

DIV32 Hardware Installation Guide

Order Number EK-DIV32-IN-002

digital equipment france, annecy

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WARNING

The following installation instructions provide specific directions for the safe installation of the module kit. For your protection from possible shock or energy hazards, do not attempt to access or disassemble parts of the equipment other than those specified. Refer other servicing to qualified personnel.

ATTENTION

Suivre les instructions pour installer le module en toute sécurité. Afin d'éviter tout risque d'électrocution, ne manipuler que les pièces indiquées. Pour toute autre opération, faire appel à du personnel qualifié.

VORSICHT

Um das Modul richtig und gefahrlos zu installieren, gehen Sie unbedingt nach den folgenden Anweisungen vor: Hantieren Sie auf keinen Fall an anderen als den angegebenen Teilen, oder versuchen Sie nicht, diese zu entfernen. Es könnte sonst Berührungsspannung auftreten. Wartungsarbeiten dürfen ausschließlich von geschultem Fachpersonal ausgeführt werden.

PRECAUCIÓN

Las siguientes instrucciones de instalación ofrecen directrices específicas para una segura instalación del juego de módulos. Para evitar posibles descargas eléctricas o cualquier tipo de riesgo, no intente acceder o desarmar ninguna parte del equipo que no sean las especificadas. En caso de cualquier duda, consulte a personal cualificado.

WAARSCHUWING

Volg onderstaande instructies voor het veilig installeren van de kaart. Om risico's of elektrische schokken te voorkomen, alleen werkzaamheden verrichten aan de gespecificeerde onderdelen. Laat onderhouds- en reparatiewerkzaamheden over aan gekwalificeerd personeel.

ATTENZIONE

Le seguenti istruzioni per l'installazione forniscono informazioni per una corretta installazione del modulo. Onde evitare possibili pericoli di scariche di corrente, non tentare di accedere o smontare parti diverse da quelle indicate. Consultare, per qualsiasi ulteriore necessità, personale qualificato.

ADVARSEL

Følgende installasjonsveiledning viser nøyaktig fremgangsmåte for en korrekt og trygg installasjon av modulen. For å unngå elektrisk støt eller andre personskader, er det viktig at man ikke berører eller prøver å ta fra hverandre deler av utstyret. Utfør bare det som er anvist i håndboken. Overlat all annen reparasjon og service til kvalifisert fagfolk.

注意：

モジュール・キットを安全にインストールするために、必ず本書の指示に従ってください。ここで示されている箇所以外の部分に手を触れたり、部品等を取り外したりするとたいへん危険です。電圧等によるショックやけがのもととなりますから絶対におやめください。他の部分についての修理、変更は、当社技術部にご相談ください。

VARNING

Føljande installationsanvisning innehåller exakt vägledning för en säker installation av modulen. För att undvika elektriska stötar eller annan fara, bör man inte försöka komma åt eller montera isär andra delar av utrustningen, än de angivna. För övrig service, kontakta en fackman.

VAROITUS

Seuraavat asennusohjeet varmistavat moduulikitin turvallisen asennuksen. Jotta vaaratilanteilta vältytään, ei pidä koskea muihin laitteiston osiin kuin ohjeissa on mainittu eikä pyrkiä purkamaan niitä. Muut ylläpitotoimet on jätettävä koulutetun ylläpitohenkilöstön huoleksi.

ADVARSEL

Følgende installationsprocedure giver vejledning i sikker installation af modulet. Forsøg ikke at berøre eller adskille andre dele af udstyret, da der kan være risiko for højspænding. Yderligere service bør udføres af autoriseret personale.

AVISO

As instruções que se seguem explicam a forma de proceder, com segurança, à instalação de um "kit" de módulo. Não tente, de forma alguma, aceder ou abrir as partes do equipamento que não se refiram aqui, para que não corra o risco de choques eléctricos. Qualquer outro tipo de serviços que necessite, exija a presença de pessoal qualificado.

אזהרה

הוראות ההתקנה המובאות להלן נועדו
להביא להתקנה בטוחה.

USA

This equipment generates, uses, and may emit radio frequency. The equipment has been type tested and found to comply with the limits for a Class A computer device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such radio frequency interference. Operation of this equipment in a residential area may cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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Preface

Intended Audience

- Digital Field Service
- Digital's customers who are on Self-Maintenance contracts
- OEMs
- Third-party maintenance companies

The reader is assumed to be familiar with:

- Q-Bus
- MDM
- Normal fault-finding procedures

For the Self-Maintenance Customer

IMPORTANT

Only qualified service personnel should remove or install modules. If you are not qualified to perform the installation of the DIV32 kit, call Digital Field Service to schedule an installation.

It is your responsibility to perform a software backup before Digital Field Service personnel arrive at the site. This step is important to ensure that data is not lost during any installation process.

IMPORTANT

Make sure you are wearing an antistatic wrist strap connected to an earthed antistatic work surface before you handle the modules. The system modules can be damaged by static discharge.

Also make sure the bus grant continuity path is intact after the installation. There must not be any empty backplane slots between modules.

To install the DIV32 kit, carefully follow the installation procedure in Chapter 2, Installing the DIV32-M or Chapter 3, Installing the DIV32-S. If you have problems performing the installation, call Digital Field Service for assistance.

For Digital Field Service

Make sure you take precautions against static when unpacking and installing the module. Use the earth strap and antistatic mat found in the Static-Dissipative Field Service Kit (part number 29-26246). The antistatic kit is part of the Field Service tool kit, not the DIV32 kit.

To install the DIV32 kit, carefully follow the installation procedure in Chapter 2 (-M version) or Chapter 3 (-S version).

Submit a LARS Form After the Installation. For information on completing this form, contact your unit manager.

Conventions

The following conventions are used in this guide:

- WARNING** Provides information to prevent personal injury.
- IMPORTANT** Provides information to prevent damage to equipment or software.
- NOTE** Provides general information about the current topic.

Purpose of this Document

This guide describes the installation of:

- one of the DIV32-M series kits into a BA23, BA123, or H9642 system enclosure
- one of the DIV32-S series kits into a BA200 system enclosure.

It also gives reference information for engineers who are tracing faults on a DIV32 board, showing how to diagnose and replace DIV32 Field Replaceable Units (FRUs).

Associated Documentation

Digital provides the following documentation set for the DIV32 hardware:

- *DIV32 Hardware Installation Guide*
- *DIV32 Maintenance Print Set*
- *DIV32 Device Driver Manual*

The following documents provide reference material:

- *MicroVAX Systems Maintenance Guide*, ¹ EK-O01AA-MG
- *MicroVAX 3500 and MicroVAX 3600 Systems Maintenance Update* ¹, EK-159AA-UD
- *MDM User's Guide*, AA-FM7AB-DN

¹ Included in the MicroVAX Systems Maintenance Kit (ZNABX-GZ, C5).

United States customers may order documents from:

Digital Equipment Corporation
Peripherals and Supplies Group
P. O. Box CS2008
Nashua, NH 03061

Outside the United States, customers should contact their local Digital sales office.

Chapter 1

ISDN and DIV32 Overview

1.1 CCITT Standards

The CCITT has defined ISDN connectivity in the following documents:

- ISDN User-Network Interface Physical Layer Specification (CCITT I.430, 1984 and 1988)
- ISDN User-Network Interface Data Link Layer Specification (CCITT I.441, 1984)
- ISDN User-Network Interface Layer 3 Specification (CCITT I.451, 1984)
- Interface Connector for ISDN Basic Access (ISO/DIS 8877).

The DIV32 hardware is compliant with I.430 and ISO/DIS 8877 (i.e. it implements layer 1); layers 2 and 3 are handled by software.

1.2 Country Specifications

The countries have also defined national ISDN standards. The DIV32 complies with these national standards for the layer 1 interface for ISDN basic rate access.

1.3 The ISDN Network

1.3.1 Basic Access

The Integrated Services Digital Network (ISDN) is a communications network which can carry a huge variety of information, such as voice (telephone conversations), fax, data, images, videotext, and so on. To do this, the physical path is split into concatenated slots of one byte each at 64 Kbps. Depending on the number of such slots on the physical path, access to ISDN is called either "basic access" (also named S0) or "primary access" (also named S2 in Europe and T1 in the USA).

The one to which the DIV32 connects is the basic access. It includes 2 channels, to carry any information defined by the user. These are called the "B" channels (B for Bearer). In addition, a third channel is dedicated to signalling, i.e call set-up, dialling and so on. It is called the "D" channel. The basic access also includes some more bits for frame synchronisation and various physical layer protocol bits. These overhead bits correspond to a throughput of 48 Kbps. In summary, the basic access comprises:

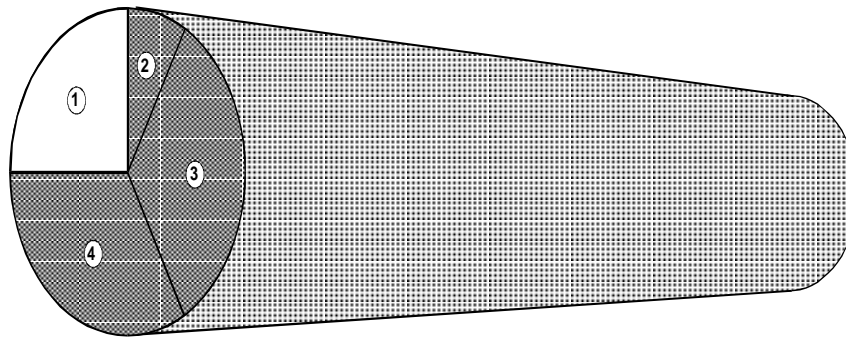
- two B-channels at 64 Kbits per second each
- one D-channel at 16 Kbits per second for signalling information
- overhead bits totalling 48 Kbits per second.

