



# HP 7936 and HP 7937 Disc Drives Operating and Installation Manual

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## MODELS COVERED

This manual covers the following models: HP 7936H/7937H,  
7936XP/7937XP, 7936FL/7937FL.

## OPTIONS COVERED

In addition to the standard model, this manual covers the  
following options: 015, 017, 1A4.



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# Notice

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### Herstellerbescheinigung

Hiermit wird bescheinigt, daß das Gerät/System HP 7936/7937 in Übereinstimmung mit den Bestimmungen von Postverfügung 1046/84 funkentstört ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes/Systems angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

### Manufacturer's Declaration

This is to certify that the product(s) HP 7936/7937 is in accordance with the Radio Interference Requirements of Directive FTZ 1046/1984. The German Bundespost was notified that this equipment was put into circulation; the right to check the series for compliance with the requirements was granted.

### Additional Information for Test and Measurement Equipment

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**HP Computer Museum**  
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**For research and education purposes only.**

# Printing History

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New editions are complete revisions of the manual. Update packages, which are issued between editions, contain additional and replacement pages to be merged into the manual by the customer. The dates on the title page change only when a new edition or a new update is published. No information is incorporated into a reprinting unless it appears as a prior update; the edition does not change when an update is incorporated.

A software code may be printed before the date; this indicates the version level of the software product at the time the manual or update was issued. Many product updates and fixes do not require manual changes and, conversely, manual corrections may be done without accompanying product changes. Therefore, do not expect a one-to-one correspondence between product updates and manual updates.

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Edition 3.....	APRIL 1988
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# Safety Considerations

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**GENERAL** - This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation.

## SAFETY SYMBOLS



Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the product against damage.



Indicates hazardous voltages.



Indicates earth (ground) terminal.

### WARNING

The **WARNING** sign denotes a hazard. It calls attention to a procedure or practice that, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a **WARNING** sign until the indicated conditions are fully understood and met.

### CAUTION

The **CAUTION** sign denotes a hazard. It calls attention to an operating procedure or practice that, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond a **CAUTION** sign until the indicated conditions are fully understood and met.

**SAFETY EARTH GROUND** - This is a safety class I product and is provided with a protective earthing terminal. An uninterruptible safety

earth ground must be provided from the main power source to the product input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that the protection has been impaired, the product must be made inoperative and be secured against any unintended operation.

**BEFORE APPLYING POWER** - Verify that the product is configured to match the available main power source according to the input power configuration instructions provided in this manual.

If this product is to be operated with an auto-transformer make sure that the common terminal is connected to the earth terminal of the main power source.

## SERVICING

### WARNING

Any servicing, adjustment, maintenance, or repair of this product must be performed only by service-trained personnel.

Adjustments described in this manual may be performed with power supplied to the product while protective covers are removed. Energy available at many points may, if contacted, result in personal injury.

Capacitors inside this product may still be charged after the product has been disconnected from the main power source.

To avoid a fire hazard, fuses with the proper current rating and of the specified type (normal blow, time delay, etc.) must be used for replacement. To install or remove a fuse, first disconnect the power cord from the device. Then, using a small flat-bladed screw driver, turn the fuseholder cap counterclockwise until the cap releases. Install either end of a properly rated fuse into the cap. Next, insert the fuse and fuseholder cap into the fuseholder by pressing the cap inward and then turning it clockwise until it locks in place.





## **CERTIFICATION**

*Products, materials, parts, and services furnished on this order have been provided in accordance with all applicable Hewlett-Packard specifications. Actual inspection and test data pertaining to this order is on file and available for examination.*

*Hewlett-Packard's calibration measurements are traceable to the National Bureau of Standards to the extent allowed by the Bureau's calibration facilities.*

*The Hewlett-Packard Quality Program satisfies the requirements of FAR 52.246-15.*





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## 1-1. INTRODUCTION

The Hewlett-Packard Model 7936 and 7937 Disc Drives are high-performance, random access, data storage devices designed for use in medium- and large-sized computer systems. In this manual, unless otherwise specified, "drive" refers to all models of the HP 7936 and HP 7937.

A microprocessor-based controller is factory-installed in the drive to provide an interface to the host computer. A number of different controllers are available for this purpose. In the HP 7936H/7937H Disc Drives, interface to the host is via an Hewlett-Packard Interface Bus (HP-IB) controller. In the HP 7936XP/7937XP, the controller has HP-IB Cache added. The HP 7936FL/7937FL drives interface with the host via HP-FL, a high-speed fiber optic interface. All of the controllers interface with the drive electronics via an HP-developed Drive Standard Interface (ESI).

For data storage, the drive employs a stack of seven nonremovable 210-millimetre (8.3-inch) diameter discs, housed in a sealed head-disc assembly (HDA). There are seven (HP 7936) or 13 (HP 7937) thin-film surfaces on the discs for data storage. An additional surface is used for dedicated servo code. The disc spindle assembly is belt-driven by a motor mounted adjacent to the sealed HDA.

The formatted storage capacity of the drive is 307 megabytes (HP 7936) or 571 megabytes (HP 7937). Each data surface uses a movable read/write head to service its data tracks. The bottom surface of the lowest disc in the stack contains prerecorded servo code which is used to generate timing and seeking information.

Head positioning is performed by a rotary actuator and closed loop servo system. Control of

the servo system is derived from the prerecorded servo on the servo surface and also from servo code embedded between data sectors on all of the data surfaces.

The drive is contained in an enclosed housing and is fitted with removable covers and rack slides to permit easy access for servicing. A total of two drives can be installed in a desk-height HP 19511A Cabinet. See figure 1-1. An HP 19512A Rack Slide Adapter Kit is available for mounting the drive in an EIA 19-inch rack cabinet. The HP 19514A Cabinet will accommodate up to eight drives. A special lifter tool makes it possible for one person to install the 56.7 kg (125 lb) drive in either cabinet.

Two upgrade kits are available for the drive: the HP 97520XP HP-IB Cache Upgrade Kit, and the HP 97522FL Controller Upgrade Kit.

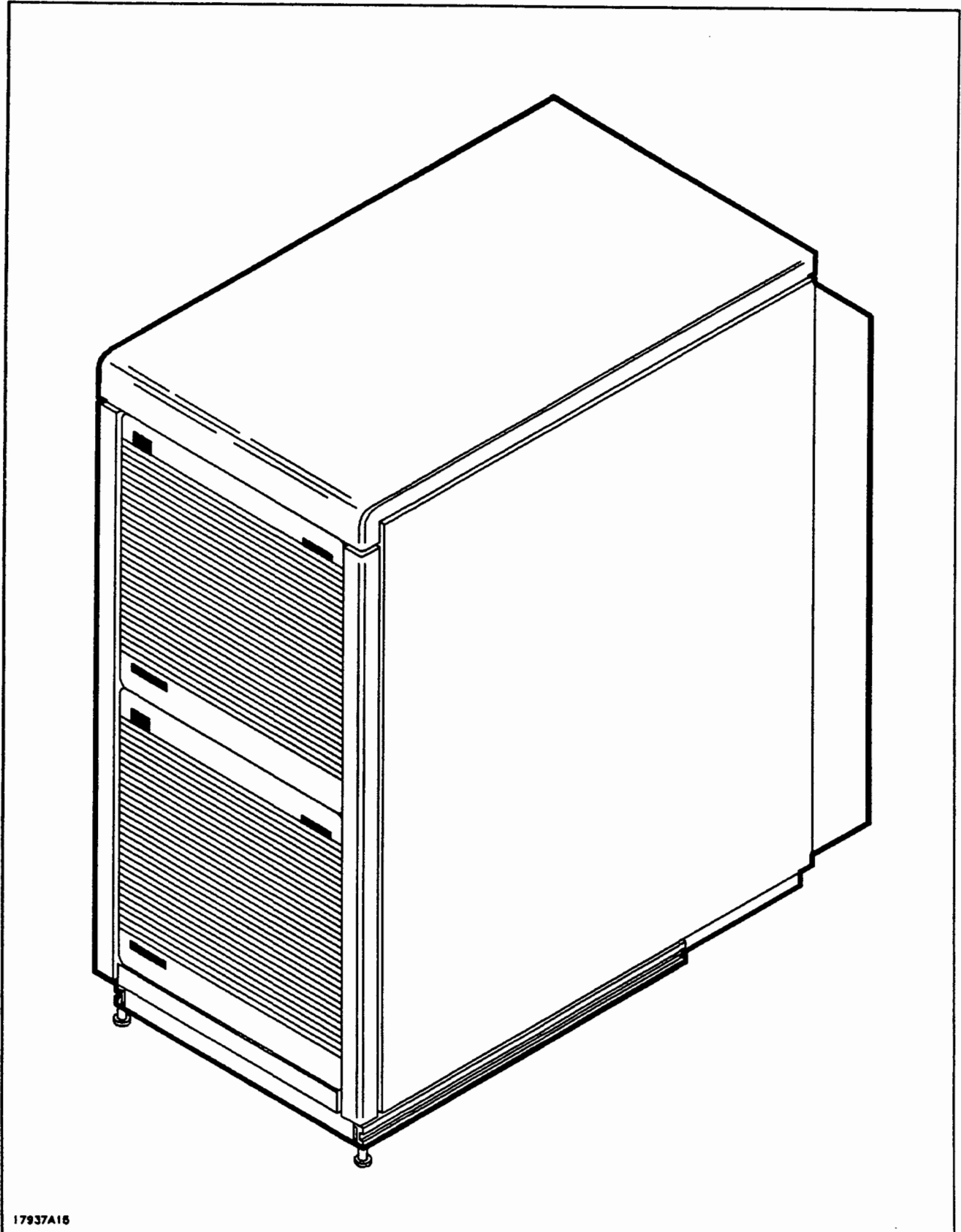
Self-test diagnostics and a fault-finding system contained within the drive exercise key functions of its operation. Self-test is performed automatically at power on and also can be initiated by the host. Drive status is indicated by three light-emitting diodes (LEDs) on the front panel. In the event of a self-test failure, the LEDs will identify the most likely failed assembly in the drive. On FL-model drives, an additional set of LEDs on the controller PCA indicate the status of the HP-FL interface.

## 1-2. DIMENSIONS

Dimensions for the drive and the HP 19511A Cabinet are shown in figures 1-2 and 1-3, respectively.

## 1-3. PRODUCT STRUCTURE

The drive product structure is outlined in table 1-1.



17937A16

Figure 1-1. HP 7937 Disc Drives in HP 19511A Cabinet

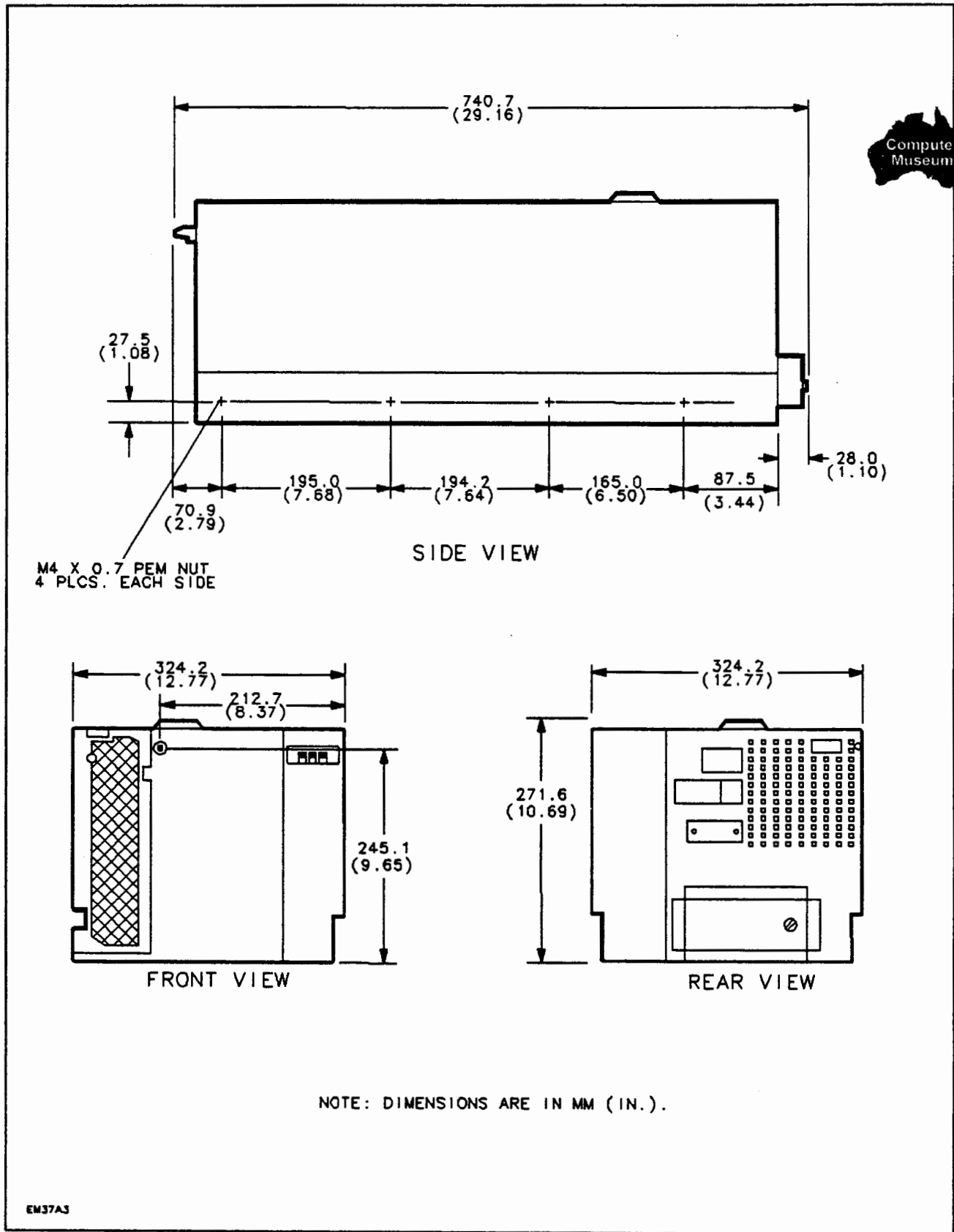
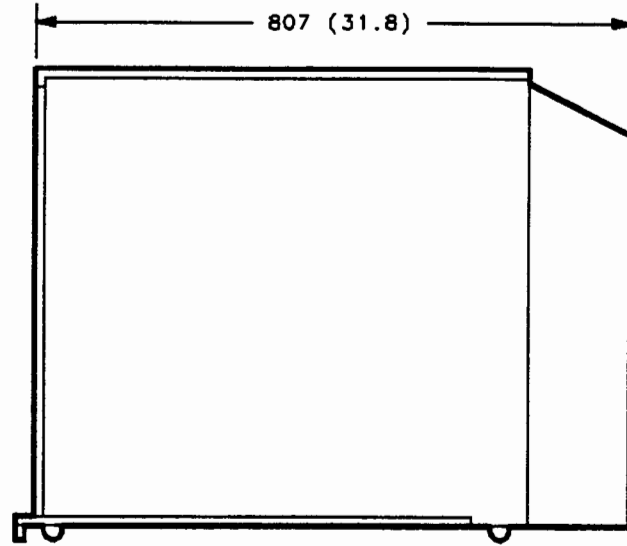
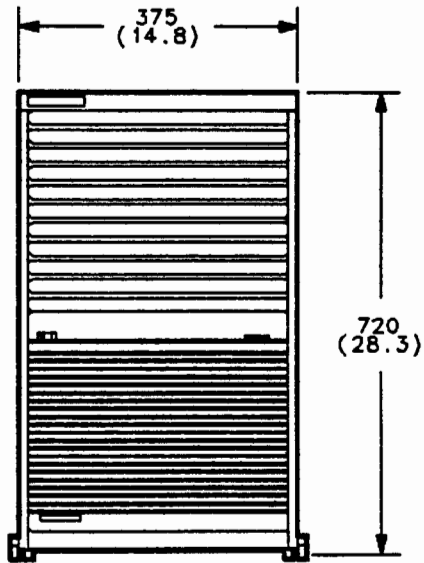


Figure 1-2. Disc Drive Dimensions





SIDE VIEW



FRONT VIEW

NOTE: DIMENSIONS ARE IN MM (IN.)

17937A14

Figure 1-3. HP 19511A Cabinet Dimensions

Table 1-1. Disc Drive Product Structure

**DISC DRIVE**

HP 7936H/7937H - 307/571 Mbyte Disc Drive, HP-IB Controller

HP 7936XP/7937XP - 307/571 Mbyte Disc Drive, HP-IB Controller with Cache

HP 7936FL/7937FL - 307/571 Mbyte Disc Drive, HP-FL Controller

**DRIVE OPTIONS**

015 - Configures drive for 50 Hz operation

017 - Configures drive for 200-240 Vac operation

1A4 - Includes the HP 19512A Rack Slide Kit for mounting a 7936/7937 Disc Drive in one of the following HP cabinets: 29453 series, 29431 series, and the HP 93561V cabinet.

**UPGRADE KITS**

HP 97520XP - HP-IB Cache Upgrade Kit. Upgrades an H-model drive to an XP-model drive.

HP 97522FL - HP-FL Controller Upgrade Kit. Upgrades an H- or XP-model drive to an FL-model drive.

**CABINETS**

HP 19511A - Desk-height Cabinet for up to two 7936/7937 Disc Drives.

HP 19514A - Cabinet for up to eight 7936/7937 Disc Drives.

**CABINET OPTIONS**

208 - Adds 07937-60214 Power Tap to HP 19511A Cabinet. Designed for environments using NEMA 6-30R power receptacles (208 Vac, 60 Hz). For USA only.

#### 1-4. DRIVE SPECIFICATIONS

Detailed specifications for the drive are provided in the *Disk Product Specifications and Site Environmental Requirements*, part no. 5955-3456. This publication is supplied with the drive.

#### 1-5. SUPPORTING DOCUMENTATION

The following supporting documentation for the drive may be ordered from your nearest Hewlett-Packard Sales and Support Office:

- *HP 7936 and HP 7937 Disc Drive Hardware Support Manual*, part no. 07937-90903
- *CS/80 Instruction Set Programming Manual*, part no. 5955-3442
- *CS/80 External Exerciser Manual*, part no. 5955-3462
- *HP 7936/7937 CE Handbook*, part no. 07937-90905

#### 1-6. WARRANTY

The drive is covered by a standard Hewlett Packard warranty. However, this warranty is voided if the sealed head-disc assembly is opened or otherwise tampered with. The warranty does not include installation or rack mounting.

#### 1-7. SUPPORT STRATEGY

The drive may be repaired on site to the field replaceable assembly level. Troubleshooting is aided by self-test diagnostic routines resident in the drive firmware. Hardware failures isolated during the self-test diagnostics are encoded and displayed on the front panel LEDs. The drive also maintains an internal log used to record errors and faults detected during self-test and normal operation. This fault log information, as well as additional troubleshooting capabilities, are available through the use of an external exerciser or other host-supported diagnostic program.

## 2-1. INTRODUCTION

### WARNING

The drive must be installed by service-trained personnel only. To prevent electrical shock, refer all installation and maintenance activities to service-trained personnel. This includes cabling and connection to host systems.

This chapter contains the information needed by a service-trained person to install, set up, and check out operation of the drive in an HP 19511A Cabinet, an HP 19514A Cabinet, or an EIA 19-inch rack cabinet. Also included in the section are repacking instructions for the drive and HP 19511A Cabinet. These instructions should be retained for future use.

For drive servicing information, refer to the *HP 7936 and HP 7937 Disc Drive Hardware Support Manual*, part no. 07937-90903. For environmental information relating to drive installation, refer to the *Disk Product Specifications and Site Environmental Requirements*, part no. 5955-3456.

## 2-2. SITE PREPARATION

The site must be prepared in accordance with the information provided in the *Disk Product Specifications and Site Environmental Requirements*, part no. 5955-3456.

The drive is designed to operate within the environmental limits specified in the above mentioned manual. These specifications were type-tested under controlled conditions. Hewlett-Packard maintains an active program of auditing production products to ensure these specifications remain true when products are tested again under the same conditions. The limits of these specifications do not represent optimum

conditions for long, trouble-free operation and are not recommended for maximum customer satisfaction. The recommended conditions are stated separately where applicable. For additional details, refer to the *Disk Product Specifications and Site Environmental Requirements*.

## 2-3. TOOLS AND TEST EQUIPMENT REQUIRED

The tools and test equipment needed for installation of the drive are described in the next two paragraphs.

## 2-4. HAND TOOLS

### NOTE

TORX\* hardware is used extensively in the drive and cabinet. Removal and installation of this hardware requires the use of special TORX drivers. Any reference to this type of hardware will be accompanied by the appropriate driver size, for example T15.

The hand tools required to install the drive in a cabinet are listed below:

- TORX driver, with T9, T10, T15, and T30 bits
- flat-blade screwdriver, 3/16 by 9 inches long

## 2-5. TEST EQUIPMENT

Test equipment capable of accurately measuring the limits of the environmental specifications is required during installation of the drive.

\*TORX is a registered trademark of the Camcar Division of Textron, Inc.

## 2-6. UNPACKING AND INSPECTION

The drive is shipped in a reusable container. See figure 2-1. When the shipment arrives, ensure that the container has been received as specified by the carrier's bill of lading. Inspect the shipping container immediately upon receipt for evidence of mishandling during transit. If the container is damaged or water-stained, request that the carrier's agent be present when the container is unpacked.

The HP 19511A Cabinet is also shipped in a reusable container. See figure 2-2. Inspect this container in a similar manner. Instructions for unpacking the HP 19514A Cabinet are contained in the *HP 19514A Cabinet Installation and Service Manual*, part no. 19514-90902.

If the container(s) in the shipment appears to be in a satisfactory condition, proceed with the unpacking of its contents, as described in the following paragraphs.

## 2-7. UNPACKING THE DRIVE

### CAUTION

To avoid damage to the drive, do not apply any sudden mechanical shocks to it.

### CAUTION

The drive is fitted with a shipping latch. See figure 3-1. This latch must remain in the 0 (Ship) position until the drive is installed at its operating location and is ready for the application of power.

- a. Remove the packing list from the shipping carton and compare this list with the purchase order. Verify that the shipment is correct.
- b. Cut the container polystrap bands. See figure 2-1.
- c. Lift the corrugated carton from the shipping pallet.
- d. Remove the protective cover and equipment boxes.
- e. Remove the plastic bag from the drive.
- f. Move the shipping pallet to a location adjacent to the front of the cabinet or rack cabinet in which the drive is to be installed.

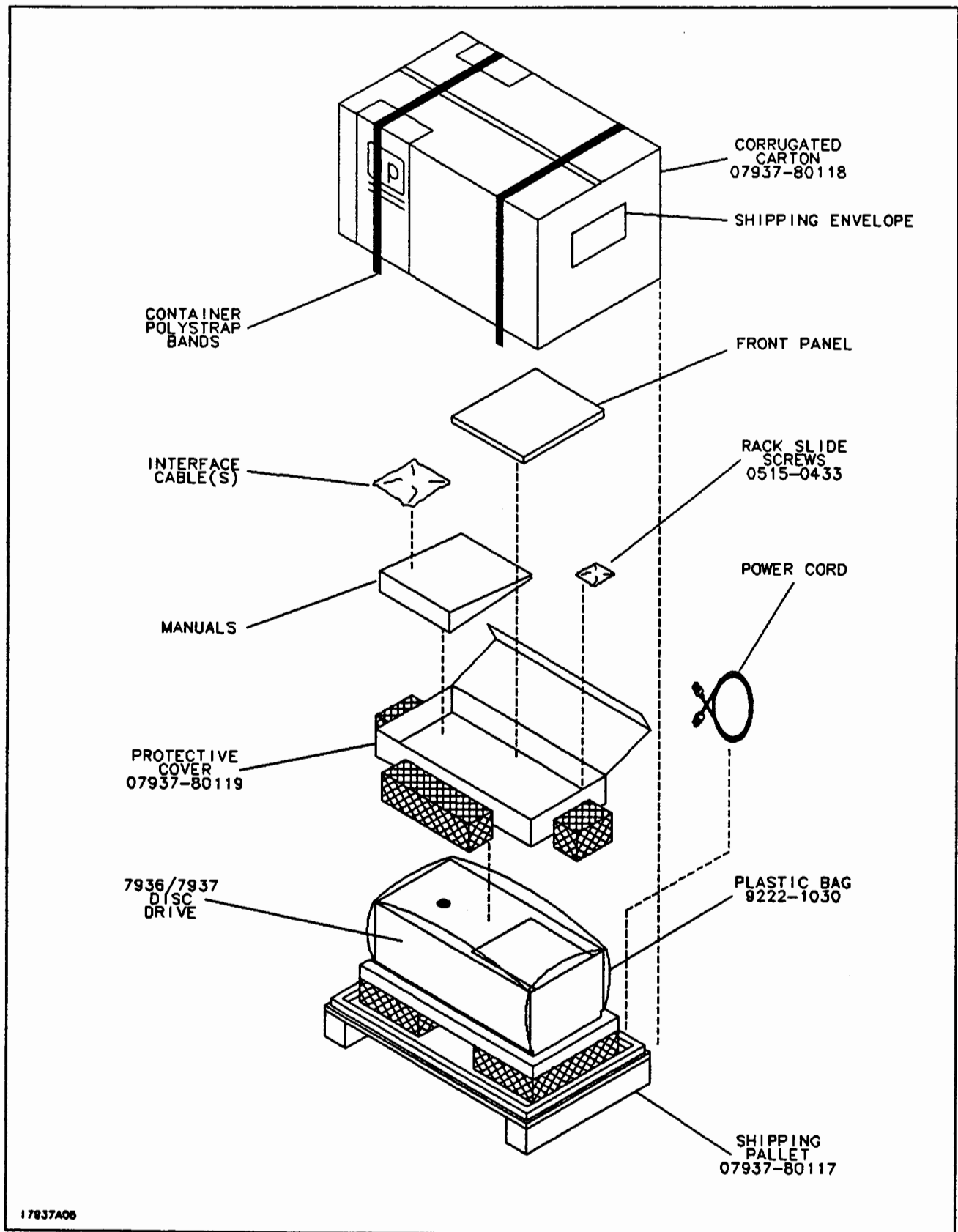
### WARNING

The drive weighs approximately 56.7 kg (125 lb). During installation, do not attempt to lift the drive from the pallet without the use of lifter tool, part no. 07937-60141.

- g. The drive is lifted from the shipping pallet with lifter tool, part no. 07937-60141. The use of this tool is described in the drive installation procedure.

