Apple III

Silentype III

User's Guide

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WARNING:

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions manual, may cause interference to radio communications. As temporarily permitted by regulation, it has not been tested for compliance with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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Preface

Your new Apple III Silentype printer is quiet, compact, and easy to use. It can perform a wide variety of tasks useful in many applications. This manual will help you get the most out of your Silentype, whether you are an experienced programmer or not. Before you read any more of this manual, first read your Apple III Owner's Guide.

This manual contains four chapters and three appendices. The first chapter tells you how to set up the Silentype with your Apple III. If you aren't planning to write programs to run the Silentype, you only need to read chapter one and Appendix A. Chapter two describes how to use the Silentype with BASIC. The third chapter discusses how to use print commands to modify the Silentype's operation for various formats. The fourth chapter describes how to use the Silentype to print graphics.

Appendices A and C contain information useful to both the programmer and the non-programmer. Appendix A tells you how to replace the paper, change the print intensity, and interpret some error messages. It also gives the codes for the ASCII character set. Appendix B is intended for advanced programmers. It describes SOS calls and the device configuration block. Appendix C tells you how to transfer the .SILENTYPE driver from the SILENTYPE III DRIVER diskette to other boot diskettes.

The index and reference card are located in the back of the book. You may want to tear out the reference card and place it where you can easily refer to it while working with your Apple and Silentype.

This manual uses two symbols to point out paragraphs of special interest. The symbols are:

The hand indicates an especially useful or noteworthy piece of information.

The eye means "watch out!" It precedes a paragraph describing a situation in which you should be especially cautious to avoid harming your Silentype or Apple III.

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Setting Up the Silentype

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The Printer

The Silentype printer is versatile and easy to use. It can print graphics as well as text. It will work with any program or language available on the Apple III and in any possible system configuration, except when you are running the Apple II Emulator. True to its name, the Silentype is exceedingly quiet. It has few moving parts, and it is quite reliable, requiring almost no maintenance except for replacing the paper.

Unpacking

The package your Silentype came in should contain the following items:

- the Silentype printer
- a roll of heat-sensitive paper (already installed in the printer)
- a diskette containing the Silentype device driver
- this manual
- a warranty card
- a packing list.

If you haven't already done so, carefully unpack all of the items in the box. Save the packing material in case you wish to transport your printer or in the unlikely event that you must return it for service. If you didn't fill out the warranty card while you were at your Apple dealer's store, fill out the card and send it in now.

Checking the Paper

Often a package will be jolted and bumped as it is being shipped. Athough your Silentype printer was carefully packed to prevent damage in transit, the roll of paper inside it may have slipped out of position. Check the placement of the paper roll before you use the printer.

The roll of paper sits just inside the rear of the printer, beneath the dark-toned portion of the printer casing. To get to the paper, push the dark portion backwards with your thumb and

forefinger as shown in Figure 1-1. The dark-toned "lid" is hinged at the back bottom corners and will open easily, revealing the roll of paper.

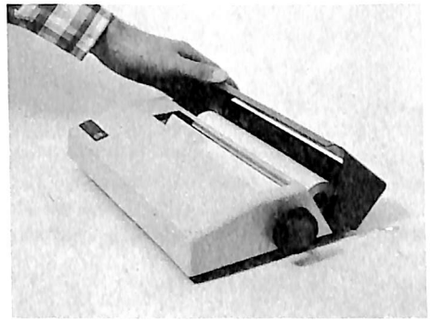

Figure 1-1. Paper roll in position.

Check that the square black bearings on either side of the paper roll are resting firmly in the deepest notches as shown in the photograph. If the paper roll has slipped out of place, carefully line up the bearings with the notches. Then press in on the bearings, and the paper roll should fall into position. When the paper is back in place, close the lid of the printer.

Connecting to the Apple

Turn your Apple III so that you are looking at the back. Notice the row of variously shaped and colored built-in connectors near the lower edge (See Figure 1-2.) Locate the connector labeled PORT A. The Silentype printer plugs directly into this connector.

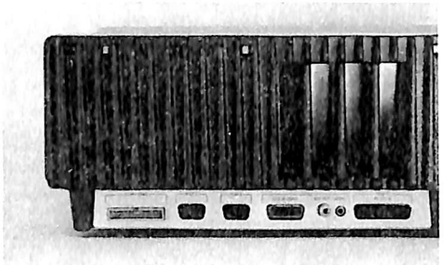

Figure 1-2. The Apple III's connectors.

Be sure the power switch on your Apple is turned to the off position. The power must be off before you connect or disconnect anything on your Apple III. This is important! If you connect or disconnect your Silentype when the power is on, you may damage the Apple III's electronics.

If there is anything (such as a joystick) currently plugged into the PORT A connector, disconnect it. The PORT A connector cannot be used for any other purpose while the Silentype is connected. Plug the Silentype's power cord into the PORT A connector. To ensure a secure connection, you may need to wiggle the plug up and down as you push it in.

Care of Diskettes

There are three main rules to consider when caring for diskettes. Always handle them carefully, store them in a safe place, and make duplicate copies of any diskettes that contain important information. If you follow these three rules, your diskettes should have a long and useful life. See the Apple III Owner's Guide for more information on the care and handling of diskettes.

Backing Up

People often make duplicate or backup copies of important documents, so that if one copy is destroyed they will have another. For the same reason, you should make backup copies of diskettes that contain important information. We can't stress enough the importance of making backup copies of your diskettes. While neglecting to make backups won't harm your diskettes, it might cause you to lose hours, or days, of work.

Right now, take a few minutes to make a copy of the SILENTYPE III DRIVER (the diskette that came in the package with your Silentype). Your Apple III Owner's Guide includes a section on how to use the duplication program to make copies of diskettes. After you have made a copy of the Silentype diskette, store the original in a safe place. The original serves as your backup copy in case you lose or damage the second copy.

The Printer Driver

The Apple III's operating system, SOS, uses programs called device drivers to communicate with all peripheral devices such as disk drives and printers (including your Silentype). A device driver is a program written in the Apple's machine language. These programs work directly with the computer's hardware and electronics. No other programs work with peripheral devices in this manner; only device drivers can perform the actual electronic manipulation of devices.

To send text or other information to your Silentype, you must communicate with the Silentype device driver. The device driver will, in turn, communicate directly with the Silentype.

Each time your Apple boots a diskette in the built-in drive, the Apple reads the device driver programs from the diskette and loads them into memory. The device driver programs are stored in a system file called SOS.DRIVER in the root directory of every boot diskette. Once the SOS.DRIVER file is loaded, it remains in your Apple's memory until you turn off the power or reboot the system.

The SOS.DRIVER file on a boot diskette initially contains drivers for the console, disk drives, and any other devices connected to your Apple. SILENTYPE III DRIVER, the boot diskette that comes with the printer, contains a SOS.DRIVER that includes the device driver for the Silentype. The name of that driver is .SILENTYPE.

To use the Silentype, boot the Apple with a diskette that contains .SILENTYPE. When you want to use the Silentype with boot diskettes that don't yet have .SILENTYPE as part of their SOS.DRIVER, refer to Appendix C, which describes how to add .SILENTYPE (or any other device driver) to a SOS.DRIVER file.

SILENTYPE III DRIVER contains two drivers that you may use with the Silentype printer: BIG.DRIVER and SMALL.DRIVER. BIG.DRIVER is about 1.5K bytes larger than SMALL.DRIVER. The extra space holds character fonts; BIG.DRIVER has three fonts, SMALL.DRIVER has one font. Otherwise, the drivers are identical. A later section of the manual describes the fonts in more detail.

The Demonstration Program

To see how the Silentype works, boot the Apple, using SILENTYPE III DRIVER, and run a demonstration program that shows some of the things the Silentype can do.

When you boot the Apple III using SILENTYPE III DRIVER as the boot diskette, the screen first shows the Apple III greeting screen, then presents the directory for SILENTYPE III DRIVER. At the bottom of the screen it asks

Do you wish to run the demo (y/n) ?

To run the demonstration program, type a Y and press the RETURN key. The disk drive whirrs for a few seconds as the Apple loads the demonstration program into memory, then the Silentype begins printing. To stop the demonstration, hold down the CONTROL key and press the C, or press RESET without pressing CONTROL.

If you type anything other than Y in response to the question about running the demo, the program ends.

Your Silentype printer is now installed. With many programs written to work with printers, all you need to do to use the Silentype is to boot a diskette containing one of those programs. The Apple either starts the Silentype automatically or asks you to type a specific command to start the printer.

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Printing with BASIC

This chapter assumes that you know how to write programs. It describes how to write statements in your programs to print text on your Silentype. If you don't know how to write programs for your Apple III, you must learn how to do that before you can use most of the information in this chapter.

The programming examples in this chapter are in BASIC. Later versions of this manual may use examples in other languages.

This chapter uses printed lines 60 characters wide for most of the samples of text printed by the Silentype. We use that width so that the sample text conforms to this manual's format specifications.

Initializing the Printer

Before you can print anything from a BASIC program, you must initialize the printer with the OPEN# statement. In the statement

```
)OPEN# 1, ".SILENTYPE"
```

the number 1 is the file reference number that will be used to refer to the printer. All subsequent BASIC input/output statements must refer to the printer by this same number. You may use any number that you like (except 0, which refers to the .CONSOLE device driver that controls the display screen and keyboard). This manual uses the number 1. The file reference number can only be changed by another OPEN# statement.

When an OPEN# statement is executed, you should hear a muffled click, and the Silentype's print head (the small white square you can see beneath the clear plastic shield) shifts its position slightly or moves to the left margin if it isn't already there. This means the printer is ready to accept output from the Apple.

Directing Output to the Printer

Once you have initialized the Silentype with an OPEN# statement, you can use the OUTPUT# statement to direct your program's output to the Silentype. The statement

```
)OUTPUT# 1
```


causes all subsequent characters output by your program to be sent to the file specified by the file reference number. The number 1 in this case denotes the Silentype printer as specified in the OPEN# statement.

After executing that OUTPUT# statement, a program sends to the Silentype any characters that would normally be displayed on the screen. For example, the program

```
)10 OPEN# 1, ".SILENTYPE"
)20 OUTPUT# 1
)30 FOR LOOP=65 TO 122
)40 PRINT CHR$(LOOP);" ";
)50 NEXT LOOP
)60 PRINT
```

prints the entire upper and lowercase alphabet on the Silentype, like this:

```
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ]
^ _ ` a b c d e f g h i j k l m n o p q r s t u v w x y z
```

Figure 2-1. Alphabet printed by the Silentype.

