



*Personal Computer
Hardware Reference
Library*

Guide to Operations

1502490



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Hardware Reference
Library*

Guide to Operations

First Edition (March 1984)

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If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the equipment with respect to the receiver.
- Move the equipment away from the receiver.
- Plug the equipment into a different outlet so that equipment and receiver are on different branch circuits.
- Ensure that card mounting screws, attachment connector screws, and ground wires are tightly secured.
- Ensure that card slot covers are in place when no card is installed.
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If necessary consult your dealer service representative for additional suggestions.

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CAUTION

The product described herein is equipped with a grounded plug for the user's safety. It is to be used in conjunction with a properly grounded receptacle to avoid electrical shock.

Preface

This *Guide to Operations* provides you with the necessary information to operate your IBM Personal Computer AT. External tabs are provided for ease in locating each section.

Here is how your *Guide to Operations* manual is organized:

"Section 1, Operating Your IBM Personal Computer AT"

This section provides operating instructions for your system unit, keyboard and disk drives. It also provides operating procedures for options you may attach to your IBM Personal Computer AT.

"Section 2, Testing Your IBM Personal Computer AT"

This section contains step by step instructions that help you determine if your system is operating properly. The section also contains information on the Setup program.

"Section 3, Moving Your IBM Personal Computer AT"

This section contains the procedures required for both short-distance and long-distance moves of your system.

"Appendix A, Keyboard Templates"

This section contains graphic layouts (templates) of all the keyboards available to you. The templates allow you to convert your keyboard to match various languages.

"Appendix B, Serial Numbers"

This section shows you serial number locations of your system and provides a place to record them.

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IMPORTANT

If your system has not been installed, go to *CHART 1, Cabling Your System* or *CHART 2, Installing Your Internal Options*. When you have completed installation of your system return to this manual for operating procedures.

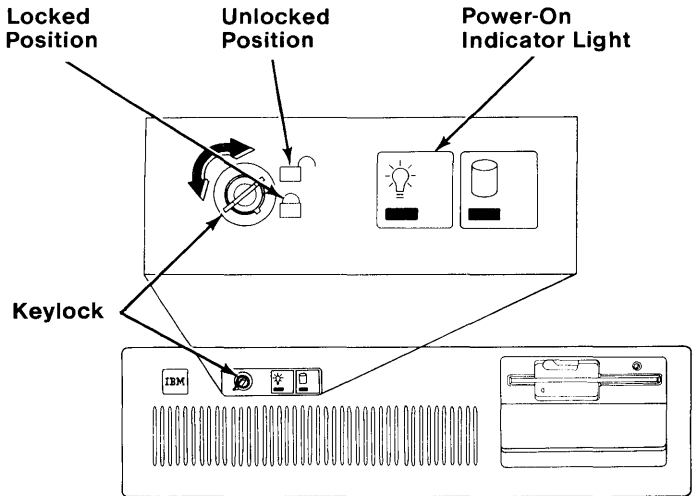
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System Unit

The main component of your IBM Personal Computer AT is the system unit. It does all of the processing and controls the operations for your system through a set of instructions called a program. The IBM Personal Computer AT comes with an installed program language called IBM BASIC.

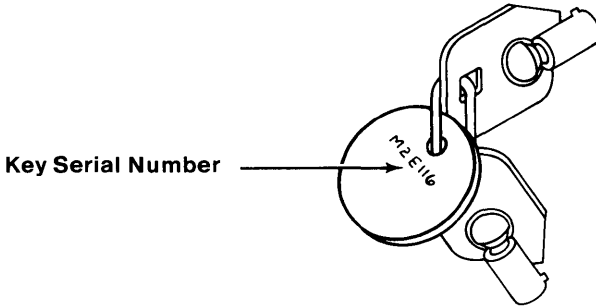
The Key Lock deactivates the keyboard and locks the cover for security. You can lock the system whether the power is on or off. Turn the key clockwise to lock the system or counterclockwise to unlock it. The key may be removed in either position.

When the system unit's power is on, the green power-on indicator light is on.



Ordering a Key

Information for ordering replacement keys and their cost may be obtained by writing to the address below. Be sure to include the lock number (#1501419) and the serial number, which is attached to the key ring.

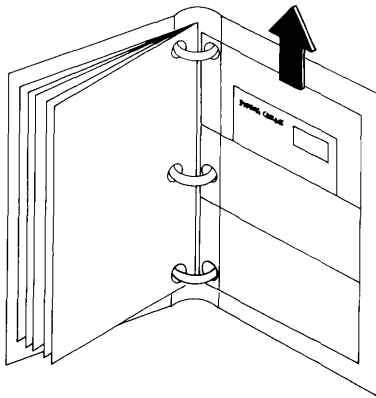


Chicago Lock Company
4311 West Belmont Ave.
Chicago, Il. 600641

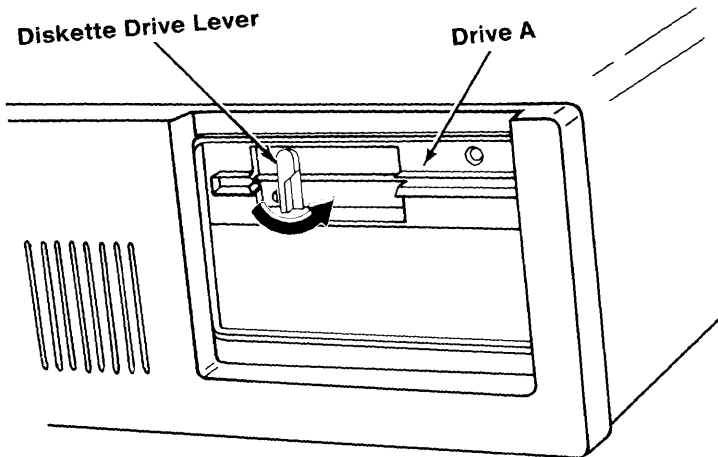
You are responsible for the security of your system.

Exploring Your IBM Personal Computer AT

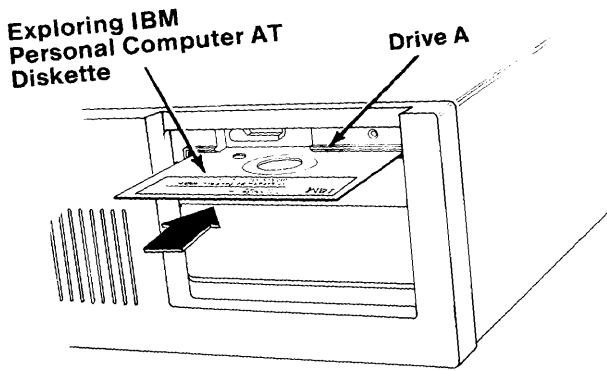
Included with your *Guide to Operations* is a diskette program called "Exploring the IBM Personal Computer AT". This program is designed to help you understand and use the functions of your IBM Personal Computer AT. Get the Exploring IBM Personal Computer AT diskette located at the back of this manual, and continue with the next page.



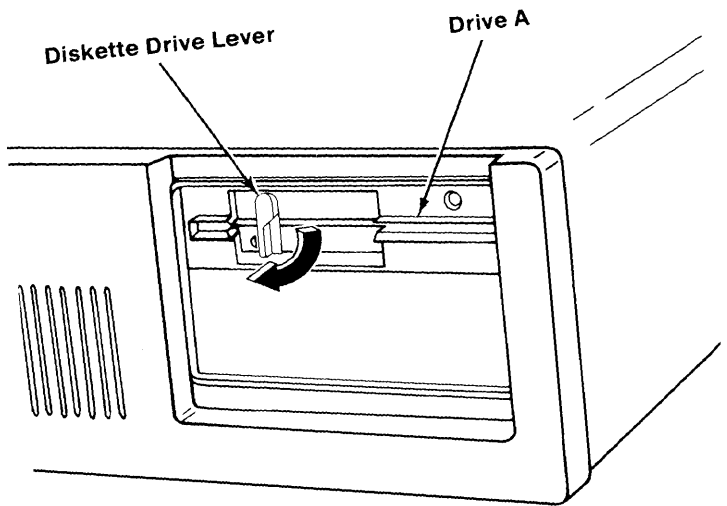
- 1** Be sure your system unit's power is off.
- 2** Rotate diskette drive A lever counterclockwise to open the diskette drive.



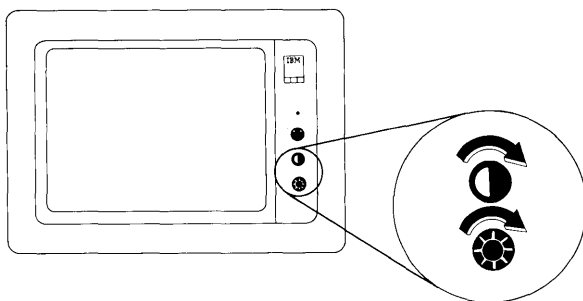
- 3** Be sure you do not have a diskette in drive A, then insert your "Exploring IBM Personal Computer AT" diskette into diskette drive A.



- 4** Rotate diskette lever A clockwise.

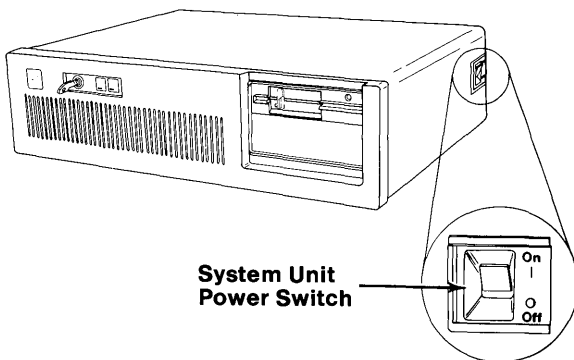


- 5** Turn your display contrast and brightness controls clockwise. (If your display has a Power control, turn the display on.)

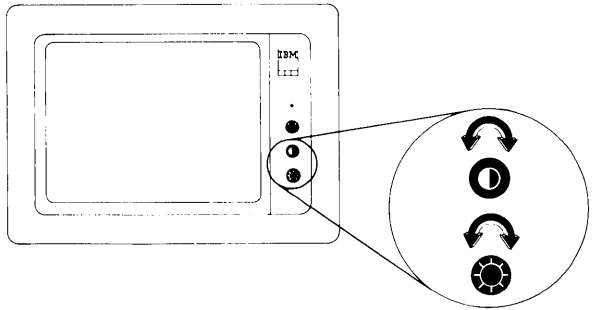


- 6** Turn your system unit's power on.

Note: Each time you turn your system unit on it does a Power-On Self Test (POST) which completes in 13 to 90 seconds.



- 7** Adjust your display's contrast and brightness controls for eye comfort.



- 8** Follow the instructions on the screen to follow the "Exploring your IBM Personal Computer AT" program.

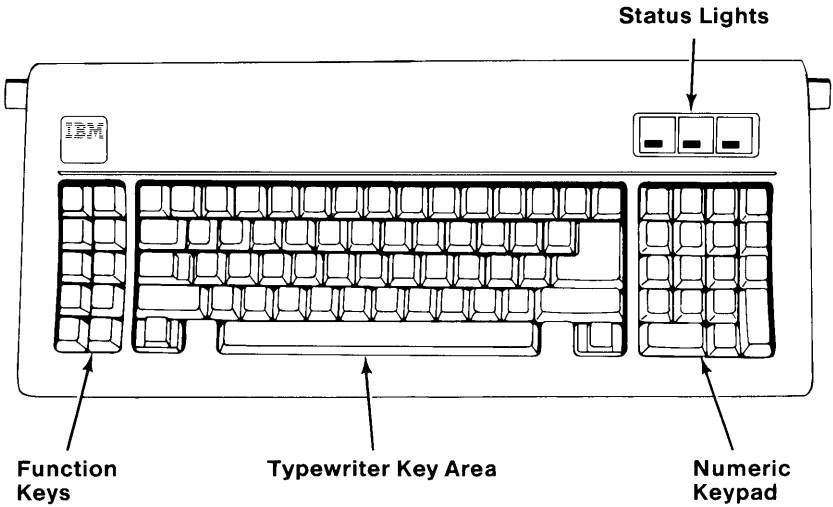
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Keyboard

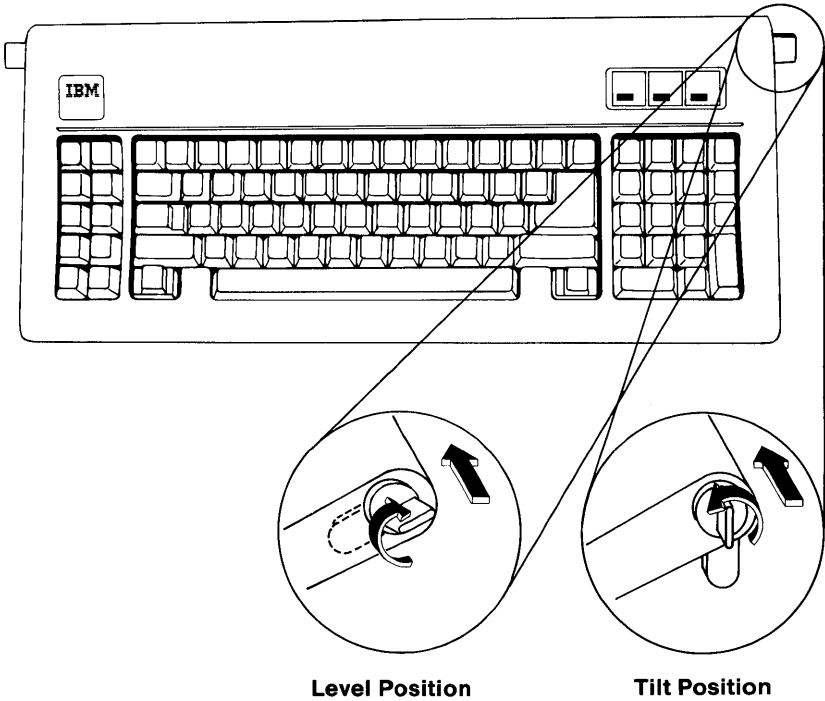
Your keyboard is divided into three sections: the typewriter key area, the function keys, and the numeric keypad. It also has three status lights that show the status of the Capital (Caps) Lock, Numeric (Num) Lock, and the Scroll Lock keys.



Keyboard Height Adjustment

You can adjust your keyboard to two different positions for typing comfort.

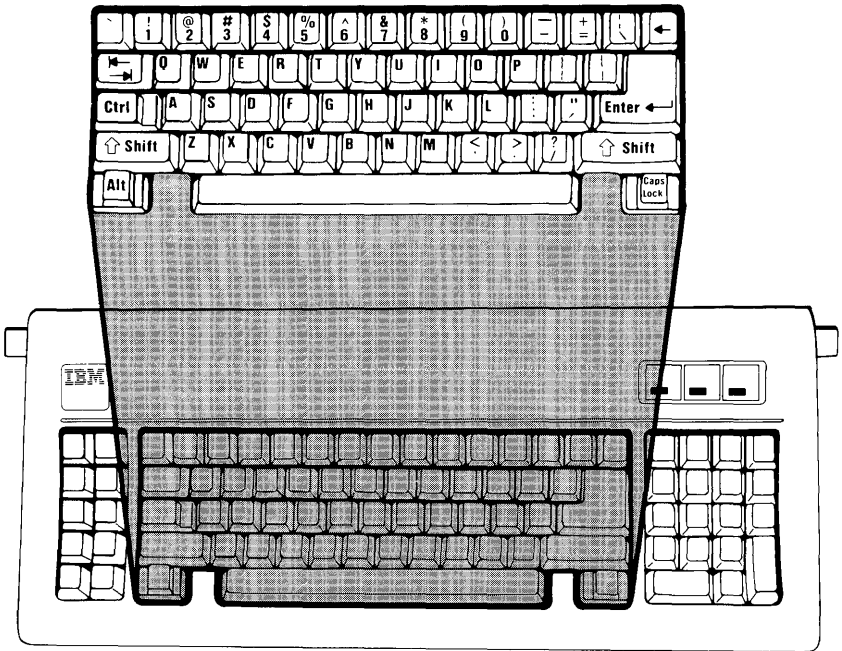
To adjust, push in on the adjustable leg handles on both sides and turn them to the desired position.



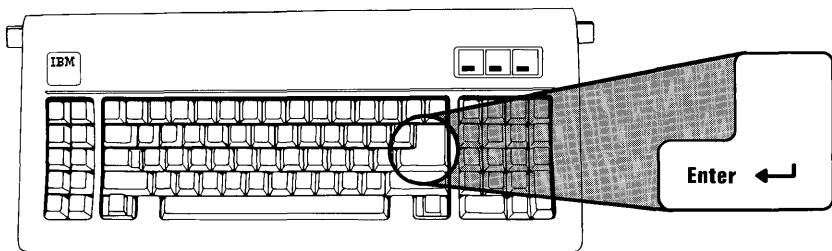
Typewriter Key Area

The keys in the typewriter area are similar to those of a standard typewriter. Most of the keys are typematic. This means they will repeat as long as you hold them down.

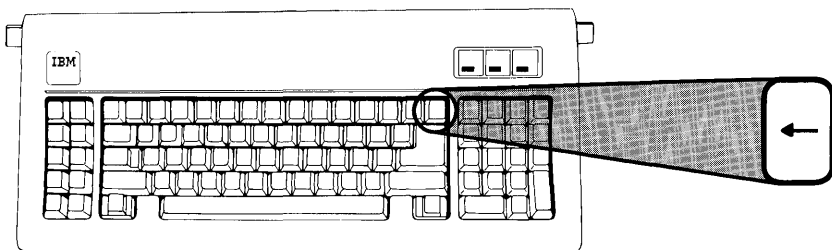
There are some additional keys that perform control functions for your IBM Personal Computer AT. These functions are controlled by the program you are using. The IBM Personal Computer AT comes with an installed program language called Beginner's All-purpose Symbolic Instruction Code (BASIC). BASIC, is a programming language that uses common English words. The descriptions and functions of individual keys on the following pages apply when you are using IBM BASIC. If you are using other programs you must refer to those program manuals for key descriptions and their functions.



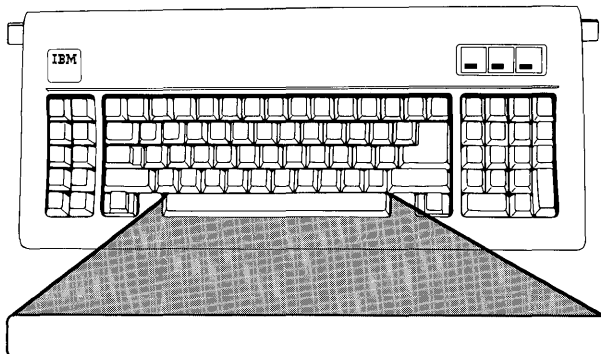
The Enter key works like a carriage return by moving the cursor to the start of a new line. The Enter key is often used to tell your IBM Personal Computer AT to start doing a job.



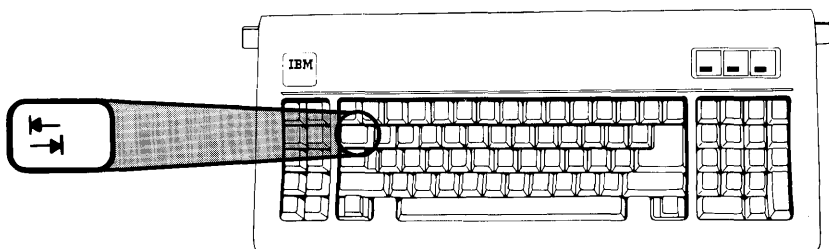
The Backspace key erases mistakes. Each time you press the backspace key it moves the cursor one position to the left and erases the character in that position.



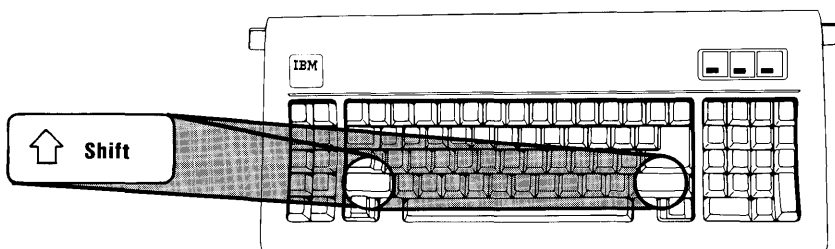
The Spacebar key moves the cursor one position to the right. Any character the cursor moves over is replaced by a blank.



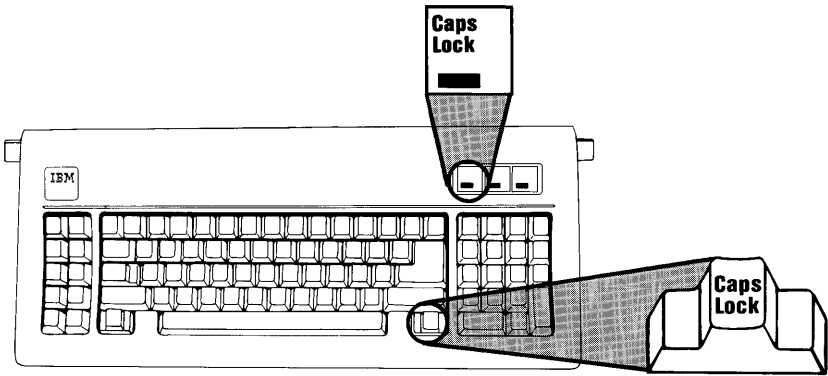
The Tab key moves the cursor to the right, to the next available tab stop. If you press and hold the Shift key and then press the Tab key the cursor will move left, to the next available tab stop. When your system starts, the tab stops are set automatically at every eight characters.



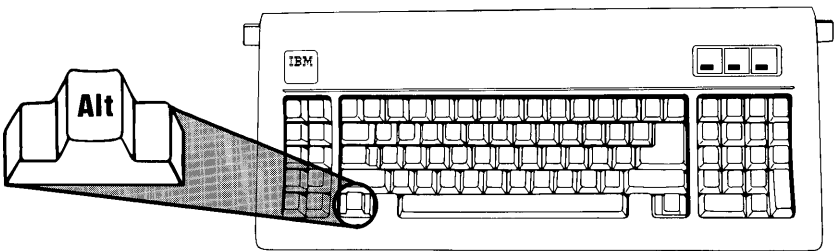
There are two Shift keys on your keyboard. Pressing either of the Shift keys switches the letter keys, the symbol keys and the numeric keypad keys from Lower case mode to the Upper case mode.



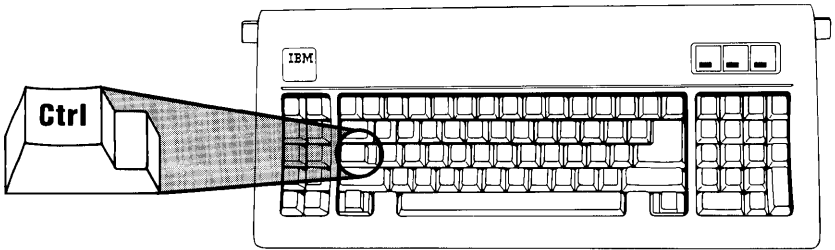
The Capital Lock light comes on when you press the Caps Lock key, or when your program is in the capital lock mode. The light lets you know that the A through Z keys are locked in uppercase. It cannot be used to type the symbols that appear on the tops of other keys. The light goes off when you press the Caps Lock key again, or your program is no longer in the capital lock mode.



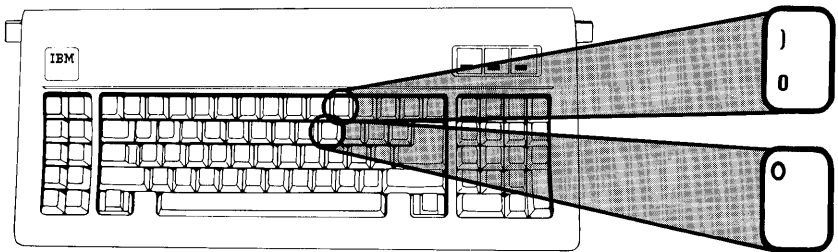
The Alternate (Alt) key is used with other keys to enter BASIC statement keywords quickly. If you press and hold the Alt key and then press any alphabetic key A through Z, the defined BASIC keyword is entered. The Alternate key is also used with the numeric keypad keys to enter ASCII codes. For more information on the use of the Alternate key, refer to the IBM *BASIC* reference manual.



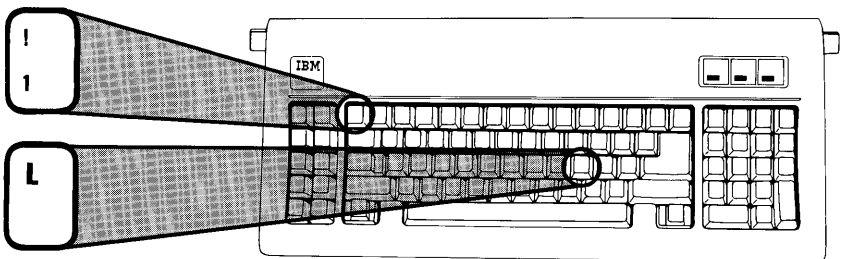
The Control (Ctrl) key is always used with another key to perform a command or function. For more information on the use of the Control key, refer to the IBM *BASIC* reference manual.



When entering data into your computer, you should be aware that the zero (0) key and the letter "O" key are not interchangeable.



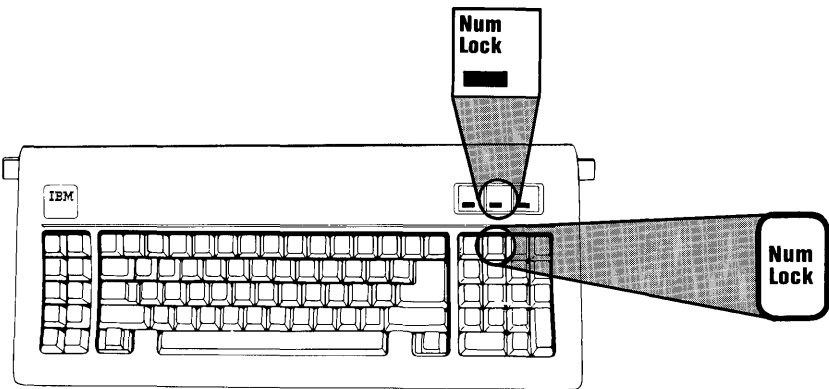
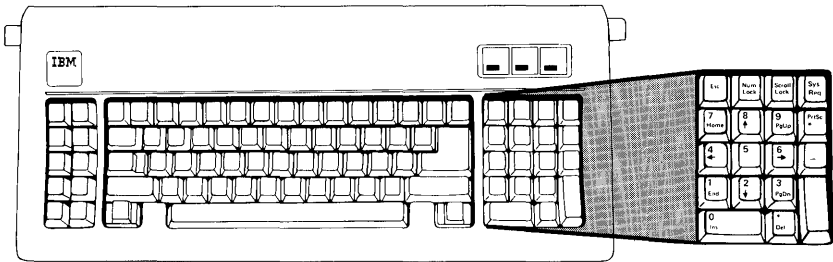
Also the number one (1) key and the lowercase letter "L" key are not interchangeable.



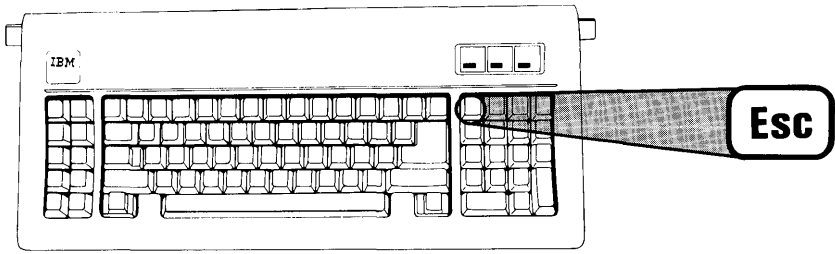
Numeric Keypad

Pressing the Numeric Lock (Num Lock) key once switches the cursor keys to number keys and the shift keys work in reverse. The keypad is arranged like a calculator to save time when typing many numbers. Pressing Num Lock again returns keys 0 through 9 to cursor control keys.

The numeric lock light comes on when you press the Num Lock key or when your program is in the number lock mode. The light goes off when you press the Num Lock Key again, or your program is no longer in the number lock mode.

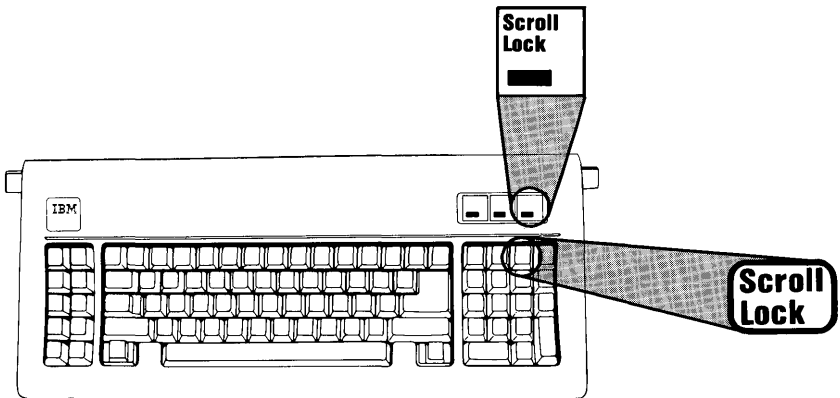


The Escape (Esc) key has its functions defined in your operating system or application program manual.

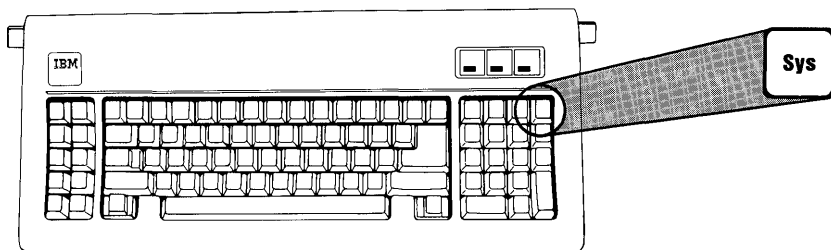


When the Scroll lock key is pressed once the cursor up and cursor down keys move the text up or down one line and the cursor is locked to the line it is on. Scroll Lock also serves as a break key. It is often used with the Control (Ctrl) key to stop a job. Refer to your operating system or application program manual for more details on Scroll lock.

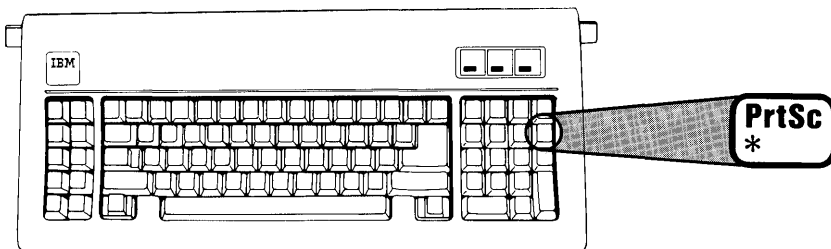
The scroll lock light comes on when you press the Scroll Lock key or when your program is in the scroll lock mode. The scroll lock light goes off when you press the Scroll lock again, or your program is no longer in the scroll lock mode.



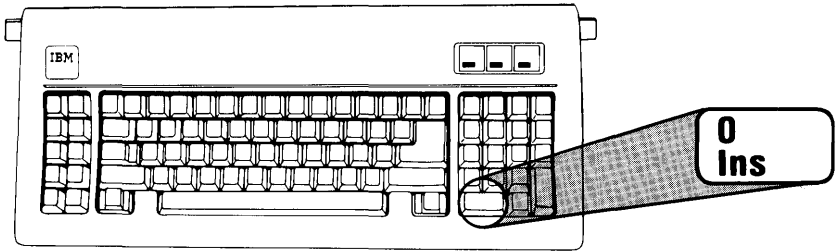
The System (Sys) key has its functions defined in your operating system or application program manual.



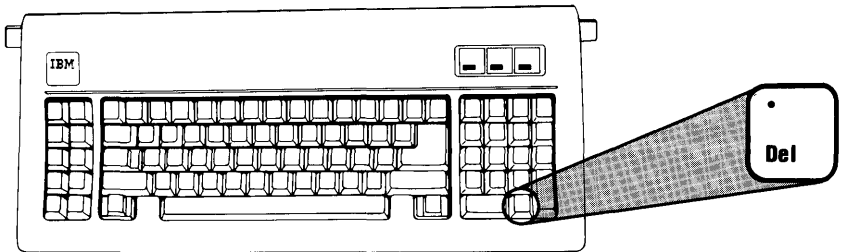
The Print Screen (PrtSc) key when pressed displays an asterisk (*). If you press and hold a shift key and then press Print Screen (PrtSc) most programs will print (if you have a printer) the data that is displayed on your screen.



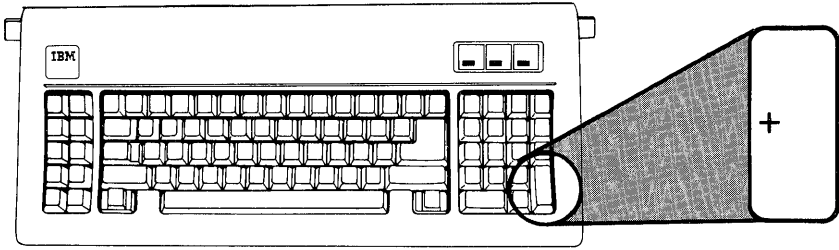
The Insert (Ins) key is used to insert data in a line. When a character is inserted, all data to the right of the cursor moves right one position. Press the Insert (Ins) key once and the cursor changes to a blinking block to indicate the insert mode. Press the Insert key again and the cursor returns to a blinking line to indicate the replace mode.



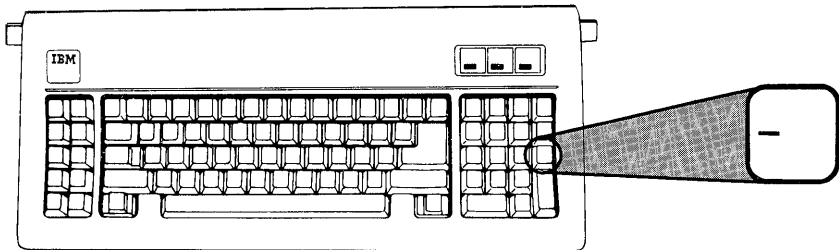
The Delete (Del) key erases the character where the cursor is positioned. When a character is deleted, all data to the right of the cursor moves left one position.



The Plus key displays a plus (+) when pressed.

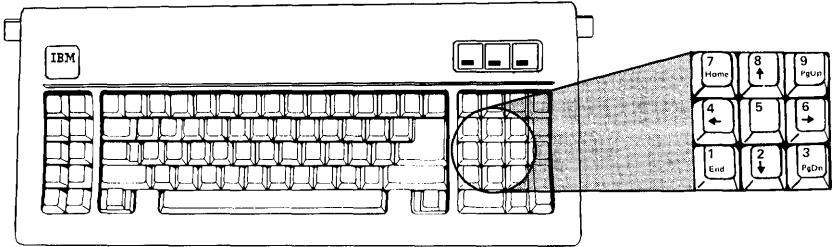


The Minus key displays a minus (-) when pressed.



Cursor Control Keys

The cursor is the blinking marker that shows where you are on your screen. The Cursor control keys allow you to move the cursor around on your screen.



The Cursor Up key moves the cursor up one line at a time.



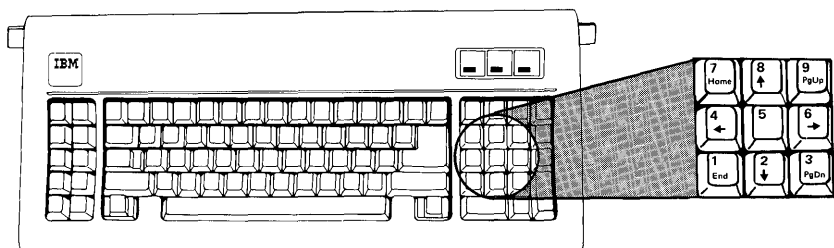
The Cursor Down key moves the cursor down one line at a time.



The Cursor Right key moves the cursor right one position at a time.



The Cursor Left key moves the cursor left one position at a time.



The Home key moves the cursor to the top left corner of your screen.



The End key moves the cursor to the right of the last character on the line.



The Page Up key is defined in your Operating System or Application Program manual.

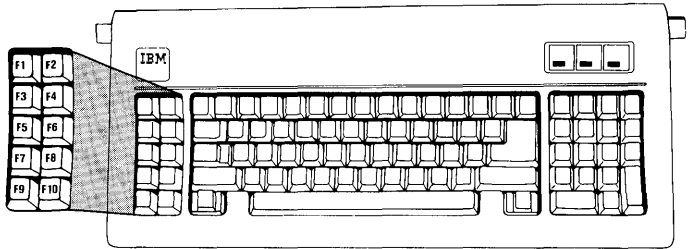


The Page Down key is defined in your operating system or application program manual.

Function Keys

The 10 Function Keys are multi-purpose keys. What each key does depends on the program you are using.

The following Function Key commands have been assigned for use with your IBM BASIC program.



LIST -- Press F1 to display "List" on your screen. Press Enter (↵) to display the lines of your program.



RUN -- Press F2 to start your program from the beginning.



LOAD -- Press F3 to display "Load" on your screen. Type your program name and press Enter (↵) to read your program from auxiliary storage and store it in your system unit's memory.



SAVE-- Press F4 to display "Save" on your screen. Type your program name and press Enter (↵) to store your program on your diskette or fixed disk.



CONT -- Press F5 to display "Cont" on your screen. This restarts your program after you have interrupted it by a Stop command in your program or by pressing Ctrl Break.



,LPT1 -- Press F6 to display the ,"LPT1:" on your screen.



TRON -- Press F7 to display "Tron" on your screen. This is used to display the line numbers as a program is run.



TROFF -- Press F8 to display "Troff" on your screen. This cancels the F7 "Tron" command.



KEY -- Press F9 to display "Key" on your screen. This is to be followed by other key statements. It is used to change the function of other function keys.



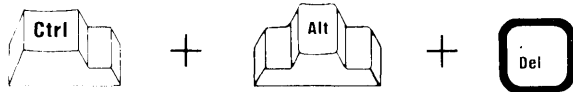
SCREEN -- Press F10 to display "Screen" on your screen. This returns the program to text mode from graphics mode and turns color off.

Multikey Commands

The following are examples of multikey sequences that perform control functions, when using IBM BASIC.

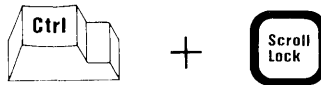
System Restart reloads your program.

Press and hold the Ctrl and Alt keys. Then, press the Del key to generate a system restart.



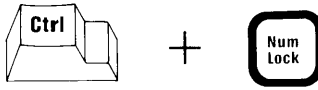
Control Break stops your program while it's running and identifies the line where it stops.

Press and hold the Ctrl key. Then, press the Scroll Lock key to generate a control break.



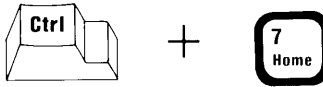
Pause stops your program.

Press and hold the Ctrl key. Then, press the Num Lock key to generate a pause. Press any key to continue.



Clear Screen removes all information from the screen and moves the cursor to the upper-left corner.

Press and hold the Ctrl key. Then, press the Home key to generate a clear screen.



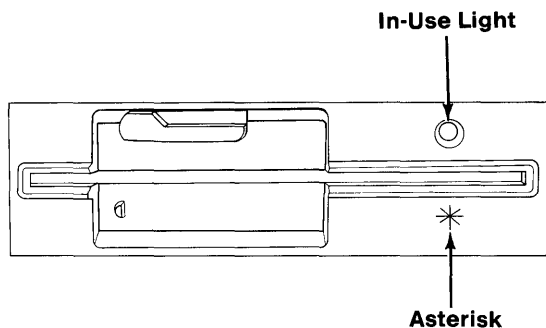
Diskette Drives

Diskette drives are used to read and record data on diskettes.

Two types of drives are available for your IBM Personal Computer AT:

- The High Capacity drive comes installed in your IBM Personal Computer AT. It stores approximately 1.2M bytes of data on a 5-1/4 inch high capacity diskette.
- The Double Sided drive is an option for your IBM Personal Computer AT. It stores up to 360K bytes of data on a 5-1/4 inch diskette.

The Double Sided drive is identified by a large asterisk below the in-use light. The High Capacity drive has no special markings.



About Diskettes

A diskette is a 5 1/4 inch magnetic disk inside a protective plastic jacket. Diskettes are used to store data.

Your selection of the correct diskette is CRITICAL to the successful operation of your IBM Personal Computer AT.

IMPORTANT: Diskettes must be formatted to be used by your IBM Personal Computer AT. How your diskettes are formatted, depends upon your Disk Operating System (DOS) and the type of drive you are using. For more information on how diskettes are formatted, refer to your *DOS* manual.

Diskette Selection Requirements for your IBM Personal Computer AT

- To read and record in the 1.2M bytes format with your High Capacity drive you must use the IBM "High Capacity" ("2HC") diskette or an equivalent diskette.
- To read and record in the 320/360K bytes format with your High Capacity drive or a Double Sided drive you must use diskettes that are double sided and double density.

Note: Do not use IBM High Capacity ("2HC") diskettes or their equivalent when you are reading or recording in the 320/360K bytes format.

About Diskette and Drive Compatibility

The following chart shows the compatibility of your IBM Personal Computer AT drives with different types of formatted diskettes.

	Single Sided Diskette (160/180K)	Double Sided Diskette (320/360K)	High Capacity Diskette (1.2M)
Double Sided Drive ->	Read or Write	Read or Write	Do Not Use (1)
High Capacity Drive ->	Read Only (2)	Read Only (2)	Read or Write

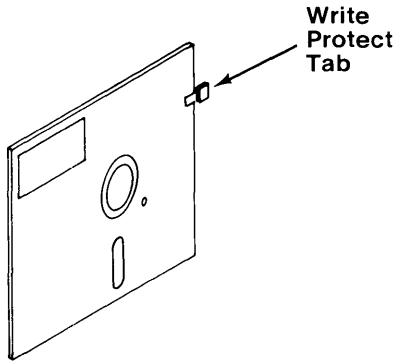
- 1 Do not use in a Double Sided drive.
- 2 **Warning:** If you write (record) on a single sided or double sided diskette with your High Capacity drive, that diskette may become unusable in a Single Sided or Double Sided drive. To guard against accidentally writing (recording) on these diskettes, you should consider placing a write protect tab on the diskette before you use it. Refer to the "Write Protect" procedure later in this section.

Summary of Diskette and Drive Compatibility

- Use only high capacity diskettes to read and record in the 1.2M bytes format with your IBM Personal Computer AT High Capacity drive.
- Use only double sided diskettes to read and record in the 320/360K bytes format with your IBM Personal Computer AT High Capacity drive.
- Use only double sided diskettes in a Double Sided drive.
- Do not write on double sided diskettes in your High Capacity drive if you intend to use the diskettes in a double sided drive.

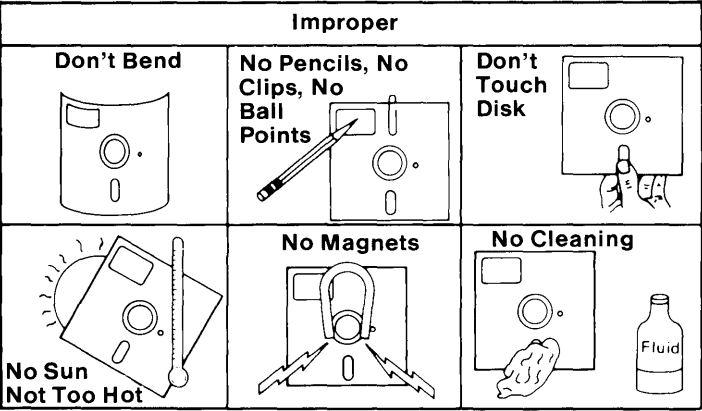
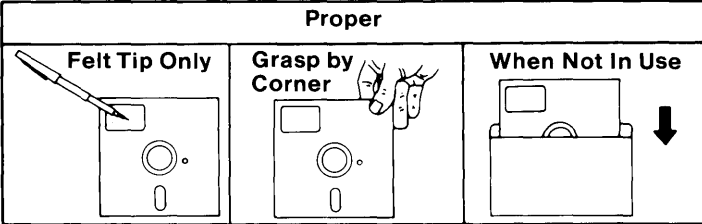
Write Protect

When a diskette is write protected, no information can be stored (written) on the diskette. To write protect a diskette, cover the notch on the side of the diskette with a write protect tab. If you want to store (write) information on a diskette, remove the write protect tab.



Diskette Care

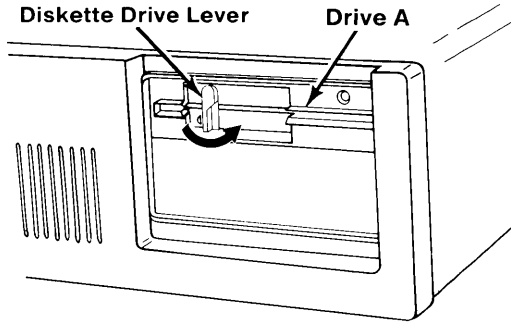
The figures below show proper and improper ways of handling your diskettes. Proper handling will greatly reduce the possibility of damaging them.



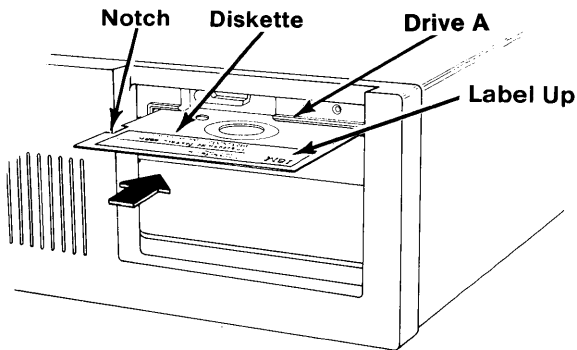
Operating your Diskette Drive

To insert a diskette:

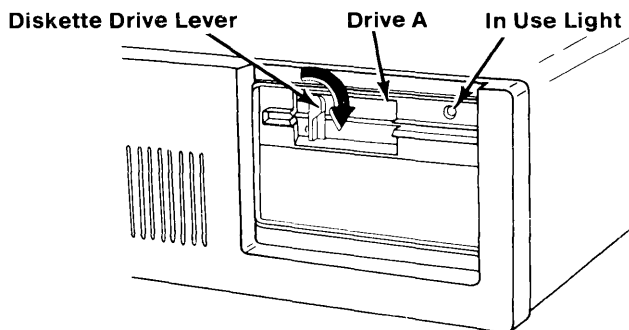
- 1** Rotate the drive lever on your diskette drive counterclockwise to open the drive.



- 2** Insert your diskette into the drive with the label facing up and the write protect notch to the left. When you have inserted your diskette all the way, it clicks into place.



- 3** Close your diskette drive by rotating the drive lever clockwise.



When the in-use light is on it indicates that your system unit is using your diskette drive.

To remove your diskette from your drive, rotate your diskette drive lever counterclockwise and pull your diskette out. Do not remove your diskette when the in-use light is on.

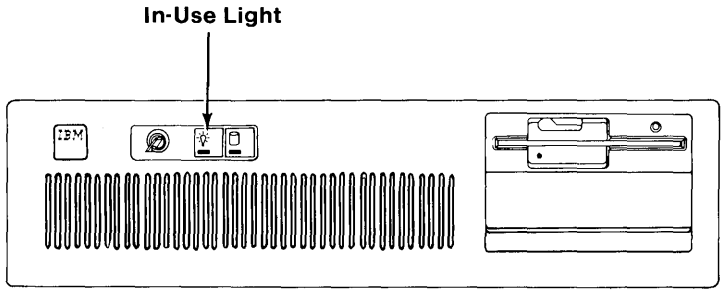
Notes:

Fixed Disk Drives

Data can be stored and retrieved from your fixed disk drive by using an operating system such as the IBM *Disk Operating System (DOS)*.

You can have one or two fixed disk drives in your IBM Personal Computer AT.

The in-use light on the indicator panel is on when the system unit is using either fixed disk drive.



Notes:

(

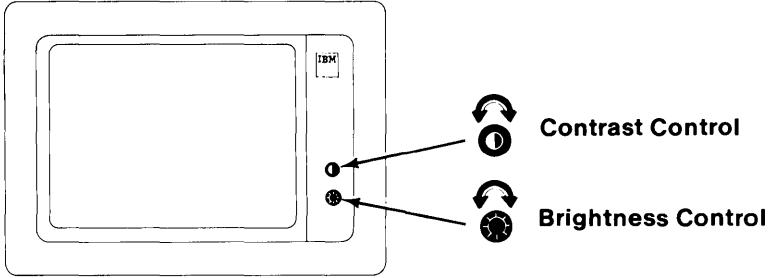
(

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IBM Monochrome Display

Operating the IBM Monochrome Display

Controls



The Contrast Control increases the brightness of the data displayed on your screen when turned clockwise, and decreases the brightness when turned counterclockwise.



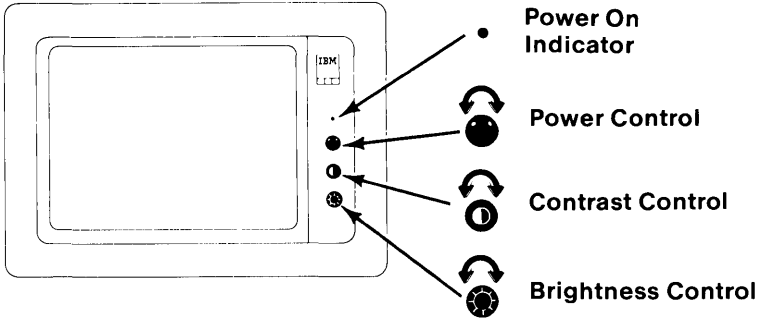
The Brightness Control increases the brightness of the entire screen when it is turned clockwise, and decreases the brightness when it is turned counterclockwise.




Notes:

IBM Color Display

Operating the IBM Color Display

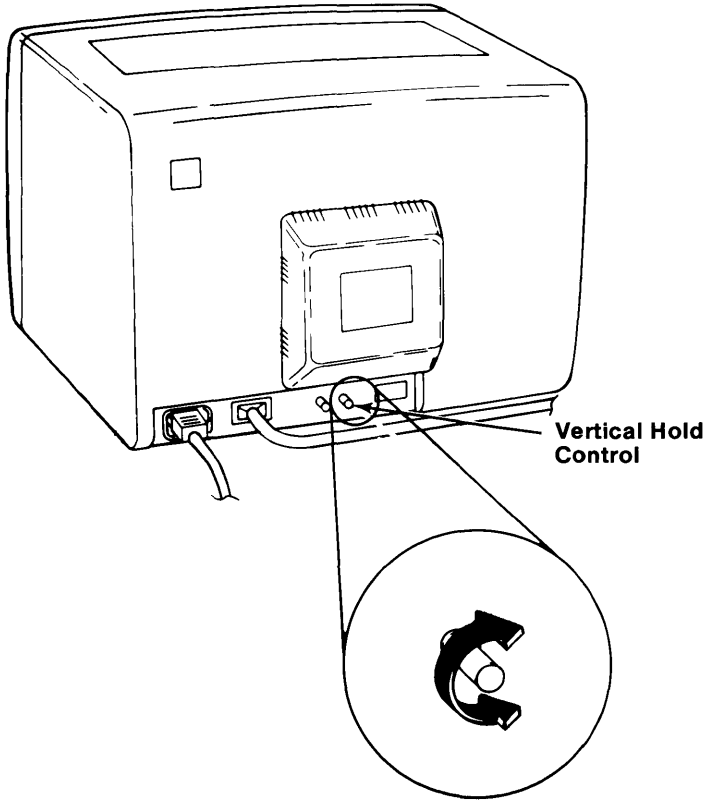
Controls



-  The Power control turns your IBM Color Display on when turned clockwise, and sets it to off when turned counterclockwise. The Power-On indicator lights when your display is turned on.
-  The Contrast Control increases the brightness of black, blue, green, cyan (greenish blue), red, magenta (purplish red), brown, and white only when turned clockwise, and decreases the brightness of these colors when turned counterclockwise.
-  The Brightness Control increases the brightness of the entire screen when it is turned clockwise, and decreases the brightness when it is turned counterclockwise.

Vertical Hold Adjustment

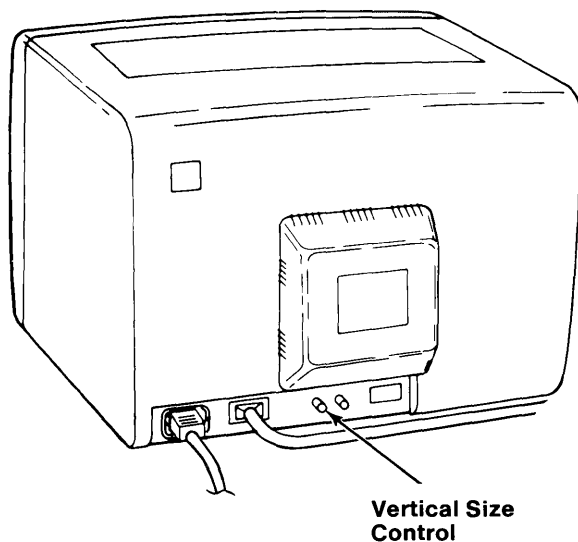
This adjustment is needed only if your IBM Color Display has a vertical-hold problem (screen rolling top-to-bottom or bottom-to-top).



- 1** Turn your system unit's and your display's power on.
- 2** Turn the Vertical Hold control clockwise as far as it will go, then turn it counterclockwise until the screen stops rolling and is stable.

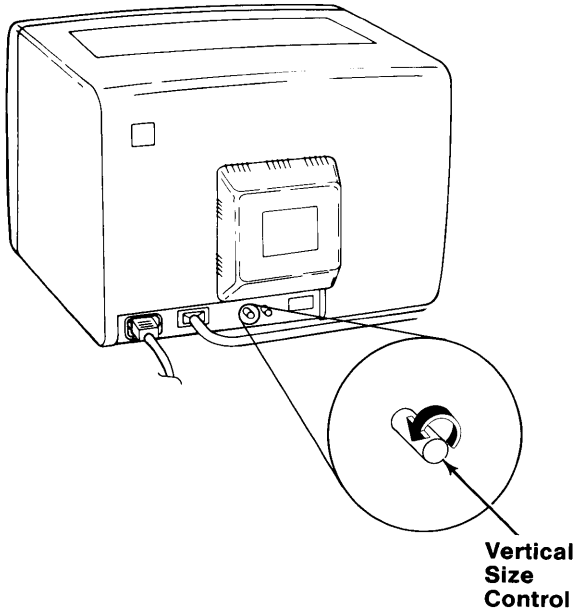
Vertical Size Adjustment

This adjustment is needed only if the height of the figures on the screen is wrong.

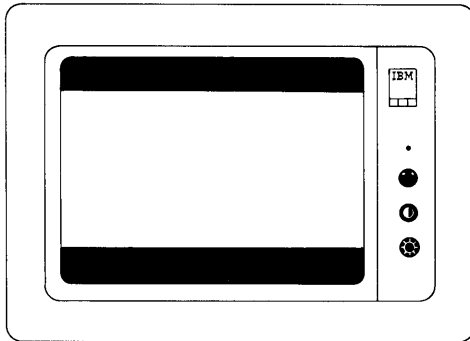


- 1** Turn your system unit's power off.
- 2** Turn the Power control on your IBM Color Display on.
- 3** Turn the Brightness and Contrast controls fully clockwise.

- 4** Turn the Vertical Size control fully counterclockwise.

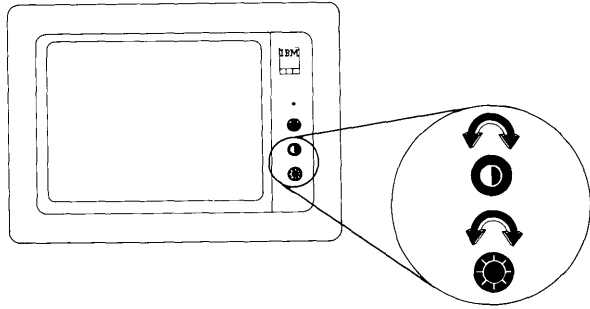


- 5** A black area should appear across the top and bottom of the screen.



- 6** Turn the Vertical Size control clockwise until the black area at the top and bottom of the screen just disappears. If one of the black areas disappears before the other, continue to turn the Vertical Size control until the second black area is gone.

- 7** Adjust the Brightness and Contrast controls for eye comfort.