## 2-8. UNPACKING THE HP 19511A CABINET

- a. Cut the container polystrap bands. See figure 2-2.
- b. Lift the corrugated carton from the shipping pallet.



17837A08

Figure 2-1. Drive Shipping Container

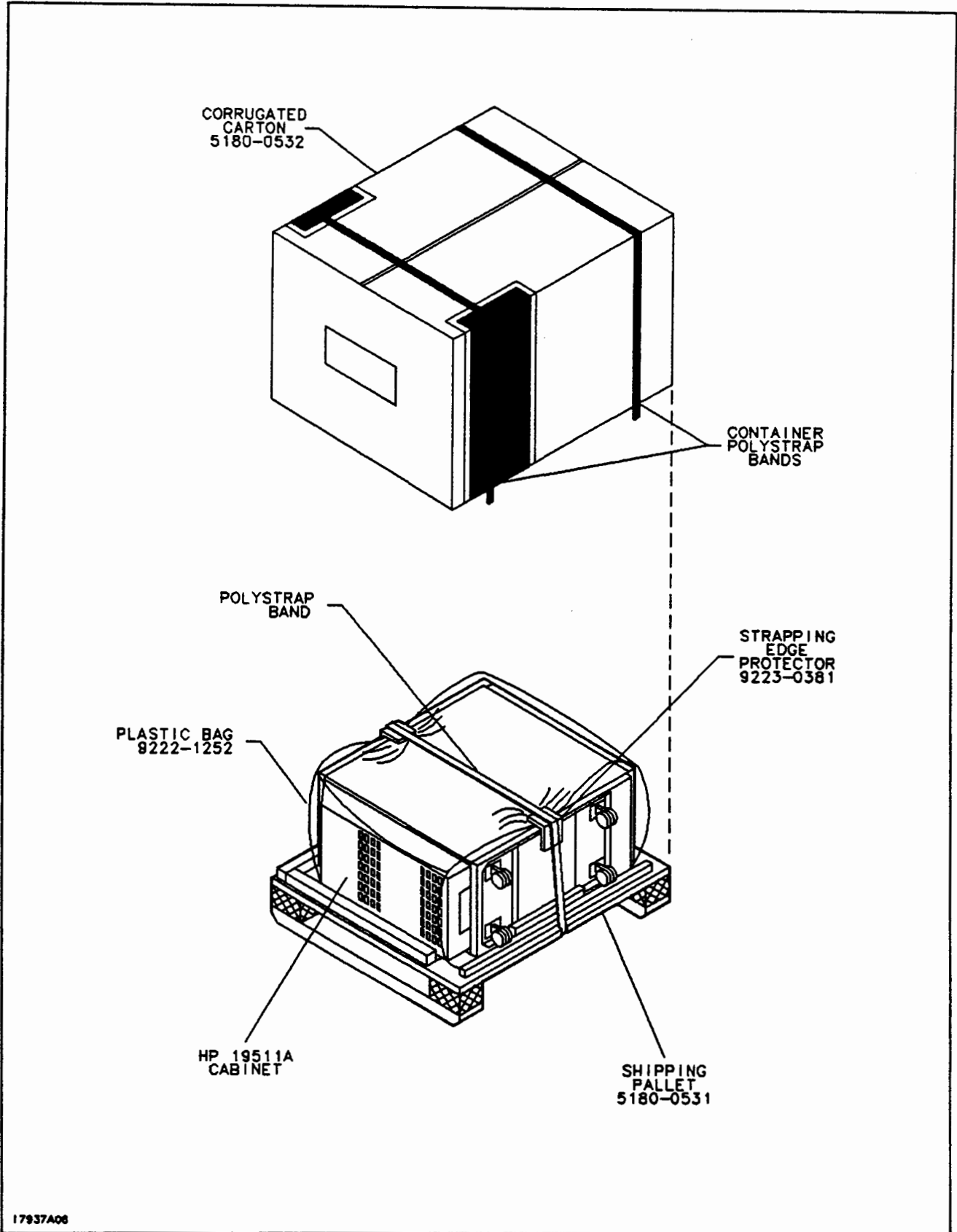


Figure 2-2. HP 19511A Cabinet Shipping Container

- c. Lift the pallet up until the casters on the cabinet are resting on the floor, as shown in figure 2-3.
- d. Cut the polystrap band that secures the cabinet to the pallet.
- e. Separate the cabinet from the pallet.
- f. Remove the plastic bag from the cabinet.
- g. Visually inspect the cabinet for damage.
- h. If the visual inspection reveals any damage to the cabinet, follow the claims procedure outlined in the next paragraph.
- i. Move the cabinet to its operating location.
- j. Retain the cabinet packaging and shipping material for future use.

## 2-9. CLAIMS PROCEDURE

### WARNING

To avoid dangerous electrical shock, do not apply power to the drive when there are any signs of physical damage to its outer enclosure.

If the shipment is incomplete or if the equipment is damaged or fails to meet specifications, notify your nearest Hewlett-Packard Sales and Support Office. If damage occurred in transit, notify the carrier as well. Hewlett-Packard will arrange for replacement or repair without waiting for settlement of claims against the carrier. In the event of damage in transit, retain the shipping container(s) and packaging material for inspection.

## 2-10. MANUALS

The following manuals are supplied with the drive:

- *HP 7936 and 7937 Disc Drive Operating and Installation Manual*, part no. 07937-90902
- *Disk Product Specifications and Site Environmental Requirements*, part no. 5955-3456.

## 2-11. MANUAL UPDATING

Before installing and operating the drive, read all of the updating supplements for the drive manuals and any related manuals. Updating supplements (if any) are supplied with the appropriate manuals.

## 2-12. COOLING REQUIREMENTS

### CAUTION



To obtain maximum cooling efficiency from the fan, ensure that the location chosen for the drive permits the free flow of air through the front and rear panels. The rear of the drive should be at least 152 mm (6 inches) from the nearest obstruction.

Air is circulated through the drive by a squirrel-cage fan driven by the spindle motor. The impeller of the fan is attached to the motor shaft at the end opposite the motor pulley. See figure 2-4. Air is drawn into the drive through slots in the front panel and exhausted through openings in the rear panel. The air circulation path through the fan and the interior of the drive is shown in figure 2-4.



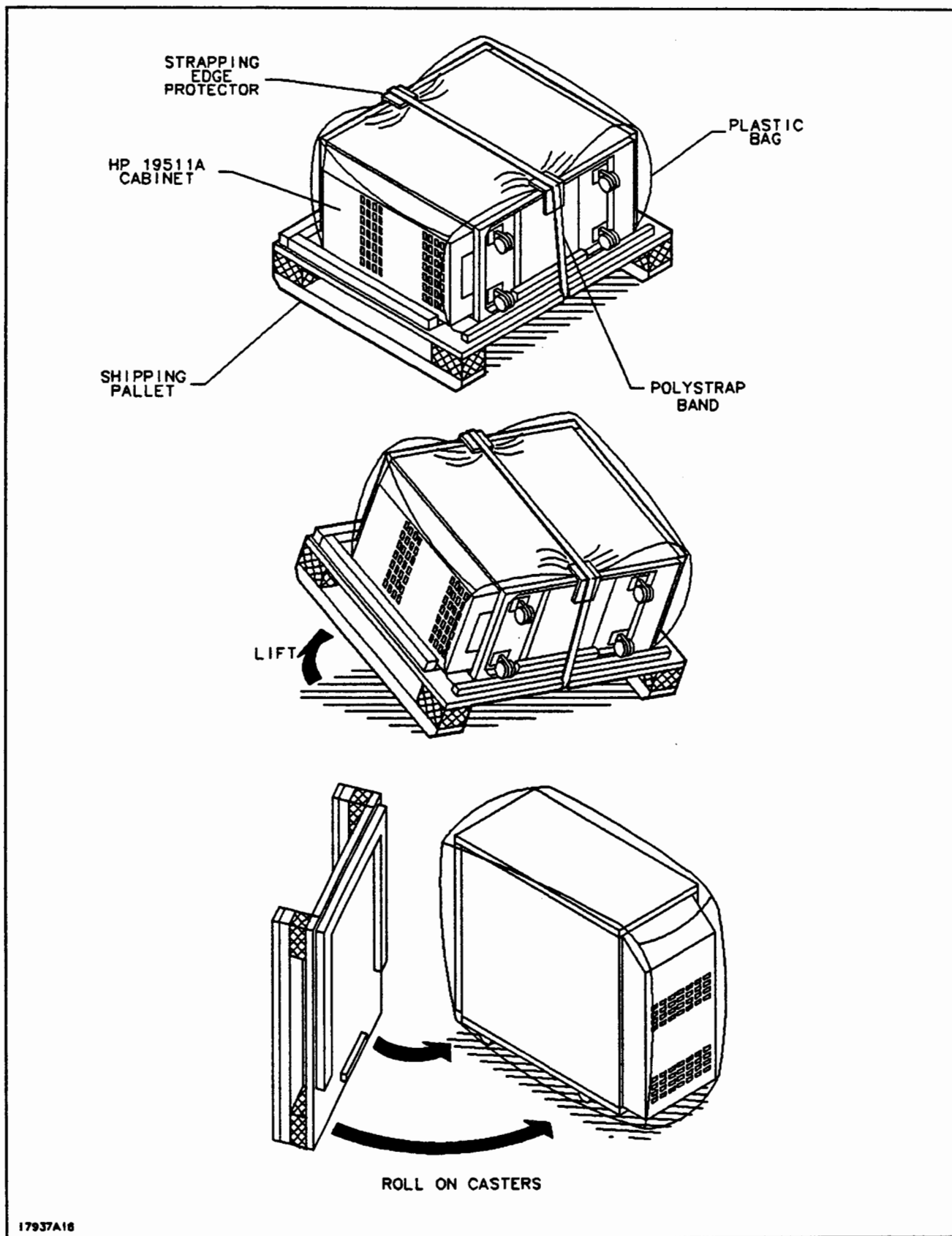


Figure 2-3. HP 19511A Cabinet Unpacking Details

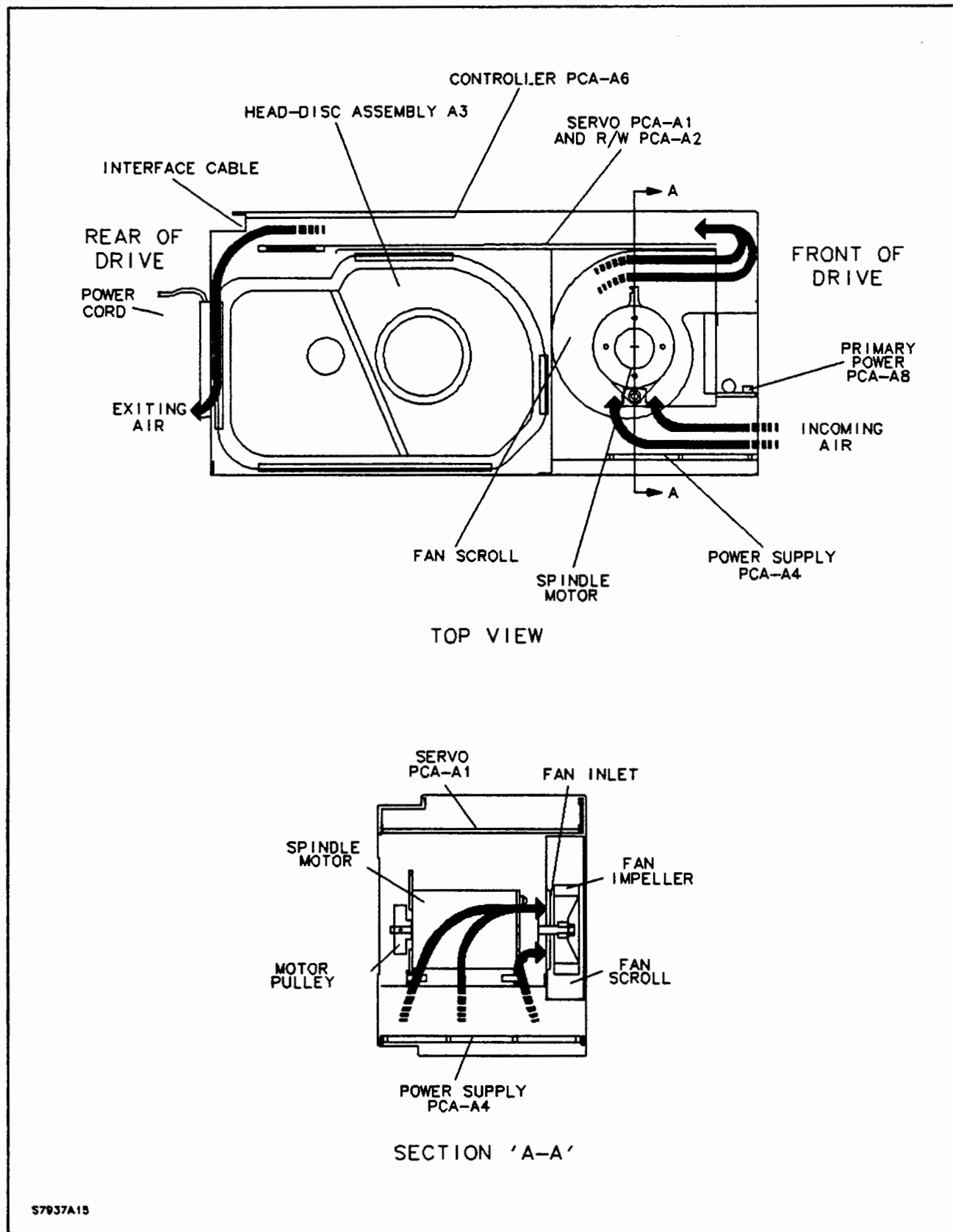


Figure 2-4. Airflow Within Drive

To ensure adequate airflow, the rear of the drive should be at least 152 mm (6 inches) from the nearest solid surface. To allow for servicing, position the drive so that there is at least 914 mm (36 inches) of clear space in front of the drive.

## 2-13. DRIVE INSTALLATION

Two drives can be installed in the HP 19511A Cabinet, and up to eight drives can be installed in an HP 19514A Cabinet. Up to four drives can be installed in an EIA 19-inch rack cabinet using HP 19512A Rack Slide Adapter Kits. A special lifter tool, part no. 07937-60141, allows one person to install the drive.

### CAUTION

The drive is fitted with a shipping latch. See figure 3-1. This latch must remain in the 0 (Ship) position until the drive is installed at its operating location and is ready for the application of power.

### CAUTION

If the drive has been exposed to extreme temperatures during shipping, allow a minimum of 12 hours for the drive to stabilize at room temperature before installation.

## 2-14. INSTALLATION IN HP 19511A CABINET

### WARNING

The anti-tip feet on the cabinet must be extended before the drive is installed in the cabinet. Failure to observe this precaution could result in injury to personnel and/or equipment damage.

### WARNING

Following installation of the drive in the cabinet, a mechanical interlock system in the cabinet requires that the anti-tip feet be extended before the drive can be withdrawn on the rack slides. Do not attempt to bypass this safety feature.

## 2-15. CABINET PREPARATION

To prepare the cabinet for installation of the drive, proceed as follows:

- a. Lift the rear end of the cabinet top panel to release it from the frame of the cabinet. Remove the top panel. See figure 2-11, part 1.
- b. Loosen the two captive screws that secure the right-hand side panel to the cabinet frame and remove the panel.
- c. Remove the left-hand side panel from the cabinet.
- d. Grasp the two catches at the top of the rear panel and pull on the panel to release it from the frame of the cabinet. Remove the panel from the cabinet.

### NOTE

Steps e and f are required only when preparing a new cabinet for drive installation.

- e. Remove the two wooden braces taped to the upper set of rack slides.
- f. Remove the cabinet spacer from each end of the cabinet. Each spacer is easily removed by moving it toward the center of the cabinet, rotating it 90-degrees, then lifting it out the top of the cabinet.

**NOTE**

Retain the wooden braces and cabinet spacers for use when repackaging the cabinet.

- g. Lower the four leveling pads on the base of the cabinet until they contact the floor. Ensure that the cabinet is level and can no longer roll on its casters.
- h. Loosen the two screws that secure the right-hand anti-tip foot to the cabinet.
- i. Extend the anti-tip foot until the locking bar falls into the groove in the anti-tip foot rail.
- j. Tighten the two screws that secure the anti-tip foot to the cabinet.
- k. Lower the leveling pad on the anti-tip foot until it makes contact with the floor.
- l. Extend the left-hand anti-tip foot in a similar manner, following the instructions given in steps g through j.
- m. Cut the plastic tie-wraps used to immobilize the rack slides during shipment.

## 2-16. LIFTER TOOL ATTACHMENT AND DRIVE UNLOADING

Lifter tool, part no. 07937-60141, raises the drive from the shipping pallet and holds it in position so that the rack slides in the cabinet can be secured to the sides of the drive. To attach this tool to the cabinet, check its adjustment, and unload the drive, proceed as follows:

- a. Loosen the leg lock on the lifter tool and set the retractable legs to their extended position. Tighten the leg lock. See figure 2-11, part 2.
- b. Loosen the extension lock and extend the length of the tool until the end of the outer section lines up with the "A" marking on the inner section.
- c. Center the tool on top of the cabinet and secure it to the rear of the cabinet with the rear lock. Tighten the rear lock.

- d. Check that the retractable legs are resting firmly on the front of the cabinet. Tighten the extension lock.
- e. Carefully locate the drive shipping pallet over the cabinet anti-tip feet, with the drive at right-angles to the front of the cabinet.
- f. Attach the captive screws on the lifting straps to the lifting points on the drive.

**NOTE**

The three lifting straps are color coded. Ensure that the straps are attached as shown in figure 2-11, part 2.

- g. Raise the drive one-half inch by turning the lifter tool handle clockwise.
- h. Check the adjustment of the lifter tool by slowly releasing the handle and ensuring that the drive remains elevated with no signs of slippage. Tap the handle counter-clockwise and again check that the drive is properly supported.
- i. If the lifter tool is properly adjusted, proceed to step j and continue with the drive unloading procedure. If the lifter tool does not support the drive properly, the tool clutch must be adjusted before proceeding. To adjust the lifter tool, proceed as follows:
  - 1) Remove the five T20 screws securing the lifter tool clutch cover. See figure 2-11, part 2. Remove the cover.
  - 2) Use the 5/16-inch allen screws to adjust the tension on the clutch until steps g and h can be performed successfully. See figure 2-11, detail C. Do not apply too much tension to the clutch or it will be difficult to turn the tool handle to lower the drive.
  - 3) Using the five T20 screws, install the clutch cover.
- j. Turn the handle on the tool clockwise until the drive is raised clear of the shipping pallet.

Remove the pallet from the front of the cabinet.

- k. Visually inspect the drive for damage.
- l. If visual inspection reveals any damage to the drive, follow the claims procedure outlined in paragraph 2-9.
- m. Retain the shipping carton and packing for possible future use.

## 2-17. DRIVE INSTALLATION

### CAUTION

In a single drive installation, the drive should be installed in the bottom of the cabinet. This ensures maximum cabinet stability and allows the most efficient use of the 1-metre HP-IB interface cable.

To install the drive in the cabinet, proceed as follows:

- a. Raise the drive until it is slightly above the level of the rack slides in the cabinet. See figure 2-11, part 3.
- b. Pull the rack slides out of the cabinet until they are fully extended and the slide locks engage.

### CAUTION

The tabs on the ends of the rack slides must engage the slots in the drive mainframe before the full weight of the drive is placed on the rack slides. Failure to observe this precaution may result in damage to the rack slides.

- c. Lower the drive until the tabs on the ends of the rack slides engage in the slots at the bottom of the drive mainframe. See figure 2-11, part 3. It may be necessary to push down on the front

of the drive and move it forward or back in order to engage the tabs in the slots.

- d. Lower the drive until its full weight is resting on the rack slides.
- e. Attach the right-hand rack slide to the side of the drive with four of the T15 screws supplied with the drive. (The screws are located in the protective cover. See figure 2-1.)
- f. Attach the left-hand rack slide to the drive in a similar fashion.
- g. After the slides are securely attached to the drive, detach the lifting straps from the drive. To obtain enough slack to detach the lifting straps, pull down on the left-hand rope between the end of the tool and the pulley assembly.
- h. Insert the tip of a small flat-blade screwdriver through the hole in the right-hand locking bar and turn the locking pin counter-clockwise until it is fully retracted.
- i. Retract the locking pin in the left-hand side of the cabinet in a similar fashion.
- j. Depress the slide locks and slide the drive into the cabinet.
- k. Turn the two locking pins clockwise until they are fully extended.

### NOTE

The locking pins engage in holes on the sides of the drive. It may be necessary to move the drive back and forth slightly until a position is reached where the pins can be inserted into the holes.

- l. Check that the locking pins now prevent the drive from being withdrawn from the cabinet.
- m. If a second drive is to be installed, repeat steps a through l.
- n. Remove the lifter tool from the cabinet.

- o. If only one drive has been installed, fill in the empty space at the front of the cabinet with the eleven filler panels supplied with the cabinet. See figure 2-5 for details of filler panel installation.
- p. Unpack the drive front panel from the carton contained in the protective cover of the drive shipping container. See figure 2-1.
- q. Install the front panel on the drive.
- r. Raise the leveling pad on the right-hand anti-tip foot.
- s. Loosen the two screws that secure the anti-tip foot to the cabinet.
- t. Raise the right-hand locking bar and simultaneously push in the anti-tip foot until it is fully retracted.
- u. Tighten the two screws that secure the anti-tip foot to the cabinet.
- v. Similarly retract the left-hand anti-tip foot following the instructions given in steps t through w.
- w. Reinstall the side panels on the cabinet.

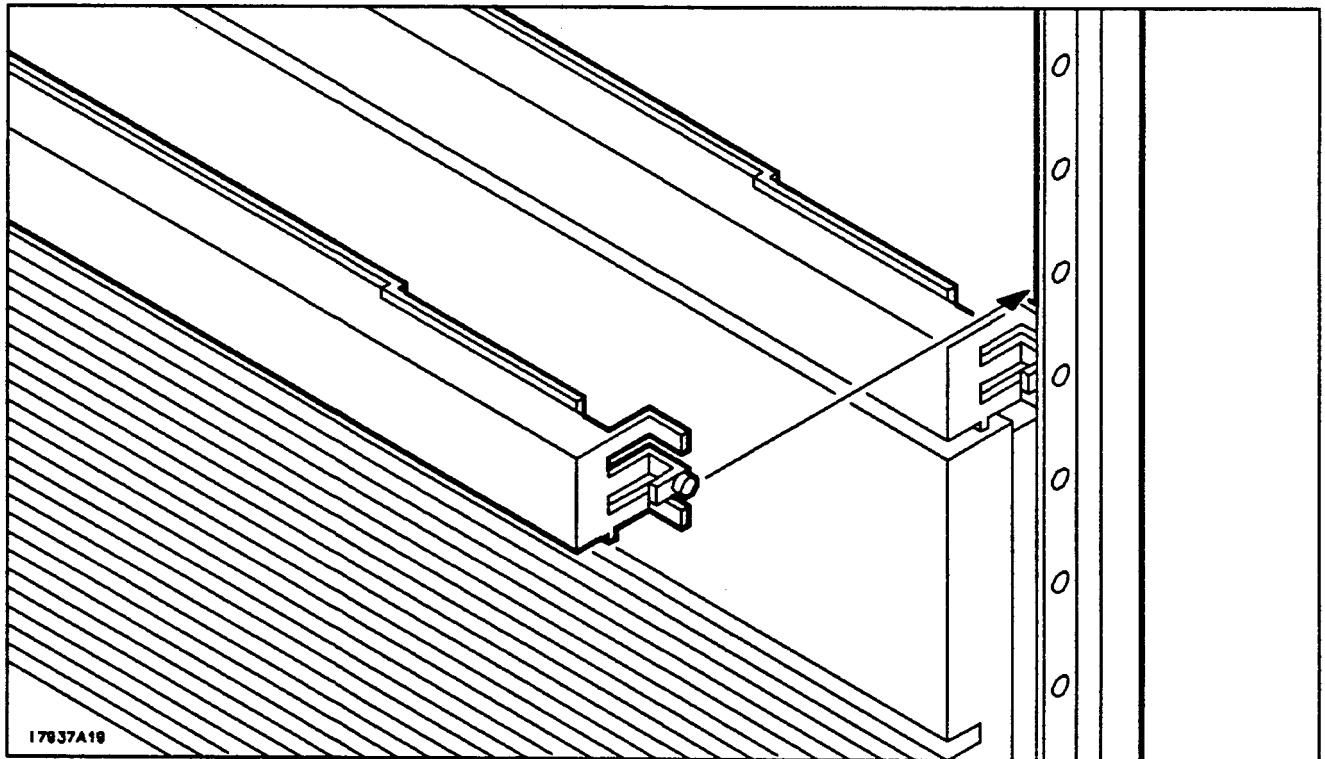


Figure 2-5. Cabinet Filler Panels, Installation Details

## 2-18. INSTALLATION OF POWER TAP (HP 19511A CABINET OPTION 208)

### NOTE

Option 208 is intended for use only within the United States.

Option 208 to the HP 19511A Cabinet includes the 07937-60214 Power Tap. The power tap is intended for use when installing HP 7936/7937 Disc Drives in environments using NEMA 6-30R power receptacles (208 Vac, 60 Hz). When using the power tap, two HP 7937/7936 Disc Drives may be operated off a single NEMA 6-30R power receptacle. The power tap is designed for installation on the rear of the HP 19511A Cabinet.

### WARNING

For continued protection against risk of fire, replace fuse only with the same type and rating of fuse.

The power tap is protected by two 15 amp branch-circuit protection fuses (Bussman part number KTK-R-15). Two extra replacement fuses are included with the power tap.

To install the power tap on the rear of the HP 19511A Cabinet, proceed as follows:

- a. Loosen the two mounting screws on the rear panel of the cabinet (see figure 2-6).
- b. Slide the power tap mounting slots onto the screws. Orient the power tap as shown in figure 2-6.
- c. Tighten the two mounting screws.
- d. Plug the drive power cord(s) into the receptacle(s) on the power tap.

- e. Plug the power tap NEMA 6-30P connector into an available power source.

