IBM

Series/1

SY34-0083-1

IBM Series/1
4963 Disk Subsystem
and Attachment Feature
Maintenance Information Manual

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Federal Communications Commission (FCC) Statement

Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Second Edition (May 1980)

This is a major revision of, and obsoletes, SY34-0083-0. Information has been added and art updated to show changes in the new-style disk unit. Changes or additions to the text and figures are indicated by a vertical line to the left of the change.

Use this publication only for the purpose stated in the Preface.

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Preface

This book contains information required to maintain the IBM Series/1 4963 Disk Subsystem and Attachment Feature. The information is intended for maintenance personnel who have been trained on the subsystem and its attachment feature.

The programs used to diagnose subsystem problems are written for execution on an IBM Series/1 processor; therefore, the reader should also be familiar with Series/1 and its diagnostic programs.

How This Book is Organized

Each procedure and major heading in this book is preceded by a number for easy reference. The table of contents, the maintenance analysis procedure (MAPs), and several individual procedures within this book use these numbers to help the reader quickly locate related information.

The material is presented in three chapters.

Chapter 1, "General Maintenance Information," describes the recommended approach to maintenance and trouble analysis, and identifies the tools and test equipment required to maintain the subsystem.

Chapter 2, "Illustrations and Locations," shows the physical relationships of the various subsystem components, identifies field replaceable units (FRUs), and points out the location of the attachment-card jumpers that are used to select various options.

Chapter 3, "Adjustments and Removal and Replacement Procedures," contains the step-by-step instructions for making adjustments and replacing parts, as directed by the MAPs.

Related Publications

Additional 4963 information can be found in:

- *IBM Series/1 4963 Disk Subsystem and Attachment Feature Description*, GA34-0051.
- *IBM Series/1 4963 Disk Subsystem and Attachment Feature Theory Diagrams*, SY34-0082.
- *IBM Series/1 4963 Disk Subsystem Parts Catalog,* S134-0034.

Additional Series/1 information can be found in publications listed in *IBM Series/1 Graphic Bibliography*, GA34-0055.

Contents

Personal

Personal safety cannot be overemphasized; it is a vital part of customer engineering. To ensure your safety and that of co-workers, always observe the safety training and observe the general safety practices outlined in *CE Safety Practices* card, S229-1264.

KNOWING SAFETY IS NOT ENOUGH. AN UNSAFE ACT INEVITABLY LEADS TO AN ACCIDENT. USE GOOD JUDGMENT - ELIMINATE UNSAFE ACTS.

Be sure that your actions do not render the product unsafe or expose customer personnel to unsafe conditions. Practice the following precautions to protect customer personnel:

- Maintain good housekeeping in the machine area during and after maintenance.
  - Place removed machine covers in an out-of-the-way place where no one can trip over them.
  - Place your tool kit away from walk areas (under a desk or table) so no one can trip over it.
- Make sure that fellow customer engineers and customer personnel are not in a hazardous position before starting the equipment.
- Replace all machine covers before returning the machine to the customer.

Equipment

Electrical

Be careful when grounding signal lines. Don't (1) apply a voltage instead of a ground, or (2) ground the output of an emitter-follower or driver circuit. Always replace fuses with correct size and type.

Power Supplies

Before working on any power supply, remove power from the machine and allow at least one minute for capacitors to discharge.

DANGER
Resistors become extremely hot after prolonged use, and motor temperatures may exceed safe handling limits. Be certain components have cooled before performing maintenance in these areas:

- Disk enclosure removal
- Brake assembly adjustment
- Drive motor removal and replacement
- Power supply removal and replacement

Machine Warning Labels

Heed the warning labels placed in hazardous areas of the machine.

Grounding

Ground current may reach dangerous levels. Never operate a machine with the ground conductor removed.

Line-Powered Equipment

Ground all line-powered test equipment through the third-wire ground conductor in the power cord of the machine being tested and check periodically for safe and proper connection.

Mechanical

Practice these precautions when operating, replacing, and adjusting mechanical components:

- Do not operate machine under power when it is disassembled or maladjusted.
- After making an adjustment, manually cycle the mechanical components to be sure there are no binds.

Environmental Hazards

When entering any part of the customer's area, observe all safety precautions and regulations. Check the following items:

- The need for safety glasses, hard hats, or special clothing
- Particular route that should be taken to and from installation (Escort required?)
- Smoking restrictions

- Restrictions on use of electrical and other spark-producing tools
- Exposure to high voltages
- Exposure to heavy machinery or other equipment
- Exposure to splashing acids, molten metal, or hot liquid
- Exposure to toxic gases or vapors
- Warning alarms and emergency exits.

Chapter 1. General Maintenance Information

Introduction

There is no scheduled maintenance for the IBM Series/1 4963 Disk Subsystem. To repair the disk storage unit, adjust the internal components or replace the field replaceable units (FRUs) as directed by the maintenance analysis procedures (MAPs).

Diagnosis, repairs, adjustments, service checks, or verification of a problem are done online (using the system). Verification of a repair should always be done using the system diagnostics.

For proper use of the MAPs and diagnostic programs, see the introductory pages of the *IBM Series/1 Diagnostic Service Guide*.

Maintenance Tools

1.1 Customer Engineer Tool Kit

The basic Customer Engineer tool kit, the IBM volt-ohmmeter, and the IBM General Logic Probe II can be used to isolate most problems. An oscilloscope may be required in some instances when more than the basic tools are needed to solve a problem.

1.2 IBM General Logic Probe II

The General Logic Probe II is a rectangular, hand-held unit used by maintenance personnel to detect logic signals for several technologies. The probe replaces the old SLT-type logic probes, and it is designed for use on all IBM machines requiring a logic probe for maintenance.

The probe can be used with the following logic families:

MST 1, MST 2, MST 4, SLT 700, SLT 100, SLD 30, TTL (VTL), FET, Golf, and Dutchess.

The General Logic Proble II kit (part 453212) includes:

- The IBM General Logic Probe II Unit
- Standard accessories
- *IBM General Logic Probe II Manual*, SY34-0127

Each of these components may be ordered separately.

Note: The general logic probe manual describes the features of the probe and the functions and limitations of each feature. Because all of the information is not duplicated here, refer to that manual.

1.2.1 Description

The description and operating procedure for the general logic probe is keyed to Figure 1-1. The general logic probe is 155 mm (6.2 in.) long, 65 mm (2.6 in.) wide, and 28 mm (1.2 in.) thick.

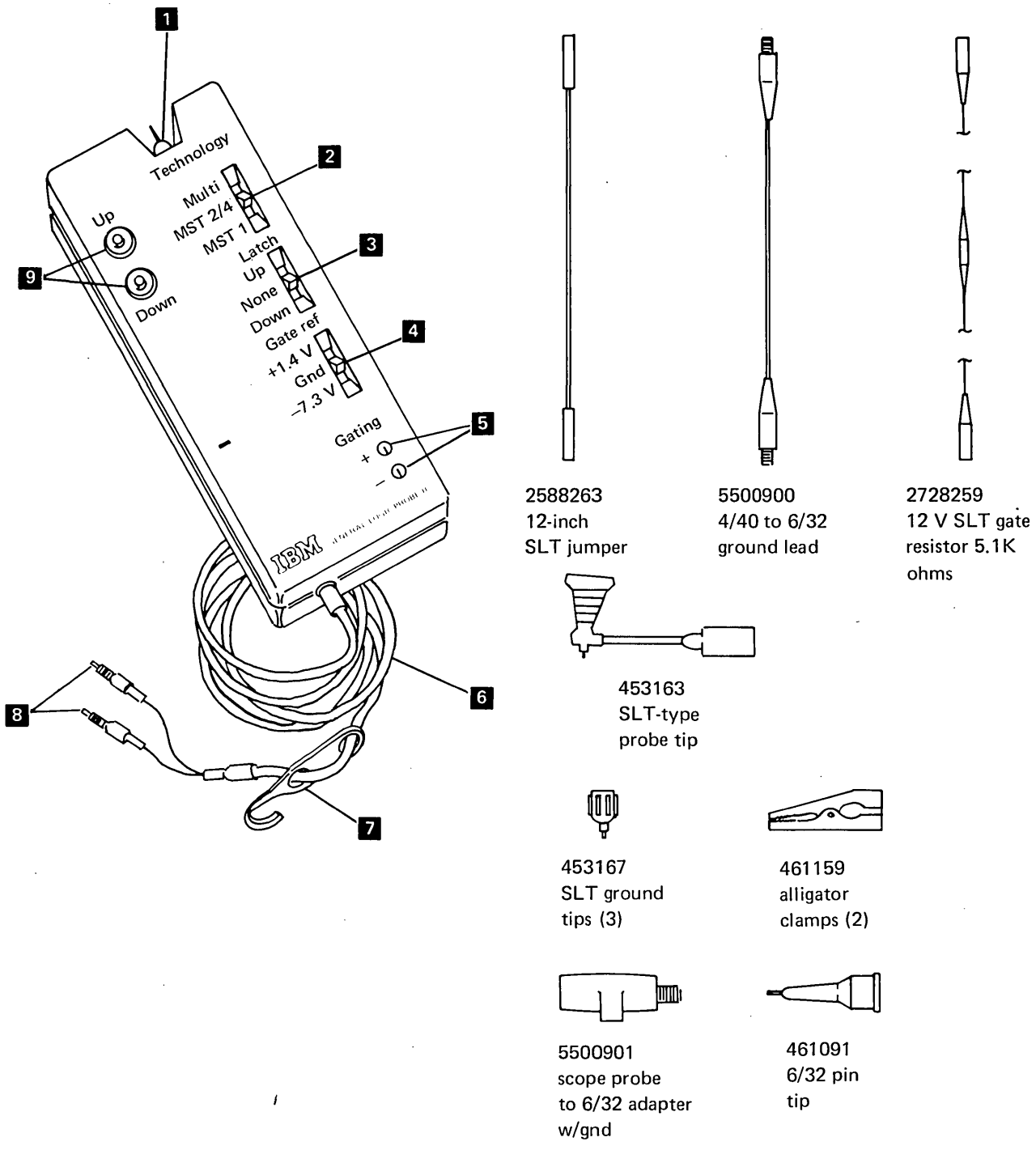


Figure 1-1. IBM General Logic Probe II and accessories

1 Main input. The main input probe is similar to an oscilloscope probe tip, and it will accept most oscilloscope probe connectors. One of the following connector sets is normally used here:

Connector set	Part
Scope probe to 6-32 adapter w/gnd	5500901
Ground lead 4-40 to 6-32	5500900
SLT ground tip	453167
SLT-type probe tip	453163
General logic probe extender cable	453605
SLT ground tip	453167
SLT-type probe tip	453163
*MST 4-probe tip adapter	453888

*May be ordered from IBM; not in the general logic probe kit

Because both power cable leads are isolated from the main input probe ground, the main input probe ground *must* be connected to the logic's ground.

For your convenience and as a time saver, use the probe extender cable; however, do not use the cable with FET circuits or while gating.

Special accessories 6-32 pin tip (part 461091) and alligator clamps (part 461159) may, on occasion, be used with the scope probe to 6-32 adapter w/gnd (part 5500901).

2 Technology switch. Set the Technology switch to the Multi position when troubleshooting the 4963 Disk Subsystem.

3 Latch switch. The Latch switch keeps the Up light or Down light on when the logical state of the input matches the switch position; the lights become inactive when the switch is set to the None position.

This feature can be employed to "baby sit" for an intermittent error condition or to verify that a pulse occurred when the operator could not continuously see the probe.

4 Gate ref switch. The gate reference (Gate ref) switch controls the reference voltages for the logic families to be connected to the probe gate pins.

The +1.4-volt position allows TTL (VTL), Dutchess, SLT 3-volt, SLT/SLD 6-volt and 12-volt logic families to be gated.

5 Gating pins. The Gating pins (labelled + and −) are recessed SLT-type pins. An SLT jumper (part 2588263) is provided for use with the Gating pins.

6 Power cable. The probe receives power through a cable, which can be connected to any dc source that has a voltage difference of 4-to-12 volts (maximum of 14 volts). If you are not sure where the power pins on the board are located, use the a meter to verify proper voltages before and after connecting the general logic probe. When a voltage differential of 4 volts is used, the unit uses a maximum of 450 mA; for a 12 volt differential, the unit uses a maximum of 150 mA.

Examples of power lead connection:

Red lead (positive) to +12 volts
Black lead (negative) to ground
} SLT 12 V

Or

Red lead to ground
Black lead to -4 volts
} MST 1

Reverse power lead damage protection is guaranteed at up to 15-volts difference.

7 Sky hook. The sky hook may be used to support the general logic probe instead of hanging the probe from a pin (which will bend the pin and eventually break it). However, the hook's most common use is to provide mechanical stress relief for the power lead that is connected to the board pins.

8 Power lead ends. These 6–32 power lead screw ends can be mated with several connectors. The most common connectors are the SLT ground tips (part 453167). They are used to obtain power from the board pins. The alligator clamps (part 461159) can be used when it becomes necessary to use other power sources.

9 Indicating lights. The Up and Down lights are used as indicators for four status conditions:

Condition	*Lights*	
	Up	*Down*
Proper logical up-level	on	off
Proper logical down-level	off	on
Pulsing between valid levels	on	on
Invalid signal levels	off	off

1.2.2 Operation

1.2.2.1 Preliminary Steps for Analytical Probing

1. Connect one of the connector sets to the general logic probe.
2. Connect the power leads to a source that has a voltage difference of 4-to-12 volts.
3. Ensure that there are *no* inputs to the gates.
4. Set the Gate ref switch to any position.
5. Set the Latch switch to None.
6. Connect the ground lead to the unit being tested.
7. Set the Technology switch to the position required for the type of logic being probed and observe the specifications, given in the *IBM General Logic Probe II Manual*, SY34-0127, for that position.
8. Probe the test points and observe the lights.

1.2.2.2 Latch Use

1. Follow the above preliminary steps.
2. If there is a valid static logic condition, one light will be *on*.
3. If the Up light is *on*, set the Latch switch to the Down position.
4. If the Down light is *on*, set the Latch switch to the Up position.
5. If a minimum detectable pulse occurs, the light that is *off* will come *on*, and both lights will remain *on*.

1.2.2.3 Gating

Gating is used to indicate the logical state of a pulsing line at any particular instant in time, or to verify that two pulses are occurring at the same time and within one pulse width.

The Gate Ref switch and two recessed SLT-type pins are provided for gating the probe. If signals are not applied to the gates, the probe operates in the normal manner. If a signal is applied to either pin, the probe operation is inhibited, causing both lights to go *off* until the proper conditions are met (see Figure 1-2).

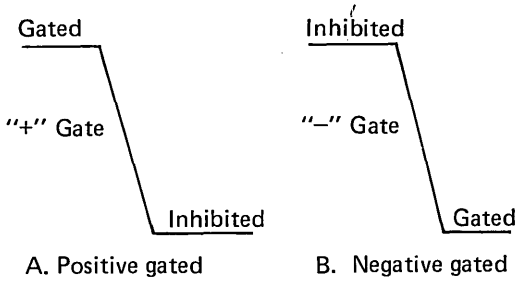


Figure 1-2. Definition of gated condition

Do not connect a gate pin to an FET circuit.

The maximum and minimum voltage for a gate pin is ±14 volts.

Note: Do not use the general logic probe extender cable when gating; the indications will not be accurate.

Example Problem:

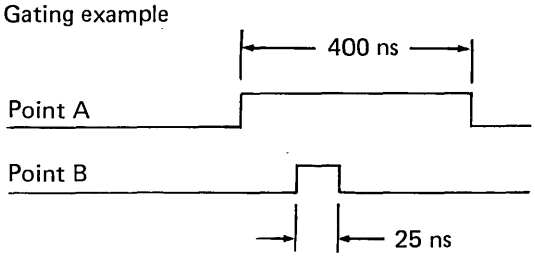
Determine the address at which the clock sync pulse occurs.

Solution:

There are eight points to probe, but all are similar to point A. Point B will be used for gating. The logic family is TTL or Dutchess.

1. Connect power to the general logic probe.
2. Set the Technology switch to Multi.
3. Set the Gate ref switch to +1.4 volts.
4. Set the Latch switch to None.
5. Connect the ground lead of the main input accessories (parts 5500901, 5500900, 453167, and 453163) to the board ground pin.
6. Connect the main input to point A. Both lights should be *on*.
7. Connect one end of the 12-inch jumper accessory (part 2588263) to the + Gating pin and the other end to point B.

Gating example



Results:

Only the Up light is *on*; therefore, point A has an address bit of 1. (If the Down light comes on, the address bit is a 0.)

1.2.2.4 Probe Checkout Procedure

1. Connect the general logic probe power leads to a dc supply that has a voltage differential of 4 to 12 volts (red lead = positive, black lead = negative). When the unit is connected, verify the dc voltage with a meter.
2. Set the Latch switch to None.
3. Set the Technology switch to Multi. Both lights should be *off*.
4. Connect the general logic probe ground to machine ground; connect the main input to either +3, +5, +6, or +12 volts. Only the Up light should be *on*.
5. Connect both the general logic probe ground and the main input to machine ground. The Down light should be *on*.
6. Set the Gate ref switch to ±1.4 volts.
7. Connect one end of the SLT jumper (part 2588263) to the + Gating pin and the other end to machine ground. Both lights should be *off*.
8. Move one end of the jumper to the – Gating pin and the other end to either +3, +5, +6, or +12 volts. Both lights should be *off*.
9. If any of the above conditions are not met, the general logic probe, the probe tips, or the jumpers are defective and should be replaced. Be sure to check out the replacement general logic probe, probe tips, or jumpers using the above procedure.

1.3 Oscilloscope

The general logic probe is recommended for use, whenever possible, rather than an oscilloscope. If you need to use an oscilloscope, the Tektronix* model 454 oscilloscope, or equivalent, should be used.

1.4 Shipped Tools

A jumper (part 8326945), that is included in the ship group, must be used to disable the "brake applied" signal before the drive motor switch is turned off. If the jumper is not installed, the power supply will be disabled with an active "brake applied" signal.

1.5 Metric Considerations

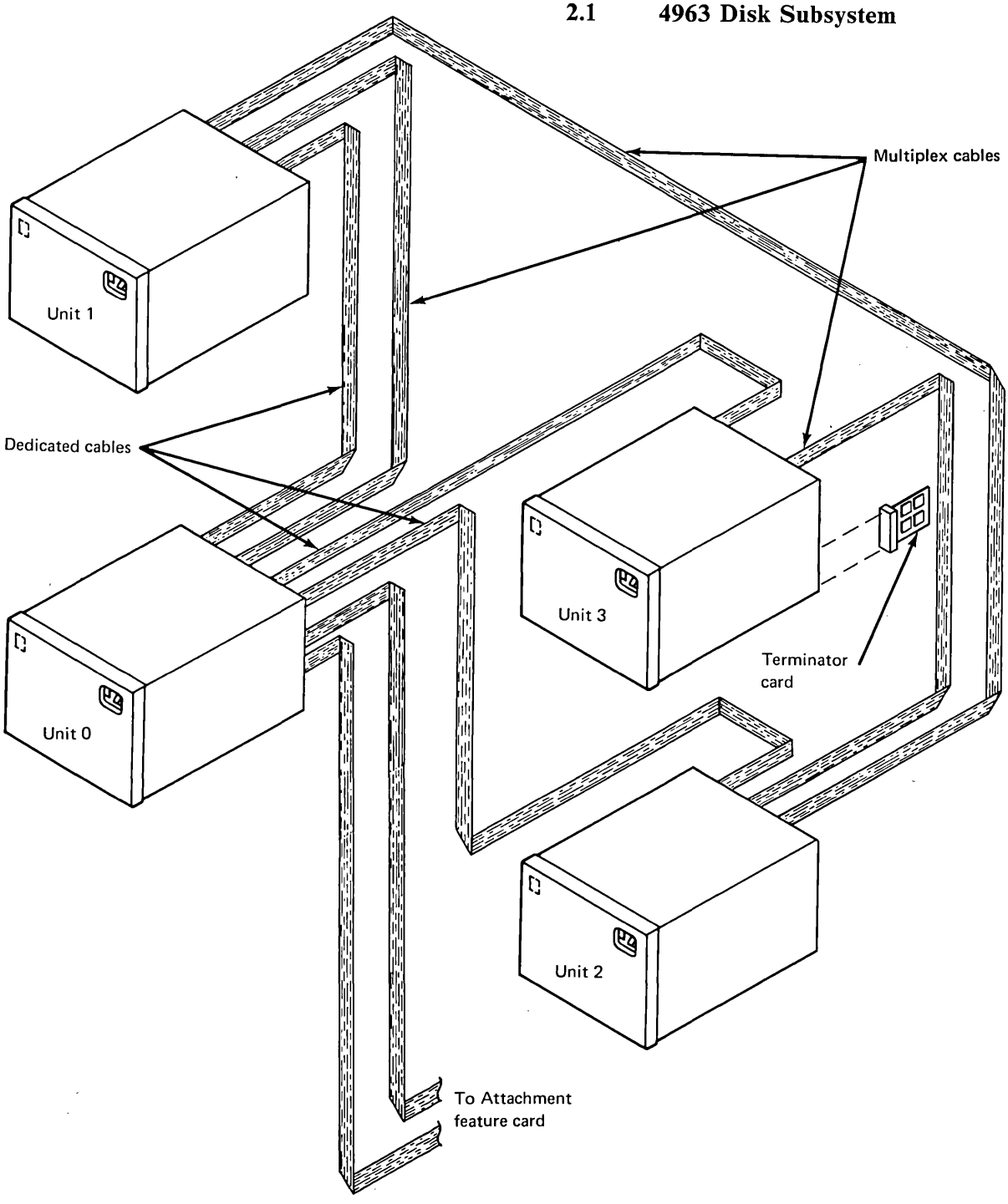
If metric screws are used in the disk storage unit, they are colored blue. Consult the parts catalog, as necessary, to determine the thread size.

* Trademark of Tektronix, Inc.

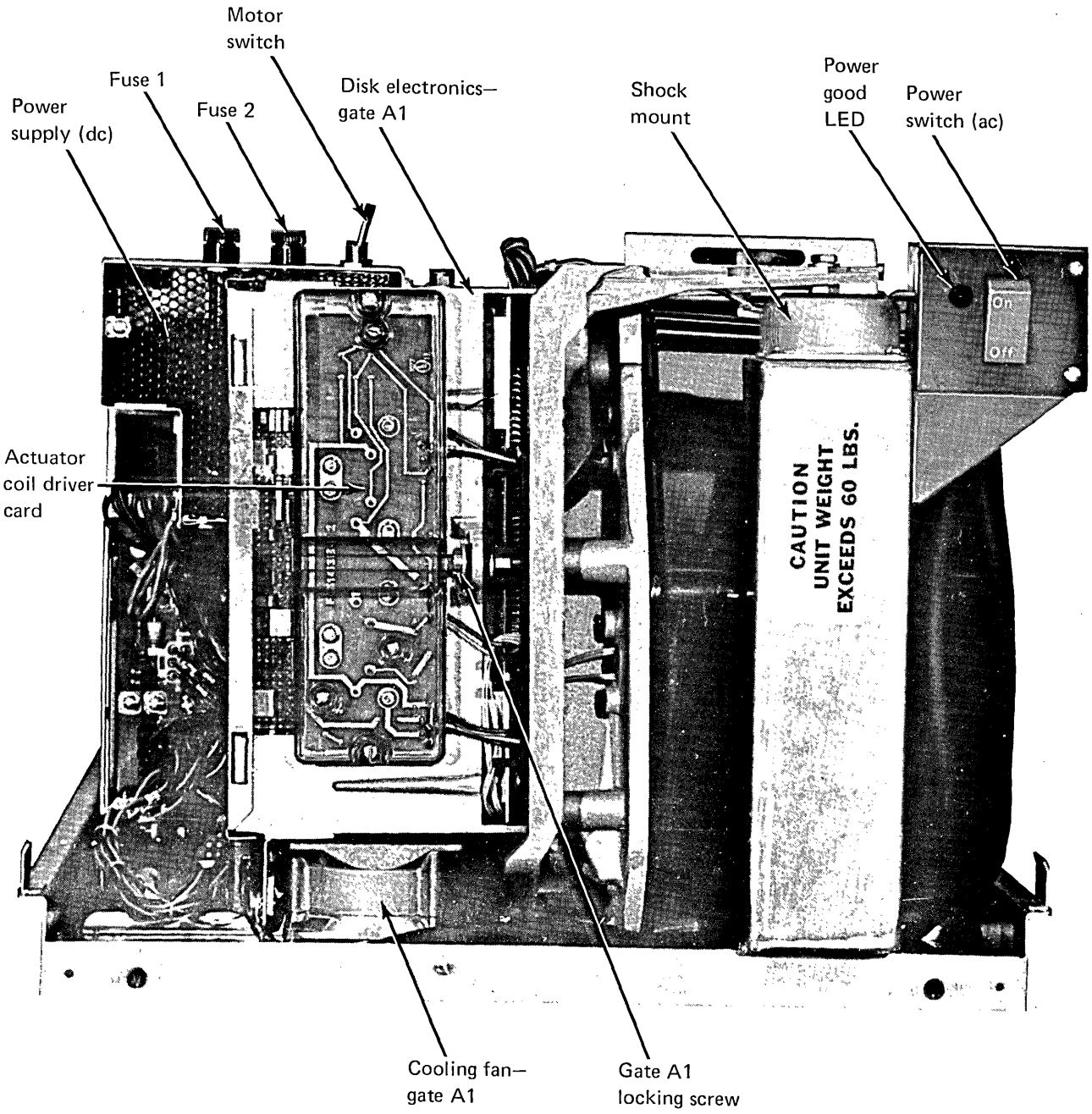
Chapter 2. Illustrations and Locations

This chapter contains the locations of the field replaceable units (FRUs), the jumpers on the logic cards, and the terminal blocks (TBs) and their terminal numbers.