The aggregate throughput is 192 Kbits per second, but only 144 Kbps of this (two B-Channels and the D-Channel) are useful. Figure 1-1 illustrates this.

The DIV32 hardware only supports layer 1 of every channel protocol. On each B-channel, the DIV32 supports DECNET and PSI communications using DDCMP or HDLC (single or double byte addressing). The two B-Channels are independent - one may run DECNET and the other PSI simultaneously.

The D-Channel protocol is handled by the VAX ISDN Software; the DIV32 hardware supports LAPD on this channel.

Figure 1-1: Basic Access Throughput



Key:

1	48 Kbit/s overhead				
2	16 Kbit/s D-Channel	} total 144 Kbits/s	} total 192 Kbit/s		
3	64 Kbit/s B-Channel				
4	64 Kbit/s B-Channel				

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1.3.2 The S-Interface

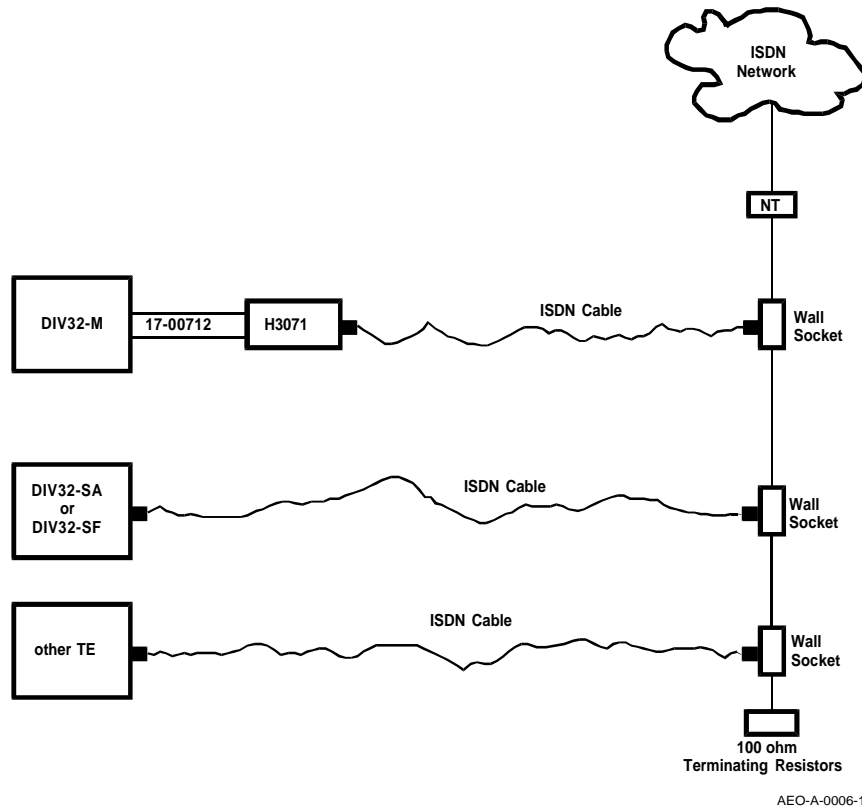
The ISDN network basic access interfaces with the user through an NT (Network Termination) device. The NT generates a bus on which up to 8 TEs (Terminal Equipment) can be connected. Several configurations are supported, as defined in Section 1.3.5.

The NT includes 100Ω resistors to match the bus impedance. At the other end of the bus, such resistors must be provided.

NOTE

The DIV32 does not provide the bus with terminating resistors. Make sure that the S-Bus wall socket has been fitted with such resistors.

Figure 1–2: Electrical Connections between DIV32 and ISDN S-Bus



1.3.3 ISDN Mechanical Interface

The interface to the ISDN Basic Access bus is via an ISDN cable, which connects the S-Bus wall socket (jack) to the DIV32 ISDN socket (see Figure 1–2).

The latter is located on the I/O panel (DIV32-M) or on the module handle (DIV32-S). The physical characteristics of this connector are defined by ISO 8877; the DIV32 pin assignments are given in Table 1–1.

Table 1–1: Pin Assignments for the DIV32 ISDN Connector

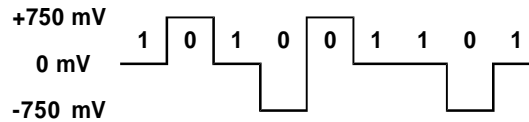
Pin Number	TE	Polarity
1	not connected	+
2	not connected	–
3	Transmit	+
4	Receive	+
5	Receive	–
6	Transmit	–
7	not connected	–
8	not connected	+

Note that pins 1, 2, 7, and 8 are defined by ISO 8877 as being for optional power supplies on the ISDN Bus. These are not used by the DIV32.

1.3.4 ISDN Electrical Interface

The signal levels on the bus are shown in Figure 1–3. A binary "1" is represented by no signal (0 Volt), while "0"s are alternately represented by +750 mV and -750 mV.

Figure 1–3: Signal Levels on ISDN Bus



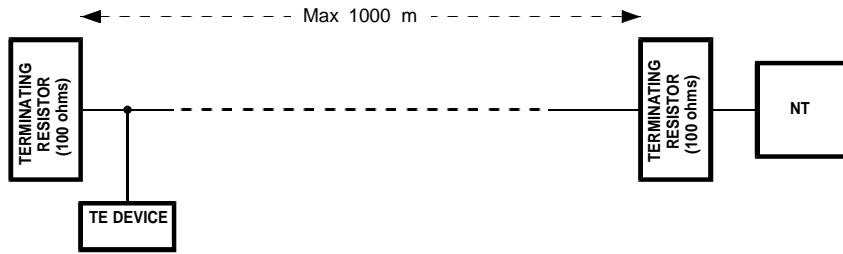
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1.3.5 S-Bus Configurations

The DIV32 works as a TE on the Basic Rate Access bus. It can be set anywhere on the bus, provided that the bus configuration rules defined by CCITT I.430 are adhered to. I.430 defines the following three possible configurations:

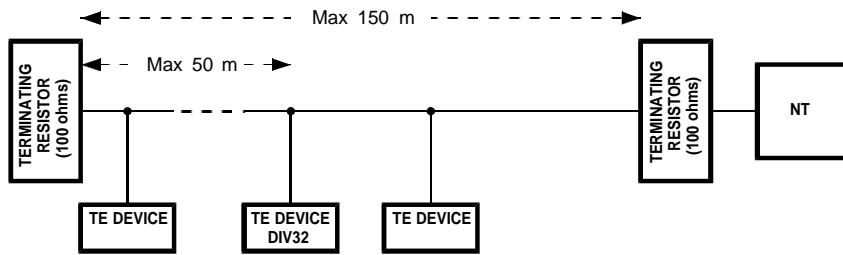
1. **Point to point connection**—see Figure 1–4. The DIV32 is the only TE. The line length can be up to 1 km.
2. **Short passive bus**—see Figure 1–5. The DIV32 can be any of the eight TE's on the bus; there are no constraints on the other seven TE's.
3. **Extended passive bus**—see Figure 1–6. The DIV32 can be any of the eight TE's on the bus; there are no constraints on the other seven TE's. The DIV32, like any other TE, must however be located within the last 50 metres of the bus.

Figure 1-4: Point to Point Configuration



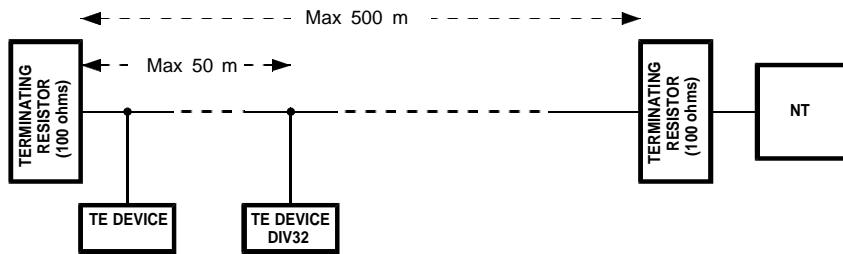
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Figure 1-5: Short Passive Bus Configuration



AE-A000B-00

Figure 1-6: Extended Passive Bus Configuration



AE-A000C-00

1.4 DIV32 Overview

1.4.1 General Description

This section briefly describes the architecture of the DIV32.

The DIV32 is an ISDN Basic Rate access communications controller for Q-Bus VAX systems (i.e. MicroVAXes). It can simultaneously handle the two B-Channels and the D-Channel defined by Basic Rate access.

The DIV32 controller provides the following features:

- Full compliance with the CCITT I 430 Standard
- The DIV32 supports the LAPD synchronous protocol on the D-Channel (16 Kbits/sec).
- The DIV32 supports the following synchronous protocols on the two B-channels:

DDCMP

HDLC (single and double byte addressing)

Rate adaptation on the B-Channels is not supported: the speed is fixed at 64 Kbits/sec.

A microprocessor controls the internal operation of the DIV32. ROM-based diagnostics, running on the microprocessor, extensively test the module each time it is powered on or reset. An MDM diagnostic program for MicroVAX systems is also available.

All DIV32 functions and configurations are programmable, apart from the Q-Bus base address which is set up on DIP switches.

Data is transferred between the memory of the host system and the DIV32's internal data buffers by DMA transfer. Command blocks are used to send instructions to, and receive responses from, the DIV32. Command blocks and responses reside in DIV32 memory and are read and written by the host via three of the registers. The DIV32 has four registers in the Q-Bus I/O space which are used to initiate and monitor command block processing.

1.4.2 Host Machine

The DIV32 must be configured on MicroVAX Q-Bus systems in accordance with the standard Q-Bus configuration rules. The DIV32 uses:

- One Q-Bus QUAD slot
- for the DIV32-M only: one I/O slot, size B
- 3.9 AC loads
- One DC load
- 5.5 A maximum current at 5V.

