CONVEX VMEbus SCSI
Host Adapter Service Guide

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CONVEX Computer Corporation
Richardson, Texas USA

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Host Adapter Service Guide
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Host Adapter Service Guide

Edition	Document	Date	Description
First	081-006830-000	June 1990	First release of the *CONVEX VMEbus SCSI Host Adapter Service Guide.*

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Preface

Purpose and Intended Audience

The *CONVEX VMEbus Small Computer Systems Interface (SCSI) Host Adapter Service Guide* provides a general overview of the VMEbus SCSI host adapter and related hardware and shows how to:

- Install the host adapter and related hardware
- Integrate the host adapter into the CONVEX Operating System (ConvexOS)
- Test the host adapter and related hardware
- Remove and replace the host adapter and related hardware

Audience

This document is intended for:

- CONVEX Customer Support Engineers
- CONVEX manufacturing personnel
- Customers who need to install a VMEbus SCSI host adapter and related hardware

Outline

This document consists of the following chapters:

- **Chapter 1. Description and Specifications**—Describes the VMEbus SCSI host adapter and related hardware at the block diagram level. Defines and lists the electromechanical and environmental specifications.
- **Chapter 2. Unpacking and Installation**—Provides guidelines on how to unpack and install the VMEbus SCSI host adapter and its related hardware.
- **Chapter 3. Integration and Test**—Explains how to integrate the VMEbus SCSI host adapter into the ConvexOS software. Explains how to test the host adapter and related hardware.
- **Chapter 4. Maintenance Procedures and IPB**—Provides removal and replacement instructions for the controller and related hardware.
- **Appendix A. Ciprico Model 3516 VME/SCSI Host Adapter Configurator**—Contains the VMEbus SCSI Host Adapter Configurator document.
- **Appendix B. Reporting Problems**—Provides an example of the CONVEX ***contact*** utility for reporting minor software and hardware problems.

Notational Conventions

The following are examples of warnings, cautions, and notes and their typical content as used in documents:

WARNING

Warnings highlight procedures or information necessary to avoid injury to personnel. Warnings immediately precede the critical information and include a description of the hazard.

CAUTION

Cautions highlight procedures or information necessary to avoid damage to equipment, damage to software, or loss of data. Cautions immediately precede the critical information and include a description of the possible damage.

NOTE

Notes highlight useful information that is supplemental in nature. Notes may immediately precede or follow the information that is being highlighted.

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 Diagnostic Utility Manual (C200 Series)*, Order No. DHW-082
- *CONVEX PBUS I/O System Diagnostics Manual*, Order No. DHW-008
- *CONVEX Processor Operation Guide (C100 Series, C200 Series)*, Order No. DHW-015
- *CONVEX VMEbus SCSI Host Adapter Configurator*, CONVEX Part No. 220-000019-600
- *CONVEX System Manager's Guide*, Product No. DSW-004
- *CONVEX VIOP/VBCU Service Guide*, Order No. DHW-051
- *CONVEX VMEbus Reference Manual*, Order No. DHW-061
- *CONVEX VMEbus Service Kit*, Order No. DHW-050
- *Ciprico Rimfire 3510 SCSI Host Bus Adapter and Floppy Disk Controller Reference Manual*, CONVEX Part No. 900-000425-001

- *Electrostatic Discharge Failures of Semiconductor Devices.* Unger, B.A. 1981. Bell Laboratories
- *The VMEbus SPECIFICATION C.1*, Motorola Inc.

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If you wish to mail your comments to us, please use the form at the end of this manual and list the document page number with your questions and comments. Thank you.

Acknowledgments

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

- Technical contributors: Larry Price
- Document review team: Ray Anderson, Rob Carruthers, Alan Gant, Alan Hasty, Harold Hinson, Allan Koh, Joe Machado, John Rachels, Andy St Martin, Dick Shelton, Chip Stroup, Cari Tuttle, Lihwen Wu
- Hardware documentation staff: Larry Bonura and Josie Davis

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

Bill Benson
CONVEX I/O Documentation

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Chapter 1
Description and Specifications

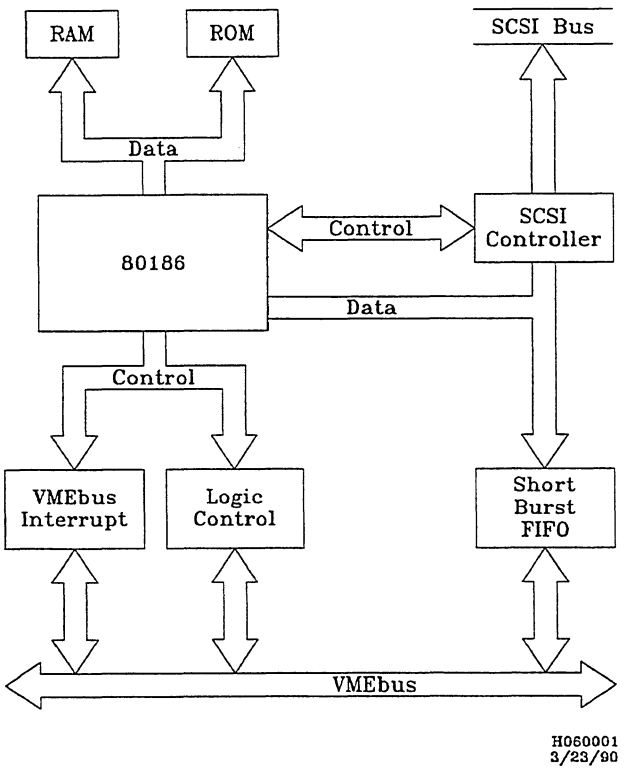
1.1 Overview

The CONVEX VMEbus Small Computer Systems Interface (SCSI) host adapter is a high-performance SCSI host bus adapter for the VMEbus. SCSI bus data supports rates of 1.5 Mbytes/second in asynchronous mode and 5.0 Mbytes/second in synchronous mode.

1.2 Functional Description

This section gives a brief functional description of the VMEbus SCSI host adapter. Figure 1–1 shows a functional block diagram of the VMEbus SCSI host adapter:

Figure 1–1, VMEbus SCSI Host Adapter Block Diagram



1.2.1 Features

The following sections describe some of the features of the VMEbus SCSI host adapter .

1.2.1.1 SCSI Port Features

The following are SCSI port features:

- Differential interface that can drive a signal up to 25 meters
- SCSI data rates to 1.5 Mbytes/second in asynchronous mode or 5 Mbytes/second in synchronous mode
- Supports Full Common Command set
- Allows overlapping SCSI operations using disconnect/reconnect

1.2.1.2 VMEbus Features

The following are VMEbus features:

- Compatible with VMEbus Specification, Revision C.1
- Sustained VMEbus transfer rates at 10 Mbytes/second
- 8-bit, 16-bit, or 32-bit data transfers
- 16-bit, 24-bit, or 32-bit addressing

1.2.2 SCSI Command Operation Sequence

The CONVEX VMEbus SCSI host adapter executes commands sent by the host device. Each issued command is stored in a *parameter block* structure in system memory. The address of this parameter block is passed to the host adapter. The adapter interprets the parameter block, executes the operation, and returns a completion signal and any error information in one or more structures called *status blocks.*

1.2.3 Parameter Blocks

The parameter block holds data that tells the host adapter what to do when executing a command. Table 1–1 lists the format for the standard parameter block for SCSI pass-through commands:

Table 1–1, Standard Parameter Block

Bits <31...24>	Bits <23...16>	Bits <15...8>	Bits <7...0>
Command Identifier			
Reserved	Flags	Addr. Mod.	Target ID
VMEbus Memory Address			
Transfer Count			
0[1]	1	2	3
4	5	6	7
8	9	10	11

[1] Bytes 0 through 11 are the SCSI command descriptor block.

NOTE

Refer to the *Ciprico Rimfire 9510 SCSI Host Bus Adapter and Floppy Disk Controller Reference Manual*, chapter 4, "Operational Characteristics," for additional information on the characteristics of the SCSI host adapter.

1.3 VMEbus Input/Output Processor (VIOP)

VMEbus host adapter controllers installed in a CONVEX VMEbus expansion chassis communicate with main memory in a CONVEX computer via the PBUS, the VMEbus Control Unit (VBCU), and the VMEbus Input/Output Processor (VIOP).

The VIOP contains all intelligence for the VMEbus subsystem. It controls all data transfers between the main memory PBUS and the VBCU. The VIOP communicates with a VMEbus host adapter controller via the VBCU. The VIOP connects to the VBCU through three 60-pin I/O cables. The VIOP's VBCU interface architecture allows 8-, 16-, and 32-bit data transfers coupled with 22-bit addressing.

The VIOP uses a 20-MHz 68020 microprocessor and static no-wait state memory. Data is pipelined between the VIOP and VBCU in both directions and is controlled by an asynchronous protocol. The pipelining and asynchronous protocol compensate for propagation delays introduced by long cable lengths. These features enable the maximum possible transfer bandwidth for a given peripheral device configuration.

The VIOP's transfer bandwidth to and from main memory is 80 Mbytes/second in the burst transfer mode of operation. The theoretical transfer rate between the VBCU, VIOP, and VMEbus host adapter controller is approximately 7.4 Mbytes/second.

Depending on the type of CONVEX computer, one to eight VIOPs can be installed in the computer card cage. Each VIOP has two ports and can control two separate VMEbus buses through two VBCUs.

In a CONVEX C200 Series multiprocessor system, the data path to main memory is different from a C100 Series system. The VIOP connects to a Peripheral Interface Adapter (PIA), the interface between the VIOP and the PBUS in main memory. The standard PIA configuration for a C200 Series system contains a single PIA and up to four VIOPs. A second PIA and four additional VIOPs can be added as an option to most systems.

1.4 VMEbus Control Unit (VBCU)

The VBCU is the interface between the VIOP and the VMEbus. In general, an arbitration circuit on the VBCU ensures that there is time for each VMEbus controller on its bus.

Normally all controllers with the same priority levels have data transfers handled in a round-robin, first-come, first-serve basis. However, if a VMEbus controller becomes the VMEbus master, all other VMEbus devices (including the VIOP) must request access to the bus.

All bus requests are ORed together in the VBCU and are used to generate a BusReq 0. Once generated, BusReq 0 is sent out on the bus and causes the VMEbus controller to release the bus. Once the device that caused BusReq 0 to be generated is serviced, the VBCU resumes its round-robin grant process.

1.5 VMEbus Expansion Chassis

A CONVEX VMEbus expansion chassis is a self-contained unit that has its own:

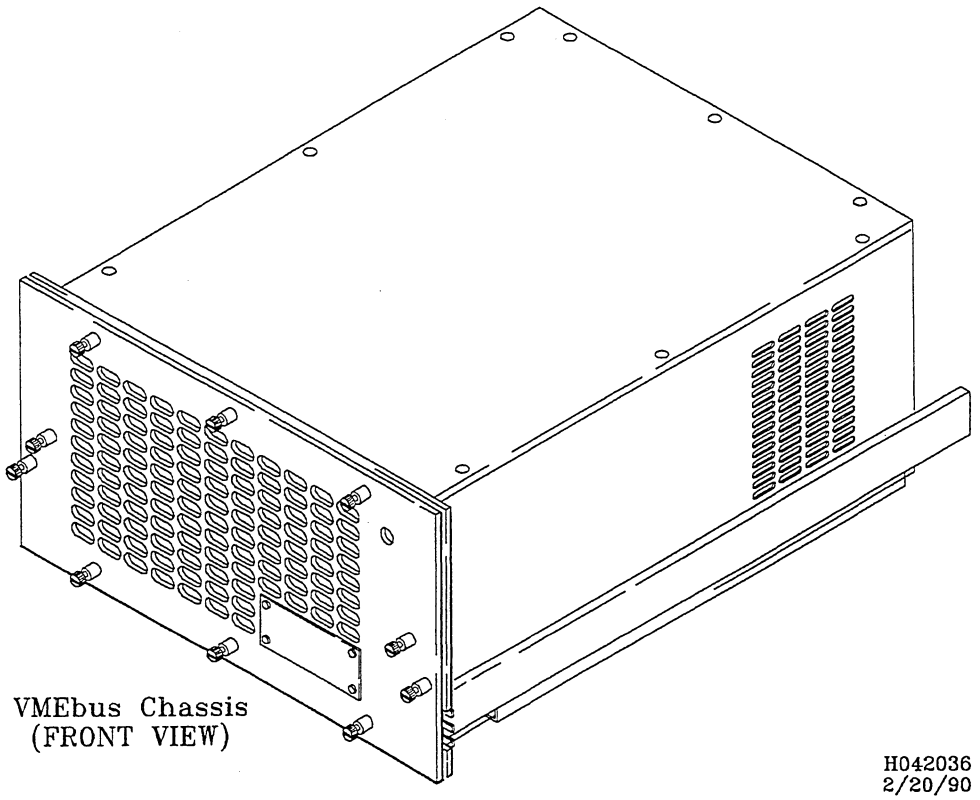
- Power supply
- VMEbus backplane, or VMEbus and Multibus backplanes
- Built-in bus terminator networks
- Chassis and power supply cooling fans
- Electromagnetic Interference (EMI) shielding
- Rear bulkhead cable entry points (12 each) with EMI shielding
- Power control switch with built-in circuit breaker and line filter
- Front panel DC indicator
- Low-airflow circuit breaker for automatic DC power shutdown
- Air filter

The VMEbus expansion chassis accepts both 6U and 9U VMEbus form factor cards.