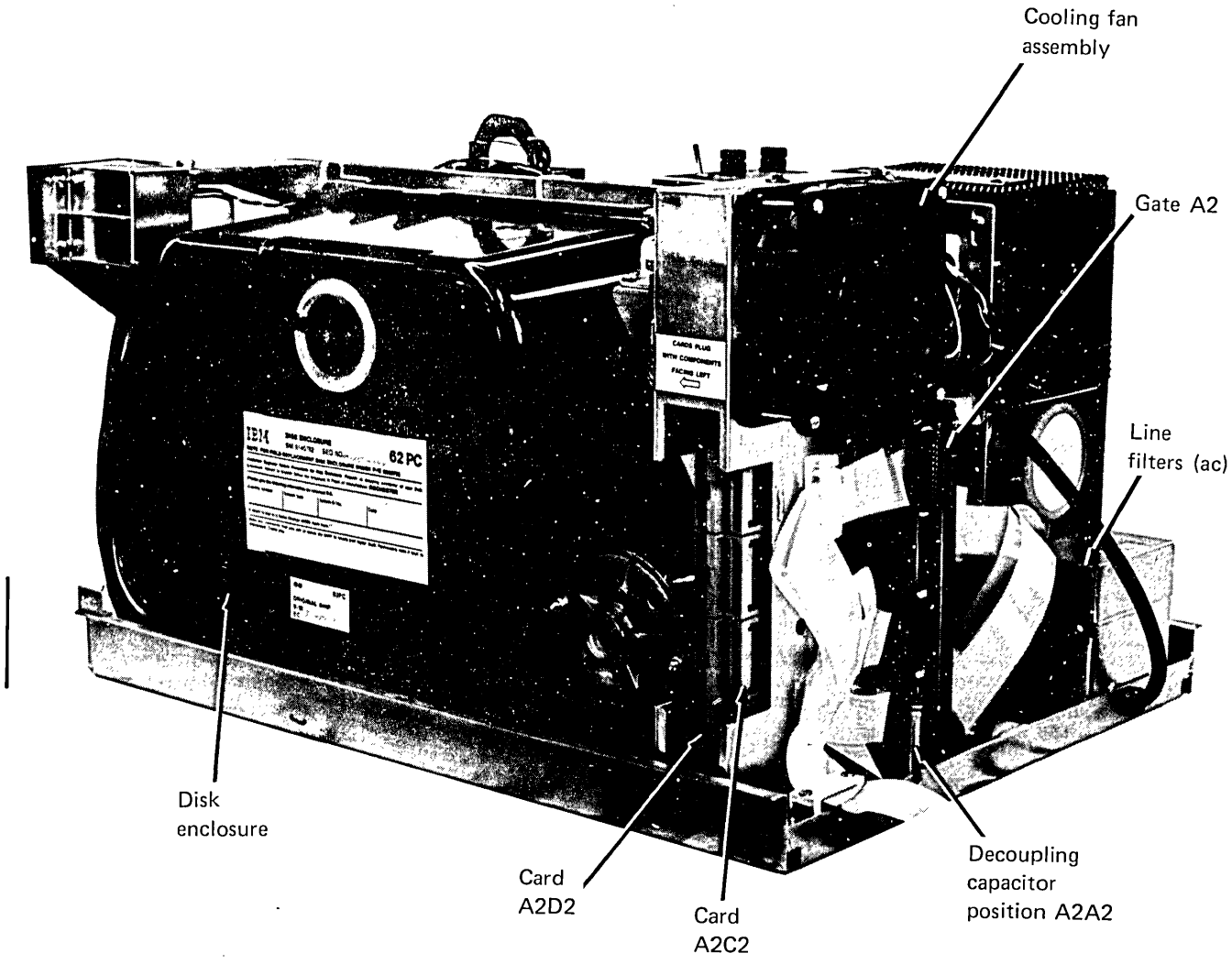
2.1 4963 Disk Subsystem



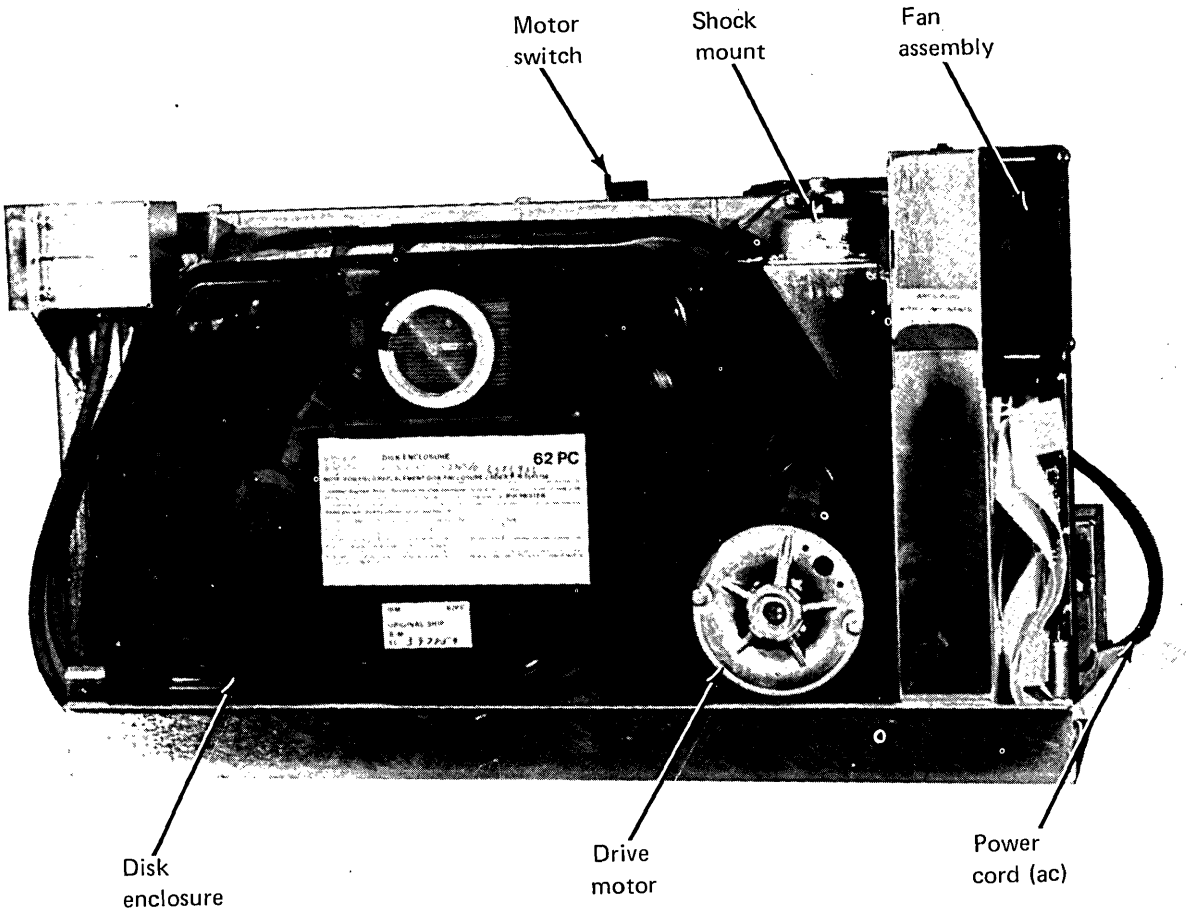
2.2 Disk Storage Unit—Front View



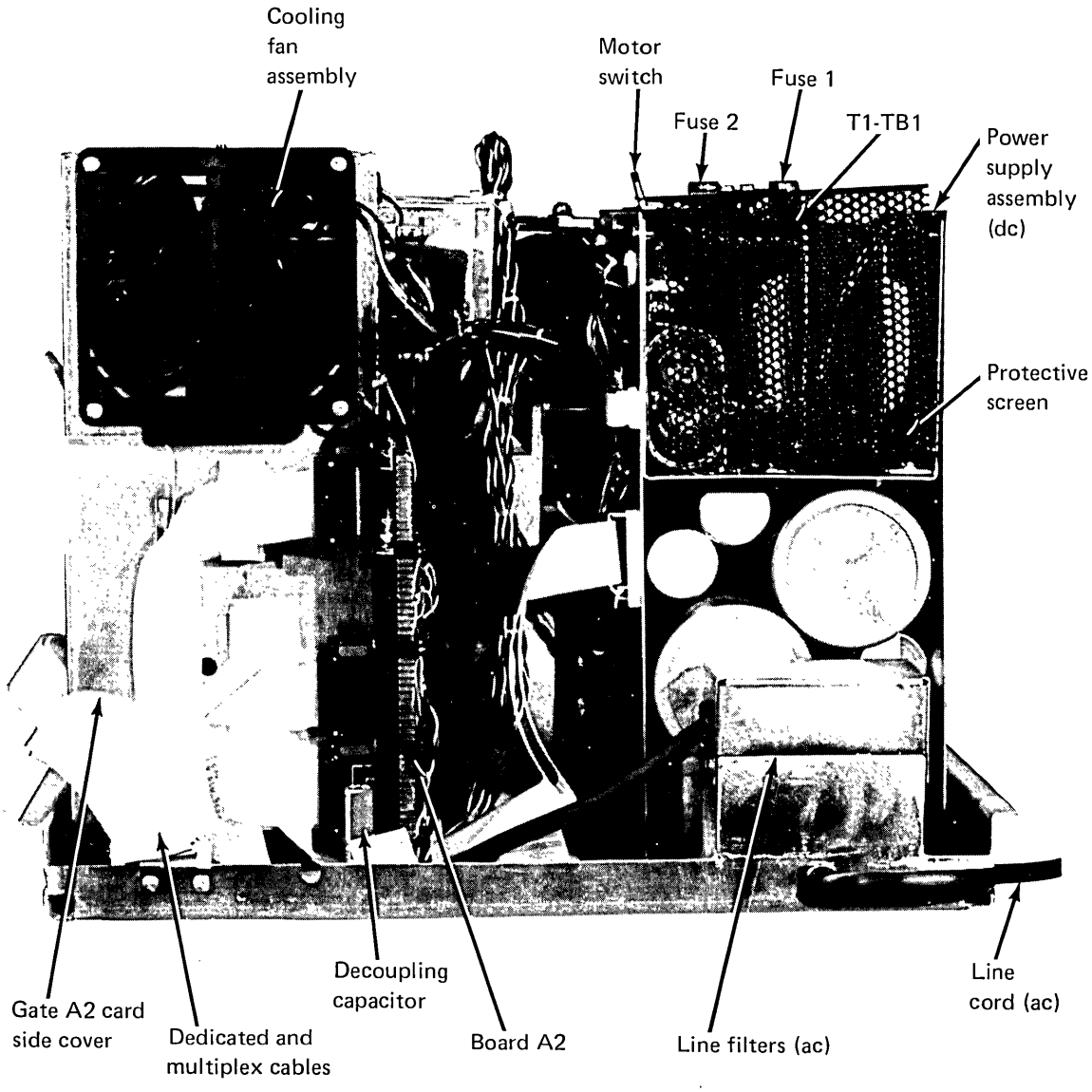
2.3 Disk Storage Unit—Right Side View (Primary Unit)



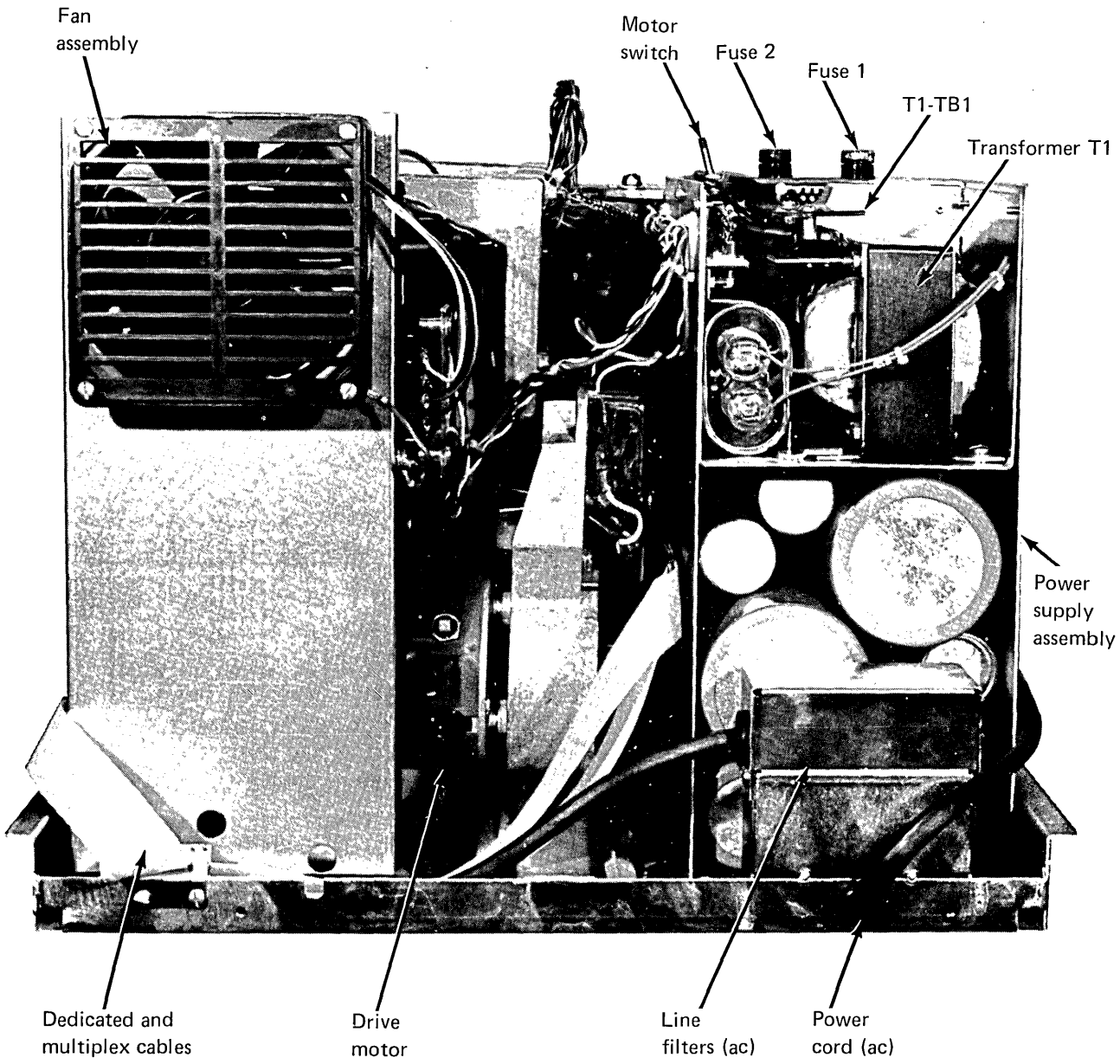
2.4 Disk Storage Unit—Right Side View (Expansion Unit)



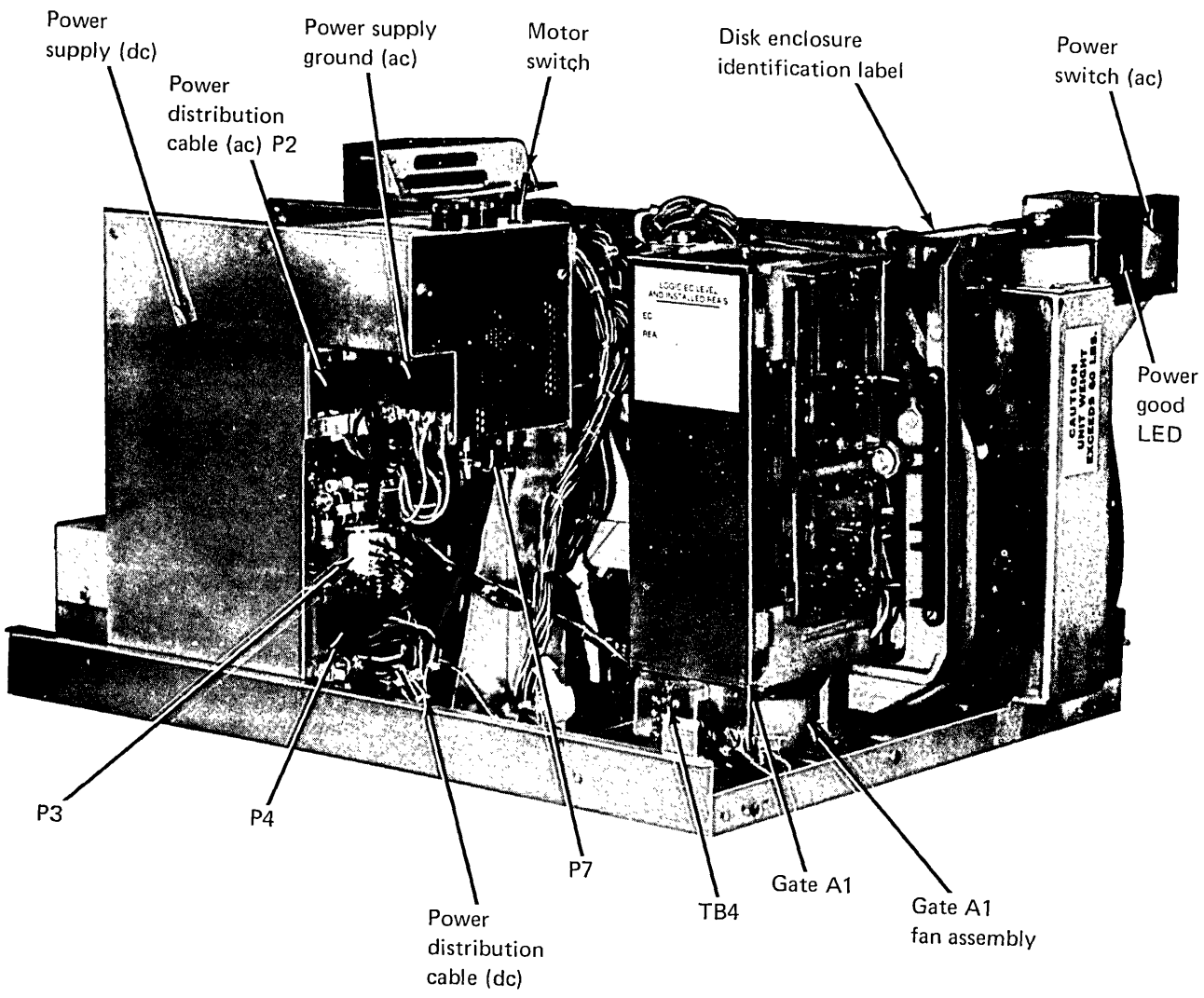
2.5 Disk Storage Unit—Rear View (Primary Unit)



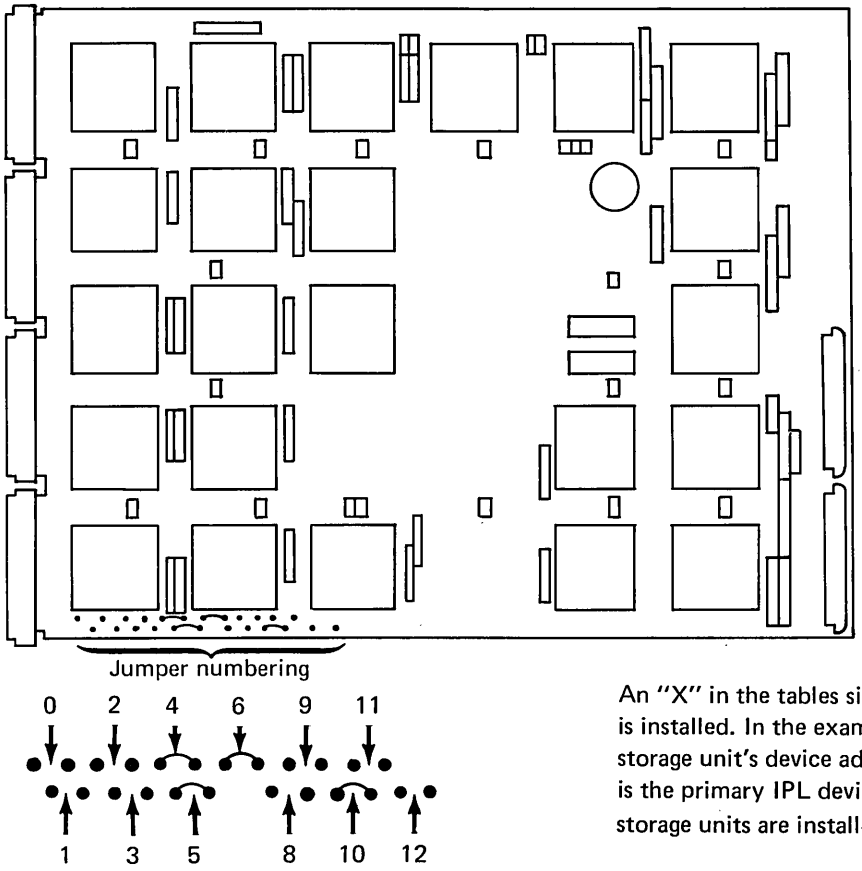
2.6 Disk Storage Unit—Rear View (Expansion Unit)



2.7 Disk Storage Unit—Left Side View



2.8 4963 Disk Subsystem Attachment Feature Card



An "X" in the tables signifies that a jumper is installed. In the example, the primary disk storage unit's device address is X'F0', unit 0 is the primary IPL device, and four disk storage units are installed.