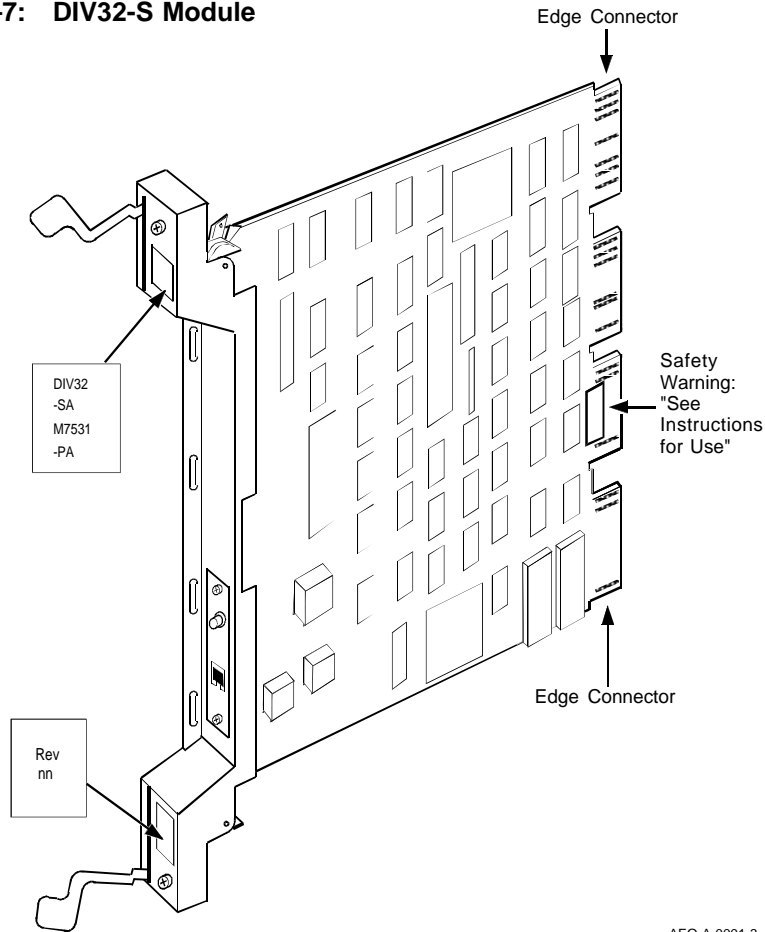
It does not require a 12V supply.

The DIV32 Q-Bus Base address must be set, using on-board DIP switches. The interrupt vector address is programmable.

The placement of the DIV32 on the bus must respect device-ordering guidelines; this is important because it makes extensive use of DMA transfers over the Q-Bus.

1.5 DIV32 Versions

Figure 1-7: DIV32-S Module



The DIV32 is available in the following two versions:

1. The **DIV32-S**, which consists of:
 - A quad-height module (M7531-PA), for insertion into a BA200-Series Enclosure
 - This DIV32 Hardware Installation Guide
 - Gap fillers and screws (DIV32-SF only)

- A loopback plug for testing.

There are two “subspecies” of DIV32-S – the **DIV32-SF**, which is used when installation takes place on-site, and the **DIV32-SA**, which is identical to the DIV32-SF† but is installed at the factory.

The DIV32-S board is illustrated in Figure 1–7.

2. The **DIV32-M**, which consists of:

- A quad-height module (M7531-00)
- This DIV32 Hardware Installation Guide

It has three variations, depending on the enclosure used:

Enclosure	Part Number of Required Cabinet Kit
BA23	CK-DIV32-MB
BA123	CK-DIV32-MA
H9642	CK-DIV32-MF

Each cabinet kit for the DIV32-M consists of:

- the DIV32-M interface panel H3071 (size B)
- a 17-00712 flat cable, which goes from the DIV32 board to the I/O panel. The length of this cable will depend on the cabinet kit used.
- a loopback plug H3072.

The DIV32-M board is illustrated in Figure 1–8.

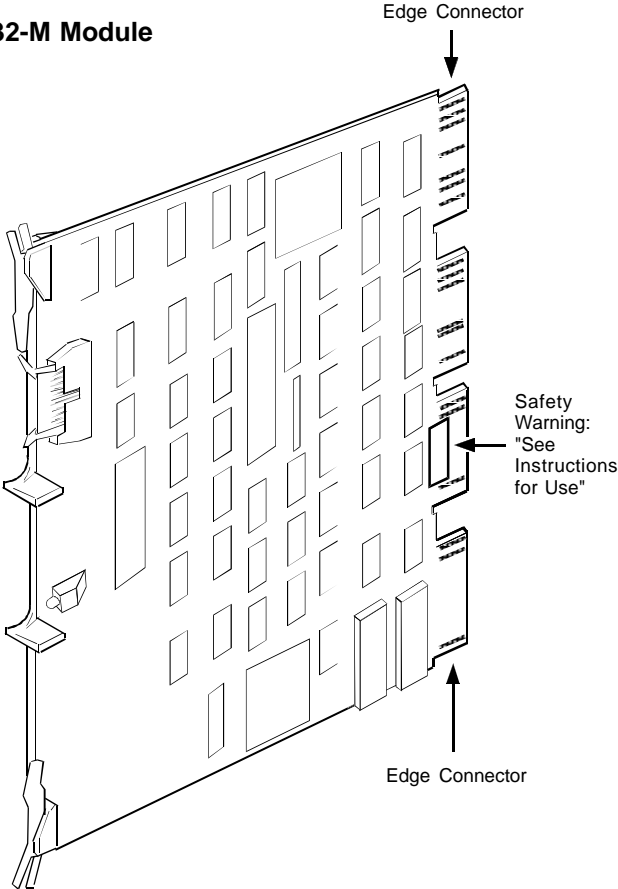
All DIV32 versions are in the form of a QUAD Q-Bus module, the dimensions of which are 21.6 cm × 26.5 cm (8.51 inches × 10.44 inches).

The DIV32-M is connected to the ISDN lines through the ribbon cables and the H3071 interface panel; the DIV32-S is connected directly to the ISDN lines.

The ISDN cable is used to connect the H3071 interface panel (DIV32-M) or module handle (DIV32-S) to the ISDN standard plate.

† except that the -SF has the gap fillers and screws

Figure 1-8: DIV32-M Module



AEO-A-000Q-2

Chapter 2

Installing the DIV32-M

This chapter concerns the -M version only. If you are installing the DIV32 in a BA200 series enclosure, ignore this chapter; refer instead to Chapter 3.

WARNING

The following installation instructions provide specific directions for the safe installation of the module kit. For your protection from possible shock or energy hazards, do not attempt to access or disassemble parts of the equipment other than those specified. Refer other servicing to qualified personnel.

ATTENTION

Suivre les instructions pour installer le module en toute sécurité. Afin d'éviter tout risque d'électrocution, ne manipuler que les pièces indiquées. Pour toute autre opération, faire appel à du personnel qualifié.

VORSICHT

Um das Modul richtig und gefahrlos zu installieren, gehen Sie unbedingt nach den folgenden Anweisungen vor: Hantieren Sie auf keinen Fall an anderen als den angegebenen Teilen, oder versuchen Sie nicht, diese zu entfernen. Es könnte sonst Berührungsspannung auftreten. Wartungsarbeiten dürfen ausschließlich von geschultem Fachpersonal ausgeführt werden.

PRECAUCIÓN

Las siguientes instrucciones de instalación ofrecen directrices específicas para una segura instalación del juego de módulos. Para evitar posibles descargas eléctricas o cualquier tipo de riesgo, no intente acceder o desarmar ninguna parte del equipo que no sean las especificadas. En caso de cualquier duda, consulte a personal cualificado.

WAARSCHUWING

Volg onderstaande instructies voor het veilig installeren van de kaart. Om risico's of elektrische schokken te voorkomen, alleen werkzaamheden verrichten aan de gespecificeerde onderdelen. Laat onderhouds- en reparatiewerkzaamheden over aan gekwalificeerd personeel.

ATTENZIONE

Le seguenti istruzioni per l'installazione forniscono informazioni per una corretta installazione del modulo. Onde evitare possibili pericoli di scariche di corrente, non tentare di accedere o smontare parti diverse da quelle indicate. Consultare, per qualsiasi ulteriore necessità, personale qualificato.

ADVARSEL

Følgende installasjonsveiledning viser nøyaktig fremgangsmåte for en korrekt og trygg installasjon av modulen. For å unngå elektrisk støt eller andre personskader, er det viktig at man ikke berører eller prøver å ta fra hverandre deler av utstyret. Utfør bare det som er anvist i håndboken. Overlat all annen reparasjon og service til kvalifisert fagfolk.

注意：

モジュール・キットを安全にインストールするために、必ず本書の指示に従ってください。ここで示されている箇所以外の部分に手を触れたり、部品等を取り外したりするとたいへん危険です。電圧等によるショックやけがのもととなりますから絶対におやめください。他の部分についての修理、変更は、当社技術部にご相談ください。

VARNING

Följande installationsanvisning innehåller exakt vägledning för en säker installation av modulen. För att undvika elektriska stötar eller annan fara, bör man inte försöka komma åt eller

montera isär andra delar av utrustningen, än de angivna. För övrig service, kontakta en fackman.

VAROITUS

Seuraavat asennusohjeet varmistavat moduulikitin turvallisen asennuksen. Jotta vaaratilanteilta vältytään, ei pidä koskea muihin laitteiston osiin kuin ohjeissa on mainittu eikä pyrkiä purkamaan niitä. Muut ylläpitotoimet on jätettävä koulutetun ylläpitohenkilöstön huoleksi.

