CONVEX
ESDI Disk System
Service Guide

Order No. DHW-282

First Edition
September 1991

CONVEX Computer Corporation
Richardson, Texas USA

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FCC Notice

Warning

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

Do not connect external equipment to the utility outlets in CONVEX equipment cabinets. Unauthorized connection voids all agencies' emissions certification.

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Purpose and audience

The *CONVEX ESDI Disk System Service Guide* provides a general overview of the ESDI disk drive and related hardware and how to:

- Install the ESDI disk drive, ESDI chassis, and related hardware
- Integrate the ESDI disk drive into the CONVEX Operating System (ConvexOS)
- Test the ESDI drive and related hardware
- Remove and replace the ESDI drive and related hardware

This document is intended for:

- CONVEX customer support engineers and CONVEX manufacturing personnel
- CONVEX customers who need to install and maintain their own ESDI disk system and related hardware

Scope

The information presented in this service guide applies exclusively to the ESDI disk system and related hardware. The ESDI disk system can be used with all CONVEX computers that have a VMEbus chassis with a VME ESDI disk controller installed and have ConvexOS V8.1 or later installed.

Organization

This document consists of the following sections:

- **Chapter 1, Description and Specifications**—Describes the ESDI disk system and related hardware at the block-diagram level. Defines and lists the electromechanical and environmental specifications.
- **Chapter 2, Unpacking and Installing**—Provides guidelines on how to unpack and install the ESDI drive, ESDI chassis, and related hardware.
- **Chapter 3, Integration and Test**—Explains how to integrate the ESDI disk system into the ConvexOS operating system. Explains how to test the ESDI disk system and related hardware.
- **Chapter 4, Maintenance Procedures and IPB**—Provides removal and replacement instructions for the ESDI drive, ESDI chassis, and related hardware. It also gives the Illustrated Parts Breakdown for the ESDI disk system.
- **Appendix A, Hitachi 780MB ESDI Disk Drive Configurator**—Contains a copy of the *Hitachi 780MB ESDI Disk Drive Configurator* document.

Notational conventions

Notational conventions are those systems of characters, symbols, terminology, or abbreviated expressions used to express technical facts or quantities as established by this guide. The following notational conventions are used in this document:

- **Boldface** indicates user-entered information for a computer program and should be entered exactly as they appear.
- *Italic* is used for emphasis and also designates file names, program names, directory paths, release tape titles, and titles of publications.
- All CONVEX illustrations have an illustration file number at the bottom right-hand corner that is for CONVEX use only.

Warnings

The following are examples of warnings and their typical content and locations as used in CONVEX documents:

Warning

A warning highlights procedures or information necessary to avoid injury to personnel. The warning immediately precedes the critical information and includes a description of the hazard.

Cautions

The following are examples of cautions and their typical content and location as used in CONVEX documents:

Caution

A caution highlights procedures or information necessary to avoid damage to equipment, damage to software, loss of data, or that leads to invalid test results. The caution immediately precedes the critical information and includes a description of the possible damage.

Notes

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Note

A note highlights information of a supplemental nature. The note immediately precedes or follows the highlighted information.

Associated documents

The following is a partial list of other manuals or books that may provide more detailed information on the topics presented in this manual:

- *CONVEX VME ESDI Disk Controller Service Guide* DHW-053
- *Managing ConvexOS: Configuration and Operations Guides* DSW-015
- *CONVEX VMEbus SMD/ESDI Disk and Formatter (dev5130) Diagnostics Manual* DHW-242
- *Hitachi DK515 Winchester Disk Drive Service Guide* (CONVEX part number 900-000347-001)
- *Hitachi 780MB ESDI Disk Drive Configurator* (CONVEX part number 204-000019-600)
- *Interphase 4201 (ESDI) Disc Controller Configurator* (CONVEX part number 220-000011-600)

Ordering documents

To order the current edition of this or any other CONVEX document, send requests to:

CONVEX Computer Corporation
Customer Service
PO Box 833851
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Include the order number with the request. The order number is on the title page of the manual and begins with the letters "DHW" or "DSW."

Technical assistance

Hardware, software, and documentation support can be obtained through the CONVEX Technical Assistance Center (TAC):

- From all locations in the continental United States, call 1(800)952-0379.
- From locations in Alaska, Hawaii, and Canada, call 1(214)497-4379.
- From all other locations, contact the nearest CONVEX office.

Acknowledgments

I would like to thank the following people for their contributions to this manual:

Technical contributor: Erin Clancy

Review team: Rob Carruthers, Erin Clancy, Jim Day, Harold Hinson, Larry Price, Rich Scheller, Chip Stroup, Cari Tuttle

Editorial services: Larry Bonura, Josie Davis

Without the efforts of all the aforementioned, this document would not have been possible.

Barry Lyden
I/O Documentation

Description and Specifications

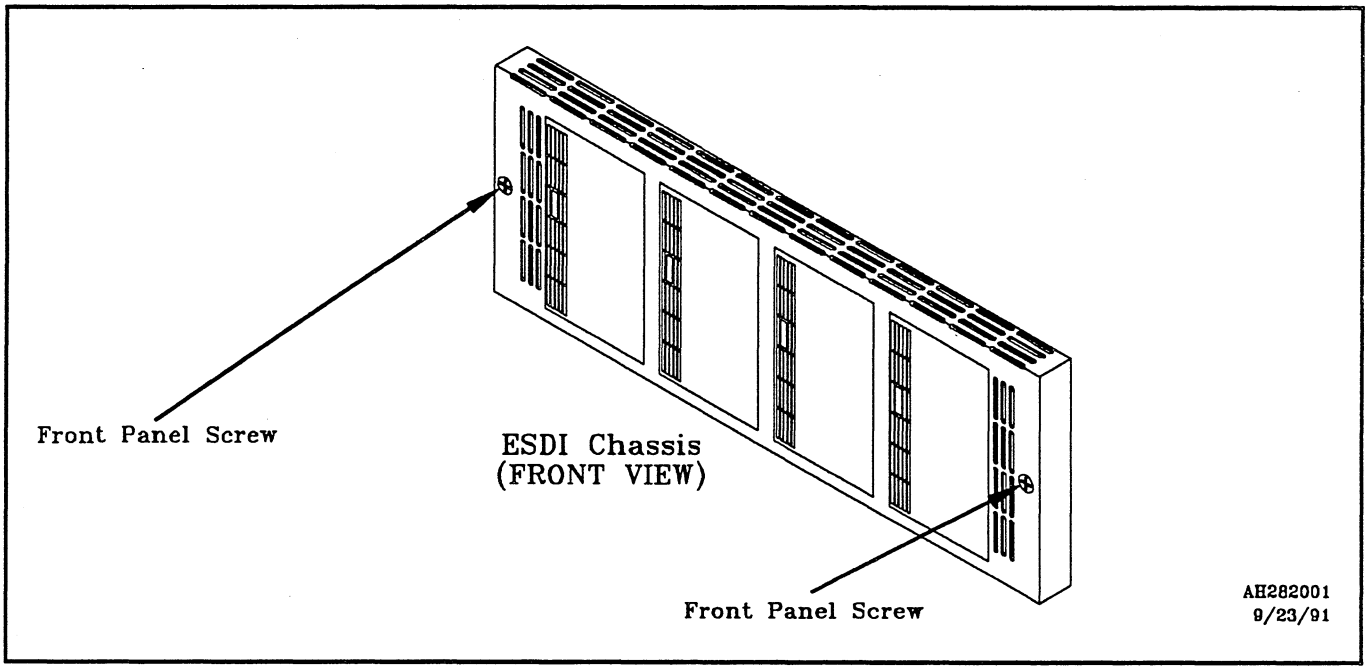
1

1.1 Overview

The CONVEX ESDI disk system is a high-capacity VME-based disk storage system contained in a standard 19-inch rack-mountable chassis. Each chassis can contain from one to four ESDI disk drives, with a maximum storage capacity of 2.6 Gbytes. Each ESDI disk drive has the following features:

- VME-based Enhanced Small Device Interface (ESDI)
- 650 Mbyte formatted storage capacity
- Peak data transfer rate of 2.46 Mbytes/second
- 16 milliseconds average seek time
- Compact size (7" W x 4.25" H x 12" D)

Figure 1-1 ESDI chassis with four drives (front view)



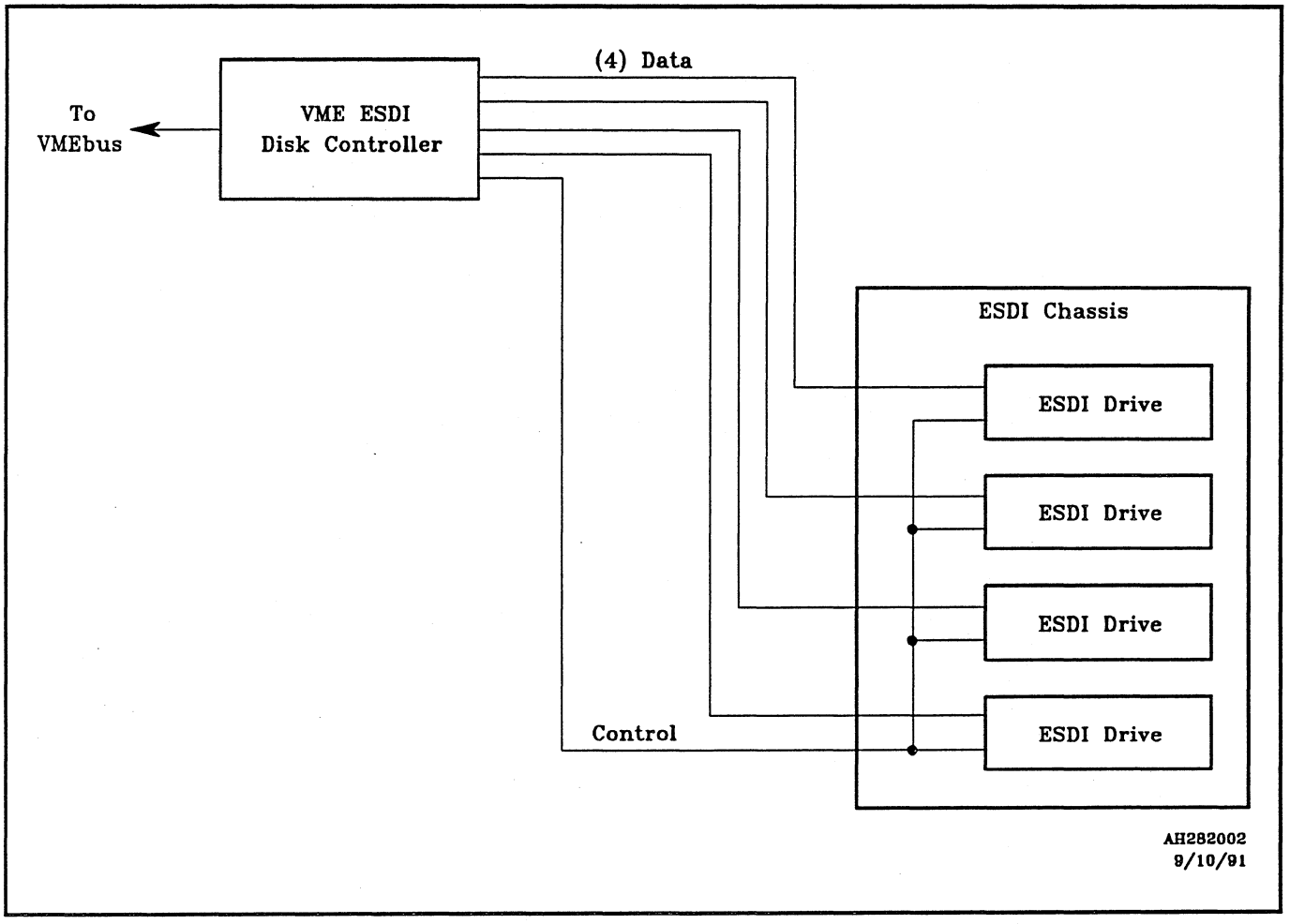
Note

Refer to the *Hitachi DK515 Winchester Disk Drive Service Manual* for more information on the ESDI drive.

The CONVEX ESDI disk system can be configured with one or two VME ESDI disk controllers: CONVEX systems running ConvexOS V8.1 or V9.0 can support a maximum of 2 disk drives per controller; CONVEX systems running ConvexOS V9.1 can support up to 4 drives per controller but require a system generation. ConvexOS V10.0 and greater can support up to 4 disk drives per controller without a system generation. Refer to Chapter 3, "Integration and Test," for more information.

One control cable is required from each VME ESDI disk controller to the ESDI chassis. Internal control ribbon cables connect from one to four disk drives together in the chassis. In addition to the control cable, a single data cable is required for each disk drive in the ESDI chassis. Figure 1-2 shows the block diagram for a 1 controller/4 drive configuration.

Figure 1-2 ESDI disk system block diagram



1.2 ESDI disk system specifications

This section gives the physical and operational specifications for the ESDI disk system. See Table 1-1 and Table 1-2.

Table 1-1 ESDI disk physical specifications

Parameter	Value/Comment
Width	5.7 in (146 mm)
Height	3.25 in (82.5 mm)
Depth	8.0 in (203 mm)
Weight	7.7 lbs (3.5 kg)

Table 1-2 ESDI chassis specifications (four drives)

Parameter	Value/Comment
Width	19.0 in (48.26 cm)
Height	7.0 in (17.78 cm)
Depth	17.5 in (44.45 cm)
Weight	Chassis with 1 drive 46 lbs (20.9 kg) Add 7.7 lbs (3.5 kg) for each add-on drive
Voltage range Domestic International	 2.66 amps @ 120VAC in chassis with 4 drives 1.33 amps @ 240VAC in chassis with 4 drives
Temperature range Operating Nonoperating	 +59° F to +90° F (+15° C to +32° C) -4° F to +140° F (-40° C to +60° C)
Temperature change	≤ 18° F/hour (10° C/hour)
Humidity range Operating Nonoperating	 40% to 60% noncondensing 8% to 90% noncondensing
Wet bulb	84.2° F (29° C)
Altitude Operating Nonoperating	 9842.5 ft (3000 m) 40,000 ft (12,000 m)

Unpacking and Installing 2

2.1 Overview

This chapter discusses unpacking and inspection, identifies major components of the ESDI disk system assembly, and provides installation procedures.

2.2 Unpacking and inspection

This section gives general guidelines for unpacking and inspecting the ESDI drives and related hardware. Also, this section gives safety and equipment damage precaution information.

2.2.1 Electrostatic discharge damage

Typically, Electrostatic Discharge (ESD) damage occurs to electronic circuit boards during handling. Static charges take place when various objects are separated or rubbed together, often creating a high-voltage charge. If a high-voltage charge is discharged into electronic computer circuits, the charge damages the electronic components. The main factors that determine a voltage level charge are:

- Types of materials
- Relative humidity
- Rate of change or separation

Table 2-1 lists an approximation of ESD levels based on various personnel activities and humidity levels:

Table 2-1 Static charge levels and relative humidity

Personnel Activity[1]	Humidity[2] & Charge Levels (Volts[3])			
	26%	32%	40%	50%
Person walking across linoleum floor	6,150V	5,750V	4,625V	3,700V
Person walking across carpet	18,450V	17,250V	13,875V	11,100V
Person getting up from a plastic chair	24,600V	23,000V,	18,500V	14,800V

[1]Source: B. A. Unger, *Electrostatic Discharge Failures of Semiconductor Devices* (Bell Laboratories, 1981).
[2]A high rate of air flow produces higher static charges than a low air-flow rate, for the same relative humidity level.
[3]Some data in this table has been extrapolated.

2.2.2 Inspection for damage

All shipping containers have been specially designed to protect their contents under normal shipping conditions. Carefully inspect each carton for signs of shipping damages as it is unpacked. If damage is found after visual inspection, document the damage with photographs and contact the transport carrier immediately.

2.2.3 Unpacking

The customer's bill of material lists all equipment shipped from CONVEX. It should be used as a checklist to ensure that all equipment has arrived.

The procedure for unpacking the shipping container is:

1. Unpack each item of equipment from its shipping container.
2. Inspect each item of equipment for any sign of shipping damage as it is unpacked.
3. If equipment damage is found, document and proceed to the next section.

Note

Save all packing material until after operational checkout of the equipment. This enables equipment to be returned safely to CONVEX, if required.

2.2.4 Damage claims

If the ESDI disk drives or related hardware is damaged, a damage claim must be completed. Damage claims should be completed by the customer and given to the shipping representative. Claim forms are normally obtained from the shipping representative.