In addition to OUTPUT#, you can use PRINT# and PRINT# USING. For example, the program

```
)10 OPEN# 1, ".SILENTYPE"
)20 PRINT# 1; "This will be printed on the Silentype"
)30 PRINT# 1 USING "+6Z.3Z"; 04745
```

prints these lines:

```
This will be printed on the Silentype

+004745.000
```

Figure 2-2. Message printed by the Silentype.

When you want the Silentype to stop printing and have the screen display the text, type

```
)OUTPUT# Ø
```

This sends output to the console and stops sending output to the Silentype. Or, you may type

```
)CLOSE# 1
```

to close the printer file completely. If you use CLOSE# to stop output, you must OPEN# the printer file again before you can resume printing.

Printing in Immediate Execution

You may use BASIC input/output statements to print something immediately in much the same way as you use them in a program to print something as output from that program.

To initialize the printer and direct output to it, type

```
)OPEN# 1, ".SILENTYPE"
)OUTPUT# 1:  (statement)
```

For example, to print a listing of a program, load the program into memory and type

```
)OUTPUT# 1:LIST
```

The Silentype then prints all statements in the program in numerical order by line number. To print a copy of a diskette's directory, type

```
)OUTPUT# 1: CATALOG
```

See the Apple Business BASIC Reference Manual for a complete explanation of input/output statements.

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Printer Commands

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Having followed the instructions in the first two chapters of this manual, you know how to use your Silentype in its simplest operating state. This chapter describes some more versatile capabilities of the Silentype. With the technical information in this chapter, you can change the Silentype's printing format to fit your personal style. Like chapter two, this chapter assumes you already know how to write programs.

This chapter contains sample programs illustrating how to issue printer commands to change the format of the text printed by the Silentype. The sample programs are in BASIC, but the commands work in any language your Apple III can use.

Printer Commands

To specify each formatting parameter for your Silentype, issue a printer command in a program statement. The printer commands take the form of control characters or control sequences. To issue a printer command to the Silentype, include the control character or sequence in an input/output statement that causes something to be printed by the Silentype. For example, to issue a CONTROL-L to the Silentype, use statements like these:

```
)OPEN# 1, ".SILENTYPE"
)PRINT# 1; CHR$(12)
)REM CHR$(12) is a CONTROL-L, which causes a form feed.
```

The number 12 was used in this example because 12 is the ASCII code for CONTROL-L. ASCII codes are numerical representations of all characters usable by the Apple. Printing CHR$(12) is equivalent to printing a CONTROL-L.

Generally, you'll use an ASCII code in a printer command. This chapter gives the code for each printer command. Appendix A includes a complete list of characters and their ASCII codes.

Control Characters

A control character is a special character that can't be displayed on your video screen and won't be printed as a character by your Silentype. To produce a control character, hold down the CONTROL key and press another key. For example, to generate a CONTROL-L, press the L key while holding down the CONTROL key.

Your Silentype ignores most control characters you can type, but it does recognize those control characters that activate special functions of the Silentype. The control characters used by the Silentype make the printer print a carriage return, line feed, reverse line feed, form feed, back space, or print the contents of the buffer. Some control characters are defined by all computers; for example, carriage return and line feed are automatically supplied by a PRINT statement.

Carriage Return

When a program sends characters to the Silentype, they're not printed immediately. Instead, they're stored in a buffer where they remain until the Silentype receives a signal to print them. One such signal is a carriage return. Another signal is CONTROL-F (see below).

Printing a CONTROL-M (ASCII 13) returns the Silentype's print head to the left margin of the page without feeding any paper. This is a carriage return. If the print head is already at the margin, it does not move. After the carriage return, the Silentype prints the contents of the buffer.

In bi-directional mode (see below), the print head might not return immediately to the left margin. Instead, it may print the line from right to left before returning to the left margin.

Programming languages usually supply a carriage return/line feed sequence automatically at the end of each line.

Line Feed

Printing a CONTROL-J (ASCII 1Ø) feeds the paper up one line. You can specify the precise amount of paper fed by issuing an ESCAPE-^ control sequence (see below). The height of a line feed defaults to 6 motor steps, but can be changed (see the section on interline spacing below). Four motor steps is about the height of a character in the standard Silentype font.

A line feed does not force the Silentype to print the contents of the buffer. The .SILENTYPE driver stores line feeds in the

buffer, and the Silentype prints them only when it executes a command that causes it to print the contents of the buffer.

If you would like to cause a carriage return and a line feed before the print head reaches the end of the line, print CONTROL-M before CONTROL-J. If you print CONTROL-J first, the printer moves the paper up and down unnecessarily.

Programming languages usually supply a carriage return/line feed sequence automatically at the end of each line.

Reverse Line Feed

Printing a CONTROL-N (ASCII 14) feeds the paper down one line. You can specify the amount of paper fed by issuing an ESCAPE-^ command sequence (see below). The height of a reverse line feed defaults to 6 motor steps, which leaves a space about half a character's height between lines. You can change the height of a reverse line feed (see interline spacing below).

Printing a CONTROL-N many times in a row may jam the paper in the Silentype.

Form Feed

Printing a CONTROL-L (ASCII 12) feeds a fixed amount of paper. The exact amount of paper fed is determined by the height of a line feed (the interline spacing) and the number of line feeds in a form feed (see ESCAPE-L and ESCAPE-^). The height of a form feed defaults to 60 motor steps (6 motor steps per line feed times 10 line feeds per form feed). The Silentype prints the contents of the buffer before issuing a form feed.

You can specify the exact number of line feeds printed during a form feed by printing an ESCAPE-L followed by a character whose ASCII value is less than 16. The value specifies the number of line feeds that should be printed. Values greater than 15 are interpreted modulo 16. Values less than 0 or greater than 255 will cause an error message to be displayed.

Back Space

Printing a CONTROL-H (ASCII 8) moves the print head one character width in the direction opposite to the current printing direction. The print head moves back a distance equal to the width of the last character printed. If you change the font just before printing a CONTROL-H, the print head moves backwards a distance equal to the width of a character in the new font. CONTROL-H is useful for underlining or overprinting characters (such as slashing zeros).

Here is a sample program using CONTROL-H to overprint:

```
 10  OPEN#1,".silentype"
 20  PRINT#1;"Here is an example of how backspace is used
 for overstriking:"
 30  PRINT#1;"Each o";CHR$(8);"/ in the sentence is o";CH
R$(8);"/verstruck."
 40  CLOSE#1
```

Here is the text printed by the Silentype when you run the program:

```
Here is an example of how backspace is used for overstriking:
Each o in the sentence is overstruck.
```

Printing the Buffer

Printing a CONTROL-F (ASCII 6) forces the Silentype to print all of the characters stored in its buffer--whether it contains 0 characters, 20 characters, or 99 characters (assuming the printed line holds 100 characters).

When the buffer contains enough characters to fill a complete line between margins, the .SILENTYPE driver automatically generates a carriage return. This causes the Silentype to print a line of characters from the buffer. By using CONTROL-F, you can make the Silentype print the contents of the buffer before the buffer contains enough characters to generate an automatic carriage return.

The Silentype also prints the buffer's contents when the buffer reaches its maximum capacity of about 120 characters. Since the number of characters in the buffer is reduced at the end of each

line, the buffer rarely reaches its capacity. To fill the buffer, you would have to type many non-printing characters, such as the backspace (or left-pointing arrow), or many control sequences (see below).

Although both CONTROL-L and CONTROL-M commands move the print head as well as printing the contents of the buffer, CONTROL-F does not imply any motion of the print head before or after printing.

Control Sequences

A control sequence consists of an ESCAPE followed by a sequence of characters. For example, to generate an ESCAPE-^, press the ESCAPE key, and then the ^, which you get by holding down the SHIFT key and pressing the 6 key. When you use an ESCAPE sequence in a program, the characters won't be displayed on the video screen and won't be printed as characters by your Silentype.

Some control sequences use ESCAPE-SHIFT and a letter to turn on a formatting change, and ESCAPE and the same letter to turn off the formatting change. One instance is boldface, which uses ESCAPE-SHIFT-B to turn on that function and ESCAPE-B to turn it off. To make it easy to remember, uppercase letters turn functions on, and lowercase letters turn functions off. For example, ESCAPE-B = boldface on, and ESCAPE-b = boldface off.

Some of the formatting parameters use small numbers to specify format items, such as how wide a character is printed. The Apple looks at only the lower 4 bits for these parameters, so you can use a number in your program statement without the CHR. For example, to specify that you wanted "Hi, Mom" printed in format width 3, you would use:

```
)PRINT# 1; CHR$(27);"W3Hi, Mom"
```

instead of

```
)PRINT# 1; CHR$(27);"W";CHR$(3);"Hi, Mom"
```

Your Apple ignores most control sequences you can type, but it does recognize those control sequences that activate special functions of the Silentype. The control sequences used by the Silentype expand the carriage return; change the interline

spacing; set bi-directional or uni-directional printing; set margins; change intercharacter spacing; set horizontal and vertical tabs; set boldface printing, wide printing, and line clipping; and let you change the ESCAPE character.

Changing the ESCAPE Character

ESCAPE (ASCII 27) is a non-printing character and therefore somewhat inconvenient to use on the Silentype because you must use CHR$(27). To make your programs simpler, you may want to change the ESCAPE to another character that will print.

To change the ESCAPE, use a print statement that prints an ESCAPE followed by a question mark, followed by the new character. For example, to change the ESCAPE to a vertical bar (|), use

```
)PRINT# 1; CHR$(27);"?|"
```

You may want to use a non-printing ESCAPE to prevent any control sequences in the program from changing the operation of the Silentype as you are printing a listing of the program.

Expanding the Carriage Return

To force the Silentype to generate a line feed every time it executes a carriage return, print ESCAPE-E. To force the Silentype to generate only carriage returns, print ESCAPE-e.

When the Silentype reaches the end of a line at either margin, it automatically generates a carriage return. The print head returns to the opposite margin, sometimes printing characters as it moves. All languages currently available on the Apple III generate a line feed after this carriage return, so the paper is ejected one line. The Silentype defaults to this condition. However, to allow for languages that may not generate a line feed after a carriage return, ESCAPE-E lets you expand on that carriage return and force a line feed.

When using the Silentype with most languages, you get printed lines that are double spaced. To stop the expanded carriage return, use ESCAPE-e.