1.6 Chassis Hardware

The expansion chassis is mounted on slides and is normally installed in a CONVEX expansion cabinet. The top and bottom panels are removable for servicing operations. The top panel is removed to install or remove Printed Circuit Boards (PCBs), power supply, or chassis fan. Figure 1–2 illustrates a CONVEX VMEbus chassis:

Figure 1–2, Typical VMEbus Chassis



1.7 Types of CONVEX VMEbus Chassis

There are three types of VMEbus expansion chassis available; each contains a different backplane style, such as single, dual, or VMEbus/Multibus combination. All backplanes have built-in bus terminators; no plug-in terminators are required. The following sections discuss each chassis in detail.

1.7.1 Single VMEbus Chassis

The single (9-slot) VMEbus expansion chassis contains a single (9-slot) VMEbus backplane. Slot **1** is reserved for the VBCU and slots **2** through **8** are for standard VMEbus controllers. Slot **9** *cannot* be used for a single board VMEbus controller. However, slot **9** can be used for the second board of a two-board VMEbus controller set when the first board is located in slot **8**.

1.7.2 Dual VMEbus Chassis

The dual (two 5-slot) VMEbus chassis contains two VMEbus backplanes and two VBCUs. Slot **1** is reserved for VBCU-0 and slot **10** for VBCU-1. The dual VMEbus chassis can contain eight VMEbus controllers; four controllers may be installed in each VMEbus in the dual VMEbus chassis.

1.7.3 VMEbus/Multibus Combo Chassis

The VMEbus/Multibus combo chassis contains a 6-slot VMEbus and a 5-slot Multibus. Slot **1** is reserved for the VBCU and slot **7** is reserved for the Multibus Control Unit (MBCU). The VMEbus can contain five VMEbus controllers; the Multibus can contain four Multibus controllers.

NOTE

Refer to the "Associated Documentation" list in the preface for additional information on the VMEbus Input/Output Processor (VIOP), VMEbus Control Unit (VBCU), VMEbus chassis, Multibus Control Unit (MBCU), and the Multibus Input/Output Processor (MIOP).

1.8 SCSI Host Adapter LED Indicators

The SCSI host adapter board has a red (**FAIL**) LED and a green (**BUSY**) LED. Figure 1–3 shows the LEDs on the SCSI host adapter:

Figure 1–3, SCSI Host Adapter LEDs

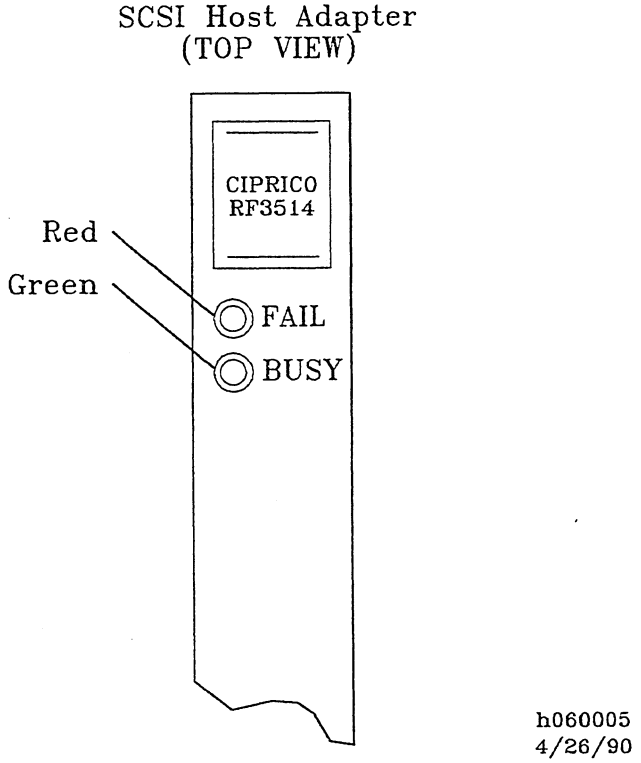


Table 1–2 list the meaning of the different combinations of lit and unlit LEDs:

Table 1–2, SCSI Host Adapter LEDs

Red	Green	Description
Off	Off	No power to host adapter card
Off	On	Host adapter powered but not active
Off	Blinking	Host adapter is active
On	On	Host adapter is booting
On	Off	An error has occurred

1.9 Specifications

This section lists in a table the specifications for the VMEbus SCSI host adapter. Table 1–3 lists the VMEbus SCSI host adapter specifications:

Table 1–3, VMEbus SCSI Host Adapter Specifications

Parameter	Value/Comment
Voltage Range	4.75 VDC to 5.25 VDC
Current, Maximum	4.0 Amp typical (at +5 VDC)
Temperature Range:[1]	
Operating	32 °F to 131 °F (0 °C to 55 ° C)
Non-Operating	-40 °F to 185 °F (-40 °C to 85 ° C)
Humidity Range:	
Operating	10% to 80% with no condensation
Non-Operating	10% to 95% with no condensation
Elevation:	
Operating	0 ft to 10,000 ft (0 m to 3,048 m)
Non-Operating	40,000 ft. (12,192 m) maximum
Air Flow	200 linear ft/min (102 linear cm/sec)

[1] At altitudes above 3,280 ft (1,000 m), lower air densities affect air conditioning. If the unit is located above this altitude, lower the recommended temperature value by 1 °F/1,000 ft (2 °C/1,000 m).

Chapter 2
Unpacking and Installation

2.1 Overview

This chapter discusses unpacking and inspection, identifies major components of the CONVEX VMEbus SCSI host adapter assembly, and provides installation procedures.

2.2 Unpacking and Inspection

This section gives general guidelines for unpacking the SCSI host adapter and related hardware.

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-level charge. If a high voltage-level charge is discharged into electronic computer circuits, it will damage 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 provides an approximation of electrostatic charge 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.

Table 2–2 lists various components and their susceptibility to static damage:

Table 2–2, Components Susceptibility to ESD Damage

Susceptibility Ranges of Various Devices Exposed to Electrostatic Discharge (Human Body Model[1])	
Device Type	**Level of ESD Susceptibility (Volts)**
MOSFET	>10
JFET	> 140
CMOS	> 250
Schottky Diodes, TTL	> 300
Bipolar Transistors	> 380
ECL (For Hybrid use, PCB level)	> 500
SCR	> 680

[1] Source: B. A. Unger, *Electrostatic Discharge Failures of Semiconductor Devices* (Bell Laboratories, 1981).

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 damage as it is unpacked. If damage is found after visual inspection, document the damage with photographs and contact the transport carrier immediately. Unpack the equipment as described in the next section.

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.

Table 2–3 lists a bill of materials for a SCSI host adapter assembly:

Table 2–3, Bill of Material

Product Number	Description	Quantity
550-000338-200	Host adapter assembly[1]	1
220-000019-200	Host adapter	1
604-500006-200	20 ft Shielded Cable	1

[1] An assembly contains a complete set of CONVEX VMEbus SCSI host adapter hardware.

CAUTION

The SCSI host adapter can sustain ESD damage during unpacking procedures. A grounded wrist strap (or other grounding method) must be used when the SCSI host adapter is removed from its protective packing. Failure to do so will cause damage to the device.

The following is the procedure for unpacking the shipping container:

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 SCSI host adapter 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.

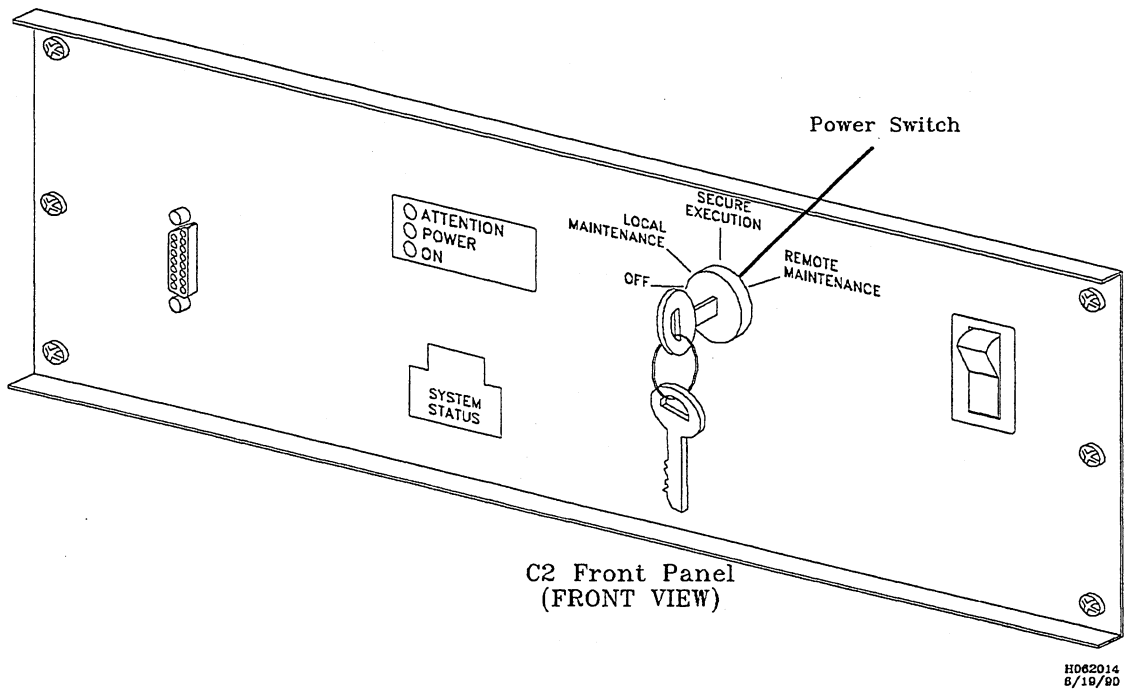
2.3 Installation

This section gives the procedure for installing the SCSI host adapter into the VMEbus chassis.

> **CAUTION**
>
> Shut down the system before removing power to the VMEbus chassis. Failure to do so will cause a system crash and possible loss of data. Refer to the *CONVEX Processor Operation Guide (C100 Series, C200 Series)* for power-down procedures on a CONVEX supercomputer.