ADVARSEL

Følgende installationsprocedure giver vejledning i sikker installation af modulet. Forsøg ikke at berøre eller adskille andre dele af udstyret, da der kan være risiko for højspænding. Yderligere service bør udføres af autoriseret personale.

AVISO

As instruções que se seguem explicam a forma de proceder, com segurança, à instalação de um "kit" de módulo. Não tente, de forma alguma, aceder ou abrir as partes do equipamento que não se refiram aqui, para que não corra o risco de choques eléctricos. Qualquer outro tipo de serviços que necessite, exija a presença de pessoal qualificado.

אזהרה

הוראות ההתקנה המובאות להלן נועדו
להביא להתקנה בטוחה.

2.1 System Enclosures

The DIV32-M is used in three types of MicroVAX enclosures.

BA23	Used in tabletop, pedestal, and rack-mounted installations
BA123	Used as a movable floor-standing unit
H9642	Used to hold large mass storage devices (tape and disk drives)

For more information: See the *MicroVAX Systems Maintenance Guide* for more information about the enclosures.

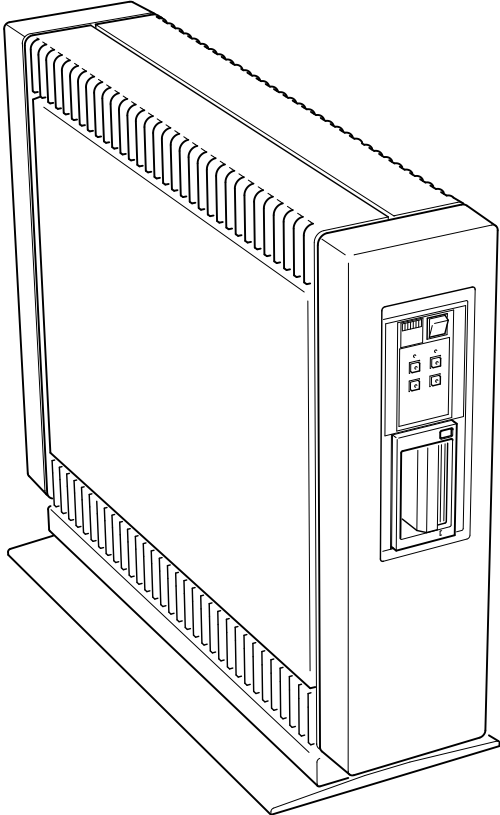
2.1.1 BA23 Enclosure

The BA23 is used in tabletop, pedestal, and rack-mounted installations. Figure 2-1 shows the pedestal version. The BA23 includes the following components:

- 230 watt power supply
- control panel
- I/O distribution panel
- two fans
- space for two 13.3 cm (5.25 in) mass storage devices.

The backplane has eight slots for modules compatible with the Q22-bus.

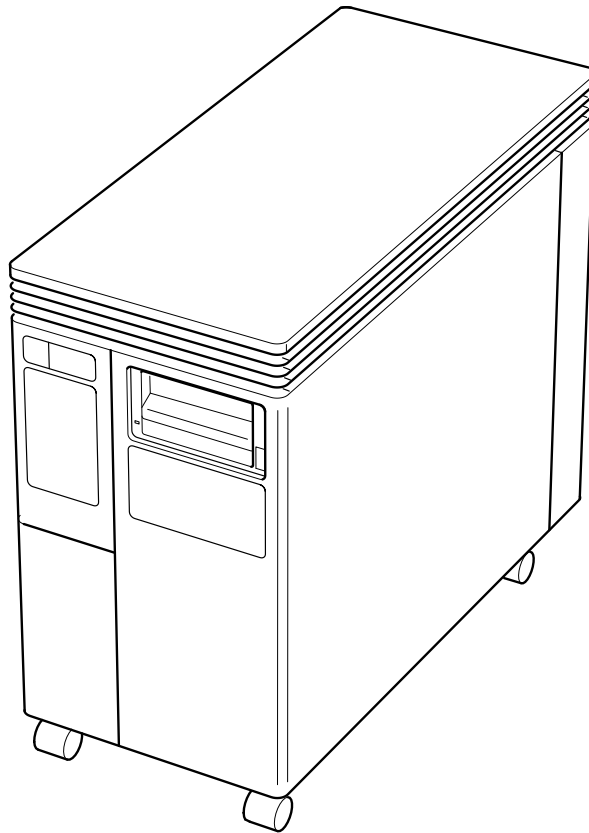
Figure 2-1: BA23 Enclosure



MA-X0020-88

2.1.2 BA123 Enclosure

Figure 2–2: BA123 Enclosure



MA-X0021-88

The BA123 is a movable floor-standing enclosure (Figure 2–2). The BA123 includes the following components:

- 460 watt power supply
- control panel
- I/O distribution panel
- two fans

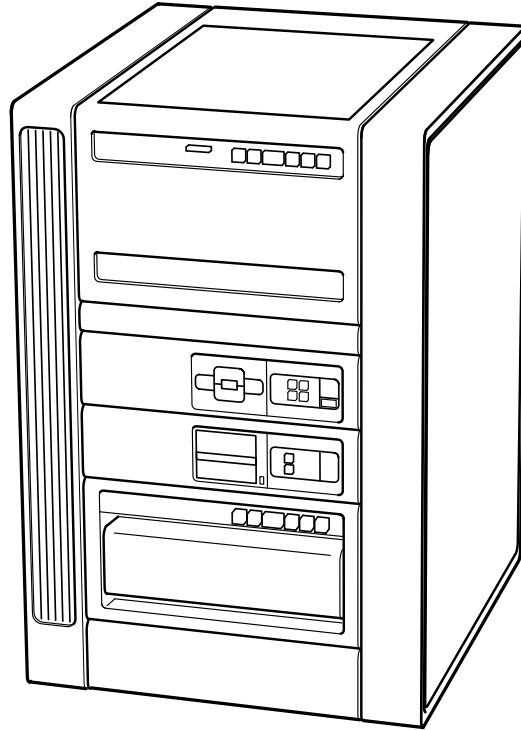
2-6 Installing the DIV32-M

- space for five 13.3 cm (5.25 in) mass storage devices.

The backplane has 12 slots for modules compatible with the Q22-bus.

2.1.3 H9642 Enclosure

Figure 2-3: H9642 Enclosure



MA-X0022-88

The H9642 enclosure (Figure 2-3) contains two rack-mounted BA23 enclosures. The H9642 also includes the following components:

- two 230 watt power supplies
- two control panels
- one large I/O distribution panel
- four fans

- space for four 13.3 cm (5.25 in) and two 35.6 cm (14 in) mass storage devices

Each BA23 enclosure in the H9642 has its own 8-slot backplane. The backplanes are connected by an expansion kit.

2.2 Pre-installation: Site Preparation

The DIV32-M uses one quad slot in the backplane. Before continuing, check that there is one such slot available.

Check that the ISDN access point (the female connector on the wall) is close enough to the VAX for connection with the supplied ISDN cable.

2.3 The Kits

Two kits are required for the installation of the DIV32-M:

1. The DIV32-M kit (the board itself plus this book)
2. The DIV32-M cabinet kit (ribbon cable, screws, etc.)

There are three varieties of the DIV32-M cabinet kit, one for each type of enclosure.

Enclosure	Part Number of Required Cabinet Kit
BA23	CK-DIV32-MB
BA123	CK-DIV32-MA
H9642	CK-DIV32-MF

2.3.1 Unpacking the Kits

Unpack the shipment and check the contents as follows:

1. Look for external damage on the shipping container, such as dents, holes, or crushed corners.
2. Do not dispose of the packing material until you have installed the module and tested the system successfully.

IMPORTANT

Use the Static-Dissipative Field Service Kit (Part Number 29-26246) for the next step. If you have another antistatic kit, follow the instructions with the kit.

3. Put on your antistatic wrist strap. Attach the crocodile clip to the metal chassis of the system enclosure. Place the antistatic mat on your work surface. The earth wire has a press stud (snap) that connects to the mat.
4. Use Table 2-1 and Table 2-2 to identify the contents of the DIV32 kit. The check-list numbers correspond to the numbered items in Figure 2-4 and Figure 2-5.
5. Remove the DIV32 module from the antistatic bag.
6. Inspect the module for shipping damage. Carefully check for cracks, breaks, and loose components.
7. Place the DIV32 module on the antistatic mat.

If any item is missing or damaged, contact:

- the customer's sales representative
- the customer's delivery agent.

