Repair Information

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

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Notes:

How to Use the Repair Information

This section contains safety grounds, locations, adjustments, and removals for both the IBM Personal Computer and the IBM Personal Computer XT. Any differences between the two are noted as exceptions; otherwise the procedures work for both systems. Look in the section Table of Contents to find the assembly you are servicing.

Each removal procedure 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. Remove the screw holding the speaker.

In the example, Step 2 refers you to procedure **1005** for complete instructions on removing the system unit cover.

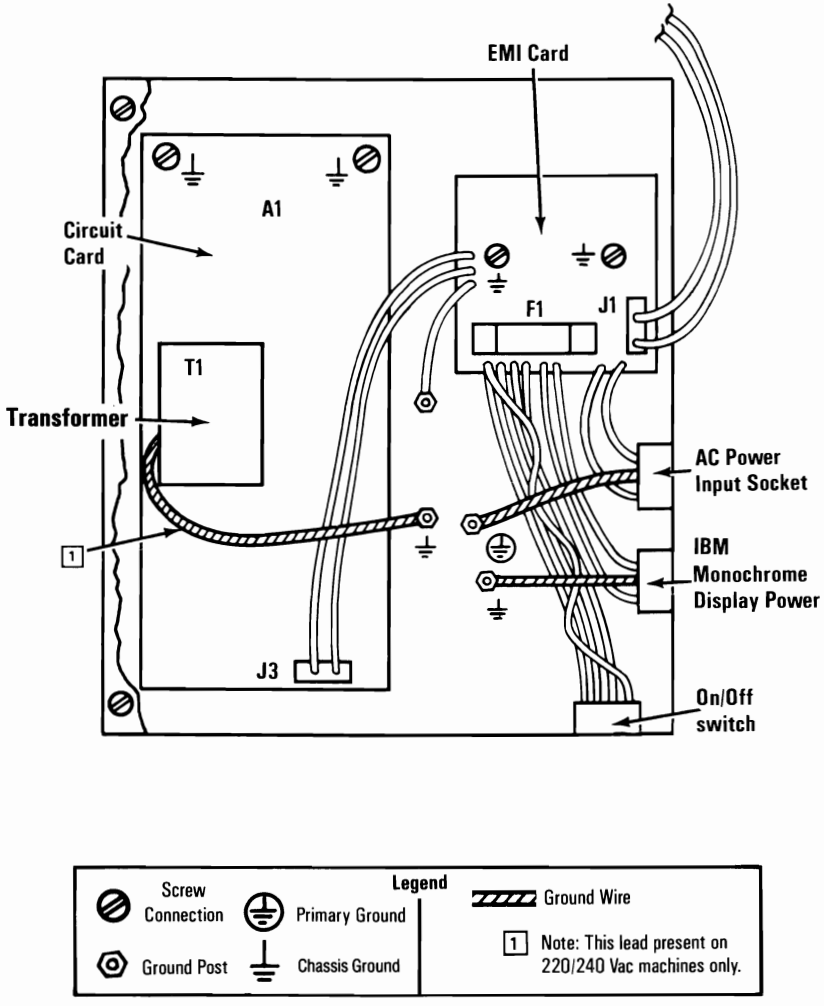
> **Note:** Procedures are listed in numeric order in the section Table of Contents under "Removals and Replacements."

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

Safety Ground Locations

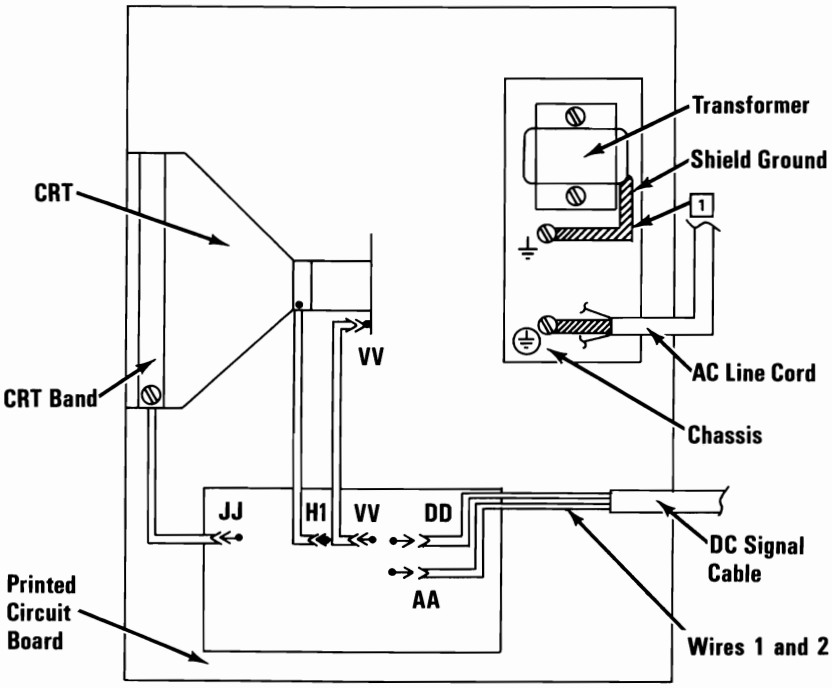
Power Supply

- IBM Personal Computer
- IBM Personal Computer XT
- IBM Personal Computer Expansion Unit.



IBM Monochrome Display

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

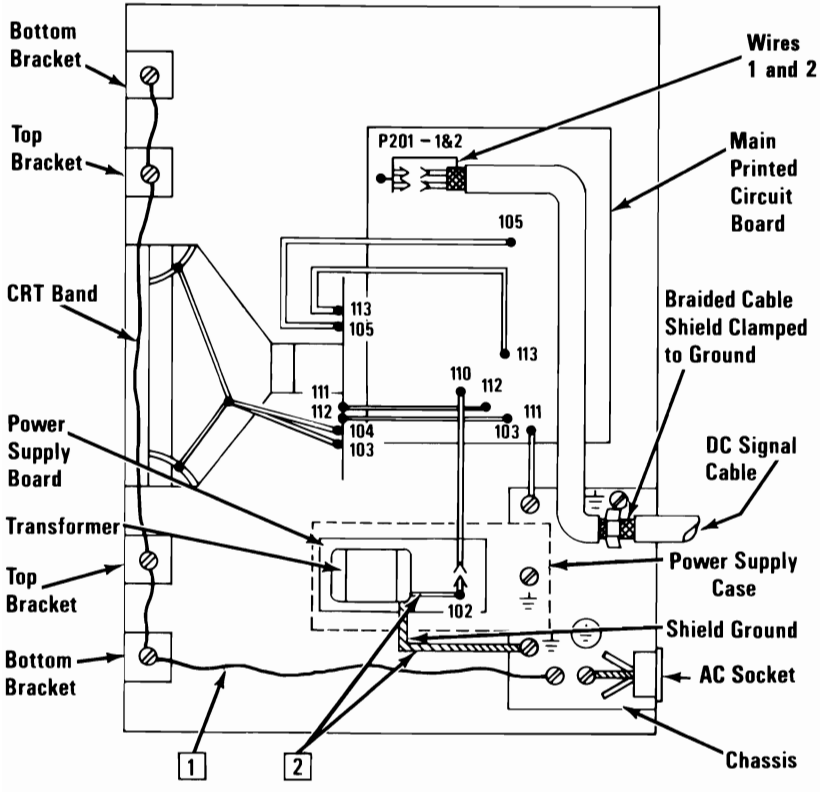


Legend

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

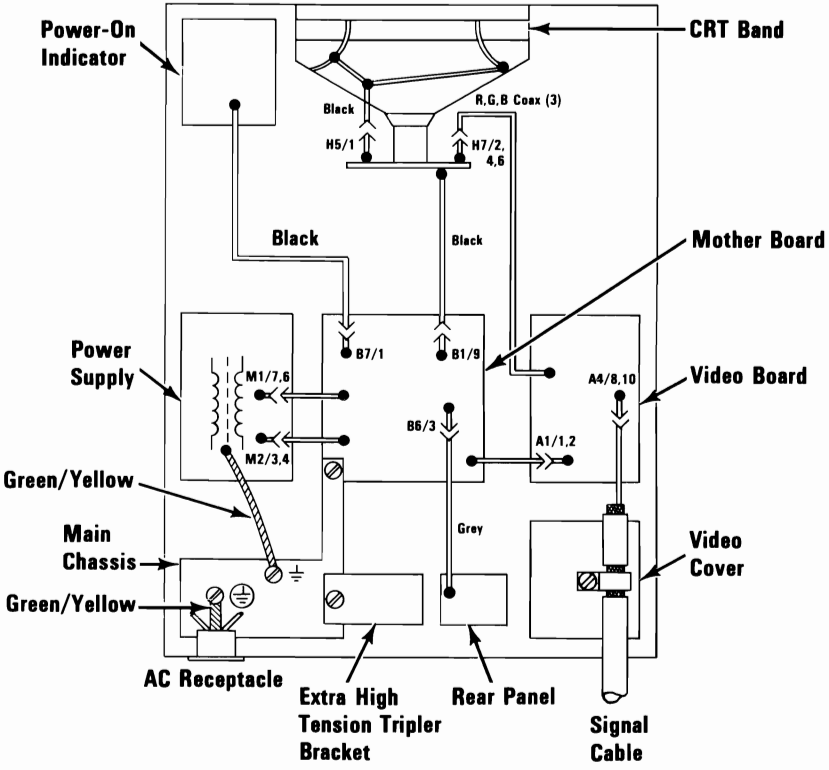
Screw Connection	Ground Lead
Soldered Connection	Primary Ground
Plugged Connection	Chassis Ground

Note: Points 103, 105, 110, 111, 112, 113, and P201 1&2 on main board are joined by printed circuit lands.

1 **Not present on U.S. displays**

2 **Present only on Model-2 displays**

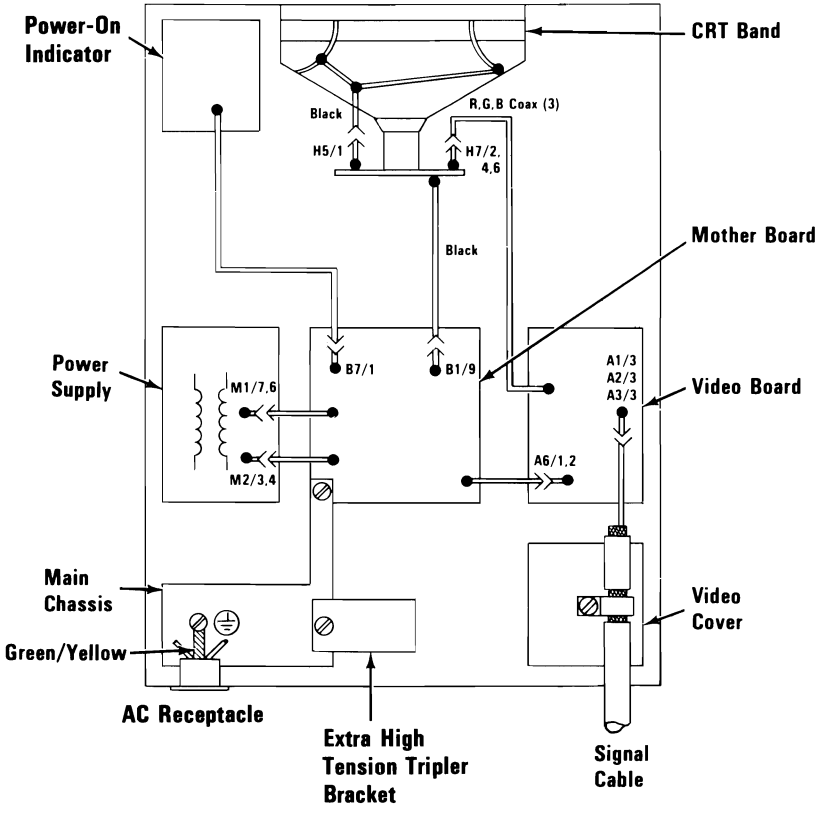
IBM Enhanced Color Display



Legend

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

IBM Professional Graphics Display



Legend

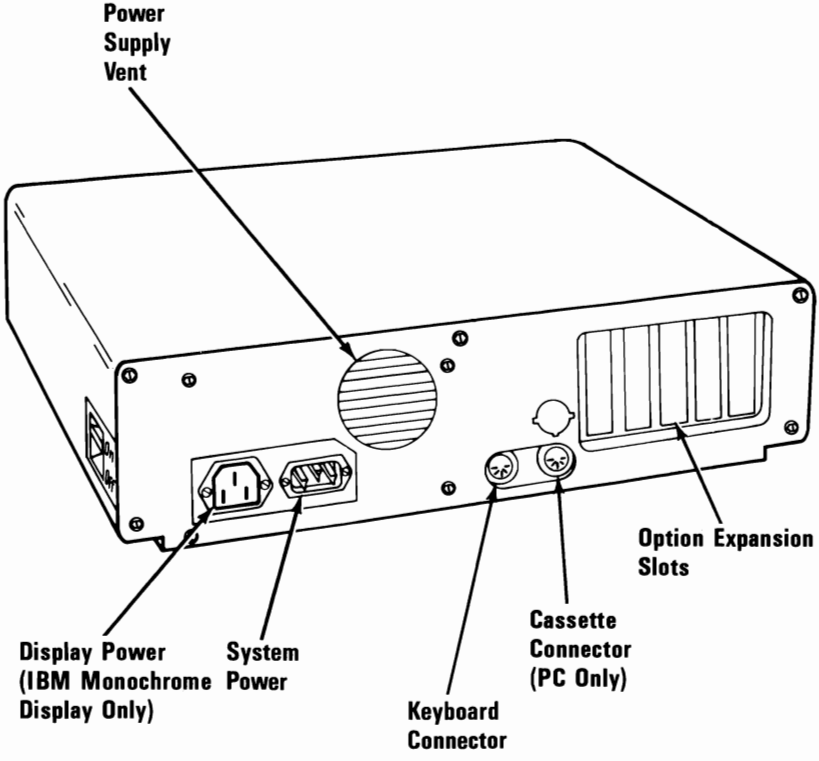
Screw Connection	Ground Lead
Soldered Connection	Primary Ground
Plugged Connection	Chassis Ground

Locations

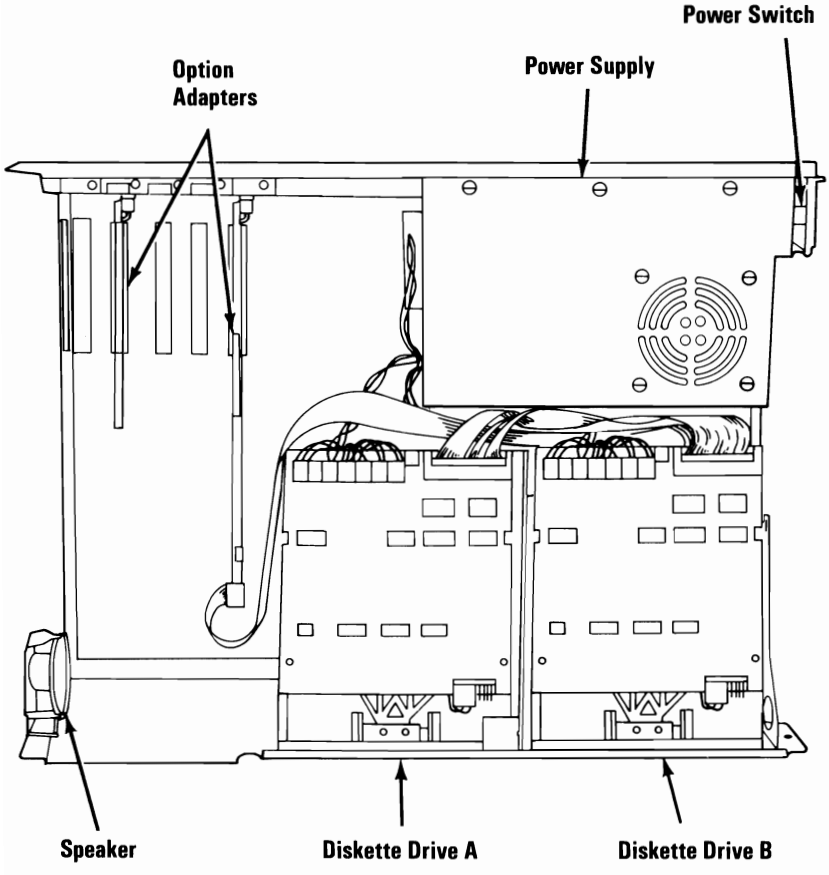
Switch settings and jumper locations are found in the *Hardware Maintenance Service* manual.

IBM Personal Computer

Rear View



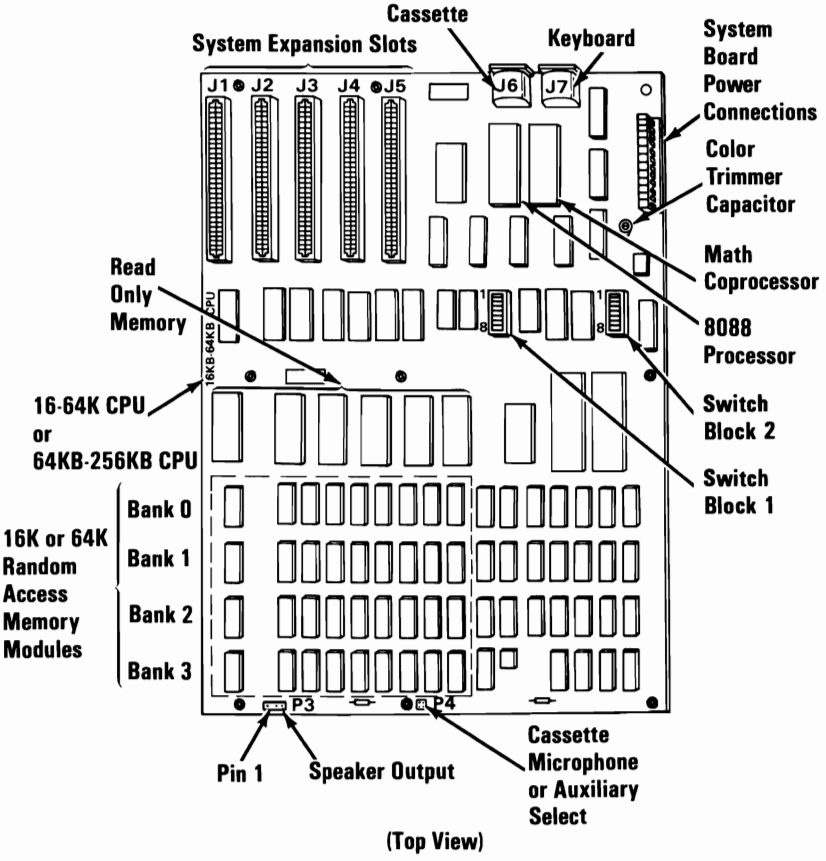
Top View


Power Switch
Option
Adapters
Power Supply
Speaker
Diskette Drive A
Diskette Drive B

System Board

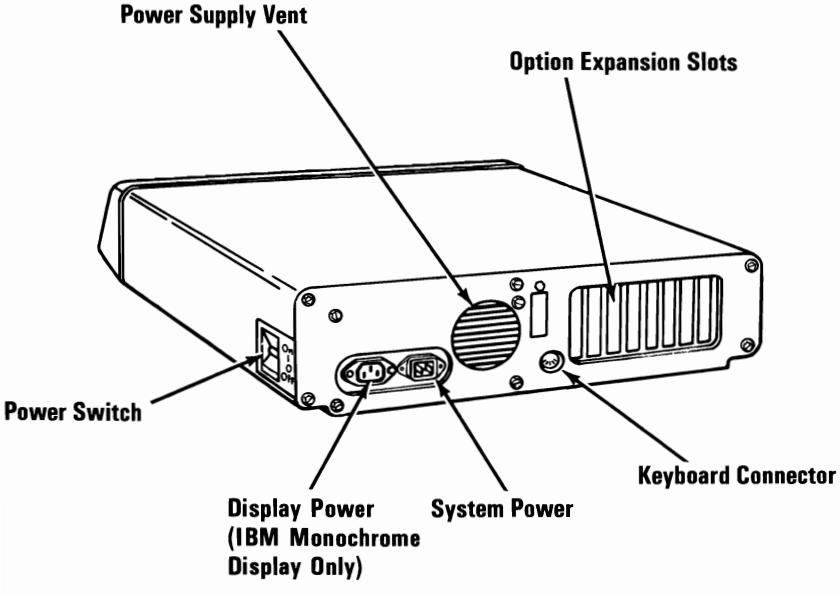
The 16KB-64KB system board uses 16KB memory modules.

The 64KB-256KB system board uses 64KB memory modules.

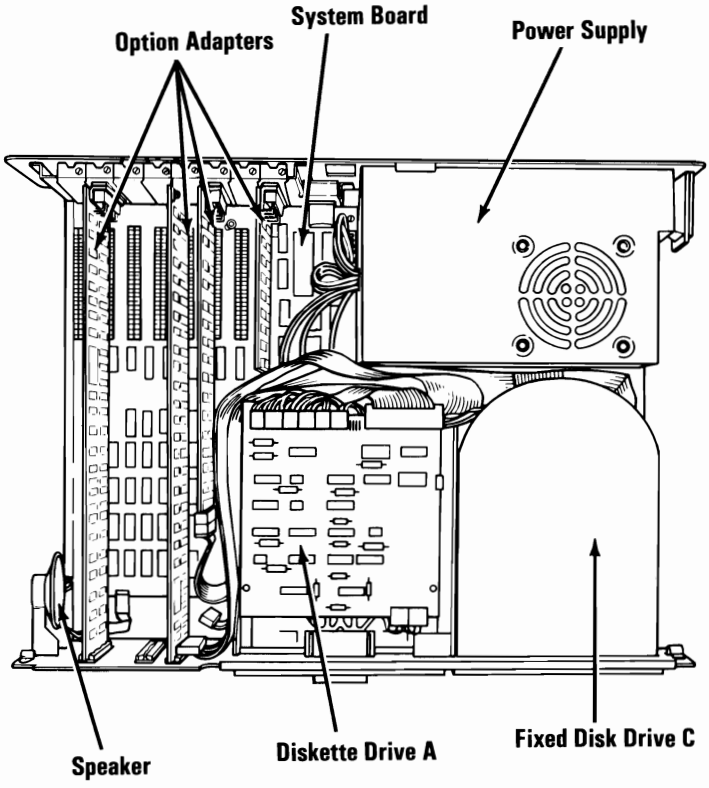


IBM Personal Computer XT

Rear View

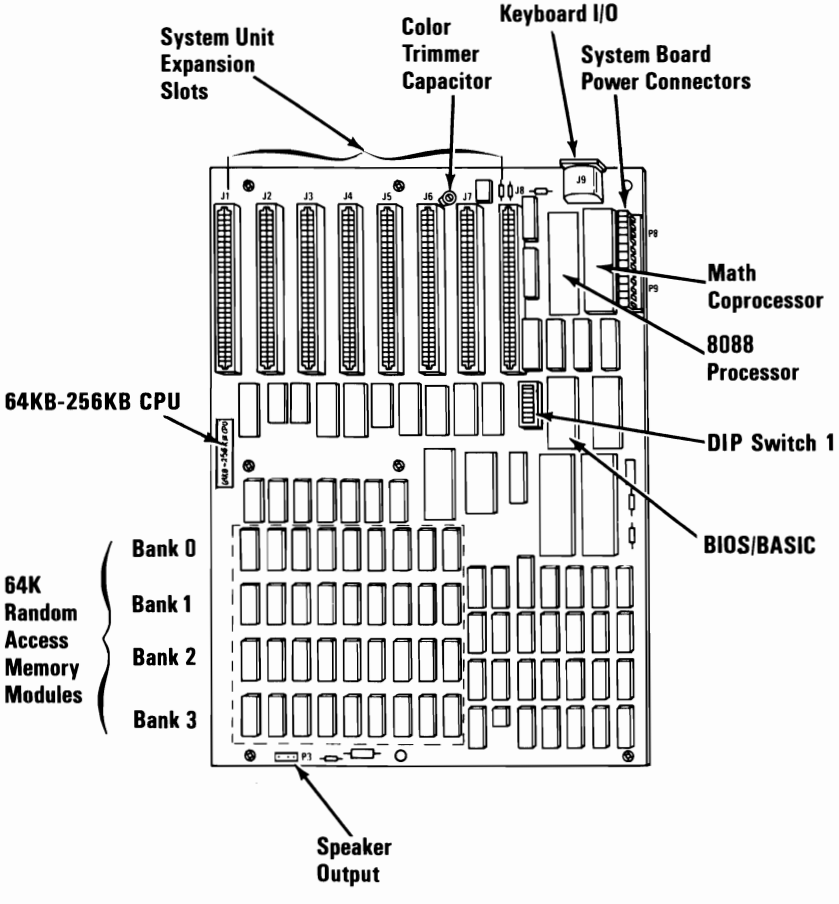


Top View


System Board
Option Adapters
Power Supply
Speaker
Diskette Drive A
Fixed Disk Drive C

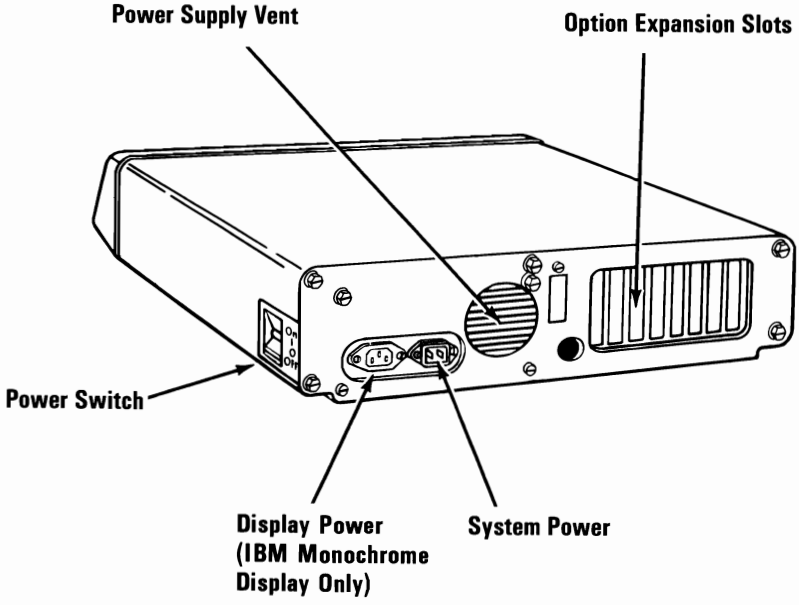
System Board

The 64-256KB system board uses 64KB memory modules.