1. Turn the processor's front panel key switch to the **OFF** position. Figure 2–1 shows a typical processor's front panel control switch:

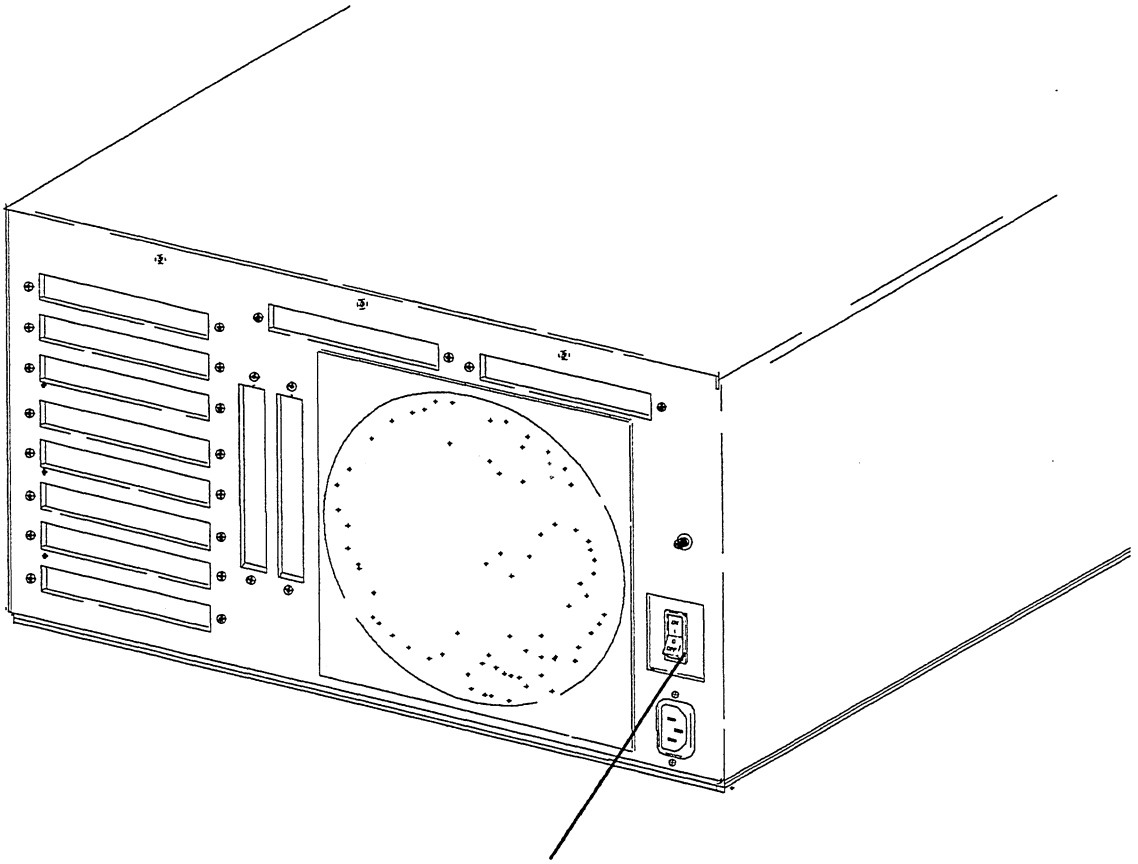
Figure 2–1, Processor's Front Panel Power Control Switch



> **CAUTION**
>
> Remove power to the VMEbus chassis before installing or removing equipment. Failure to do so will damage electronic equipment components.

2. Set the VMEbus chassis power control switch to the **OFF** position. Figure 2–2 shows the VMEbus power control switch:

Figure 2–2, VMEbus Chassis Power Control Switch

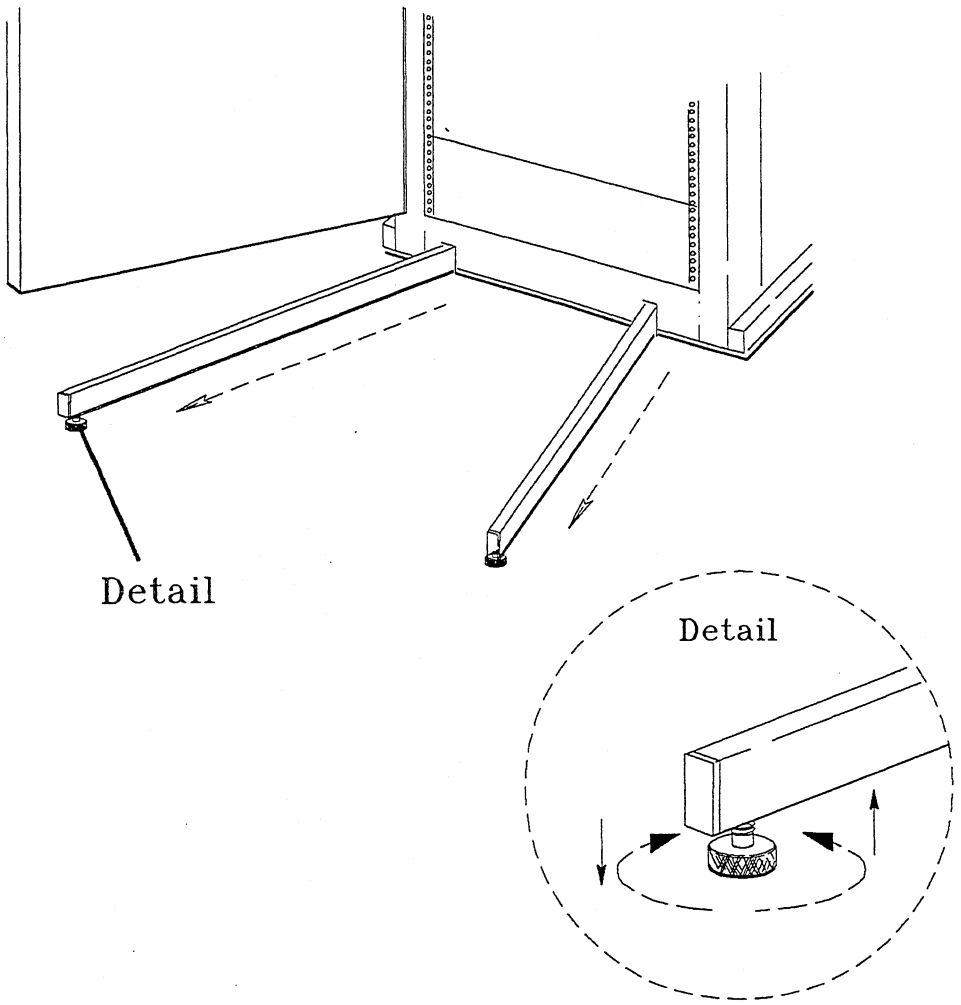


WARNING

Expansion cabinet stabilizer bars *must* be extended before installing a VMEbus chassis or before extending the VMEbus 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 the 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. Figure 2–3 shows the expansion cabinet stabilizer bars and adjustable feet:

Figure 2–3, Expansion Cabinet Stabilizer Bars



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4. Unlock the 2 VMEbus chassis lock screws and extend the chassis on its side.
5. Unlock the 12 top panel lock screws on the VMEbus chassis top panel and remove the top panel.
6. Select the appropriate cable cover plate on the rear of the VMEbus chassis. Table 2–4 lists the appropriate cable cover for the slot desired:

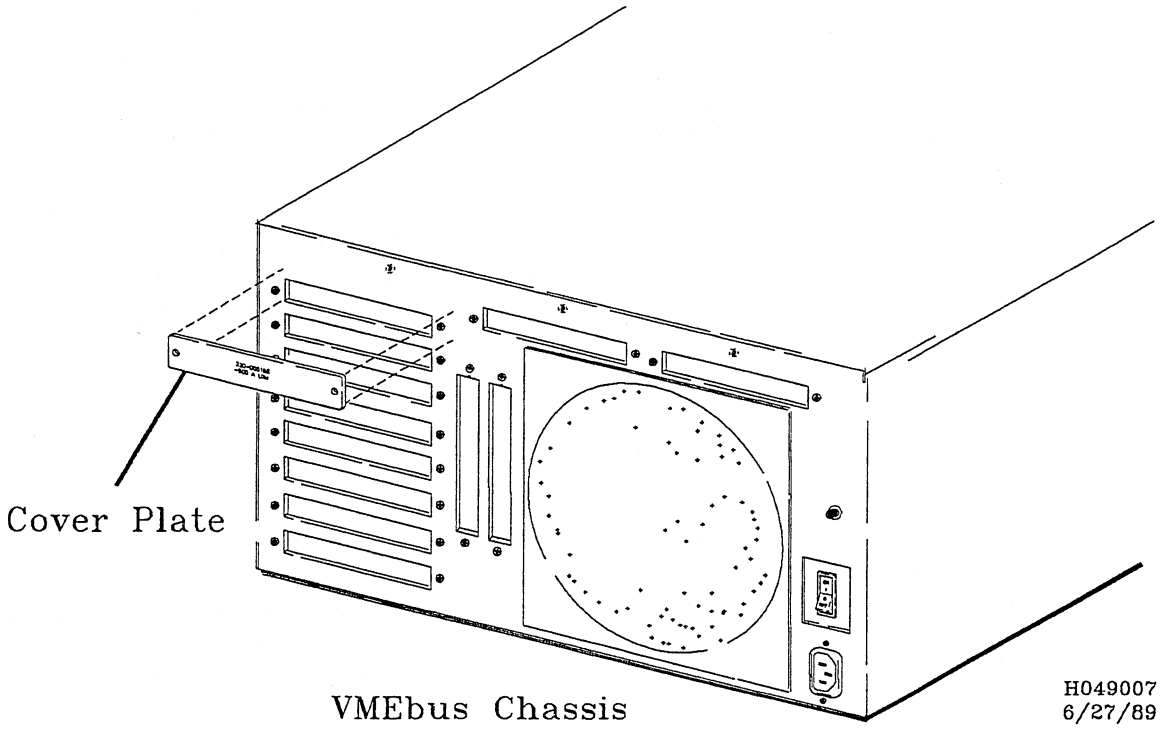
Table 2–4, Cable Opening Numbers for VMEbus Chassis

Cable Opening Number	Dual (10-slot) VMEbus	Single (9-slot) VMEbus	Combo VMEbus/MBUS
J1	VBCU0	VBCU	VBCU
J2	VME0 Ctlr 1	VMEbus Ctlr 1	VMEbus Ctlr 1
J3	VME0 Ctlr 2	VMEbus Ctlr 2	VMEbus Ctlr 2
J4	VME0 Ctlr 3	VMEbus Ctlr 3	VMEbus Ctlr 3
J5	VME0 Ctlr 4	VMEbus Ctlr 4	VMEbus Ctlr 4
J6	VME1 Ctlr 5	VMEbus Ctlr 5	VMEbus Ctlr 5
J7	VME1 Ctlr 3	VMEbus Ctlr 6	MBUS Ctlr 3
J8	VME1 Ctlr 2	VMEbus Ctlr 7	MBUS Ctlr 2
J9	VME1 Ctlr 1	VMEbus Ctlr 7[1]	MBUS Ctlr 1
J10	unassigned	assigned	MBUS Ctlr 0
J11	unassigned	unassigned	unassigned
J12	VBCU1	unassigned	MBCU

[1] This controller slot is reserved for the second board of a two-board controller; the first board, of the two-board set, must be located in the *previous* VMEbus slot.