Notes:

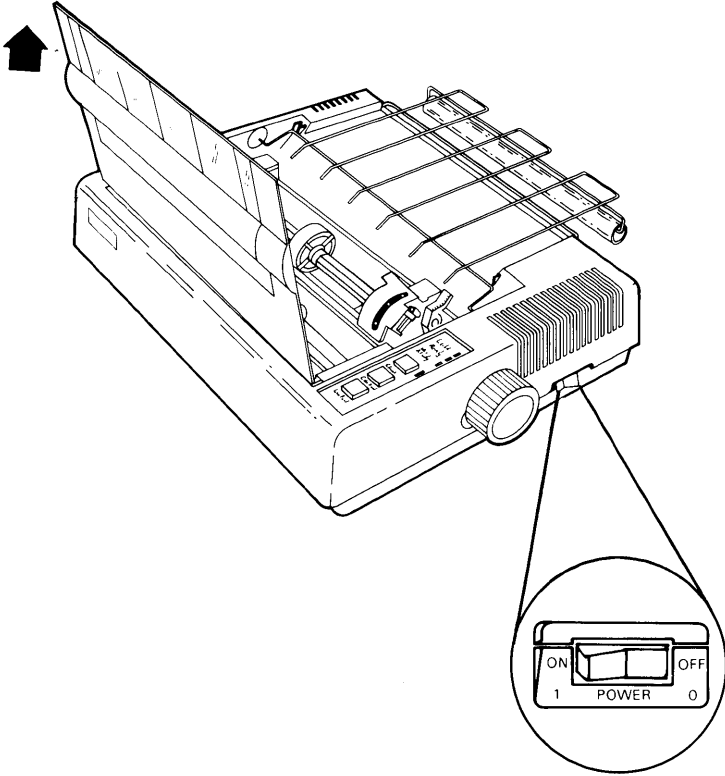
Graphics Printer

Introduction

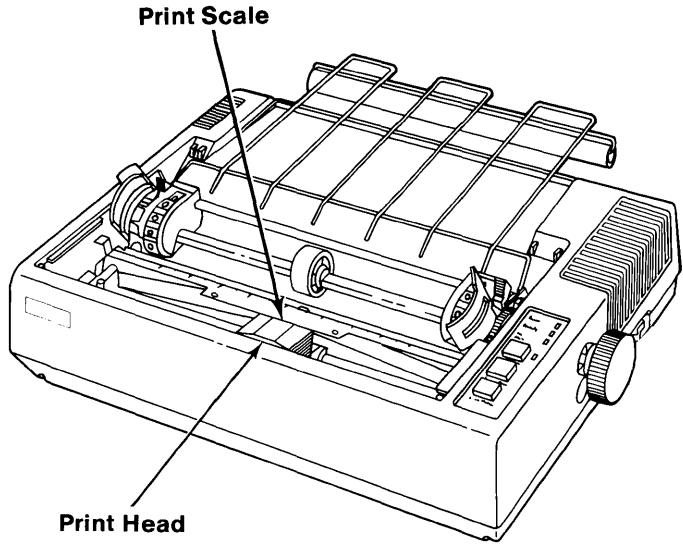
Your IBM Personal Computer Graphics Printer is capable of bidirectional printing in several character sizes. The printer uses only continuous form paper that is either single or multi-part forms in widths of 101.6 to 254.0 mm (4 to 10 in.).

Ribbon Installation

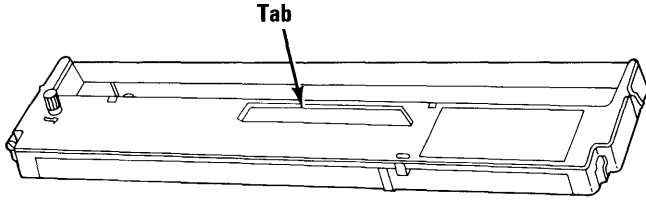
- 1 Be sure your printer's power is off.
- 2 Raise the printer access cover and lift it from the printer.



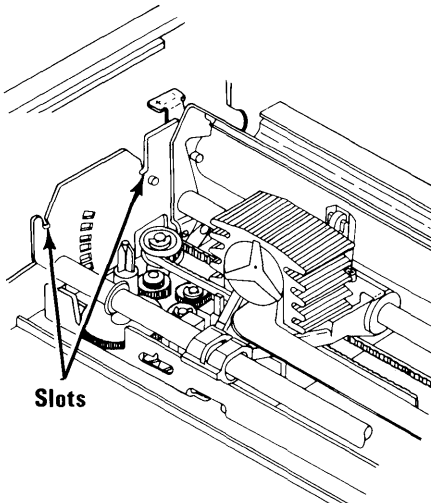
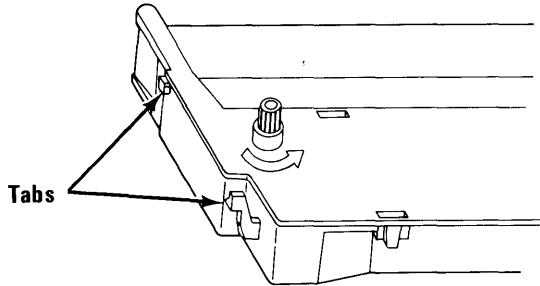
- 3 Be sure the print scale is in the rear position.
- 4 Center the print-head carriage by sliding it left or right.



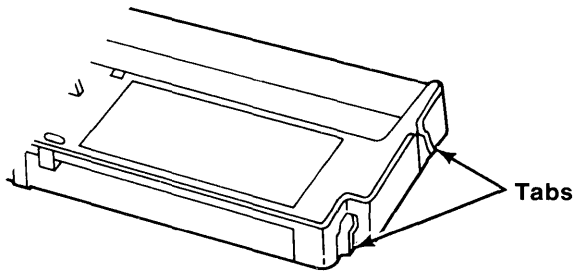
- 5** Grasp the tab in the center of the ribbon cartridge.



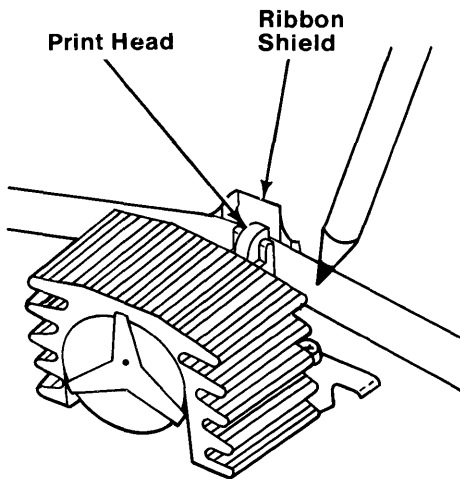
- 6** Guide the two tabs on the left side of the ribbon cartridge into the slots on the left side of your printer's frame.



- 7** Guide the two tabs on the right side of the ribbon cartridge into the two slots on the right side of your printer's frame. Press the ribbon cartridge firmly into place.

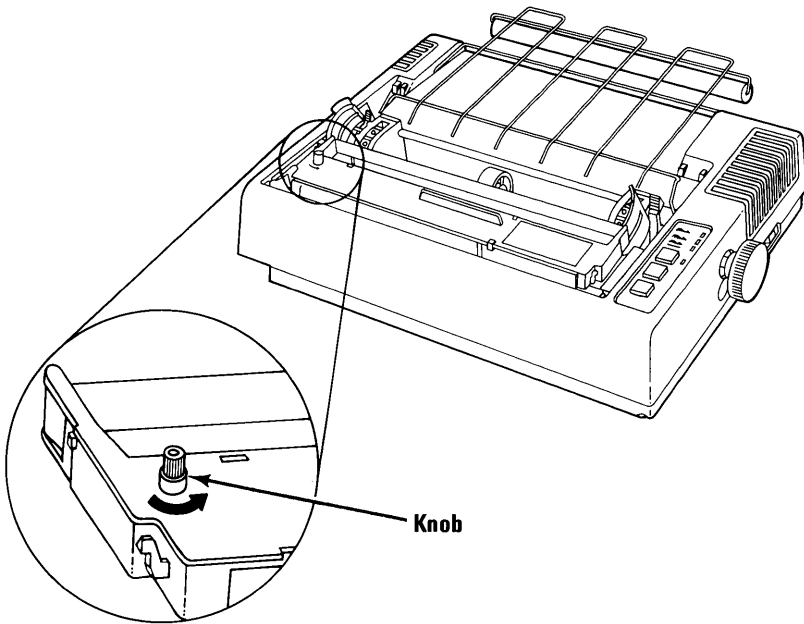


- 8** Using a pencil or your finger, guide the ribbon into the slot between the print head and the ribbon shield.

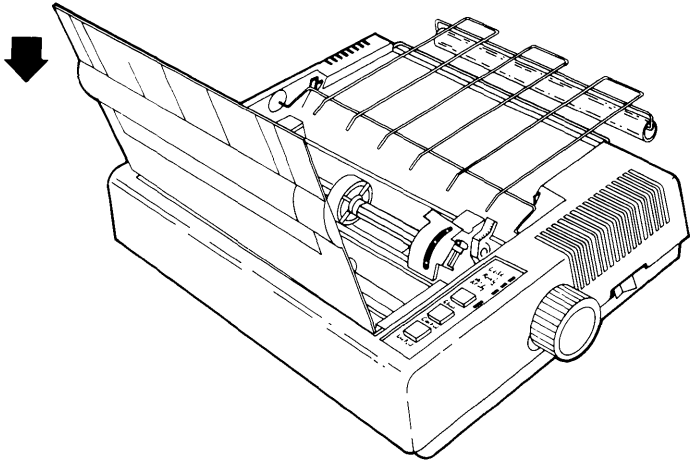


9 Turn the knob in the direction of the arrow to remove any slack in the ribbon.

10 Carefully slide the print head left to right to be sure the ribbon is moving freely between the print head and the ribbon shield.

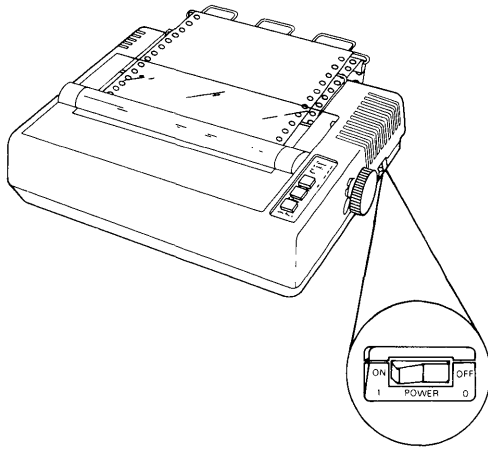


- 11 Replace the printer access cover.

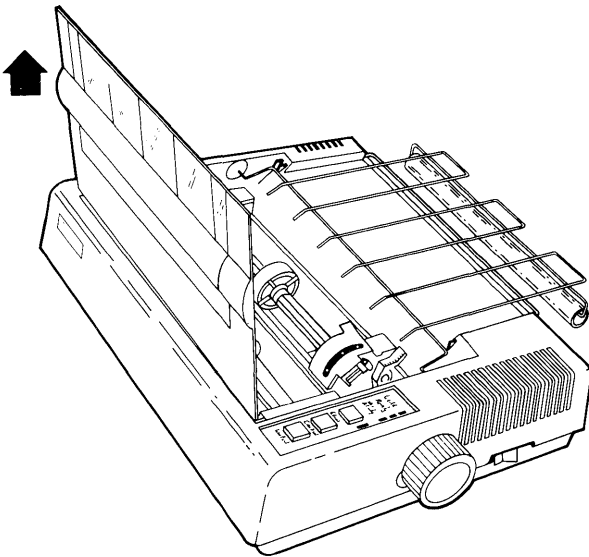


Paper Installation

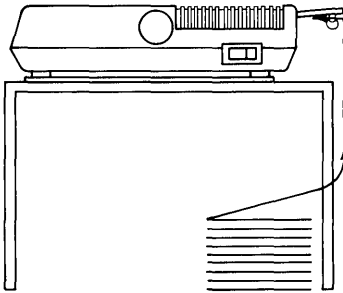
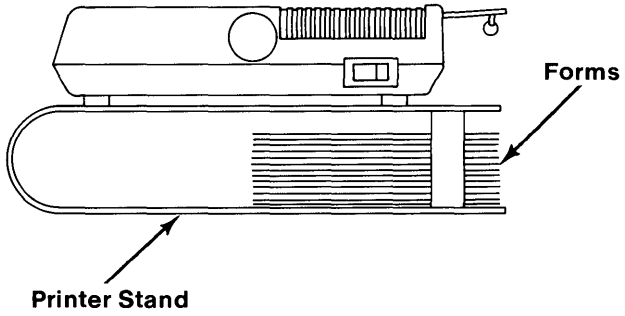
- 1 Be sure that your printer's power is off.



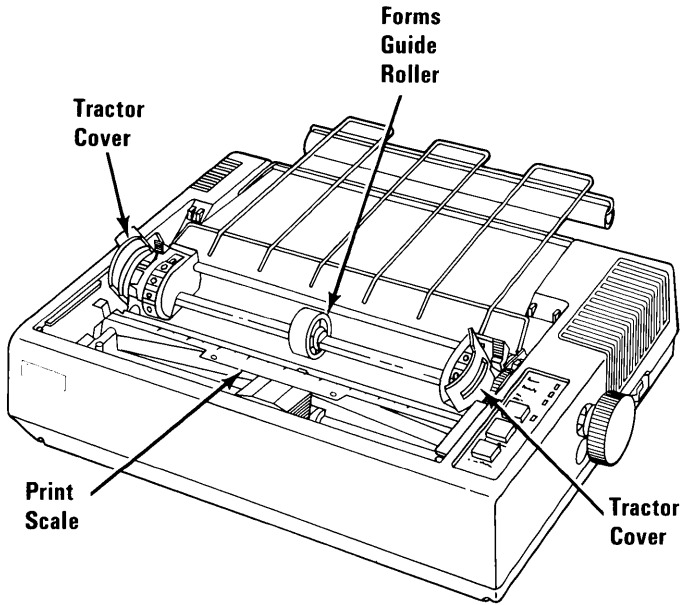
- 2 Raise the printer access cover and lift it from the printer.



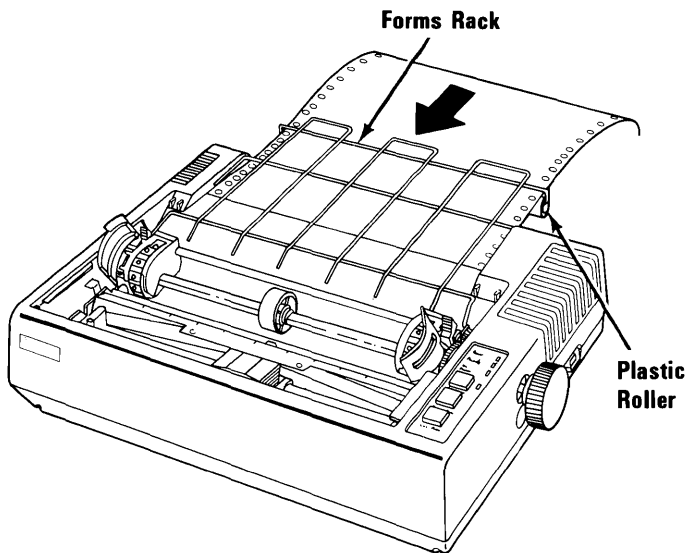
- 3** Place the paper behind and below your printer using a printer stand or the floor.



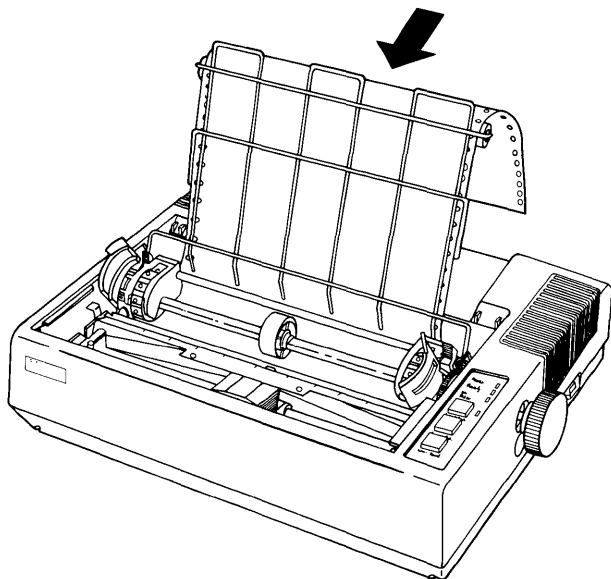
- 4** Move the print scale toward the front of the printer and center the forms guide roller.
- 5** Open the tractor covers.



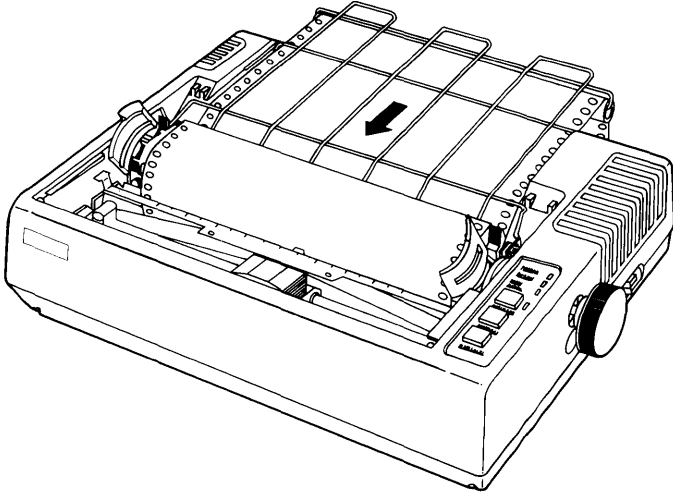
- 6** Insert the end of the paper between the forms rack and the clear plastic roller.



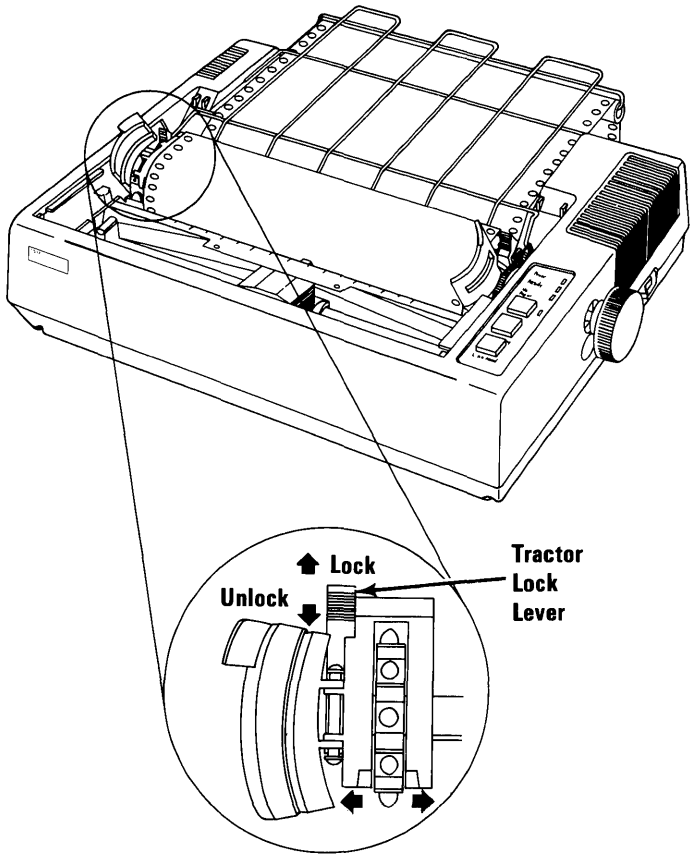
- 7** Tilt the forms rack up and guide the paper into the printer opening.



- 8** Push the paper into the printer opening until 76.2 to 101.6 mm (3 to 4 in.) appear in the front.



- 9** If the paper width is different from the distance between the tractors, unlock the tractors by tilting the tractor lock levers forward and sliding the tractors to the correct width.

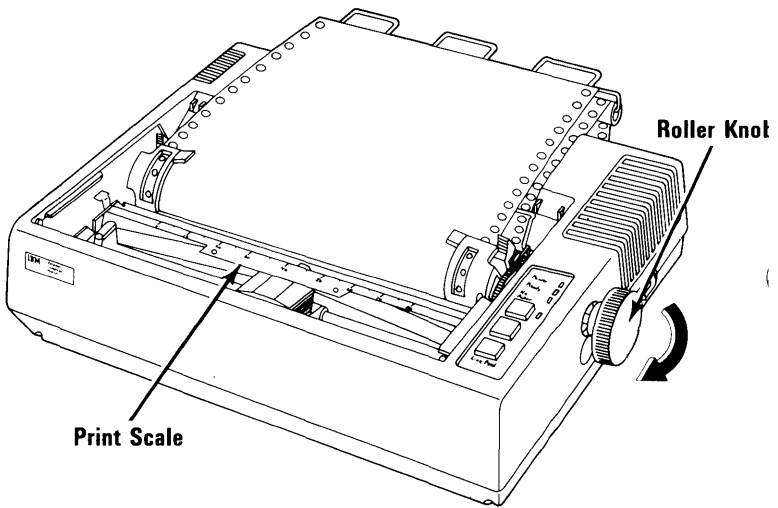


- 10** Place the holes of the paper over the tractor pins and close the tractor covers. Adjust the tractors so the paper is centered and free of any buckles.

- 11** Lock the tractors in place by moving the tractor lock levers to the rear.

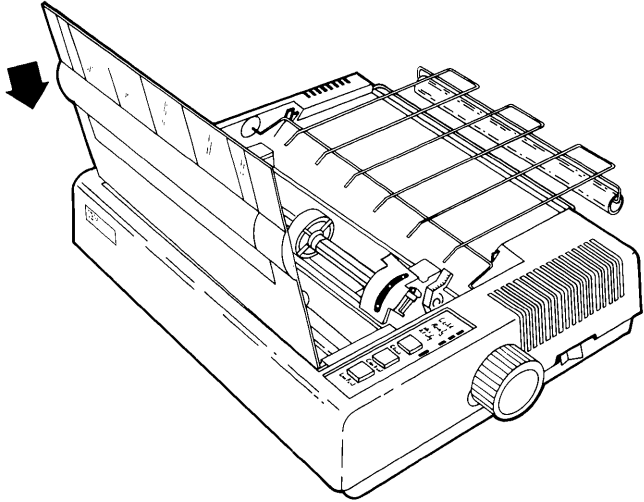
Warning: Always roll the paper forward. Rolling it backward may damage your printer.

- 12** Roll the paper up with the roller knob. Be sure that the paper is feeding properly. Center the paper under or behind your printer making sure that the paper does not rub against anything, including the printer cable.



- 13** Move the print scale to the rear and against the paper.

14 Install the printer access cover.

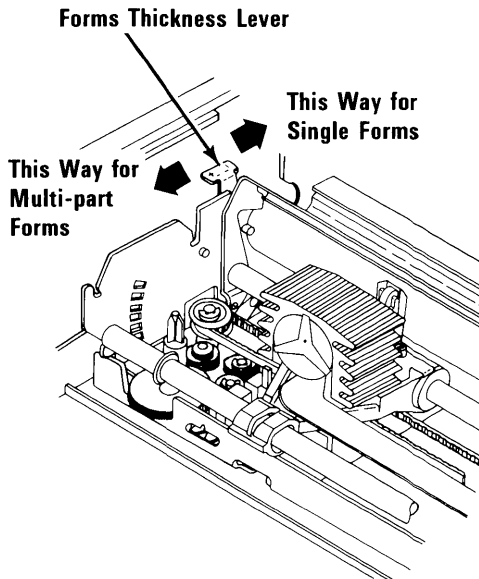


Forms Thickness Control Lever

The Forms Thickness Control lever adjusts the position of the print head to allow room for single sheets or multiple-copy forms. Move the lever toward the rear for single sheets, and toward the front for multiple-copy forms.

This lever can affect print darkness. If the printing is too light, move the lever toward the rear of your printer; if the printing is smeared, move the lever toward the front. The best position for the lever is as far to the front of your printer as possible while still getting good print with a good condition ribbon installed.

Warning: Positioning the Forms Thickness Control lever too far to the rear for the paper being used will result in premature wear of the print head.



Top-of-Form Setting

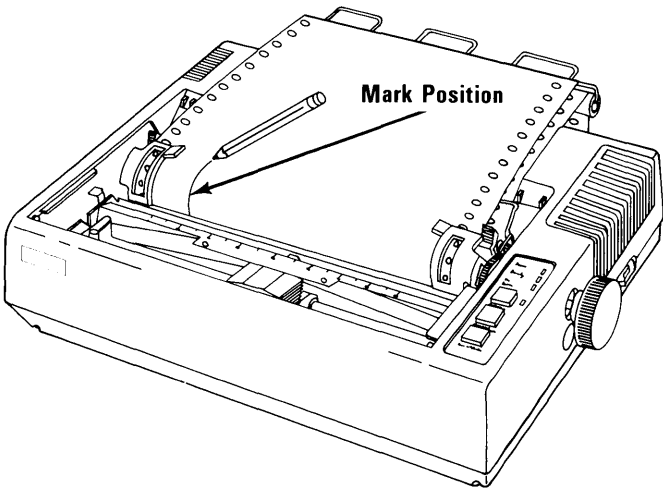
- 1 Be sure your printer's power is off.
- 2 Raise your printer access cover.
- 3 Using the roller knob, roll the paper up so that the perforation line is to the top of the print scale.
- 4 Lower the printer access cover.
- 5 Turn your printer's power on.
- 6 To change the top-of-form setting, repeat the above sequence.

Note: The position of the paper when the printer's power is turned on determines where the paper will feed to when a Form Feed command is given. For example, if the print scale is in the middle of the form when the power is turned on, the paper feeds to the middle of the next page when the Form Feed command is given or when the Form Feed button is pressed. The length of the page can be changed by using printer commands from your system unit. When your printer's power is turned off and then on again or when your printer receives a printer reset from the system unit, the page length is 279.4 mm (11 in.).

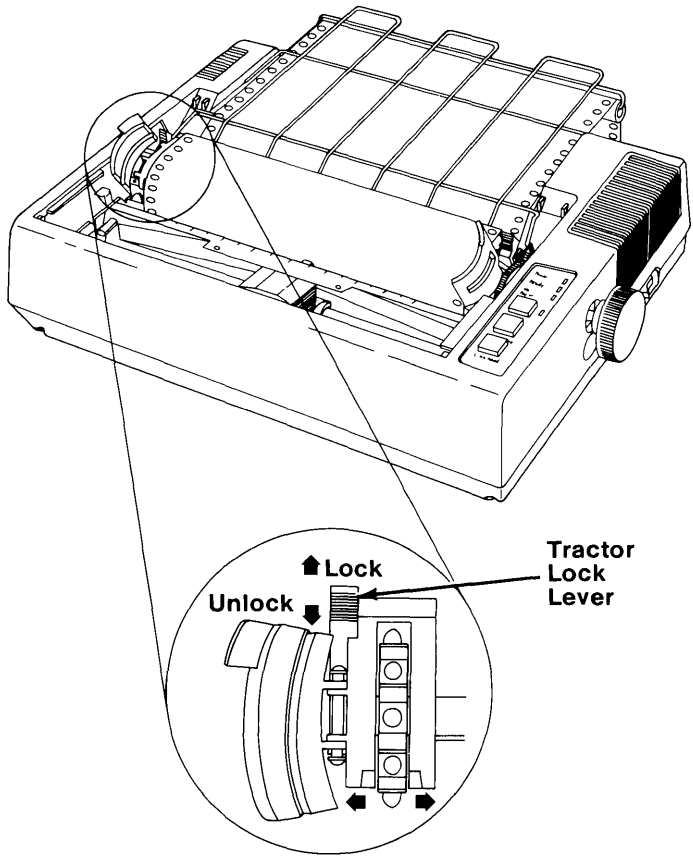
Left Margin Adjustment

- 1** Be sure your printer's power is off.
- 2** Decide where you want your printer to start printing and mark that position on the paper. (The mark must not be more than 32 mm (1.75 in.) from the left edge of the paper, including the perforated edge.)

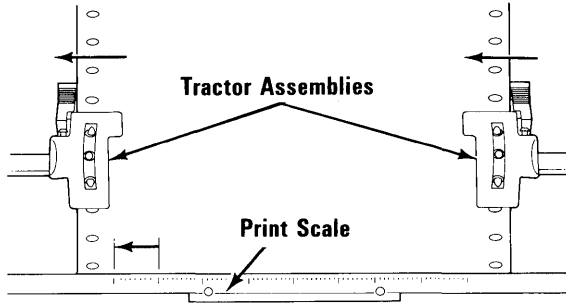
Note: The access cover has been removed to show the inside of the printer better.



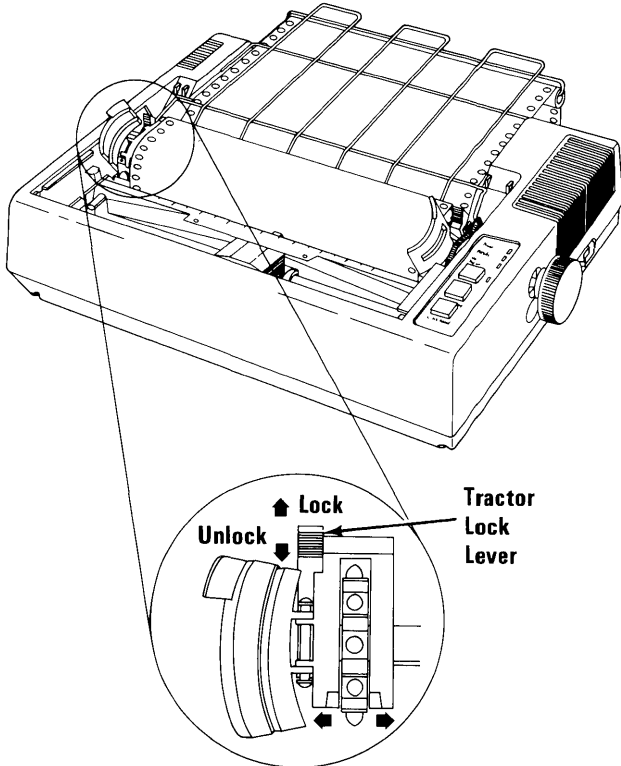
- 3** Unlock the right and left tractors by moving the tractor lock levers forward.



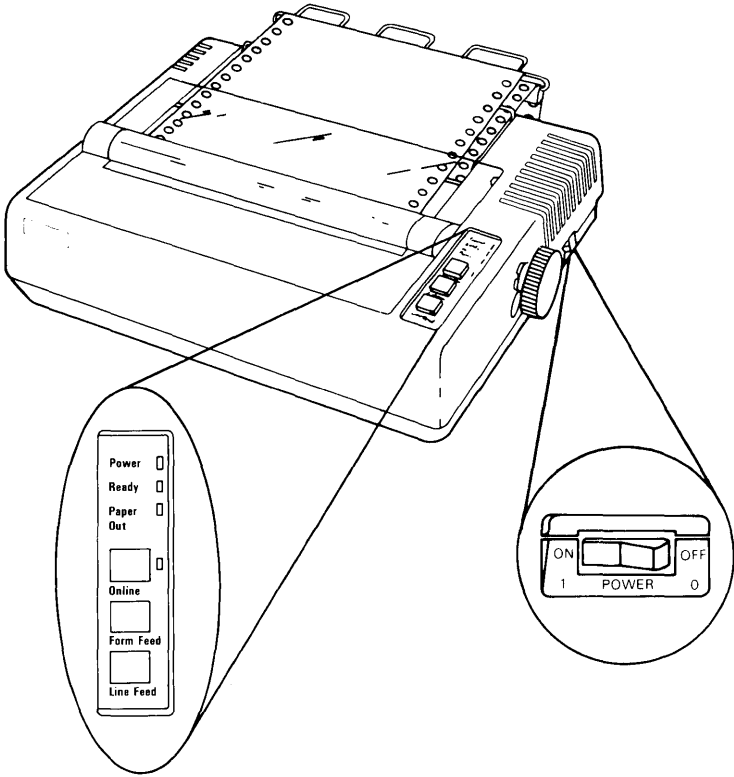
- 4** Slide the tractor assemblies with the paper and align your mark with the number 1 position on the print scale.



- 5** Lock both tractor assemblies in place by moving both tractor lock levers back.



Printer Controls and Lights



POWER When the printer's power is on the power light on the control panel will come on.

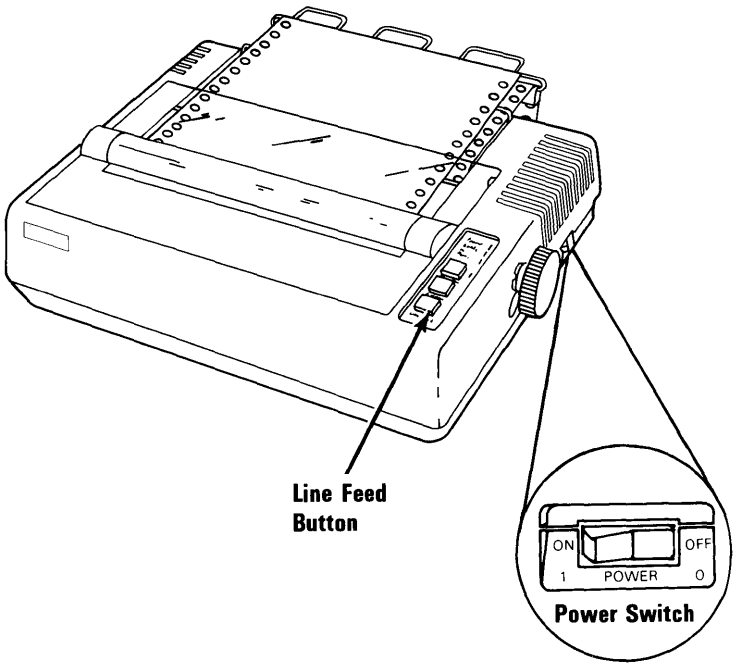
Ready When your printer is ready to receive information, the Ready light will light.

- No Paper** When your paper supply reaches the end, the No Paper light will light and you will hear a beeping sound.
- On-line** When you turn your printer on, the On-line light will light indicating the printer is ready to receive information from your computer. If you press the On-line button once, the On-line light goes off indicating that the printer cannot receive any information from your computer. If you press the On-line button again the light will light returning your printer to the On-line mode.
- Form Feed** This button works only if your printer is Off-line (the On-line light is off). Each time you press the Form Feed button, the printer feeds the paper to the first line of the next form. If you forget to position the paper to the top of the form before turning your printer on, simply turn your printer off, correct the position of the paper, then turn your printer on again.
- Line Feed** This button works only if your printer is Off-line (the On-line light is off). Each time you press the Line Feed button, your printer moves the paper up one line. If you hold the button down, your printer continues to feed the paper through your printer until you release the button.

Printer Self-Test

Before you go any further, you may want to see your printer print. The Printer Self-Test allows you to do this. Whenever you want to see if your printer is working correctly, follow the steps below.

- 1** Be sure your printer's power is off.
- 2** Press and hold the Line Feed button and turn your printer's power on.



- 3** When your printer starts to print, release the Line Feed button.

Note: The complete test takes about 10 minutes.

Printer Modes

The chart below shows combinations of printer modes that can be selected using "Printer Control Codes."

Your IBM Personal Computer Graphics Printer can print any of the combinations shown and can change printer modes at any place within a line.

Note: Modes in the same vertical column of the chart can be selected and combined.

Printer Modes	Combinations										
Normal	X	X	X								
Compressed				X	X	X					
Emphasized								X	X	X	
Double Strike	X			X				X			
Subscript		X			X				X		
Superscript			X			X					X
Double Width	X	X	X	X	X	X	X	X	X	X	X
Underline	X	X	X	X	X	X	X	X	X	X	X

Printer Control Codes

Printer control codes are special characters you have your system unit send to your printer to get your data printed the way you want it.

Each program you use has its own way of sending printer control codes, refer to the manual that came with your program to determine how to put these codes into your data. Your IBM Personal Computer Graphics Printer supports all the printer control codes listed in this section. IBM Personal Computer BASIC uses the American National Standard Code for Information Interchange (ASCII) decimal values to send control codes to the printer.

The following pages contain:

- Two examples of printer control codes using IBM BASIC.
- A Quick Reference Chart of the printer control codes.
- A detailed description of the Quick Reference Chart.
- Charts listing the American Standard Code for Information Interchange (ASCII).

Printer Control Codes Examples

Following are two examples using printer control codes with the IBM Personal Computer BASIC. To send data directly to the printer using IBM Personal Computer BASIC, you use the command LPRINT. You use the label CHR\$ followed by the ASCII decimal value in parentheses to indicate the data you want sent to the printer. Therefore, to send a printer control code to the printer, you use LPRINT CHR&(X), where X is the ASCII value of the control code.

In order to try the examples, first start BASIC. Your IBM *BASIC* manual describes how to start BASIC.

Example 1.

This is an example of a printer instruction used to print in the Double Width print mode.

1 Type: `LPRINT CHR$(14);"IBM Personal Computer"`

2 Press Enter (↵).

3 Your printer will print:

**IBM Personal
Computer**

Example 2.

This example shows the use of the "Escape"* printer control code with another printer control code to instruct the printer to print in the Emphasized mode.

1 Type:`LPRINT CHR$(27);CHR$(69);"IBM
Personal Computer"`

2 Press Enter (↵).

3 Your printer will print:

IBM Personal Computer

Escape code [CHR\$(27)]: Lets your printer know that the next data sent is a printer command.

Quick-Reference Chart

The Quick-Reference Chart is in alphabetic order. You will find it helpful in locating the code you need to perform a certain job, or to determine the ASCII decimal value quickly.

Description	Code	ASCII Value
Bell	BEL	7
Cancel	CAN	24
Cancel Ignore Paper End	ESC 9	57
Cancel Skip Perforation	ESC O	79
Carriage Return	CR	13
Compressed Character	SI	15
Compressed Character Off	DC 2	18
Double Strike	ESC G	71
Double Strike Off	ESC H	72
Double Width (One Line)	SO	14
Double Width	ESC W	87
Double Width (SO Only)	DC 4	20
Emphasized	ESC E	69
Emphasized Off	ESC F	70
Escape	ESC	27
Form Feed	FF	140
Home Head	ESC <	60
Horizontal Tab	HT	9
Ignore Paper End	ESC 8	56
Line Feed	LF	10
Null	NUL	0
Select Character Set 1	ESC 7	55
Select Character Set 2	ESC 6	54
Set Horizontal Tab Stops	ESC D	68
Set Length of Page	ESC C	67
Set Lines Per Page	ESC C	67
Set Skip Perforation	ESC N	78
Set Variable Line Feed 0.12 mm (1/216 in.)	ESC 3	51
Set Variable Line Feed 0.35 mm (1/72 in.)	ESC A	65
Start Variable Line Feed 0.35 mm (1/72 in.)	ESC 2	50

Description	Code	ASCII Value
Subscript-Superscript On	ESC S	83
Subscript-Superscript Off	ESC T	84
Underline	ESC -	45
Unidirectional Printing	ESC U	85
Variable Line Feed 0.12 mm (1/216 in.)	ESC J	74
3.18 mm (1/8 in.) Line Feed	ESC O	48
2.47 mm (7/72 in.) Line Feed	ESC I	49
480-Bit-Image Graphics Mode	ESC K	75
960-Bit-Image Graphics Mode	ESC L	76
960-Bit-Image Graphics Mode Normal Speed	ESC Y	89
1920 Bit-Image Graphics Mode	ESC Z	90

Printer Control Codes Descriptions

The following pages list, in alphabetic order, the printer control codes with a detailed description of the printer control codes. Some knowledge of BASIC programming or how to insert printer control codes in your program is necessary to properly use these codes. An example of each code in BASIC is at the end of each description. The "Format" information is given where more information is needed for programming considerations.

CODE	FUNCTION
BEL	Bell Sounds the printer buzzer for 1 second. LPRINT CHR\$(7);
CAN	Cancel Clears the printer buffer. Control codes except SO, remain in effect. LPRINT CHR\$(24);
CR	Carriage Return Ends the line the printer is on and prints the data remaining in the printer buffer. IBM Personal Computer BASIC adds a line feed to the carriage return code CHR\$(13). To avoid a line feed, use carriage return code CHR\$(141) in printer character set 1. (See ESC 6 or ESC 7 to switch character sets.) LPRINT CHR\$(13); or LPRINT CHR\$(141); for IBM Personal Computer BASIC.
DC 2	Device Control 2 (Compressed Character Off) Stops printing in the Compressed print mode. LPRINT CHR\$(18);

- DC 4** **Device Control 4 (Double Width Off)**
Stops printing in the Double Width print mode.
LPRINT CHR\$(20);
- ESC** **Escape**
Lets the printer know that the next data sent is a printer command.
LPRINT CHR\$(27);
- ESC A** **Escape A (Set Variable Line Feed)**
Format: **ESC A;n;**
Escape A sets the line feed to $n \times 0.35$ mm (1/72 in.). Any increment between 0.35 and 29.99 mm (1/72 and 85/72 in.) may be used. The example below tells the printer to set line feeding to 8.47 mm (24/72 in.). ESC 2 must be sent to the printer before line feeding will change. For example, ESC A, 24 (text) ESC 2 (text). The text following ESC A, 24 will space at the previously set line-feed increments. The text following ESC 2 will be printed with new line feed increments of 8.47 mm (24/72 in.).
LPRINT CHR\$(27);CHR\$(65);CHR\$(24);CHR\$(27);CHR\$(50);

ESC C**Escape C (Set Lines Per Page)**

Format: ESC C;n;

Sets the page length. The ESC C command must have a value following it to specify a desired page length. The maximum page length for the printer is 127 lines. The example below sets the page length to 55 lines. The printer defaults to 66 lines per page when powered on or reset.

LPRINT CHR\$(27);CHR\$(67);CHR\$(55);

Escape C (Sets Length Of Page)

Format: ESC C;n;m;

Sets the length of the page. This command requires a value of 0 (zero) for n and a value between 25 and 559 mm (1 and 22 in.) for m. The value of m must be between 1 and 22.

**LPRINT CHR\$(27);CHR\$(67);CHR\$(0);
CHR\$(12);**

ESC D Escape D (Set Horizontal Tab Stops)
Format: ESC D;n₁;n₂;...n_k;NUL;
Sets the horizontal tab stop positions. The example below shows the horizontal tab stop positions set at printer column positions of 10, 20, and 40. They are followed by the NUL Code. They must also be in ascending numeric order as shown. Tab stops can be set between 1 and 80. When in the Compressed print mode, tab stops can be set between 1 and 132. The printer can have a maximum of 28 tab stops. HT code is used to execute a tab operation.
LPRINT CHR\$(27);CHR\$(68);CHR\$(10);CHR\$(20);CHR\$(40);CHR\$(0);

ESC E Escape E (Emphasized)
Changes the printer to Emphasized print mode. The speed of the printer is reduced to half speed during the Emphasized print mode.
LPRINT CHR\$(27);CHR\$(69);

- ESC F Escape F (Emphasized Off)**
Stops printing in the Emphasized print mode.
LPRINT CHR\$(27);CHR\$(70);
- ESC G Escape G (Double Strike)**
Changes the printer to the Double Strike print mode. The paper is spaced 0.12 mm (1/216 in.) before the second pass of the print head.
LPRINT CHR\$(27);CHR\$(71);
- ESC H Escape H (Double Strike off)**
Stops printing in the Double Strike print mode.
LPRINT CHR\$(27);CHR\$(72);
- ESC J Escape J (Set Variable Line Feed)**
Format: ESC J;n;
When ESC J is sent to the printer, the paper will feed in increments of $n \times 0.12$ mm (1/216 in.). The value of n must be between 1 and 255. The example below gives a line feed of 5.88 mm (50/216 in.). ESC J is canceled after the line feed takes place.
LPRINT CHR\$(27);CHR\$(74);CHR\$(50);

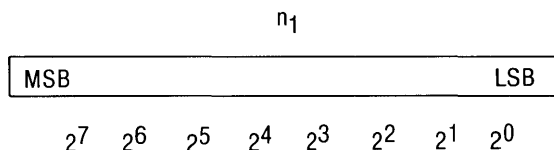
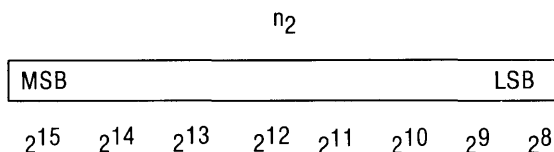
ESC K **Escape K (480-Bit-Image Graphics Mode)**

Format: ESC K; n_1 ; n_2 ; v_1 ... v_k ;

Changes from the Text mode to the Bit Image Graphics mode. The n_1 and n_2 are numbers, each consisting of 1 byte, which specify the number of bit-image data bytes to be transferred. The v_1 through v_k are the bytes of bit-image data. The number of bit-image data bytes (k) is equal to $n_1 + 256n_2$ and cannot exceed 480 bytes. At every horizontal position, each byte can print up to 8 vertical dots. Bit-image data may be mixed with text data on the same line.

Note: Assign values to n_1 and n_2 as follows: n_1 represents values from 0 to 255 and n_2 represents values from 0 to 256.

MSB is the most-significant bit and LSB is the least-significant bit.

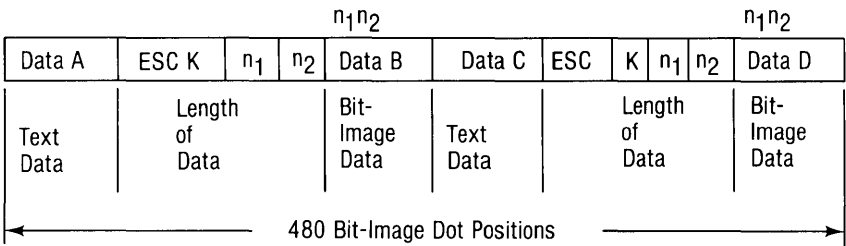


Data sent to the printer looks like this:

Test (20 Characters)	ESC	K	n = 360	Bit-Image Data	Next Data
----------------------	-----	---	---------	----------------	-----------

The 20 characters in Text mode correspond to 120 bit-image positions ($20 \times 6 = 120$). The printable portion left in Bit-Image mode is 360 dot positions ($480 - 120 = 360$).

Data sent to the printer looks like this:



Example:

1. 'OPEN PRINTER IN RANDOM MODE WITH
LENGTH OF 255
2. WIDTH "LPT1:",255
3. OPEN "LPT1:" AS #1
4. PRINT #1,CHR\$(13);CHR\$(10);
5. SLASH\$=CHR\$(1)+CHR\$(2)+CHR\$(4)
+CHR\$(8)
6. SLASH\$=SLASH\$+CHR\$(16)+CHR\$(32)
+CHR\$(64);CHR\$(128)+CHR\$(0)
7. GAP\$=CHR\$(0)+CHR\$(0)+CHR\$(0)
8. NDOTS=480
9. 'ESC K N1 N2
10. PRINT#1,CHR\$(27);"K";CHR\$(NDOTS MOD
256) CHR\$(FIX(NDOTS/256))
11. 'SEND NDOTS NUMBER OF BIT IMAGE
BYTES
12. FOR I=1 TO NDOTS/12 'NUMBER OF
SLASHES TO PRINT USING GRAPHICS
13. PRINT #1,SLASH\$;GAP\$;
14. NEXT I
15. CLOSE
16. END

This example gives you a row of slashes printed in the 480-Bit-Image Graphics mode.

- ESC L** **Escape L (960-Bit-Image Graphics Mode)**
Format: ESC L;n₁;n₂;v₁...v_k.
Changes from the text mode to 960-Bit-Image Graphics mode. The input is similar to ESC K. The 960-Bit-Image mode prints at half speed of the 480-Bit-Image mode but can produce a denser graphic image. The number of bytes of bit-image data (k) is $n_1 + 256n_2$.
- ESC N** **Escape N (Set Skip Perforation)**
Format: ESC N;n.
Sets the Skip Perforation function. The number following ESC N sets the value for the number of lines of Skip Perforation. The example shows a 12-line skip perforation. This will print 54 lines and skip 12 lines. The value of n must be reset whenever the page length (ESC C) is changed.
LPRINT CHR\$(27);CHR\$(78);CHR\$(12);
- ESC O** **Escape O (Cancel Skip Perforation)**
Cancels the Skip Perforation function.
LPRINT CHR\$(27);CHR\$(79);

- ESC S Escape S (Subscript/Superscript On)**
Format: ESC S;n;
Changes the printer to the Subscript mode when ESC S is followed by a 1 as in the example below. When ESC S is followed by a 0 (zero), the printer prints in the Superscript print mode.
LPRINT CHR\$(27);CHR\$(83);CHR\$(1);
- ESC T Escape T (Subscript/Superscript Off)**
The printer stops printing in the Subscript or Superscript print mode.
LPRINT CHR\$(27);CHR\$(84);
- ESC U Escape U (Unidirectional Printing)**
Format: ESC U;n;
The printer prints from left to right following the input of ESC U;1. When ESC U is followed by a 0 (zero), the left-to-right printing operation is canceled. The Unidirectional print mode ensures a more accurate print start position for better print quality.
LPRINT CHR\$(27);CHR\$(85);CHR\$(1);

- ESC W Escape W (Double Width)**
Format: ESC W;n;
Changes the printer to the Double Width print mode when ESC W is followed by a 1. This mode is not canceled by a line-feed operation and must be canceled with ESC W followed by a 0 (zero).
LPRINT CHR\$(27);CHR\$(87);CHR\$(1);
- ESC Y Escape Y (960-Bit-image Graphics Mode Normal Speed)**
Format: ESC Y;n₁;n₂;v₁...v_k;
Changes from the Text mode to the 960-Bit-Image Graphics mode. The printer prints at normal speed during this operation and cannot print dots on consecutive dot positions. The input of data is similar to ESC K.
- ESC Z Escape Z (1920-Bit-Image Graphics mode)**
Format: ESC Z;n₁;n₂;v₁...v_k;
Text mode changes to the 1920-Bit-image Graphics mode. The input of data is similar to ESC K. ESC Z can print only every third dot position.
- ESC < Escape Less Than (Home Head)**
The print head returns to the left margin to print the line following ESC <. This occurs for one line only.
LPRINT CHR\$(27);CHR\$(60);

- ESC - Escape Minus (Underline)**
Format: ESC -;n;
ESC - followed by a 1 prints all of the following data underlined. ESC - followed by a 0 (zero) cancels the Underline print mode.
LPRINT CHR\$(27);CHR\$(45);CHR\$(1);
- ESC 0 Escape Zero, 3.18 mm (1/8 in.) Line Feed**
Changes paper feeding to 3.18 mm (1/8 in.).
LPRINT CHR\$(27);CHR\$(48);
- ESC 1 Escape 1, 2.47 mm (7/72 in.) Line Feed**
Changes paper feeding to 2.47 mm (7/72 in.). **LPRINT CHR\$(27);CHR\$(49);**
- ESC 2 Escape 2 (Starts Variable Line Feed)**
ESC 2 is an execution command for ESC A. If ESC A command has not been given, line feeding returns to 4.23 mm (1/6 in.).
LPRINT CHR\$(27);CHR\$(50);

- ESC 3 Escape 3 (Set Variable Line Feed)**
Format: ESC 3;n;. Changes the paper feeding to n x 0.12 mm (1/216 in.). The example below sets the paper feeding to 6.35 mm (54/216 in.). The value of n must be between 1 and 255.
LPRINT CHR\$(27);CHR\$(51);CHR\$(54);
- ESC 6 Escape 6 (Select Character Set 2)**
Selects Character Set 2. See "Printer Character Set 2" in this section.
LPRINT CHR\$(27);CHR\$(54);
- ESC 7 Escape 7 (Select Character Set 1)**
Selects Character Set 1. See "Printer Character Set 1" in this section. Character Set 1 is selected when the printer's power is turned on.
LPRINT CHR\$(27);CHR\$(55);
- ESC 8 Escape 8 (Ignore Paper End)**
Allows the printer to print to the end of the paper. The printer ignores the Paper End switch.
LPRINT CHR\$(27);CHR\$(56);

- ESC 9** **Escape 9 (Cancel Ignore Paper End)**
Cancels the Ignore Paper End command. ESC 9 is selected when the printer's power is turned on or reset.
LPRINT CHR\$(27);CHR\$(57);
- FF** **Form Feed**
Advances the paper to the top of the next page.
- Note:** The location of the paper when the printer's power is turned on determines the top of the page. The next top of page is 279.4 mm (11 in.) from that position. ESC C can be used to change the paper length.
- LPRINT CHR\$(12);**
- HT** **Horizontal Tab**
Tabs to the next horizontal tab stop. Tab stops are set with ESC D. Tab stops are set every 8 columns when the printer's power is turned on.
LPRINT CHR\$(9);
- LF** **Line Feed**
Spaces the paper up one line. Line spacing is 4.23 mm (1/6 in.) unless reset by ESC A, ESC 0, ESC 1, ESC 2, or ESC 3.
LPRINT CHR\$(10);

NUL **Null**
Used with ESC B and ESC D as a list terminator. NUL is also used with other Printer Control Codes to select options (for example, ESC S).
LPRINT CHR\$(0);

SI **Shift In (Compressed Character)**
Changes the printer to the Compressed Character print mode.
LPRINT CHR\$(15);

SO **Shift Out (Double Width One Line)**
Changes the printer to the Double Width print mode.

Note: CR, LF, or DC 4 cancels Double Width print mode.

LPRINT CHR\$(14);

Graphics-Printer Control and Character Chart with ASCII Decimal Value (Set 1)

0	1	2	3	4	5	6	7	8	9
NUL							BEL		HT
10	11	12	13	14	15	16	17	18	19
LF		FF	CR	SO	SI			DC2	
20	21	22	23	24	25	26	27	28	29
DC4				CAN			ESC		
30	31	32	33	34	35	36	37	38	39
		SP	!	"	#	\$	%	&	'
40	41	42	43	44	45	46	47	48	49
(	)	*	+	,	-	.	/	0	1
50	51	52	53	54	55	56	57	58	59
2	3	4	5	6	7	8	9	:	;
60	61	62	63	64	65	66	67	68	69
<	=	>	?	⌋	A	B	C	D	E
70	71	72	73	74	75	76	77	78	79
F	G	H	I	J	K	L	M	N	O
80	81	82	83	84	85	86	87	88	89
P	Q	R	S	T	U	V	W	X	Y
90	91	92	93	94	95	96	97	98	99
Z	[	\	\]	^	_	`	a	b	c
100	101	102	103	104	105	106	107	108	109
d	e	f	g	h	i	j	k	l	m
110	111	112	113	114	115	116	117	118	119
n	o	p	q	r	s	t	u	v	w
120	121	122	123	124	125	126	127	128	129
x	y	z	{	|	}	~		NUL	

Graphics-Printer Control and Character Chart with ASCII Decimal Value (Set 1 continued)

130	131	132	133	134	135	136	137	138	139
					BEL		HT	LF	
140	141	142	143	144	145	146	147	148	149
FF	CR	SO	SI			DC2		DC4	
150	151	152	153	154	155	156	157	158	159
		CAN			ESC				
160	161	162	163	164	165	166	167	168	169
á	í	ó	ú	ñ	Ñ	à	ò	¿	␣
170	171	172	173	174	175	176	177	178	179
␣	½	¼	¡	<<	>>	▒	▒	▒	▒
180	181	182	183	184	185	186	187	188	189
␣	␣	␣	␣	␣	␣	␣	␣	␣	␣
190	191	192	193	194	195	196	197	198	199
␣	␣	␣	␣	␣	␣	␣	␣	␣	␣
200	201	202	203	204	205	206	207	208	209
␣	␣	␣	␣	␣	␣	␣	␣	␣	␣
210	211	212	213	214	215	216	217	218	219
␣	␣	␣	␣	␣	␣	␣	␣	␣	␣
220	221	222	223	224	225	226	227	228	229
▒	▒	▒	▒	α	β	Γ	Π	Σ	σ
230	231	232	233	234	235	236	237	237	239
μ	τ	ϕ	θ	Ω	δ	∞	∅	ε	∩
240	241	242	243	244	245	246	247	248	249
≡	±	≥	≤	∫	∫	÷	≈	◦	■
250	251	252	253	254	255				
-	√	∩	2	■	SP				

Graphics-Printer Control and Character Chart with ASCII Decimal Value (Set 2)

0	1	2	3	4	5	6	7	8	9
NUL			♥	♦	♣	♠	BEL		HT
10	11	12	13	14	15	16	17	18	19
LF		FF	CR	SO	SI			DC2	
20	21	22	23	24	25	26	27	28	29
DC4	§			CAN			ESC		
30	31	32	33	34	35	36	37	38	39
		SP	!	"	#	\$	%	&	'
40	41	42	43	44	45	46	47	48	49
(	)	*	+	,	—	.	/	0	1
50	51	52	53	54	55	56	57	58	59
2	3	4	5	6	7	8	9	:	;
60	61	62	63	64	65	66	67	68	69
<	=	>	?	∅	A	B	C	D	E
70	71	72	73	74	75	76	77	78	79
F	G	H	I	J	K	L	M	N	O
80	81	82	83	84	85	86	87	88	89
P	Q	R	S	T	U	V	W	X	Y
90	91	92	93	94	95	96	97	98	99
Z	[	\	\]	^	_	`	a	b	c
100	101	102	103	104	105	106	107	108	109
d	e	f	g	h	i	j	k	l	m
110	111	112	113	114	115	116	117	118	119
n	o	p	q	r	s	t	u	v	w
120	121	122	123	124	125	126	127	128	129
x	y	z	{	|	}	~		ç	ü

Graphics-Printer Control and Character Chart with ASCII Decimal Value (Set 2 continued)

130	131	132	133	134	135	136	137	138	139
é	â	ä	à	å	ç	ê	ë	è	ï
140	141	142	143	144	145	146	147	148	149
î	ì	Ä	Å	É	æ	Æ	ô	ö	ò
150	151	152	153	154	155	156	157	158	159
û	ù	ÿ	ö	ü	ç	£	¥	₪	₯
160	161	162	163	164	165	166	167	168	169
á	í	ó	ú	ñ	Ñ	à	ó	¿	⌂
170	171	172	173	174	175	176	177	178	179
⌂	½	¼	¡	<<	>>	▒	▒	▒	▒
180	181	182	183	184	185	186	187	188	189
⌈	⌈	⌈	⌈	⌈	⌈	⌈	⌈	⌈	⌈
190	191	192	193	194	195	196	197	198	199
⌋	⌋	⌋	⌋	⌋	⌋	⌋	⌋	⌋	⌋
200	201	202	203	204	205	206	207	208	209
⌋	⌋	⌋	⌋	⌋	⌋	⌋	⌋	⌋	⌋
210	211	212	213	214	215	216	217	218	219
⌋	⌋	⌋	⌋	⌋	⌋	⌋	⌋	⌋	⌋
220	221	222	223	224	225	226	227	228	229
▒	▒	▒	▒	α	β	Γ	Π	Σ	σ
230	231	232	233	234	235	236	237	237	239
μ	τ	ϕ	θ	Ω	δ	∞	∅	€	∩
240	241	242	243	244	245	246	247	248	249
≡	±	≥	≤	∫	∫	÷	≈	°	■
250	251	252	253	254	255				
-	√	∩	2	■	SP				

Notes:

Color Printer

Introduction

Your IBM Personal Computer Color Printer is a 35 to 200 character-per-second (cps) printer, and is capable of bidirectional printing in several character sizes. There are three basic types of printing: data-processing quality (DPQ), text quality (TQ), and near-letter quality (NLQ).

