

Repair Information

Place the hard-tab page labeled "Repair Information" in place of this page, then discard this page.



SECTION 3. REPAIR INFORMATION

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How to Use the Repair Information

This section contains safety grounds, locations, adjustments, and removals. Look in the section Table of Contents and find the assembly you are servicing.

Each removal for a field replaceable unit (FRU) has a reference number next to the title of the procedure. When a step is explained fully by another procedure, you can refer back to that procedure by using the reference number in parentheses.

For example:

1. Power off the system.
2. Remove the system unit cover (**1005**).
3. Disconnect the speaker connector.
4. Remove the speaker mounting screw.

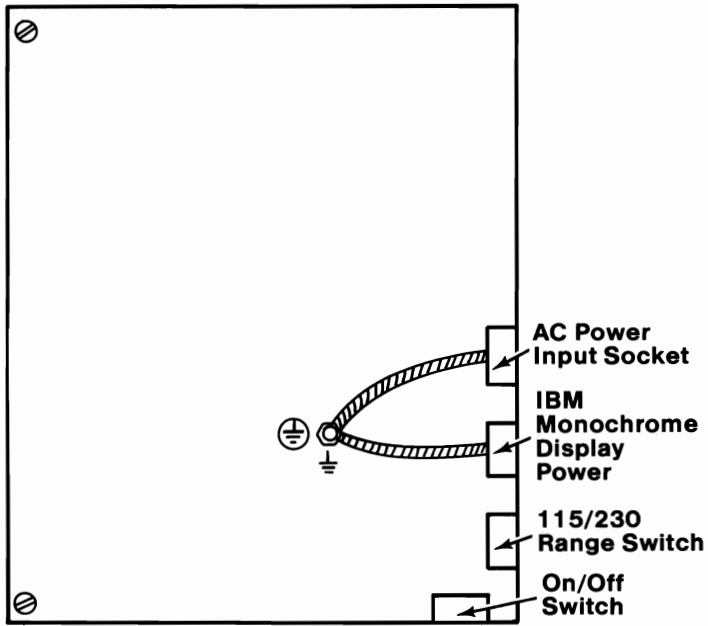
In the example, Step 2 has the reference number **1005**, which means the complete instructions for removing the system unit cover are in procedure **1005**. The steps after Step 2 are based on the assumption that you followed the specified procedure.

Note: Procedures are listed in numeric order in the section Table of Contents under "Removals and Replacements."






To replace a FRU, reverse the removal procedure and follow any notes that pertain to replacement.

Safety Grounds

Power Supply

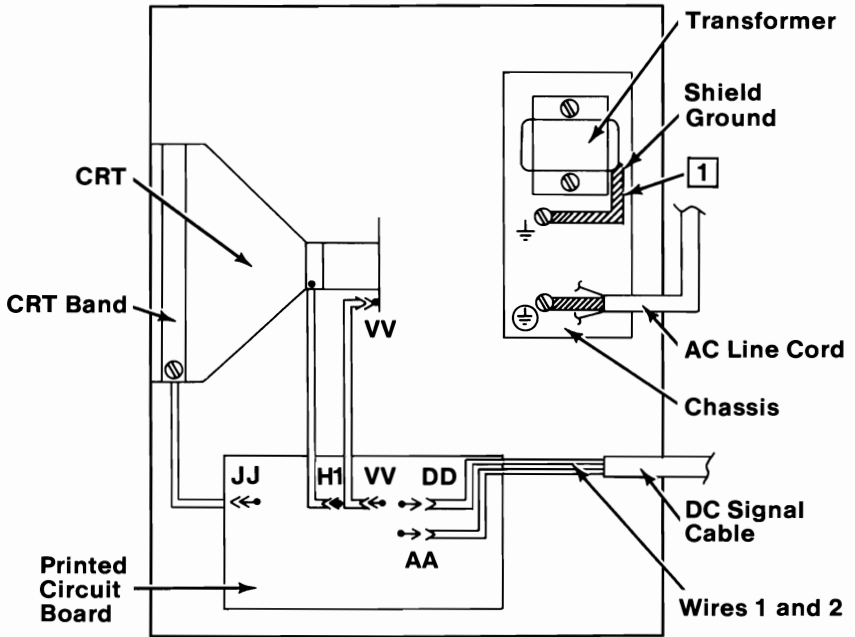


Legend







	Screw Connection		Primary Ground		Ground Wire
	Ground Post		Chassis Ground		

IBM Monochrome Display

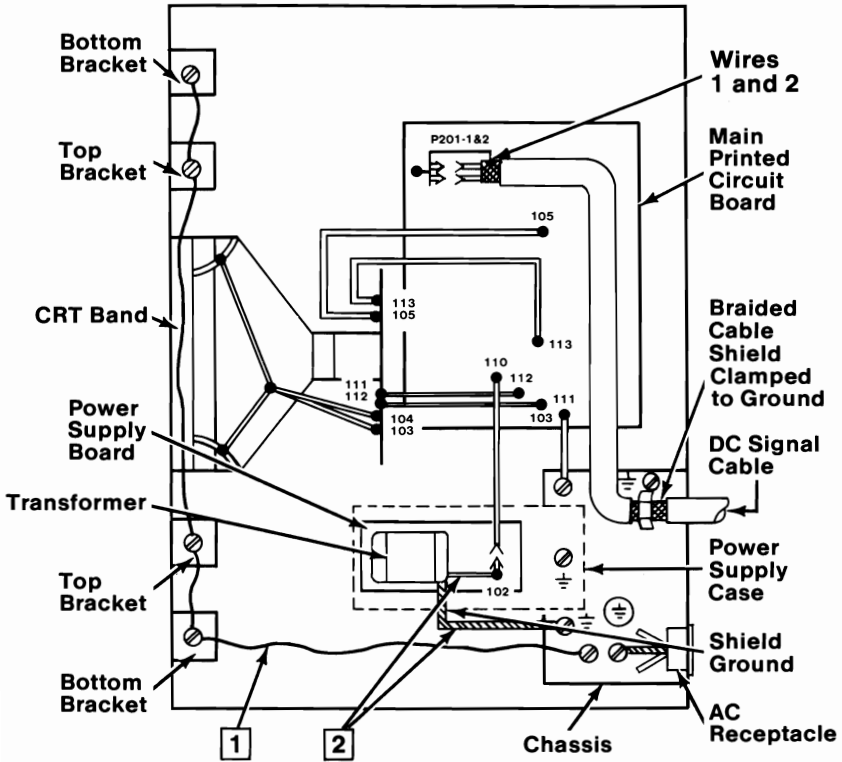
Note: JJ, H1, VV, AA and DD are joined printed circuit lands on board.









Legend

 Screw Connection	 Ground Lead
 Soldered Connection	 Primary Ground
 Plugged Connection	 Chassis Ground
1 This lead only present on 220/240 Vac machines.	

IBM Color Display



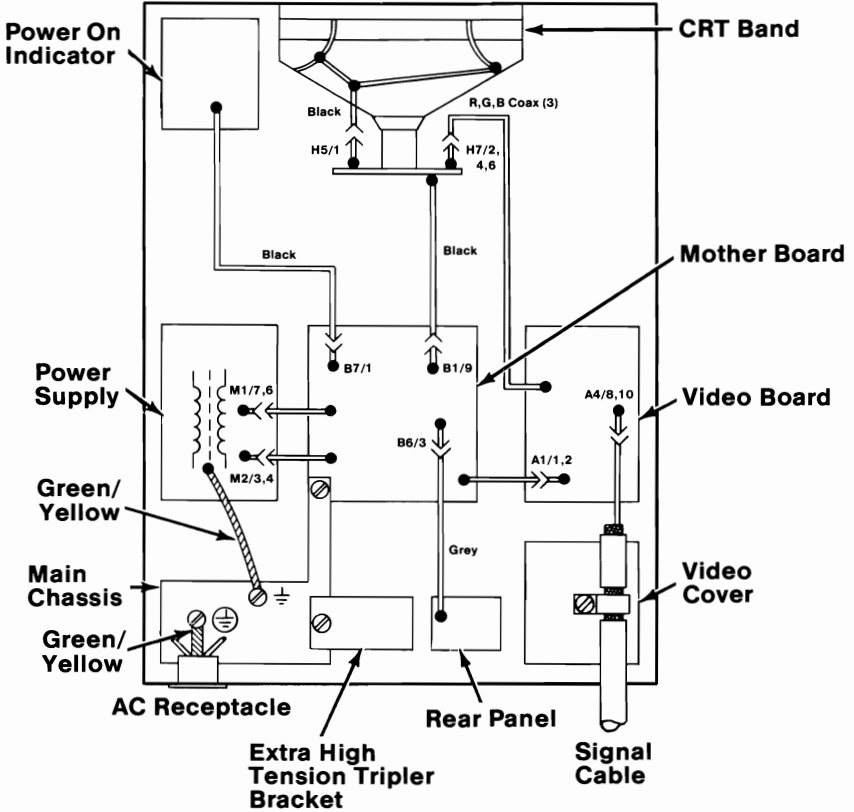
Legend

 Screw Connection	 Ground Lead
 Soldered Connection	 Primary Ground
 Plugged Connection	 Chassis Ground
<p>Note: Points 103, 105, 110, 111, 112, 113, and P201 1 & 2 on main board are joined by printed circuit lands.</p>	







1 Not present on U.S. displays

2 Present only on Model-2 displays

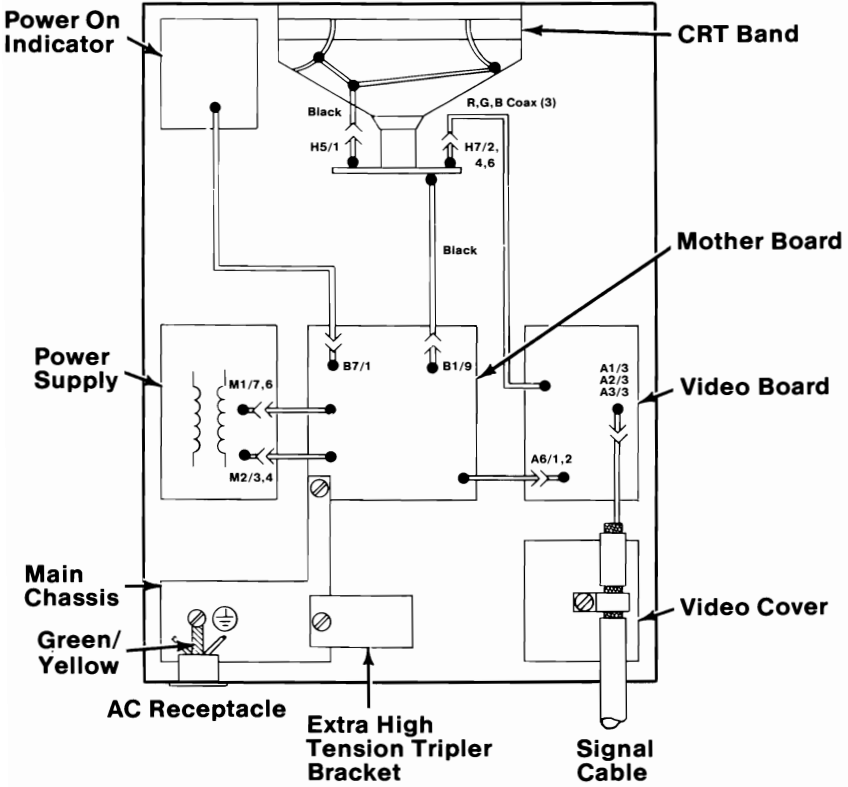
IBM Enhanced Color Display









Legend

	Screw Connection		Ground Lead
	Soldered Connection		Primary Ground
	Plugged Connection		Chassis Ground