7. Remove the appropriate cable cover plate from the VMEbus chassis. Figure 2–4 shows the VMEbus chassis, a cable cover plate, and the location of the cable cover plates:

Figure 2–4, Cable Cover Plate

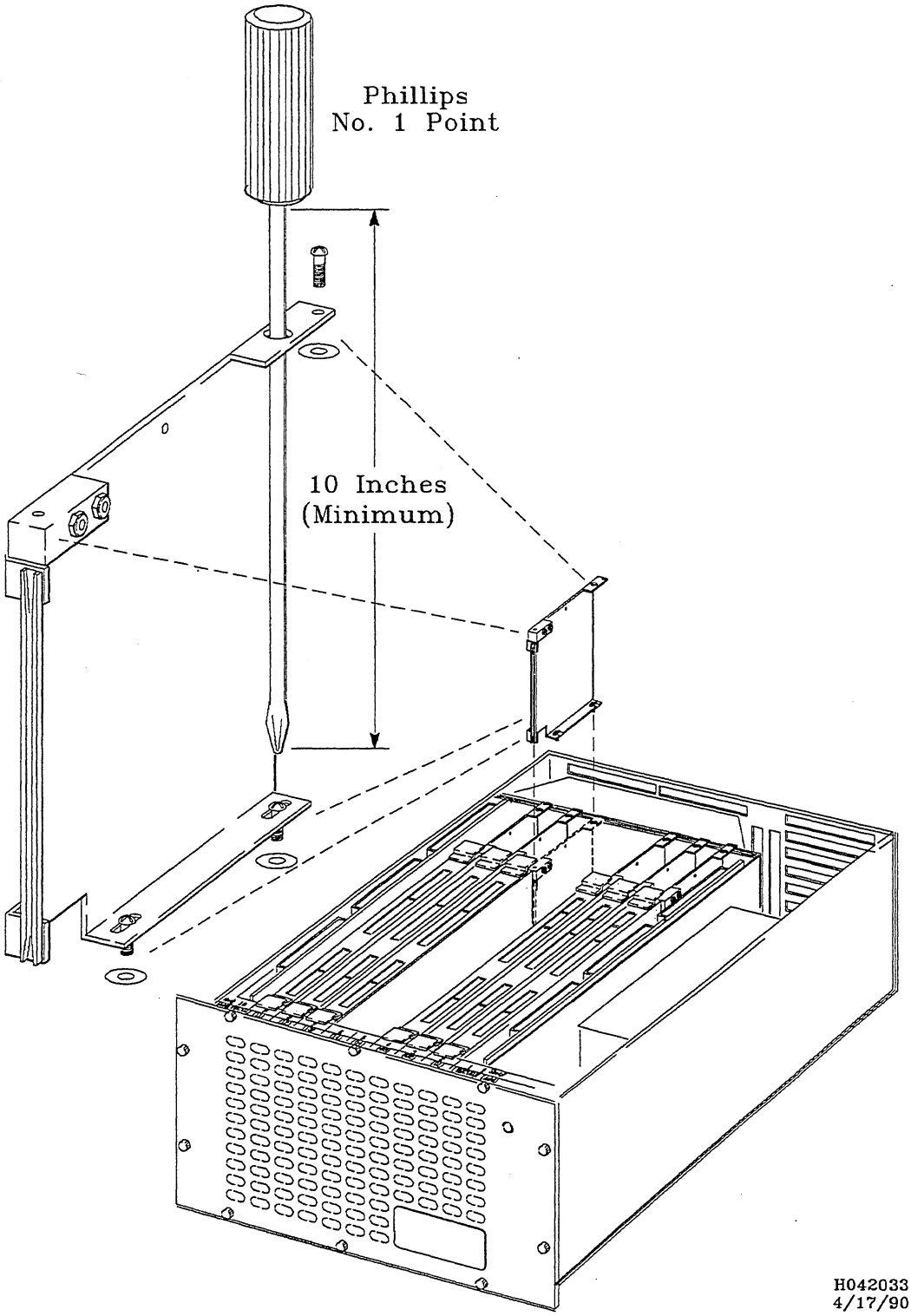


NOTE

A Phillips screw driver (approximately 10 inches long) with a No. 1 point is required to install the 2 bottom screws in the single (6U) VMEbus Printed Circuit Board (PCB) adapter.

8. Attach the single (6U) PCB adapter (with 2 screws) to the bottom of the chassis and (with 1 screw) to the top rear support rail. Figure 2–5 shows the VMEbus chassis PCB adapter:

Figure 2–5, (6U) VMEbus PCB Adapter



CAUTION

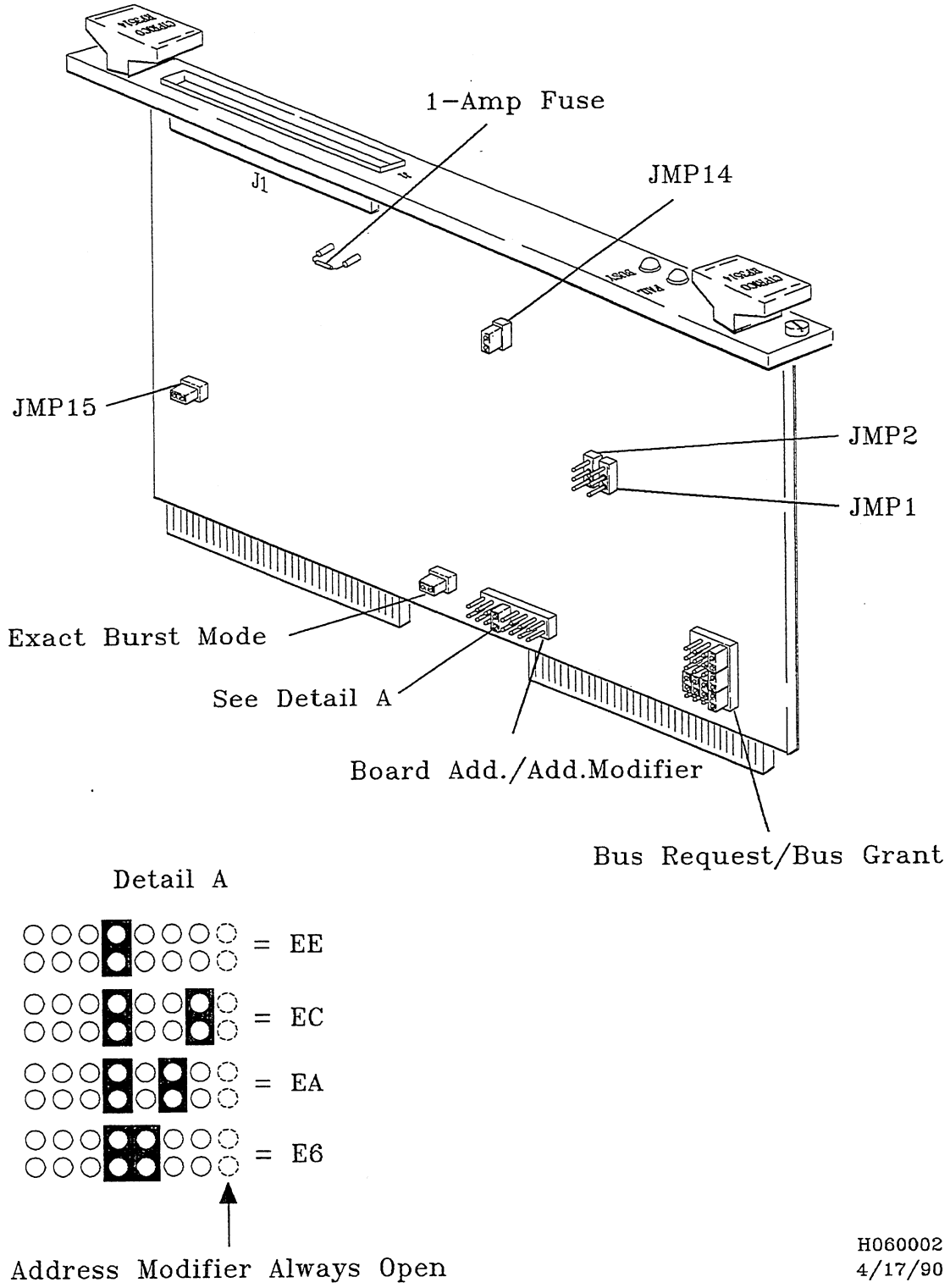
The SCSI host adapter can sustain ESD damage during installation. A grounded wrist strap (or other grounding method) must be used when handling the host adapter. Failure to do so will cause damage to the device.

9. The jumpers on the SCSI host adapter are preset from the factory. The board address jumpers are the only jumpers that will ever be changed. Check the board's jumpers against Figure 2–6 to ensure that the jumpers are set correctly. Figure 2–6 shows the SCSI host adapter, the 1A fuse, the factory-set jumper settings, and four recommended board address jumper settings:

NOTE

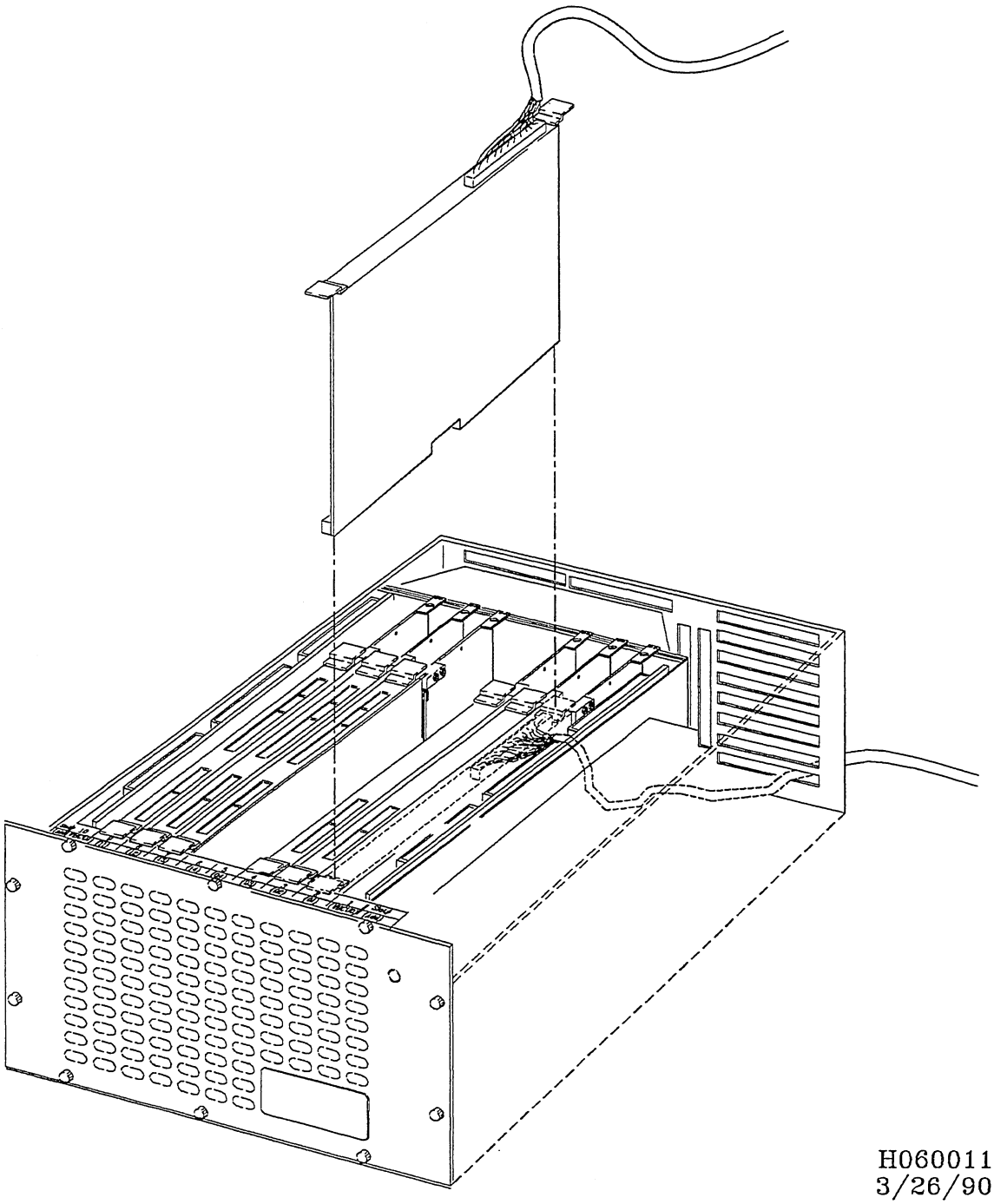
The */ioconfig* file must be changed whenever the board address jumpers are changed. Refer to the *ConvexOS System Manager's Guide* before making these changes.