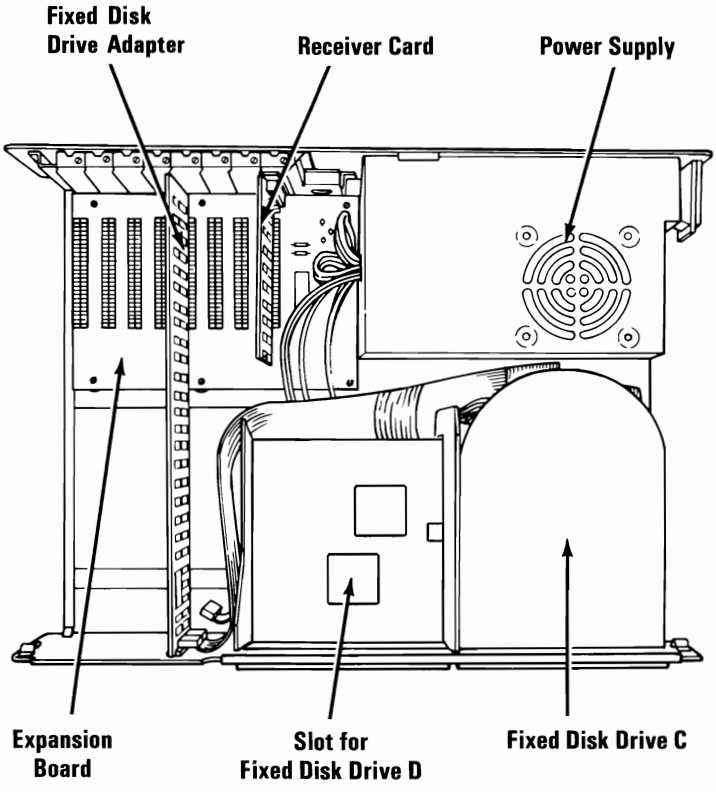


Expansion Unit

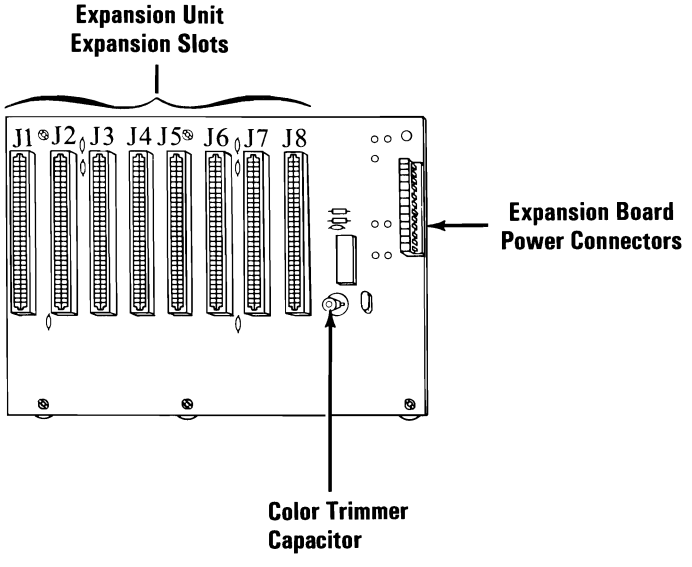
Rear View



Top View

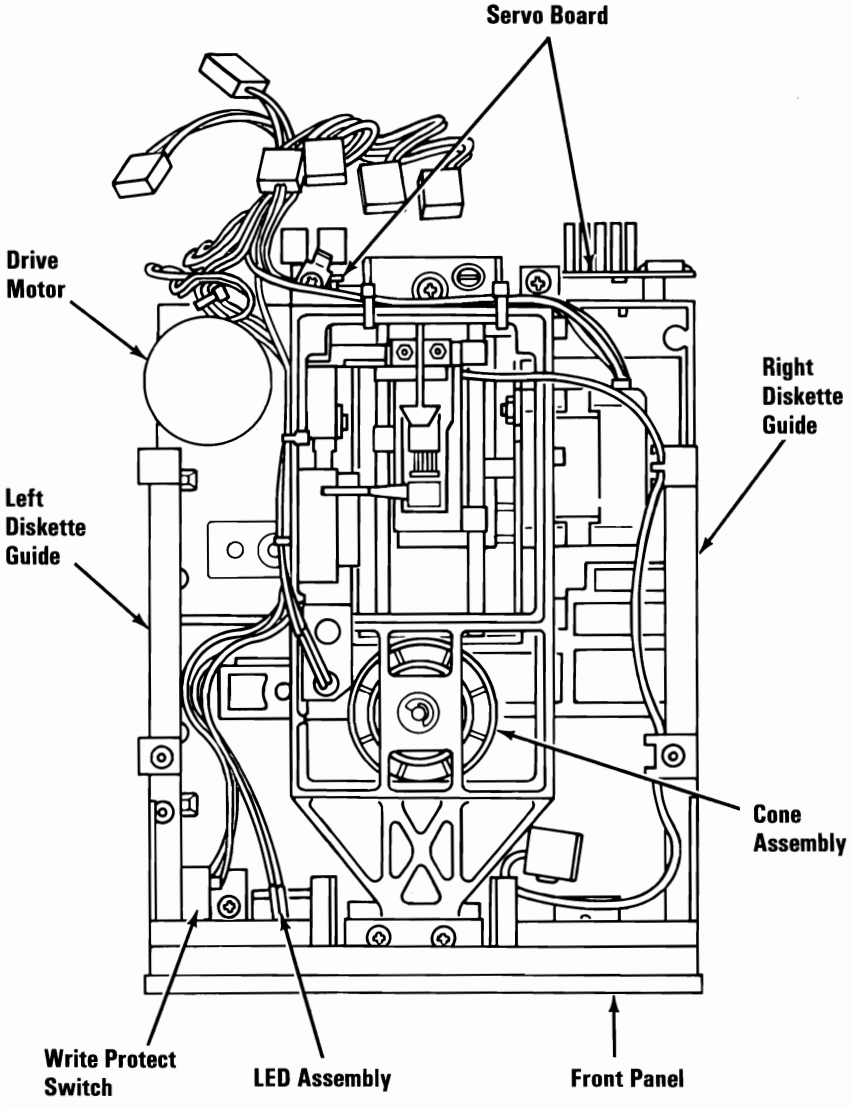

Fixed Disk
Drive Adapter
Receiver Card
Power Supply
Expansion
Board
Slot for
Fixed Disk Drive D
Fixed Disk Drive C

Expansion Board

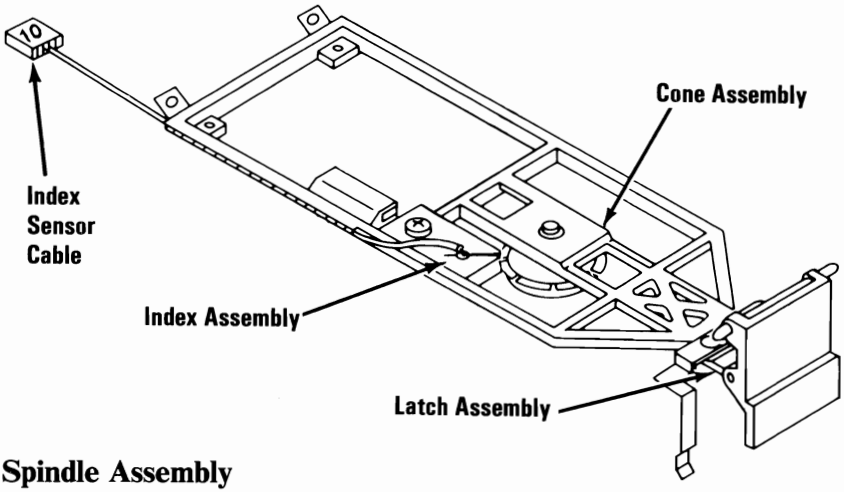


Diskette Drives

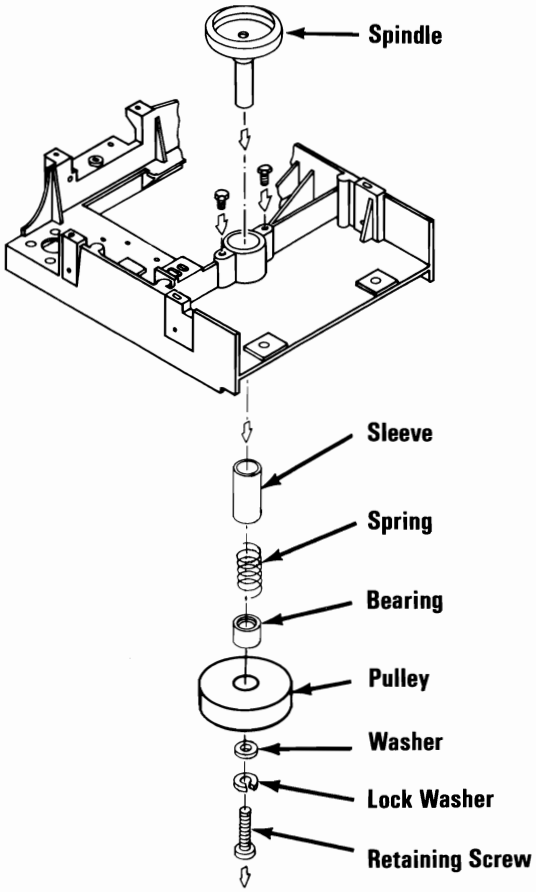
Full High Diskette Drive Assembly - Type 1



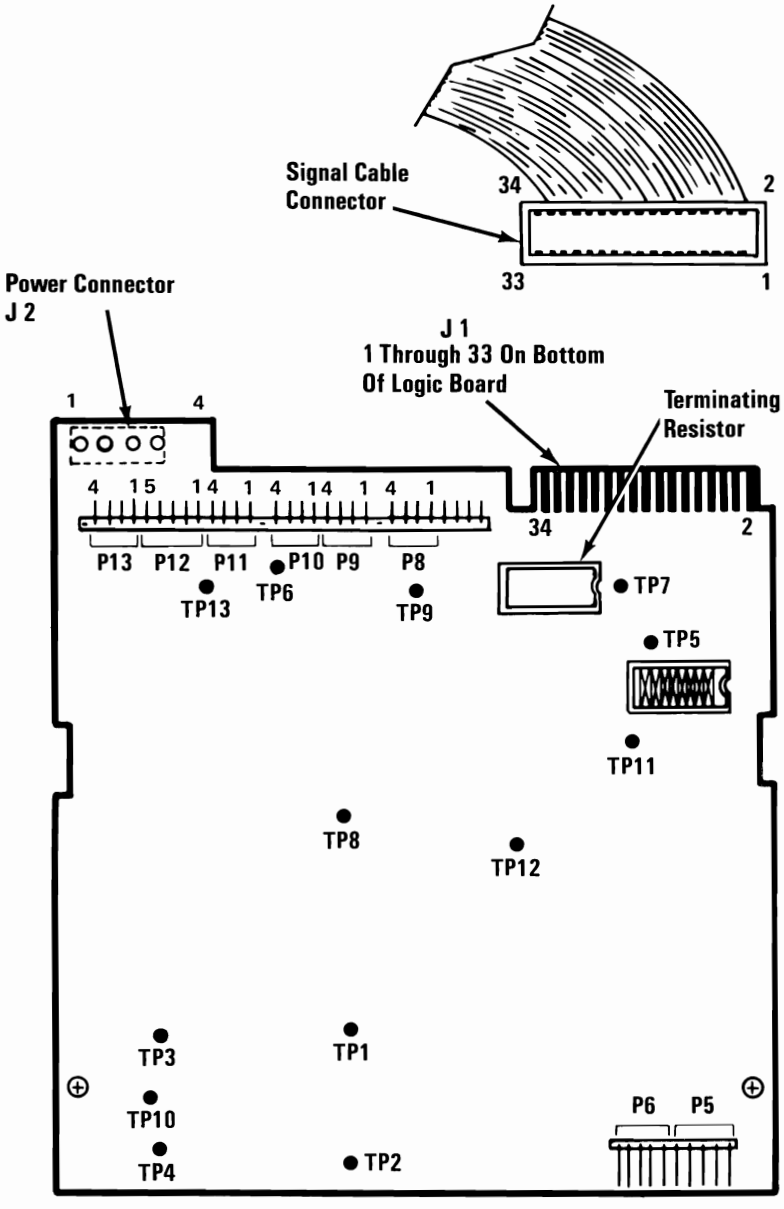
Cone Lever Arm



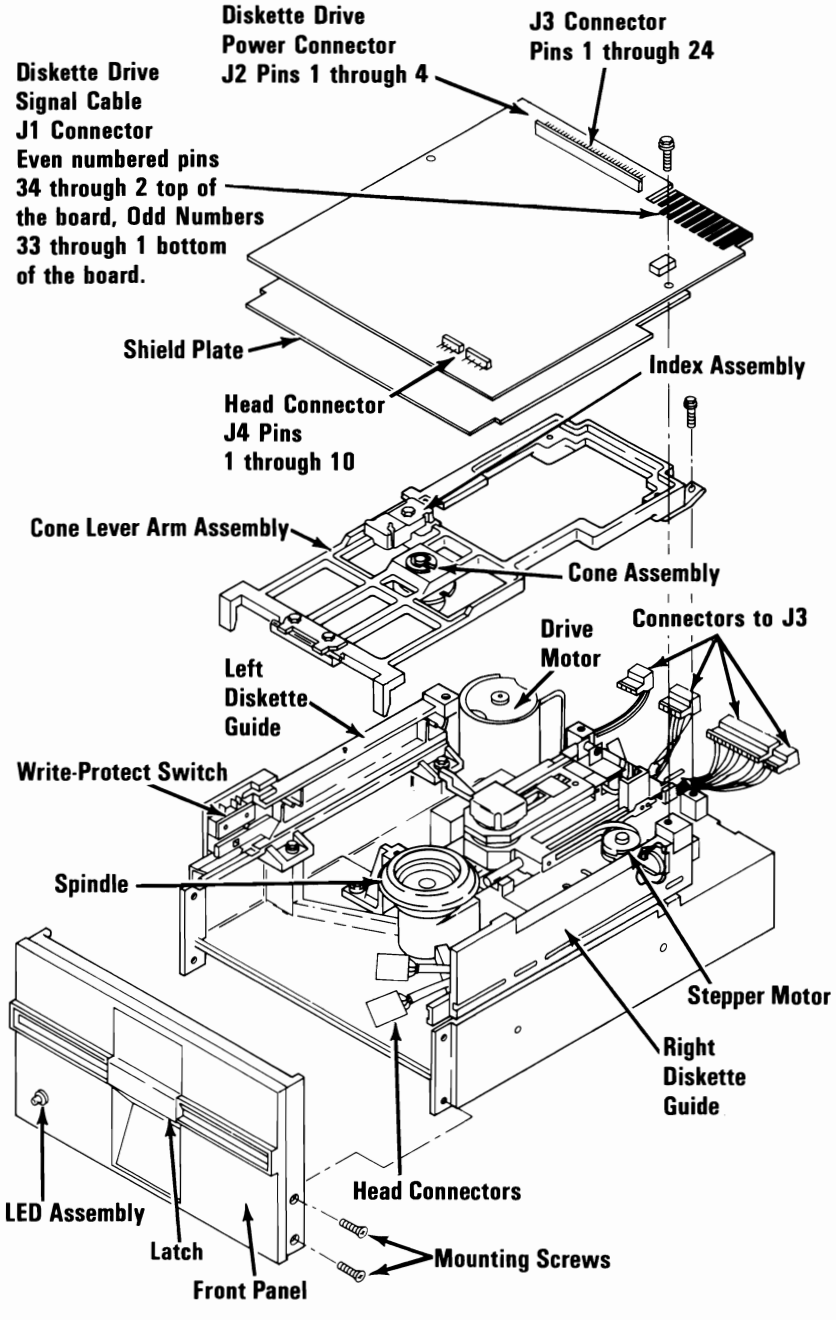
Spindle Assembly



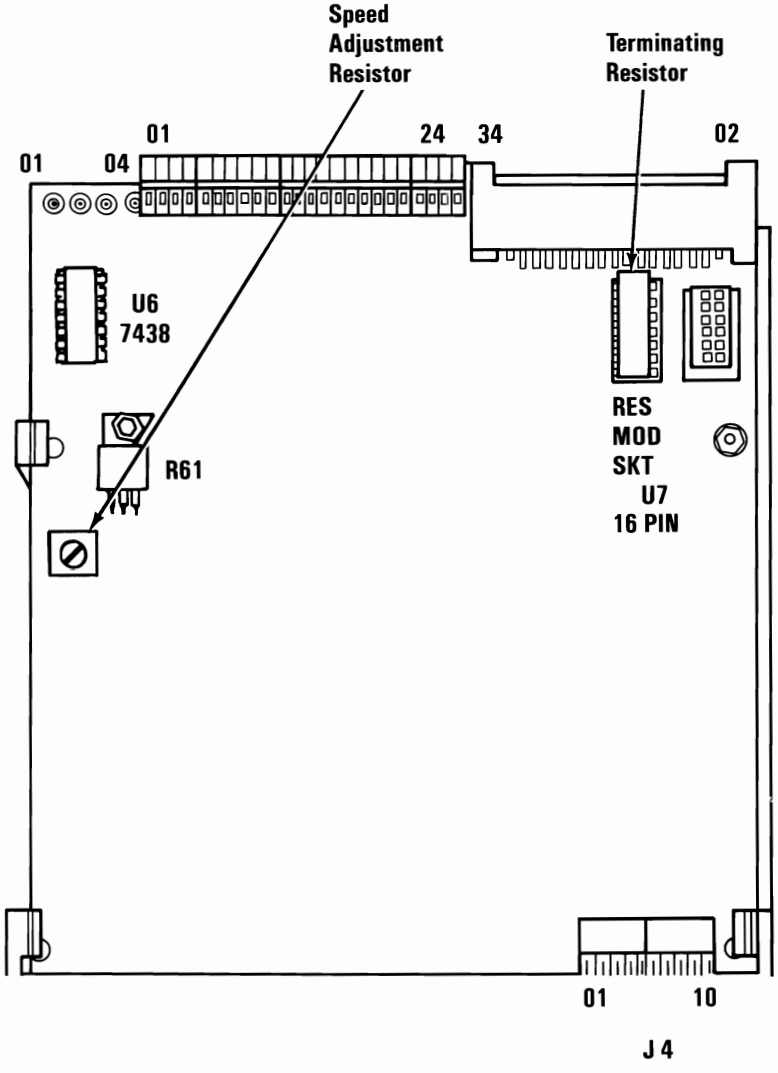
Logic Board


Signal Cable
Connector
34
2
33
1
Power Connector
J 2
J 1
1 Through 33 On Bottom
Of Logic Board
Terminating
Resistor
1
4
4 15 14 1 4 14 1 4 1
34
2
P13 P12 P11 P10 P9 P8
TP13
TP6
TP9
TP7
TP5
TP11
TP8
TP12
TP3
TP1
TP10
TP4
TP2
P6 P5

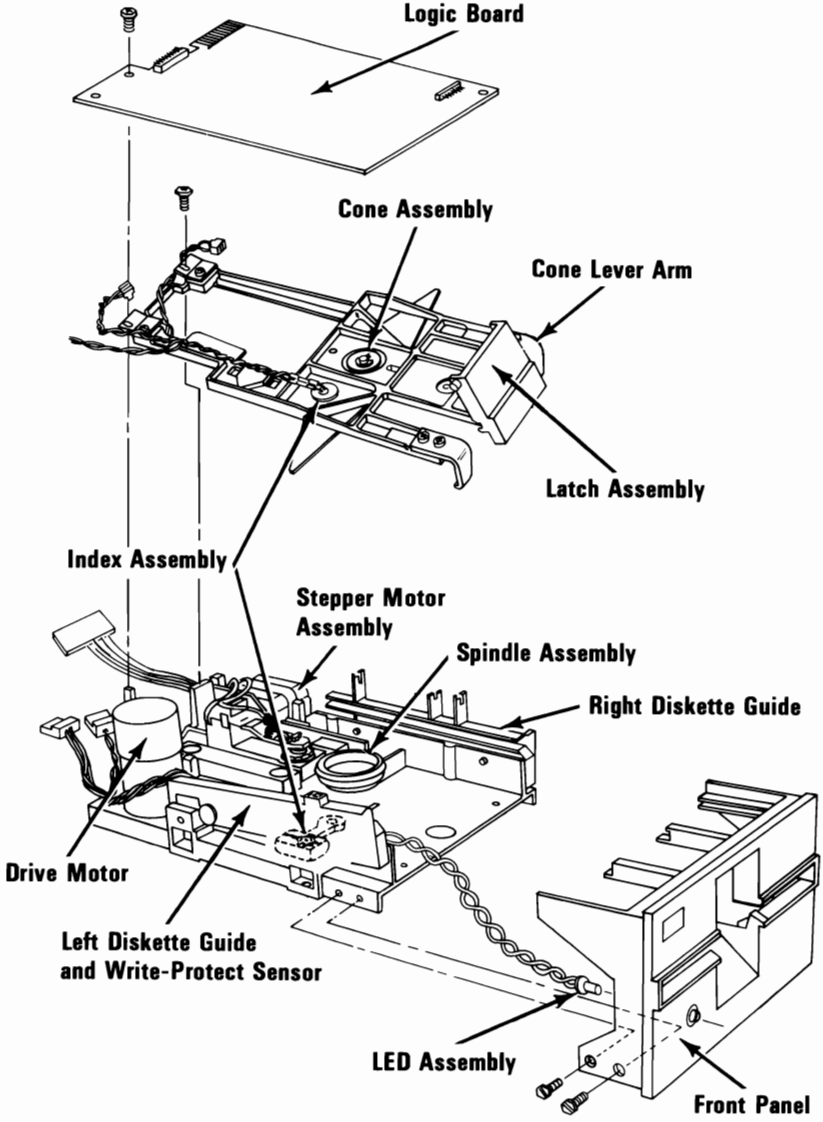
Full High Diskette Drive Assembly - Type 2



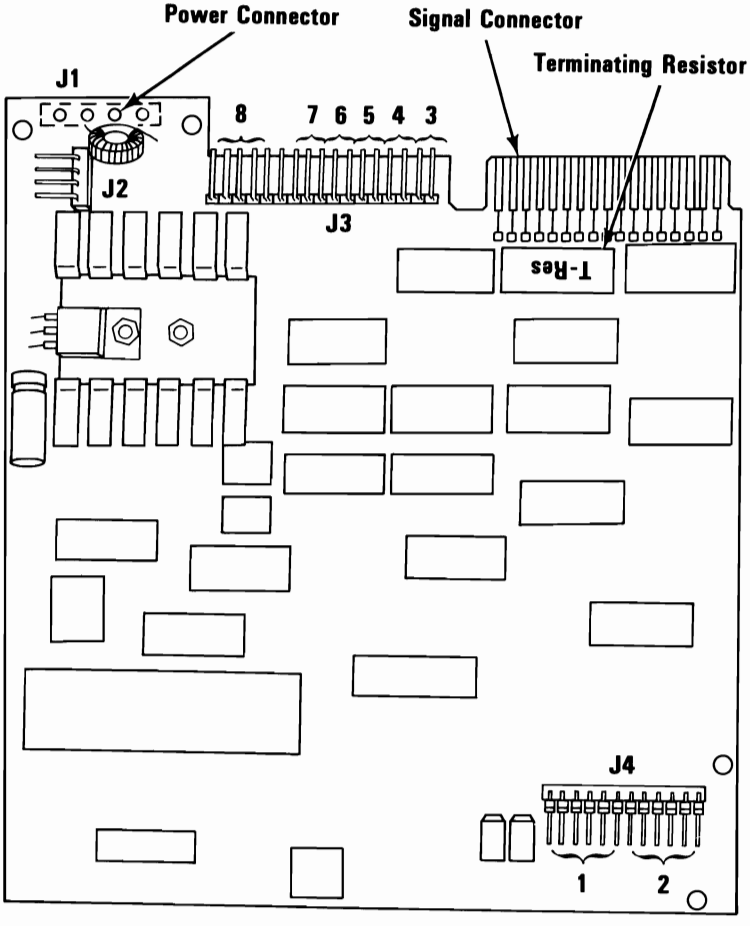
Logic Board


Speed
Adjustment
Resistor
Terminating
Resistor
01
24
34
02
01
04
U6
7438
R61
RES
MOD
SKT
U7
16 PIN
01
10
J 4

Full High Diskette Drive Assembly - Type 3

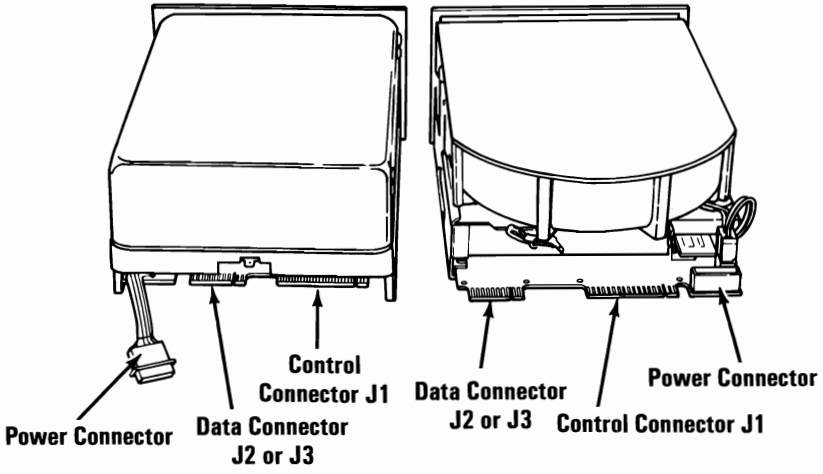


Logic Board


Power Connector
Signal Connector
Terminating Resistor
J1
J2
8
7 6 5 4 3
J3
T-Res
J4
1
2

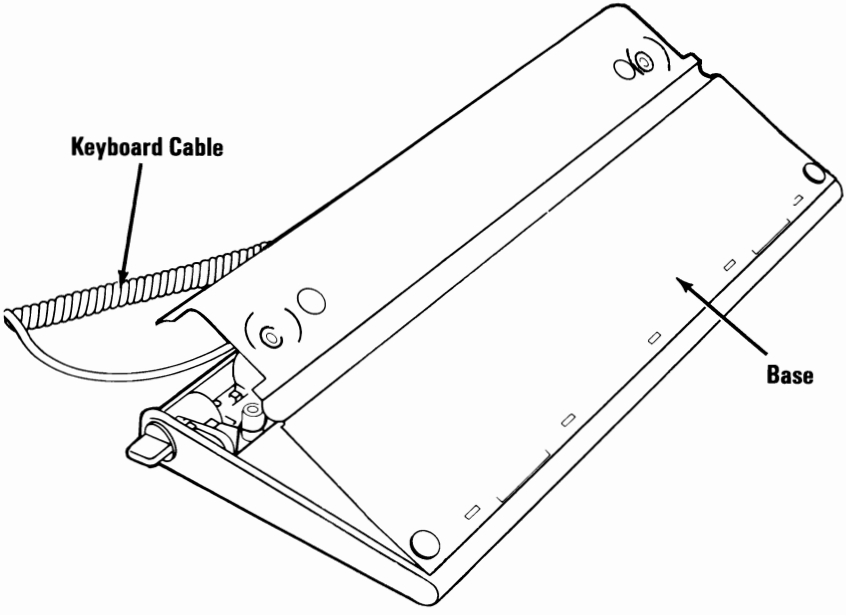
Fixed Disk Drive

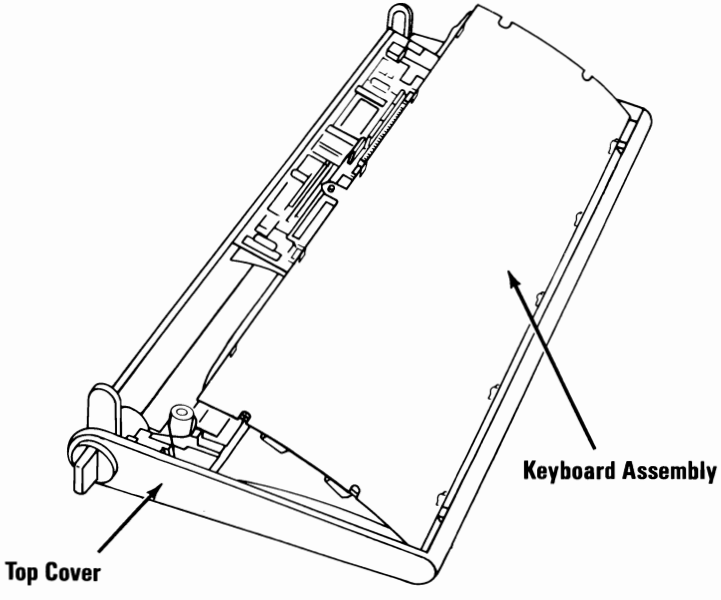
Note: Fixed disk drives may vary in appearance and connector location.