IPL selection
Primary and/or secondary IPL devices

Jumper number	8	9	10
IPL not supported			
Unit 0 primary			X
Unit 1 primary	X		X
Unit 0 secondary	X	X	
Unit 1 secondary		X	
Unit 0 primary and unit 1 secondary		X	X
Unit 1 primary and unit 0 secondary	X	X	X

Device address selection (Note 1)

Jumper number	0	1	2	3	4	5	6	7
Logical address	1	1	1	1	0	0	0	0
Jumpers installed					X	X	X	X

(Note 2)

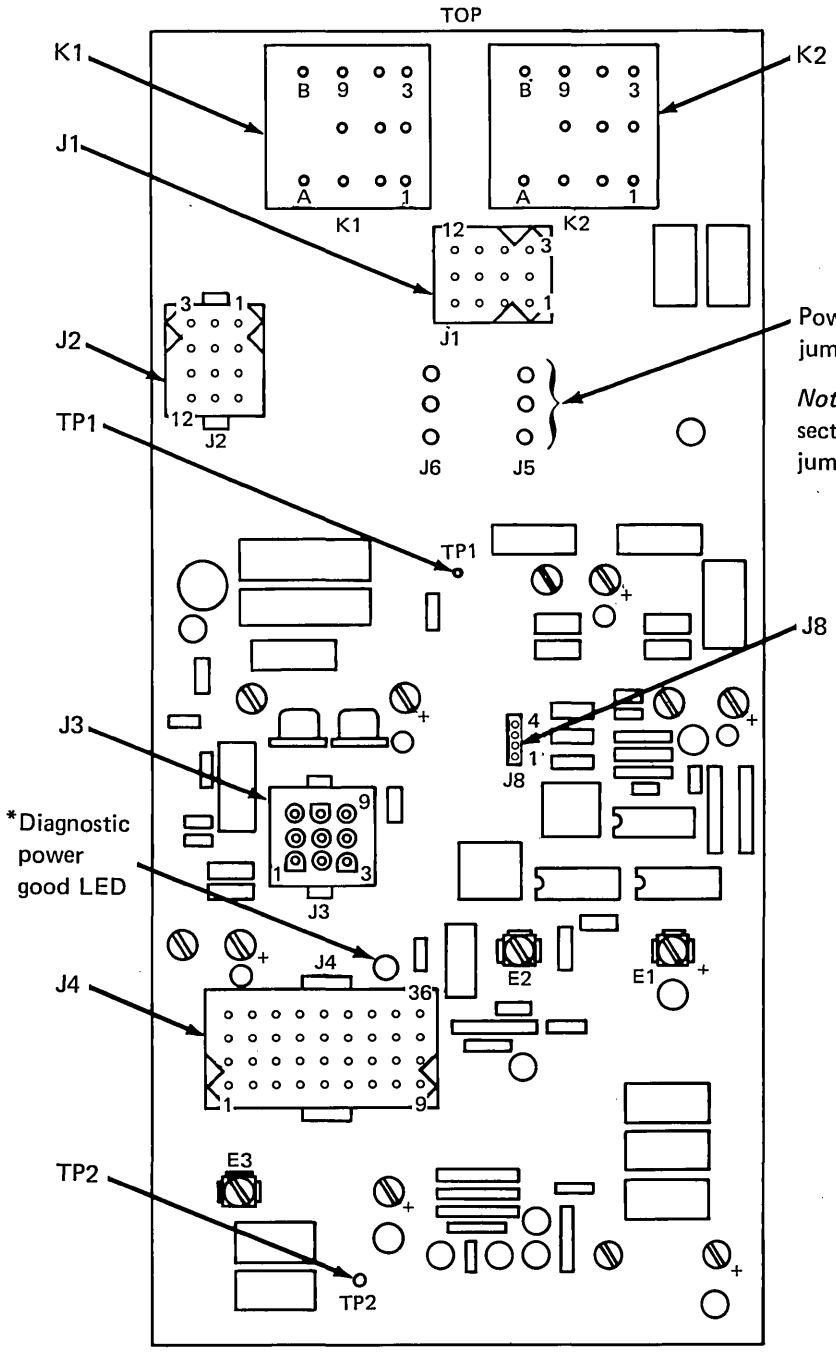
Number of disk storage units installed

Jumper number	11	12
1 unit installed	X	X
2 units installed		X
3 units installed	X	
4 units installed		

Notes:

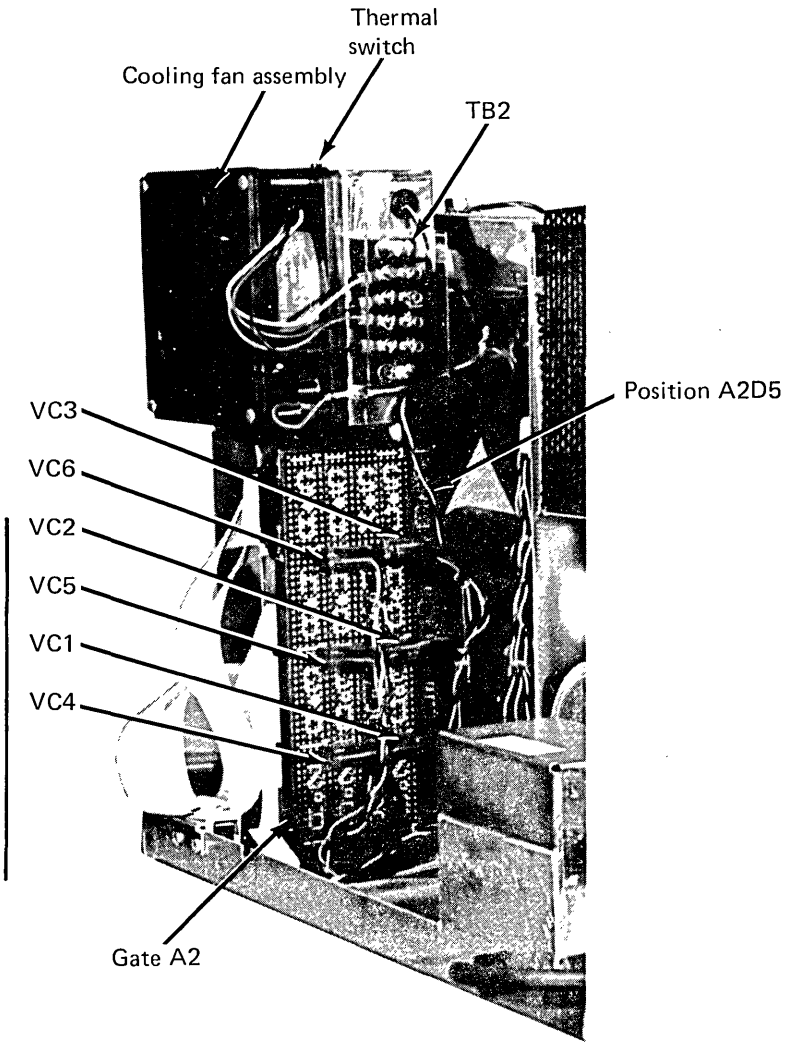
1. The base address is always divisible by 2. If more than two disk storage units are installed the base address must be divisible by 4.
2. Pins for jumper number 7 are not present on the card.

2.9 Power Supply Card

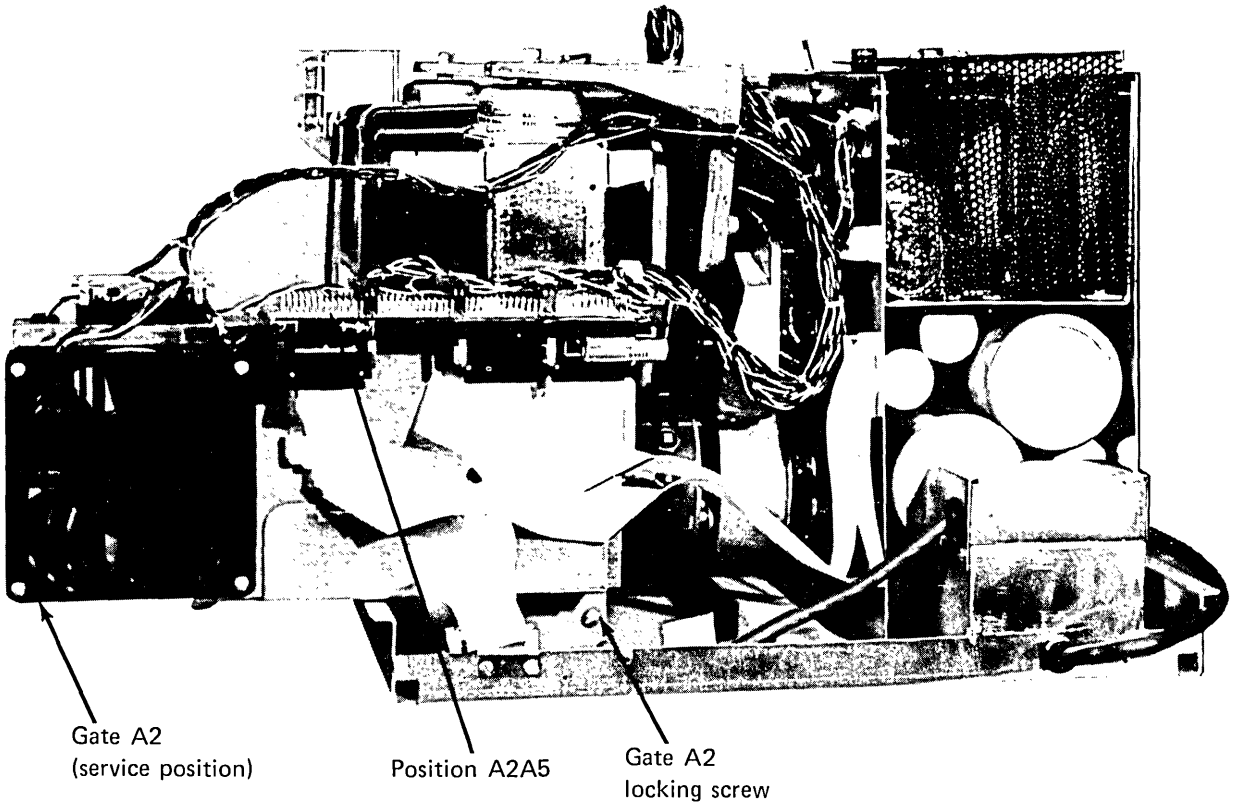


*Active only when the proper jumpers are installed, per the MAPs.

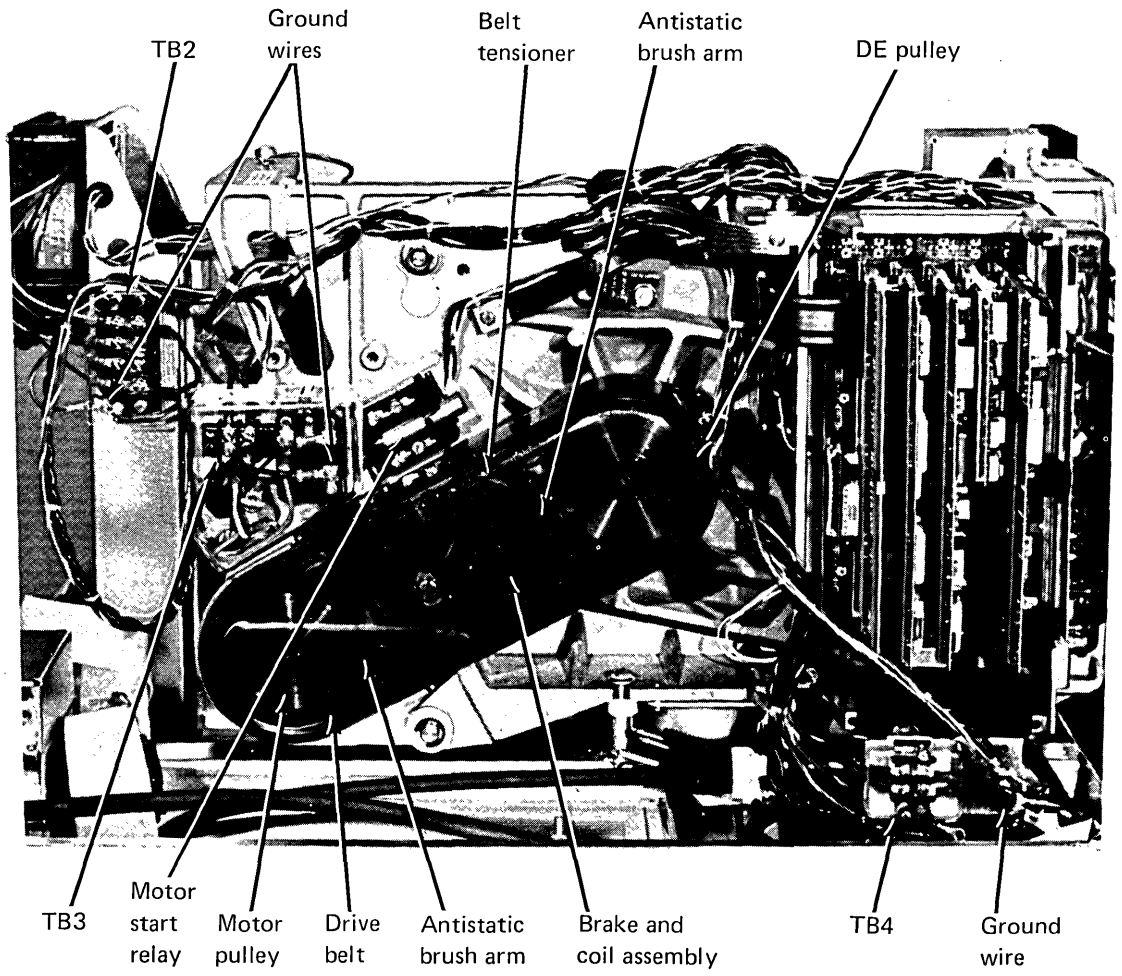
2.10 Disk Unit Controls—Gate A2



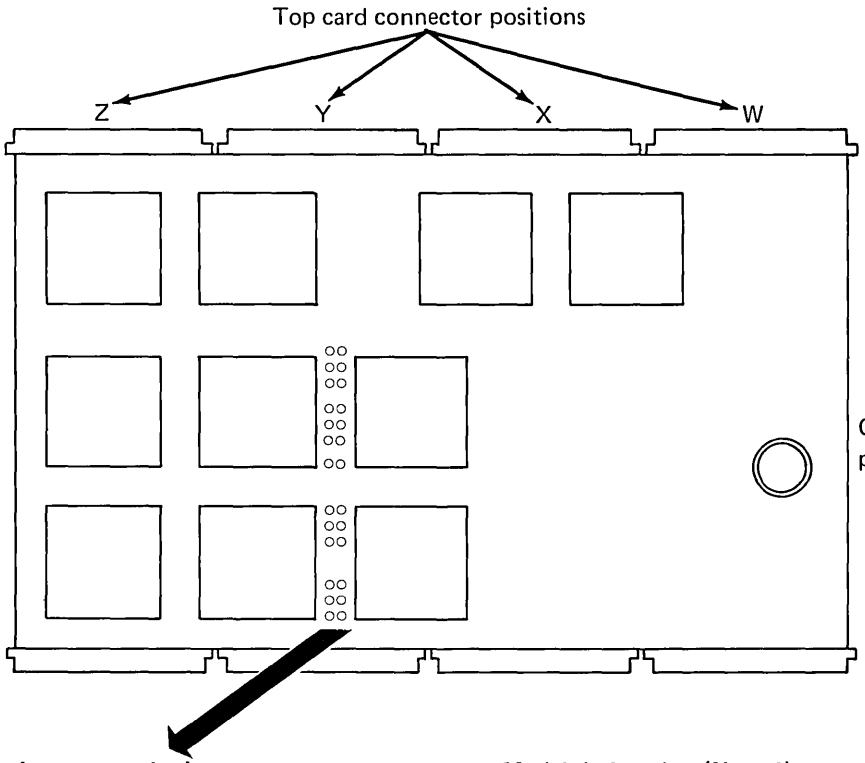
2.11 Disk Unit Controls, Gate A2—Service Position



2.12 4963 Disk Storage Unit—Drive Assembly



2.13 Disk Unit Controls—Channel Card



Jumper numbering

1, 2, 3	Disk unit 0
1, 2, 3	Disk unit 1
4	Always installed for the 4963
1, 2, 3	Disk unit 2
1, 2, 3	Disk unit 3

Model designation (Note 1)

Jumper number	1	2	3
Models 23A or 23B			X
Models 29A or 29B	X		X
Models 58A or 58B			
Models 64A or 64B	X		
Disk unit not installed		X	X

(Note 2)

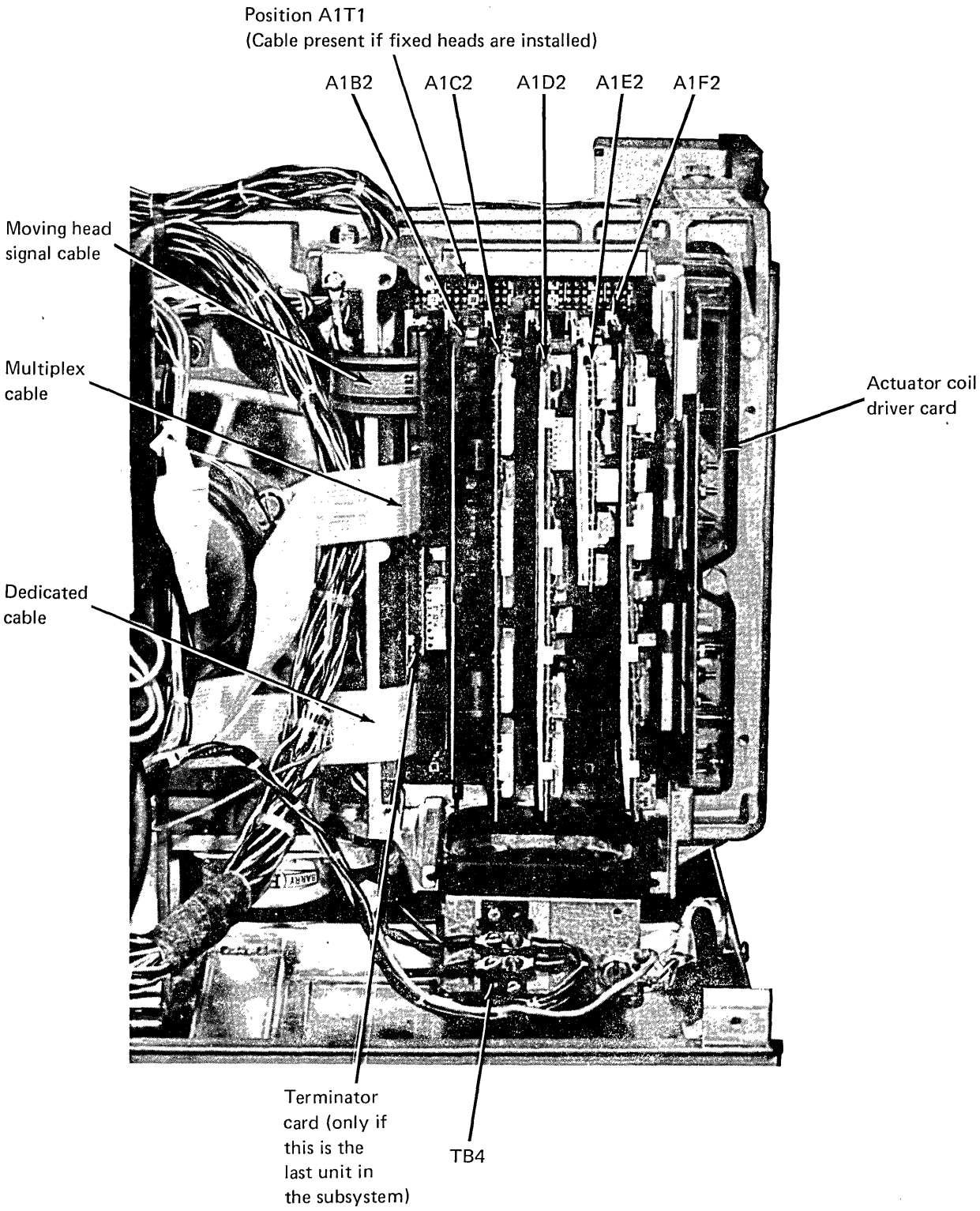
An "X" in the table signifies that a jumper is installed.

In the above example disk unit 0 is a model 64A, disk unit 1 is a model 58B, disk unit 2 is a model 29B, and disk unit 3 is not installed.

Notes:

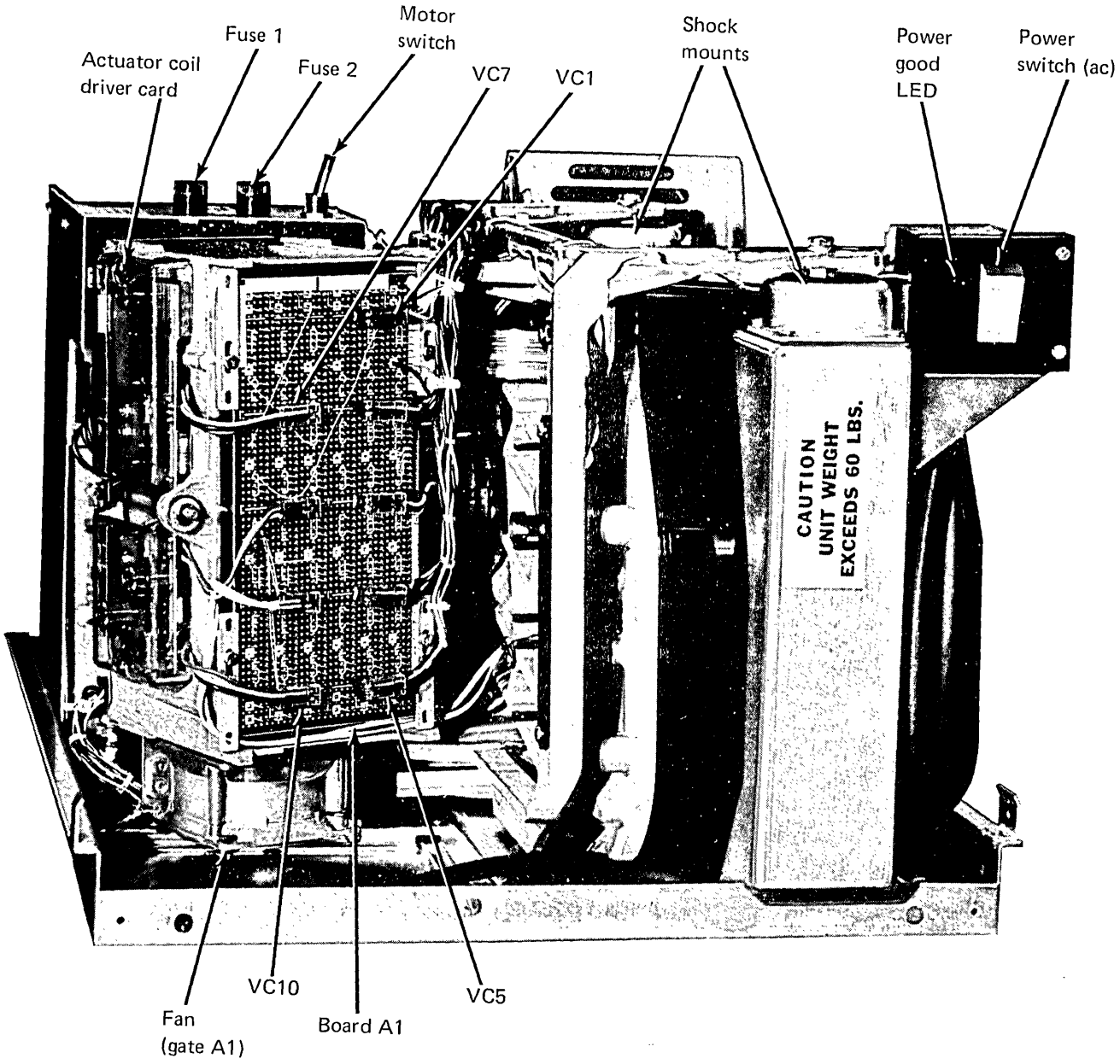
1. Jumpers 1, 2, and 3 have the same significance for all disk units.
2. If a disk unit is not installed it must be jumpered as shown.