Figure 2–6, Address Jumpers



10. Install the SCSI host adapter into the appropriate slot in the VMEbus chassis.
11. Connect one end of the cable to the SCSI connector on the SCSI host adapter, then route the cable through the appropriate cable opening on the rear of the VMEbus chassis. Figure 2–7 shows the SCSI host adapter, the VMEbus chassis, and the attached cable:

Figure 2–7, SCSI Host Adapter Cabling



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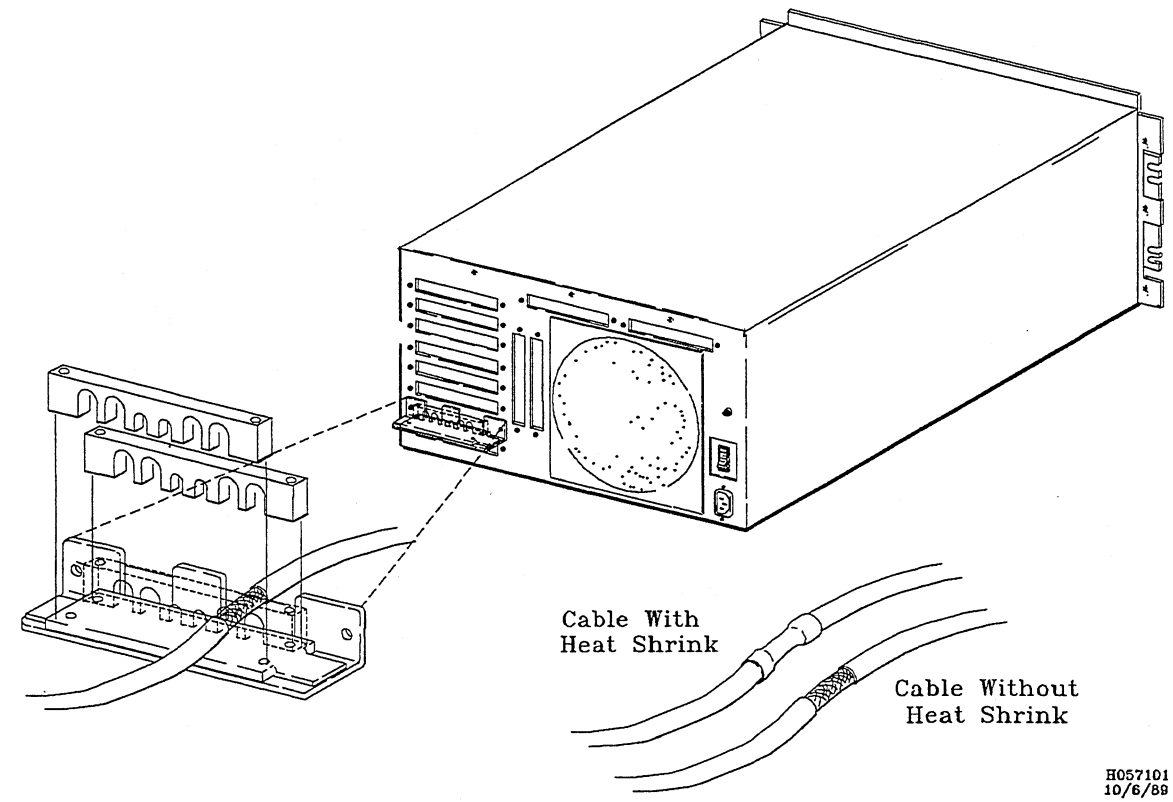
CAUTION

Contact the exposed cable shielding with the cable clamp. Failure to do so will result in loss of the EMI shielding and may cause damage to equipment.

12. Install the cable in the inner cable clamp, then mount the clamp on the mounting bracket with the screws provided. Remove the heat shrink insulation from the cable. Install the outer clamp over the uninsulated cable area, then mount the clamp on the mounting bracket with the screws provided. Mount the complete assembly to the rear of the VMEbus chassis with the screws provided. Figure 2–8 shows the cable mounting clamps and the cable shielding:

Figure 2–8, Cable Mounting Clamp and Cable Shielding



NOTE

Refer to the installation guide or service guide of the target device for information on installation and cabling of the target device.

13. Connect the cable from the host adapter to the target device.

CAUTION

Do not operate the VMEbus chassis with its top panel removed. The panel must be installed to obtain proper airflow inside the VMEbus chassis. Operating the VMEbus chassis with the top panel removed may cause damage to equipment.

14. Install the VMEbus chassis top panel and secure with the 12 locking screws.
15. Return the VMEbus chassis to its retracted position and secure with the 2 locking screws.
16. Set the VMEbus chassis power control switch to the **ON** position.
17. Set the processor's front control panel key switch to the **ON** position.

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Chapter 3
Integration and Test

3.1 Overview

The VMEbus SCSI host adapter must be integrated into the CONVEX Operating System (ConvexOS) and tested before it can be used. This chapter contains guidelines for integrating the VMEbus SCSI host adapter into ConvexOS and information on the VMEbus SCSI host adapter diagnostic tests.

3.2 Software Integration

> **NOTE**
>
> ConvexOS V8.1 or greater is required to operate a CONVEX VMEbus SCSI host adapter.
>
> ConvexOS V8.1 requires a system generation of the software drivers when a SCSI host adapter is installed.
>
> ConvexOS V9.0 or later contains all the software drivers needed for the SCSI host adapter; therefore a system generation is not required when a SCSI host adapter is installed.

The software for the CONVEX VMEbus SCSI host adapter is released separately from ConvexOS and utilities. Refer to the *ConvexOS System Manager's Guide* for additional software integration information. This chapter provides a complete description of software integration procedures for CONVEX VMEbus SCSI host adapter 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 host adapter(s), and peripheral devices. ConvexOS uses this information to assign a physical device number to a device of a given type.

> **NOTE**
>
> Each board installed in a VMEbus chassis *must* have a unique interrupt number.

Each type of VMEbus device is identified to the operating system by a mnemonic device code. These codes, and other information, are entered into the */ioconfig* file on the SPU disk. This file contains entries such as VIOP number, VMEbus chassis number, controller type, control and status register (csr) address, interrupt number, and peripheral device type. The device codes for

the SCSI host adapter and other SCSI controlled devices are below:

- MTC-202—SCSI host adapter
- MTD-207—3480 cartridge tape system

Figure 3–1 shows a typical */ioconfig* file with the VMEbus SCSI host adapter specific items in **bold**:

Figure 3–1, Example */ioconfig* File

```
iop 3
    mbus 0
      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 LAN-202 csr 0x7740 int 3
        unit 0 type unet

    vme 1
      ctrl MTC-202 csr 0xee00 int 5
        unit 0 subunit 0 type MTD-207
        unit 0 subunit 1 type MTD-207
        unit 1 subunit 0 type MTD-207
        unit 1 subunit 1 type MTD-207
        unit 1 subunit 2 type MTD-207
      ctrl DKC-203 csr 0x800 int 3
        unit 0 DKD-214
        unit 1 DKD-214
      ctrl DKC-203 csr 0xa00 int 4
        unit 0 DKD-214
        unit 1 DKD-214
```

Whenever a VMEbus SCSI host adapter is 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 the *ConvexOS System Manager's Guide* when making these changes.

3.3 Testing the VMEbus SCSI Host Adapter

The *dev_v3480* diagnostic program tests the VMEbus SCSI host adapter. This program verifies the operation of the VMEbus SCSI host adapter by ensuring that:

- The VIOP can boot the VMEbus SCSI host adapter program from memory
- Communications are established between the VIOP, VBCU, and the VMEbus SCSI host adapter
- The VBCU responds to forced interrupts
- The VMEbus SCSI host adapter can correctly execute instructions

The *dev_v3480* 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 PBUS I/O System Diagnostics Manual*; consult it before running this test.

Chapter 4
Maintenance Procedures and IPB

4.1 Overview

This chapter contains maintenance procedures and Illustrated Parts Breakdown (IPB) for all Field Replaceable Units (FRUs) for the SCSI host adapter.

4.2 SCSI Host Adapter Removal/Replacement

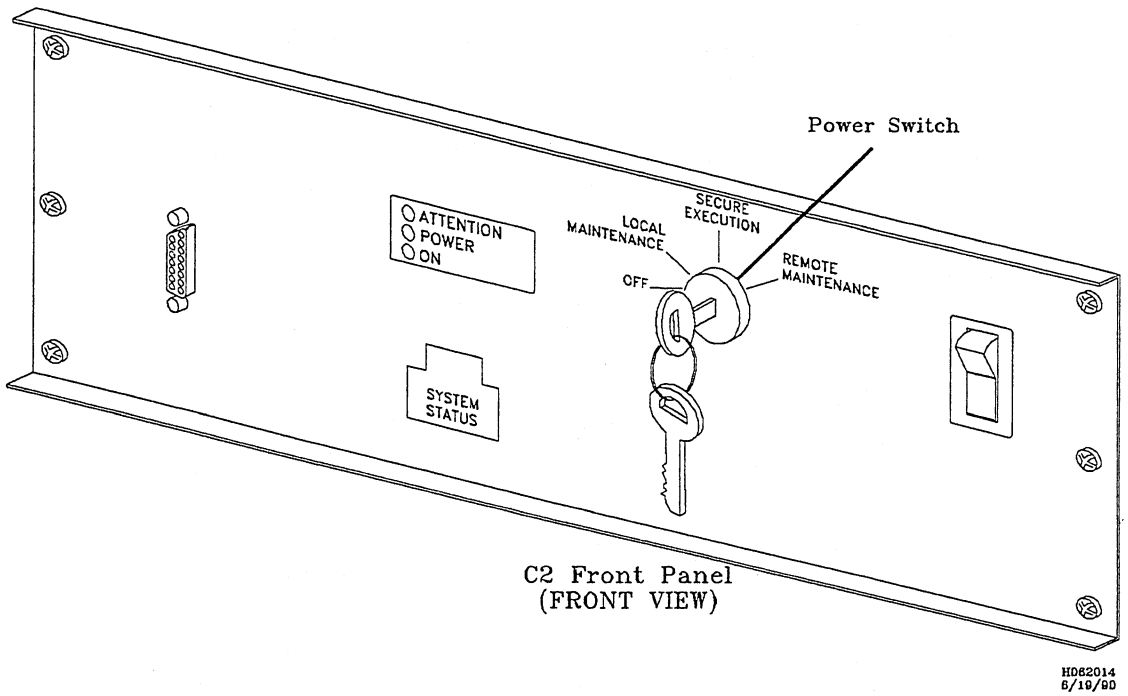
The following sections define the maintenance procedures for the SCSI host adapter.

4.2.1 Removal

> **CAUTION**
>
> Power down the system before removing power to the VMEbus chassis. Failure to do so will cause a system crash and may result in loss of data or damage to equipment. Refer to the *CONVEX Processor Operation Guide (C100 Series, C200 Series)* for power-down procedures on a CONVEX computer.

1. Turn the processor front panel key switch to the **OFF** position. Figure 4–1 shows a typical processor's front panel control switch:

Figure 4–1, Processor's Front Panel Power Control Switch

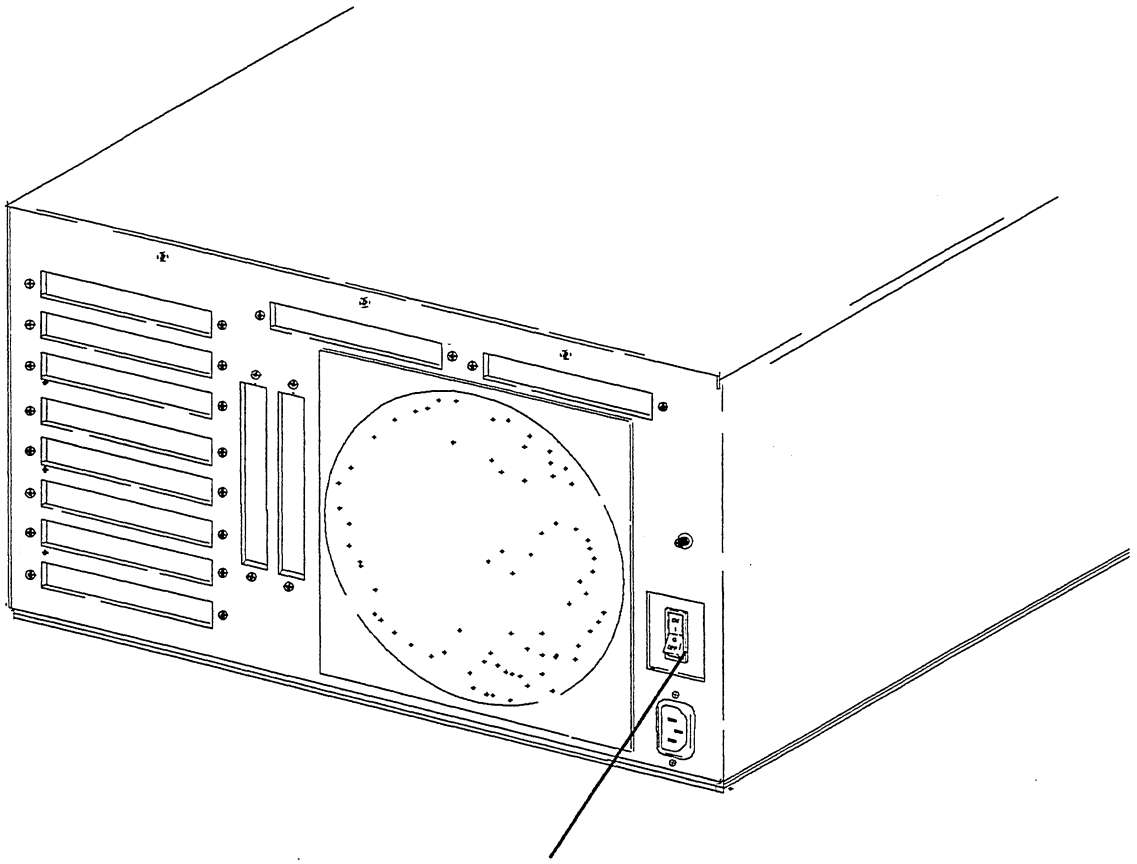


CAUTION

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

2. Set the VMEbus chassis power control switch to the **OFF** position. Figure 4–2 shows the VMEbus power control switch:

Figure 4–2, VMEbus Chassis Power Control Switch

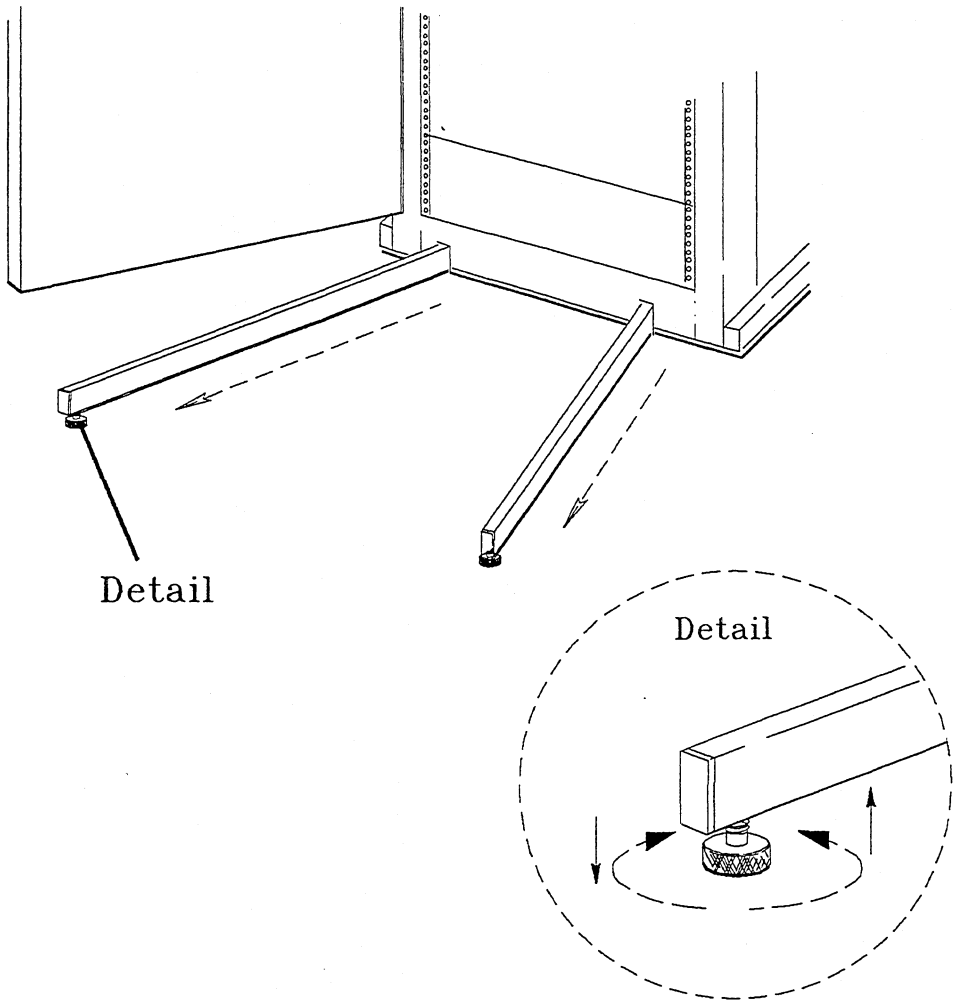


WARNING

Expansion cabinet stabilizer bars *must* be extended before installing a VMEbus chassis or before extending the VMEbus 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 the 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. Figure 4–3 shows the expansion cabinet stabilizer bars and adjustable feet:

Figure 4–3, Expansion Cabinet Stabilizer Bars



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4. Unlock the 2 VMEbus chassis lock screws and extend the chassis.
5. Unlock the 12 top panel lock screws on the VMEbus chassis top panel and remove the top panel.

CAUTION

The SCSI host adapter can sustain damage by ESD during removal and replacement. A grounded wrist strap (or other grounding method) *must* be used when handling the host adapter. Failure to do so may cause damage to the device.

6. Disconnect the cable attached to the SCSI host adapter.
7. Remove the 2 screws securing the host adapter.
8. Remove the SCSI host adapter from its slot in the VMEbus chassis.

4.2.2 Replacement

NOTE

If a SCSI host adapter is to be initially installed, refer to Chapter 2, "Unpacking and Installation," section 2.3, "Installation," for installation information.

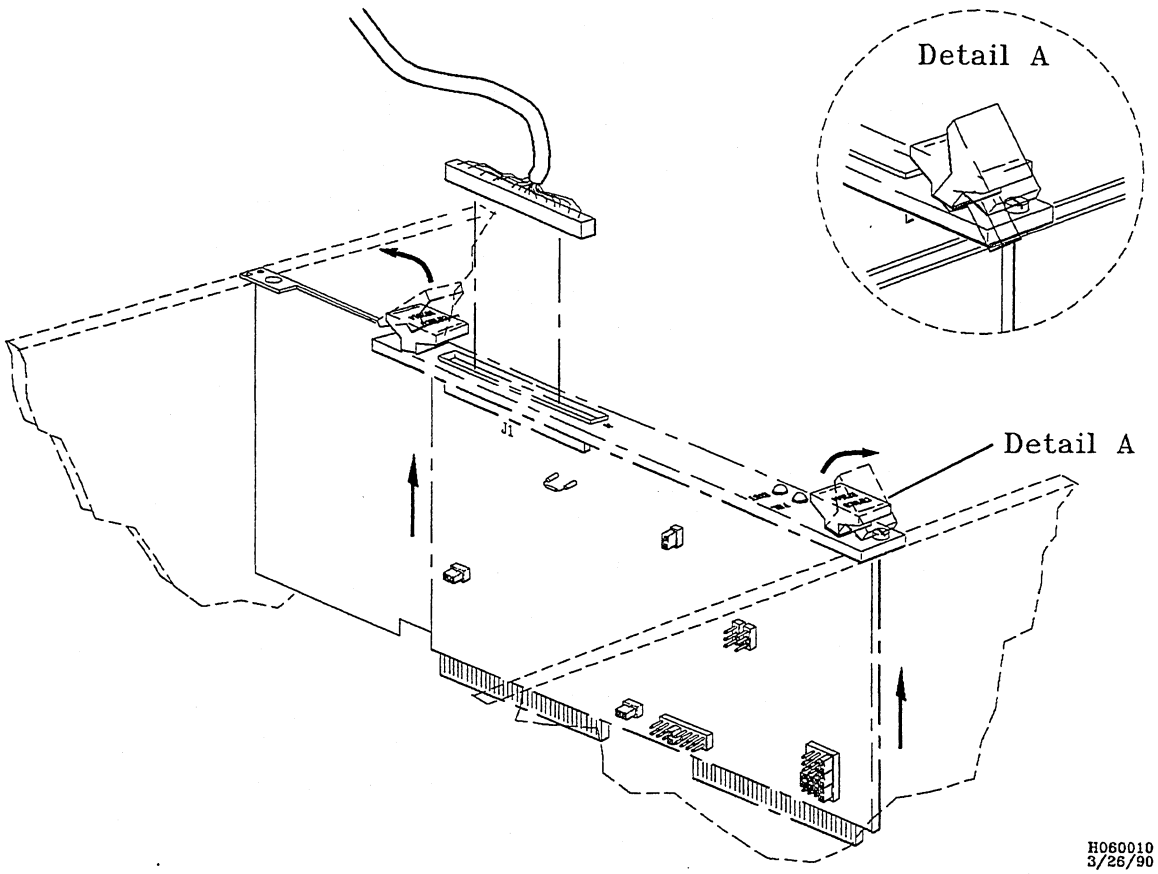
The following procedure is for the replacement of a VMEbus SCSI host adapter.

CAUTION

The SCSI host adapter can sustain damage by ESD. A ground wrist strap (or other grounding method) *must* be used when handling the SCSI host adapter. Failure to do so may result in damage to equipment.

1. Install the SCSI host adapter into its VMEbus chassis slot.
2. Install the 2 screws that secure the host adapter.
3. Connect the cable to the **J1** connector on the SCSI host adapter. Figure 4–4 shows the SCSI host adapter, the VMEbus chassis, and the cables:

Figure 4–4, VMEbus SCSI Host Adapter Cabling



CAUTION

Do not operate the VMEbus chassis with its top panel removed. The panel must be installed to obtain proper airflow inside the VMEbus chassis. Operating the VMEbus chassis with its top panel removed may cause damage to equipment.

4. Install the VMEbus chassis top panel and secure with the 12 locking screws.
5. Return the VMEbus chassis to its retracted position and secure with the 2 locking screws.
6. Return the expansion cabinet stabilizer bars to their retracted position.
7. Set the VMEbus chassis power control switch to the **ON** position.
8. Set the processor front control panel key switch to the **ON** position.

4.3 SCSI Host Adapter Fuse Removal/Replacement

The following sections give the maintenance procedures for the fuse on a SCSI host adapter.

4.3.1 Removal

CAUTION

Power down the system before removing power to the VMEbus chassis. Failure to do so will cause a system crash and may result in loss of data or damage to equipment. Refer to the *CONVEX Processor Operation Guide (C100 Series, C200 Series)* for power-down procedures on a CONVEX computer.

1. Turn the processor front panel key switch to the **OFF** position.

CAUTION

Remove power to the VMEbus chassis before installing or removing equipment. Failure to do so may damage electronic equipment components.