Keyboards

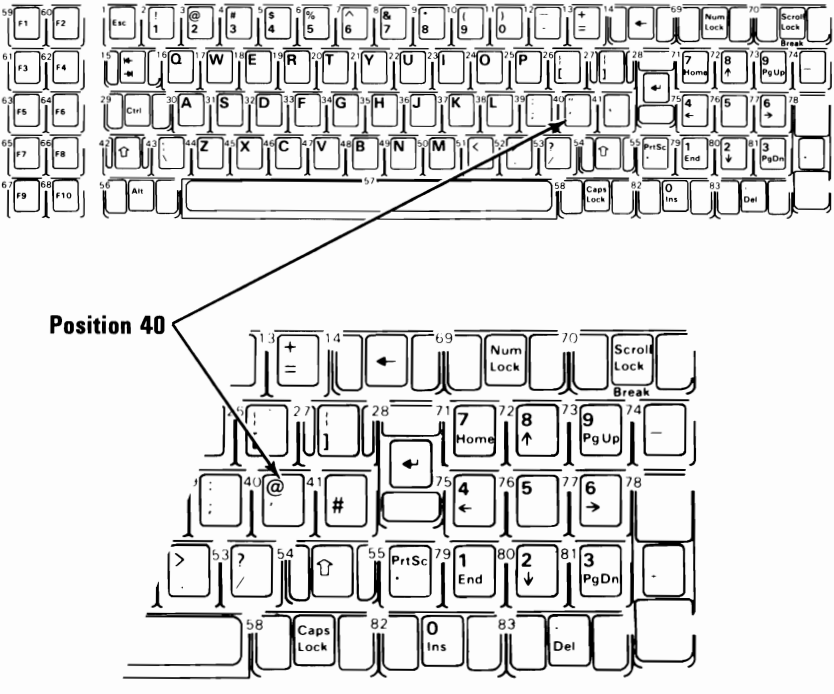
83-Key Keyboard





National Language Keyboard Types (83-Key)

Look at the characters in position 40 on the keyboard and compare them with those in the chart to determine which language keyboard you have.



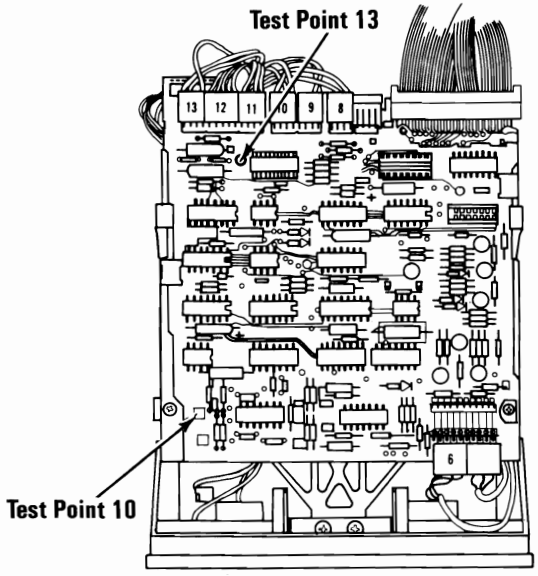
If Position 40 is:	The Keyboard is:
' / "	U.S. (English)
' / @	UK (English)
`u / %	French
¨A	German
`a / #	Italian
; / :	Spanish

Full High Diskette Drive - Type 1

Use this procedure for diskette drive A or B when the Advanced Diagnostics program will not load or the Diagnostics Speed Test cannot be performed. Fluorescent lighting is needed to see the strobe effect in this test.

Drive-Motor Preliminary Speed

1. Power off the system.
2. Remove the system unit cover **(1005)**.
3. Remove the diskette drive.
4. Insert a scratch diskette into the diskette drive.
5. Connect a jumper between test points 10 and 13 on the diskette-drive logic board.



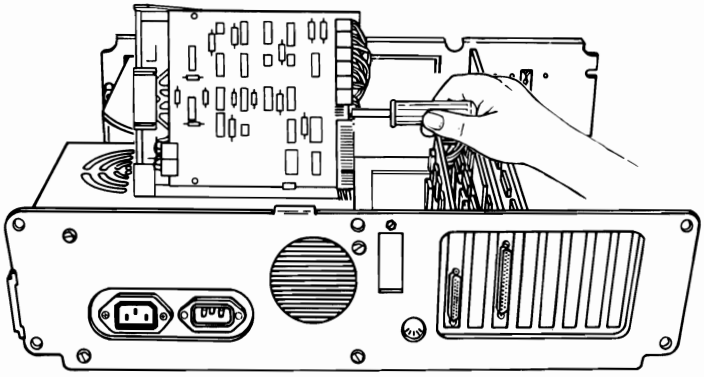
(Top View)

6. Place the diskette drive (left side up) on the system-unit power supply.

7. Plug the power connector into the diskette-drive logic board; leave the signal cable disconnected.

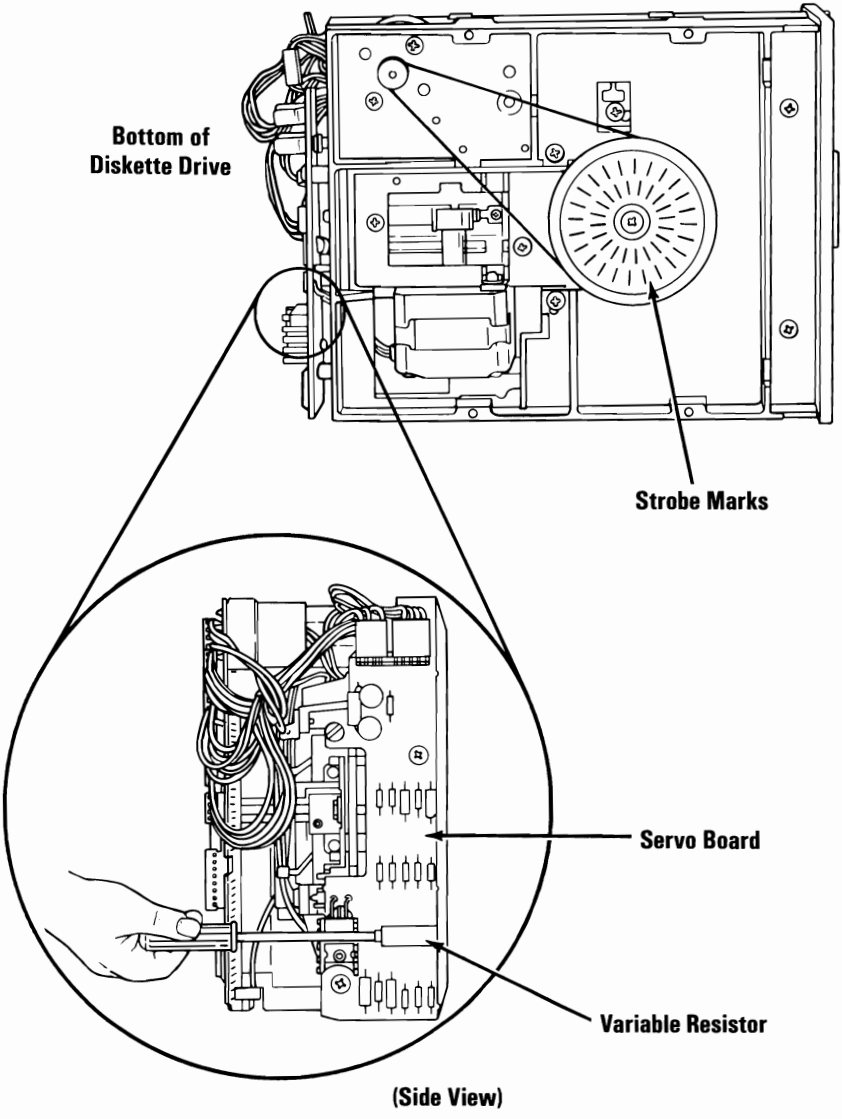
8. Plug the system-unit power cord into the system unit, then into the outlet.

9. Power on the system.



(Rear View)

10. Under fluorescent lighting, observe the strobe marks on the drive pulley. One of the two rings of marks should appear to stand still. (The outer ring of strobe marks is for 60 hertz, and the inner ring is for 50 hertz.) If a ring of marks does not appear to stand still, the diskette drive is not operating at the correct speed.



11. Power off the system.

12. Install the diskette drive.

13. Turn to "Drive-Motor Speed" and ensure the speed is within specification. Adjust if necessary.

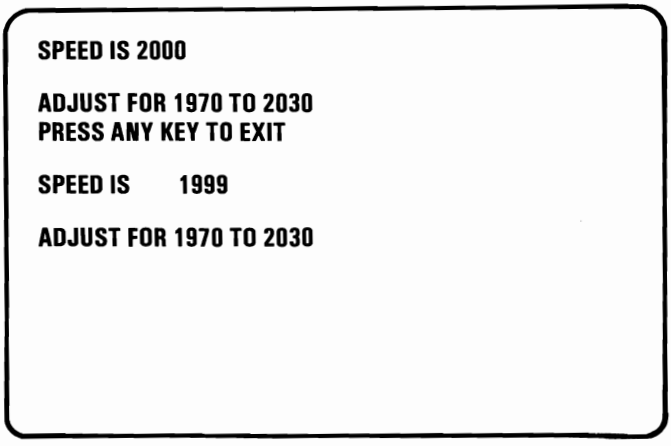
14. Install the cover of the system unit.

15. Connect all cables.

Drive-Motor Speed

1. Insert the Advanced Diagnostics diskette.
2. Power on the system unit.
3. Load the diskette drive diagnostic tests.
4. Select 4 **(SPEED TEST)** for the diskette drive you are testing. The diskette drive speed and adjustment specification appear on the screen.

   Note: If you are unable to load the Advanced Diagnostics program, or if the Speed Test will not run, go to "Drive-Motor Preliminary Speed."



5. Power off the system.

6. Remove the system unit cover **(1005)**.

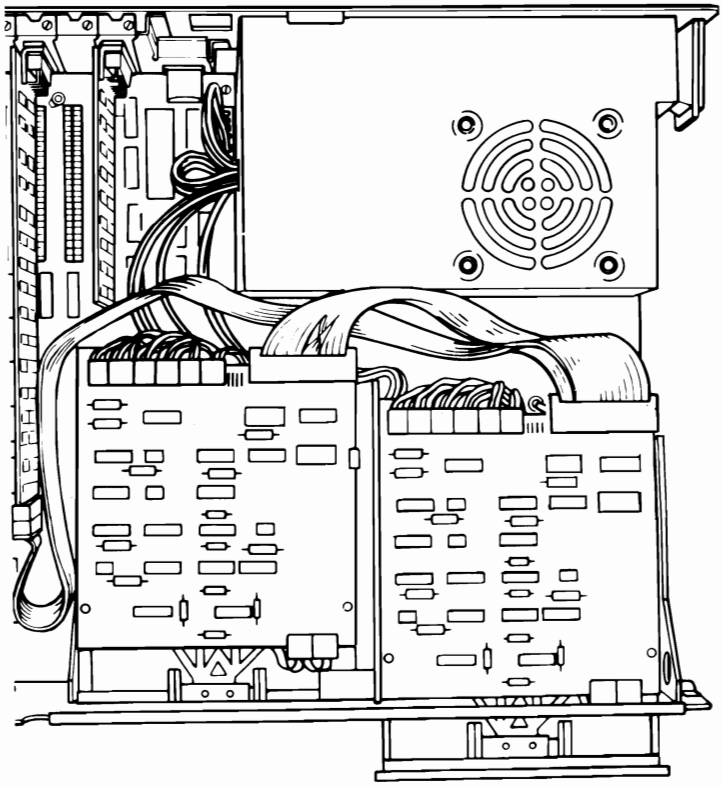
7. Remove the two mounting screws on the diskette drive that needs adjusting.

8. Slide the diskette drive out of the system unit approximately 50 mm (2 inches).

9. Connect all cables.

10. Insert the Advanced Diagnostics diskette.

11. Power on the system.

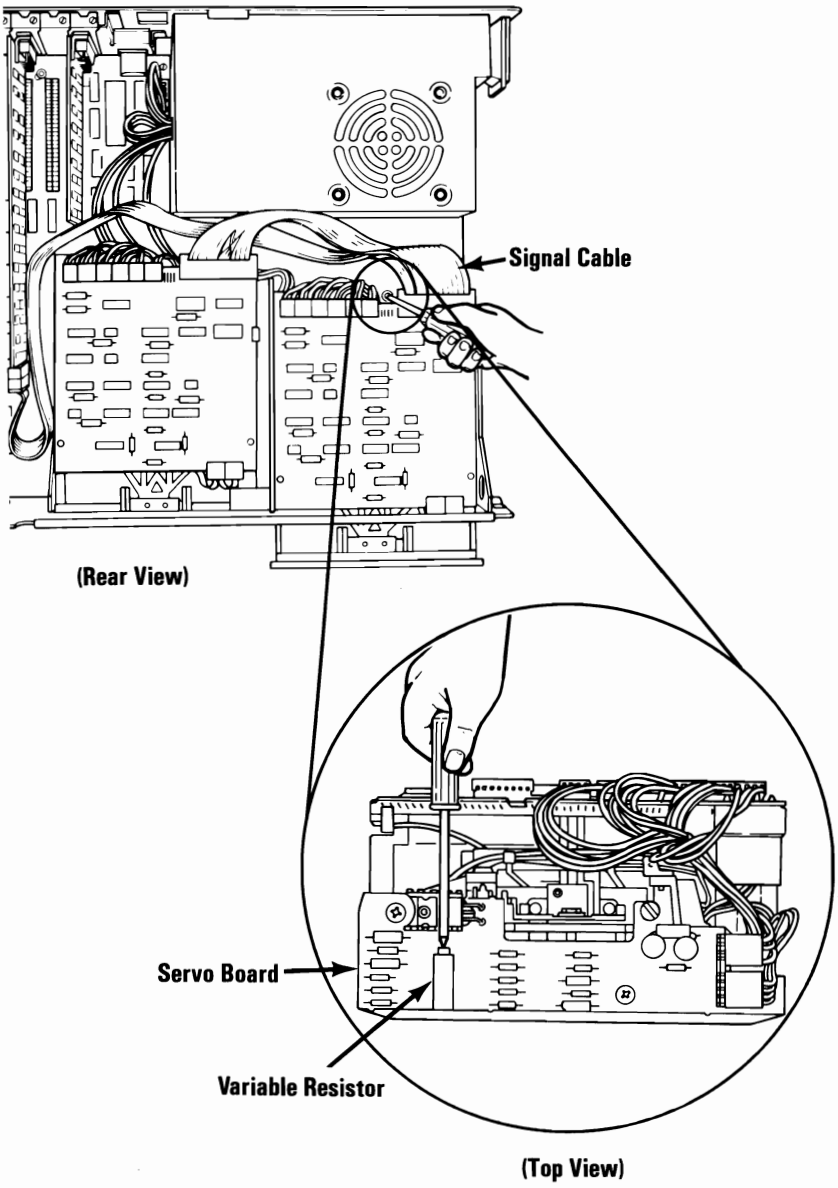


12. Load the diskette drive diagnostic tests.

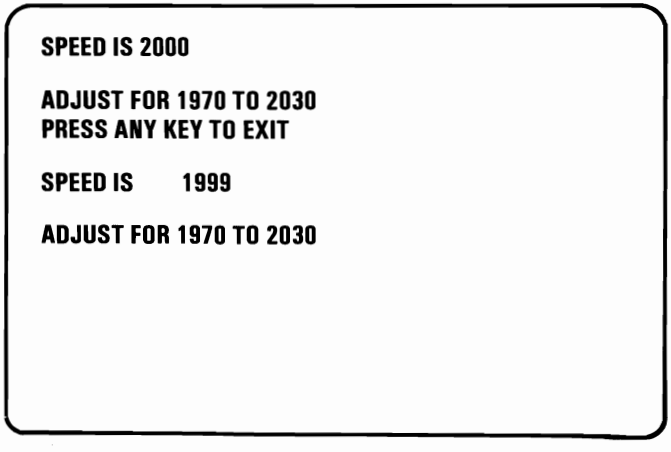
13. Select 4 **(SPEED TEST)** for the diskette drive you are adjusting. The diskette drive speed and the adjustment specification appear on the screen.

```
SPEED IS 2000

ADJUST FOR 1970 TO 2030
PRESS ANY KEY TO EXIT

SPEED IS      1999

ADJUST FOR 1970 TO 2030
```

14. The adjustment for the diskette drive speed is a variable resistor on the servo board. To adjust the speed, carefully insert an insulated screwdriver down past the left end of the diskette-drive signal cable to the adjusting screw on top of the variable resistor.



15. Turn the screw until the speed shown on the screen is within the required specifications.



16. Power off the system.

17. Unplug the system unit power cord (and expansion unit) from the outlet.

18. Install the diskette drive.

19. Install the system unit cover.

20. Connect all cables.

Full High Diskette Drive - Type 2

Use this procedure for diskette drive A or B when the Advanced Diagnostics program will not load or the Diagnostics Speed Test cannot be performed. Fluorescent lighting is needed to see the strobe effect in this test.

Drive-Motor Preliminary Speed

1. Power off the system.
2. Remove the system unit cover **(1005)**.
3. Remove the diskette drive.
4. Insert a scratch diskette into the diskette drive.

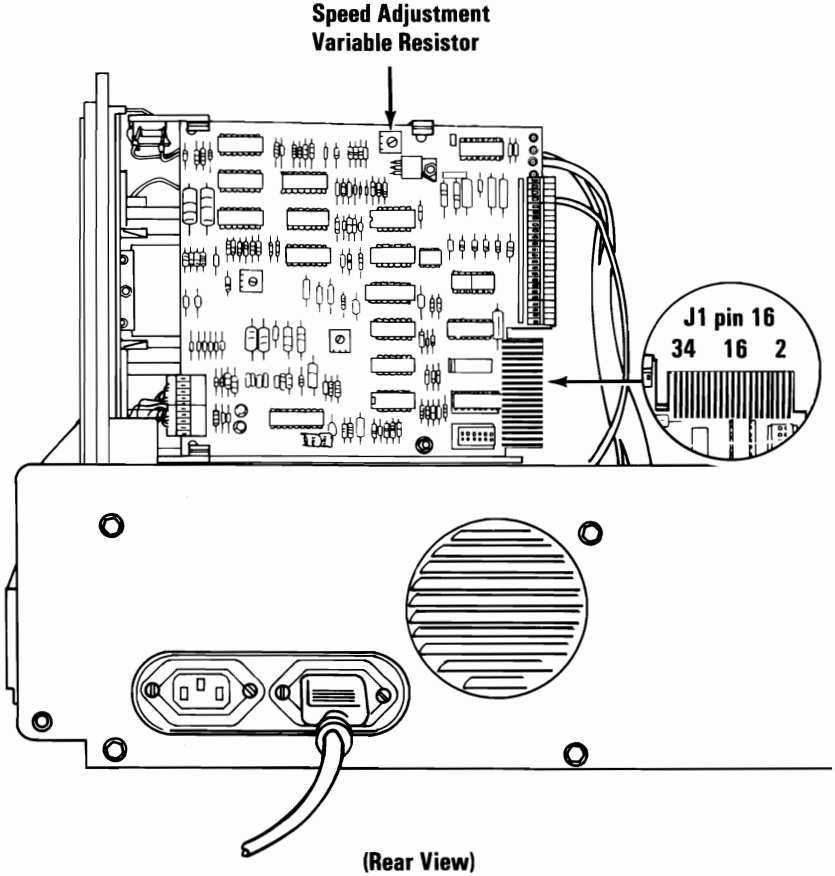
5. Place the diskette drive (left side up) on the system unit power supply.

6. Connect a jumper between J1 pin 16 on the diskette-drive logic board and ground.

7. Plug power connector P3 into the diskette-drive logic board.

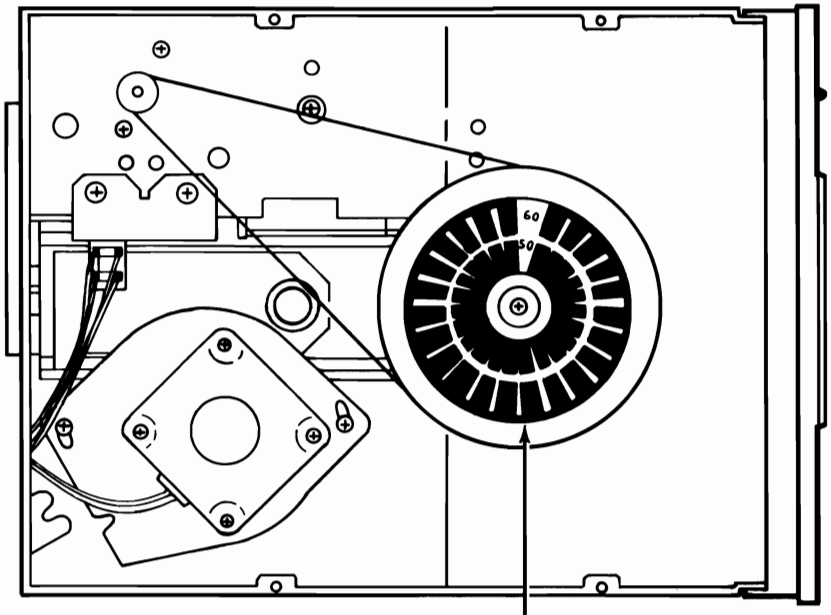
8. Plug the system unit power cord into the system unit, then into the outlet.

9. Power on the system unit.



(Rear View)

10. Under fluorescent lighting, observe the strobe marks on the drive pulley. One of the two rings of marks should appear to stand still. (The outer ring of strobe marks is for 60 hertz, and the inner ring is for 50 hertz.) If a ring of marks does not appear to stand still, the diskette drive is not operating at the correct speed.



11. Power off the system.

12. Disconnect the system unit power cord from the outlet.

13. Disconnect the system unit power cord from the rear of the system unit.

14. Install the diskette drive.

15. Turn to "Drive-Motor Speed" and ensure the speed is within specification. Adjust if necessary.

16. Install the system unit cover.

17. Connect all cables.

Drive-Motor Speed

1. Insert the Advanced Diagnostics diskette.

2. Power on the system.

3. Select 4 **(SPEED TEST)** for the diskette drive you are testing. The diskette drive speed and adjustment specification appear on the screen.

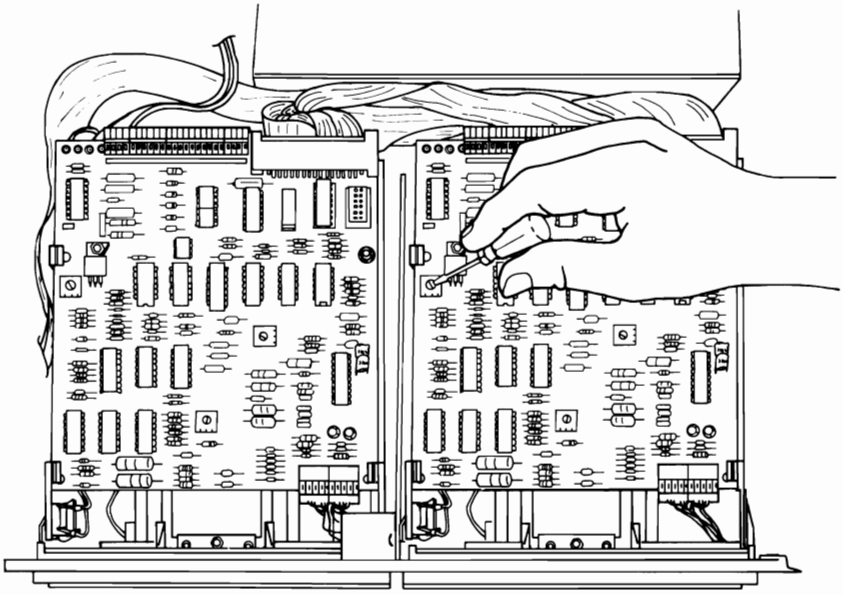
   Note: If you are unable to load the Advanced Diagnostics program, or if the Speed Test will not run, go to the "Drive-Motor Preliminary Speed."

```
SPEED IS 2000

ADJUST FOR 1970 TO 2030
PRESS ANY KEY TO EXIT

SPEED IS 1999

ADJUST FOR 1970 TO 2030
```

4. Power off the system.
5. Remove the system unit cover **(1005)**.
6. Connect all cables.
7. Insert the Advanced Diagnostics diskette.
8. Power on the system.
9. Load the diskette drive diagnostic tests.
10. Select 4 **(SPEED TEST)** for the diskette drive you are adjusting. The diskette drive speed and the adjustment specification appear on the screen.

```
SPEED IS 2000

ADJUST FOR 1970 TO 2030
PRESS ANY KEY TO EXIT

SPEED IS 1999

ADJUST FOR 1970 TO 2030
```

11. The adjustment for the diskette drive speed is a variable resistor on the diskette-drive logic board. To adjust the speed, carefully insert an insulated screwdriver into the screw on the top of the variable resistor.



12. Turn the screw until the speed shown on the screen is within the required specifications.

13. Power off the system.

14. Unplug the system unit (and expansion unit) power cord from the outlet.

15. Install the system unit cover.

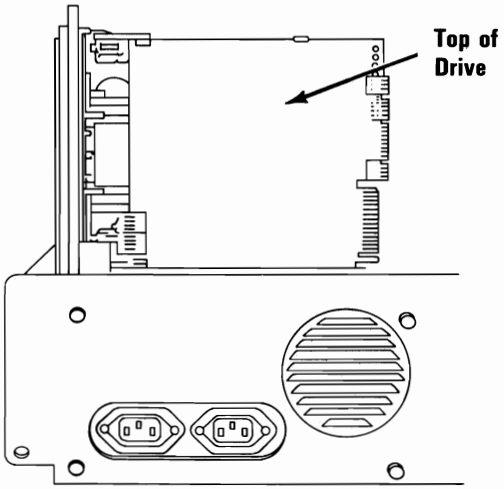
16. Connect all cables.

Full High Diskette Drive - Type 3

Use this procedure for diskette drive A or B when the Advanced Diagnostics program will not load or the Diagnostics Speed Test cannot be performed. Fluorescent lighting is needed to see the strobe effect in this test.

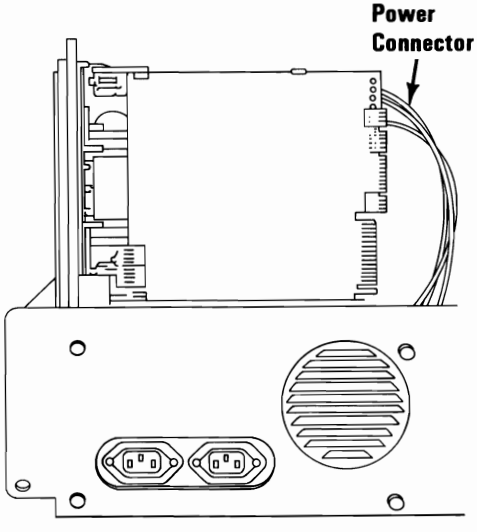
Drive-Motor Preliminary Speed

1. Power off the system.
2. Remove the system unit cover **(1005)**.
3. Remove the diskette drive.
4. Place the diskette drive (left side up) on the system unit power supply as shown below.



