CONVEX VMEbus UltraNet Interface Service Guide

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Richardson, Texas USA

CONVEX VMEbus UltraNet Interface
Service Guide
Order No. DHW-049
First Edition

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Revision Sheet
CONVEX VMEbus UltraNet Interface
Service Guide

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First	081-001630-000	October 1989	First release, Version 1.0.

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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.

Table of Contents

1 Description and Specifications

List of Tables

List of Figures

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Preface

Purpose and Intended Audience

The *CONVEX VMEbus UltraNet Interface Service Guide* provides a general overview of the UltraNet VMEbus host adapter controller and related hardware and how to:

- Install the host adapter controller and related hardware
- Integrate the host adapter controller into the CONVEX operating system
- Test the host adapter controller
- Remove and replace the host adapter controller and related hardware

Primary Audience

This document is intended for:

- CONVEX Customer Support Engineers and CONVEX manufacturing personnel
- Customers who need to install an UltraNet VMEbus host adapter controller and related hardware

Limitations

- Fault isolation to the single component level is not provided
- Specifications related to the interface between the VMEbus host adapter controller and the customer's network are not discussed.

Distribution

The *CONVEX VMEbus UltraNet Interface Service Guide* is part of the *CONVEX VMEbus Service Documentation* kit.

This document is primarily for use by CONVEX customer support engineers. It may be supplied to those customers who wish to install or maintain their own equipment.

Organization

The document consists of the following:

- **Chapter 1, Description and Specifications**—Describes the UltraNet VMEbus host adapter controller 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 host adapter controller and related hardware.
- **Chapter 3, Integration and Test**—Explains how to integrate the host adapter controller into the CONVEX operating system. Explains how to test the host adapter controller.
- **Chapter 4, Maintenance Procedures and IPB**—Provides removal and replacement instructions for the host adapter controller and related hardware.
- **Appendix A, Host Adapter Controller Configurator Document**—Contains a copy of the host adapter controller configurator document.
- **Appendix B, Problem Reporting**—Provides an example of the CONVEX ***contact*** utility for reporting minor software and hardware problems.

Terminology

The terminology conventions used in this text are listed below:

FDDI—Fiber Distributed Data Interface

UltraNet—Up to one Gigabit per second communication network

UltraNet Hubs—Central connection point on an UltraNet system

LAN—Local Area Network

Host Adapter Controller —UltraNet VMEbus host adapter controller

Link Adapter—An UltraNet control board that resides in an UltraNet hub

Notational Conventions

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

> **WARNING**
>
> Warnings highlight procedures or information necessary to avoid injury to personnel. A warning immediately precedes the critical information and includes a description of the hazard.

CAUTION

Cautions highlight procedures or information necessary to avoid damage to equipment, loss of data, or invalid test results. A caution immediately precedes the critical information and includes a description of the possible damage.

NOTE

Notes highlight useful information that is supplemental in nature. A note 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 VIOP/VBCU Service Guide*, Order No. DHW-051
- *CONVEX PBUS I/O System Diagnostics Manual*, Order No. DHW-008
- *Host Adapter Controller Configurator Document*, CONVEX Part No. 211-000108-600
- *CONVEX System Manager's Guide*, Product No. DSW-004
- *CONVEX VMEbus Reference Manual*, Order No. DHW-061
- *CONVEX VMEbus Service Kit*, Order No. DHW-050
- *The VMEbus SPECIFICATION C.1*, Motorola Inc.
- *VMEarray Programmer's Manual*, CONVEX Part No. 081-001830-300
- *VMEarray Hardware Designer's Manual*, CONVEX Part No. 081-001930-300
- *VMEarray Reference Manual*, CONVEX Part No. 081-002030-300
- *VMEarray Test Vector Description*, CONVEX Part No. 081-002130-300
- *VMEarray Schematics*, CONVEX Part No. 081-002230-300
- *CONVEX Processor Operation Guide*, Order No. DHW-015
- *CONVEX Diagnostic Utility Manual*, Order No. DHW-082
- *Installation Procedures CONVEX UltraNet Interface V1.0*, CONVEX Part No. 730-002518-200
- *Electrostatic Discharge Failures of Semiconductor Devices*. Unger, B.A. 1981. Bell Laboratories

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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, Nathan Zelle, Louis Ting, Tom White, Dan Henderson, and John Rachels
- Document review team: Tom Mcclendon, Don Davis, John Rachels, Nathan Zelle, Al Haddix, Larry Price, Jennifer Johnson, Louis Ting, Tom White, Dan Henderson, Chip Stroup, and Larry Bonura
- Hardware documentation staff: Larry Bonura, Barbara Morris, and Josie Davis

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

Randall Stiles
CONVEX Hardware Documentation

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Chapter 1
Description and Specifications

1.1 Overview

UltraNet is a communications network that uses high-speed circuitry, fiber optic technology, and parallel protocol processing to achieve fast network transfer speeds.

In a typical Ethernet network, only about 20% of the Ethernet transfer bandwidth is actually achieved because the data packets are stopped at various points for protocol processing. Most of the protocol processing is handled by the Central Processing Units (CPUs) in the hosts. Protocol processing takes time away from the hosts and usually limits data transfer rates to less than 250 Kbytes per second.

UltraNet hardware and software relieve the host of most network processing tasks and enable a network transfer to be viewed as a buffer-to-buffer transfer by the host. In addition, the transfer bandwidth on the UltraNet is much faster than most I/O channels. These features enable a CONVEX computer to transfer data, via its VMEbus subsystem, across the network at speeds exceeding 7 Mbytes per second.

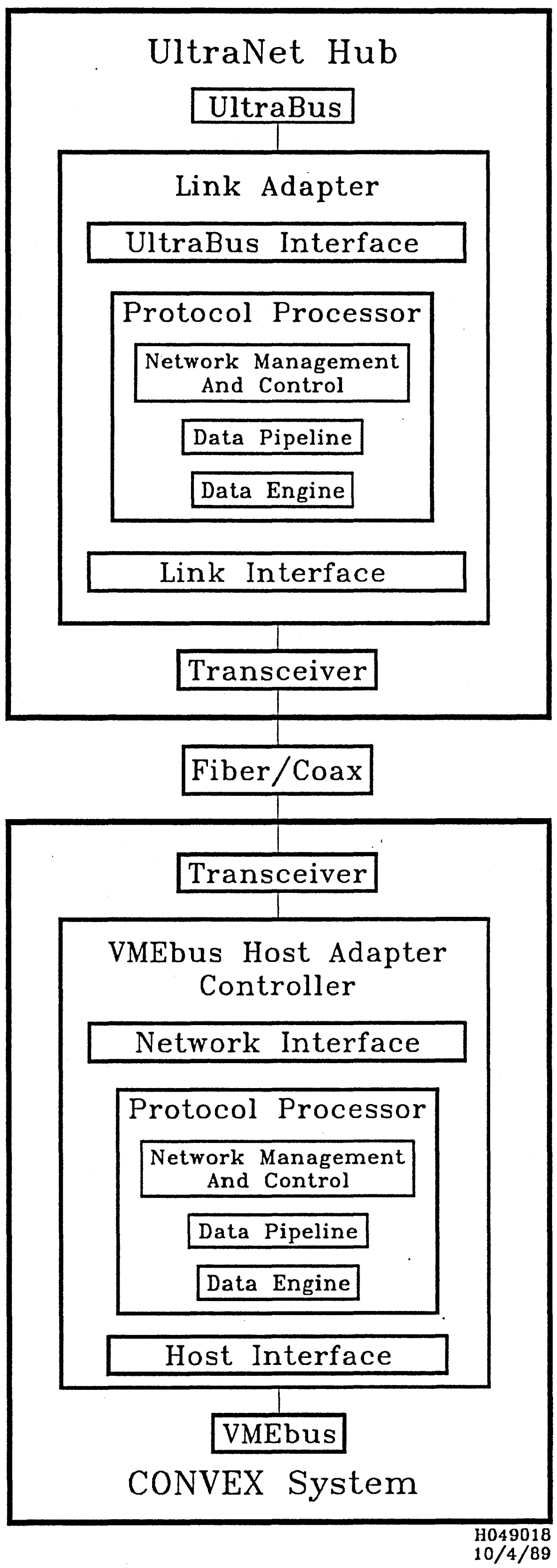
This chapter describes the major components and features of the UltraNet as well as the CONVEX VersaModule European (VMEbus) subsystem. Electromechanical and environmental specifications for the VMEbus host adapter controller and host adapter transceiver are also listed.

Major components of an UltraNet hub and a CONVEX system are the following:

- UltraNet hub
  - UltraBus
  - Protocol Processor
  - Link adapter
  - Transceiver
- CONVEX system
  - Host adapter transceiver
  - VMEbus host adapter controller
  - VMEbus Control Unit (VBCU)
  - VMEbus Input/Output Processor (VIOP)

In a CONVEX system to UltraNet configuration, a link adapter in the hub connects the UltraBus to a fiber optic or coaxial transceiver in the hub. Then via fiber optic or coaxial cable, the hub transceiver is connected to a fiber optic or coaxial host adapter transceiver in the CONVEX system. A VMEbus host adapter controller mounted in the CONVEX VMEbus chassis connects the fiber optic or coaxial host adapter transceiver to the VMEbus. Figure 1–1, "CONVEX System to UltraNet Configuration" shows the functional connection between a CONVEX system and an UltraNet hub:

Figure 1–1, CONVEX System to UltraNet Configuration



In a point to point configuration, a VMEbus host adapter controller connects the VMEbus to a fiber optic or coaxial transceiver in the system. Then via fiber optic or coaxial cable, the fiber optic or coaxial host adapter transceiver is connected to another fiber optic or coaxial host adapter transceiver in a second system. The VMEbus host adapter controller in the second system connects the fiber optic or coaxial host adapter transceiver to the VMEbus in the second system. Figure 1–2, "Point to Point Configuration" shows the functional connection between two systems.

1.2 UltraNet

UltraNet is adaptable to a variety of network communication configurations and transfer speeds. Depending on the type of protocol and system used, various UltraNet hardware components and software drivers enable systems to communicate at very high speeds. The following sections describe the functions of the various UltraNet hardware components for this high-speed communications network.

1.2.1 UltraNet Hubs

An UltraNet hub is the central connection point on an UltraNet system. A hub consists of a cabinet containing a high-speed bus (UltraBus), power supply, and cooling system. Various UltraNet boards, such as link adapters, and gateway adapters are mounted in the cabinet. These boards communicate with each other over the high-speed UltraBus at speeds of up to 1 Gbit per second. A series of UltraNet hubs are usually connected together via link adapters and fiber optic cable network links.

1.2.2 Network Link Adapters and Links

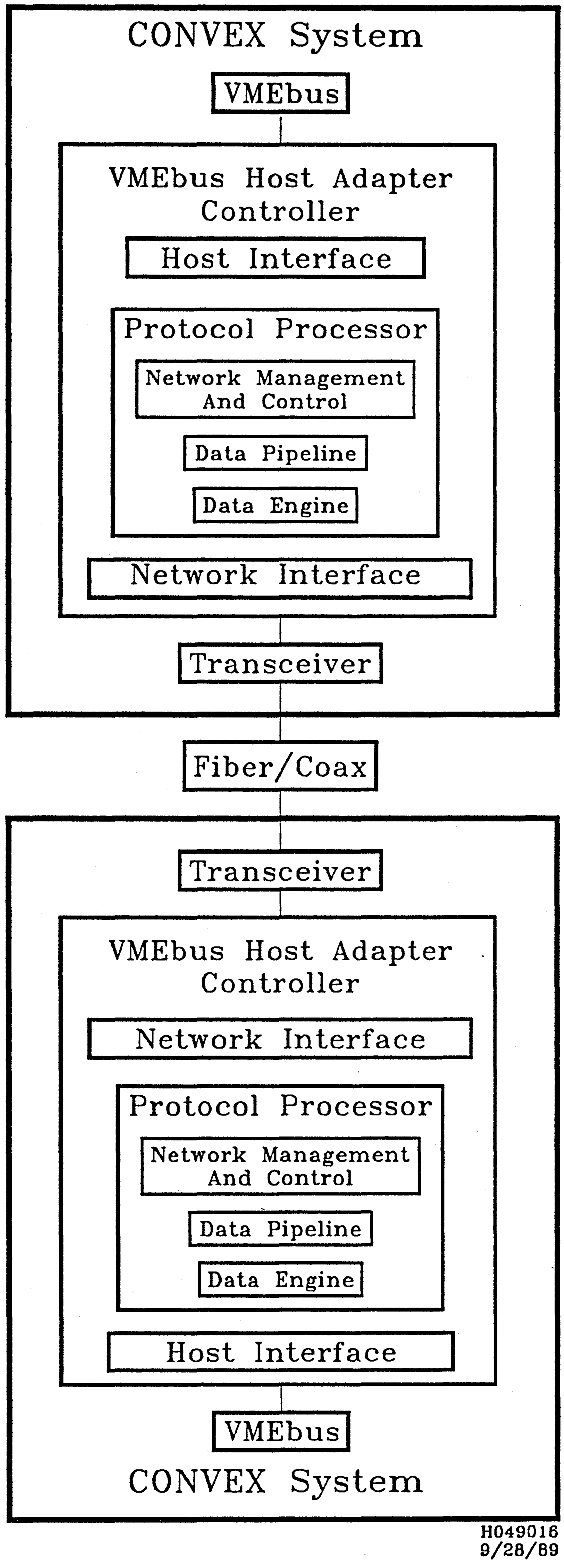
Link adapters in the hub's high-speed UltraBus support long-distance connections between hosts, hubs, and other links on the network. More than one link adapter can be installed in a hub to create a redundant communication path or provide additional connectivity for increased transfer rates. For example, up to four physical links may be joined into a single logical link to create a 1 Gbit per second inter-hub link. All link adapters contain an UltraBus interface, a protocol processor, and one or more link interfaces. The protocol processor in the link adapter provides all addressing, routing, and error handling tasks for inter-hub communications.

Link interfaces connect to fiber optic or coaxial cable network links. The fiber optic network links can extend up to 6,560 feet (2 km) between hosts or hubs. The coaxial network links can extend up to 350 feet (107 m). Data link speeds can be tailored to meet the site distance requirements for any host connection. The CONVEX VMEbus UltraNet Interface supports a data link speed of 15 Mbytes per second.

1.2.3 Gateway Adapters

Slower networks are connected to UltraNet via gateway adapters. Gateway adapters provide the interface and network protocol conversions between other networks and UltraNet. One type of gateway is the Fiber Distributed Data Interface (FDDI) token ring gateway. The FDDI token ring is defined in ANSI X3T9.5.

Figure 1–2, Point to Point Configuration



1.2.4 Network Management

Each hub has an interface for a Personal Computer (PC) based network management station. The network manager can monitor or modify various network activities from this station including:

- **Automatic network initialization**—The network monitor automatically initializes each hub in the network during a power-up cycle.
- **Assign priorities for network bandwidth**—Performance priority can be allocated as needed because network bandwidth can be allocated to a particular connection when contention occurs.
- **Configuration management**—Primary and secondary communications paths are configured between active hosts. Network connections can be shutdown, or idled.
- **Statistics gathering**—Network statistics including the number of packets sent, connection activity, re-transmission, and other network performance markers are recorded and stored for later analysis.
- **Connection control**—Provides the ability to temporarily suspend all activity from a connected host when dynamic control of host access is required.
- **Diagnostic testing**—The network manager can download and execute maintenance routines throughout the network while the network is in operation. For example, a link adapter can be tested without shutting the complete system down. However, the diagnostic program for the CONVEX VMEbus host adapter controller is *not* loaded or run via the network monitor station.