## 2-19. EIA RACK CABINET SELECTION

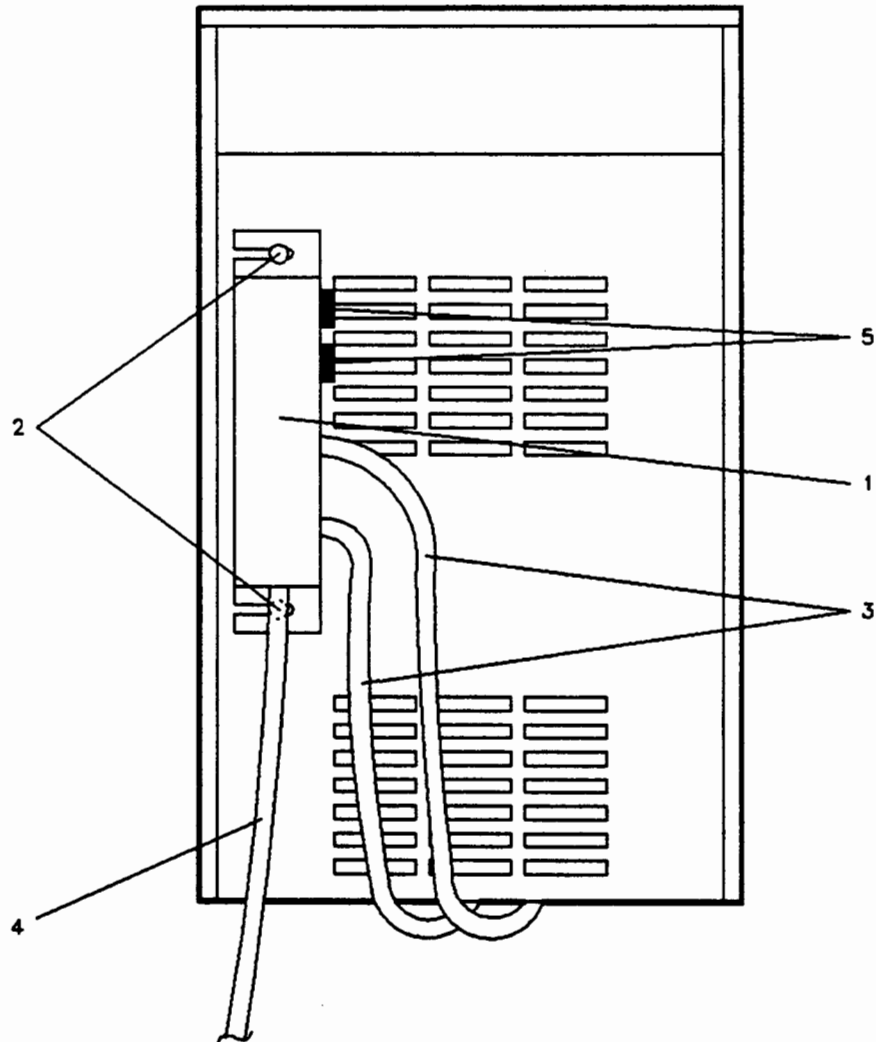
### CAUTION

Hewlett-Packard has not requalified the operation of the HP 7936/HP 7937 Disc Drive in *any* 19-inch EIA rack cabinets. To ensure that the drive meets its operating specifications and characteristics, the drive must be operated within the environmental limits specified in the *Disk Product Specifications and Site Environmental Requirements*, part number 5955-3456.

The HP 19512A Rack Slide Adapter Kit may be used to install up to four drives in the following HP cabinets: 29453-series cabinets, 29431-series cabinets, and the HP 93561V Cabinet (a standard HP-designed 1600-mm cabinet supplied without front door, rear door, or PDU). When installing HP 7936/HP 7937 Disc Drives in these cabinets, the cabinet doors must be removed to ensure adequate airflow. Also, the drives should not be operated from the cabinet PDU. Instead, the drive power cords should be routed out the rear of the cabinet to separate receptacles.

When using a 19-inch EIA rack cabinet other than those mentioned above, the cabinet must meet the following design criteria:

- The cabinet mounting hole spacing must accommodate the rack adapters supplied with the HP 19512A Rack Slide Adapter Kit. The adapters require standard universal vertical spacing, and a horizontal hole spacing from front to rear columns of 24 inches (609.6 mm).
- The cabinet must be capable of accepting lifter tool, part no. 07937-60141.
- The cabinet must include anti-tip feet which



1. POWER TAP
2. MOUNTING SCREWS (2)
3. DISC DRIVE POWER CORDS
4. POWER TAP CORD
5. FUSES

17837A22

Figure 2-6. Power Tap Installation On HP 19511A Cabinet



- If the drive(s) will be powered by a cabinet PDU, the PDU must be capable of handling the electrical load presented by the drive(s).
- Cabinet and anti-tip feet must be designed and constructed to safely support a minimum weight of 317.5 kg (700 lb).
- Any front and rear doors used on the cabinet must not restrict airflow through the drives.

## 2-20. INSTALLATION IN EIA RACK CABINET

### WARNING

The anti-tip feet on the cabinet must be extended before the drive is installed. Failure to observe this precaution could result in injury to personnel and/or equipment damage.

### WARNING

Drives must be installed in the lowest possible positions in the cabinet. Light-weight equipment mounted in the lower portions of the cabinet should be relocated to allow the drives to be mounted as low as possible in the cabinet.

### WARNING

Following installation of the drive, retainers on the rack adapters prevent the drive from being withdrawn from the cabinet on its rack slides. The cabinet anti-tip feet must be extended before these retainers are removed.

### WARNING

Do not extend more than one drive at a time on its rack slides, and do not leave the extended drive unattended.

### CAUTION

The drive must be installed by service trained personnel only, using lifter tool, part no. 07937-60141.

## 2-21. RACK PREPARATION

Before the drive can be installed, the adapters in the HP 19512A Rack Slide Adapter Kit must be installed in the cabinet and the drive rack slides attached to the adapters. To install these items, proceed as follows:

- a. Extend the anti-tip feet on the cabinet to their operating position (see figure 2-12).
- b. Lower the cabinet leveling pads and anti-tip feet leveling pads until the cabinet is level and can no longer roll on its casters.
- c. Using figure 2-12, locate and mark the proper adapter mounting holes on the inside of each cabinet column. There are a total of eight mounting holes, two on each column.

### NOTE

Hole positions are counted starting from the bottom of the cabinet.

- d. Attach eight sheetmetal nuts to the inside of the cabinet columns at the hole positions identified in the previous step.
- e. Attach a rack slide adapter to the cabinet left-hand front and rear columns with four of the T25 screws supplied with the adapter kit. Ensure that the end of the adapter with the two retainer mounting holes faces toward the front of the cabinet. See figure 2-12, detail A.

**NOTE**

To facilitate installation, three of the mounting holes (two rear, one front) on each adapter are keyhole slots. This allows the three corresponding mounting screws to be threaded into the cabinet columns before the adapter is placed in position. The fourth mounting screw ensures proper positioning of the adapter.

- f. Attach a rack slide adapter to the right-hand columns of the cabinet in a similar fashion.
- g. Remove the drive rack slides from the rack slide adapter kit. Check that there is a left-hand rack slide, part no. 07937-80083 and a right-hand rack slide, part no. 07937-80098 in the kit. The part numbers are marked on the slides.
- h. Attach left-hand rack slide, part no 07937-80083, to the adapter on the left-hand side of the cabinet with two of the T15 screws supplied with the slides. See figure 2-12, detail A.
- i. Attach right-hand rack slide, part no. 07937-80098, to the adapter on the right-hand side of the cabinet in a similar fashion.
- j. Push the rack slides into the cabinet.
- k. If additional drives are to be installed in the cabinet, repeat steps c through j as required.

**2-22. LIFTER TOOL ATTACHMENT AND DRIVE UNLOADING**

Lifter tool, part no. 07937-60141, raises the drive from the shipping pallet and holds it in position so that the rack slides installed in the cabinet can be secured to the sides of the drive. The lifter tool is shown in figure 2-12.

To attach the lifter tool to the cabinet, adjust the tool, and unload the drive, proceed as follows:

- a. Check that the retractable legs on the lifter tool are set to their retracted position.

**NOTE**

If a drive is to be installed at the highest position in the cabinet, it will be necessary to lock the tool's retractable legs in their extended position. This provides the additional height needed to raise the drive to the proper level for installation.

- b. Loosen the extension lock and extend the length of the tool until the end of the outer section lines up with the "B" marking on the inner section. Tighten the extension lock.
- c. Center the tool on top of the cabinet and secure it to the rear of the cabinet with the rear lock. Tighten the rear lock.
- d. Carefully locate the drive shipping pallet in front of the cabinet, with the drive at right-angles to the cabinet.
- e. Attach the captive screws on the lifting straps to the lifting points on the drive.

**NOTE**

The three lifting straps are color coded. Ensure that the straps are attached as shown in figure 2-12.

- f. Raise the drive one-half inch by turning the lifter tool handle clockwise.
- g. Check the adjustment of the lifter tool by slowly releasing the handle and ensuring that the drive remains elevated with no signs of slippage. Tap the handle counter-clockwise and again check that the drive is properly supported.

**CAUTION**

h. If the lifter tool is properly adjusted, proceed to step i and continue with the drive unloading procedure. If the lifter tool does not support the drive properly, the tool clutch must be adjusted before proceeding. To adjust the lifter tool, proceed as follows:

- 1) Remove the five T20 screws securing the lifter tool clutch cover. See figure 2-12. Remove the cover.
- 2) Use the 5/16-inch allen screws to adjust the tension on the clutch until steps f and g can be performed successfully. See figure 2-12, detail C. Do not apply too much tension to the clutch or it will be difficult to turn the tool handle to lower the drive.
- 3) Using the five T20 screws, install the clutch cover.

i. Turn the handle on the tool clockwise until the drive is raised clear of the shipping pallet. Remove the pallet from the front of the cabinet.

j. Visually inspect the drive for damage.

k. If visual inspection reveals any damage to the drive, follow the claims procedure outlined in paragraph 2-9.

l. Retain the shipping carton and packing for possible future use.

## 2-23. DRIVE INSTALLATION

To install the drive in the cabinet, proceed as follows:

- a. Raise the drive until it is slightly above the level of the rack slides installed in the cabinet.
- b. Pull the rack slides out of the cabinet until they are fully extended and the slide locks engage.

The tabs on the ends of the rack slides must engage the slots in the drive mainframe before the full weight of the drive is placed on the rack slides. Failure to observe this precaution may result in damage to the rack slides.

- c. Lower the drive until the tabs on the ends of the rack slides engage in the slots at the bottom of the drive mainframe. See figure 2-12, detail B. It may be necessary to push down on the front of the drive and move it forward or back in order to engage the tabs in the slots.
- d. Lower the drive until its full weight is resting on the rack slides.
- e. Attach the right-hand rack slide to the side of the drive with four of the T15 screws supplied with the drive. The screws are packed in the protective cover included with the drive shipping container.
- f. Attach the left-hand rack slide to the drive in a similar fashion.

**WARNING**

**The drive must be securely fastened to the rack slides before the straps on the lifter tool are removed from the drive.**

- g. After the slides are securely attached to the drive, detach the lifting straps from the drive. To obtain enough slack to detach the straps, pull down on the left-hand rope between the end of the tool and the pulley assembly.
- h. Depress the slide locks and slide the drive into the cabinet.
- i. Install a retainer on the left-hand rack slide using the two T15 screws provided. Ensure that the retainer is positioned directly against the end of the rack slide, and that the retainer prevents the drive from being pulled out of the cabinet.

- j. Install a retainer on the right-hand rack slide in the same fashion.
- k. Unpack the drive front panel from the carton contained in the protective cover of the drive shipping container.
- l. Install the front panel on the drive.
- m. Using figure 2-12, locate and mark the four holes on the front cabinet columns used to mount the trim panel.

**NOTE**

Hole positions are counted starting from the bottom of the cabinet.

- n. Attach four sheet metal nuts to the front of the cabinet columns at the hole positions identified in the previous step.
- o. Install the trim panel using the four T25 screws provided. If necessary, adjust the panel for proper fit before tightening in place.
- p. If additional drives are to be installed, repeat steps a through o.
- q. Remove the lifter tool from the cabinet.

## 2-24. INSTALLATION IN HP 19514A CABINET

**WARNING**

To maintain cabinet stability, the drives must be installed in the proper pattern. For information on installing the drives in the proper pattern, refer to the *HP 19514A Cabinet Installation and Service Manual*, part no. 19514-90902.

Do not defeat the cabinet interlock system hardware or the drive(s) will be free to slide out of the cabinet.

If fewer than eight drives will be installed in the cabinet, the drives must be installed in the lowest possible positions in the cabinet.

Following installation of the drives, the cabinet may be moved short distances on its casters for proper positioning. However, do not move a loaded cabinet long distances over rough surfaces or down an incline. After positioning a loaded cabinet, the leveling feet must be lowered to ensure cabinet stability.

**CAUTION**

The drive must be installed by service trained personnel only, using lifter tool, part no. 07937-60141.

Drives installed in the cabinet must be configured for 186-264 Vac operation. This allows the drives to be operated from the cabinet PDU, which provides an output voltage of 220 Vac.

## 2-25. CABINET PREPARATION

To prepare the cabinet for installation of the drive(s), proceed as follows;

- a. Perform the cabinet installation procedure as defined in the *HP 19514A Cabinet Installation and Service Manual*, part no. 19514-90902.
- b. Open the front and rear cabinet doors using a 1/4-inch hex key.
- c. Remove the cabinet cap by removing the two T25 screws securing it to the cabinet. See figure 2-13.
- d. Remove the four cabinet doors by lifting them off their hinges.
- e. Cut the plastic tie-wraps used to immobilize the rack slides during shipment.

## 2-26. LIFTER TOOL ATTACHMENT AND DRIVE UNLOADING

Lifter tool, part no. 07937-60141, raises the drive from the shipping pallet and holds it in position so that the rack slides installed in the cabinet can be secured to the sides of the drive. The lifter tool is shown in figure 2-13.

To attach the lifter tool to the cabinet, adjust the tool, and unload the drive, proceed as follows:

- a. Loosen the leg locks on the lifter tool and set the retractable legs to their extended position. Tighten the leg locks.
- b. Insert the lifter tool into the appropriate set of mounting slots on top of the cabinet. See figure 2-13. There are separate sets of slots for the left half and right half of the cabinet.
- c. Secure the tool to the rear of the cabinet by tightening the rear lock.
- d. Loosen the extension lock and extend the length of the tool until the tool legs are positioned against the front cabinet channel. See figure 2-13. Tighten the extension lock.
- e. Carefully locate the drive shipping pallet in front of the cabinet, with the drive at right-angles to the cabinet.
- f. Attach the captive screws on the lifting straps to the lifting points on the drive.

### NOTE

The three lifting straps are color coded. Ensure that the straps are attached as shown in figure 2-13.

- g. Raise the drive one-half inch by turning the lifter tool handle clockwise.
- h. Check the adjustment of the lifter tool by slowly releasing the handle and ensuring that the drive remains elevated with no signs of slippage. Tap the handle counter-clockwise and again check that the drive is properly supported.

i. If the lifter tool is properly adjusted, proceed to step j and continue with the drive unloading procedure. If the lifter tool does not support the drive properly, the tool clutch must be adjusted before proceeding. To adjust the lifter tool, proceed as follows:

- 1) Remove the five T20 screws securing the lifter tool clutch cover. See figure 2-13. Remove the cover.
  - 2) Use the 5/16-inch allen screws to adjust the tension on the clutch until steps f and g can be performed successfully. See figure 2-13, detail B. Do not apply too much tension to the clutch or it will be difficult to turn the tool handle to lower the drive.
  - 3) Using the five T20 screws, install the clutch cover.
- j. Turn the handle on the tool clockwise until the drive is raised clear of the shipping pallet. Remove the pallet from the front of the cabinet.
- k. Visually inspect the drive for damage.
- l. If visual inspection reveals any damage to the drive, follow the claims procedure outlined in paragraph 2-9.
- m. Retain the shipping carton and packing for possible future use.

## 2-27. DRIVE INSTALLATION

To install the drive in the cabinet, proceed as follows:

- a. Raise the drive until it is slightly above the level of the desired set of rack slides.
- b. Position the interlock channel so the appropriate interlock slide is free to move side-to-side.

**NOTE**

All four interlock slides must be centered on the cabinet column to move the interlock channel.

- c. Move the interlock slide in the proper direction (left or right) until the inner rack slide can be extended.

**NOTE**

Drives installed in the left side of the cabinet must be slid all the way into the cabinet to allow the interlock slides to move fully to the left. To move the interlock slides fully to the right, drives installed in the right side of the cabinet must be pulled out slightly to allow the interlock slide to be positioned between the drive's front panel and its supporting rack slide.

- d. Pull both rack slides out of the cabinet until they are fully extended and the slide locks engage.

**CAUTION**

The tabs on the ends of the rack slides must engage the slots in the drive mainframe before the full weight of the drive is placed on the rack slides. Failure to observe this precaution may result in damage to the rack slides.

- e. Lower the drive until the tabs on the ends of the rack slides engage in the slots at the bottom of the drive mainframe. See figure 2-13, detail A. It may be necessary to push down on the front of the drive and move it forward or back in order to engage the tabs in the slots.
- f. Lower the drive until its full weight is resting on the rack slides.

- g. Attach the right-hand rack slide to the side of the drive with four of the T15 screws supplied with the drive. The screws are packed in the protective cover included with the drive shipping container.

- h. Attach the left-hand rack slide to the drive in a similar fashion.

**WARNING**

The drive must be securely fastened to the rack slides before the straps on the lifter tool are removed from the drive.

- i. After the slides are securely attached to the drive, detach the lifting straps from the drive. To obtain enough slack to detach the straps, pull down on the left-hand rope between the end of the tool and the pulley assembly.
- j. Depress the slide locks and slide the drive into the cabinet.
- k. Move the interlock slide back to its center position.
- l. If additional drives are to be installed, repeat steps a through k.
- m. Remove the lifter tool from the cabinet.
- n. Install the cabinet cap using two T25 screws.
- o. Install the front and rear doors on the cabinet.
- p. Install a front panel on each drive. The front panel is packed in the carton contained in the protective cover of the drive shipping container.
- q. Close the front cabinet doors and lock using a 1/4-inch hex key. Leave the rear cabinet doors open until the power cord and CPU connections have been made.

## 2-28. PREPARATION FOR OPERATION

### WARNING

To avoid dangerous electrical shock, do not perform any preparation for operation procedure with ac power connected to the drive.

### CAUTION

Do not operate the drive if condensation is evident anywhere on it. Wait until all condensation has evaporated before operating the drive. Failure to observe this caution could result in damage to the head-disc assembly.

The procedures described in the following paragraphs prepare the drive for operation. Included are instructions on how to unlock the shipping latch, check the input power configuration, make connection to the CPU, and perform an installation check. To ensure proper operation of the drive, all of the items listed in the procedures should be checked before placing the drive in operation.

## 2-29. UNLOCKING SHIPPING LATCH

Once the drive has been installed in its rack, the drive shipping latch must be unlocked. The operation of the shipping latch is described in detail in paragraph 3-17.

### CAUTION

The shipping latch must remain in the 0 (Ship) position until the drive is installed at its operating location and is ready for the application of power.

To unlock the shipping latch, proceed as follows:

- a. Using figure 3-1, locate the shipping latch. It is visible through a rectangular opening in the rear panel.
- b. Insert a medium-sized flat-blade screwdriver through the rear panel opening.
- c. Move the shipping latch to the 1 (Operate) position.

### NOTE

If the latch is inadvertently moved to the 0 (Ship) setting after power has been applied to the drive, the latch may overshoot the 0 (Ship) setting. (The latch is in an overshoot state if the 0 (Ship) symbol moves to the right, past the range of visibility of the rectangular opening.) Refer to paragraph 3-17 for information on recovering from an overshoot condition.

## 2-30. AC POWER OUTLET

The ac power outlet to be used to supply power to the drive should be checked by a qualified electrician with an ac voltmeter to ensure that the proper voltage is present. (The drive power requirements are marked on the ~LINE label on the rear cover of the drive.) Also, the earth or safety ground in the power outlet should be checked to ensure that there is a good earthed ground (properly grounded ac outlet).

For detailed information regarding site power specifications and drive power requirements, refer to the *Disk Product Specifications and Site Environmental Requirements*, part no 5955-3456.

**WARNING**

**2-31. PRIMARY POWER REQUIREMENTS**

**CAUTION**

Do not operate a drive configured for 90-132 Vac on 180-264 Vac, or vice versa. Also do not operate a drive configured for 60 Hz on 50 Hz, or vice versa. Failure to observe these precautions may result in damage to the drive.

The drive has been factory preset for the proper line voltage and frequency in your area. The standard model is configured for an ac input of 90-132 Vac, 60 Hz; a drive with option 017 is configured for an input of 180-264 Vac, 60 Hz. A drive with option 015 is configured for an input frequency of 50 Hz.

The voltage and frequency for which the drive has been configured at the factory is marked on the ~LINE label attached to the rear cover of the drive. Make sure that your power source meets these requirements.

Voltage configuration (standard/option 017) is accomplished by changing the position of plug-in connectors on power supply PCA-A4 and primary power PCA-A8.

Frequency configuration (standard/option 015) is accomplished by changing the spindle motor pulley and drive belt.

Details of how to change the drive voltage and/or frequency configuration are provided in the following paragraphs.

**2-32. VOLTAGE/FREQUENCY CONVERSION**

To change the drive input voltage and/or frequency configuration, proceed as follows. See figure 2-14 for the location of the components called out in the procedure. Following access to the components involved in the conversion, perform only the part of the procedure needed.

If the cabinet is equipped with anti-tip feet, the feet must be extended before the drive is pulled out on its rack slides. Failure to observe this precaution could result in injury to personnel and/or equipment damage.

**CAUTION**

Following any voltage or frequency configuration change, the ~LINE label on the rear panel must be changed to denote the new power configuration.



**2-33. ACCESS TO COMPONENTS.** To reach the components associated with the frequency/voltage changeover:

- a. If required, extend the cabinet anti-tip feet.
- b. Unlock the drive and pull it out of the cabinet on its rack slides.
- c. Pull on the front panel to release it from the drive mainframe and remove the panel.
- d. Remove the twelve T15 screws and two T10 screws that secure the front cover to the drive and remove the cover.
- e. Pull the belt cover forward and out of the drive.

**2-34. FREQUENCY CONVERSION.** To change the operating frequency of the drive, proceed as follows:

- a. Remove the five T9 screws that secure the top cover to the drive and remove the cover.
- b. If a fan scroll cover is installed, remove it. On later model drives, the fan scroll cover is part of the top cover.



**CAUTION**

**CAUTION**

Do not turn the spindle pulley on the head disc assembly (HDA) during removal and replacement of the drive belt or motor pulley.

- c. Remove the 1/2-inch nut that secures the belt guard and motor pulley to the motor shaft. Hold the fan rotor to prevent the motor shaft from turning when removing the nut.
- d. Remove the belt guard.
- e. Move the motor against the tension of the motor spring and remove the drive belt.
- f. Remove the motor pulley from the motor shaft.
- g. Select the motor pulley required for the frequency changeover. The pulleys are identified by part number as follows:  
  
60 Hz: 07937-20181  
50 Hz: 07937-20182
- h. Install the new motor pulley on the motor shaft.
- i. Select the drive belt required for the frequency changeover. The belts are identified by part number as follows:  
  
60 Hz: 07937-80033  
50 Hz: 07937-80034
- j. Install the new drive belt on the pulleys. When installed, the smooth side of the belt should be in contact with the pulleys.
- k. Install the belt guard using the 1/2-inch nut.
- l. Reinstall the belt cover in the drive.
- m. If necessary, reinstall the fan scroll cover.

When the top cover is reinstalled, make sure that the PCA guide on the cover fits freely between the edge of PCA-A4 and its metal base plate.

- n. Reinstall the top cover on the drive.
- o. Remove the two T10 screws that secure the ~LINE labels to the rear panel and remove the labels.
- p. Select the label that matches the new voltage/frequency configuration and reinstall the labels on the rear panel with the selected label visible.

**2-35. VOLTAGE CONVERSION.** To change the drive voltage configuration:

- a. Disconnect connector P1 on power supply output cable W4 from connector J2 on power supply PCA-A4. See figure 2-14 for the location of connectors on PCA-A4.
- b. Pull power supply PCA-A4 partially out of the drive mainframe.
- c. Insert the 2-pin plug on power supply PCA-A4 into the appropriate connector on PCA-A4: for input voltages ranging from 90 Vac to 132 Vac, use the connector marked 115V; for input voltages ranging from 180 Vac to 264 Vac use the connector marked 230V.
- d. Insert the spindle motor power plug into the appropriate connector on primary power PCA-A8: for input voltages ranging from 90 Vac to 132 Vac, use the connector marked 115V; for input voltages ranging from 180 Vac to 264 Vac use the connector marked 240V.
- e. Reinstall power supply PCA-A4 in the drive.
- f. Reconnect connector P1 on power supply output cable W4 to connector J2 in PCA-A4.

- g. Reinstall the front cover and front panel on the drive.
- h. Remove the two T10 screws that secure the ~LINE labels to the rear panel and remove the labels.
- i. Select the label that matches the new voltage/frequency configuration and reinstall the labels on the rear panel with the selected label visible.

## 2-36. FUSE

### WARNING

For continued protection against fire hazard, replace the fuse only with the type and rating specified.

### WARNING

Make sure that the power cord is disconnected from the drive before installing or replacing the fuse. Failure to disconnect the power cord could result in electrical shock or damage to the drive.

The drive is equipped with a primary power fuse located in the line filter assembly on the rear panel of the drive. See figure 3-1. The drive uses either a 5 ampere (H- and XP-models) or 6.25 ampere (FL-model) fuse. The label attached to the line filter assembly indicates the ampere rating of the fuse installed in the drive. Always replace a fuse with the type indicated by the label.

The descriptions of the two fuses follow:

DRIVE MODEL	OPERATING VOLTAGE	FUSE DESCRIPTION	HP PART NO.
H/XP	A11	5AS-250V	2110-0030
FL	A11	6.25AS-250V	2110-0722

## 2-37. CPU CONNECTION - HP-IB INTERFACE

### CAUTION

Do not connect or disconnect the HP-IB cable(s) from the drive while the system is in an active state.

The interconnection of the drive is dependent on the system configuration. The location of the drive's HP-IB connector is shown in figure 3-1. The major considerations concerning the connection of the drive to an HP-IB channel are contained in the following paragraphs.

### NOTE

When installing HP-IB cables on drives installed in an HP 19514A cabinet, refer to figure 2-13 for the proper cable routing.