2.14 Disk Electronics—Gate A1 (Card Side)

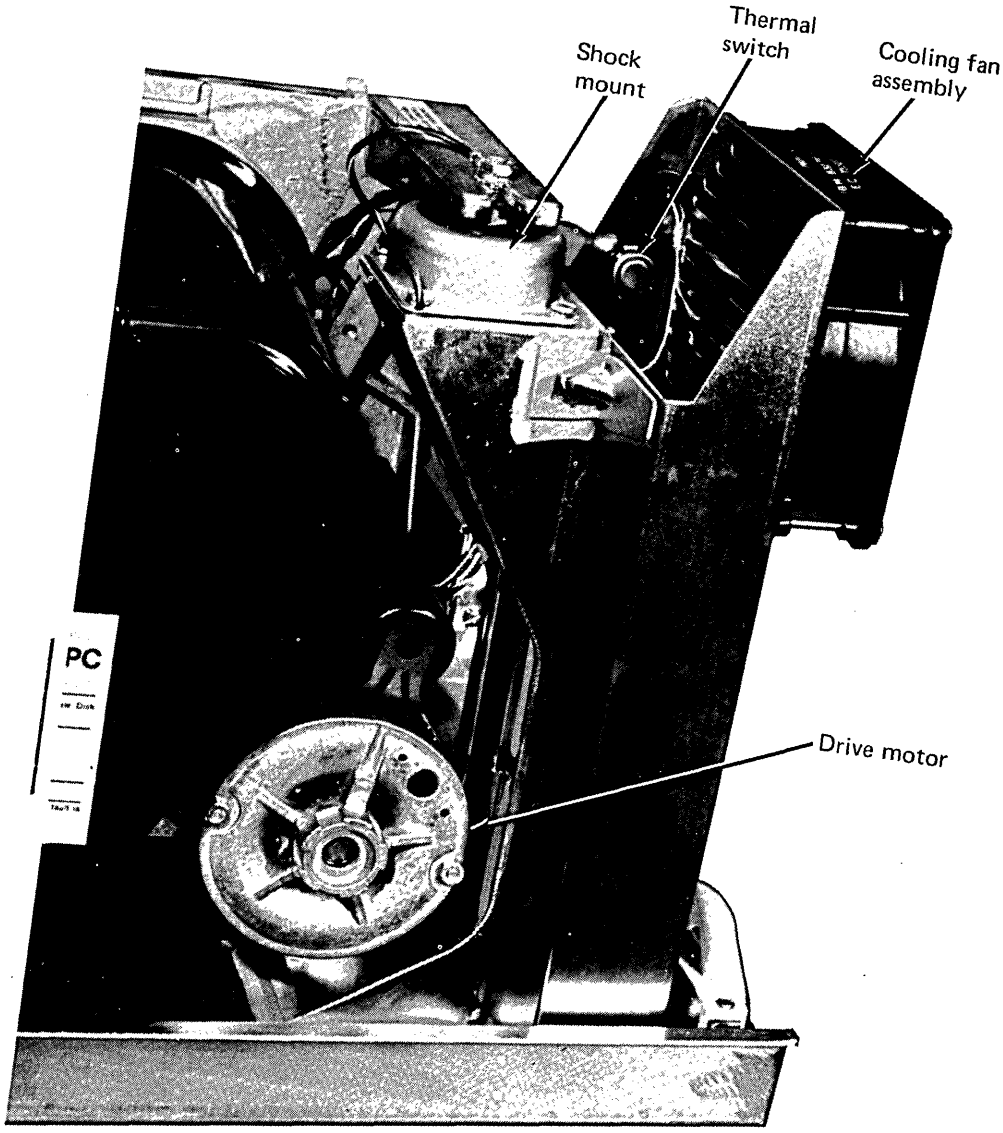


2.15 Disk Electronics—Gate A1

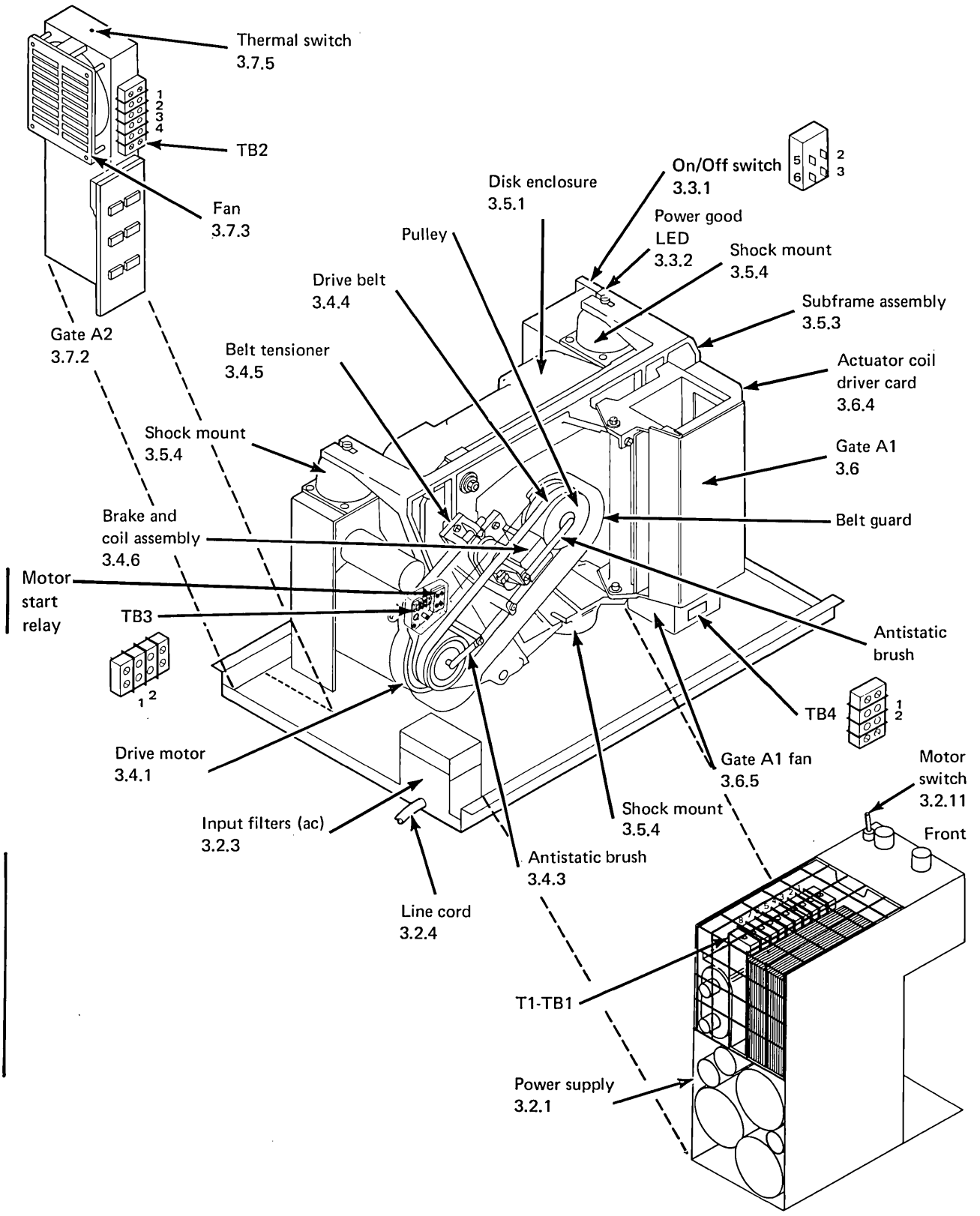
Pin Side



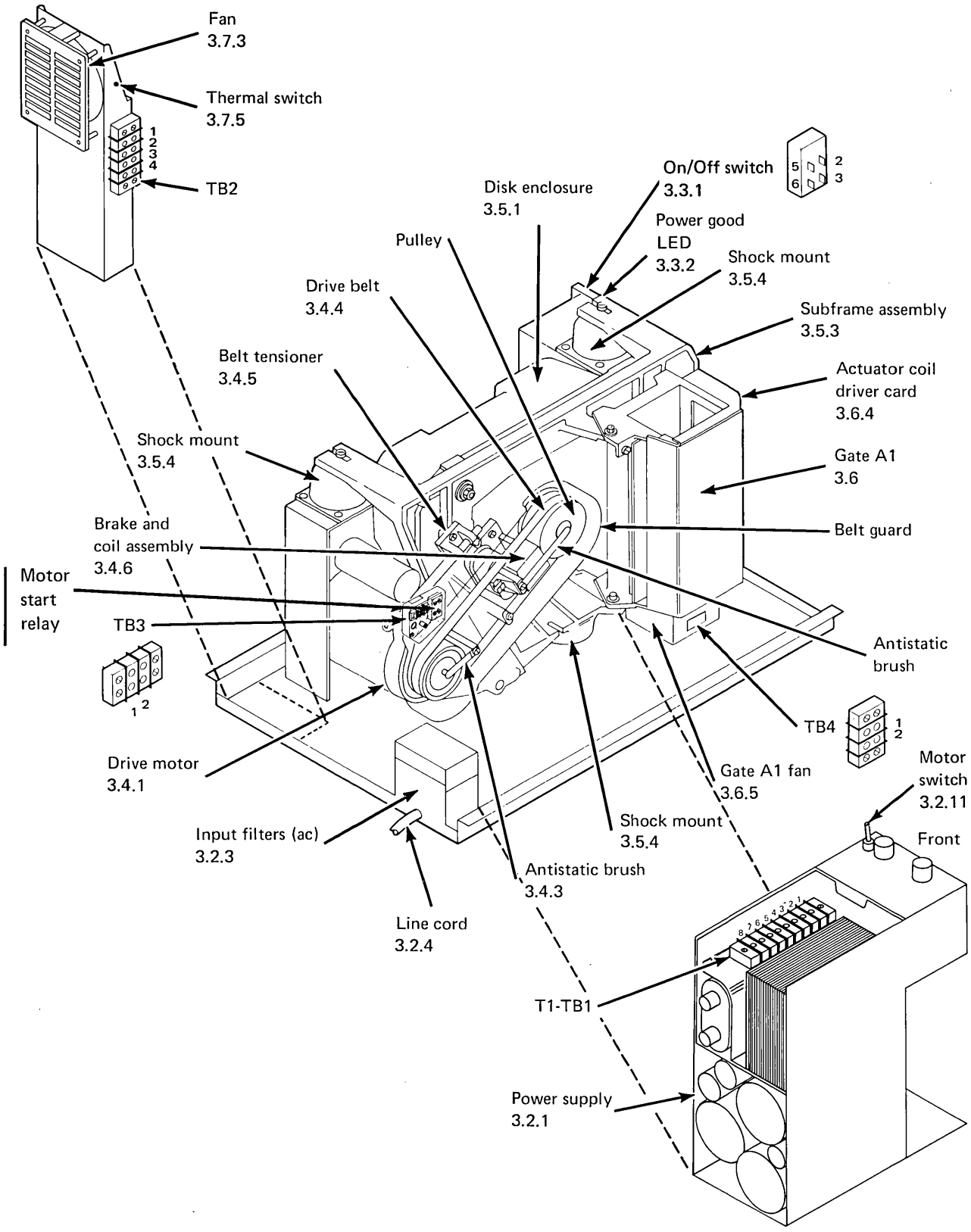
2.16 Drive Motor and Thermal Switch (Expansion Unit)



2.17 Component Locations and Reference Guide—Primary Unit



2.18 Component Locations and Reference Guide—Expansion Unit



Chapter 3. Adjustments, and Removal and Replacement Procedures

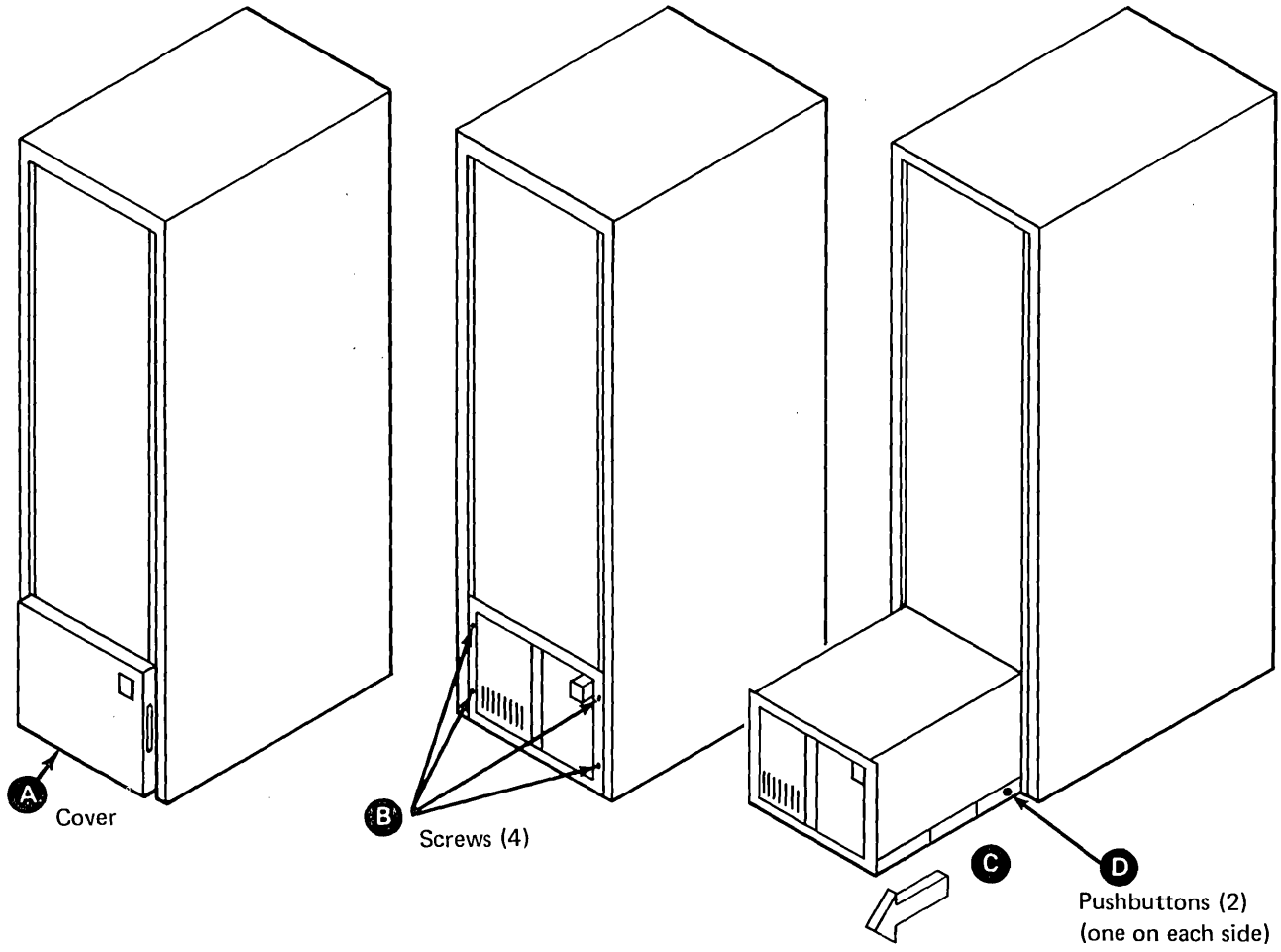
Introduction

The 4963 disk storage unit requires no scheduled maintenance. In the event of a failure, the maintenance aids are the maintenance analysis procedure (MAP) charts and the diagnostic programs. The diagnostic programs identify the cause of the failure. If the cause is located in the 4963 or in the attachment, the diagnostics identify the failing field replaceable unit (FRU).

3.1 Service Position; Cover, Unit, and Slide Removal and Replacement

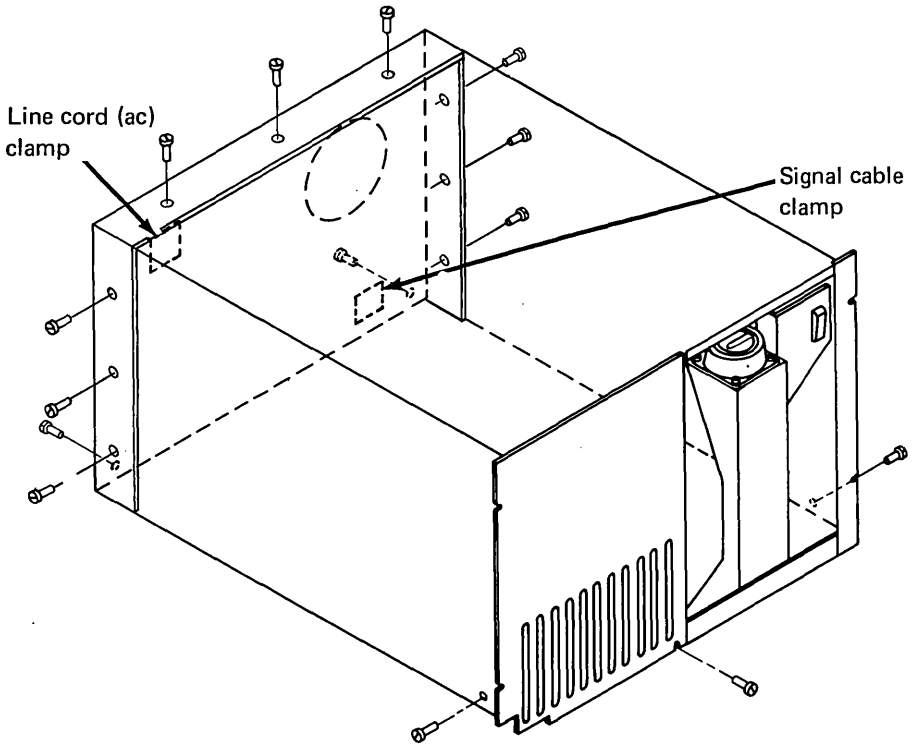
3.1.1 Service Position

1. Turn off the power.
2. Remove the front decorative cover by pulling it toward the front of the machine Ⓐ.
3. Remove the four screws Ⓑ.
4. Slide the unit forward to the fully extended position Ⓒ. Spring-loaded push buttons Ⓓ located on the slide rails lock the unit at this position.
5. To return the unit to the normal operating position, press in on the two spring-loaded push buttons Ⓓ on the slide rails and slide the unit into the rack.



3.1.2 Cover Removal and Replacement

1. Turn off the power and place the unit in the service position (see 3.1.1).
2. Remove the 14 screws.
3. Unfasten the ac line cord and the signal cables from the clamps on the rear of the cover.
4. Remove the two-piece cover.
5. Replace the cover by reversing the removal procedure.



3.1.3 Unit Removal and Replacement

3.1.3.1 Removal

1. Turn off the power and place the unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Unplug the unit's external signal and power cables and tape them to the top of the unit.

DANGER
Do not remove the screws Ⓐ and washers. If the screws are removed, the weight of the disk storage unit may spread the slides apart and allow the unit to slip through and fall.

4. Loosen but do not remove the two screws Ⓐ.

Note: The following step requires two people.

DANGER
The 4963 disk storage primary unit weighs approximately 57 kg (126) lb); do not attempt to lift it alone.

5. Lift the front of the unit until the screws clear the tabs; then lift the unit forward and up. The unit *must* be moved forward to disengage the tabs located at the rear of the slides from the slots in the base assembly.

3.1.3.2 Replacement

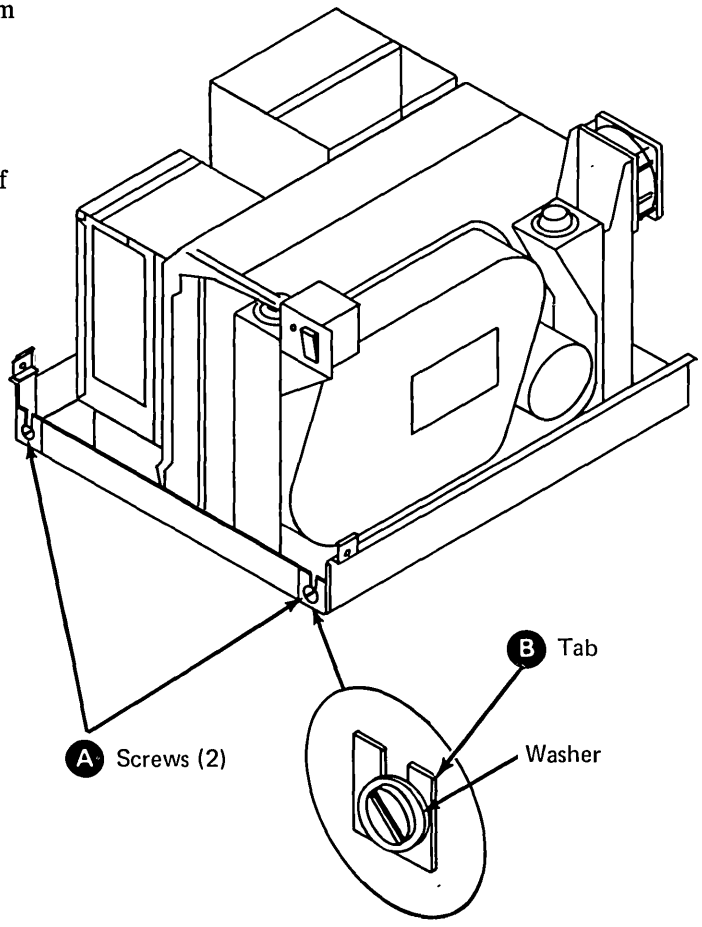
1. When replacing the unit, ensure that the screws Ⓐ have been started into the front of the base assembly.

DANGER
If the screws are not started into the base assembly, the weight of the unit may spread the slides far enough to allow the disk storage unit to slip through and fall.

DANGER
The 4963 disk storage Primary unit weighs approximately 57 kg 126 lb); do not attempt to lift it alone.

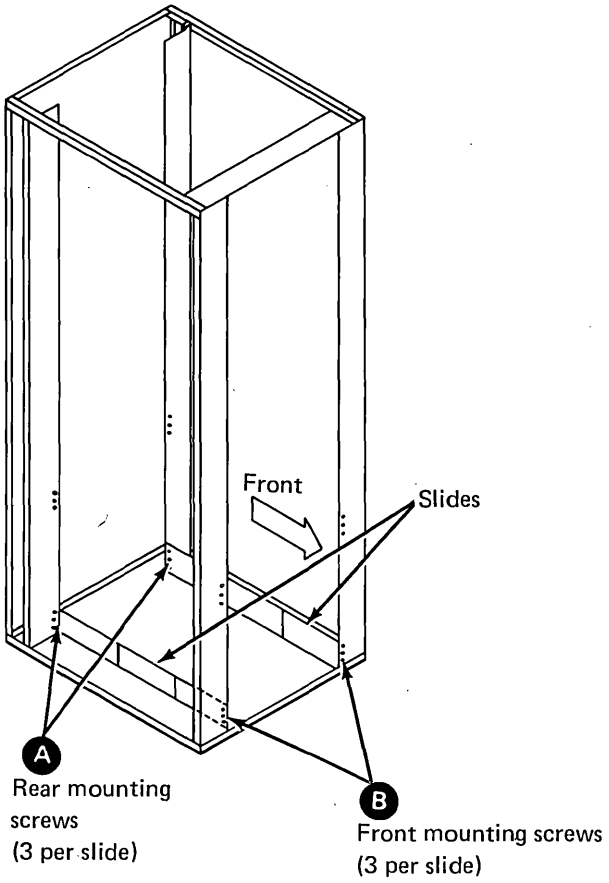
Note: The following step requires two people.

2. Lift the unit onto the slides. As the unit is being lowered, engage the tabs located on the rear of the slides with the slots in the rear of the base assembly. Lower the front of the unit and engage the front screws with the tabs Ⓑ on the front of the slides.
3. Tighten the screws Ⓐ.
4. Plug in the unit's external signal and power cables.
5. Replace the cover (see 3.1.2).
6. Turn on the power.



3.1.4 Slide Removal and Replacement

1. Remove the disk storage unit (see 3.1.3).
2. Remove the three screws Ⓑ that attach the slide support to the front cabinet frame.
3. Remove the three screws Ⓐ that attach the slide support to the rear cabinet frame.
4. Remove the slide.
5. Replace the slide by reversing the removal procedure.



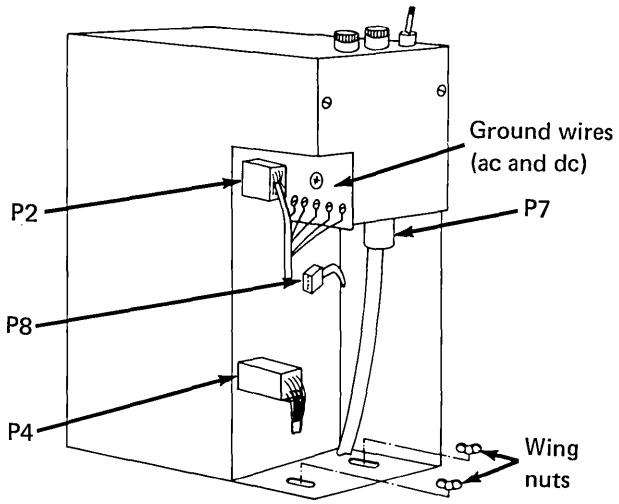
3.2 Power Supply

3.2.1 Removal and Replacement

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Unplug the unit's ac line cord from the power source.
3. Remove the cover (see 3.1.2).
4. Remove the ac distribution cable ground wires from the power supply.
5. Unplug the following:
   a. P2 from J2
   b. P4 from J4
   c. P7 from J7
   d. P8 from J8
6. Unscrew the two wing nuts that secure the power supply to the base.
7. Unfasten the signal and power cables from the clamps located on the side of the power supply.
8. Raise the front of the power supply, slide it forward, and lift it out of the unit.
9. Replace the power supply by reversing the removal procedure.

CAUTION: If the ac input voltage is other than that which is marked on the power supply, T1-TB1 wiring and/or the ac input voltage jumpers (J5 and J6) on the power supply card must be changed. Refer to the power supply section of the maintenance logic diagrams (MLDs), as necessary, and to section 2.8 "Power Supply Card", in Chapter 2.