IBM Professional Graphics Display



Legend

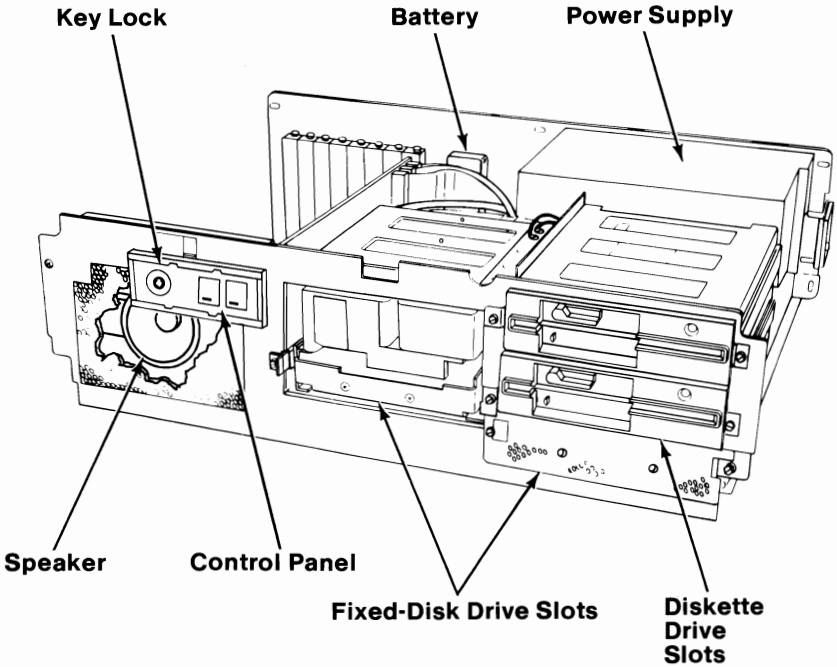
	Screw Connection		Ground Lead
	Soldered Connection		Primary Ground
	Plugged Connection		Chassis Ground

Locations

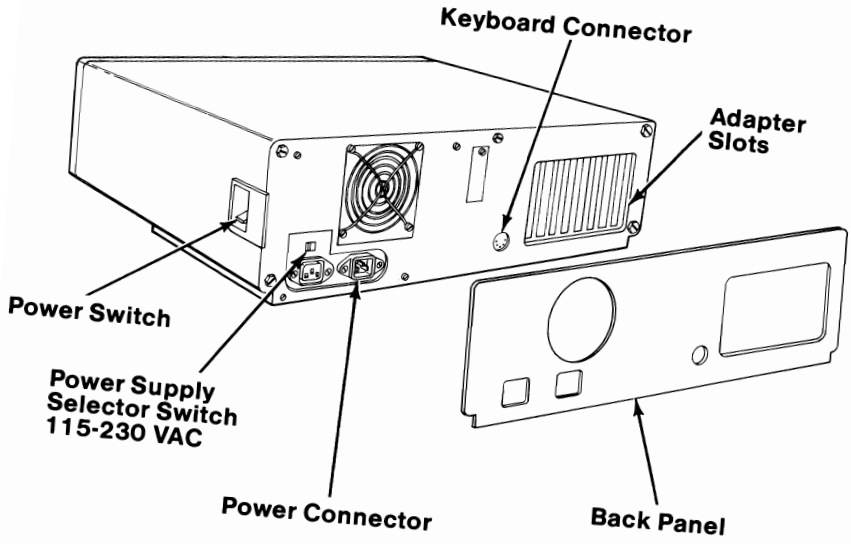
Switch settings and jumper locations are found in the *Hardware Maintenance Service* manual.

IBM Personal Computer AT

Front View

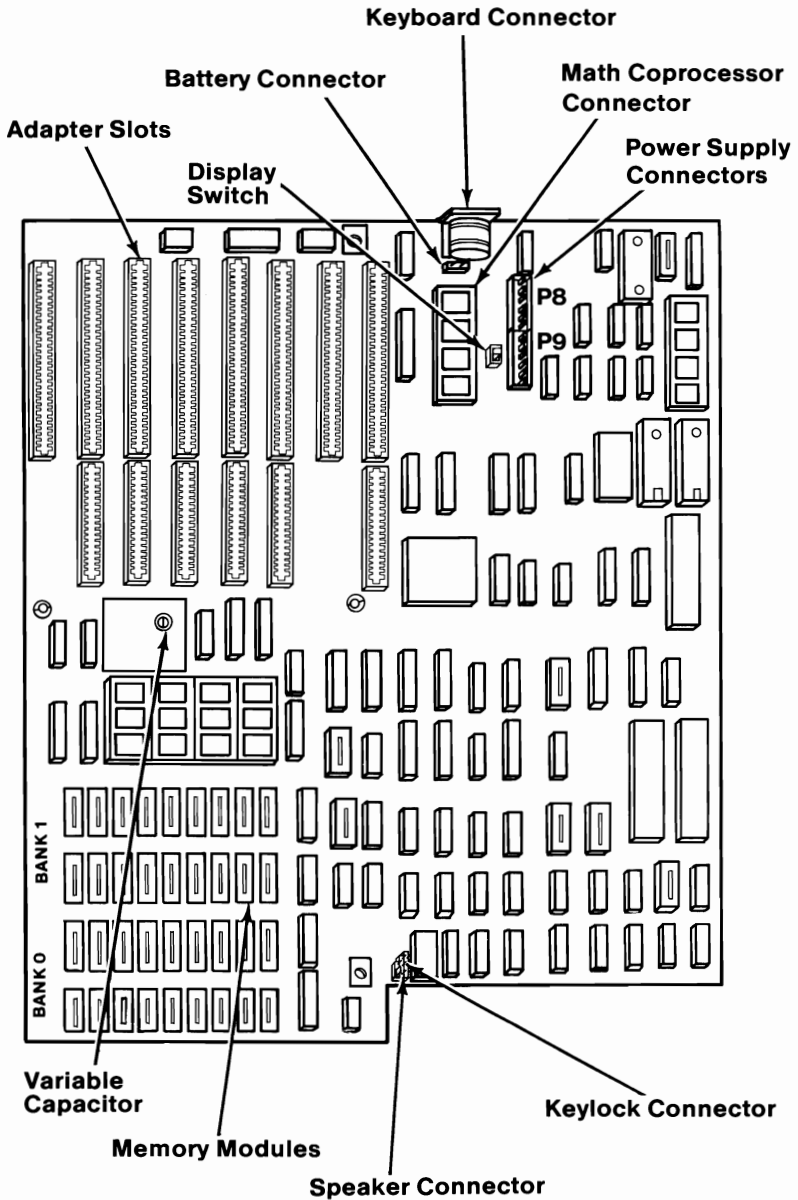


Rear View



System Board Type 1

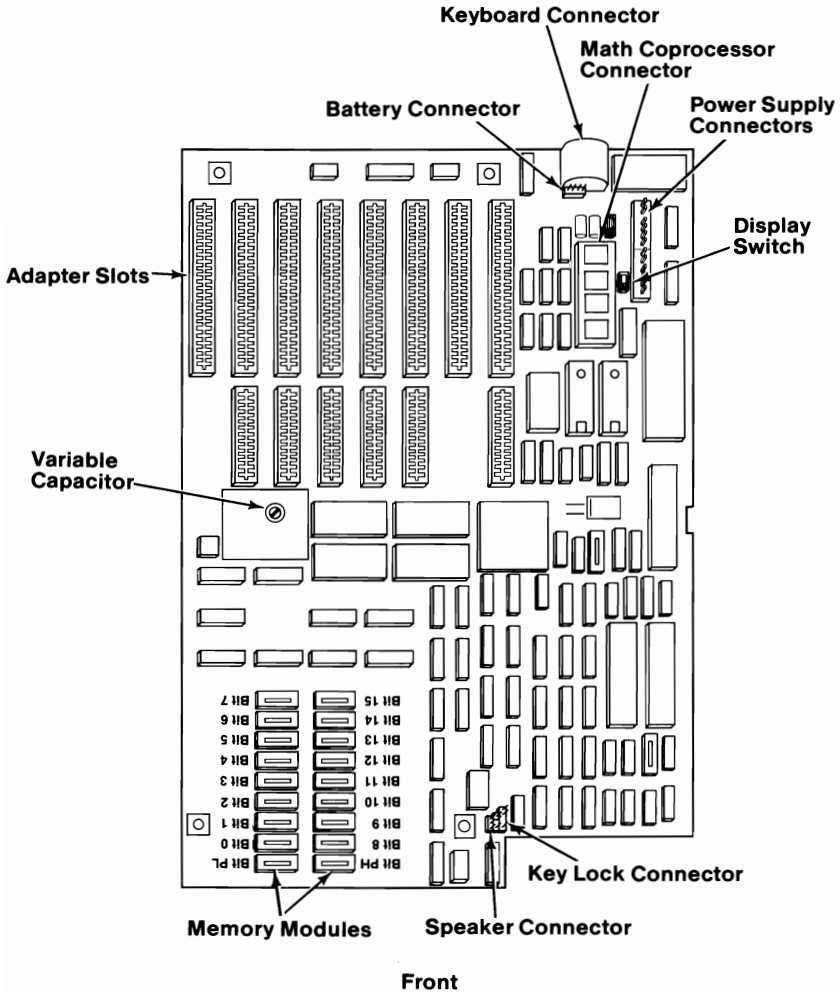
All memory modules on this system board are stacked 128KB RAM modules.



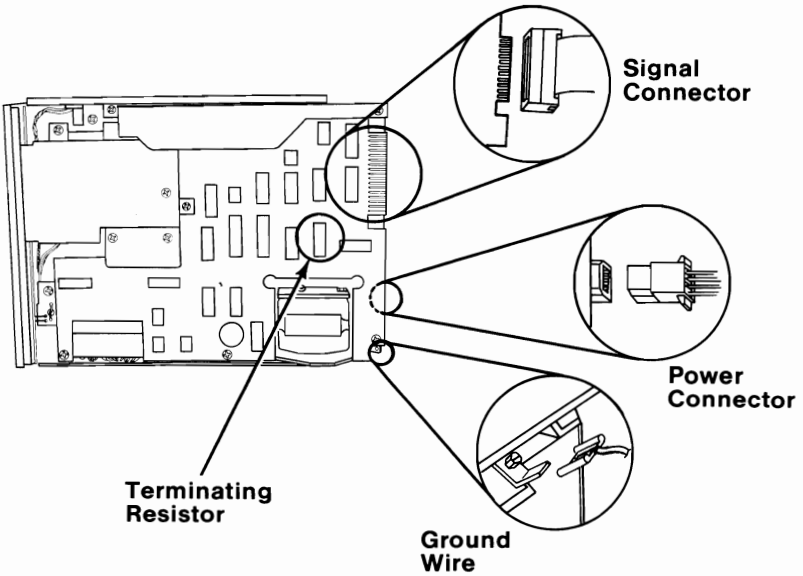
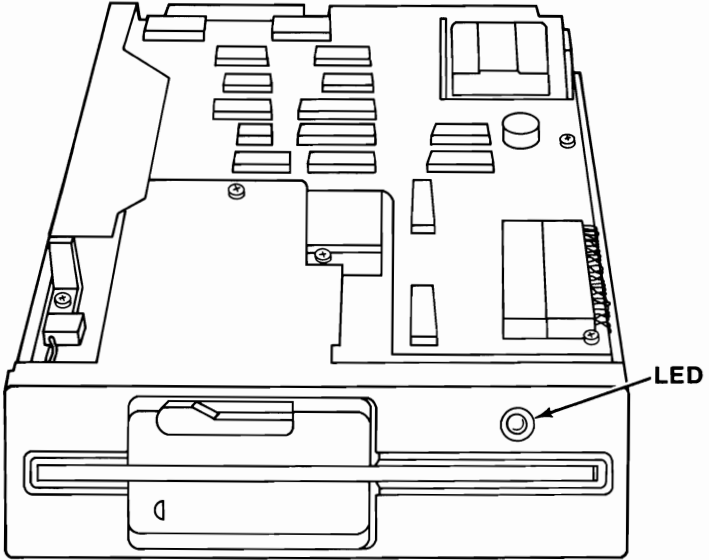
Front