(Rear View)

5. Plug the power connector into the logic board and leave the signal cable unplugged.



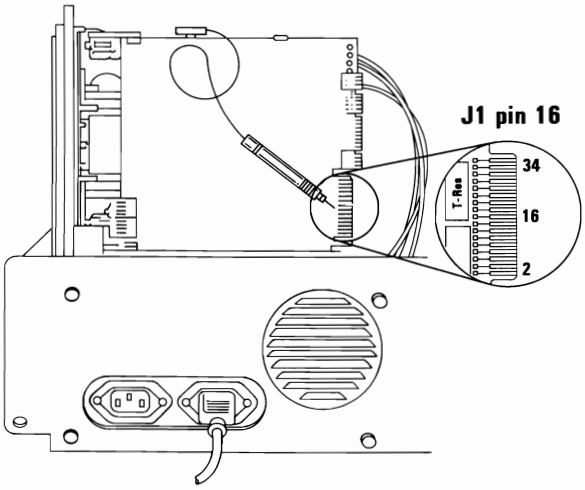
(Rear View)

6. Plug the power cord into the system unit, then into the outlet.

7. Power on the system.

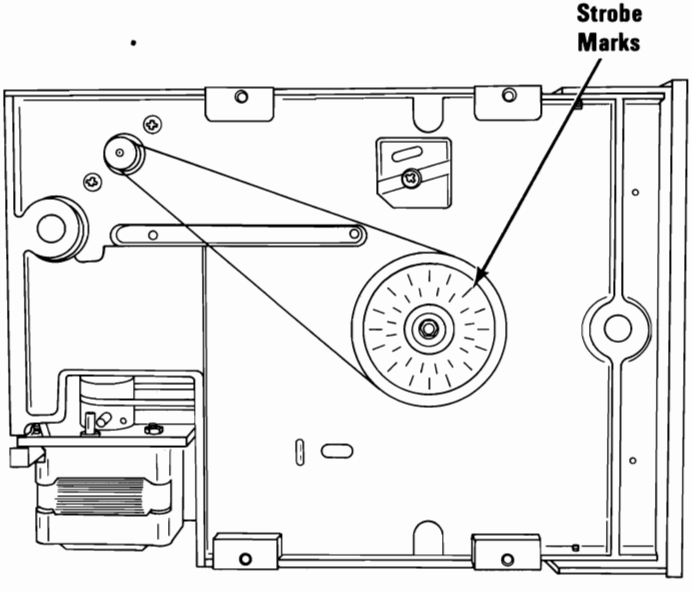
8. Using a meter probe, connect one end of the probe to the diskette drive frame ground (inserting it into one of the diskette drive mounting screw holes may work well).

9. Touch the other end of the meter probe to pin 16 of the logic board signal connector. The diskette drive motor will run as long as the probe touches pin 16.



(Rear View)

10. Under fluorescent lighting, observe the strobe marks on the drive pulley. One of the two rings of marks should appear to stand still. (The outer ring of strobe marks is for 60 hertz, and the inner ring is for 50 hertz.) If a ring of marks does not appear to stand still, the diskette drive is not operating at the correct speed.



Bottom View

Drive-Motor Speed

This is a test to check the drive motor speed of the Type 3 diskette drive. The drive motor speed is not adjustable.

1. Insert the Advanced Diagnostics diskette.
2. Power on the system.

   Note: If you are unable to load the Advanced Diagnostics program, or the Speed Test will not run, go to the "Drive-Motor Preliminary Speed Test."

3. Go to the diskette drive tests.
4. Select option 4 (SPEED TEST) for the diskette drive you are testing. The diskette drive speed and speed specification appear on the screen.

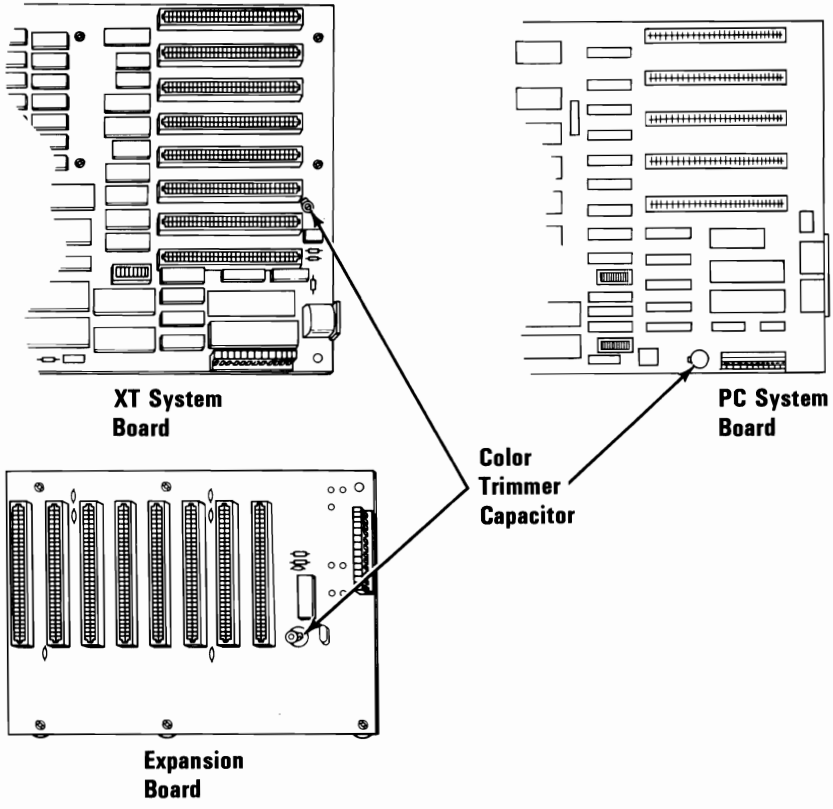
If the speed is not within the specification, go to *Hardware Maintenance Service* manual, "MAP 0000: Start."

```
SPEED IS 2000

ADJUST FOR 1970 TO 2030
PRESS ANY KEY TO EXIT

SPEED IS 1999

ADJUST FOR 1970 TO 2030
```

Color Trimmer Capacitor Adjustment

If the color is missing or the wrong hue, adjust the trimmer capacitor, which is on the system-unit system board, in small increments until the color is correct.

If you have a Color/Graphics Monitor Adapter installed in the expansion unit, adjust the trimmer capacitor, which is on the expansion board next to expansion slot 8. (Use only a nonmetallic screwdriver or aligning tool.)

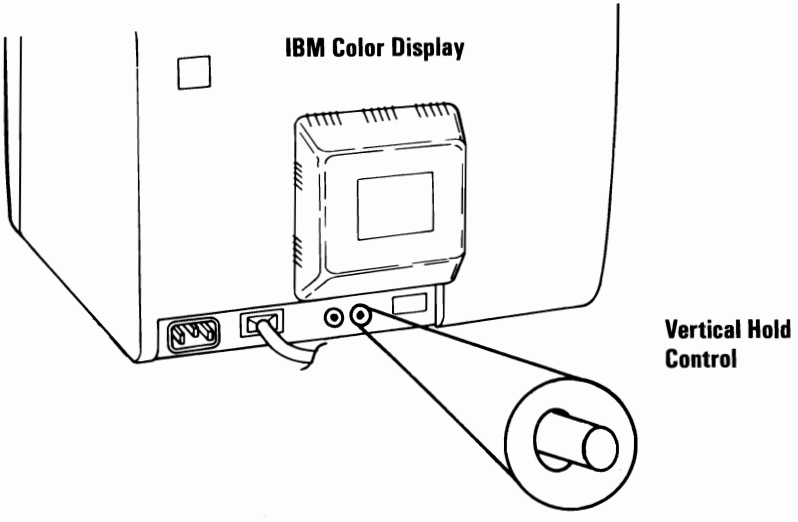


IBM Color Display

Vertical Hold

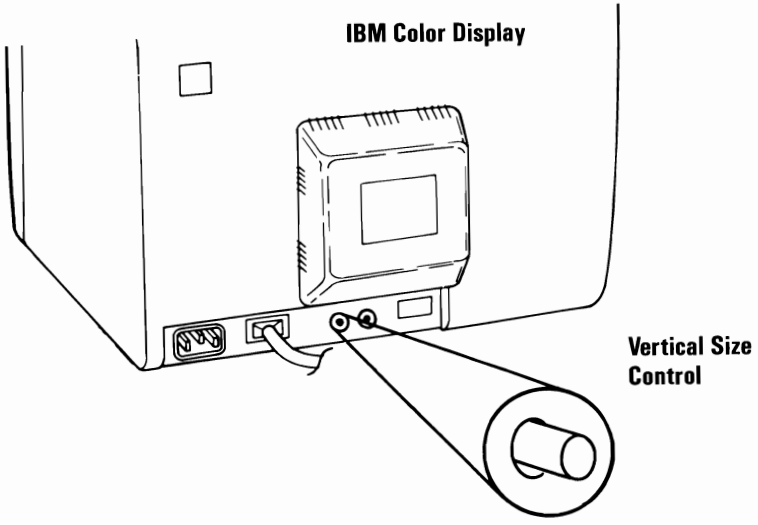
Make this adjustment only if your IBM Color Display has a vertical-hold problem (screen rolling from top-to-bottom or bottom-to-top.)

1. Power on the system.
2. Wait for the POST to complete.
3. 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

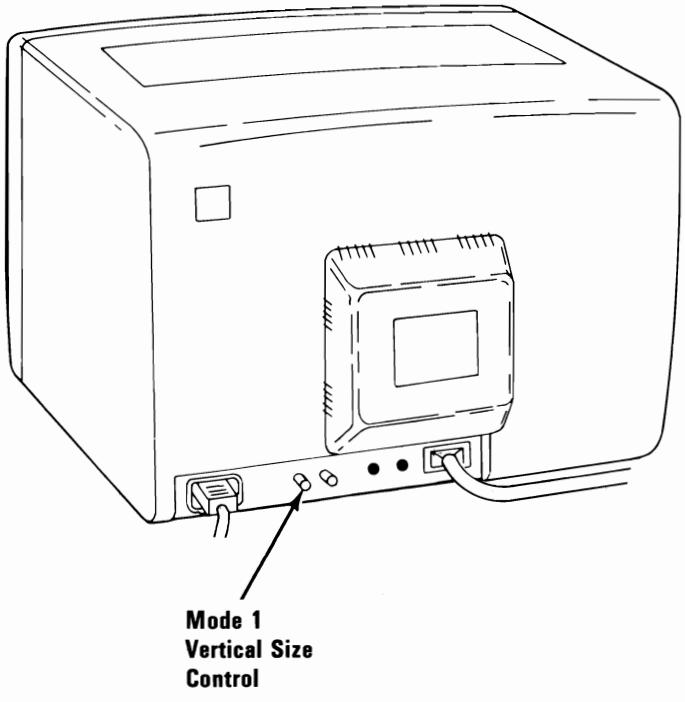
1. Power off the system.
2. Power on the display.
3. Turn the Brightness and Contrast controls fully clockwise.
4. Turn the Vertical Size control fully counterclockwise. A black area appears across the top and bottom of the screen.
5. Turn the Vertical Size control clockwise until the black areas just disappear. If one of the black areas disappears before the other, continue to turn the control until the second black area is gone.
6. Adjust the Brightness and Contrast controls for eye comfort.



IBM Enhanced Color Display

Vertical Size Adjustment - Mode 1

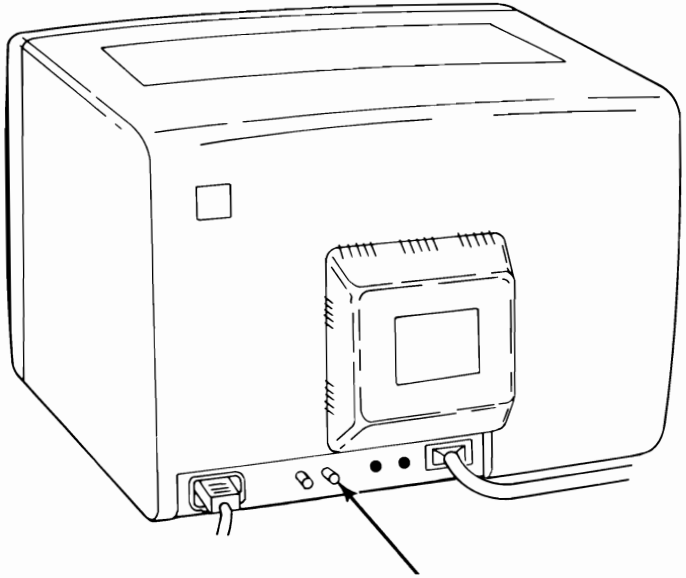
1. Power off the system.
2. Power on the Enhanced Color Display.
3. Turn the Brightness control fully clockwise.
4. Turn the Mode 1 Vertical Size control fully counterclockwise. A black area appears across the top and bottom of the screen.
5. Turn the Vertical Size control clockwise until both black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



Vertical Size Adjustment - Mode 2

To make this adjustment, this display must be connected to a IBM Enhanced Graphics Adapter operating in the Enhanced Color Mode.

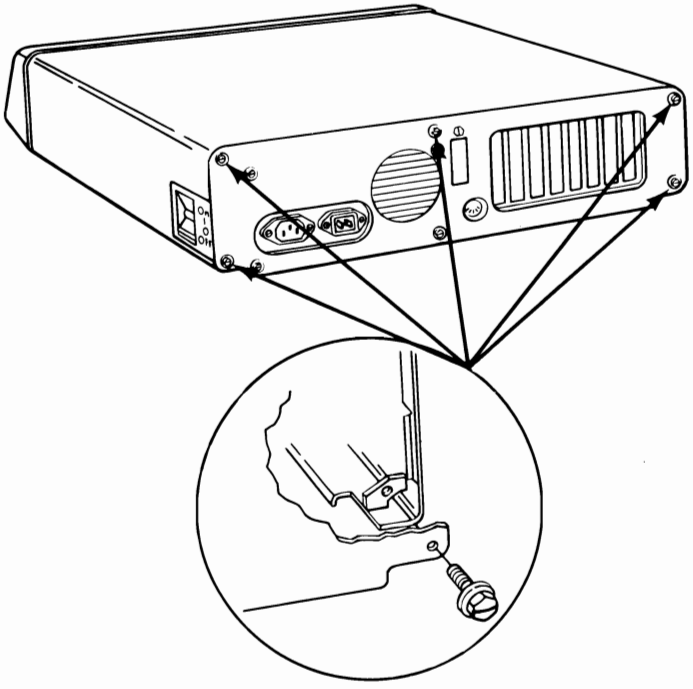
1. Power on the Enhanced Color Display.
2. Turn the Brightness control fully clockwise.
3. Power on the system.
4. Wait for the POST to complete.
5. Adjust the Mode 2 Vertical Size control until the black areas at the top and bottom are approximately the same size as the black areas at the sides.
6.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



Cover 1005

- IBM Personal Computer
- IBM Personal Computer XT
- IBM Personal Computer Expansion Unit.

1. Power off the system.
2. Unplug the system unit power cord.
3. Move all external options away from the work surface.
4. Remove the cover mounting screws and slide the cover toward the front until it clears the unit.

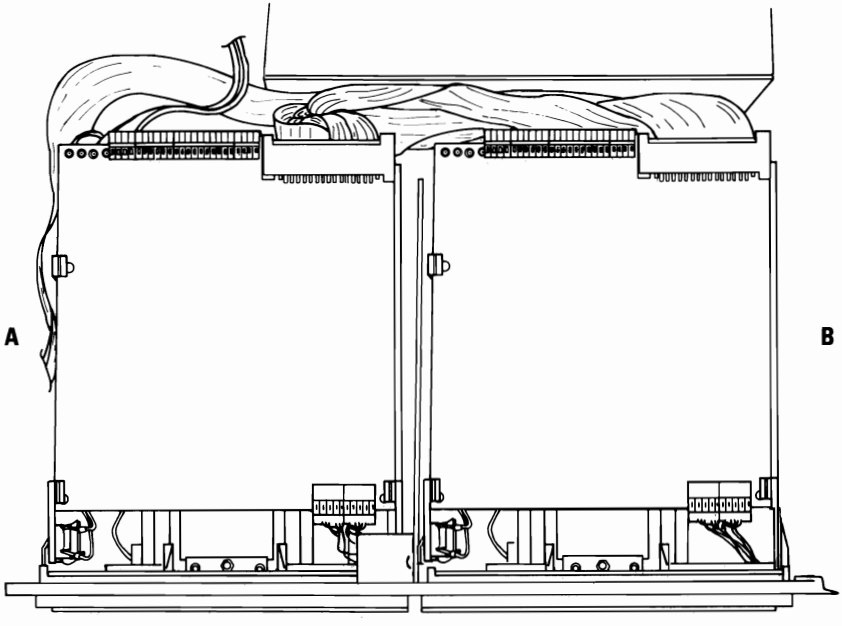


Diskette Drives

Full High Diskette Drive A 1010

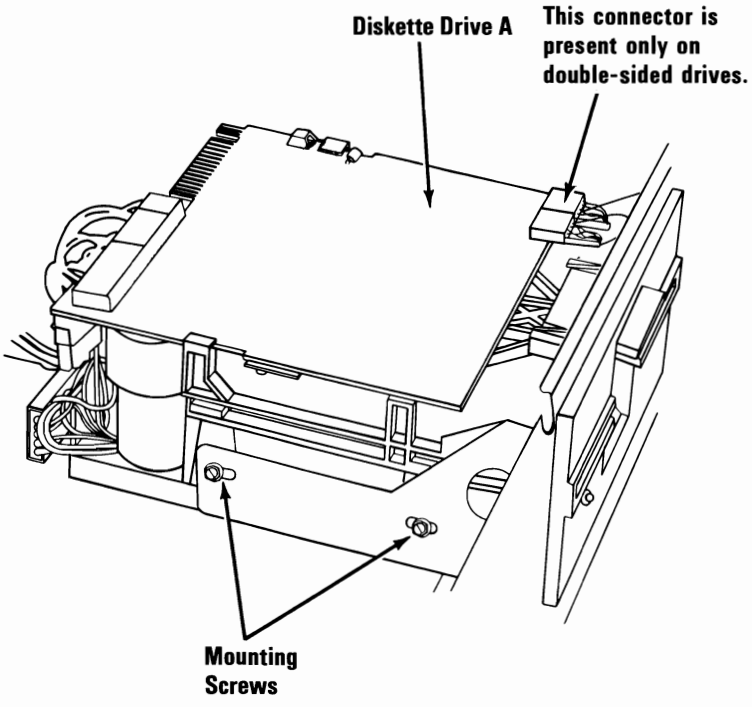
Note: If a fixed disk drive is present in the system, load the diagnostic diskette and run "Prepare the System for Moving," option three, to protect the drive from damage.

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Disconnect the signal cable from the diskette-drive logic board.



Note: You may have to remove some of the option adapters to remove the diskette-drive mounting screws.

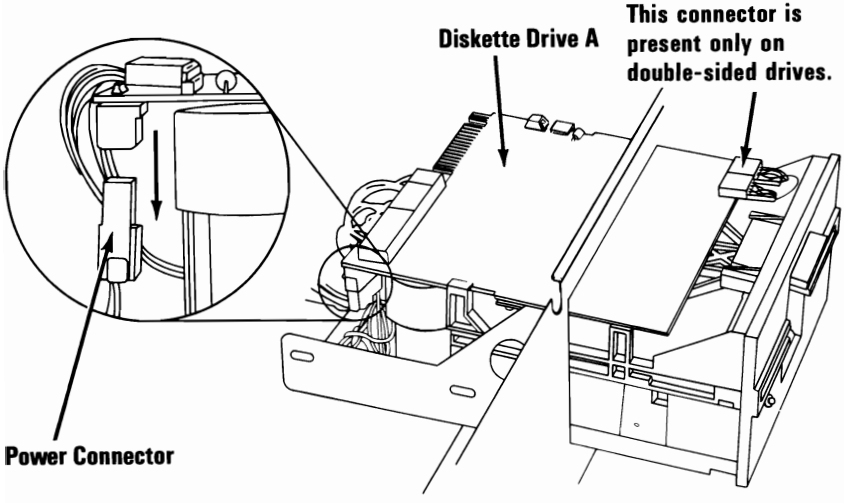
5. Remove the two mounting screws on the left side of diskette drive A.



6. Slide the diskette drive approximately 50 mm (2 inches) out of the system unit. Disconnect the power connector from the diskette-drive logic board.

   Note: Drive A must have a terminating resistor installed; drive B must not.

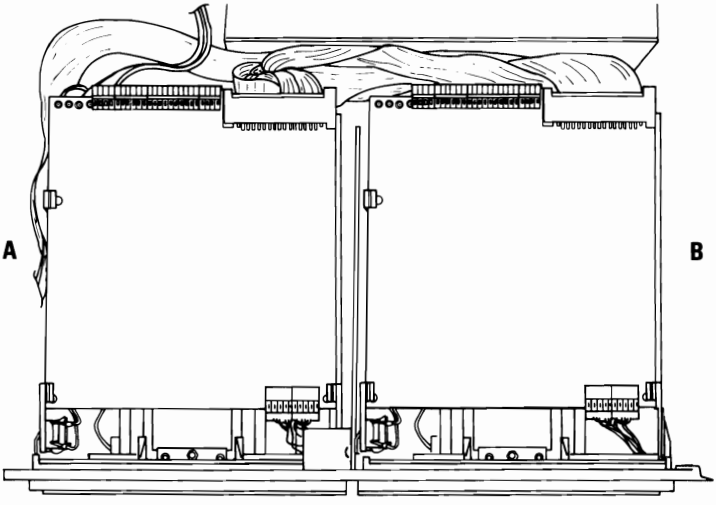
7. Remove the diskette drive from the system unit.



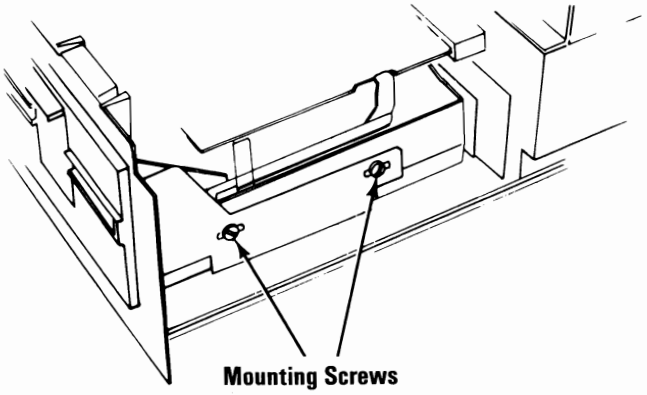
(Side View)

Full High Diskette Drive B 1015

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Disconnect the signal cable from the diskette-drive logic board.



5. Remove the two mounting screws on the right side of diskette drive B.



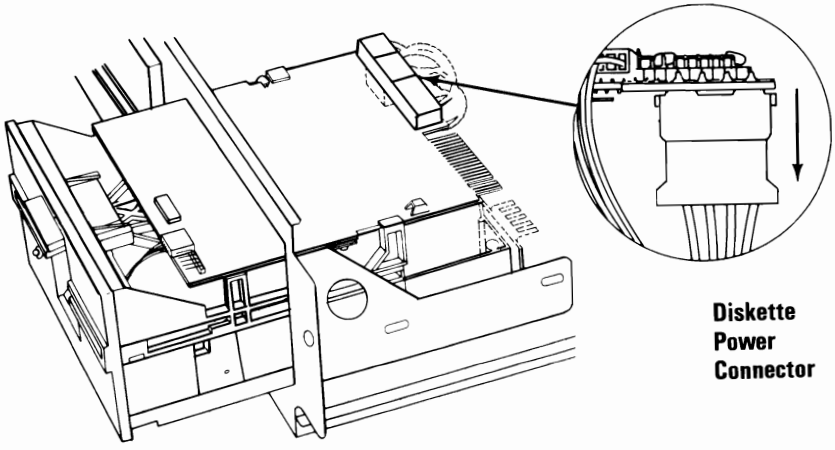
(Side View)

6. Slide the diskette drive approximately 50 mm (2 inches) out of the system unit. Disconnect the power connector from the diskette-drive logic board.

7. Remove the diskette-drive signal cable.

   Note: Drive A must have a terminating resistor installed; drive B must not.

8. Remove the diskette drive from the system unit.



(Side View)

Terminating Resistor (T-RES) Removal 1020

1. Locate the terminating resistor on the circuit board. The terminating resistor is identified by a white adhesive label with **T-RES** in black letters.

2. Pull the terminating resistor from its connector on the circuit board.

Do not remove the terminating resistor from:

Diskette Drive A

-or-

Fixed Disk Drive C.

Fixed Disk Drive

Drive C: 1025

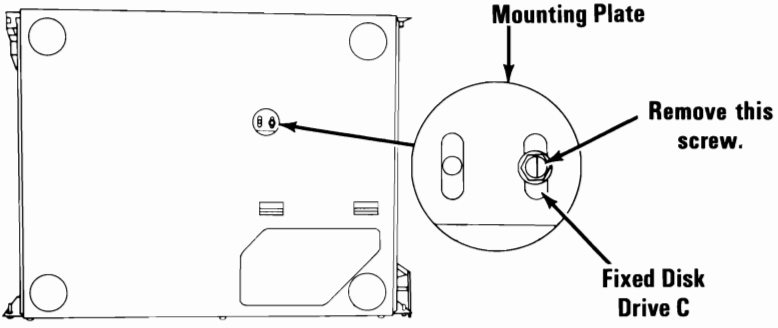
Warning: Normal shipping and handling can result in permanent loss of all data and formatting of the fixed disk drive. We recommend that you copy all files onto diskettes.

> **Note:** Before removing the fixed disk drive, do the "Prepare System for Moving" function of the Advanced Diagnostics program.

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Move all external options away from the work surface.
4. Remove the (system or expansion) unit cover **(1005)**.

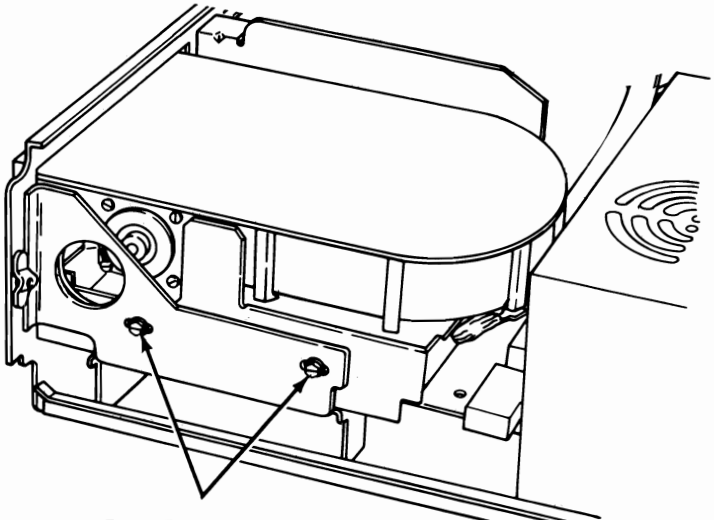
5. Tilt the unit up and remove the mounting plate screw for drive C.

   Warning: When replacing the drive, be sure to use the same screw (short screw) that you removed from the mounting plate, or damage will result.



6. Remove the mounting screws on the right side of drive C.

Warning: When replacing the drive, be sure to use the same two mounting screws (long screws) that you removed from the side of the drive, or damage to the drive will result.