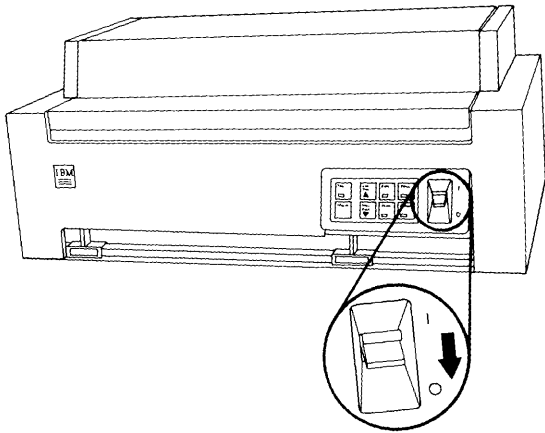
With the use of control commands, this printer is able to blend a four-band ribbon to produce seven colors, plus black.

Two paper-feed modes are standard in your IBM Personal Computer Color Printer. They are the forms-feed mode for continuous paper or forms and the sheet-feed mode for individual sheets.

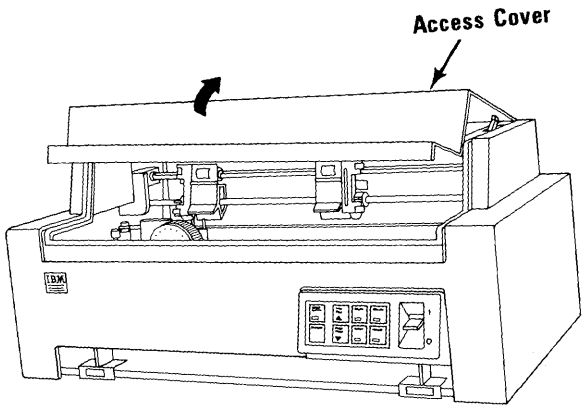
Use the illustrations and examples that follow to help you operate your IBM Personal Computer Color Printer.

Ribbon Removal

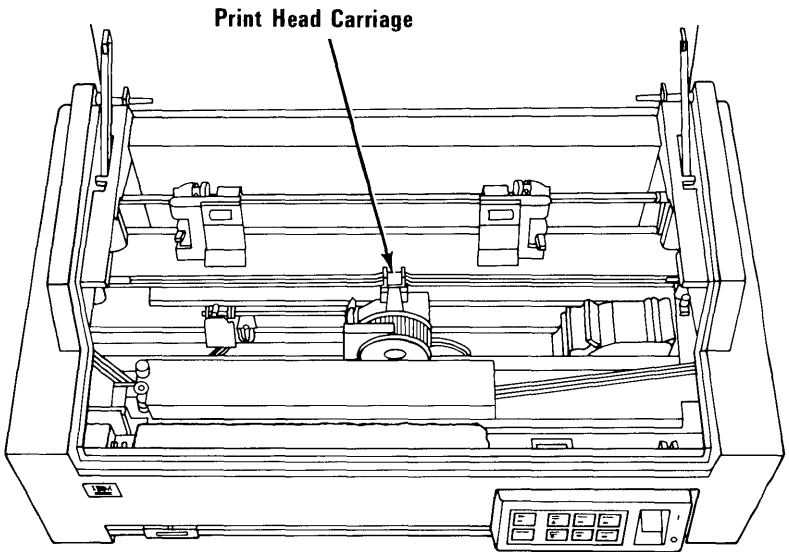
1 Be sure your printer's power is off.



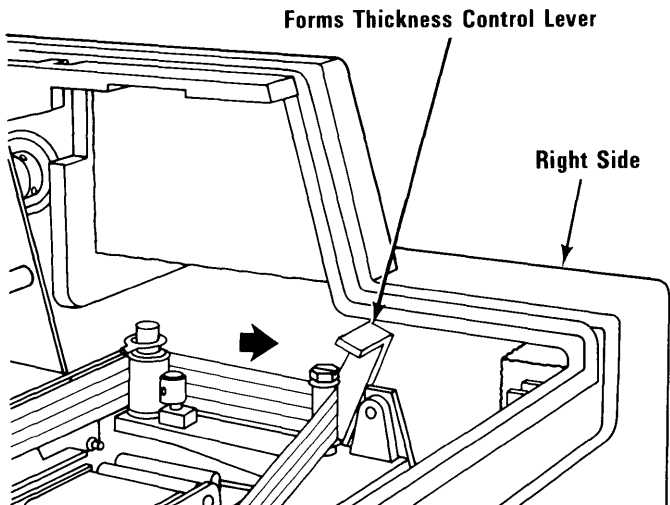
2 Open the access cover.



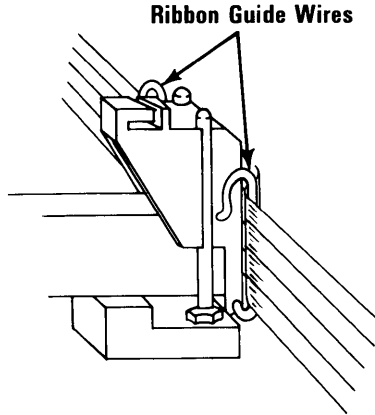
- 3** Center the print-head carriage by sliding it left or right.



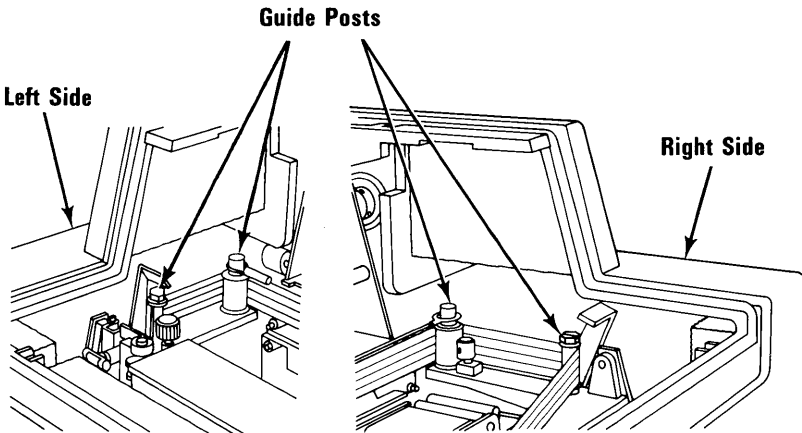
- 4** Note the position of the Forms Thickness Control lever, then move the lever toward the front of your printer.



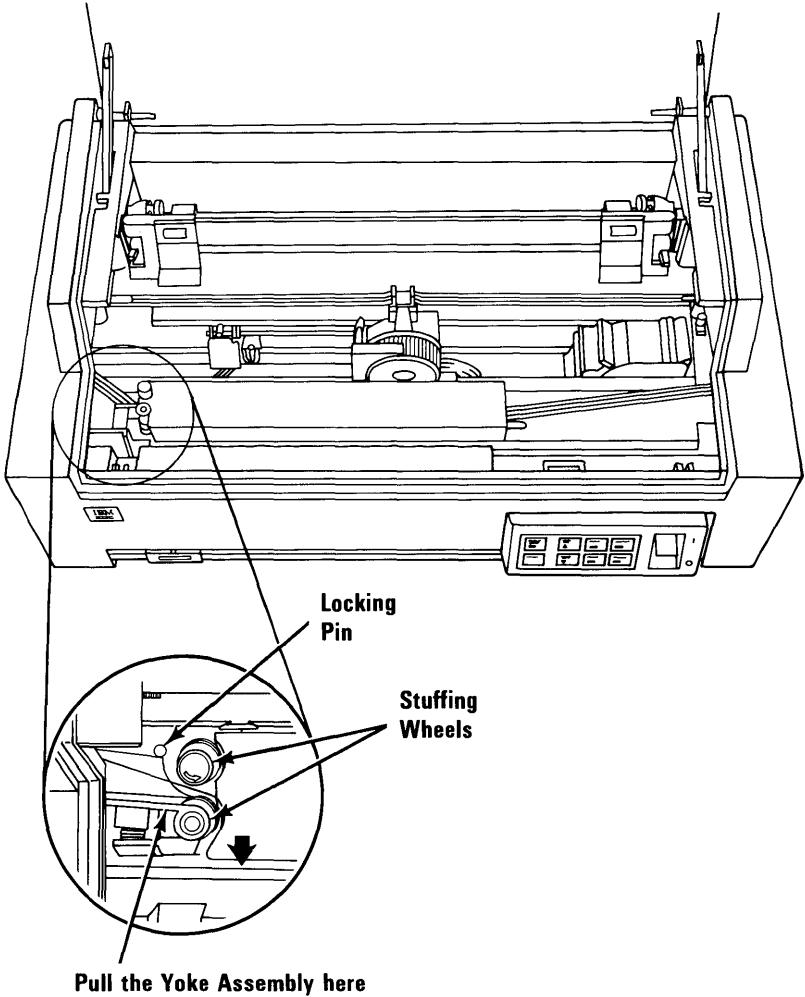
- 5** Push down on the top of the ribbon (where it goes through the print-head ribbon guide wires) to clear it from under the curved guides. Pull the ribbon slightly forward, then up to remove it from the print-head ribbon guide.



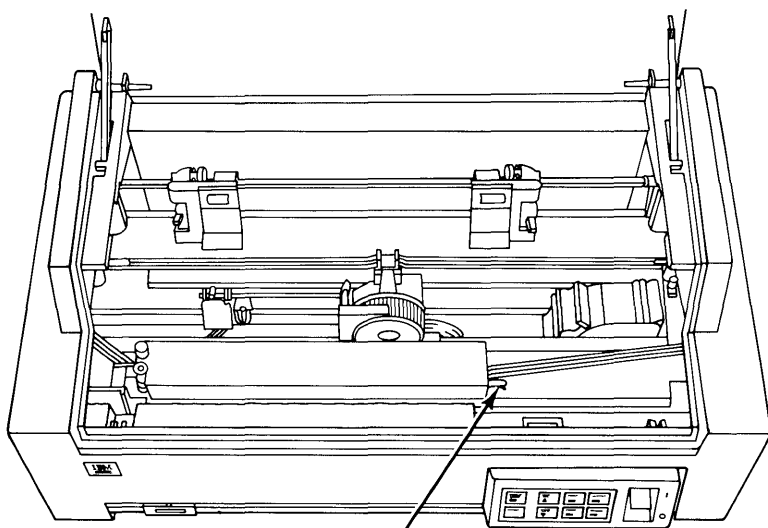
- 6** Lift the ribbon from around the left and right guide posts.



- 7** Open the stuffing wheels by pulling the yoke assembly toward the front of your printer. When you hear a click, the locking pin is holding the stuffing wheels open.



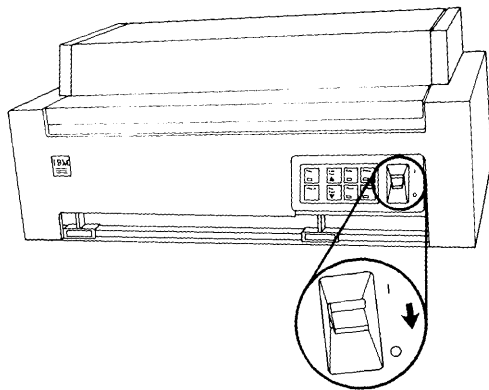
- 8** Press and hold down the ribbon-cartridge latch to unlock the cartridge. Slide the ribbon cartridge to the right and over the latch. Lift the ribbon cartridge from your printer and discard it.



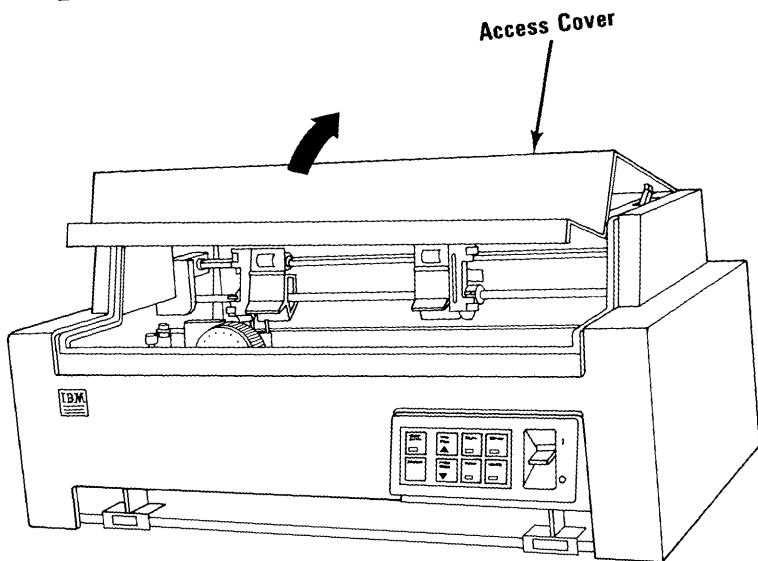
Ribbon Cartridge Latch

Ribbon Installation

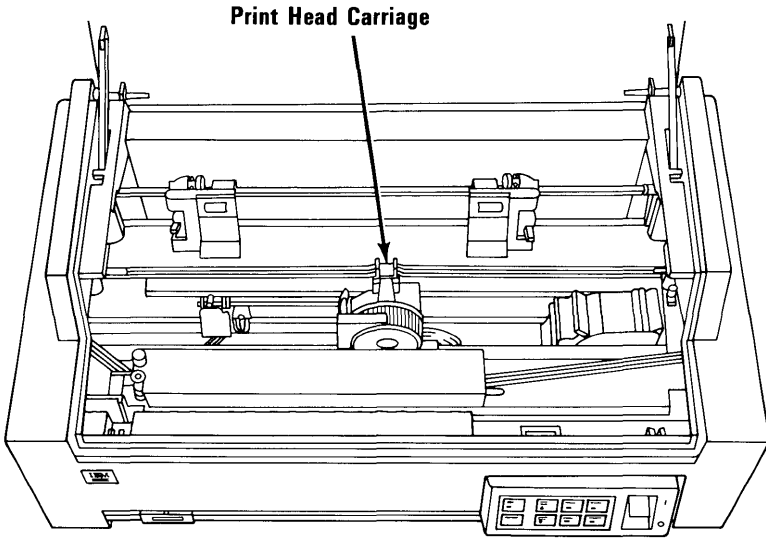
- 1 Be sure your printer's power is off.



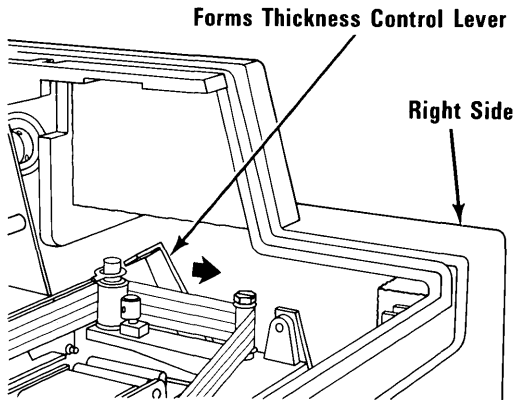
- 2 Open the access cover.



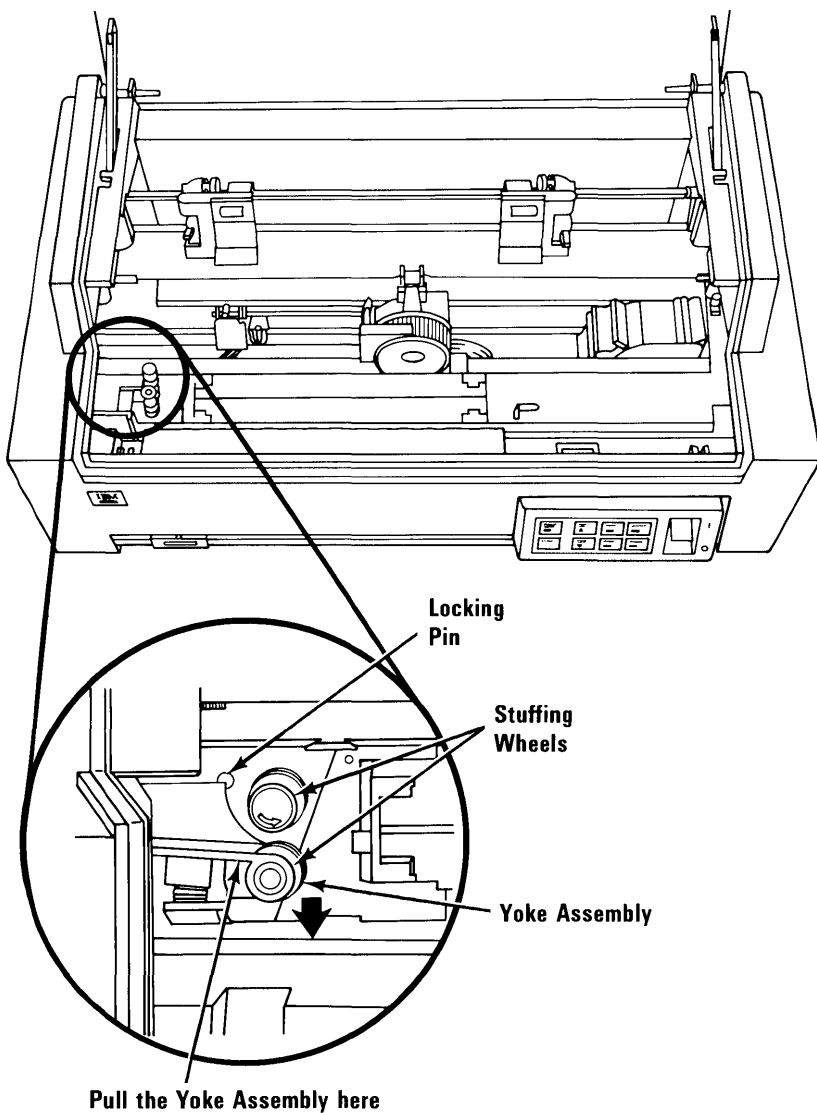
- 3** Center the print-head carriage by sliding it left or right.



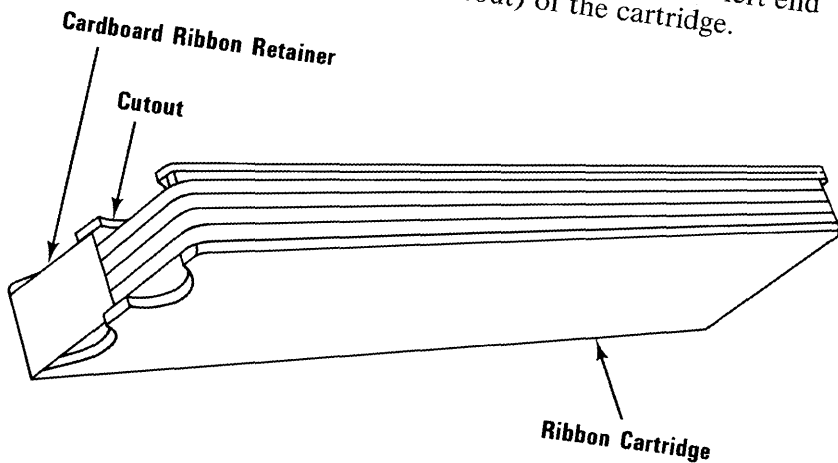
- 4** Note the position of the Forms Thickness Control lever (the lever is inside the right side of the cover) and move the lever toward the front of your printer.



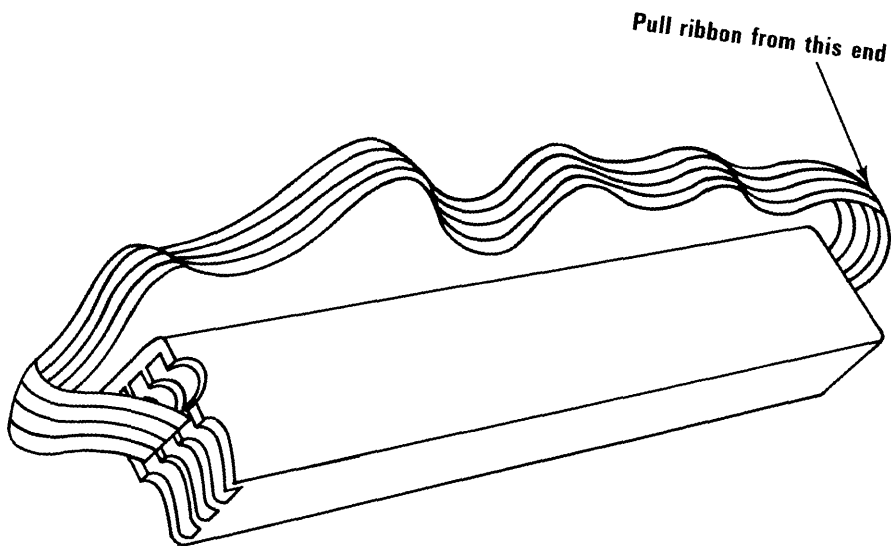
- 5** Open the stuffing wheels by pulling the yoke assembly toward the front of your printer. When you hear a click, the locking pin is holding the stuffing wheels open.



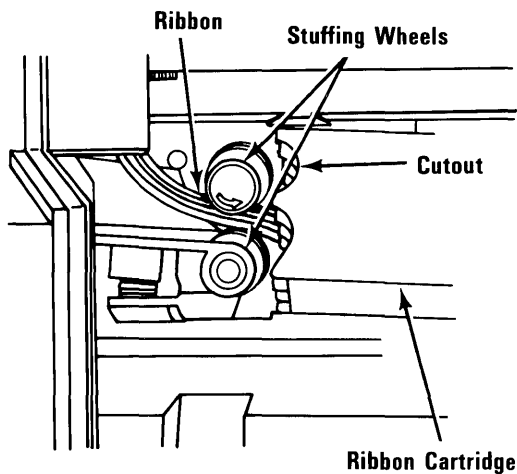
- 6** Unwrap the ribbon cartridge; carefully pull the cardboard ribbon retainer out of the left end (end with the cutout) of the cartridge.



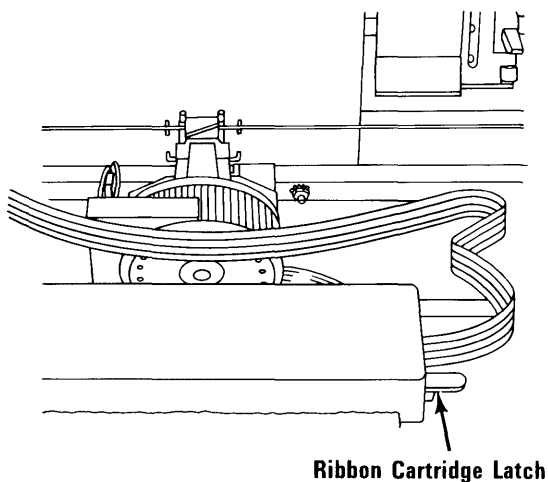
- 7** Carefully pull about 50.8mm (2 in.) of ribbon from the right end of the cartridge.



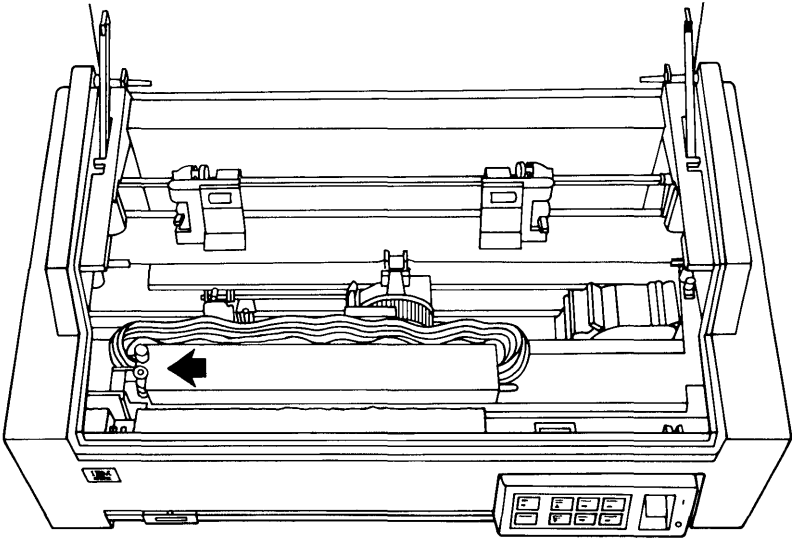
- 8** Place the ribbon cartridge with the cutouts to the left, then place the ribbon between the two stuffing wheels, as shown.



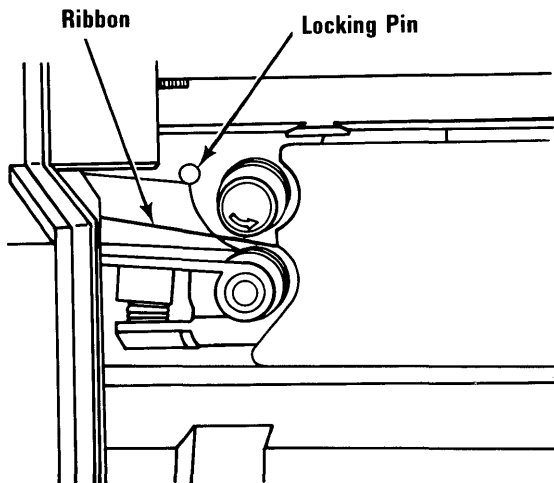
- 9** Place the ribbon cartridge on the ribbon feed assembly so that you can see approximately 19mm (0.75 in.) of the ribbon cartridge latch at the right end of the ribbon cartridge.



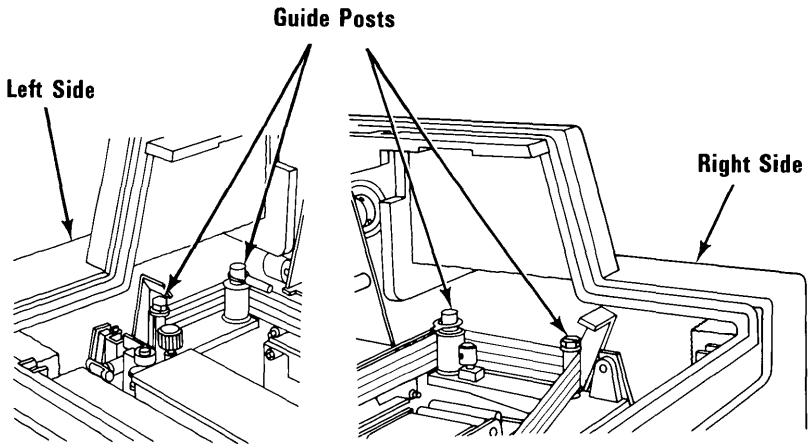
- 10** Press down on the cartridge and slide it to the left until you hear a click. The cartridge is now locked in place.



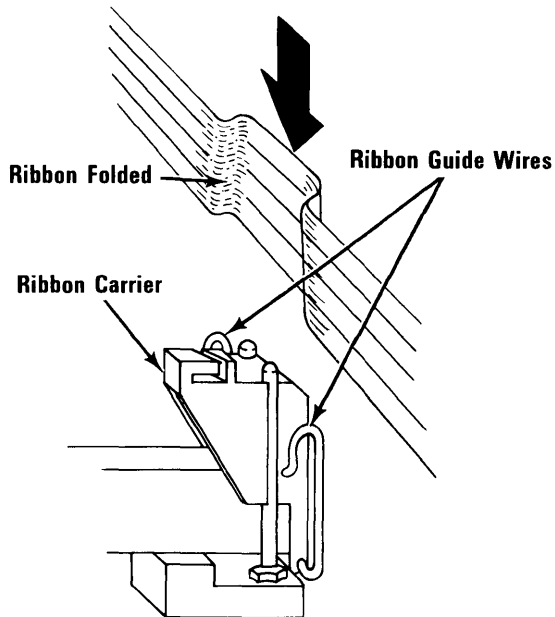
- 11** Be sure the ribbon is not folded in the stuffing wheels (pull the ribbon slightly if necessary). Then press down on the locking pin to release the yoke assembly.



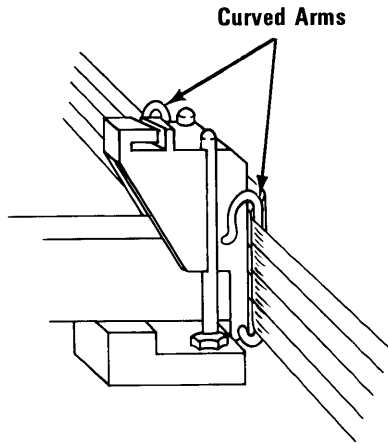
- 12** Guide the ribbon around the two guide posts on the left and the two on the right.



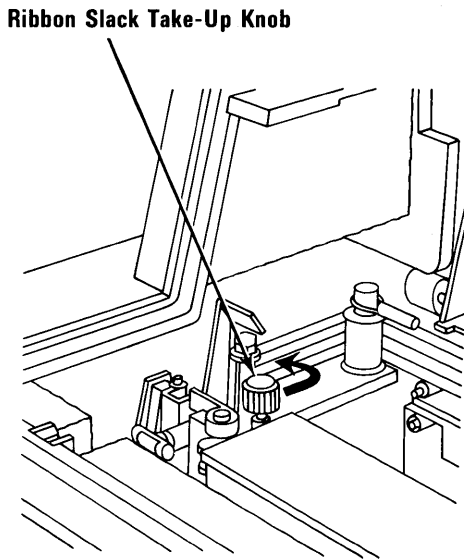
- 13** Fold the ribbon as shown below, and thread it down between the ribbon carrier and the ribbon guide wires (curved arms).



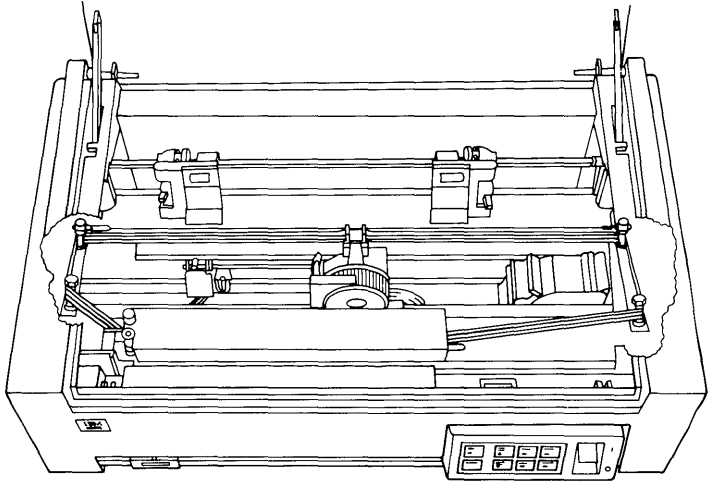
- 14** When properly installed, your ribbon should be as shown in the figure below. Be sure the top of the ribbon is underneath the curved arms of the two guide wires.



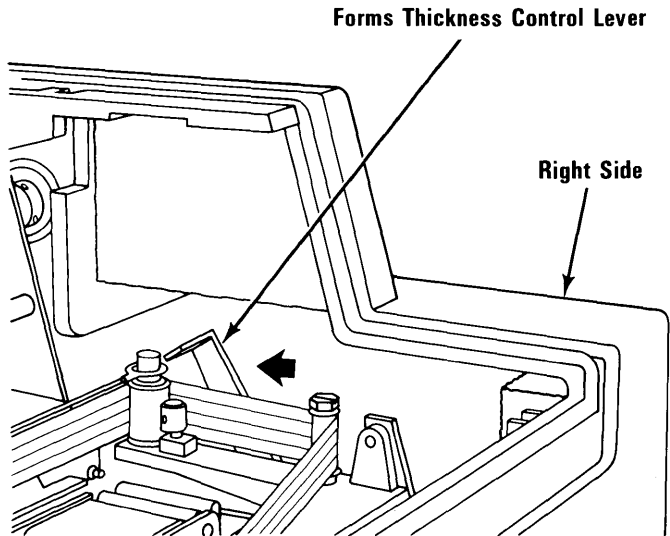
- 15** Remove any slack in the ribbon by turning the take-up knob counterclockwise.



- 16** Be sure the ribbon is around the four guide posts and is threaded through the ribbon guide correctly.



- 17** Move the Forms Thickness Control lever to its original position and close the access cover.



Notes:

1. If you installed an all-black ribbon, set DIP (Dual In-Line Package) Switch 7 On. This causes the ribbon to shift one ribbon band at the end of each page to extend the life of the ribbon.
2. If you have installed a four-color ribbon, check the setting of DIP (Dual In-Line Package) Switch 7. It must be set Off to prevent the ribbon from shifting one ribbon band at the end of each page.

If you need help setting DIP Switch 7, refer to "DIP Switch Settings" later in this section.

Using Single Sheets of Paper or Continuous Paper or Forms

Your printer uses either single sheets or continuous multiple-copy (up to four-part) forms. Single sheets can be from 177.8 mm (7 in.) to 304.8 mm (12 in.) wide and from 215.9 mm (8.5 in.) to 431.8 mm (17 in.) long. The paper can range in widths from 88.9 mm (3.5 in.) to 400.05 mm (15.75 in.) including perforations.

The following pages describe how to use either type of paper. To use continuous paper or forms, see "Continuous Paper or Forms Operation" on the next page. To use single sheets, see "Single Sheet Operation" later in this section.

Note: Your printer is designed to operate with the access cover closed. Operating your printer with the access cover open may cause the paper or forms to jam in your printer.

Continuous Paper or Forms Operation

Note: To use single sheets, see "Single Sheet Operation" later in this section.

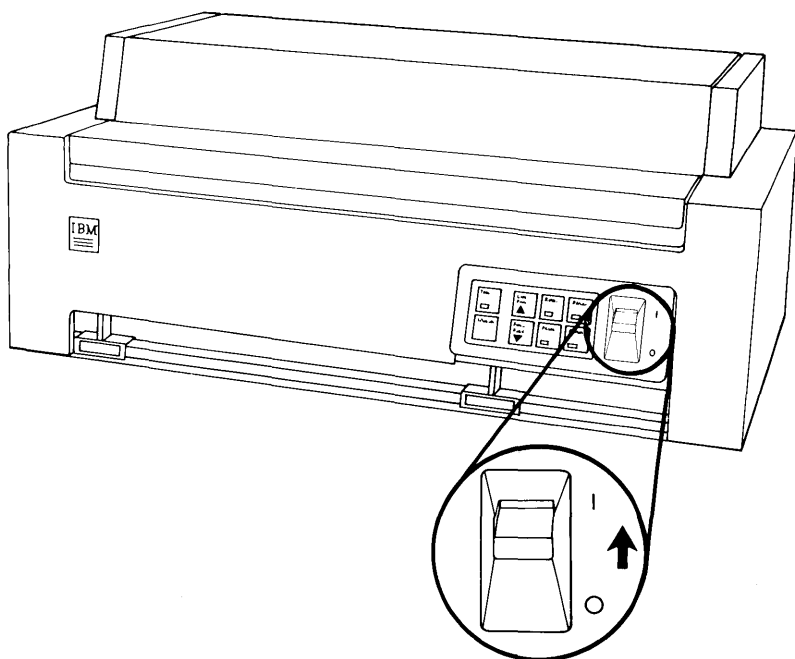
Continuous Paper or Forms Installation

- 1 Place a supply of continuous paper or forms close to the front loading slot.

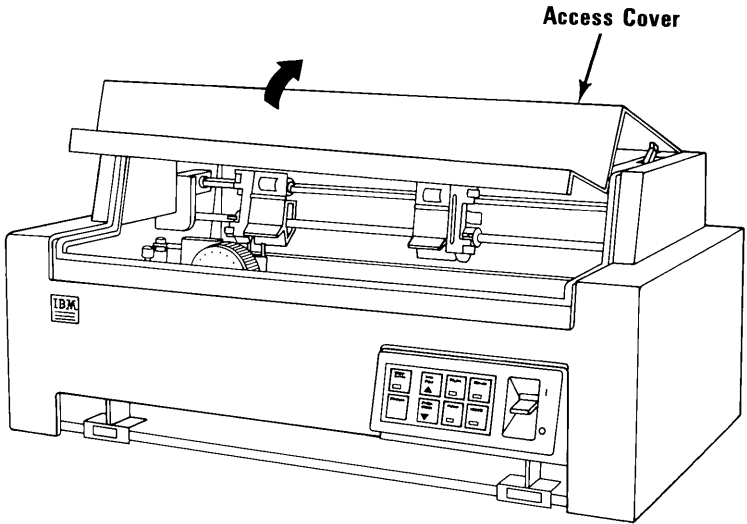
Note: The front loading slot is easiest to use when first learning to use your printer. If you choose to use the rear or bottom loading slot, place a supply of paper close to the loading slot you wish to use.

- 2 Turn your printer's power on.

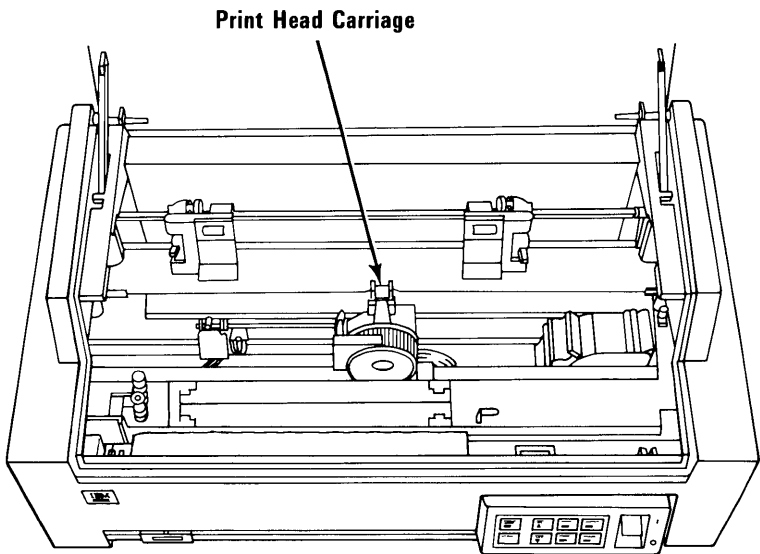
Warning: Turning your printer's power off during printing, will result in the loss of data.



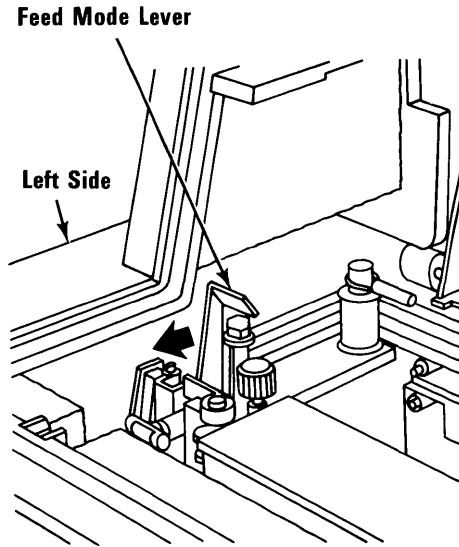
- 3** Open the access cover.



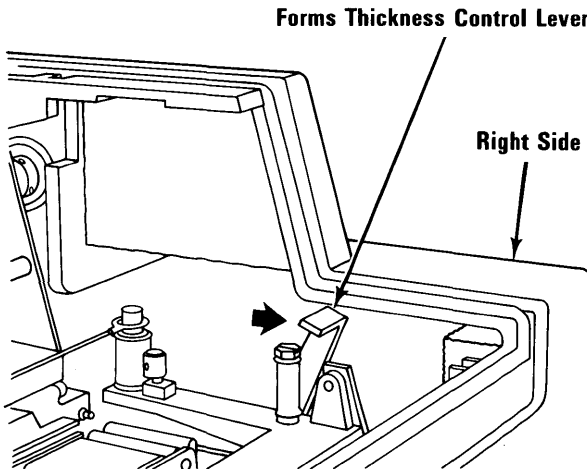
- 4** Center the print-head carriage by sliding it left or right.



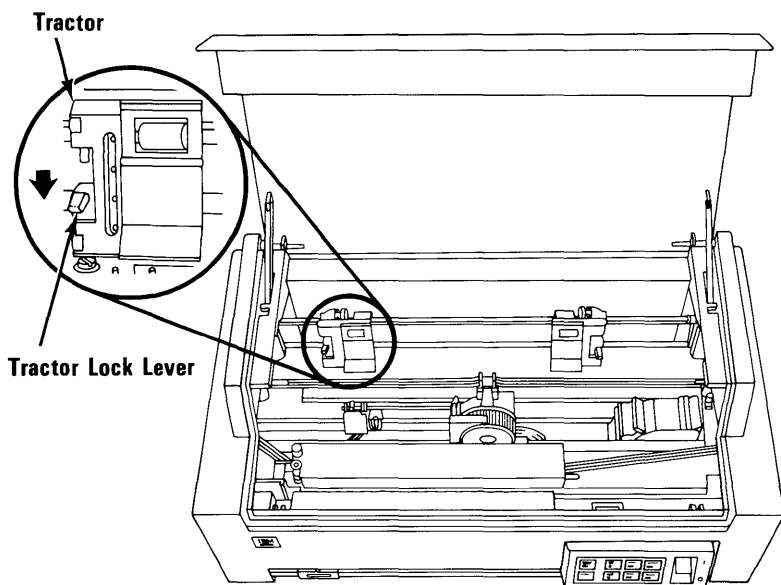
- 5** Move the Feed Mode lever toward the front of your printer to the open (continuous forms) position.



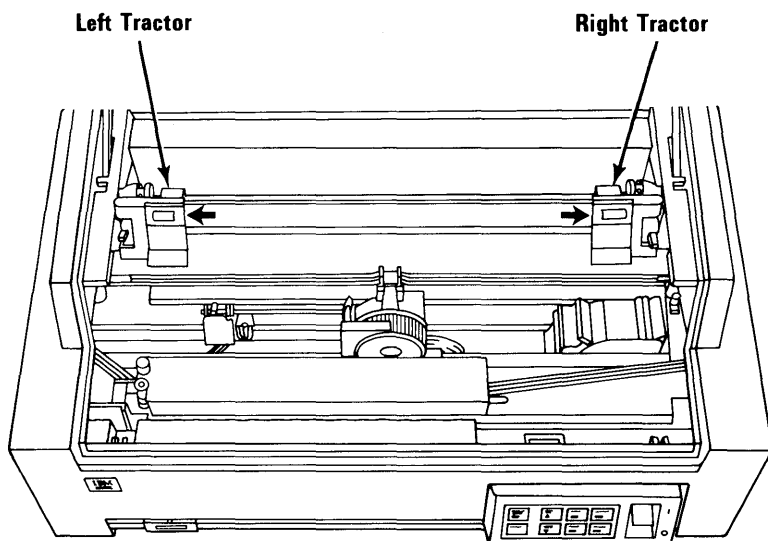
- 6** Move the Forms Thickness Control lever toward the front of your printer.



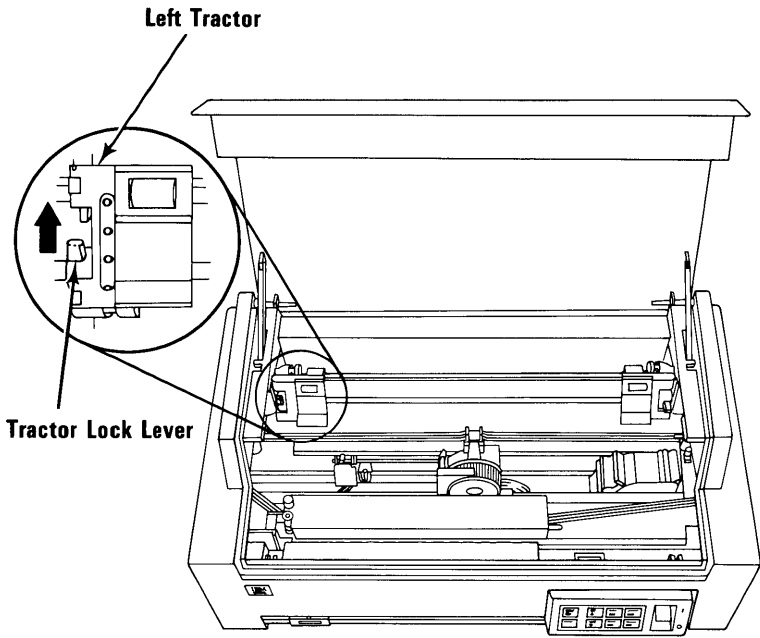
- 7** Unlock both tractors by pushing the Tractor Lock levers down.



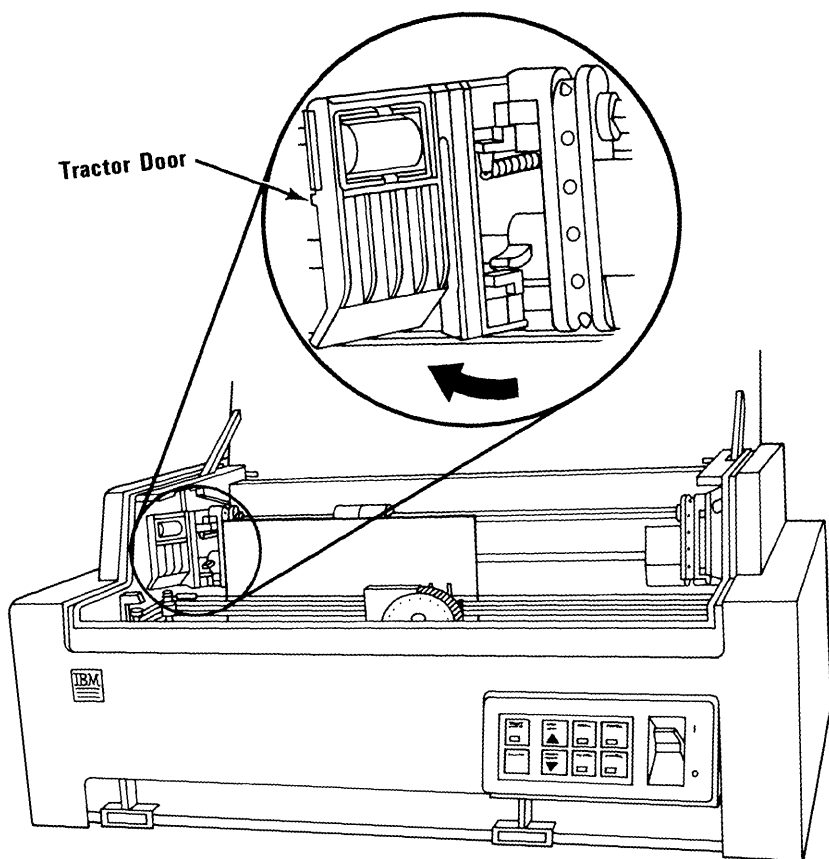
- 8** Slide both tractors to their outermost positions.



- 9** Lock the left tractor in place by pushing the lock lever up.

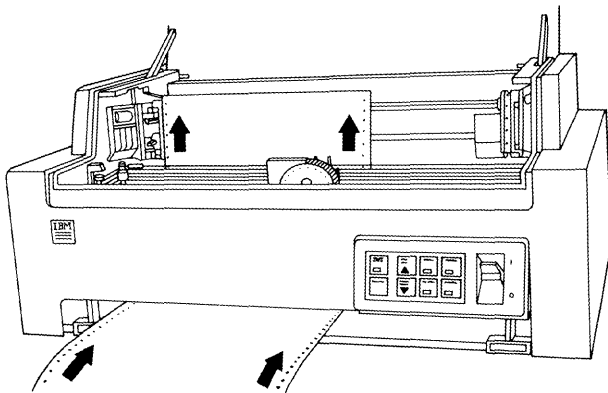


10 Open both tractor doors.

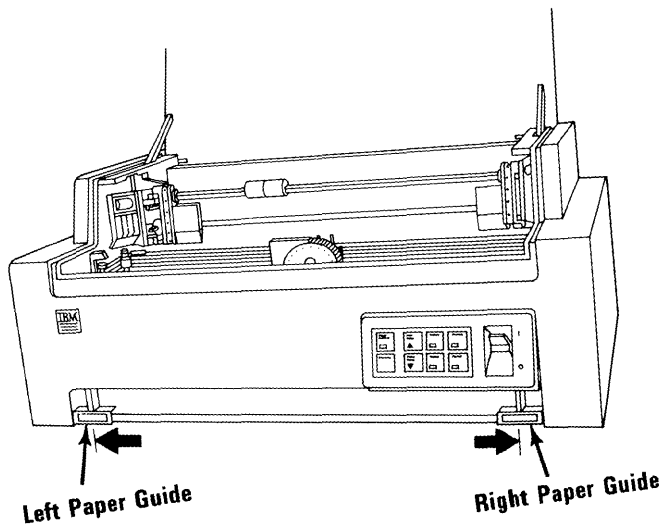


- 11** Slide both paper guides to their outermost positions.

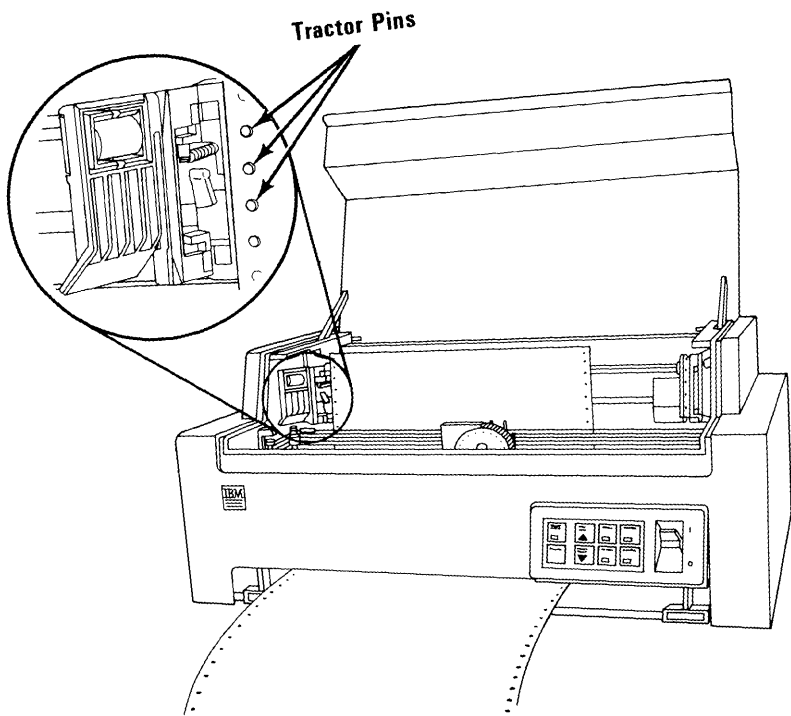
Note: This step is for front loading only.



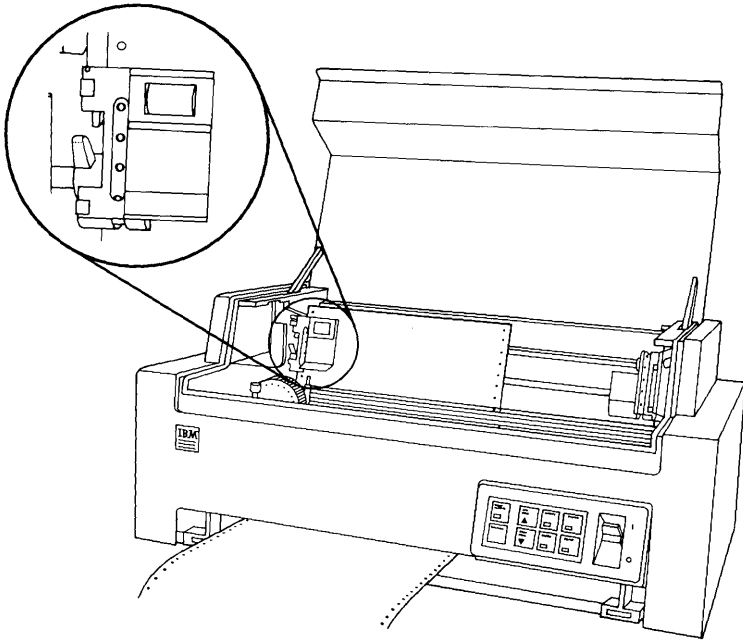
- 12** Insert your paper into the paper loading slot until it just passes the tractors. (Front loading is shown below.)



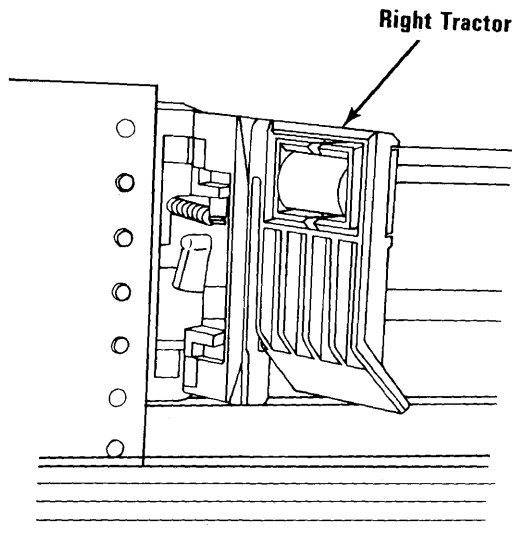
- 13** Adjust the paper so the holes in the left side align with the left tractor pins.



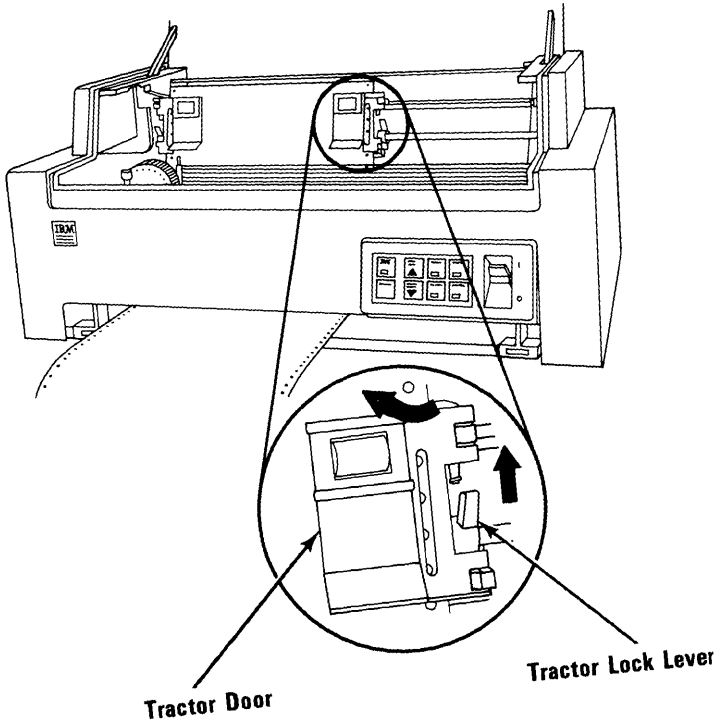
- 14** Close the left tractor door.



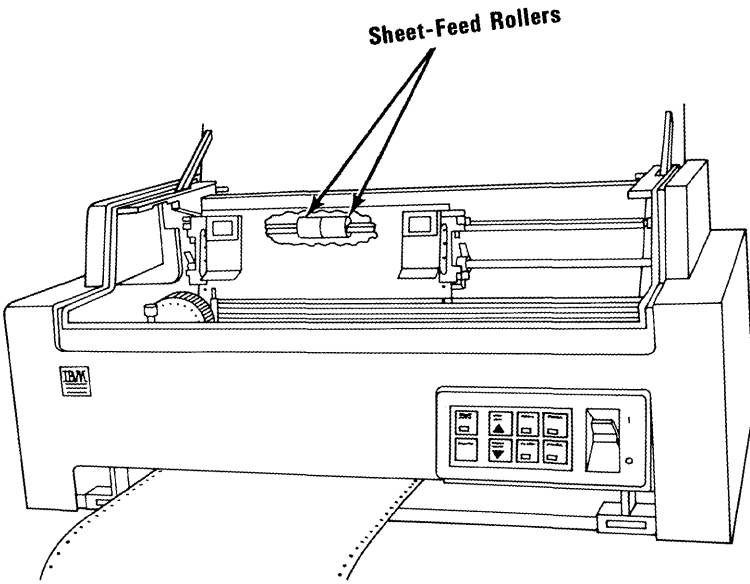
- 15** Adjust the right tractor so the tractor pins align with the holes in the right side of the paper.



- 16** Close the tractor door and push the lock lever up. If the paper buckles, unlock the right tractor and slide it to the right. Then lock the tractor in place.