1.3 VMEbus Host Adapter Controller

The VMEbus host adapter controller is an example of an UltraNet host adapter. It enables a VMEbus host to be connected to an UltraNet. The VMEbus host adapter controller is an intelligent device and includes its own Protocol Processor (PP), host interface, and network interface. Some of its main features are:

- A maximum of 13.3 Mbytes per second sustained VMEbus Direct Memory Access (DMA) transfer rate
- Two serial ports for diagnostic testing
- Diagnostic loop back capability
- Other network topologies (such as token ring) can be used
- Software can be loaded from the host

1.3.1 Host Adapter Controller Functional Overview

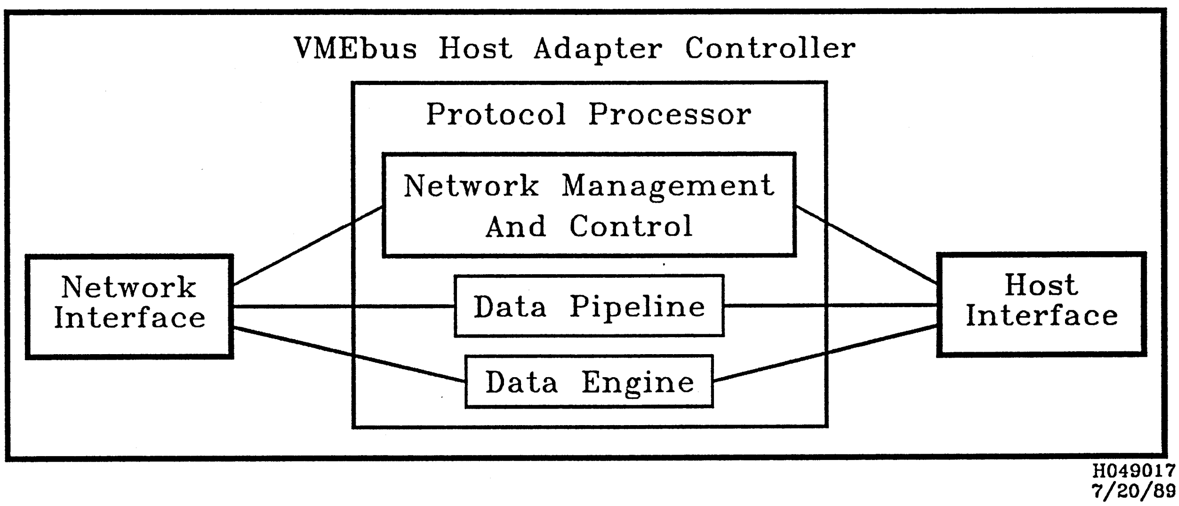
Circuits within the VMEbus host adapter controller perform many tasks, such as protocol processing, that are normally accomplished by a CPU host. Because the VMEbus host adapter controller completely eliminates the need for a host to generate or process network protocols, system processing rates are increased.

A VMEbus host adapter controller contains three main sections:

- **Network interface**—Communicates over the physical data link used for the network, specifically, the UltraBus or UltraNet network link
- **Protocol processor**—Performs functions such as protocol generation, error processing, message routing, and network management
- **Host interface**—Performs the handshaking and data transfer between a host computer I/O or DMA channel and the protocol processor

Figure 1–3, "Host Adapter Controller Functional Diagram" illustrates the main functional areas of the controller:

Figure 1–3, Host Adapter Controller Functional Diagram



1.3.1.1 Network Interface

This section of the host adapter controller communicates with the protocol processor and UltraNet through a link connector. In the CONVEX VMEbus subsystem, this link connection is made via a host adapter transceiver.

1.3.1.2 Protocol Processor

The protocol processor eliminates the need for a CONVEX computer to generate or process network protocols. Some of the main features of the protocol processor are:

- **Multiple high-speed processors**—Each optimized for a particular task

- **Custom VLSI high-speed hardware**—For performing checksum calculations
- **128-Kbyte FIFO memory**—Provides packet buffering and wide data path throughput

Data from the VIOP buffer flows through the host interface to the Protocol Processor on the VMEbus host adapter controller and then on to the network interface. As the data flows into the Protocol Processor, protocol headers and checksums are computed and inserted in real time to create data packets.

The data packets then flow into the network through the network interface to their final destination. If the data packets require bridging between UltraNet hubs, protocol headers are interrogated in real time to direct the data packets to their final destination. Once there, another protocol processor validates the packets, strips the protocol information away, and flows the data directly into the user's space.

1.3.1.3 Host Interface

The host interface on the VMEbus host adapter controller performs handshaking and data transfer operations between the VBCU and the protocol processor.

As a slave device, the VMEbus host adapter controller responds to two address locations in the VMEbus Short I/O address space. The first address location serves as a communication port between the VIOP and the host adapter controller. When the VIOP writes to this location, an interrupt is generated to the protocol processor. This location also contains a Request Address Register that stores the information that was written by the VIOP. This information can be read by the protocol processor at a later time. Only a 32-bit data format is written to this location. If this location is read by the VIOP, *random* data is read.

The second address location, when read from or written to, generates a hardware reset on the VMEbus host adapter controller. When reset, the protocol processor executes a diagnostic self test, then runs a loader routine which waits for the host adapter controller software to be loaded.

> **NOTE**
>
> Chapter 2, "Unpacking and Installation" contains information on the VMEbus host adapter controller address jumpers for the two addresses located in the short I/O address space.

Other characteristics of the host interface are:

- **Data Transfer**—The host adapter controller is capable of being a bus master. As a bus master it can support read or write transfers to either Standard or Extended address space with data widths of 8, 16, or 32 bits.

  During a DMA operation, data transfers are restricted to 32 bits on a VMEbus long word address boundary; i.e., VMEbus address bits "1" and "0" must equal "0."
- **Interrupts**—The host adapter controller is capable of generating interrupts on interrupt levels 3, 4, 5, and 6. This is controlled by software; no jumpers are required to configure the interrupt level.

- **VMEbus Request**—The host adapter controller is capable of generating bus requests on levels 0 through 3. The bus request level is controlled by the software; no jumpers are required. In the CONVEX VMEbus system, level 3 is always used.
- **VMEbus Release**—Once the VMEbus host adapter controller becomes bus master, it will *only* release the VMEbus if there is another VMEbus request pending. This means the host adapter controller operates as a Release On Request (ROR) master.

> **CAUTION**
>
> CONVEX VBCUs with a revision level of *A*, *B*, or *C* will not work with an ROR type of VMEbus bus request. Therefore, a VBCU with a revision level of *D* or later must be used with the VMEbus host adapter controller.

1.3.2 Host Adapter Controller Hardware Architecture

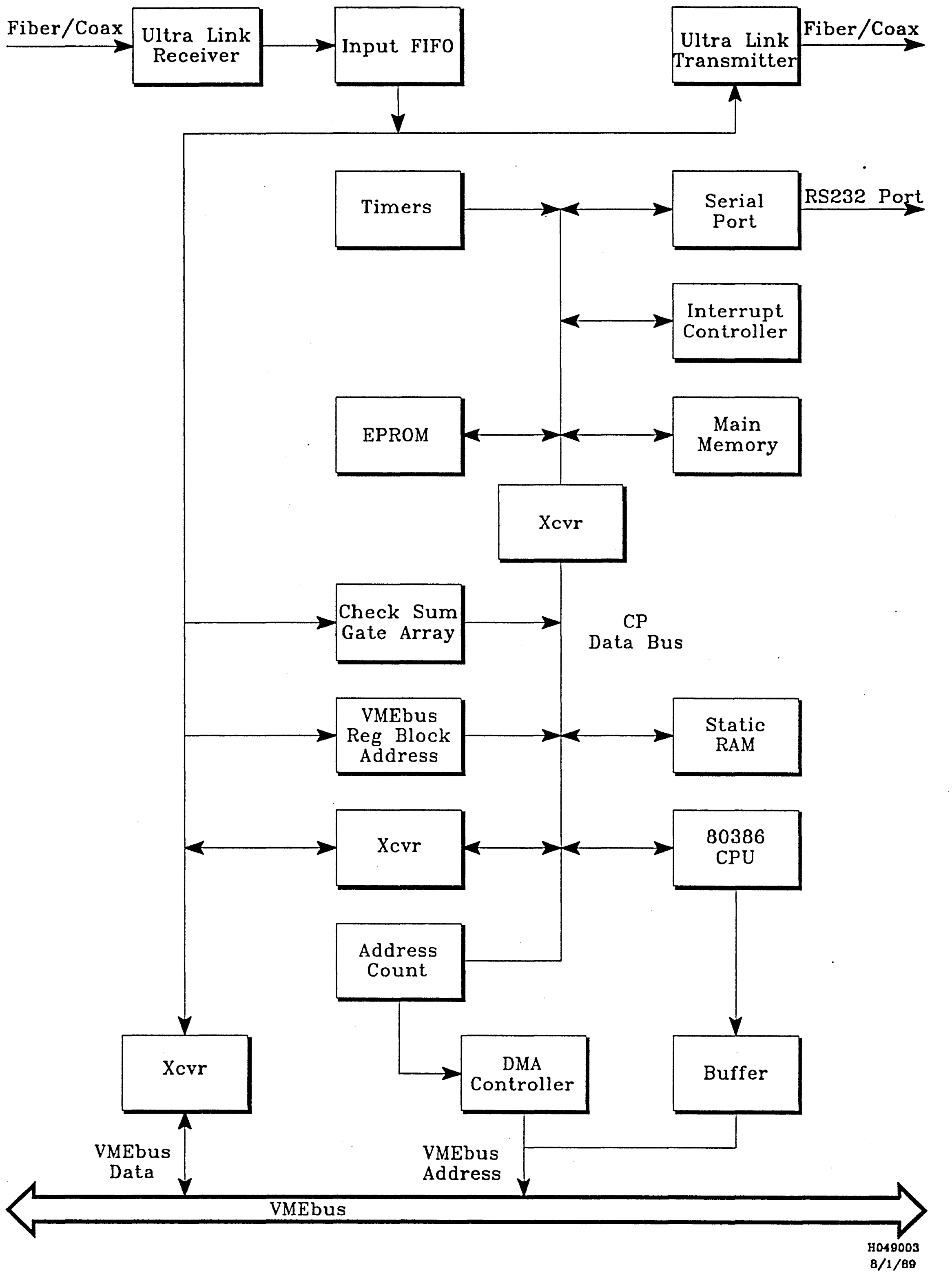
Hardware architecture on the VMEbus host adapter controller is optimized to minimize delays as data is moved between a CONVEX computer and UltraNet. For example, the onboard microprocessor does not process the actual data, rather it handles the network control activities. Other special purpose processors handle the data; these fast special processors handle such tasks as checksum generation, or removal, and VMEbus communications.

Major hardware components of the VMEbus host adapter controller are:

- 80386 protocol processor
- 1-Mbyte of main memory
- 64 Kbytes of zero-wait state static RAM
- 128-Kbyte EPROM
- Two serial diagnostic ports
- Three timers
- Interrupt Controller (16 interrupt request lines)
- 128 Kbyte input FIFO
- High-speed asynchronous DMA Controller

Figure 1–4, "Host Adapter Controller Block Diagram" illustrates the various hardware areas of a VMEbus host adapter controller:

Figure 1–4, Host Adapter Controller Block Diagram



1.3.2.1 80386 Protocol Processor

In general, the 80386 Protocol Processor (PP) performs the same functions as a PP residing in an UltraBus hub. The main difference is that it is implemented with a single 80386 microprocessor. The PP coordinates all communications to or from the network such as routing and error handling. The PP also sets up and monitors all VMEbus interface activity.

1.3.2.2 Main Memory

Main memory consists of eight 256-Kbit by 4-bit Dynamic Random Access Memory (DRAM) chips. Although there is 1 Mbyte of physical memory, only 896 Kbytes can be used because the static RAM and all of the I/O space is mapped into the first 1 Mbyte of address space.

Between one and two wait states occur when accessing main memory, but no DMA activity occurs with this memory.

1.3.2.3 Static RAM

This memory consists of eight 16-K by 4-bit static RAMs that operate with 0-wait states. Time critical tasks, such as frame header processing, operate from this memory.

1.3.2.4 EPROM

The EPROM contains the diagnostics, debugger and boot routines, and other executable code that rarely changes. The EPROM does not contain the actual code for the driver; this code is loaded into the host adapter controller via the CONVEX VIOP.

1.3.2.5 Serial Ports and Timers

Two independent serial ports and two timers are available for use by the software. The ports can be used to run local diagnostic tests. A third timer is used by the hardware to generate a DRAM refresh request to the DRAM arbiter.

1.3.2.6 Interrupt Controller

Up to 16 asynchronous interrupt events can be handled by the VMEbus host adapter controller; each interrupt has its own interrupt vector. Six of the 16 are used by the hardware to notify the PP of real time events that must be processed. The other 10 interrupt lines are reserved for software use. Because each interrupt has a priority level assigned, interrupts are arranged in order of their importance.

1.3.2.7 Input FIFO

Incoming data from UltraNet is buffered in this First-In-First-Out (FIFO) buffer memory. The memory is 34-bits wide and has 32 K locations. Two bits are used to indicate an End of Frame (EOF) or an error status condition; the rest of the bits are data.

The FIFO operates synchronously with input data from UltraNet; however, the FIFO operates asynchronously with output data going to the PP and the VMEbus. There is no output FIFO buffer since UltraNet can handle the transfer rate from the VMEbus. In a case where the VMEbus might get ahead of UltraNet, the VMEbus host adapter controller will throttle the VMEbus activity to match the speed of the UltraNet transfer rate.

An overflow condition exists when the FIFO is full and another character arrives from UltraNet. An overflow causes the VMEbus host adapter controller to overwrite the last word in the FIFO buffer and assert an error bit.

1.3.2.8 DMA Controller

All of the VMEbus signals on the VMEbus host adapter controller are controlled by the DMA controller, including VMEbus master requests. The DMA controller is the heart of the VMEbus host adapter controller and enables data transfers between the VMEbus and UltraNet to occur at a high-speed rate.

The DMA controller is a high-speed asynchronous state machine. It uses address and word count information, previously programmed by the PP, to transfer data between the FIFO and the VMEbus.

The sequence of operation depends on the transfer direction. When a frame arrives from UltraNet, the PP is interrupted; this causes the PP to process the header and place the VMEbus address and word count into the DMA controller's register. When instructed by the PP, the DMA controller gains control of the VMEbus and starts transferring the data into the VIOP's memory buffer. If the transfer count goes to zero, or the FIFO runs out of data, the transfer stops and the PP is interrupted. The interrupt causes the PP to write a Request Block to the VIOP, then interrupt it.

The transfer data format is fixed at 32 bits. The DMA controller's word count is programmed with the number of 32 bit words for the transfer operation.

During the transfer to main memory, VMEbus Clear and other VMEbus requests signals are monitored by the DMA controller. If a VMEbus Clear, or another VMEbus request signal is detected, the DMA controller halts its transfer operation and releases the VMEbus. As soon as the VMEbus is available, the DMA controller regains control of the bus and continues with its transfer operation. Because the VMEbus host adapter controller will release the VMEbus for all other VMEbus requests, transfer throughput can be reduced between the network and the VMEbus host adapter controller. In a high-performance system, only a *single* VMEbus host adapter controller should be installed in a CONVEX VMEbus.

For transfers from the VIOP to UltraNet, the VIOP writes the location of the Request Block to the VMEbus host adapter controller's register which causes an interrupt to the PP. When interrupted, the PP reads the Request Block directly from the VIOP's memory. After some additional processing, the PP programs the DMA controller to transfer data from the VIOP's memory to UltraNet.

Once started, the DMA controller continues with the transfer until either the word count goes to zero, or the VMEbus host adapter controller detects a VMEbus error. In either case the PP is interrupted; this causes the PP to process the interrupt.

1.3.3 Host Adapter Controller Registers

The PP controls the activity on the VMEbus host adapter controller by reading from or writing to various host adapter controller registers. Table 1–1, "Host Adapter Controller Register Map" shows how these registers are mapped into the host adapter controller's address space:

Table 1–1, Host Adapter Controller Register Map

Function or Description	Type of Access	Address Location	Size
EEPROM	Read only	FFFE0000-FFFFFFFF	128 Kbytes
Request Block Address	Read only	0010F000	4 bytes
Clear Non-Maskable-Interrupt	Write only	0010E000	4 bytes
Send End-Of-Frame	Write only	0010D000	4 bytes
Next Frame	Write only	0010C000	4 bytes
Output Port Link	Write only	0010A000-0010BFFF	8 Kbytes
Input FIFO Port	Read only	00108000-00109FFF	8 Kbytes
CheckSum 1 Register	Read and write	00104900	4 bytes
CheckSum 0 Register	Read and write	00104800	4 bytes
CheckSum Clear	Write only	00104700	4 bytes
Host Interrupt Register	Write only	00104600	4 bytes
VMEbus Controller Register	Write only	00104400	4 bytes
DMA Address Register	Read and write	00104300	4 bytes
DMA Control Register[1]	Read and write	00104200	4 bytes
DMA Start Register	Write only	00104100	4 bytes
Status Register	Read only	00104000	4 bytes
Serial Port	Read and write	00100400	32 bytes
Timer Status and Command	Read and write	00100300	16 bytes
Reset FIFO	Read and write	00100200	4 bytes
Interrupt 1 Command	Read and write	00100104	1 byte
Interrupt 1 Data	Read and write	00100100	1 byte
Interrupt 0 Command	Read and write	00100004	1 byte
Interrupt 0 Data	Read and write	00100000	1 byte
VMEbus Address Space	Read and write	000F0000-000FFFFF	64 Kbytes
Main Memory	Read and write	00010000-000EFFFF	896 Kbytes
Zero Wait State Memory	Read and write	00000000-0000FFFF	64 Kbytes

[1] The DMA word count transfer must be included

1.3.3.1 Status Register

This register may be read at any time to determine the status of the VMEbus host adapter controller. This register is a *negative* logic register; all bits are true when *low*.