System Board Type 2

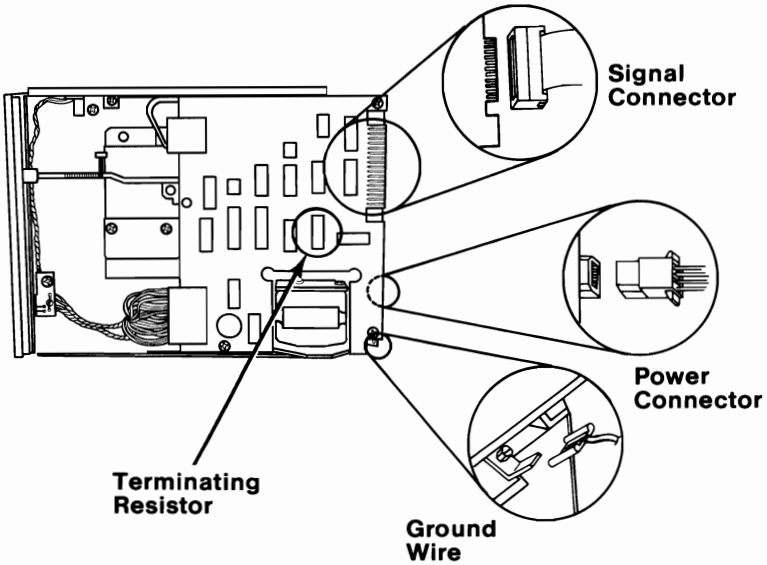
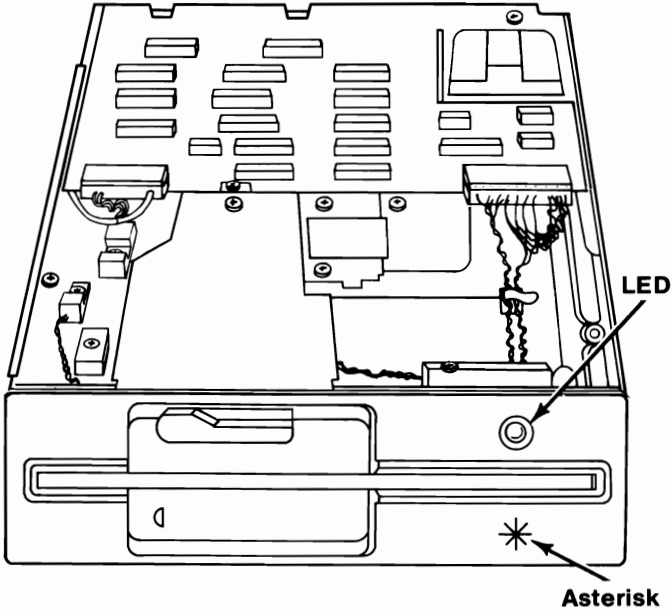
All memory modules on this system board are 256KB RAM modules.



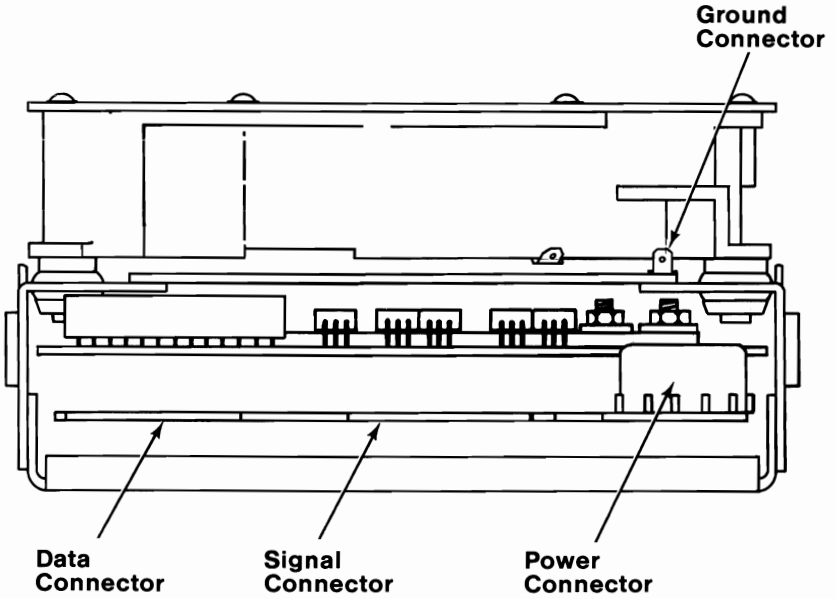
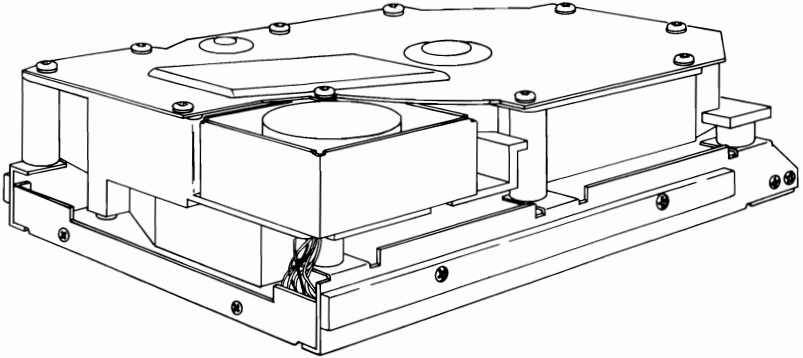
High Capacity Diskette Drive



Double Sided Diskette Drive

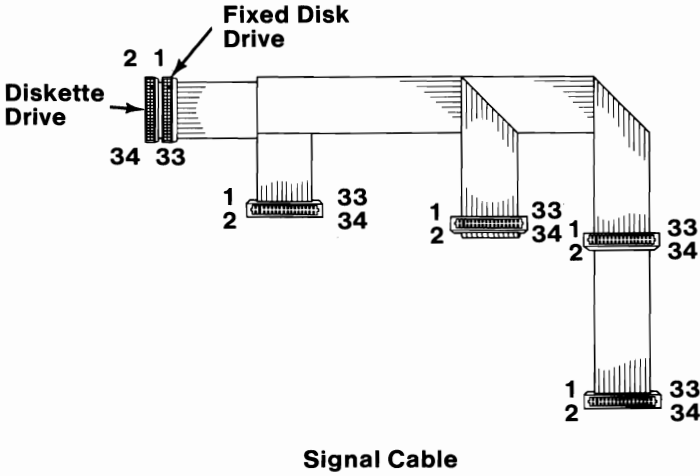


Fixed Disk Drive

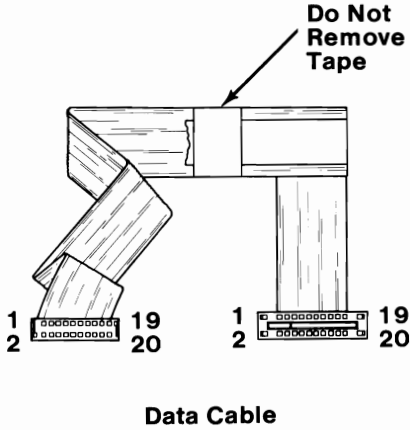


Rear View

Fixed Disk and Diskette Drive Signal Cable

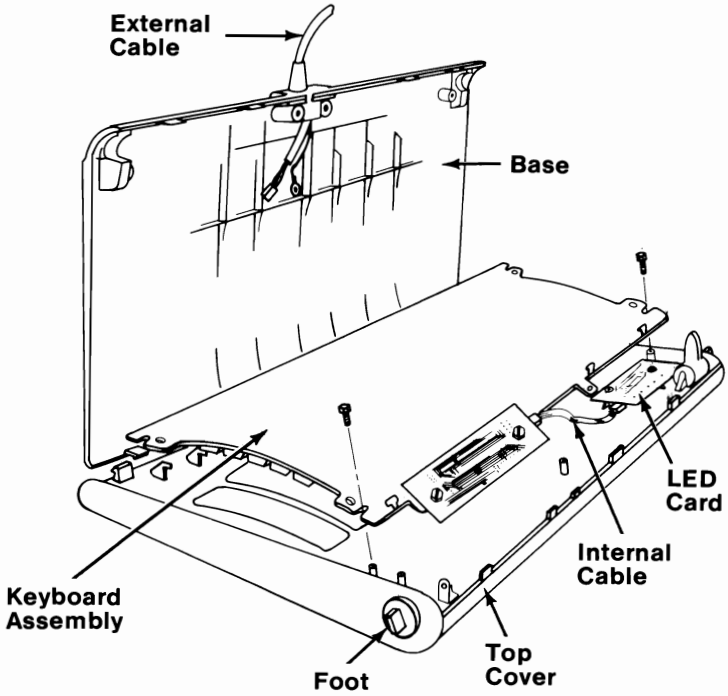


Fixed Disk Drive Cable



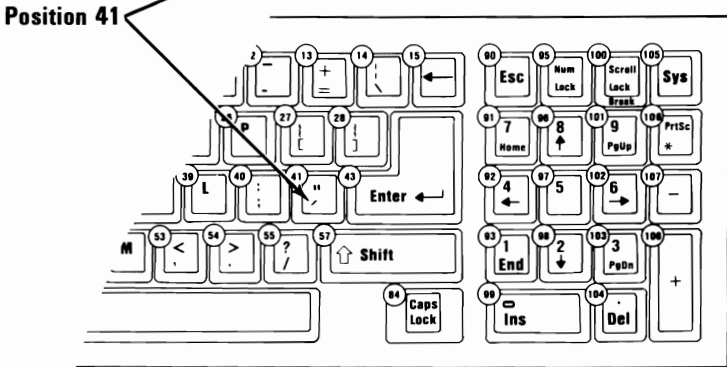
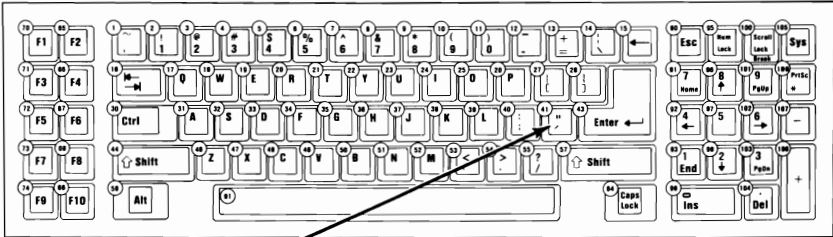
Keyboards

84-Key Keyboard



National Language Keyboard Types (84-Key)

Look at the characters in position 41 on the keyboard and compare them with those in the chart to determine which language keyboard you have.