Table 2-1: DIV32-M Kit Check-List

Part Description	Part Number
❶ DIV32-M module	M7531-00
❷ This Installation Guide	EK-DIV32-IN-002

Figure 2-4: DIV32-M Kit Contents

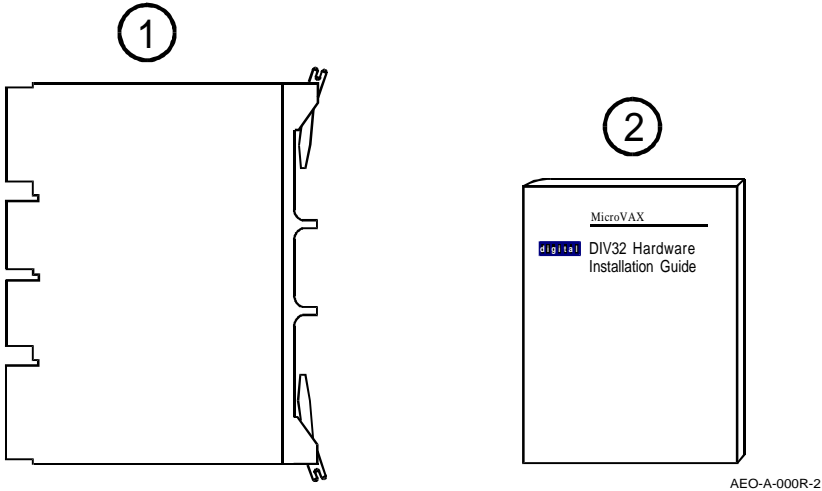
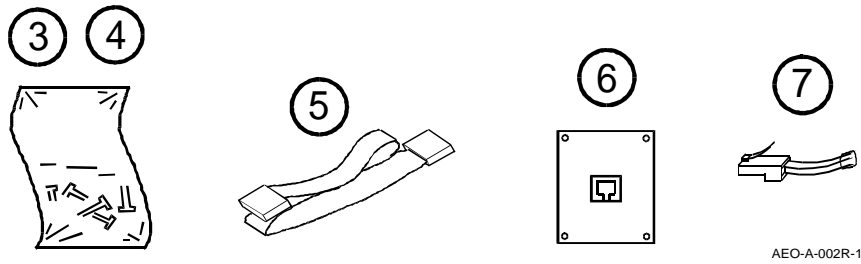


Table 2-2: DIV32-M Cabinet Kit Check-List

Part Description	Part Number
③ Four screws	90-06021-01
④ Four washers	90-0663-00
⑤ Ribbon cable	
For BA123 kit: 25 inch ribbon cable	17-00712-01
For BA23 kit: 15 inch ribbon cable	17-00712-02
For H9642 kit: 37 inch ribbon cable	17-00712-03
⑥ Interface panel	H3071
⑦ Loopback plug	H3072

Figure 2-5: DIV32-M Cabinet Kit Contents



2.3.2 Software Backup

It is the customer's responsibility to perform a software backup.

Make sure that the software has been backed up before you continue.

2.4 Checking the System Configuration

Before you install the DIV32, you must complete a configuration worksheet for the enclosure that you are using (see Figure 2-6 or Figure 2-7 or Figure 2-8). This step ensures that you do not exceed the system's limits for power and bus loads.

Figure 2-6: BA23 Configuration Worksheet

BACKPLANE SLOT	MODULE	CURRENT (AMPS)		POWER (WATTS)	BUS LOADS		I/O PANEL INSERTS	
		+5 V	+12 V		AC	DC	B (2X3)	A (1X4)
1	AB CD							
2	AB CD							
3	AB CD							
4	AB CD							
5	AB CD							
6	AB CD							
7	AB CD							
8	AB CD							
MASS STORAGE								
1					0	0	0	0
2					0	0	0	0
COLUMN TOTALS								
MUST NOT EXCEED		36 A	7 A	230 W	38	20	4	2

INSTALLING AN ADAPTOR PLATE (PN 74-27720-01) GIVES YOU THREE MORE TYPE A INSERT PANELS, BUT DECREASES THE NUMBER OF TYPE B INSERT PANELS TO TWO.

AE-N000S-00

Figure 2-7: BA123 Configuration Worksheet

SLOT	MODULE	REGULATOR A			REGULATOR B			BUS LOADS		I/O INSERTS	
		CURRENT (AMPS)		POWER (WATTS)	CURRENT (AMPS)		POWER (WATTS)	AC	DC	B (2X3)	A (1X4)
		+5 V	+12 V		+5 V	+12 V					
1	AB CD										
2	AB CD										
3	AB CD										
4	AB CD										
5	AB CD										
6	AB CD										
7	AB CD										
8	AB CD										
9	AB CD										
10	AB CD										
11	AB CD										
12	AB CD										
13	AB CD	0.52		2.60							
MASS STORAGE											
5											
4											
3								0	0	0	0
2								0	0	0	0
1											
COLUMN TOTALS											
MUST NOT EXCEED		36 A	5 A	230 W	36 A	5 A	230 W	38	20	6	4

RECOMMENDED FOUR DRIVES MAXIMUM - TWO IN SHELVES 1 AND 2, AND TWO IN SHELVES 3, 4, OR 5. INSTALLING AN ADAPTOR PLATE (PN 74-27720-01) GIVES YOU THREE MORE TYPE A INSERT PANELS, BUT DECREASES THE NUMBER OF TYPE B INSERT PANELS TO FOUR.

AE-N000T-00

You need to gain access to the modules installed in the system backplane before you configure the system. Refer to the system documentation for procedures to help you remove any covers and gain access to the modules.

To check the system configuration, perform the following steps:

1. On the worksheet, list all the devices already installed in the system. Each module has an identifying label on the cover or handle.

Figure 2-8: H9642 Configuration Worksheet

BACKPLANE SLOT	MODULE	CURRENT (AMPS)		POWER (WATTS)	BUS LOADS		I/O PANEL INSERTS	
		+5 V	+12 V		AC	DC	B (2X3)	A (1X4)
UPPER	1 AB CD							
	2 AB CD							
	3 AB CD							
	4 AB CD							
	5 AB CD							
	6 AB CD							
	7 AB CD							
	8 AB CD	M9404	0	0	0	0	0	0
MASS STORAGE								
1					0	0	0	0
2					0	0	0	0
COLUMN TOTALS								
MUST NOT EXCEED		36 A	7 A	230 W	17			
LOWER	1 AB CD	M9405-YB	0	0	0	0	0	0
	2 AB CD							
	3 AB CD							
	4 AB CD							
	5 AB CD							
	6 AB CD							
	7 AB CD							
	8 AB CD							
MASS STORAGE								
1					0	0	0	0
2					0	0	0	0
COLUMN TOTALS								
MUST NOT EXCEED		36 A	7 A	230 W	17	20	11	6

INSTALLING AN ADAPTOR PLATE (PN 74-27720-01) GIVES YOU THREE MORE TYPE A INSERT PANELS, BUT DECREASES THE NUMBER OF TYPE B INSERT PANELS TO NINE.

AE-N000U-00

2. List all the devices you plan to install in the system.
3. Fill in the information for each device, using the data listed in Table 2-3.
4. Add up the columns. Make sure the totals are within the limits for the enclosure.

Table 2-3: Power and Bus Load Data for DIV32-M

	Module	Current (Amps) (Max)		Power (Max)	Bus Loads	
		+5 V	+12 V	Watts	AC	DC
AAV11	A1009	1.8	0.0	9.0	2.1	0.5
ADV11	A1008	3.2	0.0	16.0	2.3	0.5
AXV11	A026	2.0	0.0	10.0	1.2	0.3
DELQA	M7516	2.7	0.5	19.5	2.2	0.5
DEQNA	M7504	3.5	0.50	23.5	2.2	0.5
DFA01	M3121	1.97	0.40	14.7	3.0	1.0
DHV11	M3104	4.5	0.55	29.1	2.9	0.5
DIV32	M7531	5.5	0.0	27.5	3.9	1.0
DLVJ1	M8043	1.0	0.25	8.0	1.0	1.0
DMV11-M	M8053	3.4	0.4	21.8	2.0	1.0
DMV11-N	M8064	3.4	0.4	21.8	2.0	1.0
DPV11	M8020	1.2	0.30	9.6	1.0	1.0
DRQ3B	M7658	4.5	0.0	22.5	2.0	1.0
DRV1J	M8049	1.8	0.0	9.0	2.0	1.0
DRV1W	M7651	1.8	0.0	9.0	2.0	1.0
DSV11	M3108	5.43	0.69	38.0	3.9	1.0
DZQ11	M3106	1.0	0.36	9.3	1.4	0.5
IBQ01	M3125	5.0	0.0	25.0	4.6	1.0

Table 2-3 (Cont.): Power and Bus Load Data for DIV32-M

	Module	Current (Amps) (Max)		Power (Max)	Bus Loads	
		+5 V	+12 V	Watts	AC	DC
IEQ11	M8634	3.5	0.0	17.5	2.0	1.0
KA630	M7606	6.2	0.14	32.7	2.7	1.0
KDA50-Q	M7164	6.93	0.0	34.65	3.0	0.5
KDA50-Q	M7165	6.57	0.03	33.21	–	–
KLESI	M7740	3.0	0.0	15.0	2.3	1.0
KMV1A	M7500	2.6	0.2	15.4	3.0	1.0
KWV11	M4002	2.2	13 mA	11.156	1.0	0.3
LPV11	M8086	1.6	0.0	8.0	1.8	0.5
M9060		5.3	0.0	26.5	0.0	0.0
MRV11	M7942	1.6 ¹	0.0	8.0 ¹	3.0	0.5
MS630-AA	M7607	1.0	0.0	5.0	–	–
MS630-BA	M7608	1.3	0.0	6.5	–	–
MS630-CA	M7609	2.1	0.0	10.5	–	–
MS650	M7621	2.7	0.0	13.5	–	–
RA70		3.3	2.9	69.4	–	–
RC25		1.0	2.5	35.0	–	–
RD51		1.0	1.6	24.2	–	–
RD52		1.0	2.5	35.0	–	–
RD53		0.9	2.5	34.5	–	–
RD54		1.3	1.34	23.7	–	–
RQDX2	M8639-YB	6.4	0.1	33.2	2.0	1.0
RQDX3	M7555	2.48	0.06	13.2	1.0	1.0

¹Value is for the unpopulated module only.

Table 2–3 (Cont.): Power and Bus Load Data for DIV32-M

	Module	Current (Amps) (Max)		Power (Max)	Bus Loads	
		+5 V	+12 V	Watts	AC	DC
RQDXE	M7513	0.8	0.0	4.0	1.0	0.0
RX33		0.5	0.3	5.6	–	–
RX50		0.85	1.8	25.9	–	–
TK50		1.35	2.4	35.6	0.0	0.0
TK70		1.3	2.4	35.3	–	–
TQK50	M7546	2.9	0.0	14.5	2.8	0.5
TQK70	M7559	3.5	0.0	17.5	4.3	0.5
TSV05	M7196	6.5	0.0	32.5	3.0	1.0
VCB01	M7602	5.0	0.0	25.0	3.0	1.0
VCB02	M7168	3.4	0.0	17.0	0.0	0.0
VCB02	M7169	5.8	0.75	38.0	3.5	1.0

2.4.1 Bus Continuity

This section describes the bus grant continuity for the BA23, BA123, and H9642 enclosures.