- **Bit <0>, DMA Running**—Indicates that the DMA controller is transferring data between the FIFO buffer and the VMEbus. The PP must not access the VMEbus or the FIFO buffer while a DMA transfer operation is in progress. Bit <0> is also routed to the Interrupt Controller and can be used to interrupt the PP when the DMA transfer operation is completed.
- **Bit <1>, Reserved**—For future use, this bit will always contain a logic zero (*high*).
- **Bit <2>, Link Busy**—Indicates that the Output Link is busy and is not able to accept any data. Writing to the Output Link after checking this bit will result in a word written with no wait states. Checking this bit during normal operations is not necessary because the Output Link can accept new data every 128 ns. During a DMA transfer operation, bit <2> is invalid.
- **Bit <3..4>, Reserved**—These bits are reserved for future use.
- **Bit <5>, FIFO Error**—Indicates that the data available in the FIFO read port is in error. The error condition was caused by a FIFO overflow, or an error condition was detected when the data was written to the FIFO. The FIFO error bit must be set at the same time as the FIFO Ready bit, and is meaningless unless the FIFO Ready bit is also set. The FIFO error bit is cleared as soon as a new read command for the next data is received. Bit <5> is invalid while bit <0> is set.
- **Bit <6>, Input FIFO End of Frame (EOF)**—Indicates that the word in the FIFO read port is an End of Frame *marker*; this means that the previous word read was the actual end of the data frame. Unless the FIFO Ready bit is set, bit <6> is invalid. Bit <6> is cleared as soon as a new read command for the next data is received.

  If bit <10> is set (FIFO error bit) along with the EOF bit, the most likely cause is that a FIFO overflow condition occurred just after the marker data pattern. Bit <6> is invalid while bit <0> is set.
- **Bit <7>, Input FIFO Word Ready**—Indicates that a valid 32-bit word, parity, and EOF status are available at the input FIFO port. Accessing the input FIFO port will result in a word read with no wait states. Bit <7> is also routed to the Interrupt Controller and can be used to interrupt the PP. While bit <0> is set, bit <7> is invalid.

> **NOTE**
>
> When an error condition occurs during a DMA or PP cycle a Non-Maskable-Interrupt (NMI) is generated. Bits <8..13> provide the PP with information on the cause of the NMI event.

- **Bit <8>, DMA Error Bit**—Indicates an error occurred during a DMA transfer operation. If bit <8> is set when the NMI occurred, then the error was caused by the PP.

- **Bit <9>, Port Timeout**—This bit is set when a DMA controller or PP access operation fails with the Input FIFO port, or the Output Link. The failure is caused when the operation is attempted, and the device fails to set its ready bit within 556μs.
- **Bit <10>, Input FIFO Error**—This bit is set when a DMA controller, or PP "Input FIFO read" occurs and a parity error or FIFO overflow condition is detected.
- **Bit <11>, VMEbus Error**—The DMA controller or PP attempted to access the VMEbus which results in a VMEbus error.
- **Bit <12>, FIFO Protection Error**—The PP attempted to access the FIFO while a DMA operation is in progress. This error *halts* the DMA transfer operation.
- **Bit <13>, Illegal Address**—The PP attempted to access an invalid address.

1.3.3.2 DMA Start Register

Any access to the DMA Start Register starts a DMA operation. However, the DMA Address Register and Word Count Register must contain valid data before the DMA transfer operation starts.

1.3.3.3 DMA Controller Register

The DMA controller register controls the operations of the DMA controller and four of the five Light Emitting Diode (LED) status indicators.

- **Bit <17>, DMA Write**—This bit determines the direction of the DMA transfer operation. When the DMA Write bit is cleared, the DMA operation reads data from the Input FIFO and writes it to the VMEbus. When the DMA Write bit is set, the DMA operation reads data from the VMEbus and writes it to the Input FIFO.
- **Bit <18>, DMA Loopback**—When this bit is cleared, all DMA transfer operations occur from the Input FIFO to the Output Link. The DMA Write (bit <17>) has no effect in this mode of operation.
- **Bit <19>, VMEbus Extended Address Space**—When this bit is cleared, all VMEbus transfer operations occur within the VMEbus 32-bit extended address space. When this bit is set, the VMEbus 24-bit address space is used.
- **Bit <20>, Packet Retransmit**—This bit toggles on and off when a data packet is retransmitted. Bit <20> controls the LED 0 status indicator. When this bit is cleared, the **LED 0** status indicator turns on.
- **Bit <21>, Packet Discard**—This bit toggles on and off when a data packet is discarded. Bit <21> controls the LED 1 status indicator. When this bit is cleared, the **LED 1** status indicator turns on.
- **Bit <22>, Spare**—This bit toggles on and off when the FIFO on the host adapter controller is full. Bit <22> controls the LED 2 status indicator. When this bit is cleared, the **LED 2** status indicator turns on.
- **Bit <23>, Alive**— This bit is on when the host adapter controller software is alive and functioning. If the software encounters a fatal error, this bit is turned off. Bit <23> controls the LED 3 status indicator. When this bit is cleared, the **LED 3** status indicator turns on.

> **NOTE**
>
> **LED 3** toggles on and off continuously after the host adapter controller has passed its self-test.

1.3.3.4 DMA Word Count Register

This 16-bit register contains the number of *32-bit* words to transfer during a DMA transfer operation. Up to 128 Kbytes can be transferred without intervention from the PP. The Least Significant Bit (LSB) of this register must always equal zero. A fault condition occurs if the PP attempts to access this register while a DMA operation is in progress.

1.3.3.5 DMA Address Register

This 32-bit register contains the VMEbus starting address for a DMA transfer operation. When the VMEbus host adapter controller is operating in standard address mode, the bits not required are ignored.

1.3.3.6 VMEbus Control Register

The contents of this register are used to set up the mode of operation for the VMEbus host adapter controller. The parameters for this register are obtained from the EPROM during a power-up initialization cycle. The various bits in the VMEbus Control Register are:

- **Bit <0>, VMEbus Supervisory Access Mode**—When asserted, all VMEbus transfers occur in the VMEbus Supervisory Access Mode (SAM).
- **Bits <2..1>, Interrupt Level**—This 2-bit field determines the interrupt level used by the PP to interrupt the VBCU. Interrupt levels 3, 4, 5, and 6 are selected by this field.
- **Bits <6..3>, Bus Request Level**—This 4-bit field defines the interrupt level used to request the VMEbus. Only one bit must be set, the other three bits must be cleared. The bit number corresponds to the interrupt level.
- **Bits <14..7>, Interrupt Vector**—This 8-bit field contains the interrupt vector that is sent to the VMEbus host during an interrupt acknowledge cycle.

1.3.3.7 Host Interrupt Register

When the PP accesses this register, an interrupt is sent to the VBCU. No interrupt is generated if this register is accessed before an interrupt acknowledge is received for the first interrupt.

1.3.3.8 CheckSum0 and CheckSum1 Registers

Reading these registers returns the C0 and C1 values of the checksums accumulated since the last write to these registers. A new checksum is calculated automatically in these registers whenever a word is read from the Input FIFO or written to the output FIFO. The up-to-date checksum value is always available in these registers.

1.3.3.9 CheckSum Clear

Writing to this location clears both checksum registers. This is done prior to accumulating checksum data for a new data frame.

1.3.3.10 Input FIFO Port

Reading this location causes the PP to input a 32-bit word from the Input FIFO. After this operation is completed, the FIFO pointers are automatically incremented to the next word, and the Word Ready status is updated. If a word is not available, the FIFO inserts wait states to the PP until a valid word is available. An access timer will cause an interrupt and error status to be generated if an access operation fails to occur within 556μs.

The FIFO interface enables the PP to either poll the Word Read status bit prior to a read, or if the number of words in the FIFO are known, read without polling.

The VMEbus DMA controller also accesses the Input FIFO when high-speed transfers are occurring on the bus. If an error occurs, the PP is notified via an NMI. The PP should not access the Input FIFO while a DMA operation is in progress. If it does, an NMI error interrupt is generated and sent to the PP.

1.3.3.11 Output Port Link

Writing to this location causes the PP to output a 32-bit word to the Output Link. The Link Busy status bit is also updated. An attempt to write to the FIFO port when it is busy will cause wait states to be inserted until the Output Port Link is read or a timeout error occurs. A timeout error causes an interrupt to the PP. Either polled or non polled operations can be used with the Output Port Link.

1.3.3.12 VMEbus Address Space

The PP can directly access the A32 and A24 VMEbus address space via a 64-Kbyte window. The 64-Kbyte window can be positioned on any 32-Kbyte address boundary. The PP must first set up the upper 17 bits of the 32-bit address into a window register, then directly address the VMEbus address space with the lower 15 bits. During a VMEbus access operation, the 17-bit page register is added to bit <15> of the window address; the lower 14 bits of the address from the PP are passed through to form a complete 32-bit address.

1.3.3.13 Interrupt Status

Real time events are handled as multilevel priority interrupts to the PP. The interrupt controller is mapped into the PP's I/O space and appears as a series of registers.

While the DMA controller is executing a transfer operation with the FIFO, access to the FIFO by the PP is not allowed. FIFO status bits are not valid while the DMA controller is running. External hardware interrupt signals are arranged from the highest to the lowest. These signals are listed in order of their importance in the following list:

- **Bit <6>, Input FIFO End of Frame (priority 1)**—Indicates that the word that is being sent out on the data lines is the final word of the frame in the Input FIFO. DMA Complete remains set until the next frame is accessed. This bit is also available in the FIFO Status Register.
- **Bit <0>, DMA Complete (priority 3)**—Indicates that the DMA controller has completed transferring data to or from the VMEbus. If an error occurs during the DMA transfer operation, hardware causes an NMI to the PP.
- **VMEbus Host Interrupt (priority 7)**—Indicates that the VMEbus host has written to the Register Block (RB) register and is requesting the VMEbus host adapter controller to service the request block in the VMEbus host memory.
- **Timer Number 2 (priority 9)**—One of two independent timers used by the control software for various events.
- **Timer Number 1 (priority 14)**—One of two independent timers used by the control software for various events.

1.3.4 Reset Switch, Status Indicators, and Address Jumpers

The Reset switch on the VMEbus host adapter controller is used to re-initialize the circuits on the board and start an onboard self-test. When the self-test is completed, the "Alive" LED indicator toggles on and off.

There are two green and three red Light Emitting Diode (LED) indicators on the faceplate of the VMEbus host adapter controller. The two green LEDs are closest to the ejection handle. The function of each LED, starting at the ejection handle, is as follows:

- **LED 4, Bus Master**—This indicator is on when the host adapter controller is VMEbus master.
- **LED 3, Alive**— This indicator is on when the host adapter controller software is alive and functioning. If the software encounters a fatal error, this indicator is turned off. Bit <23> of the DMA Control Register controls the LED 3 status indicator. When this bit is cleared, the **LED 3** status indicator turns on.

> NOTE
>
> **LED 3** toggles on and off continuously after the host adapter controller has passed its self-test.

- **LED 2, Spare**—This indicator toggles on and off when the FIFO on the host adapter controller is full. Bit <22> of the DMA Control Register controls the LED 2 status indicator. When this bit is cleared, the **LED 2** status indicator turns on.
- **LED 1, Packet Discard**—This indicator toggles on and off when a data packet is discarded. Bit <21> of the DMA Control Register controls the LED 1 status indicator. When this bit is cleared, the **LED 1** status indicator turns on.
- **LED 0, Packet Retransmit**—This indicator toggles on and off when a data packet is retransmitted. Bit <20> of the DMA Control Register controls the LED 0 status indicator. When this bit is cleared, the **LED 0** status indicator turns on.

Table 1–2, "Host Adapter Controller Address Jumpers" lists the VMEbus address jumper settings for the VMEbus host adapter controller:

> **NOTE**
>
> Pins **2** and **3** on the jumper located at **J8C4** are always shorted together.

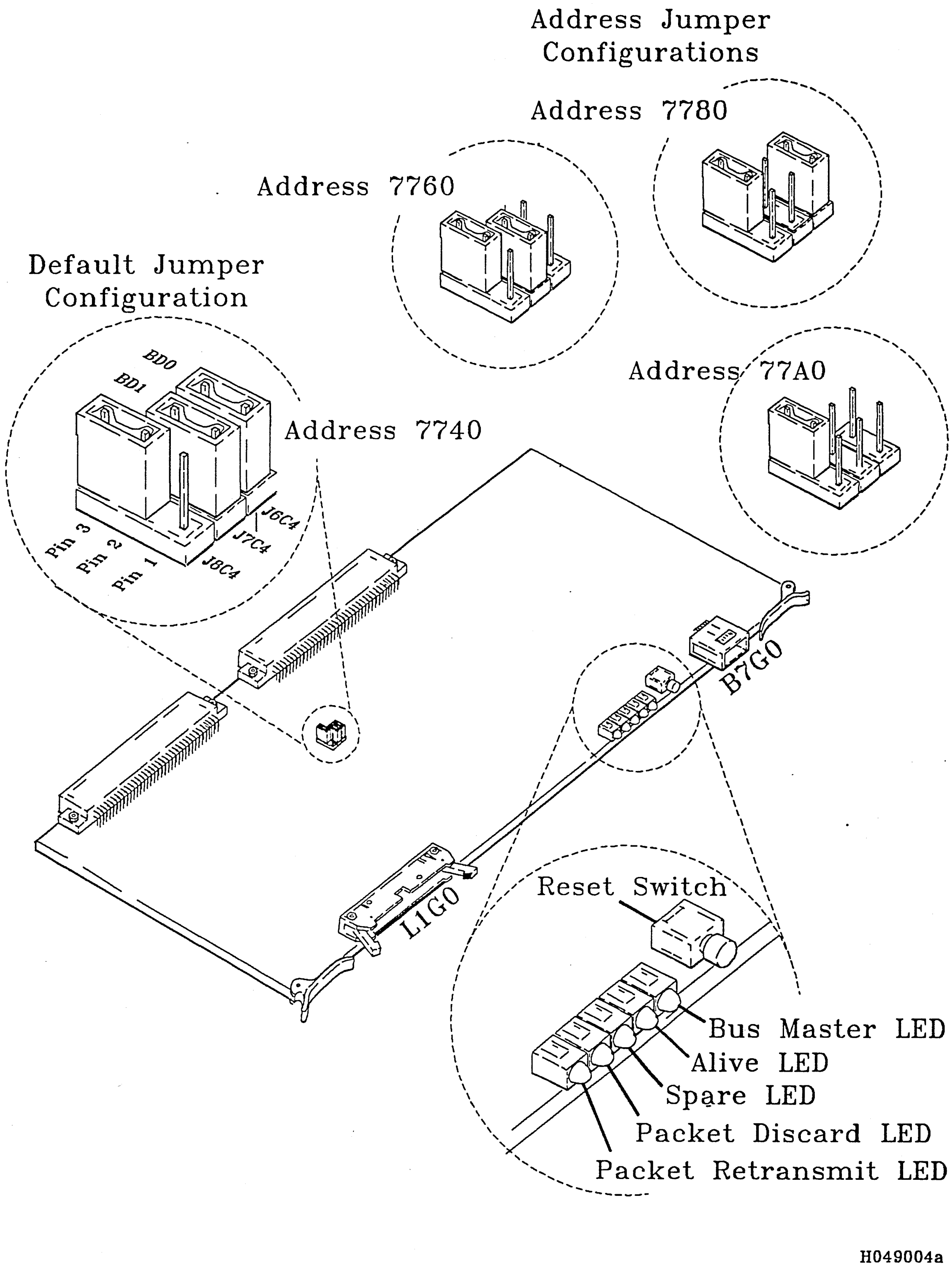
Table 1–2, Host Adapter Controller Address Jumpers

Controller Number	BD1	BD0	Address	Short I/O Address
0	In	In	0x7740	0x7750
1	In	Out	0x7760	0x7770
2	Out	In	0x7780	0x7790
3	Out	Out	0x77A0	0x77B0

[1] Jumper **BDO** is located at J6C4 on the VMEbus host adapter controller
[2] Jumper **BD1** is located at J7C4 on the VMEbus host adapter controller

Figure 1–5, "Host Adapter Controller Reset Switch, LEDs, and Address Jumpers" illustrates the locations of the reset switch, LED indicators, and address jumpers:

Figure 1–5, Reset Switch, LEDs, and Address Jumpers



1.4 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 of the intelligence for the VMEbus subsystem. It controls all data transfers between the main memory PBUS and the VMEbus Control Unit (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 per 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 per second.

