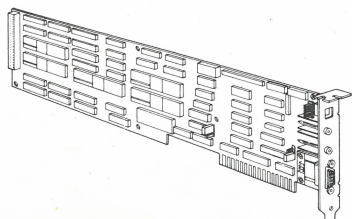
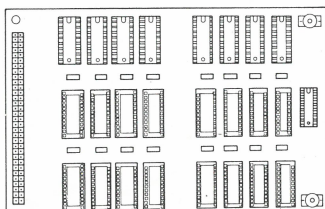


Installation Instructions for The:

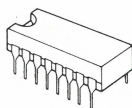
**Enhanced Graphics Adapter, or
Graphics Memory Expansion Card, or
Graphics Memory Module Kit**



Enhanced Graphics Adapter



Graphics Memory Expansion Card



Graphics Memory Module Kit

The Enhanced Graphics Adapter option* consists of:

- Enhanced Graphics Adapter
- Card Support Bracket
- Problem Determination Procedures
- Diagnostic Diskette
- Installation Instructions

The Graphics Memory Expansion Card option* consists of:

- Graphics Memory Expansion Card
- Installation Instructions

The Graphics Memory Module Kit option* consists of:

- 16 Graphics Memory Modules
- Installation Instructions

If any of the items are missing or damaged, notify your place of purchase.

* These options are sold separately.

August 2, 1984

© Copyright IBM Corporation 1984

Limited Warranty

The International Business Machines Corporation warrants this IBM Personal Computer Product to be in good working order for a period of one year from the date of purchase from IBM or an authorized IBM Personal Computer dealer. Should this Product fail to be in good working order at any time during this one year warranty period, IBM will, at its option, repair or replace this Product at no additional charge except as set forth below. Repair parts and replacement Products will be furnished on an exchange basis and will be either reconditioned or new. All replaced parts and Products become the property of IBM. This limited warranty does not include service to repair damage to the Product resulting from accident, disaster, misuse, abuse, or non-IBM modification of the Product.

Limited Warranty service may be obtained by delivering the Product during the one year warranty period to an authorized IBM Personal Computer dealer or IBM Service Center and providing proof of purchase date. If this Product is delivered by mail, you agree to insure the Product or assume the risk of loss or damage in transit, to prepay shipping charges to the warranty service location and to use the original shipping container or equivalent. Contact an authorized IBM Personal Computer dealer or write to IBM Personal Computer, Sales and Service, P.O. Box 1328-W, Boca Raton, Florida 33432, for further information.

August 2, 1984

ALL EXPRESS OR IMPLIED WARRANTIES FOR THIS PRODUCT INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO A PERIOD OF 1 YEAR FROM THE DATE OF PURCHASE, AND NO WARRANTIES, WHETHER EXPRESS OR IMPLIED, WILL APPLY AFTER THIS PERIOD. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

IF THIS PRODUCT IS NOT IN GOOD WORKING ORDER AS WARRANTED ABOVE, YOUR SOLE REMEDY SHALL BE REPAIR OR REPLACEMENT AS PROVIDED ABOVE. IN NO EVENT WILL IBM BE LIABLE TO YOU FOR ANY DAMAGES, INCLUDING ANY LOST PROFITS, LOST SAVINGS OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF OR INABILITY TO USE SUCH PRODUCT, EVEN IF IBM OR AN AUTHORIZED IBM PERSONAL COMPUTER DEALER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, OR FOR ANY CLAIM BY ANY OTHER PARTY.

SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR CONSUMER PRODUCTS, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH MAY VARY FROM STATE TO STATE.

August 2, 1984

© Copyright IBM Corporation 1984

iii

FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

Warning: This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.

INSTRUCTIONS TO USER

This equipment generates and uses radio frequency energy and if not installed and used properly, i.e., in strict accordance with the operating instructions, reference manuals, and the service manual, may cause interference to radio or television reception. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a residential installation.

August 2, 1984

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.
- If peripherals not offered by IBM are used with this equipment, it is suggested that you use shielded, grounded cables with in-line filters, if necessary.

If necessary consult your dealer service representative for additional suggestions.

The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interference.

August 2, 1984

© Copyright IBM Corporation 1984

Notes:

Contents

Installation Requirements	1
Tools Required	1
Installation Instructions	2
Direct Drive Connector Information	31
Light Pen Connector Information	32

Notes:

August 2, 1984

© Copyright IBM Corporation 1984

Installation Requirements

The Enhanced Graphics Adapter must be installed in the system unit.

Tools Required

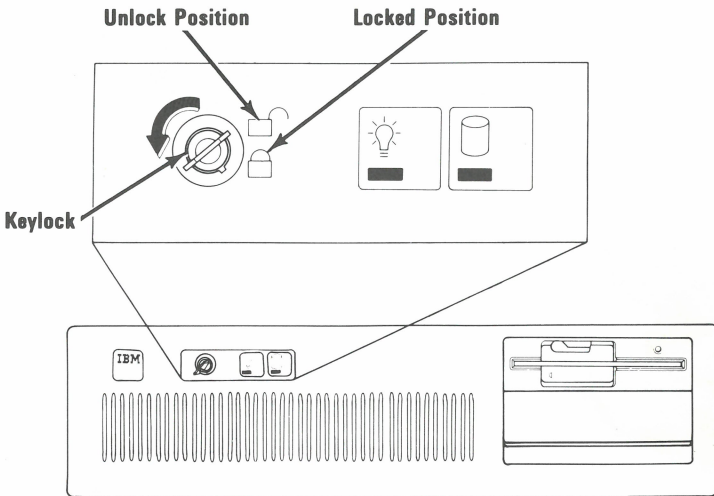
- Medium-size, flat-blade screwdriver

Optional:

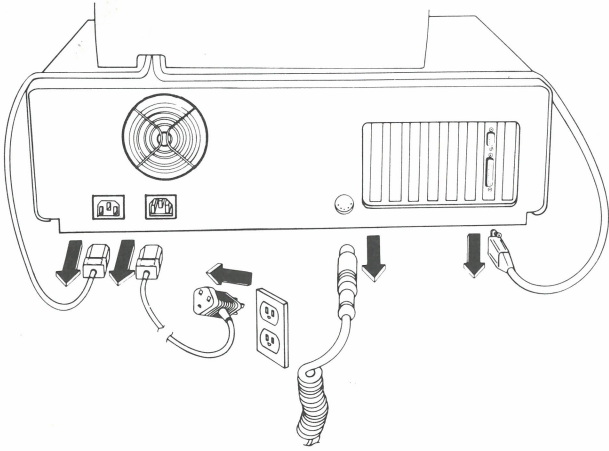
- Medium screwstarter
- 3/16-inch nutdriver
- 1/4-inch nutdriver
- Module puller (if installing Graphics Memory Module Kit)
- Small screwdriver

Installation Instructions

- 1** Set the power switch on the system unit to Off.
- 2** Set the power switches on all external devices (printer, display, etc.) to Off.
- 3** Be sure that the lock is unlocked (turn the key counterclockwise and remove the key).