A *dual-height* module has connectors that fit into two rows of a backplane slot. Two dual-height modules can occupy one backplane slot.

A *quad-height* module has connectors that fit into all four rows of a backplane slot. One quad-height module occupies one backplane slot.

The DIV32-M is a quad-height module.

2.4.1.1 MicroVAX Memory Interconnect

Certain rows within certain slots on all the enclosures described in this chapter are interconnected, forming a separate bus to the Q22-Bus. This feature is termed MicroVAX Memory Interconnect. Note that the Q22-Bus is only implemented on those rows which do *not* have MicroVAX Memory Interconnect; thus the DIV32-M, which fills all four rows of a slot, can only be placed in a slot which does not have any MicroVAX Memory Interconnect rows within it.

The following table shows how the various enclosures are divided up between Q22-Bus and MicroVAX Memory Interconnect (MMI).

Enclosure	Slot	Rows	Q-Bus or MMI
BA23	1	A,B	Q-Bus
BA23	1	C,D	MMI
BA23	2	A,B	Q-Bus
BA23	2	C,D	MMI
BA23	3	A,B	Q-Bus
BA23	3	C,D	MMI
BA23	4,5,6,7,8 ¹	all	Q-Bus
BA123	1	A,B	Q-Bus
BA123	1	C,D	MMI
BA123	2	A,B	Q-Bus
BA123	2	C,D	MMI
BA123	3	A,B	Q-Bus
BA123	3	C,D	MMI
BA123	4	A,B	Q-Bus
BA123	4	C,D	MMI
BA123	5 to 12 incl. ¹	all	Q-Bus

¹suitable for DIV32

Enclosure	Slot	Rows	Q-Bus or MMI
BA123	13	all	neither
H9642		See values for BA23	

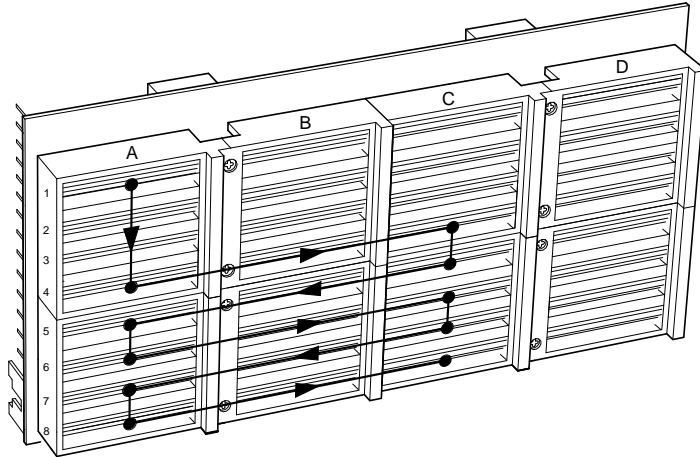
2.4.1.2 BA23 Bus Continuity

The BA23 backplane has eight slots for dual- or quad-height modules compatible with the Q22-bus. Each slot has four rows: A, B, C, and D. Figure 2-9 shows the grant continuity for the backplane.

Rows C and D of slots 1, 2, and 3 are not on the Q-Bus (see Section 2.4.1.1). You should only install MS630 memory modules in rows C and D of slots 2 and 3. You can install any dual-height modules in rows A and B of slots 2 and 3. The CPU module uses slot 1.

If you install a dual-height module in any of the slots 4 to 8 inclusive, you usually have to install another dual-height module or an M9047 grant card in the other two rows of the slot. The exception is the last dual-height module installed on the grant continuity chain. For example, a dual-height module installed in rows A and B of slot 6 does not need a grant card in rows C and D, if it is the last module in the system.

Figure 2–9: BA23 Backplane



MA-X0028-88

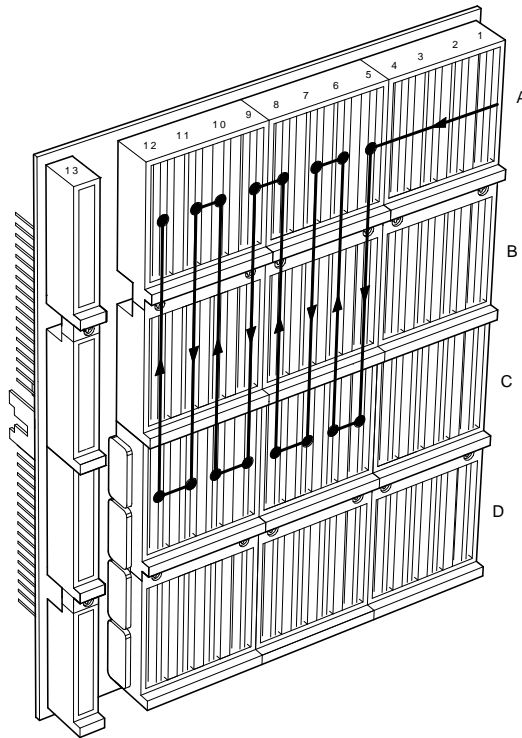
2.4.1.3 BA123 Bus Continuity

The BA123 has a 13-slot backplane. The first 12 slots of the backplane are for dual- or quad-height modules compatible with the Q22-bus. Each backplane slot has four rows: A, B, C, and D. Figure 2–10 shows the grant continuity for the backplane.

The rows C and D of slots 1, 2, 3, and 4 are not on the Q-Bus (see Section 2.4.1.1). You can use MS630 memory modules only in rows C and D of slots 2 and 3. You can use any dual-height Q22-bus module in the rows A and B of slots 2, 3, and 4. The CPU module uses slot 1.

As a rule, if you use any dual-height modules in slots 5 to 12 inclusive, you must install another dual-height module or an M9047 grant card in the other two rows of the slot. The exception is the last dual-height module installed on the grant continuity chain. For example, if the last dual-height module is in rows A and B of slot 9, you do not need a grant card in rows C and D.

Figure 2–10: BA123 Backplane



MA-X0029-88

2.4.1.4 H9642 Bus Continuity

The H9642 contains two BA23 enclosures. Each BA23 has its own backplane (Figure 2–9). The backplanes are connected by the M9404 and M9405-YB dual-height interconnect modules. The M9404 module must occupy the last dual-height Q22-bus slot (rows A and B, or rows C and D) in the BA23-A (top) enclosure. The M9405-YB module must occupy rows A and B of slot 1 in the BA23-C (bottom) enclosure. Since the M9405-YB occupies this slot, the BA23-C cannot have a CPU module.

The locations and priorities of all other modules in the two BA23 enclosures are the same for each BA23.

NOTE

If you install any devices in the BA23-C backplane, you must install a module or grant card in all Q22-bus slots in the BA23-A backplane. If there are any empty Q22-bus slots in the BA23-A backplane, the devices in the BA23-C backplane will not work.

2.4.2 Power Supplies

The BA23 enclosure contains one 230 watt power supply.

The BA123 enclosure contains one 460 watt power supply with two regulators. Regulator A supplies power to the odd-numbered slots in the backplane. Regulator B supplies power to the even-numbered slots in the backplane. The maximum power drawn from each regulator must not exceed 230 watts.

The H9642 enclosure has two 230 watt power supplies, one in each BA23 enclosure.

Each power supply or power supply regulator in the enclosure must have a minimum 4.5 amp load on the 5 volt output to maintain regulation. If a power supply does not meet the minimum load requirement, you *must* install an M9060 load module in one of the open backplane slots powered by that power supply. Otherwise, the power supply enters an error mode and shuts down the system.

If a power supply meets the minimum load requirement, you should remove any existing M9060 load module.

2.4.3 Module Order

The order of modules in the backplane depends on four factors:

- the relative use of devices in the system
- the expected performance of each device relative to other devices
- the ability of a device to tolerate delays between bus requests and bus grants (delay tolerance)
- the tendency of a device to prevent devices farther from the CPU from accessing the bus.

Use the following recommended module order as a guideline for installing modules in a BA23, BA123, or H9642 enclosure. Read across, like normal text.

KA620/KA630	MS630	AAV11	ADV11
AXV11	KWV11	DRV1J	TSV05
DMV11		DEQNA/DELQA/DESQA	DPV11
DIV32	DSV11	KMV1A	DZQ11
DHQ11	DFA01	LPV11	VCB02
DRV1W	IEQ11	ADQ32	DRQ3B
IBQ01	KLESI	TQK50	TQK70
KDA50	RQDX3	KFQSA	M9060

2.5 Finding CSR Addresses and Interrupt Vectors

When you add a DIV32 module to the backplane, you need to configure the new module and reconfigure the modules already installed. Use the following procedures to find the new CSR addresses and interrupt vectors for the modules.

For modules in a MicroVAX system, you can either use the CONFIG program, or you can manually calculate CSR addresses and interrupt vectors. To calculate values manually, see Chapter 5 of the *MicroVAX Systems Maintenance Guide*.

The CONFIG program is in the MicroVMS or VMS SYSGEN utility. When you type in a list of the devices in the system, CONFIG automatically provides CSR address and interrupt vector information. Table 2-4 lists the devices supported by this utility.

If you have a non-Digital device, see the device documentation for configuration information.