## 2-38. HP-IB CABLING

The Hewlett-Packard Interface Bus (HP-IB) has certain rules which must be observed for successful installation of the drive. Cabling is limited to 1 metre per HP-IB load. Typically the Central Processing Unit (CPU) is 7 equivalent loads and the drive is 1 equivalent load. See figure 2-7.

The CPU adheres to an HP standard which allows 7 metres of HP-IB cable between the CPU and the nearest device connected to it and 1 metre of cable between each additional device. The maximum configuration is 8 devices (excluding the CPU) per HP-IB channel or a maximum of 15 metres of 10 equivalent loads.

### NOTE

The maximum number of devices that can be connected to a single HP-IB channel is host dependent. This information is contained in the appropriate host configuration guide.

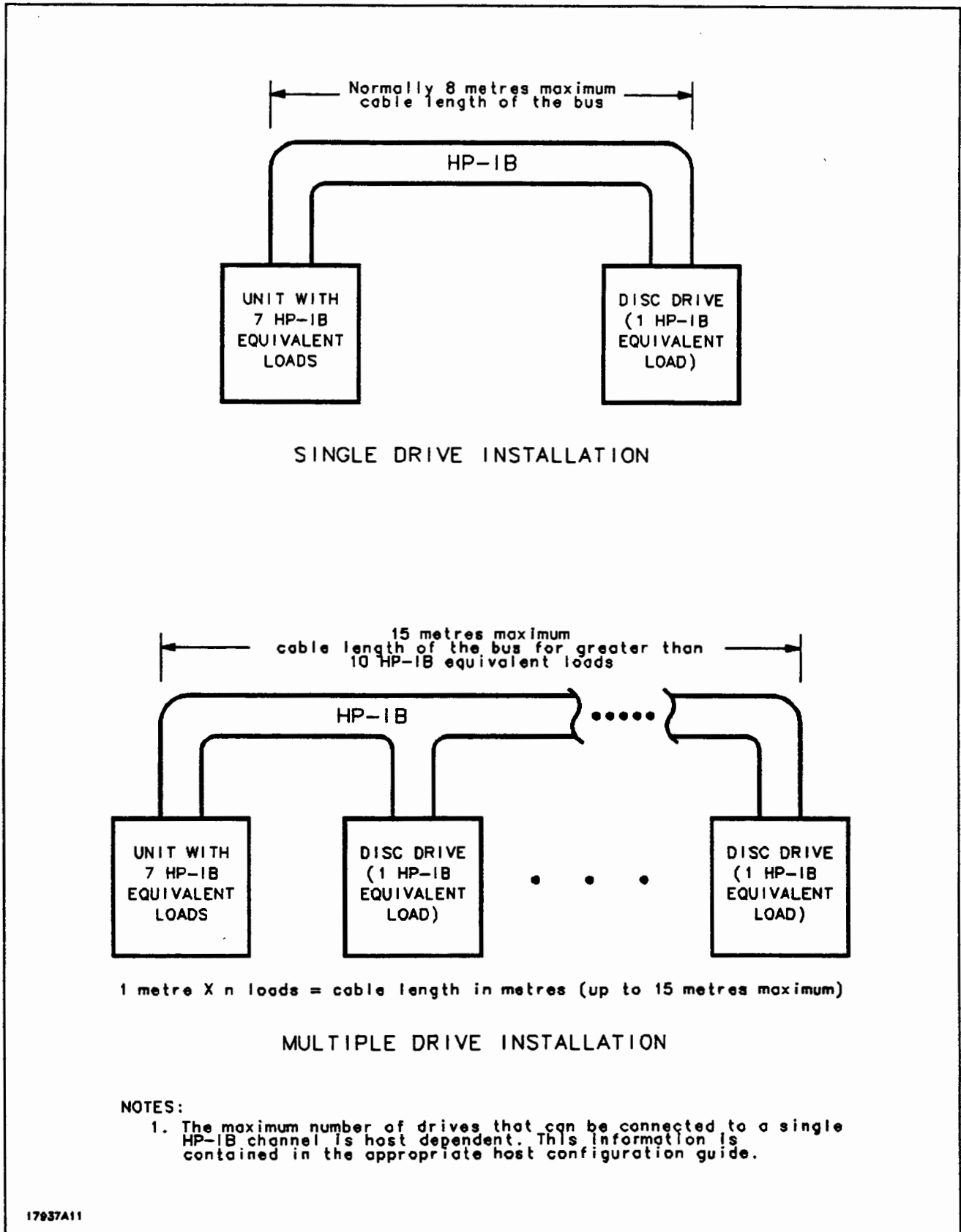


Figure 2-7. Maximum Cable Length for HP-IB Channel

## 2-39. CPU CONNECTION - HP-FL INTERFACE

### CAUTION

To avoid electrostatic damage to the controller PCA when connecting the HP-FL cabling, observe proper grounding techniques. Ground the drive and use a grounding wrist strap.

### NOTE

Before configuring an FL-model drive into a host system, a stand-alone diagnostic routine should be performed on the drive. Refer to paragraph 3-24 for instructions on running the stand-alone diagnostic routine.

### NOTE

The number of disc drives supported on an HP-FL interface is system dependent. Refer to the appropriate system documentation for information on supported configurations.

Two levels of interface are used in host/drive communication over HP-FL. The first level is the optical connection between the host and a drive. This connection is made using an HP-FL fiber optic cable. The second level is the PBus, an electrical interface that provides the common connection between drives in multiple drive installations. Drive-to-drive connections are made using PBus cables. HP-FL cabling configurations and limitations are shown in figure 2-8.

### NOTE

When installing HP-FL cabling on drives installed in an HP 19514A cabinet, refer to figure 2-13 for the proper cable routing.

## 2-40. HP-FL FIBER OPTIC CABLING

A host is connected to a drive or cluster of drives using the HP-FL duplex fiber optic cable. The cable contains two glass fibers: one transmit, and one receive. Both fibers in the cable are terminated by a 905-type SMA connector. A 30-metre fiber optic cable is included with the host HP-FL interface PCA. The maximum length of the fiber optic cable is 500 metres.

Each HP-FL drive is equipped with a pair of connectors to accept a fiber optic cable. In multiple-drive installations, a host can be connected to any drive in the cluster.

### NOTE

Because each drive includes a fiber optic connection, it is physically possible to connect more than one host to a cluster of drives. However, multi-host configurations are not supported at this time.

**2-41. STRAIN RELIEF INSTALLATION.** To avoid damage to the fiber optic cable, strain and bend relief must be provided for the cable. The strain relief is attached to the fiber optic cable before connecting the cable to the drive. To install the strain relief, proceed as follows:

### CAUTION

When routing the HP-FL fiber optic cable, all bends must have a radius greater than 25 mm (1 inch). Sharp bends or kinks will damage the cable. A damaged fiber optic cable may result in low optic power. In this case, the only symptom will be a large number of channel retries. If low optic power is suspected, an optic power meter should be used to test the cable. For details on testing and troubleshooting the fiber optic cable, refer to the host HP-FL interface PCA documentation.

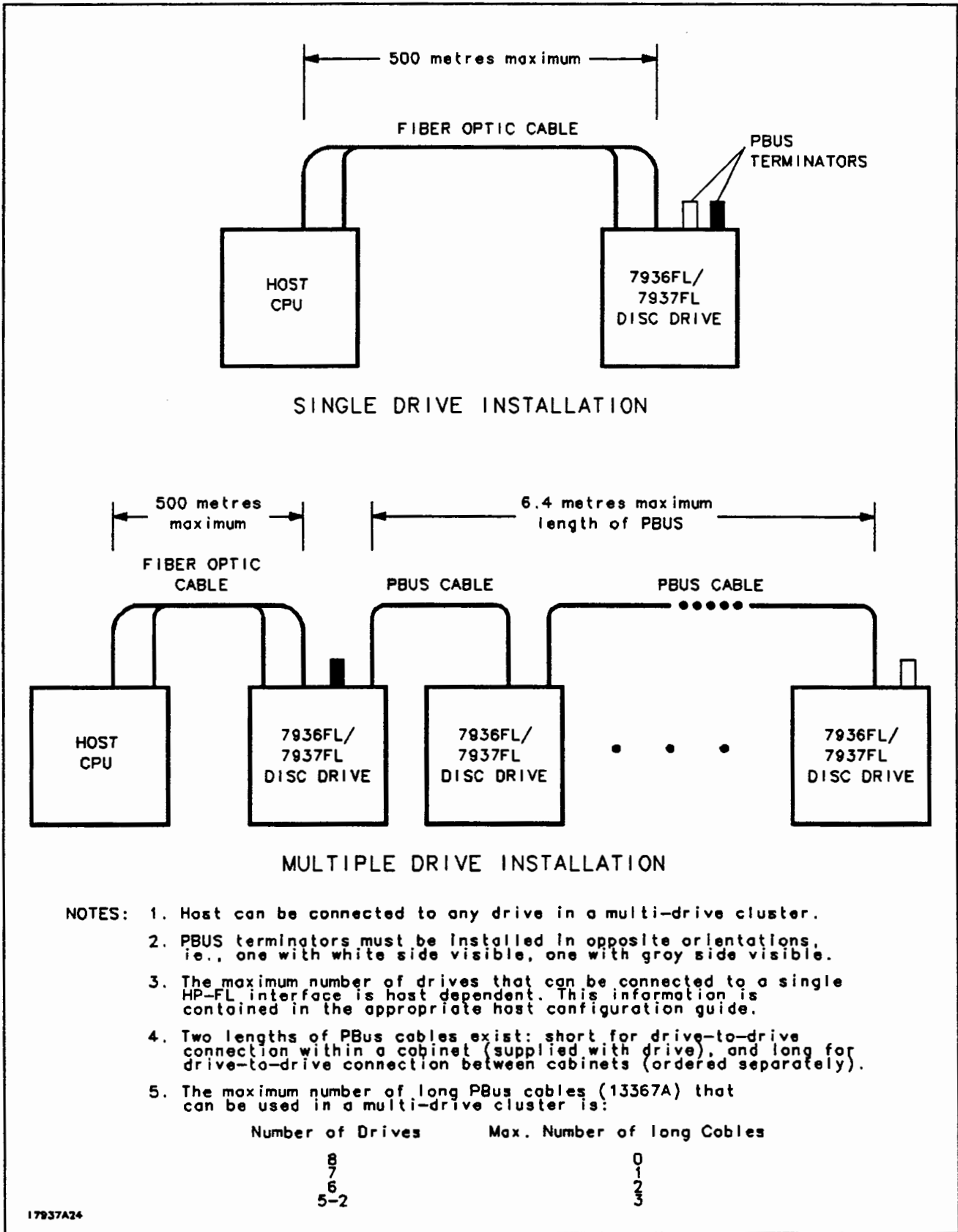


Figure 2-8. HP-FL Cabling Configurations

- a. Remove the connector cover from the rear of the drive. The cover is held in place by three T15 screws.
- b. Pull the fiber optic cable strain relief off the rear cover. See figure 2-9, part A.
- c. Slide the cable clamp off the strain relief body. See figure 2-9, part A.
- d. Slide the cable clamp onto the fiber optic cable by threading each fiber through the clamp.
- e. Pry the strain relief open by hand.
- f. Holding the fiber optic cable with the other hand, insert the cable into the strain relief. See figure 2-9, part B. Avoid twisting the cable or violating the bend radius restriction.
- g. Position the strain relief so it is 215 mm (8.5 inches) from the end of the cable. See figure 2-9, part B.
- h. Slide the cable clamp onto the strain relief body. Orient the clamp so the clamp ear straddles the slit in the strain relief.
- i. Using a pair of pliers, grasp the cable clamp by the clamp ear. See figure 2-9, part C.
- j. Squeeze the clamp ear until its width is reduced to 4 mm. This will provide adequate holding force on the cable.
- k. Press the strain relief into the curved cutout on the rear panel until the strain relief is firmly attached to the panel. See figure 2-9, part D.

To remove the strain relief from the fiber optic cable, the cable clamp must be removed from the strain relief body. Use a pair of diagonal cutting pliers to cut the cable clamp and pull it off the strain relief body.

**2-42. FIBER OPTIC CABLE CONNECTION.**  
The fiber optic connectors are located on the HP-FL drive controller PCA. See figure 2-10. The connectors are accessed by removing the connector cover from the rear of the drive.

**CAUTION**

The fiber optic cable connection should be performed by hand. Avoid the use of tools that may stress and damage the connectors. Use caution to avoid cross-threading the cable connections and damaging the plastic connectors.

**NOTE**



Before connecting a new FL-model drive to a host, a stand-alone diagnostic routine should be performed on the drive. Refer to paragraph 3-24 for instructions on running the stand-alone diagnostic routine.

To connect an HP-FL cable to the drive, proceed as follows:

- a. Install the fiber optic cable strain relief per paragraph 2-42.
- b. Protective plastic connector covers are installed on new fiber optic cables. Similar covers are also installed on the controller PCA fiber optic connectors of new drives. If necessary, remove these plastic covers from the fiber optic cable and the drive controller PCA.

**CAUTION**

When routing the HP-FL fiber optic cable, all bends must have a radius greater than 25 mm (1 inch). Sharp bends or kinks will damage the cable.

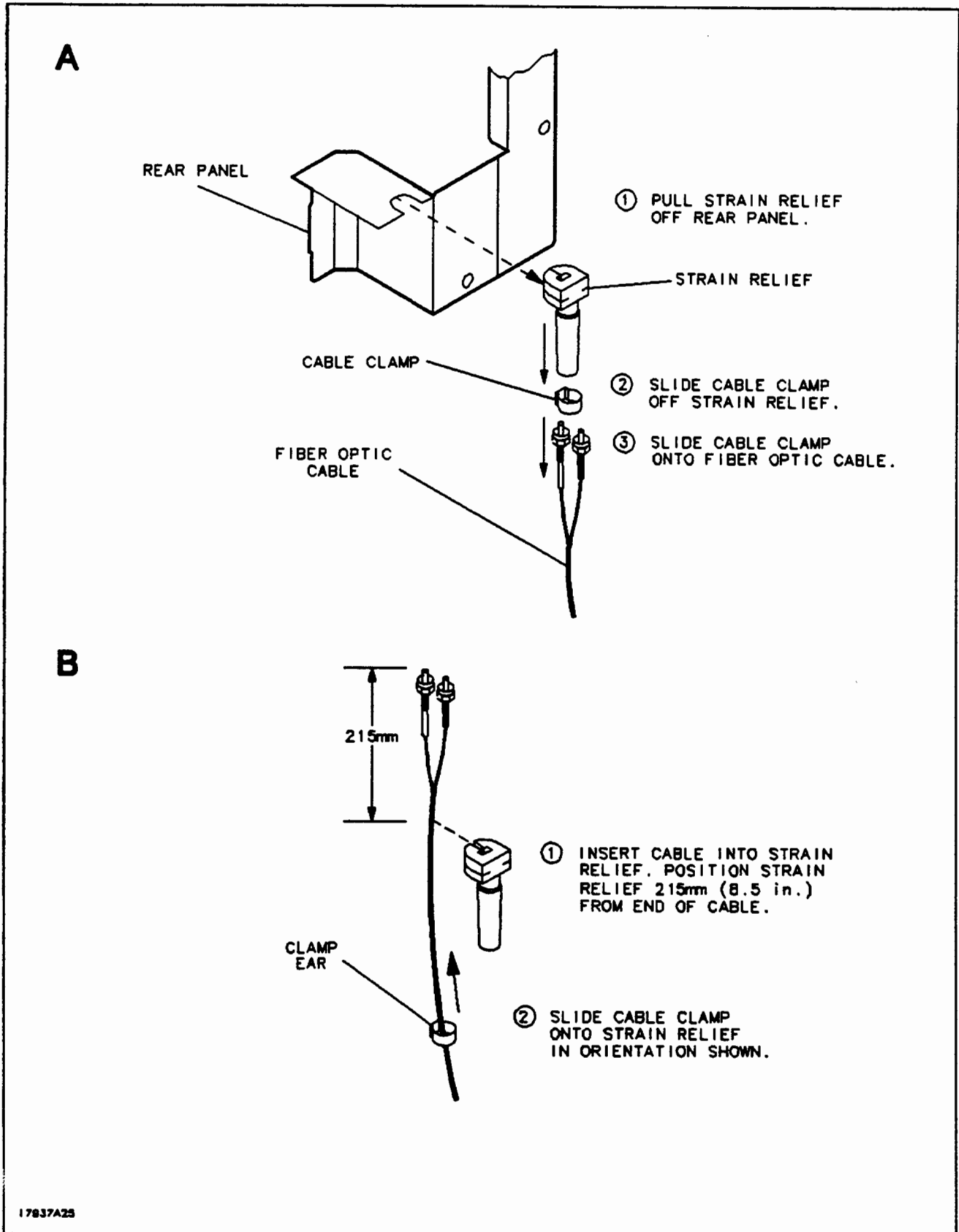


Figure 2-9. HP-FL Fiber Optic Cable Strain Relief Installation (1 of 2)

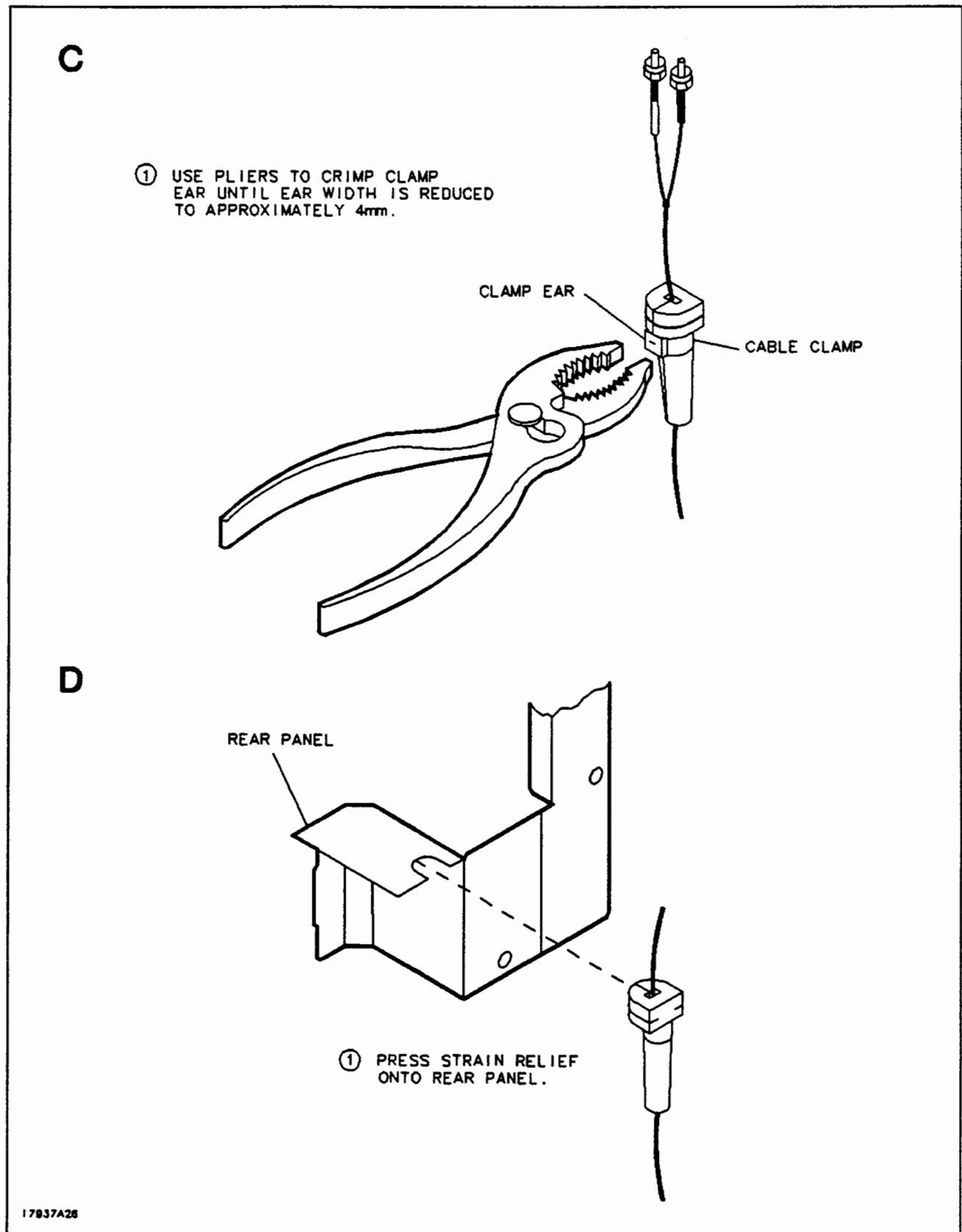


Figure 2-9. HP-FL Fiber Optic Cable Strain Relief Installation (2 of 2)



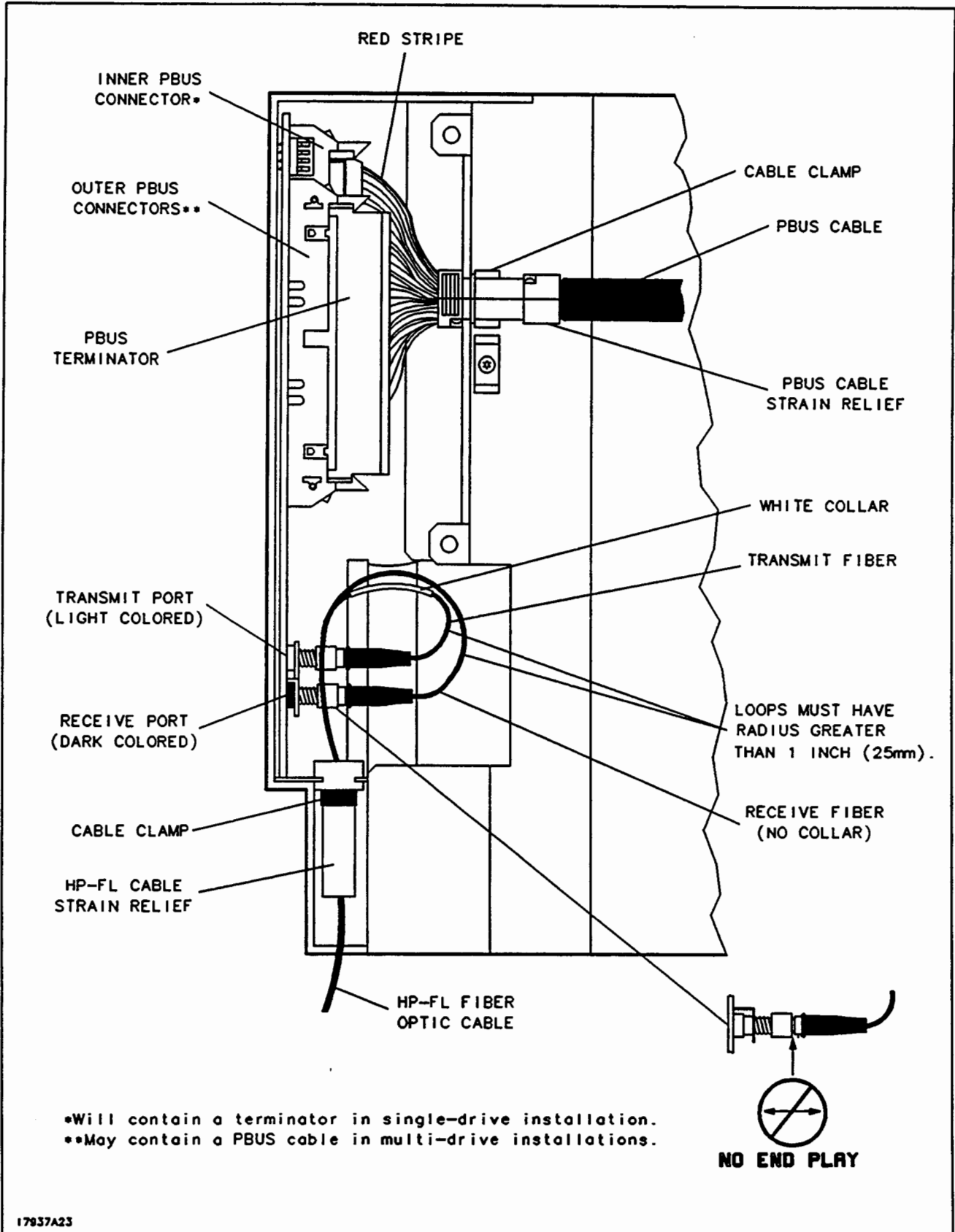


Figure 2-10. HP-FL Cable Connections

- c. The transmit fiber is marked with a white collar. Position the white collar 38 mm (1.5 in.) from the connector strain relief. If the collar is too close to the connector, the cable bend radius specification will be violated.
- d. Carefully bend the cable to form a loop with a radius of 25 mm (1 inch) or greater. See figure 2-10.

**CAUTION**

Tighten the fiber optic connectors only finger tight. Using tools or excessive force to tighten the connectors may damage the HP-FL controller PCA.

Tighten the connectors until there is no end play evident as shown in figure 2-10. A loose connector may cause intermittent problems requiring a service call.

- e. Connect the transmit fiber to the light-colored connector on the HP-FL drive controller PCA. See figure 2-10. Tighten the connector finger tight.

**NOTE**

When connecting the transmit optic fiber, the HDA ribbon cable may interfere with the fiber optic connector. Press the HDA ribbon cable inward far enough so it does not interfere when connecting the fiber.

- f. Connect the receive fiber (without the white collar) to the dark-colored connector on the HP-FL drive controller PCA. Tighten the connector finger tight.
- g. Tuck the cable into the drive so it will not be pinched or crimped when the connector cover is installed.

## 2-43. PBus CABLING

The PBus provides the electrical interface between drives in multi-drive installations. It is the path over which a host communicates with all drives in the cluster.

Each HP-FL drive includes two PBus connectors. These connectors allow drives to be daisy-chained together using PBus cables. The cabling creates a common PBus among all drives in the cluster. The PBus connectors are located on the HP-FL drive controller PCA. See figure 2-10.

Up to eight drives can be connected to the PBus, with the maximum cable length of the bus limited to 6.4 metres. The PBus is terminated using two terminators supplied with the HP 27111A CIO/HP-FL Interface Card.

Figure 2-8 shows the two PBus configurations: single-drive and multiple-drive. The following paragraphs discuss both configurations.

**NOTE**

When making the PBus connections, it is important to remember that both PBus connectors on every drive must have either a cable or terminator properly installed. Improper connection or termination will render the entire HP-FL interface inoperative.