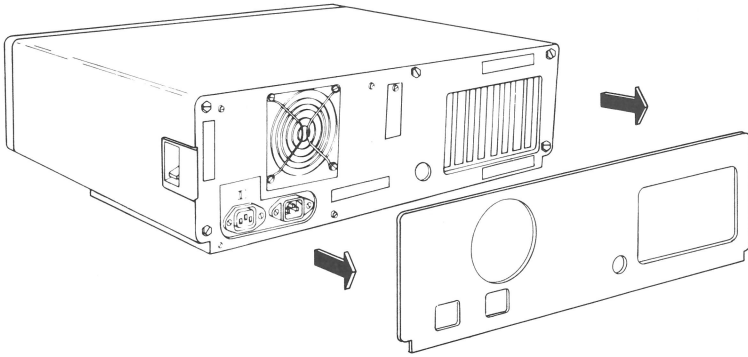


- 4 Unplug the system unit's power cord from the wall outlet.
- 5 Disconnect all cables from the rear of the system unit.

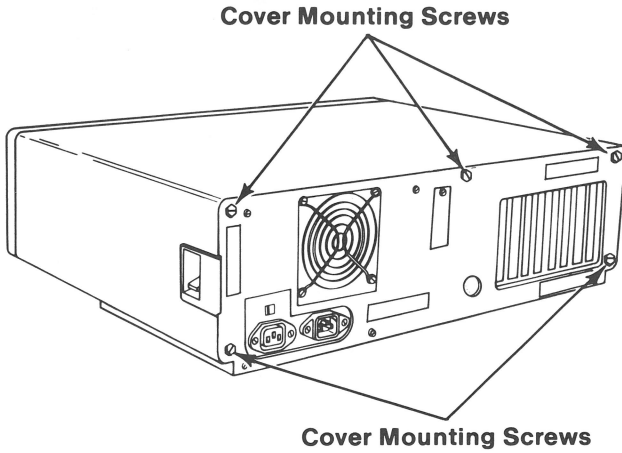


- 6** Position the system unit to allow access to the rear and remove the back panel from the rear of your system unit.

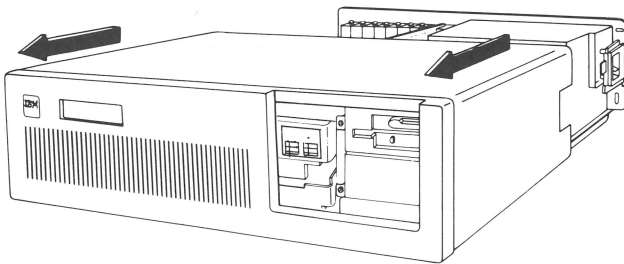
Note: The back panel is attached to the system unit with plastic fastener strips.



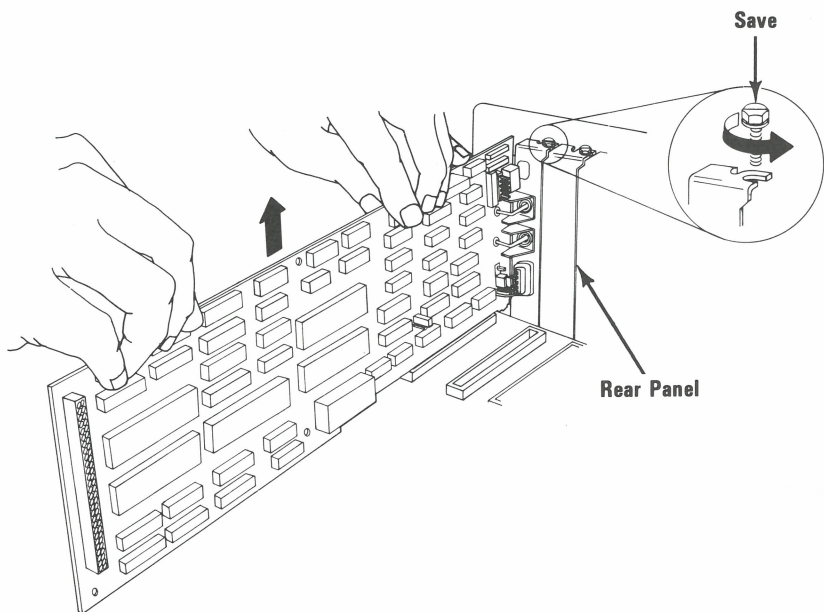
- 7** Use the flat-blade screwdriver or 1/4-inch nutdriver and remove the five cover mounting screws. Save the screws for reinstallation of the cover.



- 8** Remove the cover.

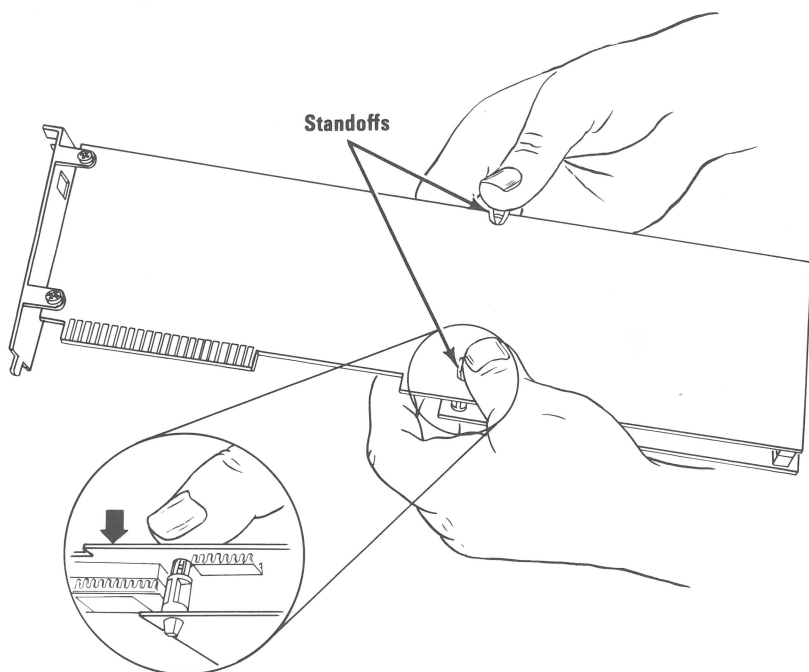


- 9** If you are installing the Enhanced Graphics Adapter in your system for the first time, go to Step 14. If the graphics adapter is already installed in your system, and you are installing the Graphics Memory Expansion Card or the Graphics Memory Module Kit, go to Step 10.
- 10** Use the flat-blade screwdriver or 3/16-inch nutdriver and remove the screw that holds the Enhanced Graphics Adapter in place by turning the screw counterclockwise. Save the screw for the reinstallation of the adapter.
- 11** Grasp the adapter by the top and lift it straight up.