Depending on the type of CONVEX computer, from one to five 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.

1.5 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, for controllers with the same priority levels, data transfers are handled in a round-robin, first come, first serve basis. However, if a VMEbus controller becomes VMEbus master, another VMEbus device (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.

1.6 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

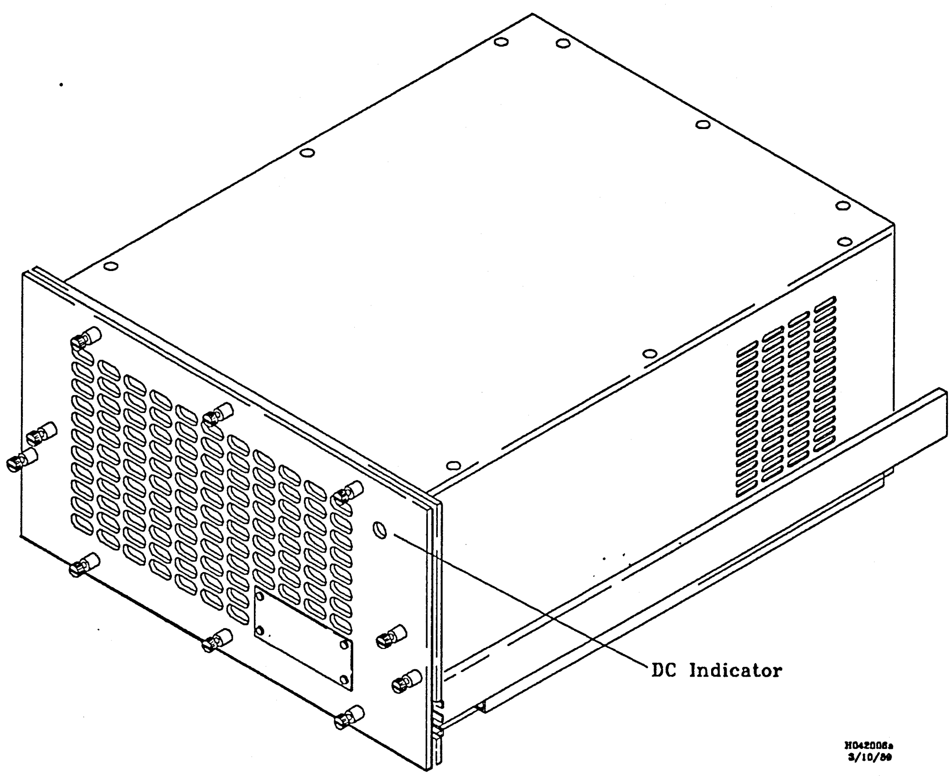
The VMEbus expansion chassis will accept both 6U and 9U VMEbus form factor cards.

1.7 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 1–6, "Typical VMEbus Chassis" illustrates a CONVEX VMEbus chassis:

Figure 1–6, Typical VMEbus Chassis



1.8 Types of CONVEX VMEbus Chassis

Three types of VMEbus expansion chassis are available. Each one 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 greater detail.

1.8.1 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**.

1.8.2 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.

1.8.3 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
>
> Additional information is available on the VMEbus Input/Output Processor, VMEbus Control Unit, VMEbus chassis, Multibus Control Unit (MBCU) and the Multibus Input/Output Processor (MIOP). Refer to the "Associated Documentation List" in the preface.

1.9 Specifications

The following sections discuss the specifications for the VMEbus host adapter controller and host adapter transceiver.

1.9.1 Host Adapter Controller Specifications

Table 1–3, "Host Adapter Controller Specifications" lists the specifications and the recommended operating ranges for the host adapter controller:

Table 1–3, Host Adapter Controller Specifications

Parameter	Value/Comment
Width	14.43 in. (36.65 cm)
Height	6.29 in. (15.98 cm)
Thickness	0.65 in. (*approx*) (1.65 cm)
Weight	3 lb. (*approx*) (1.36 Kg)
Power Dissipation, Maximum	50 W
Temperature Range,[1] Maximum	32 °F to 104 °F (0 °C to 40 °C)
Temperature Range,[1] Recommended	70 °F to 80 °F (21 °C to 26.6 °C)
Temperature Change, Maximum Rate	14.4 °F/hr (8 °C/hr)
Humidity Range, Maximum	10% to 95% with no condensation
Humidity Range, Recommended	20% to 80% with no condensation

[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).

1.9.2 Host Adapter Transceiver Specifications

Table 1–4, "Host Adapter Transceiver Specifications" lists the specifications and the recommended operating ranges for the host adapter transceiver:

Table 1–4, Host Adapter Transceiver Specifications

Parameter	Value/Comment
Width	7.20 in. (18.29 cm)
Height	2.80 in. (7.11 cm)
Thickness	1.30 in. (3.30 cm)
Weight	1.19 lbs. (0.54 Kg)
Power Dissipation, Maximum	4.8 W
Temperature Range,[1] Maximum	32 °F to 104 °F (0 °C to 40 °C)
Temperature Range,[1] Recommended	70 °F to 80 °F (21 °C to 26.6 °C)
Temperature Change, Maximum Rate	14.4 °F/hr (8 °C/hr)
Humidity Range, Maximum	10% to 95% with no condensation
Humidity Range, Recommended	20% to 80% with no condensation

[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).

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Chapter 2
Unpacking and Installation

2.1 Overview

Unpacking and inspection are discussed, major components of the host adapter assembly are identified, and installation procedures are provided.

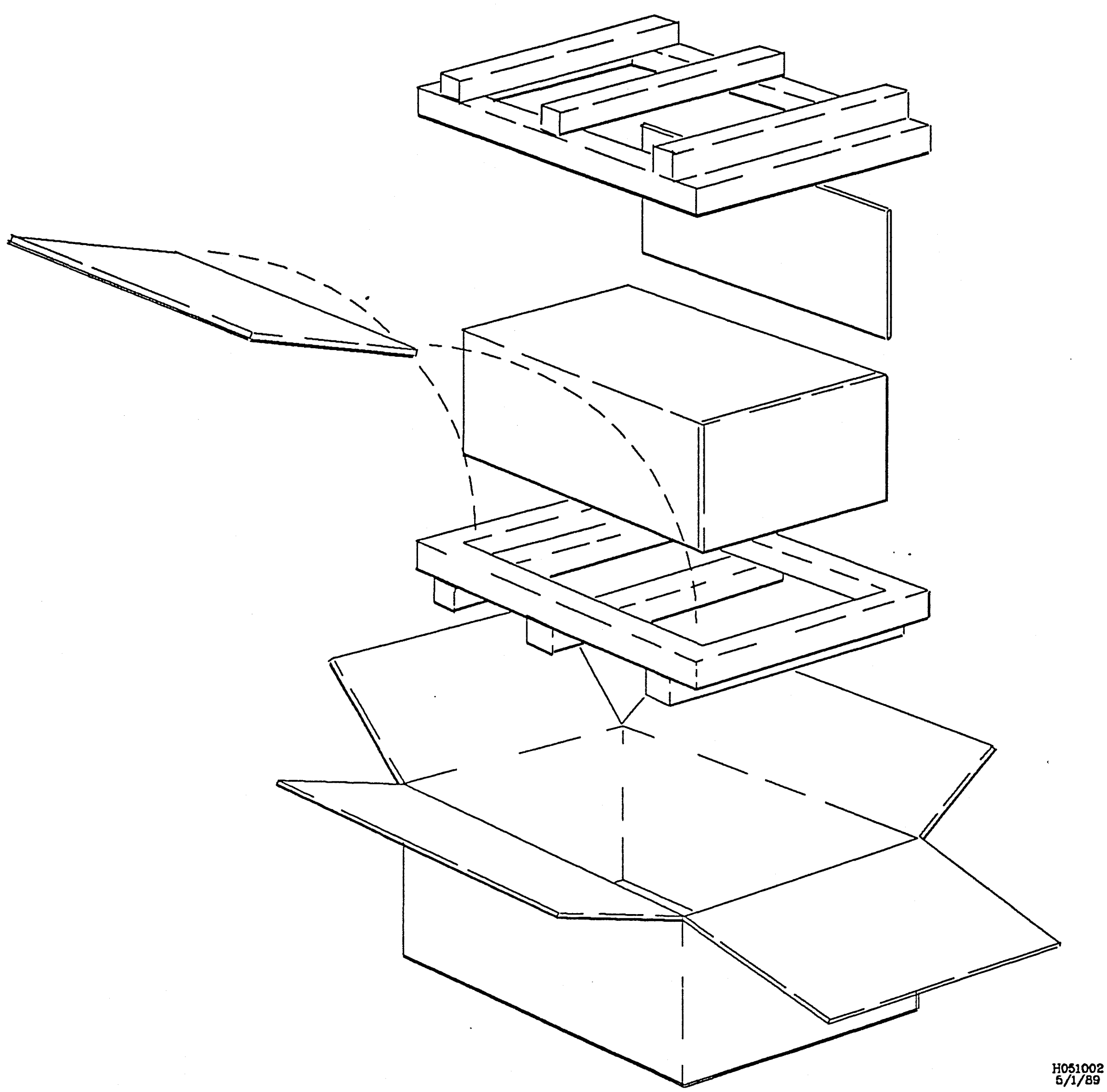
2.2 Unpacking and Inspection

General guidelines for unpacking the host adapter controller and related hardware are provided.

2.2.1 Shipping Configuration

A typical VMEbus host adapter controller shipping configuration consists of the items illustrated in Figure 2–1, "Host Adapter Controller Shipping Carton":

Figure 2–1, Host Adapter Controller Shipping Carton



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 Electrostatic Discharge (ESD) Damage

Typically 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, "Static Charge Levels and Relative Humidity" 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, "Components Susceptibility to ESD Damage" 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).

2.2.4 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. Refer to the following table for a bill of materials for a coaxial host adapter assembly:

Table 2–3, Typical Bill of Material-Coaxial

Product Number	Description	Quantity
550-000336-201	Host adapter assembly-coaxial[1]	1
211-000108-000	Host adapter controller-coaxial	1
211-000108-002	Host adapter transceiver-coaxial	1

[1] An assembly contains a complete set of CONVEX UltraNet Interface hardware.

Refer to the following table for a bill of materials for a fiber optic host adapter assembly:

Table 2–4, Typical Bill of Material-Fiber Optic

Product Number	Description	Quantity
550-000336-200	Host adapter assembly-fiber optic[1]	1
211-000108-200	Host adapter controller-fiber optic	1
211-000108-001	Host adapter transceiver-fiber optic	1

1 An assembly contains a complete set of CONVEX UltraNet Interface hardware.

> **CAUTION**
>
> The VMEbus host adapter controller can be damaged by Electrostatic Discharges (ESD) during unpacking procedures. A grounded wrist strap (or other grounding method) must be used when the VMEbus host adapter controller is removed from its protective packing to prevent ESD damage.

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.

2.2.5 Damage Claims

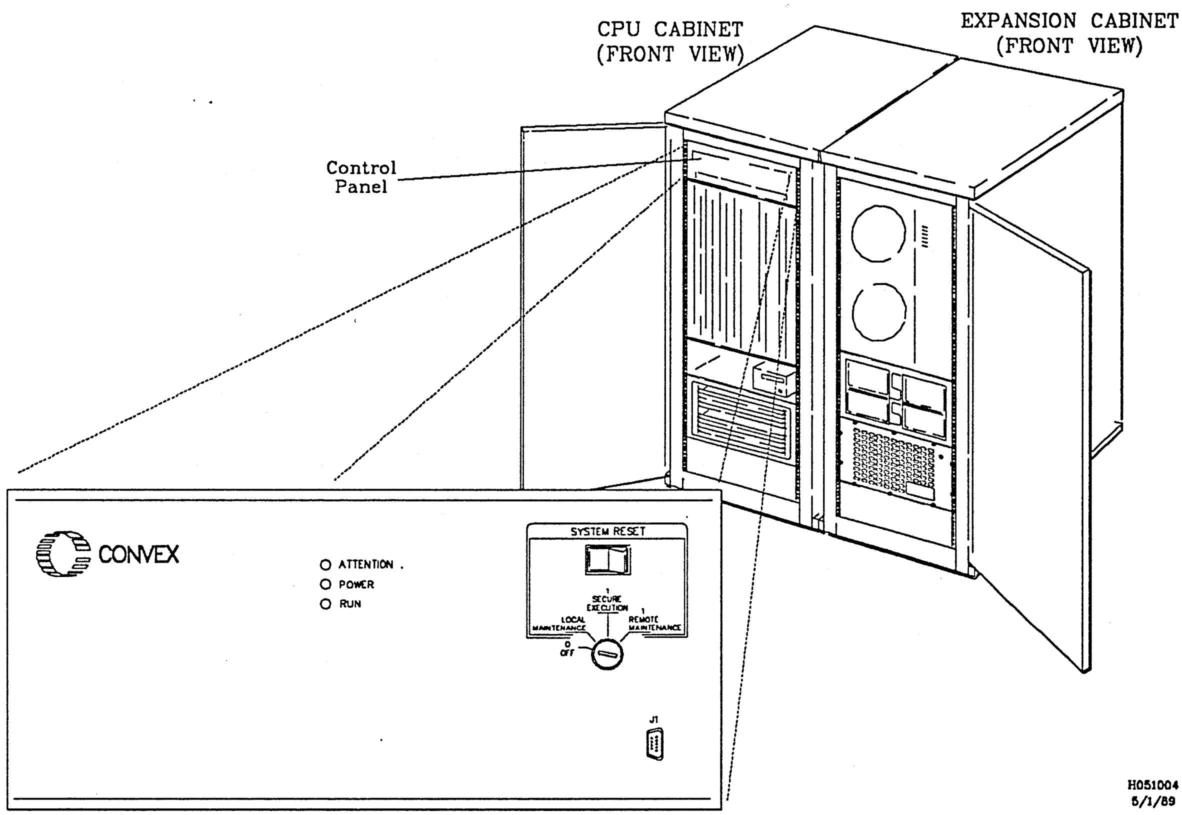
If the VMEbus host adapter controller or related hardware is damaged, a damage claim must be completed. Damage claims should be completed by the customer and given to the shipping representative. Claim forms are normally obtained from the shipping representative.

2.3 Installation Procedures

> **CAUTION**
>
> Failure to shut the system down before removing power to the VMEbus chassis will cause a system crash. Refer to the *CONVEX Processor Operation Guide (C100 Series, C200 Series)* for power down procedures on a CONVEX computer.