2.3 Preinstallation

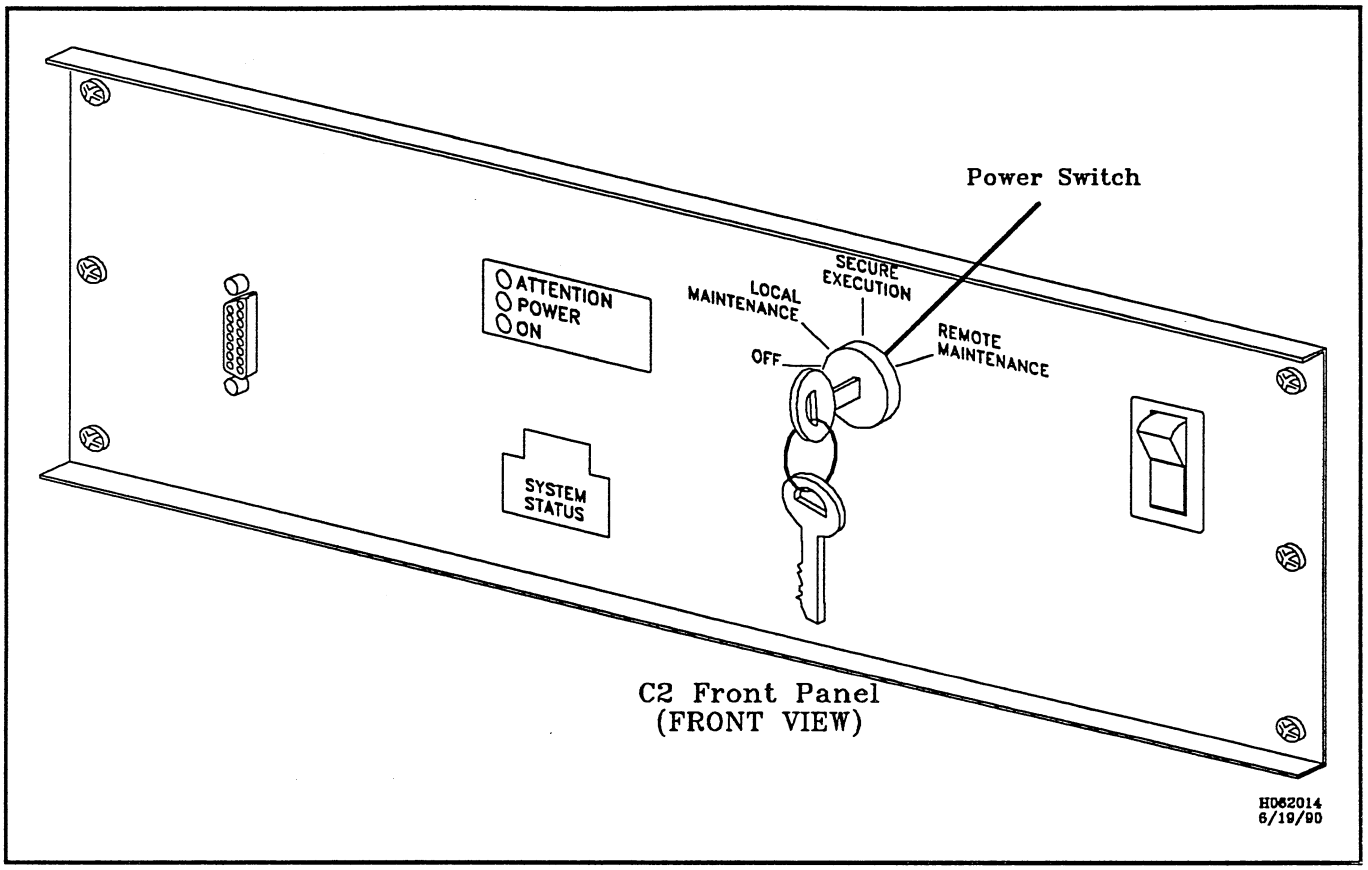
This section gives steps to be done before installing the ESDI disk system into an existing expansion cabinet or an ESDI drive into an existing ESDI chassis.

Caution

Shut down the system before removing power to the existing expansion cabinet. Failure to do so will cause a system crash and possible loss of data. Refer to *Managing ConvexOS: Operations Guide* for power-down procedures on a CONVEX supercomputer.

1. Turn the processor's front panel key switch to the OFF position. See Figure 2-1.

Figure 2-1 Front panel power switch



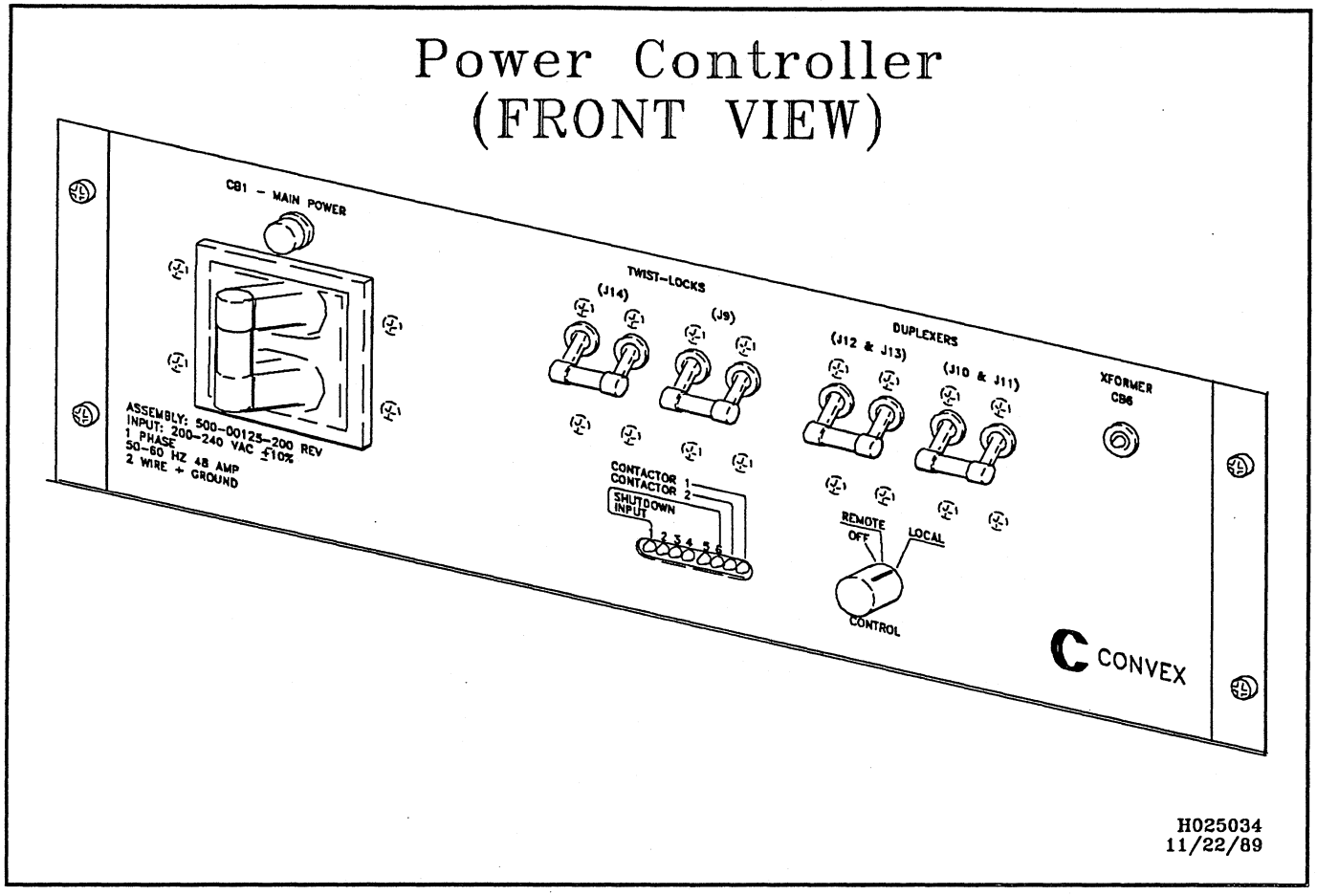
Caution

Remove power to the expansion cabinet before installing or removing equipment. Failure to do so will damage electronic equipment components.

2. Remove power to the expansion cabinet.

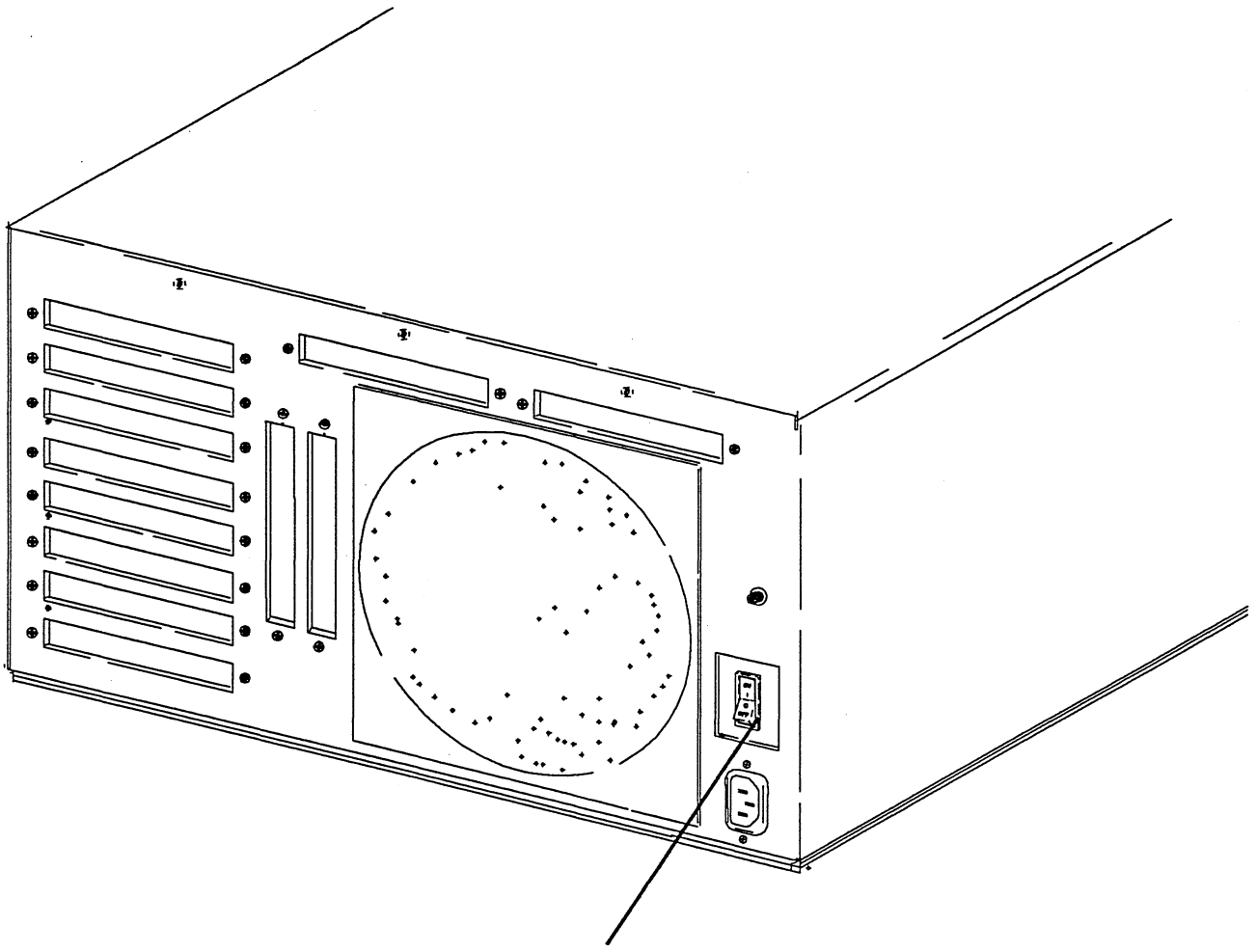
- To remove power from a CONVEX EXP-101 or EXP-102 expansion cabinet, disconnect the cabinet's AC power cord.
- To remove power from a CONVEX EXP-105 high-performance expansion cabinet, set the main power control switch to the OFF position. See Figure 2-2.

Figure 2-2 EXP-105 power controller



3. Set the VMEbus chassis power control switch to the **OFF** position. See Figure 2-3.

Figure 2-3 VMEbus chassis power control switch

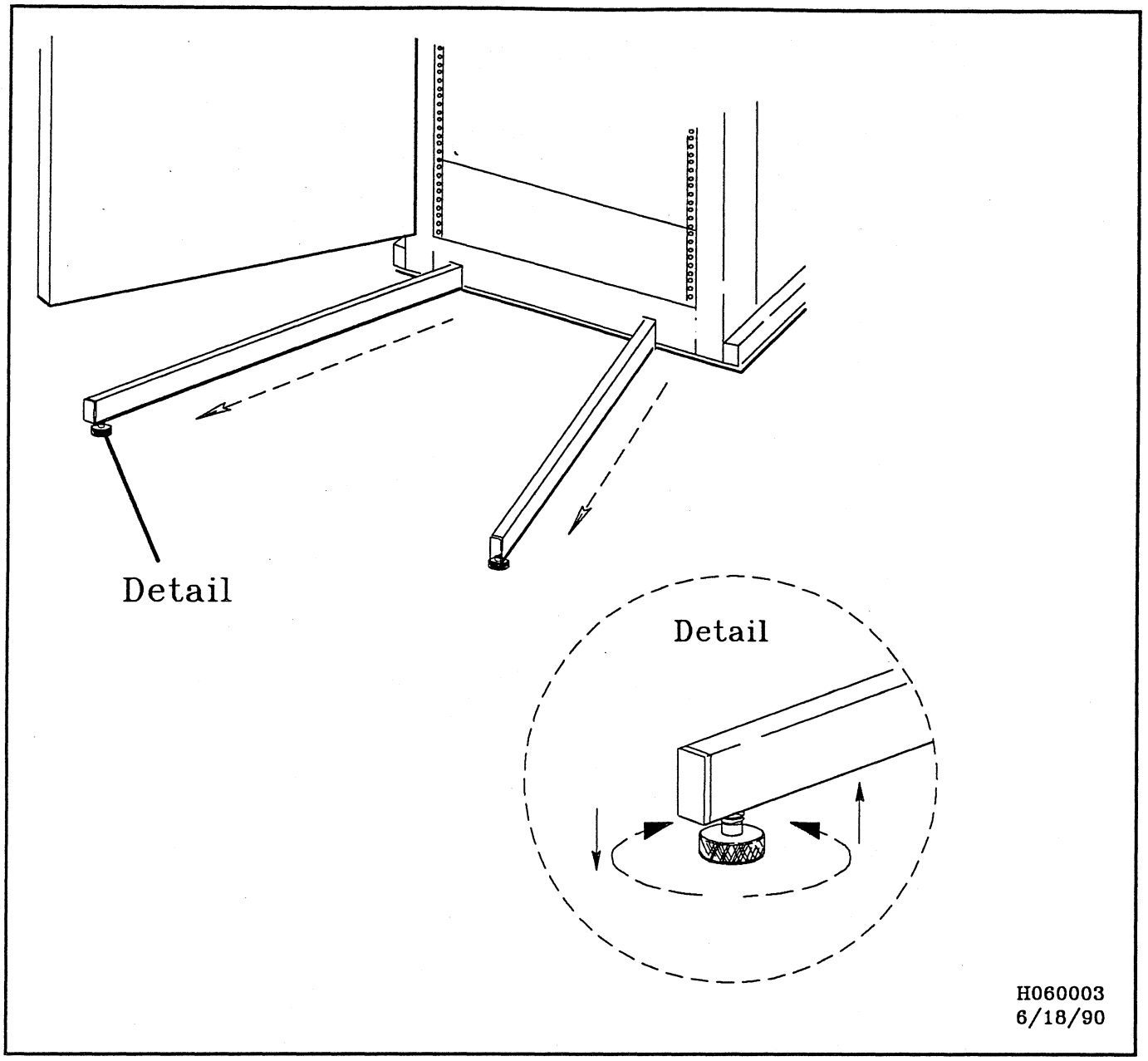


Warning

Expansion cabinet stabilizer bars *must* be extended before installing an ESDI chassis or before extending the ESDI chassis assembly from its expansion cabinet for service. Failure to do so will make the expansion cabinet unstable, increase the possibility of it falling forward, can cause injury to personnel, and will cause damage to equipment.

4. Extend the expansion cabinet stabilizer bars and adjust the feet until they are in firm contact with the floor. See Figure 2-4.

Figure 2-4 Expansion Cabinet Stabilizer Bars



2.4 Installing an ESDI chassis into an expansion cabinet

The following sections give procedures for installing an ESDI disk system chassis into an existing CONVEX expansion cabinet. The CONVEX ESDI disk system can be installed in any CONVEX expansion cabinet.

1. Do the preinstallation steps listed in Section 2.3.

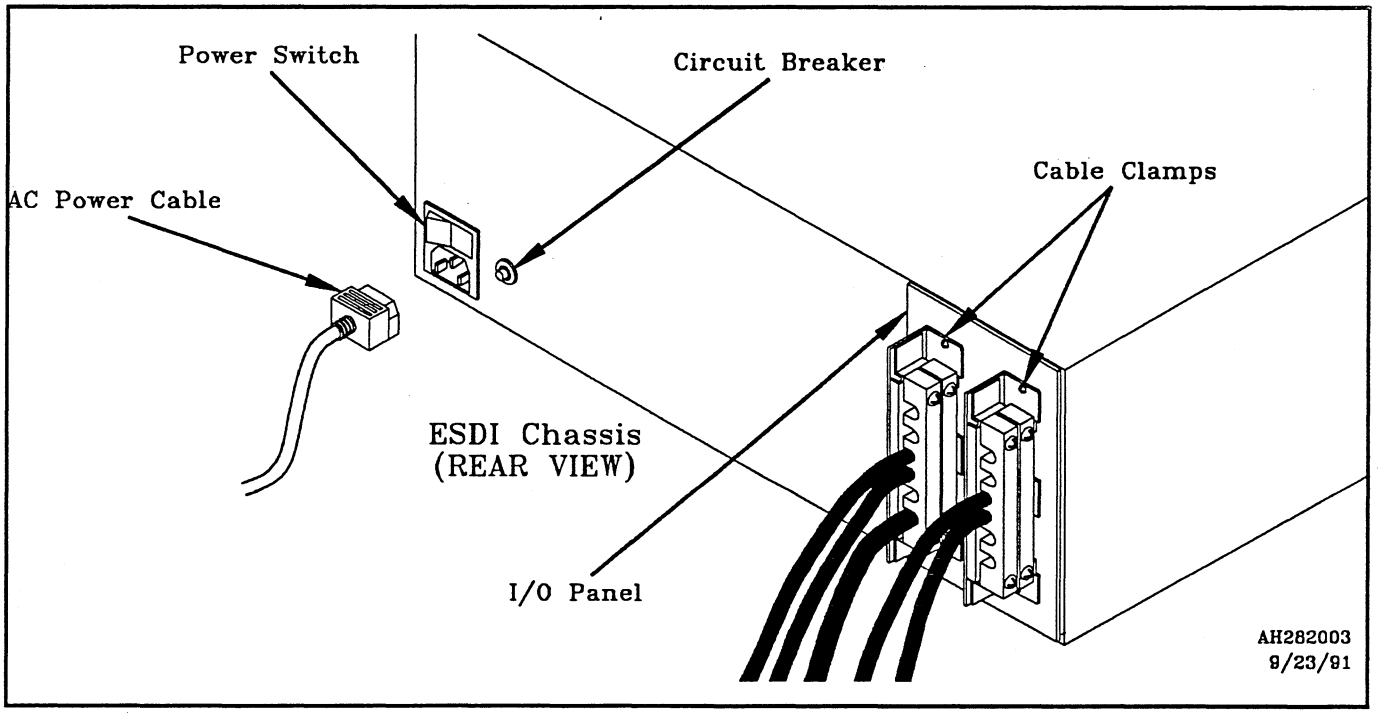
Notes

Refer to the *CONVEX VME ESDI Disk Controller Service Guide* for more information on installing the VME ESDI disk controller.