If Position 41 is:	The Keyboard is:
" / '	U.S. (English)
' / @	UK (English)
` / %	French
¨	German
à / #	Italian
: / ;	Spanish

Adjustments

Diskette Drive-Motor Speed

Applies only to 360KB Diskette Drives.


1. Insert the Advanced Diagnostics diskette into drive A.
2. Power on the system.
3. Advance to the Diskette Drive Diagnostic menu.
4. Select 4 (**SPEED TEST**) for the diskette drive you are testing. The drive-motor speed and the adjustment specification appear on the screen.
5. The indicated speed should be within the range displayed on the screen. If it is not, continue on the next page.

SPEED IS 1660

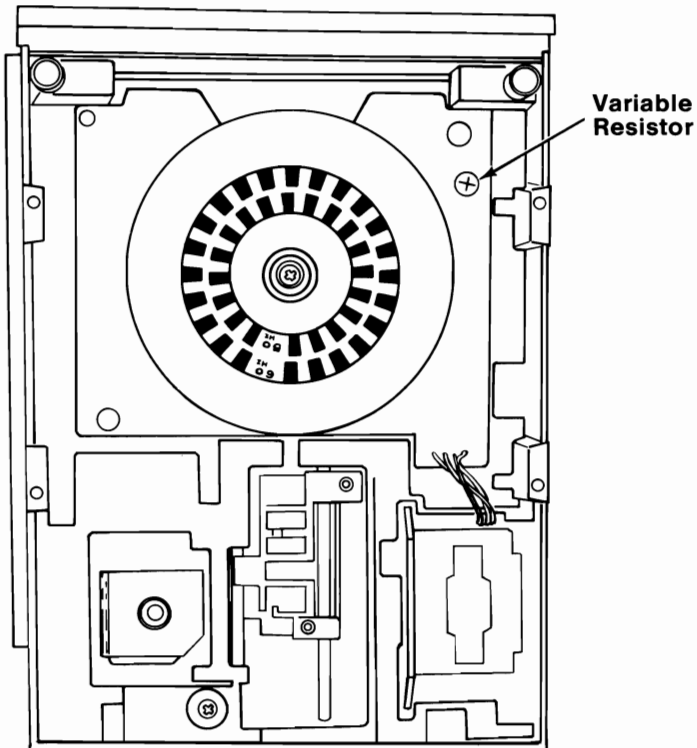
**SHOULD BE 1640 To 1695
PRESS ANY KEY TO EXIT**

SPEED IS 1660

**SHOULD BE 1640 TO 1695
PRESS ANY KEY TO EXIT**

6. Power off the system.
7. Remove the system unit cover (**1005**).
8. Reconnect all cables that were removed to take the cover off.
9. Remove the diskette drive mounting screws and clips (**1035**). 
10. Slide the diskette drive approximately 76 mm (3 inches) toward the front.
11. Power on the system.
12. Advance to Diskette Drive Diagnostic menu.
13. Select 4 (**SPEED TEST**) for the diskette drive you are testing.

14. The adjustment for the drive-motor speed is a variable resistor on the diskette drive circuit board (on the underside of the diskette drive). To adjust the speed, carefully insert an insulated screwdriver into the resistor slot.
15. Turn the screw until the speed shown on the screen is within the required specifications.
16. Power off the system.
17. Unplug the power cord from the outlet.
18. Disconnect all cables from the system unit.
19. Replace the system unit cover.

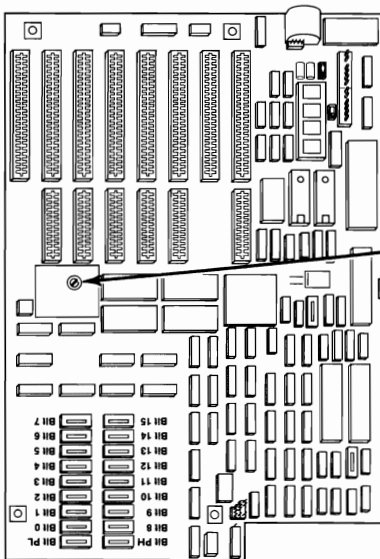


Variable Capacitor

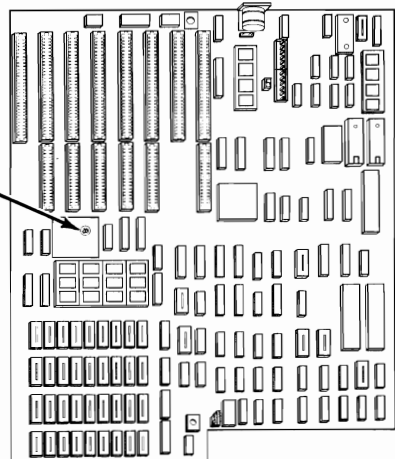
Note: This adjustment is effective for composite displays only.

If the color is incorrect or absent, adjust the variable capacitor **A** on the system board as follows:

1. Remove the system unit cover (**1005**).
2. Find the variable capacitor adjustment control.
3. Power on the system.
4. Using a small, nonmetallic screwdriver, adjust the variable capacitor in small increments until the correct color returns.
5. Adjust the Tint and Color controls on the display.



Type 2



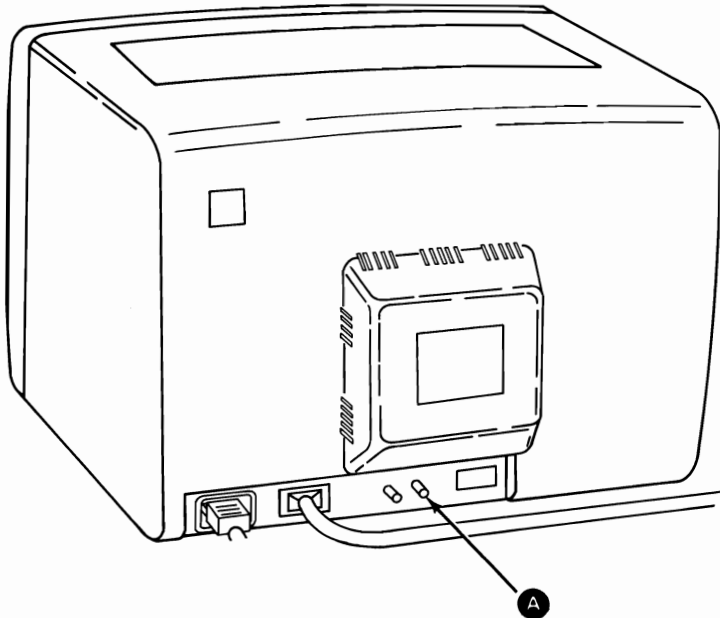
Type 1

IBM Color Display

Vertical Hold

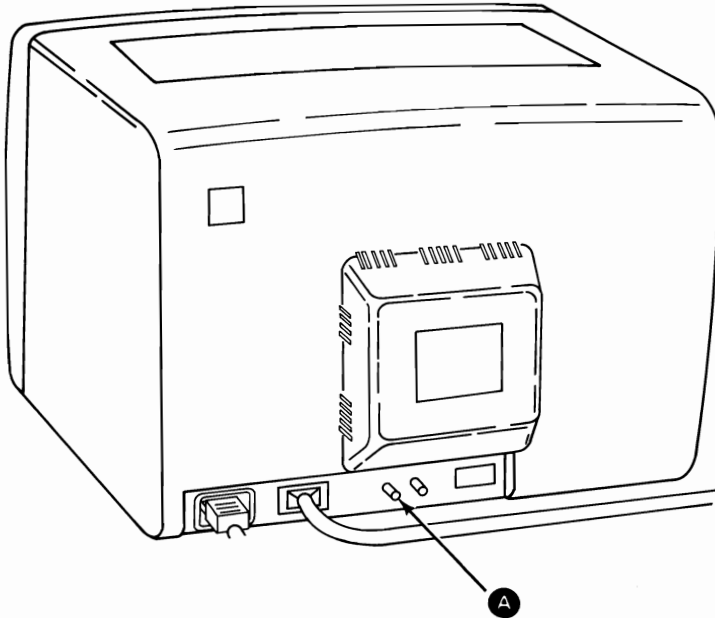
If the IBM Color Display has a vertical hold problem (image rolling), adjust the Vertical Hold control **A** as follows:

1. Power on the Color Display.
2. Power on the system.
3. Wait for the POST to finish.
4. Turn the Vertical Hold control fully clockwise.
5. Turn the Vertical Hold control counterclockwise until the image stops rolling and is steady.



Vertical Size

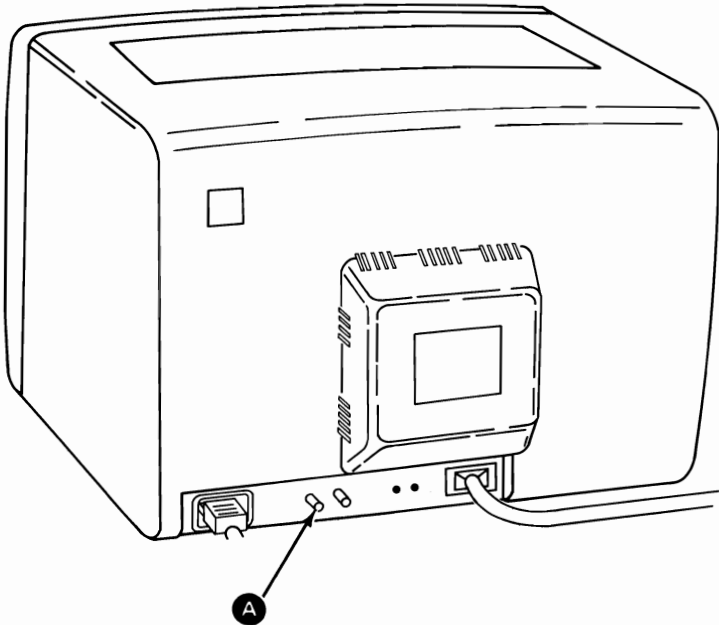
1. Power off the system.
2. Power on the Color Display.
3. Turn the Brightness and Contrast controls fully clockwise.
4. Turn the Vertical Size control **A** fully counterclockwise. A black area appears across the top and bottom of the screen.
5. Turn the Vertical Size control clockwise until both black areas disappear.
6. Adjust the Brightness and Contrast controls for eye comfort.



IBM Enhanced Color Display

Vertical Size (Mode 1)

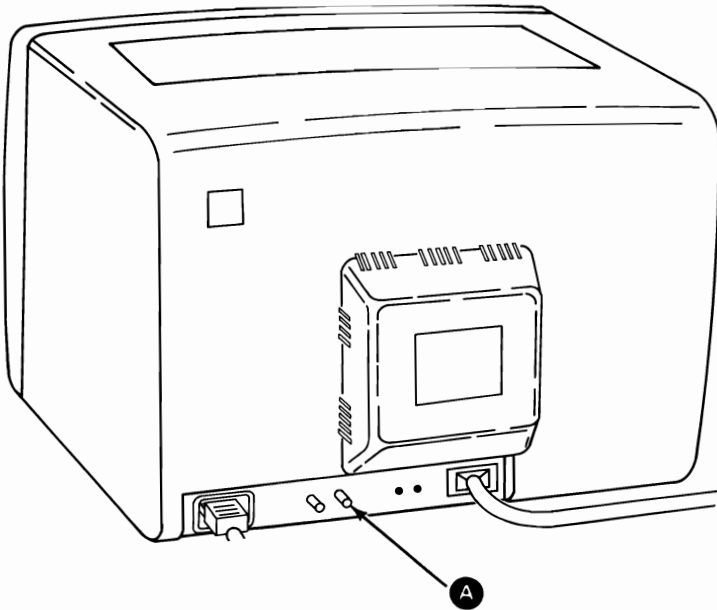
1. Power off the system.
2. Power on the Enhanced Color Display.
3. Turn the Brightness control fully clockwise.
4. Turn the Mode 1 Vertical Size control **A** fully counterclockwise. A black area appears across the top and bottom of the screen.
5. Turn the Vertical Size control clockwise until both black areas disappear.
6. Adjust the Brightness control for eye comfort.