1. Turn the processor's front control panel key switch to the **OFF** position as shown in Figure 2–2, "Typical Front Panel Power Control Switch":

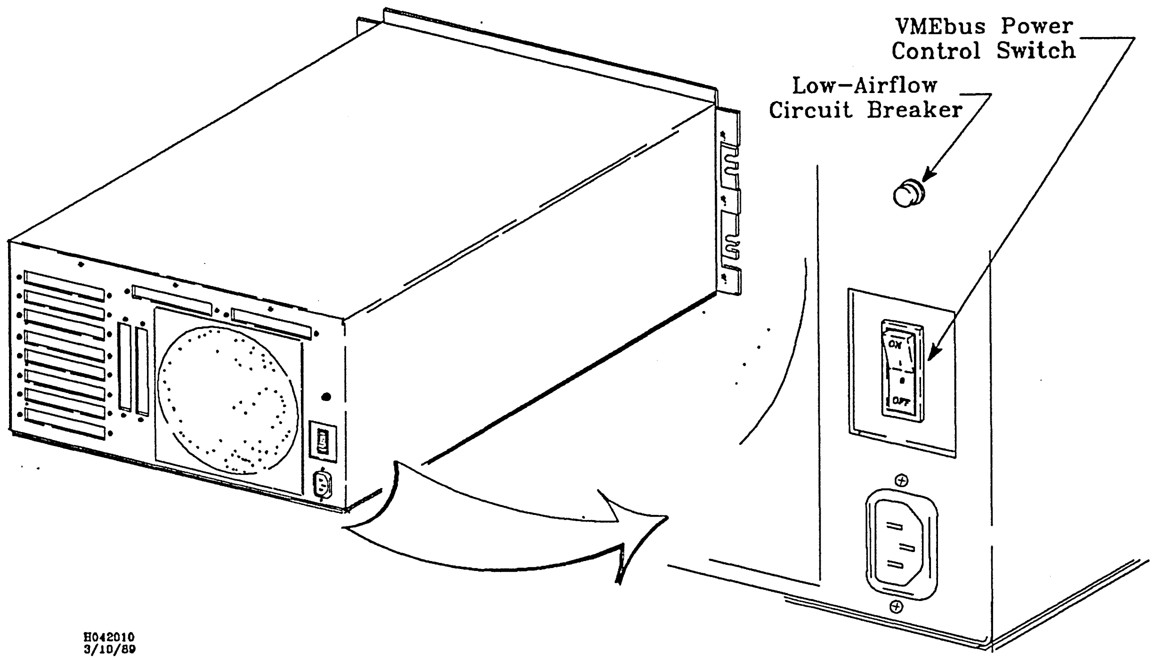
Figure 2–2, Typical Front Panel Power Control Switch



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

2. Set the VMEbus chassis power control switch to the **OFF** position as shown in Figure 2–3, "VMEbus Chassis Power Control Switch":

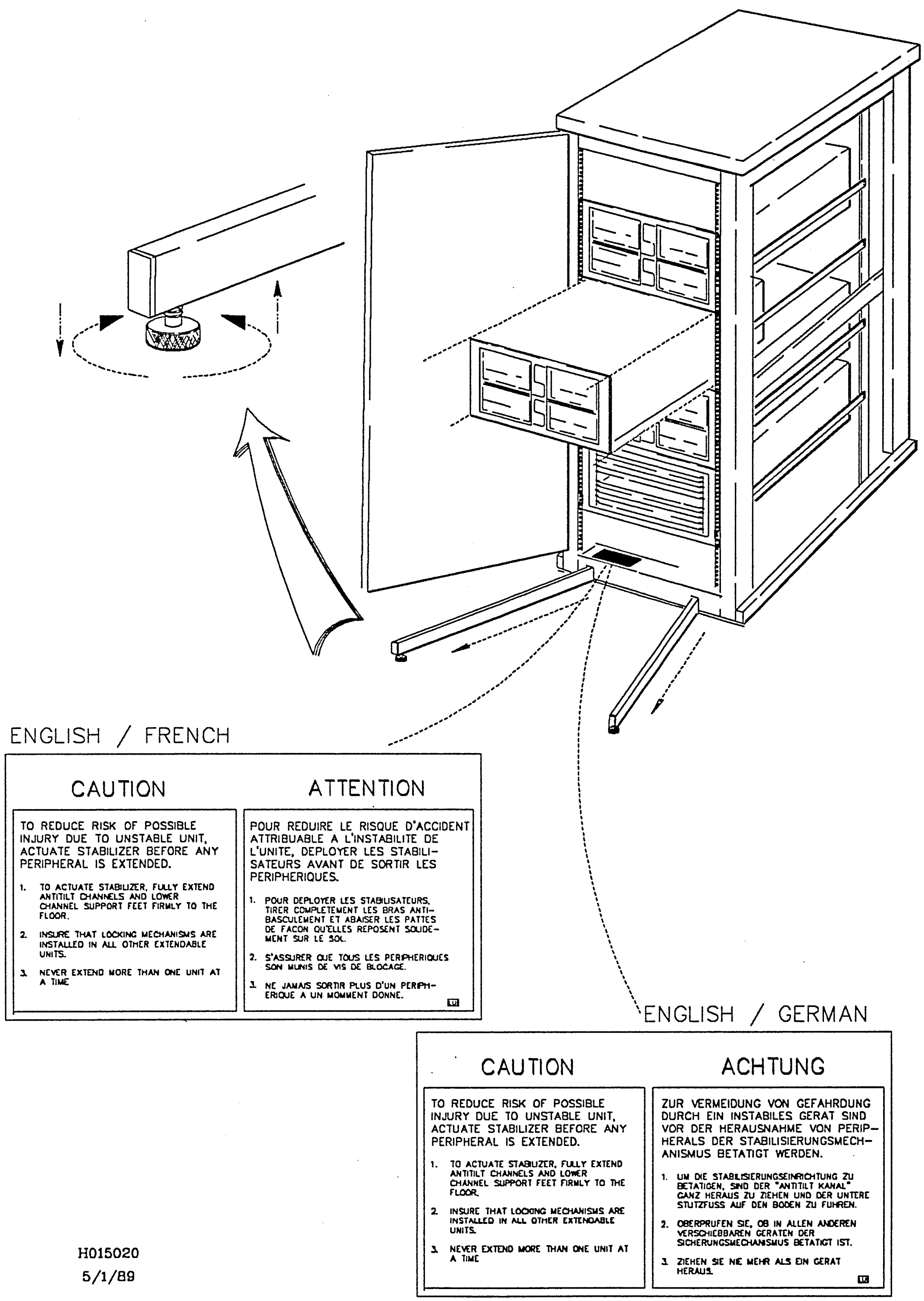
Figure 2–3, VMEbus Chassis Power Control Switch



> **WARNING**
>
> Expansion cabinet stabilizer bars must be extended prior to 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, increasing the possibility of it falling forward. This can cause injury to personnel and will cause damage to equipment.

3. Extend the expansion cabinet stabilizer bars and adjust feet until they are in firm contact with the floor as shown in Figure 2–4, "Expansion Cabinet Stabilizer Bars":

Figure 2–4, Expansion Cabinet Stabilizer Bars



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

> **NOTE**
>
> The VMEbus backplane slot positions are labeled on the front of each chassis. Cable opening numbers are stamped on the outside rear panel on all CONVEX VMEbus chassis. VMEbus controller cables exit the chassis at the rear through cable openings. Cables from a given controller should always exit the VMEbus chassis at the same hole position.

Table 2–5, "Cable Opening Numbers for VMEbus Chassis" defines cable opening numbers and device types for the three types of CONVEX VMEbus chassis:

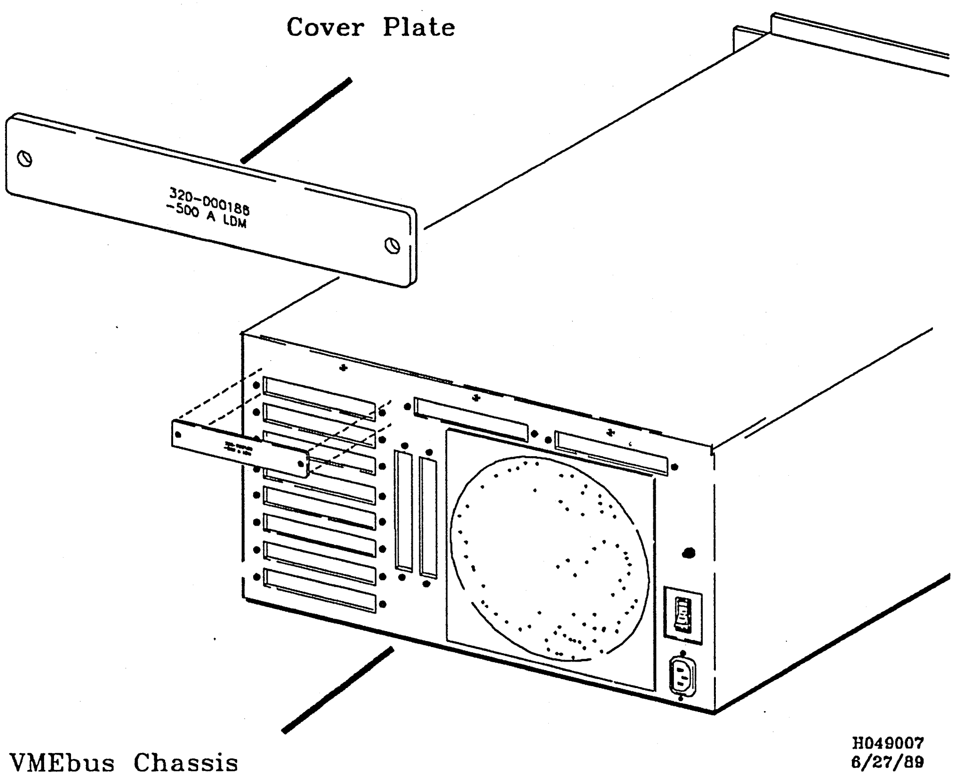
Table 2–5, Cable Opening Numbers for VMEbus Chassis

Cable Opening Number	Dual (10-slot) VMEbus	Single (9-slot) VMEbus	Combo VME/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 4	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	unassigned	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.

6. Refer to Table 2-5 "Cable Opening Numbers for VMEbus Chassis" and remove the appropriate cable cover plate on the rear of the VMEbus chassis as shown in Figure 2-5, "Cable Cover Plate":

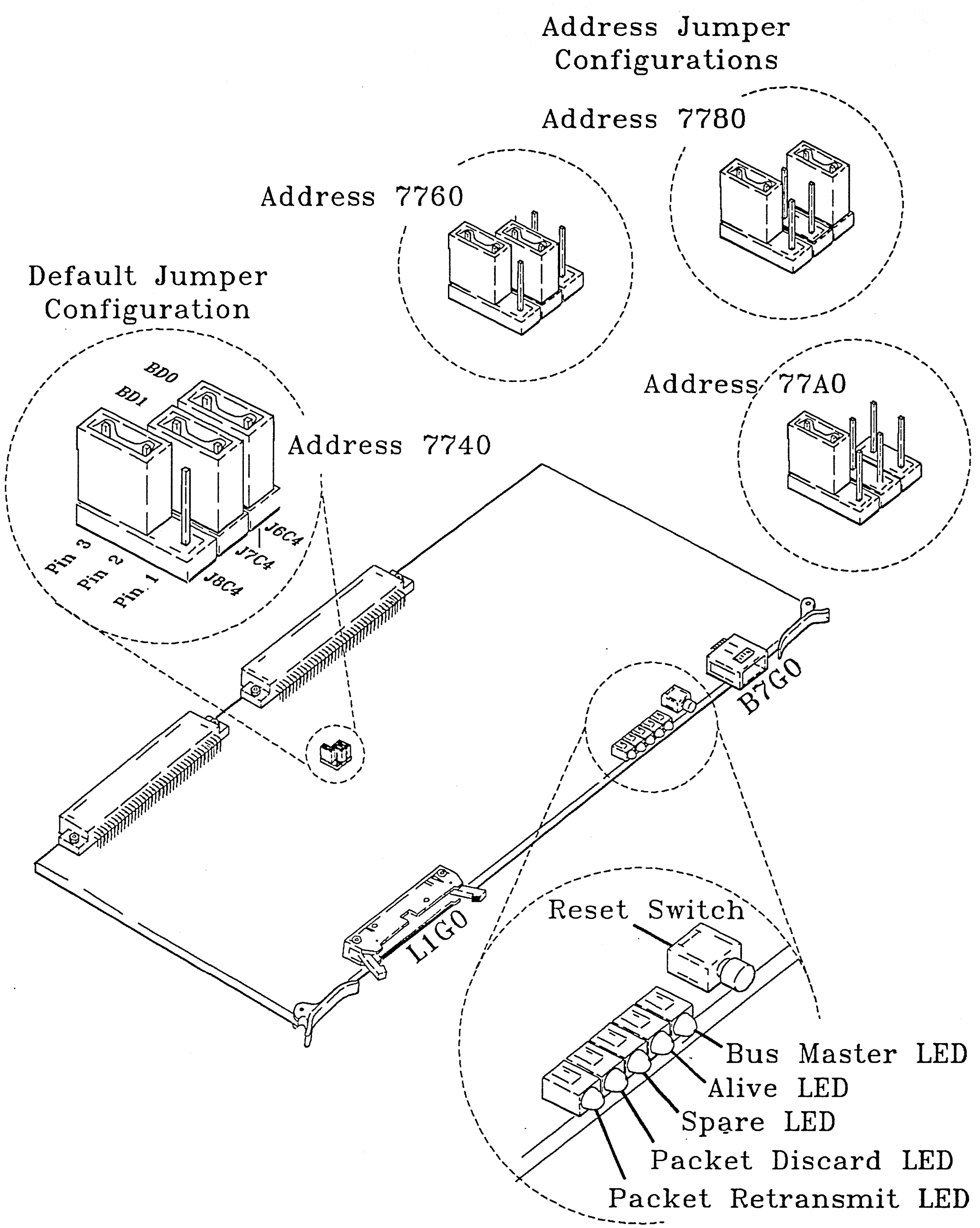
Figure 2–5, Cable Cover Plate



> **CAUTION**
>
> The VMEbus host adapter controller can be damaged by Electrostatic Discharges (ESD) during installation. A grounded wrist strap (or other grounding method) must be used when handling the host adapter controller to prevent ESD damage.

7. Refer to Table 2–6, "Host Adapter Controller Address Jumpers" and set the VMEbus address jumpers on the VMEbus host adapter controller to the appropriate positions as shown in Figure 2–6, "Host Adapter Controller Address Jumpers" :

Figure 2–6, Host Adapter Controller Address Jumpers



H049004a
8/14/89

NOTE

Pins **2** and **3** on the jumper located at **J8C4** are always shorted together.

Table 2–6, Host Adapter Controller Address Jumpers

Controller Number	BD1	BD0	Address	Short I/O Address
0	In	In	0x7740	0x7750
1	In	Out	0x7760	0x7770
2	Out	In	0x7780	0x7790
3	Out	Out	0x77A0	0x77B0

[1] Jumper **BDO** is located at J6C4 on the VMEbus host adapter controller

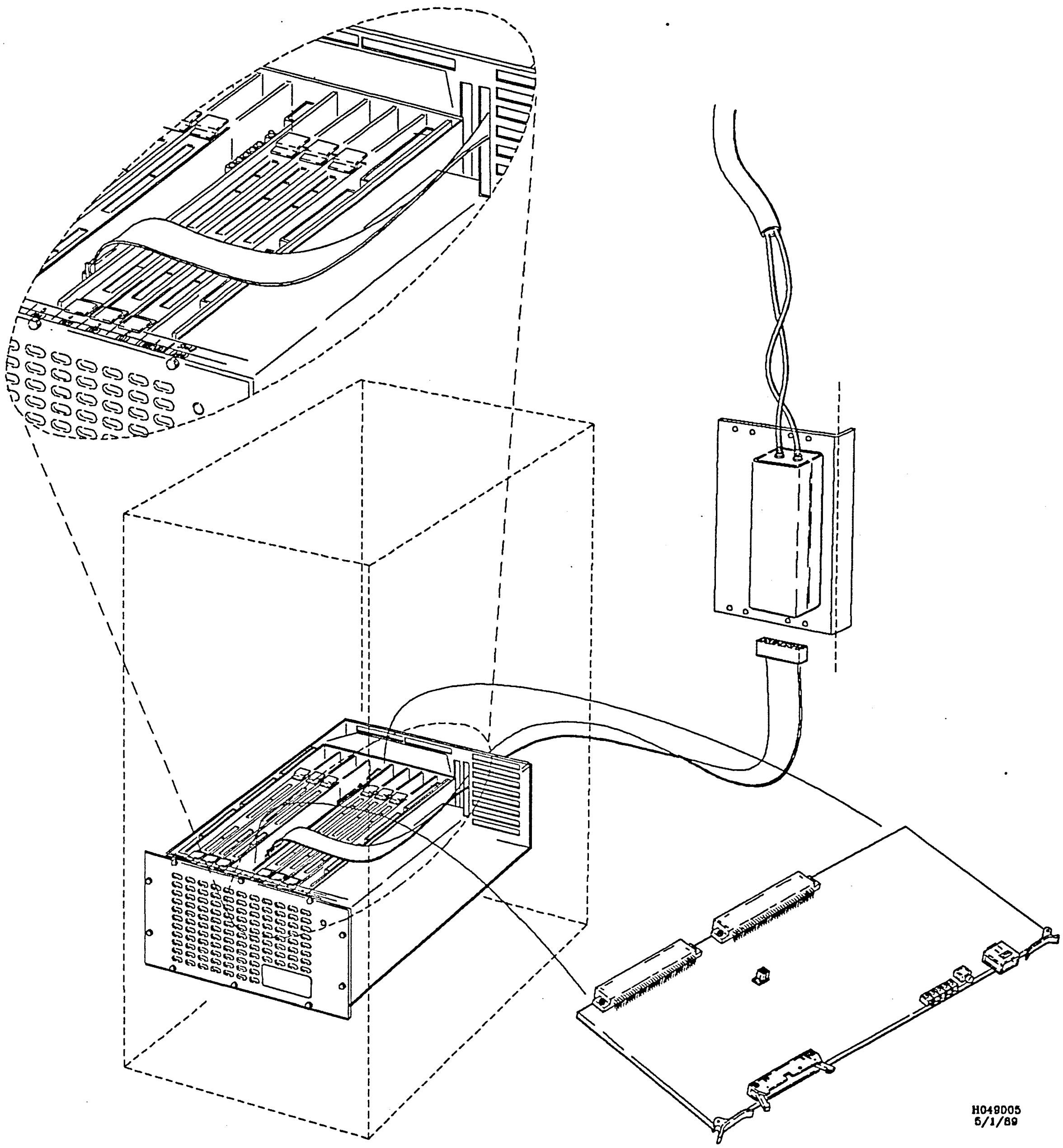
[2] Jumper **BD1** is located at J7C4 on the VMEbus host adapter controller

CAUTION

Failure to have the VMEbus chassis power control switch set to **OFF** before installing the VMEbus host adapter controller will damage electronic components on the host adapter controller or VMEbus chassis.