The maximum cable length allowed between the VME ESDI disk controller and the ESDI chassis is approximately 10 ft (3 m).

2. Install the VME ESDI disk controller in the VMEbus chassis.
3. Select a position 7.0 inches in height in the expansion cabinet and remove the blank panels to open the space for the chassis installation.
4. Install the left and right chassis rails in the selected position in the expansion cabinet, making sure the rails are level front to back and level side to side.
5. Unlock the 2 captive screws holding the front panel to the ESDI chassis and remove the panel. See Figure 1-1.
6. Unlock the 14 captive screws that hold the top panel of the ESDI chassis and remove the panel.
7. Remove the 6 screws that hold the I/O panel to the rear of the ESDI chassis and remove the panel. See Figure 2-5.

Figure 2-5 ESDI chassis I/O panel



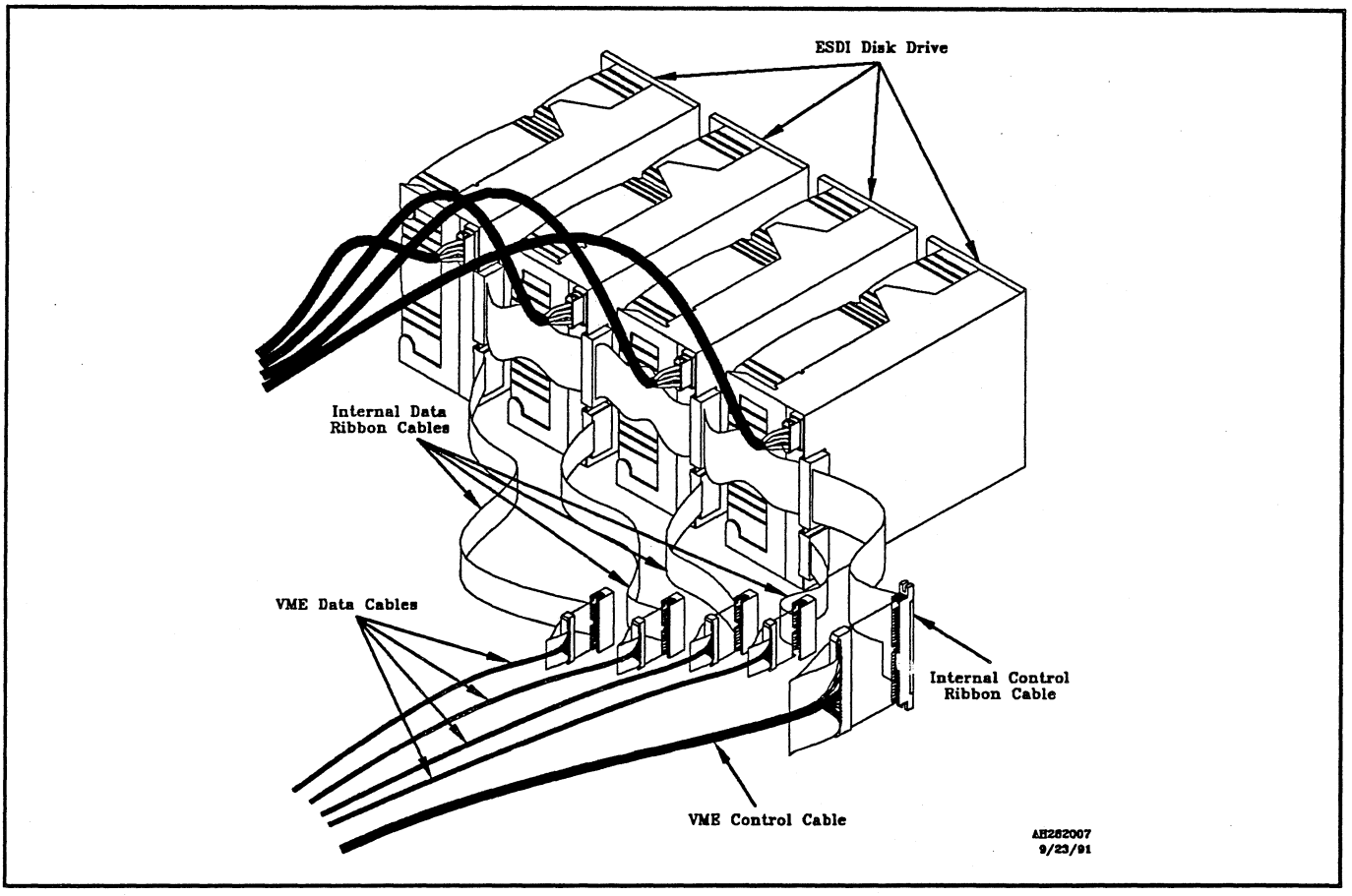
8. Loosen, or remove if necessary, the two cable clamps on the I/O panel.
9. Remove the protective sleeve from each VME control and data cable to be installed to expose the cable shielding.
10. Carefully route the VME control and data cables through the I/O panel and secure them with the cable clamps. Be sure to clamp the cables across the braided shielding to provide a proper ground connection. Note that the VME control cables must be routed through the larger openings in the cable clamp. Data cables may be routed through the smaller openings.

Note

Assemble the inner-most cable connector first. This is necessary due to the location of the screws used to tighten the clamp.

11. Replace the I/O panel and connect each VME control cable to the internal control ribbon cable. Figure 2-6 shows the control cable connection for a single controller with 4 drives.
12. Connect each VME data cable to the appropriate internal data ribbon cable. See Figure 2-6.
13. Replace the top panel on the ESDI chassis and secure the panel with the 14 captive screws.

Figure 2-6 ESDI chassis cable connections



14. Carefully place the ESDI chassis in the rails, feeding the cables through the expansion cabinet so they exit the rear of the cabinet. Push the buttons inward on the side rails and slide the chassis into the expansion cabinet.

Caution

Power *must* be removed from the VMEbus chassis before connecting the VME ESDI disk controller to the ESDI chassis. Failure to do so will cause damage to equipment.

Note

Refer to the *CONVEX VME ESDI Disk Controller Service Guide* and the *Interphase 4201 (ESDI) Disc Controller Configurator* for more information on cabling the VME ESDI disk controller.

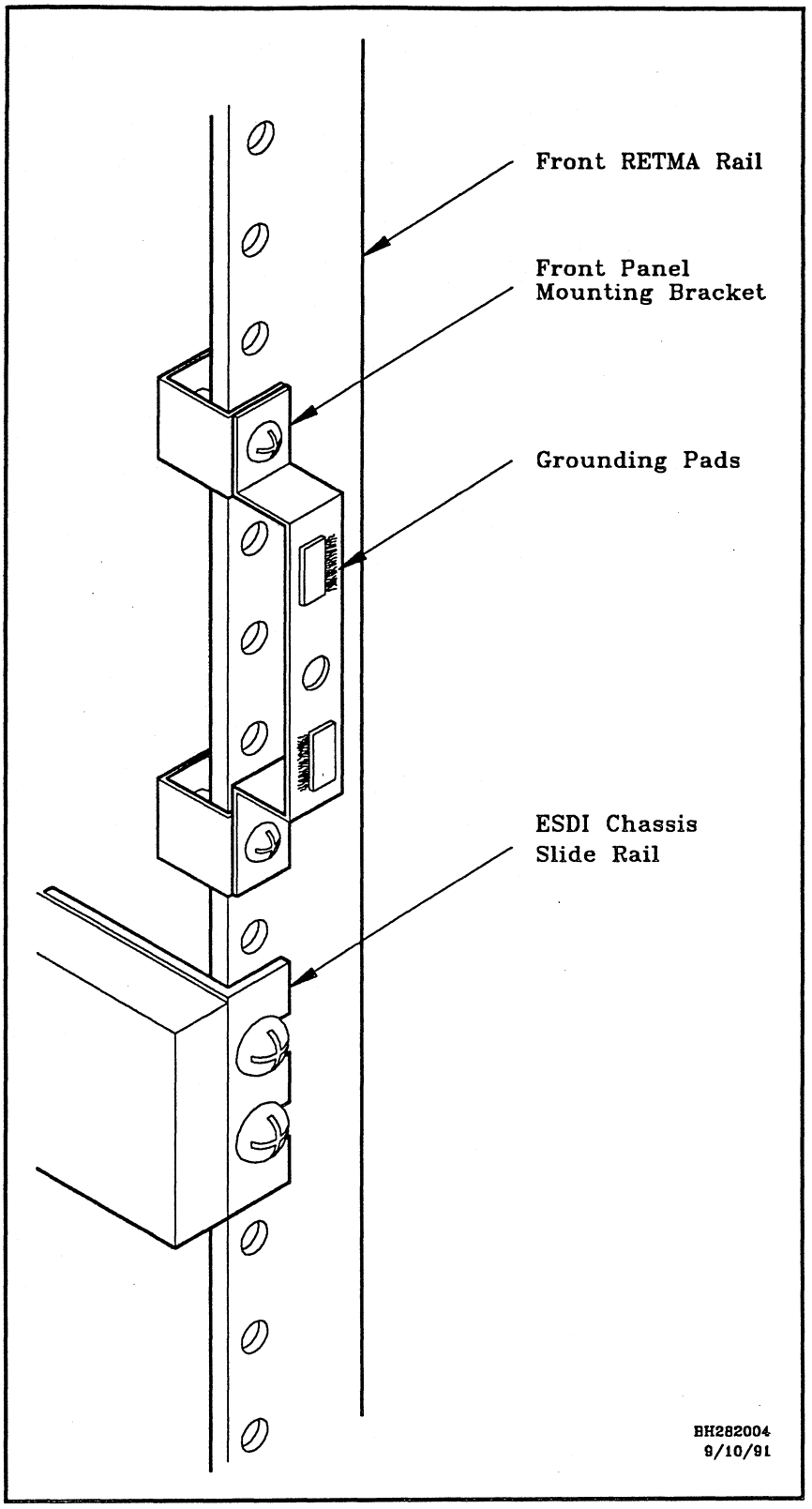
15. Connect the VME control and data cables from the ESDI chassis to the VME ESDI disk controller in the VMEbus chassis.
16. Connect the AC power cable to the rear of the ESDI chassis.

Caution

Ensure that the grounding pads are firmly attached to the front panel mounting brackets. Failure to do so may cause ESD damage to components within the ESDI chassis.

17. Attach the grounding pads, 2 per bracket, to the front panel mounting brackets. See Figure 2-7.
18. Install the 2 front panel mounting brackets on the first 4 holes in the front RETMA rail above the ESDI chassis with the screws provided.
19. Set the ESDI chassis power switch to the ON position.
20. Position the front panel on the ESDI chassis and secure the 2 captive screws.
21. Do the postinstallation steps listed in Section 2.6.

Figure 2-7 Front panel mounting bracket



2.5 Installing a drive into an ESDI chassis

This section discusses the installation of an ESDI drive into an existing ESDI chassis.

1. Do the preinstallation steps listed in Section 2.3.

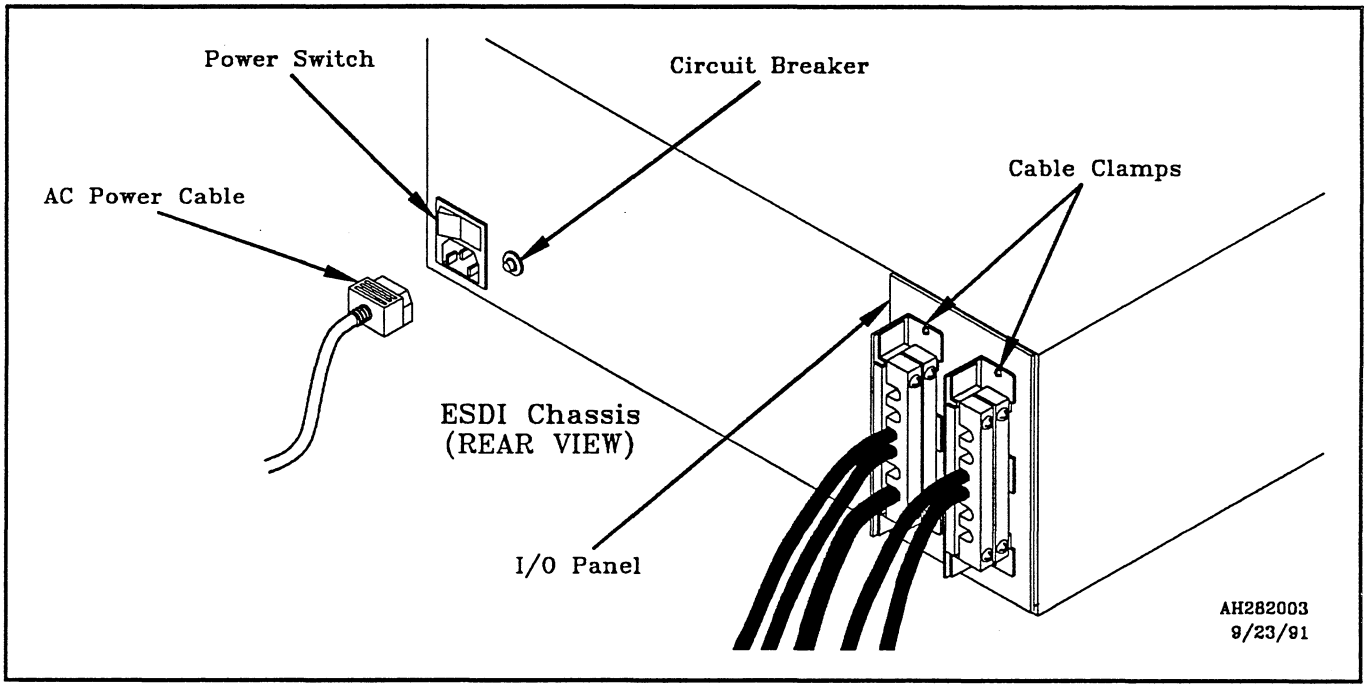
Note

If you are installing a second VME ESDI disk controller, refer to the *CONVEX VME ESDI Disk Controller Service Guide* for information on installing the controller.

The maximum cable length allowed between the VME ESDI disk controller and the ESDI chassis is approximately 10 ft (3 m).

2. Set the ESDI chassis power switch to the OFF position. See Figure 2-8.

Figure 2-8 ESDI chassis power switch



3. Unlock the 2 captive screws holding the front panel of the ESDI chassis and remove the panel.
4. Remove the 2 screws holding the ESDI chassis to the front RETMA rails of the expansion cabinet.
5. Pull the ESDI chassis out of the expansion cabinet until the side rails lock into place.
6. Unlock the 14 captive screws that hold the top panel of the ESDI chassis and remove the panel.

Note

Refer to the *Hitachi 780MB ESDI Disk Drive Configurator* in Appendix A for more information about drive termination and setting the device address.

7. Locate and remove the terminator TM223 (see Figure 2-9) and the 3 jumpers in jumper block JP224 from the last disk currently installed in the chassis.
8. Remove the jumper from pins 11-12 of jumper block JP282 on the new disk drive. This selects a 512 byte sector size with 69 sectors per track. See Figure 2-9 for the location of jumper block JP282.
9. Check and, if necessary change, the device address (JP213) of the new disk drive. Each disk must have a unique address. Refer to Table 2-2 for the jumper settings. See Figure 2-9 for the location of jumper block JP213.
10. Check for, and, if necessary add, the terminator TM223 and the 3 jumpers in jumper block JP224 on the new disk drive.

