user input.

Read-Only Memory (ROM) is a type of main memory that comes from the manufacturer with data or programs that cannot be modified by the user. Unlike most RAMs, the contents of a ROM are not lost by turning the power "off."

Resolution is the degree of detail that the user can obtain with different printing modes. The Gemini printers offer 60 x 72 low-resolution, 120 x 144 high-resolution and 240 x 144 ultra high resolution bit image graphics.

Serial transmission is a type of communication in which each byte of data is transmitted from the computer to the printer, arranged so that each bit is sent on one wire, end-to-end ("serially").

Software is the set of tasks or programs that makes hardware perform particular functions.

Subscripts are those characters that are printed beneath the baseline for standard-size characters. The "2" is a subscript in H₂O, the chemical notation for water.

Superscripts are characters above the baseline of characters. The "2" is a superscript in E = mc², Einstein's simple equation for the relationship of energy to mass.

Throughput is the total printing time, including data acquisition and line feed time.

Write is to copy, generally from internal to external storage.
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### DIP SWITCH GUIDE

#### Dip Switch 1

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<th>When “ON”</th>
<th>When “OFF”</th>
<th>Factory Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>Selection of Character Set</td>
<td>Contingent on pin no. 4</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(See Figure 4-5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>Print Mode</td>
<td>Normal/Emphasized</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>1-3</td>
<td>Set of Print Pitch</td>
<td>10 CPI/17 CPI</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>1-4</td>
<td>Selection of Character Set</td>
<td>Contingent on pin no. 1</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(See Figure 4-5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-5</td>
<td>Line Feed Value</td>
<td>% Inch / % Inch</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>1-6</td>
<td>Selection of International</td>
<td>Combinations of</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>1-7</td>
<td>Character Set and Form Length</td>
<td>switch settings</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>produce varied output</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(See Figure 4-6)</td>
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</table>

#### Dip Switch 2

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Function</th>
<th>When “ON”</th>
<th>When “OFF”</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1</td>
<td>No-paper detection</td>
<td>Signals paper-out/No signal</td>
<td>ON</td>
</tr>
<tr>
<td>2-2</td>
<td>Buffer full</td>
<td>Prints at full buffer</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>prints at each CR code</td>
<td></td>
</tr>
<tr>
<td>2-3</td>
<td>Bit selection</td>
<td>7-bit interface/8-bit interface</td>
<td>OFF</td>
</tr>
<tr>
<td>2-4</td>
<td>Automatic Line Feed</td>
<td>Automatic feed/No feed</td>
<td>OFF</td>
</tr>
</tbody>
</table>

#### DIP SWITCH STATUS CHART

You may wish to use this chart to keep track of the DIP Switch settings of the Gemini. This may come in handy as a good reference if things are not going as planned.