Interline Spacing

By changing the Silentype's interline spacing, you can create precisely spaced tables or make your program listings easier to read. The spacing between lines is measured in motor steps. The interline spacing defaults to 6 steps (one character in the standard Silentype font is about 4 motor steps tall).

To change the interline spacing, print ESCAPE-^, followed by a character whose ASCII value is less than 16. Values greater than 15 are interpreted modulo 16. Values less than zero, or greater than 255 cause an error message to be displayed. The actual space between lines is caused by line feeds and reverse line feeds, but it is ESCAPE-^ that determines their magnitude (see CONTROL-J and CONTROL-N above). Values less than 4 will cause lines to overprint.

Here is a sample program using ESCAPE-^ for interline spacing:

```
10  OPEN#1,".silentype"
20  PRINT#1;"This demonstrates interline spacing control:"
30  FOR line=4 TO 9
40    PRINT#1;CHR$(27);"^";line;
50    PRINT#1;"The interline spacing is now set at ";line
60    NEXT line
70  CLOSE#1
80  END
```

Here is the text printed by the Silentype when you run the program:

```
This demonstrates interline spacing control:
The interline spacing is now set at 4
The interline spacing is now set at 5
The interline spacing is now set at 6
The interline spacing is now set at 7
The interline spacing is now set at 8
The interline spacing is now set at 9
```

Bi- and Uni-directional Printing

Your Silentype is usually in bi-directional mode. In this mode it can print from left to right or from right to left. Each time the printer is ready to print a line, the printer selects the direction that results in the smallest amount of print head

movement. The Silentype then prints the line in the optimal direction.

You can force the Silentype to print only from left to right if you choose. This is called uni-directional printing. Uni-directional printing is about half as fast as bi-directional printing, but the printing is more accurate because the print head is recalibrated each time it reaches the left margin of the page. The head is recalibrated about twice as often in uni-directional mode as it is in bi-directional mode. You may want to use uni-directional printing when accuracy is important, for example, when you are printing a high-resolution picture. (The section on PSCREEN explains how to print a picture.)

The pictures in Figure 3-1 were printed by the Silentype. Notice the difference in accuracy.

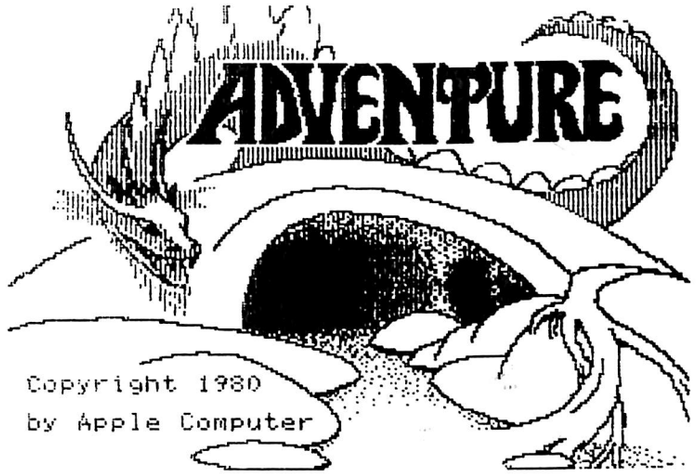

Figure 3-1a. Uni-directional printing.

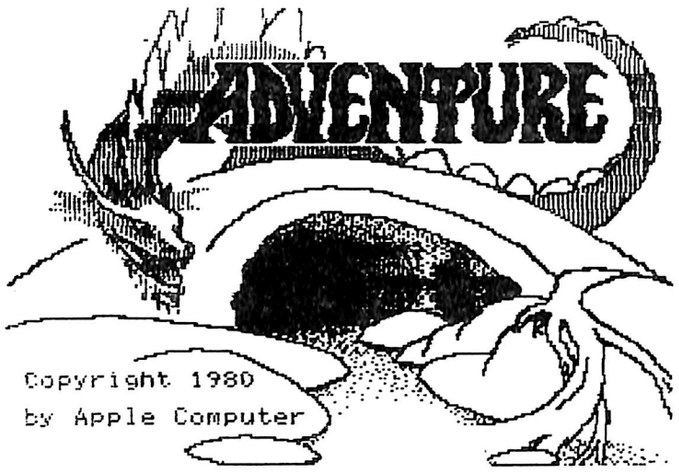

Figure 3-1b. Bi-directional printing.

To change from bi-directional mode to uni-directional, print ESCAPE-> (which is the same as ESCAPE-SHIFT-,). To return to bi-directional mode, print ESCAPE-< (which is the same as ESCAPE-SHIFT-.). The Silentype defaults to bi-directional printing.

Margins

Up to now, you've used the Silentype's 80-character line. An 80-character line is convenient for many applications, but some of the time you may want to use either wider margins or fewer characters per line. The Silentype can print a maximum of 83 standard Silentype characters per line, numbered from 0 to 82. The default setting of the left margin is 2, and the default setting for the right margin is 81.

You can specify the left and right margins to be almost anything you like from 0 to 80. To set the left margin, print ESCAPE-J, followed by a character whose ASCII value is between 0 and 80, inclusive. To set the right margin, print ESCAPE-K, followed by a character whose value is between 0 and 80, inclusive. For example, if you want a 58-character line with a left margin 10 characters wide and a right margin 15 characters wide, use

```
PRINT# 1; CHR$(27);"J";CHR$(10); CHR$(27);"K";CHR$(66);
```

The left margin must be to the left of the right margin, and the right margin must be to the right of the left margin. If you

try to set the left margin to a value equal to or greater than the right margin, or the right margin to a value less than or equal to the left margin, you will get a page printed one character wide. The left margin will be the lower of the two numbers you specified, and the right margin will be one character greater than the lower number you specified.

The Silentype uses the current character width to calculate the limits of the margin. For example, using the Silentype standard font, neither margin can be set greater than 82. If you try to set a margin to a value greater than 82, neither margin changes. ASCII values less than 0 or greater than 255 cause an error message. Changing either margin generates a carriage return automatically, and the Silentype prints the contents of the buffer.

Here is a sample program using ESCAPE-J to change the left margin:

```
 10  OPEN#1,".silentype"
 20  PRINT#1;"This illustrates the use of the left margin
parameter:"
 25  PRINT#1
 30  FOR margin=10 TO 30 STEP 5
 40    PRINT#1;CHR$(27);"J";CHR$(margin);
 50    PRINT#1;"The margin is now set at ";margin;"."
 60    NEXT margin
 70  CLOSE#1
 80  END
```

Here is the text printed by the Silentype when you run the program:

```
This illustrates the use of the left margin parameter:

        The margin is now set at 10.

             The margin is now set at 15.

                  The margin is now set at 20.

                       The margin is now set at 25.

                            The margin is now set at 30.
```

Note that if you change to or from boldface or wide printing, change the font, or change the intercharacter spacing, the margins don't move to accommodate the change in character width. After any of those changes, a different number of characters fit on a line.

Intercharacter Spacing

The intercharacter spacing defines the distance the print head moves between printed characters. The intercharacter spacing default is one print head step. One printed character in standard Silentype font is 6 head steps wide, that is, 5 steps for a character and 1 step for the intercharacter space. You can change the intercharacter spacing to any number of steps between 1 and 15. Print ESCAPE-. (N.B.: that is ESCAPE followed by a period), followed by a character whose ASCII value is between Ø and 15, inclusive. Values greater than 15 are interpreted modulo 16. Values less than Ø or greater than 255 cause an error message.

Here is a sample program using ESCAPE-. to change the intercharacter spacing:


```
 10  OPEN#1,".silentype"
 20  PRINT#1;"This is an example of various intercharacter
spacings:"
 30  FOR s=0 TO 4
 40    PRINT#1;CHR$(27);".";s
 50    PRINT#1;"This is printed with spacing ";s;"."
 60    NEXT s
 70  CLOSE#1
 80  END
```

Here is the text printed by the Silentype when you run the program:

```
This is an example of various intercharacter spacings:

This is printed with spacing 0.

This is printed with spacing 1.

This is printed with spacing 2.

This is printed with spacing 3.

This is printed with spacing 4.
```

Boldface Printing

The Silentype allows you to print specific characters darker than others. This is useful when you want to emphasize certain words or phrases. Print an ESCAPE-B to indicate that the characters that follow should be printed darker than normal. Printing ESCAPE-b causes subsequent characters to be printed their normal intensity again.

Figure 3-2 shows how the boldface printing combines two images of a character to produce a boldface character.

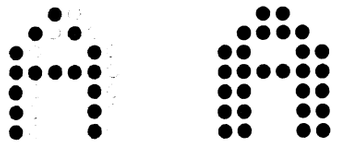

Figure 3-2. Printing a Boldface Character.

Here is a sample program using ESCAPE-B and ESCAPE-b to print boldface and normal characters:

```
 10  OPEN#1,".silentype"
 20  PRINT#1;"Here is an example of ";CHR$(27);"B";"bold le
tters";
 30  PRINT#1;CHR$(27);"b printed in the middle of a line."
 40  CLOSE#1
```

Here is the text printed by the Silentype when you run the program:

Here is an example of **bold letters** printed in the middle of a line.

Printing in boldface results in fewer characters per line.

Wide Printing

In addition to boldface printing, your Silentype can print various widths of characters. To change the width, print an ESCAPE-W, followed by a character whose ASCII value is between Ø and 7, inclusive. The ASCII value specifies the absolute width increase in print head steps. Numbers greater than 7 are interpreted modulo 8. Numbers less than Ø or greater than 255 cause an error message. Printing ESCAPE-w returns character width to normal.

Each character of the standard Silentype font consists of dots arranged in a cell 5 columns wide by 7 rows high. When you specify an ASCII value from Ø to 7, the Silentype doubles the number of dots in some of the columns of the character. The growth of a character's width proceeds as shown in Figure 3-3.

Width	Doubles dots in column #
1	3
2	1 & 5
3	2 & 4
4	2, 3, & 4
5	1, 3, & 5
6	1, 2, 4, & 5
7	1, 2, 3, 4, & 5

Figure 3-3. Growth of a character's width.

Here is a sample program using ESCAPE-W and ESCAPE-w to print boldface and normal characters:

```
 10  OPEN#1,".silentype"
 20  PRINT#1;"Here is an example of the Silentype's double
wide characters:"
 30  FOR w=Ø TO 7
 40    PRINT#1;CHR$(27);"W";w
 50    PRINT#1;"This is text in width number ";w;"."
 60    NEXT w
 70  CLOSE#1
 80  END
```

Here is the text printed by the Silentype when you run the program:

Here is an example of the Silentype's wide characters:
This is text in width number 0.