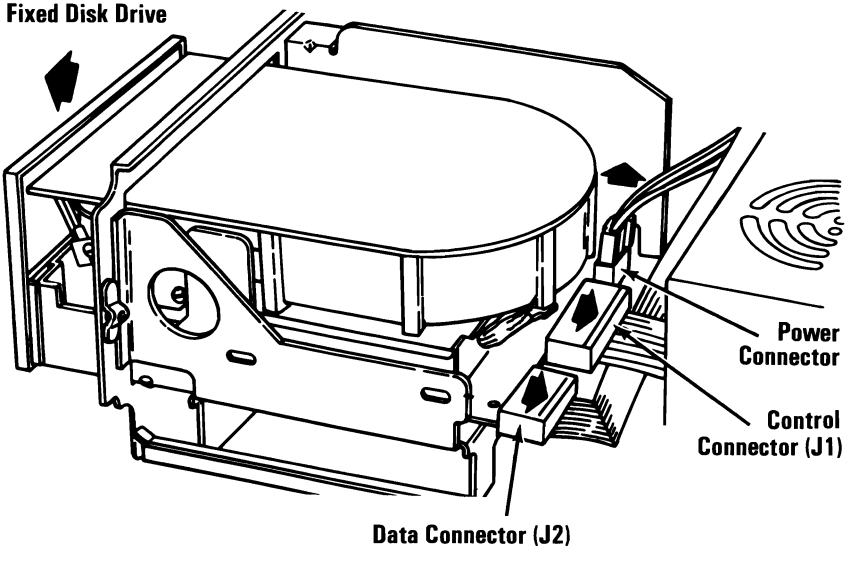
Fixed Disk Drive Mounting Screws

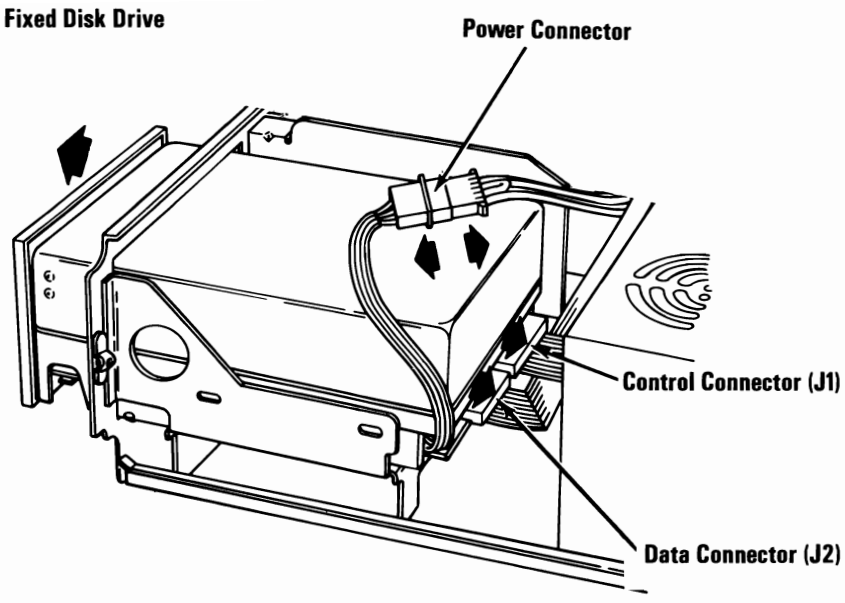
Note: Shown below are examples of the fixed disk drive and connectors. These may not be the same as those in your system; however, certain items are the same.

- J1, the control connector, has 34 pins.
- J2, the data connector, has 22 pins.
- The Power connector has 4 pins and:
  - May be mounted on the logic board or,
  - May be on a pigtail.

7. Slide the drive out approximately 50 mm (2 inches) and disconnect the control connector (J1), data connector (J2), and the power connector.

8. Remove the drive from the unit.




Fixed Disk Drive
Power Connector
Control Connector (J1)
Data Connector (J2)

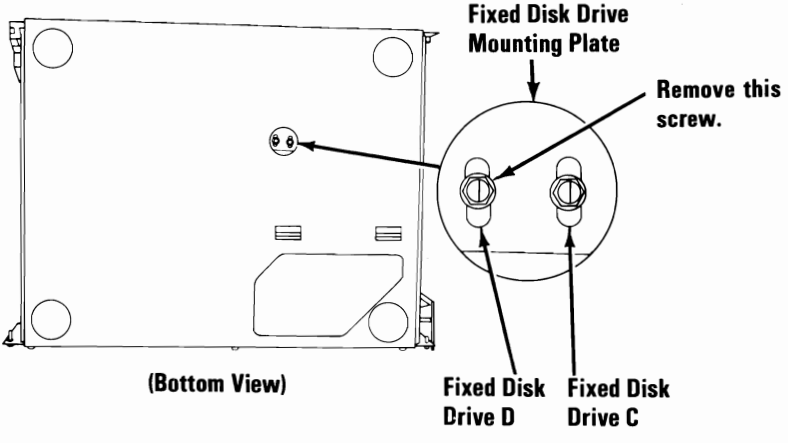
Drive D: 1030

Warning: Normal shipping and handling can result in permanent loss of all data and formatting of the fixed disk drive. We recommend that you copy all files onto diskettes.

Note: Before removing the fixed disk drive, do the "Prepare System for Moving" function of the Advanced Diagnostics program.

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Move all external options away from the work surface.
4. Remove the expansion unit cover **(1005)**.
5. Tilt the unit up and remove the mounting plate screw for drive D.

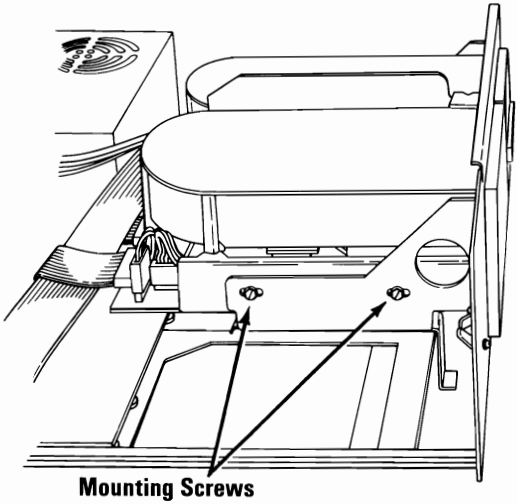
   Warning: When replacing the drive, be sure to use the same screw (short screw) that you removed from the mounting plate, or damage will result.



6. Remove all option adapters **(1035)**.

7. Remove the mounting screws on the left side of drive D.

   Warning: When replacing the drive, be sure to use the same two mounting screws (long screws) that you removed from the side of the drive, or damage to the drive will result.

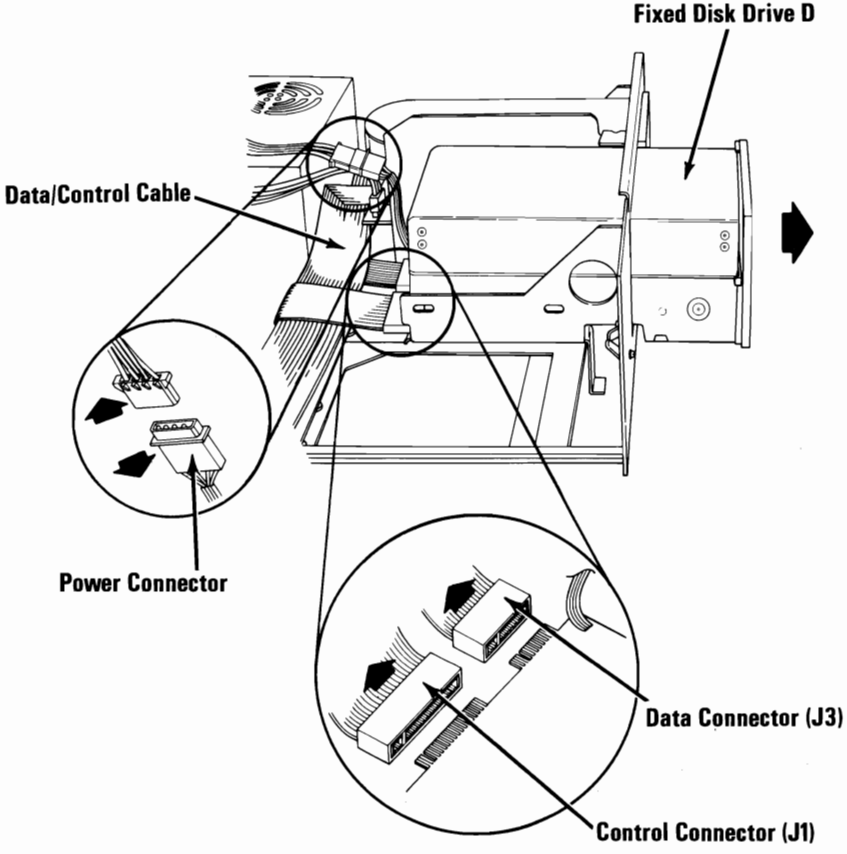


Note: Shown below are examples of the fixed disk drive and connectors. Some items may not be the same as those in your system.

- J1, the control connector, has 34 pins.
- J3, the data connector, has 22 pins.
- The Power connector has 4 pins and:
  - May be mounted on the logic board or,
  - May be on a pigtail.

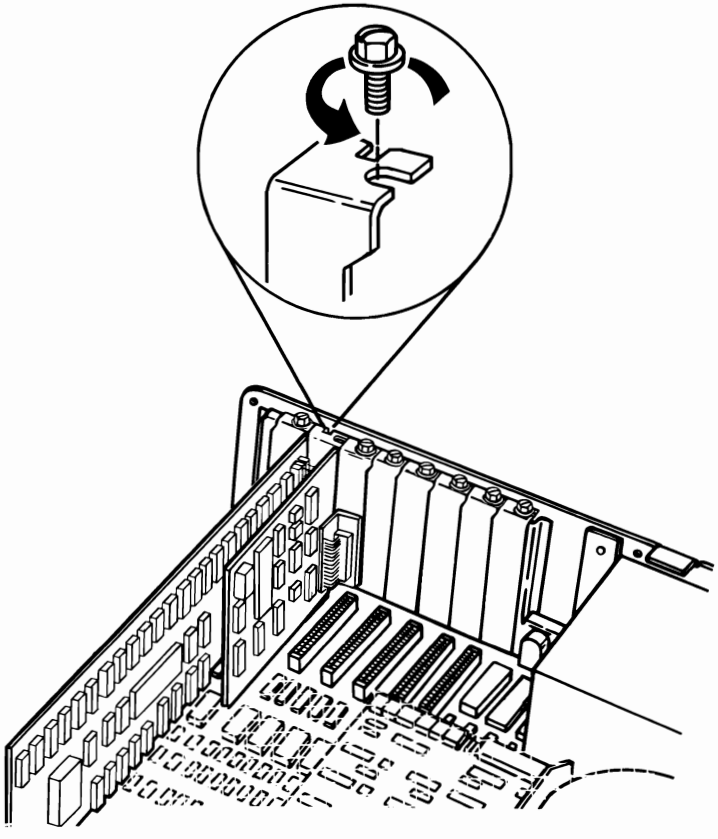
8. Slide the drive out approximately 50 mm (2 inches) and disconnect the control connector (J1), data connector (J3), and the power connector.

9. Remove the drive from the unit.



Option Adapters 1035

1. Power off the system.
2. Remove the system unit (or expansion 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.



Power Supply 1040

- IBM Personal Computer
- IBM Personal Computer XT
- IBM Personal Computer Expansion Unit.

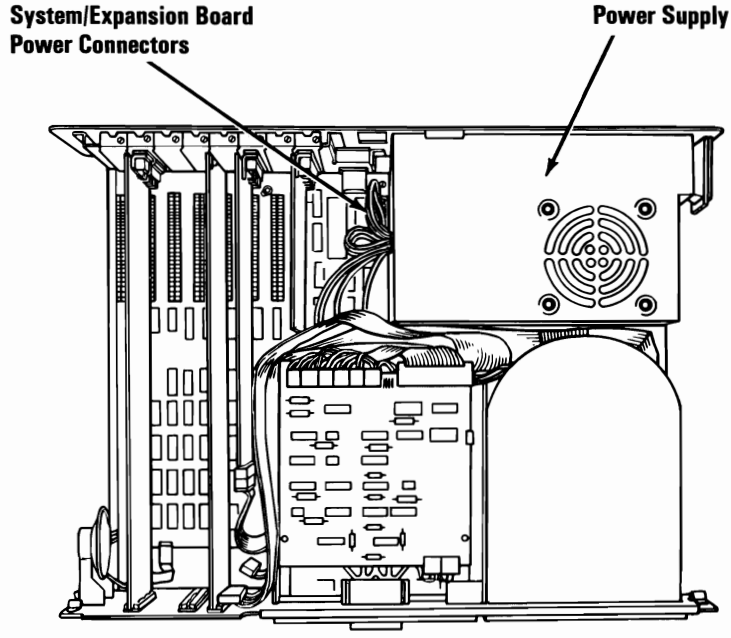
1. Power off the system.

2. Unplug the system unit (and expansion unit) power cord from the outlet, then unplug the cord from the rear of the system (expansion) unit.

3. Remove the system unit (expansion unit) cover **(1005)**.

4. Disconnect the system board (expansion board) power connectors by grasping the connectors and pulling straight up.

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



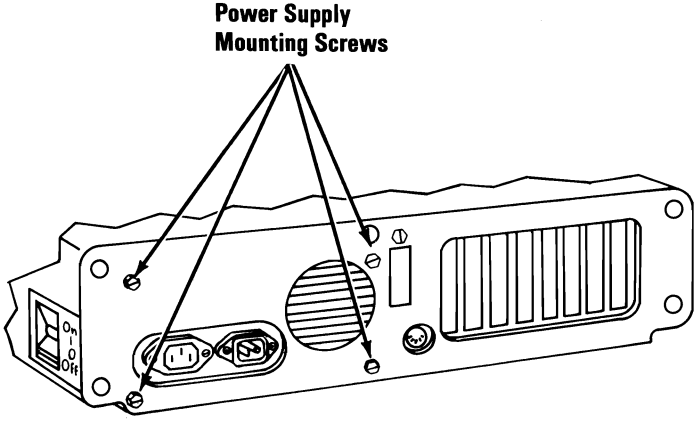
System Unit
(Top View)

5. Disconnect the power connectors from the fixed disk drive or diskette drive.

6. Remove the four power supply mounting screws.

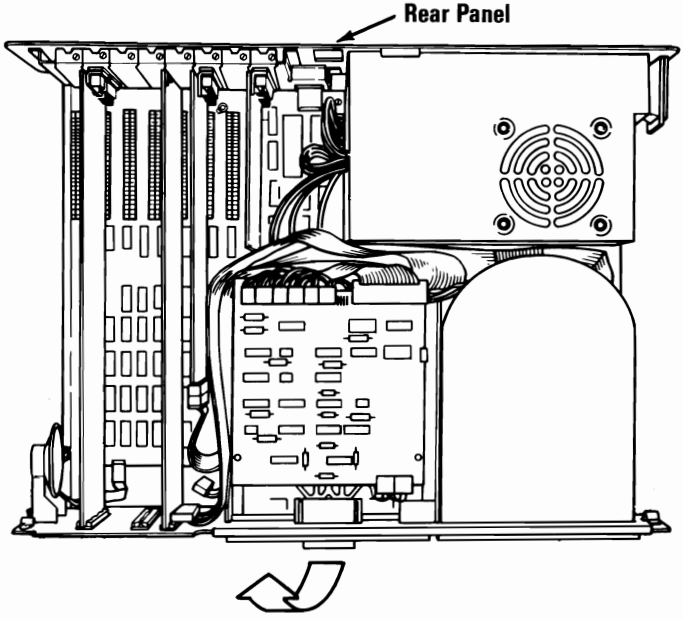
   If you are replacing the power supply in a system that has a fixed disk drive, continue with Step 7.

   If you are replacing the power supply in a system without a fixed disk drive, continue with Step 11.

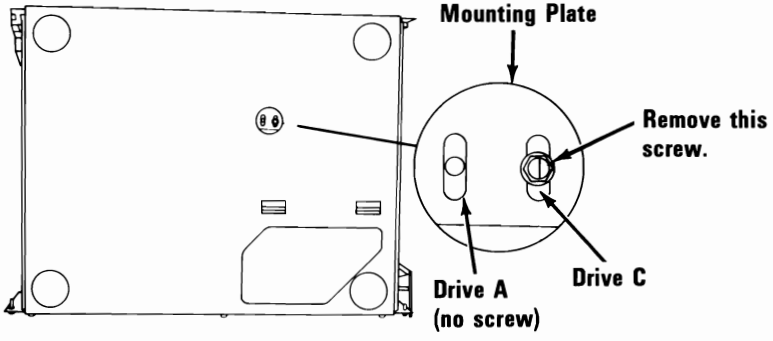


(Rear View)

7. Hold the system by the front panel and tilt up until the system rests on the rear panel.

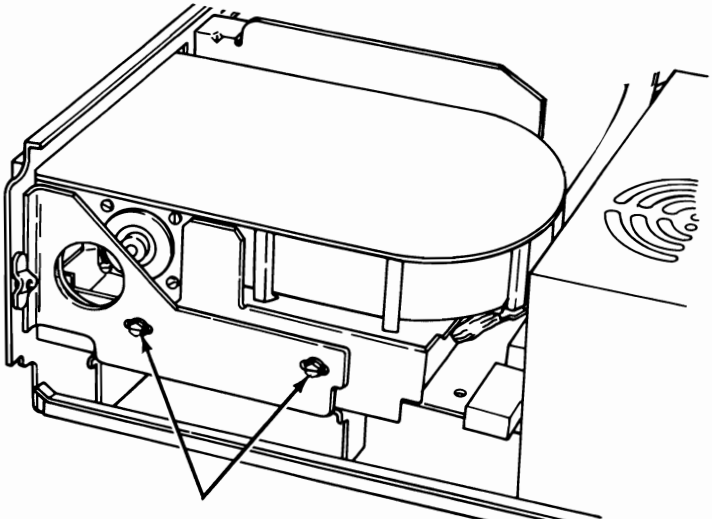


8. Remove the fixed disk drive mounting plate screw.



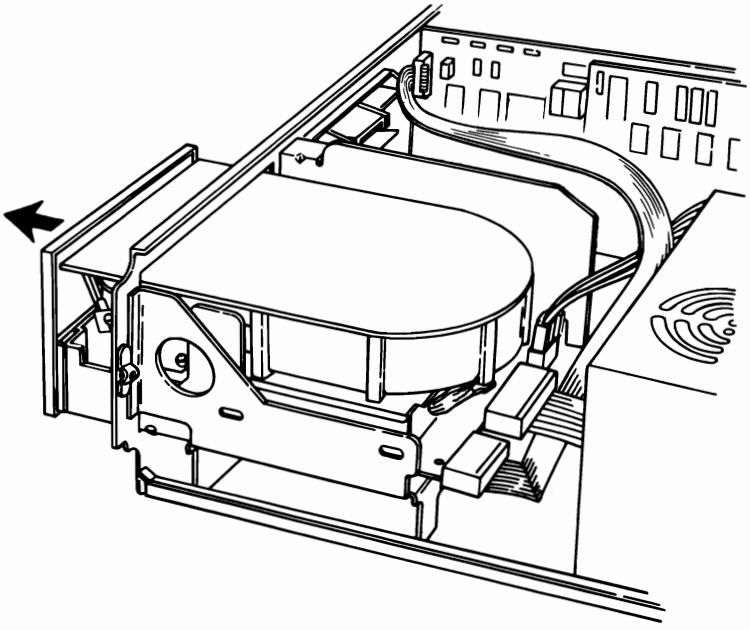
(Bottom View)

9. Remove the fixed disk drive mounting screws.

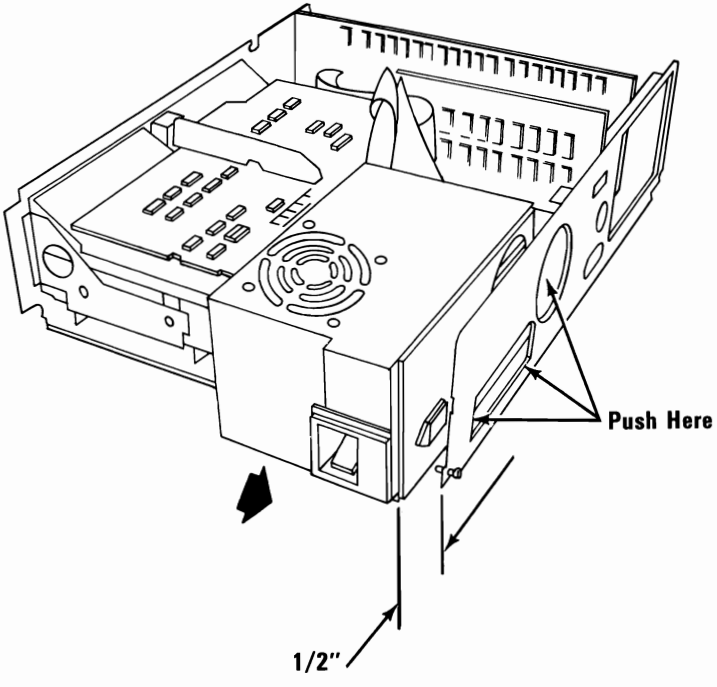


Fixed Disk Drive Mounting Screws

10. Slide the fixed disk drive assembly forward approximately 25 mm (1 inch).

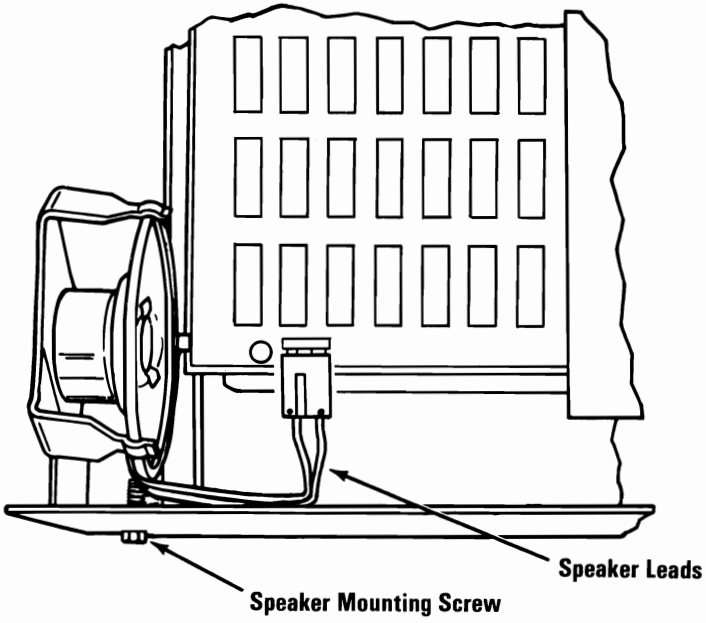


11. Push the power supply forward approximately 13 mm (0.5 inch), then lift and remove.



Speaker 1045

1. Power off the system.
2. Remove the system unit power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Disconnect the speaker leads.
5. Remove the speaker mounting screw. Some systems have speakers that snap into place without a screw.
6. Remove the speaker.



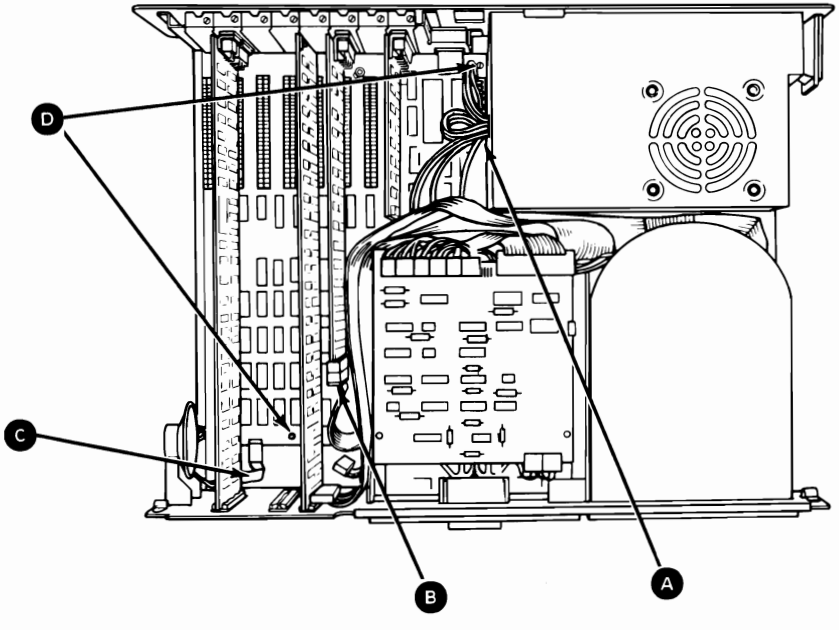
(Top View)

System Board 1050

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove all option adapters **(1035)**.

   Note: The system board shown is for an IBM Personal Computer XT; however, the procedures and locations also apply to the IBM Personal Computer.

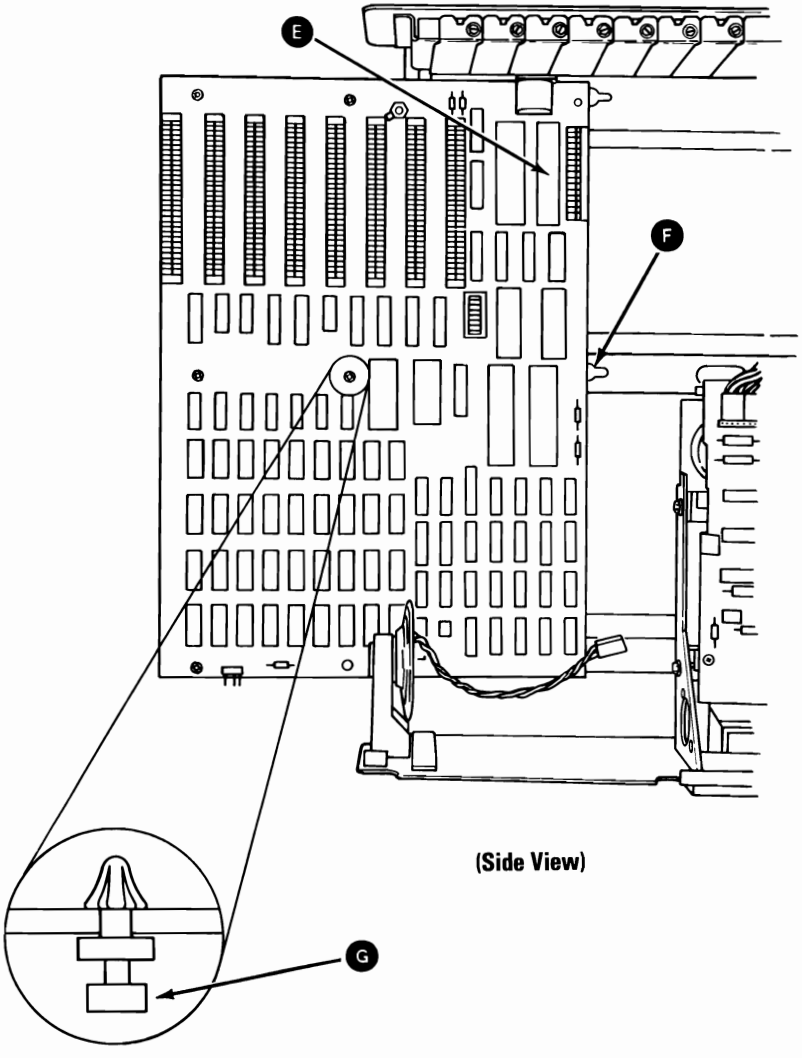
5. Disconnect the diskette-drive signal cable (B) and the system board power connectors (A).
6. Remove the speaker connector (C).
7. Remove the system board mounting screws (D).



8. Slide the system board away from the power supply, approximately 13 mm (0.5 inch), until the standoffs (G) can be lifted from the mounting slots (F).

9. Lift the system board up and out of the system unit.

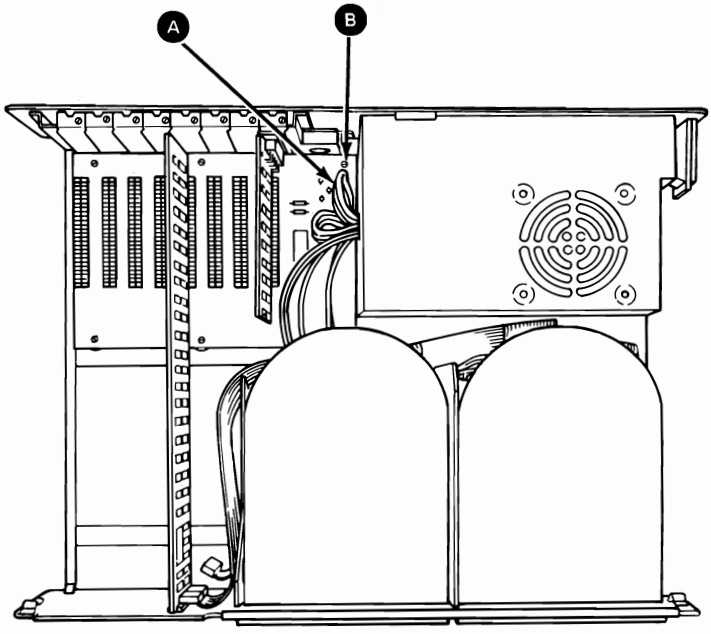
Note: If you are going to install a new system board, remove the plastic standoffs, all the memory modules, and the Math Coprocessor (E) (if installed). A new system board will not have these items.