Figure 2-9 ESDI disk drive jumper locations

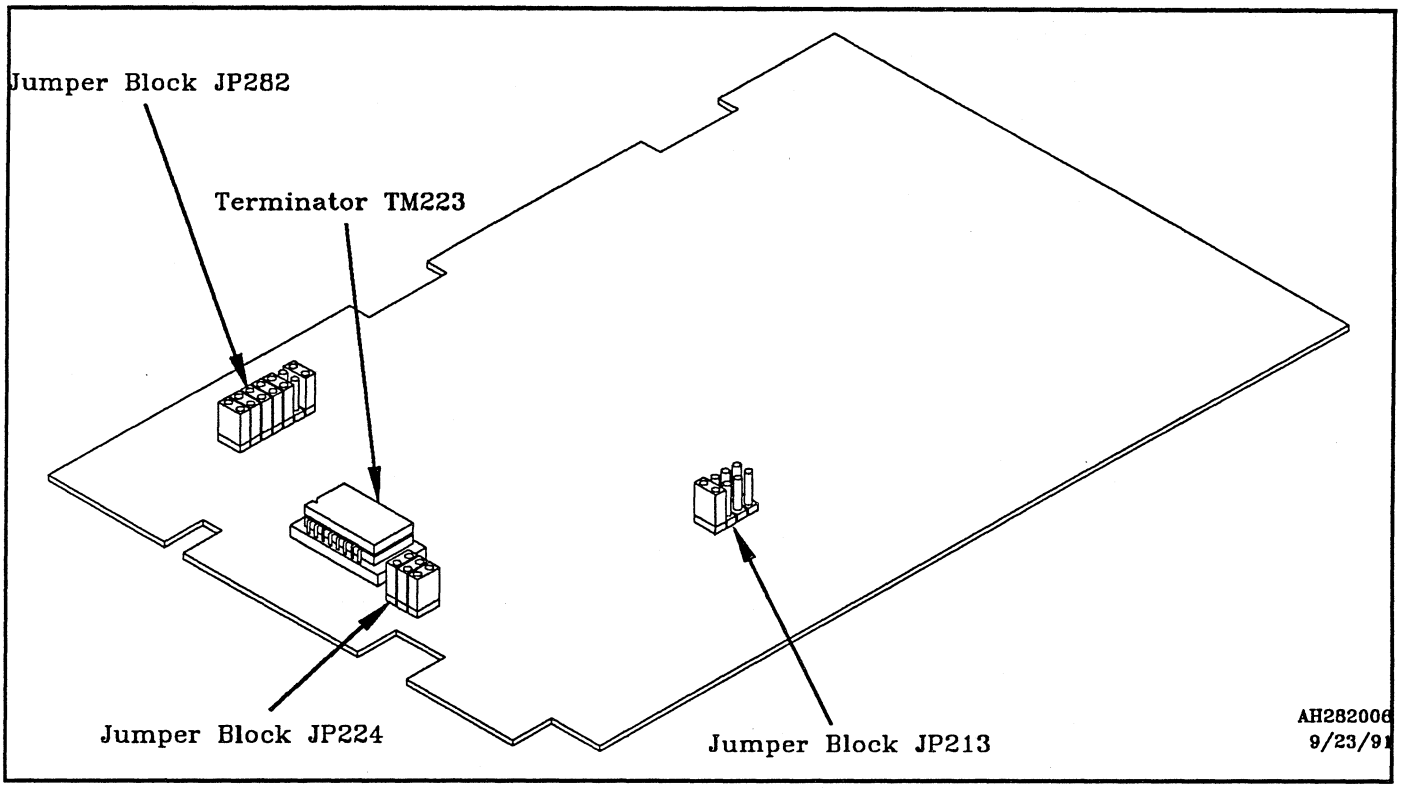
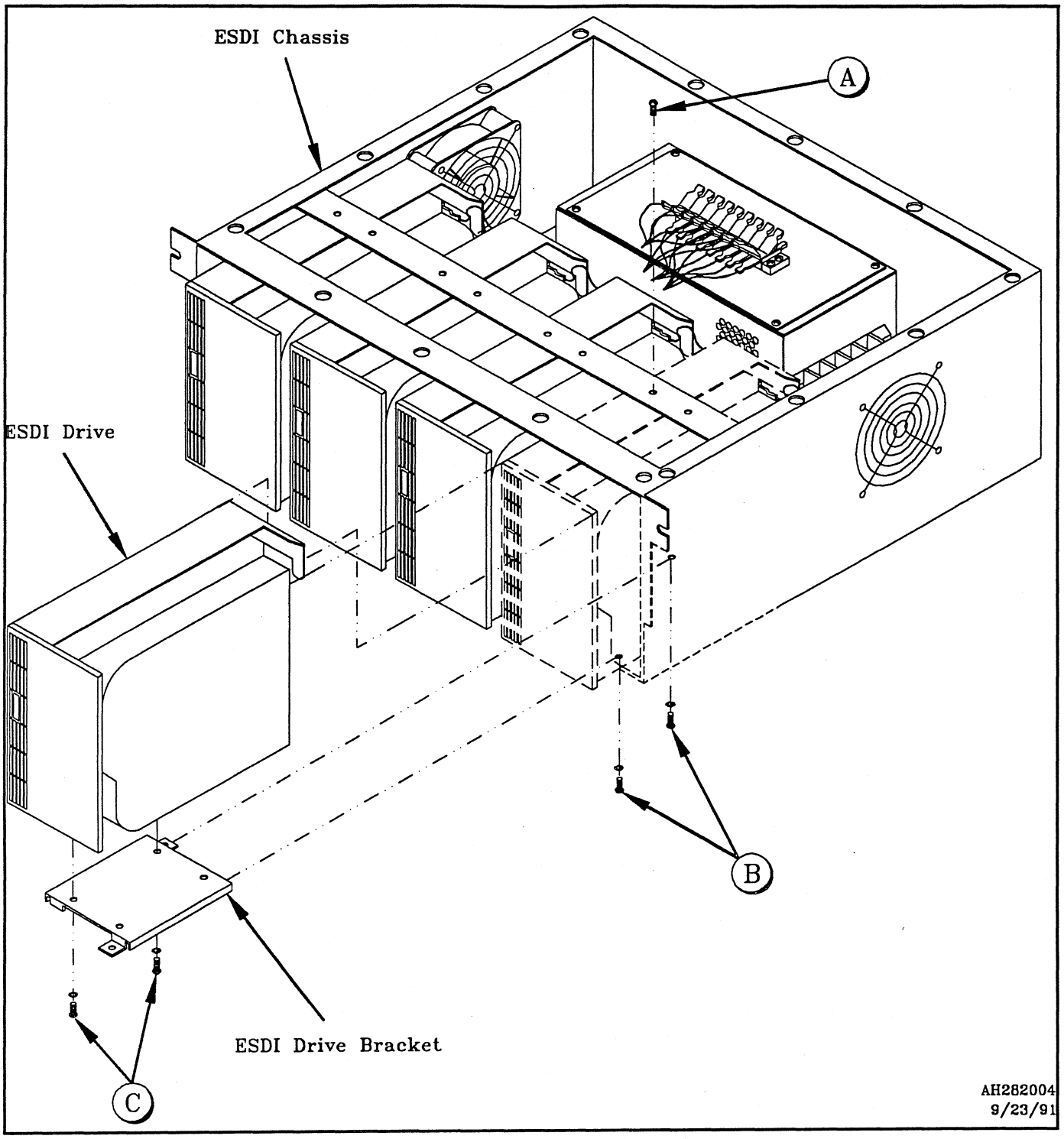


Table 2-2 ESDI disk device address selection

Jumper Block JP213 (Device Address)		
Pins	**Setting**	**Description**
1—2 3—4 5—6	IN OUT OUT	Device Address 1
1—2 3—4 5—6	OUT IN OUT	Device Address 2
1—2 3—4 5—6	IN IN OUT	Device Address 3
1—2 3—4 5—6	OUT OUT IN	Device Address 4
7—8	OUT	OUT enables writing; IN write protects the drive

11. Position the disk bracket on the ESDI drive and install the 2 screws (C in Figure 2-10) that hold the bracket to the drive.

Figure 2-10 ESDI disk drive position in ESDI chassis



12. Secure the green grounding wire to one of the two screw posts located in the bottom of the chassis between the disks and the 12 volt power supply.
13. Position the ESDI drive in the selected slot of the ESDI chassis.
14. Connect the ESDI data ribbon cable to connector J2 on the back of the ESDI drive. See Figure 2-11.

15. Connect the ESDI control ribbon cable to connector J1 on the back of the ESDI drive. See Figure 2-11 for a single controller configuration and Figure 2-12 for 2 controller configuration.
16. Connect the disk drive power cable (already installed), from the power supply barrier strip, to connector J3 on the back of the ESDI drive.
17. Attach the other end of the green grounding wire to the small ground connector on the rear of the drive (see detail in Figure 2-11). Be sure that the connector is pushed fully on to the pin.
18. Install the 2 screws (B in Figure 2-10) that hold the ESDI drive to the bottom of the ESDI chassis.
19. Install the screw (A in Figure 2-10) that holds the ESDI drive to the top of the ESDI chassis.

Figure 2-11 Cable connections (4 drives / controller)

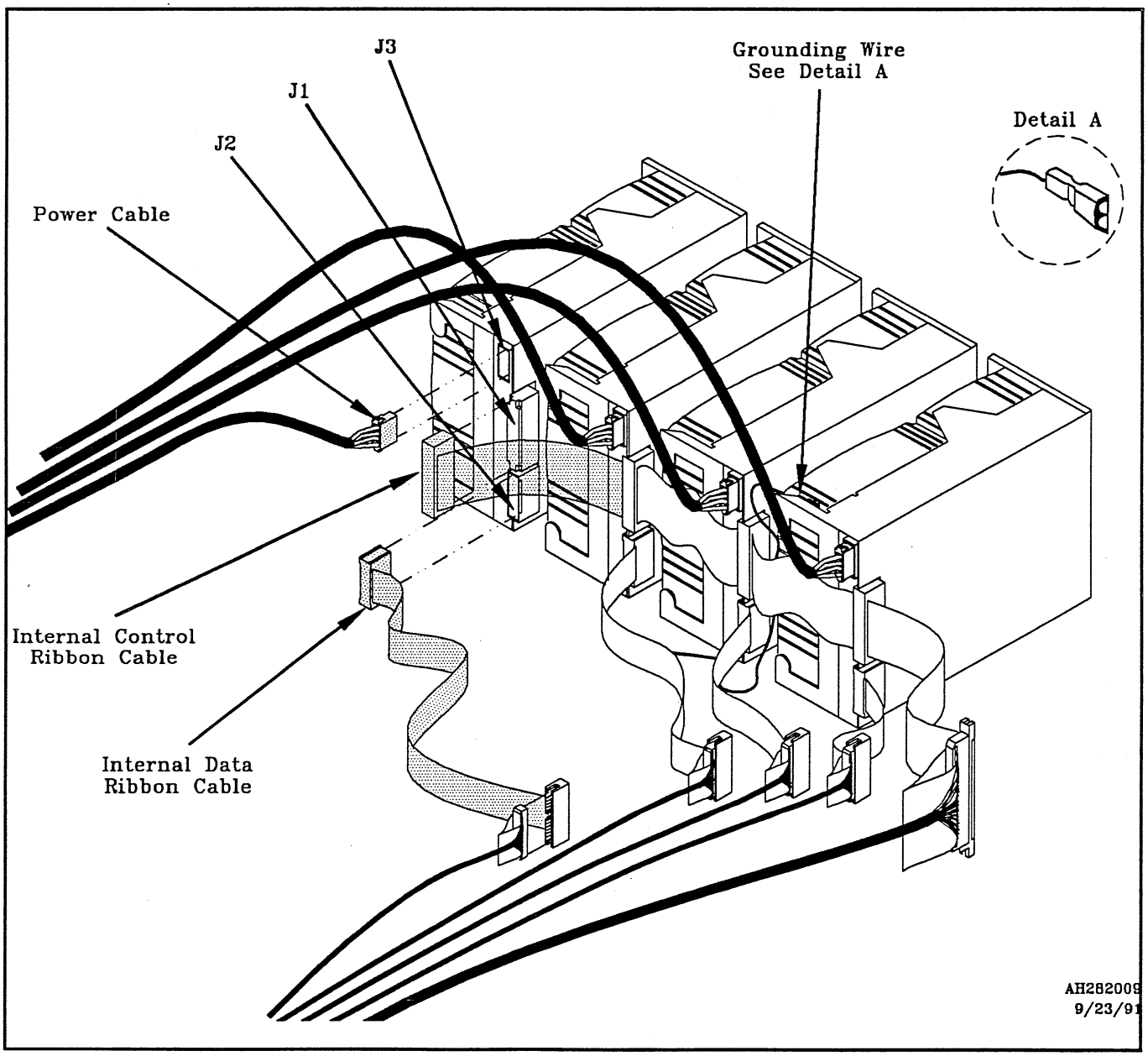
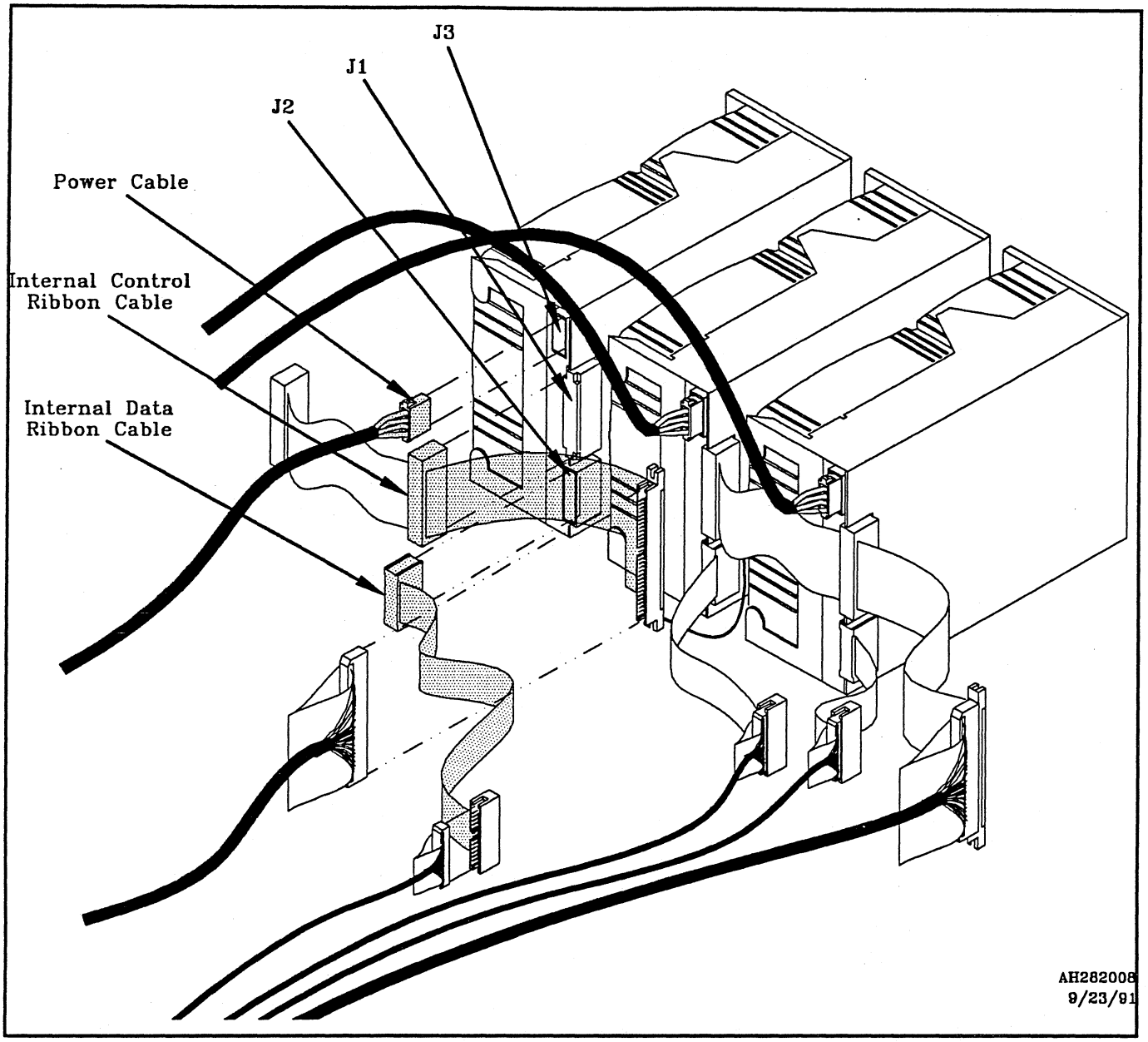


Figure 2-12 Cable connections (2 drives / controller)



20. Loosen, or remove if necessary, one or both cable clamps on the I/O panel.
21. Remove the protective sleeve from the VME data cable to be installed to expose the braided shielding.
22. Carefully route the VME data cable through the I/O panel and secure the cable with the cable clamp. Be sure to clamp the cable across the braided shielding to ensure a proper ground connection.
23. If the disk drive requires an additional VME ESDI disk controller, route the additional VME control cable through the I/O panel, remove the protective sleeve, and secure the cable clamp across the braided shielding. Note that VME control cables must be routed through the larger openings in the cable clamp.

24. Replace the I/O panel and connect the VME data cable to the internal data ribbon cable as shown in Figure 2-11 and Figure 2-12.
25. If necessary, connect the VME control cable to the appropriate internal control ribbon cable. See Figure 2-12.
26. Replace the top panel on the ESDI chassis and secure the panel with the 14 captive screws.

Caution

Power *must* be removed from the VMEbus chassis before connecting the VME ESDI disk controller to the ESDI chassis. Failure to do so will cause damage to equipment.

Note

Refer to the *CONVEX VME ESDI Disk Controller Service Guide* and the *Interphase 4201 (ESDI) Disc Controller Configurator* for more information on installing and cabling the VME ESDI disk controller.