This is text in width number 1.

This is text in width number 2.

This is text in width number 3.

This is text in width number 4.

This is text in width number 5.

This is text in width number 6.

This is text in width number 7.

Printing wider characters results in fewer characters per line.

Line Clipping

If you try to print more characters on one line than fit between the margins, the characters that won't fit on one line are printed on the next. Sometimes you may want to have every character printed in this manner; however, you can have the extra characters clipped off. Printing ESCAPE-C initiates line clipping. Printing ESCAPE-c disables line clipping.

Here is a sample program using ESCAPE-C and ESCAPE-c to print a clipped and a non-clipped listing of a program:


```
10  OPEN#1,".silentype"
20  PRINT#1;"This illustrates line clipping by listing in
double wide mode"
30  PRINT#1;"with the clipping mode enabled:"
40  PRINT#1;CHR$(27);"C";CHR$(27);"W7"
50  OUTPUT#1:LIST
60  CLOSE#1
70  END
```

Here is the text printed by the Silentype when you run the program:

This illustrates line clipping by listing in double wide mode with the clipping mode enabled:

```
10   OPEN#1,".silentype"
15   PRINT#1;CHR$(27);"K";CHR$(6
20   PRINT#1;"This illustrates l
30   PRINT#1;" mode with the cli
40   PRINT#1;CHR$(27);"C";CHR$(2
50   OUTPUT#1:LIST
60   CLOSE#1
70   END
```

Horizontal Tabs

For very fine horizontal positioning of the print head (such as printing variable spaces between characters), use ESCAPE-H. This is a relative tab, which tells the Silentype how much to move the print head relative to its current position. The Silentype can move the print head to the right or the left from 1 to 127 steps on the current line. The standard Silentype font uses about 6 steps per character.

To move the head, print ESCAPE-H, followed by a character whose ASCII value is between Ø and 255, inclusive. To move the head to the right from 1 to 127 steps, specify a value less than 128. To move the head to the left, specify a value greater than 127. The number of steps the head moves to the left equals 256

minus the value you specify. For example, to move the print head left 5 steps, specify a value of 251 (5 = 256-251). The ASCII value you specify to move the print head to the left is a single-byte integer that is a signed two's complement. Figure 3-4 shows some sample values.

ASCII value	Moves print head
CHR$(1)	right 1 step
CHR$(48)	right 48 steps
CHR$(127)	right 127 steps
CHR$(196)	left 60 steps
CHR$(251)	left 5 steps

Figure 3-4. Sample values for ESCAPE-H.

Values outside the range 0 to 255 cause an error message. If you specify a range for ESCAPE-H that would cause the head to move past either margin, the Silentype ignores the ESCAPE-H.

Here is a sample program using ESCAPE-H to move the print head:

```
10  OPEN#1,".silentype"
20  PRINT#1;"This illustrates underlining that uses ";
30  PRINT#1;"horizontal tabs.";
40  PRINT#1;
45  PRINT#1;
50  PRINT#1;"Here is a ";
60  l$="line":GOSUB 500
70  PRINT#1;" that has some ";
80  l$="underlined":GOSUB 500
90  PRINT#1;" words."
100  CLOSE#1
110  END
500  REM
       underline subroutine
510  PRINT#1;l$;
520  PRINT#1;CHR$(27);"H";CHR$(256-6*LEN(l$));
530  PRINT#1;CHR$(27);"V1";
540  FOR x=1 TO LEN(l$):PRINT#1;"_";:NEXT x
550  PRINT#1;CHR$(27);"V";CHR$(255);
560  RETURN
```


Here is the text printed by the Silentype when you run the program:

This illustrates underlining that uses horizontal tabs.

Here is a line that has some underlined words.

Vertical Tabs

For very fine vertical positioning of the print head (such as printing blank lines between characters), use ESCAPE-V. This makes the Silentype feed paper in or out. The Silentype can feed the paper up or down 15 or fewer motor steps from the current line. A single printed character in the standard Silentype font is about 4 motor steps tall.

ESCAPE-V allows the Silentype to print superscripts and subscripts. Figure 3-5 demonstrates superscripting.

Here is an example of superscripting:

$$x^2 + y^2 = z^2 .$$

Figure 3-5. Superscripting printed by ESCAPE-V.

To move the paper, print ESCAPE-V, followed by a character whose ASCII value is between 0 and 255, inclusive. Values less than 15 feed the paper up. Values greater than 239 feed the paper down a number of motor steps equal to 256 minus the value. That is, a value of 251 tells the Silentype to feed down 5 motor steps. Values outside the range 0 to 255 will cause an error message. If you specify a number of motor steps greater than 15, the number is interpreted modulo 16.

Here is a sample program using ESCAPE-V to move the print head:

```
 10  OPEN#1,".silentype"
 15  PRINT#1;CHR$(27);">";
 20  PRINT#1;"This illustrates the use of relative vertica
l tabs "
 25  PRINT#1;"for fine positioning."
 30  FOR x=1 TO 2
 40    FOR i=1 TO 10
 50      PRINT#1;"hello";
 60      PRINT#1;CHR$(27);"U";
 70      IF i<6 THEN PRINT#1;"2";:ELSE PRINT#1;CHR$(254);
 80      NEXT i
 90    PRINT#1
 100    NEXT x
 110  CLOSE#1
 120  END
```

Here is the text printed by the Silentype when you run the program:

```
This illustrates the use of relative vertical tabs
for fine positioning.
hellohellohellohellohellohellohellohellohellohello
hellohellohellohellohellohellohellohellohellohello
```

Issuing an ESCAPE-V many times in a row may jam the paper in the Silentype.

Multiple Fonts

Each character of the standard Silentype font consists of dots arranged in a cell 5 columns wide by 7 rows high. This is the font you have been using up to this point. The SOS.DRIVER and BIG.DRIVER files on your Silentype diskette both contain two additional fonts, Roman and Compact.

The SMALL.DRIVER file on your Silentype diskette contains only the standard font. Use SMALL.DRIVER when you need to conserve memory space. The two extra fonts require about an additional 1000 bytes of memory. The ESCAPE-F command is ignored by the SMALL.DRIVER.

Each character of the Roman font consists of dots arranged in a cell 7 columns wide by 7 rows high. Due to the increased cell width, fewer Roman characters can fit on one line than can standard characters. Figure 3-6 shows the alphabet printed in Roman font.

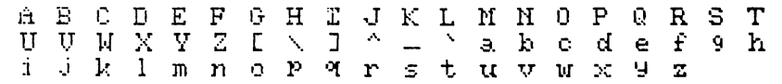

Figure 3-6. The alphabet in Roman font.

Each character of the Compact font consists of dots arranged in a cell 4 columns wide by 7 rows high. Because the characters are narrower, 96 Compact characters fit on a line that holds 80 standard characters. Figure 3-7 shows the alphabet printed in Compact font.

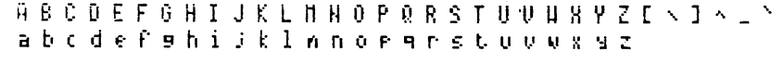

Figure 3-7. The alphabet in Compact font.

Changing Fonts

If you have a SOS.DRIVER file with more than one font, you can change fonts by printing an ESCAPE-F, followed by a character whose ASCII value is the number of the new font. The number must be a positive integer less than 8. The standard font is font 0, the Compact font is font 1, and the Roman font is font 2. Values greater than 7 are interpreted modulo 8. Values less than 0 or greater than 255 will cause an error message. As with

any printer command, you can use ESCAPE-F at any time. You can even change fonts in the middle of a line.

Here is a sample program using ESCAPE-F to change fonts:

```
 10  OPEN#1,".silentype"
 20  PRINT#1;"Here is an example of the 3 character fonts:"
 30  FOR f=0 TO 2
 40    PRINT#1;CHR$(27);"F";f
 50    PRINT#1;"This text is printed in font number ";f;"."
 60    NEXT f
 62  PRINT#1
 65  PRINT#1;"This text";CHR$(27);"F";0;" uses all three ";
CHR$(27);"F";1;"fonts in one";CHR$(27);"F";2;" sentence."
 70  CLOSE#1
 80  END
```

Here is the text printed by the Silentype when you run the program:

```
Here is an example of the 3 character fonts:

This text is printed in font number 0.

This text is printed in font number 1.

This text is printed in font number 2.

This text uses all three fonts in one sentence.
```


Default Printer Command Values

Reinitializing the Silentype, or printing an ESCAPE-=, cancels all printer commands in effect. The commands return to their default values, which are shown in Figure 3-8.

Printer Commands	Default Value
Initial printer command character	ESCAPE
Line feed length	6 motor steps
Carriage return/line feed combination	Off
Reverse line feed length	6 motor steps
Interline spacing	6 motor steps
Form feed length	10 line feeds
Printing direction	Bi-directional
Left margin	Position 2
Right margin	Position 81
Intercharacter spacing	1 head step
Boldface printing	Off
Double wide printing	Off
Line clipping	Off

Figure 3-8. Default values.

ESCAPE-= removes all characters from the buffer without printing any of them. If you don't want to loose the contents of the buffer, precede ESCAPE-= with CONTROL-F.

Summary of Printer Commands

Figure 3-9 summarizes the printer commands and their effects:

Control Character	CHR(#)	Its Function
CONTROL-F	CHR(6)	prints contents of buffer
CONTROL-H	CHR(8)	backspace
CONTROL-J	CHR(10)	line feed
CONTROL-L	CHR(12)	form feed
CONTROL-M	CHR(13)	carriage return
CONTROL-N	CHR(14)	reverse line feed

Control Sequence	Its Function
ESCAPE-B	Boldface on
ESCAPE-b	Boldface off
ESCAPE-C	Clipping on
ESCAPE-c	Clipping off
ESCAPE-E	Expanded carriage return on
ESCAPE-e	Expanded carriage return off
ESCAPE-F	Font change
ESCAPE-H	Horizontal tab
ESCAPE-J	Change left margin
ESCAPE-K	Change right margin
ESCAPE-V	Vertical tab
ESCAPE-W	Wide printing on
ESCAPE-w	Wide printing off
ESCAPE-.	Intercharacter spacing
ESCAPE-^	Interline spacing
ESCAPE-=	Restores defaults
ESCAPE->	Uni-directional printing
ESCAPE-<	Bi-directional printing
ESCAPE-?	Changes ESCAPE character

Figure 3-9. Printer Commands.