2. Set the VMEbus chassis power control switch to the **OFF** position.

WARNING

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

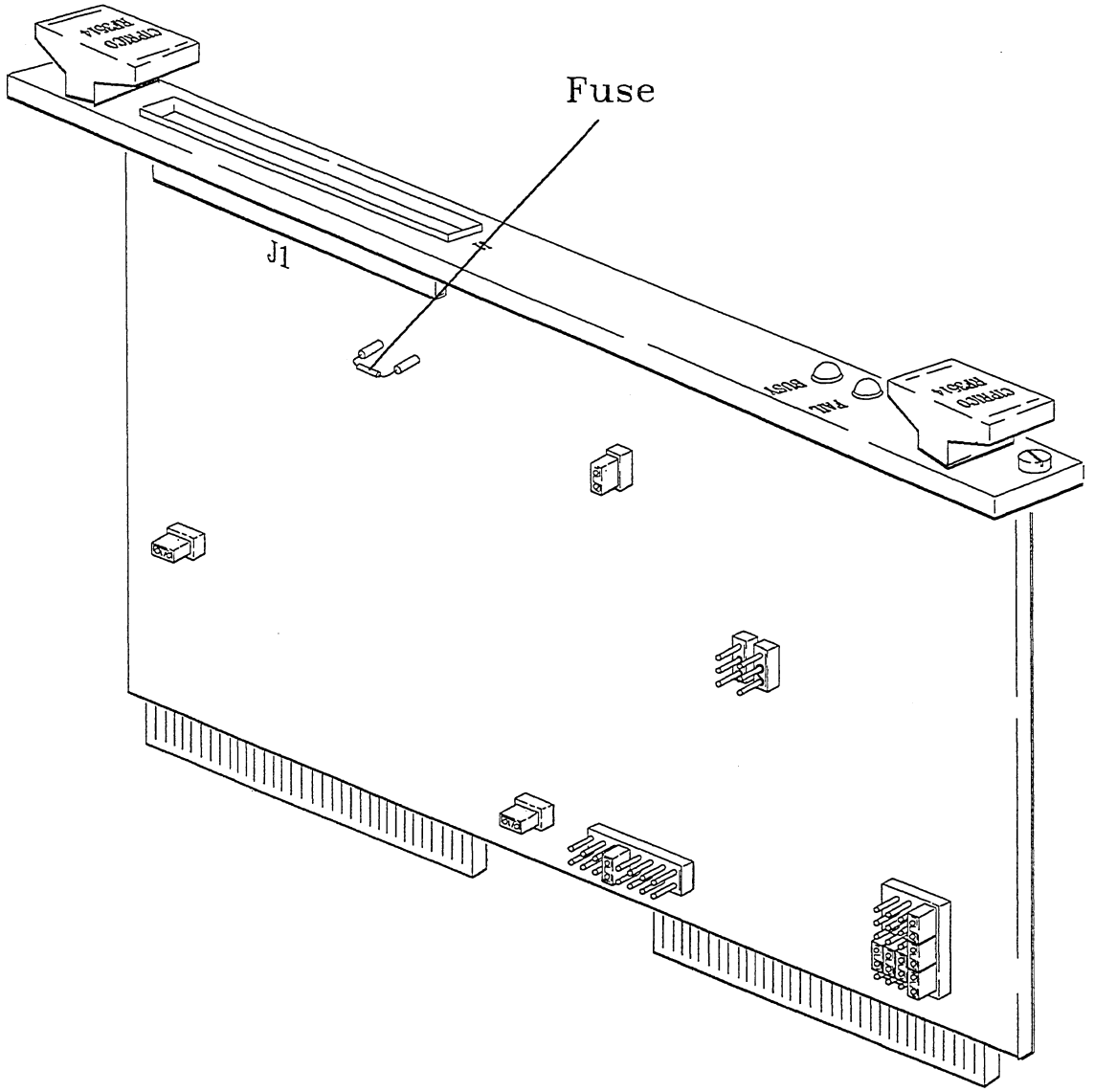
3. Extend the expansion cabinet stabilizer bars and adjust the feet until they are in firm contact with the floor.
4. Unlock the 2 VMEbus chassis lock screws and extend the chassis.
5. Unlock the 12 top panel lock screws on the VMEbus chassis top panel and remove the top panel.

CAUTION

The SCSI host adapter can sustain damage by ESD during removal and replacement. A grounded wrist strap (or other grounding method) *must* be used when handling the host adapter. Failure to do so may cause damage to the device.

6. Remove the 2 screws securing the host adapter.
7. Remove the SCSI host adapter from its slot in the VMEbus chassis.
8. Remove the fuse from the host adapter PCB. Figure 4–5 shows the location of the fuse link.

Figure 4–5, SCSI Host Adapter Fuse



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4.3.2 Replacement

CAUTION

The SCSI host adapter can sustain damage by ESD. A ground wrist strap (or other grounding method) *must* be used when handling the SCSI host adapter. Failure to do so may result in damage to equipment.

1. Install the fuse into the SCSI host adapter. Figure 4-5 shows the location of the fuse link.
2. Install the SCSI host adapter into its VMEbus chassis slot.
3. Install the 2 screws that secure the host adapter.

CAUTION

Do not operate the VMEbus chassis with its top panel removed. The panel must be installed to obtain proper airflow inside the VMEbus chassis. Operating the VMEbus chassis with its top panel removed may cause damage to equipment.

4. Install the VMEbus chassis top panel and secure with the 12 locking screws.
5. Return the VMEbus chassis to its retracted position and secure with the 2 locking screws.
6. Return the expansion cabinet stabilizer bars to their retracted position.
7. Set the VMEbus chassis power control switch to the **ON** position.
8. Set the processor front control panel key switch to the **ON** position.

4.4 Illustrated Parts Breakdown

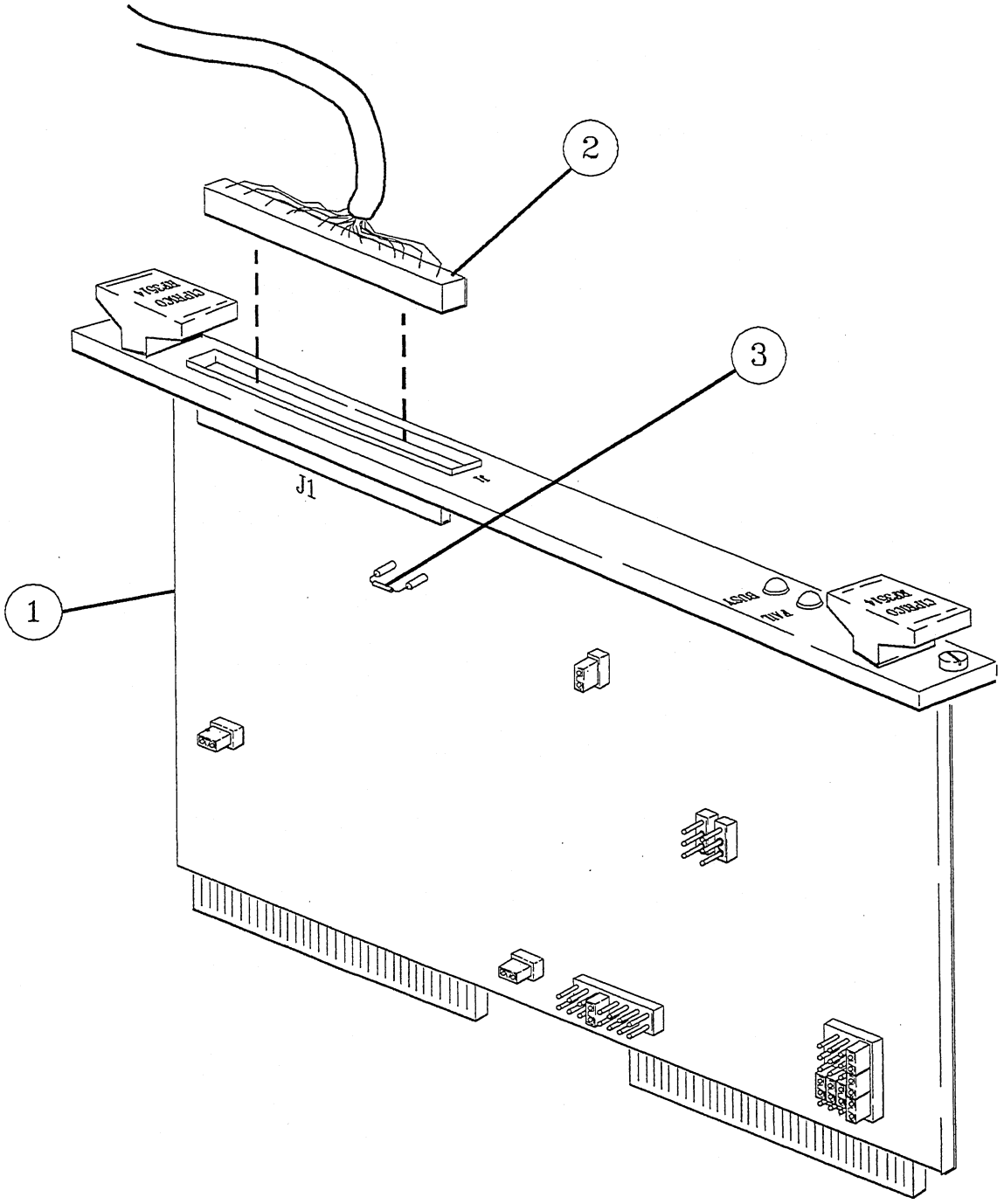
This section is the Illustrated Parts Breakdown (IPB) for the SCSI host adapter assemblies. Table 4–1 shows the description and CONVEX part number for each Field Replacement Unit (FRU):

Table 4–1, VMEbus SCSI Host Adapter Parts List

Part Number	Description	Item No.
220-000019-200	VME/SCSI DIFFERENTIAL HOST ADAPTER	1
604-500006-200	CABLE ASSY, STD/CINCH SHLD 20 FT CABLE	2
604-500006-201	CABLE ASSY, STD/CINCH SHLD 50 FT CABLE	2
604-500006-202	CABLE ASSY, STD/CINCH SHLD 10 FT CABLE	2
253-000122-001	FUSE, 1 AMP SUBMINI	3

Figure 4–6 shows the SCSI host adapter installed in the VMEbus chassis with cable connected:

Figure 4–6, VMEbus SCSI Host Adapter IPB



Appendix A
Ciprico Model 3516 VME/SCSI Host Adapter Configurator

This appendix contains a copy of the adapter controller configurator document.

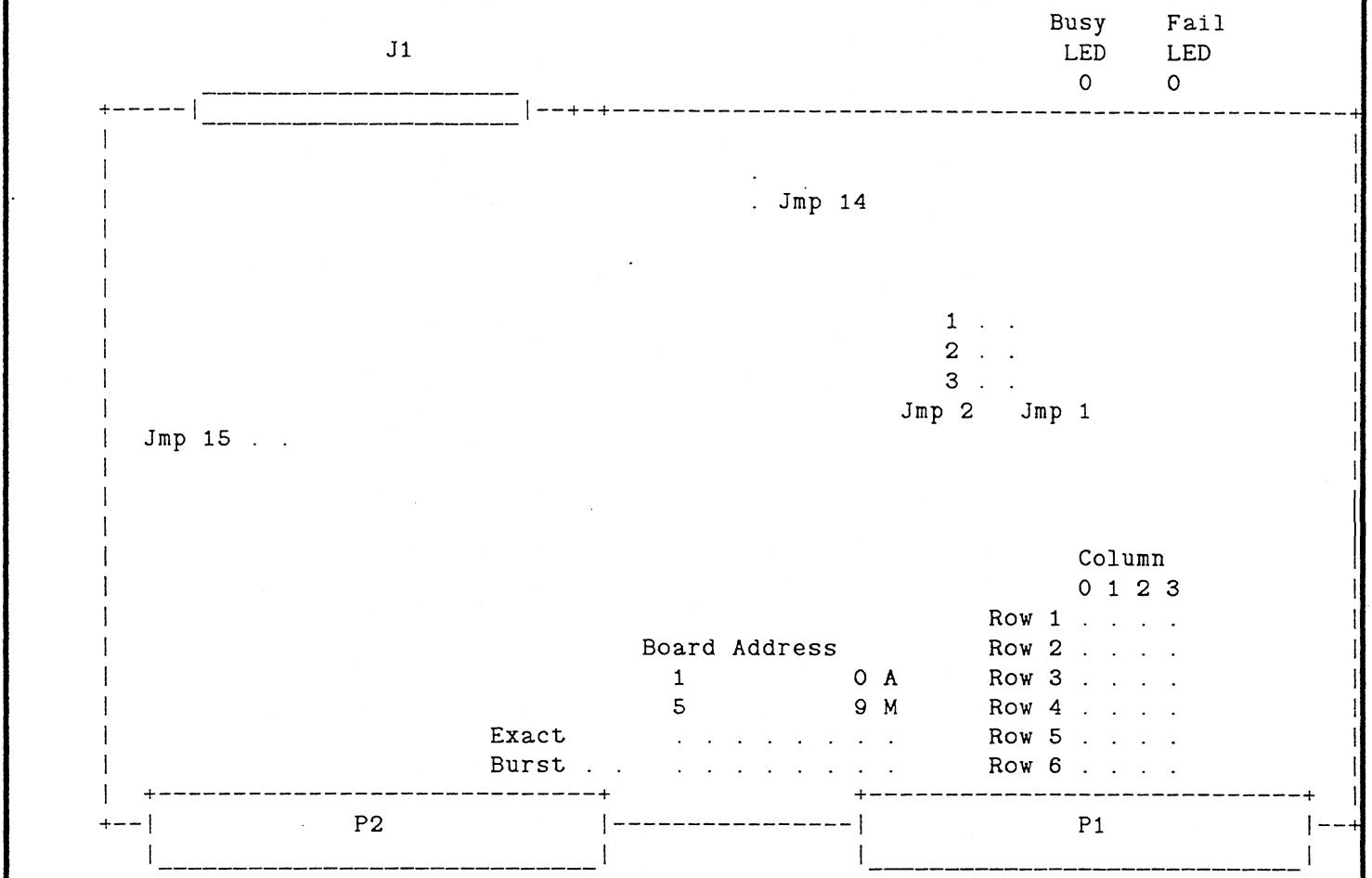
> **NOTE**
>
> The *Ciprico Model 3516 VME/SCSI Host Adapter Configurator* document contains basic configuration information for the VMEbus SCSI host adapter. In the event of changes regarding host adapter controller configuration, an updated version of the document will be made available. Configurator document updates should be inserted into this appendix.