Vertical Size (Mode 2)

In order to make this adjustment, this display must be connected to an IBM Enhanced Graphics Adapter operating in the Enhanced Color Mode.

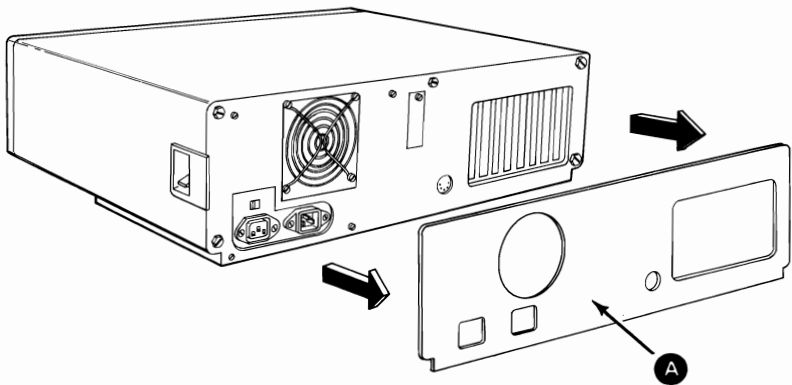
1. Power on the Enhanced Color Display.
2. Turn the Brightness control fully clockwise.
3. Power on the system.
4. Wait for the POST to finish.
5. Adjust the Mode 2 Vertical Size control **A** until the black areas at the top and bottom are approximately the same size as the black areas at the sides.
6. Adjust the Brightness control for eye comfort.



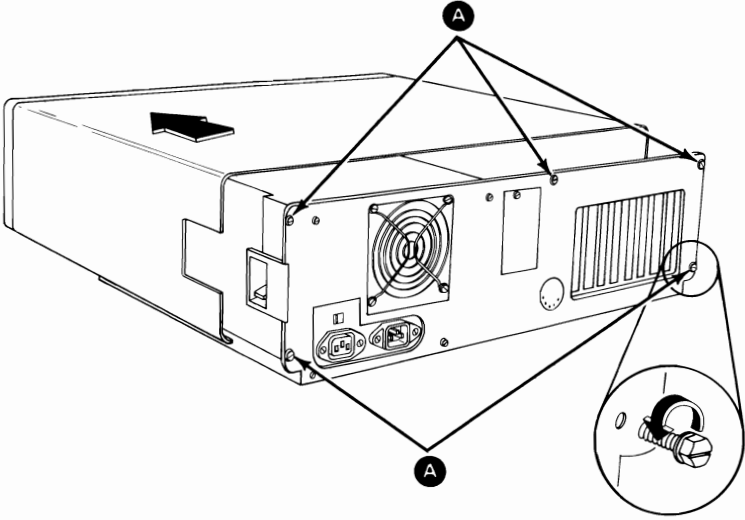
Removals and Replacements

Cover 1005

1. Power off the system.
2. Unplug the power cord from the outlet.
3. Move all external options away from the system unit.
4. Turn the key to the unlocked position and remove it.
5. Turn the system unit around, as shown.
6. Remove the back panel **A** from the rear of the system unit. The back panel is attached to the system unit by plastic fastener strips.



7. Remove the five cover mounting screws **A**.
8. Slide the cover away from the rear panel until it is clear of the system unit.



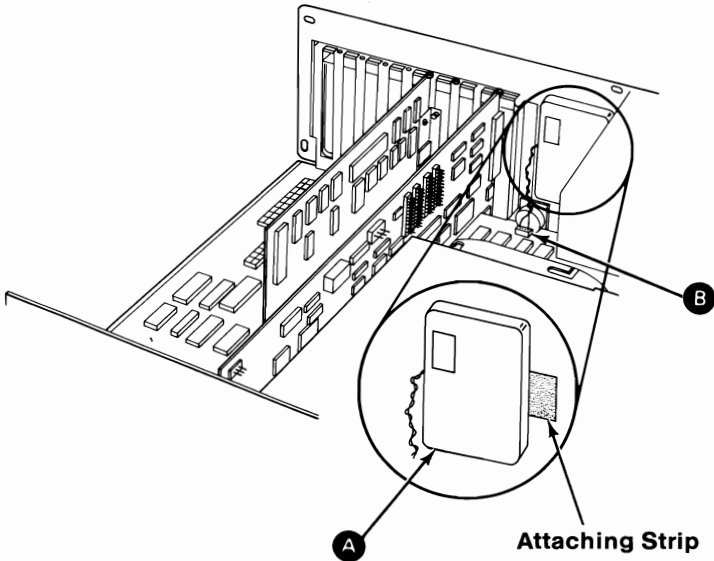
Battery 1010

1. Power off the system.
2. Remove the system unit cover (1005).
3. Disconnect the battery cable **B** from the system board.
4. The battery is attached to the back panel by a plastic attaching strip. Gently pull the battery **A** loose, and out of the system unit.

Note: Early models of the battery may have two screws to attach it to the system unit. Remove these screws; they are no longer needed.

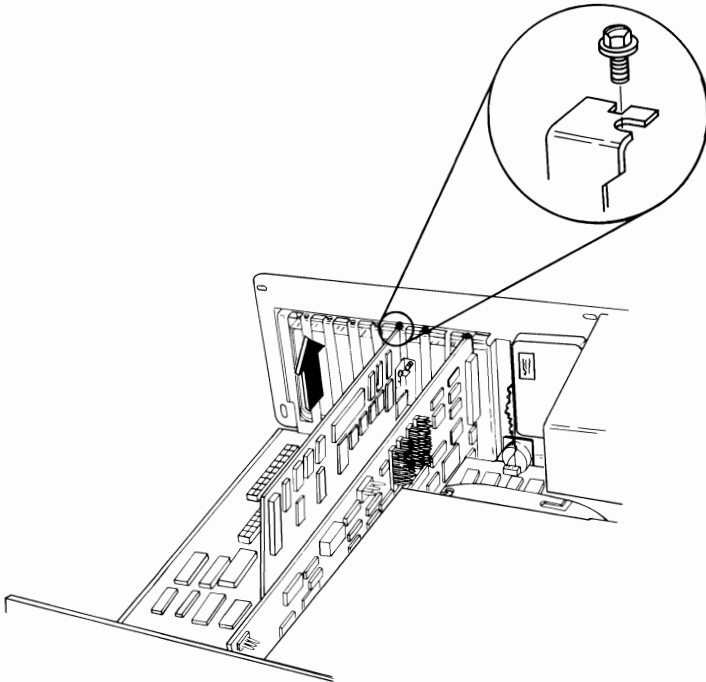
CAUTION

The lithium battery presents a fire, explosion, and severe burn risk. **DO NOT** recharge, remove polarized connector, disassemble, heat above 100°C (212°F), incinerate, or expose battery cell contents to water.



Option Adapter 1015

1. Power off the system.
2. Remove the system unit cover (**1005**).
3. Make a note of which slot the adapter is in.
4. Remove the option adapter mounting screw.
5. If the option adapter has internal cables connected to it, make a note of their location and remove the cables.
6. Grasp the option adapter by the top corners and lift straight up.
7. If the option adapter has any switches on it, make a note of their position. If replacing the adapter, set the new option adapters switches.

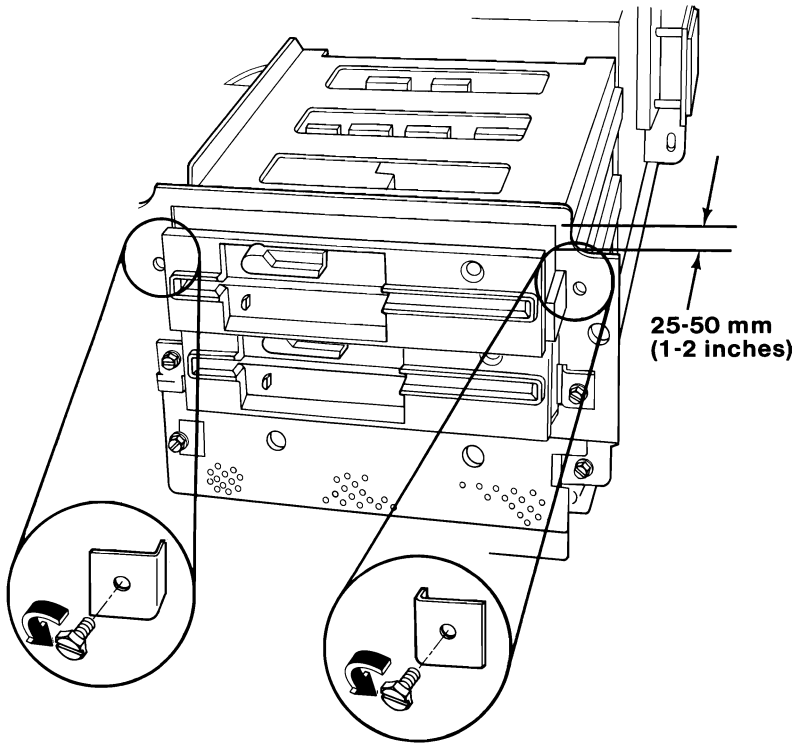


Diskette Drives

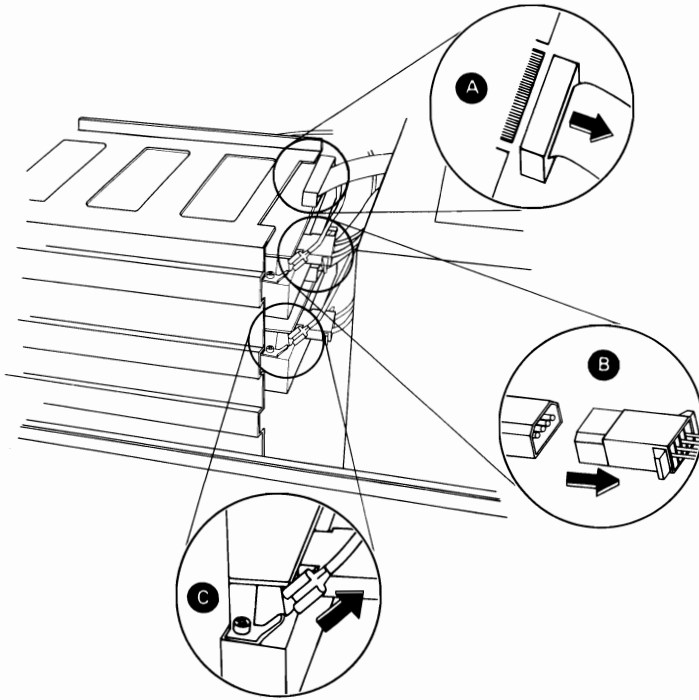
Half High Diskette Drive 1035

If you have two diskette drives, you may have to remove the diskette drive in the top slot to gain access to the diskette drive connectors in the bottom slot.

1. Power off the system.
2. Remove the the system unit cover (**1005**).
3. Remove the mounting screws and clips.
4. Slide the diskette drive approximately 25-50 mm (1-2 inches) toward the front.