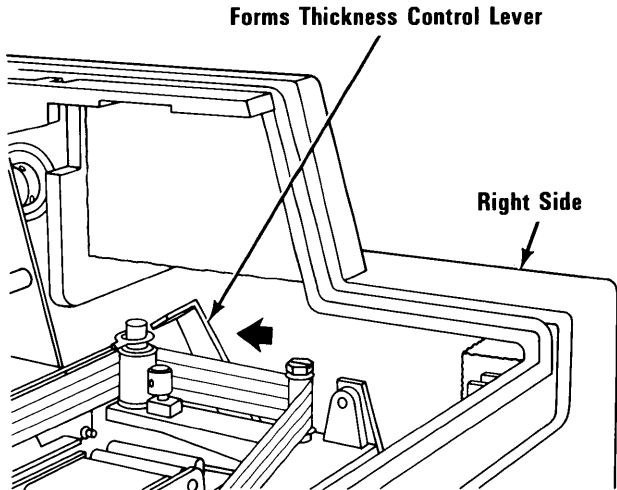


17 Center the two sheet-feed rollers between the tractors.

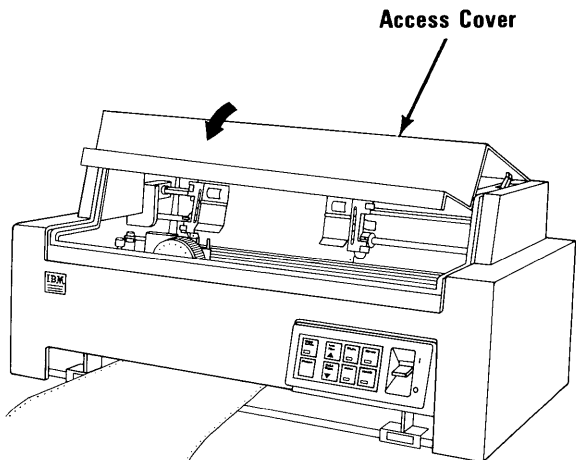


- 18** Move the Forms Thickness Control lever toward the rear of your printer (single-sheet position).

Note: If your printing smears, gradually move this lever toward the front of your printer until the smearing stops. (See "Forms Thickness Control Lever" on the next page.)



- 19** Close the access cover.

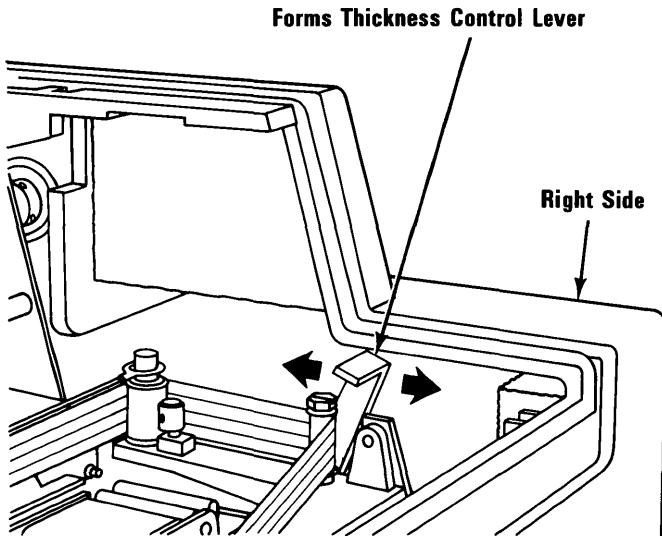


Forms Thickness Control Lever

The Forms Thickness Control lever adjusts the position of the print head to allow room for single sheets or multiple-copy forms. Move the lever toward the rear for single sheets, and toward the front for multiple-copy forms.

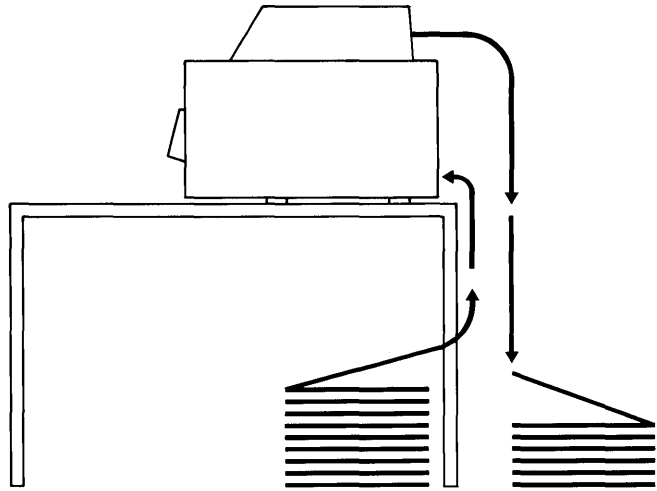
This lever can affect print darkness. If the printing is too light, move the lever toward the rear of your printer; if the printing is smeared, move the lever toward the front. The best position for the lever is as far to the front of your printer as possible while still getting good print with a good condition ribbon installed.

Warning: Positioning the Forms Thickness Control lever too far to the rear for the forms being used will result in premature wear of the print head and platen.

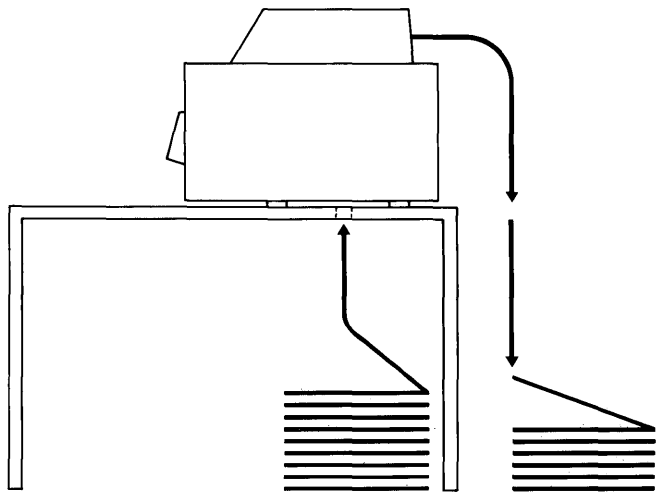


Rear and Bottom Loading Slots.

Continuous paper or forms can also be loaded from the rear or bottom of your printer, as shown in the figures below. The instructions are the same as for front loading with the exception of Step 11.



Rear Loading



Bottom Loading

Control Panel Operation with Continuous Paper or Forms

The following procedure steps you through the operation of the control panel when continuous paper or forms are installed. Each button and light is explained.

It is important to follow the steps in sequence. If you experiment in the middle of the procedure, the rest of the steps may not work correctly. If you lose your place, simply start over. You must have paper installed in your printer before you begin.

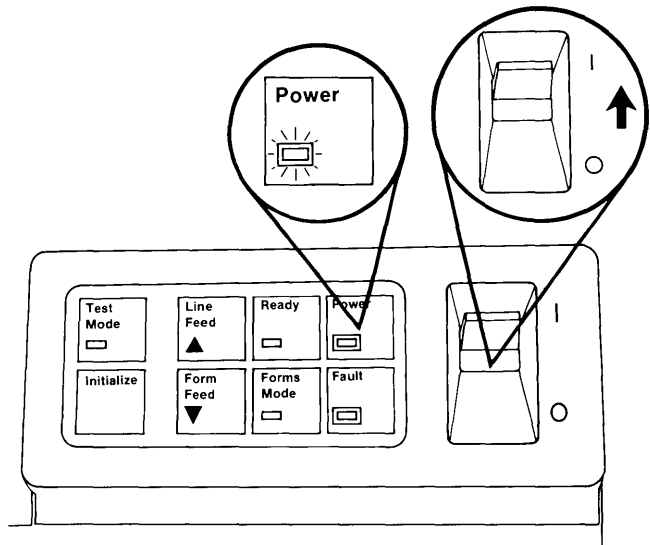
At the end of the procedure are pages that summarize the functions of the buttons and lights. You can use them for reference until you are experienced at operating your printer.

Power Switch and Light

CAUTION

The printer access cover may have to be open with your printer's power turned on to do some of the following steps. Be sure to keep your hands and all objects away from the printer carriage when your printer's power is on. Do not open the access cover unless told to do so.

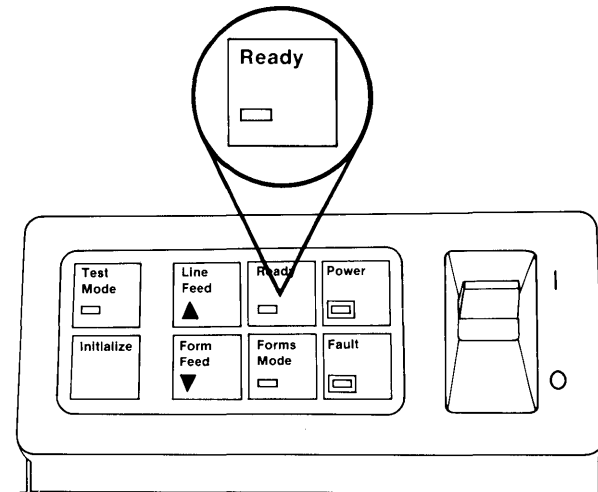
- 1 Turn your printer's power on. The Power light on the control panel will light.



Ready Button and Ready Light

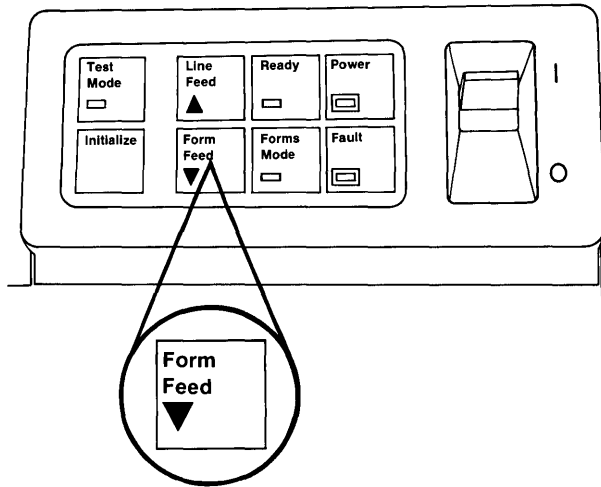
- 2 Press the Ready button several times and watch the Ready light go on and off.
- 3 Press the Ready button until the Ready light is on. Your printer is now in the ready mode and will accept data from the system.
- 4 Try pressing some of the other buttons. Notice that when your printer is in the ready mode, none of the other buttons can be used.
- 5 Press the Ready button again to turn the Ready light off. Your printer is now in the not-ready mode and will not accept data from the system.

Note: The Ready light will flash continuously if your printer is in the ready mode but has been released by your system. See "ESC Q 2" and "DC3" in "Printer Control Codes."



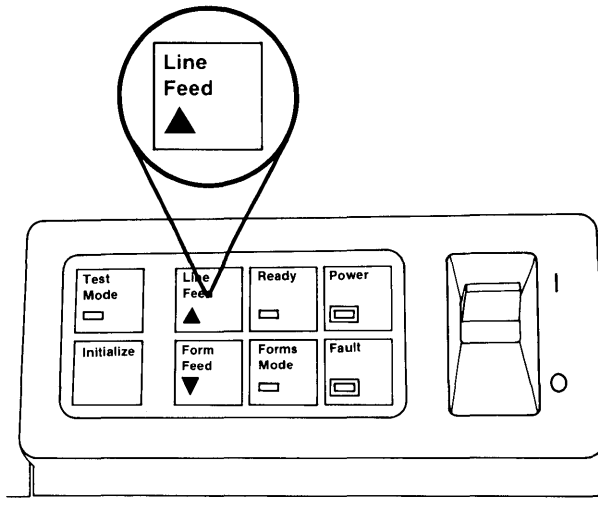
Form Feed Button

- 6** Press the Form Feed button. The paper moves up 279.4 mm (11 in.). This is the length of a page automatically set by your printer when you turned it's power on. This length can be changed with printer control codes or with the DIP (Dual In-Line Package) switches explained later in these instructions.
- 7** Try the preceding step several times to see how the Form Feed button moves the paper up the length of one page each time you press the button.



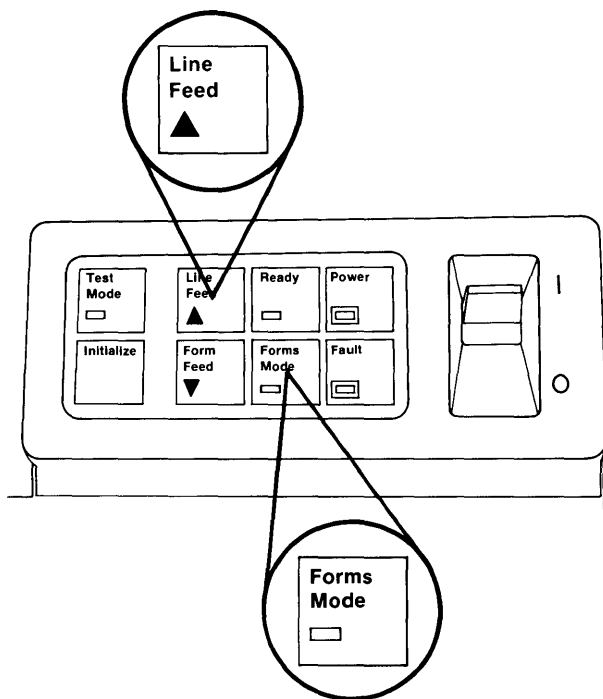
Line Feed Button

- 8 Watch the paper and press the Line Feed button. The paper moves up one line each time you press the button.
- 9 Press and hold the Line Feed button. The paper moves up continually.
- 10 Press the Line Feed button to move the paper up until a perforation is just above the top of the ribbon.



Forms Mode Button and Forms Mode Light

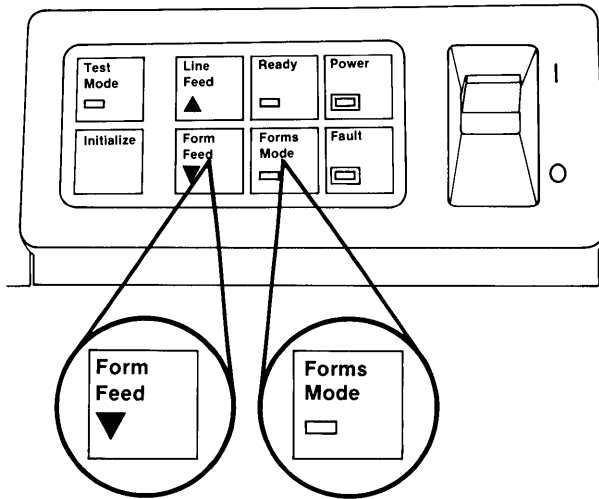
- 11** Press the Forms Mode button until the Forms Mode light is on. Your printer is now in the forms mode.
- 12** Watch the paper and press the Line Feed button. The paper moves up 0.176 mm (1/144 in.). Notice that this button works differently when your printer is in the forms mode.
- 13** Press and hold the Line Feed button. The paper moves up continually until you release the button.



14 Watch the paper and press the Form Feed button. The paper moves down 0.176 mm (1/144 in.). Notice that this button works differently when the printer is in the forms mode.

15 Press and hold the Form Feed button. The paper moves down continually until you release the button.

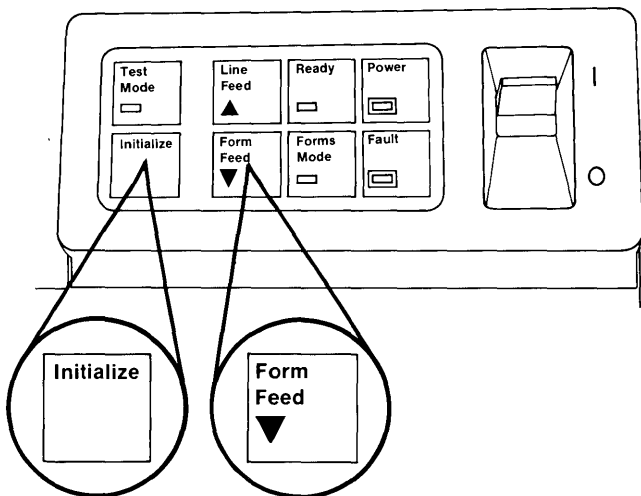
Note: When using labels, or thick forms, avoid feeding them down whenever possible. The labels or forms could get caught in your printer.



Initialize Button (Setting the Top-of-Form)

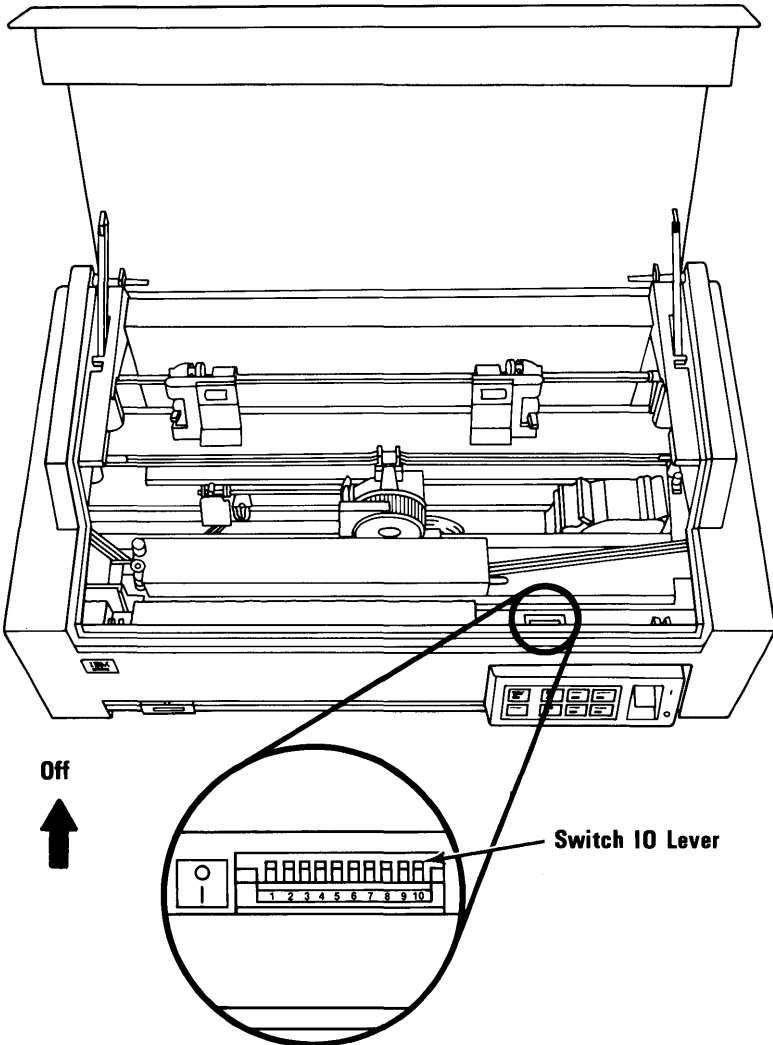
- 16 Press the Line Feed button or Form Feed button to move the paper up or down to where you want to print the first line. The printer prints the first line 19.05 mm (0.75 in.) below the top of the ribbon.
- 17 Press the Initialize button. The Forms Mode light goes off to indicate your printer is no longer in the forms mode. The present position of the paper is now set as the new top-of-form, replacing the top-of-form position automatically set when you turned the power on. This is the position to which the paper advances each time your printer performs a form-feed operation or you press the Form Feed button.
- 18 Press the Form Feed button to see how this works.

Note: To leave the forms mode without changing the top-of-form setting, press the Forms Mode button. The Forms Mode light will go off to indicate your printer is no longer in the forms mode.



Setup for Printer Self-Test

- 19** Turn your printer's power off.
- 20** Open the access cover.
- 21** Turn DIP (Dual In-line Package) Switch 10 off by pushing the switch lever toward the rear of your printer with the point of a ball-point pen.



By setting DIP (Dual In-line Package) switches 9 and 10 off, you will get the same printout each time you run the printer self-test. If the printout does not print correctly, your printer may require service.

22 Close the access cover.

23 Turn your printer's power on.

24 Press the Ready button until the Ready light is Off.

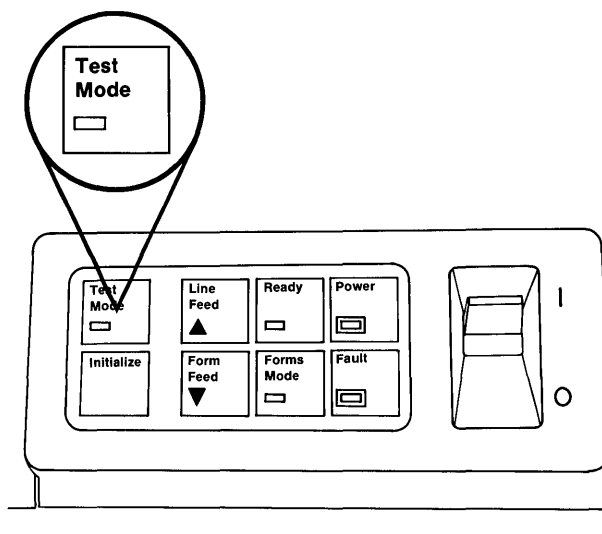
Note: Paper at least 215.9 mm (8.5 in.) wide must be installed for the printer self-test.

Test Mode Button and Test Mode Light

- 25** Press the Test Mode button until the Test Mode light is on. Your printer is now in the test mode.

After three seconds, your printer starts printing a pattern of all of the printable characters. The ribbon color changes every 25.4 mm (1 in.). This is the printer self-test. A sample of the printout is shown under "Printer Self-Test" in the back of these instructions.

- 26** Press the Test Mode button again to stop the test. The Test Mode light goes out to show your printer is no longer in the test mode.

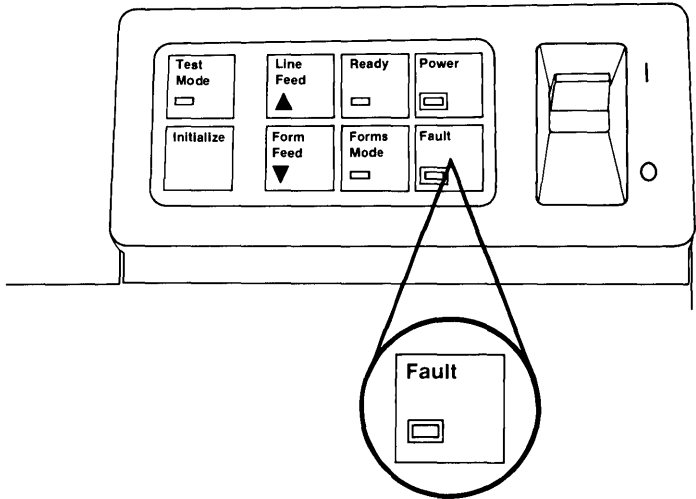


Note: You will probably want to set the DIP switches to a setting other than the printer self-test set-up. When you complete this installation, refer to "DIP Switch Settings" later in this section for all of the available settings.

Fault Light

The Fault light has two functions:

1. It signals when your printer is out of paper by glowing steadily. The audio alarm also sounds three times.
2. It signals when a problem is detected during your printer power-on checks by flashing continually. This is an indication that your printer requires service.



Summary

You have now seen how each control-panel button and light works.

Your IBM Personal Computer Color Printer has four modes: ready, not-ready, forms, and test. It can be in only one of these modes at a time. The ready, forms, and test modes are each indicated by a light with the same name. When only the Power light is on, your printer is in the not-ready mode.

The Ready button sets your printer to the ready mode to accept data from your system, or to the not-ready mode so that other modes may be set.

The Forms Mode button sets your printer to the forms mode. The Initialize button causes your printer to leave the forms mode and changes the top-of-form setting. In the forms mode, the Line Feed button and the Form Feed button produce very small paper movement. In the not-ready mode, these buttons produce a large amount of paper movement.

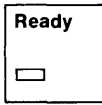
Test Mode button sets your printer to the test mode and starts the printer self-test to verify printer operation.

The Power light indicates when power is supplied to your printer. If only the Power light is On, your printer is in the not-ready mode.

The Fault light glows steadily when your printer is out of paper, and flashes continually if the power-on tests detect a problem.

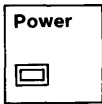
Control Panel Reference for Continuous Paper or Forms

Light Indicates

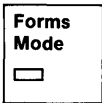


On – your printer is in the ready mode.

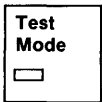
Flashing – your printer is in the ready mode but has been released by command from your system.



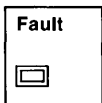
If this is the only light On, power is supplied to your printer, and your printer is in the not-ready mode.



Your printer is in the forms mode.



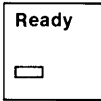
Your printer is in the test mode.



On – your printer is out of paper.

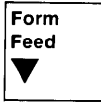
Flashing continually – your printer requires service.

Button Function



Sets your printer to the ready mode.

Sets your printer to the not-ready mode.



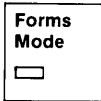
In the not-ready mode – moves the paper up one page length.

In the forms mode – moves the paper down 0.176 mm (1/144 in.).



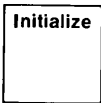
In the not-ready mode – moves the paper up one line space.

In the forms mode - moves the paper up 0.176 mm (1/144 in.).

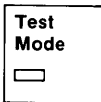


Sets your printer to the forms mode.

Causes your printer to leave the forms mode without changing the top-of-form setting.



In the forms mode – changes the top-of-form setting to the current paper position, and causes your printer to leave the forms mode.




Sets your printer to the test mode.


Causes your printer to leave the test mode.

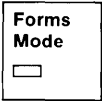
Setting the Top-of-Form


Install paper in your printer and follow the steps below.

Press: **To:**

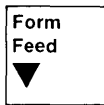
1.  Set your printer to the not-ready mode.

2.  Move the paper to the approximate position you wish to set as the top-of-form.


3.  Set your printer to the forms mode.

4. 

OR



Move the paper up or down to the exact position you wish to set as the top-of-form.

5.  Set the present position of the paper as the top-of-form and leave the forms mode.

Setting the Left Margin

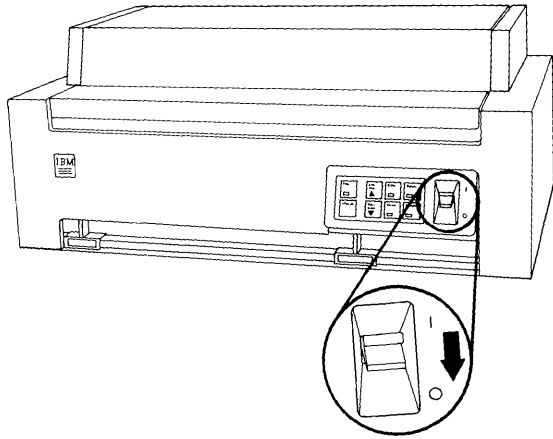
When the left tractor is set as far left as possible, your printer will start your lines 25.4 mm (1 in.) to the right of the left side of the paper. If you want to start your lines farther to the right, see "ESC X" under "Printer Control Codes." If you want to print closer to the left side of the paper, follow this procedure.

- 1** Turn your printer's power off.
- 2** Open the printer access cover.
- 3** With continuous paper or forms installed, unlock both tractors by pushing the Tractor Lock levers down.
- 4** Slide the tractors and paper to the right the distance you want to move the left margin.
- 5** Lock both tractors in place by pushing the Tractor Lock levers up. Make sure the tractors are set so the paper lays flat between them.
- 6** Close the printer access cover.
- 7** Turn your printer's power on.

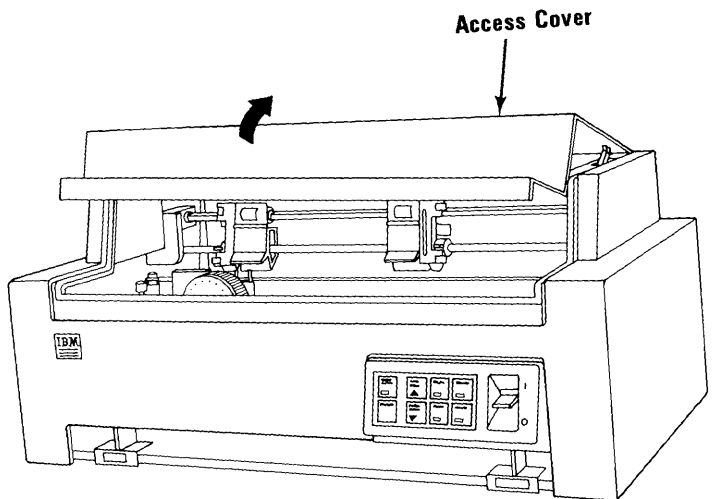
Single-Sheet Operation

Paper Installation

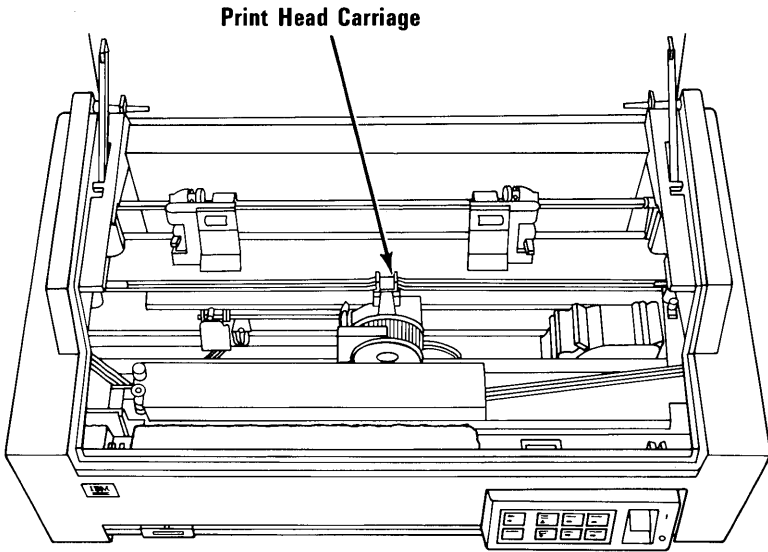
- 1 Remove any paper presently in your printer.
- 2 Turn your printer's power off.



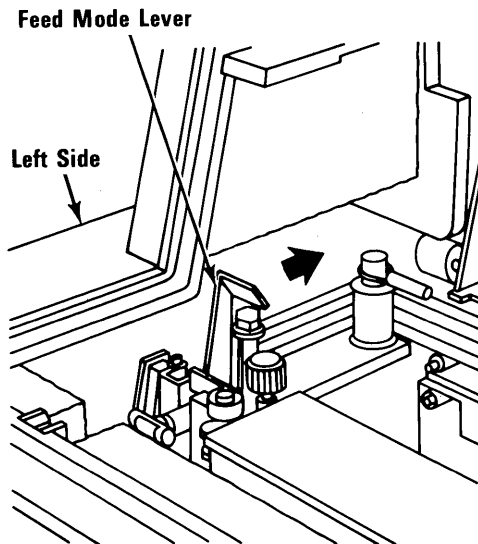
- 3 Open the access cover.



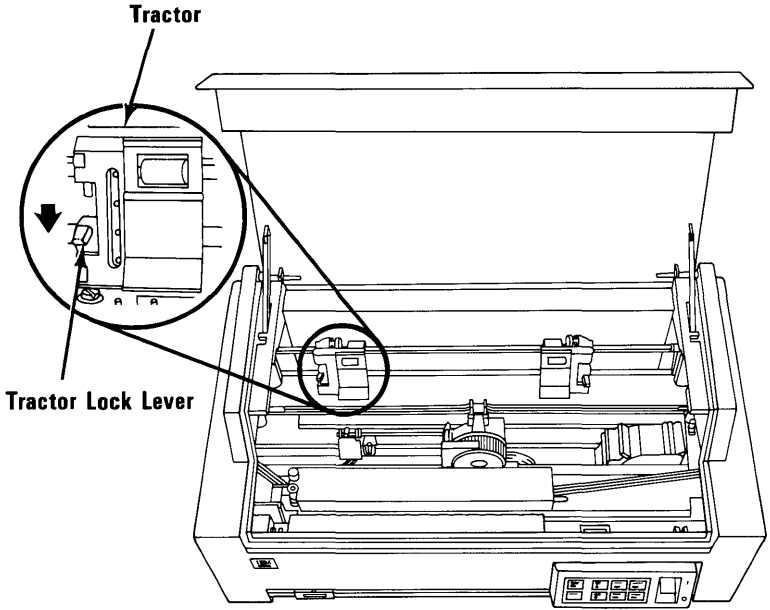
- 4** Center the print-head carriage by sliding it left or right.



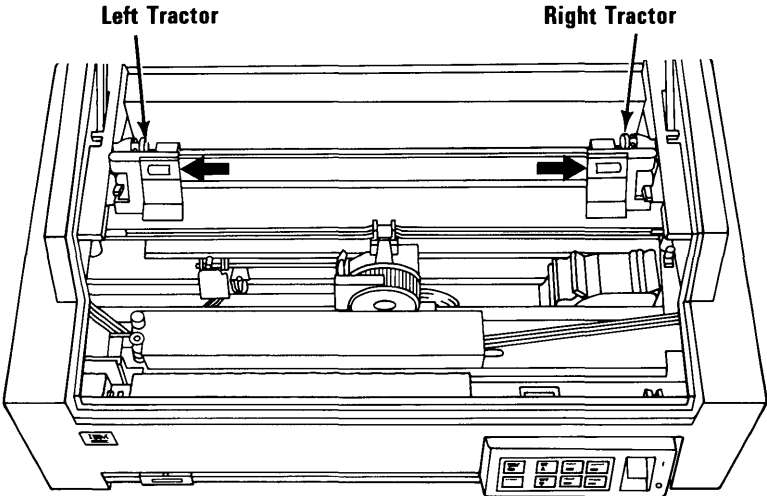
- 5** Move the Feed Mode lever toward the rear of your printer to the closed (single sheet) position.



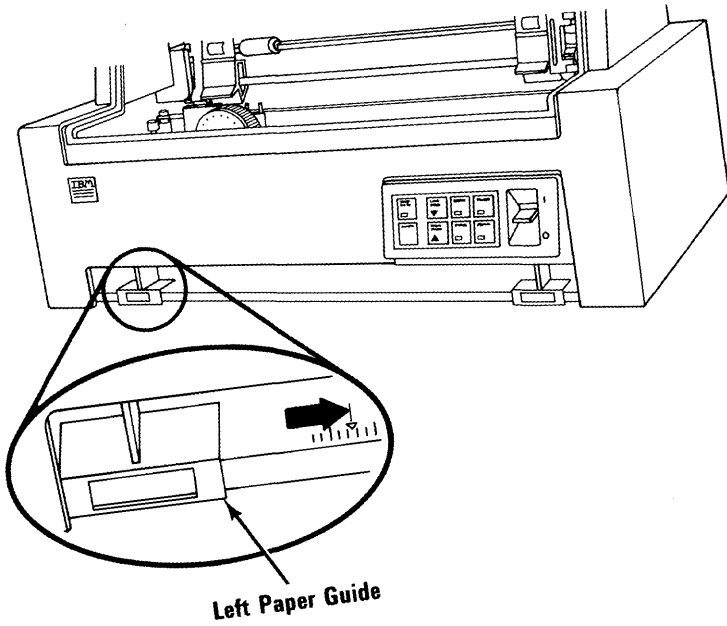
- 6** Unlock both tractors by pushing the Tractor Lock levers down.



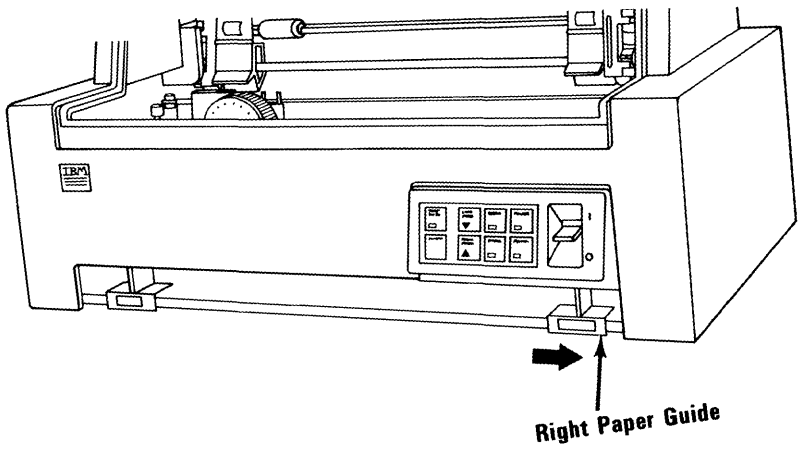
- 7** Slide both tractors to their outermost positions.



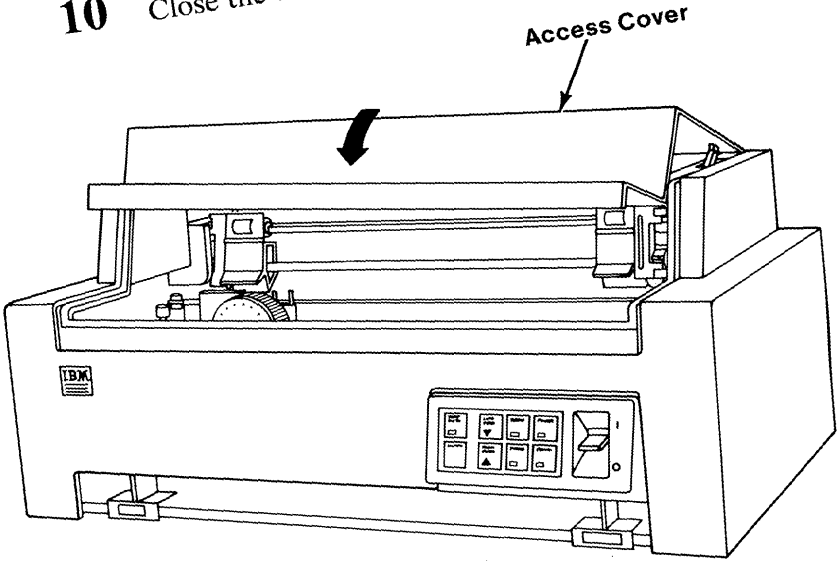
- 8** Slide the left paper guide until its right edge is aligned with the arrowhead on the scale.



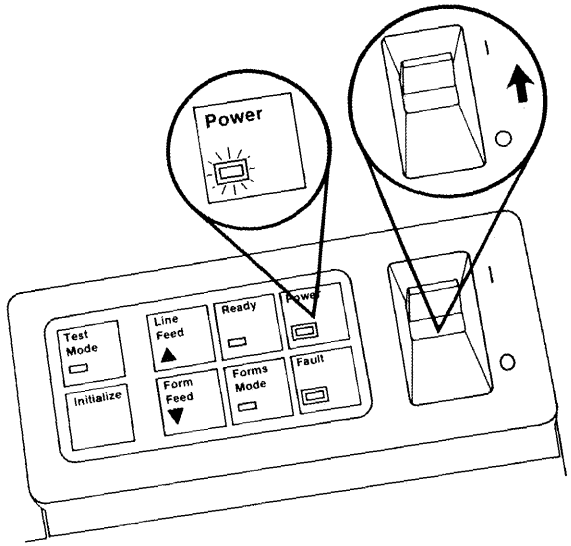
- 9** Slide the right paper guide to the far right.



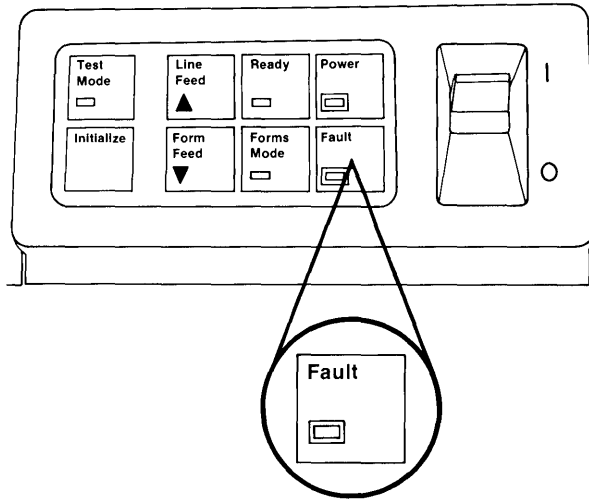
10 Close the access cover.



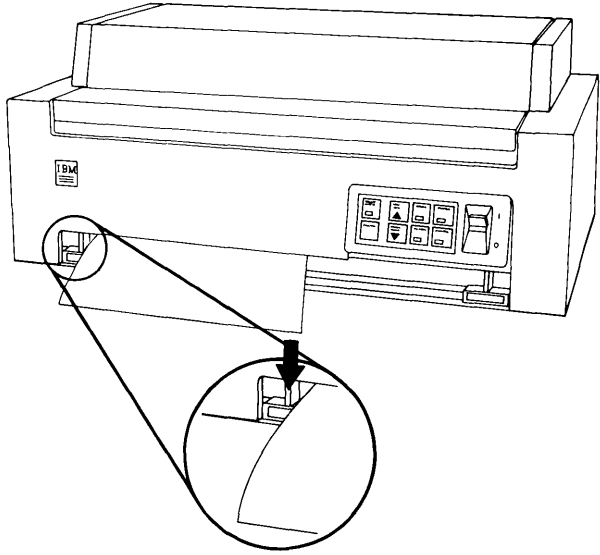
11 Turn your printer's power on.



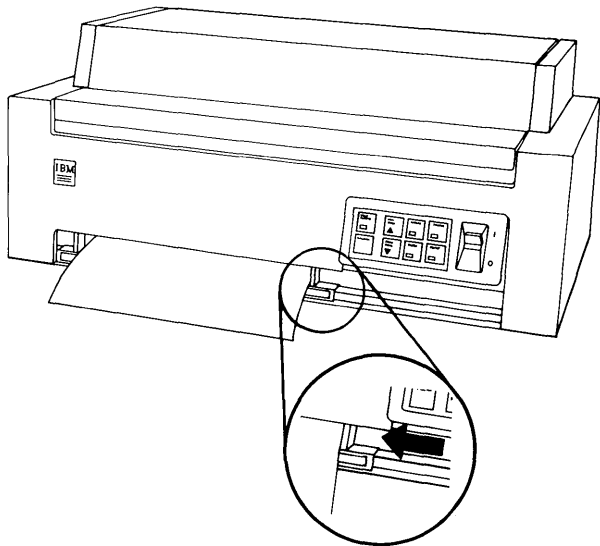
- 12** Wait for the Fault light to come on (approximately 10 seconds).



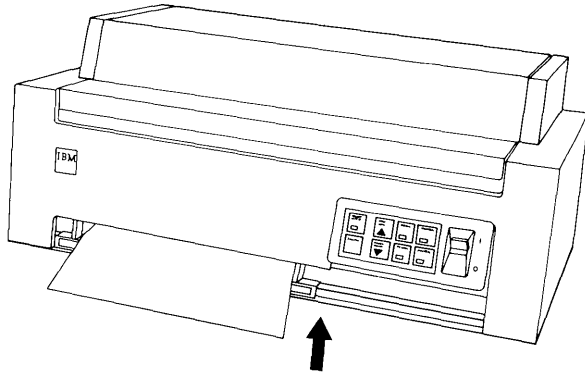
- 13** Place the top-left edge of a test sheet of paper against the left paper guide (do not push the paper up into the feed mechanism).



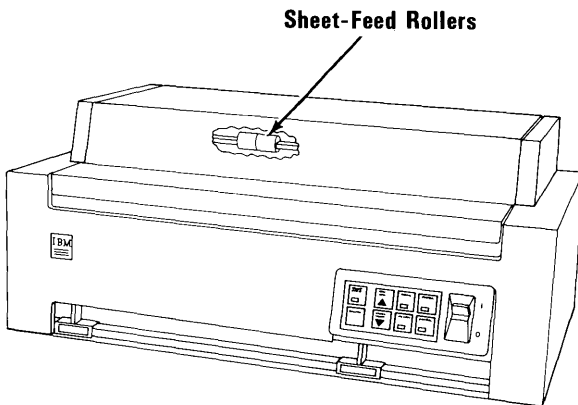
- 14** Slide the right paper guide against the right edge of the paper.



- 15** Insert the paper into the front loading slot until it is caught by the feed mechanism. Your printer automatically moves the paper to the first printable line, approximately 19.05 mm (0.75 in.) below the top edge of the ribbon.



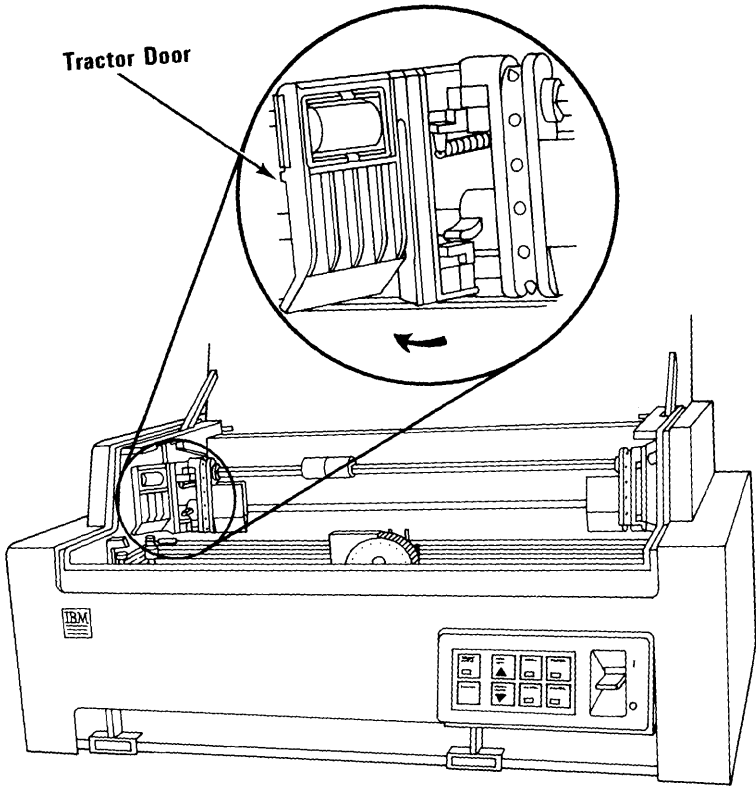
- 16** Press the Ready button once to turn the Ready light Off.
- 17** Press and hold the Line Feed button to advance the paper to the top of the sheet-feed rollers.



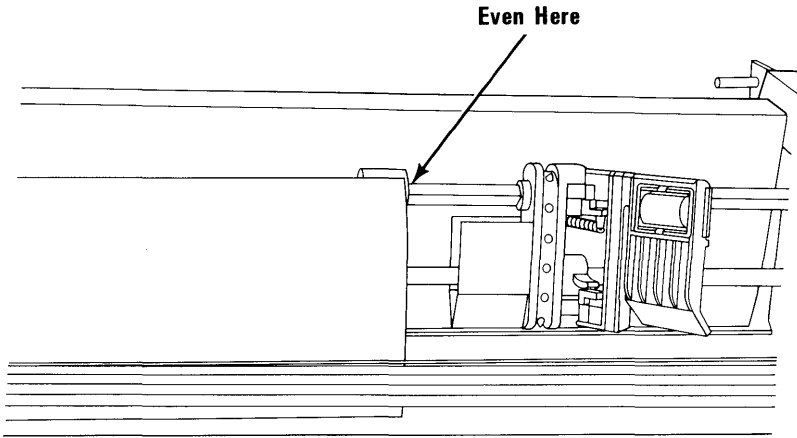
18 Turn your printer's power off.

19 Open the access cover.

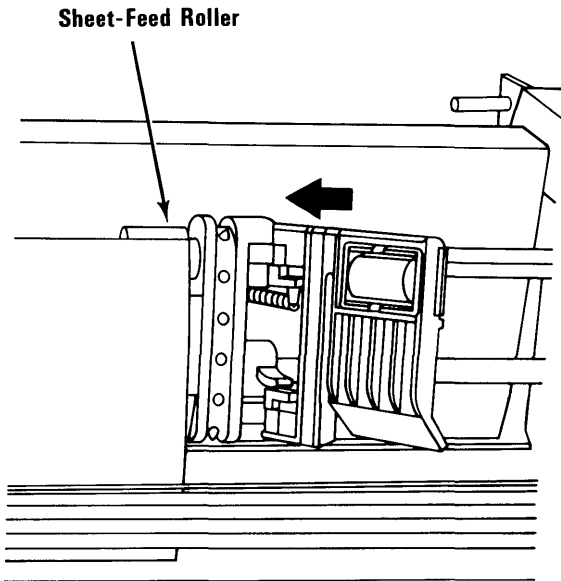
20 Open both tractor doors.



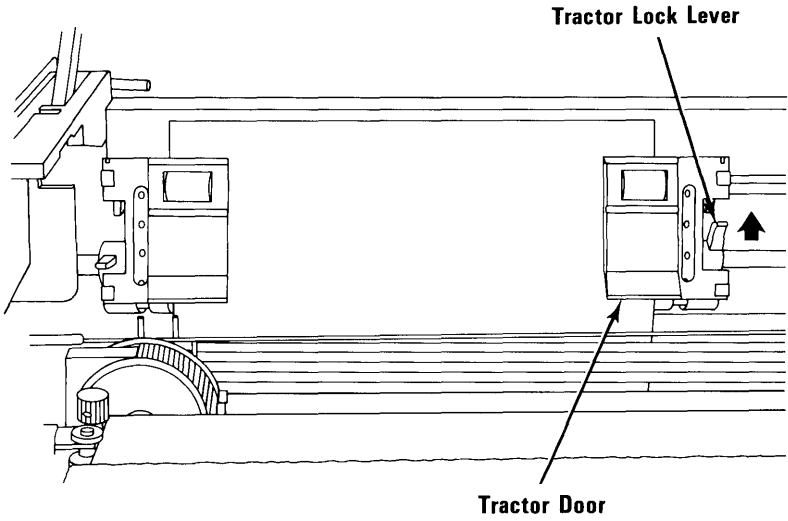
- 21** Adjust the sheet-feed rollers on the tractor drive rail so the outside edges of the rollers are even with the edges of the paper.



- 22** Slide each tractor against its respective sheet-feed roller.

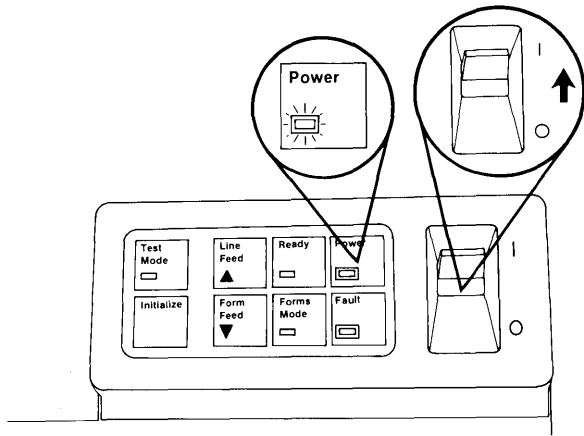


- 23** Close the tractor doors and lock the tractors in place by pushing the Tractor Lock levers up.



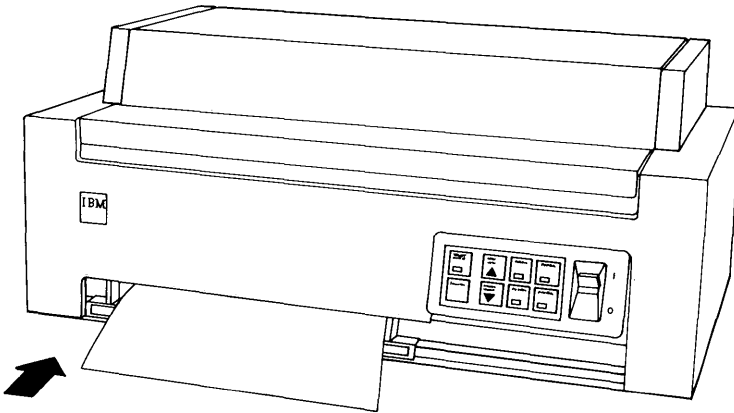
- 24** Close the access cover.

- 25** Turn your printer's power on. Press the Ready button to turn the Ready light Off.



26 Press the Form Feed button to move the test sheet of paper out of your printer. The Fault light will then come on.

27 You can now insert a sheet of paper into the front loading slot. The paper will automatically advance to the first printable line.

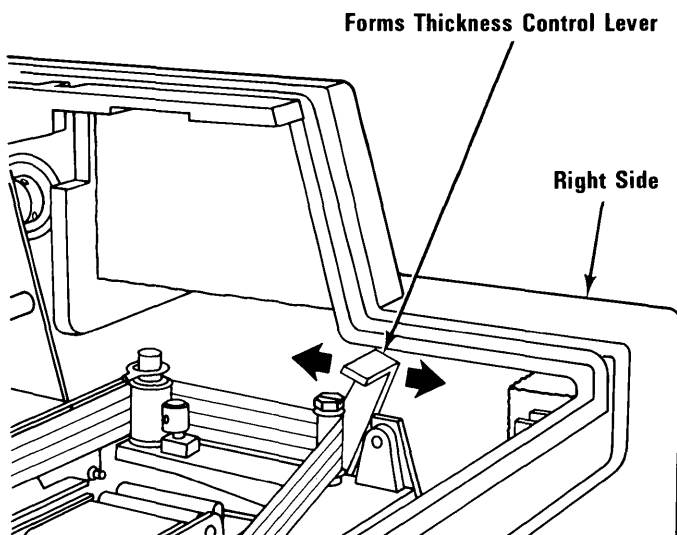


Forms Thickness Control Lever

The Forms Thickness Control lever adjusts the position of the print head to allow room for single sheets or multiple-copy forms. Move the lever toward the rear for single sheets, and toward the front for multiple-copy forms.

This lever can affect print darkness. If the printing is too light, move the lever toward the rear of your printer; if the printing is smeared, move the lever toward the front. The best position for the lever is as far to the front of your printer as possible while still getting good print with a good condition ribbon installed.

Warning: Positioning the Forms Thickness Control lever too far to the rear for the forms being used will result in premature wear of the print head and platen.



Control Panel Operation with Single Sheet Paper

The following procedure steps you through the operation of the Control Panel when single sheet paper is installed. Each button and light is explained.

It is important to follow the steps in sequence. If you experiment in the middle of the procedure, the rest of the steps may not work correctly. If you lose your place, simply start over. You must have a sheet of paper installed in your printer before you begin.

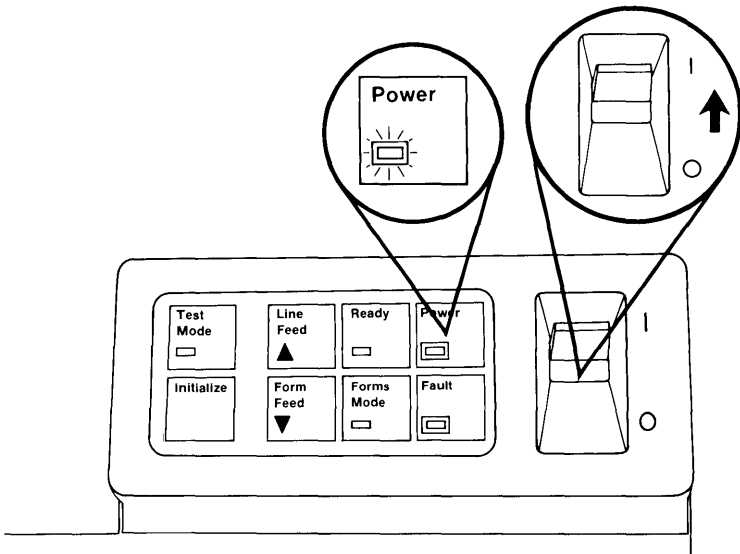
At the end of the procedure are pages that summarize the functions of the buttons and lights. You can use them for reference until you are experienced at operating your printer.

Power Switch and Light

CAUTION

The printer access cover may have to be open with your printer power turned on to do some of the following steps. Be sure to keep your hands and all objects away from your printer carriage when the power is turned on. Do not open the access cover unless told to do so.

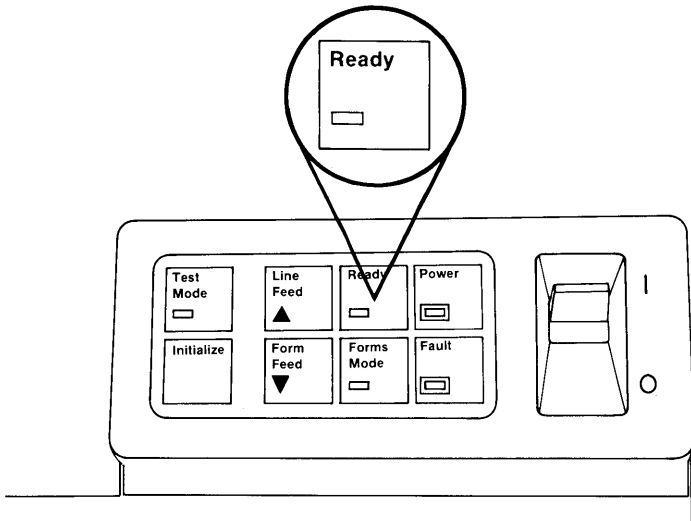
- 1 Turn your printer's power on. The Power light comes on to show that power is being supplied to your printer.



Ready Button and Ready Light

- 2** Press the Ready button several times, and watch the Ready light go on and off.
- 3** Press the Ready button until the Ready light is on. Your printer is now in the ready mode and will accept data from the system.
- 4** Try pressing some of the other buttons. Notice that when your printer is in the ready mode, none of the other buttons can be used.
- 5** Press the Ready button again to turn off the Ready light. Your printer is now in the not-ready mode and will not accept data from the system.

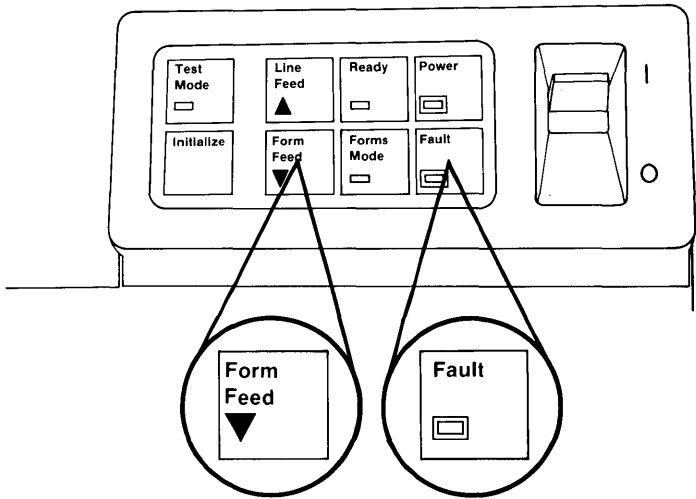
Note: The Ready light will flash continually if your printer is in the ready mode but has been released by the system. See "ESC Q 2" and "DC3" in "Printer Control Codes."



Form Feed Button and Fault Light

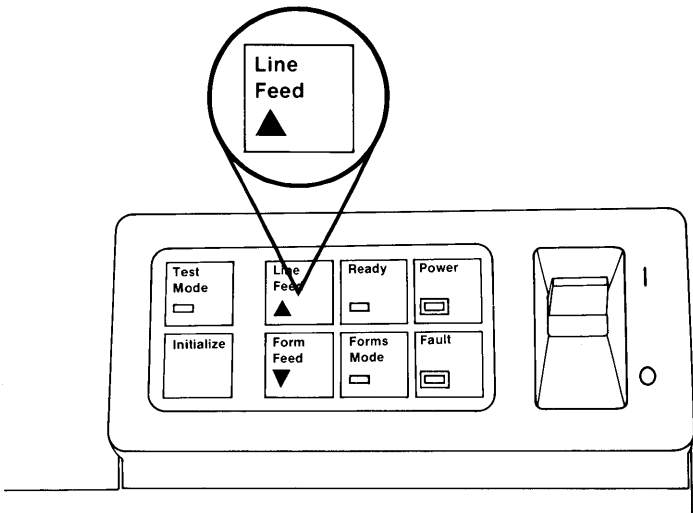
- 6 Press the Form Feed button. The paper moves up and out of your printer.
- 7 After a short delay, the Fault light glows steadily to indicate your printer is out of paper. The audio alarm also beeps three times.

The Fault light also has another function. Your printer automatically performs electronic checks each time power is turned on. The Fault light flashes once when your printer is turned on and continues flashing if a printer problem is detected during these checks. This is an indication that your printer requires service.



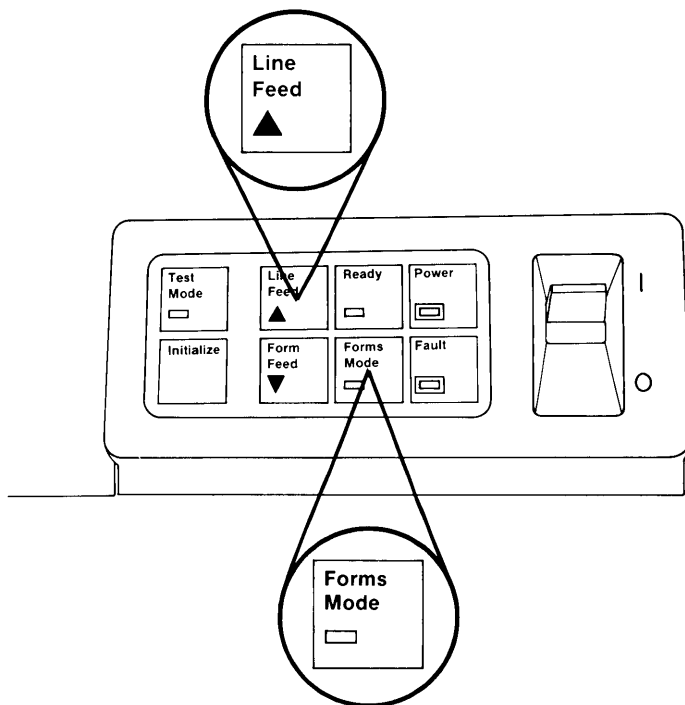
Line Feed Button

- 8 Insert another sheet of paper into your printer.
- 9 Watch the paper and press the Line Feed button. The paper moves up one line each time you press the button.
- 10 Press and hold the Line Feed button. The paper moves up continually. Press and hold the button to feed the paper out of your printer.
- 11 Insert another sheet of paper into your printer.
- 12 Press the Line Feed button to move the paper up until the top of the paper is just above the top of the ribbon.



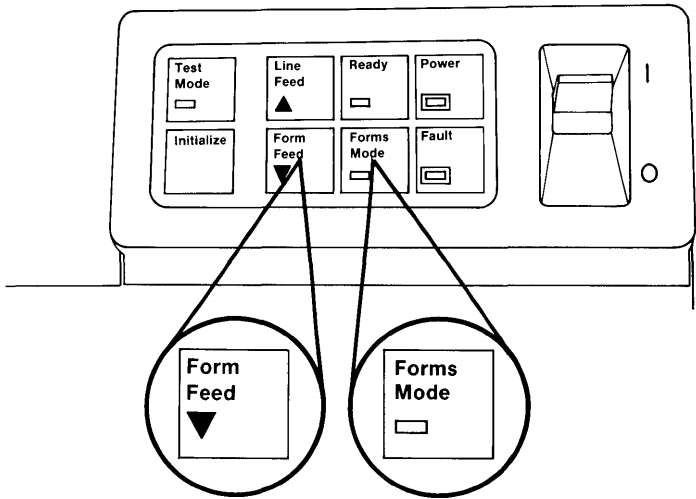
Forms Mode Button and Forms Mode Light

- 13 Press the Forms Mode button until the Forms Mode light is on. Your printer is now in the forms mode.
- 14 Watch the paper and press the Line Feed button. The paper moves up 0.176 mm (1/144 in.). Notice that this button works differently when your printer is in the forms mode.
- 15 Press and hold the Line Feed button. The paper moves up continually until you release the button.



16 Watch the paper and press the Form Feed button. The paper moves down 0.176 mm (1/144 in.). Notice that this button works differently when your printer is in the forms mode.

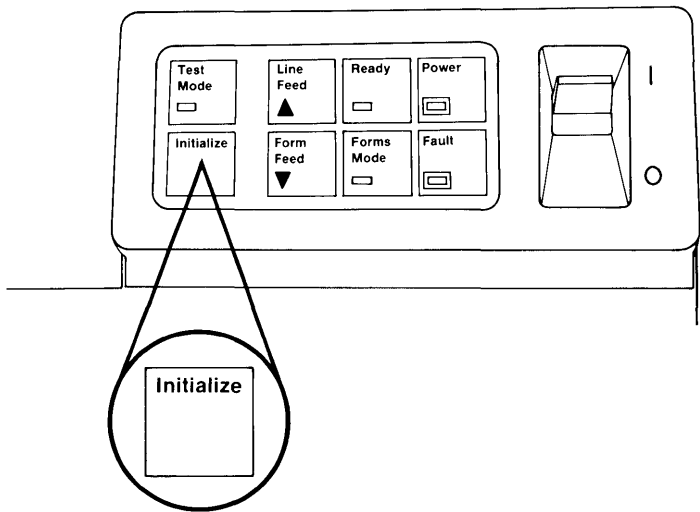
17 Press and hold the Form Feed button. The paper moves down continually until you release the button.



Initialize Button (Setting the Top-of-Page)

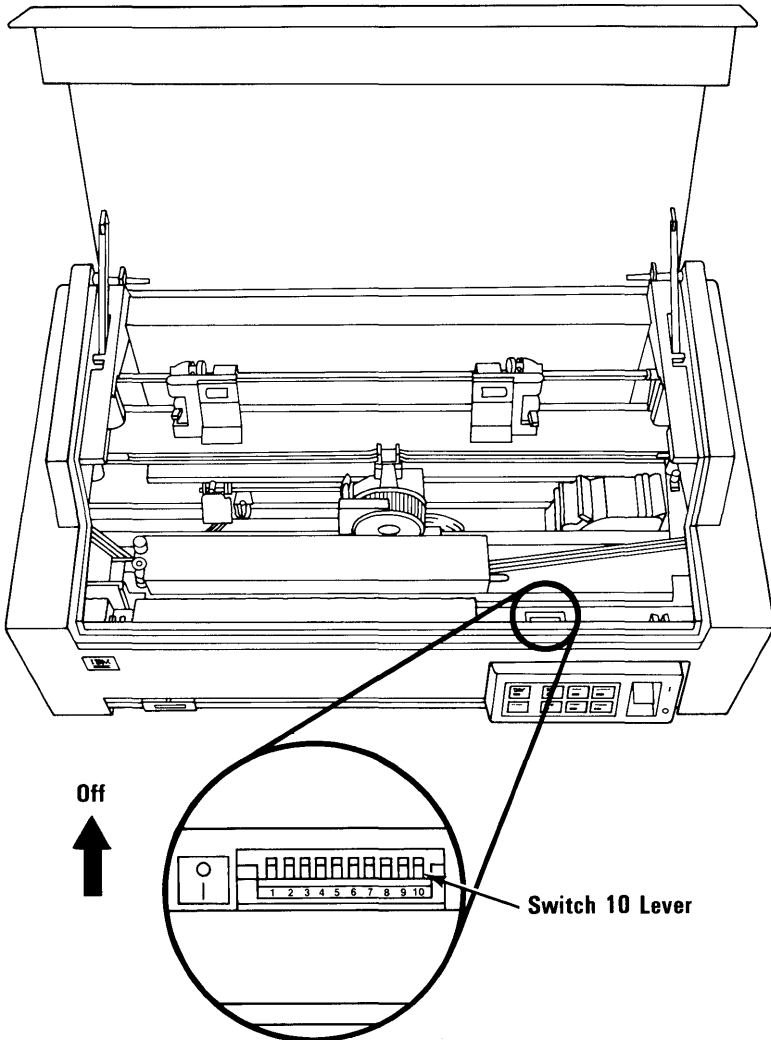
- 18** Press the Line Feed button or Form Feed button to move the paper up or down to where you want to print the first line. Your printer prints the first line 19.05 mm (0.75 in.) below the top of the ribbon.
- 19** Press the Initialize button. The Forms Mode light goes off to indicate your printer is no longer in the forms mode. The present position of the paper is now set as the new top-of-page, replacing the top-of-page position set when you turned the power on. This is the position to which the paper advances each time your printer performs a form-feed operation or you press the Form Feed button.

Note: To leave the forms mode without changing the top-of-form setting, press the Forms Mode button. The Forms Mode light will go off to indicate your printer is no longer in the forms mode.



Setup for Printer Self-Test

- 20** Turn your printer's power off.
- 21** Open the access cover.
- 22** Turn switch 10 off by pushing the switch lever toward the rear of your printer with the point of a ball-point pen.



By turning DIP (Dual In-line Package) switches 9 and 10 off, you will get the same printout each time you run the printer self-test. If the printout does not print correctly, your printer may require service.

23 Close the access cover.

24 Turn your printer's power on.

25 Press the Ready button until the Ready light is Off.

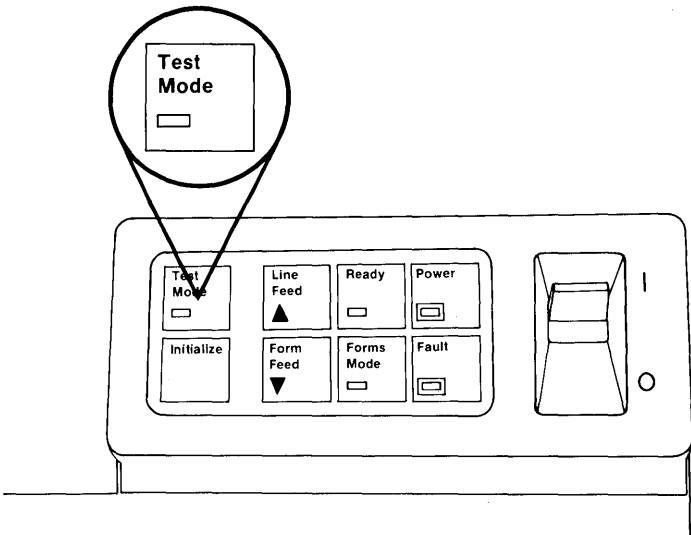
Note: Paper at least 215.9 mm (8.5 in.) wide must be installed for the printer self-test.

Test Mode Button and Test Mode Light

- 26** Press the Test Mode button until the Test Mode light is on. Your printer is now in the test mode.

After three seconds, your printer starts printing a pattern of all of the printable characters. The ribbon color changes every 25.4 mm (1 in.). This is the printer self-test.

- 27** Press the Test Mode button again to stop the test. The Test Mode light goes out to show your printer is no longer in the test mode.



Note: You will probably want to set the DIP switches to a setting other than the printer self-test setup. When you finish this installation, refer to "DIP Switch Settings" for all of the available settings.

Summary

You have now seen how each control-panel button and light works.

Your IBM Personal Computer Color Printer has four modes: ready, not-ready, forms, and test. It can be in only one of these modes at a time. The ready, forms, and test modes are each indicated by a light with the same name. When only the Power light is on, your printer is in the not-ready mode.

The Ready button sets your printer to the ready mode to accept data from your system, or to the not-ready mode so that other modes may be set.

The Forms Mode button sets the printer to the forms mode. The Initialize button causes the printer to leave the forms mode and changes the top-of-form setting.

In the forms mode, the Line Feed button and the Form Feed button produce very small paper movement. In the not-ready mode, these buttons produce a large amount of paper movement.

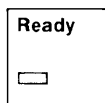
The Test Mode button sets your printer to the test mode and starts the printer self-test to verify printer operation.

The Power light indicates when power is supplied to your printer. If only the Power light is On, your printer is in the not-ready mode.

The Fault light glows steadily when your printer is out of paper, and flashes continually if the power-on tests detect a problem.

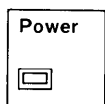
Control Panel Reference for Single Sheets

Light Indicates

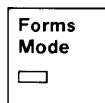


On – your printer is in the ready mode.

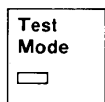
Flashing – your printer is in the ready mode but has been released by command from the system.



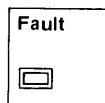
If this is the only light On, power is supplied to the printer, and your printer is in the not-ready mode.



Your printer is in the forms mode.



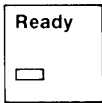
The printer is in the test mode.



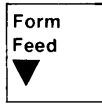
On – your printer is out of paper.

Flashing continually – your printer requires service.

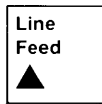
Button Function



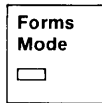
Sets your printer to the ready mode.
Sets your printer to the not-ready mode.



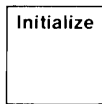
In the not-ready mode – moves the paper up one page length.
In the forms mode – moves the paper down 0.176 mm (1/144 in.).



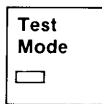
In the not-ready mode – moves the paper up one line space.
In the forms mode - moves the paper up 0.176 mm (1/144 in.).



Sets your printer to the forms mode.
Causes your printer to leave the forms mode without changing the top-of-page setting.



In the forms mode – changes the top-of-page setting to the current paper position, and causes your printer to leave the forms mode.




Sets your printer to the test mode.
Causes your printer to leave the test mode.


Setting the Top-of-Page

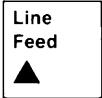
Install paper in the printer and follow the steps below.

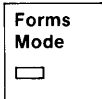
Press: **To:**

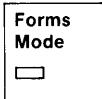
1.  Set your printer to the not-ready mode.




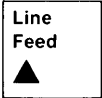
2.  Move the paper to the approximate position you wish to set as the top-of-page.



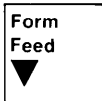
3.  Set your printer to the forms mode.

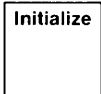


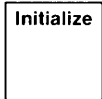
4.  **OR**



OR Move the paper up or down to the exact position you wish to set as the top-of-page.



5.  Set the present position of the paper as the top-of-page and leave the forms mode.

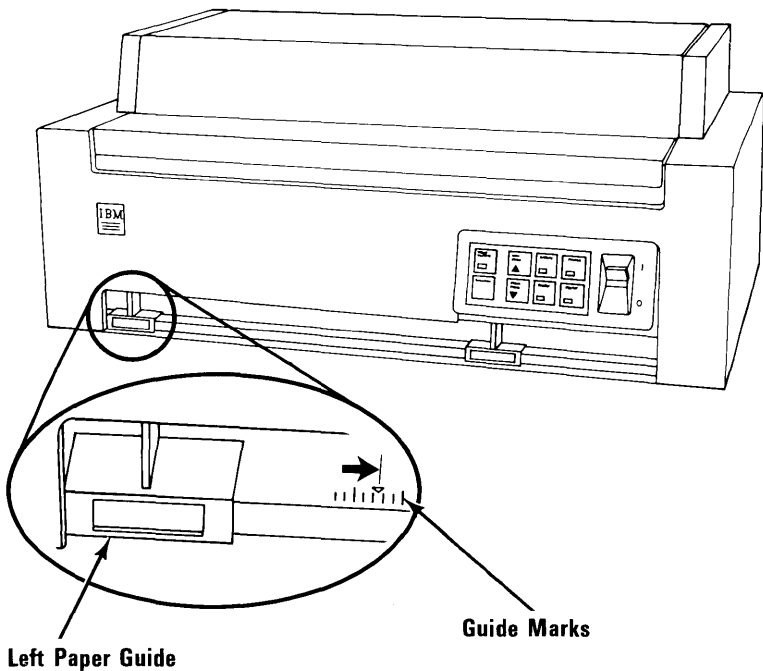


Setting the Left Margin

When the left paper guide is set at the arrow, the printer will start your lines 3.2 mm (0.125 in.) from the left edge of the paper. When the left paper guide is set as far left as possible, the printer will start your lines 38.1 mm (1.5in.) from the left edge of the paper. If you want to start your lines farther to the right, see "ESC X" under "Printer Control Codes."

To adjust the paper position:

- 1** Move the front paper guides to the left or right as needed to change the left-to-right feed position of the paper.
- 2** Refer to "Single Sheet Operation" to adjust the tractors and feed rollers to match the new position of the paper.



Ribbon-Color Knob Adjustment

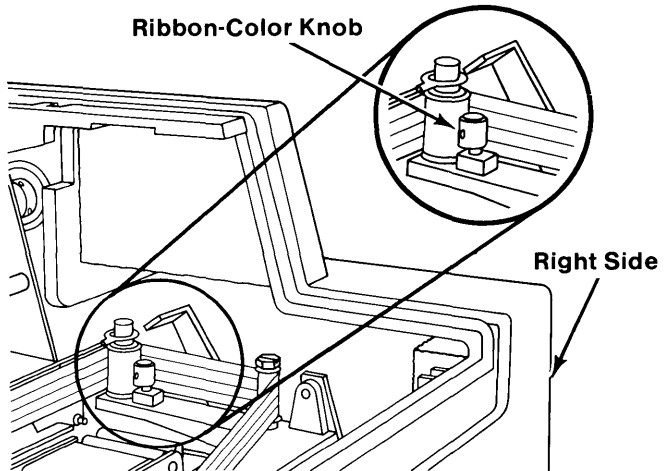
If your printer prints the top or bottom of the characters a different color from the rest of the character, you need to adjust the Ribbon-Color knob.

- 1** Run the system tests until the display reads "Are the characters on the printed test pattern correct, and each character a single color (Y/N)?" . If you need help, refer to "Testing Your IBM Personal Computer AT."
- 2** Press "N" and press **Enter** (↵) .

Warning: Wait until your printer stops before making any adjustments.
- 3** Turn your printer's power off.
- 4** Open the access cover.

- 5** If the tops of the characters are the wrong color, turn the Ribbon-Color knob clockwise a small amount.

If the bottoms of the characters are the wrong color, turn the Ribbon-Color knob counterclockwise a small amount.



- 6** Close the access cover.
- 7** Turn your printer's power on.
- 8** Press **Enter** (↵) .
- 9** Repeat Steps 2 through 8 until the characters are printed correctly. If this procedure does not correct the problem, refer to "Testing your IBM Personal Computer AT" in this manual.

Printer Self-Test

Whenever you want to verify that your printer is operating correctly, follow the steps below to run the printer self-test.

- 1** Turn your printer's and system unit's power off.
- 2** Disconnect the printer cable from your printer.
- 3** Install paper at least 215.9 mm (8.5 in.) wide in your printer with the left side of the paper at the left side of your printer.
- 4** Open the access cover and note the setting of all of the DIP switches.
- 5** Turn all of the DIP switches off. If you need help, see "DIP Switch Settings."
- 6** Close the access cover.
- 7** Turn your printer's power on.
- 8** Press the Ready button to set your printer to the not-ready mode (the Ready light Off).

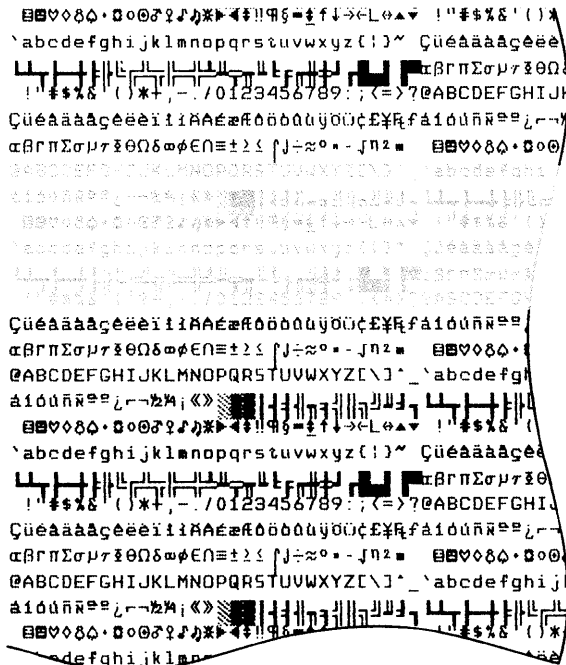
Warning: Do not run the self-test or any other printing without proper size paper installed. You will cause premature wear and/or damage of the print head and platen.

9 Press the Test Mode button.

Your printer prints a pattern of all of the printable characters. The ribbon band automatically changes every 25.4 mm (1 in.) of printing down the page. You must let the test run for 101.6 m (4 in.) down the page to test all four ribbon bands. Below is a partial sample of the printout.

10 To stop the test, press the Test Mode button again.

Printer Self-Test Sample Printout



Printer Programming Considerations

The previous pages have given you all of the information necessary to operate your printer. The following section provides advanced information that will allow you to fully use all of the functions and features of your printer.

DIP Switch Settings explains how you can change the way the printer is automatically set up when you turn your printer's power on.

Printer Control Codes Quick Reference is a listing of control-code descriptions in alphabetic order. It will help you quickly find the control code you need for a particular job.

Printer Control Codes describes the special codes used to change printing characteristics, such as margins, tabs, printing color, etc.

Printing in Color explains the use of printer control codes to print in all 8 available colors.

Character Set 1 and Character Set 2 tables are representations of the characters and control codes available in each character set. The character sets differ in the characters that are printed. Notice that Character Set 2 contains many non-English characters and symbols. "ESC 6" and "ESC 7" are used to change from one character set to another. The descriptions of "ESC 6" and "ESC 7" are found in "Printer Control Codes."

All Printable Characters table is a representation of all characters that can be printed.

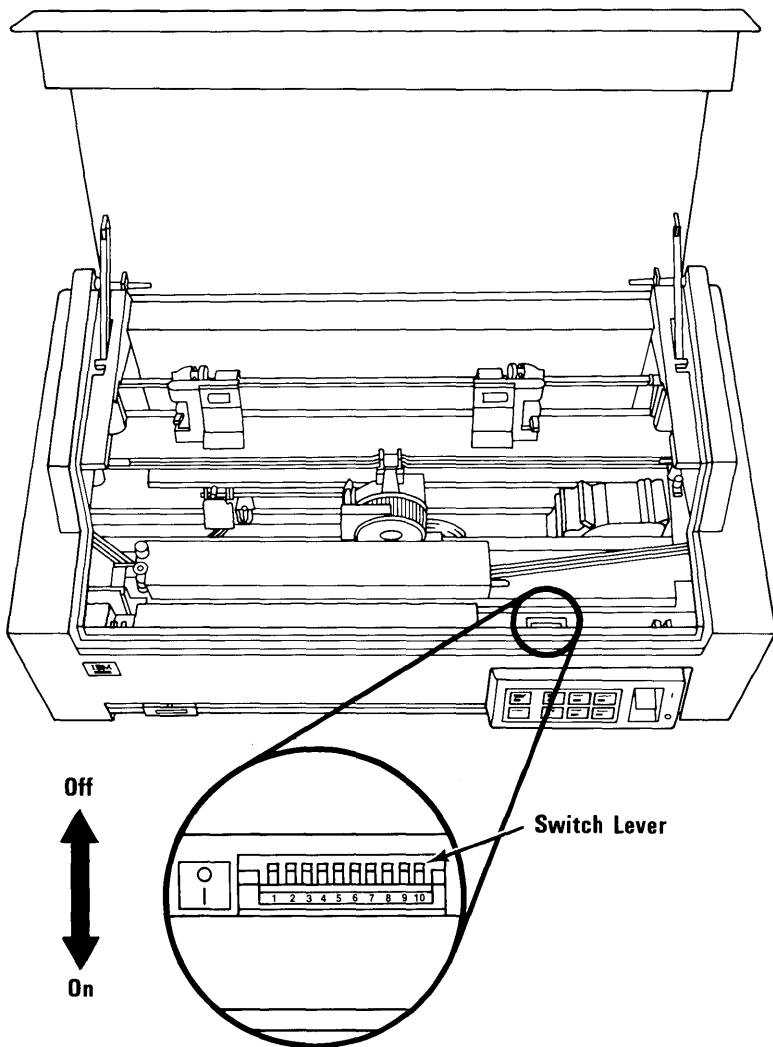
DIP Switch Settings

Use your printer DIP switches to set certain printer functions and to select line spacing, character set, form length, and printing quality. The setting of the DIP switches determines the values that will automatically be set each time your printer is turned on. You can set the DIP switches for the values you use most often and avoid having to use extra printer codes for every printing job.

Any values set by the DIP switches, except the printer self-test setting (Switches 9 and 10 Off) and the audio alarm setting (Switch 8), can be changed by printer control codes.

The tables on the following pages show the function of each switch.

Set the switches by pushing the lever with the point of a ball point pen. To set a switch to Off, push the lever to the rear. To set a switch to On, push the lever to the front.



DIP Switch Settings Table

Note: DIP switches 1 through 9 are turned off at the factory. DIP switch 10 is turned on.

Note: New settings of the DIP switches do not take effect until the printer is set to the power-on defaults. This is done by turning the printer's power off and then on, initializing the printer from the system with the initialize function set On (see "ESC ?"), or pressing the Initialize button in the test mode before the test printout begins printing.

Switch	Setting	Function
1	On	Selects Character Set 2 (see "Character Set 2") (see the "Note" below)
1	Off	Selects Character Set 1 (see "Character Set 1")
2	On	Sets line spacing to 8 lines per inch
2	Off	Sets line spacing to 6 lines per inch
3	On	Sets automatic 1 inch perforation skip
3	Off	No automatic perforation skip
4	On	Sets automatic line feed on carriage return
4	Off	No automatic line feed on carriage return
5	On	Sets printer to a 13.2 inch print line
5	Off	Sets printer to a 8 inch print line.
6	On	Selects 12 inch page length
6	Off	Selects 11 inch page length

Note: Some programs use the control codes in Character Set 1 that have ASCII decimal values above 128. These control codes are not in Character Set 2. The use of Character Set 2, therefore, may not give the desired results with some programs.

Switch	Setting	Function
7	On	Sets automatic ribbon-band shift (use with all-black ribbon)
7	Off	No automatic ribbon-band shift (use with color)
8	On	Does not allow audible alarm to sound
8	Off	Allows audible alarm to sound

Switches 9 and 10 select the printing quality and character spacing. See "ESC I" in "Printer Control Codes" for a description of the printing qualities.

Switch 9	Switch 10	Quality and Spacing Set
Off	Off	Data Processing Quality, 12 characters per inch, (see "Note" below)
Off	On	Data Processing Quality, 10 characters per inch
On	Off	Text Quality, 10 characters per inch
On	On	Near Letter Quality, 10 characters per inch

Note: When switches 9 and 10 are Off the printer prints with a 1 inch page length with no perforation skip. Switches 3 and 6 are overridden. This is the self-test setup.

Printer Control Codes

Printer control codes are special characters you have your system send to your printer to get your data printed the way you want it.

Each program you use has its own way of sending printer control codes, so consult the manual that came with your program to find out how to put these codes into your data.

On the following pages are several examples of printer control codes and how they are used with IBM Personal Computer BASIC.

IBM Personal Computer BASIC uses the American National Standard Code for Information Interchange (ASCII) decimal values to send control codes to the printer. ASCII decimal values are numbers assigned to the control codes, and to all characters when data is transferred from one machine to another. The ASCII decimal values are shown in the "Character Set 1", "Character Set 2", and "All Printable Characters" tables, in the "Printer Control Code Quick Reference", and in the "Printer Control Codes Definitions." Notice that in the following examples, the numbers inside the parentheses are the ASCII decimal values of the printer control codes.

To send data directly to the printer using IBM Personal Computer BASIC, you use the command LPRINT. You use the label CHR\$ followed by the ASCII decimal value in parentheses to indicate the data you want sent to the printer. Therefore, to send a printer control code to the printer, you use LPRINT CHR\$(X), where X is the ASCII value of the control code.

Printer Control Codes Examples

- 1** Start Basic. If you need help, refer to your IBM Personal Computer *Basic* manual.

This first example shows how to send the control code SO (ASCII decimal value 14) to the printer to print data in double-width print.

- 2** Type: `LPRINT CHR$(14);"Personal Computer"`

- 3** Press Enter (↵).

Your printer will print:

Personal Computer

This second example shows the use of the control code Escape (ESC) E (ASCII values 27 and 69) to print data in emphasized print.

- 4** Type: `LPRINT CHR$(27);CHR$(69);"IBM Personal Computer"`

- 5** Press Enter (↵).

Your printer will print:

IBM Personal Computer

This third example shows the use of the control code ESC c (ASCII decimal values 27 and 99) to print data using ribbon band 3 (cyan).

6 Type: `LPRINT CHR$(27);CHR$(99); "Personal Computer"`

7 Press Enter (↵).

Your printer will print in cyan:

Personal Computer

Notice that your printer is still printing in emphasized print. This is because some of the control codes have both a starting and a stopping code, such as the emphasized-print code and the control codes for color. The next example shows the use of the control code ESC F (ASCII decimal values 27 and 70) to stop emphasized printing and the ESC b (ASCII decimal values 27 and 98) control code to set the printer to ribbon band 4 (black).

8 Type: `LPRINT CHR$(27);CHR$(70);CHR$(27);CHR$(98);"Normal Print"`

9 Press Enter (↵).

Your printer will print:

Normal Print

Your printer is now printing normally, and ribbon band 4 (black) is selected.

Printer Control Codes Quick Reference

This is an alphabetic listing of the descriptions of the printer control codes. You will find it helpful in locating the code you need to perform a certain job.

Description	Code	ASCII Value
10 characters-per-inch print	DC2	18
12 characters-per-inch print	ESC :	58
17.1 characters-per-inch print	SI	15
alarm	BEL	7
all-characters print	ESC \	92
aspect ratio set	ESC n	110
audible alarm	BEL	7
auto justification On/Off	ESC M	77
auto line feed On/Off	ESC 5	53
auto perforation skip Off	ESC O	79
auto perforation skip On	ESC N	78
auto ribbon-band shift	ESC a	97
auto ribbon shift	ESC a	97
backspace	BS	8
backspace n increments	ESC e	69
backspace variable	ESC e	69
band 1	ESC y	121
band 2	ESC m	109
band 3	ESC c	99
band 4	ESC b	98
bell	BEL	7
black ribbon band	ESC b	98
buzzer	BEL	7
cancel	CAN	24
cancel auto line feed	ESC 5	53
cancel data	CAN	24
cancel double-strike printing	ESC H	72
cancel double-width by line	DC4	20
cancel double-width printing (lines)	ESC W	87
cancel emphasized printing	ESC F	70
cancel perforation skip	ESC O	79
cancel proportional spacing	ESC P	80
cancel subscript	ESC T	84
cancel superscript	ESC T	84

Description	Code	ASCII Value
carriage return	CR	13
change color (see ribbon band desired)		
change printing quality	ESC I	73
character quality set	ESC I	73
character set 1 select	ESC 7	55
character set 2 select	ESC 6	54
character spacing 12 per inch	ESC :	58
character spacing 10 per inch	DC2	18
character spacing 17.1 per inch	SI	15
character under decimal 32 print	ESC ^	94
characters under decimal 32 print	ESC \	92
clear data	CAN	24
clear horizontal tabs	ESC R	82
clear tabs	ESC R	82
clear vertical tabs	ESC R	82
color band 1	ESC y	121
color band 2	ESC m	109
color band 3	ESC c	99
color band 4	ESC b	98
command designator	ESC	27
command end	NUL	0
command prefix	ESC	27
command start	ESC	27
command terminator	NUL	0
compressed On	SI	15
compressed print	SI	15
condensed print	SI	15
control-data value-type set	ESC @	64
data clear	CAN	24
data-processing quality set	ESC I	73
data-value type set	ESC @	64
deselect printer	DC3	19
deselect specific printer	ESC Q	81
double-strike printing	ESC G	71
double-strike printing Off	ESC H	72
double-width-by-line Off	DC4	20
double-width-by-line On	SO	14
double-width On/Off (lines)	ESC W	87
eject form	FF	12

Description	Code	ASCII Value
eject paper	FF	12
emphasized printing	ESC E	69
emphasized printing Off	ESC F	70
escape	ESC	27
feed line	LF	10
form feed	FF	12
form, set top of	ESC 4	52
forward space variable	ESC d	100
graphics 1108 bit-image	ESC K	75
graphics 2216 bit-image 1/2 speed	ESC L	76
graphics 2216 bit-image full speed	ESC Y	89
graphics 4432 bit-image 1/2 speed	ESC Z	90
graphics line-feed set	ESC 3	51
head, home	ESC <	60
home head	ESC <	60
horizontal tab	HT	9
horizontal tab stops set	ESC D	68
incremental backspace	ESC e	69
initialize function set	ESC ?	63
justification On/Off	ESC M	77
length-of-page set in lines	ESC C	67
length-of-page set in inches	ESC C 0	67 0
line-feed	LF	10
line-feed, auto On/Off	ESC 5	53
line-feed, reverse	ESC]	93
line-feed, set 1/8 inch	ESC 0	48
line-feed, set 6/72 inch	ESC 1	49
line-feed, set graphics	ESC 3	51
line-feed, store text	ESC A	65
line-feed, start text	ESC 2	50
line-feed, variable	ESC J	74
margins set	ESC X	88
near-letter quality, set	ESC I	73
null	NUL	0
page eject	FF	12
page length, set in inches	ESC C 0	67 0
page length, set in lines	ESC C	67
paper eject	FF	12
perforation skip Off	ESC O	79
perforation skip set	ESC N	78

Description	Code	ASCII Value
print all characters	ESC \	92
print character under decimal 32	ESC ^	94
print double-width one line	SO	14
print double-width multiple lines	ESC W	87
print emphasized	ESC E	69
print emphasized Off	ESC F	70
print quality set	ESC I	73
print 10 characters per inch	DC2	18
print 12 characters per inch	ESC :	58
print unidirectional On/Off	ESC U	85
printer deselect	DC3	19
printer deselect specific	ESC Q	81
printer select	DC1	17
proportional spacing On/Off	ESC P	80
return carriage	CR	13
quality set	ESC I	73
reverse line feed	ESC]	93
ribbon band 1	ESC y	121
ribbon band 2	ESC m	109
ribbon band 3	ESC c	99
ribbon band 4	ESC b	98
ribbon band auto shift	ESC a	97
select character set 1	ESC 7	55
select character set 2	ESC 6	54
select color (see ribbon band desired)		
select printer	DC1	17
set 1 (character set 1)	ESC 7	55
set 1/8-inch line feed	ESC 0	48
set 2 (character set 2)	ESC 6	54
set 6/72-inch line feed	ESC 1	49
set aspect ratio	ESC n	110
set data-processing quality	ESC I	73

Description	Code	ASCII Value
set data-value type	ESC @	64
set graphics line feed	ESC 3	51
set horizontal tab stops	ESC D	68
set initialize function	ESC ?	63
set left margin	ESC X	88
set margins	ESC X	88
set near-letter quality	ESC I	73
set page length in lines	ESC C	67
set page length in inches	ESC C 0	67 0
set perforation skip	ESC N	78
set right margin	ESC X	88
set text quality	ESC I	73
set top-of-form	ESC 4	52
set vertical tabs	ESC B	66
space forward variable	ESC d	100
specific printer deselect	ESC Q	81
start 6/72 inch line feed	ESC 1	49
start auto line feed	ESC 5	53
start double-strike print	ESC G	71
start double-width print by line	SO	14
start double-width print (lines)	ESC W	87
start emphasized print	ESC E	69
start graphics line feed	ESC 3	51
start perforation skip	ESC N	78
start proportional spacing	ESC P	80
start subscript	ESC S	83
start superscript	ESC S	83
start text line feed	ESC 2	50
start underline	ESC -	45
stop auto line feed	ESC 5	53
stop double-strike print	ESC H	72

Description	Code	ASCII Value
stop double-width by line	DC4	20
stop double-width print (lines)	ESC W	87
stop emphasized print	ESC F	70
stop perforation skip	ESC O	79
stop proportional spacing	ESC P	80
stop subscript	ESC T	84
stop superscript	ESC T	84
stop underline	ESC -	45
stops, horizontal tabs, set	ESC D	68
stops, vertical tabs, set	ESC B	66
store text line feed	ESC A	65
subscript Off	ESC T	84
subscript On	ESC S	83
superscript Off	ESC T	84
superscript On	ESC S	83
tab horizontal	HT	9
tab stops, horizontal, set	ESC D	68
tab stops, vertical, set	ESC B	66
tab vertical	VT	11
tabs clear	ESC R	82
tabs horizontal set	ESC D	68
tabs vertical set	ESC B	66
text line-feed store	ESC A	65
text line-feed start	ESC 2	50
text quality set	ESC I	73
top-of-form set	ESC 4	52
underline On/Off	ESC -	45
unidirectional printing On/Off	ESC U	85
variable backspace	ESC e	69
variable forward space	ESC d	100
variable line feed	ESC J	74
vertical tabs set	ESC B	66
vertical tab	VT	11

Printer Control Codes Descriptions

The following pages list, in alphabetic order, the printer control codes with a description of each. Some knowledge of BASIC programming or how to insert printer control codes in your program is necessary to properly use these codes. An example of each code in BASIC is at the end of each description. The "Format" information is given where more information is needed for programming considerations.

Note: All combinations of printing qualities, character spacings, and printing types are valid. For example, you can print in emphasized print, double-width, and underline all at the same time.

Code	Description
BEL	Audible Alarm Sounds the printer buzzer for 1 second or less. The buzzer may be turned off with DIP Switch 8. LPRINT CHR\$(7);
BS	Backspace Moves the print head one character width to the left. The character width is determined by the selected character spacing. LPRINT CHR\$(8);
CAN	Clear Data Clears the printer memory of all data waiting to be printed following the last received line ending code. If the initialize function is set On by ESC ? (Set Initialize Signal Function), all control codes, except SO (Double-width Printing), remain in effect.

If the initialize function is set Off by ESC ?, all control codes are cleared and the printer is set to the values set by the DIP switches. (See "ESC ?" for more details about the initialize function.)

LPRINT CHR\$(24);

CR Carriage Return

Causes the printer to print the data that follows CR beginning at the left margin. No line-feed operation takes place unless DIP Switch 4 is On or ESC 5 (automatic line-feed) has been sent.

Note: IBM Personal Computer BASIC (and many other programs) automatically sends LF (line feed) with CR. If you do not want LF sent after CR, use ASCII decimal value 141 from Character Set 1 instead of ASCII decimal value 13.

LPRINT CHR\$(13);

DC1 Select Printer

Sets the printer to accept data from the system unit.

LPRINT CHR\$(17);

DC2 10 Characters per Inch Print

Selects character spacing of 10 characters per inch.

LPRINT CHR\$(18);

- DC3** **Deselect Printer**
Sets the Color Printer so as not to accept data from the system unit. A printer must be initialized by the system or control panel buttons or selected using DC1 (Select Printer) to accept data.
LPRINT CHR\$(19);
- DC4** **Cancel Double-Width Printing by Line**
Ends double-width printing by line which was started by SO.
LPRINT CHR\$(20);
- ESC** **Command Prefix**
Sets the printer to accept the next data sent as a printer command. (See the following list.)
LPRINT CHR\$(27);
- ESC A** **Store Text Line Spacing**
Format: ESC A;n;
ESC A stores a line-feed value of n/72 inch. ESC 2 (Start Text Line Spacing) must then be sent before the line spacing will change. For example, to store a line-feed value of 24/72 inch, the code is ESC A 24. However, until ESC 2 is sent, any text following the ESC A 24 will space at the previously set line-feed increment. The text following the ESC 2 will be printed with a new line-feed increment of 24/72 inch. Any increment between 1/72 and 85/72 may be used.
LPRINT CHR\$(27);CHR\$(65);CHR\$(n);

ESC a Select Automatic Ribbon-Band Shift
Causes the ribbon to shift one color band at the end of each page. This command is used with an all-black ribbon to extend the ribbon life.
LPRINT CHR\$(27);CHR\$(97);

ESC B Set Vertical Tabs
Format: **ESC B;n₁;n₂;...n₆₄;NUL;**
Sets the vertical tab-stop positions. The power-on default is no vertical tab stops set. n₁ through n₆₄ represent tab-stop positions by line number. The topmost line of the page is line 0. Tab-stop positions must be received in ascending numeric order and cannot exceed the set page length. Up to 64 positions are recognized by the Color Printer. The positions do not take effect until NUL is received. Once vertical tab stops are set, they remain in effect until new ones are specified or all tab stops are set to the power-on defaults by ESC R (Set All Tabs to Power-On Defaults). If no vertical tab stops are set, the Vertical Tab (VT) command behaves as a Line Feed (LF) command.
ESC B followed only by NUL cancels all vertical tab stops. The form length must be set by the ESC C command (Set Page Length in Lines) prior to setting vertical tab stops.
LPRINT CHR\$(27);CHR\$(66);CHR\$(n₁);CHR\$(n₂);...CHR\$(n₆₄);CHR\$(0);

ESC b Select Band 4
Selects ribbon band 4 (black). The printer will continue to print with band 4 until a command to change the ribbon band is received.
LPRINT CHR\$(27);CHR\$(98);

ESC C Set Page Length in Lines
Format: ESC C;n;
Sets the page length in lines. The number of lines n is converted to inches using the current line spacing. ESC C must be followed by a value, n, that specifies the desired length of page in lines. Maximum page length for this printer is 127 lines. This command also sets the current position of the paper as the top-of-form.

Note: Automatic perforation-skip (ESC N) and vertical tabs (ESC B) may need to be reset after changing the page length.

LPRINT CHR\$(27);CHR\$(67);CHR\$(n);

ESC C 0 Set Page Length in Inches
Format: ESC C;0;n;
Sets the page length in inches. This command requires a value of n between 1 and 22. The power-on default is set with DIP Switch 6. This command also sets the current position of the paper as the top-of-form.

Note: Automatic perforation-skip (ESC N) and vertical tabs (ESC B) may need to be reset after changing the page length.

**LPRINT CHR\$(27);CHR\$(67);CHR\$(0);
CHR\$(n);**

ESC c

Select Band 3

Selects ribbon band 3. The actual color printed will depend on the ribbon being used. The printer will continue to print with band 3 until a command to change the ribbon band is received.

LPRINT CHR\$(27);CHR\$(99);

ESC D

Set Horizontal Tabs

Format: ESC D;n₁;n₂;...n₂₈;NUL;

Sets the horizontal tab-stop positions represented by n₁ through n₂₈. The power-on default is a tab stop set at column 8 and every eighth column thereafter. The printer recognizes up to 28 horizontal tab stops. They must be in ascending numeric order and followed by NUL. Tab stops can be set between 1 and the maximum column count for the character spacing in effect.

ESC D immediately followed by NUL will clear all horizontal tabs. ESC R (Set All Tabs to Power-On Defaults) may be used to set horizontal tabs to the power-on default.

**LPRINT CHR\$(27);CHR\$(68);CHR\$(n₁);
CHR\$(n₂);...CHR\$(n₂₈);CHR\$(0);**

ESC d**Variable Forward Space**

Format: ESC d;n₁;n₂;

Places the next printed character n₁;n₂/120 inch to the right of the last dot of the current character. The position may be beyond the right margin setting. If the position is beyond the physical end of the line the next character will be printed at the left end of the printer.

n₁ and n₂ are binary numbers that specify the number of 1/120 inch increments the next printed character is to be placed to the right. n₁ represents values from 0 to 255, and n₂ represents values from 0 to 255 times 256.

LPRINT CHR\$(27);CHR\$(100);CHR\$(n₁);CHR\$(n₂);

ESC E**Emphasized Printing**

Changes the printer to emphasized printing. Characters are double struck with the smallest possible horizontal offset between strikes.

LPRINT CHR\$(27);CHR\$(69);

ESC e**Variable Backspace**

Format: ESC e;n₁;n₂;

Places the next printed character n₁;n₂/120 inch to the left of the last dot of the current character. The position may be beyond the left margin setting. If the specified position is beyond the physical left end of the printer, the next character will be printed at the left end of the printer.

n_1 and n_2 are binary numbers that specify the number of 1/120 inch increments the next printed character is to be placed to the left. n_1 represents values from 0 to 255, and n_2 represents values from 0 to 255 times 256.

LPRINT CHR\$(27);CHR\$(101);CHR\$(n_1);CHR\$(n_2);

- ESC F Cancel Emphasized Printing**
Ends emphasized printing started by ESC E.
LPRINT CHR\$(27);CHR\$(70);
- ESC G Double-Strike Printing**
Sets the printer to double-strike printing. Characters are struck twice with no horizontal offset between strikes.
LPRINT CHR\$(27);CHR\$(71);
- ESC H Cancel Double-Strike Printing**
Ends double-strike printing started by ESC G.
LPRINT CHR\$(27);CHR\$(72);
- ESC I Change Printing Quality**
Format ESC I;n;
Selects the printing quality. When n is 1, data processing quality is selected; when n is 2, text quality is selected; when n is 3 letter quality is selected. Each printing quality produces a different spacing of the dots that make up a character. Each character box is: with data-processing quality selected, 8 by 9 dots; with text quality selected, 24 by 9 dots; and with near-letter quality selected, 36 by 18 dots.
LPRINT CHR\$(27);CHR\$(73);CHR\$(n);

ESC J Variable Line Space

Format: ESC J;n;

Advances the paper in increments of $n/144$ inch. The value of n must be between 1 and 255. Line spacing of $14/144$ is recommended for bit-image graphics using eight bits. ESC J is canceled after the line space takes place. The value of n is not stored.

LPRINT CHR\$(27);CHR\$(74);CHR\$(n);

ESC K 1108 Bit-Image Graphics

Format: ESC K;n₁;n₂;v₁;v₂;...v₁₁₀₈;

Sets dot spacing to 84 by 84 dots per inch in 1:1 aspect ratio, to 70 by 84 dots per inch in 5:6 aspect ratio (see "ESC n (Set Aspect Ratio)"). All bit-image graphics is printed from left to right. If the graphics data exceeds the space remaining on the line, the data to be printed beyond the end of the line is printed at the left margin on the next line.

n_1 and n_2 are binary numbers that specify the number of bit-image data bytes to be transferred. n_1 represents values from 0 to 255, and n_2 represents values from 0 to 4 times 256. The total number of bit-image data bytes is equal to $n_1 + n_2 \times 256$ and cannot exceed 1108 (the total number of dot positions in a 13.2 inch line).

Bit-image graphics is printed using eight of the nine print-head wires (the bottom wire is not used). v_1 through v_{1108} are bit-image data bytes, each of which represents a set of 8 dots in a vertical line. The horizontal position of these 8 dots is determined by the position of the bit-image data byte within the v_1 through v_{1108} series. v_1 is printed at the starting position followed in order from left to right by v_2 through v_{1108} .

Each bit of a bit-image data byte represents a vertical dot position at the horizontal position represented by that bit-image data byte. The lowest value, or least significant bit, (Bit 0) represents the bottom dot position, and the highest value, or most significant bit, (Bit 7) represents the top dot position.

In the following table the left-hand column of • represents dot positions within a vertical line. The right-hand column shows the corresponding bit number within a bit-image data byte. (The bits are numbered 7 through 0, from left to right.)

Dot Position	Bit Number
Top	• - 7
	• - 6
	• - 5
	• - 4
	• - 3
	• - 2
	• - 1
Bottom	• - 0

For example: if v_1 is binary 10000000 (decimal 128), only the top dot prints in that horizontal position; if v_1 is binary 00000001 (decimal 01), only the bottom dot prints; and if v_1 is binary 11111111 (decimal 255), all eight dots print.

**LPRINT CHR\$(27);CHR\$(75);CHR\$(n_1);
CHR\$(n_2);CHR\$(v_1);CHR\$(v_2); ...
CHR\$(v_{1108});**

ESC L 2216 Bit-Image Graphics (half-speed)

Format: ESC L; n_1 ; n_2 ; v_1 ; v_2 ;... v_{2216} ;

Sets dot spacing to 168 by 84 dots per inch in 1:1 aspect ratio, to 140 by 84 dots per inch in 5:6 aspect ratio (see "ESC n (Set Aspect Ratio)"). 2216 bit-image graphics (half-speed) prints at one-half the speed of 2216 bit-image graphics (ESC Y) for improved print quality and the ability to print consecutive dot positions. n_1 , n_2 , v_1 , and v_2 through v_{2216} represent the same values as in 1108 bit-image graphics (ESC K). Refer to the description of ESC K for a complete description of these values. The total number of bit-image data bytes cannot exceed 2216 (the total number of dot positions in a 13.2 inch line).

**LPRINT CHR\$(27);CHR\$(76);CHR\$(n_1);
CHR\$(n_2);CHR\$(v_1);CHR\$(v_2); ...
CHR\$(v_{2216});**

ESC M Automatic Line Justification

Format: ESC M; n ;

Justifies the right margin. Automatic justification is started when n is 1 and stopped when n is 0.

The printer adjusts the spaces between words in the text so that the last character of the words at the end of the lines all print in the last position of the line. Thus both the left and right margins appear as straight lines. This gives a block appearance to the printed text. Automatic line justification can be used with any of the character spacings.

Note: The Color Printer operates only on the least significant bit of n. Therefore, any odd-numbered ASCII decimal value gives the same result as n=1, and any even-numbered ASCII decimal value gives the same result as n=0.

LPRINT CHR\$(27);CHR\$(77);CHR\$(n);

ESC m

Select Band 2

Selects ribbon band 2. The actual color printed depends on the ribbon being used. The printer will continue to print with band 2 until a command to change the ribbon band is received by the printer.

LPRINT CHR\$(27);CHR\$(109);

ESC N

Set Automatic Perforation-Skip

Format: ESC N;n;

Specifies the number of lines to be skipped at the end of each page. This causes the printer to automatically skip over the perforation between pages of continuous paper or forms. The number of lines n, is converted to inches using the line-spacing in effect.

The value of n must be between 1 and 127. ESC N must be reset anytime the page length is changed by ESC C (Set Page Length in Lines) or by ESC C 0 (Set Page Length in Inches).

LPRINT CHR\$(27);CHR\$(78);CHR\$(n);

ESC n Set Aspect Ratio

Format: ESC n;x;

Sets the printer to a 5:6 or 1:1 aspect ratio. When x is 1, the aspect ratio is set to 1:1; when x is 0, the aspect ratio is set to 5:6. With the 5:6 aspect ratio selected, graphics are printed to match the shape that appears on the display. The 1:1 aspect ratio is recommended for bit-image graphics to improve quality and simplify bit-position calculations. The power-on default is the 5:6 aspect ratio.

Note: The Color Printer operates only on the least significant bit of n.

Therefore, any odd-numbered ASCII decimal value gives the same result as n=1, and any even-numbered ASCII decimal value gives the same result as n=0.

LPRINT CHR\$(27);CHR\$(110);CHR\$(x);

ESC O Cancel Automatic Perforation-Skip

Cancels the automatic perforation-skip function.

LPRINT CHR\$(27);CHR\$(79);

ESC P Proportional Spacing

Format: ESC P;n;

Starts proportional spacing when n is 1.

Stops proportional spacing when n is 0.

Proportional spacing gives each different character a different amount of space on the line. That is, narrow characters, such as i, are given a small amount of space on the line relative to a broader character, such as M. This is similar to the way people write characters and gives a more balanced look to the text. Most books are printed in proportional spacing, as is this one.

The distance of a forward space is 10 units; the distance of a backspace is determined by the last printed character or space, if the printing of the character or the space was the last carriage movement.

Normal processing of all control codes continues during proportional spacing.

Note: The Color Printer operates only on the least significant bit of n.

Therefore, any odd-numbered ASCII decimal value gives the same result as n=1, and any even-numbered ASCII decimal value gives the same result as n=0.

LPRINT CHR\$(27);CHR\$(80);CHR\$(n);

ESC Q 2 Deselect Specific Printer

Format: ESC Q;2;

Sets only the Color Printer so as not to accept data from the system unit. The printer must be initialized by the system or selected using DC1 (Select Printer) to accept data.

LPRINT CHR\$(27);CHR\$(81);CHR\$(2);

ESC R Set All Tabs to Power-On Defaults

Sets all tabs, horizontal and vertical, to the power-on defaults.

LPRINT CHR\$(27);CHR\$(82);

ESC S Subscript or Superscript Printing

Format: ESC S;n;

ESC S followed by 1 changes the printer to subscript printing. ESC S followed by 0 changes the printer to superscript printing. ESC S is canceled by ESC T.

Note: If line feed (LF) codes are issued while in subscript or superscript printing, the line feed does not change the subscript or superscript setting. For example, if in superscript printing, the line feed causes the paper to advance to the superscript position of the next line.

Note: The Color Printer operates only on the least significant bit of n. Therefore, any odd-numbered ASCII decimal value gives the same result as n=1, and any even-numbered ASCII decimal value gives the same result as n=0.

LPRINT CHR\$(27);CHR\$(83);CHR\$(n);

ESC SI Compressed Printing
Alternate command for SI.
LPRINT CHR\$(27);CHR\$(15);

ESC SO Double-Width Printing by Line
Alternate command for SO.
LPRINT CHR\$(27);CHR\$(14);

ESC T Cancel Subscript or Superscript
Ends subscript or superscript printing
started by ESC S.

Note: If ESC T is issued when not
printing in subscript or superscript, it is
acknowledged and ignored.

LPRINT CHR\$(27);CHR\$(84);

ESC U Unidirectional Printing
Format: ESC U;n;
When n is 1, sets the printer to print from
left to right only. ESC U 0 returns the
printer to normal two-direction printing.
Unidirectional printing ensures a more
accurate printing start position for better
print quality.

Note: The Color Printer operates only
on the least significant bit of n.
Therefore, any odd-numbered ASCII
decimal value gives the same result as
n=1, and any even-numbered ASCII
decimal value gives the same result as
n=0.

LPRINT CHR\$(27);CHR\$(85);CHR\$(n);

ESC W**Continuous Double-Width Printing**

Format: ESC W;n;

ESC W 1 changes the printer to double-width printing. ESC W 0 ends the double-width printing started by ESC W 1. ESC W 1 is not canceled by a line ending code and must be canceled by ESC W 0.

Note: The Color Printer operates only on the least significant bit of n.

Therefore, any odd-numbered ASCII decimal value gives the same result as $n=1$, and any even-numbered ASCII decimal value gives the same result as $n=0$.

LPRINT CHR\$(27);CHR\$(87);CHR\$(n);

ESC X**Set Left and Right Margins**

Format: ESC X;n₁;n₂;

The numbers, n₁ and n₂, are selected in relation to the left side of the printer, with n₁ representing the left margin and n₂ the right margin. The value of n₁ or n₂ is the column of the page you wish to set as the left or right margin. n₂ must be greater than n₁ by 12.7 mm (1/2 inch) or more and cannot be greater than 13.2 times the character-spacing (in characters per inch) in effect. If n₂ is greater than this limit, the right margin will be set at the maximum allowable length. Data is printed beginning in column n₁. Column n₂ is considered the last printable position of the line. If a word to be printed exceeds the right margin, a carrier-return and line-feed are inserted before the word, and the word is printed on the next line.

The margins are converted to inches based on the current character-spacing setting. The power-on default is set with DIP Switch 5.

Note: Both n_1 and n_2 must be included in the command or the results will be unpredictable.

LPRINT CHR\$(27);CHR\$(88);CHR\$(n_1);CHR\$(n_2);

ESC Y

2216 Bit-Image Graphics

Format: ESC Y; n_1 ; n_2 ; v_1 ; v_2 ;... v_{2216} ;

Sets dot spacing to 168 by 84 dots per inch in 1:1 aspect ratio, to 140 by 84 dots per inch in 5:6 aspect ratio (see "ESC n (Set Aspect Ratio)") and prints at normal printing speed. ESC Y graphics cannot print dots in consecutive horizontal dot positions. If consecutive dot positions are specified, the printer will not print the second dot. n_1 , n_2 , v_1 , and v_2 , through v_{2216} represent the same values as in 1108 Bit-Image Graphics (ESC K). Refer to the description of ESC K for a complete description of these values. The number of bit-image data-bytes cannot exceed 2216 (the total number of dot positions in a 13.2 inch line).

LPRINT CHR\$(27);CHR\$(89);CHR\$(n_1);CHR\$(n_2);CHR\$(v_1);CHR\$(v_2); ...CHR\$(v_{2216});

ESC y

Select Band 1

Selects ribbon band 1. The actual color printed depends on the ribbon being used. The printer will continue to print with band 1 until a command to change the ribbon band is received by the printer.

LPRINT CHR\$(27);CHR\$(121);

ESC Z

4432 Bit-Image Graphics

Format: **ESC Z;n₁;n₂;v₁;v₂;...v₄₄₃₂;**

Sets dot spacing to 336 by 84 dots per inch in 1:1 aspect ratio, to 280 by 84 dots per inch in 5:6 aspect ratio (see "ESC n (Set Aspect Ratio)"). 4432 bit-image graphics prints at one-half the speed of 1108 bit-image graphics (ESC K) for improved print quality. ESC Z graphics can print only every third consecutive horizontal dot position. If consecutive dot positions are specified, the printer will ignore the second and third dots. n₂, v₁, v₂, and v₄₄₃₂ represent the same values as in 1108 bit-image graphics (ESC K). Refer to the description of ESC K for a complete description of these values. The number of bit-image data-bytes cannot exceed 4432 (the total number of dot positions in a 13.2 inch line).

**LPRINT CHR\$(27);CHR\$(90);CHR\$(n₁);
CHR\$(n₂);CHR\$(v₁);CHR\$(v₂); ...
CHR\$(v₄₄₃₂);**

ESC 0

1/8 Inch Line Spacing

Sets line spacing to 8 lines per inch.

LPRINT CHR\$(27);CHR\$(48);

- ESC 1 6/72 Inch Line Spacing**
Sets line spacing to 6/72 inch.
LPRINT CHR\$(27);CHR\$(49);
- ESC 2 Start Text Line Spacing**
ESC 2 is an execution command for ESC A (Set Text Line Spacing). If no ESC A command has been given, line spacing returns to 6 lines per inch.
LPRINT CHR\$(27);CHR\$(50);
- ESC 3 Graphics Line Spacing**
Format: ESC 3;n;
Sets line spacing to n/144 inch. Line spacing of 14/144 is recommended for bit-image graphics using eight bits. The value of n must be between 1 and 255.
LPRINT CHR\$(27);CHR\$(51);CHR\$(n);
- ESC 4 Set Top of Page**
Sets the current vertical position as the top-of-page.
LPRINT CHR\$(27);CHR\$(52);
- ESC 5 Automatic Line Feed**
Format: ESC 5;n;
When n is 1, automatic line feeding starts; the printer will line-feed each time a code that indicates the end of a line, such as CR, is received. When n is 0, automatic line feeding stops.

Note: The Color Printer operates only on the least significant bit of n. Therefore, any odd-numbered ASCII decimal value gives the same result as n=1, and any even-numbered ASCII decimal value gives the same result as n=0.

LPRINT CHR\$(27);CHR\$(53);CHR\$(n);

ESC 6

Select Character Set 2

Selects character set 2. (See "Character Set 2".) Character Set 2 contains most characters and symbols used in non-English languages. The power-on default for Character Set is set with DIP Switch 1.

Note: Some programs use the control codes in Character Set 1 that have ASCII decimal values above 128. These control codes are not in Character Set 2. The use of Character Set 2, therefore, may not give the desired results with some programs.

LPRINT CHR\$(27);CHR\$(54);

ESC 7

Select Character Set 1

Selects character set 1. (See "Character Set 1".) Character Set 1 contains characters and symbols commonly used in the English language, along with some common, non-English, characters and symbols. The power-on default for Character Set is set with DIP Switch 1.

LPRINT CHR\$(27);CHR\$(55);

ESC - Continuous Underline
Format: ESC -;n;
When n is 1 all of the following data is underlined. ESC - followed by 0 cancels underlining.

Note: The Color Printer operates only on the least significant bit of n. Therefore, any odd-numbered ASCII decimal value gives the same result as n=1, and any even-numbered ASCII decimal value gives the same result as n=0.

LPRINT CHR\$(27);CHR\$(45);CHR\$(n);

ESC : 12 Characters per Inch Printing
Sets character spacing to 12 characters per inch.

LPRINT CHR\$(27);CHR\$(58);

ESC < Move Carriage to Home Position
Returns the print head to the left side of the printer to print the line following the command. No line feed occurs.

LPRINT CHR\$(27);CHR\$(60);

ESC ? Set Initialize Signal Function
Format: ESC ?;n;
Defines what the printer does when an initialize signal is received. The initialize signal is a hardware signal sent to the printer by the system unit when called for by the program being used. This signal is commonly called for when a program is first loaded.

When n is 1, the initialize function is set On; when n is 0, the initialize function is set Off. When the initialize function is On, the initialize signal causes the printer to clear all data from the printer memory and set all printer functions to the power-on defaults. Some of the data may not have been printed and will be lost.

When the initialize function is Off, the initialize signal causes the printer to insert CAN (Clear Data) into the data in the printer memory. The CAN, when processed by the printer, clears the printer memory of all data waiting to be printed following the last received line ending code. All control codes are cleared and the printer is set to the values set by the DIP switches. This allows a printing job to be completed before the printer is reset for the next application. The power-on default is the initialize function set Off.

Note: The Color Printer operates only on the least significant bit of n. Therefore, any odd-numbered ASCII decimal value gives the same result as n=1, and any even-numbered ASCII decimal value gives the same result as n=0.

```
LPRINT CHR$(27);CHR$(63);CHR$(n);
```

ESC @ Select Control-Value Data Type

Format: ESC @;n;

Sets the control-value data type to binary if n is 0 and to ASCII if n is 1. If binary is selected, values following the ESC code must be coded as CHR\$(n); no separator is required between values, and NUL is the command terminator. If the ASCII data-type is selected, values following the ESC code are coded as n; the comma is used to separate values, and the ampersand is the command terminator.

For example, to set margins at columns 10 and 80 with the binary data type selected, the command would be coded:

```
LPRINT CHR$(27);CHR$(64);  
CHR$(10); CHR$(80);.
```

With the ASCII data type selected, the same command would be coded:

```
LPRINT CHR$(27);"X,10,80,"
```

Note: The Color Printer operates only on the least significant bit of n.

Therefore, any odd-numbered ASCII decimal value gives the same result as n=1, and any even-numbered ASCII decimal value gives the same result as n=0.

```
LPRINT CHR$(27);CHR$(64);CHR$(n);
```

ESC \ Print All Characters

Format: ESC \;n₁;n₂;

Allows the printing of characters with an ASCII decimal-value below 32. (see "All Printable Characters") These ASCII values are normally recognized by the printer as control codes.

^ This code (ESC \) allows the printer to print the special symbols assigned to these ASCII values. If no character is assigned to a decimal value received by the printer, a space character is printed. No control code functions are performed when this command is in effect.

n_1 and n_2 are binary numbers that specify the number of characters to be printed. n_1 represents values from 0 to 255, and n_2 represents values from 0 to 255 times 256.

**LPRINT CHR\$(27);CHR\$(92);
CHR\$(n_1);CHR\$(n_2);**

ESC]

Reverse Line Feed

Causes the printer to move the paper down one line space as defined by DIP Switch 2 or by printer control codes; ESC A and ESC 2, ESC 0, ESC 1, or ESC 3.

LPRINT CHR\$(27);CHR\$(93);

ESC ^

Print One Character Under Decimal-Value 32

Allows the printer to print one character under ASCII decimal-value 32 each time the command is received. (see "All Printable Characters") These ASCII values are normally recognized by the printer as control codes.

This code (ESC ^) allows the printer to print the special symbols assigned to these ASCII values. If no character is assigned to a decimal value received by the printer, a space character is printed.

LPRINT CHR\$(27);CHR\$(94);

- FF Form Feed**
Advances the paper to the next top-of-form position. The top-of-form position is set by the position of the paper when power is switched On, or by ESC 4, ESC C, or the control-panel buttons. The next top-of-form is determined by the form length defined by DIP Switch 6, ESC C, or ESC C 0.
LPRINT CHR\$(12);
- HT Horizontal Tab**
Moves the print head to the next horizontal tab stop. If the next horizontal tab stop is beyond the right margin, the character following HT is printed at the left margin. Tab stops are set with ESC D. A tab stop every 8 columns is the power-on default.
LPRINT CHR\$(9);
- LF Line Feed**
Advances the paper one line-space as defined by DIP Switch 2 or by printer control codes; ESC A and ESC 2, ESC 0, ESC 1, or ESC 3.
LPRINT CHR\$(10);
- NUL Command End**
Used with control commands as a command list terminator. NUL is also used with other printer control codes to select options.
LPRINT CHR\$(0);
- SI Compressed Printing**
Causes the printer to begin compressed printing. Character spacing in compressed printing is 17.1 characters per inch.
LPRINT CHR\$(15);

SO

Double-Width Printing by Line

Causes the printer to start double-width printing. Double-width printing prints the characters twice as wide as the current character spacing. This results in half as many characters per inch. A Carriage Return, Line Feed or DC4 (End Double-Width Printing by Line) cancels the SO command.

LPRINT CHR\$(14);

VT

Vertical Tab

Advances the paper to the next vertical tab-stop position. If the next vertical tab-stop is beyond the bottom of the page, the paper is positioned at the first line of the next page. If no vertical tab stops are set, the VT command is treated as a line-feed (LF) command.

LPRINT CHR\$(11);

Printing in Color

Your IBM Personal Computer Color Printer is capable of printing in 8 colors, when the process color ribbon is used. The 4 colors of the ribbon are selected by: ESC b (Select Band 4) for black, ESC c (Select Band 3) for cyan, ESC m (Select Band 2) for magenta, and ESC y (Select Band 1) for yellow. You can print four additional colors, orange, green, violet, and brown, by printing the data twice. Print the data in one color and then print over the data in a second color according to the table below. When printing data twice to mix colors, always print the lighter color first to avoid contaminating the ribbon.

Color Desired	Ribbon Bands to Mix
Orange	Bands 1 (ESC y) and 2 (ESC m)
Green	Bands 1 (ESC y) and 3 (ESC c)
Violet	Bands 2 (ESC m) and 3 (ESC c)
Brown	Bands 2 (ESC m) and 4 (ESC b)

To mix colors data must be sent to the printer in the following order: printer control code to select the first color, data to be printed, carriage return with no line feed, printer control code to select the second color, repeat the data to be printed. For example, to print "IBM Personal Computer" in green, you must; select band 1 (yellow) with ESC y, print "IBM Personal Computer", return the carriage with no line feed, select band 3 with ESC c, and print "IBM Personal Computer".

Character Set 1

0	1	2	3	4	5	6	7	8	9
NUL	☺	☹	♥	♦	♣	♠	BEL	BS	HT
10	11	12	13	14	15	16	17	18	19
LF	VT	FF	CR	SO	SI	▶	DC1	DC2	DC3
20	21	22	23	24	25	26	27	28	29
DC4	§	▬	↕	CAN	↓		ESC	└	↔
30	31	32	33	34	35	36	37	38	39
▲	▼	SP	!	”	#	\$	%	&	'
40	41	42	43	44	45	46	47	48	49
(	)	*	+	,	—	.	/	0	1
50	51	52	53	54	55	56	57	58	59
2	3	4	5	6	7	8	9	:	;
60	61	62	63	64	65	66	67	68	69
<	=	>	?	∅	A	B	C	D	E
70	71	72	73	74	75	76	77	78	79
F	G	H	I	J	K	L	M	N	O
80	81	82	83	84	85	86	87	88	89
P	Q	R	S	T	U	V	W	X	Y
90	91	92	93	94	95	96	97	98	99
Z	[	\	\]	^	_	`	a	b	c
100	101	102	103	104	105	106	107	108	109
d	e	f	g	h	i	j	k	l	m
110	111	112	113	114	115	116	117	118	119
n	o	p	q	r	s	t	u	v	w
120	121	122	123	124	125	126	127	128	129
x	y	z	{	|	}	~		NUL	ü

Character Set 1 (continued)

130	131	132	133	134	135	136	137	138	139
é	â	ä	à	å	BEL	BS	HT	LF	VT
140	141	142	143	144	145	146	147	148	149
FF	CR	SO	SI	É	DC1	DC2	DC3	DC4	ò
150	151	152	153	154	155	156	157	158	159
û	ù	CAN	Ö		ESC	£	¥	₣	ƒ
160	161	162	163	164	165	166	167	168	169
á	í	ó	ú	ñ	Ñ	<u>a</u>	<u>o</u>	¿	Γ
170	171	172	173	174	175	176	177	178	179
⌋	½	¼	ı	<<	>>	▒	▒	▒	
180	181	182	183	184	185	186	187	188	189
190	191	192	193	194	195	196	197	198	199
200	201	202	203	204	205	206	207	208	209
210	211	212	213	214	215	216	217	218	219
									■
220	221	222	223	224	225	226	227	228	229
■	■			α	β	Γ	Π	Σ	σ
230	231	232	233	234	235	236	237	238	239
μ	τ	ϕ	θ	Ω	δ	∞	∅	ε	∩
240	241	242	243	244	245	246	247	248	249
≡	±	≥	≤	∫	J	÷	≈	◦	●
250	251	252	253	254	255				
•	√	∩	2	■	SP				

Character Set 2

0	1	2	3	4	5	6	7	8	9
NUL	☺	☹	♥	♦	♣	♠	BEL	BS	HT
10	11	12	13	14	15	16	17	18	19
LF	VT	FF	CR	SO	SI	▶	DC1	DC2	DC3
20	21	22	23	24	25	26	27	28	29
DC4	§	▬	↕	CAN	↓		ESC	└	↔
30	31	32	33	34	35	36	37	38	39
▲	▼	SP	!	”	#	\$	%	&	'
40	41	42	43	44	45	46	47	48	49
(	)	*	+	,	—	.	/	0	1
50	51	52	53	54	55	56	57	58	59
2	3	4	5	6	7	8	9	:	;
60	61	62	63	64	65	66	67	68	69
<	=	>	?	↻	A	B	C	D	E
70	71	72	73	74	75	76	77	78	79
F	G	H	I	J	K	L	M	N	O
80	81	82	83	84	85	86	87	88	89
P	Q	R	S	T	U	V	W	X	Y
90	91	92	93	94	95	96	97	98	99
Z	[	\	\]	^	_	`	a	b	c
100	101	102	103	104	105	106	107	108	109
d	e	f	g	h	i	j	k	l	m
110	111	112	113	114	115	116	117	118	119
n	o	p	q	r	s	t	u	v	w
120	121	122	123	124	125	126	127	128	129
x	y	z	{	|	}	~		NUL	ü

Character Set 2 (continued)

130	131	132	133	134	135	136	137	138	139
é	â	ä	à	å	ç	ê	ë	è	ï
140	141	142	143	144	145	146	147	148	149
î	ì	Ä	Å	É	æ	Æ	ô	ö	ò
150	151	152	153	154	155	156	157	158	159
û	ù	ÿ	ö	ü	ç	£	¥	₪	₯
160	161	162	163	164	165	166	167	168	169
á	í	ó	ú	ñ	Ñ	à	ó	¿	¬
170	171	172	173	174	175	176	177	178	179
¬	½	¼	í	<<	>>	■	■	■	■
180	181	182	183	184	185	186	187	188	189
┆	┆	┆	┆	┆	┆	┆	┆	┆	┆
190	191	192	193	194	195	196	197	198	199
┆	┆	┆	┆	┆	┆	┆	┆	┆	┆
200	201	202	203	204	205	206	207	208	209
┆	┆	┆	┆	┆	┆	┆	┆	┆	┆
210	211	212	213	214	215	216	217	218	219
┆	┆	┆	┆	┆	┆	┆	┆	┆	■
220	221	222	223	224	225	226	227	228	229
■	■	■	■	α	β	Γ	Π	Σ	σ
230	231	232	233	234	235	236	237	237	239
μ	τ	ϕ	θ	Ω	δ	∞	∅	ε	∩
240	241	242	243	244	245	246	247	248	249
≡	±	≥	≤	∫	∫	÷	≈	°	■
250	251	252	253	254	255				
-	√	∩	2	■	SP				

All Printable Characters

0	1	2	3	4	5	6	7	8	9
NUL	☺	☹	♥	♦	♣	♠	•	◼	◯
10	11	12	13	14	15	16	17	18	19
◼	♂	♀	♪	♫	☀	▶	◀	↕	!!
20	21	22	23	24	25	26	27	28	29
¶	§	▬	↕	↑	↓	→	←	└	↔
30	31	32	33	34	35	36	37	38	39
▲	▼	SP	!	”	#	\$	%	&	'
40	41	42	43	44	45	46	47	48	49
(	)	*	+	,	—	.	/	0	1
50	51	52	53	54	55	56	57	58	59
2	3	4	5	6	7	8	9	:	;
60	61	62	63	64	65	66	67	68	69
<	=	>	?	↻	A	B	C	D	E
70	71	72	73	74	75	76	77	78	79
F	G	H	I	J	K	L	M	N	O
80	81	82	83	84	85	86	87	88	89
P	Q	R	S	T	U	V	W	X	Y
90	91	92	93	94	95	96	97	98	99
Z	[	\	\]	^	_	`	a	b	c
100	101	102	103	104	105	106	107	108	109
d	e	f	g	h	i	j	k	l	m
110	111	112	113	114	115	116	117	118	119
n	o	p	q	r	s	t	u	v	w
120	121	122	123	124	125	126	127	128	129
x	y	z	{	|	}	~		Ç	ü

All Printable Characters (continued)

130	131	132	133	134	135	136	137	138	139
é	â	ä	à	å	ç	ê	ë	è	ï
140	141	142	143	144	145	146	147	148	149
î	ì	Ä	Å	É	æ	Æ	ô	ö	ò
150	151	152	153	154	155	156	157	158	159
û	ù	ÿ	Ö	Ü	ç	£	¥	₤	ƒ
160	161	162	163	164	165	166	167	168	169
á	í	ó	ú	ñ	Ñ	à	ó	¿	Γ
170	171	172	173	174	175	176	177	178	179
⌋	½	¼	ı	<<	>>	▒	▒	▒	▒
180	181	182	183	184	185	186	187	188	189
▒	▒	▒	▒	▒	▒	▒	▒	▒	▒
190	191	192	193	194	195	196	197	198	199
▒	▒	▒	▒	▒	▒	▒	▒	▒	▒
200	201	202	203	204	205	206	207	208	209
▒	▒	▒	▒	▒	▒	▒	▒	▒	▒
210	211	212	213	214	215	216	217	218	219
▒	▒	▒	▒	▒	▒	▒	▒	▒	▒
220	221	222	223	224	225	226	227	228	229
▒	▒	▒	▒	α	β	Γ	Π	Σ	σ
230	231	232	233	234	235	236	237	238	239
μ	τ	ϕ	θ	Ω	δ	∞	∅	ε	∩
240	241	242	243	244	245	246	247	248	249
≡	±	≥	≤	∫	J	÷	≈	◦	•
250	251	252	253	254	255				
•	√	∩	2	■	SP				

Voltage Selection

Warning: To prevent damage to the printer, the printer must be set correctly for the voltage range available to you.

Follow these steps to check or set the printer voltage setting.

- 1** Find the correct setting for the voltage range available to you. If you need assistance, contact your place of purchase.

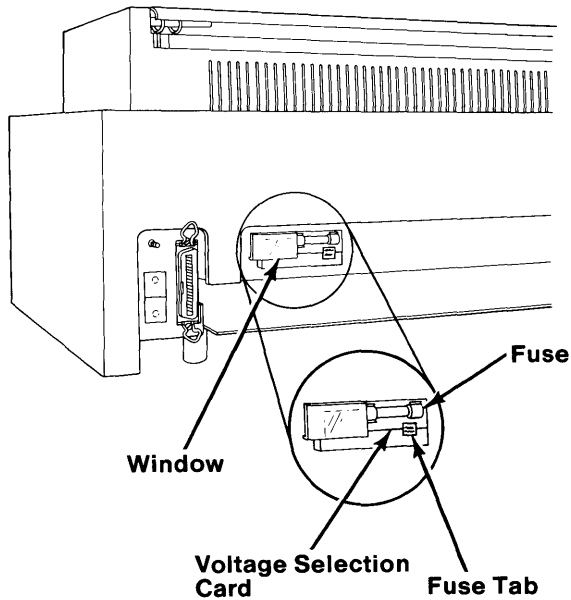
Voltage Range	Setting
90 – 118 Vac	100
102 – 139 Vac	120 (U.S. standard)
180 – 236 Vac	200
190 – 264 Vac	220

- 2** Compare your required setting with the number visible through the window at the back of your printer. This number is the present voltage setting of your printer.

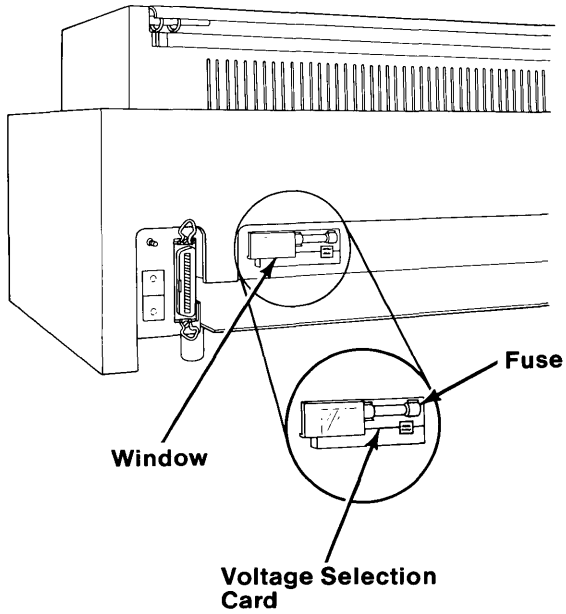
If your printer is not set correctly, continue with these steps. If you need help with the following steps, contact your place of purchase.

- 3** Set the printer Power switch to Off, and unplug the power cord from the wall outlet and from the printer.

- 4** Open the window by sliding it to the left.
- 5** Pull on the Fuse Pull tab to pivot the fuse out, then remove the fuse from the printer.
- 6** Using a needle-nose pliers or similar tool, pull the voltage selection card straight out of the printer.
- 7** Arrange the voltage selection card so that the setting number you want is right-side up and facing you.



- 8** Insert the voltage selection card into the printer, and press it all the way in. You should now see only the number for your required voltage setting.
- 9** Reinstall the fuse between the clips, and close the window by sliding it to the right.
- 10** Connect the power cord to the printer and to a properly grounded wall outlet.



Notes:

SECTION 2. TESTING YOUR IBM Personal Computer AT

Contents

- Testing Preparation 2-3**
 - Introduction 2-3
 - Checking Electrical Connections 2-5

- Loading Your Diagnostics Diskette 2-8**

- Error Examples 2-15**

- Setup 2-23**

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- System Testing 2-40**
 - Test 100 100-1**
 - Test 200 200-1**
 - Test 300 300-1**
 - Test 400 400-1**
 - Test 500 500-1**
 - Test 600 600-1**
 - Test 700 700-1**
 - Test 900 900-1**
 - Test 1000 1000-1**
 - Test 1100 1100-1**

Test 1200	1200-1
Test 1300	1300-1
Test 1400	1400-1
Test 1500	1500-1
Test 1700	1700-1
Test 2000	2000-1
Test 2100	2100-1
Test 2900	2900-1
Test 8000	8000-1
Test 8020	8020-1
Test 9000	9000-1
System Checkout	99999-1

Testing Preparation

Introduction

This section contains step by step instructions that help you determine if your IBM Personal Computer AT is operating properly. You should be in this section if:

- You received an error code.
- You have a problem with your system.
- You have installed certain options.
- You have replaced the battery.

In this section you will be instructed to test your system to determine if it is operating properly. Testing is done in two parts.

The first part is Power On Self Test (POST). Each time you turn your system unit on POST automatically runs.

The second part is System Testing. To run the system tests you will be instructed to load the Diagnostics diskette and run the system tests.

This section also contains information on the Setup program. You will be instructed how and when to run the Setup program as you go through this section.

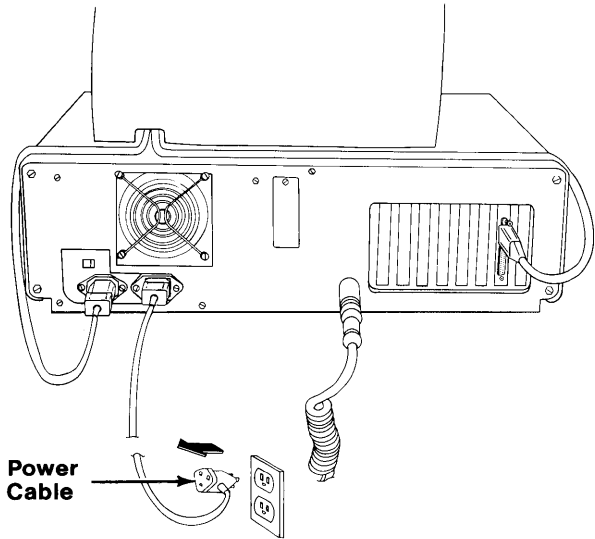
Always start this section at "Checking Electrical Connections" and follow the instructions.

Note: If your system unit needs to be moved for servicing, go to Section 3, "Moving your IBM Personal Computer AT" for instructions.

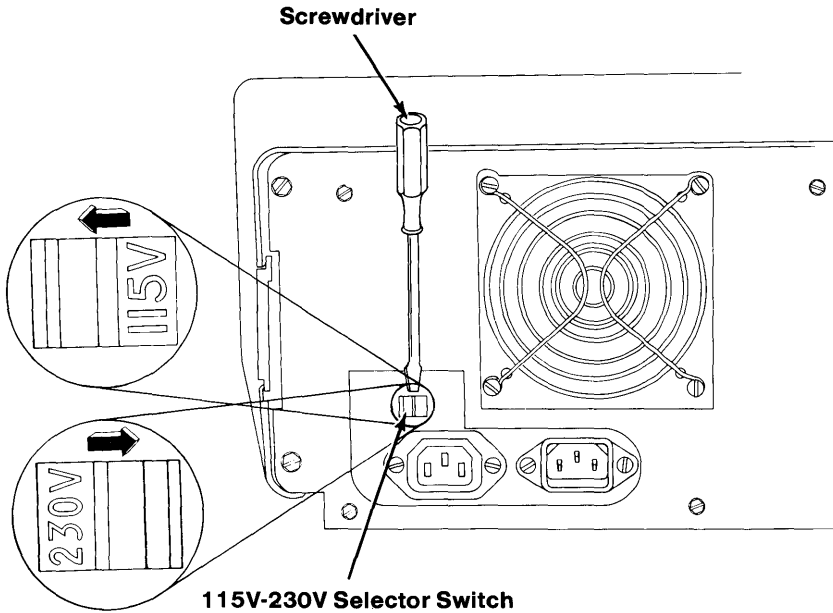
Notes:

Checking Electrical Connections

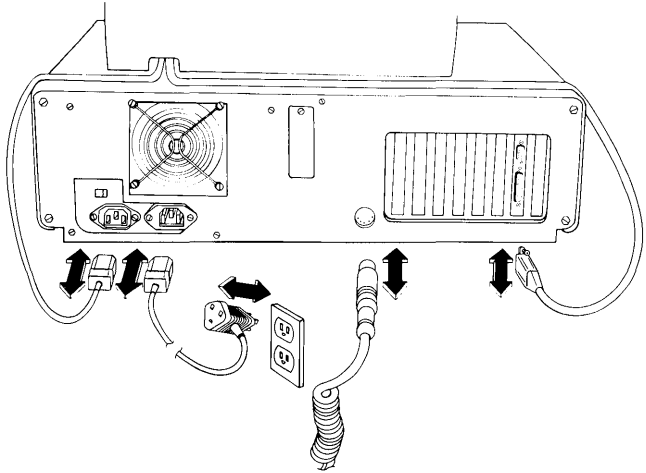
- 1** Be sure your system unit's power is off.
- 2** Turn all externally attached devices' (printer, TV, etc.) power off.
- 3** Disconnect all non-IBM devices from your system unit, except the display.
- 4** Unplug your system unit's power cable from the wall outlet.



- 5** Check the 115V-230V selector switch to be sure it is in the correct position. The correct position for the United States and Canada is **115V**. If the 115V-230V selector switch is in the wrong position set it at this time.



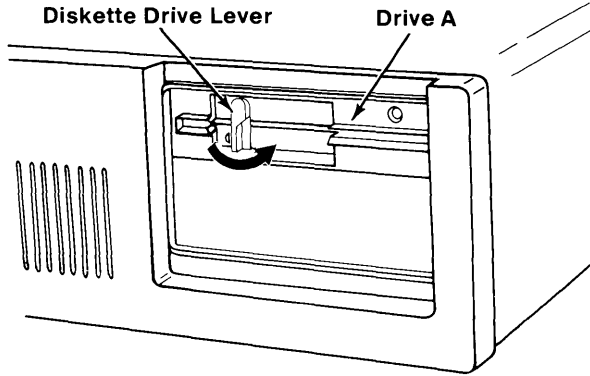
- 6** Check your wall outlet by plugging in a working lamp.
- 7** Disconnect and reconnect each cable on your system unit to ensure a proper electrical connection.
- 8** Plug your system unit's power cable into your wall outlet.



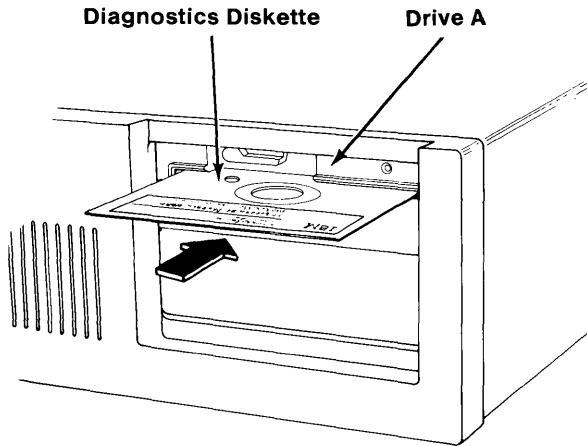
- 9** Go to "Loading your Diagnostic Diskette" in this section.

Loading Your Diagnostics Diskette

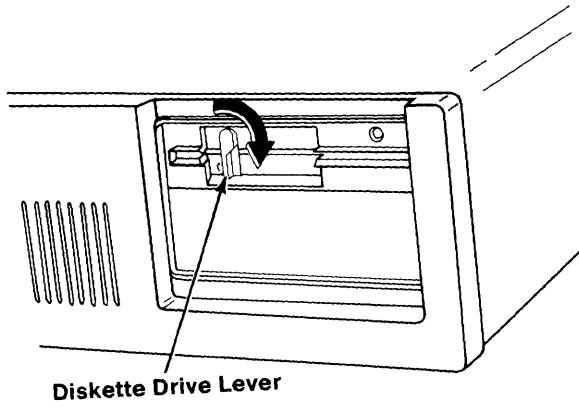
- 1 Be sure your system unit's power is off.
- 2 Rotate the diskette drive lever counterclockwise.



- 3 Get the Diagnostics diskette located at the back of this manual and insert it into drive A.



- 4** Rotate the diskette drive lever clockwise.

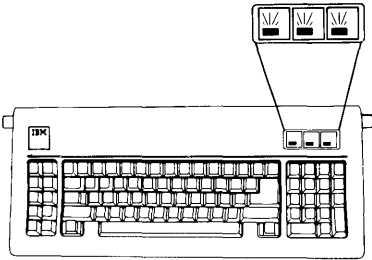


Important

Before turning your system unit's power on, review the four events that happen during a Power-On Self Test (POST). Make a note of any event that is different from the ones listed. These notes are used to find problems in your system unit.

Event 1

Keyboard status lights blink on and off.



Event 2

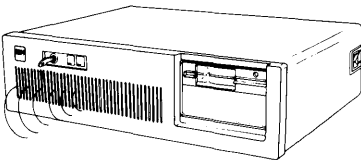
Memory size Test appears in upper-left corner of screen. If memory size is wrong, go to "Error Examples" later in this section.

XXXXX KB OK

Event 3

The keyboard status lights blink on and off then one short beep is heard when POST is complete.

Note: One long beep and two short beeps indicate a system unit failure. Go to "Error Examples" later in this section.



Event 4

This screen appears.

The IBM Personal Computer
DIAGNOSTICS
Version 3.00
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SELECT AN OPTION

- 0 - SYSTEM CHECKOUT
- 1 - FORMAT DISKETTE
- 2 - COPY DISKETTE
- 3 - PREPARE SYSTEM FOR MOVING
- 4 - SETUP
- 9 - END DIAGNOSTICS

SELECT THE ACTION DESIRED
?

5 Turn your display's Brightness and Contrast controls fully clockwise. (If your display has a Power control, turn the control on.)

6 Turn all externally attached devices' (printer, TV, etc.) power on.

7 Turn your system unit's power on.

Note: Remember the four events that take place during Power-On Self Test (POST). Post completes in 13 to 90 seconds.

Go to step 8.

8 Does your screen match the following screen?

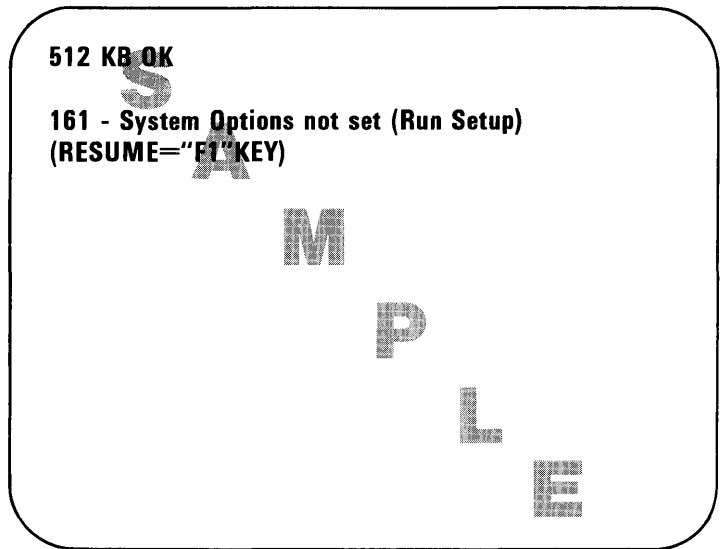
**The IBM Personal Computer
DIAGNOSTICS
Version 3.00
(C) Copyright IBM Corp. 1981, 1982, 1983
SELECT AN OPTION
0 – SYSTEM CHECKOUT
1 – FORMAT DISKETTE
2 – COPY DISKETTE
3 – PREPARE SYSTEM FOR MOVING
4 – SETUP
9 – END DIAGNOSTICS
SELECT THE ACTION DESIRED
?**

Note: If you are using a television or color display with your IBM Personal Computer AT, you can move your screen left by pressing **F7** or right by pressing **F8**.

YES Go to "Diskette Format Procedures" later in this section.

NO Go to Step 9.

- 9** If an error occurs during "Power-On Self Test" (POST), your screen looks similar to the one below.



Did you receive an error?

Note: If you received a 302 error, unlock your system unit Key Lock on the front of your system unit and press **F1** to continue. If you are unable to correct the 302 error, have your system unit serviced. Be sure your Key Lock key is with your system unit.

YES Go to "Error Examples" later in this section.

NO Go to Step 10.

10 Remove the diskette and verify that:

- It is the Diagnostics diskette.
- It is inserted correctly.

If the Diagnostics diskette is the problem, start again with step 1 "Loading Your Diagnostics Diskette."

If the Diagnostics diskette was inserted correctly, go to "Error Examples" in this section.

Error Examples

An "Error Example" has three blocks. Each block has a response and they are:

- A screen response.
- An audio response.
- An action to resolve your problem.

The screen and audio response of an Error Example must match the responses of your system. When you find the response that matches your system's, follow the action in the action block.

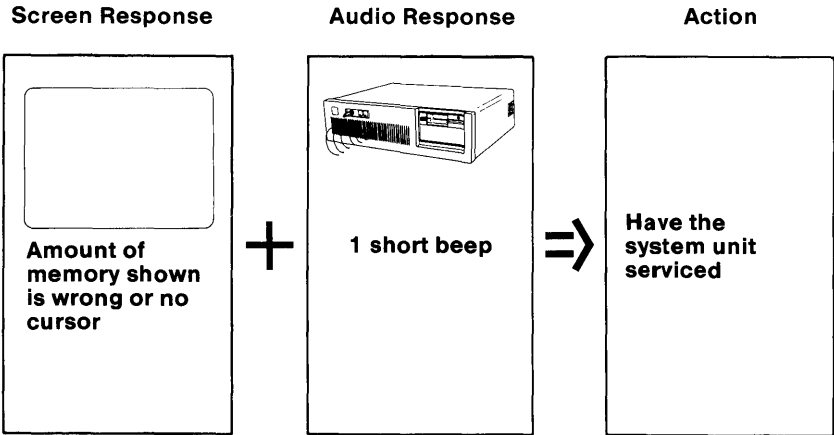
Note: If you missed a response or are not sure of your system's responses turn your system unit's power off then on again.

Warning: If you have to move your system unit for service and it has a fixed disk drive, it is recommended that all files be backed up onto diskettes. Normal shipping and handling can result in permanent loss of data on your fixed disk drives.

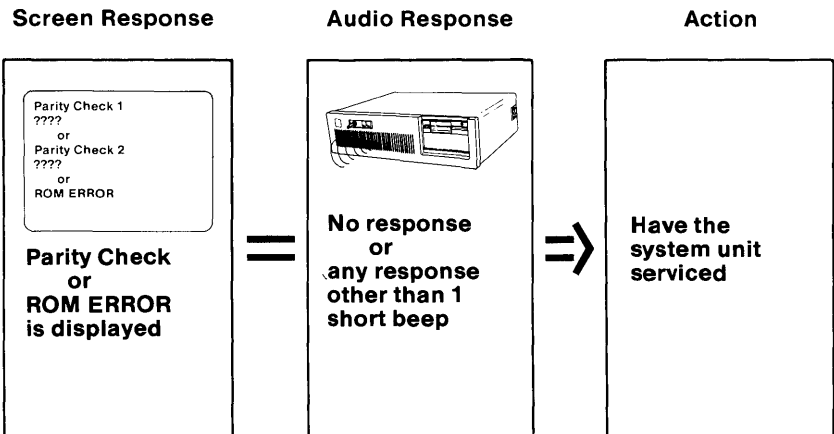
See the *IBM Disk Operating System (DOS)* manual for a description of the BACKUP command.

Go to the "Error Examples" on the following pages and find the error example that matches your system's responses.

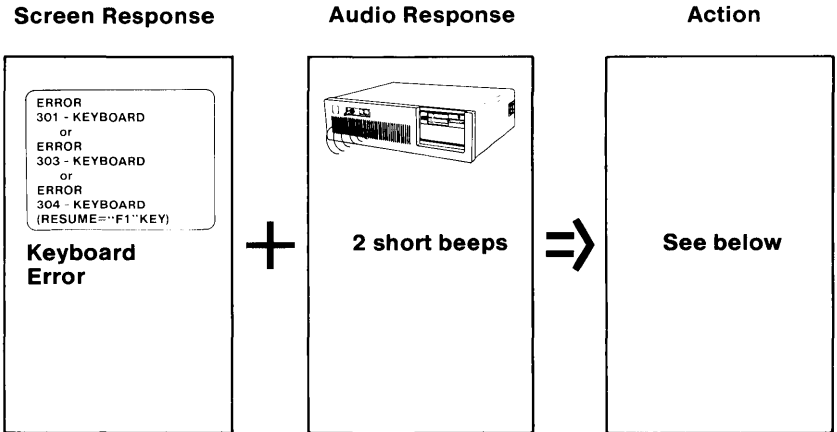
Example 1



Example 2



Example 3

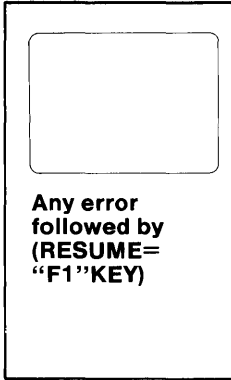


Turn your system unit's power off, disconnect the keyboard from your system unit. Turn your system unit's power on.

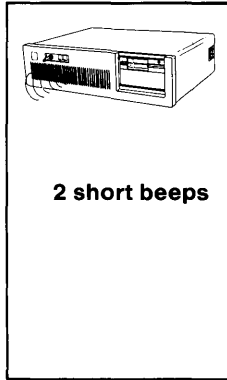
- If the 303 or 304 error remains, have your system unit serviced. Be sure your Key Lock key is with your system unit.
- If a 301 error appears, have your keyboard serviced.

Example 4

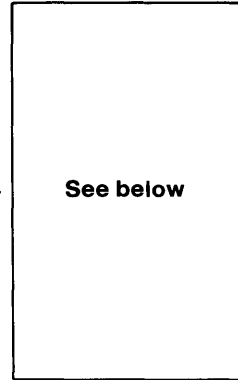
Screen Response



Audio Response



Action



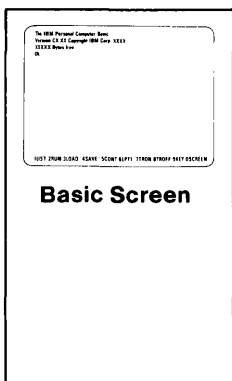
Did you get a 16X, or a 201 error?

YES Go to "Setup" in this section.

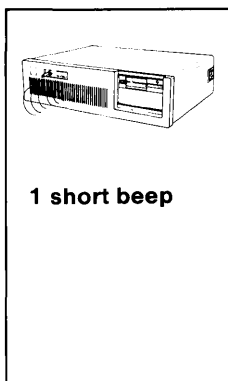
NO Press **F1** and go to "Diskette Format Procedures" in this section. If you pressed **F1** and nothing happened, have your keyboard and system unit serviced. Be sure your Key Lock key is with your system unit.

Example 5

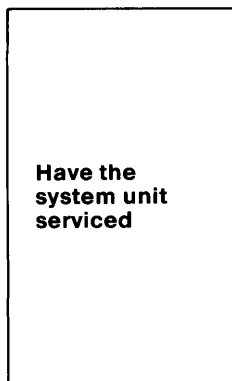
Screen Response



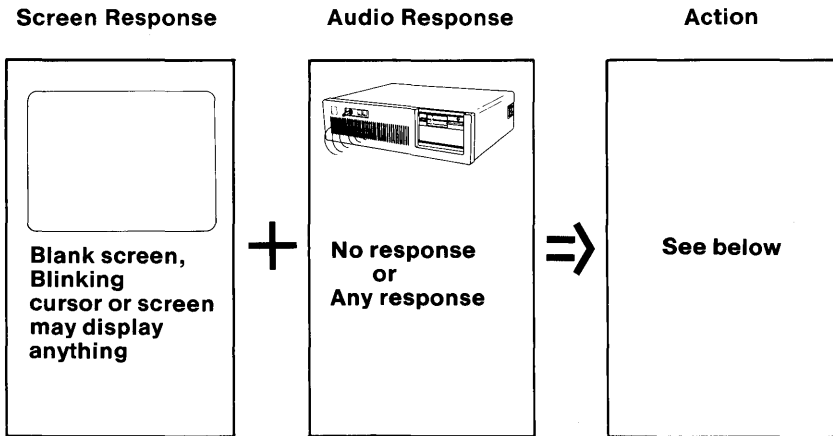
Audio Response



Action



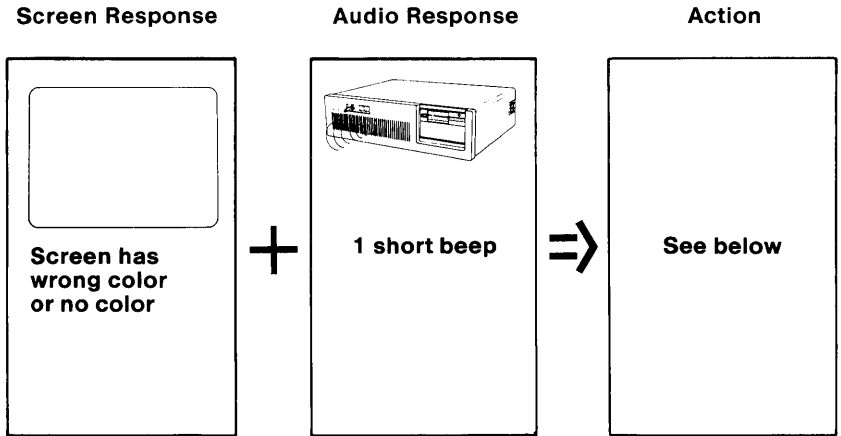
Example 6



Refer to the display adapter installation instructions in your *Installation and Setup* manual. After setting your display's switch, return to "Checking Electrical Connections" in this section.

If your switch is set correctly, have your system unit serviced. Be sure your Key Lock key is with your system unit.

Example 7 Color Display only

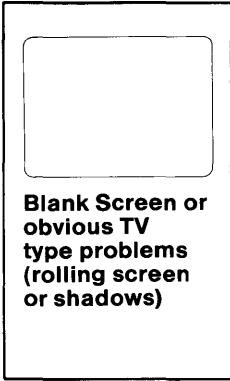


If you are using a TV as your display, check that the color is correct by disconnecting your TV from your IBM Personal Computer AT. Operate your TV normally to verify correct color quality. If you have an IBM Color Display, go to "Test 9000" in this section.

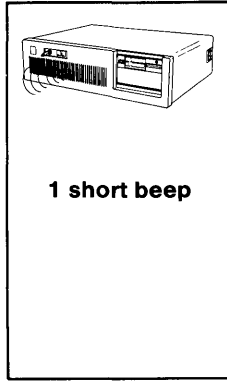
Note: If you are using your home television or non-IBM display, it must be U.S. television system (NTSC) compatible. Also, you may experience data errors while using your diskette or disk drive. You can correct this interference by moving your display or TV a minimum of 31 cm (12 inches) away from your IBM Personal Computer AT.

Example 8

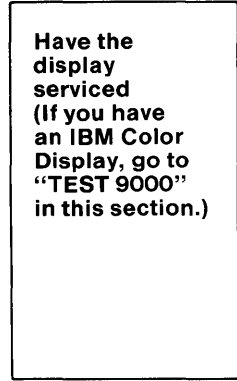
Screen Response



Audio Response



Action



+

⇒

Setup

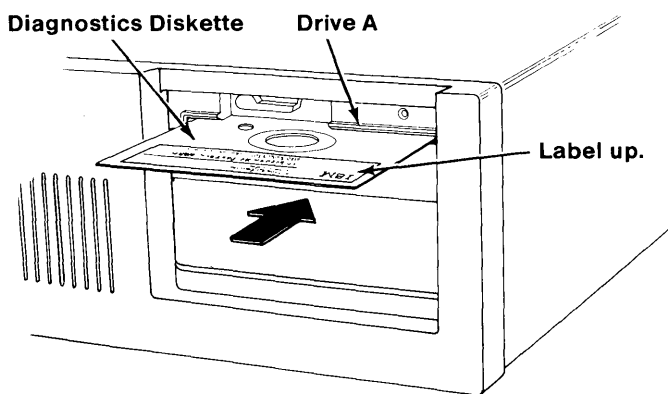
You need to set the date, time, and installed options when you:

- Install your system unit for the first time.
- Install certain options.
- Replace the battery.
- Have a battery problem.

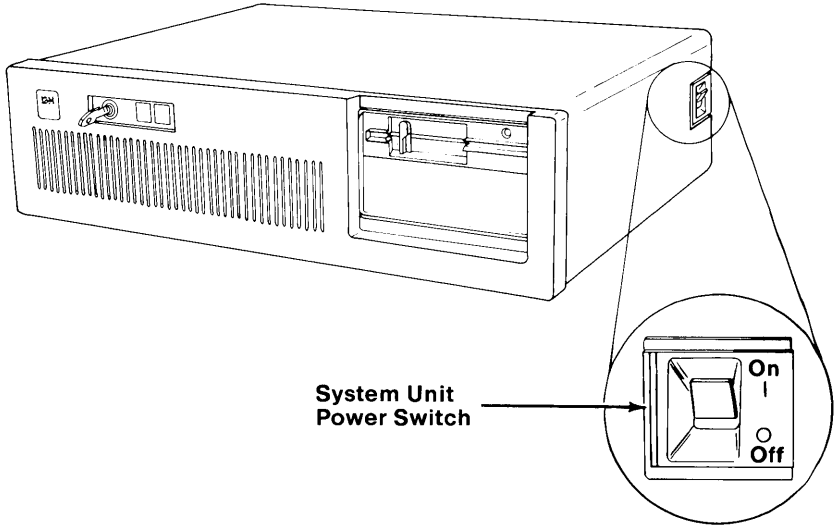
To set the system options you must know what options are installed in your system. You listed this information on the "Setup Information" foldout in the back of the *Installation and Setup* manual.

Note: If you do not know what options are installed in your system, your system unit's cover must be removed to complete the list. For information on cover removal, go to Section 2 of the *Installation and Setup* manual.

- 1** Be sure your system unit's power is off.
- 2** Turn all the external devices' (printer, TV, etc.) power off.
- 3** Get the Diagnostics diskette located at the back of this manual.
- 4** Rotate the diskette drive lever counterclockwise.
- 5** Insert the Diagnostics diskette into drive A if it is not inserted yet.
- 6** Rotate the diskette drive lever clockwise.

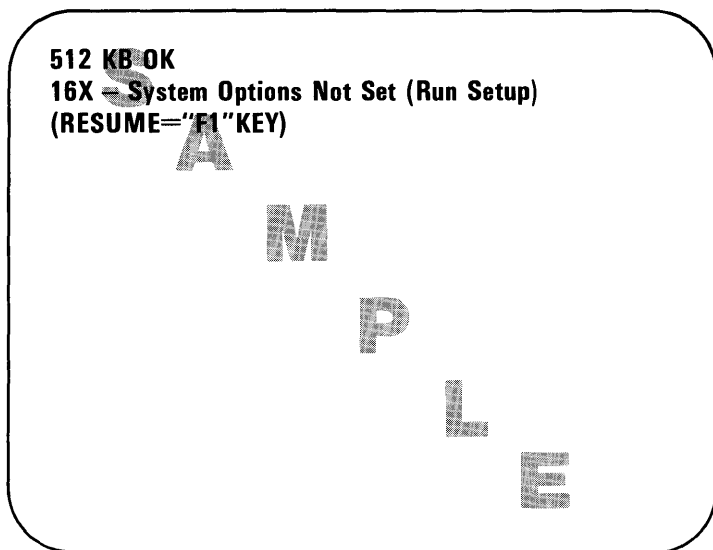


- 7** Turn all externally attached devices' (printer, TV, etc.) power on.
- 8** Turn your system unit's power on.



Go to step 9.

- 9 If an error occurs during the POST, your screen looks similar to the one below.



(X can be any number.)

DID YOU GET A 16X, OR 201 ERROR?

YES Go to "Setup Errors" on the next page.

NO Go to "Diskette Format Procedures" later in this section.

Setup Errors

You may receive a "Setup Error" during POST if:

- You are installing your system unit for the first time.
- You have installed certain options.
- You replaced the battery.
- You have a defective battery.
- You did not connect the battery properly when installing your system for the first time.

Many of the errors described are results of the battery not working or the date, time and options being set incorrectly. Some common errors that you may receive and what you can do to correct them are on the following pages.

161-System Options Error-(Run SETUP).

If you installed your system unit for the first time and received a 161 error you may have the battery improperly connected or the battery may be defective. Refer to *CHART 2, Installing your Internal Options* to verify that you connected the battery properly. If the battery is properly connected go to step 10, "Running the Setup Program". If you cannot correct the 161 error with the Setup Program contact your place of purchase for instructions on battery replacement.

Note: If you have a battery problem you can continue to operate your IBM Personal Computer AT by running the "Setup" program **EACH** time you turn your system unit's power on.

CAUTION

Fire, explosion, and severe burn hazard may be caused by the battery. **DO NOT** recharge, disassemble, heat above 100° C (212° F), solder directly to the cell, incinerate, or expose battery cell contents to water.

162-System Options Error-(Run SETUP).

To correct go to step 10, "Running the Setup Program".

163-Time & Date Error-(Run SETUP).

To correct go to step 10, "Running the Setup Program".

164-Memory Size Error-(Run SETUP).

To correct go to step 10, "Running the Setup Program" and enter the correct memory size.

201-Error System Unit.

To correct have your system unit serviced. Be sure your Key Lock key is with your system unit.

164 and 201 error combination is corrected as follows:

1. First, go to step 10, "Running the Setup Program" to verify that your memory size is correct. If your memory size is correct, then
2. Refer to your *Installation and Setup* manual if you installed a :
 - 256KB Memory Module Kit and verify that it is installed properly. After checking for proper installation, go to step 10 again to run "Setup".
 - 512KB Memory Expansion option to check the switch settings on the adapters for proper memory size. After checking the switch settings, go to step 10 again to run "Setup".
3. If you cannot correct the error, have your system unit serviced. Be sure your Key Lock key is with your system unit.

10 Running the Setup Program

This program allows you to tell your system the date, time, and what type of options you have installed in your system. The answers to the questions this program will ask you are listed on the "Setup Information" foldout in the back of your *Installation and Setup* manual.

Press **F1** and follow the instructions on your screen. Refer to the "Setup Information" foldout to complete "Setup."

- If you receive a **152** error during "Setup," have the system unit serviced. Be sure your Key Lock key is with your system unit.
- If you pressed **F1** and nothing happened, have the keyboard serviced.
- If you had a **parity check** or **ROM** error, have the system unit serviced. Be sure your Key Lock key is with your system unit.

When you have completed "Setup," continue with the "Diskette Format Procedures" in this section.

Diskette Format Procedures

To test your system you will need a formatted diskette for each drive in your system unit. The diskettes will be used in the diskette drive tests you will perform later in this section.

Important: The high capacity diskette drive must use a high-capacity diskette.

Go to Step 1 to begin formatting your diskette.

1 Is your screen similar to the one shown below?

The IBM Personal Computer
DIAGNOSTICS
Version 3.00
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SELECT AN OPTION

- 0 – SYSTEM CHECKOUT
- 1 – FORMAT DISKETTE
- 2 – COPY DISKETTE
- 3 – PREPARE SYSTEM FOR MOVING
- 4 – SETUP
- 9 – END DIAGNOSTICS

SELECT THE ACTION DESIRED

?_

YES Press **1** to select **FORMAT DISKETTE**.
Then, press **Enter** (↵). Go to Step 2.

NO Remove the diskette and verify that :

- It is the Diagnostics diskette.
- It is inserted correctly.

If the Diagnostics diskette is the problem, start again with step 1 "Loading Your Diagnostics diskette".

If the Diagnostics diskette was inserted correctly have your system unit serviced. Be sure your Key Lock key is with your system unit.

2 The following screen appears.

```
The IBM Personal Computer
DIAGNOSTICS
Version 3.00
(C)Copyright IBM Corp.
1981, 1982, 1983, 1984

SELECT AN OPTION
0 – SYSTEM CHECKOUT
1 – FORMAT DISKETTE
2 – COPY DISKETTE
3 – PREPARE SYSTEM FOR MOVING
4 – SETUP
9 – END DIAGNOSTICS

SELECT THE ACTION DESIRED
? 1
ON WHICH DISKETTE DRIVE
DO YOU WANT TO FORMAT ON (A/B)
?__
```

- Remove the Diagnostics diskette.
- Press A.
- Then press **Enter** (↵).
- Go to Step 3.

3 You are ready to begin formatting a diskette.

The IBM Personal Computer
DIAGNOSTICS
Version 3.00
(C)Copyright IBM Corp.
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SELECT AN OPTION

0 – SYSTEM CHECKOUT
1 – FORMAT DISKETTE
2 – COPY DISKETTE
3 – PREPARE SYSTEM FOR MOVING
4 – SETUP
9 – END DIAGNOSTICS

SELECT THE ACTION DESIRED

? 1

**ON WHICH DISKETTE DRIVE
DO YOU WANT TO FORMAT (A/B)**

? a

HIGH CAPACITY DRIVE FORMAT

INSERT DISKETTE FOR FORMAT

PRESS "ENTER" WHEN READY

? _

- Insert the blank high capacity diskette you are formatting into drive **A**.
- Press **Enter** (←↵).
- Go to Step 4.

- 4** When **FORMAT COMPLETE** appears, remove your formatted diskette and insert your Diagnostics diskette into drive A. Go to Step 5.

```
SELECT THE ACTION DESIRED
? 1
ON WHICH DISKETTE DRIVE
DO YOU WANT TO FORMAT (A/B)
? a
HIGH CAPACITY DRIVE FORMAT
INSERT DISKETTE FOR FORMAT
PRESS "ENTER" WHEN READY
?
FORMATTING. . .
FORMAT COMPLETE
SELECT AN OPTION
0 - SYSTEM CHECKOUT
1 - FORMAT DISKETTE
2 - COPY DISKETTE
3 - PREPARE SYSTEM FOR MOVING
4 - SETUP
9 - END DIAGNOSTICS
SELECT THE ACTION DESIRED
?
```

If you cannot format the diskette, try another one. Make sure you are using a high capacity diskette. If you are unable to format any diskettes, note the error and have your system unit serviced. Be sure your Key Lock key is with your system unit.

5 Do you have another diskette drive on your system?

SELECT THE ACTION DESIRED
?1
ON WHICH DISKETTE DRIVE
DO YOU WANT TO FORMAT (A/B)
? a
HIGH CAPACITY DRIVE FORMAT
INSERT DISKETTE FOR FORMAT
PRESS ENTER WHEN READY
?
FORMATTING. . .
FORMAT COMPLETE
SELECT AN OPTION
0 - SYSTEM CHECKOUT
1 - FORMAT DISKETTE
2 - COPY DISKETTE
3 - PREPARE SYSTEM FOR MOVING
4 - SETUP
9 - END DIAGNOSTICS
SELECT THE ACTION DESIRED
?_

YES Press **1** and then **Enter** (↵). Go to Step 6.

NO Press **0** then **Enter** (↵). Go to "System Testing" in this section.

6 The following screen appears.

```
ON WHICH DISKETTE DRIVE
DO YOU WANT TO FORMAT (A/B)
? a
HIGH CAPACITY DRIVE FORMAT
INSERT DISKETTE FOR FORMAT
PRESS ENTER WHEN READY
?
FORMATTING. . .
FORMAT COMPLETE
SELECT AN OPTION
0 - SYSTEM CHECKOUT
1 - FORMAT DISKETTE
2 - COPY DISKETTE
3 - PREPARE SYSTEM FOR MOVING
4 - SETUP
9 - END DIAGNOSTICS
SELECT THE ACTION DESIRED
? 1
ON WHICH DISKETTE DRIVE
DO YOU WANT TO FORMAT (A/B)
? _
```

- Remove the Diagnostics diskette.
- Press **B**.
- Then press **Enter** (↵).
- Go to Step 7.

7 You are ready to begin formatting a diskette for drive **B**.

```
INSERT DISKETTE FOR FORMAT
PRESS "ENTER" WHEN READY
?
FORMATTING...
FORMAT COMPLETE
SELECT AN OPTION
0 - SYSTEM CHECKOUT
1 - FORMAT DISKETTE
2 - COPY DISKETTE
3 - PREPARE SYSTEM FOR MOVING
4 - SETUP
9 - END DIAGNOSTICS
SELECT THE ACTION DESIRED
? 1
ON WHICH DISKETTE DRIVE
DO YOU WANT TO FORMAT (A/B)
? b
DOUBLE SIDED DRIVE FORMAT
INSERT DISKETTE FOR FORMAT
PRESS "ENTER" WHEN READY
?
```

If you have a High Capacity drive in B, the message will be, HIGH CAPACITY DRIVE FORMAT

Important: Be sure to use the correct diskette (high capacity or double sided) for drive **B**. The Double Sided Diskette drive is identified by a large asterisk below the in-use light. The High Capacity Diskette drive has no special markings.

- Insert the blank diskette you are formatting into drive **B**. Press **Enter** (↵).
- Go to Step 8.

8 When **FORMAT COMPLETE** appears:

- Remove your formatted diskette.
- Insert the Diagnostics diskette into drive A.
- Press **0** then press **Enter** (↵)
- Go to "System Testing" in this section.

```
SELECT THE ACTION DESIRED
? 1
ON WHICH DISKETTE DRIVE
DO YOU WANT TO FORMAT (A/B)
? b
DOUBLE SIDED DRIVE FORMAT
INSERT DISKETTE FOR FORMAT
PRESS "ENTER" WHEN READY
?
FORMATTING . . .
FORMAT COMPLETE
SELECT AN OPTION
0 - SYSTEM CHECKOUT
1 - FORMAT DISKETTE
2 - COPY DISKETTE
3 - PREPARE SYSTEM FOR MOVING
4 - SETUP
9 - END DIAGNOSTICS
SELECT THE ACTION DESIRED
?
```

If you have a High Capacity drive in B, the message will be,
**HIGH CAPACITY DRIVE
FORMAT**

If you cannot format the diskette, try another one. Be sure you are using the correct diskette (high capacity or double sided) for drive **B**. If you are unable to format any diskettes, note the error and have your system unit serviced. Be sure your Key Lock key is with your system unit.

System Testing

Tests are run only on the options you have attached to your IBM Personal Computer AT. This manual however has instructions for tests on all the options available for the IBM Personal Computer AT.

Before a test runs, the test number is displayed on the screen. When the test number is on the screen, turn to the same test in this manual and follow the instructions. The test page numbers will be the same as the test number on the screen.

You are now ready to begin testing your system unit. If you have not formatted a diskette for each drive, go to the "Diskette Format Procedures" earlier in this section before beginning "System Testing".

During the system tests, you may be asked to record an error. This information is needed to assist you in getting your system serviced.

The following are examples of screen messages you may receive during "System Testing".

Example of a successful test.

REFER TO – TEST 1000

PRESS "ENTER" TO CONTINUE

?

END – TEST 1000

PRESS "ENTER" TO CONTINUE

?

Example of a failing test.

XX:XX:XX

ERROR

SYSTEM UNIT 10XX

END – TEST 1000

PRESS "ENTER" TO CONTINUE

?

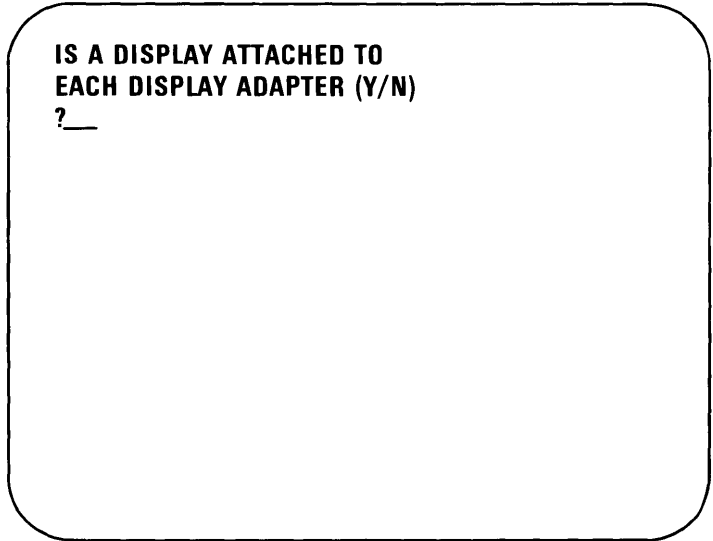
Have your system unit serviced if you get any of the following errors. Be sure your Key Lock key is with your system unit.

- A parity check error.
- A ROM error.
- A screen with a blinking cursor and you are unable to proceed.
- The same screen indefinitely and you are unable to proceed.

Go to Step 1 to begin "System Testing".

- 1** This screen appears if you have more than one display adapter. If you have only one display adapter, go to Step 2.

Is your screen similar to the screen shown below?



YES Answer the question on the screen. If your answer is;

- Yes, press **Y** then press **Enter** (↵). Go to Step 2.
- No, press **N** then press **Enter** (↵). Go to Step 2.

NO Go to Step 2.

2 Does your screen list all of your installed options correctly?

Note: The game control adapter may not be listed if the joysticks or paddles are not connected.

THE INSTALLED DEVICES ARE

SYSTEM UNIT

256K-BYTE MEMORY

KEYBOARD

1 DISKETTE DRIVE(S) AND ADAPTER

1 FIXED DISK DRIVE(S) AND ADAPTER

IS THE LIST CORRECT (Y/N)

?__

YES Press **Y** and then press **Enter** (↵). Go to Step 6.

NO Press **N** and then press **Enter** (↵). Go to Step 3.

- 3 After pressing **N** in step 2, the following screen appears.

```
THE INSTALLED DEVICES ARE  
SYSTEM UNIT  
256K-BYTE MEMORY  
KEYBOARD  
1 DISKETTE DRIVE(S) AND ADAPTER  
1 FIXED DISK DRIVE(S) AND ADAPTER  
IS THE LIST CORRECT (Y/N)  
?_  
  
XX:XX:XX  
ERROR  
LIST OF INSTALLED DEVICES 199  
  
PRESS ENTER TO CONTINUE
```

Note: If you pressed **N** because the IBM printer attached to your system unit was not listed, go to "Test 8000" for the IBM Graphics Printer and "Test 8020" for the IBM Color Printer.

Go to step 4.

- 4** Press **Enter** (↵) and the following screen appears.

SYSTEM CHECKOUT
0 – RUN TEST ONE TIME
1 – RUN TESTS MULTIPLE TIMES
2 – LOG UTILITIES
9 – END SYSTEM CHECKOUT
SELECT THE ACTION DESIRED
?_

- Press **9**.
- Then press **Enter** (↵).
- Go to step 5.

5 The following screen appears.

SELECT AN OPTION
0 – SYSTEM CHECKOUT
1 – FORMAT DISKETTE
2 – COPY DISKETTE
3 – PREPARE SYSTEM FOR MOVING
4 – SETUP
9 – END DIAGNOSTICS
SELECT THE ACTION DESIRED
?4

- Press **4**.
- Then press **Enter** (↵).
- Follow the instructions on the screen.
- Go to "Setup" in this section.

If this is your second time here and you cannot correct the installed device list, have your system unit serviced. Be sure your Key Lock key is with your system unit.

- 6** After pressing **Y** in Step 2, the following screen appears.

SYSTEM CHECKOUT

0 – RUN TESTS ONE TIME

1 – RUN TESTS MULTIPLE TIMES

2 – LOG UTILITIES

9 – END SYSTEM CHECKOUT

SELECT THE ACTION DESIRED

?_

- Press **0**.
- Then press **Enter** (↵).
- Refer to the screen for the next test.

Introduction to Testing

Testing begins with "Test 100" and ends with the "System Checkout" screen. Tests are run only on the options you have attached to your IBM Personal Computer AT. This manual however has tests for all the options that are available for the IBM Personal Computer AT. If your manual has an option not displayed on your screen, go to the next test in your manual. To match the test on the screen with the test in your manual, look at the bottom of the page in this section. The page number will be the same as the test you have on the screen.

Notes:

Test 100

1 Press **Enter** (↵) to start this test.

The following screen appears. You need to run this test only if you cannot set the time or alarm or if the alarm does not work.

- If you wish to test your clock press **Y** then press **Enter** (↵).
- If you do not wish to test your clock press **N** then press **Enter** (↵). Refer to the screen for the next step.

REFER TO – TEST 100

PRESS "ENTER" TO CONTINUE

?

**IF YOU TEST YOUR SYSTEM CLOCK,
THE TIME & ALARM SETTINGS NEED
TO BE RESET.**

**DO YOU WANT TO TEST YOUR
SYSTEM CLOCK (Y/N)**

?

Go to Step 2.

2 Did you receive a 1XX error?

**XX:XX:XX
ERROR
SYSTEM UNIT 1XX**

END – TEST 100

**PRESS ENTER TO CONTINUE
?**

(X can be any number.)

YES Note the error and have your system unit serviced. Be sure your Key Lock key is with your system unit.

NO You have completed the system unit and system clock test. Press **Enter** (←↵) and refer to the screen for the next test.

Test 200

1 Press **Enter** (←) to start this test.

Did you receive a 2XX error?

**XX:XX:XX
ERROR
SYSTEM UNIT 2XX

END – TEST 200

PRESS ENTER TO CONTINUE
?**

(X can be any number.)

YES Note the error and have your system unit serviced. Be sure your Key Lock key is with your system unit.

NO You have completed the memory test. Press **Enter** (←) and refer to the screen for the next test.

Notes:

Test 300

- 1** Press **Enter** (↵) to start this test.

Use the system unit Key Lock test to check the operation of your Key Lock. You have fifteen seconds after pressing **Y** and then **Enter** (↵) to lock and then unlock your system unit Key Lock during the test.

Do you want to test your system unit Key Lock?

SYSTEM UNIT 200

**DO YOU WANT TO TEST YOUR SYSTEM UNIT
KEYLOCK (Y/N)?**

**LOCK THE SYSTEM UNIT KEYLOCK
UNLOCK THE SYSTEM UNIT KEYLOCK**

YES Press **Y** and then press **ENTER**(↵).
Lock and unlock your system unit Key
Lock. Go to Step 2.

NO Press **N** and then press **Enter** (↵). Go
to Step 3.

2 Did you receive a 3XX error?

**XX:XX:XX
ERROR
SYSTEM UNIT 3XX**

END – TEST 300

**PRESS "ENTER" TO CONTINUE
?**

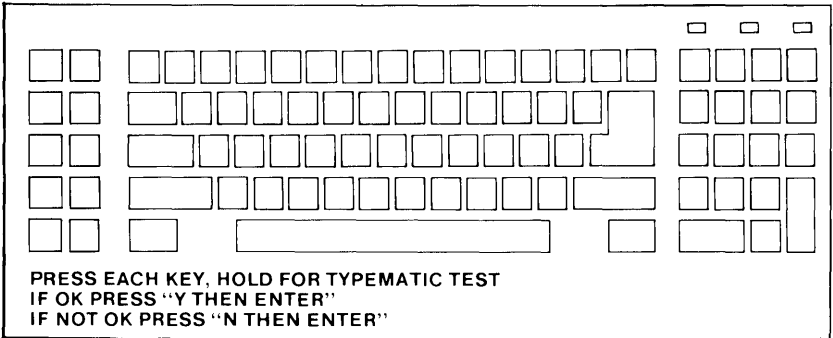
(X can be any number.)

YES Note the error and have your system unit serviced. Be sure your Key Lock key is with your system unit.

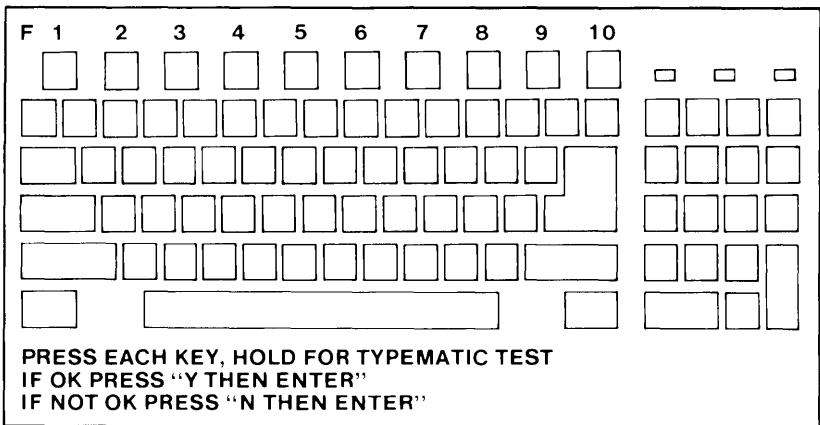
NO Go to Step 3.

3 **IMPORTANT:** Do not perform any of the commands on the screen. Follow the instructions in the manual.

Did one of the following screens appear?



or



Go to the next page for instructions.

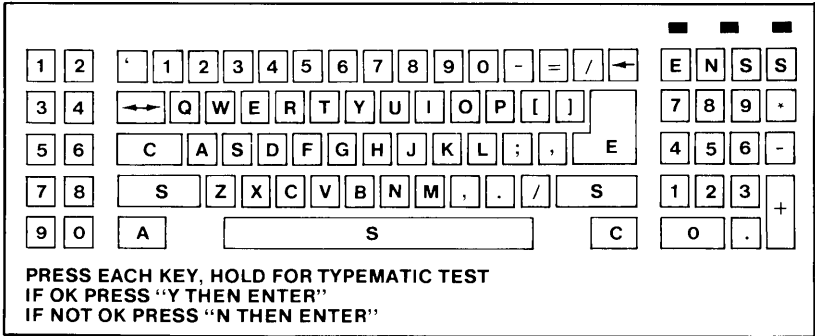
YES Press each key once. As each key is pressed:

- The corresponding character appears in each block on the screen.
- The three squares in the upper right corner of the screen will intensify.
- The three status lights on your keyboard come on.
- Go to Step 4.

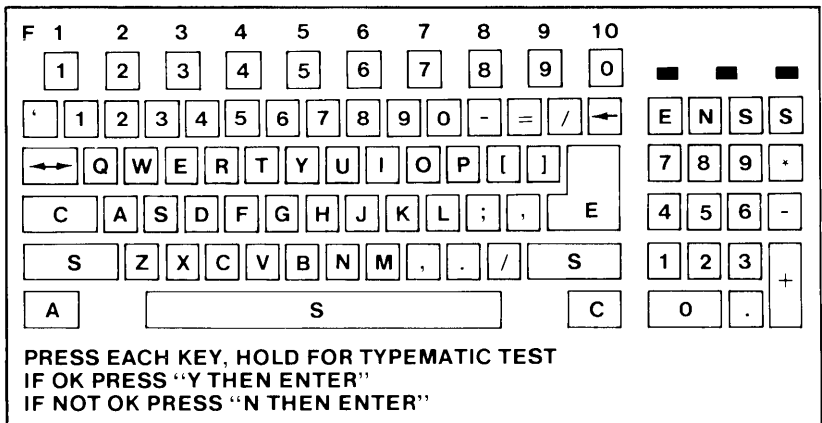
NO Press **N** and then press **Enter** (↵). Note the error and have your keyboard serviced.

4 Did all of the following happen with the keyboard on your screen?

- The corresponding characters appeared in each block on the screen.
- The three squares in the upper right corner of the screen intensified.
- The three status lights on your keyboard came on.



or



YES Go to Step 5.

NO Have your keyboard serviced.

5

Follow the directions for the typematic and keyboard status light test.

1. Press and hold any key. The corresponding character flashes on the screen.
2. Press and release the Caps Lock, Num Lock, and the Scroll Lock. The squares in the upper right corner of your screen change intensity. Also verify that the status lights on your keyboard go off.

If steps 1 and 2 of the typematic test works correctly:

1. Press **Y**.
2. Then press **Enter** (↵).
3. Press **Enter** (↵) again and refer to the screen for the next test.

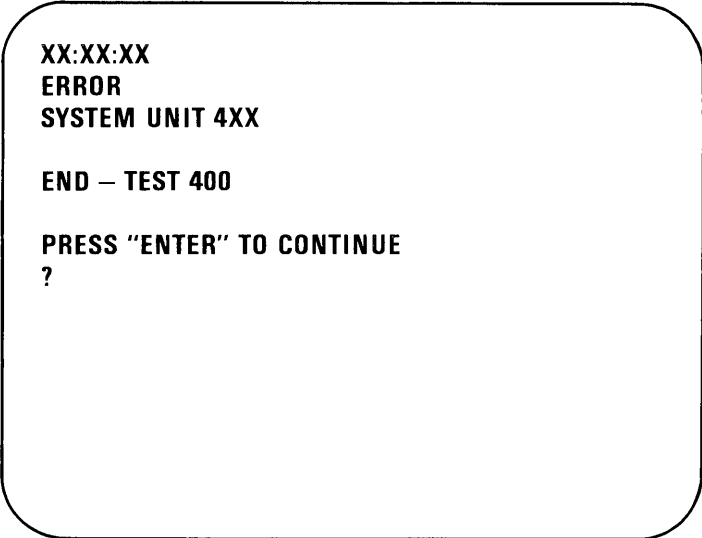
If steps 1 and 2 of the typematic test failed :

1. Press **N**.
2. Then press **Enter** (↵).
3. Note the error and have your keyboard serviced.

Test 400

1 Press **Enter** (←) to start this test.

Did you receive a 4XX error?



```
XX:XX:XX  
ERROR  
SYSTEM UNIT 4XX  
  
END – TEST 400  
  
PRESS "ENTER" TO CONTINUE  
?
```

(X can be any number.)

- YES** Note the error and have your system unit serviced. Be sure your Key Lock key is with your system unit.
- NO** If you do not have an IBM Monochrome Display attached to your system unit, press **Enter** (←) and refer to the screen for the next test. Otherwise, go to Step 2.

2 Do the lines on your screen match their descriptions?

DISPLAY ATTRIBUTES

THIS LINE IS AT NORMAL INTENSITY.

THIS LINE IS INTENSIFIED.

THIS LINE IS IN REVERSE VIDEO.

THIS LINE IS BLINKING

THIS LINE IS UNDERLINED

IS THE SCREEN CORRECT (Y/N)?

YES Press **Y** and then press **Enter** (↵). Go to Step 3.

NO Press **N** and then press **Enter** (↵). Note the error and have your system unit serviced. Be sure your Key Lock key is with your system unit.

3 Do the characters on your screen match the characters on the screen shown below?

CHARACTER SET

Q W X Y Z [\] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~
! " # \$ % & ' () * + , - . / : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _
` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~
@ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _
` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~
! " # \$ % & ' () * + , - . / : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _
` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~
! " # \$ % & ' () * + , - . / : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _
` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~



IS THE SCREEN CORRECT (Y/N)?

YES Press **Y** and then press **Enter** (↵). Go to Step 4.

NO Press **N** and then press **Enter** (↵). Note the error and have your system unit serviced. Be sure your Key Lock key is with your system unit.

4

Do the characters on your screen match the characters on the screen shown below?

80X25 DISPLAY

```

! "#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNC
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOF
#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPF
$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPF
%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPFQRE
&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPFQRS1
'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPFQRTL
()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPFQSTUV
) +,-./0123456789:;<=>?@ABCDEFGHIJKLMNPFQSTUVV
* +,-./0123456789:;<=>?@ABCDEFGHIJKLMNPFQSTUVW>
+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPFQSTUVWXY
,-./0123456789:;<=>?@ABCDEFGHIJKLMNPFQSTUVWXYZ
-. /0123456789:;<=>?@ABCDEFGHIJKLMNPFQSTUVWXYZI
./0123456789:;<=>?@ABCDEFGHIJKLMNPFQSTUVWXYZI\
/0123456789:;<=>?@ABCDEFGHIJKLMNPFQSTUVWXYZI\

```

IS THE SCREEN CORRECT (Y/N)?

YES Press Y and then press Enter (↵). Press Enter (↵) and refer to the screen for the next test.

Note: If you get a 432 error, go to Step 5.

NO Press N and then press Enter (↵). Note the error and have your system unit serviced. Be sure your Key Lock key is with your system unit.

Note: If you get a 432 error, go to Step 5.

5 If you have a **432** error do one of the following:

- If you do not have a printer attached, have your system unit serviced. Be sure your Key Lock key is with your system unit.
- If you have an IBM Graphics Printer attached to your system unit, go to "Test 8000" in this section.
- If you have an IBM Color Printer attached to your system unit, go to "Test 8020" in this section.

Notes:

Test 500

1 Press **Enter** (←) to start this test.

Did you receive a 5XX error?

**XX:XX:XX
ERROR
SYSTEM UNIT 5XX

END – TEST 500

PRESS "ENTER" TO CONTINUE
?**

(X can be any number.)

YES Note the error and have your system unit serviced. Be sure your **Key Lock** key is with your system unit.

NO If you do not have a color display attached to your system unit, press **Enter** (←) and refer to the screen for the next test. Otherwise, go to Step 2.

2 Do the lines on your screen match their descriptions?







DISPLAY ATTRIBUTES

THIS LINE IS AT NORMAL INTENSITY.

THIS LINE IS INTENSIFIED.

THIS LINE IS IN REVERSE VIDEO.

THIS LINE IS BLINKING.

-  **BLUE**
-  **GREEN**
-  **CYAN**
-  **RED**
-  **MAGENTA**
- YELLOW**
-  **WHITE**

IS THE SCREEN CORRECT ? (Y/N)?

YES Press **Y** and then press **Enter** (↵). Go to Step 3.

NO Press **N** and then press **Enter** (↵). Note the error and have your system unit serviced. Be sure your Key Lock key is with your system unit.

4 Do the characters on your screen match the characters on the screen shown below?

80X25 DISPLAY

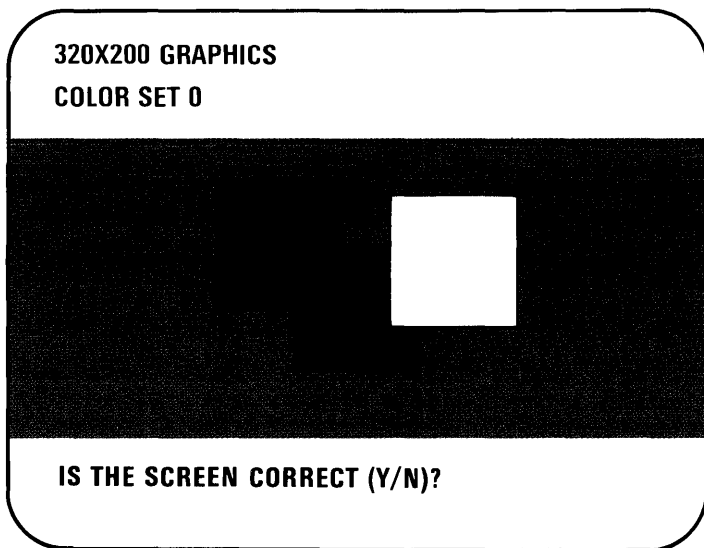
```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNC
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOF
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPG
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPOF
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPORE
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPORSI
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPORSTL
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPORSTUV
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPORSTUVW
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPORSTUVWX
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPORSTUVWXY
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPORSTUVWXYZ
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPORSTUVWXYZI
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPORSTUVWXYZL
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPORSTUVWXYZN
```

IS THE SCREEN CORRECT (Y/N)?

YES Press Y and then press **Enter** (↵). Go to Step 5.

NO Press N and then press **Enter** (↵). Note the error and have your system unit serviced. Be sure your Key Lock key is with your system unit.

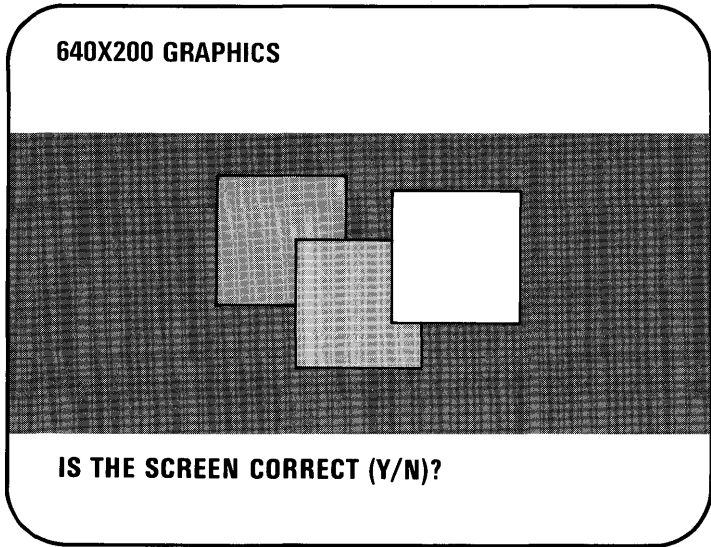
7 Does your screen match the screen shown below?



YES Press **Y** and then press **Enter** (↵). Go to Step 8.

NO Press **N** and then press **Enter** (↵). Note the error and have your system unit serviced. Be sure your Key Lock key is with your system unit.

8 Does your screen match the screen shown below?



YES Press **Y** and then press **Enter** (↵). Go to Step 9.

NO Press **N** and then press **Enter** (↵). Note the error and have your system unit serviced. Be sure your Key Lock key is with your system unit.

Test 600

1 Press **Enter** (↵) to start this test.

The following screen appears.

REFER TO – TEST 600

PRESS "ENTER" TO CONTINUE

?

****** WARNING ******

DATA WILL BE DESTROYED

INSERT SCRATCH DISKETTE IN DRIVE A

(A BLANK FORMATTED DISKETTE)

PRESS ENTER WHEN READY

?

- Remove the Diagnostics diskette.
- Insert a high capacity formatted diskette into drive **A**.
- Then press **Enter** (↵).
- Go to step 2.

2 Did you receive a **6XX** error?

XX:XX:XX
ERROR
SYSTEM UNIT 6XX

END – TEST 600

PRESS “ENTER” TO CONTINUE
?

(X can be any number.)

YES Note the error and have your system unit serviced. Be sure your Key Lock key is with your system unit.

NO Go to Step 3.

3 Is the information on the screen correct?

**DISKETTE DRIVE A
IS A HIGH CAPACITY DRIVE
IF THIS IS INCORRECT
RUN SETUP**

**DISKETTE IN DRIVE A
IS FORMATTED FOR
HIGH CAPACITY
IS THIS CORRECT? - Y/N
?__**

(X can be any number.)

YES Press **Y** and then press **Enter** (↵). Go to Step 4.

NO Press **N** and then press **Enter** (↵). Note the error and return to "Setup" in this section. If this is your second time here, have your system unit serviced. Be sure your Key Lock key is with your system unit.

4

**REMOVE DISKETTE FROM DRIVE A
PRESS ENTER WHEN READY**

?_

- Remove the formatted diskette.
- Then press **Enter** (↵).
- Go to Step 5.

5

**REMOVE DISKETTE FROM DRIVE A
PRESS ENTER WHEN READY**

?

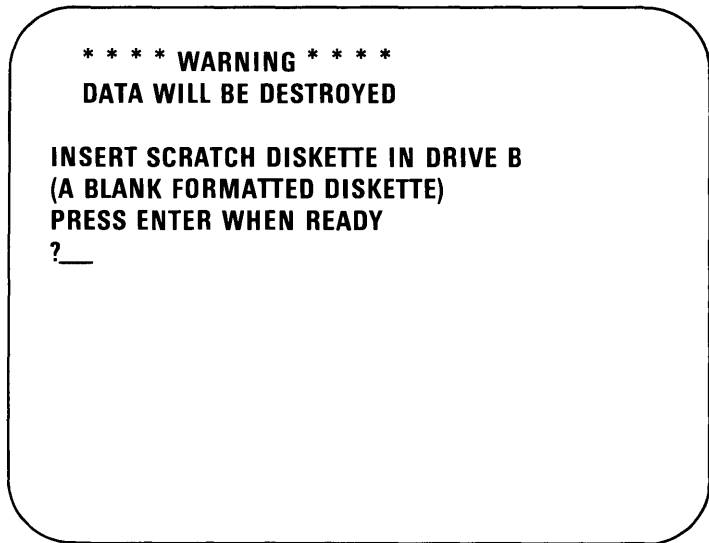
**REINSERT SAME DISKETTE
AND PRESS ENTER**

?_

- Insert your formatted high capacity diskette into diskette drive A.
- Then press **Enter** (←↵).
- Go to Step 6.

Note: If you have only one diskette drive, press **Enter** (←↵). Go to Step 9.

- 6** The following screen appears if you have diskette drive **B** installed in your system unit.



(X can be any number.)

IMPORTANT: Be sure to use the correct diskette (high capacity or double sided) for drive **B**. The Double Sided Diskette drive is identified by a large asterisk below the in-use light. The High Capacity Diskette drive has no special markings.

- Insert the blank formatted diskette into drive **B**.
- Then press **Enter** (←↵).
- Go to Step 7.

7 Did you receive a 6XX error?

**XX:XX:XX
ERROR
SYSTEM UNIT 6XX**

END – TEST 600

**PRESS "ENTER" TO CONTINUE
?**

(X can be any number.)

YES Note the error and have your system unit serviced. Be sure your Key Lock key is with your system unit.

NO Go to Step 8.

**DISKETTE DRIVE B
IS A DOUBLE SIDED DRIVE
DO NOT USE HIGH CAPACITY
FORMATTED MEDIA
IN THIS DRIVE
IF THIS IS INCORRECT
RUN SETUP**

If you have a High
Capacity drive in B,
the message will be,
IS A HIGH
CAPACITY DRIVE

**DISKETTE IN DRIVE B
IS FORMATTED FOR
NON-HIGH CAPACITY
IS THIS CORRECT? Y/N
?__**

If you have a High
Capacity diskette in
drive B, the message
will be, HIGH
CAPACITY.

(X can be any number.)

YES Press Y and then press **Enter** (↵). Go to Step 9.

NO Press N and then press **Enter** (↵). Note the error and return to "Setup" in this section. If this is your second time here, have your system unit serviced. Be sure your Key Lock key is with your system unit.

9 Did you receive a 6XX error?

**XX:XX:XX
ERROR
SYSTEM UNIT 6XX**

END – TEST 600

**PRESS "ENTER" TO CONTINUE
?**

(X can be any number.)

YES Note the error and have your system unit serviced. Be sure your Key Lock key is with your system unit.

NO Go to Step 10.

END – TEST 600

PRESS "ENTER" TO CONTINUE

?

- Remove both formatted diskettes.

Note: If you have only one diskette drive remove the formatted diskette.

- Insert the Diagnostics diskette in drive **A**.
- Then press **Enter** (←↵).
- Refer to the screen for the next test.

Test 700

Press **Enter** (←) to start this test.

Did you receive a **7XX** error?

XX:XX:XX
ERROR
SYSTEM UNIT 7XX

END – TEST 700

PRESS "ENTER" TO CONTINUE
?

(X can be any number.)

- YES** Have your system unit serviced. Be sure your Key Lock key is with your system unit.
- NO** You have completed the IBM Math Coprocessor test. Press **Enter** (←) and refer to the screen for the next test.

Notes:

Test 900

Press **Enter** (↵) to start this test.

Did you receive a **9XX** error?

XX:XX:XX
ERROR
SYSTEM UNIT 9XX

END – TEST 900

PRESS “ENTER” TO CONTINUE
?

(X can be any number.)

YES Have your system unit serviced. Be sure your Key Lock key is with your system unit.

Note: If you have more than one Serial/Parallel Adapter installed in your system unit, be sure that the jumpers on the adapter are set correctly. You can find this information in the Serial/Parallel Adapter installation instructions in your *Installation and Setup* manual.

NO You have completed the parallel portion of the Serial Parallel Adapter tests. Press **Enter** (↵) and refer to the screen for the next test.

Notes:

Test 1000

Press **Enter** (←↵) to start this test.

Did you receive a **10XX** error?

XX:XX:XX
ERROR
SYSTEM UNIT 10XX

END – TEST 1000

PRESS "ENTER" TO CONTINUE
?

(X can be any number.)

YES Have your system unit serviced. Be sure your Key Lock key is with your system unit.

Note: If you have more than one Serial/Parallel Adapter installed in your system unit, be sure the jumpers on the adapter are set correctly. You can find this information in the Serial/Parallel Adapter installation instructions in your *Installation and Setup* manual.

NO You have completed the parallel portion of the Alternate Serial/Parallel Adapter tests. Press **Enter** (←↵) and refer to the screen for the next test.

Notes:

Test 1100

Press **Enter** (←↵) to start this test.

Did you receive an **11XX** error?

XX:XX:XX
ERROR
SYSTEM UNIT 11XX

END – TEST 1100

PRESS "ENTER" TO CONTINUE
?

(X can be any number.)

- YES** Have your system unit serviced. Be sure your Key Lock key is with your system unit.
- NO** You have completed the serial portion of the Serial/Parallel Adapter tests. Press **Enter** (←↵) and refer to the screen for the next test.

Notes:

Test 1200

Press **Enter** (↵) to start this test.

DID YOU RECEIVE A 12XX ERROR?

**XX:XX:XX
ERROR
SYSTEM UNIT 12XX**

END – TEST 1200

**PRESS "ENTER" TO CONTINUE
?**

(X can be any number.)

- YES** Have your system unit serviced. Be sure your Key Lock key is with your system unit.
- NO** You have completed the serial portion of the Alternate Serial/Parallel Adapter tests. Press **Enter** (↵) and refer to the screen for the next test.

Notes:

Test 1300

1 Press **Enter** (↵) to start this test.

Did you receive a 13XX error?

**XX:XX:XX
ERROR
SYSTEM UNIT 13XX**

END – TEST 1300

**PRESS "ENTER" TO CONTINUE
?**

(X can be any number.)

YES Have your system unit serviced. Be sure your Key Lock key is with your system unit.

NO Go to Step 2.

2 Did the following screen appear?

WHICH OF THE FOLLOWING IS ATTACHED:

1 = JOYSTICK

2 = PADDLE

3 = NOTHING ATTACHED

?

YES Go to Step 3.

NO You have completed the IBM Game Control Adapter tests. Press **Enter** (↵) and refer to the screen for the next test.

3 Do the following steps:

For joysticks:

1. Press **1**.
2. Then press **Enter** (←↵).
3. Press **2**.
4. Then press **Enter** (←↵).
5. Go to Step 4.

For paddles:

1. Press **2**.
2. Then press **Enter** (←↵).
3. Enter the number of paddles attached to your game control adapter (**2 or 4**).
4. Then press **Enter** (←↵).
5. Enter the same number for the number of buttons and press **Enter** (←↵).
6. Go to Step 5.

For nothing attached:

1. Press **3**.
2. Then press **Enter** (←↵).
3. Press **Enter** (←↵) again.
4. Refer to screen for the next test.

4 Check for operation of your joysticks in the following manner:

1. Press each button and watch the word **RELEASED** change to **PRESSED**.
2. Move each joystick and watch the character **A** or **B** move inside the box.

IMPORTANT: During this test character movement could be opposite to the movement of your joysticks.

Operate all the buttons and joysticks.

BUTTON A RELEASED ***** * * * * * A * * * * * *****	BUTTON B RELEASED ***** * * * * * B * * * * * *****
PRESS AND RELEASE ALL BUTTONS, EXERCISE ALL JOY STICKS/PADDLES AND PRESS ANY KEY WHEN DONE	

Press any key and go to Step 6.

5 Check for operation of your paddles in the following manner:

1. Press each button and watch the word **RELEASED** change to **PRESSED**.
2. Move each paddle and watch the character **A, B, C** or **D** move inside the box.

Operate all buttons and paddles.

BUTTON A	BUTTON B	BUTTON C	BUTTON D
RELEASED	RELEASED	RELEASED	RELEASED
*****		*****	
* A *		* B *	
*****		*****	
*****		*****	
* C *		* D *	
*****		*****	

**PRESS AND RELEASE ALL BUTTONS,
EXERCISE ALL JOY STICKS/PADDLES
AND PRESS ANY KEY WHEN DONE**

Press any key and go to Step 6.

- 6** Did all the buttons show pressed and released and did the joysticks or paddles move in each direction?

**PRESS AND RELEASE ALL BUTTONS
EXERCISE ALL JOYSTICKS/PADDLES
AND PRESS ANY KEY WHEN DONE**

**DID ALL BUTTONS SHOW PRESSED AND
RELEASED, AND DID ALL JOYSTICKS
OR PADDLES MOVE IN EACH DIRECTION?
(Y/N)**

?

YES Press **Y** then press **Enter** (↵) and refer to the screen for the next test.

NO Have your system unit serviced. Be sure your **Key Lock** key is with your system unit.

Test 1400

1 Press **Enter** (←) to start this test.

Did you receive a 1404 error?

XX:XX:XX
ERROR
MATRIX PRINTER 1404

END – TEST 1400

PRESS "ENTER" TO CONTINUE
?

(X can be any number.)

YES Have your system unit serviced. Be sure your **Key Lock** key is with your system unit.

NO Go To Step 2.

2 Did you receive a 14XX error?

**XX:XX:XX
ERROR
MATRIX PRINTER 14XX**

END – TEST 1400

**PRESS "ENTER" TO CONTINUE
?**

(X can be any number.)

YES Go to "Test 8000" in this section.

NO Go To Step 3.

3

One of the following printer test patterns should print.

U.S. Graphics Printer Example

```

! " # $ % & ' ( ) * + , - . /
0 1 2 3 4 5 6 7 8 9 : ; < = > ?
@ A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z [ \ ] ^ _
` a b c d e f g h i j k l m n o
p q r s t u v w x y z { | } ~
! " # $ % & ' ( ) * + , - . /
0 1 2 3 4 5 6 7 8 9 ; < = > ?
@ A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z [ \ ] ^ _
` a b c d e f g h i j k l m n o
p q r s t u v w x y z { | } ~
! " # $ % & ' ( ) * + , - . /
á î ó ô õ ö ç è é ê ë ì ï « »
Σ π ρ σ τ υ φ χ ψ ω Ω
□ □ □ □

```

International Graphics Printer Example

```

! " # $ % & ' ( ) * + , - . /
0 1 2 3 4 5 6 7 8 9 : ; < = > ?
@ A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z [ \ ] ^ _
` a b c d e f g h i j k l m n o
p q r s t u v w x y z { | } ~
! " # $ % & ' ( ) * + , - . /
0 1 2 3 4 5 6 7 8 9 ; < = > ?
@ A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z [ \ ] ^ _
` a b c d e f g h i j k l m n o
p q r s t u v w x y z { | } ~
! " # $ % & ' ( ) * + , - . /
á î ó ô õ ö ç è é ê ë ì ï « »
Σ π ρ σ τ υ φ χ ψ ω Ω
□ □ □ □
☛ ♦ ♣ ♠ ù é à ä å ä

```

4 Did your printer test finish without any errors and did the printer test pattern print correctly?

NO Record the error message, and go to "Test 8000."

YES Press Enter (↵) and refer to the screen for the next test.

Test 1500

Press **Enter** (←↵) to start this test.

Did you receive a **15XX** error?

XX:XX:XX
ERROR
SYSTEM UNIT 15XX

END – TEST 1500

PRESS “ENTER” TO CONTINUE
?

(X can be any number.)

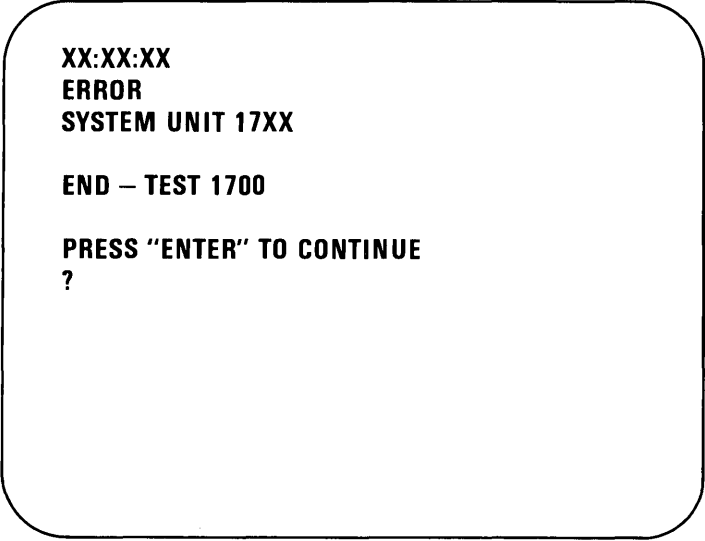
- YES** Have your system unit serviced. Be sure your Key Lock key is with your system unit.
- NO** You have completed the Synchronous Data Link Control Adapter test. Press **Enter** (←↵) and refer to the screen for the next test.

Notes:

Test 1700

Press **Enter** (←↵) to start this test.

Did you receive a 17XX error?



**XX:XX:XX
ERROR
SYSTEM UNIT 17XX**

END – TEST 1700

**PRESS "ENTER" TO CONTINUE
?**

(X can be any number.)

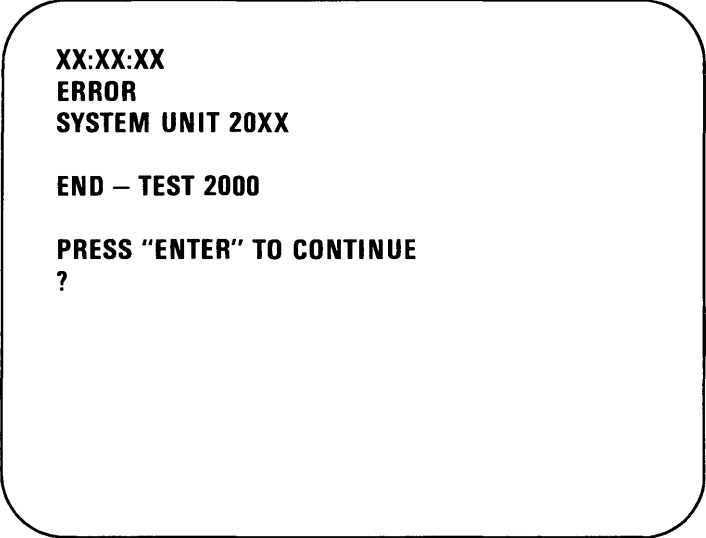
- YES** Have your system unit serviced. Be sure your Key Lock key is with your system unit.
- NO** You have completed the Fixed Disk Drive tests. Press **Enter** (←↵) and refer to the screen for the next test.

Notes:

Test 2000

Press **Enter** (←) to start this test.

Did you receive a 20XX error?



XX:XX:XX
ERROR
SYSTEM UNIT 20XX

END - TEST 2000

PRESS "ENTER" TO CONTINUE
?

(X can be any number.)

- YES** Have your system unit serviced. Be sure your Key Lock key is with your system unit.
- NO** You have completed the Binary Synchronous Communications (BSC) test. Press **Enter** (←) and refer to the screen for the next test.

Notes:

Test 2100

Press **Enter** (←↵) to start this test.

Did you receive a **21XX** error?

XX:XX:XX
ERROR
SYSTEM UNIT 21XX

END – TEST 2100

PRESS "ENTER" TO CONTINUE
?

(X can be any number.)

- YES** Have your system unit serviced. Be sure your Key Lock key is with your system unit.
- NO** You have completed the Alternate Binary Synchronous Communications (BSC) test. Press **Enter** (←↵) and refer to the screen for the next test.

Notes:

Test 2900

1 Press **Enter** (↵) to start this test.

Did you receive a 2904 error?

XX:XX:XX
ERROR
COLOR MATRIX PRINTER 2904

END TEST 2900

PRESS "ENTER" TO CONTINUE
?

(X can be any number.)

YES Have your system unit serviced. Be sure your Key Lock key is with your system unit.

NO Go to Step 2.

2 Did you receive a 29XX error?

**XX:XX:XX
ERROR
COLOR MATRIX PRINTER 29XX

END TEST 2900

PRESS "ENTER" TO CONTINUE
?**

(X can be any number.)

YES Go to "Test 8020" in this section.

NO Go to Step 3.

3 Select the width of the paper you are using.

SELECT PAPER WIDTH

1 – 8 1/2 INCH PAPER WIDTH

2 – 14 1/2 INCH PAPER WIDTH

ENTER THE OPTION DESIRED

?

Press **1** and then press **Enter** (←) for paper 8 1/2 inches wide.

Press **2** and then press **Enter** (←) for paper 14 1/2 inches wide.

Note: If the print example shows the incorrect character set, check the DIP switch settings in Section 1 of this manual. If the DIP switches are set correctly, have your printer serviced.

5 Did the printer test pattern finish without any errors and did the printer test pattern print correctly?

YES Go to Step 6.

NO If the test pattern is correct but the colors are wrong, go to Step 6.

If the test pattern is not correct or you received an error message, record the error message and go to "Test 8020."

- 6** Are the characters in your test pattern correct and is each character only one color?

**ARE THE CHARACTERS ON THE PRINTED
TEST PATTERN CORRECT, AND EACH
CHARACTER A SINGLE COLOR (Y/N)
?**

YES Press **Y** and then press **Enter** (↵) and go to Step 9.

NO Press **N** and then press **Enter** (↵) and continue on the next page.

Note: See the "Ribbon-Color Knob Adjustment" procedure in Section 1 of this manual.

- 7** Perform the ribbon adjustment procedure. Then press **Enter** (↵) to print the test pattern and verify the adjustment.

Warning: Wait until your printer stops printing before making any adjustments.

- 8** Return to Step 6.

Note: If you are unable to adjust the ribbon, have your printer serviced.

- 9** Press **Enter** (↵) and refer to the screen for the next test.

Notes:

Test 8000

- 1** Check your wall outlet by plugging in a working lamp.
- 2** Verify that the printer cable is properly connected to your printer and system unit.
Did you find any problem while doing the above step?
NO Go to Step 3.
YES Correct the problem and perform the system tests again.
- 3** Turn your printer's and system unit's power off.
- 4** Disconnect the printer cable.

5

Perform the printer self-test:

1. Press and hold the Line Feed button while you turn your printer's power on.
2. When the test starts, release the Line Feed button.

Note: The printer self-test will take approximately 10 minutes.

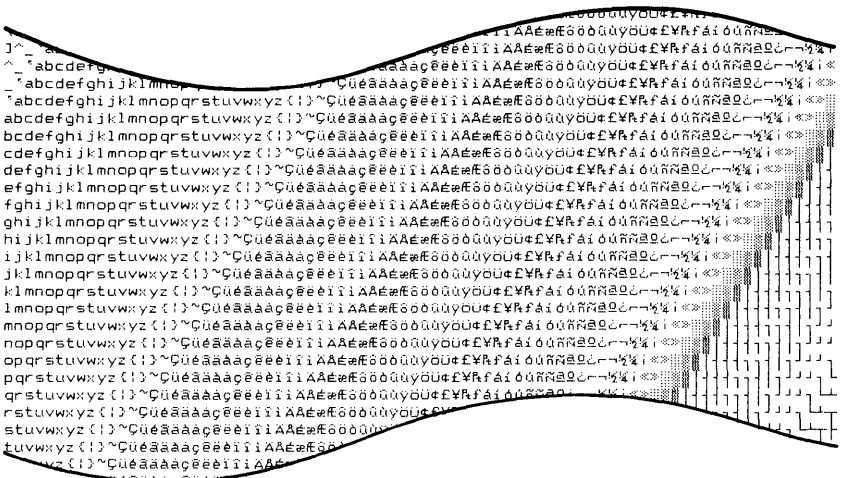
3. To stop your printer self-test before it finishes, turn your printer's power off.

Below are partial examples of the printout for each of the IBM printers. Compare your printout with the appropriate example.

Graphics Printer U.S. Example



Graphics Printer International Example



Did the self-test finish without failures?

YES Go to Step 13.

NO Go to Step 7.

7 Be sure that the ribbon is installed properly.

8 Be sure that the forms or paper are inserted properly.

9 Be sure that the forms or paper path has no obstructions.

10 Be sure that the tractors are adjusted properly.

If you need help with any of the above, refer to Section 1 for printer operating instructions.

11 **Did you find any problem while doing the above steps?**

NO Go to Step 12.

YES Correct the problem and restart the printer self-test.

Note: If you are using a non-U.S. English keyboard and your printout does not match the desired character set, have your printer serviced.

12 Do you have any of the following problems?

- Your printer beeps when the paper is installed properly.
- Your printer does not beep when it is out of paper.
- Some of the lights on the control panel do not work.
- Some of the buttons on the control panel do not work.
- Your printer continues to print when it is out of paper.
- Your printer fails to print or prints incorrectly.

NO Go to Step 13.

YES Have your IBM Graphics Printer serviced.

13 Did you receive any of the following error messages during diagnostic testing?

199

432

901

1001

1401

YES Go to Step 14.

NO If you are still having a problem, go to Step 16.

14 Leave the printer cable disconnected from your printer and run the system tests again. Verify that the list of installed devices and options is correct. (Your printer will be missing from the list).

15 Did you receive any error when you ran the system diagnostic tests this time?

YES Have your system unit serviced. Be sure your Key Lock key is with your system unit.

NO Have your system unit, printer and cable serviced. Be sure your Key Lock key is with your system unit.

- 16** Your printer is also controlled by program commands from your system unit. If you are still having a printer problem, or if you have a printer problem only during a particular program, examine the program thoroughly for commands that may cause your printer to produce undesired results. If you have completed the printer self-test and have no apparent program problems, have your system unit, printer and printer cable serviced. Be sure your Key Lock key is with your system unit.

Notes:

Test 8020

1 Check your wall outlet by plugging in a working lamp.

2 Verify that the printer cable is properly connected to your printer and system unit.

Did you find any problem while doing the above steps?

NO Go to Step 3.

YES Correct the problem and perform the system tests again.

3 Turn your printer's and system unit's power off.

4 Disconnect the printer cable.

5 Perform the printer self-test:

1. Open the access cover, and turn all switches to the Off position.
2. Close the access cover.
3. Turn your printer's power on.
4. Press the Ready button to set your printer to Not Ready (Ready indicator is off).
5. Press the Test Mode button.
6. To stop the test, press the Test Mode button again.

7 Be sure that the ribbon is installed properly.

8 Be sure that the forms or paper is inserted properly.

9 Be sure that the forms or paper path has no obstructions.

10 Be sure that the tractors are adjusted properly.

If you need help with any of the above, refer to Section 1 for printer operating instructions.

Did you find any problem while doing the above steps?

NO Go to Step 11.

YES Correct the problem and restart the printer self-test.

Note: If you are using a non-U.S. English keyboard and your printout does not match the desired character set, verify that the switch settings are correct for the desired character set. If the switch settings are correct, have your printer serviced.

11 Do you have any of the following problems?

- Your printer beeps when the paper is installed properly.
- Your printer does not beep when it is out of paper.
- Some of the lights on the control panel do not work.
- Some of the buttons on the control panel do not work.
- Your printer continues to print when it is out of paper.
- Your printer fails to print or prints incorrectly.

NO Go to Step 18.

YES Go to Step 12.

- 12** Be sure that the DIP switches are all turned to the Off position.
- 13** Be sure that the Forms Thickness Control lever is adjusted properly .
- 14** Be sure that the Feed Mode lever is in the correct position.

Did you find any problem while doing the above steps?

NO Have your printer serviced.

YES Correct the problem and restart the printer self-test.

15 **Did you receive any of the following error messages during testing?**

199

432

901

1001

1401

2901

2902

YES Go to the Step 16.

NO If you are still having a problem, go to Step 18.

16 Leave the printer cable disconnected from the printer and run all the system tests again. Verify that the list of installed devices and options is correct. (Your printer will be missing from the list).

17 **Did you receive any error when you ran the system tests this time?**

YES Have your system unit serviced. Be sure your Key Lock key is with your system unit.

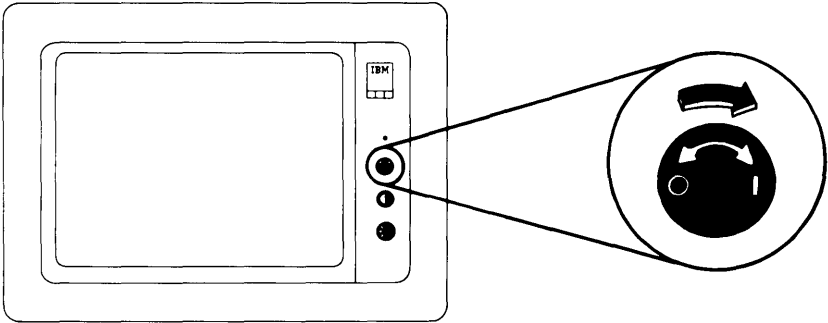
NO Have your system unit, printer and cable serviced. Be sure your Key Lock key is with your system unit.

18 Your printer is also controlled by program commands from the system unit. If you are still having a printer problem, or if you have a printer problem only during a particular program, examine the program thoroughly for commands that may cause your printer to produce undesired results. If you have completed the printer self test and have no apparent program problems, have your system unit, printer and printer cable serviced. Be sure your Key Lock key is with your system unit.

Notes:

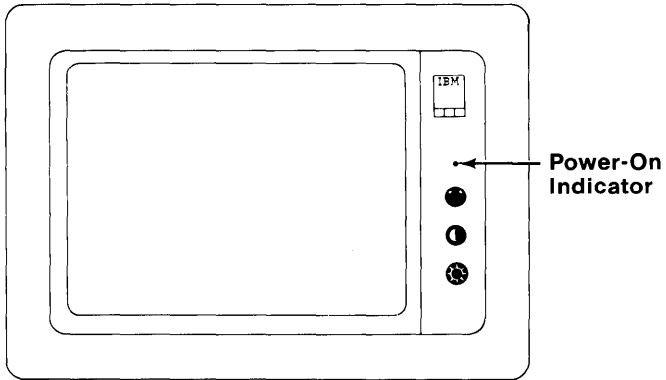
Test 9000

- 1 Turn your display's power on.



Go to step 2.

2 Is the Power-on indicator light on?



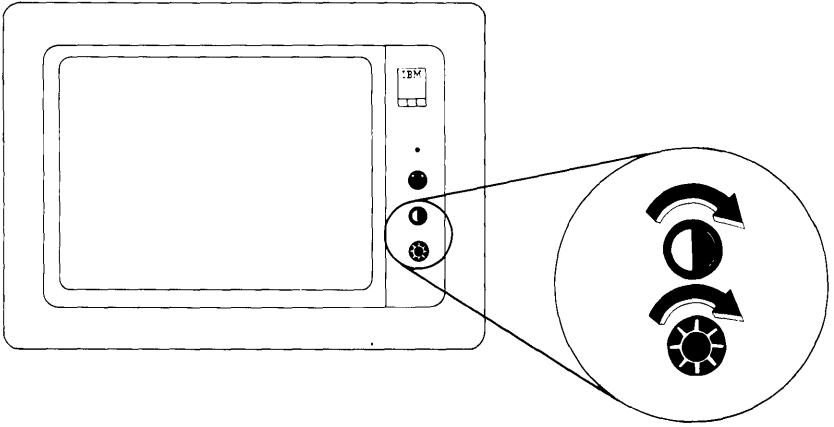
YES Go to Step 3.

NO Be sure that the power cord is plugged into a functioning wall outlet and into the rear of your display. If it is, have your display serviced. Be sure your power cable is with your display.

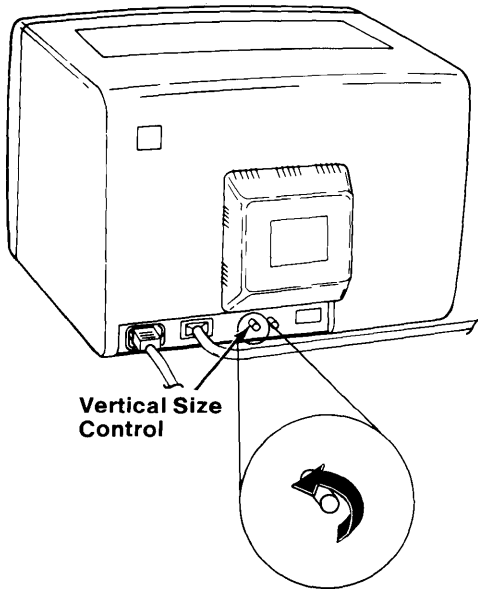
3 Turn your system unit's power off.