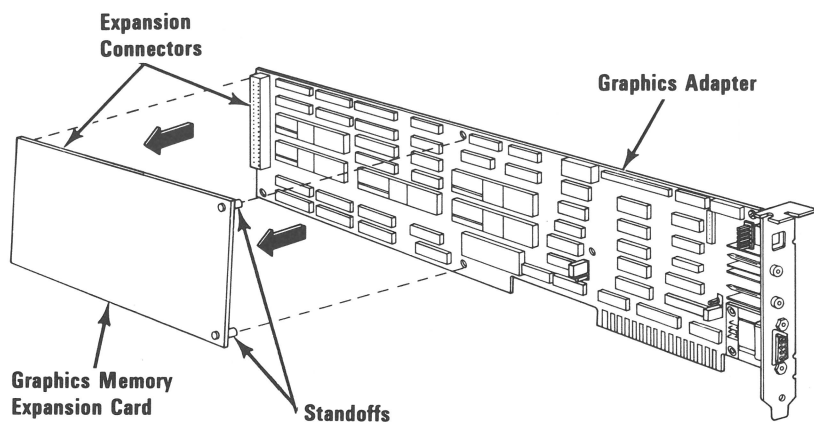


12 If the expansion card is installed on the graphics adapter, it must be removed at this time. If it is not installed, go to Step 14.

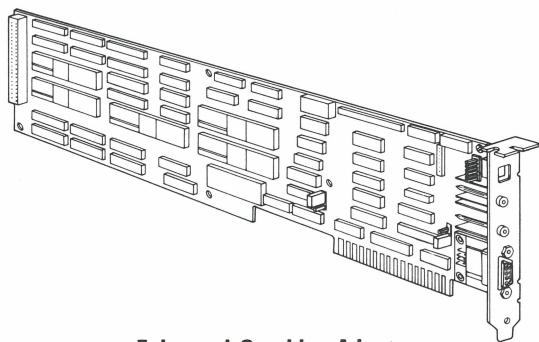
To remove the expansion card, press on the ends of the standoffs (on the pin side of the adapter) to release them from the adapter.



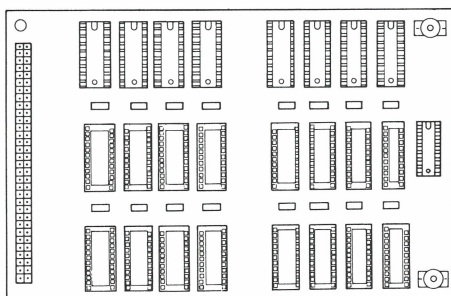
- 13** Carefully separate the expansion connector and pull the expansion card away from the graphics adapter.



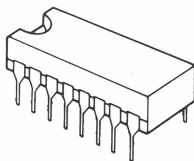
14 These installation instructions are for the Enhanced Graphics Adapter, the Graphics Memory Expansion Card and the Graphics Memory Module Kit. The adapter can be installed alone or with the expansion card and memory kit attached to it to provide additional graphics memory.



Enhanced Graphics Adapter



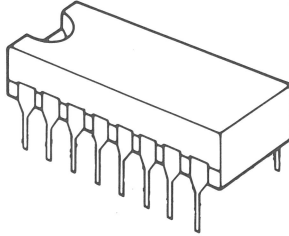
Graphics Memory Expansion Card



Graphics Memory Module Kit

15 Carefully read the following steps and answer each question as it relates to your installation.

16 The Graphics Memory Module Kit consists of 16 memory modules that plug into the expansion card. This adds an additional 128KB of graphics memory to the expansion card.



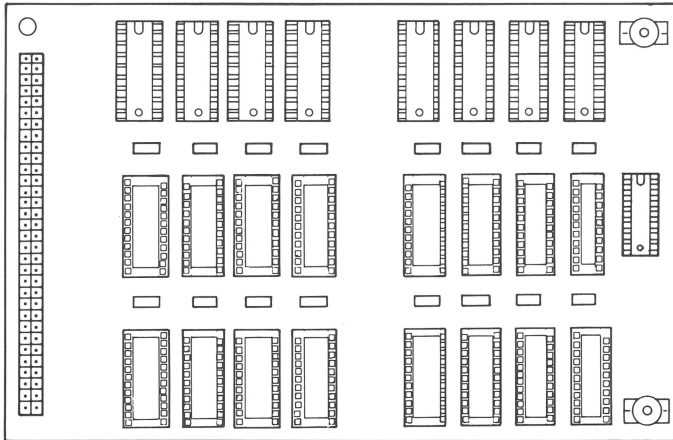
DO YOU HAVE A GRAPHICS MEMORY MODULE KIT TO INSTALL?

YES Go to Step 19, Graphics Memory Module Kit Installation.

NO Go to next step.

17

The Graphics Memory Expansion Card plugs into the graphics adapter to expand the memory of the adapter to 128KB (256KB if the memory kit has been installed on the expansion card).

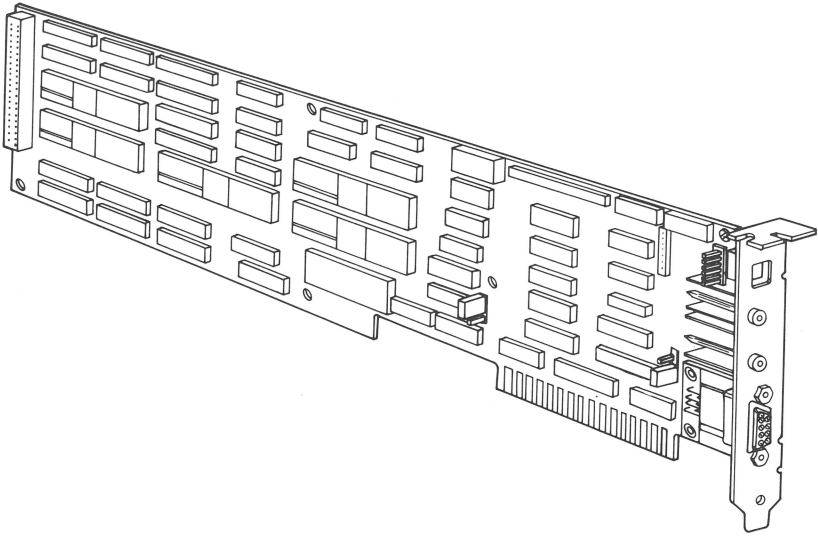


DO YOU HAVE A GRAPHICS MEMORY EXPANSION CARD TO INSTALL?

YES Go to Step 22, Graphics Memory Expansion Card Installation.