**NOTE**

A new drive can be configured into an existing drive cluster *without* turning off the operating drives and bringing down the the host system. The physical design of the drive PBus connectors ensures that a PBus cable or terminator can be removed without causing any data corruption. When a PBus cable or terminator is removed, any transactions in progress are aborted without loss of data. When the PBus is reconnected, the drives come back on-line and the host will retry all pending transactions.

While the PBus is disconnected, all drives on the interface are inaccessible to the host. The length of time the drives can remain off-line without disrupting the host is system dependent. Refer to the appropriate system documentation for information on system timeout values.

To avoid exceeding the host timeout value, connect the PBus cable(s) and terminator to the drive before disconnecting the PBus to configure the new drive into the cluster. This will reduce the amount of time the drives are off-line.

**2-44. SINGLE-DRIVE PBUS CONNECTIONS.**  
In single-drive installations no PBus cables are required. See figure 2-8. The PBus is terminated by installing terminators in both PBus connectors on the rear of the drive.

To install a single drive, proceed as follows:

- a. Install a PBus terminator in the inner PBus connector on the HP-FL drive controller PCA. See figure 2-10.
- b. Install the second PBus terminator in the outer PBus connector on the controller PCA. This terminator must be the opposite orientation of the first terminator. That is, one terminator with the white side visible, and the other terminator with the gray side visible.
- c. Install the connector cover on the rear of the drive. Insert the tabs on the cover into the corresponding slots on the drive chassis and secure the cover in place using three T15 screws.

**NOTE**

The connector cover must be in place and all three of its attaching screws tight, in order for the drive to meet its electromagnetic compatibility and data

reliability standards.

**2-45. MULTIPLE-DRIVE PBUS CONNECTIONS.** In multiple-drive installations, the PBus cables are used to interconnect up to eight drives. See figure 2-8. The drives are joined together in daisy-chain fashion, with terminators installed on the drives at each end of the chain.

**NOTE**

When connecting a group of drives that are mounted in separate cabinets (e.g., HP 19511A cabinets), a long (1743-mm) PBus cable is required to make the cabinet-to-cabinet connections. The long PBus cable, identified as product 92219L, is not shipped with the drive and must be ordered separately. See figure 2-8, note 5, for limitations on the number of long PBus cables that can be used when connecting a group of drives.

**NOTE**

Before connecting a new FL-model drive into a cluster, a stand-alone diagnostic routine should be performed on the drive. Refer to paragraph 3-24 for instructions on running the stand-alone diagnostic routine.

To install the PBus cabling, proceed as follows:

- a. To access the PBus connectors, remove the connector cover from each drive. The cover is held in place by three T15 screws.
- b. Select a convenient drive to serve as one end of the PBus. Connect a PBus cable to the inner PBus connector on the HP-FL controller PCA of this drive. See figure 2-10.

**NOTE**

When connecting PBus cables, use the following guidelines:

- Install the PBus cable strain relief into the proper cable clamp before plugging the cable into the PBus connector.
  - Use the upper cable clamp when connecting a PBus cable to the inner PBus connector. Use the lower clamp with the outer connector.
  - When connecting cables to both PBus connectors on the drive, connect a cable to the inner connector first.
  - The PBus cable connector is keyed. It must be installed with the red edge of the PBus cable up.
  - Press the cable connector into its receptacle until the extraction levers snap into place.
- c. Install a PBus terminator in the outer PBus connector on the HP-FL controller PCA of the drive.

**NOTE**

In multi-drive configurations the bus terminators should be installed in the outer PBus connector. This allows the orientation of the terminator to be seen through an opening in the connector cover.

- d. Connect the other end of the PBus cable to an adjacent drive.
- e. Connect the remainder of the drives together using the PBus cables. On the last drive in the chain, connect the PBus cable to the inner PBus connector.
- f. Install a terminator in the outer PBus connector on the last drive. This terminator must be the opposite orientation of the terminator installed at the other end of the bus. That is,

one terminator with the white side visible, and the other terminator with the gray side visible.

- g. Visually inspect all PBus cabling for proper connection. Ensure that the PBus terminators are installed in opposite orientations.
- h. Install a connector cover on the rear of each drive. Insert the tabs on the cover into the corresponding slots on the drive chassis and secure the cover in place using three T15 screws.

**NOTE**

The connector cover must be in place and all three of its attaching screws tight, in order for the drive to meet its electromagnetic compatibility and data reliability standards.

## 2-46. POWER CORD CONNECTION

**CAUTION**

Do not attempt to operate a drive configured for 90-132 Vac on 180-264 Vac, or vice versa. Also, do not operate a drive configured for 60 Hz on 50 Hz, or vice versa. Failure to observe these precautions may result in damage to the drive.

Check the ac input voltage (refer to paragraph 2-30) and the power fuse rating (refer to paragraph 2-36) before proceeding with installation of the power cord. For information regarding the specific power cords available for use with the drive, refer to the *Disk Product Specifications and Site Environmental Requirements*, part no 5955-3456.

**CAUTION**

For U.S.A. operation, use only a UL listed, detachable power cord with type SJT flexible cord, suitable for rated voltage and current. Check the ac input power, power fuse rating, and drive power configuration before connecting the power cord. The drive is supplied with the proper cord.

**NOTE**

The power cord supplied with the drive is not used when installing the drive in an HP 19514A cabinet. The cabinet is supplied with eight power cords that are used to connect the drives to the cabinet PDU.

To attach the power cord to the drive, proceed as follows:

- a. Set the LINE~ switch on the drive front panel to the 0 (out) position.
- b. Plug the female end of the power cord into the line connector on the drive rear panel.

**WARNING**

Route the power cords in the cabinet to avoid any pinching or binding.

- c. In HP 19511A cabinets and EIA rack cabinets, route the power cords out of the cabinet to the ac mains power. When installing drives in an HP 19514A cabinet, route the power cords from the drives to the cabinet PDU as shown in figure 2-13.

## 2-47. INSTALLATION CHECK

After the drive has been installed and power connections made, visually inspect the installation. If the inspection verifies that everything is in order and correct, proceed to Chapter 3 for instructions on operating the drive.

## 2-48. REPACKAGING FOR SHIPMENT

**CAUTION**

Do not attempt to repackage a cabinet containing a drive(s). If the drive(s) and cabinet are to be shipped, the drive(s) must be removed and repackaged in its own container. Failure to observe this precaution could result in damage to the drive(s) and cabinet.

When a drive or HP 19511A Cabinet must be repackaged for shipment, use the original container and packing material. See figures 2-1 and 2-2, respectively. If the container is not available, contact your local Hewlett-Packard Sales and Support Office regarding shipment. For the address of the nearest HP Sales and Support Office, contact a Hewlett-Packard Headquarter Office. Headquarter Offices are listed at the rear of the manual.

Before shipment, place a tag on the container (or equipment) which identifies the owner and the service to be performed. Include the equipment model number and full serial number.

**NOTE**

The model and serial number label for the drive is located on the rear of the drive.

For instructions on repackaging the HP 19514A Cabinet, refer to the *HP 19514A Cabinet Installation and Service Manual*, part no. 19514-90902.

## 2-49. REPACKAGING THE DRIVE

### **CAUTION**

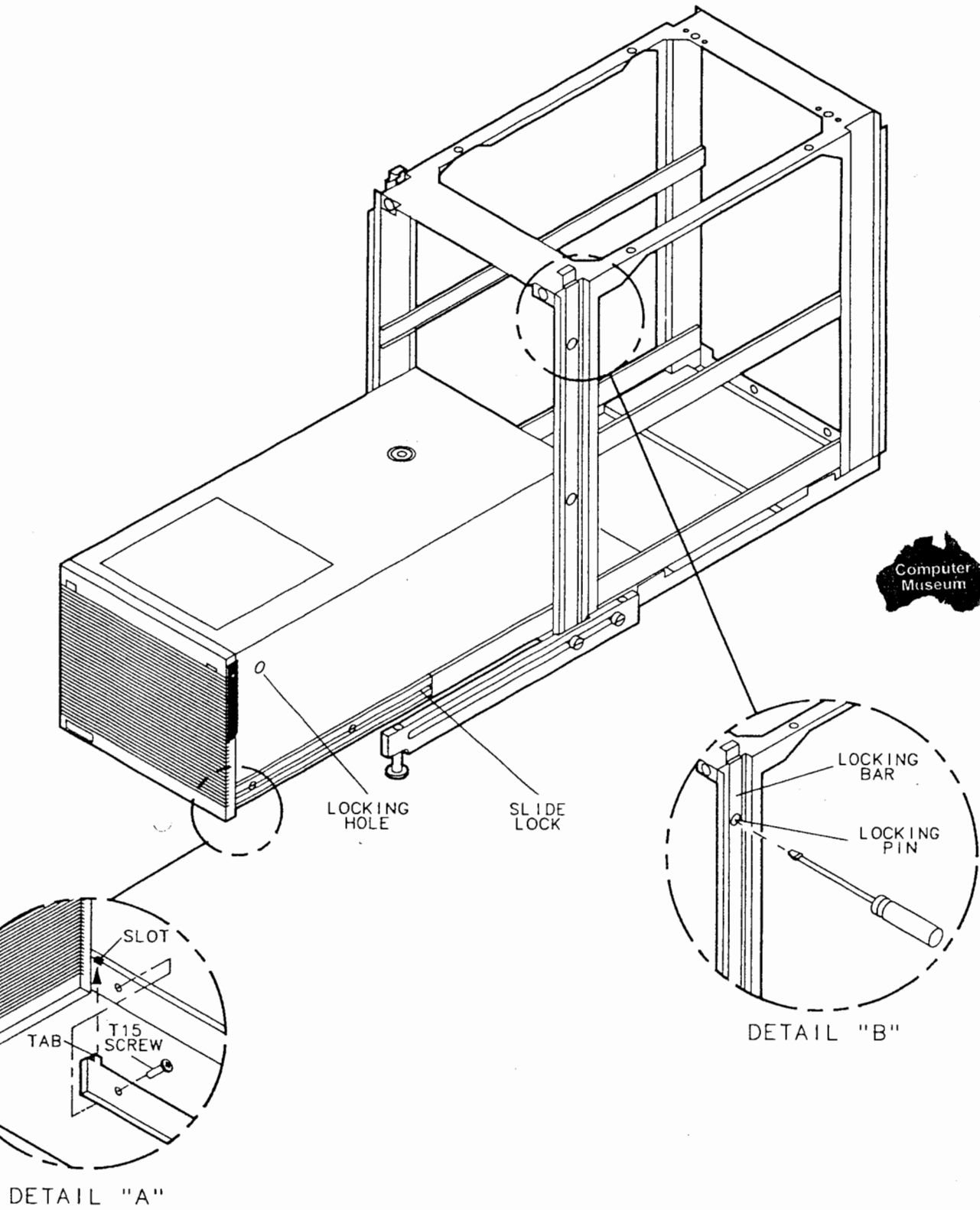
To prevent damage to the drive, the Shipping Latch must be in the 0 (Ship) position before the drive is repackaged for shipment.

- a. With power removed from the drive, set the drive Shipping Latch to the 0 (Ship) position.
- b. Remove the front panel from the drive.
- c. Place the drive on the shipping pallet.
- d. Place the plastic bag over the drive.
- e. Pack the front cover in its carton and place the carton in the protective cover.
- f. Place the protective cover on top of the drive.
- g. Place the corrugated carton over the drive and secure the carton to the pallet with two 1/2-in. polystrap bindings.

## 2-50. REPACKAGING THE HP 19511A CABINET

- a. Remove the top panel and two side panels from the cabinet. See figure 2-11.
- b. Install a cabinet spacer in each end of the cabinet.
- c. Install the wooden braces between the cabinet spacers. Each brace should be positioned against one of the upper rack slides with the ends of the brace flush against the cabinet spacers.
- d. Tape each wooden brace to its associated rack slide.
- e. Install the side panels and the top cover on the cabinet.
- f. Place the plastic bag over the cabinet. See figure 2-2.
- g. Place the cabinet on the shipping pallet.
- h. Secure the cabinet to the pallet with strapping edge protectors and a single 1/2-in. polystrap binding.
- i. Place the corrugated carton over the cabinet and secure the carton to the pallet with two 1/2-in. polystrap bindings.

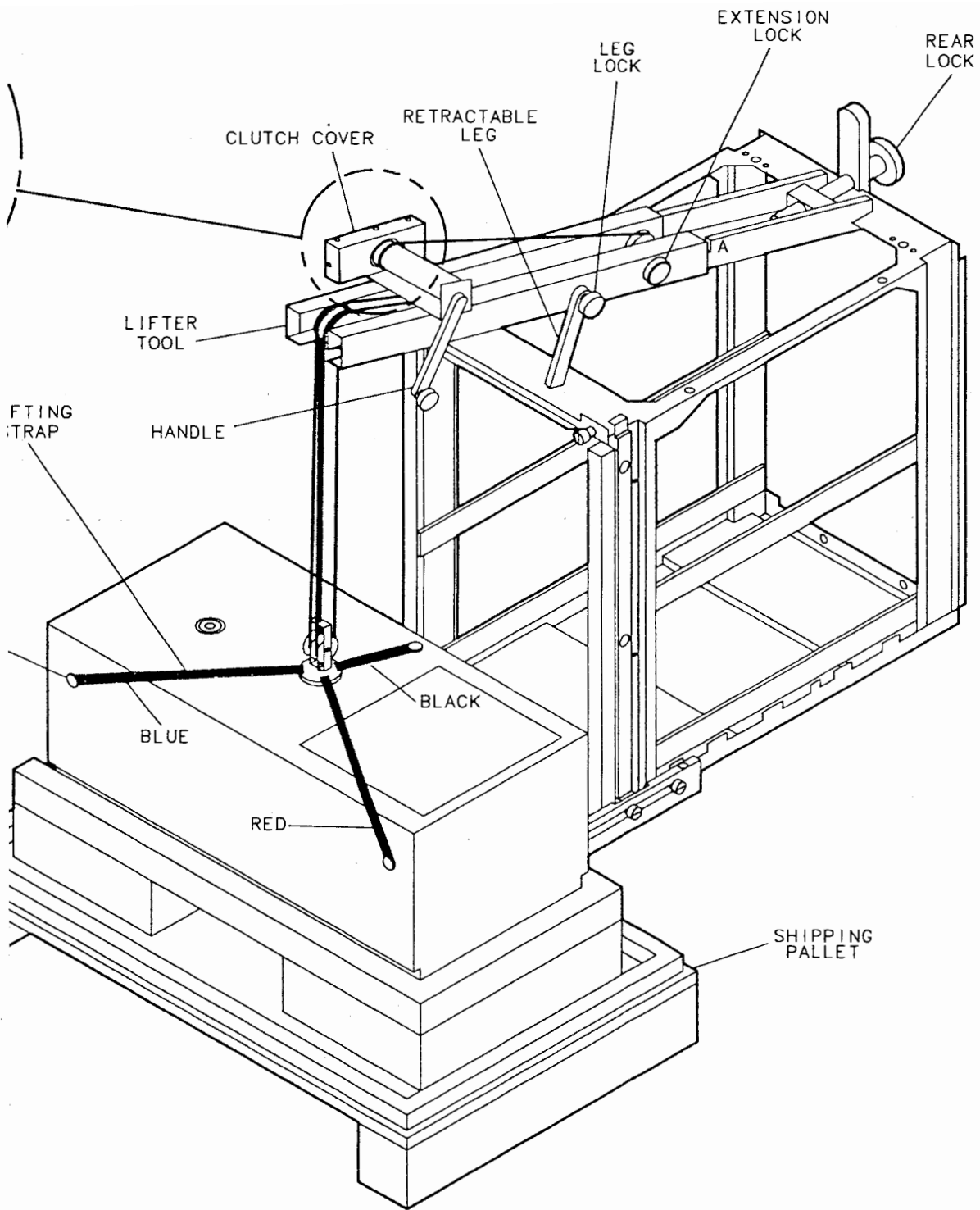




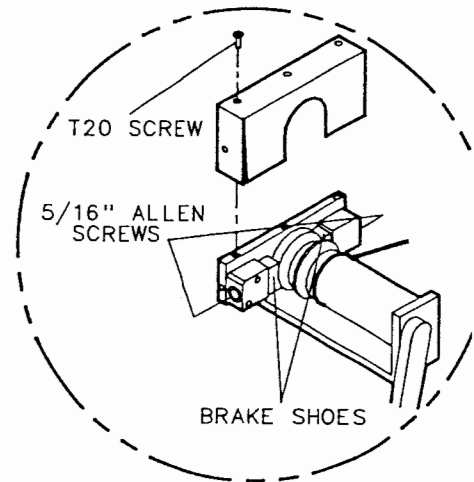
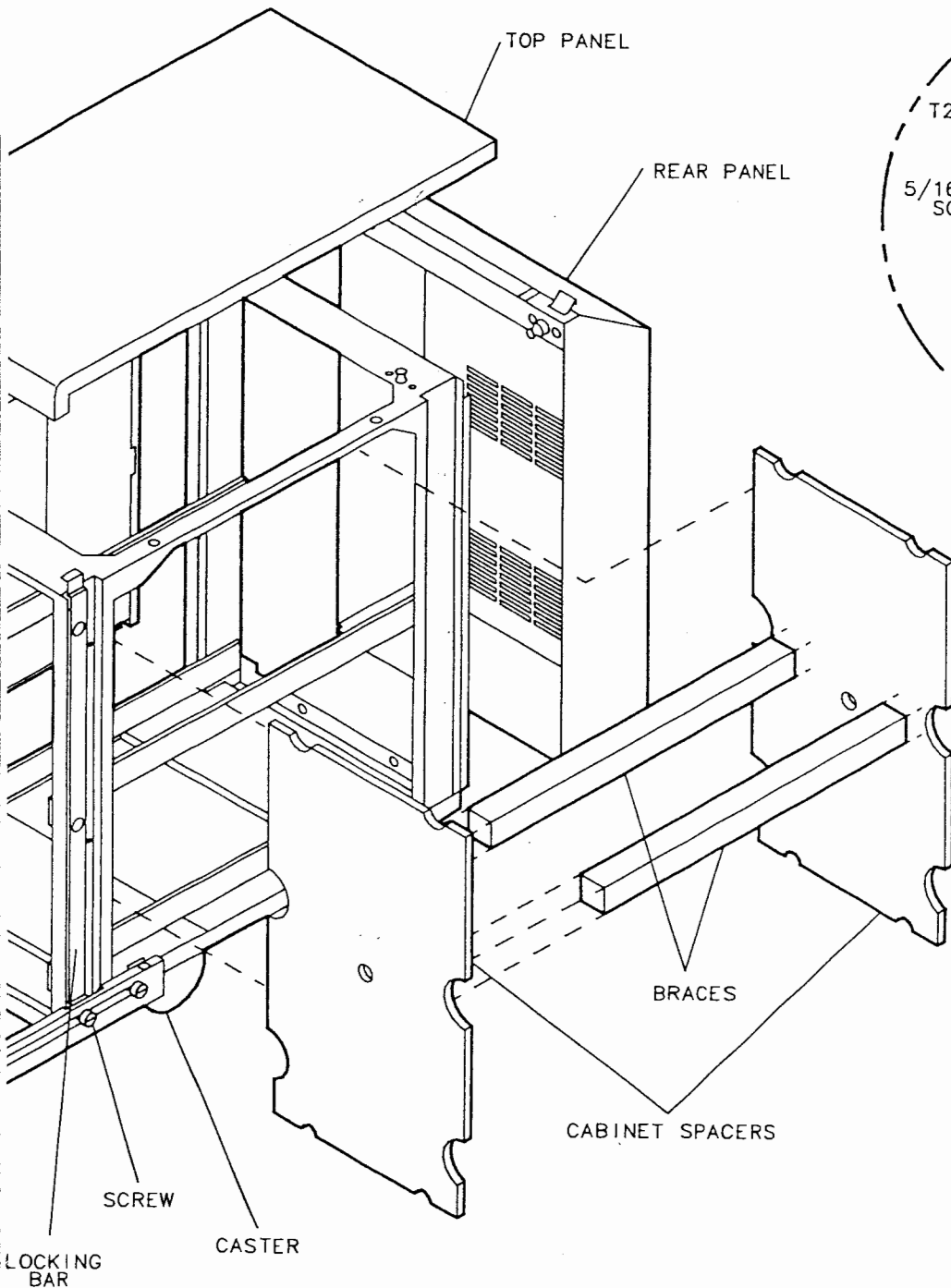
### 3. DRIVE INSTALLATION

Figure 2-11. Drive Installation in HP 19511A Cabinet



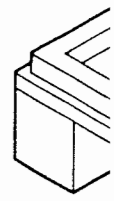


**2. LIFTER TOOL ATTACHMENT AND DRIVE UNLOADING**

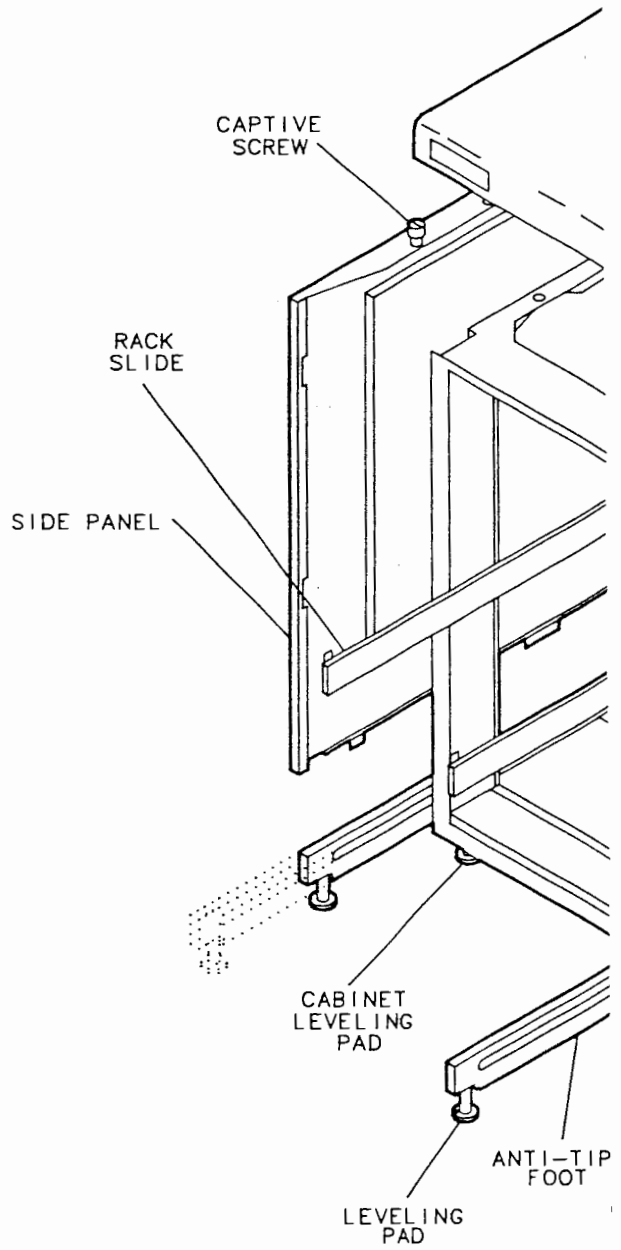


LI  
S

LIFTING  
POINT



PREPARATION



1. CABINE

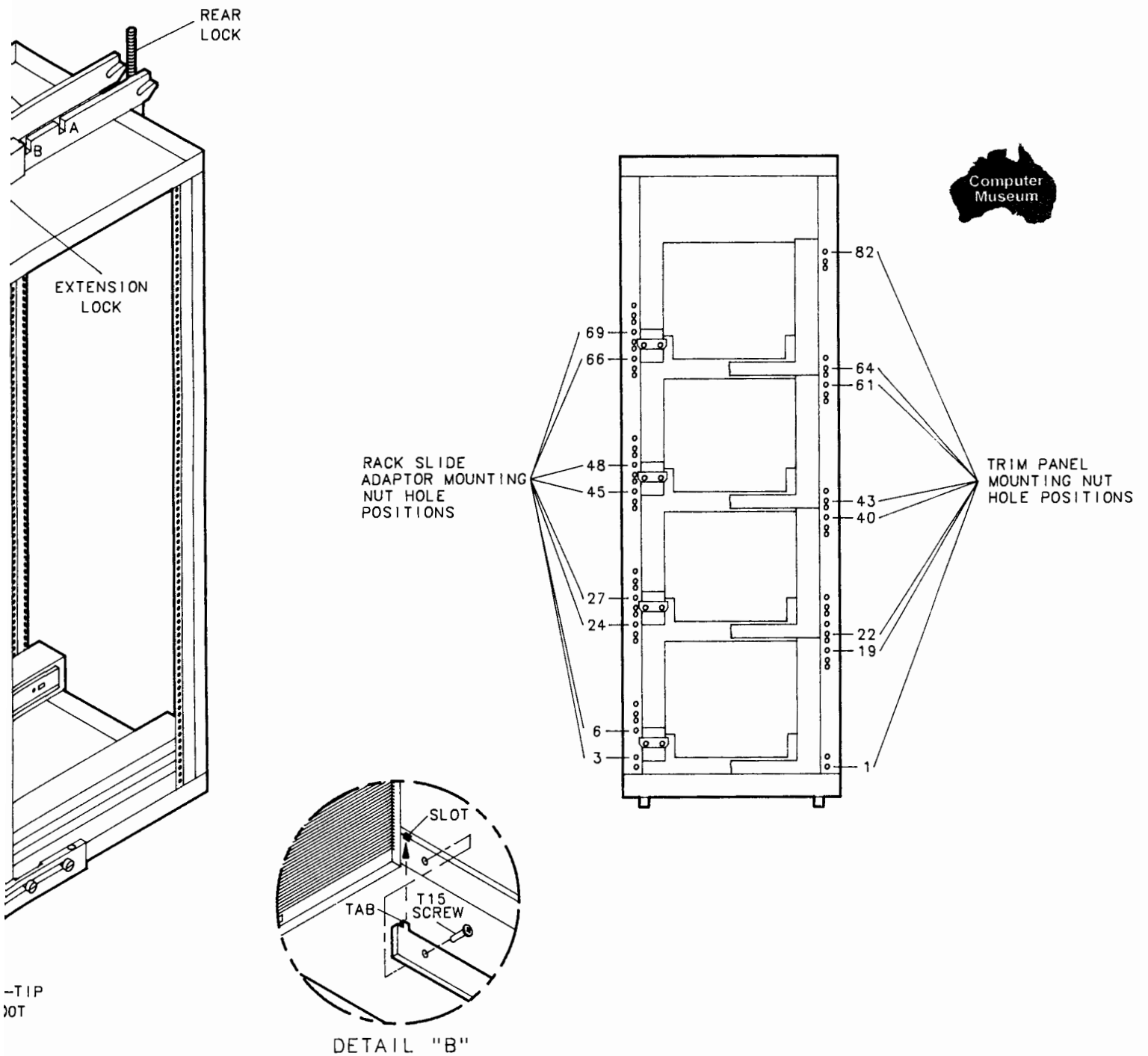
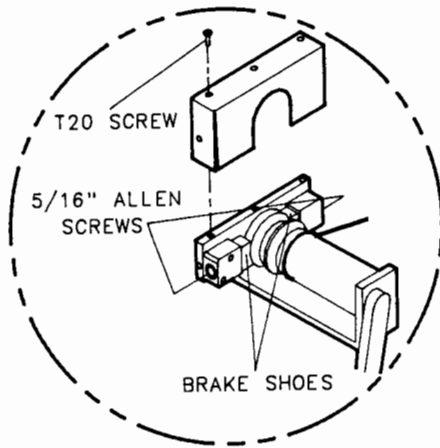
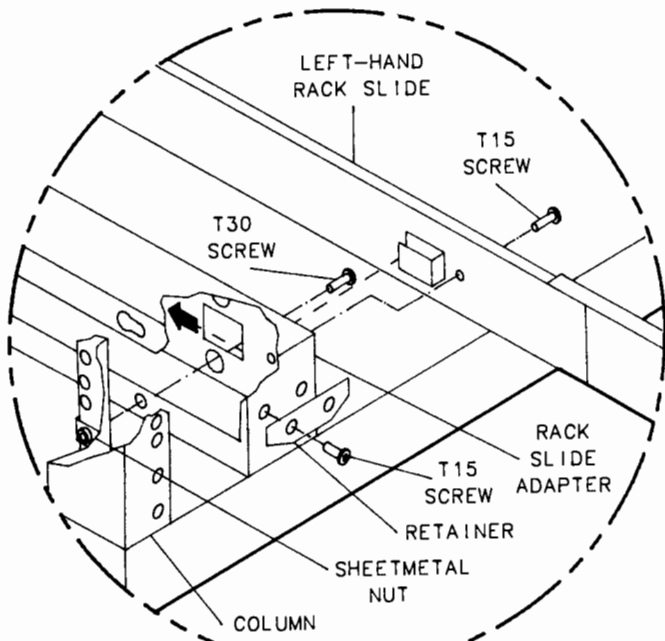