(Side View)

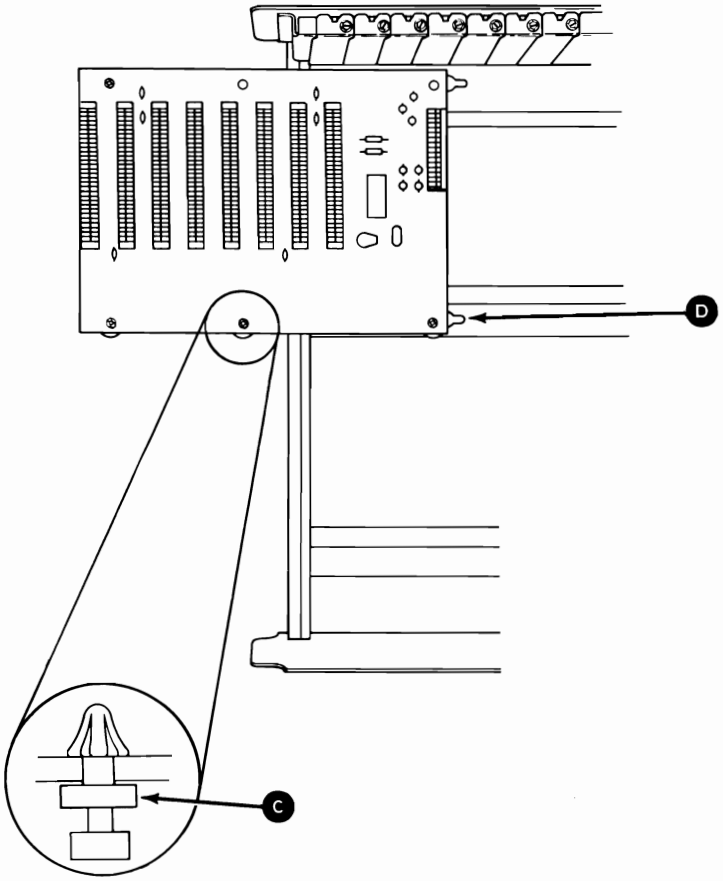
Expansion Board 1055

1. Power off the system.
2. Unplug the expansion unit power cord, and disconnect all cables from the rear of the expansion unit.
3. Remove the expansion unit cover **(1005)**.
4. Remove all option adapters, including the receiver card **(1035)**.
5. Remove the expansion board power connectors (A).
6. Remove the expansion board mounting screw (B).



7. Slide the expansion board away from the power supply approximately 13 mm (0.5 inch) until the standoffs (C) can be lifted from the mounting slots (D).

8. Lift the expansion board up and out of the system unit.



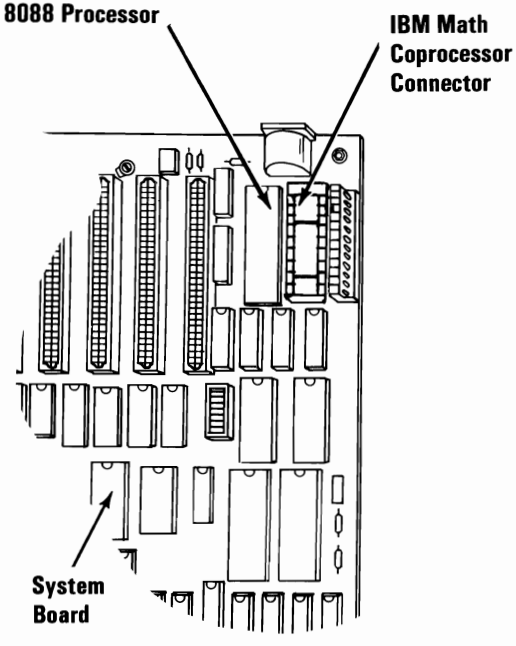
(Side View)

8088 or Math Coprocessor 1060

Warning:

- The pins on the 8088 Processor or the Math Coprocessor are easily bent. Be careful not to bend them when removing either.
- Both are sensitive to static. Maintain personal grounding by keeping one hand on the system unit frame while removing either.

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Disconnect the power supply connectors from the system board and move them out of the way.
5. Look at the figure below and find the 8088 Processor or the Math Coprocessor on the system board.



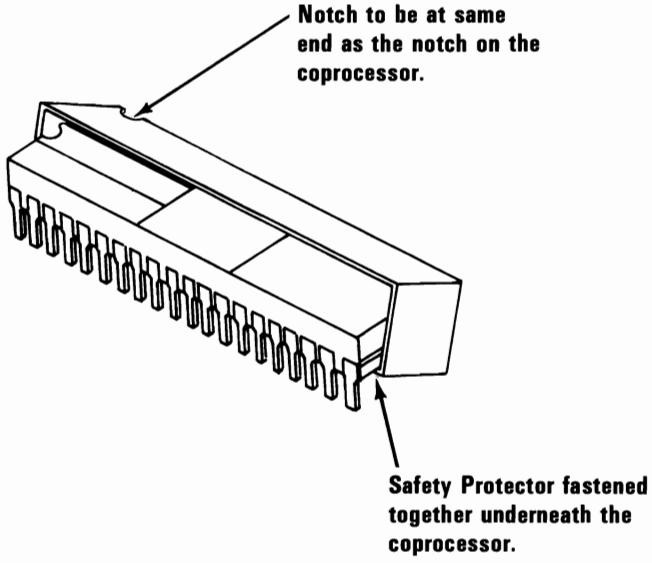
6. Using a module puller, carefully remove the 8088 Processor or the Math Coprocessor.

7. Remove the safety protector from the Math Coprocessor.

Note: When replacing the 8088 Processor or the Math Coprocessor ensure that:

1. The notch on the end of the 8088 Processor or Math Coprocessor faces the rear of the system board.

2. The notches in the safety protector are on the same end as the notch in the Math Coprocessor.

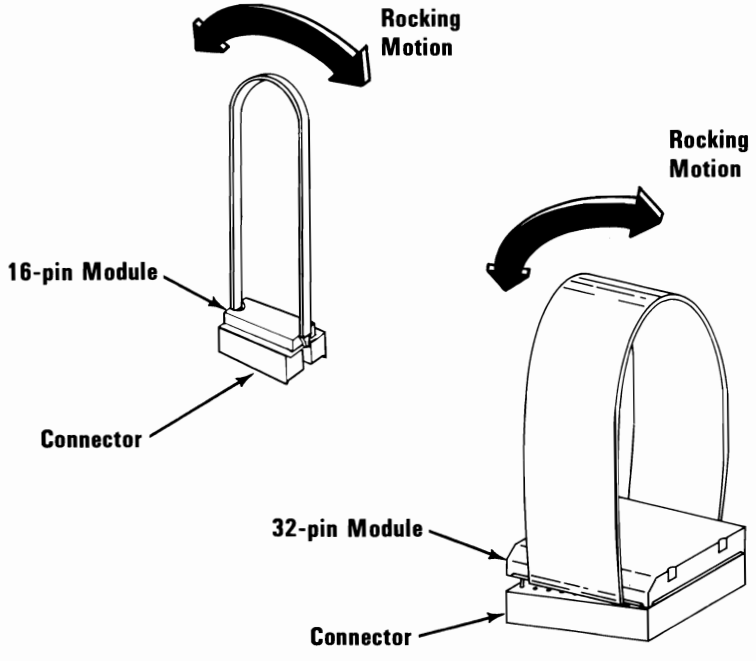


Memory Module 1065

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Find the failing memory module, on the system board or memory expansion adapter (see "MAP 0200: Memory" in the *Hardware Maintenance Service* manual).
5. Grasp the module with the module puller and lift in a two-step rocking motion, to avoid bending the pins.

Notes:

1. When replacing the 16-pin module, ensure that the notch on the module aligns with the notch on the connector.
2. When replacing the 32-pin module, ensure that the beveled edge on the module aligns with the top of the adapter.



Disassembly and Assembly

Full High Diskette Drive - Type 1

Cone Assembly 1100-1

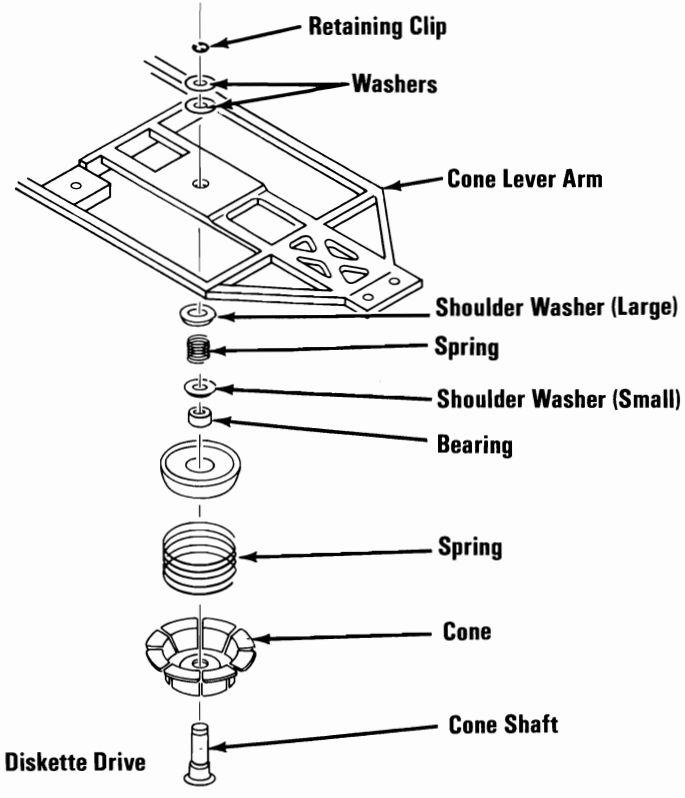
1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.

5. Remove the diskette-drive logic board **(1120-1)**.

6. Remove the cone lever arm **(1105-1)**.

7. Compress the cone assembly to relieve spring tension and remove the retaining clip from the top of the shaft.

8. Release the cone assembly and allow it to separate from the cone lever arm.



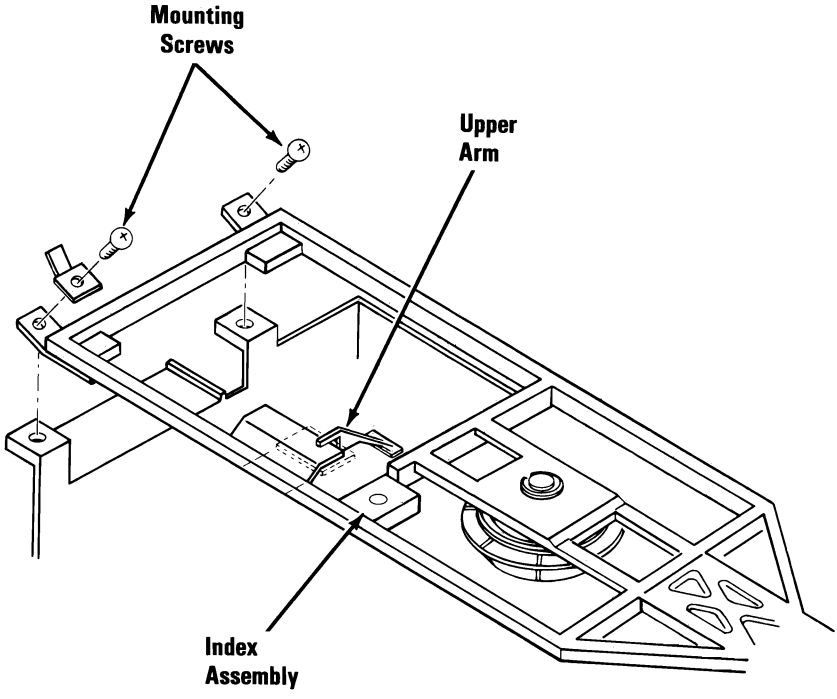
Cone Lever Arm 1105-1

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-1)**.
6. Remove the wire tie attaching the index cable to the cone lever assembly.
7. Remove the index assembly.
8. Remove the two mounting screws for the cone lever arm and remove the wire ties at the rear of the arm.

9. Slide the head carriage to the front of the diskette drive.

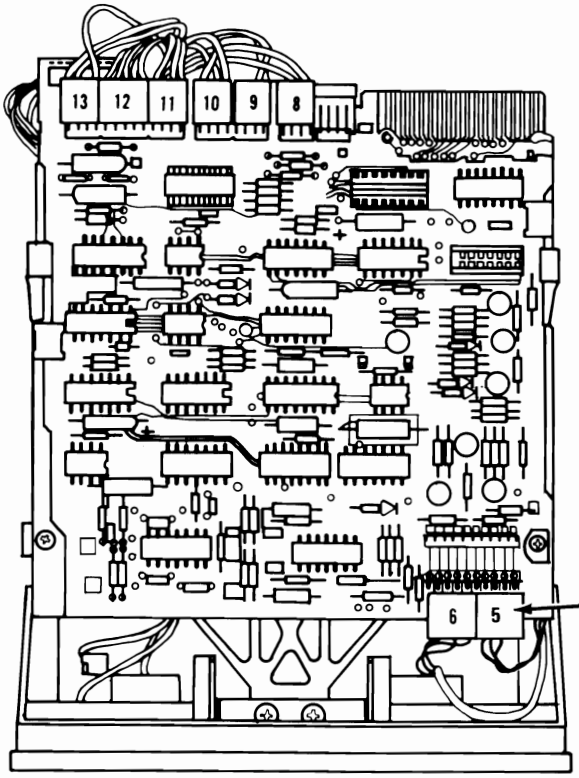
10. Release the upper arm by sliding the cone lever arm to the rear of the diskette drive.

11. Lift the cone lever arm out of the diskette drive.



Logic Board 1120-1

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Make a note of where the connectors and head cables attach to the logic board.
6. Disconnect all connectors from the rear, and the head cables from the right front of the diskette-drive logic board.

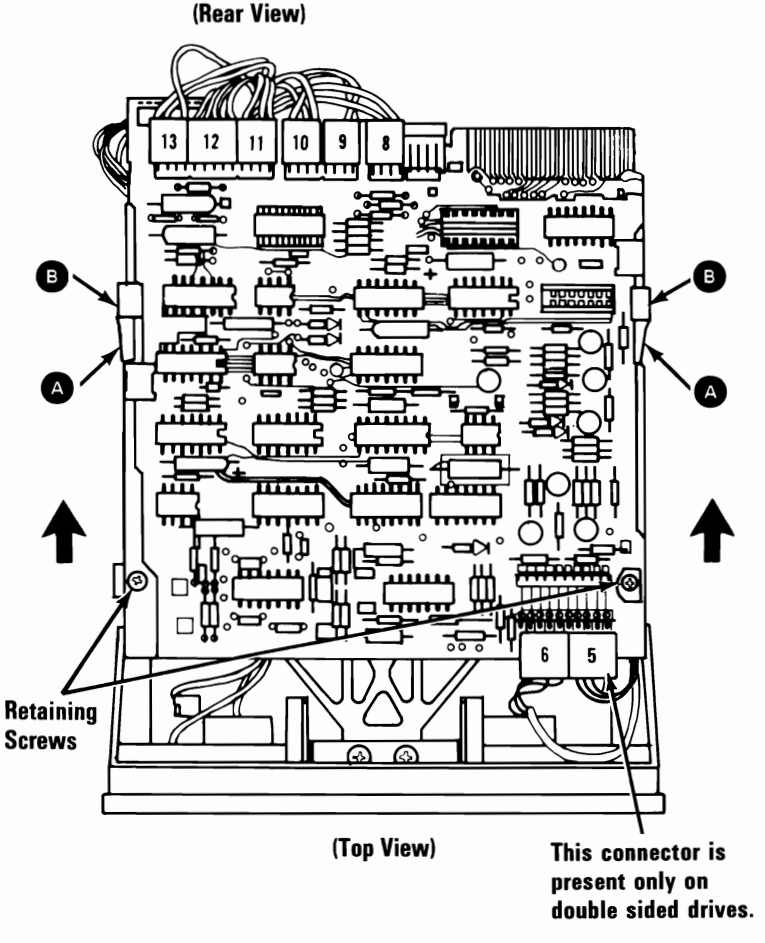


(Top View)

7. Remove the two retaining screws from the top of the diskette-drive logic board.

8. Slide the diskette-drive logic board to the rear until the notches (A) line up with the guide brackets (B), then lift the diskette-drive logic board from the diskette drive assembly.

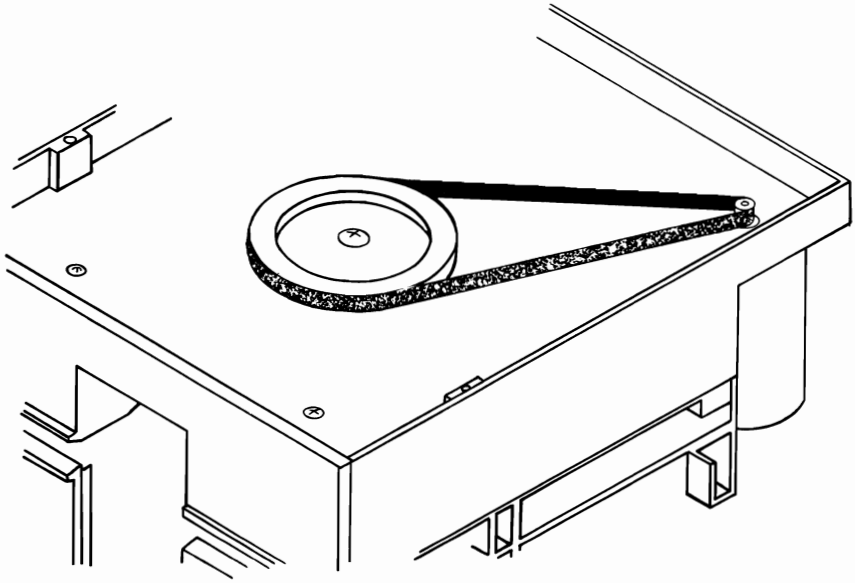
9. Disconnect the diskette-drive power connector from the left rear of the diskette-drive logic board.



Drive Belt 1125-1

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Carefully place the diskette drive on a work surface, with the drive belt and pulleys facing up.
6. Lift the belt off the large pulley, then off the small pulley.

Note: When installing the belt, ensure that the dark, shiny side of the belt is facing the pulleys.



(Bottom View)

Drive Motor 1130-1

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-1)**.

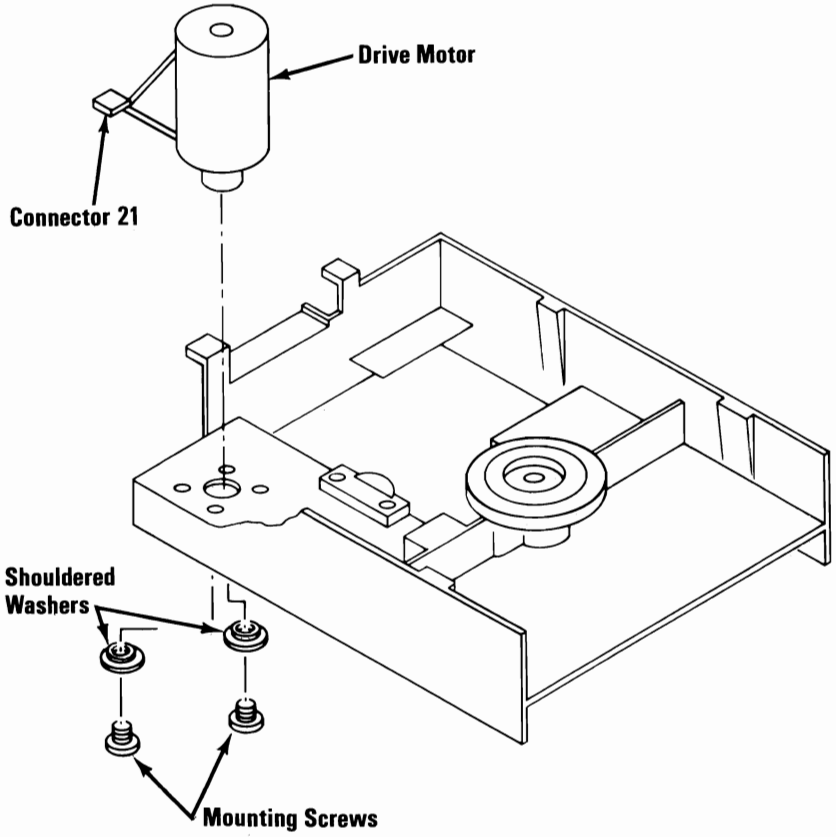
6. Carefully place the diskette drive on a work surface, with the drive belt and pulleys facing up.

7. Disconnect connector 21 from the servo board.

8. Remove the drive belt **(1125-1)**.

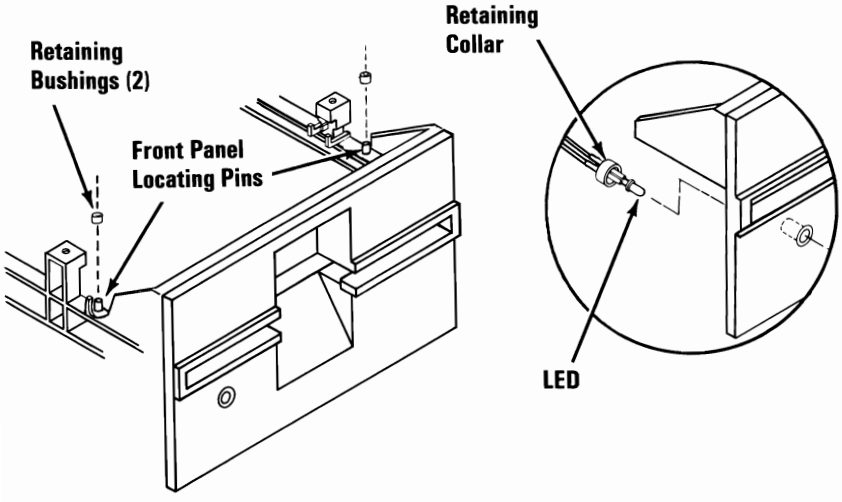
9. Remove the drive-motor mounting screws and shouldered washers.

10. Carefully pull the drive motor out of the diskette drive.



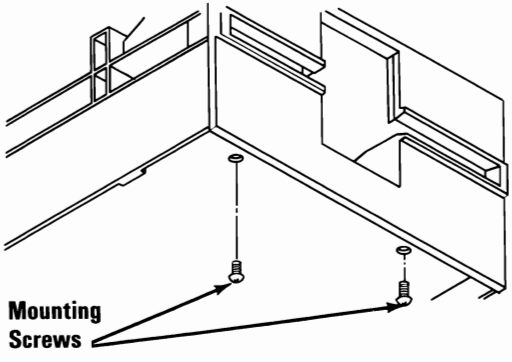
Front Panel 1140-1

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-1)**.
6. Remove the retaining collar that holds the LED assembly to the front panel.
7. Remove the LED assembly from the front panel.
8. Remove the retaining bushings.



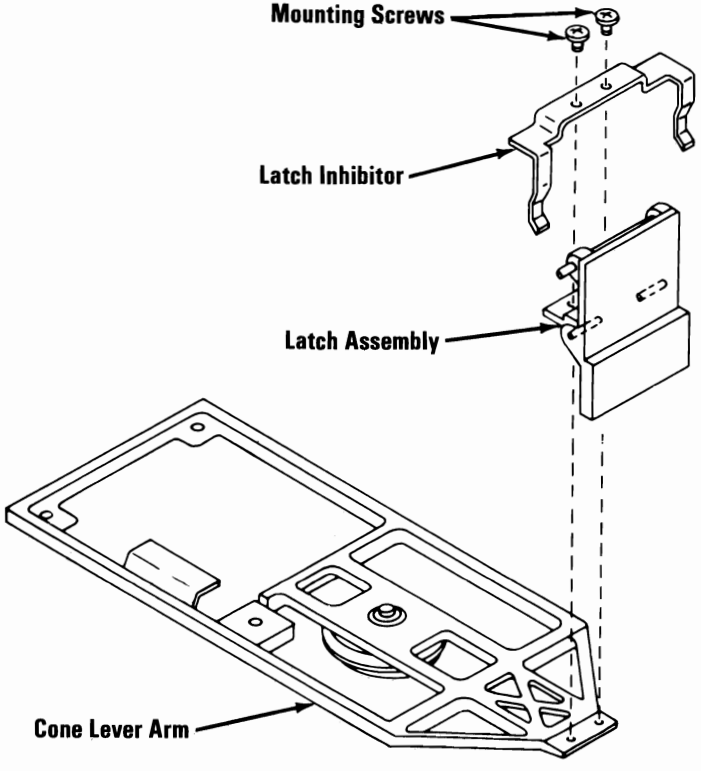
9. Carefully place the diskette drive on its side and remove the front panel mounting screws.

10. Remove the front panel from the diskette drive.



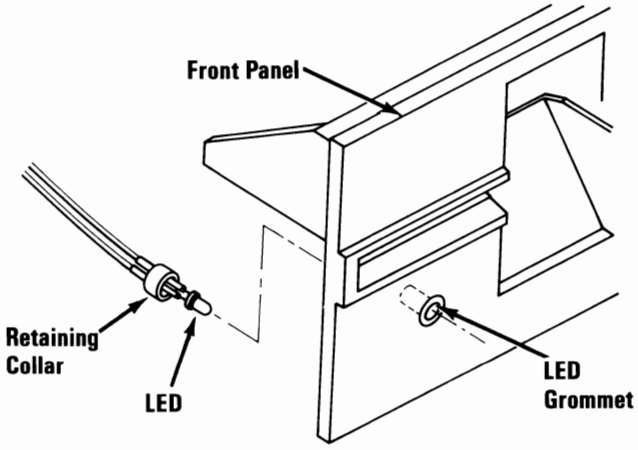
Latch Assembly 1145-1

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-1)**.
6. Close the latch and lightly hold the cone lever arm down while removing the latch mounting screws.
7. Lift the latch inhibitor out of the diskette drive.
8. Slide the latch assembly out through the slots in the rear of the front panel.



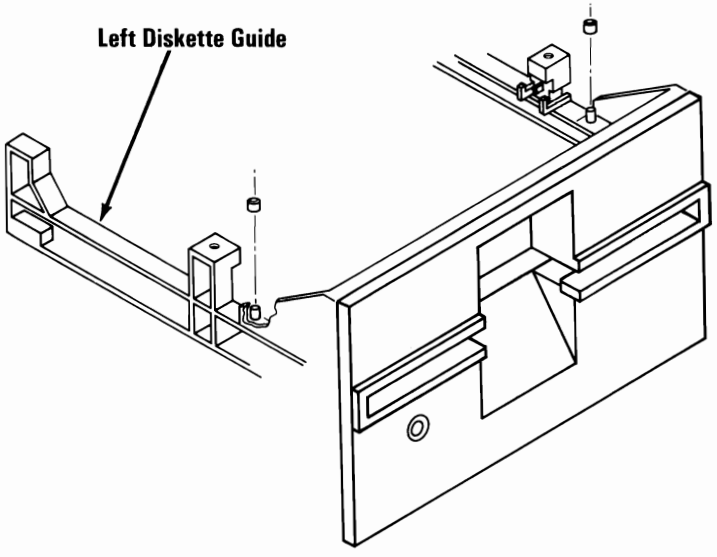
LED Assembly 1150-1

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-1)**.
6. Remove the retaining bushings.
7. Carefully place the diskette drive on its side and remove the front panel mounting screws.
8. Remove the front panel from the diskette drive.
9. Remove the retaining collar that holds the LED assembly to the front panel.
10. Remove the LED assembly from the front panel.