27. Connect the new VME data cable from the ESDI chassis to the VME ESDI disk controller in the VMEbus chassis.
28. If necessary, connect the new VME control cable from the ESDI chassis to the new VME ESDI disk controller in the VMEbus chassis.
29. Set the ESDI chassis power switch to the ON position. See Figure 2-8.
30. Push the buttons inward on the side rails and slide the ESDI chassis back to its retracted position.
31. Remove appropriate insert from the ESDI front panel.
32. Install the 2 screws that hold the ESDI chassis in the expansion cabinet.
33. Position the front panel on the ESDI chassis and secure the 2 captive screws. See Figure 1-1.
34. Do the postinstallation steps listed in Section 2.6.

2.6 Postinstallation

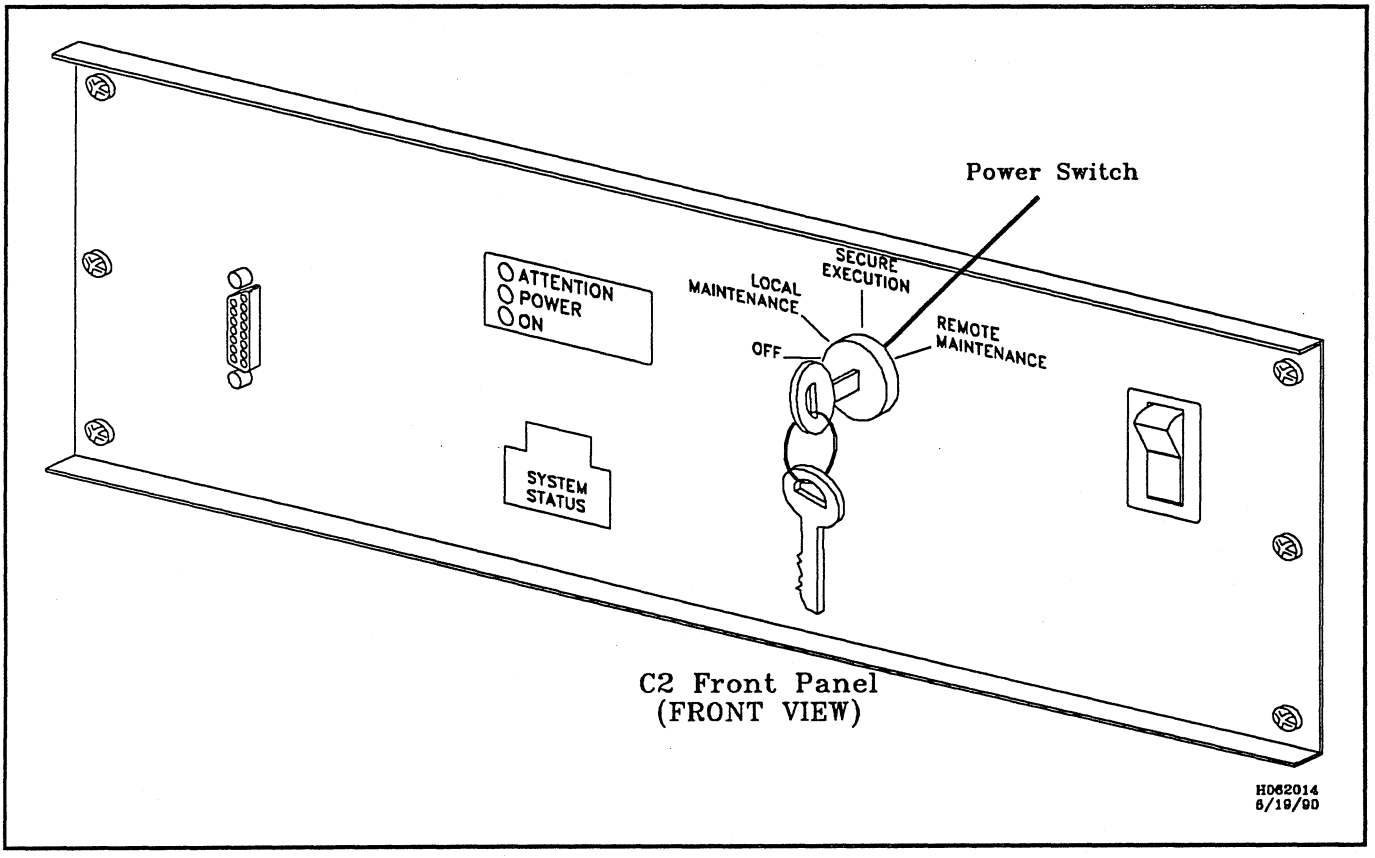
This section lists steps to be done after an ESDI system installation:

1. Return the expansion cabinet stabilizer bars to their retracted position. See Figure 2-4.
2. Return power to the VMEbus chassis. See Figure 2-3.
3. Return power to the expansion cabinet.

- To return power to a CONVEX EXP-101 or EXP-102 expansion cabinet, connect the AC power cord to the site source.
- To return power to a CONVEX EXP-105 high-performance expansion cabinet, set the main power control switch to the ON position.

4. Turn the processor's front panel key switch to the **Local Maintenance** or **Secure Execution** position. See Figure 2-13.

Figure 2-13 Front panel power switch



Integration and Test 3

3.1 Overview

The CONVEX ESDI disk system must be integrated into the CONVEX Operating System (ConvexOS) before it can be used. This chapter contains guidelines for integrating an ESDI drive into ConvexOS as well as information on the CONVEX diagnostic tests for the ESDI disk system.

Notes

ConvexOS V8.1 or greater is required to operate a CONVEX ESDI disk system.

ConvexOS V8.1, V9.0, and V9.1 support a maximum of 2 disk drives per VME ESDI disk controller; two controllers are required to operate a 4-disk configuration. However, ConvexOS V9.1 can support up to 4 disk drives per controller with a system generation of the software drivers. These drivers are part of the software release tape, *ESDI Disk System Support* (CONVEX part number 081-006015-000).

ConvexOS V10.0 contains all the software drivers needed for 4-drive support of the VME ESDI disk controller.

3.2 Software integration

The software for the CONVEX ESDI disk system is released separately from ConvexOS and utilities. Refer to *Managing ConvexOS: Configuration Guide* for additional software integration information. That document includes a complete description of the software integration procedures for ESDI disk drive system software.

System-level hardware is identified to ConvexOS via a configuration file (*/ioconfig*) located on the Service Processor Unit (SPU) disk. The */ioconfig* file describes, in hierarchical fashion, the connections between VIOPs, VMEbus chassis number, controller type, Control and Status Register (csr) address, interrupt number, and peripheral device type. The device codes for the ESDI disk system are listed below:

- DKC-203—VME ESDI disk controller
- DKD-284—ESDI disk drive

The marketing numbers for the ESDI disk system are listed below:

- DKD-210—650 Mbyte add-on disk
- DKD-310—650 Mbyte disk with VME ESDI disk controller
- DKD-310c—650 Mbyte disk with VME ESDI disk controller and ESDI chassis

Figure 3-1 shows a typical */ioconfig* file with ESDI disk system and VME ESDI disk controller specific items in **bold** type:

Figure 3-1 Example */ioconfig* file

```
iop 3
    mbus 0
      ctrl LAN-001 csr 0x4c0 int 1
        unit 0 type ex
      ctrl DKC-001 csr 0x3f0 int 2
        unit 0 type DKD-005
      ctrl MTC-001 csr 0x0c0 int 4
        unit 0 type MTD-001
      ctrl ACM-001 csr 0x3c0 int 7
        unit 0 type TTY
        unit 1 type TTY
        unit 2 type TTY
        unit 3 type TTY
        unit 4 type TTY
viop 4
    vme 0
     ctrl DKC-203 csr 0xc00 int 3
        unit 0 type DKD-284
        unit 1 type DKD-284
        unit 2 type DKD-284
        unit 3 type DKD-284
```

Whenever ESDI drives are added or removed, the information in the hardware section of the configuration file (*/ioconfig*) must be changed, otherwise system operation problems will occur. Refer to *Managing ConvexOS: Configuration Guide* when making these changes.

3.3 Testing the ESDI disk system

The CONVEX ESDI disk system is tested by the *dev5130* diagnostic program. This program verifies the operation of the ESDI disk system. The *dev5130* diagnostic program verifies the:

- Functional ability of the VME ESDI disk controller to operate in the CONVEX VMEbus I/O environment, including main memory access and interrupt generation and detection
- Mechanical and electrical integrity of the disk drives

In addition, the *dev5130* diagnostic performs the following functions:

- Formats new disk drives and verifies previously formatted drives
- Disk maintenance such as slipping of bad sectors and mapping bad tracks to alternate tracks

The *dev5130* diagnostic program is an offline program that must be executed on the SPU while the CPU is halted. The procedures for executing this test are beyond the scope of this manual. This information is contained in the *CONVEX VMEbus SMD/ESDI Disk and Formatter (dev5130) Diagnostics Manual.* Consult that manual before running CONVEX diagnostics.

Note

***dev5130* Release 7.0 is required to support 4 disk drives from a single VME ESDI disk controller.**

Maintenance Procedures and IPB 4

4.1 Overview

This chapter provides removal and replacement procedures and an Illustrated Parts Breakdown (IPB) for the CONVEX ESDI disk system.

4.2 Maintenance procedures

This section gives information on removal and replacement procedures for Field Replaceable Units (FRUs) for the ESDI disk system.

4.2.1 Preservice procedures

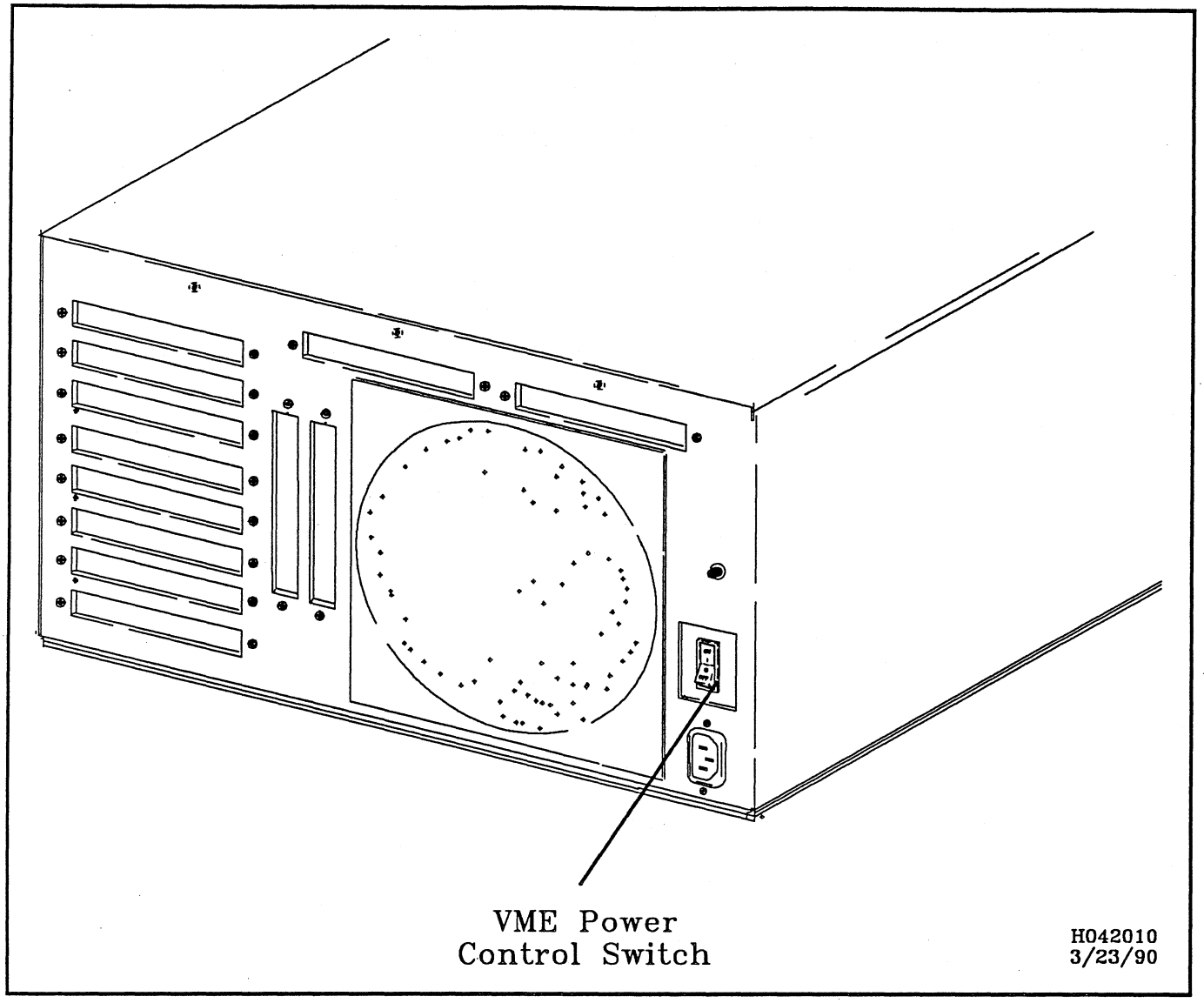
This section gives procedures that need to be preformed before continuing with any of the removal or replacement sections.

Caution

Power *must* be removed from the VMEbus chassis before disconnecting and connecting the VME ESDI disk controller to the ESDI chassis. Failure to do so will cause damage to equipment.

1. Set the VMEbus chassis power control switch to the OFF position. See Figure 4-1.

Figure 4-1 VMEbus chassis power control switch



Caution

Remove power to the expansion cabinet before removing or servicing any equipment. Failure to do so will cause damage to electronic equipment components.

2. Remove power to the expansion cabinet.

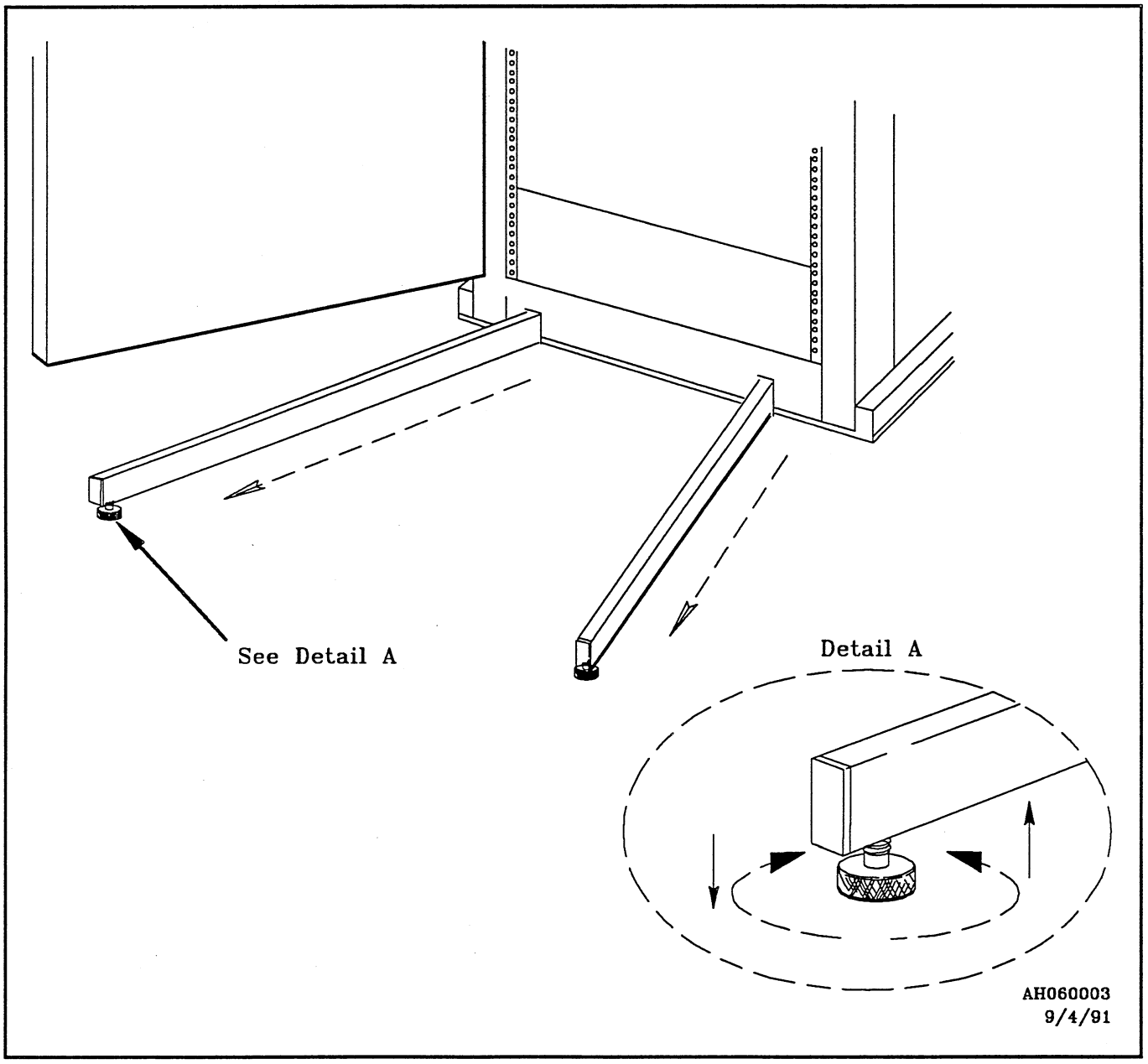
- To remove power from a CONVEX EXP-101 or EXP-102 expansion cabinet, disconnect the AC power cord from the AC power source.
- To remove power from a CONVEX EXP-105 high-performance expansion cabinet, set the main power control switch to the OFF position.

Warning

Expansion cabinet stabilizer bars *must* be extended prior to extending any component installed in the expansion cabinet. Failure to do so will make the expansion cabinet unstable, increase the possibility of it falling forward, can cause injury to personnel, and will cause damage to equipment.

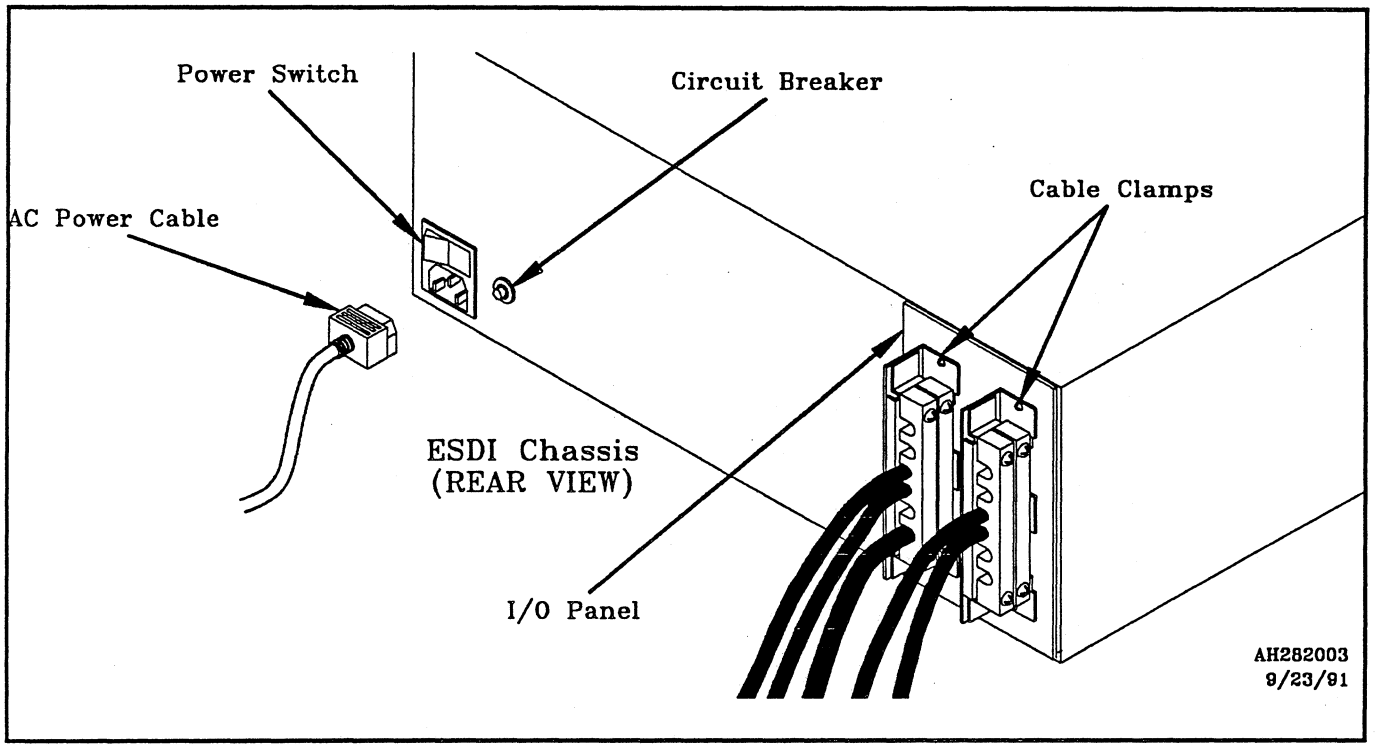
3. Extend the expansion cabinet stabilizer bars and adjust the feet until they are in firm contact with the floor. See Figure 4-2.

Figure 4-2 Expansion cabinet stabilizer bars



4. Unlock the 2 captive screws on the front panel of the ESDI chassis.
5. Remove the ESDI chassis front panel.
6. Remove the 2 screws holding the ESDI chassis in the expansion cabinet.
7. Slide the ESDI chassis out of the cabinet until the side rails lock into position.
8. On the back side of the ESDI chassis, set the power switch to the OFF position. See Figure 4-3.
9. Unlock the 14 captive screws that secure the top of the ESDI chassis and remove the top.

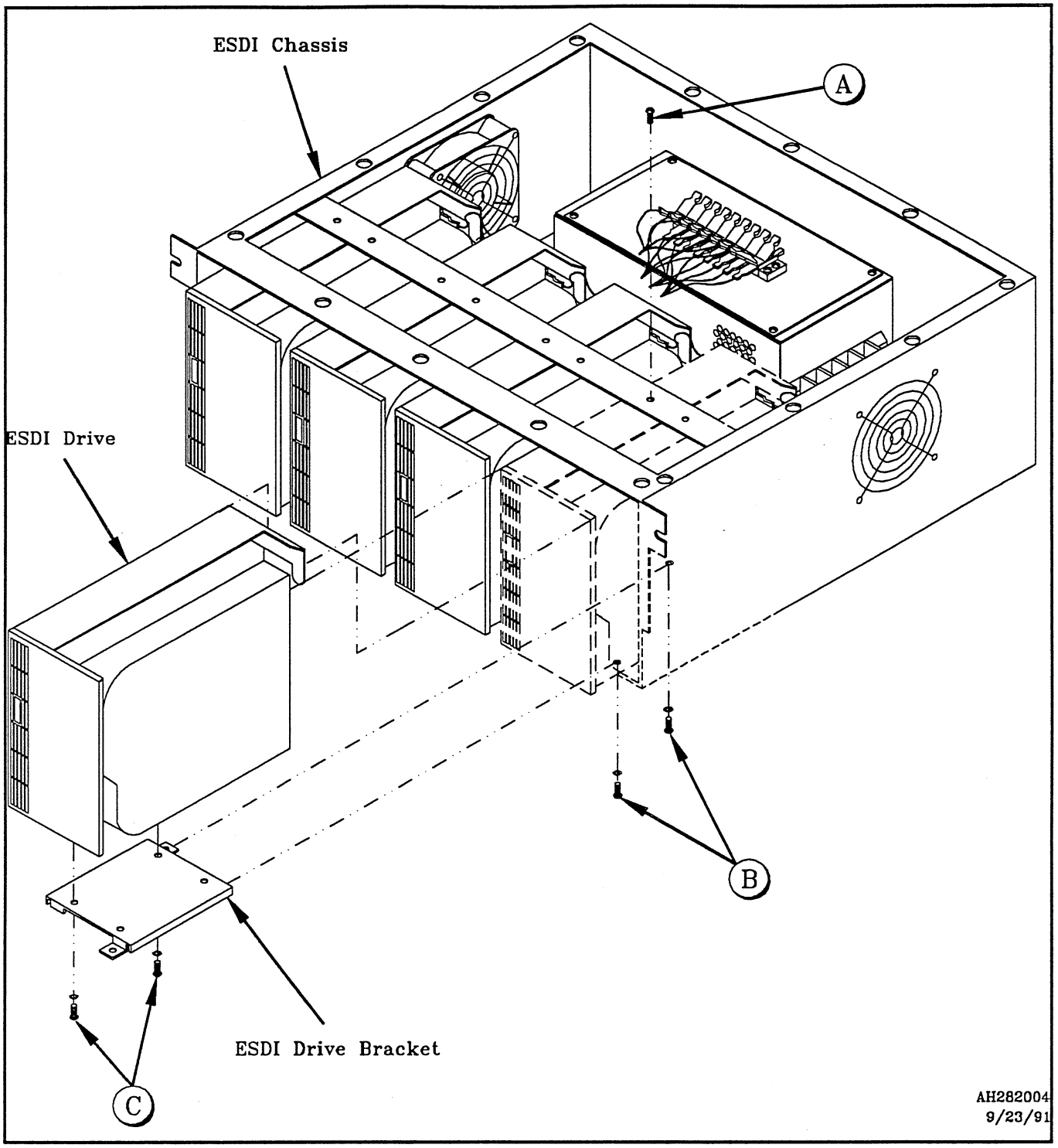
Figure 4-3 ESDI chassis power switch



4.2.2 ESDI drive unit removal and replacement

This section gives the procedure for removing and replacing the ESDI drive. See Figure 4-4.

Figure 4-4 ESDI disk unit



4.2.2.1 Removal

1. Do the preservice procedures listed in Section 4.2.1.
2. Remove the disk drive power cable from the rear of the ESDI drive.
3. Remove the two ribbon cables from the rear of the ESDI drive.
4. Remove the ground wire from the ESDI drive.

5. Remove the screw (A in Figure 4-4) holding the ESDI drive to the top of the ESDI chassis.
6. Remove the 2 screws (B in Figure 4-4) holding the ESDI drive bracket to the ESDI chassis.
7. Remove the ESDI drive.
8. Remove the 2 screws (C in Figure 4-4) holding the bracket to the ESDI drive.

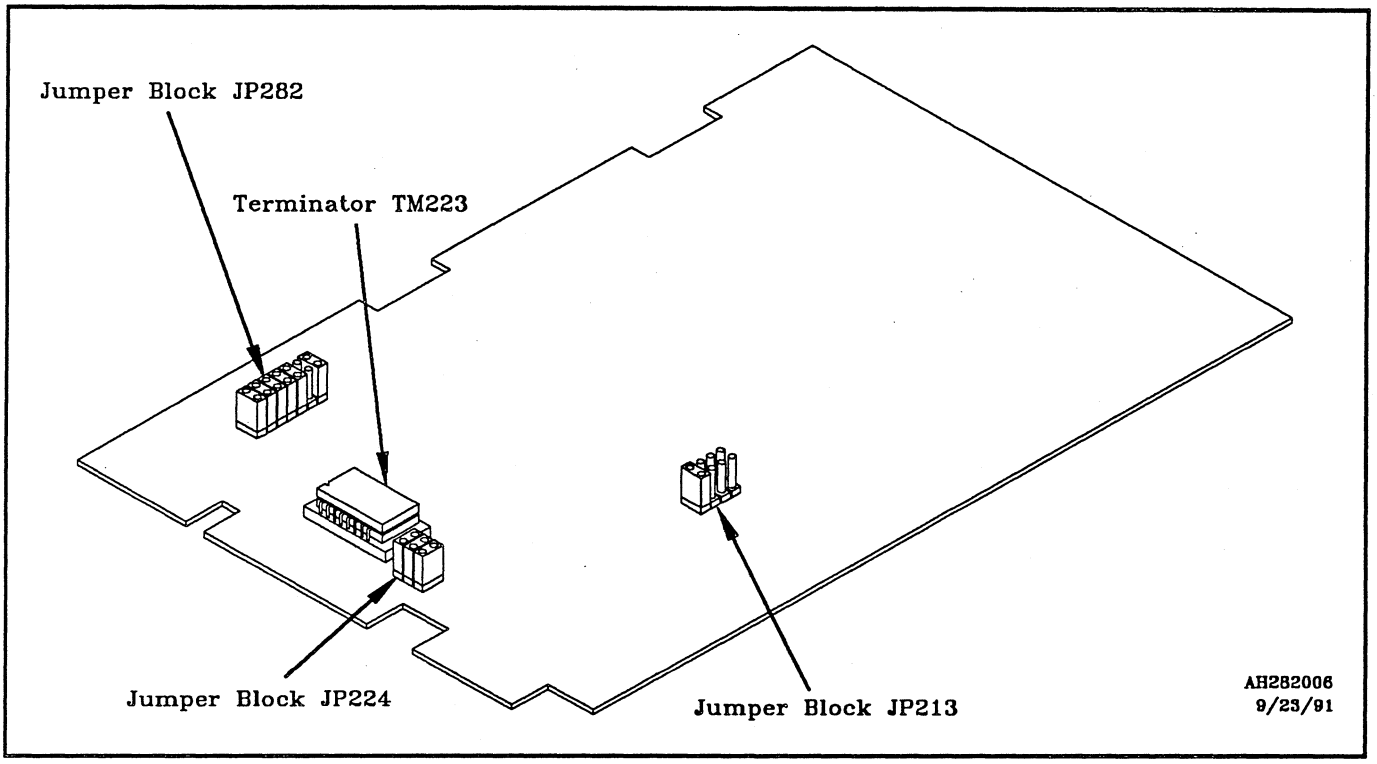
4.2.2.2 Replacement

Note

Refer to the *Hitachi DK515 Winchester Disk Drive Service Manual* for more information about drive termination and setting the device address.

1. Check and, if necessary change, the device address to match the replaced drive. See Figure 4-5 and Table 2-2.
2. Add or remove the terminator TM223 and the jumpers in jumper block JP224 to match the replaced drive. See Figure 4-5 and Table 2-2.
3. Remove the jumper from pins 11-12 of jumper block JP282. This selects a 512 byte sector size with 69 sectors per track.

Figure 4-5 ESDI disk drive jumper locations



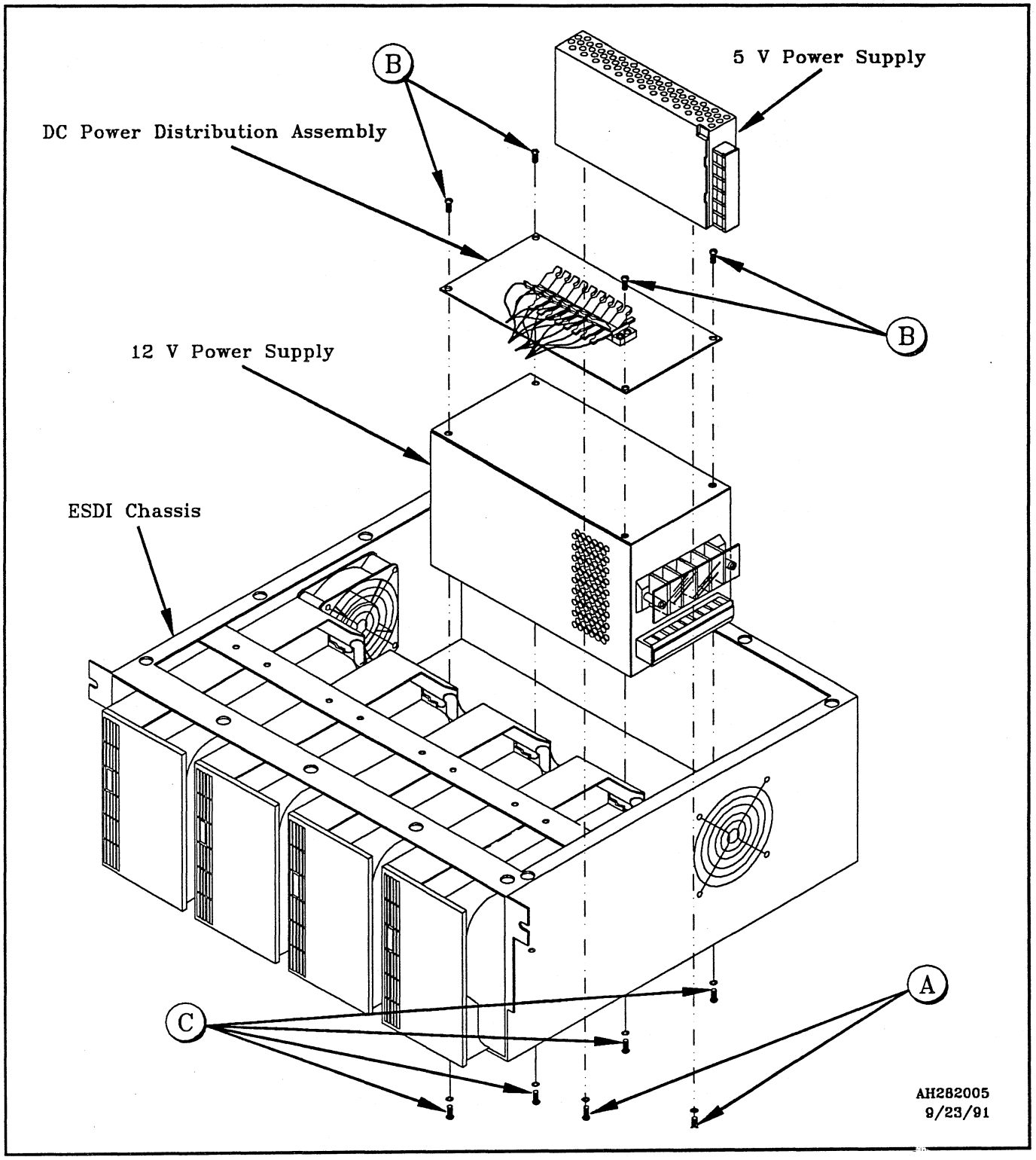
4. Install the 2 screws (C in Figure 4-4) that hold the bracket to the ESDI drive.
5. Position the ESDI drive into the chassis.
6. Connect the ESDI data ribbon cable to connector J2 on the back of the ESDI drive. See Figure 2-11.

7. Connect the ESDI control ribbon cable to connector J1 on the back of the ESDI drive.
8. Connect the disk drive power cable from the power supply barrier strip to connector J3 on the back of the ESDI drive.
9. Attach the green grounding wire to the ground connector on the rear of the drive (see detail in Figure 2-11). Be sure that the connector is pushed fully on to the pin.
10. Install the screw (A in Figure 4-4) that holds the ESDI drive to the top of the ESDI chassis.
11. Install the 2 screws (B in Figure 4-4) that hold the ESDI drive bracket to the chassis.
12. Do the postservice procedures listed in Section 4.2.8.

4.2.3 Power supply removal and replacement

This section gives procedures for removing and replacing the 5 volt and 12 volt power supplies. See Figure 4-6.

Figure 4-6 ESDI drive power supplies



4.2.3.1 5 volt power supply removal

1. Do the preservice procedures listed in Section 4.2.1.
2. Remove the 2 screws (A in Figure 4-6) connecting the power supply to the bottom of the ESDI chassis.
3. Mark and disconnect all wires from the power supply.

4. Remove the power supply from the ESDI chassis.

4.2.3.2 5 volt power supply replacement

1. Reconnect all wires to the terminal block on the side of the supply.
2. Position the power supply in the ESDI chassis.
3. Install the 2 screws (A in Figure 4-6) that hold the power supply to the bottom of the ESDI chassis. DO NOT overtighten the screws.
4. Do the postservice procedures listed in Section 4.2.8.

4.2.3.3 12 volt power supply removal

1. Do the preservice procedures listed in Section 4.2.1.
2. Disconnect the power cable from each disk drive.
3. Uncouple the cable going to the fans.
4. Remove the 4 screws (B in Figure 4-6) that hold the plate containing the terminal block on the top of the power supply. Lay the terminal block assembly over the rear edge of the chassis.
5. Remove the 4 screws (C in Figure 4-6) that hold the power supply to the bottom of the ESDI chassis.
6. Remove the power supply from the ESDI chassis.
7. Mark and disconnect all wires connected to the power supply.

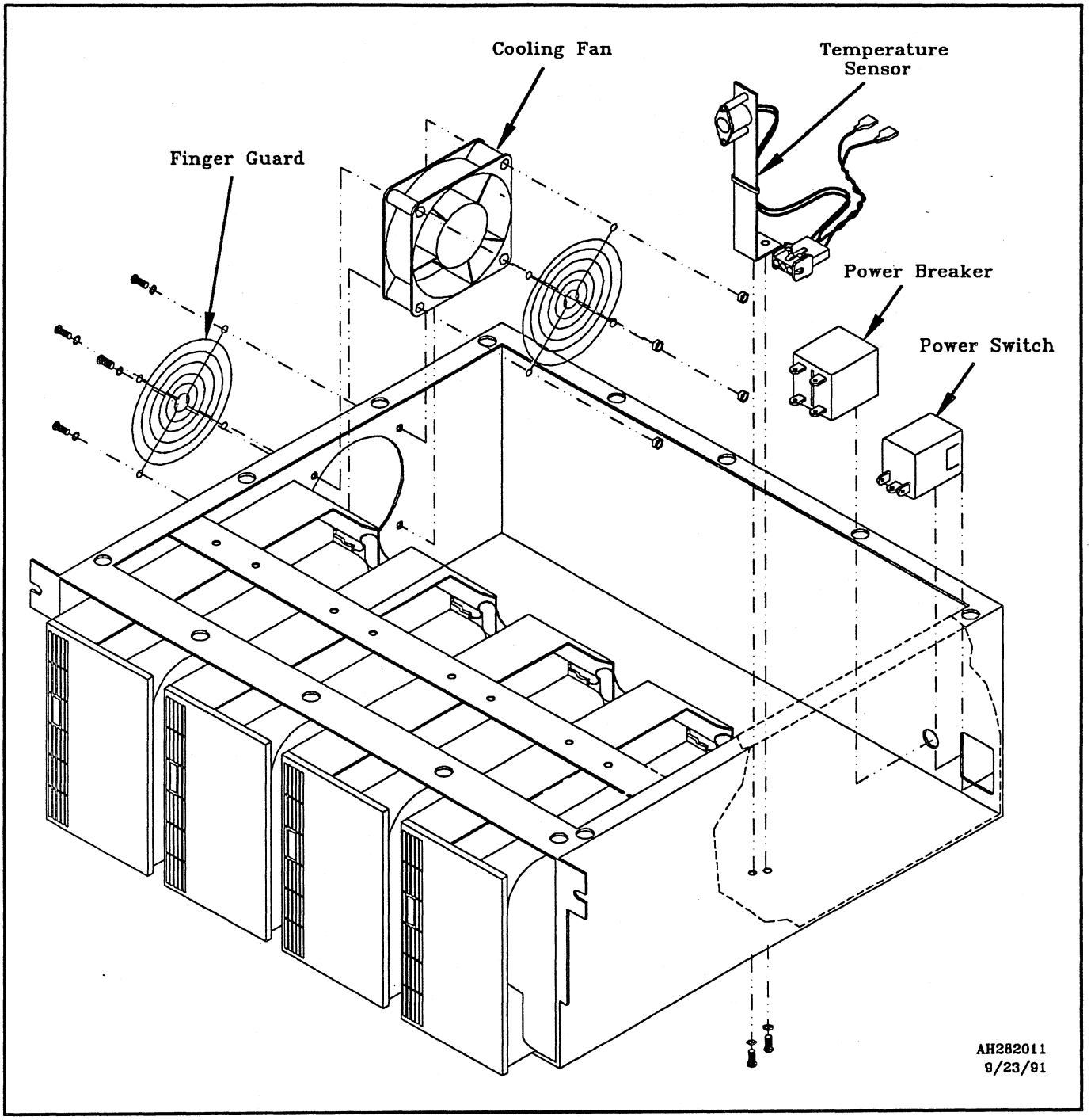
4.2.3.4 12 volt power supply replacement

1. Reconnect all wires to the terminal block on the side of the power supply.
2. Position the power supply in the ESDI chassis.
3. Install the 4 screws (C in Figure 4-6) that hold the power supply to the bottom of the ESDI chassis.
4. Install the plate containing the terminal block to the top of the power supply using the 4 screws (B in Figure 4-6).
5. Reconnect the cable going to the fans.
6. Reconnect the power cable to each disk drive.
7. Do the postservice procedures listed in Section 4.2.8.

4.2.4 ESDI chassis cooling fan removal and replacement

This section give the procedures for removing and replacing the cooling fans in the ESDI chassis. See Figure 4-7.

Figure 4-7 ESDI chassis fan and power control FRUs



4.2.4.1 Removal

1. Do the preservice procedures listed in Section 4.2.1.

Caution

Fan nuts are not captive and may be lost within the chassis. This may cause damage to equipment.

2. Remove the 4 screws and 4 nuts attaching the fan to the side of the ESDI chassis.

3. Disconnect the fan power cable.
4. Remove the inner and outer finger guards.
5. Remove the fan.

4.2.4.2 Replacement

1. Connect the power cable to the fan.
2. Position the fan to the side of the ESDI chassis.
3. Position the finger guards, one on each side of the fan.
4. Install the 4 screws and 4 nuts that attach the fan to the ESDI chassis.
5. Do the postservice procedures listed in Section 4.2.8.

4.2.5 ESDI chassis power breaker

This section gives the procedures for removing and replacing the power breaker from the back of the ESDI chassis. See Figure 4-7.

4.2.5.1 Removal

1. Do the preservice procedures listed in Section 4.2.1.
2. Mark the 4 wires connected to the chassis power breaker.
3. Disconnect the 4 wires connected to the chassis power breaker.
4. Remove the nut holding the breaker to the ESDI chassis rear panel.
5. Remove the chassis power breaker.

4.2.5.2 Replacement

1. Position the chassis power breaker in the hole in the rear panel of the ESDI chassis.
2. Install the nut that holds the breaker to the rear panel of the ESDI chassis.
3. Connect the 4 wires to the chassis power breaker.
4. Do the postservice procedures listed in Section 4.2.8.

4.2.6 ESDI chassis power switch removal and replacement

This section gives the procedures for removing and replacing the ESDI chassis power switch. See Figure 4-7.

4.2.6.1 Removal

1. Do the preservice procedures listed in Section 4.2.1.
2. Remove the ESDI chassis power breaker.
3. Mark the 3 wires connected to the ESDI chassis power switch.
4. Disconnect the 3 wires connected to the power switch.
5. Press the stop tabs on each side of the power switch inward.
6. Push and remove the power switch out the rear of the ESDI chassis.

4.2.6.2 Replacement

1. Press the power switch in the rear of the ESDI chassis until the stop tabs lock into place.
2. Connect the 3 wires to the ESDI chassis power switch.
3. Install the ESDI chassis power breaker.
4. Do the postservice procedures listed in Section 4.2.8.

4.2.7 ESDI chassis temperature sensor

This section gives the procedures to remove and replace the ESDI chassis temperature sensor. See Figure 4-7.

4.2.7.1 Removal

1. Do the preservice procedures listed in Section 4.2.1.
2. Mark the 2 wires connected to the ESDI chassis power breaker.
3. Remove the 2 wires connected to the ESDI chassis power breaker.
4. Uncouple the temperature sensor cable from the wiring harness.
5. Remove the 2 screws that hold the temperature sensor to the bottom of the ESDI chassis.

4.2.7.2 Replacement

1. Position the temperature sensor on the bottom of the ESDI chassis.
2. Install the 2 screws that hold the temperature sensor to the bottom of the ESDI chassis.
3. Couple the wiring harness to the temperature sensor coupler.
4. Connect the 2 wires to the ESDI chassis power breaker.
5. Do the postservice procedures listed in Section 4.2.8.

4.2.8 Postservice procedures

This section gives procedures that need to be performed after any of the removal and replacement procedures:

1. Position the top on the ESDI chassis and lock the 14 captive screws in place.
2. On the back of the ESDI chassis, set the chassis power switch to the ON position. See Figure 4-3.
3. Push the buttons inward on the side rails and slide the ESDI chassis into the expansion cabinet.
4. Install the 2 screws that hold the ESDI chassis in the expansion cabinet.
5. Position the ESDI chassis front panel on the chassis and lock the 2 captive screws that secure the panel to the chassis.
6. Return the expansion cabinet stabilizer bars to their retracted position. See Figure 4-2.
7. Set the VMEbus chassis power control switch to the ON position. See Figure 4-1.
8. Return power to the expansion cabinet.

- To return power to a CONVEX EXP-101 or EXP-102 expansion cabinet, connect the AC power cord to the AC power source.
- To return power to a CONVEX EXP-105 high-performance expansion cabinet, set the main power control switch to the ON position.

4.3 ESDI chassis and ESDI drive IPB

This section supplies an Integrated Parts Breakdown (IPB) for the ESDI chassis, drive, power supplies, and all associated cables.

Table 4-1 Disk drive list

Item Number	CONVEX Part Number	Description
1	204-000019-200	ESDI disk drive
2	320-001646-500	Drive bracket
3	603-010038-200	Ground wire
4	310-002301-002	Disk drive bracket screw 6-32 x ¼
5	310-002302-004	Disk drive bracket screw 6-32 x ⅜ with washer

Figure 4-8 ESDI drive IPB

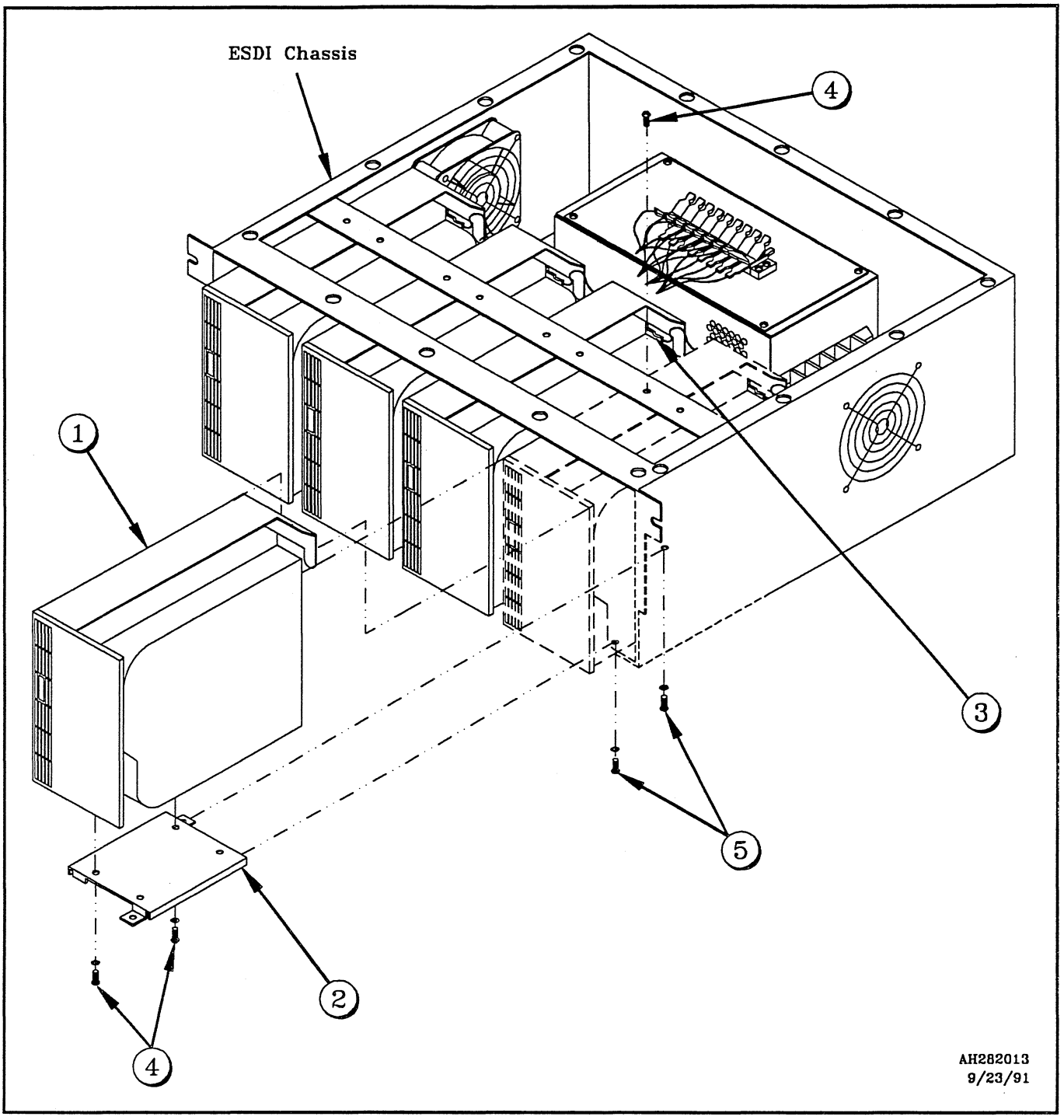


Table 4-2 Power supply list

Item Number	CONVEX Part Number	Description
1	500-000484-200	5 volt power supply subassembly
n/a	200-001031-200	5 volt power supply
n/a	200-001027-001	5 volt power supply cover
2	200-001038-200	12 volt power supply
3	500-000512-200	DC power distribution assembly
4	310-000200-003	5 volt power supply screw 4-40 x ¼
n/a	310-200210-001	#4 split lock washer for 4-40 x ¼ screw
5	310-002401-002	12 volt power supply screw 8-32 x ¼

Figure 4-9 Power supply IPB

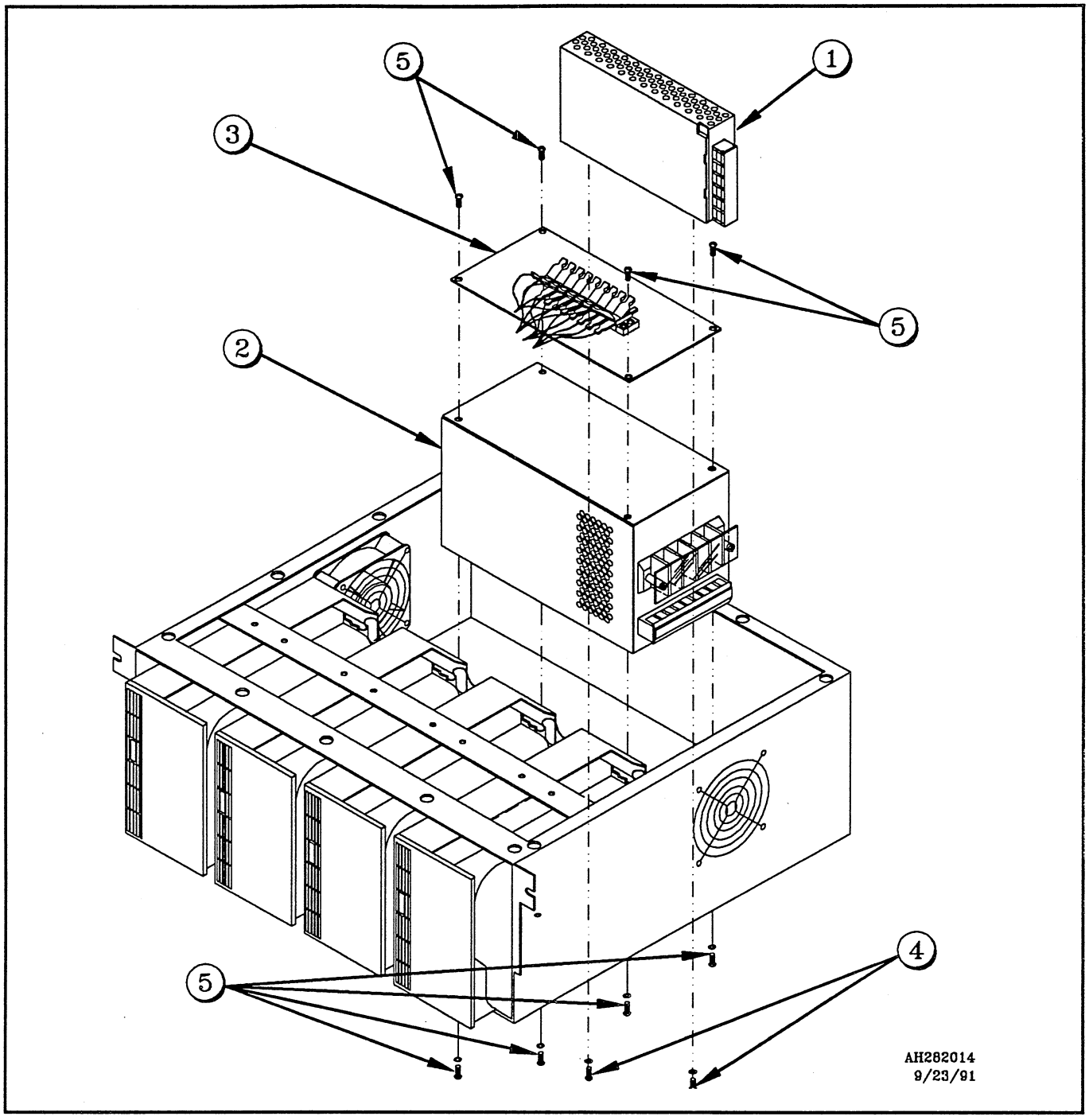


Table 4-3 Fan, sensor, breaker, and switch list

Item Number	CONVEX Part Number	Description
1	310-000431-006	Fan assembly screws 8-32 x 1.375
2	310-100400-001	Nut 8-32
3	230-000013-002	Cooling fan finger guard
4	230-000013-001	Cooling fan
5	310-000200-003	Thermostat screw 4-40 x ¼
n/a	250-000013-002	Thermostat
6	500-000310-200	Thermostat subassembly (recommended FRU)
7	253-000113-003	Circuit breaker
8	125-000011-001	ESDI chassis power switch
9	310-002302-004	Thermostat bracket screw 6-32 x ⅜ (chassis to bracket)