10. Before applying power, ensure that the power supply is wired for the appropriate ac input voltage.



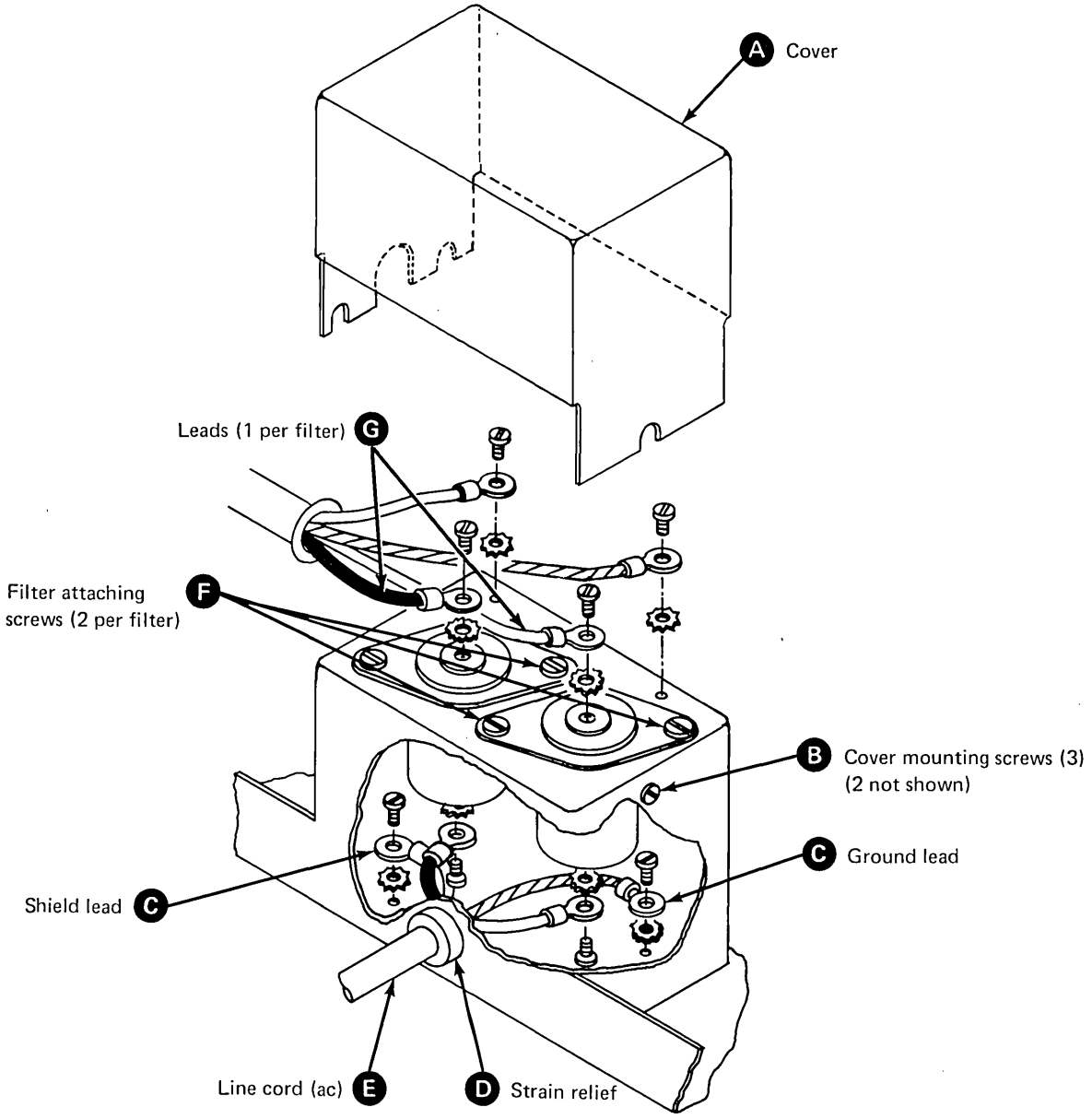
3.2.2 Fuse Removal

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Remove the fuses located on top of the power supply for checking or for replacement.

3.2.3 AC Power Input Filter Removal and Replacement

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Unplug the unit's ac line cord from the power source (E).
4. Loosen the three cover mounting screws (B) and remove the cover (A).
5. Remove the lead (G) that is connected to the top of the filter.
6. Remove the two filter attaching screws (F).
7. Lift up the filter and remove the lead attached to the bottom of the filter.
8. Replace the filter by reversing the removal procedure.

CAUTION: Be certain to attach the same color wire to the corresponding terminals from which the wire was removed (white to white, black to black). Replace all safety covers prior to turning the power on.



3.2.4 Line Cord Removal and Replacement

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Unplug the unit's ac line cord from the power source.
4. Remove the ac power input filters (see 3.2.3).
5. Disconnect the ground and shield wires located in the bottom of the filter enclosure.
6. Remove the line cord strain relief and remove the ac line cord.
7. Replace the ac line cord by reversing the removal procedure.

CAUTION: Be certain to attach the same color wires to the corresponding terminals from which the wires were removed (white to white, black to black). Replace all safety covers prior to turning the power on.

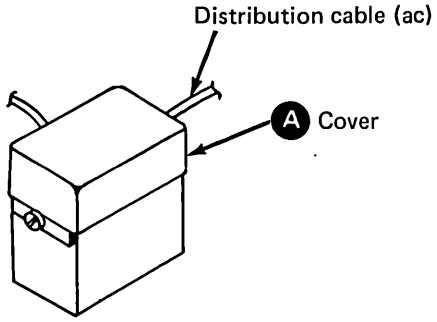
3.2.5 AC Distribution Cable, Input Filter to Power On/Off Switch, Removal and Replacement

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Unplug the unit's ac line cord from the power source.
4. Remove the cover Ⓐ from the ac power input filter assembly.
5. Label and disconnect the wires connected to the tops of the filters.
6. Disconnect the ground and shield wires Ⓒ on the top of the filter assembly.
7. Remove the rubber grommet Ⓑ from the cable.
8. Unfasten the cable from the cable routing clamps.
9. Remove the cable strain relief Ⓙ located at the On/Off switch assembly.
10. Remove the two screws that attach the On/Off switch front cover plate Ⓖ to the front of the On/Off switch mounting bracket. Allow the cover plate to hang down.
11. Remove the two screws Ⓕ that attach the On/Off switch.
12. Pull the switch forward and label and disconnect the wires connected to terminals 2 and 5 Ⓚ.
13. Remove the two screws that secure the switch cover Ⓔ.
14. Pull the switch cover back and remove the wire Ⓛ attached to the switch bracket.
15. Remove the cable Ⓗ.
16. Replace the cable by reversing the removal procedure.

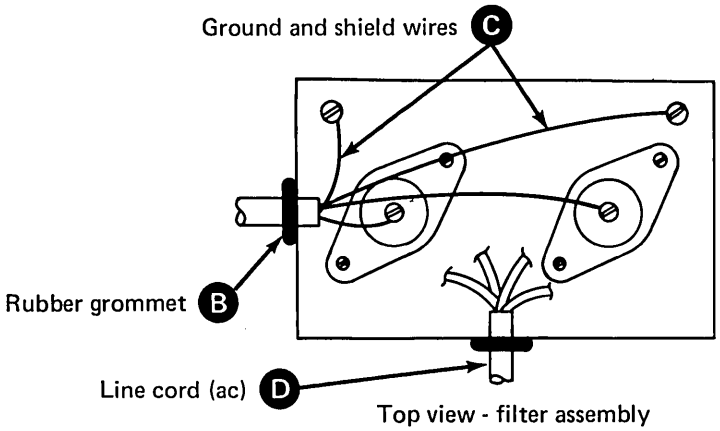
CAUTION: Be certain to attach the same color wires to the corresponding terminals from which the wires were removed (white to white, black to black). Replace all safety covers prior to turning the power on.

17. If the wires going to the LED become disconnected, attach the black wire to the shorter pin of the LED.

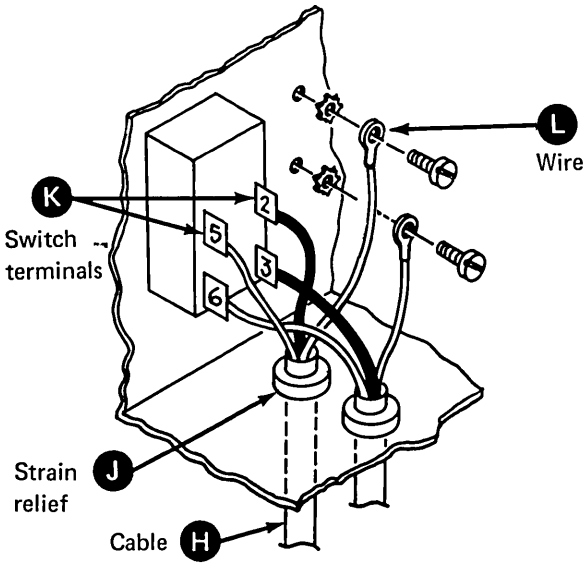
    Note: When installing the On/Off switch front cover plate, ensure that the wires going to the LED fit in the notch in the cover plate.

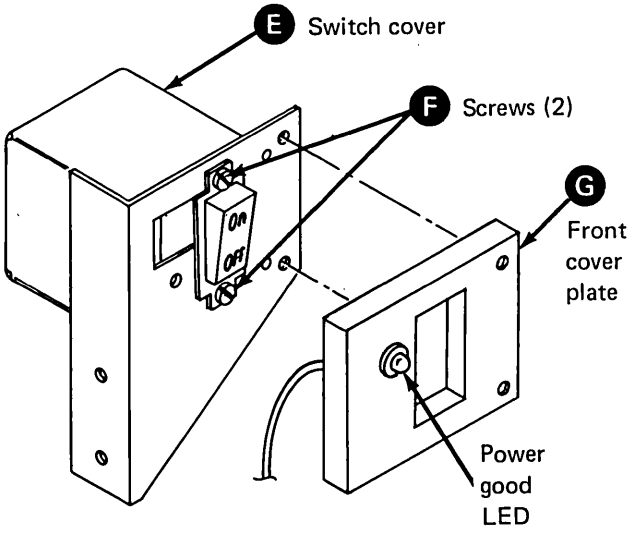


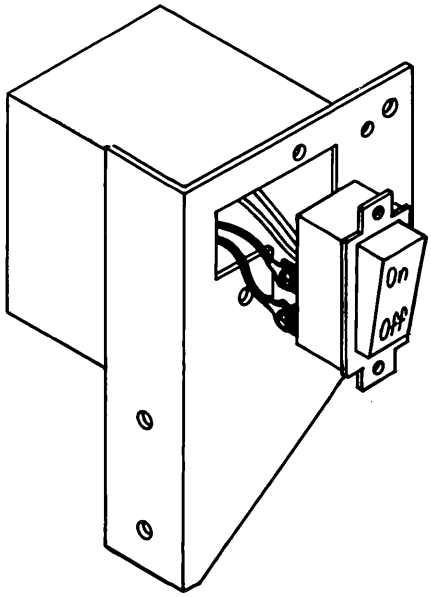
Filter assembly



Top view - filter assembly







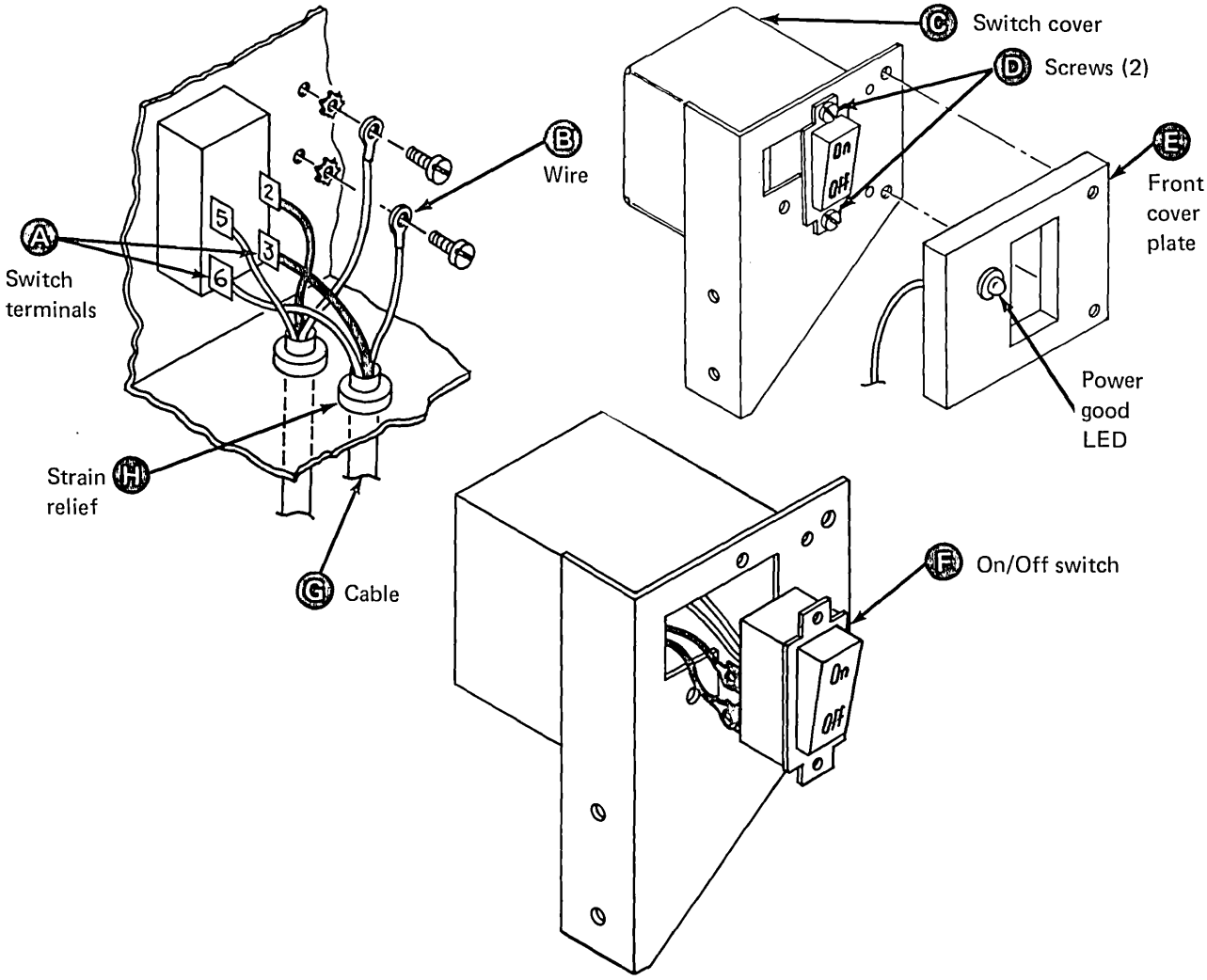
3.2.6 AC Distribution Cable, On/Off Switch to Power Supply Removal and Replacement

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Unplug the unit's ac line cord from the power source.
4. Unplug the ac input cable (P7) from the power supply.
5. Unfasten the cable from the cable routing clamps.
6. Remove the cable strain relief Ⓗ located at the On/Off switch assembly.
7. Remove the two screws that attach the On/Off switch front cover plate and LED Ⓔ to the front of the On/Off switch assembly. Allow the cover plate to hang down.

   Note: If the wires going to the LED become disconnected, attach the black wire to the shorter pin of the LED.
8. Remove the two screws Ⓓ that attach the On/Off switch.
9. Pull the switch Ⓕ forward and remove the wires attached to terminals 3 and 6 Ⓐ. Note the color of the wires.
10. Remove the two screws that attach the switch cover Ⓒ.
11. Pull the switch cover back and remove the wire Ⓑ connected to the switch bracket.
12. Remove the cable Ⓖ.
13. Replace the cable by reversing the removal procedure.

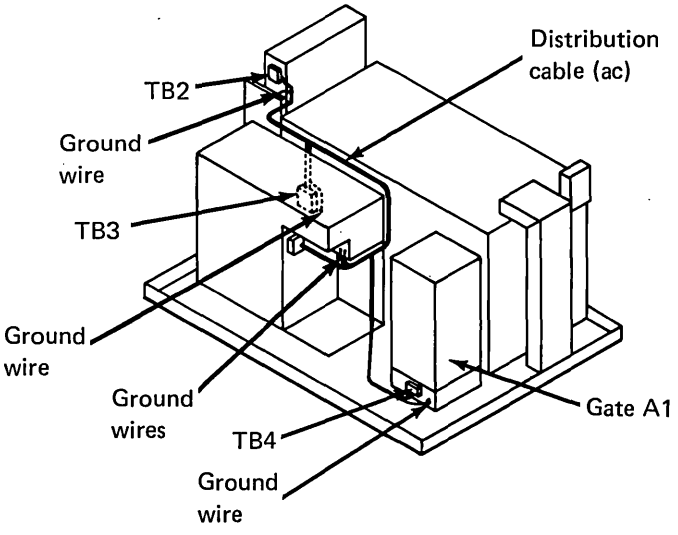
Note: When installing the On/Off switch front cover plate, ensure that the wires going to the LED fit into the notch in the cover plate.

CAUTION: Be certain to attach the same color wires to the corresponding terminals from which the wires were removed (white to white, black to black). Replace all the safety covers prior to turning the power on.


A
Switch terminals
B
Wire
C
Switch cover
D
Screws (2)
E
Front cover plate
Power good LED
F
On/Off switch
G
Cable
H
Strain relief
2
5
3
6
On
Off

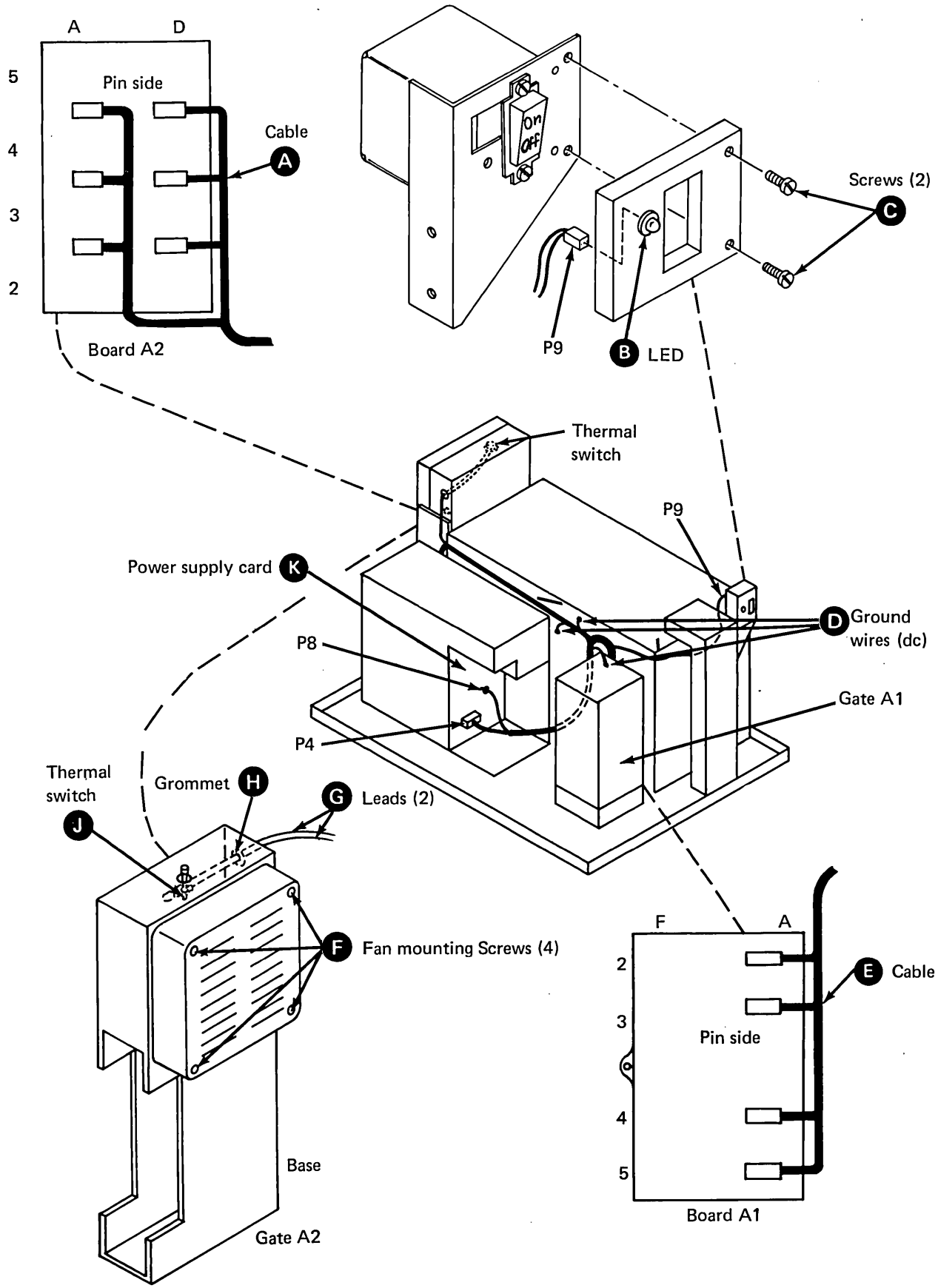
3.2.7 AC Distribution Cable (to motor and fans) Removal and Replacement

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Unplug the unit's ac line cord form the power source.
4. Remove the power supply (see 3.2.1).
5. Remove the plastic cover from TB4; label and remove the wires coming from the ac distribution cable.
6. Remove the ground wire attached to the gate A1 fan bracket.
7. Remove the plastic cover from TB3; remove the wires coming from the ac distribution cable.
8. Remove the ground wire attached to the motor casting.
9. Remove the plastic cover from TB2; remove the wires coming from the ac distribution cable.
10. Remove the ground wire connected to the rear cooling fan assembly bracket; remove the cable.
11. Replace the cable by reversing the removal procedure.



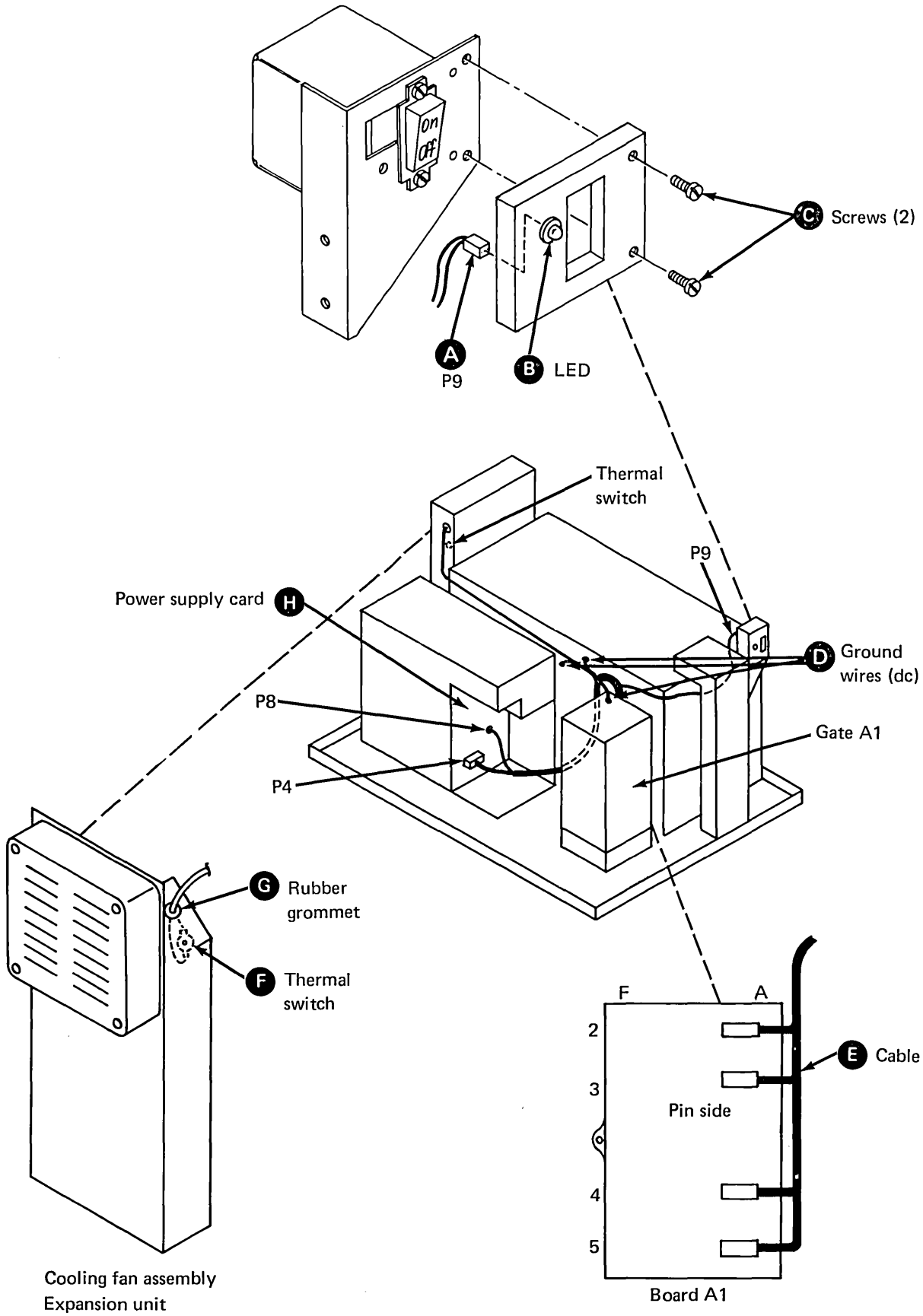
3.2.8 DC Distribution Cable (Primary Unit) Removal and Replacement

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Unplug the unit's ac line cord from the power source.
4. Unplug the dc distribution cable connector (P4) and the LED cable connector (P8) from the power supply card ⓚ.
5. Remove the cooling fan on gate A2 by removing the four screws ⓕ that attach the fan to the gate assembly. Do not remove the fan wiring.
6. Unplug the two leads ⓖ that are connected to the thermal switch ⓙ on gate A2 and feed them through the rubber grommet ⓗ located on the gate assembly.
7. Label the connectors and wires that are part of the dc distribution cable that attach to gate A2; unplug the cable ⓐ.
8. Open gate A1; label and remove the voltage connectors and wires that are part of the dc distribution cable ⓔ.
9. Remove the ground wires ⓓ coming from the dc distribution cable.
10. Remove the two screws ⓒ that attach the On/Off switch front cover plate and LED to the On/Off switch assembly.
11. Remove the front cover plate and unplug the connector (P9) from the LED ⓑ.
12. Unfasten the cable clamps and ties that hold the cable; remove the cable.
13. Replace the cable by reversing the removal procedure. Ensure that the wires going to the front LED fit in the notch in the On/Off switch front cover plate.