NO Go to next step.

- 18** The Enhanced Graphics Adapter can be installed without any options attached to it. The adapter has a total of 64KB of graphics memory. Options can be added at any time to expand the graphics memory to 128KB or 256KB.

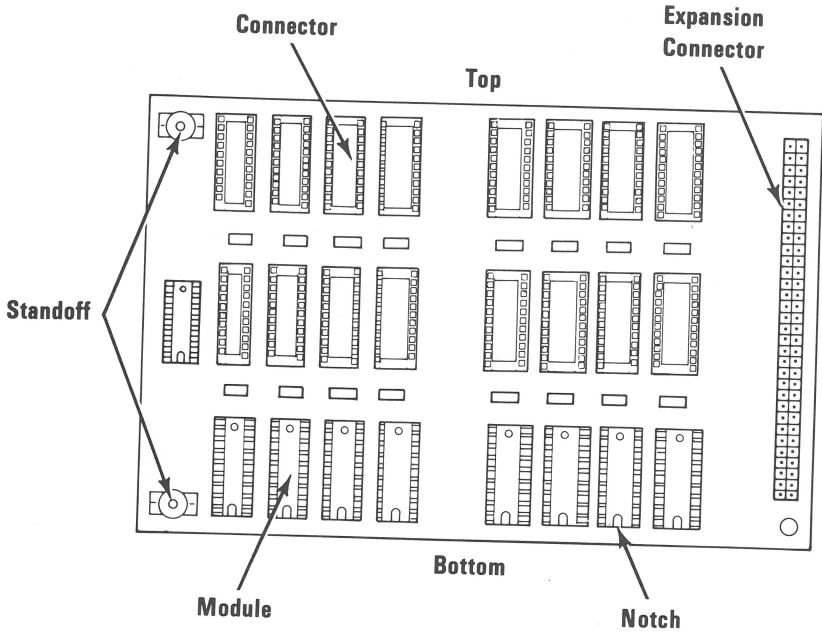


YOU ARE INSTALLING THE ENHANCED GRAPHICS ADAPTER WITH NO OPTIONS ATTACHED.

Go to Step 24, Enhanced Graphics Adapter Installation.

Graphics Memory Module Kit Installation

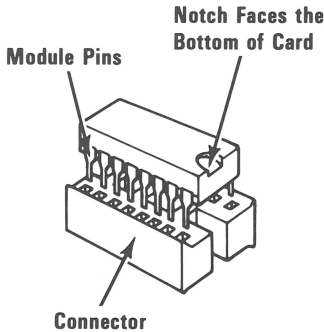
- 19** Take the expansion card and place it on a flat surface with the components facing up, as shown below. Study the figure below to become familiar with the module layout.



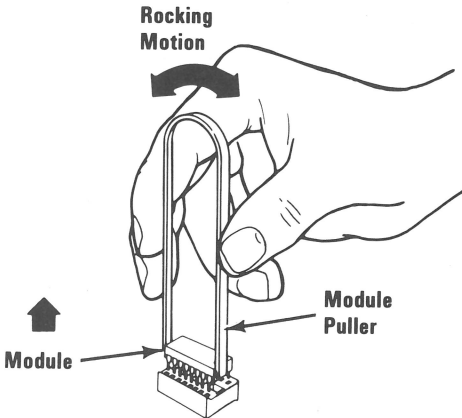
Warning: Damage to the module or expansion card may result if the modules are installed incorrectly. The module must be installed with the notch facing the bottom of the card.

- 20** You are now ready to install your modules. The modules are identical, and each module has a notch that faces the bottom of the card when installed.

Warning: The pins on the module are easily bent and must be aligned with the connector before the module is pressed in place.

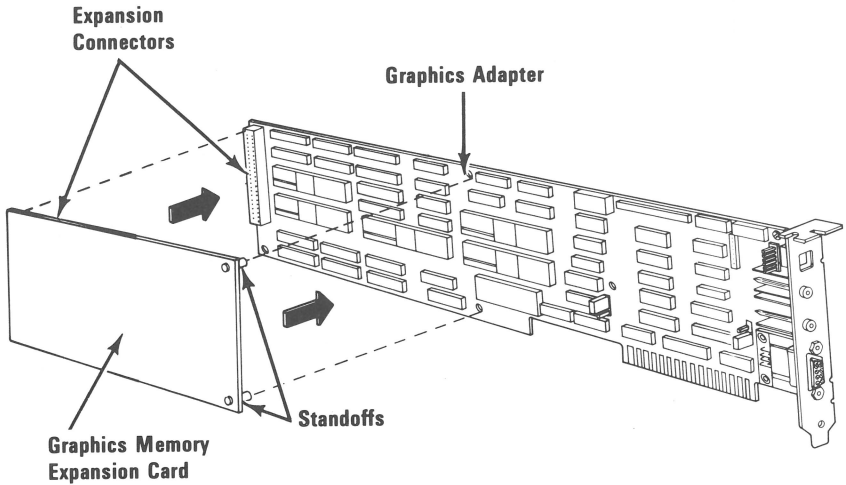


- 21** Align the pins of each module with the connector and firmly press each of the 16 modules in place. If you install a module incorrectly, carefully remove it with a module puller (or small screwdriver) as shown below. After installing all of the modules, go to Step 22.

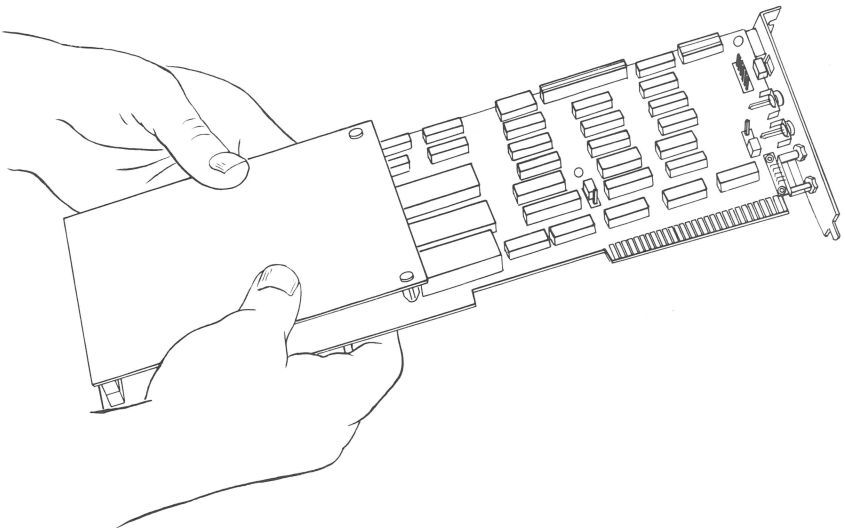


Graphics Memory Expansion Card Installation

- 22** Align the expansion card with the graphics adapter. Pay close attention to the location of the standoffs and the expansion connector.