Figure 4-10 Fan, sensor, breaker, and switch IPB

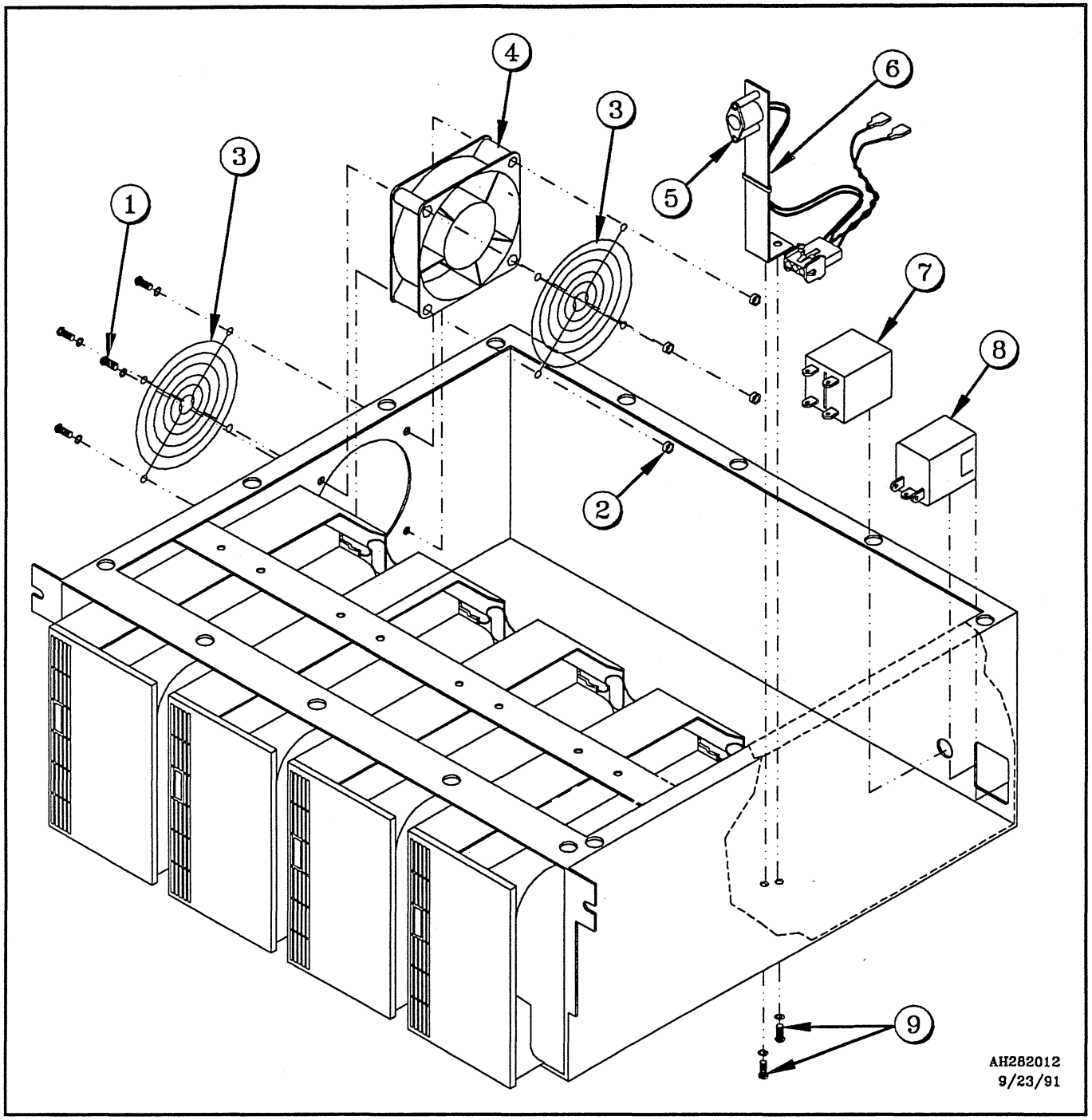


Table 4-4 Cabling list

Item Number	CONVEX Part Number	Description
n/a	603-020059-200	Fan DC power cable assembly
n/a	603-020001-200	AC filter and chassis switch cable assembly
n/a	603-010029-200	Ground strap cable assembly
n/a	603-040041-20[0-3]	5 volt/12volt DC power cable assembly
n/a	604-600002-201	VME I/O control cable assembly
n/a	604-260003-201	VME I/O data cable assembly
n/a	601-340013-200	ESDI I/O control ribbon cable (4-drive)
n/a	601-340012-20[0-1]	ESDI I/O control ribbon cable (2-drive)
n/a	601-200007-20[0-3]	ESDI I/O data ribbon cable

Table 4-5 Miscellaneous parts list

Figure Number	CONVEX Part Number	Description
n/a	312-000345-001	ESDI chassis slide rail (universal)
Figure 2-7	320-001461-500	Front panel mounting bracket
Figure 2-7	312-000346-001	Front panel mounting bracket grounding pads
Figure 1-1	320-001643-500	ESDI chassis front panel
n/a	320-001645-500	ESDI chassis front panel blank insert
n/a	310-150503-001	RETMA rail nut
n/a	310-002501-001	RETMA rail screw 10-32 x 1/2

Hitachi 780MB ESDI Disk Drive Configurator

A

A.1 Overview

This appendix contains a copy of the *Hitachi 780MB ESDI Disk Drive Configurator* document (effective 8/16/91). Note that a more recent version of this document may be available; check with the CONVEX Technical Assistance Center (TAC) for more information.

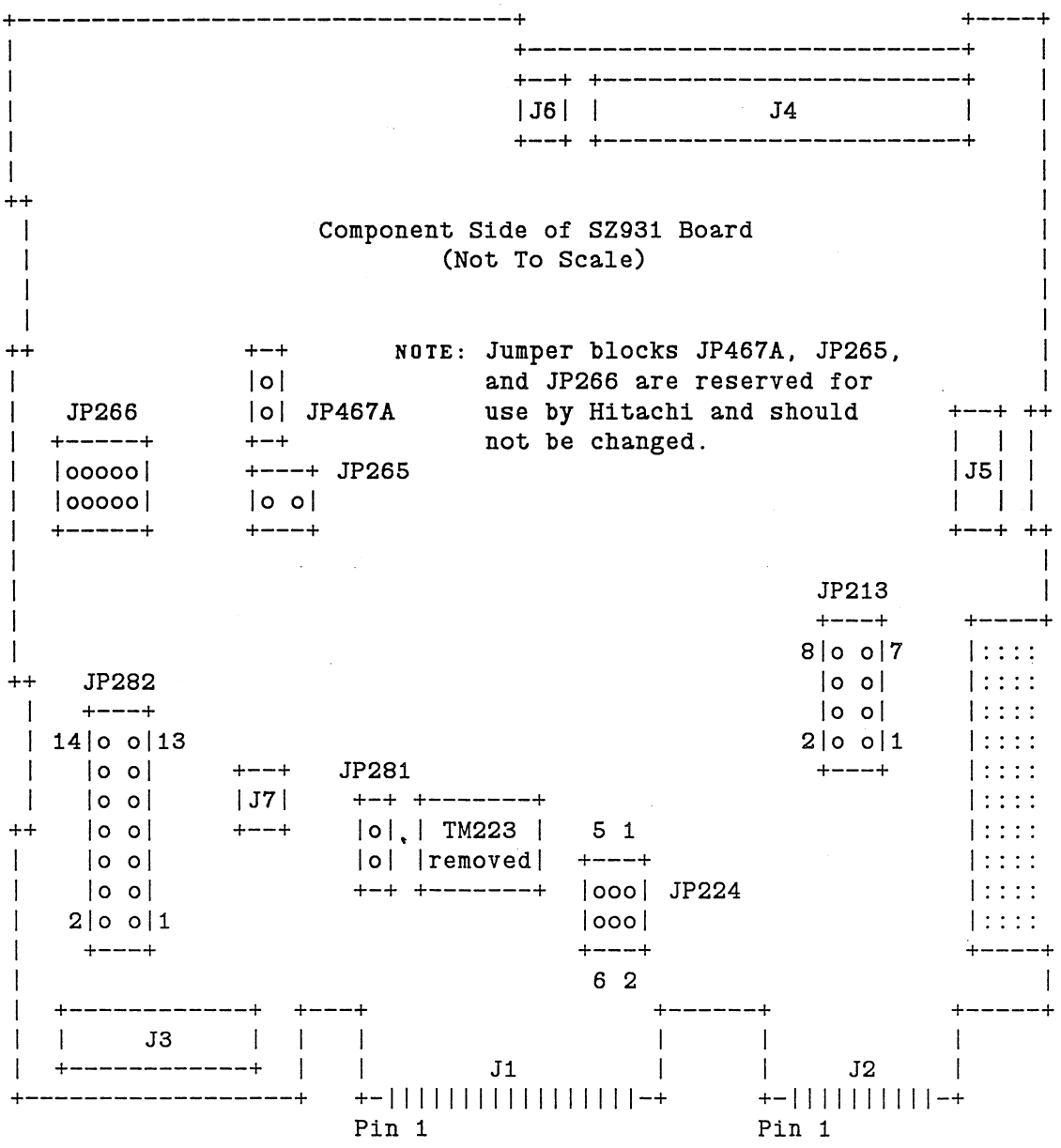
Hitachi 780MB ESDI Disc Drive Configurator Document

Section 1.0 Scope

This document provides configuration information for the Hitachi 780MB ESDI Disc Drive, Model Number DK515-78 (Convex P/N 204-000019-200).

Section 2.0 Disc Drive Configuration

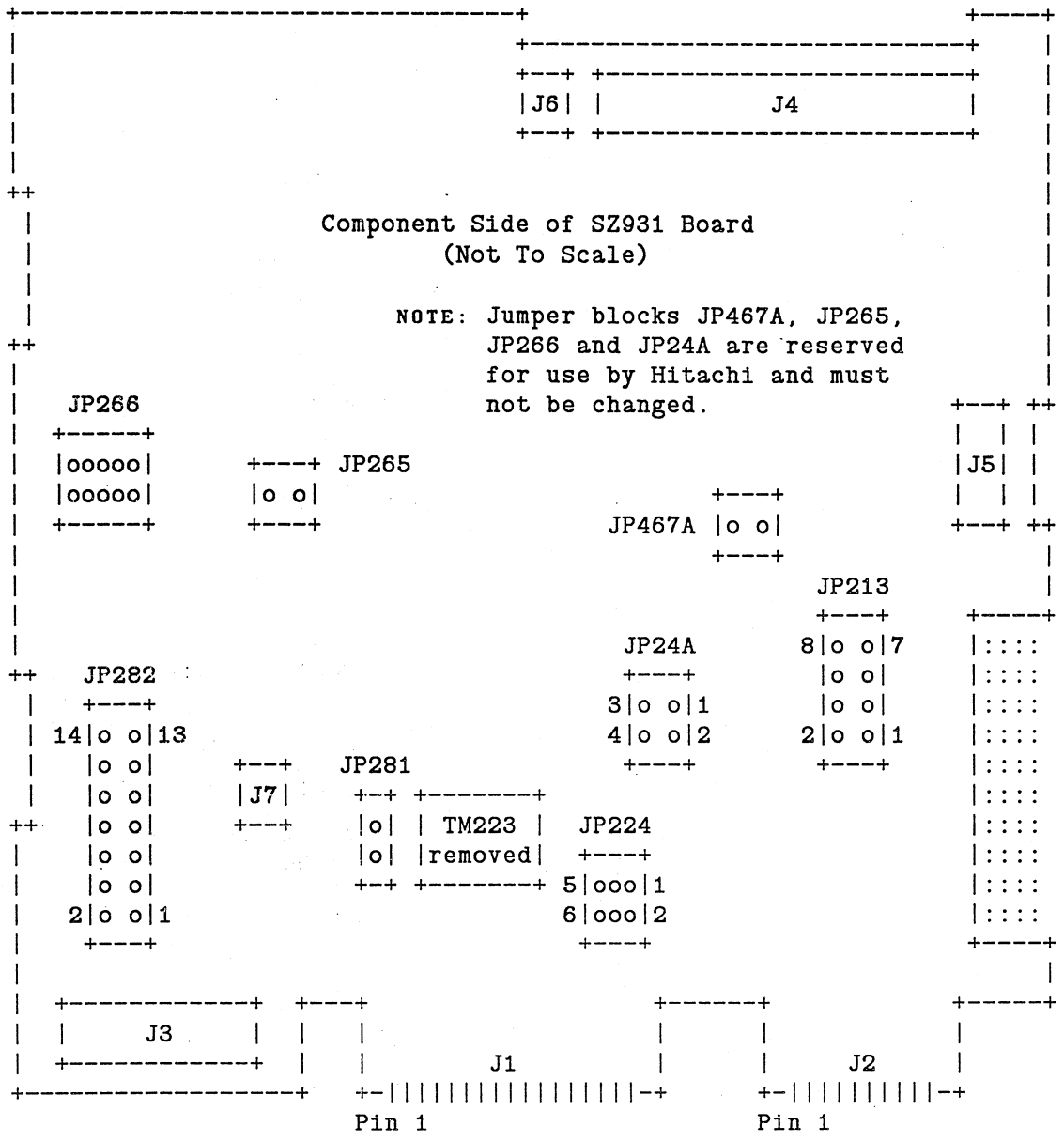
Hitachi SZ931 P.C. Board Revision *A/H1 and earlier* Only



CONVEX	TITLE: Hitachi 780MB ESDI Disc Drive Configurator Document Part Number: 204-000019-600	REV: C 08/16/91 ENGR: Brad Jones PAGE: 1

Section 2.0 Disc Drive Configuration *(Continued)*

Hitachi SZ931 P.C. Board Revision ***A/K2 and later*** **Only**



Section 3.0 Jumper Settings

The correct jumper settings are summarized in the following table:

Jumper Location	Pins	Convex Setting	Jumper Description
TM223 Terminator		→	If RDS, the base unit provides termination, so this DIP must be removed. In other applications. terminate only the last drive in a daisy-chain.
JP213	1-2 3-4 5-6	IN OUT OUT	These jumpers select the unit's Device Address. Device Address 1 (shown at left) is always used in the Convex RDS Subsystem. In other applications, Device Address 1 will be connected to Port 0 of the Interphase 4201.
JP213	1-2 3-4 5-6	OUT IN OUT	Device Address 2 (non-RDS applications only), which connects to Port 1 of the Interphase 4201.
JP213	1-2 3-4 5-6	IN IN OUT	Device Address 3 (non-RDS applications only), which connects to Port 2 of the Interphase 4201.
JP213	1-2 3-4 5-6	OUT OUT IN	Device Address 4 (non-RDS applications only), which connects to Port 3 of the Interphase 4201.
JP213	7-8	OUT	OUT enables writing; IN write protects the unit.
JP224	1-2 3-4 5-6	→ → →	All 3 jumpers OUT if the terminator is removed; all 3 jumpers IN if the terminator is installed.
JP281	1-2	IN	IN terminates synchronous spindle signal.
JP282	1-2	IN	IN selects hard sectoring; OUT selects soft.
JP282	3-4 5-6	IN IN	IN/IN selects off-line sync spindle mode; OUT/IN slave; IN/OUT master; OUT/OUT remote.
JP282	7-8	IN	IN doesn't start/stop spindle motor; OUT does.
JP282	9-10 11-12 13-14	IN OUT IN	Selects 512 data bytes/sector, 69 sectors/track.
JP467A	ALL	→	SET BY HITACHI; DO NOT CHANGE
JP265	ALL	→	SET BY HITACHI; DO NOT CHANGE
JP266	ALL	→	SET BY HITACHI; DO NOT CHANGE
JP24A	ALL	→	SET BY HITACHI; DO NOT CHANGE

DOCUMENT REVISION HISTORY

REVISION	ECN NO.	DESCRIPTION	DATE	APPROVED
A	106198	Engineering Release.	03/02/90	
B	106530	Vendor ECN DK515EC-014 released Revision A/K2 SZ931 P.C. Board.	06/26/90	
C	108030	Added Device Address jumpering and Disc Termination specifications for applications other than RDS.	08/16/91	

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