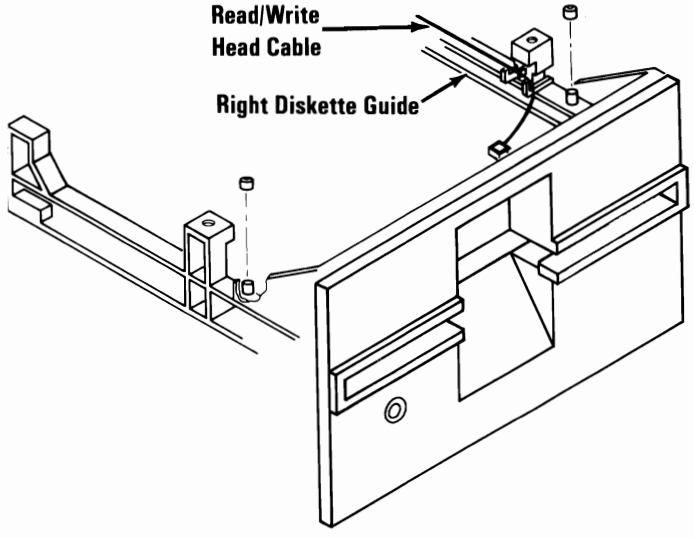
Left Diskette Guide 1155-1

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-1)**.
6. Remove the front panel **(1140-1)**.
7. Remove the retaining bushings.
8. Slide the blade of a screwdriver between the frame and the rear of the left guide and carefully pry the guide from the frame.



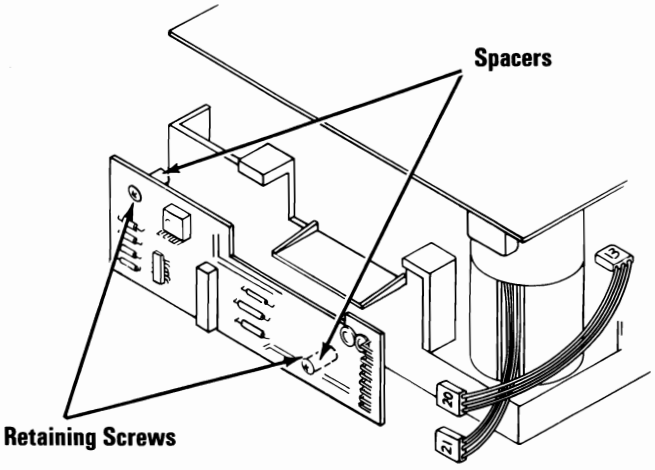
Right Diskette Guide 1160-1

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-1)**.
6. Remove the front panel **(1140-1)**.
7. Remove the read/write head cable from the brackets on the right diskette guide.
8. Remove the retaining bushing.
9. Slide the blade of a screwdriver between the frame and the rear of the right guide and carefully pry the guide from the frame.



Servo Board 1165-1

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Disconnect connectors 20 and 21 from the servo board.
6. Remove the servo board retaining screws and lift the board from the diskette drive. Do not lose the spacers between the servo board and frame when removing the board.



Spindle Assembly 1170-1

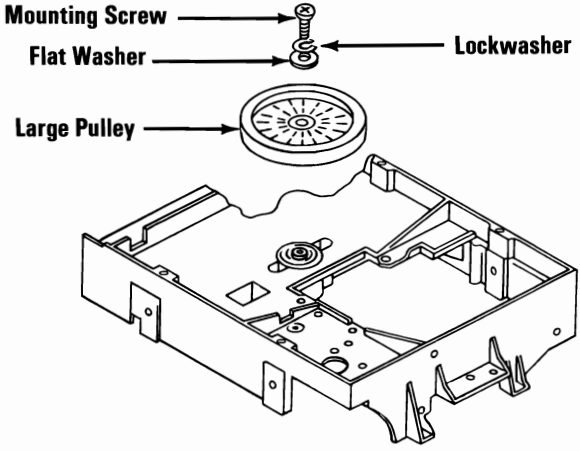
Spindle assemblies are installed two ways in the diskette drives.

An assembly installed with hex-headed screws and retainer can be replaced.

An assembly installed by bonding cannot be replaced.

Look through the latch opening of the diskette drive and find the spindle hub. If you have hex-headed screws under the spindle hub, continue with the removal and replacement procedure. If you do not have hex-headed screws, replace the diskette drive assembly.

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-1)**.
6. Remove the cone lever arm **(1105-1)**.
7. Remove the drive belt **(1125-1)**.
8. Remove the drive pulley screw and washers.

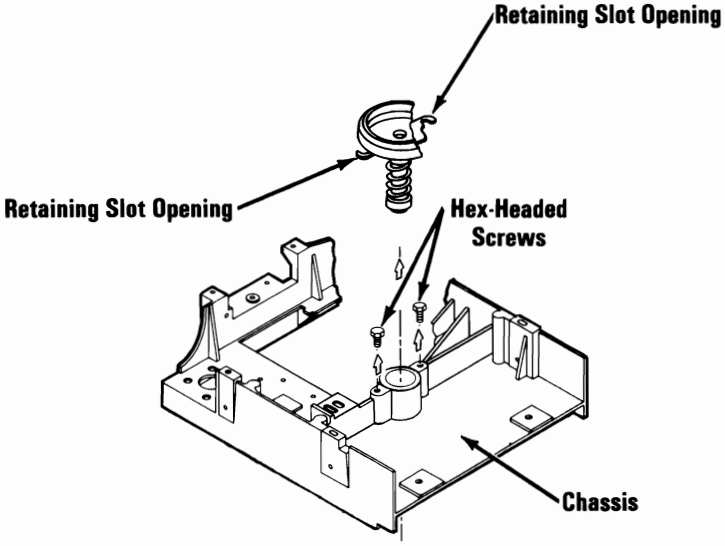


9. Remove the drive pulley by holding the spindle and twisting the pulley clockwise and counterclockwise while pulling the pulley off.

10. Loosen the two hex-headed screws under the spindle.

11. Turn the spindle retainer counterclockwise until the retainer openings clear the hex-headed screws.

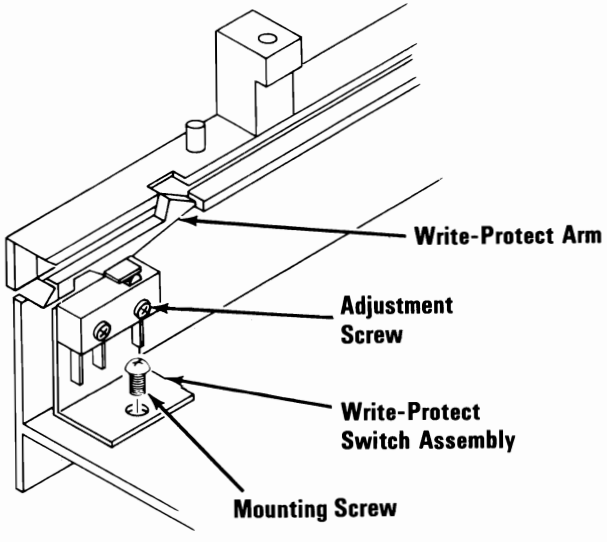
12. Remove the spindle assembly by pulling on the spindle and pushing on the spindle shaft from the opposite side.



Write Protect Switch Assembly 1180-1

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-1)**.
6. Remove the mounting screw for the Write-Protect switch (left front of the diskette drive).
7. Remove the wire ties, as necessary, along the left side of the frame and right side of the motor.
8. Remove the Write-Protect switch assembly.

Note: When installing the Write-Protect switch assembly, adjust the switch position so that when a diskette is inserted in the guides, the switch transfers without binding the diskette and the write protect assembly.

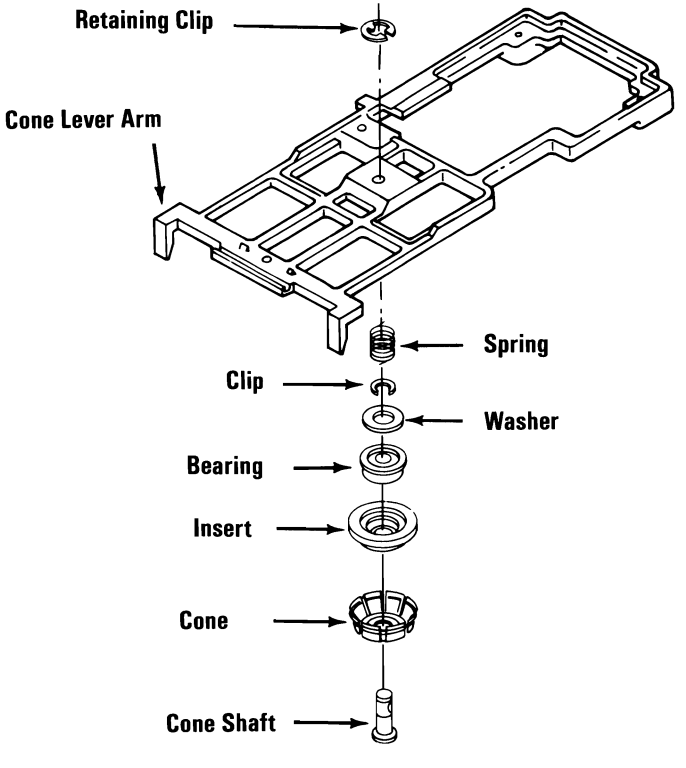


(Front View)

Full High Diskette Drive - Type 2

Cone Assembly 1100-2

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-2)**.
6. Remove the cone lever arm **(1105-2)**.
7. Compress the cone assembly to relieve spring tension and remove the retaining clip from the top of the shaft.
8. Release the cone assembly and allow it to separate from the cone lever arm.



Cone Lever Arm 1105-2

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-2)**.
6. Remove the read/write head cable from the bracket; remove the wire tie on the right diskette guide.

7. Remove the wire tie attaching the index cable to the cone lever assembly.

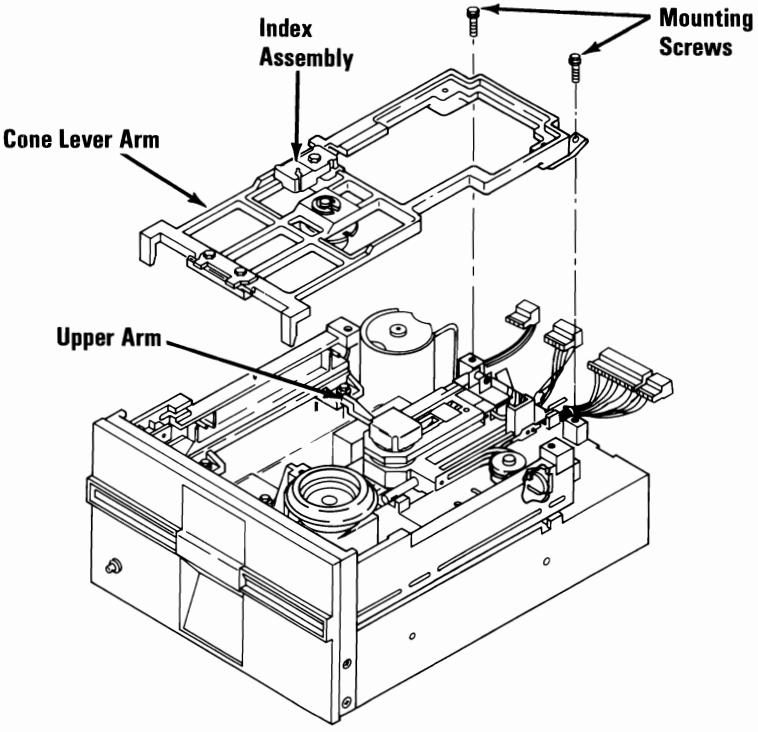
8. Remove the index assembly.

9. Remove the two mounting screws for the cone lever arm.

10. Slide the head carriage to the front of the diskette drive.

11. Release the upper arm by sliding the cone lever arm to the rear of the diskette drive.

12. Lift the cone lever arm out of the diskette drive.



Logic Board 1120-2

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Make a note of where the connectors and head cables attach to the logic board.
6. Disconnect all connectors from the rear, and the head cables from the right front of the diskette-drive logic board.

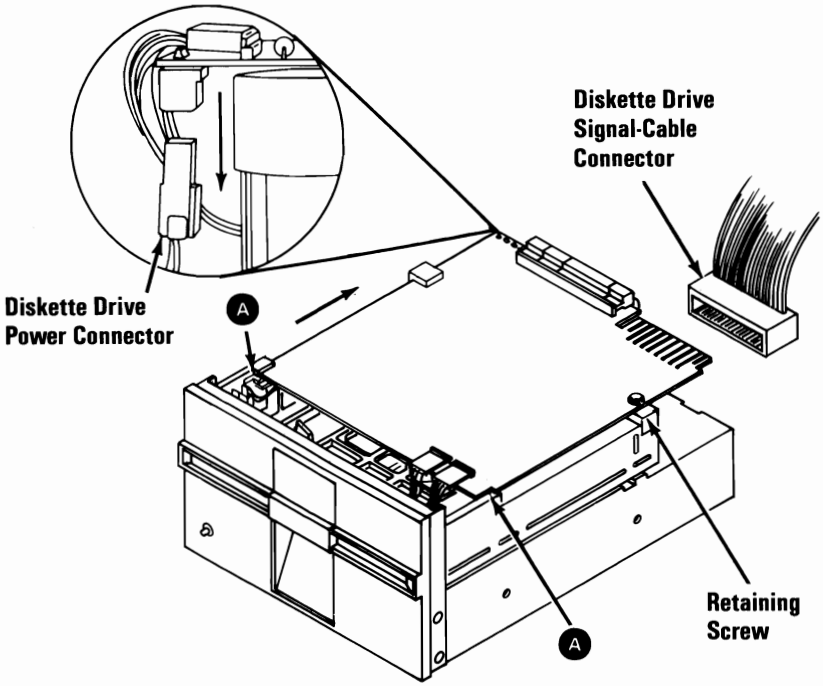
7. Remove the retaining screw.

8. Slide the diskette-drive logic board toward the rear until it clears the front guide brackets (A).

9. Lift the right side of the diskette-drive logic board up and out to clear the brackets.

10. Disconnect the diskette-drive power connector from the left rear corner of the diskette-drive logic board.

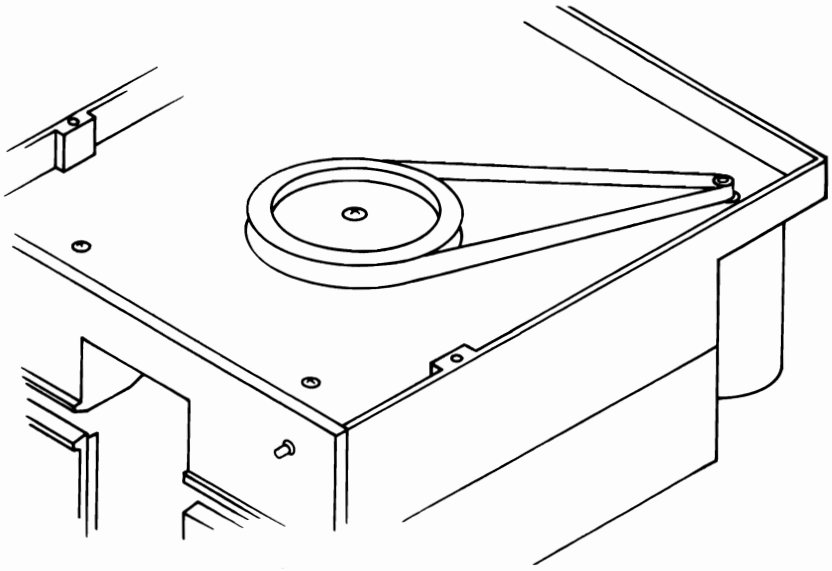
11. Remove the shield plate.



Drive Belt 1125-2

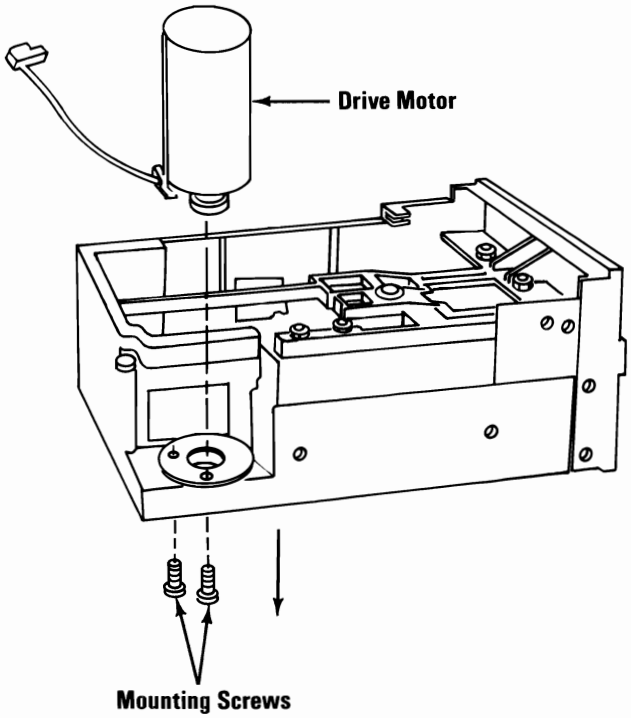
1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Carefully place the diskette drive on a work surface with the drive belt and pulleys facing up.
6. Lift the belt off the large pulley, then off the small pulley.

Note: When installing the belt, ensure that the dark, shiny side of the belt faces the pulleys.



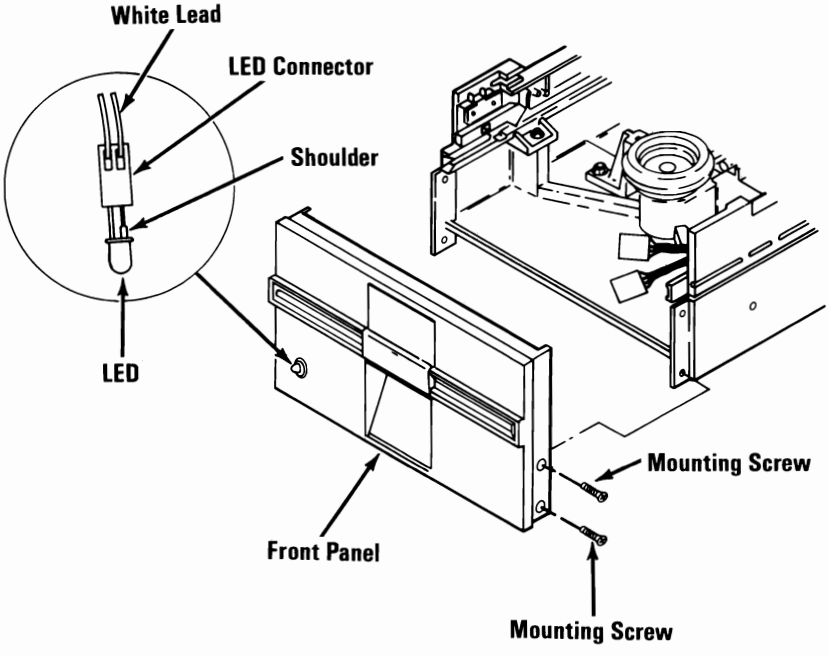
Drive Motor 1130-2

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-2)**.
6. Remove the drive belt **(1125-2)**.
7. Remove the drive motor mounting screws.
8. Carefully lift the drive motor out of the diskette drive.



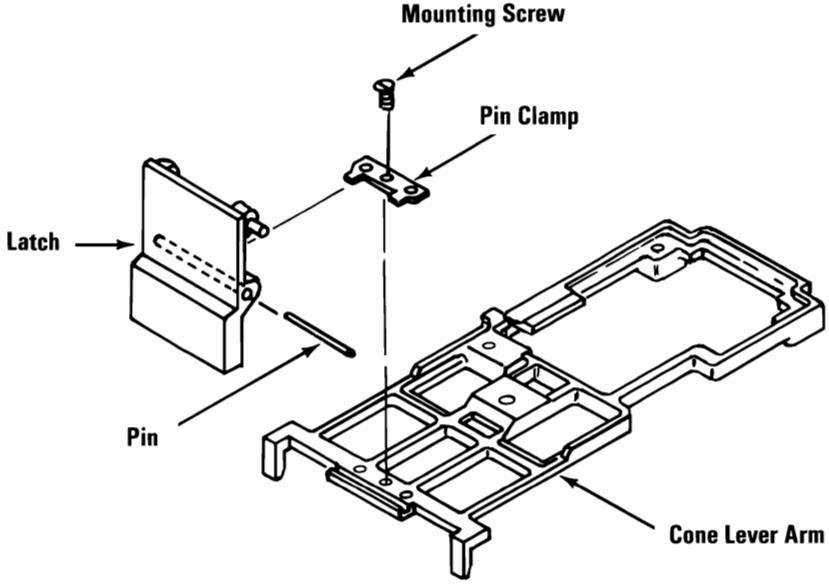
Front Panel 1140-2

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Open the latch on the front of the diskette drive.
6. Remove the diskette-drive logic board **(1120-2)**.
7. Remove the connector from the LED assembly.
8. Place the diskette drive on its right side and remove the left front mounting screws.
9. Place the diskette drive on its left side and remove the right front mounting screws.
10. Remove the front panel from the diskette drive.



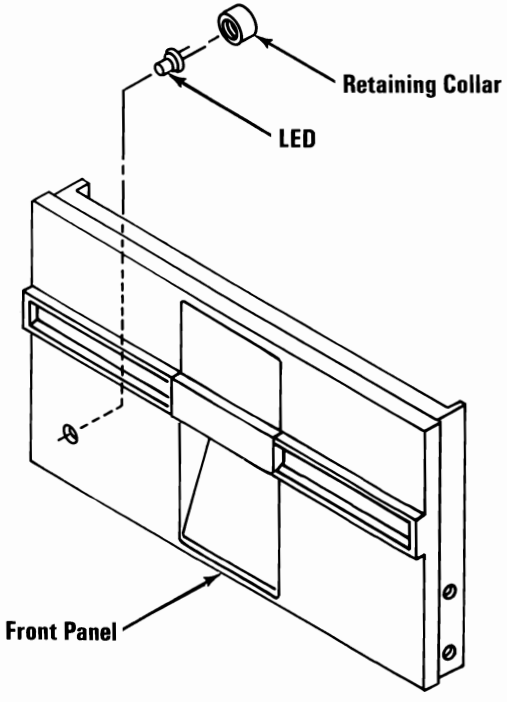
Latch Assembly 1145-2

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-2)**.
6. Close the latch and remove the mounting screw holding the pin clamp.
7. Remove the pin clamp.
8. Open the latch, push the cone arm down, and remove the latch by pulling toward the rear.



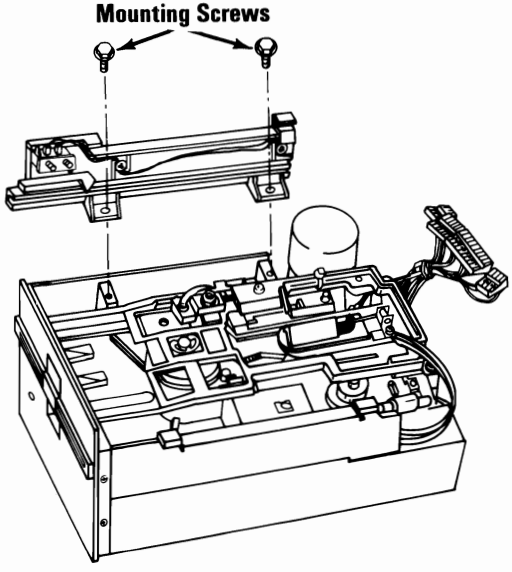
LED Assembly 1150-2

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-2)**.
6. Remove the front panel of the diskette drive **(1140-2)**.
7. Remove the retaining collar that holds the LED to the front panel.
8. Remove the LED from the front panel by pushing on the LED from the front of the front panel.



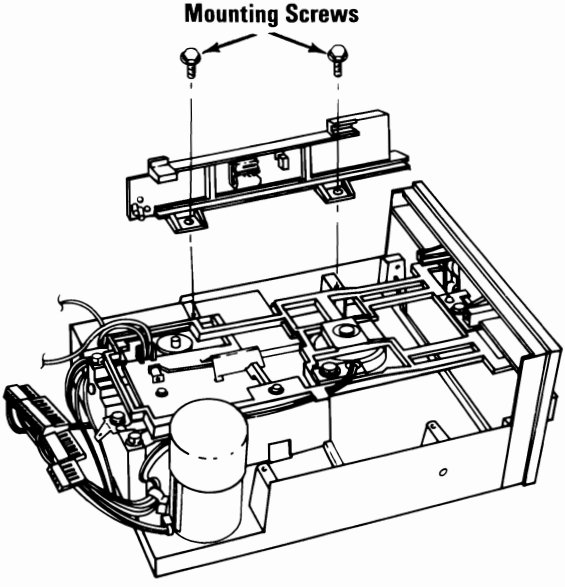
Left Diskette Guide 1155-2

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-2)**.
6. Remove the wires to the Write-Protect switch.
7. Remove the screws that hold the guide to the frame.
8. Slide the guide to the rear and lift it from the frame.



Right Diskette Guide 1160-2

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-2)**.
6. Remove the head cables from the diskette guide.
7. Remove the screws that hold the guide to the frame.
8. Move the guide to the rear and lift it from the diskette drive.

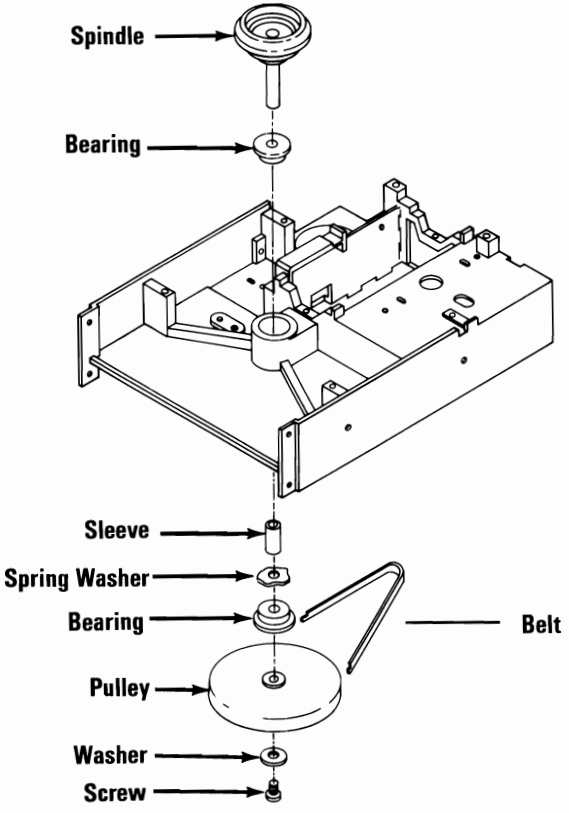


Spindle Assemble 1170-2

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-2)**.
6. Remove the cone lever arm **(1105-2)**.
7. Remove the drive belt **(1125-2)**.
8. Remove the drive pulley screw and washers.

9. Remove the drive pulley by holding the spindle and twisting the drive pulley back and forth while pulling on the pulley.