Ciprico Model 3516 VME/SCSI Host Adapter Configurator

1.1 Scope

The purpose of this document is to provide configuration information for the Ciprico Model 3516 VME/SCSI Host Adapter, (CONVEX P/N 220-000019-200).

1.2 Host Adapter Configuration



Normal Usage: Base Address of 1st controller in the VMEBus is normally EE00". The Bus Request Priority must always be strapped for "3". The Interrupt Level is software configured from the contents of the SPU file, */ioconfig*.

CONVEX	TITLE: Ciprico Model 3516 VME/SCSI Host Adapter Configurator Part Number: 220-000019-600	REV: A 06/19/90 ENGR: John Rachels PAGE: 1

1.2 Host Adapter Configuration (continued)

Jumper & Switch Setting Options:

The *Bus Request Priority* level is always jumpered for a value of "3".

BUS PRIORITY LEVEL "3" STRAPPING

FROM	TO
Col 0, Row-4	Col 0, Row-5
Col 1, Row-4	Col 1, Row-5
Col 2, Row-4	Col 2, Row-5
Col 3, Row-1	Col 3, Row-2
Col 3, Row-3	Col 3, Row-4
Col 3, Row-5	Col 3, Row-6

CONVEX normally uses *Controller Base Addresses* "EE00", "EA00", "EC00", and "E600" for the 1st through 4th Controllers, respectively, in the VMEBus. Jumpers 1 through 7 of Brd Add Jumpers are used to define the Base Address as shown below.

BASE ADDRESS JUMPER SETTINGS

BASE ADDRESS	*15*	*14*	*13*	*12*	*11*	*10*	*9*
EE00	OFF	OFF	OFF	ON	OFF	OFF	OFF
EC00	OFF	OFF	OFF	ON	OFF	OFF	ON
EA00	OFF	OFF	OFF	ON	OFF	ON	OFF
E600	OFF	OFF	OFF	ON	ON	OFF	OFF

NOTE: Jumper "8" of BRD ADD jumpers, AM must always be set to "OFF".

In CONVEX systems, the following jumpers must always be set as shown.

JUMPER	STRAP	JUMPER	STRAP
JMP1 1-2	Out	JMP14 1-2	IN
JMP1 2-3	IN	JMP15 1-2	IN
JMP2 1-2	IN	EXT BST	IN (Exact Burst)
JMP2 2-3	Out		

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Appendix B
Reporting Problems

B.1 Overview

This appendix introduces the CONVEX Technical Assistance Center (TAC) and the *contact* utility. The *contact* utility is an online system for reporting problems to the TAC. To learn *contact* by using it, enter **contact** at the system prompt and then answer the questions as they appear on the screen. To find out more about using *contact*, read through this appendix. It describes prerequisites and tips for using *contact* and the step-by-step process *contact* takes you through.

B.2 Technical Assistance Center

The CONVEX Technical Assistance Center (TAC) is staffed by technical specialists who can address the diverse questions and problems that arise in a supercomputing environment. If you have a hardware, software, or documentation problem, contact the TAC. This group stands ready to solve such problems.

B.3 The *contact* Utility

The TAC recommends using the *contact* utility to report a hardware, software, or documentation problem. The *contact* utility is an interactive utility that helps the TAC track reports and route them to the the CONVEX personnel most qualified to fix them.

After invoking *contact*, it prompts for information about the problem. When you finish your report, *contact* electronically mails it to the TAC. You are notified within 48 hours that the TAC has received your report.

B.4 Prerequisites

To use *contact* requires

- a UNIX-to-UNIX Communication Protocol (UUCP) connection to the TAC
- the full path name of the program or utility in question
- the version number of the program or utility in question

B.4.1 UUCP Connection

Before using *contact*, check with your system administrator to be sure there is a UUCP connection to the TAC. A UUCP connection allows files to be copied from one UNIX system to another. The *uucp* (UNIX-to-UNIX copy) command relies on either a dial-up or hard-wired UUCP communication line.

B.4.2 Finding the Program Path Name

To determine the full path name of the program or utility in question, use the *which* command. The following screen illustrates using the *which* command to find the full path name of the loader (*ld*) utility:

```
>which ld
/bin/ld
>
```

In this example, the full path name of the loader is */bin/ld*.

For more information on the *which* command, refer to the *which*(1) man page. You can also use the *info* online information system. Enter **info which** at the system prompt. If you use the C shell (*csh*), you can also use the *whence* command to find the program path name. The *whence* command works like *which*, only faster.

B.4.3 Finding the Program Version Number

To determine the version number of the program or utility in question, use the *vers* command. The following screen illustrates using the *vers* command (enter **vers**, then the path name of the program or utility) to find the version number of the loader (*ld*) utility.

```
>vers /bin/ld
/bin/ld: 7.0
>
```

In this example, the loader utility version number is 7.0.

For more information on the *vers* command, refer to the *vers*(1) man page. You can also use the *info* online information system. To do so, enter **info vers** at the system prompt.

B.5 Tips on Using the *contact* Utility

The *contact* utility is interactive and easy to use. This section lists tips to help use it efficiently. In particular, this section tells how to

- use a *.contact* file
- abort a contact session
- resubmit an aborted report
- suspend a contact session
- move from one prompt to another
- use tilde-escape sequences in the *contact* utility

B.5.1 Using a *.contact* File

When invoked, *contact* prompts for information regarding the problem. The first prompt is for your name, title, phone number, and company name. You can, however, create a *.contact* file to skip this first prompt. Follow these steps:

1. Create a *.contact* file in your home directory.
2. Enter your name, job title, phone number, and company name, each on a new line.

When you invoke *contact,* it automatically includes the *.contact* file as input for the first prompt and proceeds to the next prompt.

B.5.2 Aborting the Report

To abort a contact report, either enter the interrupt key (usually CTRL-C) or choose the abort option when prompted by the *contact* utility. Using CTRL-C to abort does not save the contents of the report. Using the abort option saves the contents of the report in a file named *dead.report* in your home directory.

B.5.3 Submitting the *dead.report* File

When aborting a contact session, the *contact* utility saves the report in a file named *dead.report* in your home directory. Using the *contact* command with the *-r* option automatically merges the contents of the *dead.report* file into the new contact session. Enter

contact -r

and *contact* finds the *dead.report* file in your home directory and merges it into the contact report. You can then edit the report. When you end the editing session, *contact* returns to the final prompt, which asks you to review, edit, submit, or abort the report.

B.5.4 Suspending a Report

Sometimes it is necessary to stop in the middle of a contact report and return to the shell (for instance, to suspend the contact session to find the program path name or version number). To suspend the contact session, press CTRL-Z. To return to the contact session, enter **fg**. Using CTRL-Z and the *fg* (foreground) command lets you switch back and forth between the *contact* utility and the shell. You cannot, however, use CTRL-Z and *fg* to switch back and forth if you are using a Bourne shell (*sh*).

B.5.5 Ending a Response

The *contact* utility prompts for information pertinent to your hardware, software, or documentation question. Some prompts require one-line responses; to move to the next prompt, press RETURN. Other prompts require more than a one-line response; to move to the next prompt, press CTRL-D.

B.5.6 Tilde-Escape Sequences

The *contact* utility treats input beginning with a tilde (~) as a special sequence. The character following the tilde is considered a request for a special function. The following tilde sequences are recognized by *contact*:

~e	Start the text editor (defined in your EDITOR environment variable).
~h	Display a list of available tilde-escape sequences.
~p	Print the contact report to the terminal screen.
~r *filename*	Read the contents of *filename* as a response to the current prompt. Some prompts require only a one-line response. This tilde-escape sequence only works for prompts that allow more a than one-line response.
~~	Insert a single tilde as the first character in the line.

B.6 Using the *contact* Utility

The *contact* utility prompts for the following information:

- your name, title, phone number, and corporate name
- the name and version of the product involved
- a one-line summary of the problem
- a detailed description of the problem
- the priority of the problem
- instructions on how to reproduce the problem
- comments about the problem
- comments about the documentation supporting the problem
- files to include in the contact report

The following is a step-by-step discussion of these prompts:

1a. To invoke the *contact* utility, enter **contact** at the system prompt. The system responds with a welcome message and a series of questions regarding your hardware, software, or documentation question. The following screen illustrates the *contact* command and the system response:

```
>contact
Welcome to contact version 0.11 ()

Enter your name, title, phone number, and corporate name (^D to terminate)
>
```

1b. If there is a *.contact* file in your home directory, *contact* skips the first prompt. The following screen illustrates the *contact* command and the system response when a *.contact* file is in your home directory:

```
>contact
Welcome to contact version 0.11 ()

Enter the name of the product involved
>
```

2. The *contact* utility prompts for the version number of the product. If you do not know the version number, use CTRL-Z to suspend the session. Use the *which* (or *whence* if using *csh*) and *vers* commands to find the version number of the product. Use the *fg* command to return to the session and enter the version number in the form X.X or X.X.X.X.
3. The *contact* utility prompts for a one-line summary of the problem. This summary is the subject header in any further correspondence regarding the problem. Make this summary as descriptive as possible in one line.
4. The *contact* utility prompts for a detailed description of the problem. Make this description as complete as possible. Include source code and a stack backtrace whenever possible. (Refer to the *adb*(1) or *csd*(1) man page for information on obtaining a stack backtrace.) The more information provided, the quicker the TAC can isolate and solve the problem.
5. The *contact* utility prompts for the priority of the problem. The following screen illustrates this prompt and the priority levels from which to choose; you must enter a priority number.

```
Enter a problem priority, based on the following:
1) Critical    - work cannot proceed until the problem is resolved.
2) Serious     - work can proceed around the problem, with difficulty.
3) Necessary   - problem has to be fixed.
4) Annoying    - problem is bothersome.
5) Enhancement - requested enhancement.
6) Informative - for informational purposes only.
>
```

6. The *contact* utility prompts for an explanation of how to reproduce the problem. Include the command syntax and options you used and anything else you did to make your program run.
7. The *contact* utility prompts for any other pertinent comments. Include any relevant information.
8. The *contact* utility prompts for suggestions regarding the documentation supporting the product. Indicate if the documentation could be revised to address the question.
9. The *contact* utility asks for the names of files necessary to reproduce the problem. The following screen illustrates the *contact* prompt and sample user response:

```
Are there any files that should be included in this report (yes | no)?
>yes
Please enter the names of the files, one to a line (^D to terminate)
>test.f
>~/subroutines/sub.f
>
```

NOTE

Tilde-escape sequences are not recognized in responses to this prompt. Instead, *contact* treats a tilde in this section to mean your home directory. This convention is based on use of the tilde for expanding file names in *csh*.

If the files specified are small text files, they are automatically included in the contact report. If the files are too big to be included in this report, *contact* gives further instructions on how to submit these files.

To specify a directory, combine the directory files into a single file using the *tar* command (refer to the *tar*(1) man page for further information) or enter each file name in the directory on a single line in the contact report.

10. The *contact* utility prompts you to review, edit, submit, or abort the contact report. The following screen illustrates this prompt:

```
Please select one of the following options:
1) Review the problem report.
2) Edit the problem report.
3) Submit the problem report.
4) Abort the problem report.
>
```

Choose the number of the option you want to select. These options let you do the following:

Review — Review the text of your contact report. You are then prompted again to select an option.

Edit — Edit the text of the contact report. If you choose to edit the report, *contact* puts you in your default text editor.

Submit — Send the report to the CONVEX TAC. You are notified within 48 hours that the TAC has received the report. This option exits the *contact* utility and returns you to the shell environment.

Abort — Save the text of your report in a file named *dead.report* in your home directory. This option exits the *contact* utility and returns you to the shell environment.

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