4

Printing Graphics

36 PSCREEN
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The first section in this chapter describes how to use PSCREEN, a utility program included on the Silentype diskette. The second section describes printing in raw graphics mode: dot-by-dot printing and how to control the movement of the Silentype's motor and the print head.

PSCREEN

PSCREEN is a utility program that allows you to print graphics or text displayed on the Apple's screen. You may use PSCREEN when you want to print an exact or modified replica of what's displayed on the Apple's screen. Some examples of screens you might want to print are diagrams, graphs and tables, text in an unusual or large font, and text you want printed larger than the largest font available. Using PSCREEN, you can get a printed version of the screen that is rotated or normal, wide or narrow, screen font or Silentype font, black on white or white on black, clipped or not clipped, and printed uni- or bi-directionally.

Any language may call PSCREEN as a procedure. Before you can use PSCREEN, you must first transfer the PSCREEN file to the diskette you intend to use it with. Use CONTROL-C or a break command to stop the printer while it's printing using PSCREEN.

Printing Text Screens

The PSCREEN utility can take whatever is currently on the text screen and print it on the Silentype. PSCREEN has two modes of operation: one that uses the standard .SILENTYPE driver to generate the characters, and another that uses graphics to produce an exact replica of the text screen.

PSCREEN uses the first mode when bits 2 and 4 are both off. In this mode, PSCREEN dumps characters to the driver in much the same way as they are printed from a program. If the driver is opened before PSCREEN is used, all the current parameters set by the driver (like bold or margins) are still in effect. PSCREEN parameters (like inverse, double, or rotated) are ignored.

When PSCREEN uses the graphics mode (see below) to print a text screen, the current parameters (such as bold or margins) are ignored.

Printing Graphics Screens

PSCREEN can also print the Apple III graphics screen. It can print both the 28Ø and 56Ø dot modes. However, since the Silentype has only 49Ø dots across, the last 7Ø dots are clipped in 56Ø mode unless the image is rotated. Although the Silentype cannot print the Apple III color graphics modes, the 28Ø color mode prints acceptably in 28Ø mode and the 14Ø color mode prints reasonably well in the 56Ø mode. The printscreen program included on the SILENTYPE III DRIVER diskette allows you to print a screen that you have already saved on a diskette.

Using PSCREEN

To use PSCREEN, link it to your program using an INVOKE statement. Then, call PSCREEN with a PERFORM statement containing an argument that is an integer variable specifing exactly how to print the screen, for example:

```
)PERFORM PSCREEN (%45)
```

The argument is the decimal equivalent for an 8-bit binary number. Figure 4-1 shows the decimal equivalent for each bit. For example, the PERFORM statement above uses the argument (%45), which is the decimal equivalent of having bits number 5, 3, 2, and Ø set.

7	6	5	4	3	2	1	Ø	(bit number)
128	64	32	16	8	4	2	1	(decimal equivalent)
Ø	Ø	1	Ø	1	1	Ø	1	(setting for %45)

Figure 4-1. Decimal equivalents for bits Ø-7.

Each bit specifies a feature of the printing process. The following paragraphs describe the functions of the bits.

Bit Ø: (4Ø/8Ø columns)
This bit has two functions, depending on the state of bit 4, which specifies text or graphics. In text mode (bit 4 off), bit Ø specifies whether the Silentype uses 4Ø or 8Ø columns to print the screen. When bit Ø is set, the Silentype prints in 8Ø-column mode. When bit Ø is off, the Silentype prints in 4Ø-column mode.

In graphics mode (bit 4 set), bit Ø specifies either 56Ø by 192 graphics (bit Ø off) or 28Ø by 192 graphics (bit Ø set).

Bit 1: (Black and white/color)
Bit 1 is ignored, but should be off. It allows for future expansion of the Silentype.

Bit 2: (Text/graphics or page 1/page 2)
Depending on the state of bit 4 (text or graphics), bit 2 has two meanings. In text mode (bit 4 off), when bit 2 is set, the Silentype prints the screen exactly as shown. When bit 2 is off, the Silentype prints the screen using the standard font.

The two graphics buffers are page 1 (2ØØØ to 5FFF) and page 2 (6ØØØ to 9FFF). In graphics mode (bit 4 set), bit 2 selects either page 1 (bit 2 off) or page 2 (bit 2 set).

Bit 3: (Normal/rotated)
When bit 3 is set, the Silentype prints the screen rotated 9Ø degrees, so that the full screen can be printed in 8Ø-column mode. When bit 3 is off, the Silentype prints an unrotated screen, which clips off the rightmost 12.5% of anything printed in 8Ø-column mode. Bit 3 doesn't apply to text mode unless bit 2 is set.

Bit 4: (Text/graphics)
When bit 4 is set, the Silentype prints the screen in graphics mode. When bit 4 is off, the Silentype prints the screen in text mode. (See bit 2.)

Bit 5: (Normal/double)
When bit 5 is set, and bit 2 is set, the Silentype prints the screen double-size. In 8Ø column mode, only the vertical component is doubled. When bit Ø is set, bit 5 should also be set to preserve the proper aspect ratio. When bit 5 is off, it has no effect on the printing.

Bit 6: (Normal/inverse)
When bit 6 is off, the Silentype prints the screen as black characters on a white background. When bit 6 is set, the Silentype prints the screen as white characters on a black background. The Silentype ignores bit 6 when printing using any of the built-in Silentype fonts.

Bit 7: (Uni/bi)
When bit 7 is off, the Silentype prints the screen in uni-directional mode. When bit 7 is set, the Silentype prints the screen in bi-directional mode. Generally, uni-directional printing requires twice as much time as bi-directional printing, but the printing is of higher quality.

When printing a text screen using the standard Silentype font, the Silentype ignores rotating and doubling.

Examples of PSCREEN

PSCREEN(%1) (binary = ØØØØØØØ1)

For PSCREEN(1), only bit Ø is set. This causes the Silentype to print 8Ø columns of text using the standard Silentype font, regardless of the font shown on the screen. The printing is fast, but may not be exactly what is on the screen. Figure 4-2 is an example of a screen printed this way.

```
SITYPE          (00/00/00) V0

 TYPE   BLKS  NAME             MODIFIED TIME  CREATED  TIME   EOF
 SYSTEM 00038 SOS.KERNEL       10/06/80 14:00 10/15/80 00:33  18944
 SYSTEM 00050 SOS.INTERP       11/07/80 05:07 10/15/80 00:34  24832
 SYSTEM 00035 SOS.DRIVER       10/15/80 00:39 10/15/80 00:39  17408
 PASDTA 00016 BIG.DRIVER       10/15/80 00:44 10/15/80 00:44  7680
 PASDTA 00013 SMALL.DRIVER     10/15/80 00:45 10/15/80 00:45  6144
 PASCOD 00009 PSCREEN          08/14/80 11:10 10/15/80 00:19  4096
 PASCOD 00017 BGRAF            10/15/80 00:41 10/15/80 00:49  8192
 BASIC  00001 HELLO            10/15/80 00:41 10/15/80 00:49  212
 BASIC  00005 DEMO             10/15/80 00:59 10/15/80 00:50  1681
 BASIC  00003 PRINTSCREEN      10/15/80 00:36 10/15/80 00:50  869
 FOTO   00033 LOGO.PIC         10/15/80 00:43 10/15/80 00:51  16384
 FOTO   00033 PIE.PIC          09/19/80 19:16 10/15/80 00:51  16384
 FOTO   00017 WINSTON.PIC      10/15/80 00:05 10/15/80 00:52  8192

 277   BLOCKS USED OF 280   AVAILABLE

Do you wish to run the demo (y/n) ?

BREAK IN 80
)invoke pscreen:perform pscreen(%1)
```

Figure 4-2. Example of PERFORM PSCREEN(%1).

PSCREEN(%5) (binary = ØØØØØ1Ø1)

For PSCREEN(%5), bits 2 and Ø are set. This causes the Silentype to print 8Ø columns of text in graphics mode. The Silentype prints the screen exactly as shown (regardless of font), but the rightmost 1Ø columns will be clipped off. Figure 4-3 is an example of a screen printed this way.

```
SITYPE          (00/00/00) V0

 TYPE   BLKS  NAME             MODIFIED TIME  CREATED  TIME   EOF
 SYSTEM 00038 SOS.KERNEL       10/06/80 14:00 10/15/80 00:33  18944
 SYSTEM 00050 SOS.INTERP       11/07/80 05:07 10/15/80 00:34  24832
 SYSTEM 00035 SOS.DRIVER       10/15/80 00:39 10/15/80 00:39  17408
 PASDTA 00016 BIG.DRIVER       10/15/80 00:44 10/15/80 00:44  7680
 PASDTA 00013 SMALL.DRIVER     10/15/80 00:45 10/15/80 00:45  6144
 PASCOD 00009 PSCREEN          08/14/80 11:10 10/15/80 00:19  4096
 PASCOD 00017 BGRAF            10/15/80 00:41 10/15/80 00:49  8192
 BASIC  00001 HELLO            10/15/80 00:41 10/15/80 00:49  212
 BASIC  00005 DEMO             10/15/80 00:59 10/15/80 00:50  1681
 BASIC  00003 PRINTSCREEN      10/15/80 00:36 10/15/80 00:50  869
 FOTO   00033 LOGO.PIC         10/15/80 00:43 10/15/80 00:51  16384
 FOTO   00033 PIE.PIC          09/19/80 19:16 10/15/80 00:51  16384
 FOTO   00017 WINSTON.PIC      10/15/80 00:05 10/15/80 00:52  8192

 277   BLOCKS USED OF 280   AVAILABLE

Do you wish to run the demo (y/n) ?

BREAK IN 80
)invoke pscreen: perform pscreen(%5)
```

Figure 4-3. Example of PERFORM PSCREEN(%5).