A
D
5
4
3
2
Pin side
Cable
A
Board A2
On
Off
Screws (2)
C
P9
B
LED
Thermal switch
P9
Power supply card
K
D
Ground wires (dc)
P8
Gate A1
P4
Thermal switch
J
Grommet
H
G
Leads (2)
F
Fan mounting Screws (4)
Base
Gate A2
F
A
2
3
4
5
Pin side
E
Cable
Board A1

3.2.9 DC Distribution Cable (Expansion Unit) Removal and Replacement

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Unplug the unit's ac line cord from the power source.
4. Unplug the dc distribution cable connector (P4) and the LED cable connector (P8) from the power supply card Ⓗ.
5. Unplug the leads that are connected to the thermal switch Ⓕ located on the rear cooling fan mounting bracket and feed them through the rubber grommet Ⓖ.
6. Open gate A1; remove the connectors VC1, VC2, VC4, and VC5 and the wires that are part of the dc distribution cable Ⓔ.
7. Remove the ground wires Ⓓ coming from the dc distribution cable.
8. Remove the two screws Ⓒ that attach the On/Off switch front cover plate and LED to the On/Off switch assembly.
9. Remove the front cover plate and unplug the connector (P9) Ⓐ from the LED Ⓑ.
10. Unfasten the cable clamps and ties that hold the cable; remove the cable.
11. Replace the cable by reversing the removal procedure. Ensure that the wires going to the front LED fit in the notch in the On/Off switch front cover plate.


On
Off
C Screws (2)
A
P9
B LED
Thermal switch
P9
Power supply card H
D Ground wires (dc)
P8
Gate A1
P4
G Rubber grommet
F Thermal switch
F
A
2
3
Pin side
4
5
E Cable
Board A1
Cooling fan assembly
Expansion unit

3.2.10 Relay Removal and Replacement

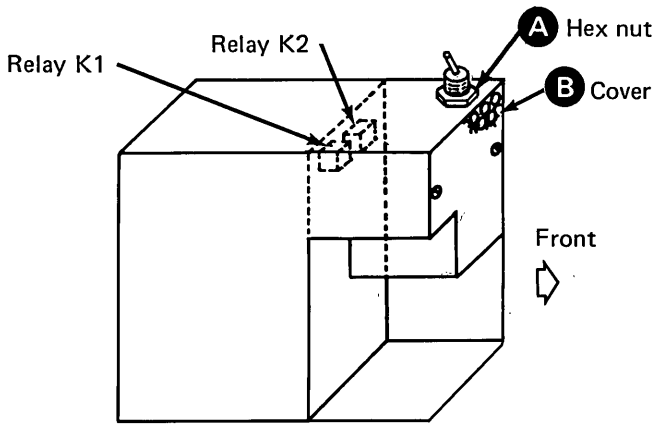
1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Disconnect the unit's ac line cord from the power source.
4. Remove the perforated metal cover Ⓑ located on the front of the power supply.

DANGER
The fuse hoders and their terminals located near the relays may have sharp edges.

5. Unplug the relay (K1 or K2) by first rocking it up and down, then pulling it toward the front of the power supply.
6. Replace the relay by reversing the removal procedure.

3.2.11 Motor Switch Removal and Replacement

1. Turn off the power and place the disk storage unit in the receive position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Unplug the unit's ac line cord from the power source.
4. Remove the perforated metal cover Ⓑ located on the front of the power supply.
5. Remove the slip-on connectors from the bottom of the motor switch.
6. Remove the hex nut Ⓐ; remove the switch.
7. Replace the switch by reversing the removal procedure.



3.3 Console

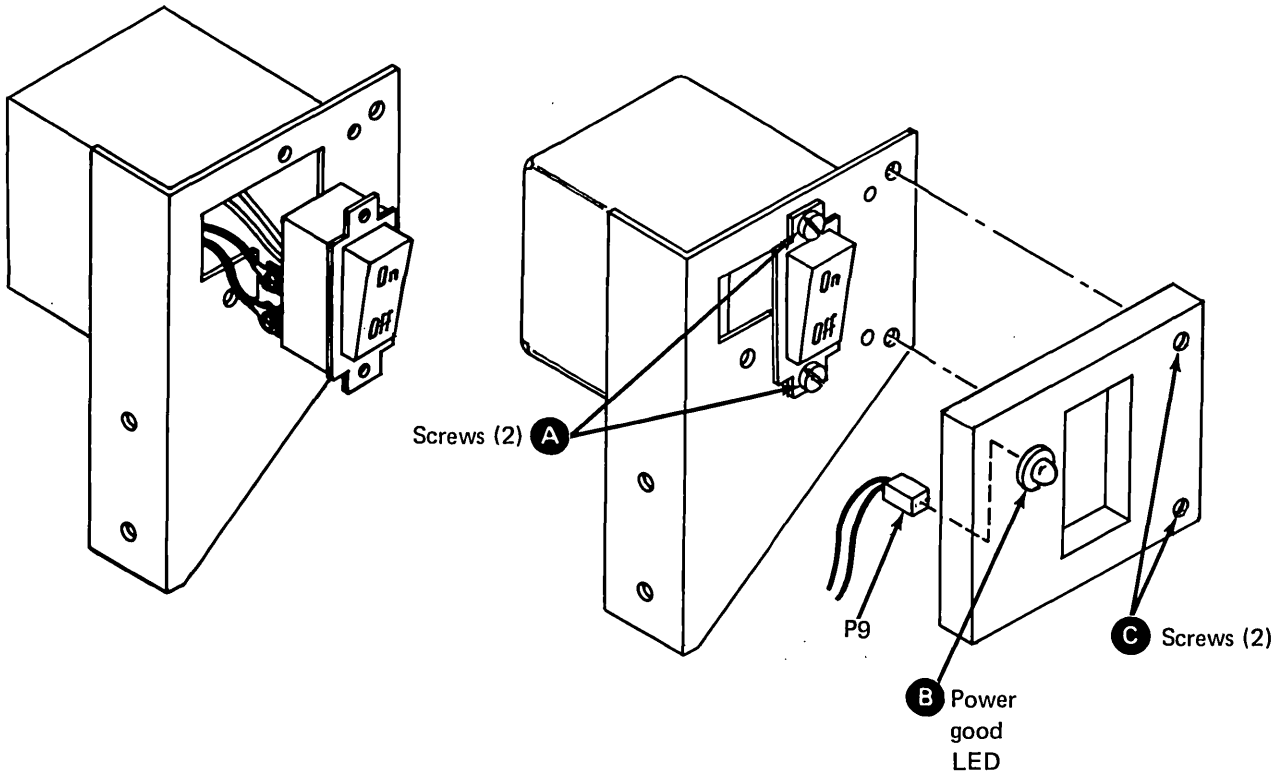
3.3.1 On/Off Switch Removal and Replacement

1. Turn off the power and unplug the disk storage unit's ac line cord from the power source.
2. Remove the front decorative cover by pulling it forward.
3. Remove the two screws Ⓒ that attach the On/Off switch front cover plate.
4. Remove the two screws Ⓐ securing the On/Off switch.
5. Pull the switch forward to gain access to the terminals.

   Note: With the switch in this position, it can be probed during troubleshooting.
6. Label the wires and remove them from the switch.
7. Replace the switch by reversing the removal procedure. Ensure that the wires going to the LED fit into the notch on the On/Off switch front cover plate.

3.3.2 Power Good LED Removal and Replacement

1. Turn off the power.
2. Remove the front decorative cover by pulling it forward.
3. Remove the two screws Ⓒ that attach the On/Off switch front cover plate.
4. Unplug the connector (P9) that attaches to the LED Ⓑ.
5. Press on the front of the LED to remove it from its socket.
6. Insert a replacement LED from the rear of the On/Off switch front cover plate.
7. Plug the connector (P9) into the LED. Be certain that the black wire on the connector plugs into the shorter pin.
8. Replace the On/Off switch front cover plate.
9. Replace the front decorative cover.



3.4 Drive Assembly

3.4.1 Drive Motor Assembly Removal and Replacement

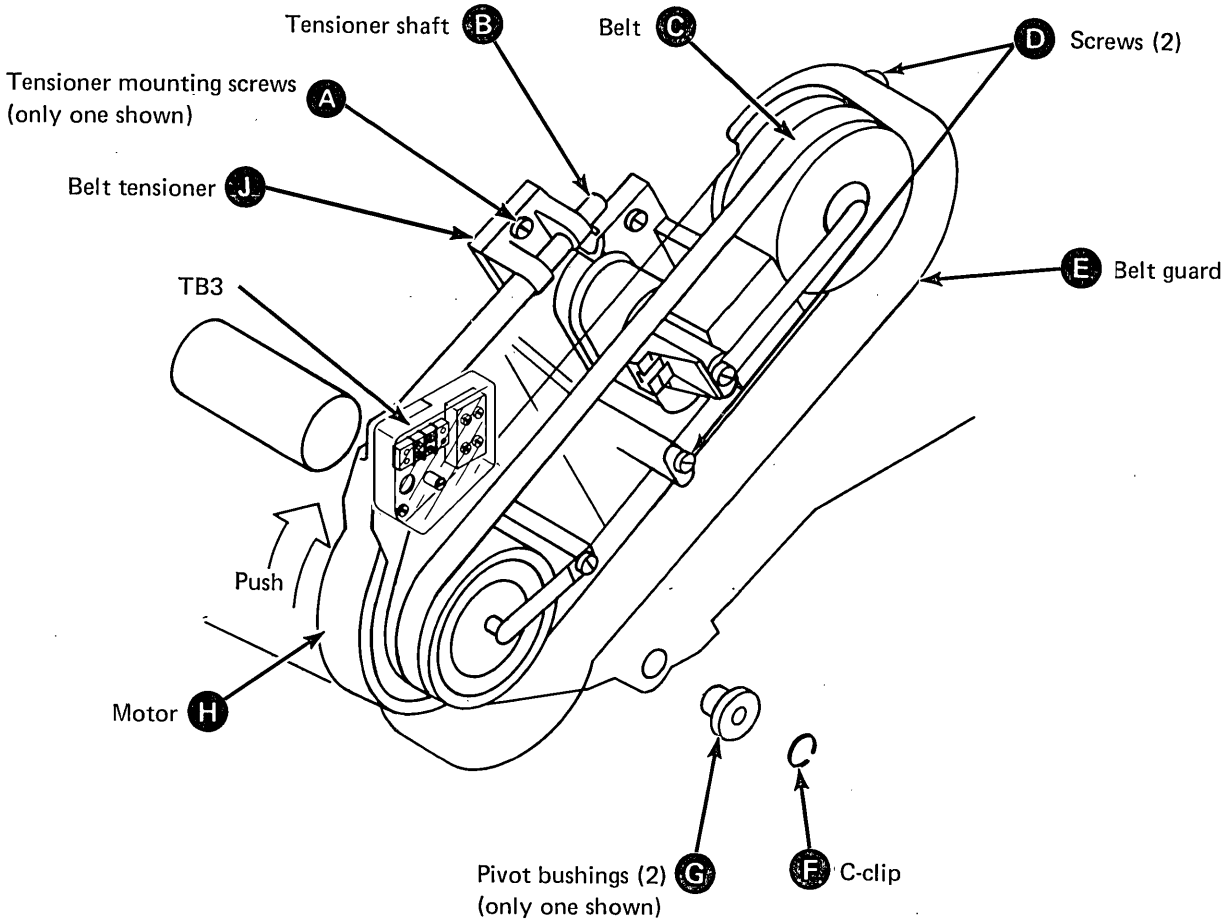
The drive motor assembly is an FRU that consists of the motor, the motor bracket and pivots, and the drive pulley.

CAUTION: Do not turn the disk enclosure spindle pulley counterclockwise; this can damage the heads and disks.

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Remove the power supply (see 3.2.1).
4. Remove the plastic cover from TB3.
5. Disconnect the wires connected to TB3 and the adjacent ground wire screw.
6. Loosen the two belt-guard screws Ⓓ and remove the belt guard Ⓔ.
7. Push the motor Ⓗ against the belt tensioner Ⓙ and turn the tensioner shaft Ⓑ 90 degrees so that the tensioner spring is held compressed.
8. Remove the tensioner mounting screws Ⓐ and remove the tensioner Ⓙ. Allow the belt to support the weight of the motor.
9. Remove the retaining ring (C-clip) Ⓕ from the motor pivot.
10. Support the weight of the motor and remove the belt Ⓒ; then move the motor toward the disk enclosure until the pivots are clear of the holes.

    Note: The motor pivot bushings might fall out as the motor is removed.
11. Remove the pivot bushings Ⓖ and inspect them carefully; if they are damaged, replace them.
12. Replace the drive motor by reversing the removal procedure.
13. Adjust the belt tensioner (see 3.4.5).

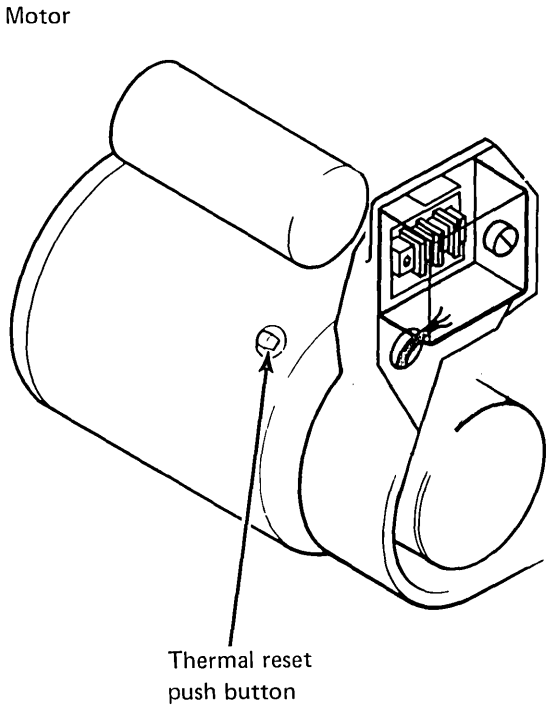
Drop-in 3011A



3.4.2 Drive Motor Thermal Cutout

CAUTION: Turn off the power to the disk storage unit before pressing the thermal reset pushbutton.

A thermal cutout is installed on the drive motor to prevent the motor from overheating. The thermal cutout cannot be reset until the motor has cooled.

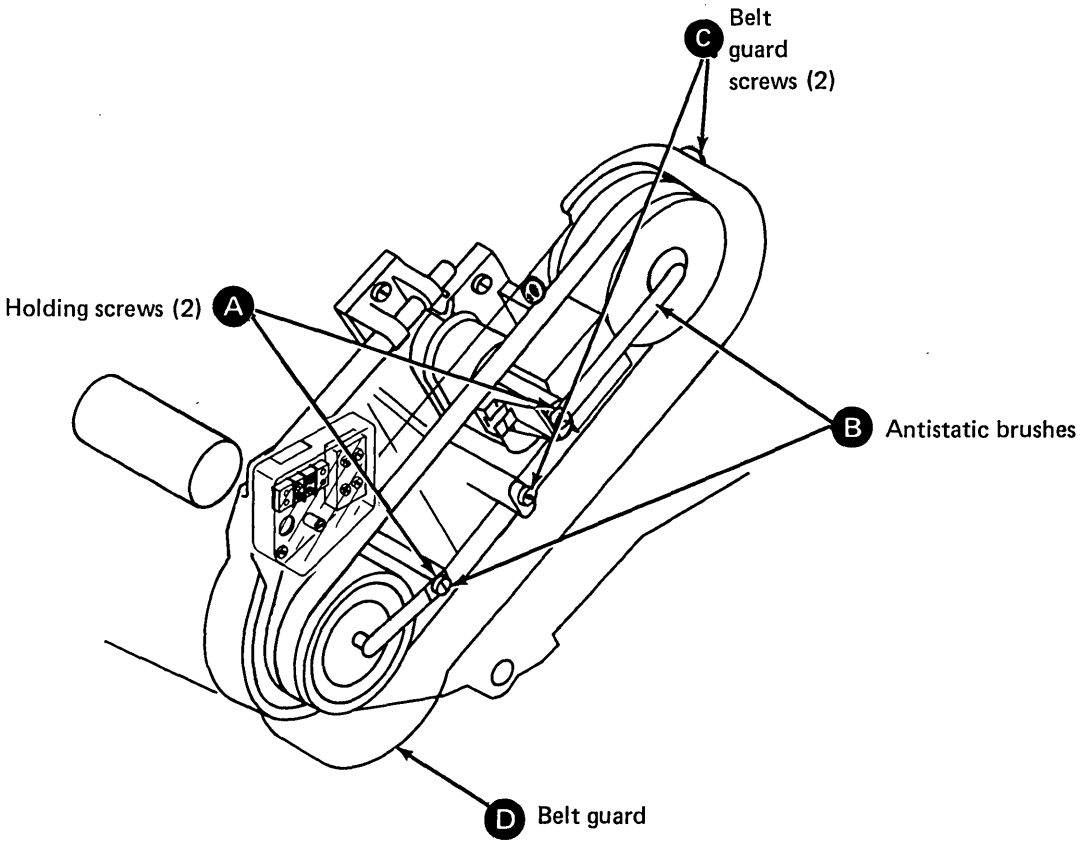


3.4.3 Antistatic Brush Removal and Replacement

CAUTION: Do not turn the disk enclosure spindle pulley counterclockwise; this can damage the heads and disks.

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Remove the power supply (see 3.2.1).
4. Loosen the belt guard screws Ⓒ; remove the belt guard Ⓓ.
5. Remove the holding screws Ⓐ; remove the antistatic brush Ⓑ.
6. Replace the antistatic brush by reversing the removal procedure.

   Note: When installing a new brush, ensure that the carbon brush is centered on the associated pulley.



3.4.4 Drive Belt Removal and Replacement

3.4.4.1 Removal

CAUTION: Do not turn the disk enclosure spindle pulley counterclockwise; this can damage the heads and disks.

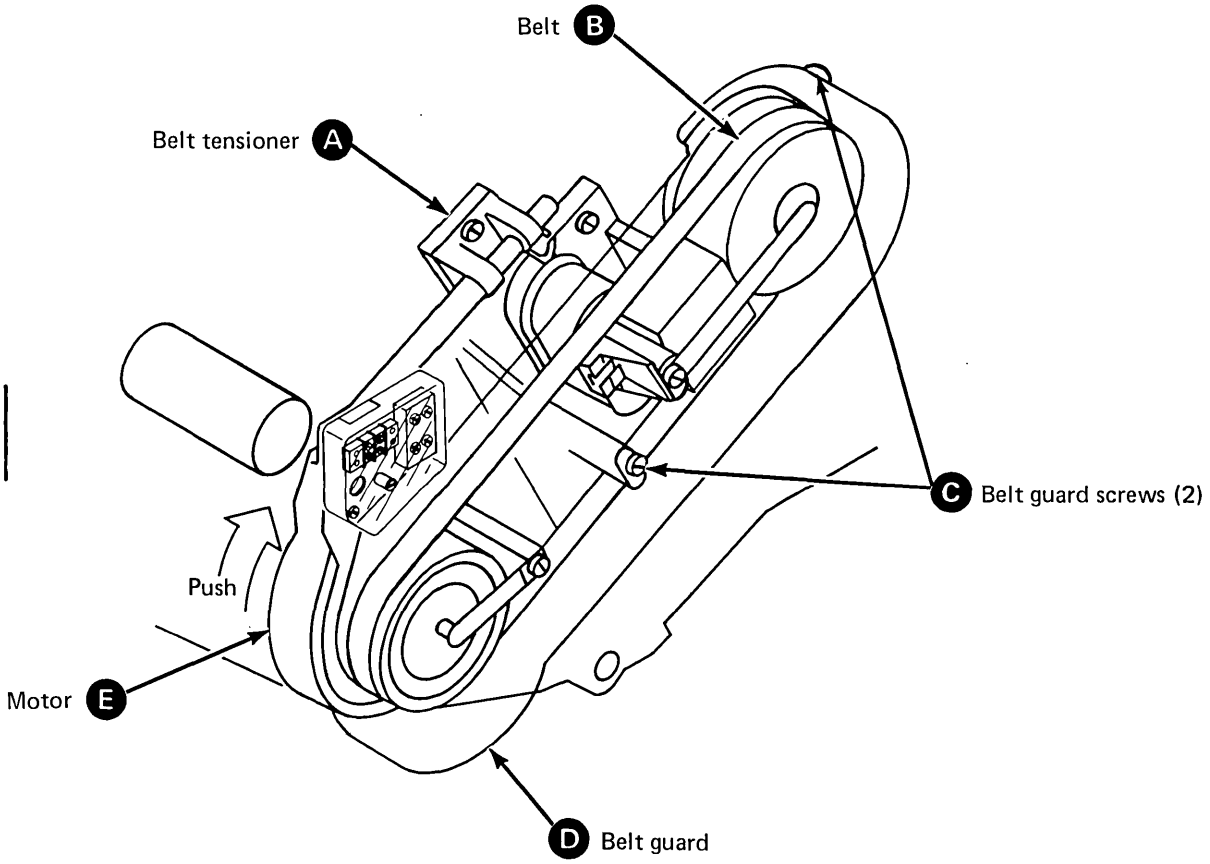
1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Remove the power supply (see 3.2.1).
4. Loosen the belt-guard screws Ⓒ and remove the belt guard Ⓓ.
5. Push the motor Ⓔ against the force of the belt tensioner Ⓐ and lift off the belt Ⓑ.
6. Gently lower the motor until it rests on its stop.

3.4.4.2 Replacement

CAUTION: Do not turn the disk enclosure spindle pulley counterclockwise; this can damage the heads and disks.

Note: Make sure that the belt to be installed is clean, dry, and not frayed or otherwise damaged. Ensure that the smooth side of the belt rides on the faces of the pulleys.

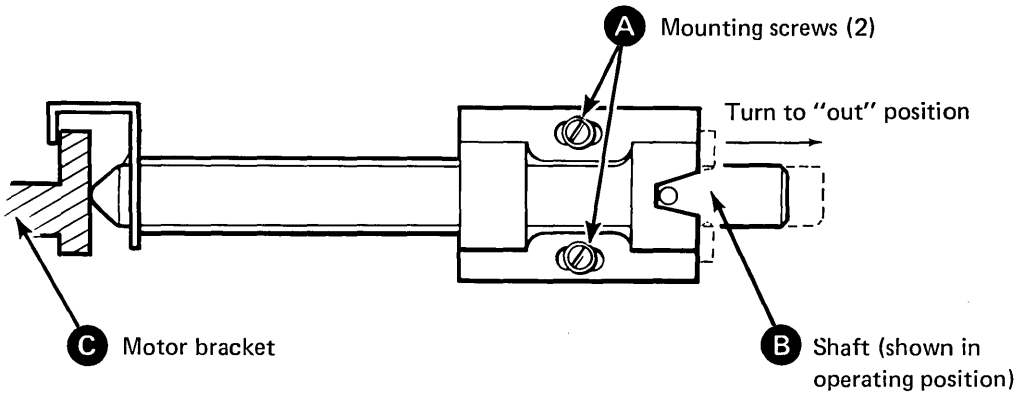
1. Push the motor Ⓔ against the belt tensioner Ⓐ and install the belt Ⓑ so that it rides in the center of the pulleys.
2. Allow the motor to be supported by the belt.
3. Adjust the belt tensioner (as described in 3.4.5).
4. Install the belt guard Ⓓ; tighten the screws Ⓒ.



3.4.5 Drive Belt Tensioner Adjustment

CAUTION: Do not turn the disk enclosure spindle pulley counterclockwise; this can damage the heads and disks.