Table 2-4: Devices Supported by SYSGEN

Device	Enter at DEVICE> Prompt
DHV11	DHV11
DHQ11	DHV11
DELQA	QNA
DEQNA	QNA
DPV11	DPV11
DRV1W	DR11W
DSV11	DSV11
DIV32	DIV32
DZQ11	DZ11
IEQ11	IEQ11
RQDX3	UDA
TQK50	TU81
TQK70	TU81
TSV05	TS11

To use the SYSGEN utility, follow these steps:

1. With VMS or MicroVMS running, log in to the system account.
2. Type the following command at the system command prompt:

```
MCR SYSGEN
```
3. Press . The utility responds with the prompt

```
SYSGEN>
```
4. At the prompt, type

```
CONFIGURE
```
5. Press . The utility responds with the prompt

```
DEVICE>
```
6. Enter the abbreviation for each system device (Table 2-4). Include those devices already installed and those you intend to install.

Enter one abbreviation per line, then press **[Return]**. The *DEVICE>* prompt prompts you for another entry. If you are installing more than one unit of a particular device, enter a space and the number of devices after the abbreviation. For example, **DHV11 2** indicates two DHV11 modules.

7. After you have entered all devices, press **[Ctrl Z]**. The program displays the following information for each device you entered:

- CSR address and vector
- the name assigned to the device by the operating system
- the operating system support status (yes or no)

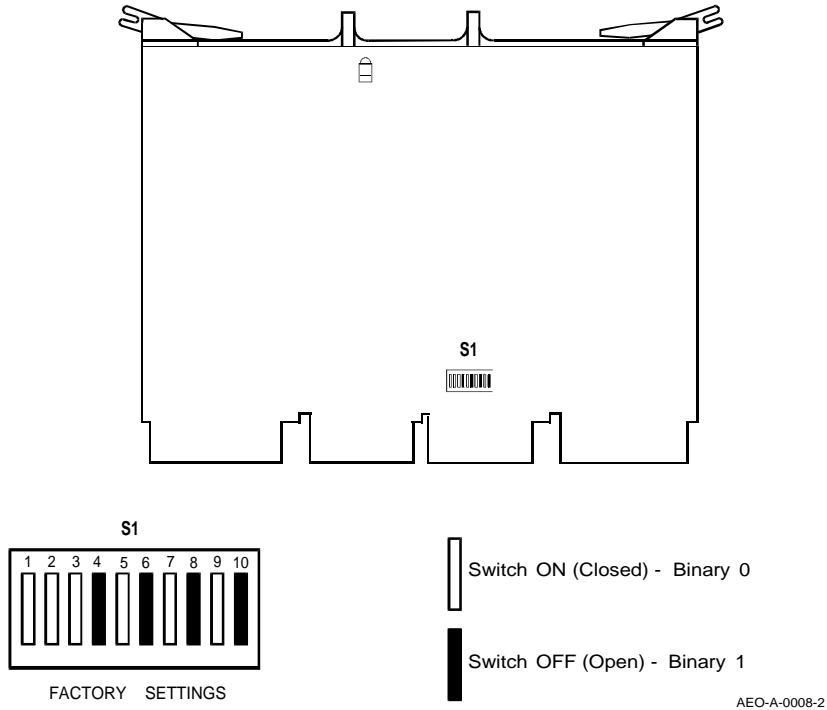
The program uses an asterisk (*) to indicate a floating address or vector. If a particular device has several units, the first address refers to the first device to be installed.

8. To exit from the SYSGEN utility, type **EXIT** at the SYSGEN prompt and press **[Return]**.
9. Log out of the system account.

2.6 Configuring the DIV32-M Module



You select the CSR address for the DIV32 by using the DIL switch (S1) on the module (Figure 2-11). The CSR address is floating. The factory setting for the DIV32 is 17761250₈. If the system has other options with floating addresses, you may need to change the factory setting.

Figure 2-11: DIV32-M DIP Switch Positioning



2.8 Testing the Existing System

You need to gain access to the system controls before you can test the existing system. Refer to the system documentation for procedures to help you gain access to the system controls. Test the existing MicroVAX system as follows:

1. Insert the MicroVAX diagnostic monitor (MDM) diagnostic tape cartridge or diskette into the system drive.
2. Boot MDM.
3. Test the existing system to make sure it is running properly. See the *MicroVAX Systems Maintenance Guide* for information on testing and troubleshooting. Chapter 4 of this guide also has information on testing and troubleshooting.
4. After the test runs successfully, remove the tape cartridge or diskette and turn the  power switch off (position ). Unplug the mains (power) cable from the mains outlet.

IMPORTANT

Always remove the tape cartridge or diskette before turning power off.

2.9 Installing the DIV32-M Module

IMPORTANT

Only qualified service personnel should remove or install modules.

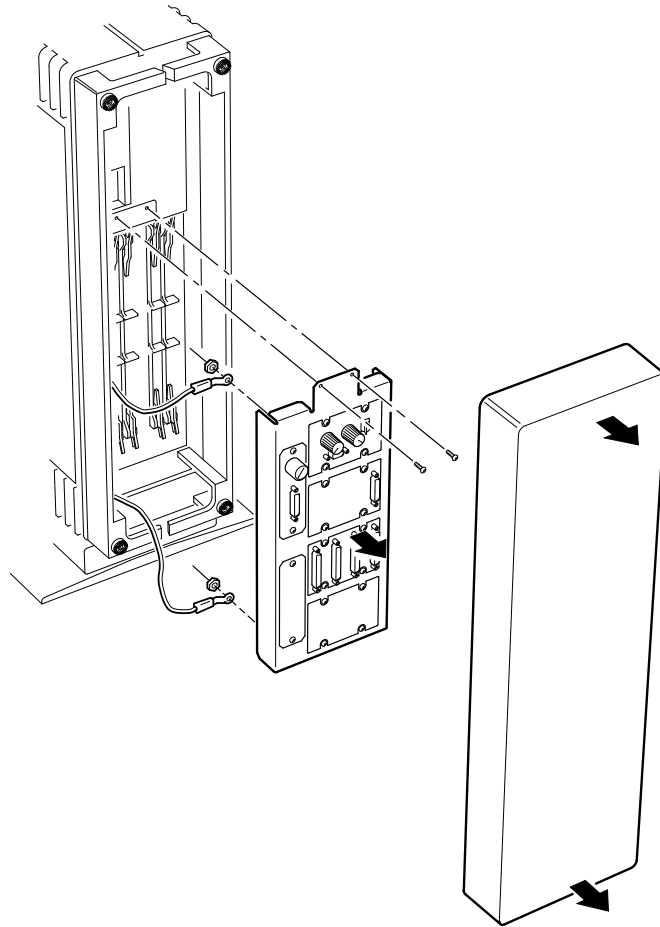
Check the recommended module order listed in Section 2.4.3 to determine which slot you should install the DIV32-M module in. If you need to relocate modules in the backplane, keep the modules in their original order.

The DIV32-M module connects to the ISDN network through the I/O distribution panel. You install an insert panel for the module in a size B cut-out on the I/O distribution panel. The insert panel is part of the kit.

The following sections provide the installation procedure for each type of enclosure.

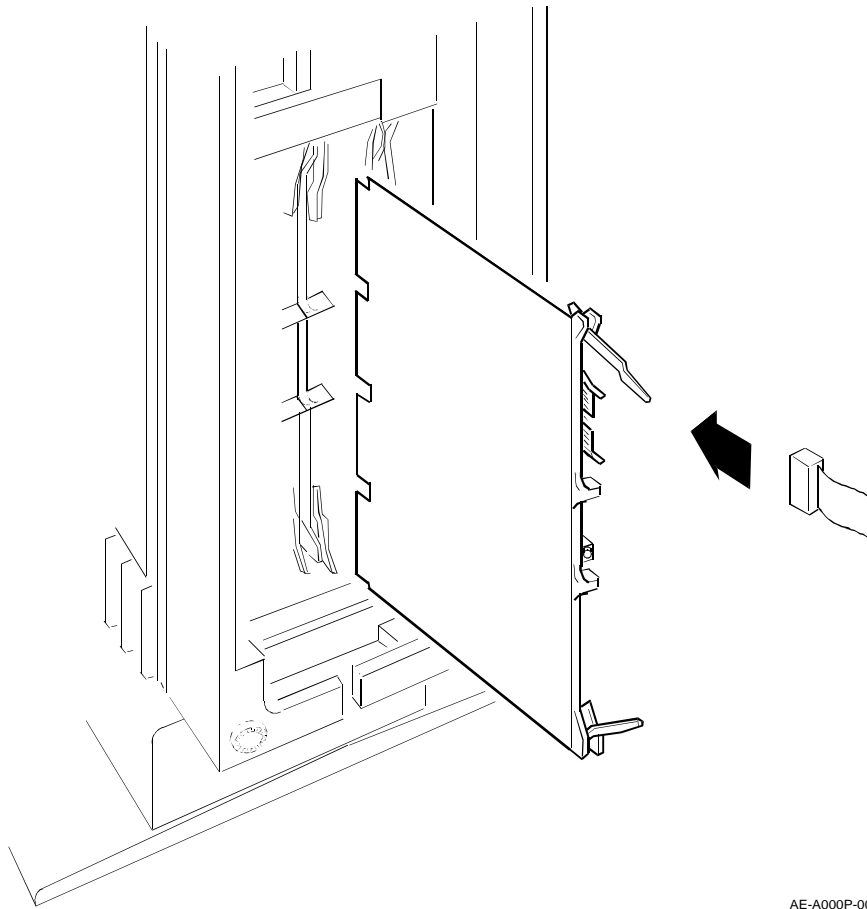
2.9.1 BA23 Enclosure

Figure 2-13: Removing the BA23 I/O Distribution Panel



MA-X0031-88

Figure 2–14: Installing the Module in the BA23



AE-A000P-00

Install the DIV32-M module in the BA23 enclosure as follows:

WARNING

For installation of the DIV32 in the UK, note the following disclaimer:

“The ports indicated do not provide isolation sufficient to satisfy the requirements of the relevant parts of BS6301. Apparatus connected to these ports must have either been approved to the relevant parts of BS6301 or have previously been evaluated against British Telecom (Post Office) Technical Guides 2 or 26

and given permission to attach. Other usage will invalidate any approval given to this apparatus.”