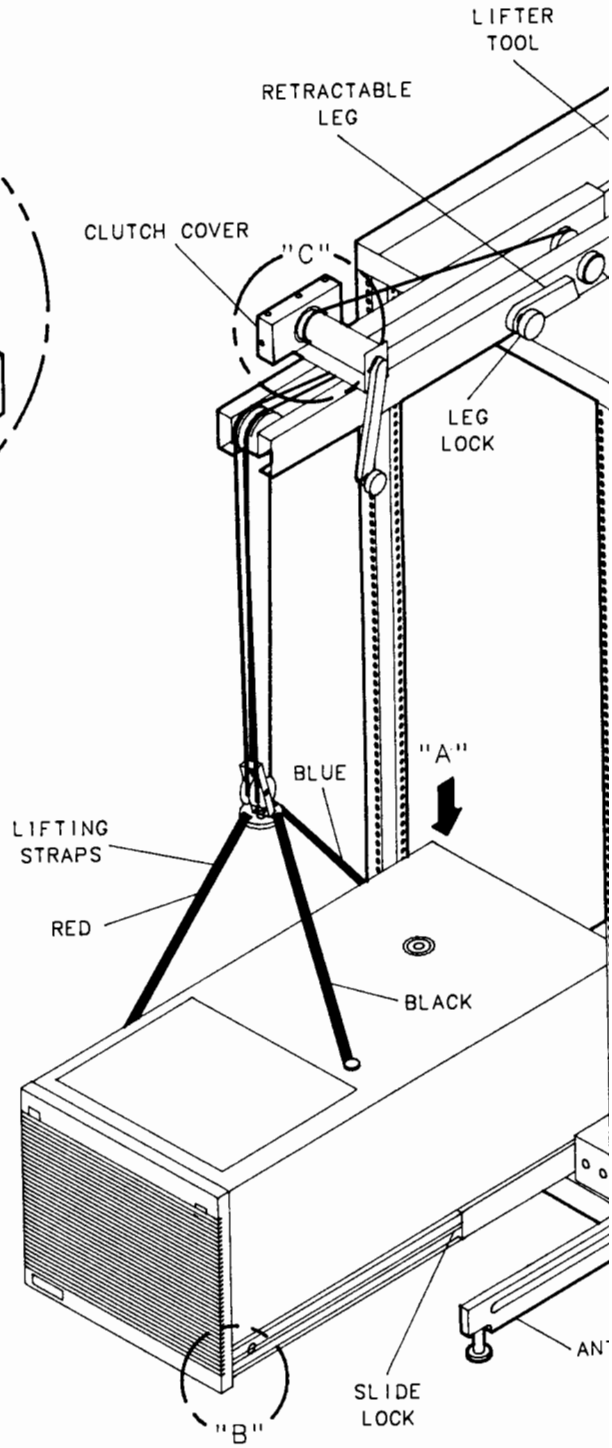
Figure 2-12. Drive Installation in EIA Rack Cabinet



DETAIL "C"

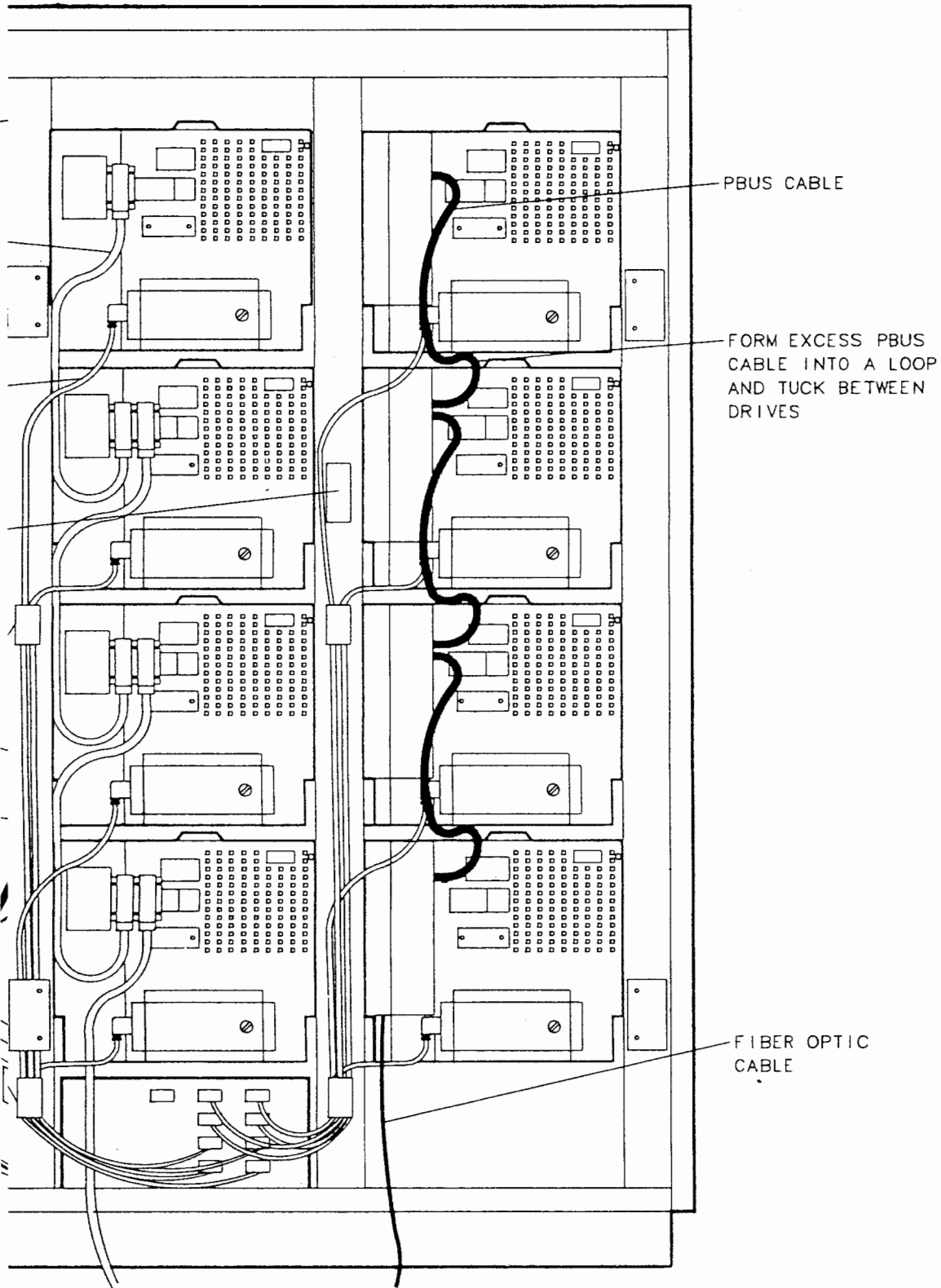


DETAIL "A"



HP-IB

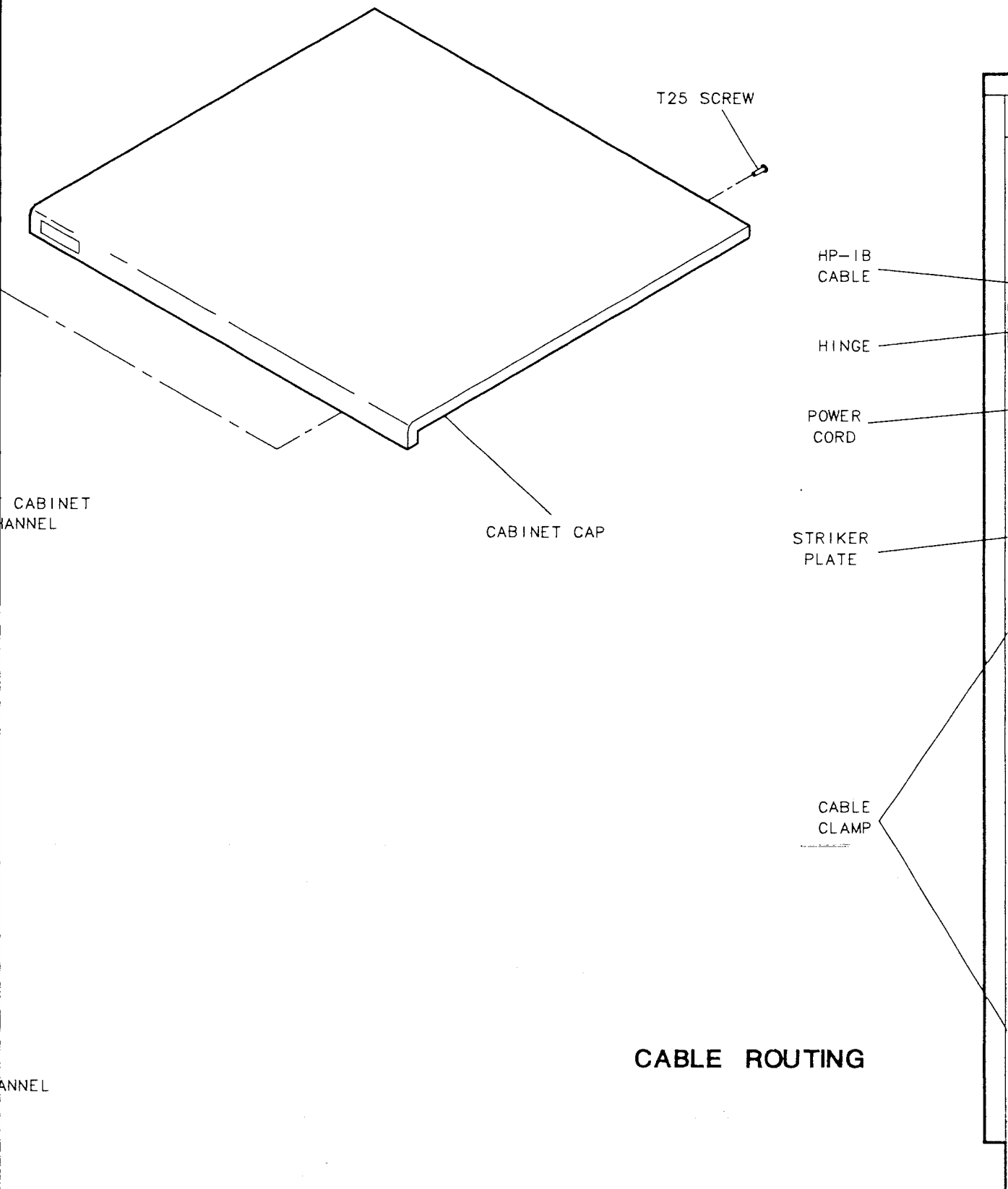
HP-FL



TO HOST

TO HOST

Figure 2-13. Drive Installation in HP 9514A Cabinet



T25 SCREW

HP-IB  
CABLE

HINGE

POWER  
CORD

STRIKER  
PLATE

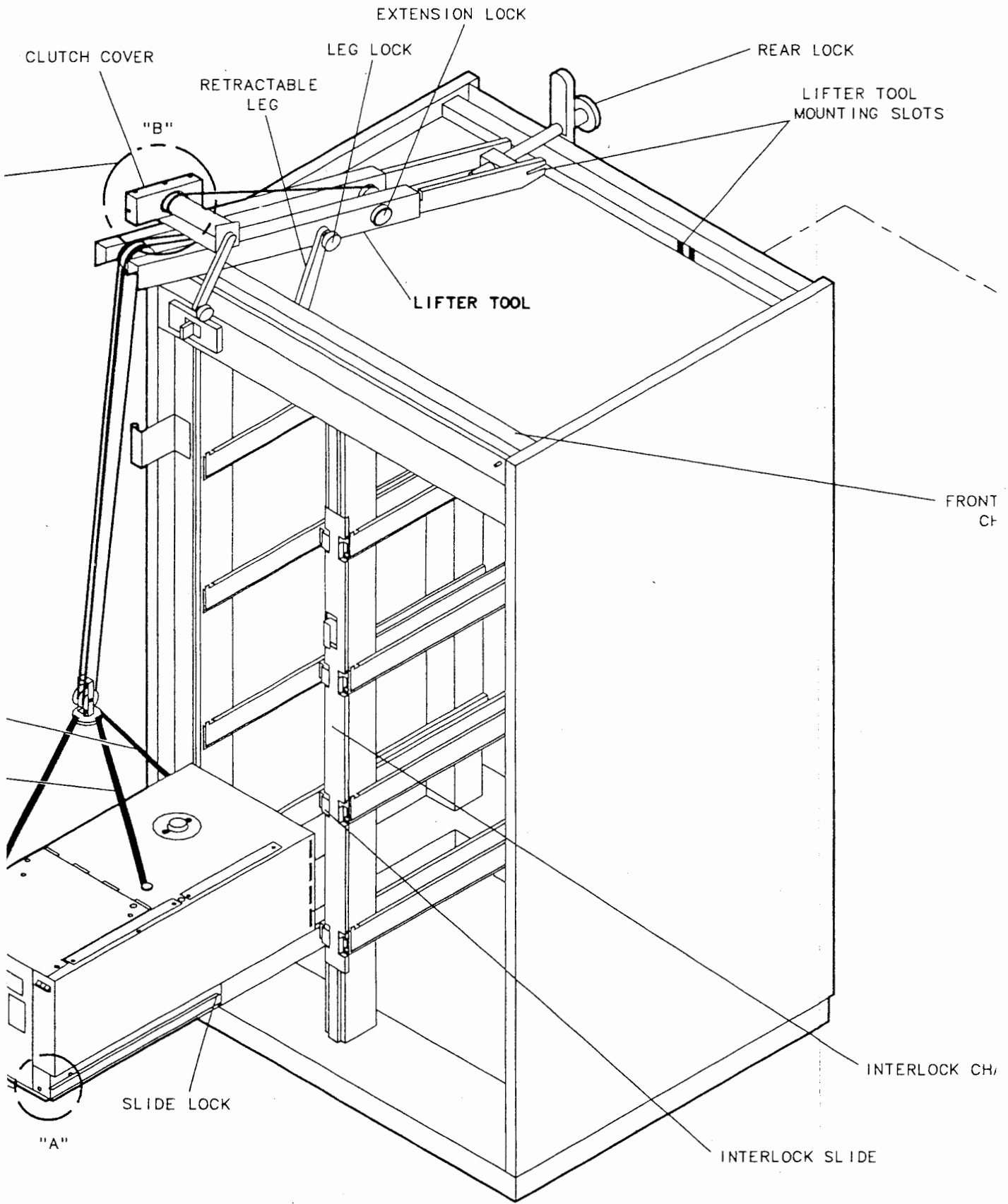
CABLE  
CLAMP

CABINET  
CHANNEL

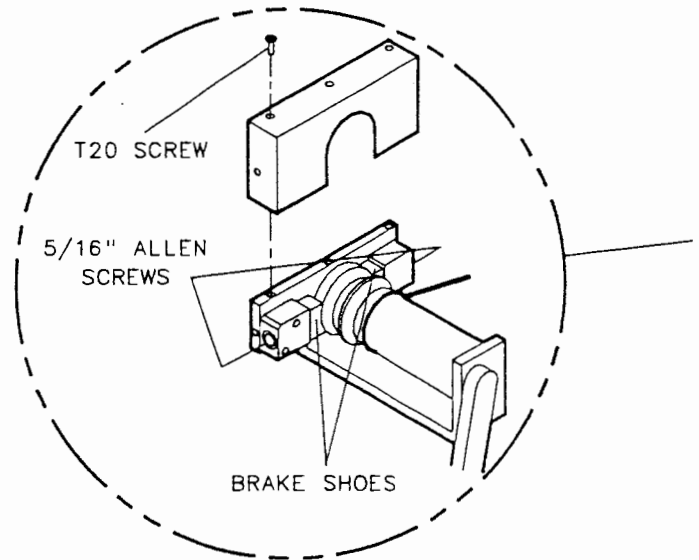
CABINET CAP

### CABLE ROUTING

CHANNEL

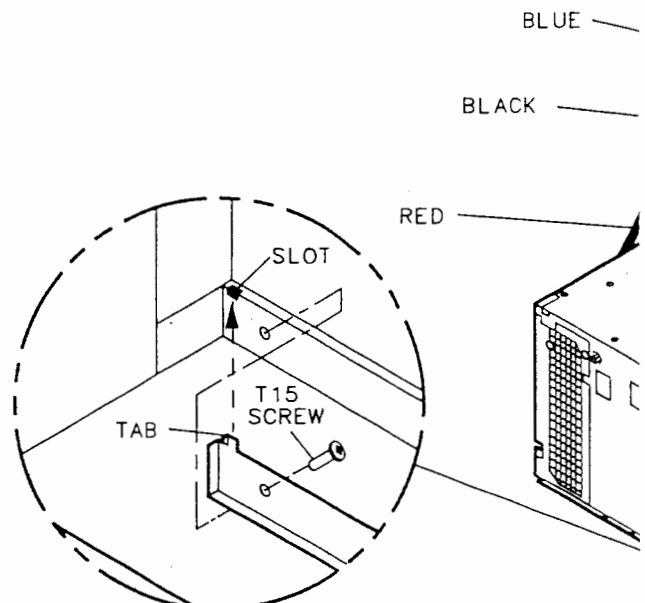




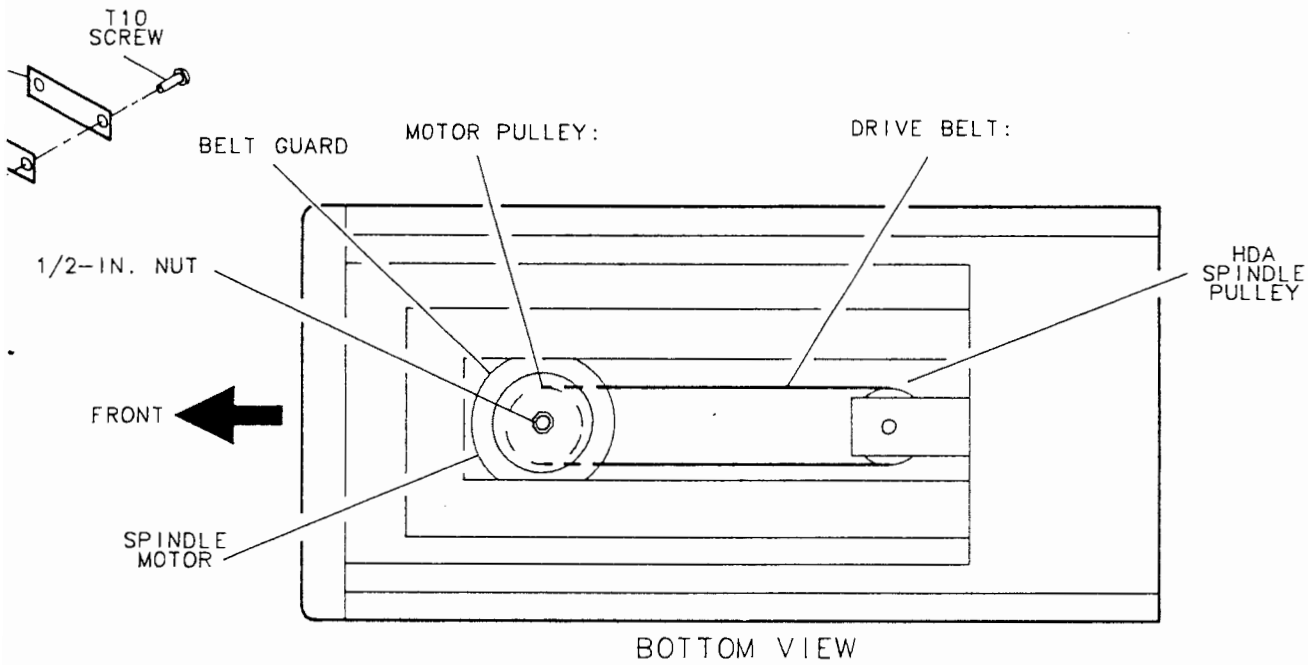


DETAIL "B"

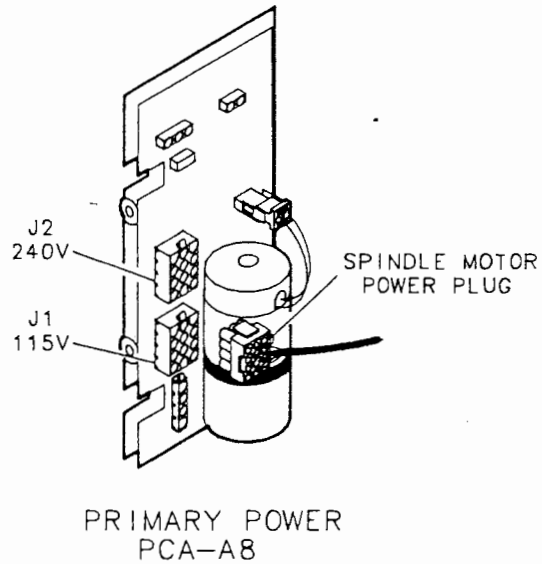
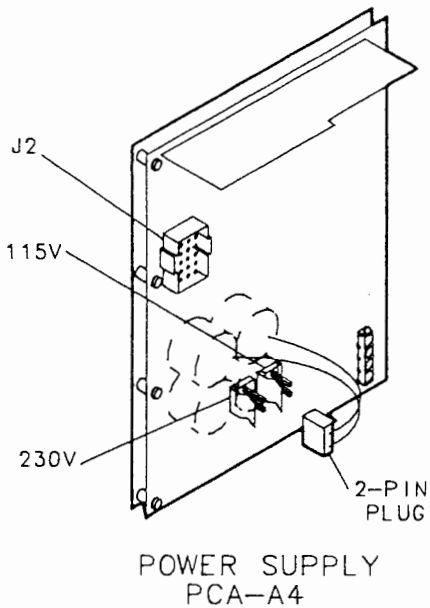
## DRIVE INSTALLATION



DETAIL "A"



## 2. FREQUENCY CONVERSION, 50/60 Hz



## 3. VOLTAGE CONVERSION, 115/230 VAC

Figure 2-14. Input Power Conversion Details

~ LINE LABELS

FAN SCROLL COVER  
(Used On Early Models Only)