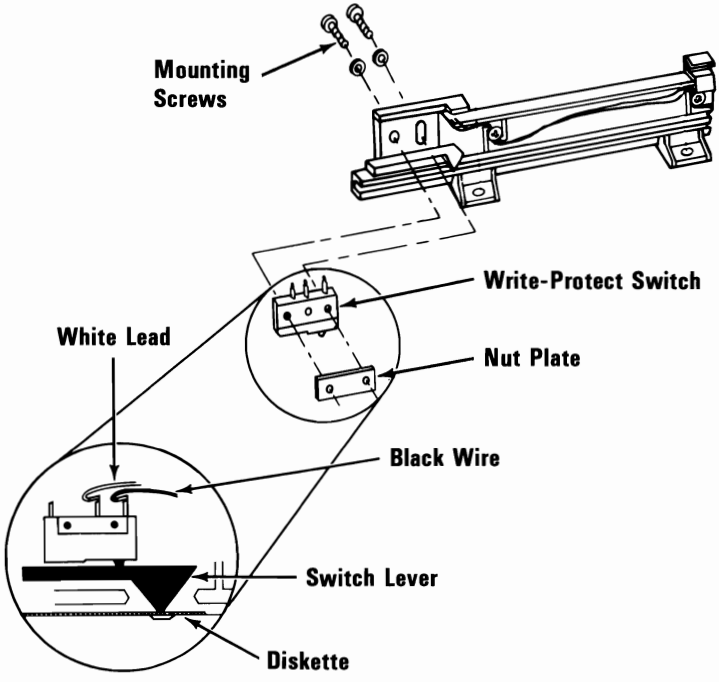
10. Remove the spindle assembly by pulling on the spindle and pushing on the spindle shaft from the opposite side.



Write Protect Switch 1180-2

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-2)**.
6. Remove the connectors from the Write-Protect switch.
7. Remove the mounting screws, washers, nut plate, and Write-Protect switch.

Note: When installing the Write-Protect switch, tighten the mounting screws and check that the Write-Protect switch operates when you first insert the diskette and again when the switch lever drops into the write-protect notch on the diskette. If necessary adjust.



Full High Diskette Drive - Type 3

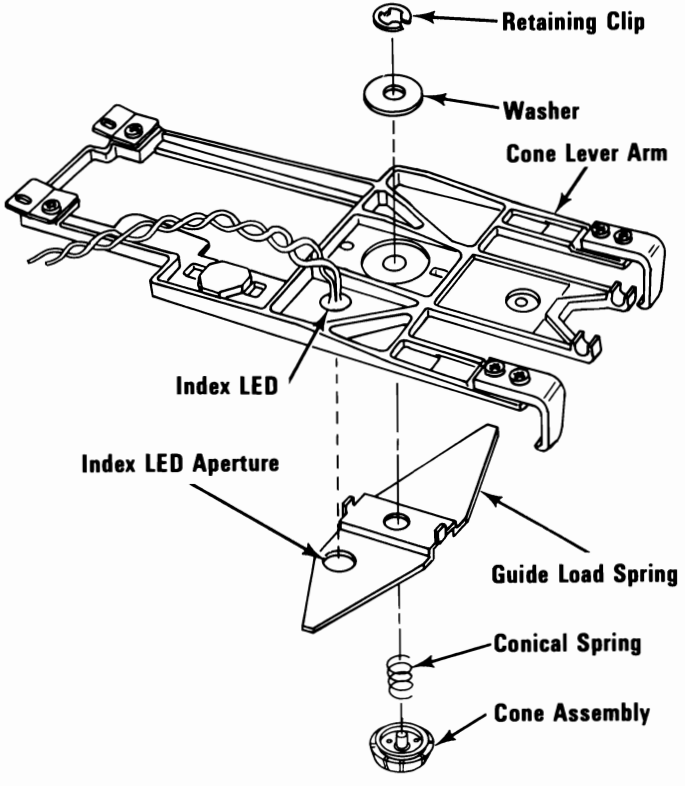
Cone Assembly 1100-3

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-3)**.

6. Remove the cone lever arm **(1105-3)**.

7. Compress the cone assembly to relieve spring tension and remove the retaining clip and washer from the top of the shaft.

8. Release the spring tension and allow the cone assembly to separate from the cone lever arm, along with the guide load spring and conical spring.



Cone Lever Arm 1105-3

Warning: When removing or replacing the cone lever arm, do not spread or bend the upper suspension of the head carriage assembly; this can cause permanent damage

Never allow the heads to strike each other. Separate them with a piece of paper during removals and replacements.

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-3)**.
6. Remove the logic board support post.
7. Open the latch assembly.
8. Place a piece of paper between the heads.
9. Position the head carriage assembly to the front of the diskette drive.
10. Remove the head cables from the right diskette guide.

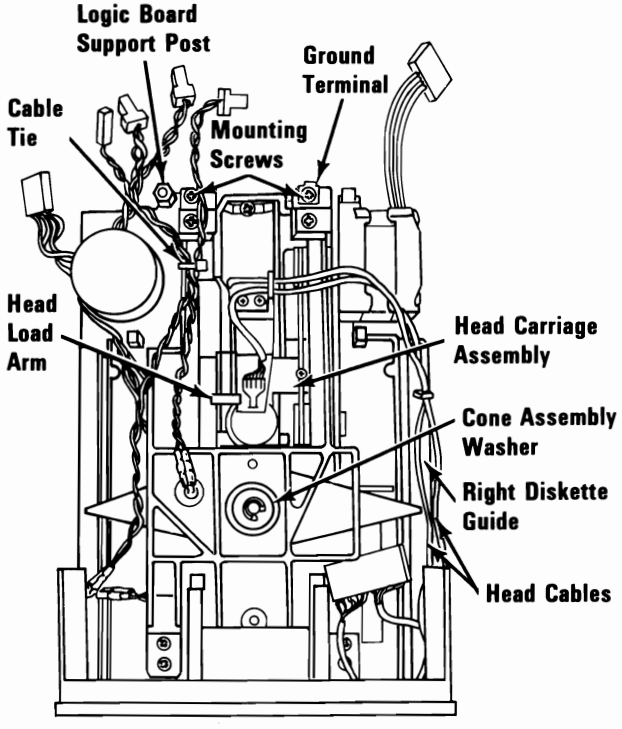
11. Remove the wire tie attaching the LED cable to the cone lever arm.

12. Remove the latch assembly **(1145-3)**.

13. Remove the two rear cone lever arm mounting screws and the grounding terminal.

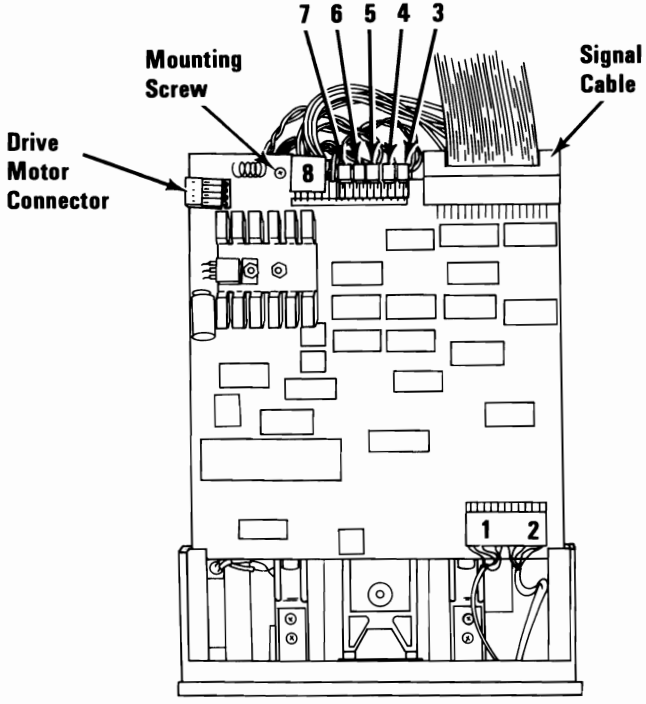
14. Slide the cone lever arm to the left (view it from the front) far enough to clear the head load arm; allow the heads to close on the paper.

15. Raise the cone lever arm, then move it to the rear and lift out.



Logic Board 1120-3

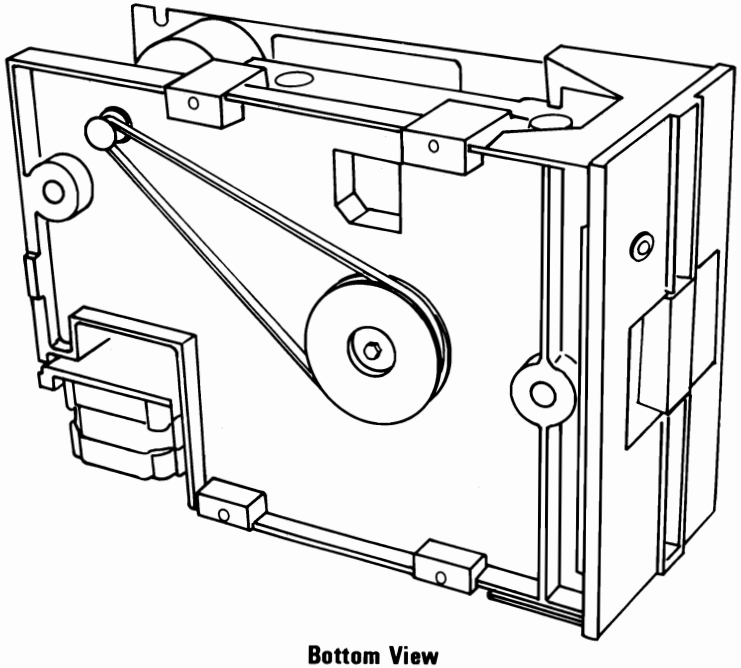
1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Make a note of where the connectors attach to the logic board.
6. Disconnect all connectors from the diskette-drive logic board.
7. Remove the logic board mounting screw.
8. Slide the diskette-drive logic board toward the rear until it clears the guide brackets, and remove it.



Drive Belt 1125-3

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Carefully place the diskette drive on a work surface with the drive belt and pulleys facing up.
6. Lift the belt off the large pulley, then off the small pulley.

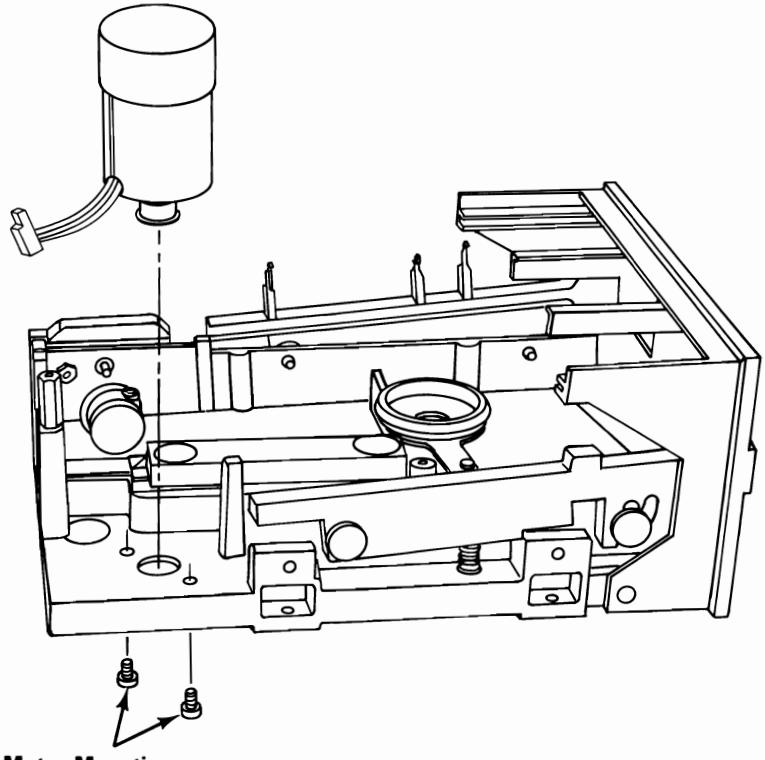
Note: When installing the belt, ensure that the dark, shiny side of the belt faces the pulleys.



Bottom View

Drive Motor 1130-3

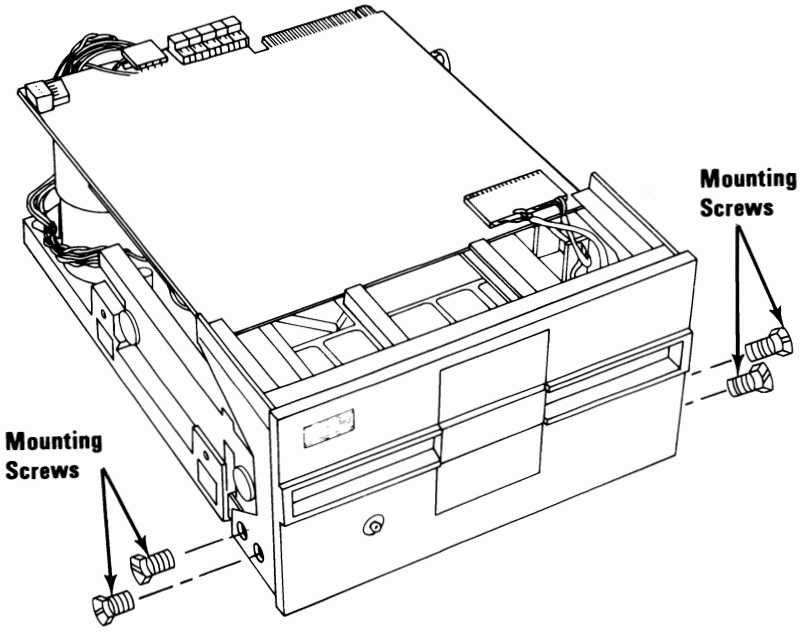
1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-3)**.
6. Remove the drive belt **(1125-3)**.
7. Remove the two drive motor mounting screws.
8. Remove the drive motor.



Front Panel 1140-3

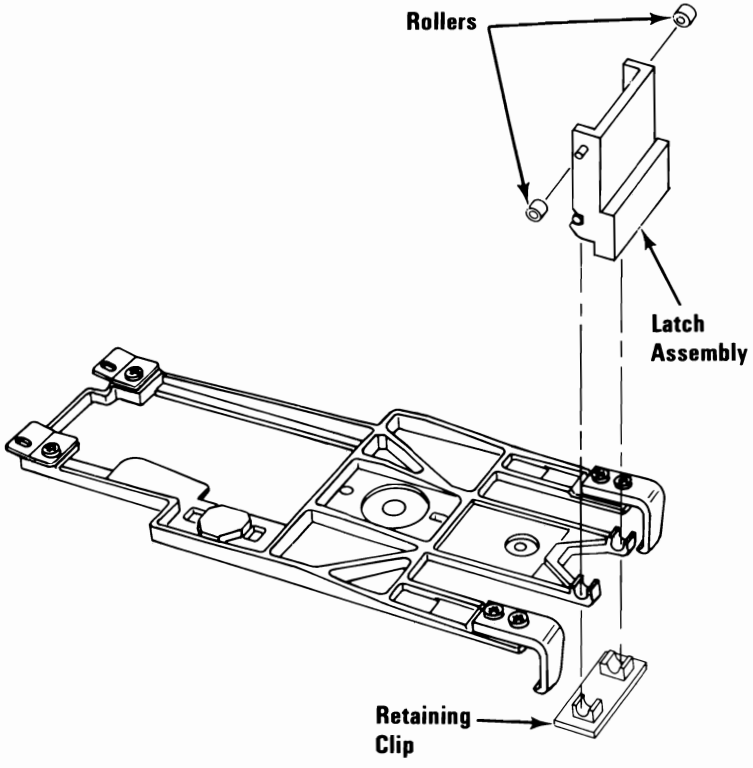
Note: When opening and closing the cone lever arm, insert a piece of paper between the heads to protect them.

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-3)**.
6. Remove the latch assembly **(1145-3)**.
7. Remove the LED assembly from the front panel **(1150-3)**.
8. Remove the four front panel mounting screws.
9. Remove the front panel from the diskette drive.



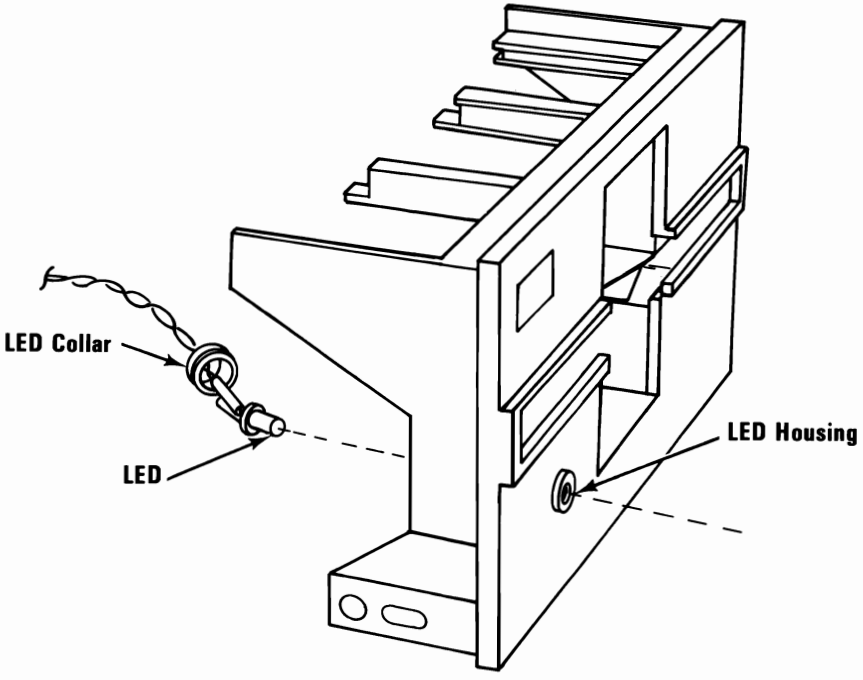
Latch Assembly 1145-3

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the logic board **(1120-3)**.
6. Open the latch assembly.
7. Remove the latch assembly retaining clip.
8. Disengage the latch assembly from the cone lever arm.
9. Slide the latch assembly to the rear of the front panel, and lift it out of the front panel. Be careful not to lose the rollers.



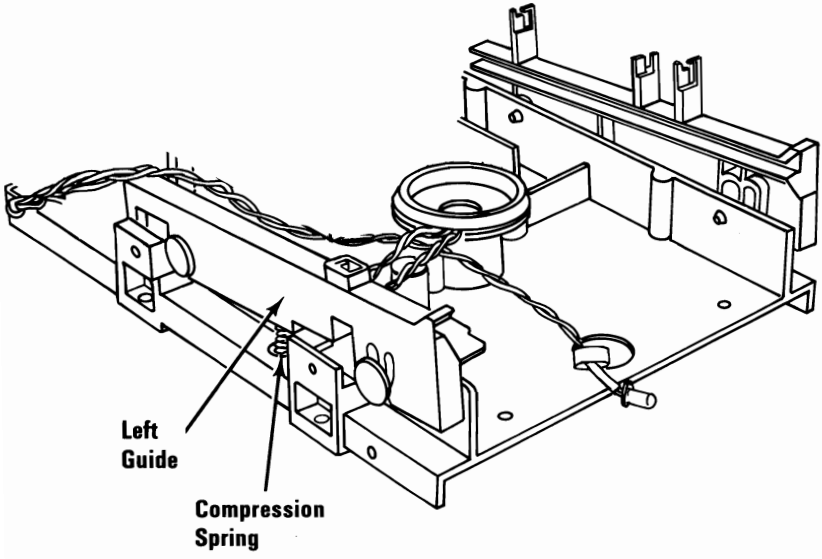
LED Assembly 1150-3

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-3)**.
6. Insert a screwdriver between the front panel and the LED collar and force the collar off the LED housing.
7. From the front of the front panel, push the LED out toward the rear of the diskette drive.



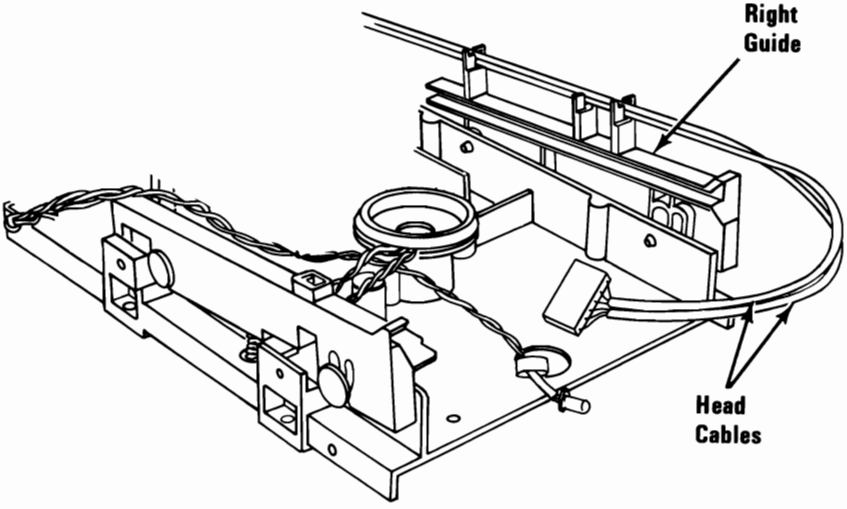
Left Diskette Guide and Write Protect Sensor Assembly 1155-3

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-3)**.
6. Cut the cable tie that holds the LED cables to the cone lever arm.
7. Remove the front panel **(1140-3)**.
8. Lifting from the front, remove the left diskette guide and write-protect sensor assembly from the studs, along with the compression spring.



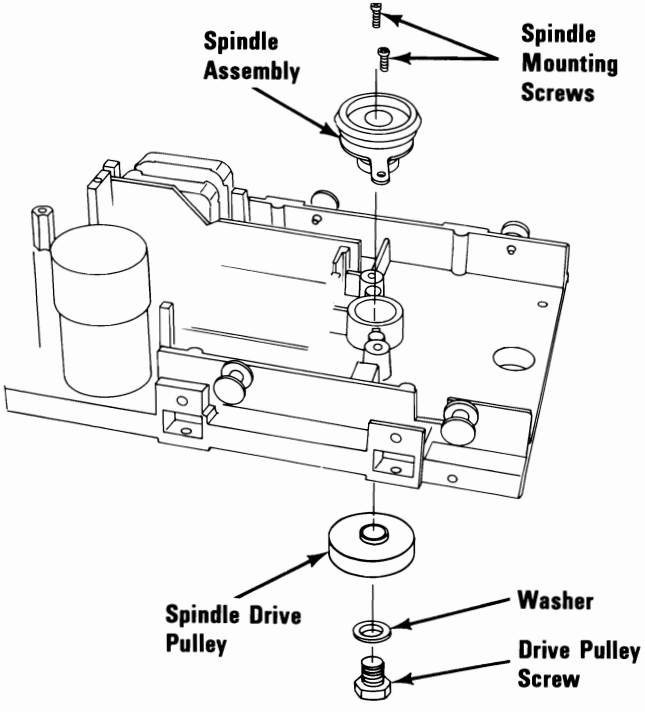
Right Diskette Guide 1160-3

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-3)**.
6. Remove the front panel **(1140-3)**.
7. Remove the head cables from the right diskette guide.
8. Lifting from the front, remove the right diskette guide from the studs, along with the compression spring.



Spindle Assemble 1170-3

1. Power off the system.
2. Unplug the system unit (and expansion unit) power cord from the outlet.
3. Remove the system unit cover **(1005)**.
4. Remove the diskette drive.
5. Remove the diskette-drive logic board **(1120-3)**.
6. Remove the cone lever arm **(1105-3)**.
7. Remove the drive belt **(1125-3)**.
8. Remove the screw (left-hand thread) and washer from the spindle drive pulley and remove the pulley.
9. Remove the spindle mounting screws.
10. Lift the spindle assembly out of the diskette drive.



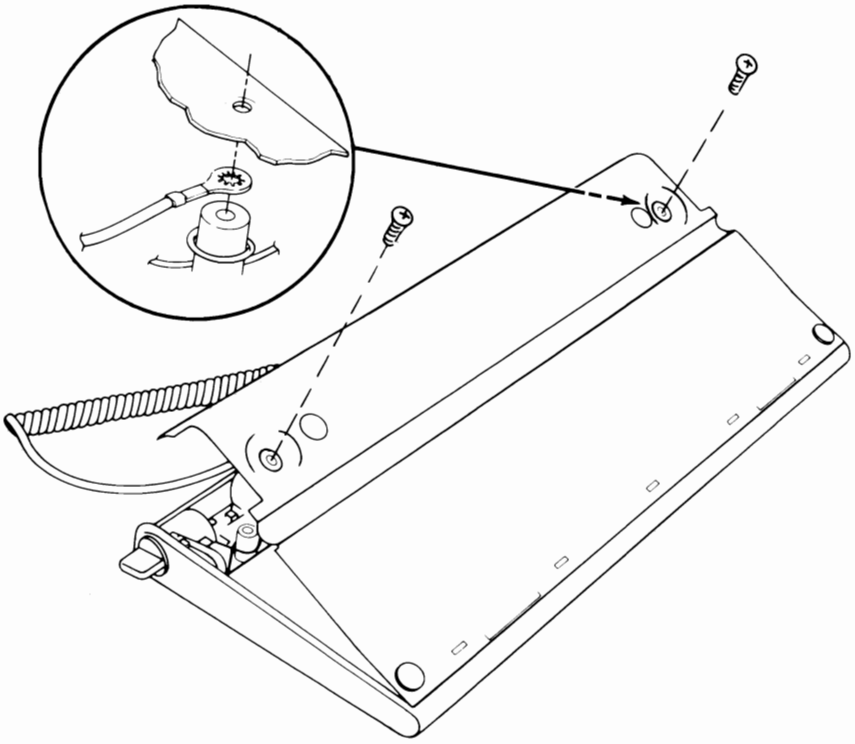
Keyboard

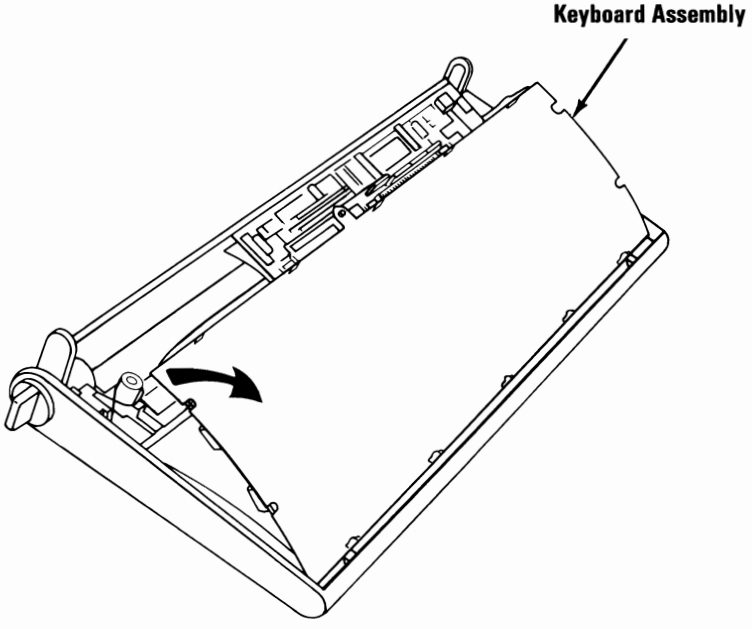
83-Key Keyboard Base 1200

1. Power off the system, and disconnect the keyboard cable from the rear of the system unit.

2. Place the keyboard with the bottom facing up and remove the two mounting screws.

3. Rotate the base up and out of the front retaining slots.



83-Key Keyboard Assembly 1205

1. Power off the system, and disconnect the keyboard cable from the rear of the system unit.
2. Remove the keyboard base **(1200)**.
3. Disconnect the cable from the keyboard assembly.
4. Lift the rear of the keyboard assembly up and out of the cover.