- 23** Carefully press the expansion card and graphics adapter together. Go to Step 24.



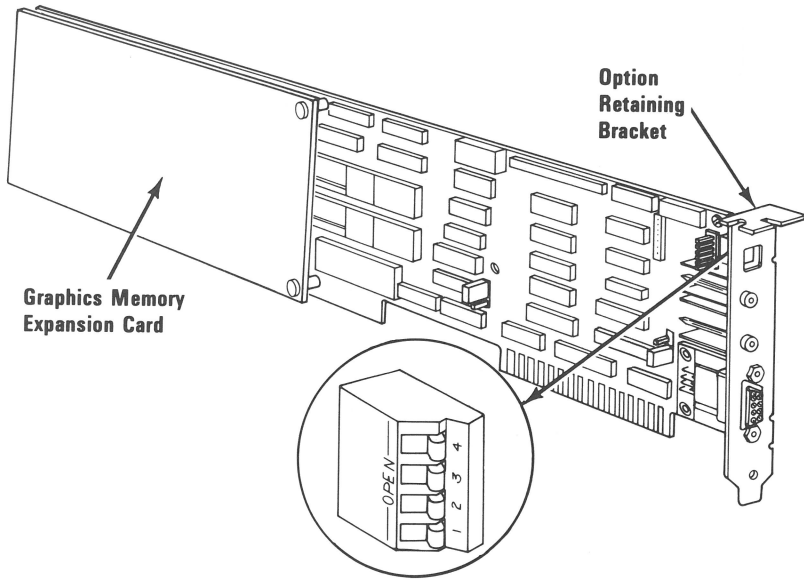
August 2, 1984

© Copyright IBM Corporation 1984

Enhanced Graphics Adapter 15

Enhanced Graphics Adapter Installation

- 24** Look at the rear of the graphics adapter and find the switch block thru the access hole in the retaining bracket.



25 To set the switches on your graphics adapter, use the Switch Setting Tables Guide on the following page.

You set the adapter switches to indicate:

- The type of display connected to your Enhanced Graphics Adapter (color or monochrome).
- The number of display screen columns (40x25 or 80x25), being used by your display.

Note: A screen display of 40x25 is 40 characters wide by 25 rows of characters high. A screen display of 80x25 is 80 characters wide by 25 rows of characters high (80x25 is usually used for the IBM Color Display.)

- That you are using more than one display adapter, and the type of displays attached.

The following chart shows the adapters and the displays that may be attached to each adapter.

ADAPTERS	DISPLAYS		
Enhanced Graphics	Monochrome	Color	Enhanced Color
Color/ Graphics		Color	Enhanced
Monochrome	Monochrome		

When you are done setting the switches on the Enhanced Graphics Adapter, go to Step 26.

Switch Setting Tables Guide

Note: The system configurations shown in the left column are the only acceptable combinations that can be installed.

Note: Whenever you are using two displays, one of them must be a Monochrome Display.

System Configuration	Use:
The Enhanced Graphics Adapter will be the only display adapter you have installed in your system.	Table 1
The Enhanced Graphics Adapter and the IBM Monochrome Display and Printer Adapter will both be installed in your system, and the Enhanced Graphics Adapter will be the Primary Display Adapter.	Table 2
The Enhanced Graphics Adapter and the IBM Monochrome Display and Printer Adapter will both be installed in your system, and the Monochrome Display and Printer Adapter will be the Primary Display Adapter.	Table 3
The Enhanced Graphics Adapter and the IBM Color/Graphics Adapter will both be installed in your system, and the Enhanced Graphics Adapter will be the Primary Display Adapter.	Table 4
The Enhanced Graphics Adapter and the IBM Color/Graphics Adapter will both be installed in your system, and the Color/Graphics Adapter will be the Primary Display Adapter.	Table 5

August 2, 1984

TABLE 1

Use these Switch Settings if the **Enhanced Graphics Adapter** is the **ONLY** display adapter you have installed in your system.

SW1	SW2	SW3	SW4	Type of Display Attached and Initial Mode Selection*
Off	Off	On	Off	Monochrome
On	Off	Off	On	Color (40x25)
Off	Off	Off	On	Color (80x25)
On	On	On	Off	Enhanced Color (in Normal Color Mode)
Off	On	On	Off	Enhanced Color (in Enhanced Color Mode)

*Note: Mode Selection can be changed by programming

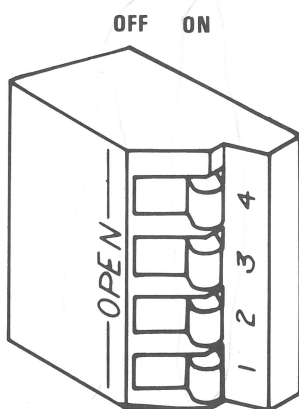


TABLE 2

Use these Switch Settings if the Enhanced Graphics Adapter and the IBM Monochrome Display And Printer Adapter are **BOTH** installed in your system, and the **Enhanced Graphics Adapter** is the **Primary Display Adapter**.

Note: A color display is the only display that may be attached to the Enhanced Graphics Adapter.

Switch Settings				Type of Display Attached and Initial Mode Selection	
SW1	SW2	SW3	SW4	Enhanced Graphics Adapter	Monochrome And Printer Adapter
On	Off	Off	On	Color (40x25)	Monochrome or None
Off	Off	Off	On	Color (80x25)	Monochrome or None
On	On	On	Off	Enhanced Color (in Normal Color Mode)	Monochrome or None
Off	On	On	Off	Enhanced Color (in Enhanced Color Mode)	Monochrome or None

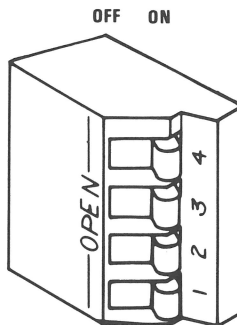


TABLE 3

Use these Switch Settings if the Enhanced Graphics Adapter and the IBM Monochrome Display And Printer Adapter are **BOTH** installed in your system, and the **Monochrome Display And Printer Adapter** is the **Primary** Display Adapter.

Note: A color display is the only display that may be attached to the Enhanced Graphics Adapter.

Switch Settings				Type of Display Attached and Initial Mode Selection	
SW1	SW2	SW3	SW4	Enhanced Graphics Adapter	Monochrome And Printer Adapter
Off	On	On	On	None	Monochrome
On	On	On	On	Color (40x25)	Monochrome
Off	On	On	On	Color (80x25)	Monochrome
On	Off	On	On	Enhanced Color (in Normal Color Mode)	Monochrome
Off	Off	On	On	Enhanced Color (in Enhanced Color Mode)	Monochrome

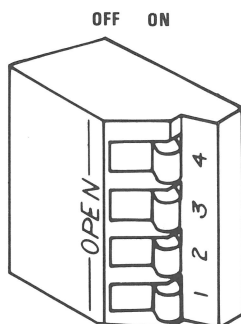


TABLE 4

Use these Switch Settings if the Enhanced Graphics Adapter and the IBM Color Graphics/Adapter are **BOTH** installed in your system, and the **Enhanced Graphics Adapter** is the **Primary Display Adapter**.