8. Install the VMEbus host adapter controller into the appropriate slot in the VMEbus chassis.
9. Connect one end of the cable to the **L1GO** connector on the host adapter controller, then route the cable through the appropriate cable opening on the rear of the VMEbus chassis as shown in Figure 2–7, "VMEbus Chassis Cabling Openings":

Figure 2–7, VMEbus Chassis Cabling Openings

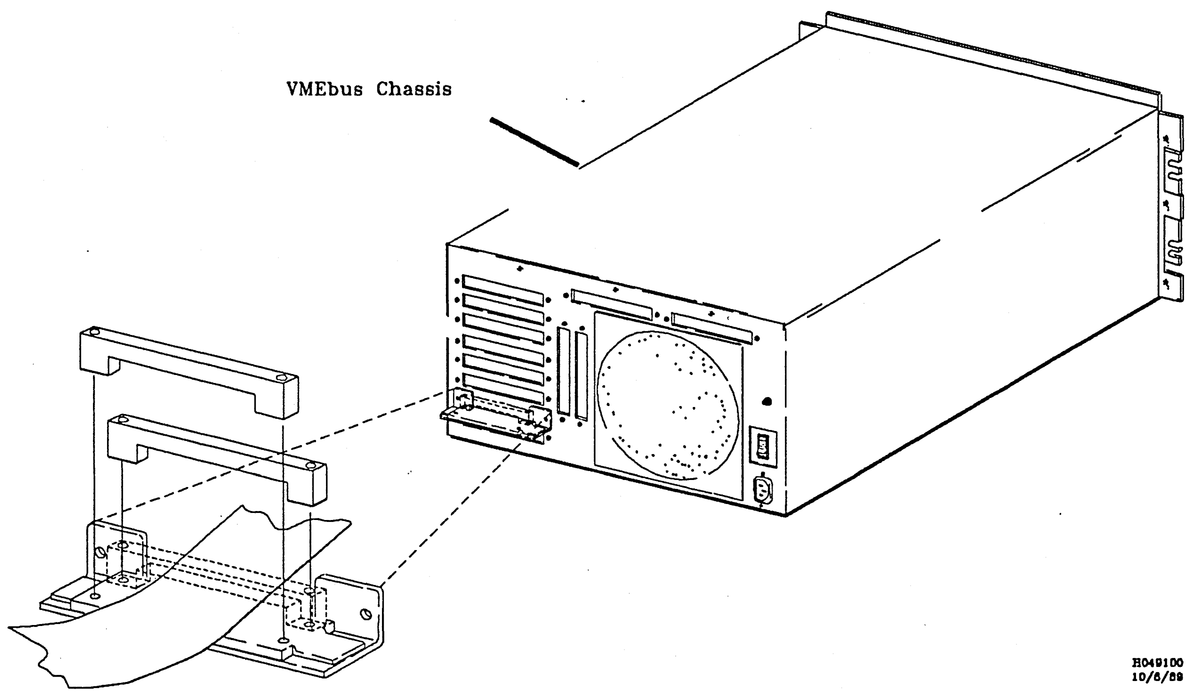


CAUTION

Failure to contact the exposed cable shield with the cable clamp will result in the loss of the EMI shielding.

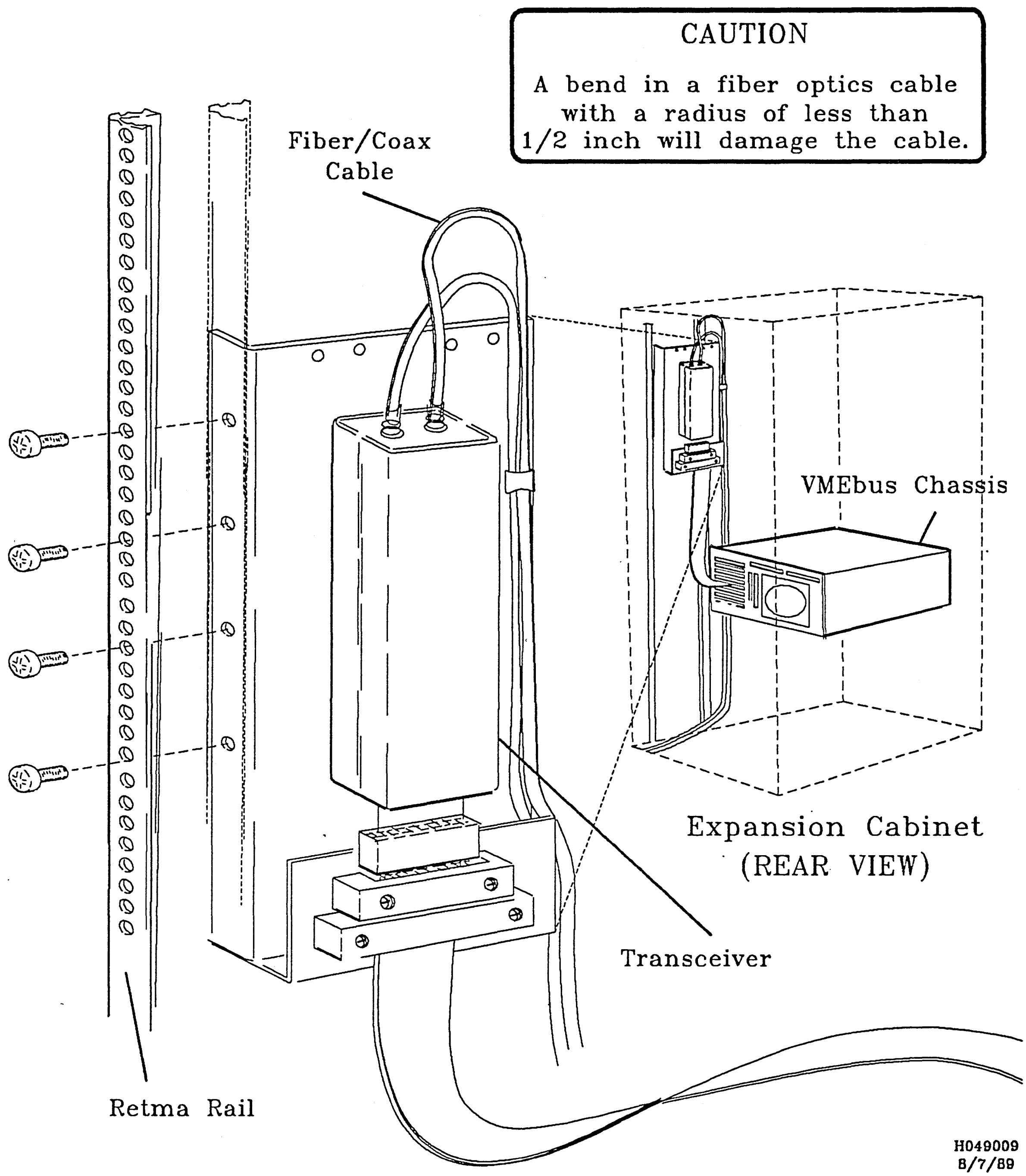
10. Install the cable in the inner cable clamp, then mount the clamp on the mounting bracket with the screws provided. Install the outer clamp over the insulated cable area, then mount the clamp on the mounting bracket with the screws provided. Then mount the complete assembly to the rear of the VMEbus chassis with the screws provided as shown in Figure 2–8, "Cable Clamps and Cable Shields":

Figure 2–8, Cable Clamps and Cable Shields



11. Connect the cable from the host adapter controller to the connector on the host adapter transceiver.
12. Install the inner cable clamp over the cable, then mount the clamp on the mounting bracket with the screws provided. Install the outer clamp over the insulated cable area, then mount the clamp on the mounting bracket with the screws provided.

Figure 2–9, Host Adapter Transceiver Mounting



13. Mount the host adapter transceiver to the Retma rails at the rear of the CONVEX expansion cabinet with the screws provided as shown in Figure 2–9, "Host Adapter Transceiver Mounting":

> **CAUTION**
>
> A bend in a fiber optic cable with a radius of less than 1/2 inch will damage the cable.

14. Connect the transmit and receive cables to the transmit and receive terminals on the host adapter transceiver. Then secure the cables to the mounting bracket with the tie wrap provided.

> **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.

15. Install the VMEbus chassis top panel and secure it with the 12 locking screws.
16. Return the VMEbus chassis to its retracted position and secure it with the 2 locking screws.
17. Return the expansion cabinet stabilizer bars to their retracted positions.
18. Set the processor's front control panel key switch to the **ON** position.
19. Set the VMEbus chassis power control switch to the **ON** position.
20. Contact the UltraNet system manager and have the CONVEX computer assigned to the network.

> **NOTE**
>
> Refer to Chapter 3 for diagnostic test information and procedures on the VMEbus host adapter controller.

Chapter 3
Integration and Test

3.1 Overview

The VMEbus host adapter controller must be integrated into the CONVEX Operating System (ConvexOS) before it can be used. Guidelines for integrating the VMEbus host adapter controller into ConvexOS are contained in this chapter as well as information on the VMEbus host adapter controller and host adapter transceiver diagnostic test.

3.1.1 Software Integration

The software for the CONVEX UltraNet Interface is released separately from ConvexOS and utilities. For additional software integration information, refer to the *Installation Procedures CONVEX UltraNet Interface V1.0* document. This document includes a complete description of software integration procedures for CONVEX UltraNet 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 controller(s), and peripheral devices. ConvexOS uses this information to assign a physical device number to a device of a given type.

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. A typical */ioconfig* file is shown in Figure 3–1, "Example */ioconfig* File":

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 MTC-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 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 host adapter controller is added or removed, the information in the hardware section of the configuration file (*/ioconfig)* must be changed, otherwise system operation problems will occur. The *CONVEX System Manager's Guide* should be consulted when making these changes.

3.2 Testing the Host Adapter Controller

The VMEbus host adapter controller is tested by the *dev_ultra* diagnostic program. This program verifies the operation of the VMEbus host adapter controller and the host adapter transceiver. The *dev_ultra* diagnostic program verifies that:

- VIOP can boot the VMEbus host adapter controller program from memory
- Communications between the VIOP, VBCU, and VMEbus host adapter controller are established
- VBCU responds to forced interrupts
- The VMEbus host adapter controller can correctly execute instructions
- The VMEbus host adapter transceiver operates in the loopback mode

The *dev_ultra* 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. However, this information is contained in the *CONVEX PBUS I/O System Diagnostics Manual.* This manual should be consulted before running this test.

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Chapter 4
Maintenance Procedures and IPB

4.1 Overview

Guidelines for obtaining technical assistance, and maintenance procedures for the VMEbus host adapter controller and the host adapter transceiver are contained in this chapter. Also, an Illustrated Parts Breakdown (IPB) for all Field Replaceable Units (FRUs) is included.

4.2 CONVEX Technical Assistance

CONVEX offers two sources of help if problems arise:

- CONVEX Technical Assistance Center (TAC)
- CONVEX *contact* utility

4.2.1 CONVEX Technical Assistance Center

Contact the CONVEX Technical Assistance Center (TAC) for real time support on urgent hardware and software problems. The TAC can be reached from all locations in the continental United States by calling 1(800)952-0379, or by calling 1(214)952-4379 from other locations in Alaska, Hawaii, or Canada. From all other locations, contact the nearest CONVEX office.

4.2.2 CONVEX *contact* Utility

Use the CONVEX *contact* utility for reporting minor hardware and software problems. Refer to Appendix B for an example of the CONVEX *contact* utility.

4.2.3 Ultra Network Technologies Assistance

Contact Ultra Network Technologies at 101 Daggett Drive, San Jose, California 95131 for technical assistance on network problems or network test procedures. Their phone number is (408)922-9287, and their FAX number is (408)433-9287.

4.3 Maintenance Procedures

The following sections define the maintenance procedures for the VMEbus host adapter controller and host adapter transceiver.

4.3.1 Host Adapter Controller

The following sections define the procedures to remove and replace the VMEbus host adapter controller.

4.3.1.1 Removal

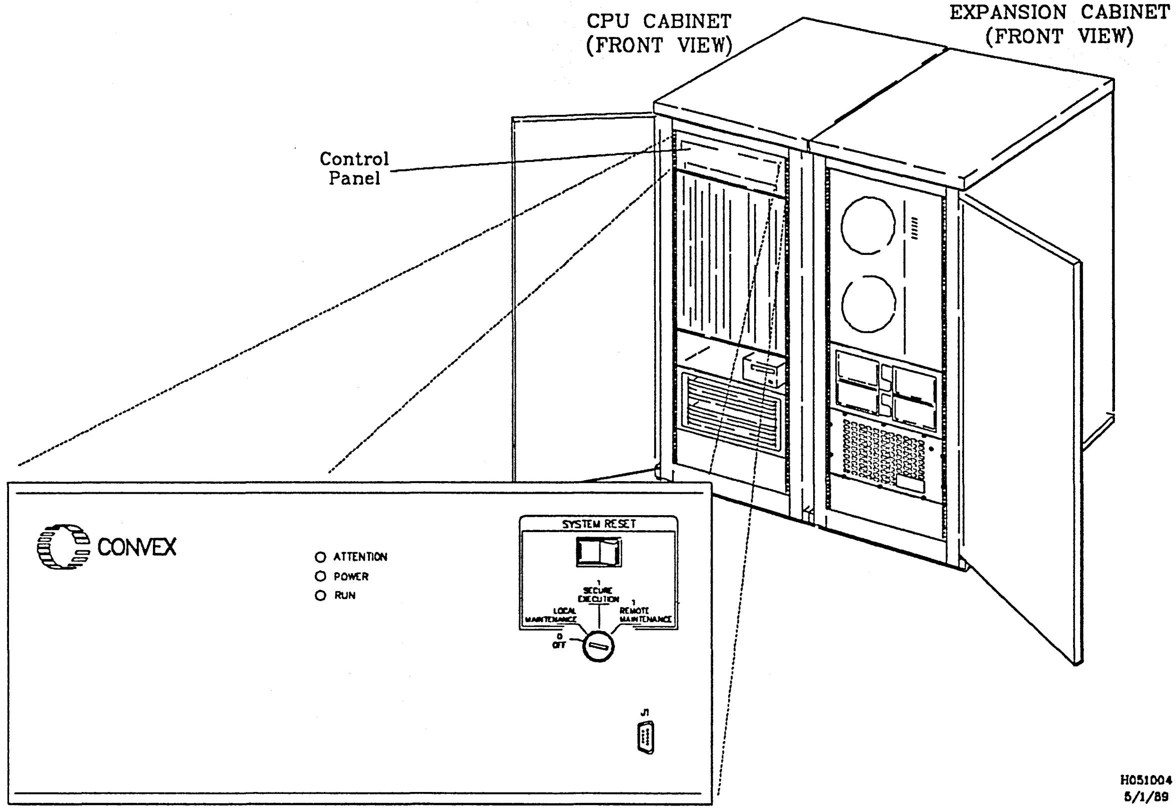
Follow these procedures to remove the VMEbus host adapter controller.