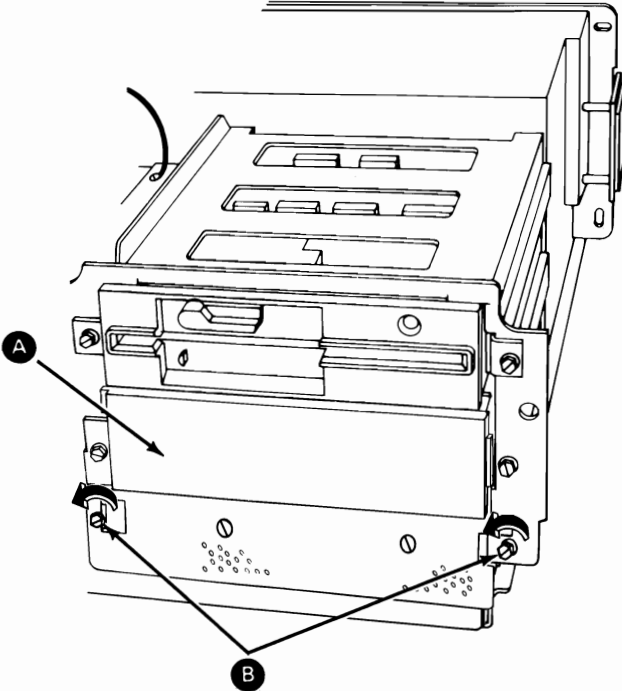


5. Disconnect the diskette drive power cable **B**.
6. Disconnect the diskette drive signal cable **A**.
7. Disconnect the diskette drive ground wire **C**.
8. Slide the diskette drive out through the front of the system unit.



Diskette Drive Cover-Plate 1040

1. Power off the system.
2. Remove the system unit cover (1005).
3. Remove the mounting screws **B** and cover plate **A**.



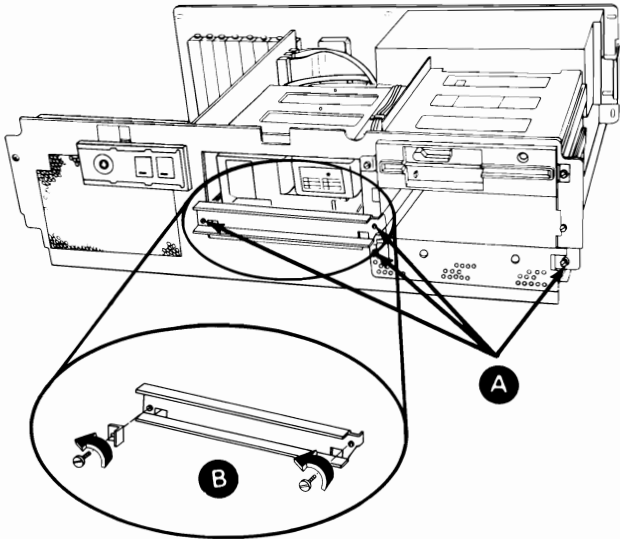
Fixed Disk Drive 1045

Warning: Normal shipping and handling can result in permanent loss of all data and formatting on the fixed disk drive; refer to the DOS manual and back up all information. Before removing the fixed disk drive, perform the "Prepare System for Moving" procedure with the Advanced Diagnostics diskette.

If the system has two fixed disk drives and one diskette drive, you may have to remove the diskette drive to gain access to the connectors of the second fixed disk drive.

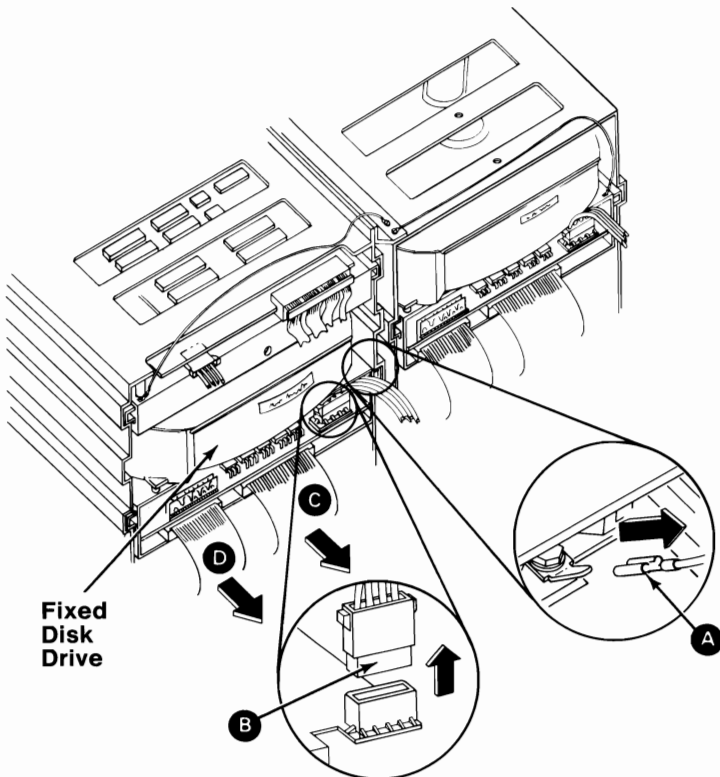
1. Power off the system.
2. Remove the the system unit cover (**1005**).
3. Remove the mounting screws and clips **A**.

Note: A keeper bar **B** may replace the mounting clips for drive C.



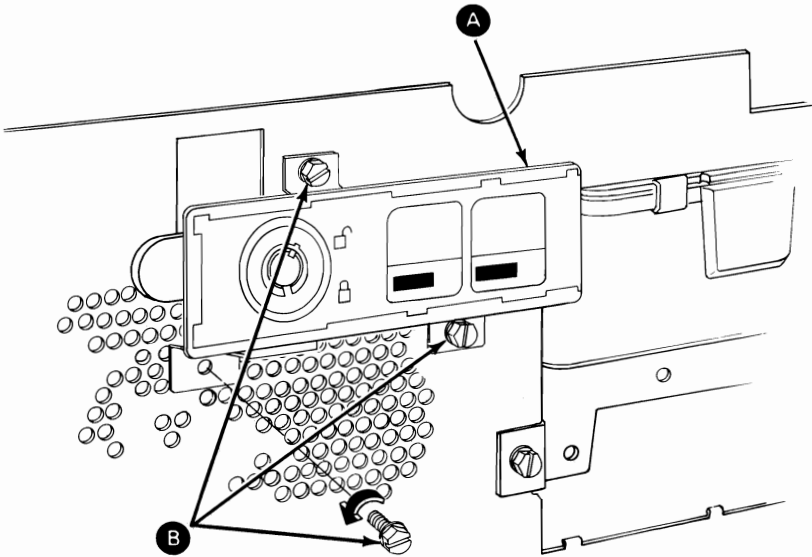
4. If required, remove the diskette drive (1035).
5. Disconnect the fixed disk drive ground wire **A**.
6. Disconnect the fixed disk drive power cable **B**.
7. Disconnect the fixed disk drive signal cable **C**.
8. Disconnect the fixed disk drive data cable **D**.
9. Grasp the fixed disk drive by the frame and slide it toward the front and out of the system unit.

Warning: Do not lift the fixed disk drive by the printed circuit board.



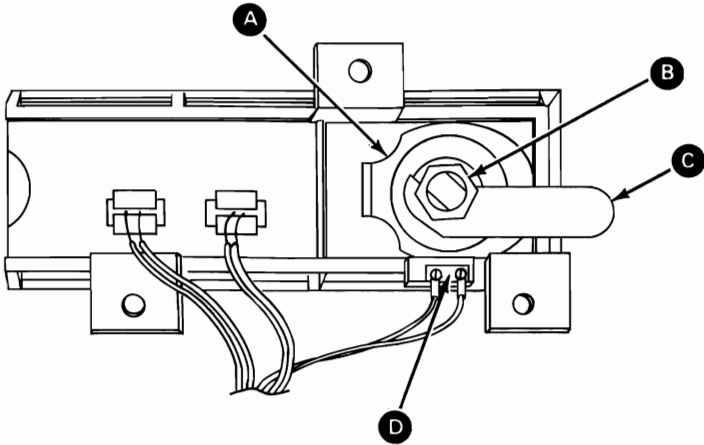
Control Panel 1050

1. Power off the system.
2. Remove the system unit cover (1005).
3. Remove the Fixed Disk and Diskette Drive Adapter (1015).
4. If required, remove the option adapters (1015) to gain access to the control panel cables.
5. Disconnect the control panel cables from the system board.
6. Remove the mounting screws **B** and the control panel **A**.



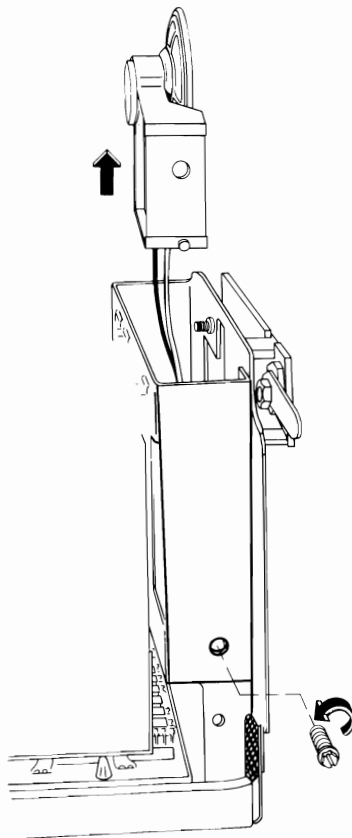
Key Lock 1055

1. Remove the control panel (1050).
2. Remove the two screws **D** and position the microswitch away from the control panel.
3. Remove the locknut **B**.
4. Remove the cover latch **C**.
5. Remove the key lock mounting nut **A**.
6. Remove the key lock.



Speaker 1060

1. Power off the system.
2. Remove the system unit cover (1005).
3. Remove the Fixed Disk and Diskette Drive Adapter (1015).
4. If required, remove the option adapters (1015) to gain access to the speaker cable.
5. Disconnect the speaker cable.
6. Remove the speaker mounting screw **B**.
7. Remove the speaker **A**.

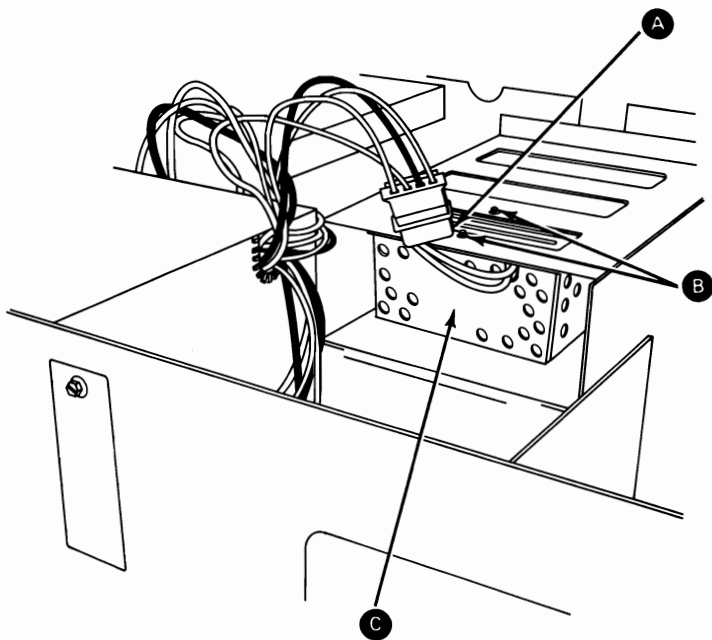


Power Supply Load Resistor 1065

1. Power off the system.
2. Remove the system unit cover (1005).
3. Disconnect the power supply cable from the load resistor (A).