Note: A monochrome display is the only display that may be attached to the Enhanced Graphics Adapter.

Switch Settings				Type of Display Attached to:	
SW1	SW2	SW3	SW4	Enhanced Graphics Adapter	Color/Graphics Adapter
Off	Off	On	Off	Monochrome	None
On	Off	On	Off	Monochrome	Color (40x25)
Off	Off	On	Off	Monochrome	Color (80x25)

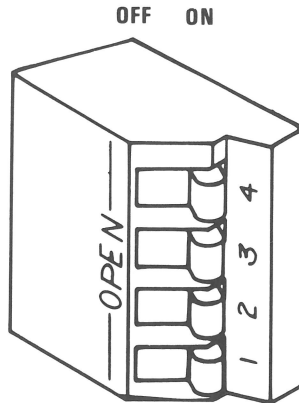
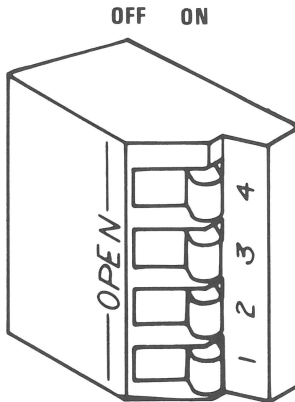


TABLE 5

Use these Switch Settings if the Enhanced Graphics Adapter and the IBM Color/Graphics Adapter are **BOTH** installed in your system, and the **Color/Graphics Adapter** is the **Primary Display Adapter**.

Note: A monochrome display is the only display that may be attached to the Enhanced Graphics Adapter.

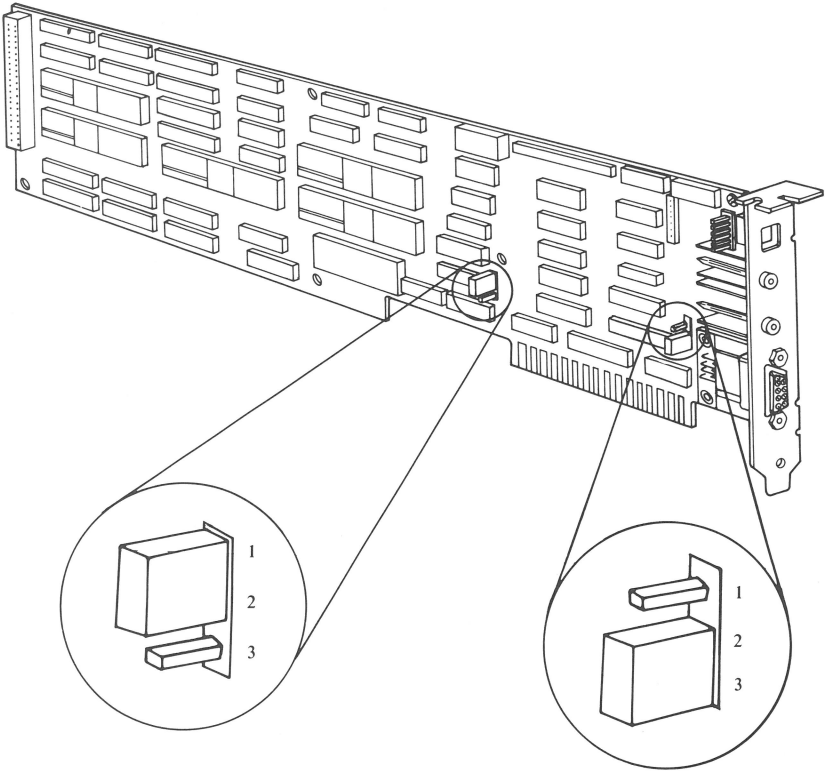
Switch Settings				Type of Display Attached to:	
SW1	SW2	SW3	SW4	Enhanced Graphics Adapter	Color/Graphics Adapter
On	On	Off	On	Monochrome or None	Color (40x25)
Off	On	Off	On	Monochrome or None	Color (80x25)



26

Study the figures below and find the two 3-pin connectors on the adapter. Ensure that the jumpers on connectors **P1** and **P3** are positioned as indicated in the chart below. If the jumpers need to be changed, they pull off the pins.

Warning: Damage to the graphics adapter, the display, or both may result if these jumpers are not in the correct position.

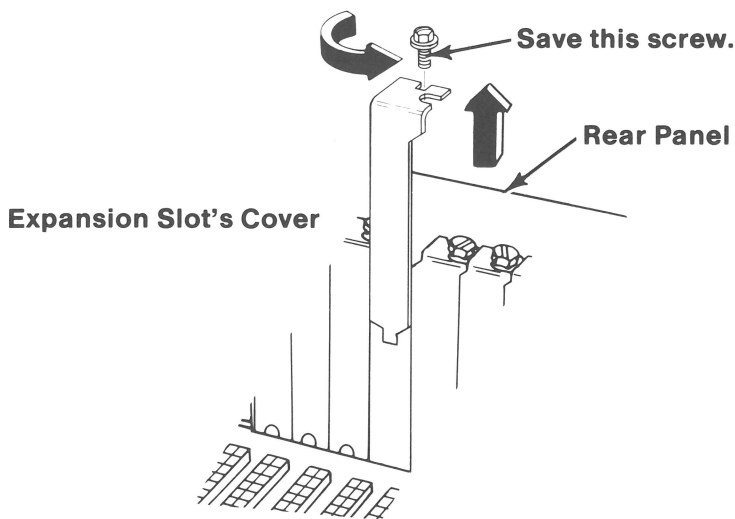


Display attached to the Enhanced Graphics Adapter.	P1	P3
IBM Color Display or IBM Monochrome Display	2 & 3	1 & 2
IBM Enhanced Color Display	1 & 2	1 & 2

- 27** Look at the inside left rear of the system unit, and locate the expansion slots. In the IBM Personal Computer AT, the Enhanced Graphics Adapter **must** be installed in Expansion Slot 1 (the slots are numbered on the back panel.)

Note: If you removed the graphics adapter in a previous Step, use the expansion slot the adapter was installed in and go to Step 30.