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Remove the power supply (see 3.2.1).
4. Loosen the belt guard screws; remove the belt guard.
5. Push up on the motor and the motor bracket Ⓒ, and place the shaft Ⓑ in the out position by rotating it 90 degrees.
6. Loosen the two mounting screws Ⓐ.
7. Allow the drive belt tensioner to rest against the motor bracket Ⓒ.
8. Retighten the two mounting screws Ⓐ.
9. Turn the shaft and release it so that it is pulled into the operating position.



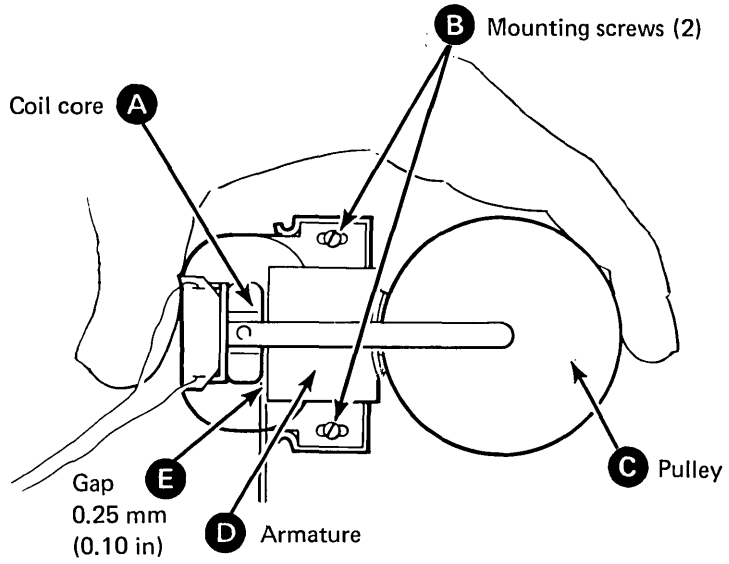
3.4.6 Brake Assembly

3.4.6.1 Adjustment

CAUTION: Do not turn the disk enclosure spindle pulley counterclockwise; this can damage the heads and disks.

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Remove the power supply (see 3.2.1).
4. Loosen the belt guard screws and remove the belt guard.
5. Check the gap Ⓔ between the coil core Ⓐ and the armature Ⓓ. If the gap is 0.25 mm (0.010 in.), the brake assembly is adjusted correctly; if not, proceed with step 6.
6. Loosen the two mounting screws Ⓑ.
7. Insert a 0.25 mm (0.010 in.) feeler gauge between the coil core Ⓐ and the armature Ⓓ; hold the two castings and pulley Ⓒ together as shown.

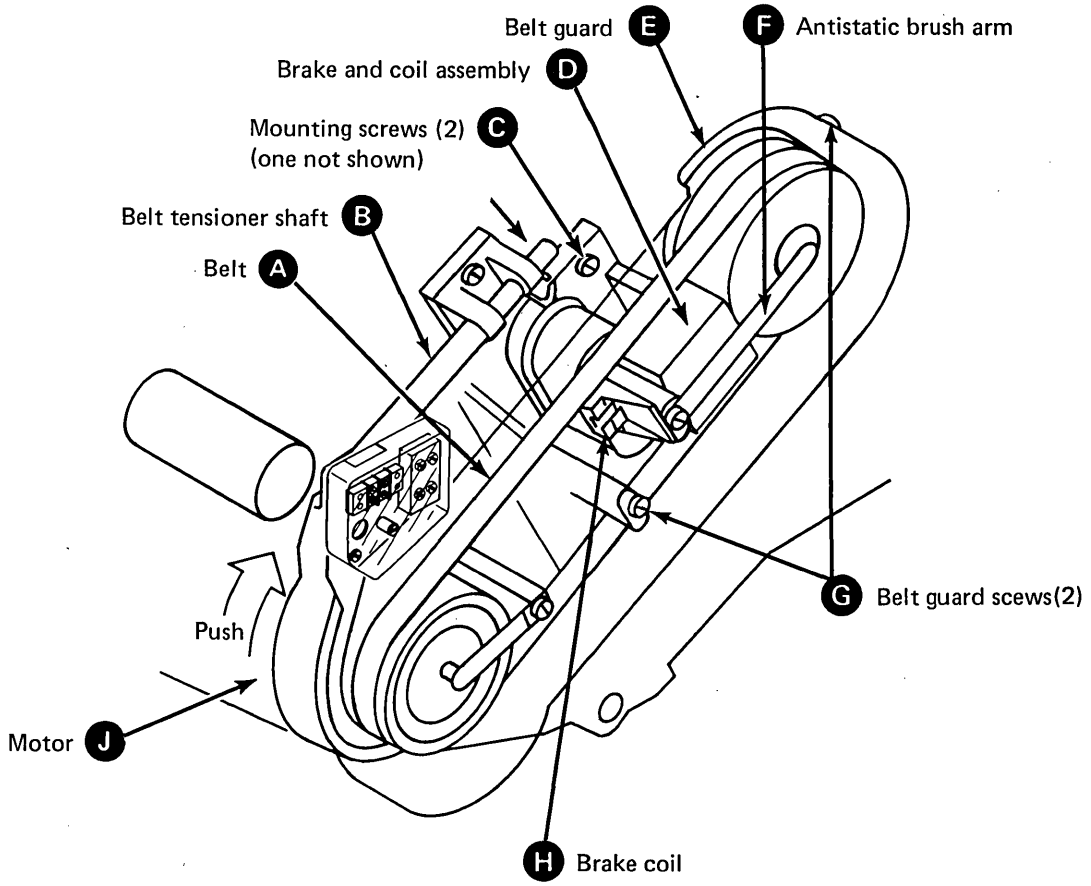
   Note: Ensure that the feeler gauge is clear of the small coil spring (not illustrated) recessed in the armature.
8. Tighten the two mounting screws Ⓑ.
9. Remove the feeler gauge.
10. Recheck the adjustment by repeating step 5.



3.4.6.2 Removal

CAUTION: Do not turn the disk enclosure spindle pulley counterclockwise; this can damage the heads and disks.

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Remove the power supply (see 3.2.1).
4. Loosen the two belt-guard screws Ⓖ and remove the belt guard Ⓔ.
5. Push the motor Ⓙ against the force of the belt tensioner shaft Ⓑ and lift off the belt Ⓐ.
6. Disconnect wires 1 and 2 from the brake coil Ⓗ.
7. Remove the two screws Ⓒ that attach the brake and coil assembly to the subframe; lift out the brake and coil assembly Ⓓ complete with the antistatic brush arm Ⓕ.

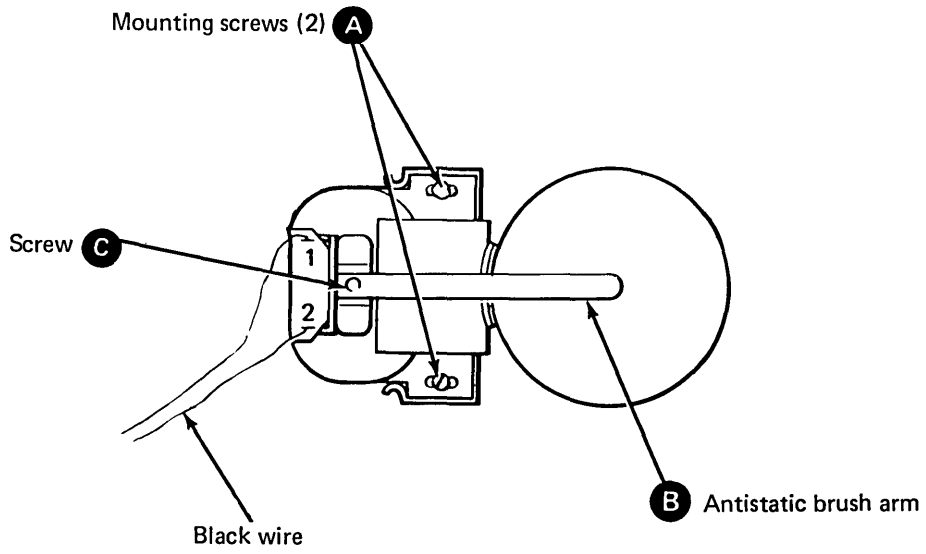


3.4.6.3 Replacement

1. Attach the brake and coil assembly *loosely* to the disk enclosure with the two brake mounting screws Ⓐ.
2. Attach the antistatic brush arm Ⓑ to the core casting with the brush arm screw Ⓒ.
3. Adjust the brake (see 3.4.6.1).

CAUTION: Wires 1 and 2 must be connected to the correct terminals (marked 1 and 2) on the coil.

4. Connect wires 1 and 2 to their respective coil terminals.
5. If necessary, adjust the antistatic brush arm Ⓑ until the brush rides in the center of the pulley spindle.
6. Push the motor against the force of the belt tensioner and install the drive belt. Ensure that the smooth side of the belt rides on the pulleys. Allow the motor to be supported by the belt.
7. Install the belt guard and tighten the belt-guard screws.
8. Install the power supply (see 3.2.1).
9. Install the cover (see 3.1.2).
10. Place the disk storage unit in the operating position (see 3.1.1).
11. Turn on the power.



3.5 Disk Enclosure

3.5.1 Removal

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Remove the power supply (see 3.2.1).

CAUTION: Do not turn the disk enclosure spindle pulley counterclockwise; this can damage the heads and disks.

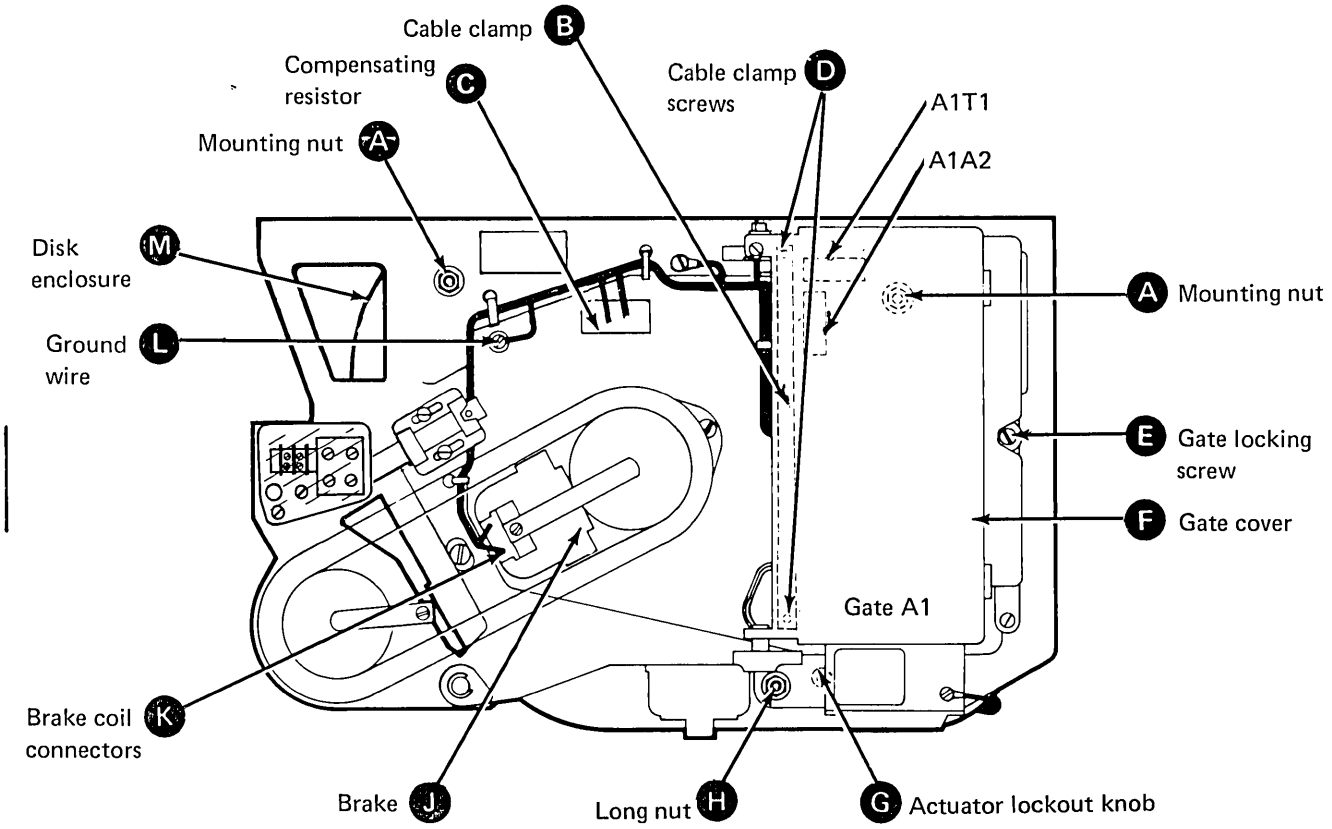
4. Open gate A1; remove the brake (see 3.4.6.2).
5. Use a screwdriver to turn the actuator lockout knob Ⓖ to the LOCK position.
6. Remove the cable clamp Ⓔ and the gate cover Ⓕ.
7. Unplug the disk enclosure flat cables from A1A2 (and A1T1 if installed).
8. Unplug VC9 Ⓤ from the pin side of board A1. Loosen the screws in the two board retainers Ⓣ and slide them upwards to release the cable.
9. Loosen the two belt guard screws Ⓠ; then remove the belt guard Ⓟ by sliding it to the right.
10. Push the motor Ⓡ against the tensioner Ⓢ and remove the drive belt Ⓝ.
11. Unplug the brake coil connectors Ⓚ, the trimmer board connections Ⓒ, and the disk enclosure ground wire Ⓛ.
12. Unscrew the lower disk enclosure mounting nut Ⓗ (long nut) and the two upper mounting nuts Ⓐ.
13. Ease the disk enclosure away from the subframe, taking care not to damage the plastic guides in the guide holes.
14. When the disk enclosure is free, it may be laid down on its cover, on a flat, clean surface.

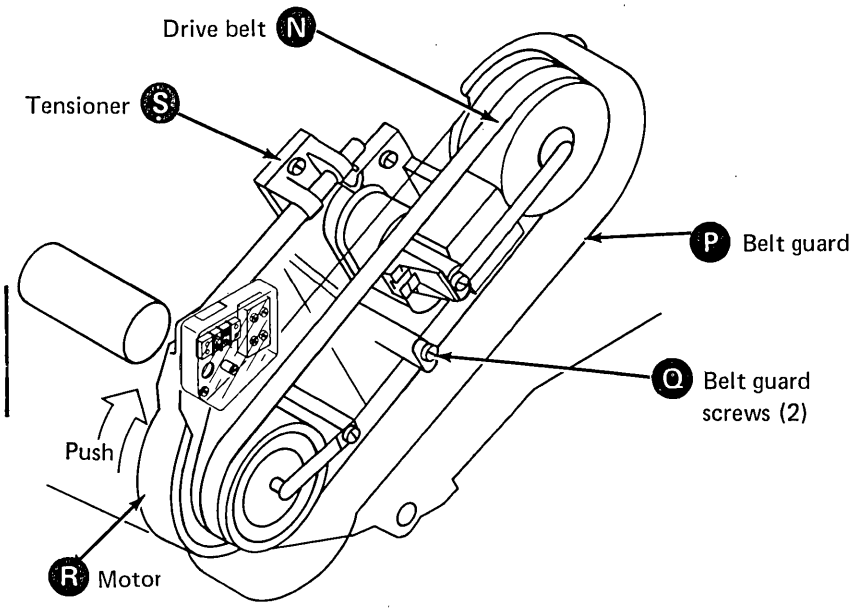
3.5.2 Replacement

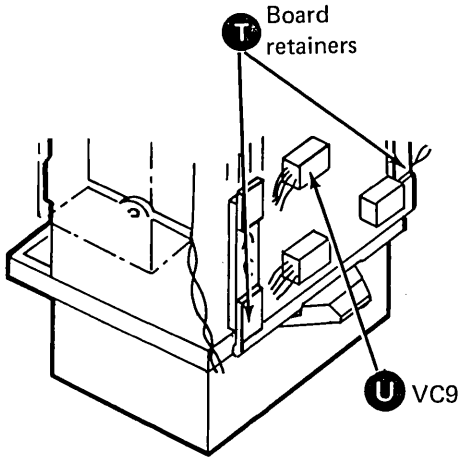
Replace the disk enclosure by reversing the removal procedure. Adjust the belt tensioner (see 3.4.5) and the brake (see 3.4.6.1).

CAUTION: Turn the actuator lockout knob to the *unlock* (counterclockwise) position before turning on the power.

Note: If a new disk enclosure has been installed, MAP 7A69, 'Disk Support Utility', must be run. If MAP 7A69 runs without errors, run the auto and manual MAPs. If the auto and manual MAPs run successfully, run MAP 7AF0, "Sector ID Move Cylinder 64 to Scatter', and then MAP 7AF1, '4963 Sector ID Save.


Cable clamp B
Compensating resistor C
Mounting nut A
Cable clamp screws D
A1T1
A1A2
Disk enclosure M
Ground wire L
A Mounting nut
E Gate locking screw
F Gate cover
Gate A1
Brake coil connectors K
Brake J
Long nut H
G Actuator lockout knob


Drive belt N
Tensioner S
P Belt guard
Q Belt guard screws (2)
Push
R Motor


T Board retainers
U VC9

3.5.3 Disk Enclosure Subframe Assembly

3.5.3.1 Removal

The disk enclosure subframe assembly should be removed only if either the subframe or the 4963 frame is damaged.

CAUTION: The subframe assembly weighs 16 kg (35 lb). The subframe assembly weight can be reduced by first removing the motor assembly and gate A1.

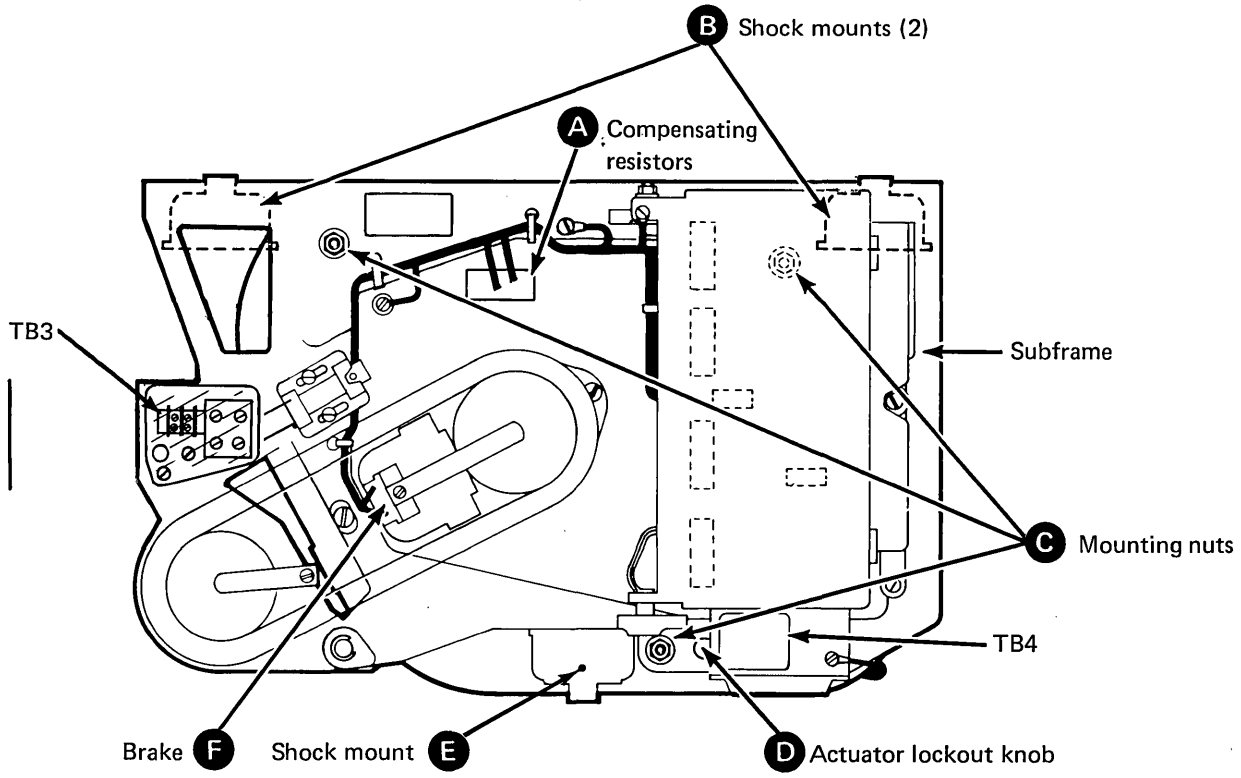
1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Unplug the unit's ac line cord from the power source.
4. Remove the power supply (see 3.2.1).
5. Use a screwdriver to turn the actuator knob Ⓓ to the LOCK position.
6. Label and remove the wires (coming from the ac distribution cable) that attach to TB3, TB4, and ground.
7. Label and remove the connectors and wires (of the dc distribution cable) that attach to components of the subframe assembly.
8. Unfasten the ac and dc distribution cables from the cable ties that attach them to the subframe assembly.
9. Unplug the flat cables on board A1.
10. Loosen the slotted hex screws that attach the subframe assembly to the three shock mounts Ⓑ and Ⓔ; remove the subframe assembly by sliding it away from the screws.
11. Allow the subframe assembly to rest on the disk enclosure cover (on a clean surface).
12. Disconnect the push-on clips from the brake Ⓕ and the compensating resistor Ⓐ.
13. Unscrew the three disk enclosure mounting nuts Ⓒ.
14. Lift the subframe assembly from the disk enclosure.

3.5.3.2 Replacement

1. Replace the subframe assembly by reversing the removal procedure.

CAUTION: Turn the actuator lockout knob to the *unlock* (counterclockwise) position before turning on the power.

2. If the motor assembly and gate A1 have been removed, install them prior to installing the power supply.



3.5.4 Shock Mount Removal and Replacement

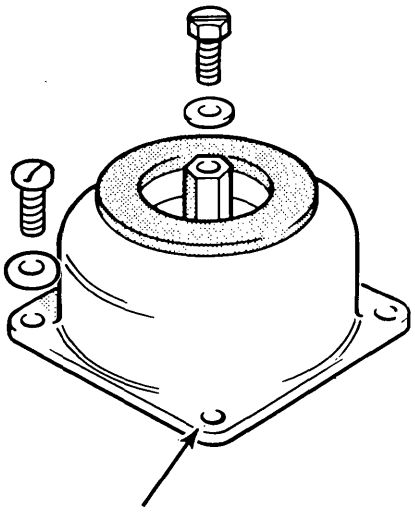
CAUTION: When replacing a shock mount, ensure that at least two shock mounts support the subframe assembly.

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Open the card gate and use a screwdriver to turn the actuator knob clockwise to the LOCK position.
4. Remove the four screws and washers that attach the shock mount to the 4963 frame.
5. Remove the screw and washer that attach the shock mount to the subframe.

CAUTION: The upper and lower shock mounts are not interchangeable.

6. Replace the shock mount by reversing the removal procedure.

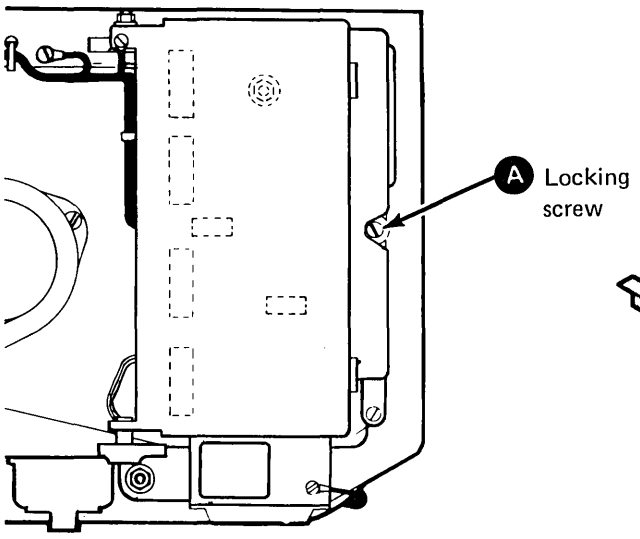
CAUTION: Turn the actuator lockout knob to the *unlock* (counterclockwise) position before turning on the power.