Go to step 4.

- 4** Turn the Brightness and Contrast controls fully clockwise.

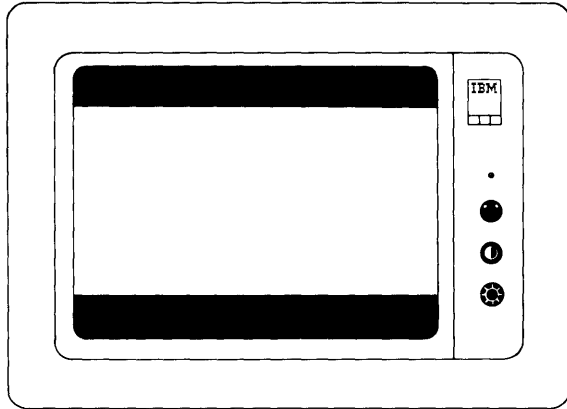


- 5** Turn the Vertical Size control fully counterclockwise. A black area should appear across the top and bottom of the screen.



Go to step 9.

- 6** Does a black area appear across the top and the bottom of the screen?



YES Go to Step 7.

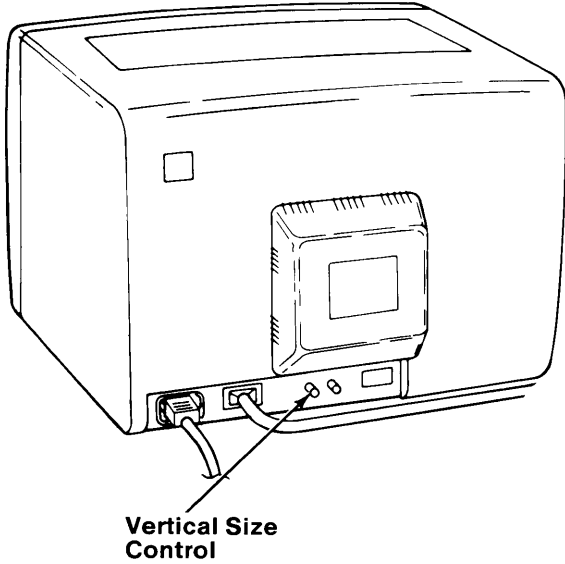
NO Have your display serviced. Be sure the power cable is with your display.

- 7** Are the black areas at the top and bottom of the screen approximately equal in size?

YES Go to Step 8.

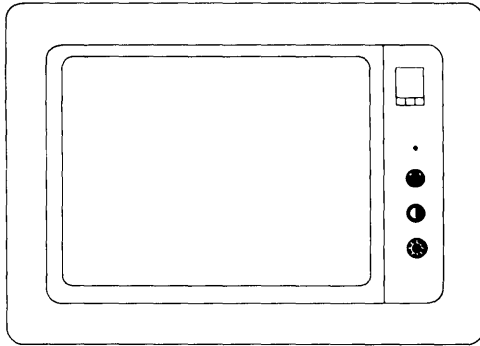
NO Have your display serviced. Be sure the power cable is with your display.

- 8** Turn the Vertical Size control clockwise until the black areas at the top and bottom of the screen just disappear. If one of the black areas disappears before the other, continue to turn the control clockwise until the other black area is gone also.



Go to Step 9.

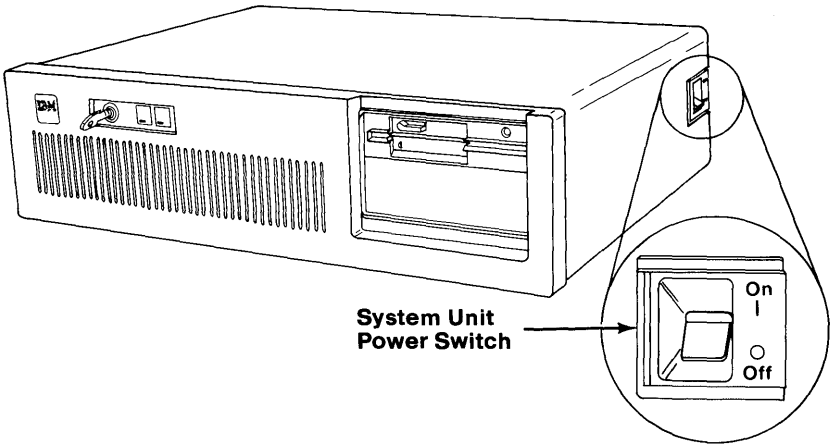
9 Is the screen all white?



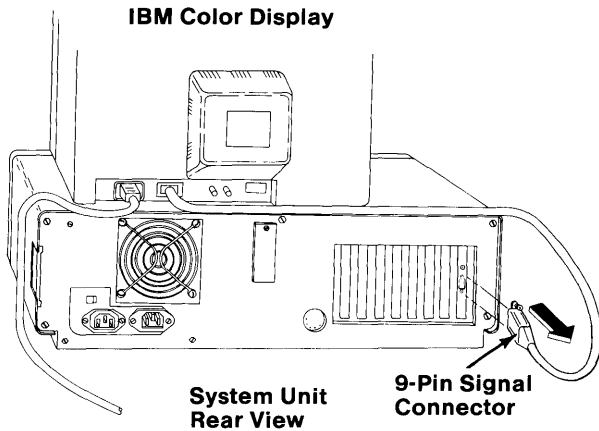
YES Go to Step 14.

NO Go to Step 10.

10 Turn your system unit's power off, and go to step 11.



- 11** Disconnect the display's signal cable from the display adapter.



- 12** Turn your display's power on.

- 13** Is the screen white?

YES Have your system unit serviced. Be sure your Key Lock key is with your system unit.

NO Have your display serviced. Be sure the power cable is with your display.

14 While you watch the screen, turn your system unit's power on.

15 Did the screen change from white to black as soon as the system unit's power was turned on? (This totally black condition may last only 13 seconds before the display changes again.)

YES Go to Step 16.

NO Have your display serviced. Be sure the power cable is with your display.

- 16** Wait for the Power-On Self Test (POST) to complete. The IBM Personal Computer BASIC message will appear with a blinking cursor (if an operating system is not loaded from a diskette or from the fixed disk drive).

```
The IBM Personal Computer Basic
Version CX.XX Copyright IBM Corp. XXXX
XXXXX Bytes Free
Ok
```

```
1LIST 2RUN 3LOAD" 4SAVE 5CONT 6LPT1 '7TRON 8TROFF 9KEY 0SCREEN
```

- 17** Is your screen blank?

YES Have your system unit serviced. Be sure your Key Lock key is with your system unit.

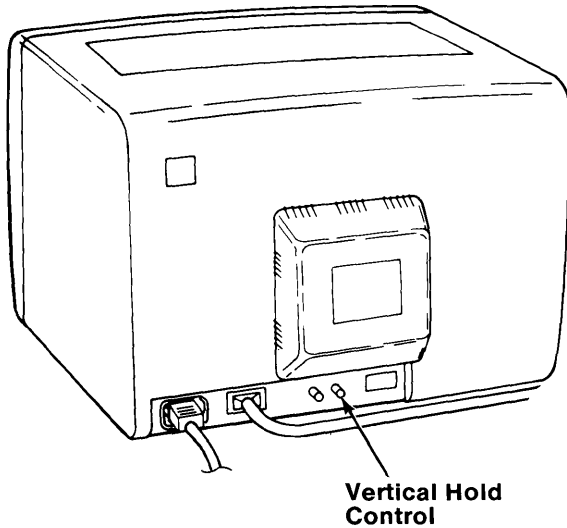
NO Go to Step 18.

18 Is the screen stable?

YES Go to Step 21.

NO Go to Step 19.

19 Turn the Vertical Hold control clockwise as far as it will go, and then turn it counterclockwise until the screen stops rolling and is stable.



20 Were you able to make the screen stable?

YES Go to Step 21.

NO Have your display serviced. Be sure the power cable is with your display.

21 Look at the screen. Does it have white characters on a dark background?

YES Go to Step 27.

NO Go to Step 22.

22 Turn your system unit's power off.

23 Turn your display's power off (if it has a Power switch).

24 Disconnect your display's signal cable from the display adapter.

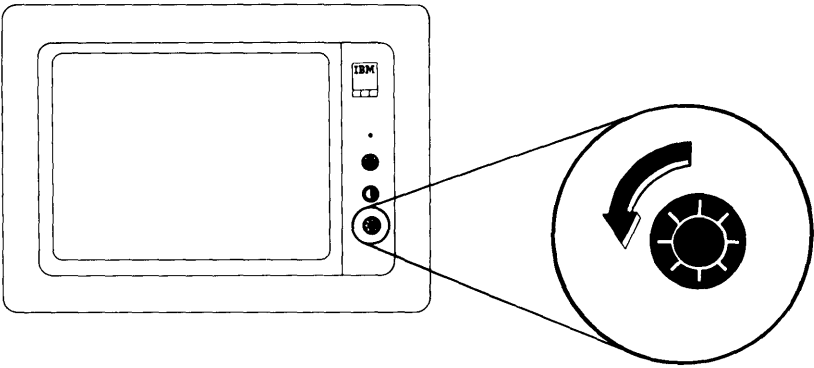
25 Turn your display's power on.

26 Is the screen white?

YES Have your system unit serviced. Be sure your Key Lock key is with your system unit.

NO Have your display serviced. Be sure the power cable is with your display.

- 27** Turn the Brightness control fully counterclockwise.

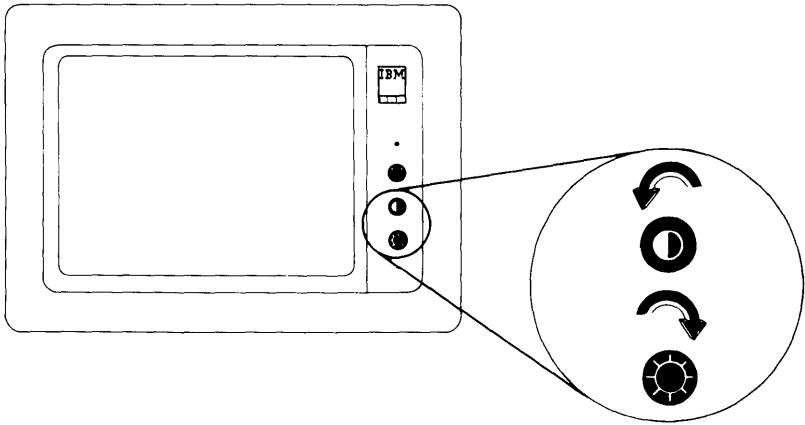


- 28** Does the intensity of the characters decrease?

YES Go to Step 29.

NO Have your display serviced. Be sure the power cable is with your display.

- 29** Turn the Brightness control fully clockwise.
Turn the Contrast control fully
counterclockwise.

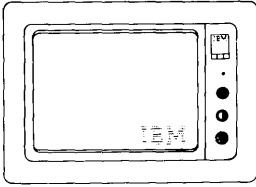


- 30** Does the intensity of the characters decrease?

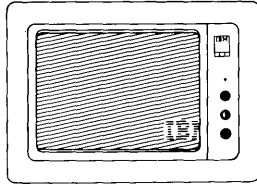
YES Go to Step 31.

NO Have your display serviced. Be sure the power cable is with your display.

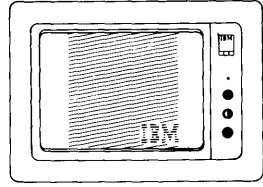
31 Turn the Contrast control fully clockwise. Look at the following examples.



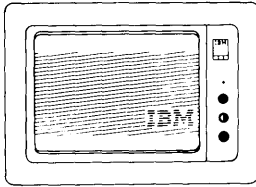
Too Dim



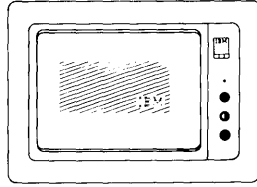
Too Wide



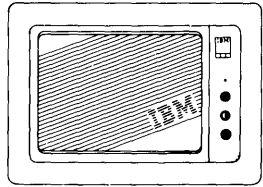
Too Narrow



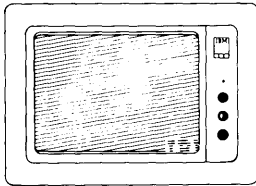
Too Short



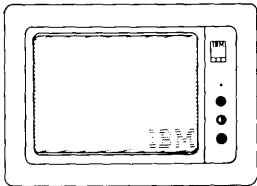
Too Small



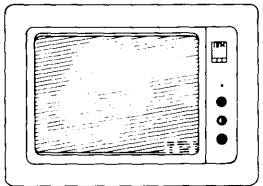
Tilted



**Changes Size When
Brightness Control
Turned**



Out of Focus



**Characters Shifted Left
or Right or Up and
Down Off the Display
Area**

32 Is your problem similar to one of the examples?

YES Have your display serviced. Be sure the power cable is with your display.

NO Go to the "Diskette Format Procedures" in this section to continue testing.

System Checkout

- 1 At the end of "System Testing," the following screen appears.

SYSTEM CHECKOUT
0 – RUN TESTS ONE TIME
1 – RUN TESTS MULTIPLE TIMES
2 – LOG UTILITIES
9 – END SYSTEM CHECKOUT
SELECT THE ACTION DESIRED
?

Press **9** and then press **Enter** (↵). Go to Step 2.

2 Options Menu

SELECT AN OPTION

0 – SYSTEM CHECKOUT

1 – FORMAT DISKETTE

2 – COPY DISKETTE

3 – PREPARE SYSTEM FOR MOVING

4 – SETUP

9 – END DIAGNOSTICS

ENTER THE ACTION DESIRED

?

Press **9** and then press **Enter** (↵). Go to Step 3.

3 You have completed "System Testing".

**PREPARE SYSTEM FOR DESIRED OPERATION
AND PRESS "ENTER"**

?_

Remove the Diagnostics diskette if it has not been removed and return it to the back of this manual.

If you received any errors, have the failing unit serviced. If you did not receive any errors, your IBM Personal Computer AT is ready to be used. Pressing **Enter** (←) will cause the system unit to begin "Power-On Self Test" again.

If you encounter further problems, contact your place of purchase for additional information.

Notes:

SECTION 3. MOVING YOUR IBM Personal Computer AT

Contents

Preparing to Move the System	3-3
Short-Distance Move	3-11
Long-Distance Move	3-12
For All Units	3-12
System Unit	3-12
Keyboard	3-14
IBM Displays	3-15
Setup at Your New Location	3-16

Notes:

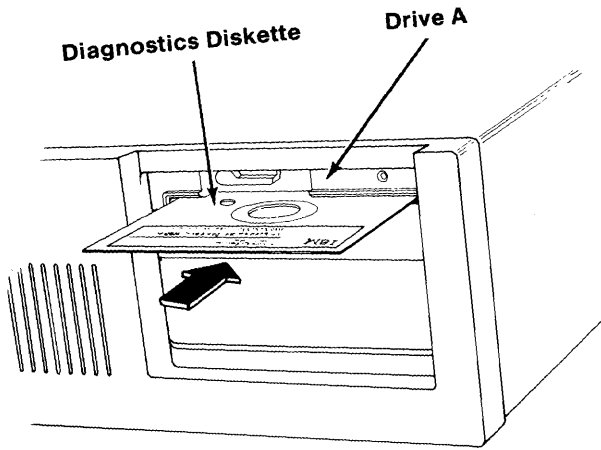
Preparing to Move the System

Warning: To prevent a permanent loss of data on the fixed disk drive, we recommend that all files be backed up and that the heads be parked before moving your system.

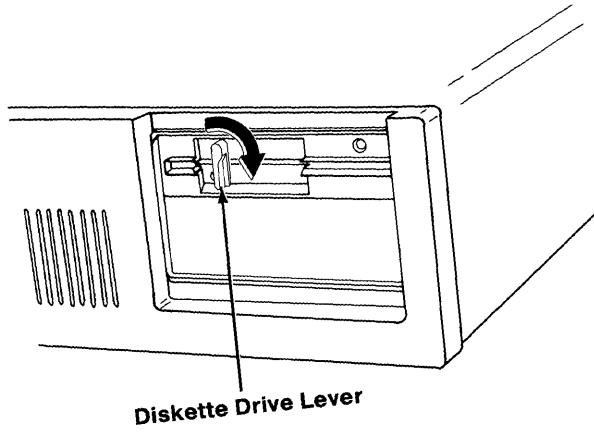
To back up the stored data on your fixed disk drive, see the *IBM Disk Operating System (DOS)* manual for a description of the BACKUP command.

When you have completed BACKUP, return to this section to park the heads of your fixed disk. Go to the next page for loading your Diagnostics diskette.

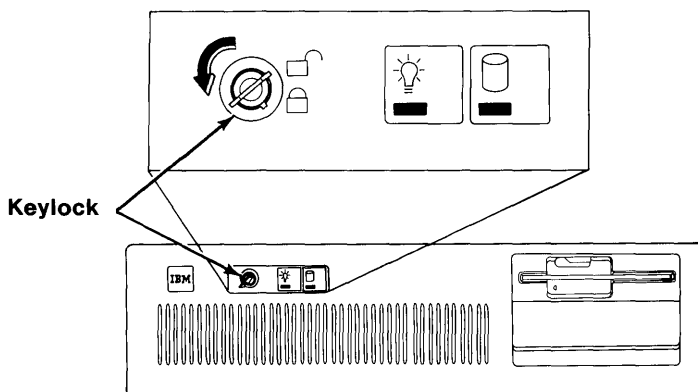
- 1 Get the Diagnostics diskette located at the back of this manual and insert it into drive A.



- 2 Rotate the diskette drive lever clockwise.

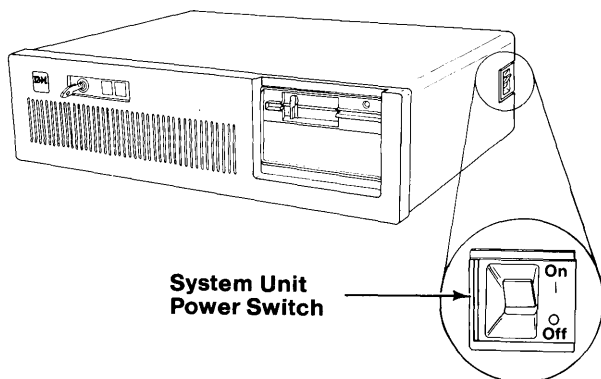


- 3** Be sure that the Key Lock is in the unlocked position.



- 4** Turn the Brightness and Contrast controls fully clockwise. Turn your display's power on (if it has a Power control).

- 5** Turn your system unit's power on.



6 The following message appears on your screen.

SELECT AN OPTION
0 – SYSTEM CHECKOUT
1 – FORMAT DISKETTE
2 – COPY DISKETTE
3 – PREPARE SYSTEM FOR MOVING
4 – SETUP
9 – END DIAGNOSTICS
ENTER THE ACTION DESIRED
?

Press **3** and then press Enter (↵).

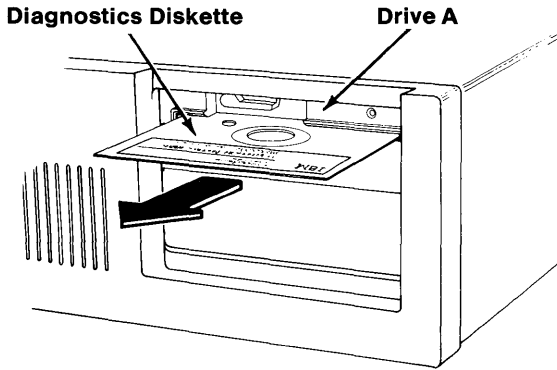
Go to Step 7.

7 The following message appears on your screen.

SELECT AN OPTION
0 – SYSTEM CHECKOUT
1 – FORMAT DISKETTE
2 – COPY DISKETTE
3 – PREPARE SYSTEM FOR MOVING
4 – SETUP
9 – END DIAGNOSTICS
ENTER THE ACTION DESIRED
?3
SYSTEM PREPARED FOR MOVING

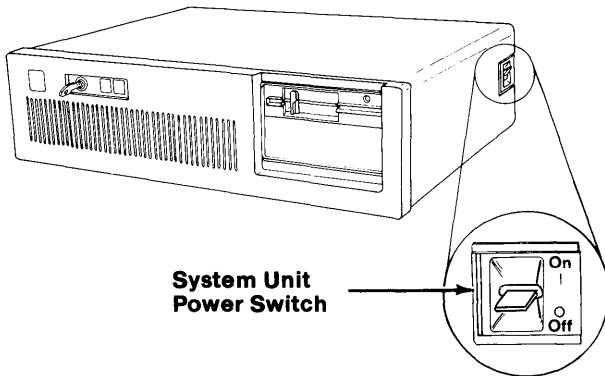
Your fixed disk is now ready to be moved. Go to Step 8.

- 8** Remove the diskette from diskette drive A.

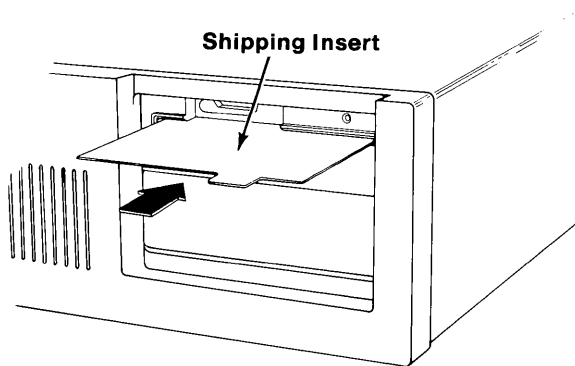


- 9** Turn your system unit's power off.

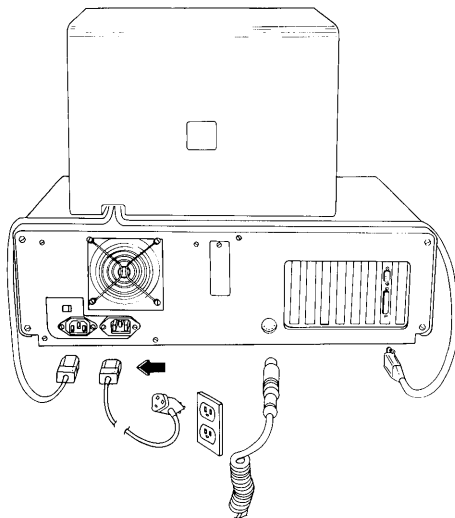
- 10** Turn your display's power off (if it has a Power control).



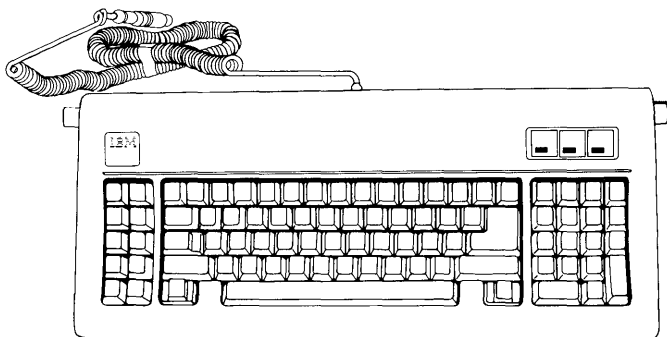
- 11** Insert a shipping insert into each diskette drive. Rotate the diskette drive lever clockwise. If you do not have a shipping insert, a blank diskette can be used.



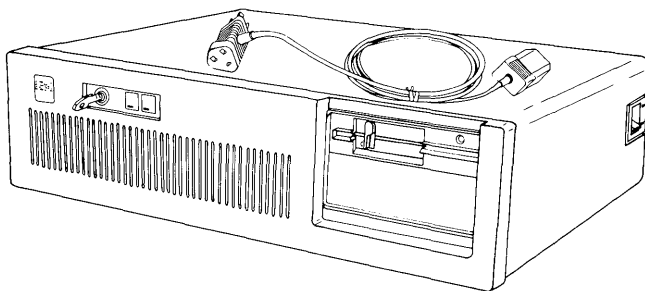
- 12** Unplug your system unit's power cord from the wall outlet. Also, unplug any externally attached device's power cord from the wall outlet. Disconnect all cables from the rear of the system unit.



- 13** Coil the cables to protect the connectors.



- 14** Tape the coiled cables to the system unit, so the unit may be carried safely. IBM recommends using masking or filament tape.



Short-Distance Move

A short distance move is any move where trucking is not involved. An example is moving from one office or one floor to another.

IBM recommends that each unit be moved separately.

CAUTION

You may need two people to move the system unit. It weighs approximately fifty pounds.

Long-Distance Move

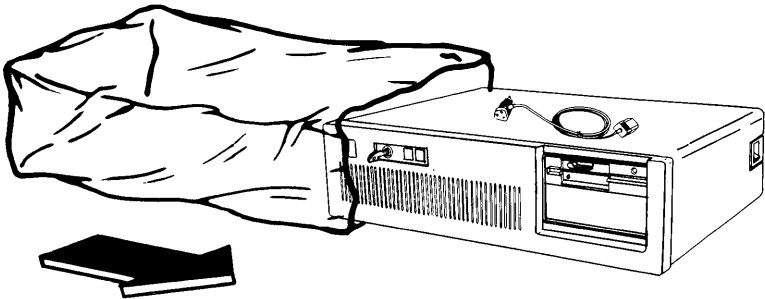
For All Units

If you saved the original shipping cartons and packing materials that your IBM Personal Computer AT came in, use them to pack your units.

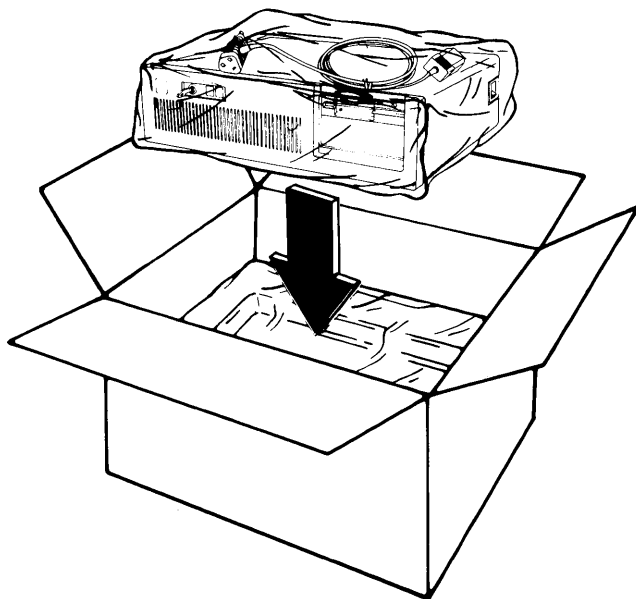
If you are using different cartons, cushion your units well to avoid any damage.

System Unit

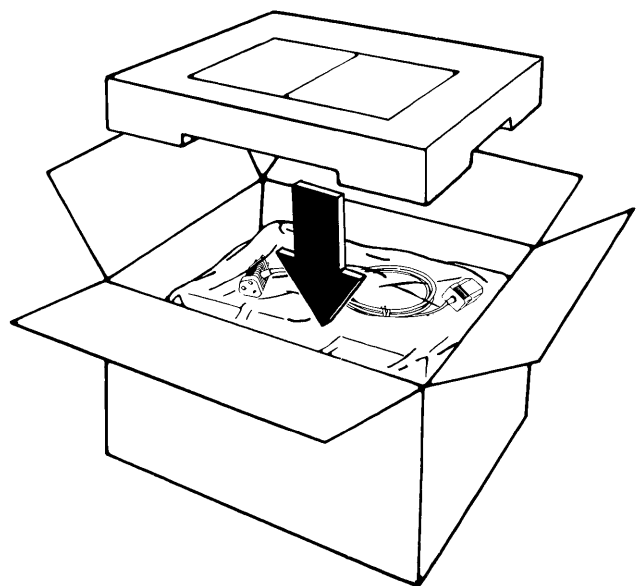
1



2

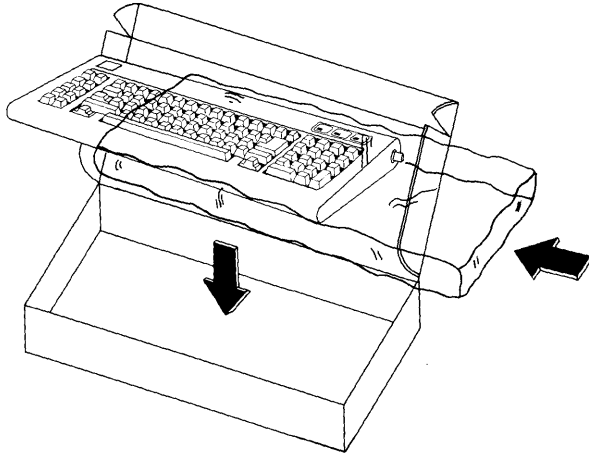


3

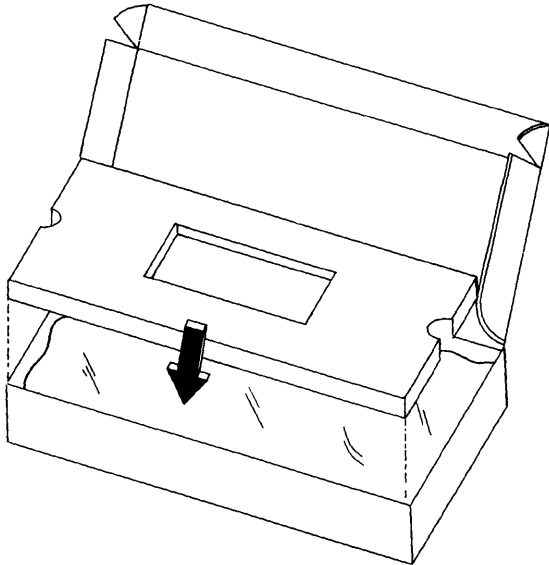


Keyboard

1

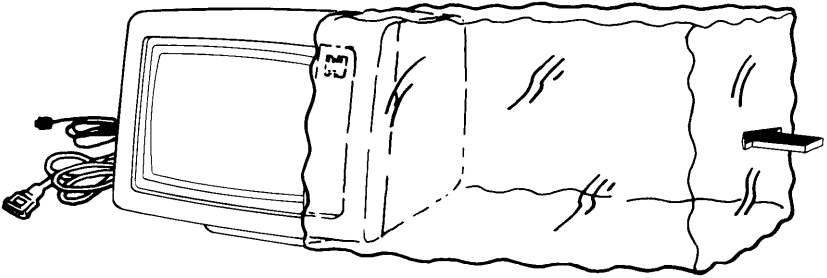


2

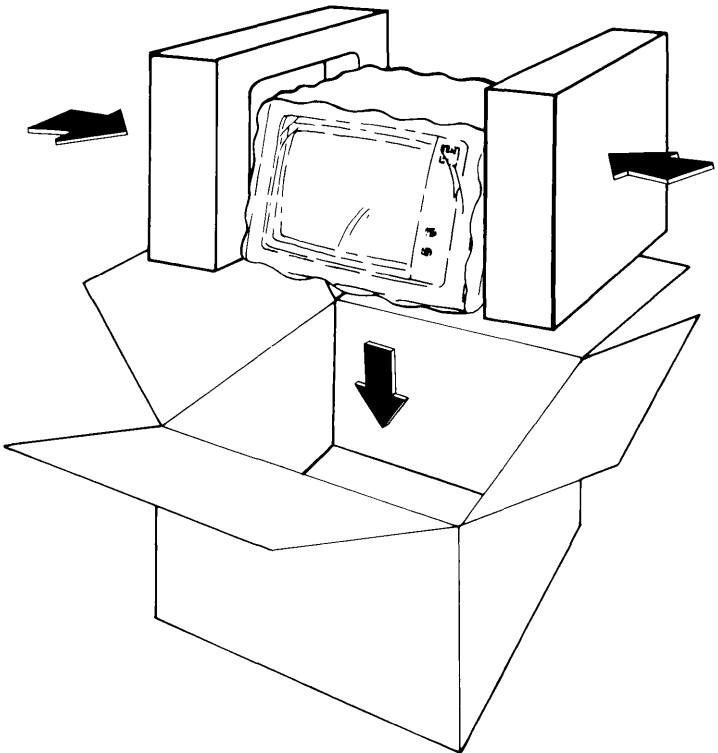


IBM Displays

1



2



Setup at Your New Location

When your system arrives at the new location, unpack it carefully.

To set up and cable your IBM Personal Computer AT, refer to your "Installation and Setup" manual.

Appendixes

Contents

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French	A-5
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Italian	A-9
Spanish	A-11
U.K. English	A-13
U.S. English	A-15
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IBM Personal Computer AT Serial Numbers	B-1

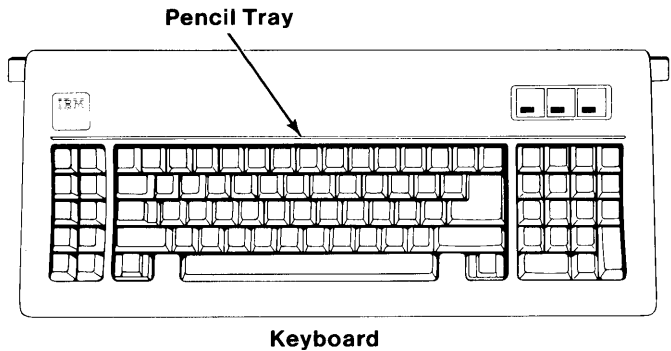
Notes:

Appendix A. KEYBOARD TEMPLATES

Introduction

This section has figures showing the layout of all available keyboards. These figures are intended to be cut out (or reproduced) and used as templates for the various languages provided on a National DOS diskette. If you do not use DOS, your keyboard converts all keystrokes as if you had a U.S. English keyboard. You should use the U.S. English template as a guide.

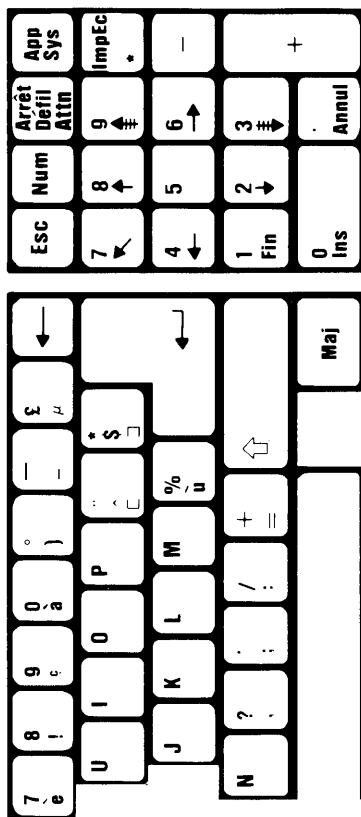
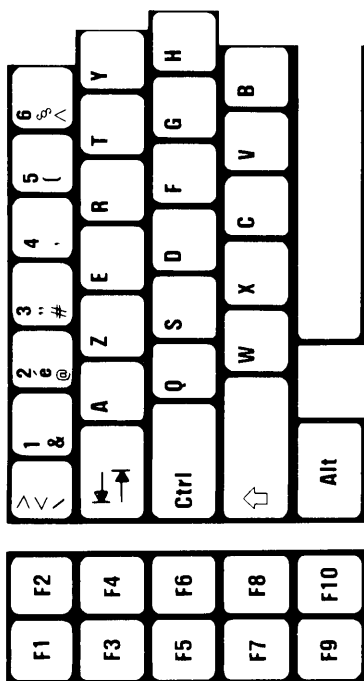
Each figure in this section consists of two parts. Tape the parts together to form the template. Set the template in the pencil tray above the keys.



Notes:

French

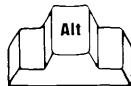
This template is intended for use only by the owner of this manual. If the owner transfers this manual, copies of the template should be destroyed or transferred with the manual.



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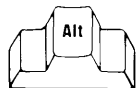
CARACTERES SUPPLEMENTAIRES

1. Appuyez et maintenez



2. Frappez le code de trois chiffres sur le clavier numérique.

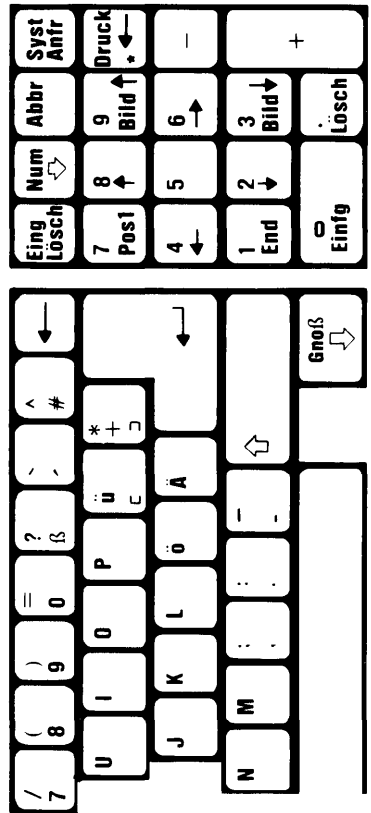
3. Relâchez



96	ˆ	143	Å	160	á	169	┌	226	┐	235	δ	244	┌	254	■
123	˜	144	Ê	161	í	170	└	227	π	236	∞	245	J		
124	˘	145	œ	162	ó	171	½	228	Σ	237	∅	246	+		
125	˙	146	Æ	163	ú	172	¼	229	σ	238	€	247	≈		
126	˚	149	ó	164	ñ	173	ı	230	μ	239	∩	249	•		
127	◊	155	¢	165	Ñ	174	«	231	τ	240	≡	250	•		
128	©	157	¥	166	æ	175	»	232	∅	241	+	251	√		
134	à	158	Pts	167	ø	224	œ	233	∅	242	≥	252	n		
141	ı	159	f	168	ç	225	β	234	Ω	243	≤	253	²		

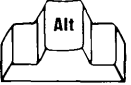
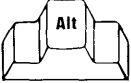
German

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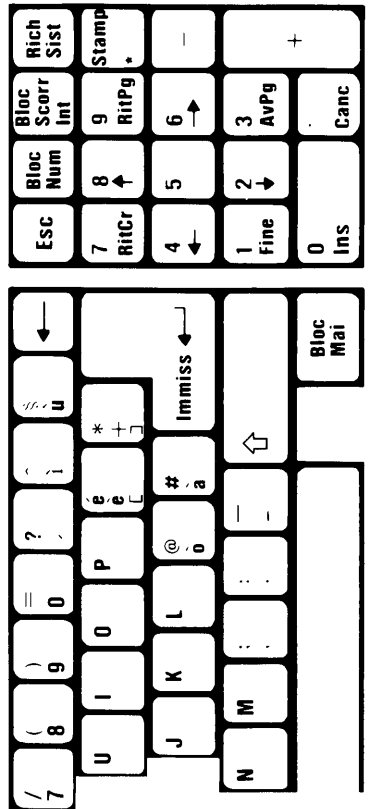
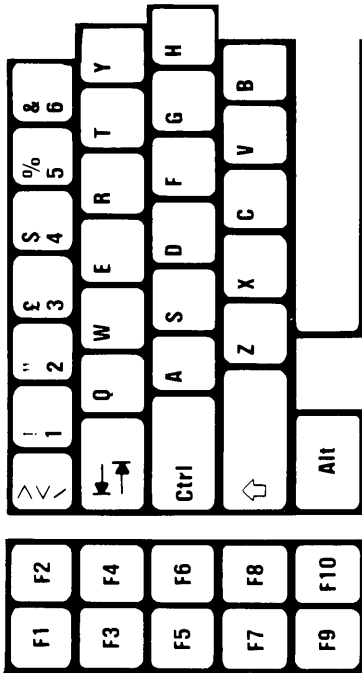
ZUSÄTZLICHE ZEICHEN

1.  **Betätigen und halten.**
2. **Ein 3-Zahlencode auf der Addiermaschinentastatur eingeben.**
3.  **loslassen.**

123	{	136	ê	152	ÿ	167	ø	224	ƒ	234	Ω	243	≤	252	ⁿ
124	|	139	ï	155	¢	168	ı	226	⌈	235	δ	244	⌈	253	^z
125	}	140	î	156	£	169	⌋	227	π	236	∞	245	J	254	■
126	~	141	ì	157	¥	170	⌌	228	Σ	237	∅	246	+		
127	⊠	143	Ë	158	Pts	171	½	229	σ	238	€	247	≈		
128	ç	145	œ	159	f	172	¼	230	μ	239	∩	248	°		
131	à	146	Æ	164	ñ	173	ı	231	τ	240	≡	249	•		
134	â	147	ô	165	Ñ	174	«	232	ϕ	241	±	250	•		
135	ç	150	û	166	ä	175	»	233	Θ	242	≥	251	√		

Italian

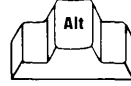
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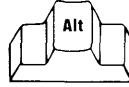
CARATTERI AGGIUNTIVI

1. Premere e tenere premuto il tasto



2. Battere un codice di tre cifre sulla tastiera numerica.

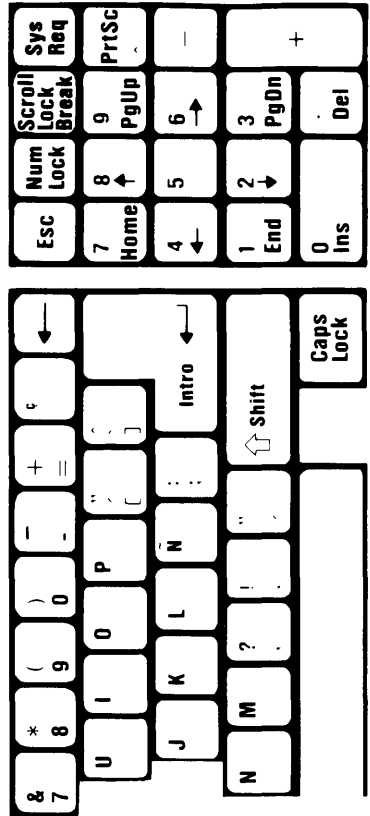
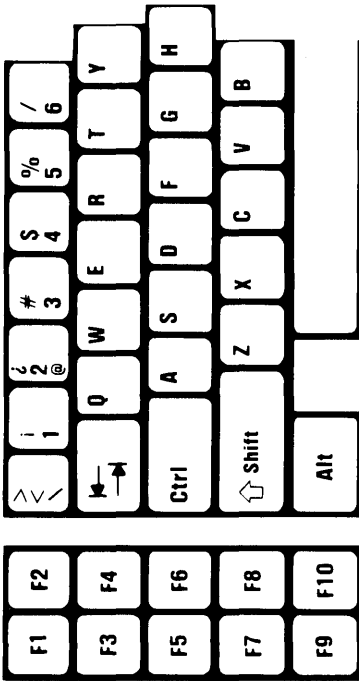
3. Rilasciare il tasto



96	´	137	ë	148	ö	160	á	169	┌	226	┐	235	ó	244	┌	253	²
127	◊	139	ï	150	û	161	í	170	└	227	π	236	∞	245	J	254	■
128	◊	140	ì	152	ÿ	162	ó	171	½	228	Σ	237	∅	246	+	255	
129	◊	142	Ä	153	Ö	163	ú	172	¼	229	σ	238	€	247	≈		
131	ä	143	Å	154	Ü	164	ñ	173	ı	230	μ	239	∩	248	°		
132	ä	144	Ê	155	ç	165	Ñ	174	«	231	τ	240	≡	249	•		
134	â	145	œ	157	¥	166	ä	175	»	232	ϕ	241	≠	250	·		
135	ç	146	Æ	158	Pts	167	ö	224	∞	233	Θ	242	≠	251	√		
136	è	147	ó	159	f	168	ù	225	β	234	Ω	243	≠	252	³		

Spanish

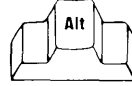
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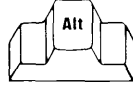
CARACTERES ADICIONALES

1. Pulse y mantenga pulsada la tecla



2. Teclee un código de 3 dígitos en el teclado numérico (Lado derecho del teclado)

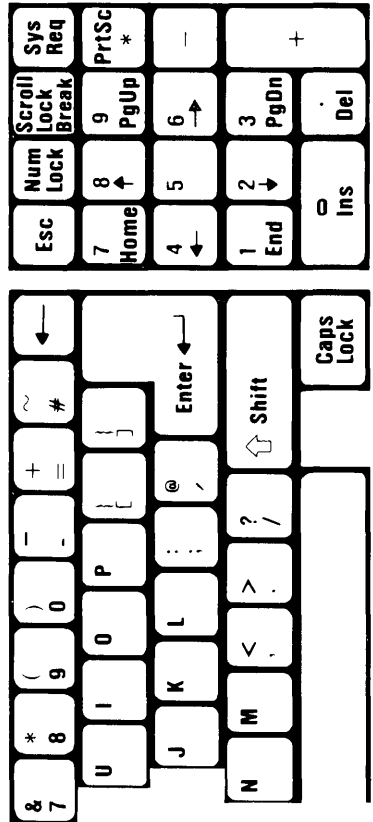
3. Libere



123	|	156	£	172	¼	230	μ	239	∩	248	°
124	¦	157	¥	174	«	231	τ	240	≡	249	•
125	}	158	Pts	175	»	232	ϕ	241	+	250	•
126	~	159	ƒ	224	∞	233	⊖	242	≥	251	√
127	□	166	Ⓐ	225	β	234	Ω	243	≤	252	ⁿ
134	Ⓐ	167	∅	226	┌	235	δ	244	┌	253	²
145	œ	169	└	227	π	236	∞	245	J	254	■
146	Æ	170	└	228	Σ	237	∅	246	+		
155	¢	171	½	229	σ	238	€	247	≈		

U.K. English

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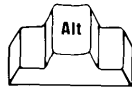


This template is intended for use only by the owner of this manual. If the owner transfers this manual, copies of the template should be destroyed or transferred with the manual.

96	'	135	ç	144	É	153	Ö	163	ú	172	¼	229	σ	238	€	247	≈
127	Ð	136	è	145	œ	154	Ü	164	ñ	173	í	230	μ	239	∩	248	◦
128	Ç	137	é	146	Æ	155	ø	165	Ñ	174	«	231	τ	240	≡	249	•
129	ç	138	e	147	ö	157	¥	166	á	175	»	232	ϕ	241	±	250	·
130	é	139	ï	148	ó	158	Pts	167	o	224	ϣ	233	Θ	242	∇	251	√
131	à	140	ì	149	ô	159	f	168	ç	225	β	234	Ω	243	≤	252	³
132	â	141	î	150	û	160	á	169	⌋	226	∏	235	δ	244	∩	253	²
133	ä	142	Ä	151	ü	161	í	170	⌋	227	π	236	∞	245	∩	254	■
134	å	143	Å	152	ÿ	162	ó	171	½	228	Σ	237	∅	246	†		

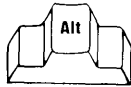
ADDITIONAL CHARACTERS

1. Press and hold



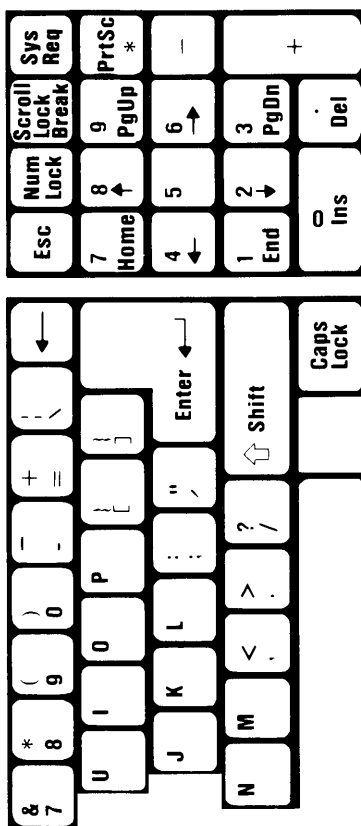
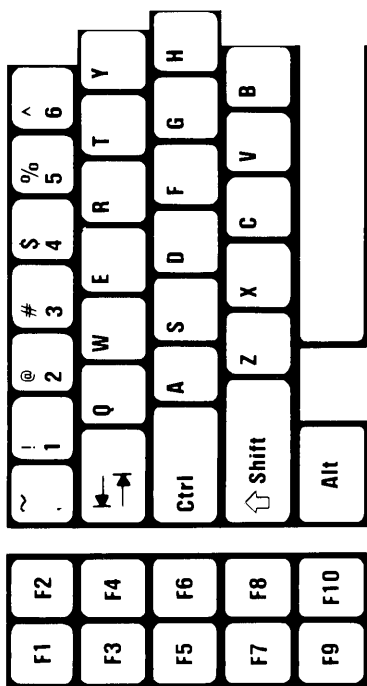
2. type 3 digit code on numeric keypad.

3. Release



U.S. English

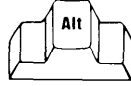
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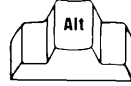
ADDITIONAL CHARACTERS

1. Press and hold



2. Type 3 digit code on numeric keypad.

3. Release



127	◊	136	ê	145	œ	154	Û	163	ú	172	¼	229	σ	239	∩	248	°
128	Ç	137	ë	146	Æ	155	ç	164	ñ	173	í	230	μ	240	≡	249	•
129	ü	138	è	147	ô	156	£	165	Ñ	174	«	231	τ	241	≠	250	•
130	é	139	ï	148	ö	157	¥	166	ä	175	»	232	ϕ	242	≠	251	√
131	â	140	î	149	ó	158	Pts	167	ó	224	∞	234	Ω	243	∞	252	n
132	ä	141	ì	150	û	159	f	168	ì	225	β	235	δ	244	∩	253	²
133	ä	142	Ä	151	ü	160	á	169	∟	226	∟	236	∞	245	∩	254	■
134	á	143	Ä	152	ÿ	161	í	170	∟	227	π	237	∅	246	+	255	
135	ç	144	È	153	Ö	162	ó	171	½	228	Σ	238	€	247	≈		

Appendix B. Recording Serial Numbers

IBM Personal Computer AT Serial Numbers

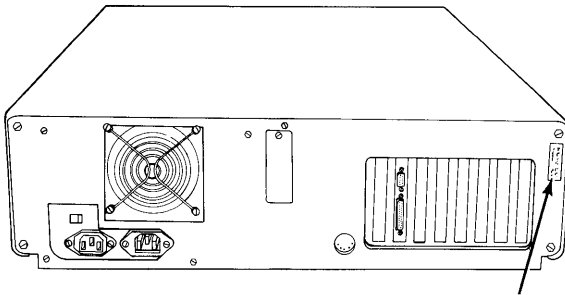
Record the serial numbers of your equipment on the following pages.

IMPORTANT

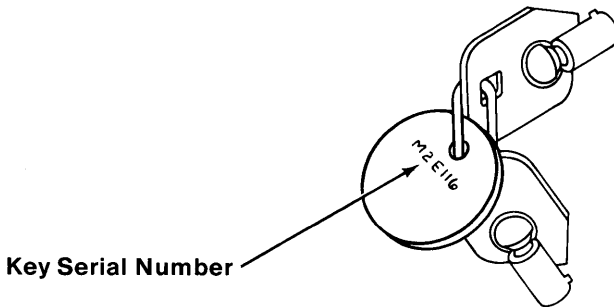
Record the serial numbers for your IBM Personal Computer AT

SYSTEM UNIT SERIAL
NUMBER _____

KEY SERIAL NUMBER _____



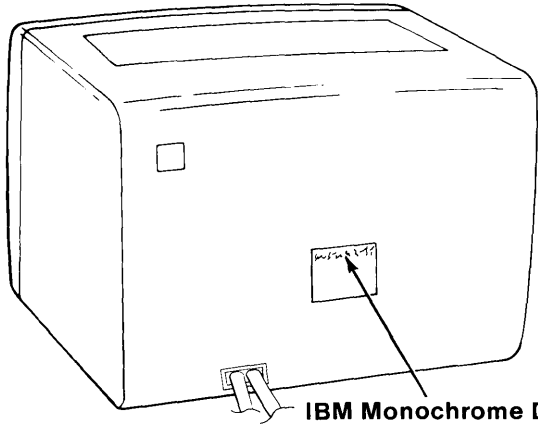
System Unit Serial Number



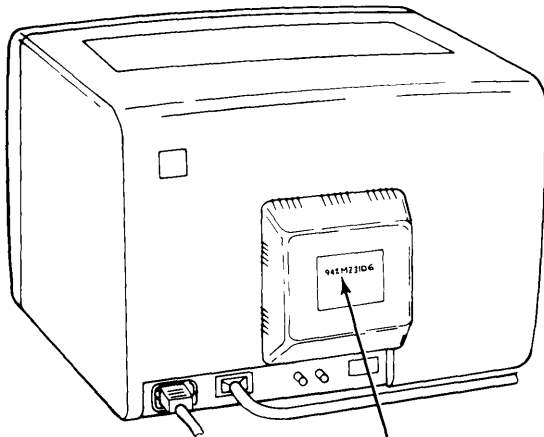
Key Serial Number

IBM MONOCHROME DISPLAY SERIAL
NUMBER _____

IBM COLOR DISPLAY SERIAL
NUMBER _____



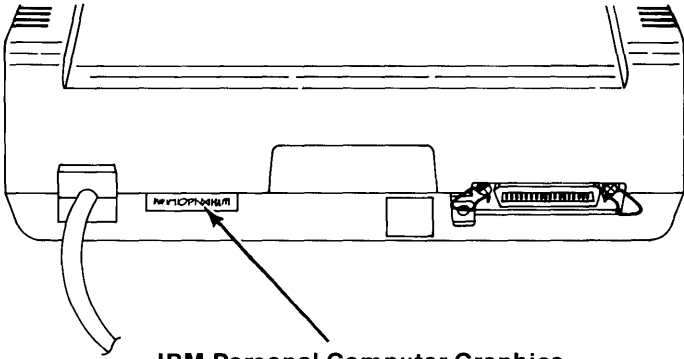
**IBM Monochrome Display
Serial Number**



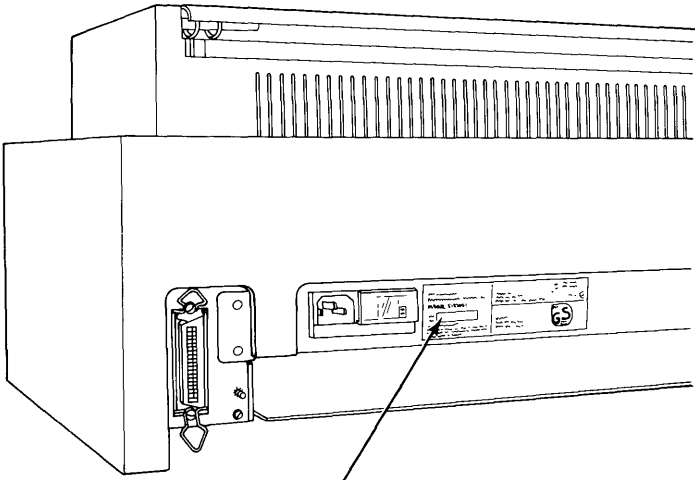
IBM Color Display Serial Number

IBM PERSONAL COMPUTER GRAPHICS
PRINTER SERIAL
NUMBER _____

IBM PERSONAL COMPUTER COLOR PRINTER
SERIAL NUMBER _____



**IBM Personal Computer Graphics
Printer Serial Number**



**IBM Personal Computer
Color Printer Serial Number**

Glossary

ASCII. American Standard Code for Information Interchange. The standard code using a coded character set consisting of 7-bit coded characters (8 bits including parity check), used for information interchange among data processing systems, data communications systems and associated equipment. The ASCII set consists of control characters and graphic characters.

BASIC. Beginner's All-purpose Symbolic Instruction Code. A programming language which uses common English words.

back up. Duplicating data from a fixed disk drive or diskette to a diskette, which ensures availability of data in the event the original is lost or damaged.

byte. A binary character operated upon as a unit and constitutes the smallest addressable unit in the system.

CPS. Characters per second. Used to measure the printing speed of a printer.

cursor. A bar of light that indicates where data entered from the keyboard will appear on the screen.

data. All information entered into or used by the computer.

diagnostic. Pertaining to the detection and isolation of a malfunction or mistake.

diagnostics diskette. A diskette used by computer users and service personnel to diagnose hardware problems.

diskette. A storage device consisting of a flexible magnetic disk inside a protective plastic jacket.

diskette drive. A device that uses diskettes for mass storage and retrieval of data.

DOS. Disk Operating System. A program that interacts with the processor and the fixed disk or diskette drive to control the flow of data.

fixed disk. A disk made of rigid material with a magnetic coating, used for mass storage and retrieval of data.

formatting. The preparation of a fixed disk or diskette for use by the computer.

formatted fixed disk or diskette. A fixed disk or diskette that can be used by the computer to store data.

joystick. A device that connects to the Game Control Adapter.

K bytes. Kilobyte. A kilobyte equals 1024 bytes of information.

M bytes. Megabyte. A megabyte equals 1,048,576 bytes of information.

modem. A device that allows information to be exchanged between computers by using telephone lines.

operating system. A program that supervises the computers use of programs.

POST. Power-On Self Test. A series of diagnostic tests that are run each time the computer's power is turned on.

scratch diskette. A diskette that has no stored data.

typematic. Keyboard buttons that repeat when held down.

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Reader's Comment Form

Guide To Operations

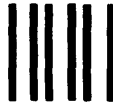
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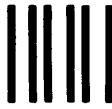
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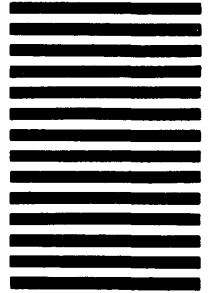


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