PSCREEN(%45) (binary = ØØ1Ø11Ø1)

For PSCREEN(%45), bits 5, 3, 2 and Ø are set. This causes the Silentype to print 8Ø columns of text in graphics mode, rotated 9Ø degrees, and double-sized. This will result in the most accurate replica of the screen, but the printing requires the greatest amount of time. Figure 4-4 is an example of a screen with an unusual font, printed this way.

```
SILTYPE          (00/00/00) V0

 TYPE   BLKS  NAME            MODIFIED TIME  CREATED  TIME   EOF
 SYSTEM 00038 SOS.KERNEL      10/06/80 14:00 10/15/80 00:33 18944
 SYSTEM 00050 SOS.INTERP      11/07/80 05:07 10/15/80 00:34 24832
 SYSTEM 00035 SOS.DRIVER      10/15/80 00:39 10/15/80 00:39 17408
 PASDTA 00016 BIG.DRIVER      10/15/80 00:44 10/15/80 00:44 7680
 PASDTA 00013 SMALL.DRIVER    10/15/80 00:45 10/15/80 00:45 6144
 PASCOD 00009 PSCREEN         08/14/80 11:10 10/15/80 00:19 4096
 PASCOD 00017 BGRAF           10/15/80 00:41 10/15/80 00:49 8192
 BASIC  00001 HELLO           10/15/80 00:41 10/15/80 00:49 212
 BASIC  00005 DEMO            10/15/80 00:39 10/15/80 00:50 1681
 BASIC  00003 PRINTSCREEN     10/15/80 00:36 10/15/80 00:50 869
 FOTO   00033 LOGO.PIC        10/15/80 00:43 10/15/80 00:51 16384
 FOTO   00033 PIE.PIC         09/19/80 19:16 10/15/80 00:51 16384
 FOTO   00017 WINSCON.PIC     10/15/80 00:05 10/15/80 00:52 8192

277  BLOCKS USED OF 280  AVAILABLE

Do you wish to run the demo (y/n) ?

BREAK IN 00
)invoke pscreen: perform pscreen(%45)
```

Figure 4-4. Example of PERFORM PSCREEN(%45).

PSCREEN(%12Ø) (binary = Ø1111ØØØ)

For PSCREEN(%12Ø), bits 5, 4, and 3 are set. This causes the Silentype to print a rotated, double-sized replica of the screen in 28Ø by 192 graphics mode. Figure 4-5 is an example of a screen printed this way.

Figure 4-5. Example of PERFORM PSCREEN(%12Ø).

PSCREEN(%49) (binary = ØØ11ØØØ1)

For PSCREEN(%49), bits 5, 4, and Ø are set. This causes the Silentype to print a double-sized replica of the screen in 56Ø by 192 graphics mode. Figure 4-6 is an example of a screen printed this way. Note that the rightmost 12.5% of the screen is clipped.

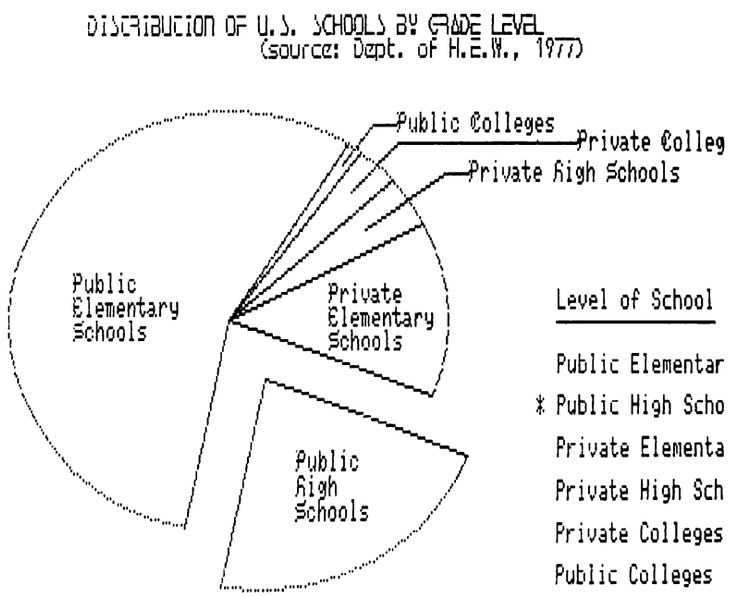

Figure 4-6. Example of PERFORM PSCREEN(%49).

PSCREEN(%57) (binary = ØØ111ØØ1)

For PSCREEN(%57), bits 5, 4, 3, and Ø are set. This causes the Silentype to print a rotated, double-sized replica of the screen in 56Ø by 192 graphics mode. Figure 4-7 is an example of a screen printed this way.

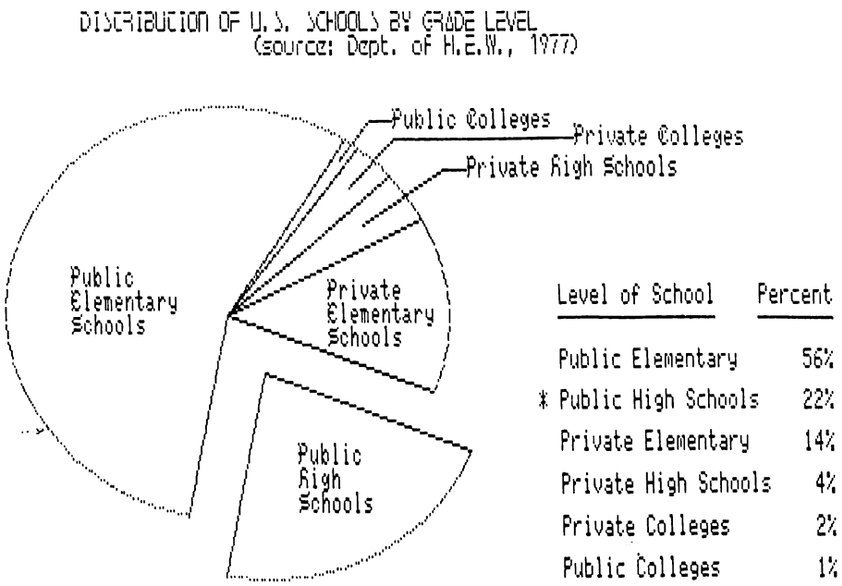

Figure 4-7. Example of PERFORM PSCREEN(%57).

Raw Graphics

Raw graphics mode allows you to control the movement of the printer's motor and to control the movement and dot-by-dot printing of the print head. To enter raw graphics mode, print an ESCAPE-G control sequence. The Apple interprets all characters sent to the printer following the ESCAPE-G as raw graphics commands. Each character interpreted as a raw graphics command is one byte of eight bits. Each bit specifies part of the command. Figure 4-8 is an example of a pattern printed in raw graphics mode.

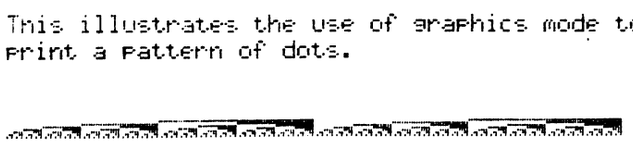

Figure 4-8. Example of raw graphics.

Moving the Print Head

When bits 7 and 6 are off, the other 6 bits specify a motion command. Bits 5 and 4 indicate the direction of movement, and the remaining four bits specify the number of print head or paper motor steps to move. Bits 3, 2, 1, and Ø must indicate a number within the range Ø to 15. Specifying the number Ø moves the print head or paper 64 steps. After moving the specified number of steps, the printer will not immediately stop. You must issue a lock command (see below). Figure 4-9 shows the direction in which the print head or paper moves as specified by bits 4 and 5:

bit 5	bit 4	direction
Ø	Ø	= print head left
Ø	1	= print head right
1	Ø	= paper up
1	1	= paper down

Figure 4-9. Moves specified by bits 4 and 5.

Be careful not to issue too many 'paper down' commands in a row, or the paper in the Silentype may jam.

Printing Dots

When bit 7 is set, the remaining seven bits specify a column of dots to be printed in the current print direction (with bit Ø at the bottom of the column). Each bit that is set causes a dot to be printed in that row of the column, and each bit that is off causes nothing to be printed. For example, Figure 4-1Ø shows what character to send to print some rows of dots.

To print these dots	Send ASCII value	Binary equivalent
● ● ● ● ● ● ● ●	CHR$(255)	////////
○ ○ ○ ○ ○ ○ ○ ●	CHR$(129)	/ØØØØØØ/
○ ○ ● ● ● ● ○ ○	CHR$(156)	/ØØ///ØØ

Figure 4-1Ø. Printing dots.

Control Commands

When bit 7 is off, and bit 6 is set, the byte is interpreted as a raw graphics control command. The effect of the command depends on bits 5, 4, 3, 2, 1, and Ø. Figure 4-11 shows the effect of the bits.

Bits 7-Ø	Effect
Ø 1 Ø Ø Ø Ø Ø Ø	Initialize raw graphics mode. The print head moves to the left margin, the print direction is set to left-to-right, the buffer is flushed, and the print head and paper motor are locked.
Ø 1 Ø Ø Ø Ø Ø 1	Recalibrate. The print head moves to the left margin, and the print direction is set to left-to-right.
Ø 1 Ø Ø Ø Ø 1 Ø	Set print direction to left-to-right.
Ø 1 Ø Ø Ø Ø 1 1	Set print direction to right-to-left.
Ø 1 Ø Ø Ø 1 Ø Ø	Set print direction to opposite of current direction.
Ø 1 Ø Ø Ø 1 1 Ø	Lock print head (so that it does not "coast" further after a motion command).
Ø 1 Ø Ø Ø 1 1 1	Lock paper motor (so that paper does not move after a motion command).
Ø 1 Ø Ø 1 Ø Ø Ø	Exit raw graphics mode. Negates effect of the ESCAPE-G used to enter raw graphics mode.

Figure 4-11. Effect of bits.

To ensure the highest print quality, you should send a few long streams of raw graphics commands to the printer, rather than many short commands.

It is important to send a lock command after every motion command so that neither the print head nor the paper motor coasts past the point specified in the motion command.

During uni-directional printing, send a recalibration command for every line. During bi-directional printing, send a recalibration command at the end of every right-to-left pass.

Do not repeatedly print dots in the same position on the paper without moving the print head, or you may damage the print head.

A

General Information

52 Replacing the Paper
53 Changing the Print Intensity
54 ASCII Character Codes
57 Error Messages

Replacing the Paper

When the paper roll is nearing its end, a pink stripe appears along one edge of the paper. The stripe indicates that you have about five more feet of paper before the roll ends.

When the Silentype gets to the end of the roll, the paper stops feeding although the printer head continues to move back and forth until it finishes the listing. You can press RESET or CONTROL-RESET to stop the printer, but anything stored in memory may be lost. To preserve the contents of memory, you may want to wait for the printer to stop of its own accord.

Use only specially treated thermal paper in your Silentype printer. You can buy more rolls from your Apple dealer.

To remove the empty paper roll, open the lid of your Silentype with your thumb and forefinger and take out the empty cardboard cylinder. Removing the paper roll reveals a diagram that shows the proper way to feed the paper through the printer.

Now unwrap the new roll of thermal paper and remove the adhesive strip. If the end of the paper is ragged, cut it off with a scissors so that the paper has a clean edge. Feed the end through the printer, making sure the paper goes under the roller as illustrated in the diagram inside the Silentype. Remove the black bearings from the empty cardboard cylinder and insert them into the center of the paper roll, with the squared ends outward.

Turn the large, round knob on the right side of the printer to advance the paper a few inches. Then put the paper roll in place and push in on the squared, black bearings in the paper cylinder while fitting them into the deepest of the two notches on either side of the roll. Now close the lid, making sure the loose end of the paper is free.

If you buy extra rolls of paper, they last much longer if you store them away from heat and light. If you want to keep permanent records of things you have printed on the Silentype, we recommend that you make photocopies of the actual printouts for storage. Thermal paper eventually darkens (after several months) and becomes unreadable. Storing printouts in a cool, dark place, such as a standard file cabinet, greatly prolongs the life of the paper.

Changing the Print Intensity

If you don't like the print intensity after you replace the roll of paper, you can change the print intensity by altering some of the information in the Silentype device configuration block. See Appendix B for information about how to use the device configuration block.

If the printing is too dark, change the values of bytes 11 to 16 (hexadecimal B to 1Ø) to match the values in one of the upper rows of figure A-1. If the printing is too light, change the values of bytes 11 to 16 to match the values in one of the lower rows of figure A-1.

Bytes:	Burn Time B	Burn Time C	Preheat Time D	Preheat Time E	Delay Time F	Delay Time 1Ø	
	ØØ	Ø8	ØØ	Ø2	ØØ	Ø3	Very Light
	ØØ	Ø9	ØØ	Ø2	EØ	Ø2	
	4Ø	Ø9	2Ø	Ø2	AØ	Ø2	Lighter
	8Ø	Ø9	4Ø	Ø2	6Ø	Ø2	
	CØ	Ø9	6Ø	Ø2	2Ø	Ø2	
	ØØ	ØA	8Ø	Ø2	ØØ	Ø2	Nominal
	4Ø	ØA	AØ	Ø2	CØ	Ø1	
	8Ø	ØA	CØ	Ø2	8Ø	Ø1	
	CØ	ØA	EØ	Ø2	4Ø	Ø1	Darker
	ØØ	ØB	ØØ	Ø3	ØØ	Ø1	
	ØØ	ØC	ØØ	Ø3	8Ø	ØØ	Very Dark

Figure A-1. Printing Intensity Table.

Be extremely careful when you increase the print intensity. If you attempt to print characters that are too dark, you may damage the print head of your Silentype.

The ASCII Character Codes

DEC = ASCII decimal code
HEX = ASCII hexadecimal code
CHAR = ASCII character name
n/a = not accessible directly from the APPLE II keyboard

CONTROL CHARACTERS

DEC	HEX	CHAR	KEYBOARD ACTION	COMMENTS AND NOTES
Ø	ØØ	Null	CONTROL-@	
1	Ø1	SOH	CONTROL-A	
2	Ø2	STX	CONTROL-B	
3	Ø3	ETX	CONTROL-C	
4	Ø4	ET	CONTROL-D	
5	Ø5	ENQ	CONTROL-E	
6	Ø6	ACK	CONTROL-F	Print buffer
7	Ø7	BEL	CONTROL-G	Backspace
8	Ø8	BS	CONTROL-H	
9	Ø9	HT	CONTROL-I	
1Ø	ØA	LF	CONTROL-J	Line feed
11	ØB	VT	CONTROL-K	
12	ØC	FF	CONTROL-L	Form feed
13	ØD	CR	CONTROL-M	Carriage return
14	ØE	SO	CONTROL-N	Reverse line feed
15	ØF	SI	CONTROL-O	
16	1Ø	DLE	CONTROL-P	
17	11	DC1	CONTROL-Q	
18	12	DC2	CONTROL-R	
19	13	DC3	CONTROL-S	
2Ø	14	DC4	CONTROL-T	
21	15	NAK	CONTROL-U	
22	16	SYN	CONTROL-V	
23	17	ETB	CONTROL-W	
24	18	CAN	CONTROL-X	
25	19	EM	CONTROL-Y	
26	1A	SUB	CONTROL-Z	
27	1B	ESC	ESCAPE	
28	1C	FS	n/a	
29	1D	GS	CONTROL SHIFT-M	
3Ø	1E	RS	CONTROL-^	
31	1F	US	n/a	

UPPERCASE LETTERS, NUMPERS, SYMBOLS

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

LOWERCASE LETTERS AND SYMBOLS

DEC	HEX	CHAR	KEYBOARD	FONTS
96	6Ø	`	`	` ` `
97	61	a	a	a a a
98	62	b	b	b b b
99	63	c	c	c c c
1ØØ	64	d	d	d d d
1Ø1	65	e	e	e e e
1Ø2	66	f	f	f f f
1Ø3	67	g	g	g g g
1Ø4	68	h	h	h h h
1Ø5	69	i	i	i i i
1Ø6	6A	j	j	j j j
1Ø7	6B	k	k	k k k
1Ø8	6C	l	l	l l l
1Ø9	6D	m	m	m m m
11Ø	6E	n	n	n n n
111	6F	o	o	o o o
112	7Ø	p	p	p p p
113	71	q	q	q q q
114	72	r	r	r r r
115	73	s	s	s s s
116	74	t	t	t t t
117	75	u	u	u u u
118	76	v	v	v v v
119	77	w	w	w w w
12Ø	78	x	x	x x x
121	79	y	y	y y y
122	7A	z	z	z z z
123	7B	{	{	
124	7C	|	|	
125	7D	}	}	
126	7E	~	~	

Error Messages

If an error occurs while you are using the Silentype, the Apple stops executing or compiling your program and displays an error message. Error messages are designed to let you know when you have made a mistake. Although few errors occur as the result of statements referring to the Silentype, the following messages may be the result of an error related to the Silentype. For more information about error messages, refer to the Apple III Owner's manual and the Business Basic manual.

#33: Invalid control/status
An illegal number was specified in a SOS DCONTROL or DSTATUS call. Error code 33 ($21).

#34: Invalid control/status parameter
An attempt was made to load a font too large for the available space in the device driver. Error code 34 ($22).

#35: Device not open
An attempt was made to write to or close a device driver before it was opened. Error code 35 ($23).

#37: Resource not available
Some other driver is using the system; you must close that driver before using the .SILENTYPE. Error code 37 ($25).

#39: I/O ERROR
Can't find the left margin. The Silentype is not properly connected to the Apple. Error code 39 ($27).

#4Ø: Device disconnected
The Silentype is not properly connected to the Apple, or the SOS.DRIVER file does not include the .SILENTYPE driver. Error code 4Ø ($28).

If you still get a "device disconnected" or "can't find the left margin" error after you think you have eliminated its cause, take your printer to an authorized Apple Service Center for service.

B

For the Advanced Programmer

60 SOS Calls
60 DSTATUS Calls
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SOS Calls

You can use both DEVICE CONTROL and DEVICE STATUS SOS calls to alter the operation of your Silentype. The control code specified in the SOS call determines the effect of the call.

See the Standard Device Drivers manual for an explanation of SOS calls to devices and the device configuration block.

DSTATUS Calls

DSTATUS calls return the status of a particular device.

DSTATUS Ø: No operation.

DSTATUS 1: This SOS call reads the 17 bytes of the device configuration block of the .SILENTYPE driver, and stores them in a SOS-supplied buffer. (See DCONTROL 1 below.)

DSTATUS 2: No operation.

DCONTROL Calls

DCONTROL calls specify that a control function be performed upon a particular device.

DCONTROL Ø: Coldstart reset of the printer. The printer is reinitialized: the print head moves to the left margin and is recalibrated, and all printing parameters are reset to their default values.

DCONTROL 1: This SOS call reads the 17 bytes from the SOS-supplied buffer recently stored by a DSTATUS 1 call (see above) and restores the buffer contents to the device configuration block.

DCONTROL 2: No operation.

DCONTROL 3: Warmstart reset of the printer. The print head moves to the left margin and is recalibrated. The printing parameters are not altered.

DCONTROL 4: Update width expansion table.

DCONTROL 5: This SOS call changes the print intensity, by saving the 6-byte control list in bytes 11 through 16 of the device configuration block.

You should not haphazardly change the print intensity or you may possibly damage your Silentype's print head.

DCONTROL 6: Font download.

DCONTROL 7: Enter graphics mode.

The Device Configuration Block

Every device driver has a device configuration block that contains information about how the device operates. The .SILENTYPE device driver contains a 17-byte device configuration block that stores the default values of the Silentype's operating parameters. Whenever the printer is reinitialized or reset from a cold start, the values of this 17-byte block are read, and the operation of the Silentype is altered to match.

The information in the device configuration block is temporarily changed whenever you issue a printer command (such as boldface printing), or issue a DCONTROL 1 or DSTATUS 1 call. The information is restored to its default condition whenever you initialize or reset the printer. The only way to alter the information permanently (so that the default operating parameters change), is through the System Configuration Program on your Utilities diskette.

To use the device configuration block, boot the Utilities diskette. Using the System Configuration Program, load the SOS.DRIVER file. Then, choose option 3 (Edit Driver Parameters) from the System Configuration Program menu. When prompted

Enter Number of Driver to be Edited:

type the number that appears to the left of the word .SILENTYPE in the upper left corner of the screen. You should see the parameters of the .SILENTYPE device driver displayed on the screen. When asked

Edit which item?

enter the number 5 (Configuration Block data). The device configuration block should appear as shown in Figure B-1.

```
[ØØ]  [ØØ]  [ØC]  [ØØ]  [EA]  [Ø1]  [Ø1]  [Ø6]
[ØØ]  [ØA]  [1B]  [8Ø]  [ØA]  [8Ø]  [Ø2]  [ØØ]
[Ø2]
```

Figure B-1. .SILENTYPE Device Configuration Block.

The following paragraphs explain the function of each byte of the device configuration block.

Byte Ø [ØØ] : Current font number.

Byte 1 [ØØ] : Bit 7 specifies bold mode if set, the other seven bits specify values of character width expansion.

Bytes 3 and 2 [ØØ] [ØC] : Position of the left margin, measured in print head steps.

Bytes 5 and 4 [Ø1] [EA] : Distance to the right margin from the left, measured in print head steps. Defaults to 48Ø to provide space for 8Ø characters of the standard font on one line.

Byte 6 [Ø1] : Intercharacter spacing, measured in step increments.

Byte 7 [Ø6] : Interline spacing, measured in motor steps. This is the number of motor steps in a line feed.

Byte 8 [ØØ] : Bit 7 specifies uni-directional mode if set; bi-directional if clear. Bit 2 specifies line clipping if set; no line clipping if clear. Bit 1, if set, specifies that the Silentype generate a line feed after each carriage return; if clear, only a carriage return.

Byte 9 [ØA] : Form feed length. This is the number of line feeds in a form feed.

Byte A [1B] : This is the ASCII value of the initial character of a printer command sequence. $1B equals 27, the ASCII code for ESCAPE.

Bytes B-1Ø [8Ø] [ØA] [8Ø] [Ø2] [ØØ] [Ø2] : These six bytes control the print intensity.

These six bytes should NOT be changed to values other than those listed in Appendix A--you might damage the print head.

To change the value of one of the bytes in the device configuration block, move the cursor to that byte, then type the new value.

When the screen first displays the device configuration block, the cursor (a pair of square brackets) is positioned around the first byte in the block. Use the four arrow keys on the Apple keyboard to move the cursor to the byte you wish to change.

When the cursor is positioned correctly, type the new value, which is two characters, each one being a digit from Ø to 9 or a capital letter from A to F. Type the characters of the new value and press RETURN. The Apple updates the configuration block and moves the cursor automatically to the next byte.

You may now change the value under the cursor by typing the new value as you did before, or you may move the cursor to another value by using the four arrow keys. When you have changed all of the values you want to revise in the configuration block, press ESCAPE to return to the parameter display.

C

Transferring the .SILENTYPE Driver

66 Loading your Current SOS.DRIVER
67 Generating a New SOS.DRIVER
67 Changing All Boot Diskettes
68 Changing the Device Name

To use the Silentype printer with any of your boot diskettes other than the one that comes with the printer, you need to transfer the .SILENTYPE device driver to the SOS.DRIVER for each boot diskette.

To add .SILENTYPE (or any other device driver) to a SOS.DRIVER file, use the System Configuration Program on your Apple III Utilities diskette. The Apple III Owner's Guide describes the procedure for using the System Configuration Program. You may also need to refer to the Apple III Device Driver's manual.

Loading Your Current SOS.DRIVER

This section of the manual assumes that you have successfully booted the Apple III Utilities diskette, have selected the System Configuration Program, and are looking at its menu on the Apple III screen. To add the .SILENTYPE device driver to the SOS.DRIVER file, you need to load the current SOS.DRIVER file into memory. Choose option 1 (Add a Driver File) by typing a 1 and pressing the RETURN key. The screen shown in figure C-1 appears on your Apple's screen.

Figure C-1. Current Driver Configuration.

Remove the Utilities diskette from the built-in disk drive and insert a boot diskette, such as the Business BASIC diskette. Type

.D1/SOS.DRIVER

and press RETURN. The Apple reads the SOS.DRIVER file from your boot diskette and loads it into memory. In the upper left corner of the screen, the Apple lists the device drivers currently in the SOS.DRIVER file.

Adding the .SILENTYPE Driver

Remove your boot diskette from the disk drive and insert the copy you made of the diskette that came with your Silentype printer. Type

.D1/SILENTYPE

and press RETURN. The Apple reads the .SILENTYPE device driver from the diskette and adds it to the other drivers in memory. Notice that the list of drivers in the upper left corner of the screen now includes the driver name .SILENTYPE. Press the RETURN key to return to the main menu for the System Configuration Program.

Generating a New SOS.DRIVER

Now that the .SILENTYPE device driver is in your Apple's memory, you can save a new SOS.DRIVER file on your boot diskette. Remove your Silentype diskette from the built-in disk drive and insert the Utilities diskette. Select option 5 (Generate New System) by typing a 5 and then pressing the RETURN key. The Apple will ask you:

[Perform system validity check? (Y/N) ?

Type Y (for yes). The Apple will check the validity of the configuration you've created, then ask you to:

[Enter Driver File Name:

Remove the Utilities diskette from the disk drive and insert your boot diskette. Type

.D1/NEW.DRIVER

and press RETURN. The new system driver file, NEW.DRIVER, will be written onto the diskette. NEW.DRIVER is just a temporary name for your new system driver file. You can use any temporary name you like as long as there is not a file by that name already stored on the diskette.

The Apple asks you again to:

[Enter Driver File Name:

Ignore the request and reboot the diskette. For a BASIC boot diskette, type

```
RENAME .D1/SOS.DRIVER, .D1/OLDSOS.DRIVER
RENAME .D1/NEW.DRIVER, .D1/SOS.DRIVER
```

These commands retain your old SOS.DRIVER file, but rename it OLDSOS.DRIVER. This way, if you want a SOS.DRIVER file that doesn't contain a Silentype driver, you can use OLDSOS.DRIVER. Your newly generated system driver file, NEW.DRIVER, is renamed as SOS.DRIVER. Now, whenever you boot this diskette, you can use your Silentype printer with your Apple.

Changing All Boot Diskettes

While you're using the System Configuration Program, you may want to incorporate the .SILENTYPE device driver into the SOS.DRIVER file on all of your boot diskettes. Repeat the steps described above for each boot diskette you want to use with the Silentype. You don't have to add the .SILENTYPE driver to any diskettes that are not boot diskettes or to any diskettes you don't intend to use with the Silentype.

Changing the Device Name

If the Silentype is the only printer you will be using with your Apple III, you may want to change the name of the device driver from .SILENTYPE to .PRINTER. One small but persistent reason is that .PRINTER is easier to type than .SILENTYPE. Another reason is that the change could increase the ease of using your Silentype with programs other people write. For example, programmers sometimes use the name .PRINTER when they don't know what type of printer the user will have. So their programs look for a device named .PRINTER.

The Standard Device Drivers manual explains how to use the System Configuration Program to change a device name.

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Control Sequences

In the following table, {char} indicates that some character must follow the printer command. The ASCII value of the character should be within the range given in the 'Possible Values' column of the table.

Function	Printer Command	Default Value	Possible Values
Print buffer	CONTROL-F CHR(6)		
Backspace	CONTROL-H CHR(8)		
Line feed	CONTROL-J CHR(1Ø)		
Form feed	CONTROL-L CHR(12)	1Ø line feeds	Ø-15
Carriage return	CONTROL-M CHR(13)		
Reverse line feed	CONTROL-N CHR(14)		
Boldface printing	ESCAPE-B (On) ESCAPE-b (Off)	Off	
Line clipping	ESCAPE-C (On) ESCAPE-c (Off)	Off	
Expanding the carriage return	ESCAPE-E (On) ESCAPE-e (Off)	Off	
Font change	ESCAPE-F{char}	Ø	Ø-8
Horizontal tab	ESCAPE-H{char}		Ø-255

Silentype Reference Card Apple III

Control Sequences

In the following table, {char} indicates that some character must follow the printer command. The ASCII value of the character should be within the range given in the 'Possible Values' column of the table.

Function	Printer Command	Default Value	Possible Values
Print buffer	CONTROL-F CHR(6)		
Backspace	CONTROL-H CHR(8)		
Line feed	CONTROL-J CHR(10)		
Form feed	CONTROL-L CHR(12)	10 line feeds	0-15
Carriage return	CONTROL-M CHR(13)		
Reverse line feed	CONTROL-N CHR(14)		
Boldface printing	ESCAPE-B (On) ESCAPE-b (Off)	Off	
Line clipping	ESCAPE-C (On) ESCAPE-c (Off)	Off	
Expanding the carriage return	ESCAPE-E (On) ESCAPE-e (Off)	Off	
Font change	ESCAPE-F{char}	0	0-8
Horizontal tab	ESCAPE-H{char}		0-255

Function	Printer Command	Default Value	Possible Values
Margins: left right	ESCAPE-J{char} ESCAPE-K{char}	position 2 position 81	0-81 1-82
Vertical tab	ESCAPE-V{char}		0-255
Wide printing	ESCAPE-W{char} ESCAPE-w (Off)	Off	0-7
Intercharacter spacing	ESCAPE-.{char}	1 head step	1-15
Interline spacing	ESCAPE-^{char}	6 motor steps	0-15
Restore defaults	ESCAPE-=		
Print direction	ESCAPE-> Uni-directional ESCAPE-<	Bi-directional	
Initial character	ESCAPE-?{char}	ESCAPE CHR(27)	(!)

PSCREEN

Bit	Status	Effect
Ø	On	8Ø-column (text) or 56Ø by 192 (graphics)
	Off	4Ø-column (text) or 28Ø by 192 (graphics)
1	Off	
2	On	Screen font (text) or page 2 (graphics)
	Off	Standard Silentype font (text) or page 1 (graphics)
3	On	Rotated
	Off	Unrotated
4	On	Graphics
	Off	Text
5	On	Double-sized printing
	Off	Normal-sized printing
6	On	White on black
	Off	Black on white
7	On	Bi-directional printing
	Off	Uni-directional printing

Raw Graphics

Use ESCAPE-G to enter raw graphics mode.

Bits 7 6 5 4 3 2 1 Ø	Effect
1 x x x x x x x	Print a column of dots (as specified by xxxxxxx), in the current print direction.
Ø Ø d d n n n n	Move print head or paper nnnn steps in direction dd. ØØ=left, Ø1=right, 1Ø=paper up, 11=paper down.
Ø 1 Ø Ø Ø Ø Ø Ø	Initialize raw graphics mode.
Ø 1 Ø Ø Ø Ø Ø 1	Recalibrate.
Ø 1 Ø Ø Ø Ø 1 Ø	Set print direction to left-to-right.
Ø 1 Ø Ø Ø Ø 1 1	Set print direction to right-to-left.
Ø 1 Ø Ø Ø 1 Ø Ø	Reverse print direction.
Ø 1 Ø Ø Ø 1 1 Ø	Lock print head.
Ø 1 Ø Ø Ø 1 1 1	Lock paper motor.
Ø 1 Ø Ø 1 Ø Ø Ø	Exit raw graphics mode.

Silentype III

Apple intends to print an improved version of this manual in a few months. To receive the final version at no cost, complete this prepaid card and mail it to Apple. For questions 1-8, circle your answer. Your response will be considered for revisions of the manual.

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