FAN SCROLL

FAN ROTOR

DRIVE MAINFRAME

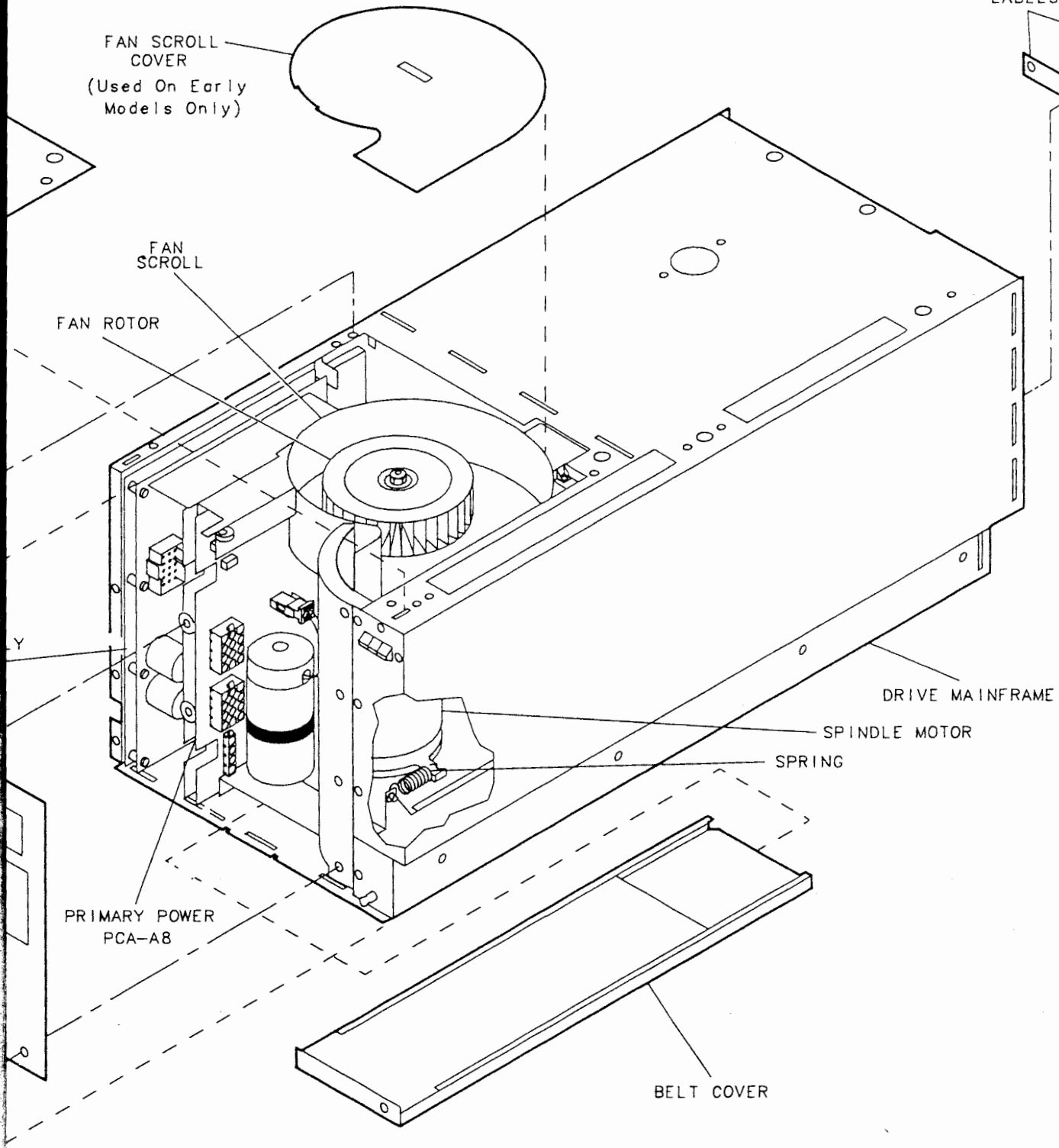
SPINDLE MOTOR

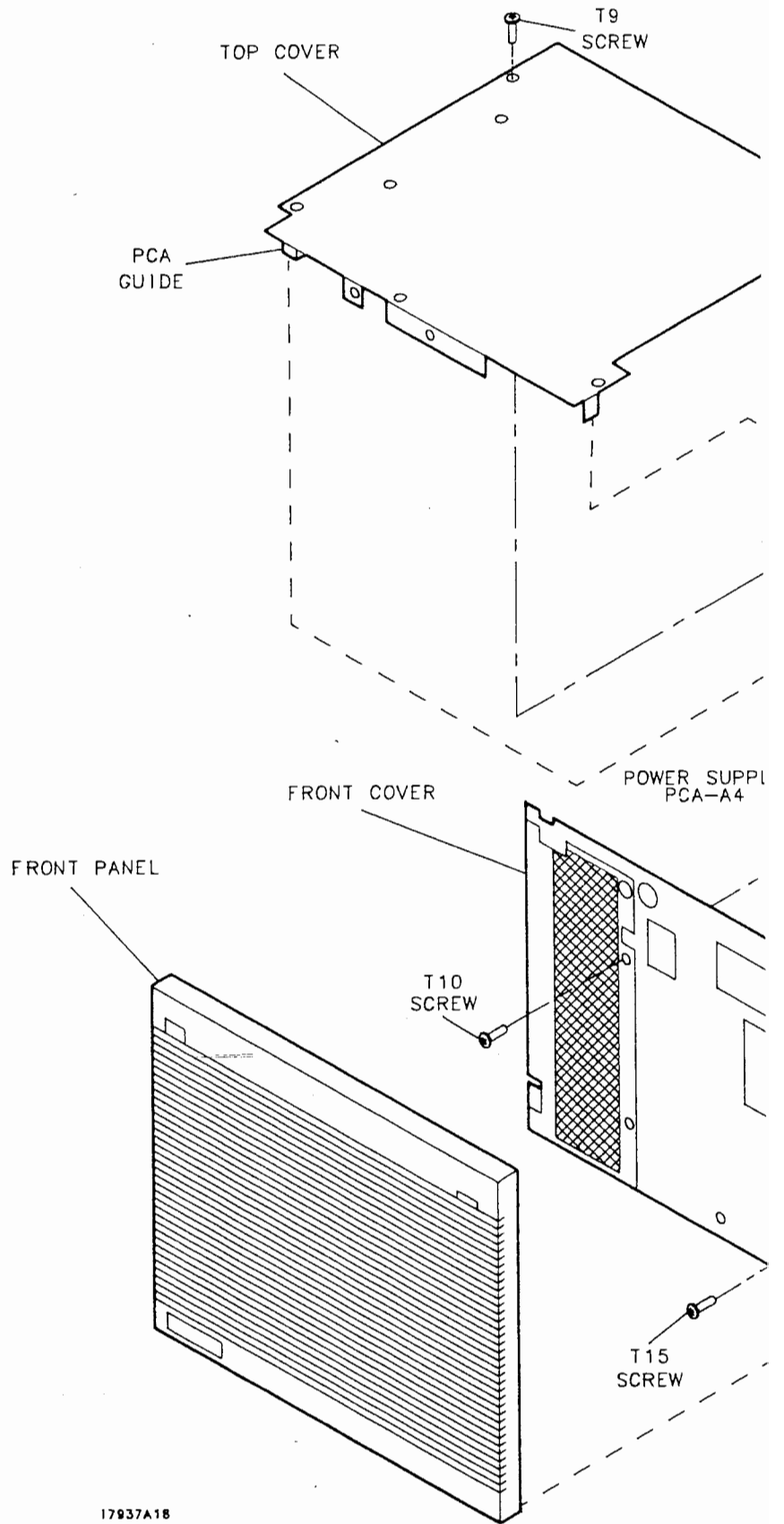
SPRING

PRIMARY POWER  
PCA-A8

BELT COVER

### 1. COMPONENT ACCESS





17937A18

## 3-1. INTRODUCTION

This chapter provides information on operating the drive. Before operating the drive, the user should be familiar with the various controls on the drive. The following paragraphs describe the functions of the drive controls, indicators, and connectors. The location of these components is shown in figure 3-1.

### **WARNING**

The drive does not contain operator-serviceable parts. To prevent electrical shock, refer all installation and service activities to service-trained personnel. This includes cabling and host connection.

### **CAUTION**

Heed all WARNING and CAUTION labels attached to the drive and cabinet.

Only service-trained personnel are qualified to unpack and the install the drive.

On HP-IB systems, do not start up or shut down the drive when the system HP-IB bus is in an active state.

On HP-IB systems do not connect or disconnect an HP-IB interface cable from the drive when the system bus is in an active state.

## 3-2. CONTROLS, INDICATORS, AND CONNECTORS

The drive front and rear panel controls, indicators, and connectors are identified in figure 3-1. The functions of these components are described in the following paragraphs.



## 3-3. LINE~ SWITCH

The LINE~ switch controls the application of ac power to the drive. Power is "on" when the switch is in the 1 (in) position and "off" when it is in the 0 (out) position. The 1 and 0 markings correspond to international symbology presently in use.

## 3-4. CHANNEL ADDRESS/DIAGNOSTIC SWITCH

The Channel Address/Diagnostic switch is a 4-segment switch assembly which selects the system channel address and the drive self-test diagnostics. The switch segments are read by the controller at power-on.

CHANNEL ADDRESS switch segments S2, S3, and S4 permit the selection of one of eight unique channel addresses. The address settings, 0 through 7, are shown on the rear panel address switch label. See figure 3-2.

When setting the address switch segments, observe the following:

- Disregard any markings on the body of switch assembly.
- Set or change switch positions only when power is removed from the drive.
- Ensure that no two drives on the channel have the same address.

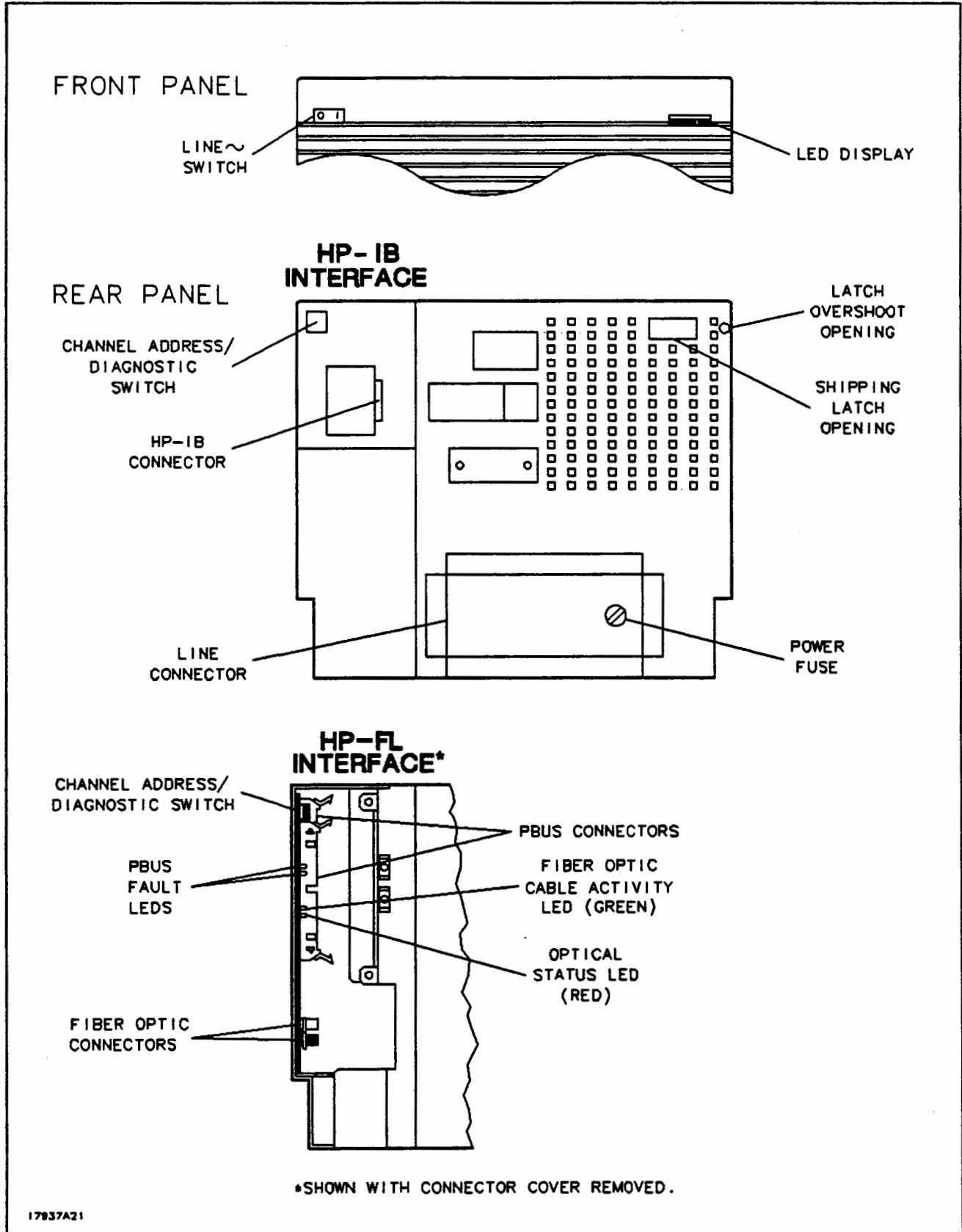
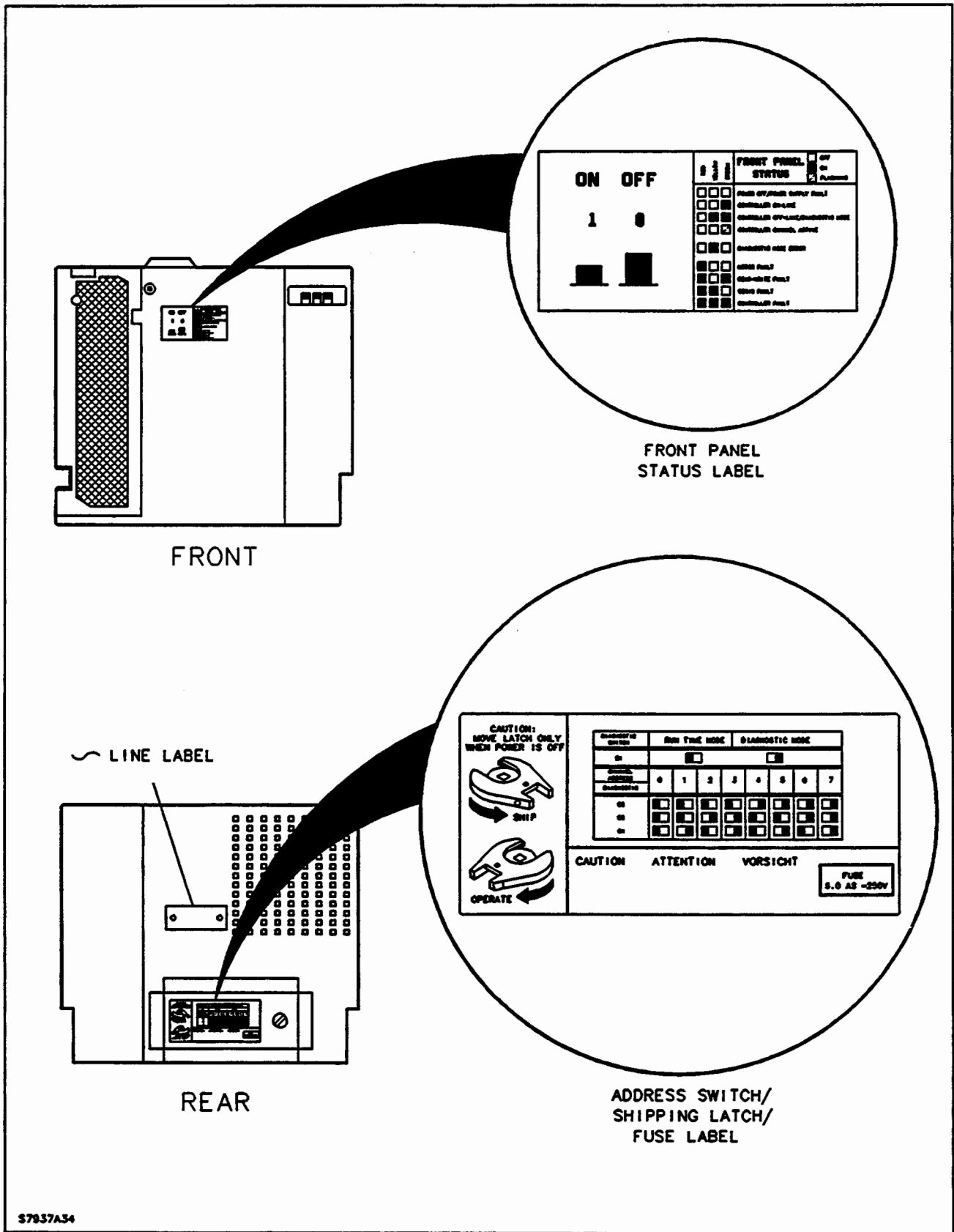


Figure 3-1. Drive Controls, Connectors, and Indicators



S7937A34

Figure 3-2. Label Locations

DIAGNOSTIC SWITCH segment S1 selects which internal diagnostic routine the drive will execute at power-on. The two diagnostic modes are described in the following paragraphs.

**3-5. RUN TIME MODE.** When switch S1 is set to the RUN TIME MODE position, a series of hardware tests are performed at power-on. Following successful completion of the hardware diagnostic routines, the drive comes on line. The diagnostic normally takes approximately 9 seconds for H-model drives, approximately 44 seconds for XP-model drives, and approximately 25 seconds for FL-model drives.

The front panel LED display indicates the results of the power-on hardware diagnostics. Successful completion of the diagnostic is indicated by the green LED remaining illuminated. If the drive fails the hardware diagnostic, the Red LED will remain illuminated and the Yellow and Green LEDs will be coded to indicate the malfunctioning assembly. A power supply failure or loss of input power is indicated by all LEDs extinguished. The coding for the LEDs is shown on a label located behind the removeable front panel. See figure 3-2.

**NOTE**

A drive fault condition (Red LED illuminated) does not necessarily mean that the drive controller is incapable of communication with the host. In most cases, details of the fault condition (beyond the information encoded by the LEDs), can still be obtained by commands from the host. Refer to Chapter 8 of the *HP 7936 and HP 7937 Disc Drive Hardware Support Manual*, part no. 07937-90903 for details.

### 3-6. DIAGNOSTIC MODE

**NOTE**

The DIAGNOSTIC MODE position is for service purposes and should not be used during normal operation of the drive.

If S1 is set to the DIAGNOSTIC MODE position, the same hardware diagnostic executed in RUN TIME MODE is invoked when power is applied. However, the controller does not bring the drive on line following the completion of the hardware diagnostic routines. Instead, the drive performs additional test routines, which differ according to drive model as follows:

- H-model - performs a full-volume RO ERT (7.5 minutes) followed by a continuous loop of random RO ERTs.
- FL-model - executes a series of HP-FL interface loopback tests. If a fiber optic loopback cable is not connected to the drive fiber optic connectors, the loopback test will fail with a controller fault indication and the diagnostics will halt. If the loopback tests are successful, the drive performs a full-volume RO ERT (7.5 minutes) followed by a continuous loop of random RO ERTs.
- XP-model - the routine performed by the XP-model drive is determined by the positions of the channel address switches at power-on.

If the HP-IB channel address is set to 5, the drive will initialize the 4 kbytes of write cache NonVolatile RAM (NVRAM). This involves clearing the entire NVRAM. Initialization of the NVRAM should only be performed during first-time installation of a new XP-model drive, or if a new XP-model controller PCA has been installed in the drive. In these two situations it is desirable to clear the NVRAM of any spurious data it might contain. If the NVRAM is not cleared, unwanted data may be written to the disc at power-on.



**NOTE**

If the channel address switches are set to any other address than 5, the drive will not perform the NVRAM initialization. The NVRAM should not be initialized for any conditions other than the two cited above. It is particularly important not to initialize the NVRAM following a loss of drive power, whether due to power failure or when removing power to service the drive. When power is removed from the drive, the NVRAM may contain valid data which has not yet been written to the disc media. When power is restored, the controller will update this data to the disc. However, if the drive is configured to initialize the NVRAM when power is restored, the valid data will be destroyed.

Following the NVRAM initialization routine, the drive performs a full-volume RO ERT (7.5 minutes) followed by a continuous loop of random RO ERTs. If the NVRAM initialization was not performed, the drive proceeds directly to the ERT routines.

When the drive begins the RO ERT routines, both the Yellow and Green LEDs will be illuminated. If any uncorrectable or marginal data errors occur during the RO ERTs, the Green LED is extinguished leaving only the Yellow LED illuminated.

A hardware diagnostic failure is indicated by the Red LED remaining illuminated and the Yellow and Green LEDs coded to indicate the source of the most likely malfunctioning assembly. A power supply failure or loss of input power is indicated by all LEDs extinguished. The coding for the LEDs is shown on a label located behind the removeable front panel. See figure 3-2.

When the DIAGNOSTIC MODE position is selected, the drive will not come on line (be capable of communication with the host) until the Power switch is turned off, switch S1 returned to the RUN TIME MODE position, and the drive powered on again.

Failure information gathered during this time will be logged in the internal error logs of the drive. Data error information will be only be transferred from RAM to the disc ERT log after five errors have been detected, or at the completion of the full-volume RO ERT. Refer to Chapter 8 of the *HP 7936 and HP 7937 Disc Drive Hardware Support Manual*, part no. 07937-90903, for details on how to retrieve this data.

### 3-7. LED DISPLAY

The front panel LED display provides a visual indication of the operational status of the drive. The LED display consists of single red, green, and yellow LEDs. As explained in the preceding paragraphs, the significance of the LED patterns is determined by the operating mode of the drive (RUN TIME or DIAGNOSTIC). The coding for the LEDs is shown on a label located behind the removeable front panel. See figure 3-2.

In addition to its role as a status display, the Green LED also serves as an activity indicator, flashing any time the drive has opened communication with the host computer.

### 3-8. HP-FL STATUS LEDs (FL-MODEL DRIVES ONLY)

The HP-FL status LEDs provide a visual indication of the current operating status of the HP-FL interface. The four status LEDs are located on the HP-FL controller PCA and are visible through the rear panel. See figure 3-1. The LEDs indicate the status of both levels of interface: the host/drive HP-FL fiber optic connection, and the interdrive PBus.



**3-9. PBus FAULT LED.** The two PBus fault LEDs indicate the integrity of the PBus connections. If both PBus terminators are installed properly and all PBus cables are connected properly (multi-drive installations), the PBus error LEDs on all drives connected to the bus will be extinguished.

If there is a problem with the PBus configuration, one or both PBus LEDs will be illuminated. In single drive installations, illuminated PBus error LED(s) indicate missing or improperly installed PBus terminator(s). In multi-drive installations, the same LED pattern displayed on all drives in the cluster indicates missing or improperly installed terminator(s). If the PBus error LED pattern changes between drives in a cluster, the PBus cabling between those drives is bad. See figure 3-3.

**3-10. OPTICAL STATUS LED.** The optical status LED indicates whether a functional host is properly connected to the drive via an HP-FL fiber optic cable. If a host is properly connected, this LED will be extinguished. In multi-drive configurations, this LED will be illuminated on all drives which are not connected to a host.

If all HP-FL interface hardware is operating properly, the optical status LED will remain extinguished. However, if a large number of channel retries occurs, this LED will come on for approximately 10 seconds. If the excessive retries continue, the LED may remain on for a longer period of time. Excessive retries indicate an increased channel error rate. This degradation in performance is most likely caused by a problem with the HP-FL fiber optic cable or interface electronics. If the optical status LED comes on, an HP Service Representative should be notified.

**3-11. FIBER OPTIC CABLE ACTIVITY LED.** The green LED is the fiber optic cable activity indicator. It illuminates only when commands, data, or status are being transferred over the HP-FL fiber optic cable. During periods of HP-FL inactivity, this LED remains extinguished.

### **3-12. HP-IB CONNECTOR (H- AND XP-MODEL DRIVES ONLY)**

The HP-IB connector allows H- and XP-model drives to be connected to the host computer via an HP-IB cable.

### **3-13. HP-FL FIBER OPTIC CONNECTORS (FL-MODEL DRIVES ONLY)**

This set of connectors allows an HP-FL duplex fiber optic cable to be connected to the drive. The optical fiber provides the interface between the drive and a host computer.

### **3-14. PBus CONNECTORS (FL-MODEL DRIVES ONLY)**

These two connectors provide the mechanical connection to the drive's internal PBus. In multiple-drive installations, the PBus connectors allow drives to be daisy-chained together using PBus cables, thus forming a common PBus among all drives in the cluster. Any unused PBus connectors must have PBus terminators installed in them.

### **3-15. POWER FUSE**

The drive is equipped with a primary power fuse located in the line filter assembly on the rear panel of the drive. See figure 3-1. The fuse protects the drive from an ac power overload. The drive uses either a 5 ampere (H- and XP-models) or 6.25 ampere (FL-model) fuse. The label attached to the line filter assembly indicates the ampere rating of the fuse installed in the drive. Always replace a fuse with the type indicated by the label.

The descriptions of the two fuses follow:

DRIVE MODEL	OPERATING VOLTAGE	FUSE DESCRIPTION	HP PART NO.
H/XP	All	5AS-250V	2110-0030
FL	All	6.25AS-250V	2110-0722

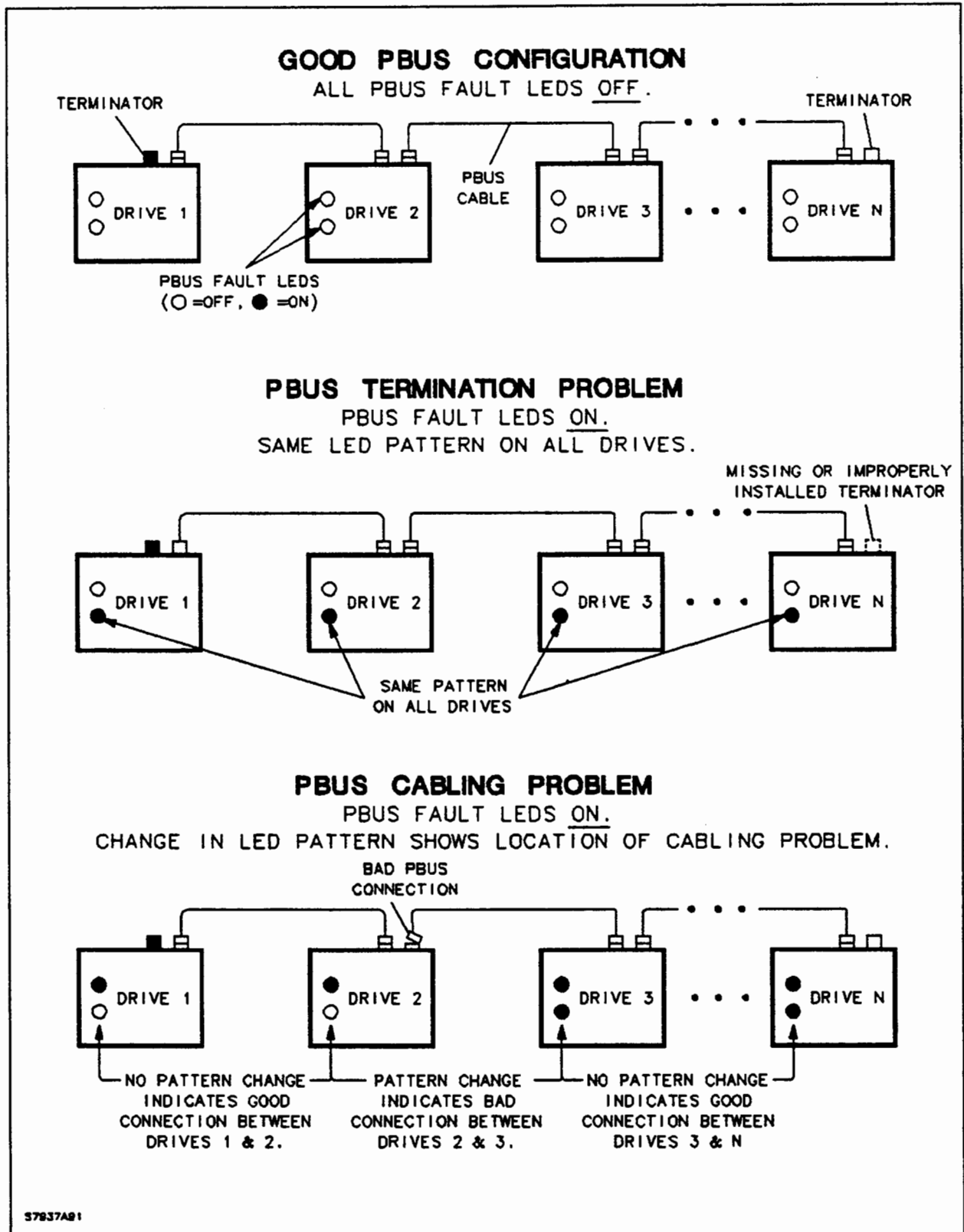


Figure 3-3. PBus Fault LED Patterns

**CAUTION**

**3-16. LINE CONNECTOR**

The line connector allows the drive to be connected to an ac power source via a suitable power cord. The input power configuration of the drive is listed on the rear panel ~LINE label.