1. Contact the UltraNet system manager and have the CONVEX computer removed from the network.

> **CAUTION**
>
> Failure to shut the system down before removing power to the VMEbus chassis will cause a system crash. Refer to the *CONVEX Processor Operation Guide (C100 Series, C200 Series)* for power down procedures on a CONVEX computer.

2. Turn the processor's front control panel key switch to the **OFF** position as shown in Figure 4–1, "Typical Front Panel Power Control Switch":

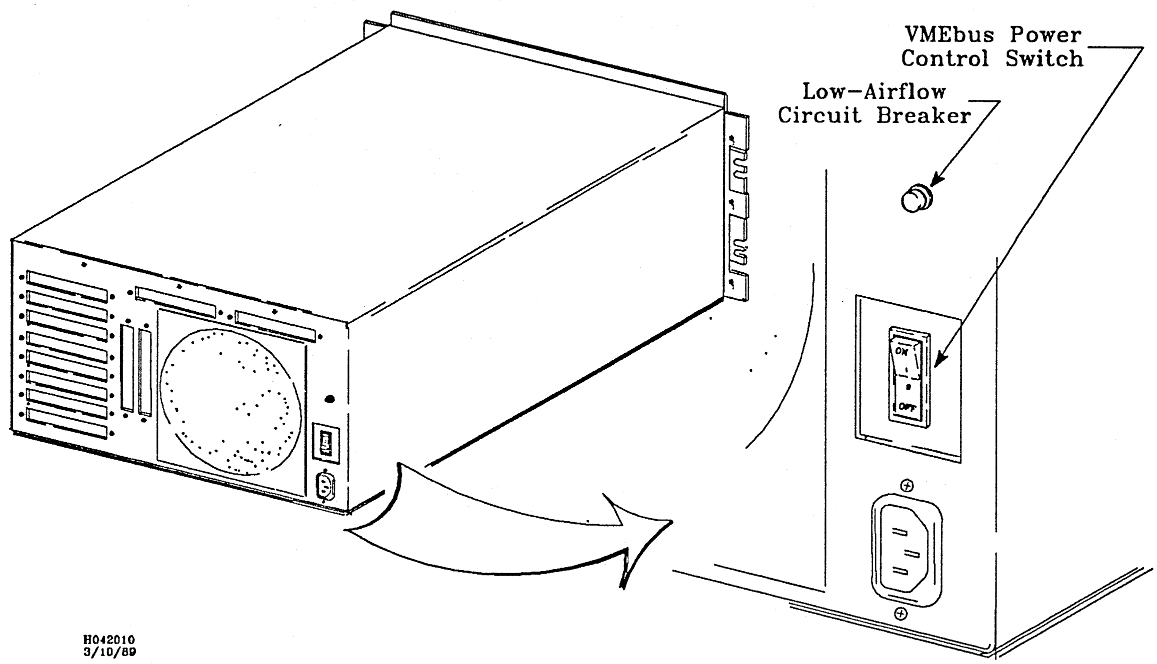
Figure 4–1, Typical Front Panel Power Control Switch



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

3. Set the VMEbus chassis power control switch to the **OFF** position as shown in Figure 4–2, "VMEbus Chassis Power Control Switch":

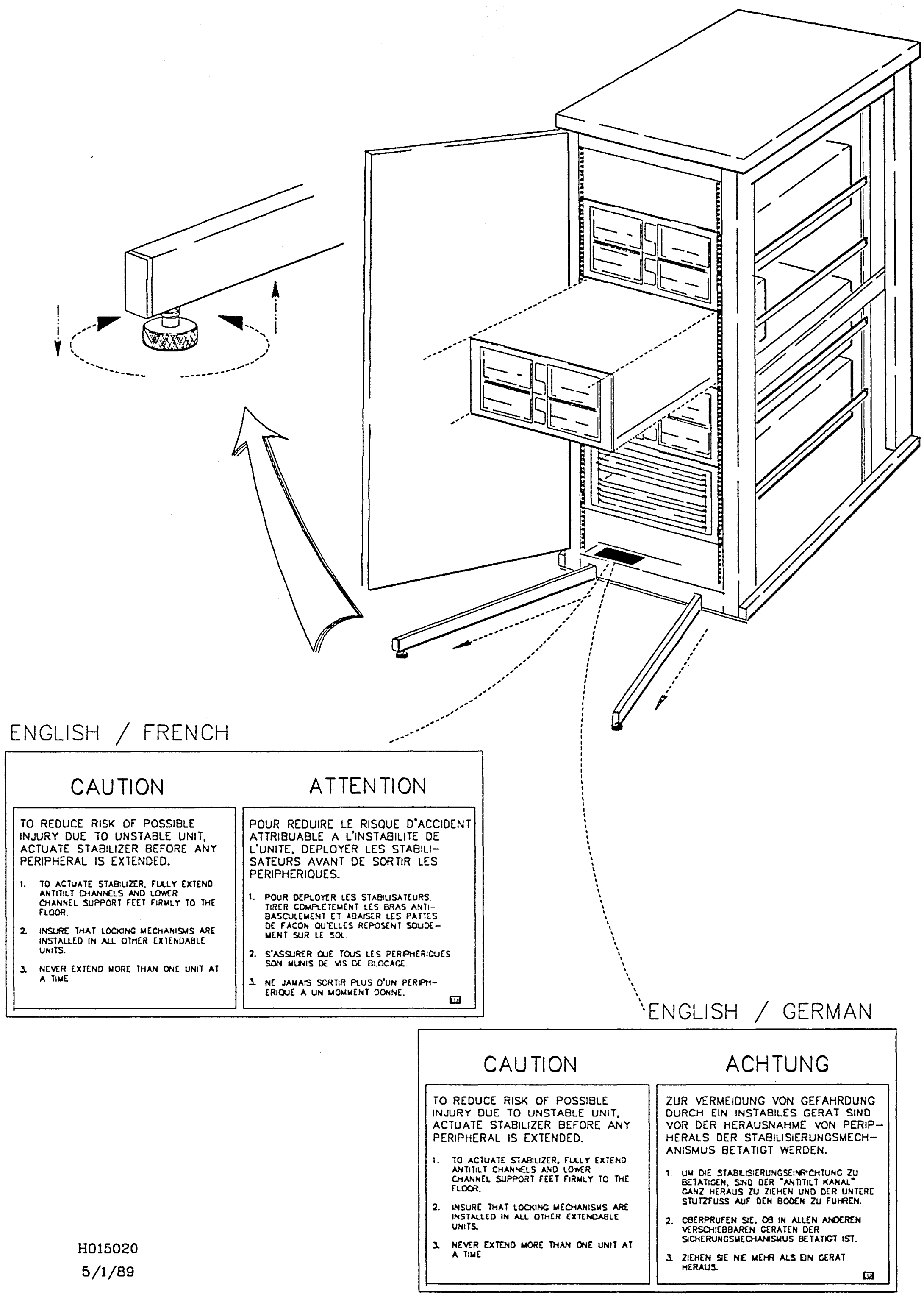
Figure 4–2, VMEbus Chassis Power Control Switch



> **WARNING**
>
> Expansion cabinet stabilizer bars must be extended prior to 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, increasing the possibility of it falling forward. This can cause injury to personnel and will cause damage to equipment.

4. Extend the expansion cabinet stabilizer bars, and adjust feet until they are in firm contact with the floor as shown in Figure 4–3, "Expansion Cabinet Stabilizer Bars":

Figure 4–3, Expansion Cabinet Stabilizer Bars



5. Unlock the 2 VMEbus chassis lock screws and extend the chassis on its slides.
6. Unlock the 12 top panel lock screws on the VMEbus chassis top panel and remove the top panel.
7. Disconnect the cable attached to the VMEbus host adapter controller.

> **CAUTION**
>
> The VMEbus host adapter controller can be damaged by Electrostatic Discharge (ESD). A grounded wrist strap (or other grounding method) must be used when handling the VMEbus host adapter controller.

8. Remove the VMEbus host adapter controller from its VMEbus chassis slot.

4.3.1.2 Replacement

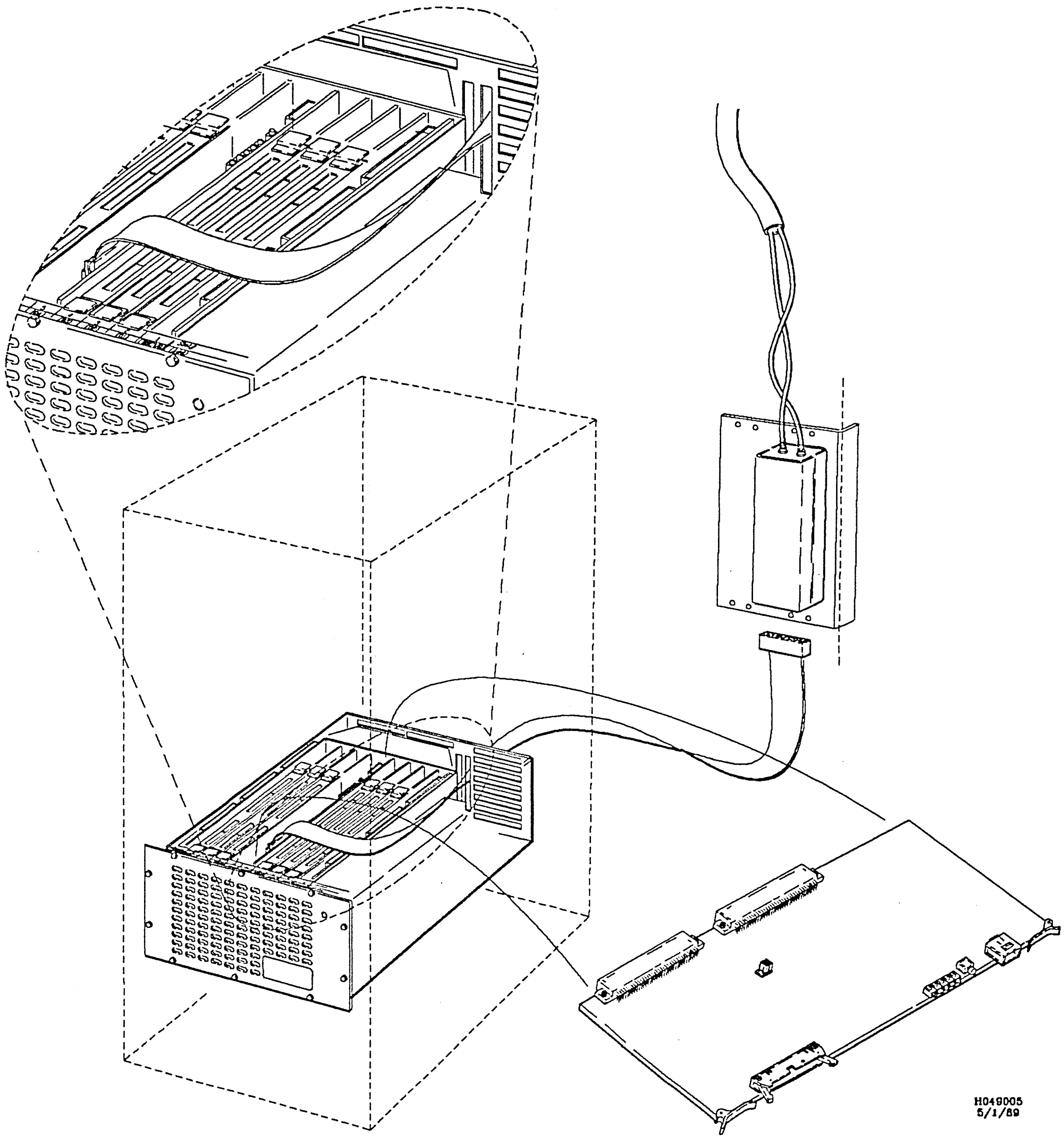
> **Note**
>
> If a VMEbus host adapter controller is to be initially installed, refer to the section "Installation Procedures" in Chapter 2 "Unpacking and Installation" for installation information.

Follow these procedures to replace the VMEbus host adapter controller.

> **CAUTION**
>
> The VMEbus host adapter controller can be damaged by Electrostatic Discharge (ESD). A grounded wrist strap (or other grounding method) must be used when handling the VMEbus host adapter controller.

1. Install the VMEbus host adapter controller into its VMEbus chassis slot.
2. Install the second VMEbus host adapter controller or MBCU into its proper position if applicable.
3. Connect the cable to the **L1GO** connector on the host adapter controller as shown in Figure 4–4, "Host Adapter Controller Cable Connection":

Figure 4–4, Host Adapter Controller Cable Connection



> **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.

4. Install the VMEbus chassis top panel and secure it with the 12 locking screws.
5. Return the VMEbus chassis to its retracted position and secure it with the 2 locking screws.
6. Return the expansion cabinet stabilizer bars to their retracted positions.
7. Set the processor's front control panel key switch to the **ON** position (see Figure 4–2, Typical Front Panel Power Control Switch).
8. Set the VMEbus chassis power control switch to the **ON** position (see Figure 4–3, VMEbus Chassis Power Control Switch).
9. Contact the UltraNet system manager and have the CONVEX computer assigned to the network.

4.3.2 Host Adapter Transceiver

The following sections define the procedures to remove and replace the VMEbus host adapter transceiver.

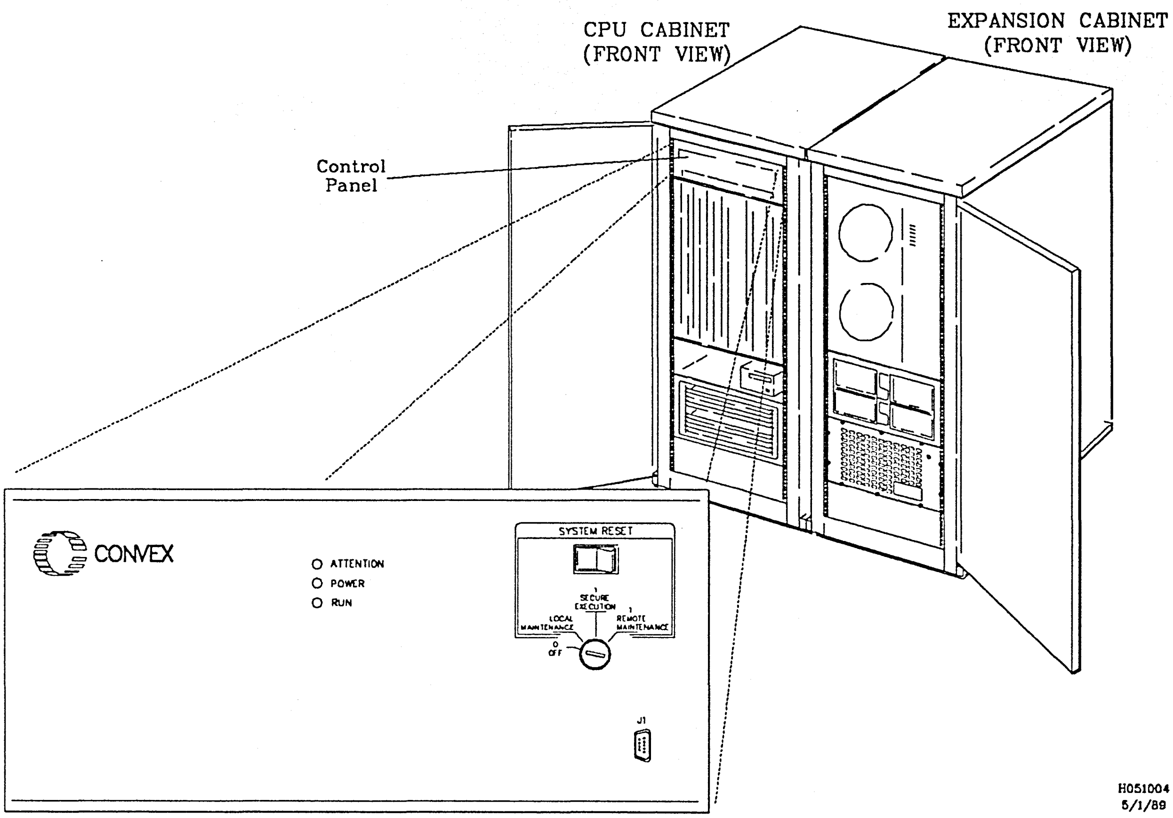
4.3.2.1 Removal

Follow these procedures to remove the VMEbus host adapter transceiver.