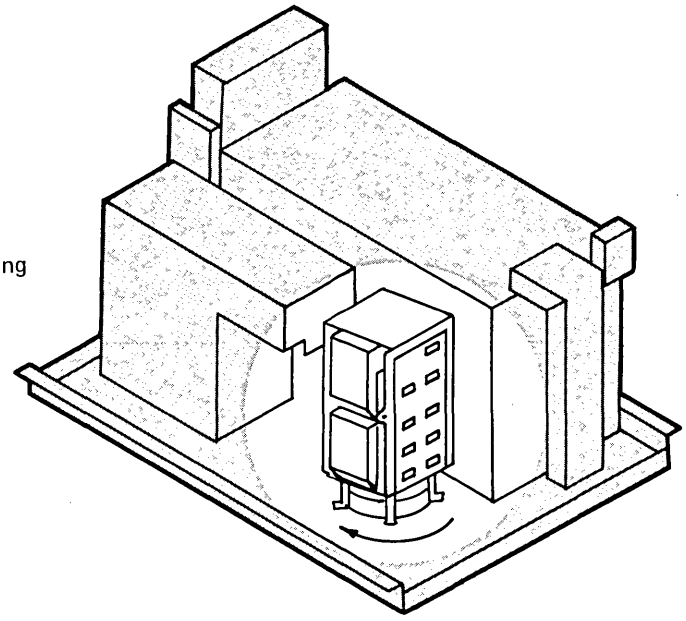


3.6 Gate A1

3.6.1 Service Position

Loosen the gate A1 locking screw Ⓐ; open gate A1 to the service position.





Service position

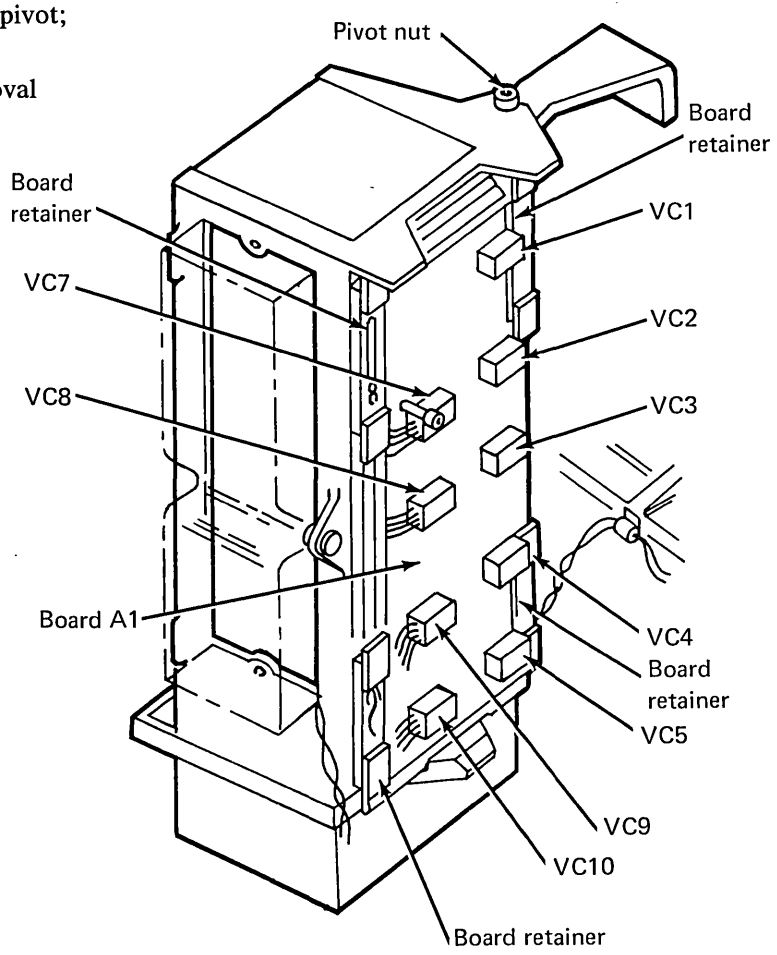
3.6.2 Gate A1 Removal and Replacement

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Unplug the unit's ac line cord from the power source.
3. Remove the cover (see 3.1.2).
4. Remove the gate A1 cable clamp screws; then remove the cable clamp and the card cover.
5. Disconnect the flat cable connectors from board positions A1A3, A1A4, and A1A5.
6. Place gate A1 into the service position (see 3.6.1).
7. Remove the cable straps.
8. Disconnect voltage connectors VC1 through VC5, and VC9.
9. Disconnect the ground connector from the gate casting.
10. Loosen the board retainer screws, lift the retainers, and unfasten the cables.
11. Disconnect the ac distribution cable from TB4.
12. Unscrew the pivot nut from the upper pivot; lift the gate off both pivots.
13. Replace gate A1 by reversing the removal procedure.

Allow sufficient cable slack around the pivot area of gate A1; the length of cable should be approximately 240 mm (1 in.) from the cable clamp to the end of the socket.

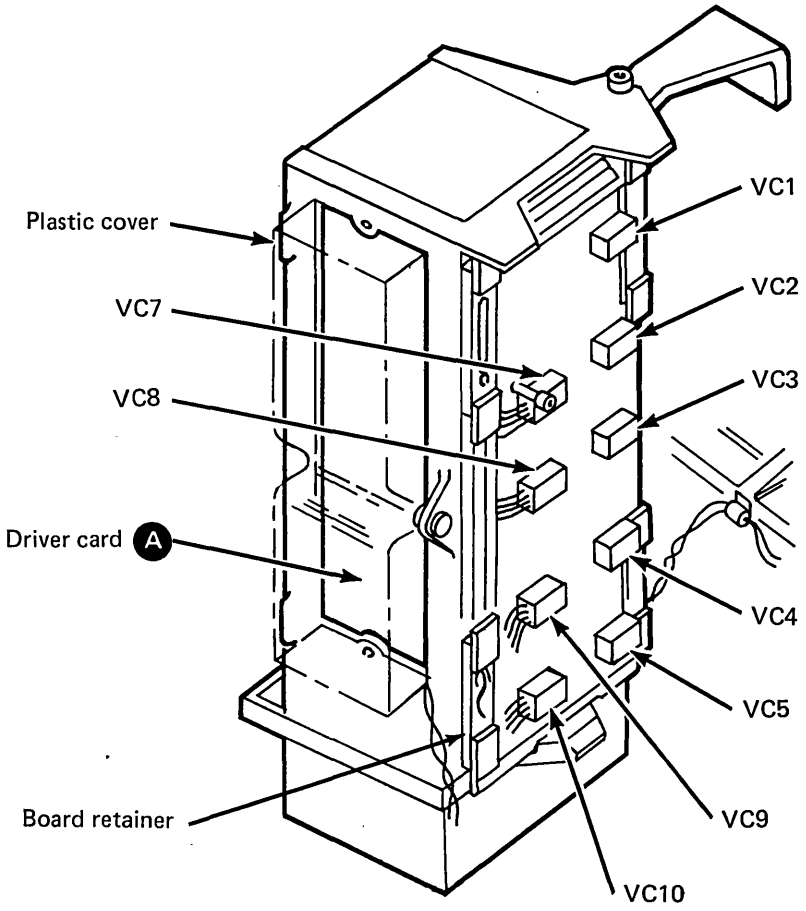
3.6.3 Board A1 Removal and Replacement

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Remove the cable clamp and the card cover.
4. Unplug the cards and the flat cable connectors; note the card part numbers and their locations as they are removed.
5. Place gate A1 into the service position (see 3.6.1).
6. Unplug the voltage connectors from the pin side of the A1 board.
7. Loosen the four screws holding the board retainers; remove the board.
8. Replace board A1 by reversing the removal procedure.



3.6.4 Actuator Coil Driver Card Removal and Replacement

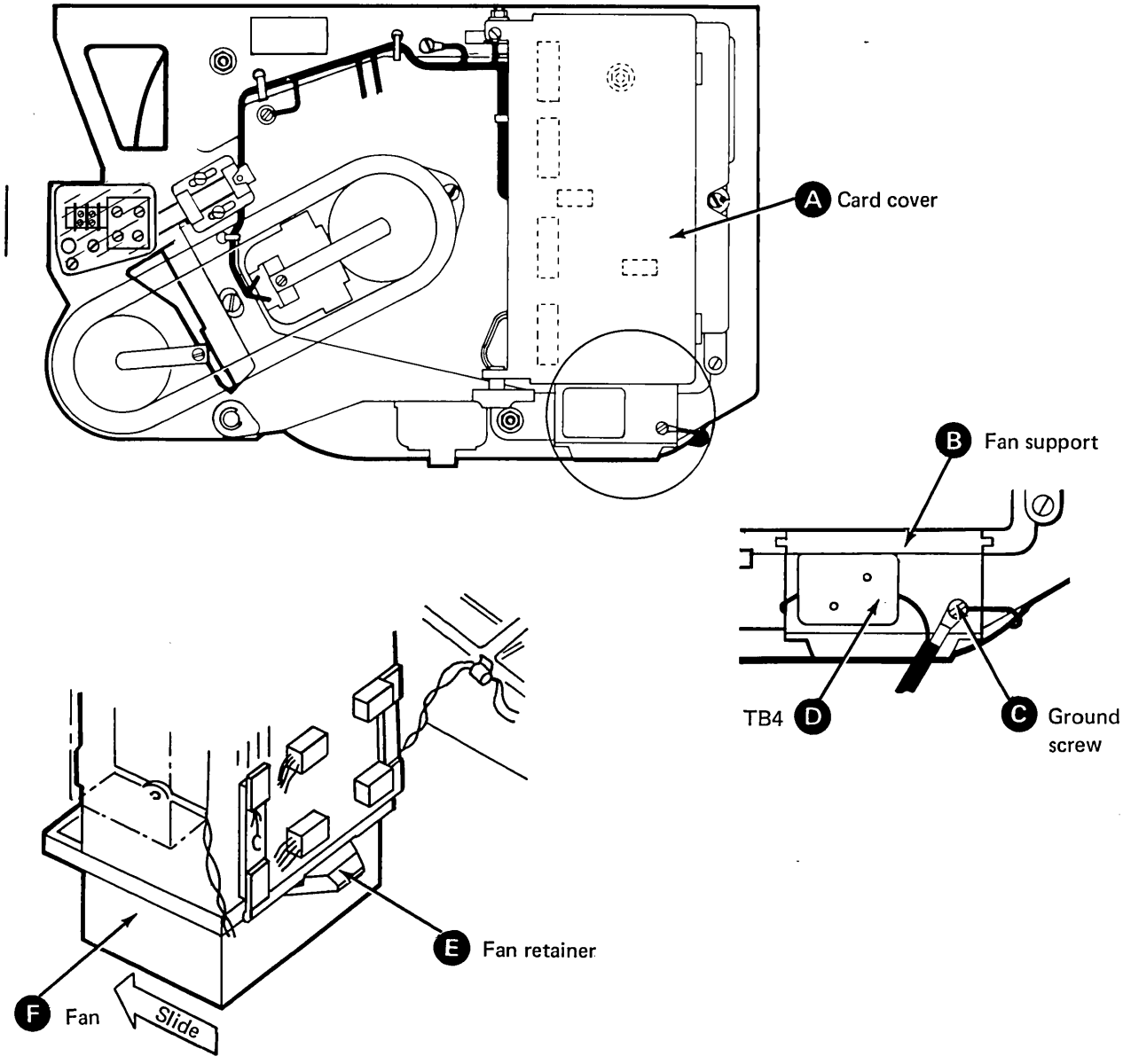
1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Unplug voltage connectors VC7, VC8, and VC10.
4. Remove the cover screws and the plastic cover.
5. Remove the card retaining screws and the card Ⓐ.
6. Replace the card by reversing the removal procedure.



3.6.5 Gate A1 Fan Removal and Replacement

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Unplug the unit's ac line cord from the power source.
3. Remove the cover (see 3.1.2).
4. Disconnect the ac distribution cable from TB4 Ⓓ.
5. Remove the gate A1 card cover Ⓐ.
6. Disconnect the ground wire Ⓒ adjacent to TB4.
7. Place gate A1 in the service position (see 3.6.1).
8. Release the fan retainer Ⓔ and remove the fan Ⓕ by sliding it towards the rear of the disk storage unit.
9. Replace the fan by reversing the removal procedure.

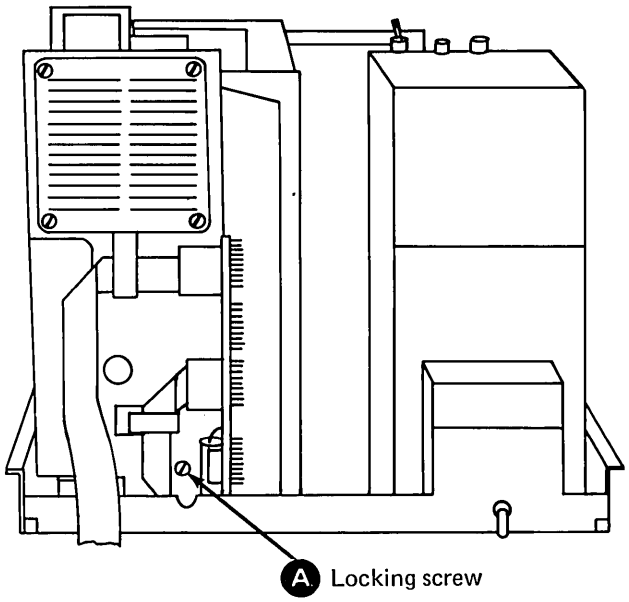
CAUTION: When replacing the fan, ensure that the air flows from the bottom to the top of gate A1.



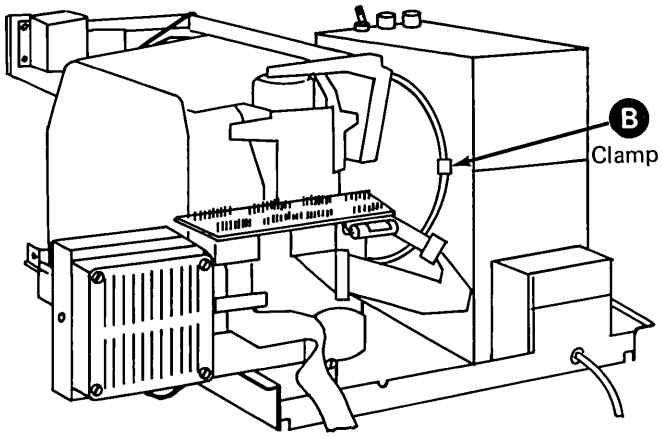
3.7 Gate A2

3.7.1 Service Position

1. Loosen screw Ⓐ.
2. Unclamp the ac distribution cable from the side of the power supply Ⓑ.
3. Lift up gate A2; carefully tilt it to the service position (as shown in the illustration).
4. Place the gate in the operating position by reversing the above procedure.



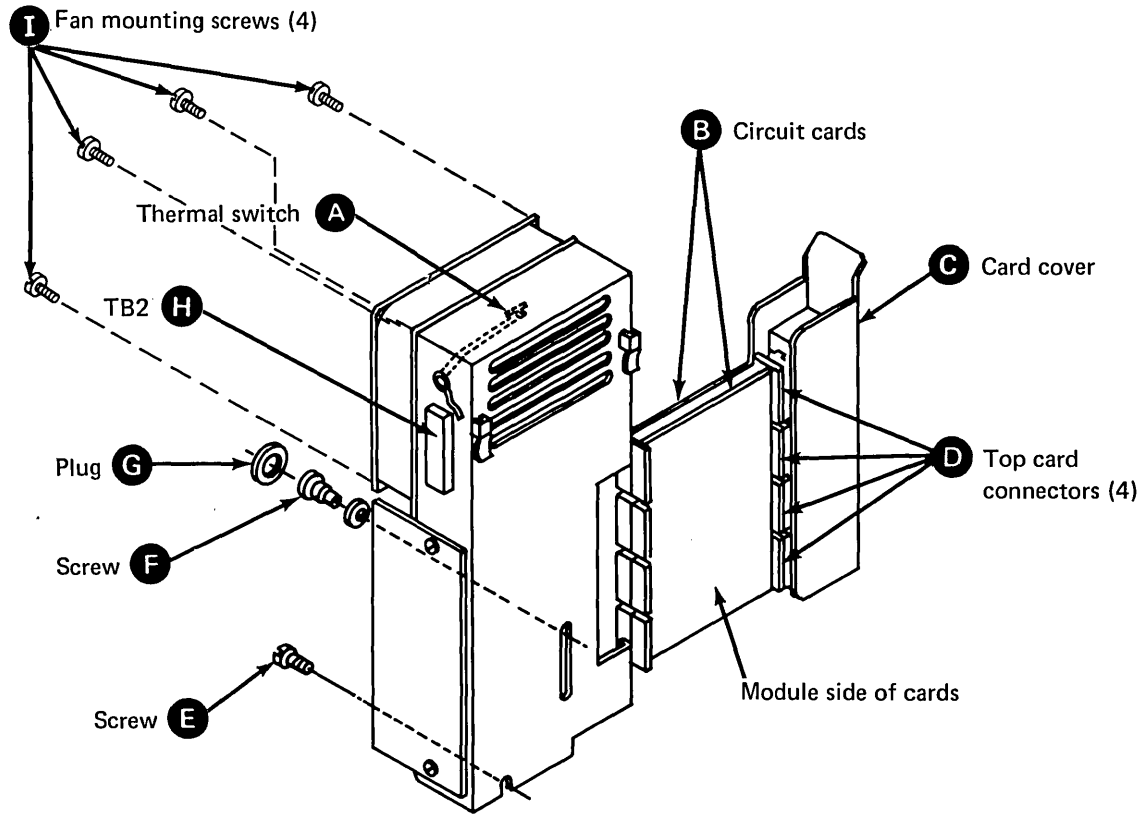
Operating position



Service position

3.7.2 Gate A2 Removal and Replacement

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Unplug the unit's ac line cord from the power source.
3. Remove the cover (see 3.1.2).
4. Remove the four screws Ⓘ that secure the cooling fan to the gate.
5. Place gate A2 in the service position (see 3.7.1).
6. Remove the ground wire that attaches to gate A2.
7. Remove the wires that attach to the thermal switch Ⓐ, and feed them through the rubber grommet.
8. Label and remove the wires from the ac distribution cable that attach to TB2 Ⓗ.
9. Unplug the signal cables going to board A2.
10. Label and unplug the connectors on the pin side of board A2.
11. Place gate A2 in the operating position (see 3.7.1).
12. Remove the card cover Ⓒ, the top card connectors Ⓓ, and the circuit cards Ⓑ from gate A2.
13. Loosen screw Ⓔ.
14. Remove the plug Ⓖ and the screw Ⓕ.
14. Lift up gate A2; remove the gate.
16. Replace the gate by reversing the removal procedure.



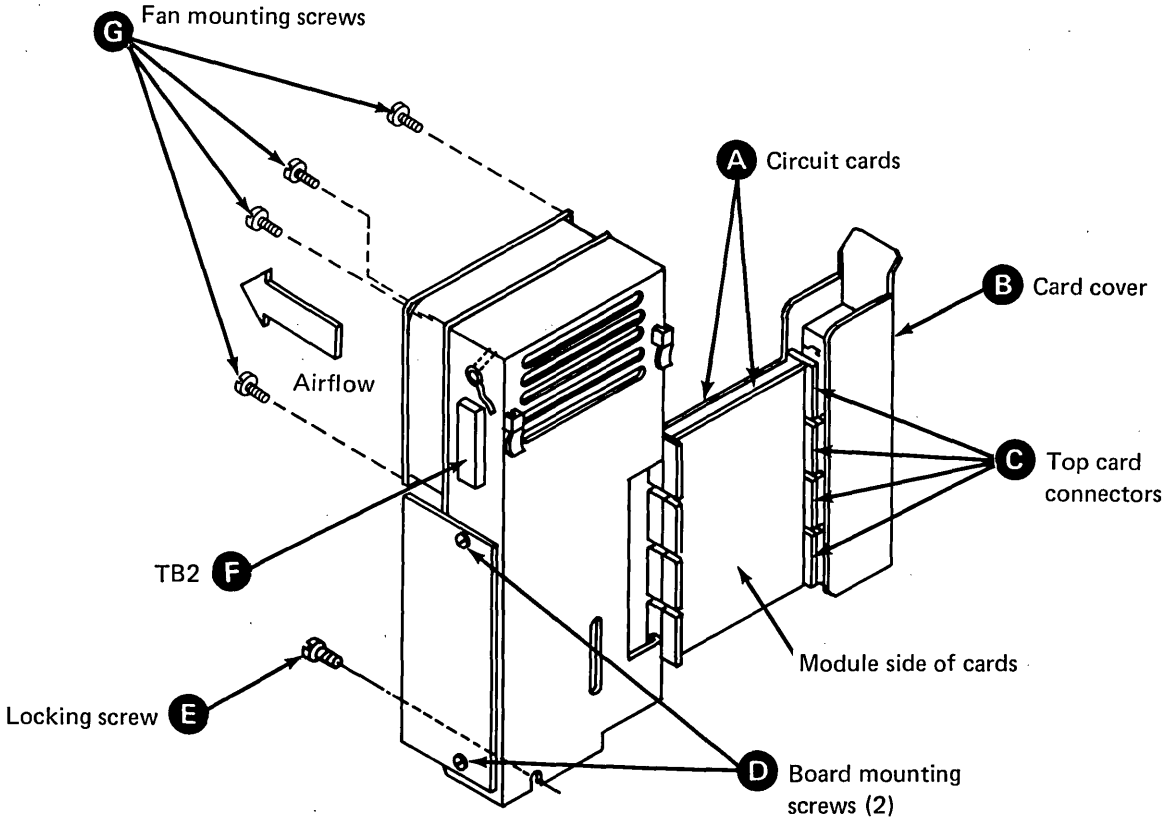
3.7.3 Gate A2 Fan Removal and Replacement

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Unplug the unit's ac line cord from the power source.
3. Remove the cover (see 3.1.2).
4. Label and remove the four wires (coming from the fan) that connect to TB2 (F).
5. Remove the four fan mounting screws (G); remove the fan.
6. Replace the fan by reversing the removal procedure.

CAUTION: When replacing the fan, ensure that the air flows toward the rear of the disk storage unit.

3.7.4 Board A2 Removal and Replacement

1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).
3. Unplug the signal cables.
4. Remove the decoupling capacitor at position A2 (see 3.7.6).
5. Remove the card cover (B).
6. Remove the four top card connectors (C).
7. Remove the circuit cards in positions C2 and D2 (A). Note the part numbers of the cards and their board positions. It may be necessary to loosen the gate locking screw (E) and raise the gate assembly to remove the cards.
8. Place gate A2 in the service position (see 3.7.1).
9. Label and unplug the voltage connectors (VC1 through VC6) and the slip-on wire connectors from the pin side of the board.
10. Remove the two board mounting screws (D); remove the board.
11. Replace the board by reversing the removal procedure.



3.7.5 Thermal Switch Removal and Replacement

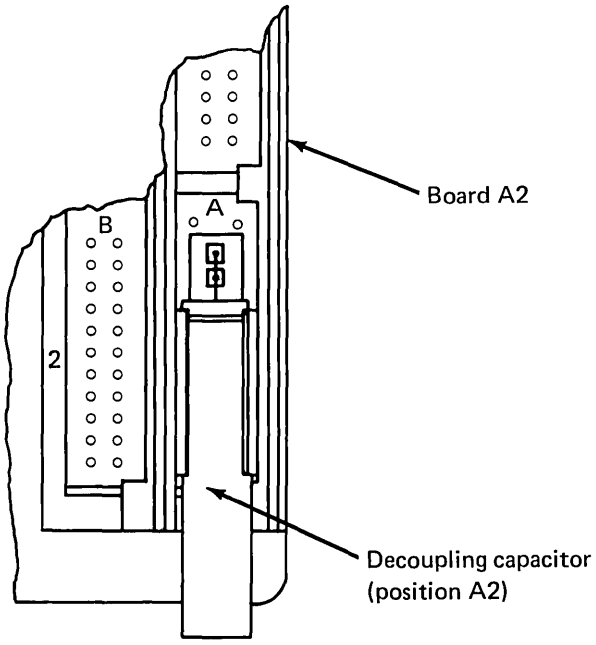
1. Turn off the power and place the disk storage unit in the service position (see 3.1.1).
2. Remove the cover (see 3.1.2).

Note: When replacing the thermal switch on a primary unit, it is necessary to remove the four screws securing the fan on gate A2 and to move the fan to gain access to the thermal switch.

3. Unplug the two slip-on connectors on the thermal switch.
4. Pry off the clip securing the thermal switch.
5. Replace the thermal switch by reversing the removal procedure.

3.7.6 Board A2 Decoupling Capacitor

When removing or replacing the decoupling capacitor on board A2, note the polarity of the two leads and the pin numbers to which the leads connect.



Cut Along Line

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IBM Series/1
4963 Disk Subsystem
and Attachment Feature
Maintenance Information

This Technical Newsletter provides replacement pages for the subject publication. Pages to be inserted and/or removed are:

title page, edition notice

A technical change to the text or to an illustration is indicated by a vertical line to the left of the change.

Summary of Amendments

Addition of the Federal Communications Commission (FCC) statement.

Note. Please file this cover letter at the back of the manual to provide a record of changes.

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