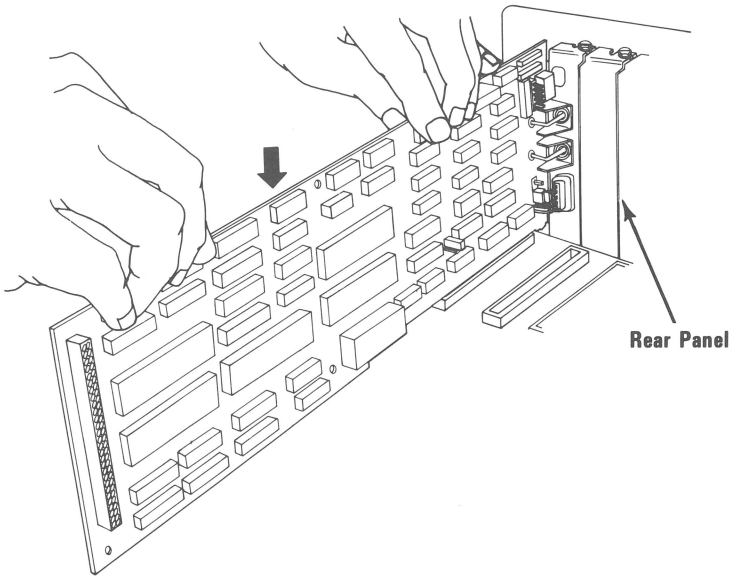
- 28** Use a flat-blade screwdriver or 3/16-inch nutdriver and remove the screw that holds the bracket in place by turning the screw counterclockwise. Save the screw for the installation of the option.



29

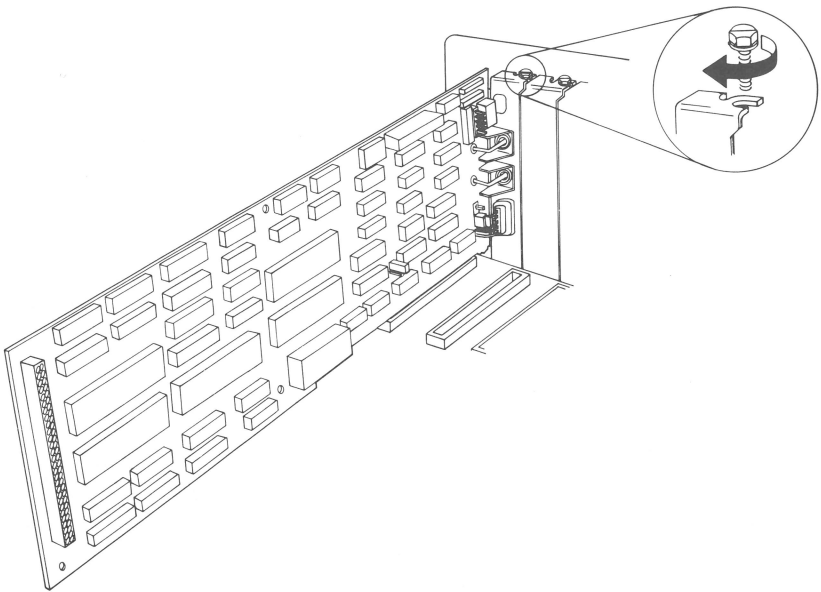
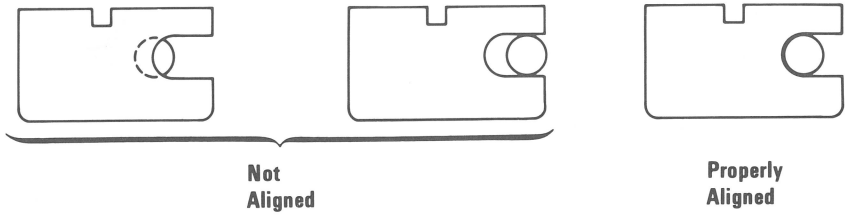
Hold the adapter by the top and firmly press it into the expansion slot making certain the adapter is in the support bracket on the front panel.

Note: Your IBM Personal Computer AT comes with support brackets installed for all expansion slots. The support bracket that came with your option is not needed.

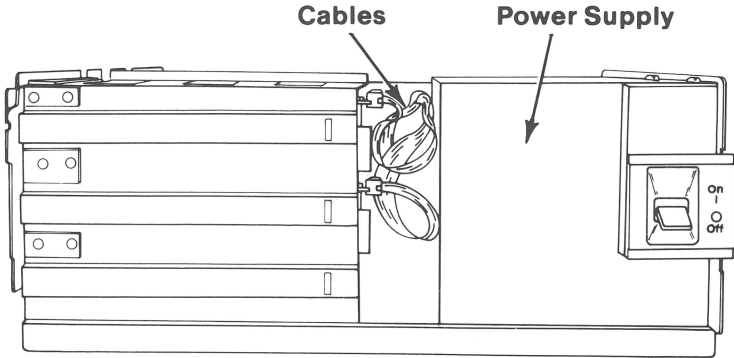


30

Align the slot in the adapter retaining bracket with the hole in the rear plate of the system unit. Start the screw clockwise, then tighten with a flat-blade screwdriver or a 3/16-inch nutdriver.

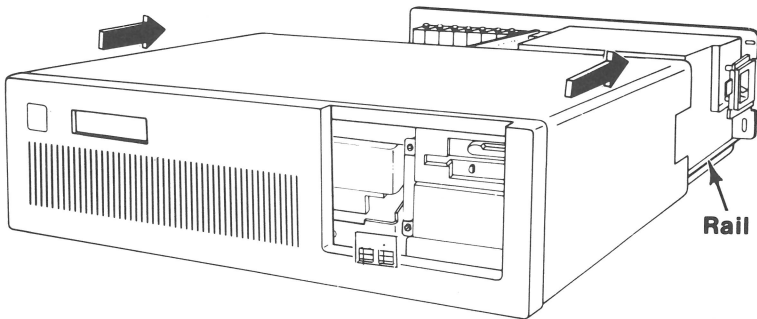


- 31** If you have any other options to install, do so now before putting the system unit's cover back on.
- 32** Push the cables down and out of the way. They should be no higher than the power supply.