Warning: Do not pull on the wires when disconnecting connectors.

4. Remove the load resistor mounting screws (B).
5. Remove the power supply load resistor (C).



Power Supply 1070

1. Power off the system.
2. Remove the system unit cover (1005).
3. Unplug the power cord from the power supply.
4. Disconnect the system board power cables by pulling the connectors **A** straight up.

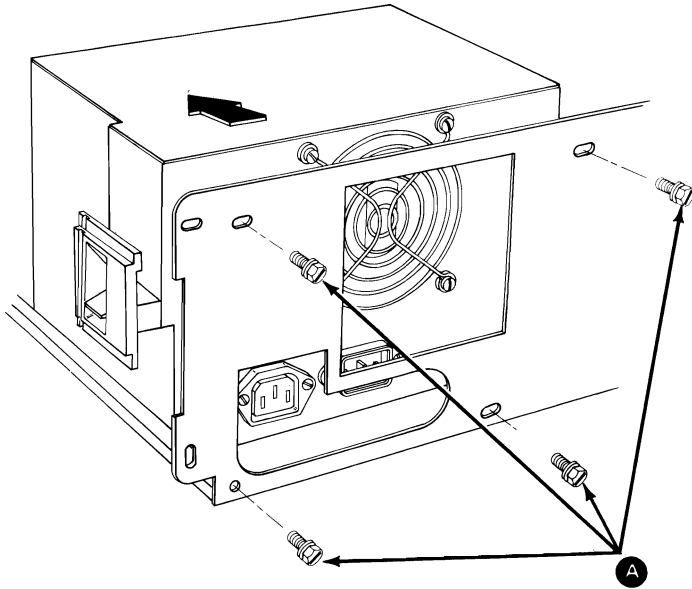
Warning: Do not pull on the wires when disconnecting connectors.



5. Disconnect the power cables from the diskette drive (1035) and the fixed disk drive (1045).

Note: If no fixed disk drive is installed in the system unit, disconnect the power cable from the power supply load resistor (1065).

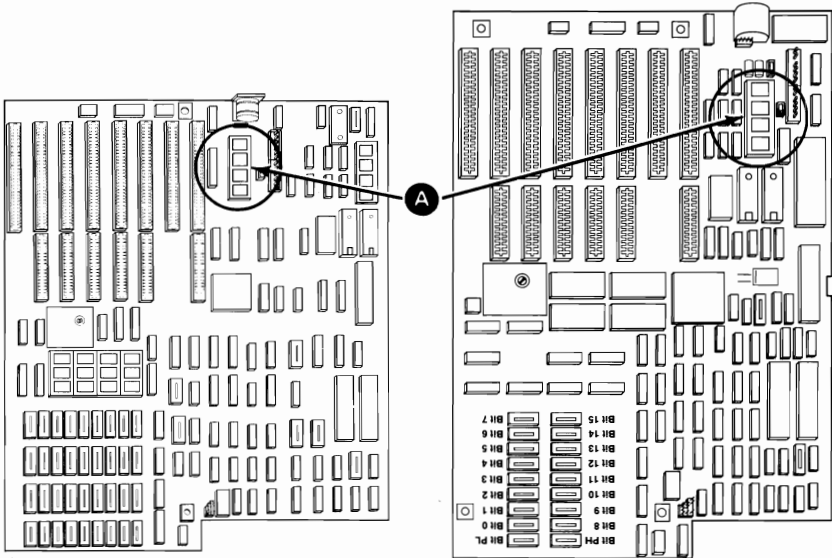
6. Remove the power supply mounting screws **A**.
7. Slide the power supply 13 mm (0.5 inch) to the front, then lift and remove.



Math Coprocessor 1075

Warning: The pins on the coprocessor are easily bent. Be careful not to bend the pins when removing the coprocessor. The coprocessor is static sensitive. Maintain personal grounding by touching the system unit frame with one hand while removing the coprocessor.

1. Power off the system.
2. Remove the system unit cover (1005).
3. Unplug the power supply connectors (1070) from the system board and position them out of the way.
4. Find the Math Coprocessor **A** on the system board in the following figure.

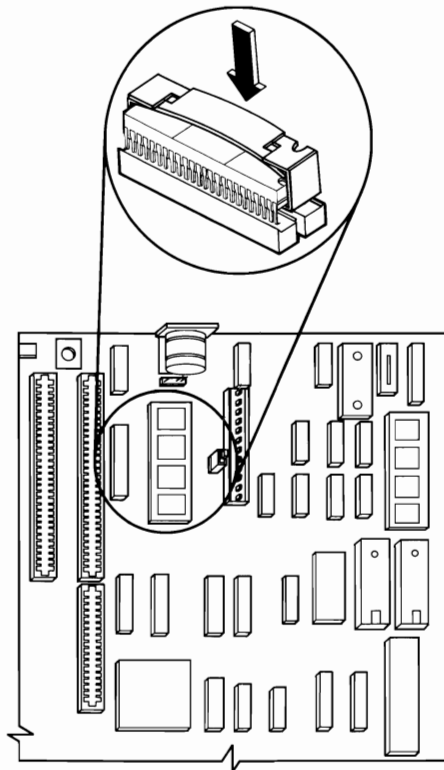


Type 1

Front

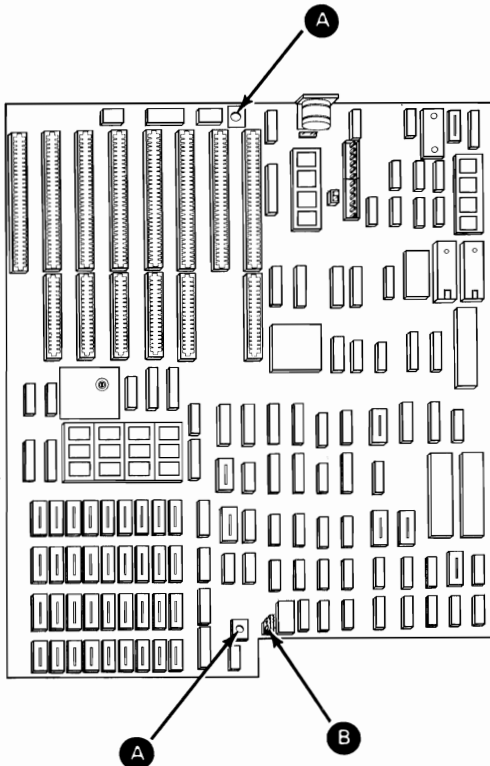
Type 2

5. Using a module puller, carefully remove the coprocessor.
6. Remove the safety protector.

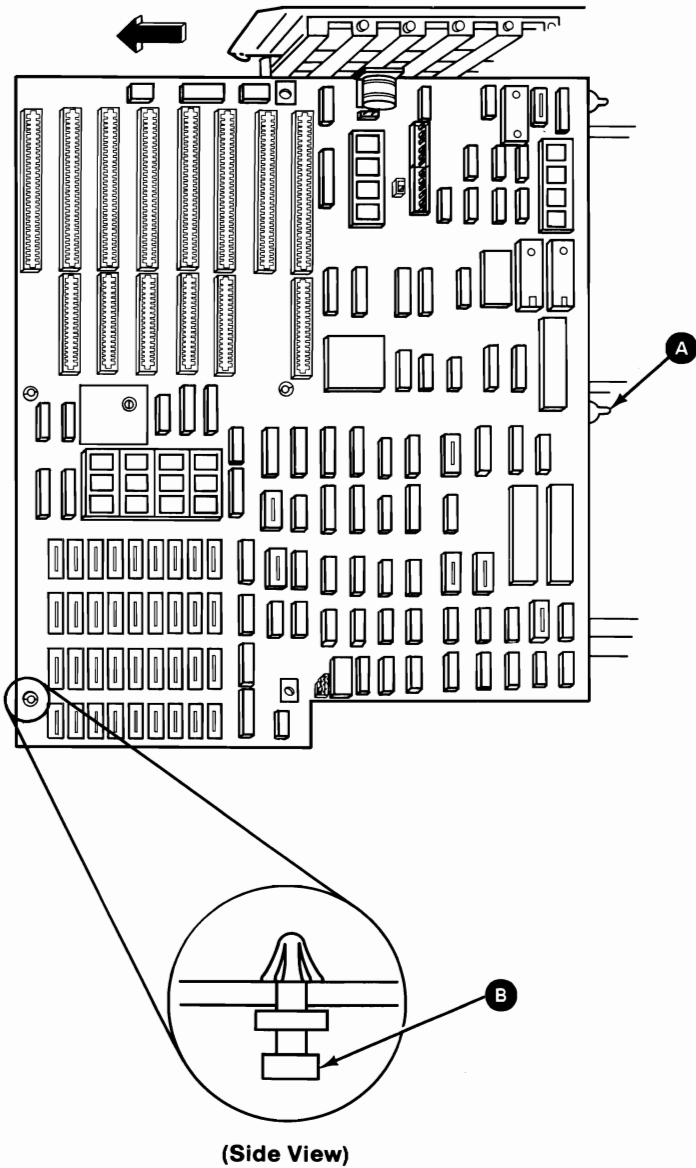


System Board 1080

1. Power off the system.
2. Remove the system unit cover (1005).
3. Disconnect the battery cable (1010).
4. Make a note of the adapter slot each option adapter is in.
5. Remove all option adapters (1015).
6. Disconnect the system board power cables (1070).
7. Disconnect the control panel cables from the system board **B**.
8. Remove the system board mounting screws **A**.



9. Slide the system board away from the power supply until the standoffs **B** can be lifted from the mounting slots **A**.
10. Lift the system board up and out the side of the system unit.

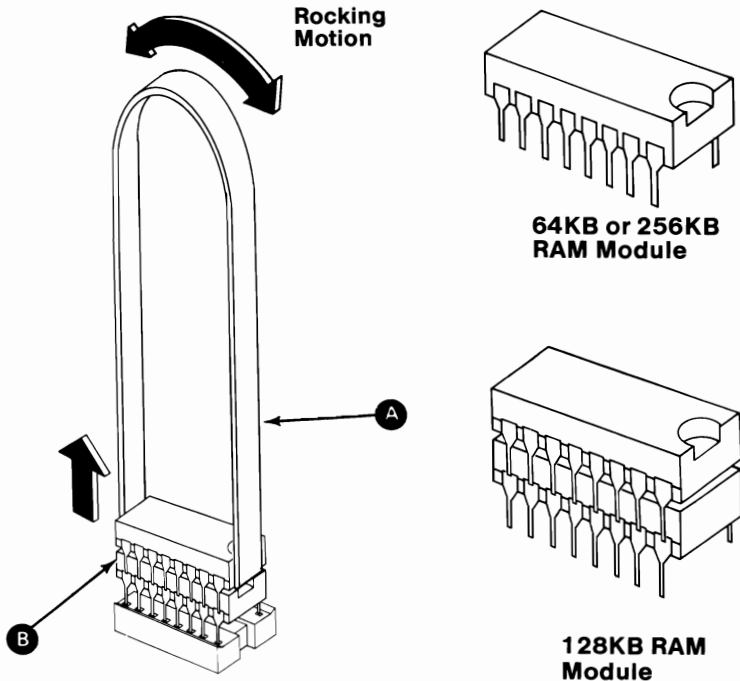


Memory Module 1085

Note: Only 64KB memory modules are installed on the 128KB Memory Expansion Adapter. Only 128KB memory modules are installed on the 512KB Memory Expansion Adapter. 256KB or stacked 128KB memory modules are installed on the system board.