> **CAUTION**
>
> Failure to shut the system down before removing power to the VMEbus chassis will cause a system crash. Refer to the *CONVEX Processor Operation Guide (C100 Series, C200 Series)* for power down procedures on a CONVEX computer.

1. Contact the UltraNet system manager and have the CONVEX computer disconnected from the network.
2. Turn the processor's front control panel key switch to the **OFF** position as shown in Figure 4–5, "Typical Front Panel Power Control Switch":

Figure 4–5, Typical Front Panel Power Control Switch

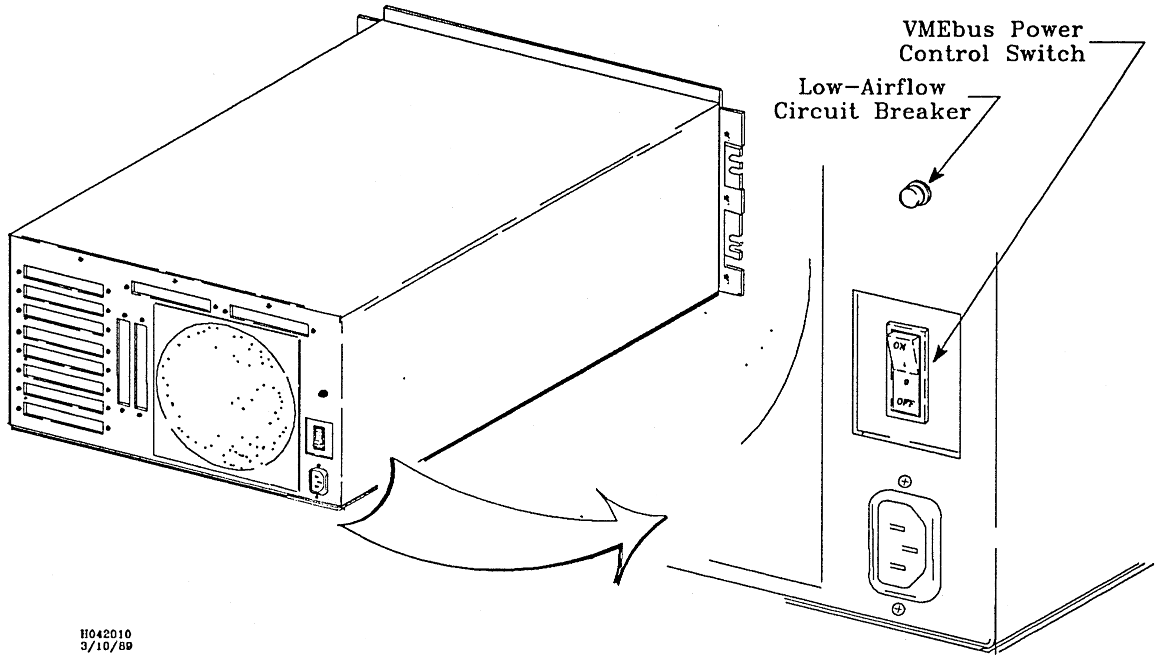


CAUTION

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

3. Set the VMEbus chassis power control switch to the **OFF** position as shown in Figure 4–6, "VMEbus Chassis Power Control Switch":

Figure 4–6, VMEbus Chassis Power Control Switch



CAUTION

A bend in a fiber optic cable with a radius of less than 1/2 inch will damage the cable.

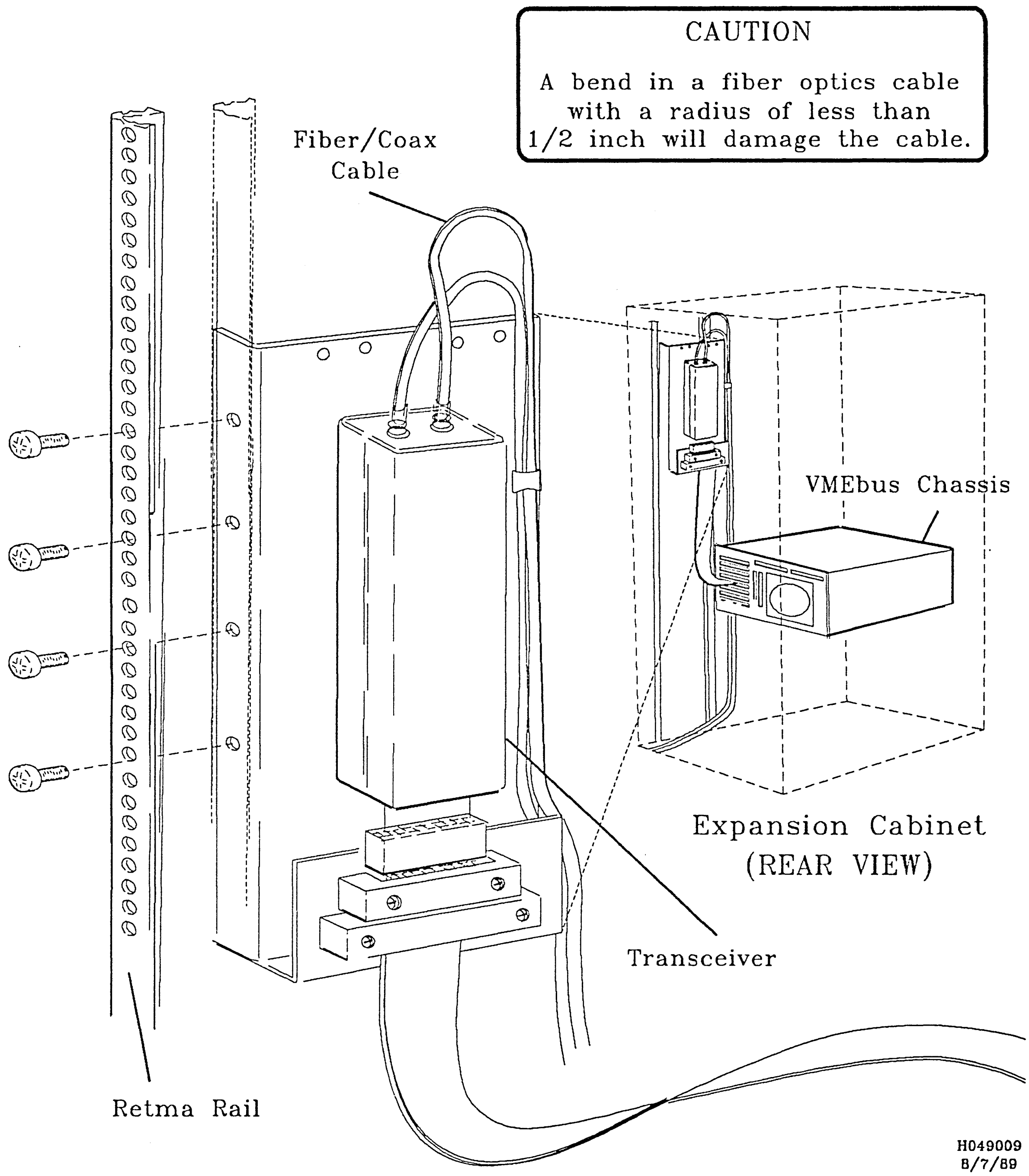
4. Remove the tie wrap to free the transmit and receive cables from the transceiver mount. Then disconnect the transmit and receive cables from the transmit and receive terminals on the host adapter transceiver.

CAUTION

Place the free ends of the transmit and receive cables in a safe location to prevent damage to the cables.

5. Unlock the locking screws for the transceiver mount and remove the host adapter transceiver and mount from the Retma rails at the rear of the CONVEX expansion cabinet as shown in Figure 4–7, "Host Adapter Transceiver Mounting":

Figure 4–7, Host Adapter Transceiver Mounting



6. Unlock the locking screws on the inner cable clamp and remove the clamp from the mounting bracket. Remove the inner cable clamp from the cable. Then unlock the locking screws on the outer cable clamp and unmount the clamp from the mounting bracket. Remove the outer clamp from the insulated cable area.
7. Disconnect the host adapter controller cable from the host adapter transceiver.

4.3.2.2 Replacement

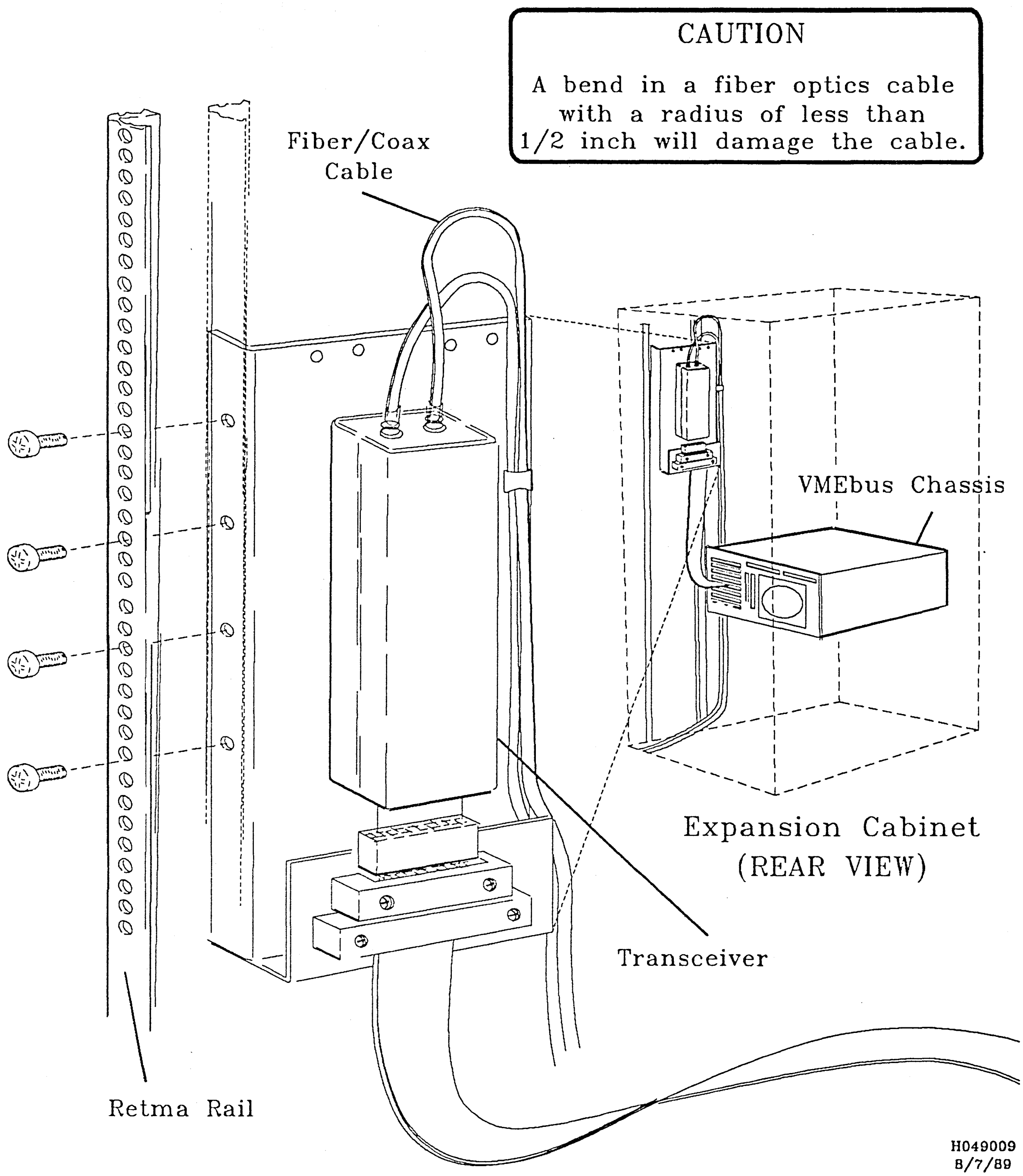
> **Note**
>
> If a VMEbus host adapter transceiver is to be initially installed, refer to the section "Installation Procedures" in Chapter 2 "Unpacking and Installation" for installation information.

Follow these procedures to replace the VMEbus host adapter transceiver.

> **CAUTION**
>
> Failure to contact the exposed cable shield with the cable clamp will result in the loss of the EMI shielding.

1. Connect the cable from the host adapter controller to the connector on the host adapter transceiver.
2. Install the inner cable clamp over the cable, then mount the clamp on the mounting bracket with the screws provided. Install the outer clamp over the insulated cable area, then mount the clamp on the mounting bracket with the screws provided.
3. Mount the host adapter transceiver to the Retma rails at the rear of the CONVEX expansion cabinet with the screws provided as shown in Figure 4-8, "Host Adapter Transceiver Mounting":

Figure 4–8, Host Adapter Transceiver Mounting



CAUTION

A bend in a fiber optic cable with a radius of less than 1/2 inch will damage the cable.

4. Connect the transmit and receive cables to the transmit and receive terminals on the host adapter transceiver. Then secure the cables to the mounting bracket with the tie wrap provided.
5. Set the processor's front control panel key switch to the **ON** position.
6. Set the VMEbus chassis power control switch to the **ON** position.
7. Contact the UltraNet system manager and have the CONVEX computer assigned to the network.

4.4 Illustrated Parts List

This section is the Illustrated Parts Breakdown (IPB) for the VMEbus host adapter assemblies. Table 4–1, "Parts List-Coaxial" lists the CONVEX part numbers for all Field Replaceable Units (FRUs) for a coaxial host adapter assembly. The table also contains a figure number reference for each FRU:

Table 4–1, Parts List-Coaxial

Description	Part Number	Quantity	Figure No.
Host adapter assembly-coaxial[1]	550-000336-201	1	4-4
Host adapter controller-coaxial	211-000108-200	1	4-4
Host adapter transceiver-coaxial	211-000108-002	1	4-4

[1] An assembly contains a complete set of CONVEX UltraNet Interface hardware.

Table 4–2, "Parts List-Fiber Optic" lists the CONVEX part numbers for all Field Replaceable Units (FRUs) for a fiber optic host adapter assembly. The table also contains a figure number reference for each FRU:

Table 4–2, Parts List-Fiber Optic

Description	Part Number	Quantity	Figure No.
Host adapter assembly-fiber optic[1]	550-000336-200	1	4-4
Host adapter controller-fiber optic	211-000108-200	1	4-4
Host adapter transceiver-fiber optic	211-000108-001	1	4-4

[1] An assembly contains a complete set of CONVEX UltraNet Interface hardware.

Appendix A
Adapter Controller Configurator Document

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

NOTE

The *Adapter Controller Configurator* document contains basic configuration information for the host adapter controller. 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.

ULTRA NETWORK VME ADAPTER CONTROLLER

A1.1 Scope

The purpose of this document is to provide configuration information for the ULTRA NETWORK VME Adapter Controller

1.2 Controller Configuration

```
         RS232   Reset                          VME Adapter to Transceiver
         Port    Switch                                  Port (COAX ribbon)
+------------------|----------------------------------------------------------+
|         ||||    |||||  LLLLL                                  |||||||||||  |
|                        EEEEE                                               |
|                        DDDDD                                               |
|                                                                            |
|                                                                            |
|                        +--------------+               J J J                |
|                        |              |               6 7 8                |
|                        |       80386  |               C C C                |
|                        |       16MHz  |               4 4 4                |
|                        |______________|               . . .                |
|                                                       ! ! .                |
|                                                           !                |
|                                                                            |
+-+    ________________      _________________      ________________   +-+|
  |   |________________|    |_________________|    |________________|   |
  +---|||||||||||||||||----------|||||||||||||||||-----------|||||||||||||||||---+
```

There are five LED indicators near the reset switch. Starting with the LED nearest the Reset Switch they are:

Bus Master LED	Packet Discard LED
Alive LED	Packet Retransmit LED
Spare LED	

The Address of the board in the short address range is set by the jumpers at J6C4, and J7C4. J8C4 is always installed on pin 2 and 3.

J6C4	J7C4	= Address
Out	Out	= 77A0
Out	IN	= 7780
IN	Out	= 7760
IN	IN	= 7740

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.

Index

A

B

C

D

E

F

G

H

I

L

M

N

O

P

R

S

T

U

V

W

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