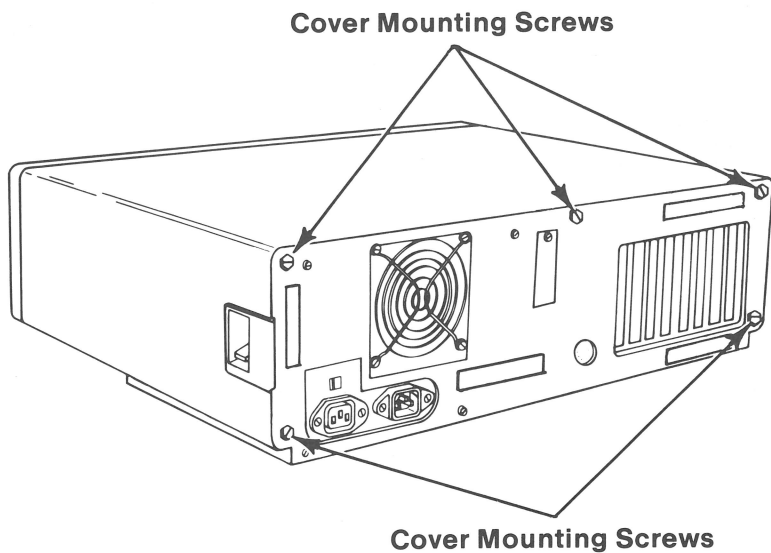


Side View

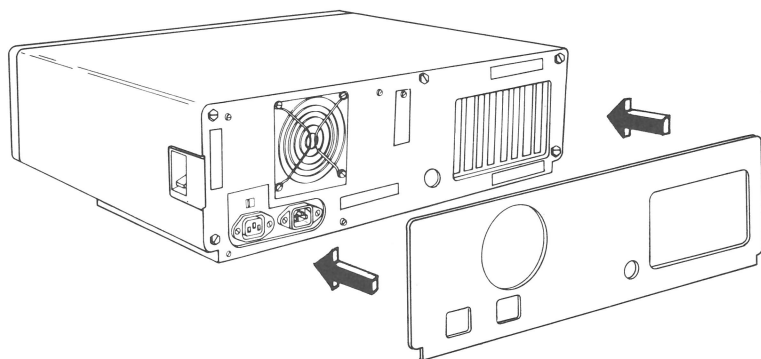
- 33** Install the system unit's cover. Make sure that the cover is under the rail on the frame.



34 Install the five cover mounting screws.



35 Install the back panel.



August 2, 1984

© Copyright IBM Corporation 1984

Enhanced Graphics Adapter 29

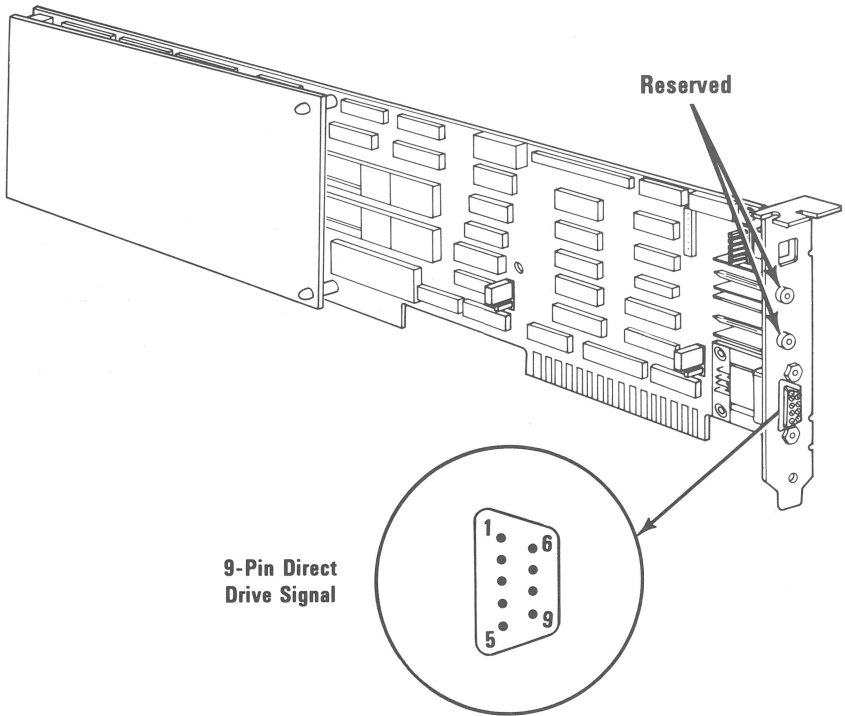
36 You are now ready to recable your system. If you have any other options to install, go to your *Installation and Setup* manual. If not, reconnect the cables to your system unit, and then go to "Section 6, System Check List" in your *Installation and Setup* manual.

Insert these instructions in your *Installation and Setup* manual in "Section 8, Additional Options."

Note: If you have any problems after installation, one of the following is the most likely cause:

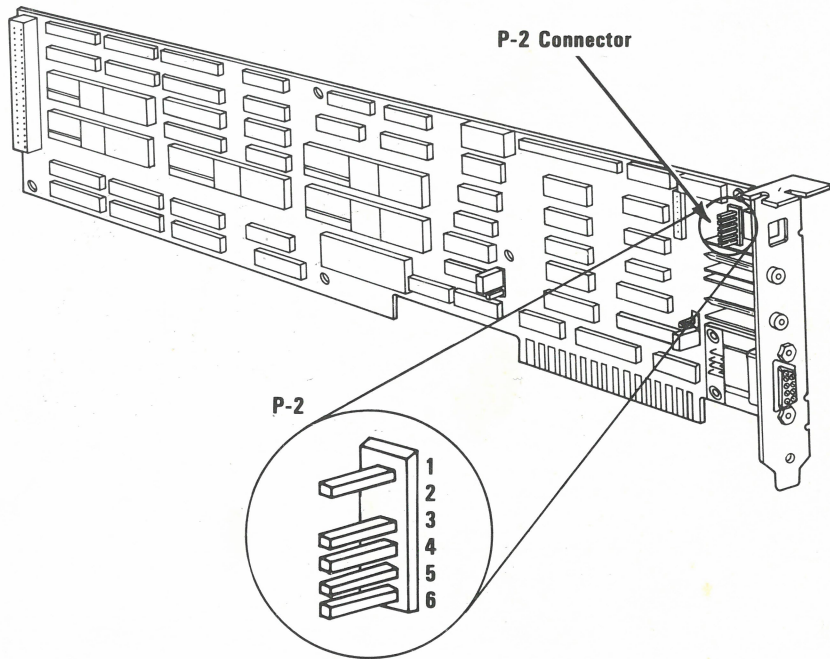
- Cabling is incorrect.
- Switches or jumpers are set incorrectly.
- Other options may have been loosened.
- Memory module (incorrectly installed).
- Graphics Memory Expansion Card.
- Enhanced Graphics Adapter.

Direct Drive Connector Information



	Signal Name - Description	Pin	
Direct Drive Display	Ground	1	Enhanced Graphics Adapter
	Secondary Red	2	
	Primary Red	3	
	Primary Green	4	
	Primary Blue	5	
	Secondary Green/Intensity	6	
	Secondary Blue/Mono Video	7	
	Horizontal Retrace	8	
	Vertical Retrace	9	

Light Pen Connector Information



	P-2 Connector	Pin	
Light Pen Attachment	+Light Pen Input	1	Enhanced Graphics Adapter
	Not used	2	
	+Light Pen Switch	3	
	Ground	4	
	+5 Volts	5	
	12 Volts	6	