**3-17. SHIPPING LATCH**

**CAUTION**

Do not operate the Shipping Latch when the drive LINE~ switch is in the 1 (in) position. Power must be removed from the drive before the latch is moved.

Do not attempt to operate the drive with the Shipping Latch in the 0 (Ship) position. If power is applied to the drive with the latch in the 0 position, a servo fault will occur (Red and Yellow LEDs illuminated). To recover from this situation, remove power from the drive, move the latch to the 1 (Operate) position, and then apply power to the drive.

The drive shipping latch prevents the drive head-disc assembly from being damaged by vibration and shock during shipment and installation of the drive. The latch is located behind the rear panel and can be activated by a medium-sized flat-blade screwdriver through a rectangular opening in the rear panel. See figure 3-1.

The latch settings are indicated by symbols on the latch, visible through the rectangular opening. The 0 symbol is the "Ship" setting and the 1 symbol is the "Operate" setting. The latch must remain in the 0 (Ship) position until the drive is installed at its operating location and is ready for the application of power. At this time, the latch should be set to the 1 (Operate) position and power applied to the drive.

If the latch is inadvertently moved to the 0 (Ship) setting after power is applied to the drive, the latch may overshoot the 0 (Ship) setting. (The latch is in an overshoot state if the 0 (Ship) symbol moves to the right, past the range of visibility of the rectangular opening.)

If an overshoot occurs, the drive will continue to operate normally; however, the drive should not be shipped with the latch in the overshoot position. To avoid damage during shipping, the latch should be reset immediately. To prevent damage to the drive, do not reset the latch while the drive is being accessed, or when power is removed from the drive.

To reset the latch, proceed as follows:

1. Remove power from the drive by setting the LINE~ switch to the 0 (out) position.
2. Disconnect the HP-IB connector.
3. Apply power to the drive.
4. Wait for the drive to finish its internal self-test diagnostic routine (approximately 9 seconds for H-model drives; 44 seconds for XP-model drives; 25 seconds for FL-model drives).
5. Insert the tip of a small flat-blade screwdriver through the round overshoot opening in the rear panel (see figure 3-1) and return the latch to the 1 (Operate) position.
6. Remove power from the drive.
7. Reconnect the HP-IB connector.
8. Apply power to the drive.

### 3-18. POWER-ON SEQUENCE

#### CAUTION

Do not operate the Shipping Latch when the drive LINE~ switch is in the 1 (in) position. Power must be removed from the drive before the latch is moved.

Do not attempt to operate the drive with the Shipping Latch in the 0 (Ship) position. If power is applied to the drive with the latch in the 0 position, a servo fault will occur (Red and Yellow LEDs illuminated). To recover from this situation, remove power from the drive, move the latch to the 1 (Operate) position, and then apply power to the drive.

On HP-IB systems do not turn the drive on or off when the system HP-IB bus is in an active state.

Do not operate the drive if condensation is evident anywhere on it. Wait until all condensation has evaporated before operating the drive.

The power-on procedure for the drive varies depending upon the type of controller PCA installed. The following paragraphs describe the procedure for each model of drive.

#### 3-19. H-MODEL POWER-ON PROCEDURE

To perform the power-on sequence for H-model drives, proceed as follows:

- a. Ensure that the Shipping Latch is set to the 1 (Operate) position. The location of the latch is shown in figure 3-1.
- b. Set the address switch segments of the Channel Address/Diagnostic switch to the desired chan-

nel address. The location of the switch is shown in figure 3-1. Information on setting the address switches is shown on the rear panel address switch label. See figure 3-2.

- c. Set Diagnostic Switch S1 to the RUN TIME MODE position. The location of the switch is shown in figure 3-1.

#### NOTE

If Diagnostic Switch S1 is in the DIAGNOSTIC MODE position when power is applied, the drive will not come on line at the conclusion of the hardware diagnostics (refer to paragraph 3-6).

- d. Set the front panel LINE~ switch to the 1 (in) position. The drive will begin its self-test hardware diagnostic, which takes approximately 9 seconds. Successful completion of the diagnostic is indicated by only the green front panel LED remaining illuminated. Refer to paragraph 3-5.

#### 3-20. XP-MODEL POWER-ON PROCEDURE

The power-on sequence for XP-model drives involves two procedures: formatting cache NVRAM, and final power-on checkout.

**3-21. INITIALIZING THE CACHE NON-VOLATILE RAM.** During first-time installation of a new XP-model drive, it is recommended that the 4-kbyte write cache NonVolatile RAM (NVRAM) be initialized. It is also recommended that this procedure be performed following replacement of the controller PCA. By setting the drive Channel Address/Diagnostic switch segments to the proper positions, the drive will initialize the NVRAM as part of the power-on self-test diagnostic routine. Refer to paragraph 3-6 for details concerning the NVRAM initialization.

**NOTE**

To initialize the NVRAM, proceed as follows:

**CAUTION**

The NVRAM initialization procedure should only be performed during first-time installation of a new drive, or following replacement of the controller PCA. In all other situations, skip the initialization procedure and proceed directly to the final power-on checkout described in paragraph 3-22.

- a. Ensure that the Shipping Latch is set to the 1 (Operate) position. The location of the latch is shown in figure 3-1.
- b. Set DIAGNOSTIC SWITCH segment S1 of the Channel Address/Diagnostic switch to the DIAGNOSTIC MODE position. The location of the switch is shown in figure 3-1. Information on setting the address switches is shown on the rear panel address switch label. See figure 3-2.
- c. Using the three remaining segments of the Channel Address/Diagnostic switch, set the drive HP-IB address to 5.
- d. Apply power to the drive by setting the LINE~ switch to the 1 (in) position.
- e. Wait for the drive to complete its self-test diagnostic and begin its sequence of RO ERTs. This takes approximately 60 seconds. The NVRAM should now be formatted.
- f. Remove power from the drive by setting the LINE~ switch to the 0 (out) position.
- g. Set the HP-IB address switch segments to the desired channel address.
- h. Set the DIAGNOSTIC SWITCH segment to the RUN TIME MODE position.

If Diagnostic Switch S1 is in the DIAGNOSTIC MODE position when power is applied, the drive will not come on line at the conclusion of the hardware diagnostics.

**3-22. FINAL POWER-ON CHECKOUT.** To perform the final checkout of the XP-model drive, proceed as follows:

- a. Ensure that the DIAGNOSTIC segment of the Channel Address/Diagnostic switch is set to the RUN TIME MODE position, and that the HP-IB address segments are set to the desired address. The location of the switch is shown in figure 3-1.
- b. Set the front panel LINE~ switch to the 1 (in) position. The drive will begin its self-test hardware diagnostic, which takes approximately 44 seconds. Successful completion of the diagnostic is indicated by only the green front panel LED remaining illuminated. Refer to paragraph 3-5.
- c. Using the appropriate system level utility or exerciser program, retrieve the cache status from the drive and ensure that cache is enabled.

**3-23. FL-MODEL POWER-ON PROCEDURE**

There are two power-on routines for the FL-model drives. The first is a stand-alone diagnostic power-on routine which is performed before the drive is configured into a host system. The stand-alone power-on diagnostic should only be performed by a trained HP Service Representative.

After the drive is connected to the host system, a final power-on checkout is performed. Drives already configured into a system require only a final power-on checkout.

### 3-24. STAND-ALONE DIAGNOSTIC.

### POWER-ON

#### **WARNING**

The HP-FL stand-alone power-on diagnostic requires access to the interior of the drive. To avoid potential shock hazard, the stand-alone power-on diagnostic must be performed only by service-trained personnel.

Before configuring an FL-model drive into the host system, the stand-alone power-on diagnostic should be performed. To perform the diagnostic, proceed as follows:

- a. Ensure that the Shipping Latch is set to the 1 (Operate) position. The location of the latch is shown in figure 3-1.
- b. Set DIAGNOSTIC SWITCH segment S1 of the Channel Address/Diagnostic switch to the DIAGNOSTIC MODE position. The location of the switch is shown in figure 3-1. Information on setting the address switches is shown on the rear panel address switch label. See figure 3-2.
- c. Remove the connector cover from the rear of the drive. The cover is held in place by three T15 screws.
- d. Remove the fiber optic cable/strain relief assembly if installed on the drive.

#### **CAUTION**

Do not exceed the bend radius restrictions for the fiber optic cable used to perform the loopback tests. Sharp kinks or bends will damage the cable.

- e. Connect a fiber optic loopback cable (P/N HFBR-3020) to the fiber optic transmit and receive ports on the drive. See figure 2-10.
- f. Install PBus terminators in both drive PBus

connectors. See figure 2-10. The terminators must be installed in opposite orientations; that is, one with the white side visible, and one with the gray side visible.

- g. Connect the power cord to the drive per paragraph 2-49.
- h. Apply power to the drive by setting the LINE~ switch to the 1 (in) position. The drive will perform its extended hardware diagnostic routine as described in paragraph 3-6.
- i. Wait 10 minutes and check the front panel LED display to ensure the diagnostic routine was successful (green and yellow LEDs illuminated).
- j. Remove power from the drive by setting the LINE~ switch to the 0 (out) position.
- k. Disconnect the fiber optic loopback cable and the PBus terminators.
- l. Set DIAGNOSTIC SWITCH segment S1 of the Channel Address/Diagnostic switch to the RUN TIME MODE position.

The drive is now ready to be configured into the host system. Refer to paragraph 2-41 for information on connecting the drive to the host CPU.

#### **NOTE**

To perform stand-alone power-on diagnostics on multiple drives simultaneously, it is necessary to have a fiber optic loopback cable (HFBR-3020) for each drive. PBus terminators are not required for each drive if the drives are connected properly using PBus cables and terminators. Before beginning the diagnostics, ensure each drive in the cluster has a unique channel address and is in run time mode. First check the integrity of the PBus by turning on all drives and ensuring that both PBus fault LEDs are off on each drive. Then turn all drives off and set each drive to diagnostic mode. Turn the drives on sequentially, waiting a few seconds between each

drive. Check the front panel status LEDs for diagnostic results.

Five uncorrectables must be found before they are written from RAM onto the disk.

**3-25. FINAL POWER-ON CHECKOUT.** Once connected to the host, the drive is ready for its final power-on checkout. To perform the final checkout, proceed as follows:

- a. Ensure that DIAGNOSTIC SWITCH segment S1 is set to the RUN TIME MODE position, and that the HP-FL address switch segments are set to the desired address. The location of the switch is shown in figure 3-1.

**NOTE**

If Diagnostic Switch S1 is in the DIAGNOSTIC MODE position when power is applied, the drive will not come on line at the conclusion of the hardware diagnostics (refer to paragraph 3-6).

- b. Set the front panel LINE~ switch to the 1 (in) position. The drive will begin its self-test hardware diagnostic, which takes approximately 25 seconds. Successful completion of the diagnostic is indicated by only the green front panel LED remaining illuminated. Refer to paragraph 3-5.
- c. Check the rear panel interface status LEDs for the proper indications. The significance of the LED states is listed in table 3-1.

### 3-26. POWER-OFF SEQUENCE

**CAUTION**

On HP-IB systems do not turn the drive power on or off when the system HP-IB bus is in an active state.

To power-off the drive, set the LINE~ switch to the 0 (out) position.

### 3-27. OPERATOR INSTRUCTIONS

The information needed by an operator to control an installed drive is summarized in figure 3-5. This information includes operating precautions and warnings, the function of the front panel controls, setting the channel address, power on sequence, and how to interpret the LED display.

### 3-28. OPERATOR MAINTENANCE

Although the drive requires no preventive maintenance, it is recommended that the drive prefilter screen be cleaned on a regular basis.

**CAUTION**

Failure to keep the prefilter screen clean will result in decreased airflow through the drive, causing the internal temperature of the drive to increase. This may cause component failure or an increase in the data error rate.

To ensure proper operation of the drive, the prefilter screen should be cleaned once a month (or more often in severe environments). The prefilter screen is located on the front of the drive and is accessed by removing the front panel. It is not necessary to shut the drive off to clean the screen.

Cleaning the prefilter screen is a simple task that can be performed by the system operator. The cleaning procedure involves removing the front



panel, cleaning the screen, and reinstalling the panel. A vacuum cleaner is the most effective tool for cleaning the screen. If a vacuum cleaner is not available, a tissue can be used to wipe the screen clean.

The drive front panel is held in place by four snap-in studs. On older drives, the front panel is removed by grasping the panel by its edges and pulling forward until the panel separates from the drive frame.

Newer drives are equipped with a front panel that uses a lever mechanism to simplify removal. The lever is located in the upper right corner of the panel. See figure 3-4. To remove this type of panel, press in on the upper part of the lever until the lower portion of the lever is exposed. Pull out on the lower part of the lever to disengage the panel from the drive.

**NOTE**

To avoid interfering with the drive line switch, the upper left panel fastener is positioned toward the center of the panel. See figure 3-4. To prevent inadvertently shutting off the drive when installing the front panel, press on the

panel in the location of the fastener and not in the upper left corner near the switch.

To install the front panel, align the panel studs with the mating clips on the drive frame and press into place.

To facilitate cleaning the prefilter screen, it may be desirable to replace old style front panels with the newer, easier-to-remove, lever-style front panels. The following parts are required to upgrade a drive to the newer model front panel:

P/N	DESCRIPTION
07937-60400	New front panel
07937-80066	7937 product label
or	
07937-80016	7936 product label
07930-80255	Cache label (XP only)

**NOTE**

Upgrading a drive to the new front panel is the customer's responsibility.



Table 3-1. HP-FL Interface Status LEDs

STATUS LED	STATE	INDICATION
Fiber Optic Cable Activity (Green)	Off  On*	No host communication with drive.  Data, commands, or status are being transferred over the fiber optic cable.
Optical Status (Red)	Off  On*   Momentarily On	A functional host HP-FL CIO PCA is properly connected to the drive via the fiber optic cable.  Normal indication if no host is connected. If host is connected, indicates:  <ol style="list-style-type: none"> <li>1) Bad fiber optic cable connections</li> <li>2) Bad fiber optic cable</li> <li>3) Malfunctioning host HP-FL CIO PCA</li> </ol> A large number of retries has occurred.
PBus Fault LEDs (1 yellow, 1 red)	Off   On (Either or both)	All PBus connections and terminations are OK. In properly configured multi-drive installations, both PBus error LEDs on all drives will be off.  In single-drive installations, indicates missing or improperly installed PBus terminator(s).  In multi-drive installations, indicates a termination or cabling problem as follows:  <ul style="list-style-type: none"> <li>- The same LED pattern displayed on all drives indicates missing or improperly installed terminator(s).</li> <li>- A change in LED pattern indicates a PBus cabling problem. The pattern change occurs between the drives that are not connected properly. See figure 3-3.</li> </ul>
<p><i>*NOTE: If both the channel activity LED and the optical status LED are on following power-on, the drive is in a controller fault state.</i></p>		

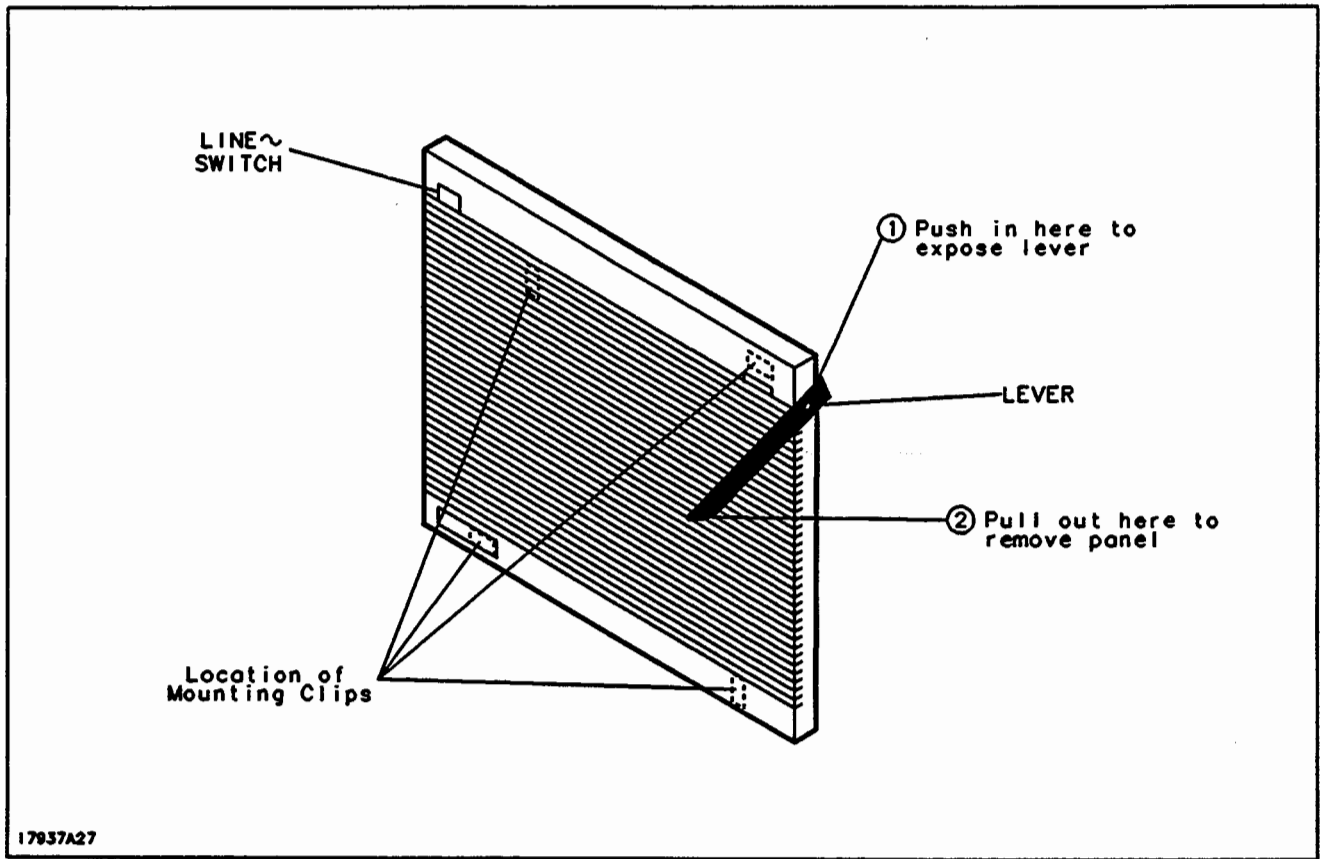


Figure 3-4. Front Panel Removal



### POWER-ON SEQUENCE

When power is applied to the drive, it performs an internal self-test diagnostic which checks key operations of the drive. Proper operation can be verified by observing the LED display (2) when power is applied.

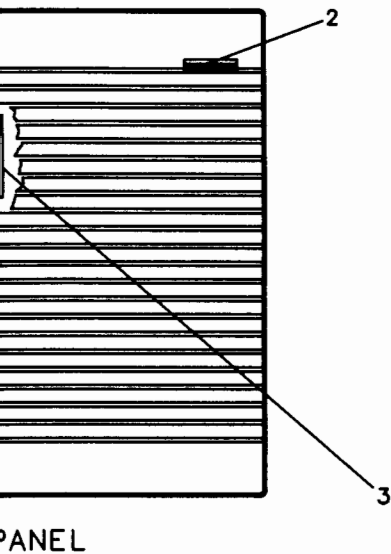
Set the LINE~ switch (1) to the 1 (In) position. The self-test diagnostic lasts approximately 9 seconds for H-model drives, 25 seconds for FL-model drives, and 44 seconds for XP-model drives. Two sounds can be heard from the drive during the diagnostic. One sound is that of the spindle motor coming up to speed and the other sound (fairly quiet) is from the actuator as it performs a drive calibration and a series of seeks.

At the start of the diagnostic, all three LEDs in the display (2) will be lit, then the Yellow and Green LEDs will remain lit, and at the end of the diagnostic, only the Green LED (controller on-line) should remain lit. This indicates a successful completion of self-test, with the drive ready for operation.

If the Red LED (fault) remains lit, it indicates that a self-test fault has occurred. The most likely source of the fault is indicated by the coding of the Yellow and Green LEDs, as shown in the LED label (3). For example, if the Yellow and Green LEDs remain unlit, this indicates a motor fault.

If all of the LEDs remain unlit, this indicates a power supply fault or the absence of AC power to the drive.

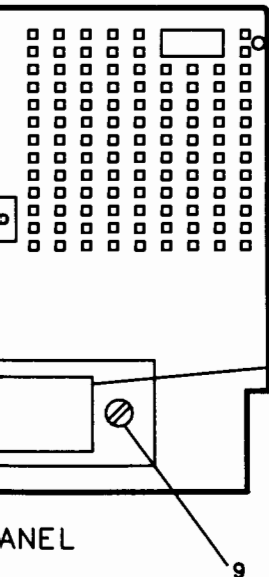
A flashing Green LED indicates that the drive has opened communication with the host computer.



PANEL

ON	OFF	YELLOW	GREEN	FRONT PANEL STATUS		<input type="checkbox"/> OFF
				<input type="checkbox"/> ON	<input checked="" type="checkbox"/> FLASHING	
1	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	POWER OFF/POWER SUPPLY FAULT
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CONTROLLER ON-LINE
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CONTROLLER OFF-LINE/DIAGNOSTIC MODE
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CONTROLLER CHANNEL ACTIVE
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	DIAGNOSTIC MODE ERROR
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	MOTOR FAULT
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	READ-WRITE FAULT
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SERVO FAULT
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CONTROLLER FAULT

FRONT PANEL STATUS LABEL (3)



PANEL

**CAUTION: MOVE LATCH ONLY WHEN POWER IS OFF**

SHIP

OPERATE

DIAGNOSTIC SWITCH	RUN TIME MODE				DIAGNOSTIC MODE			
DIAGNOSTIC ADDRESS	0	1	2	3	4	5	6	7
01	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
02	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
03	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
04	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

CAUTION    ATTENTION    VORSICHT

FUSE  
5.0 AS -250V

CHANNEL ADDRESS/DIAGNOSTIC SWITCH LABEL (5)



## WARNINGS AND PRECAUTIONS

The user should observe the following warnings and precautions when operating the HP 7936/7937 Disc Drive:

### WARNING

The drive does not contain operator-serviceable parts. To prevent electrical shock, refer all installation and service activities to service-trained personnel.

### CAUTION

- Heed all WARNING and CAUTION labels attached to the drive and cabinet.
- Do not power-on or power-off an HP-IB drive when the system HP-IB bus is in an active state.
- Do not connect or disconnect HP-IB interface cable(s) when the system bus is in an active state.

## CONTROLS AND LABELS

- LINE~Switch (1). Controls application of primary power to the drive. The 0 (out) position is "off" and the 1 (in) position is "on".
- Front Panel LED Display (2). A Green, Yellow, and Red LED display which shows the operating status of the drive.
- Front Panel LED Display Status Label (3). Shows how to interpret the coding of the LED display (2).
- Channel Address/Diagnostic Switch (4). A 4-segment switch which selects the drive channel address (segments S2 through S4) and the diagnostic mode (segment S1). Used during installation only.

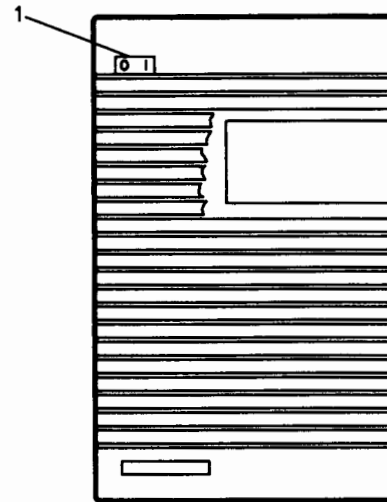
### NOTE

Switch segment S1 must be in the RUN TIME MODE for proper drive operation. If S1, or any of the switch segments are inadvertently changed, refer to Chapter 2 for instructions on resetting the switches to the proper positions.

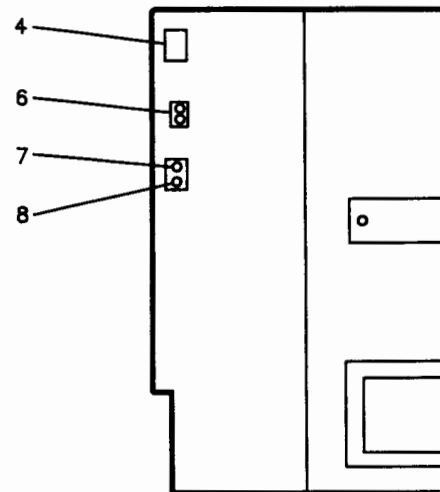
- Channel Address/Diagnostic Switch Label (5). Shows how to set the channel address/diagnostic switch (4) for the desired channel address and diagnostic mode. Used during installation only.

The four HP-FL Status LEDs (6,7, and 8) are used only on FL-model drives. They display the operating status of the HP-FL interface.

- PBus Fault LEDs (6). Indicate if all PBus cables and terminators are properly connected. If all connections are good, the PBus error LEDs will be extinguished. If this is a bad connection, one or more of these LEDs will be lit.
- Fiber Optic Cable Activity LED (7). Illuminates when data, commands, or status are being transferred over the bus.
- Optical Status LED (8). Extinguished if the drive is properly connected to a functional host via an HP-FL fiber optic cable. If no host is connected, this LED will be illuminated. Blinks if a large number of channel retries have occurred.
- Power Fuse (9). H- and XP-models use 5 ampere fuse; FL-model uses 6.25 ampere fuse.



FRONT P



REAR P



Manual Part Number: 07937-90902  
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Edition 4  
E1189



**HEWLETT  
PACKARD**