1. Power off the system.
2. Remove the system unit cover (1005).
3. Find the failing memory module, system board or memory expansion adapter (see "MAP 0200: Memory" in the *Hardware Maintenance Service* manual).
4. Grasp the module **B** with the module puller **A** and gently lift one end and then the other, to avoid bending the pins.

Note: When replacing a memory module, line up the notch on the module so it is facing in the same direction as those on the other modules.

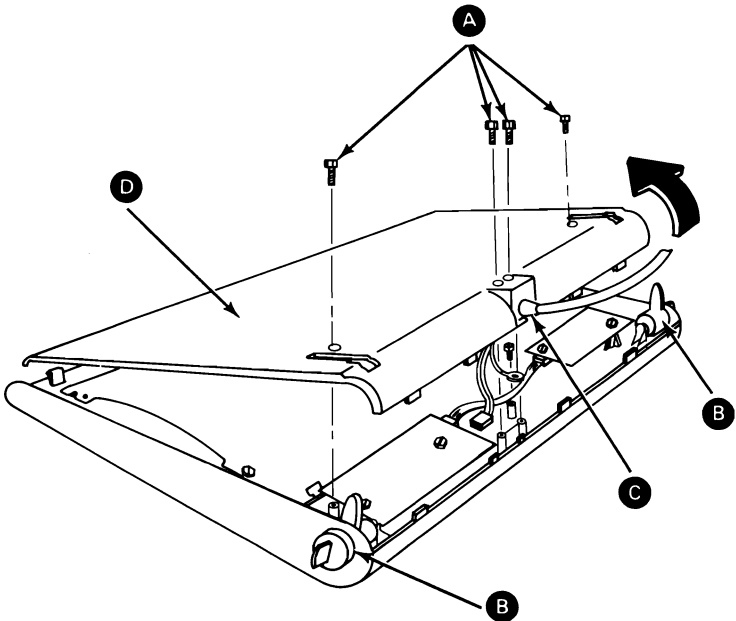


Disassembly and Assembly

Keyboard

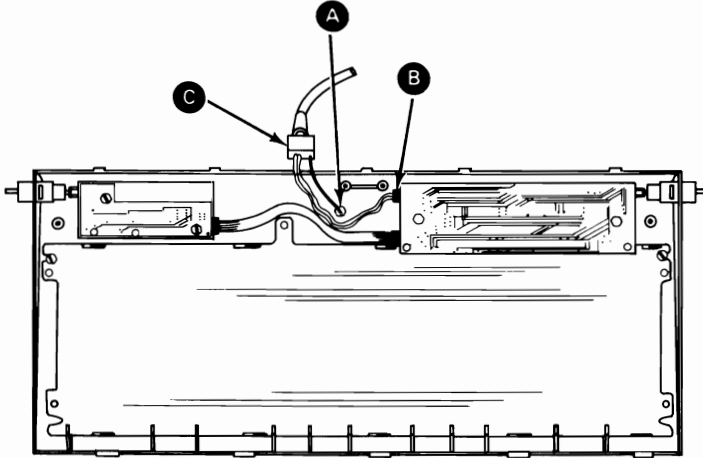
84-Key Keyboard Base 2005

1. Power off the system.
2. Disconnect the keyboard cable from the rear of the system unit.
3. Place the keyboard with the base **D** facing up, and remove the four mounting screws **A**.
4. Turn the adjustable feet **B** up to clear the base.
5. Raise the base approximately 51 mm (2 inches) and remove the cable **C** from the keyboard base.
6. Lift the base out of the top cover.



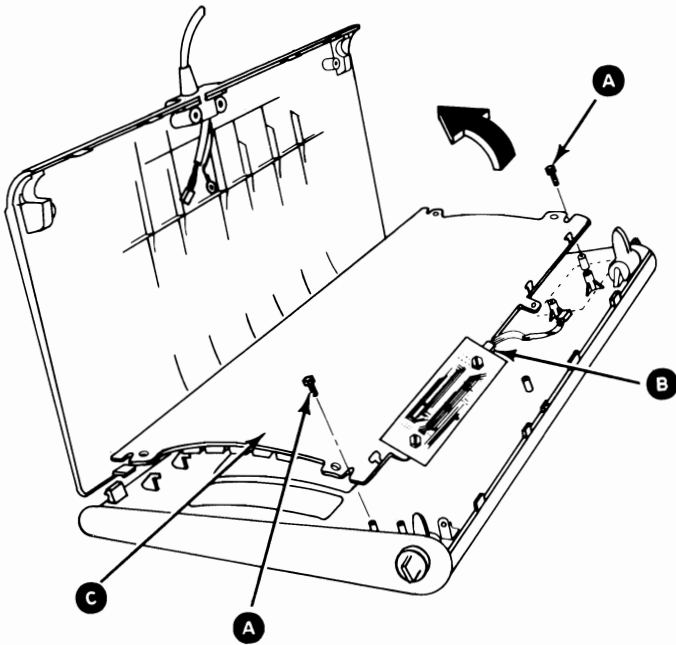
84-Key Keyboard Cable 2010

1. Remove the keyboard base (2005).
2. Remove the ground wire mounting screw **A**.
3. Disconnect the cable connector **B**.
4. Remove the keyboard cable **C**.



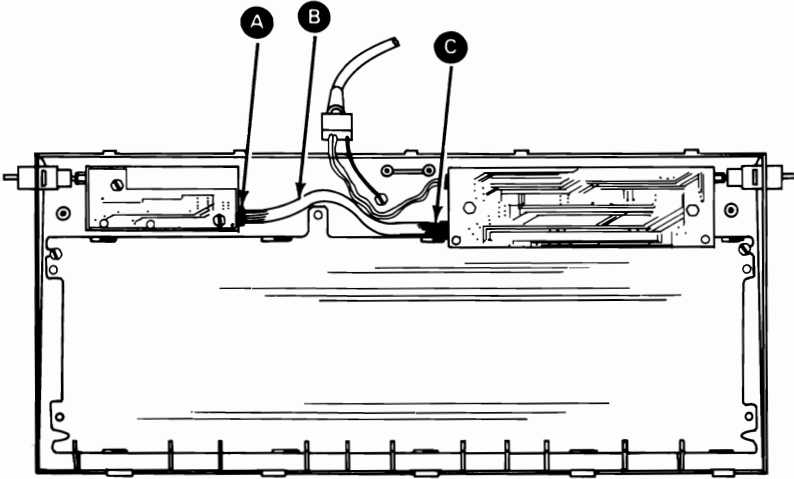
84-Key Keyboard Assembly 2015

1. Remove the keyboard base (2005).
2. Remove the two mounting screws (A).
3. Remove the keyboard cable (2010).
4. Disconnect the cable from the keyboard-assembly driver board (B).
5. Lift the rear of the keyboard-assembly (C) out of the cover.



84-Key Keyboard Internal Cable 2017

1. Remove the keyboard base (2005).
2. Disconnect the internal cable **(B)** from the LED driver card **(A)** and the keyboard assembly **(C)**.

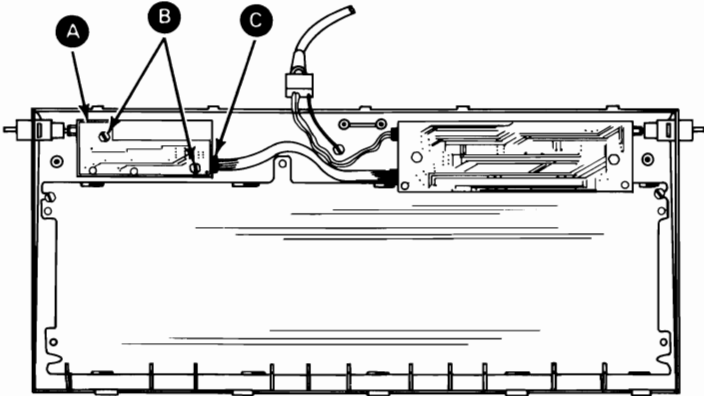


84-Key Keyboard LED Driver Card 2020

1. Remove the keyboard base (2005).
2. Disconnect the internal cable from the LED driver card **C**.
3. Remove the mounting screws **B**.

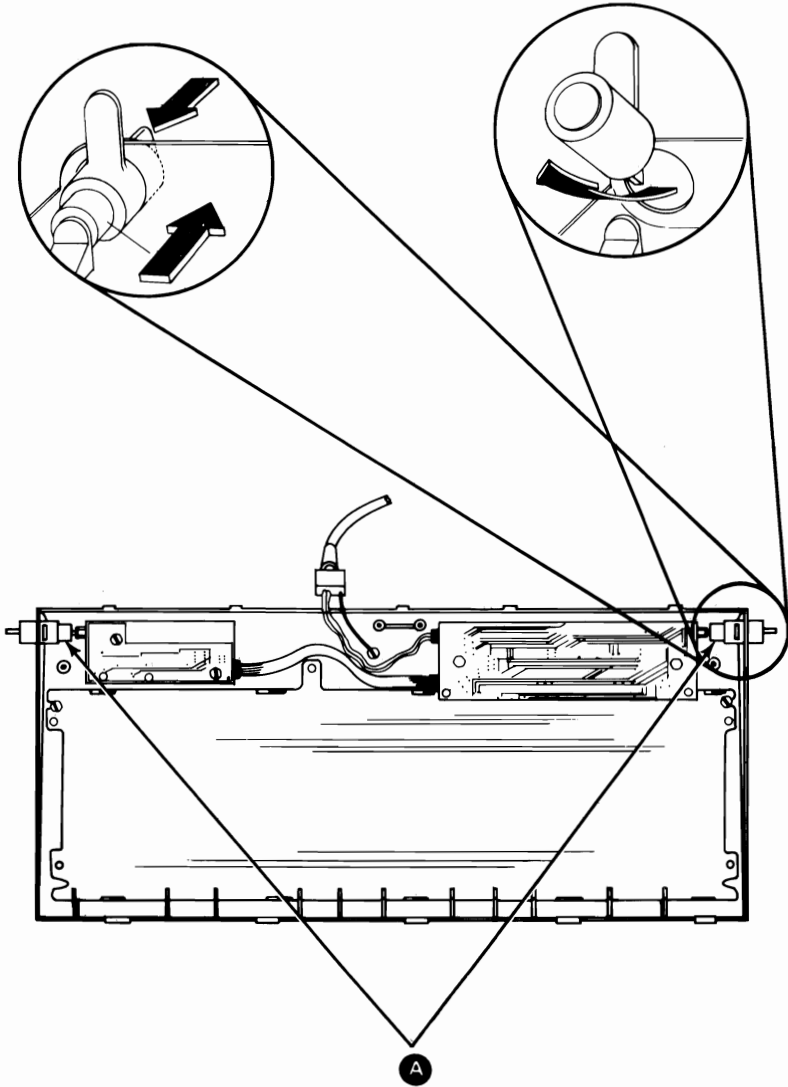
Warning: The LEDs are in the keyboard top cover. Be careful not to bend or break them when removing the LED driver card.

4. Remove the LED driver card **A**.



84-Key Keyboard Adjustable-Feet 2025

1. Remove the keyboard base (2005).
2. Compress the keyboard foot assembly **A**.
3. Move the foot assembly out of the keyboard top cover.



84-Key Keyboard Top-Cover 2030

1. Remove the keyboard cable **(2010)**.
2. Remove the keyboard assembly **(2015)**.
3. Remove the LED driver card **(2020)**.
4. Remove the keyboard feet **(2025)**.
5. Remove the cover.

Notes: