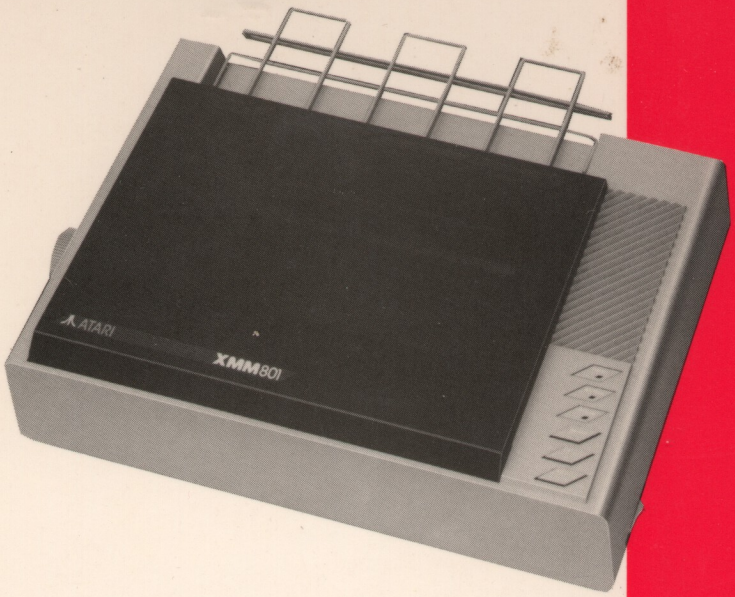
ATARI® XMM801™

Dot-Matrix Graphics Printer



OWNER'S MANUAL

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Dot-Matrix Graphics Printer

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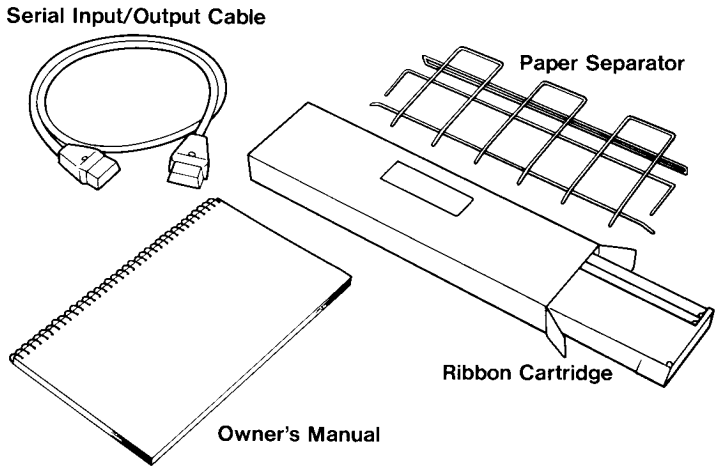
CHAPTER 1
GETTING STARTED

UNPACKING INSTRUCTIONS

1. Using both hands, lift the printer in its foam packing out of the box.

2. Place the printer on a firm, flat surface and remove the foam packing and the plastic bag from the printer. Locate and remove the ribbon cartridge that is packed within one of the foam panels.

3. Included with your XMM801 Printer are a ribbon cartridge, a paper separator, a black serial input/output cable, an owner's manual, and a warranty card. Make sure you have received all these items.



Note: Save all packing materials for storing or transporting your printer.

4. Remove the top cover from the printer by slipping your hand under the cover and lifting it up and away from the printer. Then remove the tape and foam packing from the print head inside the printer.

5. Lift the printer up from the front and rest it on its back panel. Unscrew and remove the two shipping screws. Replace the top cover.

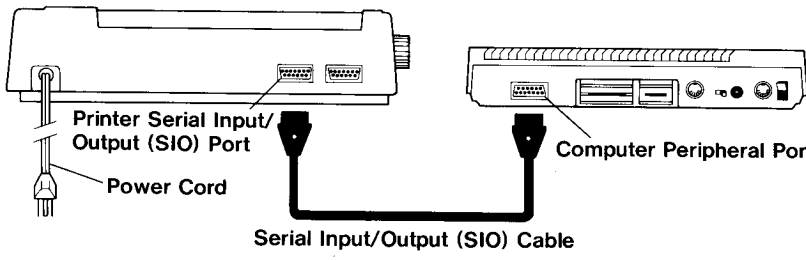
CONNECTING THE PRINTER

Choose the right working environment for your printer and for your entire computer system. Avoid places that would expose the components to dust, grease, or extreme temperatures. Lay your printer on a firm, flat surface.

To connect the printer to your computer system, follow these steps:

1. Turn off all parts of your ATARI Personal Computer System. Remove the diskettes from your disk drives and turn off all the power from your ATARI Personal Computer System.

2. Plug one end of the black serial input/output (SIO) cable that came with your printer into the peripheral port of your computer or into another peripheral in your system.



3. Plug the other end of the cable into one of the ports marked SIO on the back panel of the printer.

4. Make sure the printer is turned off. (The on/off switch is on the right side of the machine.) Then plug the power cord into a wall outlet or a power strip.

RIBBON CARTRIDGE

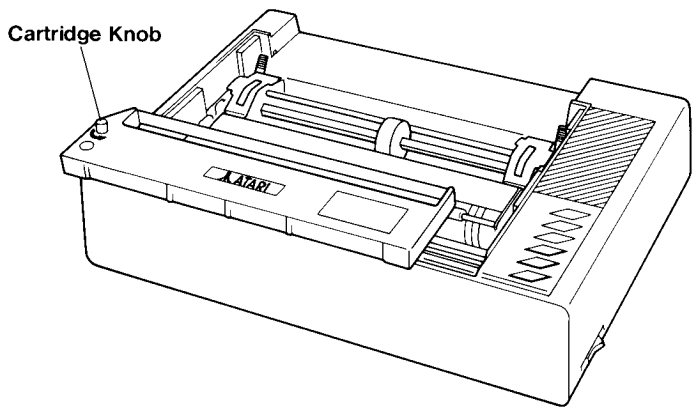
Your printer comes with a cartridge containing a long-lasting carbon-film ribbon that provides excellent print quality. The ribbon lasts longer because the film can withstand repeated strikes from the print head so that the same spot on the ribbon prints many characters, not just one.

The special size and shape of the cartridge is designed specifically for the XMM801 Printer. Replacement ribbons like the one packed with your printer are available from your ATARI Computer retailer.

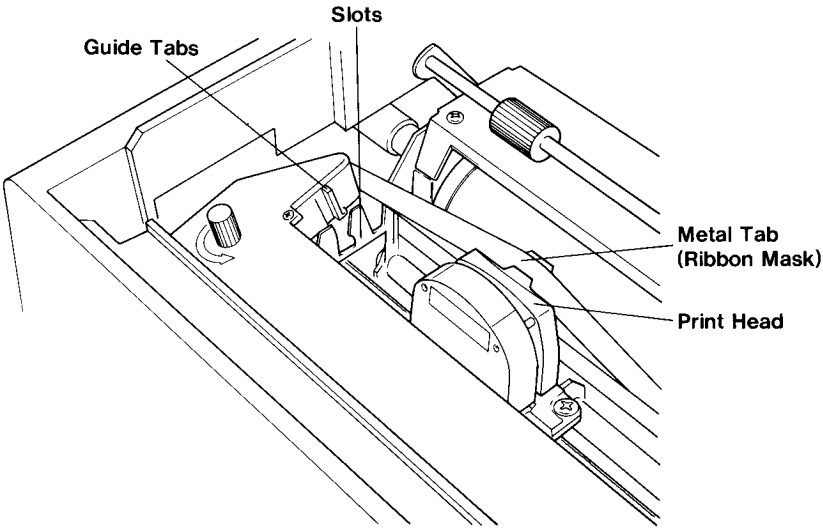
To install the ribbon, refer to the diagram on the cartridge and follow these steps:

1. Make sure the printer is turned off and remove the top cover from the machine. Take the ribbon cartridge out of its box.

2. Lay the cartridge down so that the side with the knob is facing up and the exposed portion of the ribbon is at the top. Turn the knob counterclockwise to remove any slack in the exposed ribbon. Grasp the cartridge through the opening between the exposed ribbon and the side that is directly across from the exposed ribbon. Notice the two guide tabs on either side of the cartridge.



3. Placing the bottom part in first, lower the cartridge into the printer. Allow the guide tabs to fall into their slots and gently push down on the cartridge until it snaps into place. Slip the exposed portion of the ribbon between the print head and the metal tab (ribbon mask) that lies against the platen. Again use the cartridge knob to remove any slack in the ribbon.



4. To remove the ribbon, lift up the top part of the cartridge until the guide tabs are free of their slots. Then lift the whole cartridge out of the printer.

Warning: The printer has no mechanism to alert you if the ribbon has run out or if the cartridge has not been installed. You can tell that the ribbon is used up when the characters on your printouts are too light. If the ribbon cartridge is not feeding unused portions of ribbon, it has been installed incorrectly.

LOADING PAPER

The printer accepts pin-feed computer paper as well as single sheets of regular paper. These types of paper feed into the printer in different ways: with pin-feed sprockets or with friction (like a typewriter).

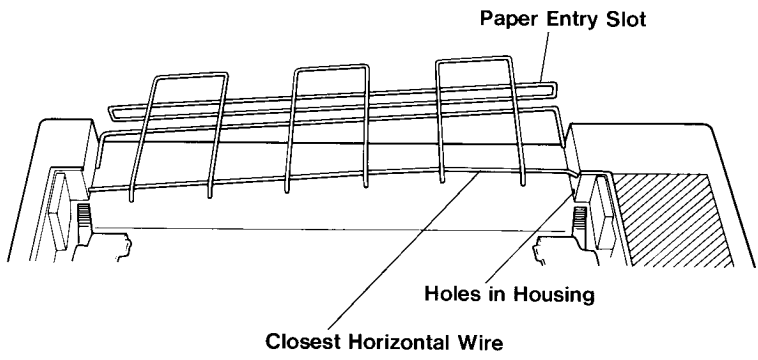
Loading Pin-Feed Paper

Pin-feed paper has punched holes down both sides. These holes fit over the printer's paper-feed sprockets, which move the paper through the printer. Pin-feed paper also comes prefolded along perforated edges to accomodate the continuous movement of paper into the printer, through the machine as it prints, and out the paper exit. This computer paper is available at your ATARI Computer retailer.

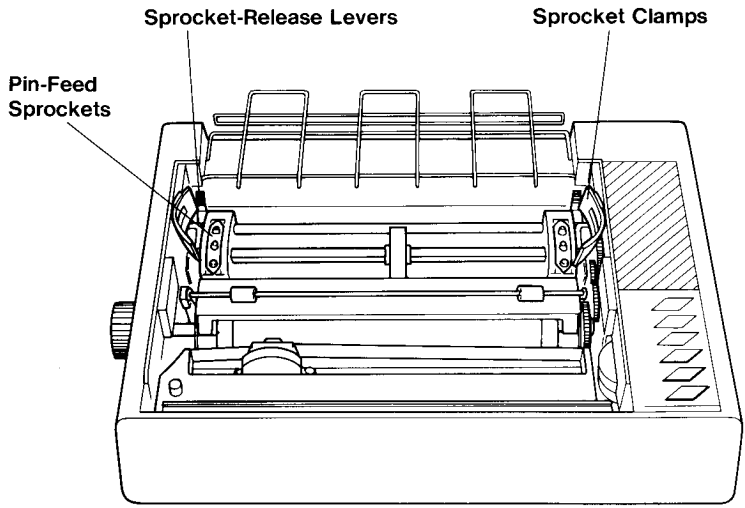
The following step-by-step instructions explain how to load pin-feed paper:

1. Remove the top cover from the printer and unpack the wire paper separator.

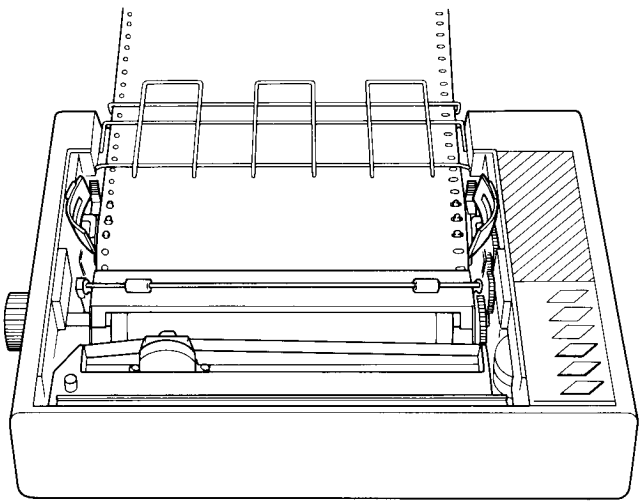
2. Hold the paper separator parallel to the top of the printer so that the paper entry slot faces downward. The side with the slot should be the side that is farthest away from you. Place both ends of the horizontal wire that is closest to you into the holes in the housing of the printer. The rest of the paper separator extends out beyond the back of the printer.



3. Lift the sprocket clamps. Unlock both sprocket-release levers by pulling them toward you. Notice that once you unlock the sprockets you can move them freely along their guide shaft.



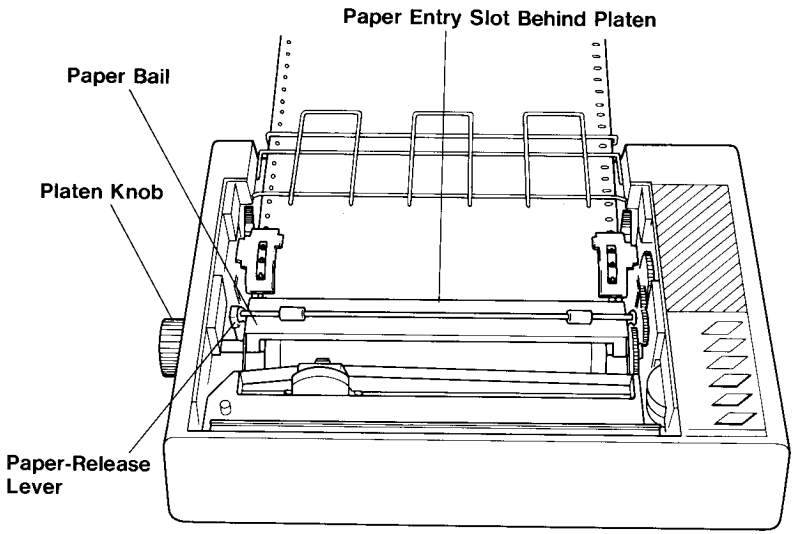
4. Insert the leading edge of the paper through the entry slot on the paper separator. Then slide the paper under the separator and up to the sprockets. Move the sprockets along their guide bar until the paper holes and sprocket pins are aligned.



5. Close the sprocket clamps to secure the paper. If necessary, slide the sprockets away from each other on both sides to remove the slack. Push the sprocket-release levers to the locked position (away from you).

6. Lift the paper bail. Flip the paper-release lever up to its friction position. (Friction is used to advance pin-feed paper only during loading and unloading.) Turn the platen knob counterclockwise to advance the paper through the slot at the back of the platen.

7. Continue to advance the paper under the platen, then up to, under, and beyond the paper bail. Once the paper is beyond the paper-bail rollers, return the paper bail to its down position. Return the paper-release lever to the down (pin-feed) position indicated by the arrow on the lever.



Aligning Pin-Feed Paper

Notice the red markings on the paper bail. Together they represent the margins of a full eight-inch printed line. The left ring marks the far left margin; the right ring marks the far right margin. The printer cannot print a longer line. When you are aligning the paper for printing, use these two red markings as reference points.

Setting the Top of the Page

The printer has no special operation or instruction to establish where each new page will begin on pin-feed paper. The top of the page is set at the position of the print head when you turn on the printer. To avoid any problems, be sure to line up the desired top-of-page position with the print head before you turn on the printer.

Paper Supply and Paper Exit

When you are using pin-feed paper, situate your printer so that its paper supply lies directly below and parallel to the printer. If you do not have a printer stand, place your printer near the edge of a desk or table, position the box of pin-feed paper under the table, and bring the leading edge of the paper supply up to the printer and through the paper entry slot on the paper separator. Let the paper exit atop the paper separator and spill over the edge of the table onto the floor.

Warning: Do not allow the exiting paper to pile up on the unprinted paper as it enters the machine. If the exiting paper is pulled back into the printer, it will jam the paper-feed mechanism and possibly damage the printer.

Unloading Pin-Feed paper

To remove pin-feed paper, move the paper-release lever to the friction position (down) and turn the platen knob clockwise until the leading edge of the paper clears the paper separator.

Loading Single-Sheet Paper

Because your printer accepts single-sheet paper, you can use typing paper, personal or business stationery, or any other single sheet of paper that is unavailable in pin-feed form.

Loading a single sheet of paper into your printer is much like loading paper into a typewriter. Follow these steps:

1. Pull the sprocket-release levers toward you to unlock the pin-feed sprockets. Move the sprockets out of the way by sliding them over to the sides as far as possible, one to the right and one to the left. Then lock the sprockets in place.

2. Flip the paper-release lever to the up position (the opposite direction indicated by the arrow on the lever) so the friction will feed the paper into the printer. Move the paper bail up and away from the platen.

3. Insert the paper through the paper slot behind the platen. Use the platen knob to bring the paper under the platen, then up to, under, and beyond the paper bail. Return the paper bail to its down position.

Aligning Single-Sheet Paper

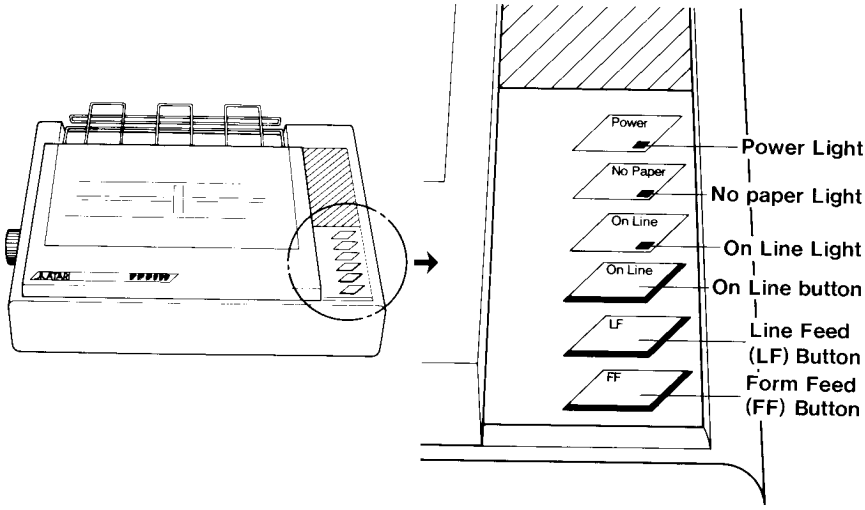
To align a single sheet of paper once it has been loaded, use the paper-release lever just as you would on a typewriter. After you have repositioned the paper, return the lever to the up (friction) position. Use the red markings on the paper bail as reference points when you align the paper.

Unloading Single-Sheet Paper

To remove a single sheet of paper, turn the platen knob counter-clockwise until the paper comes out of the printer.

THE CONTROL PANEL

Typically you'll be using your computer to tell your printer what to do. However, the printer itself has a few built-in features represented on the control panel.



Indicators

Power: Whenever the power to the printer is on, the red Power light is illuminated. It stays on until you turn the printer off. The on/off switch is located on the right side of the machine.

No Paper: Your printer is equipped with a paper-out sensor. When the printer is just about to run out of paper, the No Paper light goes on, a high-pitched buzzer sounds, and the printer stops printing (the printer goes off-line). After replenishing the paper supply, the No Paper light will go off, but the printer remains off-line until you press the On Line button. The paper-out sensor will also alert you if you turn on the printer without having loaded the paper first.

On Line: This light is illuminated when the printer is ready to receive instructions from the computer. It blinks when the printer is receiving instructions and when it is printing. The light goes off when the printer is off-line.

Controls

On Line: This button switches the printer from on-line to off-line and vice versa. When the printer is on-line, it is ready to receive printing instructions from the computer. When it is off-line, it cannot receive signals from the computer but can perform the other control-panel functions.

Line Feed (LF): Pushing this button advances the paper one line. Holding down the Line Feed button advances the paper continuously until you release the button. This function provides a handy way to remove a single sheet of paper from the printer. The Line Feed button works only when the printer is off-line.

Form Feed (FF): Depressing this button moves the paper forward one entire page length. This function provides a convenient way for you to advance and tear off a completed page from the printer. The printer must be off-line for the Form Feed button to work.

Self-Test Printing

Your XMM801 Printer features a self-test function. When you turn the printer on in a certain way, the printer automatically prints out its set of characters. It will continue the test until you turn the printer off. To activate the self test, follow these steps:

1. Make sure that the ribbon cartridge is installed correctly and that the paper is loaded properly.

Warning: Do not turn on the machine before you remove the tape on the carriage and the two shipping screws on the bottom panel of the printer.

2. Turn on the printer and depress the Line Feed (LF) button on the control panel *simultaneously.*

3. Watch it print!

4. When you've seen enough, turn the printer off.

Warning: Do not touch the top of the print head. The surface gets hot when the print head has been operating.

The purpose of this test is to insure that the printer is in good working order. Examine the self-test printout carefully. The print quality and the spacing between characters and between lines should be consistent. If you find inconsistencies, check whether the ribbon is installed correctly and whether the paper is loaded properly. If the problem persists, please contact your ATARI Computer retailer or an authorized ATARI Service Center.

CHAPTER 2
TWO WAYS TO PRINT

Self-test printing is not the most productive use of your printer. There are two ways to use your printer in conjunction with your computer: by printing from original programs that you have written in a programming language, such as ATARI BASIC, and by printing from prepackaged applications software, such as the AtariWriter™ or AtariWriter Plus™ word processing programs.

PRINTER COMMANDS IN BASIC

If your printer is connected to an ATARI 400™, 800™, or 1200XL™ Computer, first insert a BASIC cartridge, then turn on your computer, printer, and video display. If you are using an ATARI 600XL™, 800XL™, or any XE™ Computer, you are in BASIC as soon as you switch on your computer (provided, of course, you have not inserted some other software cartridge).

Note: the computer will not act on any BASIC statement, nor will it enter any BASIC statement into its memory, until you press [RETURN]. *Remember to press the* [RETURN] *key on your computer keyboard at the end of each BASIC statement.*

LPRINT

The most common way to send BASIC instructions to a printer is through the LPRINT command (short for LINE PRINT). Using LPRINT, you can send straight text and other sorts of instructions. For now the discussion will concentrate on straight text.

The following example shows how the LPRINT command works. Type the statement.

```
10 LPRINT "MY COMPUTER COMMUNICATES WITH MY
PRINTER."
```

When you type RUN and press [RETURN], the printer prints

```
MY COMPUTER COMMUNICATES WITH MY PRINTER.
```

You can also use the LPRINT command to tell the printer to advance a line without printing anything. Just type LPRINT without anything after it. For example:

```
10 LPRINT "LINE 20 TELLS THE PRINTER TO ADVANCE ONE
LINE."
20 LPRINT
30 LPRINT "I TOLD YOU SO."
RUN
```

The printer responds:

```
LINE 20 TELLS THE PRINTER TO ADVANCE ONE LINE.
```

(Now the printer advances a line.)

```
I TOLD YOU SO.
```

Your computer understands BASIC commands such as LPRINT only if they are typed in capital letters. In BASIC, words that appear on your screen must be typed in capital letters, unless they are to be printed and are enclosed in quotation marks. To print lowercase letters, press the [CAPS] key, then type the letters between the quotation marks:

```
10 LPRINT "to print lowercase letters, type them
between quotation marks."
RUN
```

The printer will print

```
to print lowercase letters, type them between
quotation marks.
```

To go back to capital letters, press [CAPS] again. (If you're using an ATARI 400 or 800 Computer, you must hold down the [SHIFT] key and press [CAPS] to return to capital letters.)

Note: You can abbreviate LPRINT by typing LP and a period (LP.). The abbreviation works just like LPRINT:

```
10 LP. "I CAN ABBREVIATE LPRINT BY TYPING LP."
RUN
```

The printer prints

```
I CAN ABBREVIATE LPRINT BY TYPING LP.
```

LIST "P:"

This command instructs your computer to print out your BASIC program on the printer instead of displaying it on the video display screen (compare with LIST in your computer manual).

For example, type

```
10 LPRINT "WOULD YOU CHECK MY PROGRAM?"
20 LPRINT "I'LL PRINT OUT A COPY FOR YOU."
```

Then type

```
LIST "P:"
```

The printer responds:

```
10 LPRINT "WOULD YOU CHECK MY PROGRAM?"
20 LPRINT "I'LL PRINT OUT A COPY FOR YOU."
```

PRINT # and OPEN

Another way to send instructions to your printer is to use the PRINT # command. Although similar to LPRINT, PRINT # has its own distinguishing characteristics.

To send a PRINT # command, you must first open an input/output channel to the printer. Your computer uses channels called "input/output control blocks" (IOCBs) to communicate with other components in your system. To open one of these channels, you must use an OPEN command.

The OPEN command links a channel, or an IOCB, to a specific device, such as your printer. The statement consists of the word OPEN followed by four elements that define your intended action.

For example:

```
10 OPEN #2,8,0,"P:"
```

The first number after OPEN assigns the channel number. This program is using channel 2. There are eight channels in all, numbered 0 through 7. Channels 1 through 5 are completely available for your use when you write BASIC programs. BASIC reserves channels 0, 6, and 7 for specific activities. (For instance, an LPRINT command automatically opens channel 7.)

The second number in the OPEN statement specifies the kind of action that will be allowed on the channel. The number 8 indicates output only, which is the kind of action you want because your computer will be sending out data to your printer. The third number is permanently reserved for uses with other devices but must be included to maintain the proper four-part form of the statement; because this program uses the printer, this number must be 0. The fourth element in the OPEN statement specifies the device that the computer will be using. In this case, "P:" represents the printer.

Subsequent PRINT #2 statements specify output to the printer.

For example:

```
10 OPEN #2,8,0,"P:"
20 PRINT #2;"THIS CHANNEL IS OPEN FOR OUTPUT TO THE
PRINTER."
```

As soon as you type RUN and press [RETURN], your printer will print

```
THIS CHANNEL IS OPEN FOR OUTPUT TO THE PRINTER.
```

It is important to remember that the OPEN command will always look like line 10 when you want to specify output to the printer. The single change you can make is to substitute a different channel number (1 through 5) for channel 2.

One advantage in using the PRINT # command instead of the LPRINT command is that you can print a line without an automatic carriage return and line feed. LPRINT always returns the carriage to the left margin and advances the paper one line at the end of the program line. However, when you use the PRINT # command and place a semicolon at the end of the program line, the carriage will not return, nor will the paper feed a line.

For example:

```
10 OPEN #2,8,0,"P:"
20 PRINT #2;"TESTING";
30 PRINT #2;"123";
40 PRINT #2;"TESTING";
50 PRINT #2;"123"
```

When you run this program, the printer will print

```
TESTING123TESTING123
```

Though it doesn't seem like much now, this feature of the PRINT # command will be used in the next chapter to send special instructions to the printer.

Note: You can abbreviate the PRINT # command by typing a question mark (?) in place of PRINT. For example, using the abbreviation for PRINT in the previous program, line 50 would read.

```
50 ? #2;"123"
```

This section is just an introduction to the general form of PRINT # and OPEN commands. The programs in the next chapter use these commands more productively. (For a detailed explanation of the PRINT # and OPEN commands, refer to the *ATARI BASIC Reference Manual.*)

CLOSE

This command closes channels that were opened by an OPEN command. Once opened, a channel stays open until the end of the program or until you use a CLOSE statement to close it.

The next example explicitly closes the channel that the previous program had opened:

```
50 CLOSE #2
```

Channel 2 is now closed.

THE CHR$(nn) FUNCTION

Every character that your XMM801 Printer can print has a decimal equivalent. The characters can be expressed as these decimal numbers. When you send a decimal number to the printer, the printer will type the corresponding character. The standard correspondence between decimal codes and characters is known as ASCII (American Standard Code for Information Interchange). The 128 ASCII characters and decimal codes are given in Appendix B, the ATASCII Table.

In BASIC, you can send the decimal codes to the printer via the CHR$(*nn*) function, in which *nn* is the decimal number of any given character.

For example:

```
10 LPRINT CHR$(65);CHR$(66);CHR$(67);
```

Decimal code 65 stands for the letter A, 66 represents B, and 67 corresponds to C. When you type RUN and press **[RETURN]**, the printer will print.

```
ABC
```

CHR$(*nn*) functions work within LPRINT and PRINT # command lines, but they must not be inside quotation marks. If you type a CHR$(*nn*) function inside print-statement quotation marks, the printer will print the CHR$(*nn*) notation itself—like any other series of characters between quotation marks—instead of carrying out the CHR$(*nn*) function.

Still, within the same print statement you can mix CHR$(*nn*) functions and text that is enclosed between quotation marks:

```
10 LPRINT CHR$(65);" IS THE FIRST LETTER OF THE
ALPHABET."
RUN
```

The printer will print

```
A IS THE FIRST LETTER OF THE ALPHABET.
```

The CHR$(*nn*) function is particularly useful for printing otherwise unavailable characters, such as quotation marks within print statements. You cannot type quotation marks within a print statement and expect to have them print out, because quotation marks are part of the print command. To print out quotation marks, use the CHR$(*nn*) function and type decimal code 34 (which is the decimal code for quotation marks) in place of *nn*.

THE XMM801 PRINTER AND ATARIWRITER

One of the more valuable tasks that your XMM801 Printer can help you tackle is word processing—using your computer to write letters, term papers, and business reports.

The AtariWriter and AtariWriter Plus word processing programs make writing faster and easier. You can arrange your written work in virtually any format. You can correct, add, delete, and rearrange text neatly and efficiently. And you can store your work on diskette or cassette for later reference and revision. Because your XMM801 printer connects directly to your ATARI Computer, you can take advantage of the speed, storage convenience, and versatility of the AtariWriter word processing program—then send your work directly to your printer.

The XMM801 has been designed for compatibility with the AtariWriter programs. There are only a few extraordinary formatting requirements. On the whole, you need only follow the AtariWriter manuals.

When you print your work, you can use any printer option in the AtariWriter menu, but the ATARI 825™ printer option is most compatible.

The XMM801 Printer has certain features that AtariWriter cannot implement explicitly. For instance, AtariWriter has no formatting instruction for boldface print yet the printer can print boldface characters. To activate a printer feature such as boldface characters, use the Control O command in AtariWriter. (See your AtariWriter manuals for details. You need not use a special printer option when you use the Control O command with your XMM801 Printer.)

CHAPTER 3
PRINTER CONTROL

When you turn on the XMM801 Printer, the machine performs a few opening routines and prepares itself to print according to a set of "default," or preselected, instructions. For example, it will automatically print pica characters and 66 lines per page. The following table gives you the printer's "power-up" routine and lists its default condition:

XMM801 Printer's Power-Up Routine and Default Condition

- The printer goes on-line, unless it is out of paper.
- The carriage returns to the "home" (far left) position.
- The left margin is set at horizontal position 0.
- Horizontal tab stops are set at intervals of eight character spaces across every line.
- All vertical tab stops are cleared if any were previously set.
- The character pitch is set at pica (10 characters per inch).
- Line spacing is set at 1/6 inch (six lines per inch).
- The page length is set at 66 lines (11 inches).
- The top of the page (the place on the paper where the printer will start every new page) is set at the position of the print head.
- The printer buffer is cleared.
- All special print and formatting instructions are cleared if any were previously in use.
- The printing direction is bidirectional.
- The character set is noninternational.
- The paper-out sensor is active.

You can override the printer's default print instructions by sending certain control codes that your printer is programmed to accept from your computer. For instance, you can send a code that tells the printer to print boldface characters or that changes the page length. Printer control codes allow you to vary the printing format so that you have maximum flexibility in creating your writing work.

USING THE CHR$(nn) FUNCTION

Keystroking printer control codes in your programs has certain disadvantages. If you print out your program, neither the control characters nor the escape sequences will print. Blank spaces will appear in place of these characters, which is an obvious disadvantage if you want to review your program on paper.

The printer will also begin implementing the codes as it prints out the program. For instance, suppose you want to print out a copy of a program in which you have keystroked the code for boldface print. When the printer reaches the program line containing the code, it will print the rest of the program in boldface characters.

The way to get around this difficulty is to use the CHR$(*nn*) string function to send printer control codes in BASIC programs.

For example, the escape sequence for boldface characters is Escape E, and the decimal equivalents for Escape and E are 27 and 69. Using the CHR$(*nn*) function to send the code in BASIC, you would type

```
10 LPRINT CHR$(27);CHR$(69);
```

Alternatively, you could type

```
10 LPRINT CHR$(27);"E"
```

When the printer receives an escape character, it waits for at least one more character to follow; the printer "knows" that the E following CHR$(27) determines a function and should not actually be printed.

This alternative approach to expressing escape sequences in the CHR$(*nn*) function is much easier to remember. The Escape part of the sequence will always be 27, and you will more readily recall the following letter in the sequence than its corresponding decimal number.

The 128 ATASCII characters include both the printable characters (like the letter A) and control characters (like Control G). Consult Appendix B, the ATASCII Table for their decimal equivalents.

The decimal equivalents for all printer control codes (escape sequences and control characters) are listed in Appendix A.

Note: If you enter an undefined printer control code, the printer will simply ignore it.

The rest of this chapter covers all the XMM801 Printer's control codes and explains how to use the CHR$(*nn*) function to express them in BASIC programs. You should have at least an introductory knowledge of BASIC before you proceed any further.

PRINTER CONTROL CODES

To help you understand the printer control codes and locate the ones you may need when you are writing programs, the section **Print Action** discusses codes that affect the movement of the print head and the paper. **Formatting** contains codes that determine the way your printed pages will look, including the line length, page length, line spacing, and page breaks. The codes in **Character Pitch** specify the number of characters per inch, which influences the spacing between characters and the size of the characters. In **Print Style** are the codes that determine the style of the printed characters. The use of international characters is explained in **Character Set**. The last section, **Other Codes**, pertains mostly to the mechanical functions of the printer.

The discussion of each code begins with a chart. At a glance you can find the control character or the escape sequence for the code, its decimal equivalent to be used in the CHR$(*nn*) function, and the function that the code performs. After a brief description of the code, a sample BASIC program shows you how to send the code to the printer.

Control Characters and Escape Sequences

There are two basic types of printer control codes: *control characters and escape sequences* When you send these codes to your printer in BASIC programs, you can keystroke them in between quotation marks in print statements.

Control characters are produced by holding down the [CONTROL] key on your computer keyboard while you press another key *at the same time*. For example, the control character that sounds the printer's buzzer is Control G. You must hold down the [CONTROL] key and *simultaneously* press the [G] key. In BASIC, pressing [CONTROL G] causes the control character to appear on your video display screen.

Most printer control codes are escape sequences. Escape sequences consist of the escape character followed by one or more characters. For example, the code for elite print is Escape M. To enter the escape sequence into your computer, you must first press the [ESCAPE] key *twice*. In BASIC, pressing the [ESCAPE] key twice causes the escape graphics character to appear on your screen. Next you must enter the other character(s) in the escape sequence. In this case, M follows the escape character. So altogether, this escape sequence consists of the following keystrokes: [ESCAPE] [ESCAPE] [M].

Note: In the charts accompanying the printer control codes later in this chapter, some escape sequences contain variables. In the charts accompanying the printer control codes later in this chapter, an *italicized* lowercase letter designates a variable. If you are keystroking an escape sequence between quotation marks, do not simply keystroke the number that you are substituting for the variable. You must keystroke the character that will send the decimal value you want to insert. for instance, if you wanted to replace a variable with the number 10, you would keystroke **[CONTROL J]**. (See Appendix B, the ATASCII Table.)

However, in many instances, keystroking printer control codes in BASIC programs is not the best way to send the codes to your printer.

Print Action

Space

CODE	DECIMAL	FUNCTION
Space	32	Moves the carriage forward one character space.

This code causes the carriage to move forward one character space.

BASIC example:

```
5 REM : SPACE
10 LPRINT "SP";CHR$(32);"ACE"
20 END
```

The printer prints

```
SP ACE
```

Backspace

CODE	DECIMAL	FUNCTION
Control H	8	Backspaces one character

Everyone is familiar with the **[BACKSPACE]** key on a typewriter or a computer keyboard. When you press **[BACKSPACE]**, the carriage (in the case of a typewriter) or the cursor (in the case of a computer) moves backward one character space. The Backspace code for your printer functions in much the same way. When you send the Backspace code to the printer, the carriage moves back one character space, where it will print the next character. This function is useful for printing two characters on top of each other. The BASIC example uses the Backspace code to print ≠.

BASIC example:

```
5 REM : BACKSPACE: CONTROL H
10 LPRINT "X="CHR$(8)"/Y MEANS X IS NOT EQUAL TO
Y."
20 END
```

The printer will print

```
X≠Y MEANS X IS NOT EQUAL TO Y.
```

Line Feed

CODE	DECIMAL	FUNCTION
Control J	10	Advances the paper one line

The Line Feed code advances the paper one line. This code has the same effect as the Line Feed button, except that the instruction is sent from the computer. Because the line spacing is preset at six lines per inch when you turn on the printer, the Line Feed code moves the paper forward 1/6 inch. If you change the printer's default line spacing, the printer will execute the Line Feed code according to the new line spacing. The Line Feed code does *not* carriage return.

BASIC example:

```
5 REM : LINE FEED: CONTROL J
10 LPRINT "PERFORM A LINE FEED,OK?"CHR$(10)
"OK."
20 END
```

The printer will print

```
PERFORM A LINE FEED,OK?
                       OK.
```

Vertical Tab Set

CODE	DECIMAL	FUNCTION
Escape B; $n_1..n_2$; Control ,	27, 66; $n_1...n_2$; 0	Sets vertical tab stops (five maximum)

Unlike horizontal tab stops, vertical tab stops are not automatically preset when you switch on the Printer. With this code, you can set as many as five vertical tab stops. The *n* variables take line numbers as values. The line numbers must be sent to the printer in ascending numerical order. You must include Control , (decimal 0) at the end of

the end of the escape sequence. The vertical tab stops are reset each time you send this code. Sending Escape B Control with no variables will clear all vertical tabs. The form length (Escape C) must be set *before* vertical tab stops are set.

BASIC example:

```
5 REM : SET VERTICAL TAB : ESCAPE B CONTROL.
10 LPRINT CHR$(27);"B";CHR$(10);CHR$(20);
CHR$(30);CHR$(0);
20 END
```

Three vertical tab stops are set at lines 10, 20, and 30.

Formatting

Horizontal Tab

CODE	DECIMAL	FUNCTION
Control I	9	Tabs horizontally in increments of eight character spaces

The Horizontal Tab code moves the carriage to the next horizontal tab stop. When the power to the printer is turned on, tab stops are automatically set at every eight columns. The printer adjusts the tab stops to the character pitch in use.

BASIC example:

```
5 REM : HORIZONTAL TAB: CONTROL I
10 OPEN #1,8,0,"P:"
20 PRINT #1;"01234567890123456789"
30 FOR X=1 TO 4
40 PRINT #1;CHR$(9);"TAB";
50 NEXT X
60 CLOSE #1
70 END
```

The printer will print

```
01234567890123456789
        TAB      TAB      TAB      TAB
```

Set Print Column Width

CODE	DECIMAL	FUNCTION
Escape Q; *n*	27, 81, *n*	Sets the number of character spaces in a line

This code sets the number of printable character spaces across one line. When you decide on the line length, replace the *n* variable with the desired number of character spaces. The maximum number of character "columns" (one-character spaces) for each print style are listed in the following chart:

Pica	80
Double Width	40
Condensed	132
Double-Width Condensed	66
Elite	96
Double-Width Elite	48

Note: The *n* value must be greater than one but no more than the maximum number of columns given in the chart. The printer will ignore incorrect values.

BASIC example:

```
5 REM :SET COLUMN LENGTH: ESCAPE Q
10 REM : SETS COLUMNS ACROSS TO 10
20 LPRINT CHR$(27);"Q";CHR$(10);
30 LPRINT "01234567890123456789012345678901234
6789"
50 END
```

The printer will print

```
0123456789
0123456789
0123456789
0123456789
```

Skip Perforation

CODE	DECIMAL	FUNCTION
Escape N; *n*	27, 28, *n*	Skips perforation

When you are not using a word processing program and cannot tell the printer when to perform a page break, you can use this code to make the printer skip the end-of-page perforation in pin-feed paper. The Skip Perforation code is useful for printing long program listings.

The number you insert for the *n* variable tells the printer how many lines from the bottom of the page to skip. The value of *n* must be a number from 1 to 127. Because the value is stored as an absolute, you must reset the value each time you change the lines-per-page setting.

BASIC example:

```
5 REM : SKIP PERFORATION: ESCAPE N
10 REM : SKIPS FIVE LINES FROM BOTTOM OF PAGE
20 LPRINT CHR$(27);"N";CHR$(5);
30 FOR X=1 TO 70
40 LPRINT "SKIPS FIVE LINES AT LINE 61"
50 NEXT X
60 END
```

The printer will print the line 61 times, skip to the top of the next page, and print it nine more times. The program assumes that the page length is set at 66 lines (the default page length) and that the printing starts at the top of the page.

1/6-Inch Line Spacing

CODE	DECIMAL	FUNCTION
Escape 6	27, 54	Selects six lines per inch

This code sets the line feed at 1/6 inch (six lines per inch). This line spacing is the default instruction and is considered single spacing.

BASIC example:

```
5 REM :1/6-INCH LINE SPACING: ESCAPE 6
10 LPRINT CHR$(27);"6"
20 FOR X=1 TO 3
30 LPRINT "THIS SPACING IS 1/6 INCH."
40 NEXT X
50 END
```

The printer will print

```
THIS SPACING IS 1/6 INCH.
THIS SPACING IS 1/6 INCH.
THIS SPACING IS 1/6 INCH.
```

1/8-Inch Line Spacing

CODE	DECIMAL	FUNCTION
Escape 8	27, 56	Selects eight lines per inch

This code sets the line spacing at 1/8 inch (eight lines per inch).

BASIC example:

```
5 REM : 1/8-INCH LINE SPACING: ESCAPE 8
10 LPRINT CHR$(27);"8"
20 FOR X=1 TO 3
30 LPRINT "THIS SPACING IS 1/8 INCH."
40 NEXT X
50 END
```

The printer will print

```
THIS SPACING IS 1/8 INCH.
THIS SPACING IS 1/8 INCH.
THIS SPACING IS 1/8 INCH.
```

Character Pitch

Pica

CODE	DECIMAL	FUNCTION
Escape Control S	27, 19	Selects pica characters (10 characters per inch)

When you first turn on the printer, the machine is prepared to print pica-sized characters, but you can choose a number of other character pitches. If you have sent the code for condensed print or proportional character spacing (see below), you can set the printer back to pica-sized printing by sending the Pica code.

BASIC example:

```
5 REM : PICA ESCAPE CONTROL S
10 LPRINT CHR$(27);CHR$(20);"THIS LINE IS
CONDENSED."
20 LPRINT CHR$(27);CHR$(19);"WE'VE CHANGED TO
PICA."
30 END
```

The printer will print

```
THIS LINE IS CONDENSED.
WE'VE CHANGED TO PICA.
```

Elite

CODE	DECIMAL	FUNCTION
Escape M	27, 77	Selects elite characters (12 characters per inch)

This code tells the machine to print elite-sized characters until you send the Elite Off code.

BASIC example:

```
5 REM: SELECT ELITE (12 CHARACTERS PER INCH):
ESCAPE M
10 LPRINT CHR$(27);"M";"THIS LINE IS ELITE."
20 END
```

The printer will print

```
THIS LINE IS ELITE.
```

Elite Off

CODE	DECIMAL	FUNCTION
Escape P	27, 80	Cancels elite characters

This code cancels the instruction for elite print.

```
5 REM : ELITE OFF: ESCAPE P
10 LPRINT CHR$(27);"M";"THIS LINE IS ELITE."
20 LPRINT CHR$(27);"P";"THIS IS NOT."
30 END
```

The printer will print

```
THIS LINE IS ELITE.
THIS IS NOT.
```

Double Width

CODE	DECIMAL	FUNCTION
Escape W Control A Escape Control N	27, 87, 1 27, 14	Selects double-width characters

This code prints double-width characters. This character pitch is excellent for headings and for highlighted portions of your text.

BASIC example:

```
5 REM : DOUBLE-WIDTH: ESCAPE W CONTROL A
10 LPRINT CHR$(27);"W";CHR$(1);"DOUBLE WIDTH"
20 END
```

The printer will print.

DOUBLE WIDTH

Note: Both Escape W Control A and Escape Control N produce double-width characters. The difference is that Esape Control N lasts for only one line. In addition to the Cancel Double Width code, a line feed or a carriage return cancels the Escape Control N instruction.

Double Width Off

CODE	DECIMAL	FUNCTION
Escape W Control, Escape Control O	27, 87, 0 27, 15	Selects double-width characters

This code cancels the instruction for double-width characters.

BASIC example:

```
5 REM : DOUBLE-WIDTH OFF: ESCAPE W CONTROL.
10 LPRINT CHR$(27);"W";CHR$(1);
20 LPRINT "DOUBLE WIDTH ON"
30 LPRINT CHR$(27);"W";CHR$(0);
40 LPRINT "DOUBLE WIDTH OFF"
50 END
```

The printer will print

DOUBLE WIDTH ON

DOUBLE WIDTH OFF

Note: The Control O code is functionally equivalent to the Escape W Control, sequence. You may use either to cancel the Double Width instruction.

Condensed

CODE	DECIMAL	FUNCTION
Escape Control T	27, 20	Selects condensed characters (17.1 characters per inch)

When you send this code, the printer prints condensed characters until you send the Pica, or Proportional code.

BASIC example:

```
5 REM : CONDENSED PRINT: ESCAPE CONTROL T
10 LPRINT CHR$(27);CHR$(20);"THIS PRINT IS
CONDENSED."
20 END
```

The printer will print

```
THIS PRINT IS CONDENSED.
```

7/72-Inch Line Spacing

CODE	DECIMAL	FUNCTION
Escape 1	27, 49	Selects 7/72-inch line spacing

This code sets the line spacing at 7/72 inch.

BASIC example:

```
5 REM : 7/72-INCH LINE SPACING: ESCAPE 1
20 LPRINT CHR$(27);"1"
30 FOR X=1 TO 3
40 LPRINT "THIS SPACING IS 7/72 INCH."
50 NEXT X
60 END
```

The printer will print

```
THIS SPACING IS 7/72 INCH.
THIS SPACING IS 7/72 INCH.
THIS SPACING IS 7/72 INCH.
```

n/72-Inch Line Spacing

CODE	DECIMAL	FUNCTION
Escape A *n*	27, 65, *n*	Selects line spacing in increments of 1/72 inch

This line-spacing code sets the line feed in increments of 1/72 inch. Because the distance between any two dot wires in the print head is 1/72 inch, any line spacing proportional to that distance is programmable. Substitute a number from 1 to 85 for the *n* variable to get the line spacing you want. This code is useful in printing graphics.

BASIC example:

```
5 REM : N/72-INCH LINE SPACING: ESCAPE A
10 LPRINT CHR$(27);"A";CHR$(12);
20 FOR X=1 TO 3
30 LPRINT "THIS SPACING IS 12/72 INCH(N=12)."
40 NEXT X
50 END
```

The printer will print

```
THIS SPACING IS 12/72 INCH(N=12).
THIS SPACING IS 12/72 INCH(N=12).
THIS SPACING IS 12/72 INCH(N=12).
```

Note: When *n* is less than 2, the accuracy of the line spacing cannot be guaranteed.

n/216-Inch Line Spacing

CODE	DECIMAL	FUNCTION
Escape 3 *n* Escape J *n*	27, 51 *n* 27, 74, *n*	Sets line spacing in increments of 1/216 inch

This code sets the line spacing in increments of 1/216 inch, which is 1/3 of the distance between the dot wires in the print head. Replace the *n* variable with a number from 1 to 255 to get the desired spacing between printing lines. This code is useful for printing denser vertical graphics.

BASIC example:

```
5 REM : N/216-INCH LINE SPACING: ESCAPE 3
10 REM : SET LINE SPACING AT 54/216 INCH(1/4 INCH)
20 LPRINT CHR$(27);"3";CHR$(54);
30 FOR X=1 TO 3
40 LPRINT "THIS SPACING IS 54/216 INCH(N=54)."
50 NEXT X
60 END
```

The printer will print

```
THIS SPACING IS 54/216 INCH(N=54).
THIS SPACING IS 54/216 INCH(N=54).
THIS SPACING IS 54/216 INCH(N=54).
```

Note: A line feed cancels the Escape J code for *n*/216-inch line spacing. Also, when *n* is less than 6, the accuracy of the paper feed cannot be guaranteed.

Lines per Page

CODE	DECIMAL	FUNCTION
Escape C *n*	27, 67, *n*	Selects lines per page (127 lines maximum)

This code sequence selects the page length by specifying the number of lines per page. The number that you insert for the *n* variable determines the number of lines per page. The maximum page length for the printer is 127 lines. The number of lines per page is stored as an absolute value that will not change even if line spacing changes. The printer will continue to execute dependent functions (such as the Form Feed and Skip Perforation codes) according to the lines-per-page setting. The default page length is 66 lines per page.

Note: Please read Inches per Page and Skip Perforation before using this example.

BASIC example:

```
5 REM : LINES PER PAGE: ESCAPE C
10 LPRINT CHR$(27);"C";CHR$(55);
20 END
```

The printer will print 55 lines per page.

Inches per Page

CODE	DECIMAL	FUNCTION
Escape C Control, *n*	27, 67, 0, *n*	Sets page length in inches

This code sets the length of the page by the number of inches. The number that you insert for the *n* variable determines the number of inches per page. The value of *n* must be a number from 1 to 22. Because the page length is stored as an absolute value, the printer continues to perform dependent functions (such as the Form Feed code) according to the page-length limit. The default page length is 11 inches.

BASIC example:

```
5 REM : INCHES PER PAGE: ESCAPE C CONTROL.
10 LPRINT CHR$(27);"C";CHR$(0);CHR$(17);
20 END
```

The page length will be set at 17 inches

Proportional Character Spacing

CODE	DECIMAL	FUNCTION
Escape p Control A Escape Control Q	27, 112, 1 27, 17	Selects proportional character spacing

This code selects proportional character spacing. With proportional spacing, the width of character spacing varies to suit the configuration of each character. The letter *W*, for example, is given more space than the letter *I*. Consult Appendix C for a detailed breakdown of proportional character widths. The code is effective until you send the Proportional Off, Pica, or Condensed code.

BASIC example:

```
5 REM : PROPORTIONAL CHARACTER SPACING: ESCAPE P
CONTROL A
10 LPRINT CHR$(27);"P";CHR$(1);
20 LPRINT "THIS LINE SHOWS PROPORTIONAL SPACING."
30 END
```

The printer will print

```
THIS LINE SHOWS PROPORTIONAL SPACING.
```

Note: In proportional Character Spacing, the printer ignores the Backspace code. also, the Escape Control Q code is functionally equivalent to the Escape p Control A code, you may use either to print proportionally spaced characters.

Cancel Proportional Character Spacing

CODE	DECIMAL	FUNCTION
Escape p Control ,	27, 112, 0	Cancels proportional character spacing

This code cancels the Proportional Character Spacing code.

BASIC example:

```
5 REM : PROPORTIONAL SPACING OFF: ESCAPE P
CONTROL,
10 LPRINT CHR$(27);"P";CHR$(1);
20 LPRINT "THIS SPACING IS PROPORTIONAL."
30 LPRINT CHR$(27);"P";CHR$(0);
40 LPRINT "THIS SPACING IS NOT."
50 END
```

The printer will print

```
THIS SPACING IS PROPORTIONAL.

THIS SPACING IS NOT.
```

Print Style

Bold Print

CODE	DECIMAL	FUNCTION
Escape E	27, 69	Prints boldface characters

This code prints boldface characters. When the print head prints boldface characters, it always operates unidirectionally (left to right only).

BASIC example:

```
5 REM : BOLD PRINT: ESCAPE E
10 LPRINT CHR$(27);"E"
20 LPRINT "THESE CHARACTERS ARE BOLDFACE."
30 END
```

The printer will print

THESE CHARACTERS ARE BOLDFACE.

Bold Print Off

CODE	DECIMAL	FUNCTION
Escape F	27, 70	Cancels bold print

This code cancels the Bold Print On code.

BASIC example:

```
5 REM : BOLD PRINT OFF: ESCAPE F
10 LPRINT CHR$(27);"E"
20 LPRINT "THESE CHARACTERS ARE BOLDFACE."
30 LPRINT CHR$(27);"F"
40 LPRINT "THESE CHARACTERS ARE NOT."
50 END
```

The printer will print

THESE CHARACTERS ARE BOLDFACE.

THESE CHARACTERS ARE NOT.

Double Strike

CODE	DECIMAL	FUNCTION
Escape G	27, 71	Selects double-strike print

This code instructs the printer to type double-strike print. The result looks much like boldface print, but the printing method is different. The print head prints a line, then the page advances 1/216 inch. The print head makes a second pass over the line and prints the characters again.

BASIC example:

```
5 REM : DOUBLE-STRIKE: ESCAPE G
10 LPRINT CHR$(27);"G"
20 LPRINT "THESE CHARACTERS ARE DOUBLE STRIKE."
30 END
```

The printer will print

THESE CHARACTERS ARE DOUBLE STRIKE.

Double Strike Off

CODE	DECIMAL	FUNCTION
Escape H	27, 72	Cancels double-strike print

This code cancels the Double Strike code.

BASIC example:

```
5 REM : DOUBLE STRIKE: ESCAPE H
10 LPRINT CHR$(27);"G"
20 LPRINT "DOUBLE STRIKE ON"
30 LPRINT CHR$(27);"H"
40 LPRINT "DOUBLE STRIKE OFF"
50 END
```

The printer will print

DOUBLE STRIKE ON

DOUBLE STRIKE OFF

Auto Underlining

CODE	DECIMAL	FUNCTION
Control O	15	Underlines text
Escape Control Y	27, 25	

When you send the Auto Underlining code, the printer will underline all subsequent text until you send the Cancel Auto Underlining code.

BASIC example:

```
5 REM : AUTO UNDERLINING: CONTROL O
10 LPRINT CHR$(15);"UNDERLINE"
20 END
```

The printer will print

UNDERLINE

Note: The two underlining codes are functionally equivalent. You may use either to underline text.

Auto Underlining Off

CODE	DECIMAL	FUNCTION
Control N Escape Control Z	14 27, 26	Cancels underlining

This code cancels the Auto Underlining code.

BASIC example:

```
5 REM : CANCEL AUTO UNDERLINING: CONTROL N
10 LPRINT CHR$(15);"START UNDERLINING."
20 LPRINT CHR$(14);"NOW STOP IT."
30 END
```

The printer will print

START UNDERLINING.
NOW STOP IT.

Note: The two codes for canceling underlining are functionally equivalent. You may use either to cancel the Auto Underlining instructions.

Superscripts

CODE	DECIMAL	FUNCTION
Escape R Control ,	27, 82, 0	Prints superscripts

When you send this code, the character or characters following the code are printed as a superscript. The superscript function is handy for footnotes and mathematical notation.

BASIC example:

```
5 REM : SUPERSCRIPTS:ESCAPE R CONTROL,
10 LPRINT "10";CHR$(27);"R";CHR$(0);"10"
20 END
```

The printer will print

10^{10}

Note: Superscripts are always printed in double-strike characters.

Subscripts

CODE	DECIMAL	FUNCTION
Escape R Control A	27, 82, 1	Prints subscripts

When you send this code, the character or characters following the code are printed as a subscript. This function is convenient for mathematical and chemical notation.

BASIC example:

```
5 REM : SUBSCRIPTS: ESCAPE R CONTROL A
10 LPRINT "H";CHR$(27);"R";CHR$(1);"2"
20 END
```

The printer will print

H_2

Note: The printer always uses double-strike characters to print subscripts.

Superscripts/Subscripts Off

CODE	DECIMAL	FUNCTION
Escape T	27, 84	Cancels superscripts and subscripts

This code cancels the Superscripts and Subscripts codes.

BASIC example:

```
5 REM : SUPERSCRIPTS/SUBSCRIPTS OFF: ESCAPE T
10 LPRINT "H";CHR$(27);"R";CHR$(1);"2";
CHR$(27);"T";"O"
20 END
```

The printer will print

H_2O

Character Set

International Character Mode

CODE	DECIMAL	FUNCTION
Escape Control W	27, 23	Prints international characters

The code allows the printer to use international characters. There are 91 ATASCII characters and 36 international characters available for printing. Consult Appendix B for a complete listing of international characters.

BASIC example:

```
5 REM : INTERNATIONAL CHARACTER MODE: ESCAPE
CONTROL W
10 LPRINT CHR$(27);CHR$(23);"INTERNATIONAL
CHARACTER MODE ON"
20 LPRINT CHR$(123);CHR$(7);CHR$(22);CHR$(10);
30 END
```

The printer will print

```
INTERNATIONAL CHARACTER MODE ON
ÄïñÜ
```

Note: Some control characters that are used for certain nonessential printer functions, as well as five printable characters, will be unavailable to you in the International Character Mode because their codes are used to print particular international characters. Consult Appendix B.

Note: If you have an ATARI 600XL, 800XL, 1200XL, or XE Computer, you can display international characters on your video display screen. Type POKE 756, 204. Then type the control character keystrokes for the individual international characters. To go back to control characters, type POKE 756, 224. (For the 1200XL, pressing [CONTROL F] and then typing the control character keystrokes for the individual international characters will also work. To go back to control characters, press [CONTROL F] again.)

Note: to format your AtariWriter or AtariWriter Plus text file for international characters, use the Control O command to enter at the top of the file the decimal escape sequence for international characters: [CONTROL] [O] 27 [CONTROL] [O] 23. To print a particular character, type [CONTROL] [O] and the decimal code for that character at the point where you want the character to appear in your text file.

International Character Mode Off

CODE	DECIMAL	FUNCTION
Escape Control X	27, 24	Cancels international characters

This code cancels the code for international characters and returns the printer to its noninternational character set.

BASIC example:

```
5 REM : INTERNATIONAL CHARACTER MODE OFF: ESCAPE
CONTROL X
10 LPRINT CHR$(27);CHR$(23);
20 LPRINT "INTERNATIONAL CHARACTER MODE ON"
30 LPRINT CHR$(123);
40 LPRINT CHR$(27);CHR$(24);
50 LPRINT "INTERNATIONAL CHRACTER MODE OFF"
60 LPRINT CHR$(123);
70 END
```

The printer will print

```
INTERNATIONAL CHARACTER MODE ON
Ä

INTERNATIONAL CHRACTER MODE OFF
{
```

Other Codes

Sound Bell

CODE	DECIMAL	FUNCTION
Control G	7	Sounds the printer's buzzer

When you send the Sound Bell code, the printer sounds its high-pitched buzzer.

BASIC example:

```
5 REM : SOUND BELL: CONTROL G
10 LPRINT CHR$(7);
20 END
```

The printer will beep.

Cancel

CODE	DECIMAL	FUNCTION
Control X	24	Clears the printer buffer

As the computer transmits data to the printer, the printer buffer holds approximately the next line of incoming text to be printed. The Cancel code clears the printer buffer.

BASIC example:

```
5 REM : CANCEL: CONTROL X
10 LPRINT CHR$(24);
20 END
```

The printer buffer will be cleared.

Initialize Printer

CODE	DECIMAL	FUNCTION
Escape @	27, 64	Returns the printer to its default condition

This code "initializes" the printer (returns it to its initial state when it was first turned on). Whenever you turn on the power or send the Initialize Printer code, the Power Up sequence of events takes place.

BASIC example:

```
5 REM : INITIALIZE PRINTER: ESCAPE @
10 LPRINT CHR$(27);"@"
20 END
```

The printer will be initialized.

Paper-Out Sensor Off

CODE	DECIMAL	FUNCTION
Escape 0	27, 48	Disables the paper-out sensor

This code disables the paper-out sensor so that you can print to the very last line of the paper. Normally when approximately one inch of the paper is left, the paper-out sensor is activated, and the printer goes off-line. For the following program example, use a single sheet of paper and be sure to begin printing at the top of the page. The program assumes that the length is set at 66 lines.

BASIC example:

```
5 REM : PAPER-OUT SENSOR OFF: ESCAPE 0
10 LPRINT CHR$(27);"0"
20 FOR X=1 TO 66
30 LPRINT "IGNORE PAPER END."
40 NEXT X
50 END
```

Warning: Be sure that the lines you want to print will fit on a single sheet and will not run over the length of the page. When the paper-out sensor is disabled, the print head will continue to print right onto the platen.

Paper-Out Sensor On

CODE	DECIMAL	FUNCTION
Escape /	27, 47	Reactivates the paper-out sensor

If you have disabled the paper-out sensor, you can use this code to reactivate it. For the following program example, use a single sheet of paper.

BASIC example:

```
5 REM : PAPER-OUT SENSOR ON: ESCAPE /
10 LPRINT CHR$(27);"0"
20 LPRINT CHR$(27);"1"
30 FOR X=1 TO 66
40 LPRINT "ACTIVATE PAPER-OUT SENSOR."
50 NEXT X
60 END
```

The printer will print the sentence until the end of the paper nears.

Vertical Tab

CODE	DECIMAL	FUNCTION
Control K	11	Tabs vertically to the next vertical tab stop

When you send this code, the carriage moves to the next vertical tab stop determined by the Vertical Tab Set code. If no vertical tabs have been set, the Vertical Tab code feeds the paper one line.

BASIC example:

```
5 REM : VERTICAL TAB: CONTROL K
10 FOR X=1 TO 3
20 LPRINT CHR$(11);"VERTICAL TAB"
30 NEXT X
40 END
```

The printer will print the phrase at each of the three vertical tab stops that were set in the Vertical Tab Set BASIC program example.

Carriage Return

CODE	DECIMAL	FUNCTION
Control M	13	Returns the carriage to the home position

As the computer transmits data to the printer, the printer buffer holds the next line of incoming text to be printed. When you send the Carriage Return code, the printer prints all the data in the printer buffer, and the carriage returns to the home (far left) position on the same line because the code does not include a line-feed instruction.

BASIC example:

```
5 REM : CARRIAGE RETURN: CONTROL M
10 LPRINT "RETURN THE CARRIAGE.OK?";CHR$(13);"OK."
20 END
```

The printer will print

```
OKETURN THE CARRIAGE.OK?
```

(The carriage moves to the far left margin and prints the second OK on top of the first sentence because the Carriage Return code does not contain a line-feed instruction.)

Note: The printer has a "logic-seeking" capability. This feature allows the printer to "know" when to conserve mechanical movement. For instance, if the BASIC example did not contain the second OK, the printer would print the first sentence, check its printer buffer for more data, and stop the carriage. Although the printer would not *physically* move the carriage to the left margin, the printer would *logically* know to return the carriage when it receives more data to print.

Print Head to Home Position

CODE	DECIMAL	FUNCTION
Escape <	27, 60	Returns the print head to the home position

This code returns the print head to the home position (the far left margin) of the same line. The code is useful for printing one line unidirectionally (left to right), then having the carriage return to the far left margin where it will begin the next printed line. However, if the printer receives instructions to print more text on the same line, the print head will move across the line and begin printing where it left off.

BASIC example:

```
5 REM : PRINT HEAD HOME: ESCAPE <
10 LPRINT "THE PRINT HEAD RETURNS HOME.";CHR$(27);
"<";CHR$(13);
20 LPRINT "OK."
30 END
```

The printer will print

```
THE PRINT HEAD RETURNS HOME.
```

(The print head then returns to the left margin of the same line, feeds a line, then prints OK.)

```
THE PRINT HEAD RETURNS HOME.
OK.
```

End of Line

CODE	DECIMAL	FUNCTION
Return	155	Causes automatic line feed and carriage return

When you send the End of Line code, the printer advances the paper one line and returns the carriage to the left margin.

BASIC example:

```
5 REM : END OF LINE: RETURN
10 LPRINT "DO A CARRIAGE RETURN AND LINE FEED,
OK?";CHR$(155);"OK."
20 END
```

The printer will print

```
DO A CARRIAGE RETURN AND LINE FEED,OK?
OK.
```

Note: Escape 155 will also send the End of Line code.

Form Feed

CODE	DECIMAL	FUNCTION
Control L	12	Advances the paper one page length

The Form Feed code advances the paper to the top of the next page. The position of the paper when the printer is first turned on determines where the top of every page begins. The Form Feed code has the same effect as the Form Feed button except that the instruction to advance the paper is sent from the computer. When the printer is first turned on, the page length is preset at 11 inches. If you change the page length, the code functions according to the new length.

BASIC example:

```
5 REM : FORM FEED: CONTROL L
10 LPRINT "DO A FORM FEED,OK?"
20 LPRINT CHR$(12);
30 LPRINT "OK."
40 END
```

The printer will print

```
DO A FORM FEED,OK?
```
(The printer moves the paper forward to the top of the next page.)
```
OK.
```

Unidirectional Printing

CODE	DECIMAL	FUNCTION
Escape U Control A	27, 85, 1	Selects unidirectional printing

When you send this code, the print head will print from left to right only. This function ensures a more accurate starting position on each printing line. Normally the print head moves from left to right, then right to left (bidirectionally) for faster printing.

BASIC example:

```
5 REM : UNIDIRECTIONAL PRINTING: ESCAPE U CONTROL A
10 LPRINT CHR$(27);"U";CHR$(1);
20 FOR X=1 TO 10
30 LPRINT "PRINT FROM LEFT TO RIGHT ONLY."
40 NEXT X
50 END
```

The printer will print the sentence unidirectionally 10 times.

Bidirectional Printing

CODE	DECIMAL	FUNCTION
Escape U Control ,	27, 85, 0	Selects bidirectional printing

If you have sent the Unidirectional Printing code, you can return to bidirectional printing by sending the Bidirectional Printing code.

BASIC example:

```
5 REM : BIDIRECTIONAL PRINTNG: ESCAPE U CONTROL.
10 LPRINT CHR$(27);"U";CHR$(1);
20 FOR X=1 TO 5
30 LPRINT "PRINT FROM LEFT TO RIGHT ONLY."
40 NEXT X
50 LPRINT CHR$(27);"U";CHR$(0);
60 FOR Y=1 TO 5
70 LPRINT "NOW PRINT FROM LEFT TO RIGHT AND RIGHT TO
LEFT."
80 NEXT Y
90 END
```

The printer will print the first sentence unidirectionally five times and the second sentence bidirectionally five times.

CHAPTER 4
GRAPHICS

TRANSFERABLE GRAPHICS

Your XXM801 Printer is capable of printing high-quality graphics. The easiest way to print graphic designs is to use a "screen-dump" program. A screen-dump program "dumps," or transfers, a design or a picture from your video display screen to the printer.

Note: Because the XMM801's normal-density graphics function is compatible with Epson® printers, any screen-dump program that is capable of dumping from an eight-bit ATARI Computer to an Epson printer will work with the ATARI XMM801 Printer.

You can also write BASIC programs to generate your own graphics directly from the printer. The next section explains this process.

DOT-ADDRESSABLE GRAPHICS

Your XXM801 Printer uses individual dots to shape characters. Examine a sample of something you've already printed to see these dots and how they form shapes.

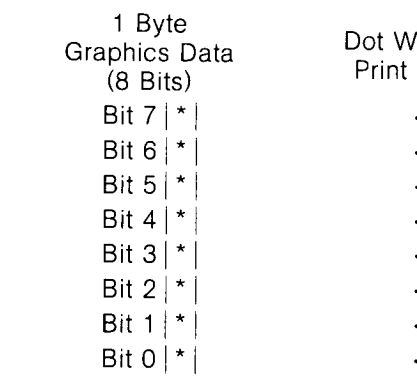
The printer prints one "dot column" at a time. Each column is eight dots high by one dot wide. You have direct control over these dots. In a graphics program, you can indicate which of those eight dots are to be printed and which ones are not. By determining the dot patterns of all available dot columns, you can create countless pictures and designs.

The computer sends graphics data, like any other data, to the printer in "bytes," which are units of information. Each byte holds the printing instruction for one dot column. Just as a dot column is made up of eight dots, so is a byte made up of eight "bits." Each bit corresponds to a dot.

Each dot in a dot column is printed by a specific dot wire in the print head. The topmost wire is controlled by the high bit (bit 7) and prints the topmost dot in a dot column; the bottommost wire is controlled by the low bit (bit 0) and prints the bottommost dot in a dot column.

Every byte that is sent to the printer is represented by an eight-place binary number—eight numbers for eight bits. When a dot in a dot column is to be printed, the value of the corresponding bit is 1; when a dot is not to be printed, the value of the related bit is 0.

The following illustration shows the relationship between a byte of graphics data, the dot wires, and a printed dot column:



In the illustration, all the dots in the column are printed. The binary number for the byte in the illustration must be 11111111.

However, binary numbers are long and difficult to use. Decimal numbers are much easier to work with. Therefore, to send a byte of graphics data to the printer, use a decimal number and allow the computer to convert the decimal number to a binary number.

The following illustration shows the decimal value of each bit in the binary sequence and demonstrates how to convert a binary number to a decimal number. To get the decimal number, add up the decimal values of only those bits whose dots are printed. (Remember that 1 represents a printed dot and that 0 indicates an unprinted dot.)

```
128  64  32  16   8   4   2   1
 1    1   1   1   1   1   1   1   (binary number)
```

128 + 64 + 32 + 16 + 8 + 4 + 2 + 1 = 255 (decimal number)

One printed line (one pass of the print head across the paper) consists of 480 dot columns. Because 8 dots times 480 columns equals 3840, a single printed line in normal-density graphics has 3840 printable dots. Although 3840 dots seem to be quite a few, the dots are very small and are printed very close together to shape characters and other designs.

Number of Dot Columns Across

1 2 3 4 5 6 7 8 9 ··· 480

One Printed Line (one pass of the print head)

Direction of Print Head →

How do you know which number will print the fourth dot from the bottom in the 251st dot column? To answer this kind of question, you should first plot out on graph paper the graphic you want to print. Use graph paper with a fairly condensed grid because you want each box in the grid to represent one dot—and the dots, remember, are very small. If the grid on the graph paper is too large, you won't be able to plot a very substantial graphic.

Divide the graph paper into horizontal blocks that are eight squares ("dots") high. Number the vertical column of squares at the far left margin as shown:

128
64
32
16
8
4
2
1

The values of the dots in the vertical dot column are the decimal values of the bits in a binary number. To get the decimal value of a binary number, add the values of only the printed dots.

Now plot out a small butterfly on your grid. Simply fill in selected squares to design the graphic.

One way to tell the printer which dots to print in a dot column is to use DATA statements in a BASIC program. The DATA statements contain the decimal numbers that identify the dots to be printed in a particular dot column. Each number in a DATA statement represents one byte of graphics data that is sent to the printer.

The first number in a DATA statement represents the dots to be printed in the first dot column. The second number indicates which dots are to be printed in the second dot column, and so on. To arrive at the DATA statement numbers, add the values of the dots that you want printed in each dot column.

In the first dot column, the third dot from the top is to be printed. Because its value is 32, the first number in the DATA statement will be 32.

In the second dot column, the printed dots have values of 64 and 16. Adding 64 and 16 produces 80, which will be the second number in the DATA statement.

The third dot column will print three dots with values of 128, 8, and 2. The third number in the DATA statement will be the sum of 128, 8, and 2—138.

In the fourth dot column, the printed dots have values of 128, 4, and 1. The numbers add up to 133, the fourth entry in the DATA statement. Because the value of the two printed dots in the fifth dot column are 128 and 1, the next DATA item will be 129. The values of the printed dots in the sixth dot column and in the seventh dot column add up to 66 and 60, respectively, which become the sixth and seventh numbers in the DATA statement.

Because the right side of the graphic is a mirror image of the left side, the dot column values just calculated for the left side can be listed in reverse order for the right side. The eighth column will be 66; the ninth, 129; the tenth, 133; the eleventh, 138; the twelfth, 80; and the thirteenth, 32.

The BASIC DATA statement will take the following form:

```
DATA 32,80,138,133,129,66,60,66,129,133,138,80,32
```

The next step is to tell the printer how to process the DATA statement so that it will print the graphic. A BASIC program, one line of which will be the DATA statement, will provide the printer with the necessary instructions.

Like other printing options, you must send a printer control code that tells the printer to perform graphics functions. The graphics code uses an escape sequence.

CODE	DECIMAL	FUNCTION
Escape K; LSB, MSB	27, 75; LSB, MSB	Selects normal-density graphics

The acronyms LSB and MSB stand for "least significant byte" and "most significant byte," which are values that you must supply. These two numbers tell the printer how much data to expect (how many bytes of graphics data are on the way).

If you are using 255 or fewer dot columns across a line in a graphic, you will be sending 255 or fewer bytes of data for that line (because each dot column constitutes a byte of data). In that case, the LSB will be the number of bytes you are sending, and the MSB will always be 0.

If you are using 256 or more dot columns across a line and are, therefore, sending 256 or more bytes of data, then the MSB will be 1 and the LSB will be the difference between 256 and the total number of bytes you are sending.

For instance, suppose you want to send 340 bytes (you are using 340 dot columns across a single printed line, and your DATA statements contain 340 entries for a single line). The LSB would be 84 (340 minus 256), and the MSB would be 1.

You can think of the LSB as the 1s place and the MSB as the 256s place. Putting a 0 in the 256s place (the MSB) means that fewer than 256 bytes will be sent and that the total number of bytes is given in the 1s place (the LSB). Putting a 1 in the 256s place (the MSB) means that the number of bytes to be sent is 256 plus the amount in the 1s place (the LSB). Putting 84 for the LSB and 1 for the MSB means that 84 plus 256 bytes will be sent to the printer (340 bytes).

In graphics functions, a line across has a maximum of 480 dot columns (480 bytes). Therefore, the MSB will always be 0 or 1. If you are sending fewer than 256 bytes, the LSB will be a number from 1 to 255. If you are sending 256 bytes or more, the LSB will be a number from 0 to 224. When the MSB is 1 (which stands for 256 bytes), the LSB cannot exceed 224 because 224 plus 256 equals 480 (the maximum number of bytes that can be sent for a single printed line).

One program line holds a lot fewer than 480 DATA-statement entries, but as long as you designate the LSB and MSB correctly, the computer will continue to read data sequentially on multiple DATA program lines.

In the case of the small butterfly graphic, you will be using only 13 dot columns and, therefore, will be sending only 13 bytes of data. The LSB will be 13, and the MSB will be 0.

To send the LSB and the MSB values to the printer, you must use the CHR$(nn) string function. The beginning of the butterfly program will look like this:

```
5 REM : SMALL BUTTERFLY: NORMAL-DENSITY GRAPHICS:
ESCAPE K;LSB,MSB
10 OPEN #1,8,0,"P:"
20 PRINT #1;CHR$(27);"K";CHR$(13);CHR$(0);
```

Next use a FOR/NEXT loop to tell the computer to read the DATA statement so that it can send the data to the printer:

```
30 FOR X=1 TO 13
40 READ A
50 PRINT #1;CHR$(A);
60 NEXT X
```

Then close the IOCB channel and insert the DATA statement:

```
70 CLOSE #1
80 DATA 32,80,138,133,129,66,60,66,129,133,138,
80,32
```

The entire program looks like this:

```
5 REM : SMALL BUTTERFLY: NORMAL-DENSITY GRAPHICS:
ESCAPE K;LSB,MSB
10 OPEN #1,8,0,"P:"
20 PRINT #1;CHR$(27);"K";CHR$(13);CHR$(0);
30 FOR X=1 TO 13
40 READ A
50 PRINT #1;CHR$(A);
60 NEXT X
70 CLOSE #1
80 DATA 32,80,138,133,129,66,60,66,129,133,138,
80,32
90 END
```

When you type RUN and press [RETURN], the printer will print a small butterfly.

The butterfly graphic was only eight dots high (one printed line across). But suppose you want to plot out a graphic that is both higher (more than eight dots high) and wider. How do you calculate the data for it?

Note: The following section is intended for computer users who are fairly good BASIC programmers.

As before, begin with graph paper. This time plot out a larger butterfly (butterflies work well because they're symmetrical).

Here's the program that will print out the large butterfly:

```
5 REM : LARGE BUTTERFLY : NORMAL-DENSI
TY GRAPHICS : ESCAPE K;LSB,MSB
10 Z=10000:GOSUB 1000
20 Z=10100:GOSUB 1000
30 Z=10200:GOSUB 1000
40 Z=10300:GOSUB 1000
50 Z=10400:GOSUB 1000
99 END
1000 OPEN #1,8,0,"P:"
1010 LSB=0:MSB=0:RESTORE Z
1020 READ A:IF A=-1 THEN 1040
1030 LSB=LSB+1:GOTO 1020
1040 IF LSB=255 THEN MSB=1:LSB=LSB-256
1050 ? #1;CHR$(27);"A";CHR$(8);CHR$(27
);"K";CHR$(LSB);CHR$(MSB);
1060 RESTORE Z
1070 FOR X=1 TO LSB+(MSB*256)
1080 READ A
1090 ? #1;CHR$(A);
1100 NEXT X
1110 CLOSE #1
1120 RETURN
10000 DATA 0,127,255,255,255,255,255,2
55,248,248,124,126,127,63,31,15,7,3,1,
0,0,0,1,1,0,0,0,0,0,0,0,1,1,0,0,0,1,3
10010 DATA 7,15,31,63,127,126,124,248,
248,255,255,255,255,255,255,127,0,-1
10100 DATA 192,224,240,248,252,255,255
,127,63,31,15,7,131,193,224,240,248,25
2,253,127,63,31,15,195,49,14,1,14,49
10110 DATA 195,15,31,63,127,253,252,24
8,240,224,193,131,7,15,31,63,127,255,2
55,252,248,240,224,192,-1
10200 DATA 0,0,0,0,0,0,224,240,248,252
,252,252,252,252,253,255,127,63,31,14,
14,142,206,238,254,255,255,255,255,255
10210 DATA 254,238,206,142,14,14,31,63
,127,255,253,252,252,252,252,252,248,2
40,224,0,0,0,0,0,0,-1
10300 DATA 0,0,0,0,0,0,0,0,0,0,31,63,1
27,255,241,224,192,129,3,7,15,31,63,12
7,255,255,192,124,192,255,127,63,31,15
10310 DATA 7,3,129,192,224,241,255,127
,63,31,0,0,0,0,0,0,0,0,0,0,-1
10400 DATA 0,0,0,0,0,0,0,0,0,0,0,0,128,192
,224,240,248,252,252,252,252,252,252,2
52,248,240,224,192,0,0,0,192,224,240
10410 DATA 248,252,252,252,252,252,252
,248,240,224,192,128,0,0,0,0,0,0,0,0,0
,0,-1
```

When you run this program, the printer will print

Lines 10 through 50 each send the computer to the subroutine beginning on line 1000. The Z variable must be set for each DATA statement that begins a new printed line.

Line 99 prevents the computer from running through the subroutine after executing line 50.

Line 1000 opens a communications channel (an IOCB) to the printer. Lines 1010 through 1030 count the number of DATA statement entries. Line 1040 calculates the LSB and MSB values for each printed line.

Line 1050 sets the line spacing at 8/72 inch and sends the code that instructs the printer to perform graphics functions. Then it plugs in the LSB and MSB values calculated in line 1040. The 8/72-inch line spacing is used because each pass of the print head prints a line that is eight dots high, and the spacing between each dot is 1/72 inch. Any line spacing less than 8/72 inch would cause the printed lines to overlap; any line spacing greater than 8/72 inch would create a gap between the printed lines.

For each printed line in graphics, you must enter the graphics escape sequence, the line spacing, and the values of LSB and MSB according to the number of bytes that you are sending for that printed line. The subroutine in this program performs these functions automatically for each line.

Lines 1060 through 1100 read the data and tell the printer to print it.

Line 1110 closes channel 1. Line 1120 returns the computer from the subroutine to the line with the next GOSUB ("go to subroutine") command.

Lines 1000 through 10410 are the DATA statements. Notice that a -1 appears at the end of lines 10010, 10110, 10210, 10310, and 10410. The -1 is used by line 1020 as it counts the number of DATA statement entries. When the computer reads a -1 within the subroutine, it stops counting and proceeds to calculate the LSB and MSB for that printed line.

There is no -1 at the end of the other DATA program lines because they don't contain data for the end of a printed line. If you use this subroutine in your own programs (and it really is a time-saver), remember to put a -1 at the end of each DATA statement that finishes a printed line.

High-Density Graphics

The ATARI XMM801 Printer produces two kinds of graphics: normal density and high density. This section contrasts the two types.

High-Density Graphics

CODE	DECIMAL	FUNCTION
Escape V; LSB, MSB	27, 86, ; LSB, MSB	Selects high-density graphics

High-density graphics work nearly the same way as normal-density graphics, except that high-density graphics have double the number of printed dot columns across each line.

The LSB and MSB are calculated in the same way. However, the maximum number of bytes (number of dot columns) for a single line across is 960. Therefore, the LSB is still a number from 0 to 255, but the MSB can range from 0 to 3. The difference is that the printer prints between normal dot-column spacing, producing an overlap of printed dot columns for higher density and a full doubling of the columns actually printed.

The following two programs demonstrate the difference in density between the two graphics modes:

```
5 REM : NORMAL-DENSITY GRAPHICS: ESCAPE K;LSB,MSB
10 OPEN #1,8,0,"P:"
20 FOR X=1 TO 5
30 PRINT #1;CHR$(27);"K";CHR$(100);CHR$(0);
40 FOR Y=1 TO 100
50 PRINT #1;CHR$(255);
60 NEXT Y
70 PRINT #1
80 NEXT X
90 END
```

```
5 REM : HIGH-DENSITY GRAPHICS: ESCAPE V;LSB,MSB
10 OPEN #1,8,0,"P:"
20 FOR X=1 TO 5
30 PRINT #1;CHR$(27);"V";CHR$(100);CHR$(0);
40 FOR Y=1 TO 100
50 PRINT #1;CHR$(255);
60 NEXT Y
70 PRINT #1
80 NEXT X
90 END
```

Note: Notice that instead of DATA statements, the previous programs use the CHR$(nn) function, in which nn is 255 in line 50. The number 255 is the sum of all dot values in one dot column. To get all dots printed in 100 columns across, it was much easier to use the CHR$(nn) function than to type 255 in DATA statements 100 times.

To produce the large butterfly in high-density graphics, just substitute V for K in line 1050 of the program. You'll get a denser but narrower image:

CHAPTER 5
TROUBLESHOOTING AND PREVENTIVE MAINTENANCE

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TROUBLESHOOTING

If you run into problems when you're hooking up or operating your printer, chances are the difficulty is a minor hitch that you can take care of yourself. This section discusses some of these problems and suggests simple solutions.

It Just Won't Work

Probably the most common problem cited by computer users is that sometimes the machine just doesn't respond. Usually the reason the machine won't respond is a very simple matter.

If your printer just won't budge, take the following steps:

- Make sure all the connections are attached properly. Check that the power cord is plugged in, that the Power light is on, and that the black SIO cable is connected securely to the printer and to the computer.
- Make sure the On Line light is illuminated. If it isn't, press the On Line button.
- Check whether you've forgotten to load the paper or whether the paper supply has run out. The paper-out sensor automatically takes the printer off-line when the machine doesn't have paper.
- If you have more than one printer connected to your system, be certain that only one printer at a time is turned on.

Print Quality

Should you detect inconsistencies in print quality or just generally poor print quality, a few things may be going wrong. Again, the reasons and solutions are simple and straightforward.

- Be sure the ribbon cartridge is installed correctly.
- If printed characters appear light, smudged, or spotty even though the ribbon is installed correctly, then the ribbon is probably feeding improperly and may be damaged. Replace the old ribbon with a new one.
- If you are getting extremely light characters or nothing at all, most likely the ribbon is used up. (The printer does not have a sensor to alert you when the ribbon runs out or when the ribbon is simply not installed.) Replace the old cartridge with a new one.

Paper Jams

Sometimes the paper may fail to advance properly, and you will have a paper jam on your hands. The most common reason for paper jams is improper paper loading. Here's how to solve the problem:

- Turn off the printer. Remove the paper. Be sure to remove any torn pieces of paper stuck along the paper path. Use tweezers to remove the bits of paper not easily accessible with your fingers.
- If you were using pin-feed paper, reload it and be sure the sprocket pins and paper holes are aligned properly. Once they are aligned, don't forget to lock the sprockets in position. Manually feed the paper forward and backward to check the paper path for hidden bits of paper. After loading the paper, don't forget to move the paper-release lever to feed the paper. Using friction feed together with pin-feed paper will inevitably cause a paper jam.
- If you were using a single sheet of paper, reload it and be sure the paper-release lever is in the up (friction) position.

Note: Your ATARI XMM801 Printer is designed for low maintenance and high reliability. However, like anything mechanical, a printer can break down. If you experience problems that you think are serious, the best course is to take your printer to an authorized ATARI Service Center.

PREVENTIVE MAINTENANCE

To insure top performance from your printer, follow these simple guidelines:

- Keep the printer dust-free, especially within the print-head and carriage area. To avoid dust, keep the top cover on, both when the printer is printing and when it is in storage.
- Keep the platen and paper-bail rollers dust-free by cleaning them occasionally. Use a cotton ball and a little rubbing alcohol to wipe them off. Rotate the platen knob as you clean the carriage and rollers.
- Do not touch the carriage rod. Finger oils attract dust, which may adversely affect the smooth movement of the carriage along the rod.
- Do not drop any foreign objects into the print-head and carriage-rod area. If such an accident does occur, immediately turn the printer off. Carefully remove the object.
- Clean the outside of the printer with a soft, damp cloth only. Do not use household cleansers or abrasives, because they may damage the printer's plastic housing. Avoid getting moisture inside the printer.
- When you turn off the printer, wait at least two seconds before you turn it on again. Otherwise, the printer may not initialize properly.

- Do not try to move the print head manually.
- Do not try to print without paper and ribbon.
- Always have your printer placed on a firm, level surface.
- Avoid operating the machine in a room with high humidity.
- Keep your printer out of direct sunlight.
- Avoid exposing your printer to extreme temperature changes. Operate your printer only at temperatures from 41°F to 95°F (5°C to 35°C). Store your printer only at temperatures from −22°F to 158°F (−30°C to 70°C).
- For shipping or storing the printer, repack it in the original factory packing materials.

APPENDIX A: SUMMARY OF PRINTER CONTROL CODES

NAME	CODE	DECIMAL	HEXA-DECIMAL	FUNCTION
Auto Underlining	Control O Escape Control Y	15 27, 25	$0F $1B, $19	Underlines text
Auto Underlining Off	Control N Escape Control Z	14 27, 26	$0E $1B, $1A	Cancels underlining
Backspace	Control H	8	$08	Backspaces one character
Bidirectional Printing	Escape U Control,	27, 85, 0	$1B, $55, $00	Selects bidirectional printing
Bold Print	Escape E	27, 69	$1B, $45	Prints boldface characters
Bold Print Off	Escape F	27, 70	$1B, $46	Cancels bold print
Cancel	Control X	24	$18	Clears the printer buffer
Carriage Return	Control M	13	$0D	Returns the carriage to the home position
Condensed	Escape Control T	27, 20	$1B, $14	Selects condensed characters
Double	Escape G	27, 71	$1B, $47	Selects double-strike print
Double Strike Off	Escape H	27, 72	$1B, $48	Cancels double-strike print
Double Width	Escape W Control A Escape Control N	27, 87, 1 27, 14	$1B,$57,$01 $1B, $0E	Selects double-width characters
Double Width Off	Escape W Control , Escape Control O	27, 87, 0 27, 15	$1B,$57,$00 $1B, $0F	Cancels double-width characters
Elite	Escape M	27, 77	$1B, $4D	Selects elite characters
Elite Off	Escape P	27, 80	$1B, $52	Cancels elite characters
End of Line	Return	155	$9B	Causes automatic line feed and carriage return
Form Feed	Control L	12	$0C	Advances the paper one page length
High-Density Graphics	Escape V	27, 86; LWB, *MSB*	$1B, $56; *LSB, MSB*	Selects high-density graphics

NAME	CODE	DECIMAL	HEXA-DECIMAL	FUNCTION
Horizontal Tab	Control I	9	$09	Tabs horizontally in increments of eight character spaces
Inches per Page	Escape C Control, *n*	27, 67, 0, *n*	$1B, $43, $00; *n*	Selects page length in inches
Initialize Printer	Escape @	27, 64	$1B, $40	Returns the printer to its default condition
International Character Mode	Escape Control W	27, 23	$1B, $17	Prints international characters
International Character Mode Off	Escape Control X	27, 24	$1B, $18	Cancels international characters
Line Feed	Control J	10	$0A	Advances the paper one line
1/6-Inch Line Spacing	Escape 6	27, 54	$1B, $36	Selects six lines per inch
1/8-Inch Line Spacing	Escape 8	27, 56	$1B, $38	Selects eight lines per inch
7/72-Inch Line Spacing	Escape 1	27, 49	$1B, $31	Selects 7/72-inch line spacing
n/72-Inch Line Spacing	Escape A, *n*	27, 65, *n*	$1B, $41, *n*	Selects line spacing in increments of 1/72 inch
n/216-Inch Line Spacing	Escape 3, *n* Escape J, *n*	27, 51, *n* 27, 74, *n*	$1B, $33, *n* $1B, $4A, *n*	Sets line spacing in increments of 1/216 inch
Lines per Page	Escape C, *n*	27, 67, *n*	$1B, $43, *n*	Selects lines per page (127 lines maximum)
Normal-Density Graphics	Escape K, *LSB, MSB*	27, 75, LSB, *MSB*	$1B, $4B, *LSB, MSB*	Selects normal-density graphics
Paper-Out Sensor On	Escape /	27, 47	$1B, $2F	Activates the paper-out sensor
Paper-Out Sensor Off	Escape 0	27, 48	$1B, $30	Disables the paper-out sensor
Pica	Escape Control S	27, 19	$1B, $13	Selects pica characters
Print Head to Home Position	Escape <	27, 60	$1B, $3C	Returns the print head to the home position

NAME	CODE	DECIMAL	HEXA-DECIMAL	FUNCTION
Proportional Character Spacing	Escape p Control A Escape Control Q	27, 112, 1 27, 17	$1B,$70,$01 $1B, 11	Selects proportional spacing
Proportional Character Spacing Off	Escape p Control ,	27, 112, 0	$1B,$70,$00	Cancels proportional character spacing
Set Column Width	Escape Q, *n*	27, 81, *n*	$1B, $51, *n*	Sets the number of character spaces in a line
Set Vertical Tab Stops	Escape B, n_1... n_5 , Control ,	27, 66, n_1... n_5 , 0	$1B, $42, n_1 ...n_5 , $00	Sets vertical tab stops (five maximum)
Skip Perforation	Escape N, *n*	27, 78, *n*	$1B, $4E, *n*	Skips perforation
Sound Bell	Control G	7	$07	Sounds the printer's buzzer
Subscripts	Escape R Control A	27, 82, 1	$1B, $52, $01	Prints subscripts
Superscripts	Escape R Control ,	27, 82, 0	$1B, $52, $00	Prints superscripts
Superscripts/ Subscripts Off	Escape T	27, 84	$1B, $54	Cancels super-scripts and subscripts
Unidirectional Printing	Escape U Control A	27, 85, 1	$1b, $55, $01	Selects unidirectional printing
Vertical Tab	Control K	11	$0B	Tabs vertically to the next vertical tab stop
One Dot Space	Escape Control A	27, 1	$1B, $01	Advances carriage by one high-res dot
Two Dot Spaces	Escape Control B	27, 2	$1B, $02	Advances carriage by two high-res dots
Three Dot Spaces	Escape Control C	27, 3	$1B, $03	Advances carriage by three high-res dots
Four Dot Spaces	Escape Control D	27, 4	$1B, $04	Advances carriage by four high-res dots
Five Dot Spaces	Escape Control E	27, 5	$1B, $05	Advances carriage by five high-res dots
Six Dot Spaces	Escape Control F	27, 6	$1B, $06	Advances carriage by six high-res dots
Reverse Line Feed	Escape Control J	27, 10	$1B, $0A	Moves the paper back one line
Half Line Feed Forward	Escape Control ↑	27, 28	$1B, $1C	Advances the paper one half-line
Half Line Feed Reverse	Escape Control ←	27, 30	$1B, $1E	Moves the paper back one half-line

APPENDIX B: ATASCII TABLE

Decimal Code	Hexa-decimal Code	ATASCII Character/ Printer Function[1]	Keystrokes	International Character[2]
0	$00		Control ,	á
1	$01		Control A	ù
2	$02		Control B	Ñ
3	$03		Control C	É
4	$04		Control D	ç
5	$05		Control E	ô
6	$06		Control F	ò
7	$07	(Sound Bell)	Control G	ì
8	$08	(Backspace)	Control H	£
9	$09	(Horizontal Tab)	Control I	ï
10	$0A	(Line Feed)	Control J	ü
11	$0B	(Vertical Tab)	Control K	ä
12	$0C	(Form Feed)	Control L	Ö
13	$0D	(Carriage Return)	Control M	ú
14	$0E	(Auto Underlining Off)	Control N	ó
15	$0F	(Auto Underlining)	Control O	ö
16	$10		Control P	Ü
17	$11		Control Q	â
18	$12		Control R	û
19	$13		Control S	î
20	$14		Control T	é
21	$15		Control U	è
22	$16		Control V	ñ
23	$17		Control W	ê
24	$18		Control X	ä
25	$19		Control Y	à
26	$1A		Control Z	Å
27	$1B		Escape Escape	

[1]ATASCII stands for ATARI ASCII. Letters, numbers, and control characters have the same values as those in ASCII. The difference is that ATARI ASCII assigns graphics characters to certain ASCII characters (for example, decimal codes 0 through 27). These graphic characters will appear on your video display screen but will not be printed by your printer. Some characters are printer control codes. In those cases, the printer-control-code function appears in parentheses next to the ATASCII character.

[2]The printer must be in the International Character Mode to print the international characters.

Decimal Code	Hexa-decimal Code	ATASCII Character/ Printer Function	Keystrokes	International Character
28	$1C		Escape Control -	↑
29	$1D		Escape Control =	↓
30	$1E		Escape Control +	←
31	$1F		Escape Control *	→
32	$20		Space bar	
33	$21		Shift 1	
34	$22		Shift 2	
35	$23		Shift 3	
36	$24		Shift 4	
37	$25		Shift 5	
38	$26		Shift 6	
39	$27		Shift 7	
40	$28		Shift 9	
41	$29		Shift 0	
42	$2A		*	
43	$2B		+	
44	$2C		,	
45	$2D		-	
46	$2E		.	
47	$2F		/	
48	$30		0	
49	$31		1	
50	$32		2	
51	$33		3	
52	$34		4	
53	$35		5	
54	$36		6	
55	$37		7	
56	$38		8	
57	$39		9	
58	$3A		Shift ;	
59	$3B		;	
60	$3C		<	
61	$3D		=	
62	$3E		>	
63	$3F		Shift /	
64	$40		Shift 8	
65	$41		A	
66	$42		B	
67	$43		C	
68	$44		D	
69	$45		E	
70	$46		F	
71	$47		G	
72	$48		H	
73	$49		I	

Decimal Code	Hexa-decimal Code	ATASCII Character/ Printer Function	Keystrokes	International Character
74	$4A		J	
75	$4B		K	
76	$4C		L	
77	$4D		M	
78	$4E		N	
79	$4F		O	
80	$50		P	
81	$51		Q	
82	$52		R	
83	$53		S	
84	$54		T	
85	$55		U	
86	$56		V	
87	$57		W	
88	$58		X	
89	$59		Y	
90	$5A		Z	
91	$5B		Shift ,	
92	$5C		Shift +	
93	$5D		Shift .	
94	$5E		Shift *	
95	$5F		Shift -	
96	$60	(Prints ')	Control .	i
97	$61		a	
98	$62		b	
99	$63		c	
100	$64		d	
101	$65		e	
102	$66		f	
103	$67		g	
104	$68		h	
105	$69		i	
106	$6A		j	
107	$6B		k	
108	$6C		l	
109	$6D		m	
110	$6E		n	
111	$6F		o	
112	$70		p	
113	$71		q	
114	$72		r	
115	$73		s	
116	$74		t	
117	$75		u	
118	$76		v	
119	$77		w	

Decimal Code	Hexa-decimal Code	ATASCII Character/ Printer Function	Keystrokes	International Character
120	$78		x	
121	$79		y	
122	$7A		z	
123	$7B	(Prints ¦)	Control ;	Ä
124	$7C		Shift =	
125	$7D	(Prints ¦)	Escape Control < or Escape Shift <	↰
126	$7E	(Prints ~)	Escape Delete Backspace	◀
127	$7F	(Prints ■)	Escape Tab	▶

APPENDIX C:
PROPORTIONAL CHARACTER SPACING

DECIMAL CODE	PRINTED CHARACTER	WIDTH (HIGH DENSITY DOT)
0	á	12
1	ù	11
2	Ñ	12
3	É	12
4	ç	10
5	ô	10
6	ò	10
7	ì	8
8	£	12
9	ï	8
10	ü	11
11	ä	12
12	Ö	12
13	ú	11
14	ó	10
15	ö	10
16	Ü	12
17	â	12
18	û	11
19	î	8
20	é	10
21	è	10
22	ñ	12
23	ê	10
24	ä	12
25	à	12
26	Å	12
27		
28	↑	12
29	↓	12
30	←	12
31	→	12
32	SPACE	12
33	!	6
34	"	8
35	#	12
36	$	12
37	%	12
38	&	12
39	'	7
40	(	7

DECIMAL CODE	PRINTED CHARACTER	WIDTH (HIGH DENSITY DOT)
41	)	8
42	*	12
43	+	12
44	,	7
45	-	12
46	.	7
47	/	10
48	0	12
49	1	8
50	2	12
51	3	12
52	4	12
53	5	12
54	6	12
55	7	12
56	8	12
57	9	12
58	:	6
59	;	7
60	<	10
61	=	12
62	>	10
63	?	12
64	@	12
65	A	12
66	B	12
67	C	12
68	D	12
69	E	12
70	F	12
71	G	12
72	H	12
73	I	8
74	J	11
75	K	12
76	L	12
77	M	12
78	N	12
79	O	12
80	P	12
81	Q	12
82	R	12
83	S	12
84	T	12
85	U	12
86	V	12
87	W	12

DECIMAL CODE	PRINTED CHARACTER	WIDTH (HIGH DENSITY DOT)
88	X	10
89	Y	12
90	Z	10
91	[	8
92	\	10
93	]	8
94	^	12
95	—	12
96	` or i	7/6
97	a	12
98	b	11
99	c	11
100	d	11
101	e	12
102	f	10
103	g	11
104	h	11
105	i	8
106	j	9
107	k	10
108	l	8
109	m	12
110	n	11
111	o	12
112	p	11
113	q	11
114	r	11
115	s	12
116	t	11
117	u	12
118	v	12
119	w	12
120	x	10
121	y	12
122	z	10
123	{ or Ä	10/12
124	|	6
125	} or \	10/12
126	~ or ◀	12/12
127	■ or ▶	12

APPENDIX D:
XMM801 PRINTER SPECIFICATIONS

Printing Method	Impact dot matrix
Printing Speed	80 characters per second (at 10 characters per inch)
Print Direction	Bidirectional with logic-seeking capability (unidirectional programmable option)
Number of Pins in Print Head	8
Print Head Life	30 million characters
Character Matrix	8 dots high by 9 dots wide
Character Modes:	
Noninternational	Full 96 ASCII character set
International	91 ASCII and 36 international characters
Graphics (bit-image)	8 dots high by 480 dots per line at normal density (960 dots per line at high density); dot addressable

Horizontal Pitches:	Characters Per Inch	Maximum Characters Per Line
Pica	10	80
Double Width Pica	5	40
Elite	12	96
Double Width Elite	6	48
Condensed	16.5	132
Double Width Condensed	8.25	66

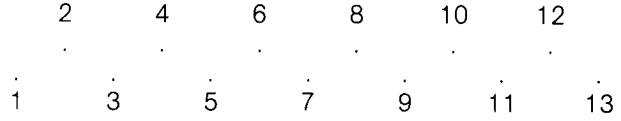
Line Spacing	1/6 inch (4.23 mm) unless programmed otherwise
Line-Feed Speed	Maximum 5 per second at 6 lines per inch (6 lines per 25.38 mm)
Paper-Feed Method	Sprocket feed or friction feed
Paper-Feed Direction	Forward (reverse by platen knob)
Overall Paper-Width Range	4 to 10 inches (101.6 to 254 mm)
Paper Thickness	0.002 to 0.006 inch (0.05 to 0.15 mm); one original plus one copy maximum
Paper Types	Fanfold pin-feed paper and single sheets
Paper Entry	Rear

Ribbon	Cartridge containing multistrike carbon-film ribbon with life expectancy of 1 million characters
Buffer Size	80 bytes
Interface	ATARI standard serial (see Appendix F)
Power Options	115 volts, 220 volts, 240 volts
Power Consumption	Standing (115 volts): 100 mA; operating (115 volts): 300-600 mA
Physical Characteristics	
Height:	4-1/2 inches (113 mm)
Width:	15-1/2 inches (394 mm)
Depth:	11-1/8 inches (284 mm)
Weight:	Approximately 10.1 lbs (4.6 kg)
Ambient Temperature:	
Operating	41°F to 95°F (5°C to 35°C)
Storage	−22°F to 158°F (−30°C to 70°C)
Maximum Humidity:	
Operating	10 to 80 percent relative humidity, noncondensing
Storage	0 to 95 percent relative humidity, noncondensing

APPENDIX E:
SERIAL INTERFACE SPECIFICATIONS

Interface	Standard ATARI 8-bit serial
Serial Input/Output Connector	Two 13-pin male connectors located at the rear of the printer
Mating Connector	Female

Serial Input/Output Pin Assignments



Pin Number	Signal
1	not used
2	not used
3	Data In
4	Signal Ground
5	Data Out
6	Signal Ground
7	Command
8	not used
9	not used
10	Ready
11	not used
12	not used
13	not used

Important Information

Like any electrical appliance, this ATARI Personal Computer equipment uses and produces radio-frequency energy. If not installed and used according to the instructions in this manual, the equipment may cause interference with your radio and television reception.

The XMM801 Printer has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of the FCC rules. These rules are designed to provide reasonable protection against such interference when the equipment is used in a residential setting. However, there is no guarantee that interference will not occur in a particular home or residence.

To ensure FCC compliance, the cable connected to the printer's I/O connector must be a shielded cable, like the one supplied with your printer. Use of a non-shielded cable will void FCC certification.

If you believe that this equipment is causing interference with your radio or television reception, try turning the equipment off and on. If the interference problem stops when the equipment is turned off, then the equipment is probably causing the interference. With the equipment turned on, you may be able to correct the problem by trying one or more of the following measures:

* Adjust the position of the radio or television antenna.
* Reposition the equipment in relation to the radio or television set.
* Move the equipment away from the radio or television set.
* Plug the equipment into a different wall outlet so that the equipment and the radio or television set are connected to different branch circuits.

If necessary, consult your ATARI Computer retailer or an experienced radio/television technician for additional suggestions.

A resource that you may find helpful is a booklet prepared by the Federal Communications Commission: *How to Identify and Resolve Radio-TV Interference Problems*. This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4.

Please Note: Every effort has been made to ensure the accuracy of the product documentation in this manual. However, because Atari Corp. is constantly improving and updating its computer hardware and software, we are unable to guarantee the accuracy of printed material after the date of publication and disclaim liability for changes, errors, or omissions.

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