The DIV32-M must be installed in enclosure type H9642, BA23 or BA123 supplied by Digital Equipment Company under the terms of General Approval NS/G/1234/J/100003.

No card or assembly which generates or uses a voltage in excess of 42.4V peak or DC may be fitted in adjacent Q-Bus slots of the enclosure in which the DIV32-M is fitted.

For further details, see Appendix A.

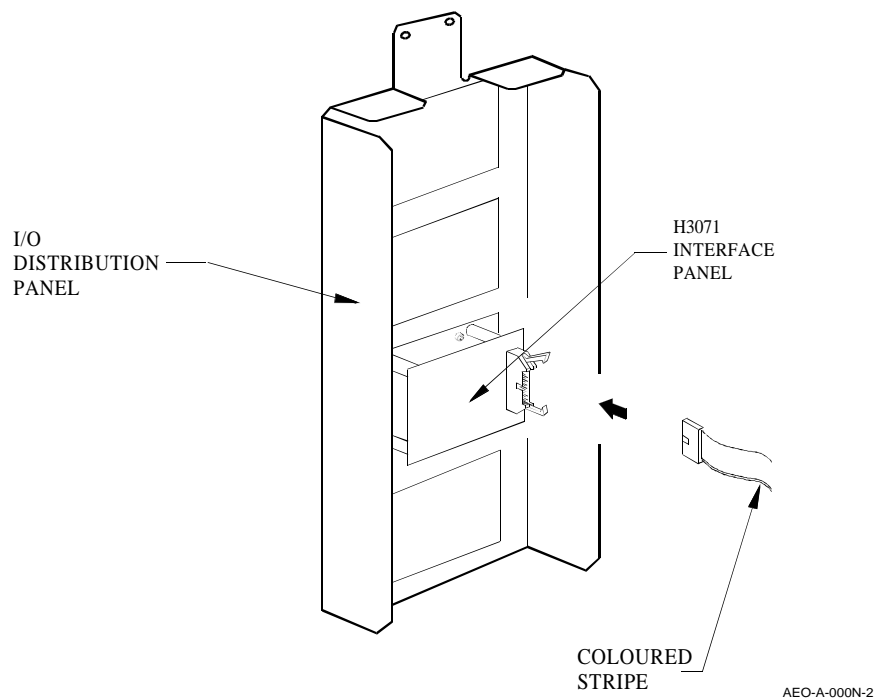
IMPORTANT

Make sure you are wearing an earthed antistatic wrist strap when you remove or install modules.

1. Turn the power switch off (○) and remove the mains (power) cable from the mains outlet.
2. Remove the rear cover.
3. Loosen the two screws that hold the I/O distribution panel in place. Swing the assembly open and remove the earth strap screws (Figure 2-13).
4. Connect the ribbon cable from the kit to connector J1 on the DIV32-M module (Figure 2-14). The cable connector is keyed to prevent incorrect installation. Fold the cable neatly, so it does not interfere with other modules or cables.
5. Insert the DIV32-M module into the appropriate backplane slot (Figure 2-14), using the recommended module order listed in Section 2.4.3.
6. Mount the H3071 interface panel in any selected position on the I/O distribution panel (Figure 2-15).
7. Connect the other end of the ribbon cable to the H3071 interface panel.
8. Plug the mains (power) cable into a mains outlet and turn the power switch on (|).
9. After 15 seconds, check that the module's green self-test LED is on. This indicates that the self-test was successful.

10. If the green self-test LED does not turn on, make sure the module is correctly inserted. If the LED still does not turn on, see Chapter 6 of the *MicroVAX Systems Maintenance Guide* for troubleshooting procedures.
11. Turn the power switch off (○) and remove the mains (power) cable from the mains outlet.
12. To complete the installation, reverse steps 1 to 3.

Figure 2-15: Connecting the Cables to the Insert Panel on the BA23



2.9.2 BA123 Enclosure

Install the DIV32-M module in the BA123 enclosure as follows:

WARNING

For installation of the DIV32 in the UK, note the following disclaimer:

“The ports indicated do not provide isolation sufficient to satisfy the requirements of the relevant parts of BS6301. Apparatus connected to these ports must have either been approved to the relevant parts of BS6301 or have previously been evaluated against British Telecom (Post Office) Technical Guides 2 or 26 and given permission to attach. Other usage will invalidate any approval given to this apparatus.”

The DIV32-M must be installed in enclosure type H9642, BA23 or BA123 supplied by Digital Equipment Company under the terms of General Approval NS/G/1234/J/100003.

No card or assembly which generates or uses a voltage in excess of 42.4V peak or DC may be fitted in adjacent Q-Bus slots of the enclosure in which the DIV32-M is fitted.

For further details, see Appendix A.

IMPORTANT

Make sure you are wearing an earthed antistatic wrist strap when you remove or install modules.


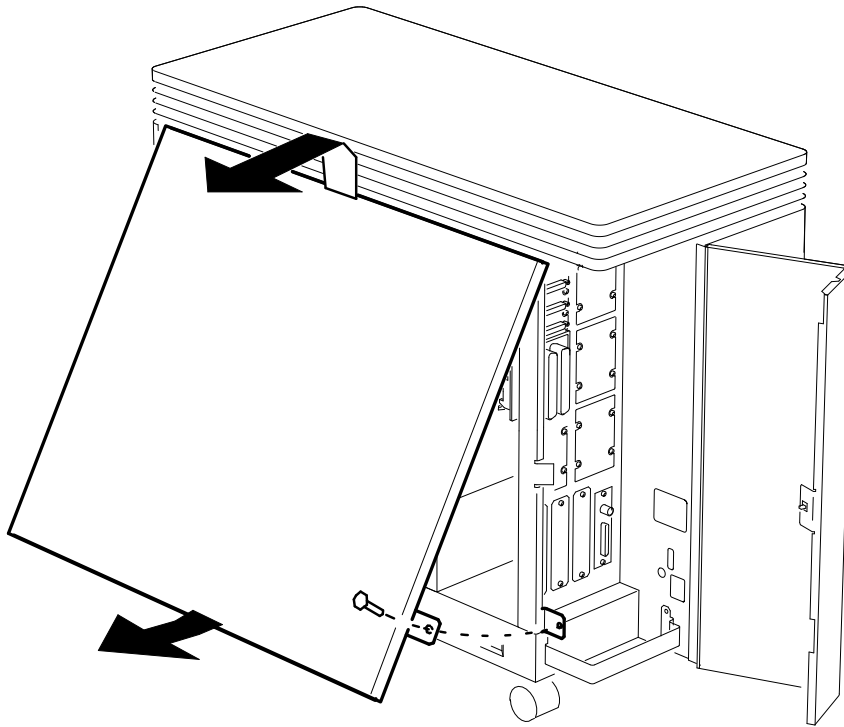
1. Turn the  power switch off (○) and remove the mains (power) cable from the mains outlet.
2. Open the rear door.
3. Loosen the screw that connects the right side panel to the rear of the BA123 (Figure 2-16).

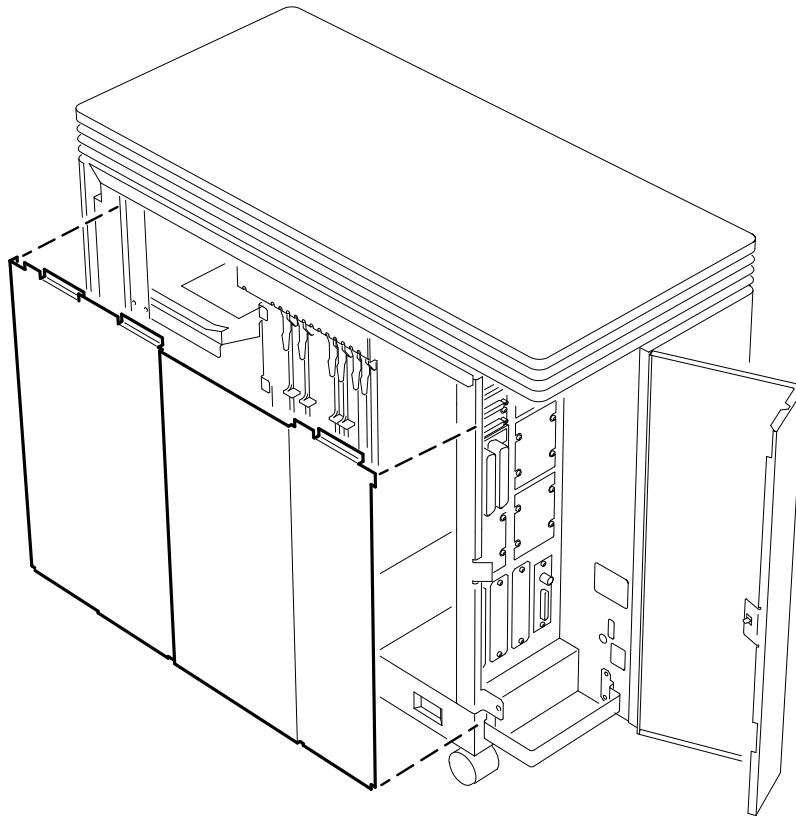
Figure 2–16: Removing the BA123 Right Side Panel



MA-X0034-88

4. Two snap fasteners hold the bottom of the panel to the BA123. Pull the bottom of the panel out until you release the fasteners.
5. Lift the panel slightly to release it from the lip at the top of the BA123. Remove the panel.

Figure 2–17: Removing the BA123 Inner Panel

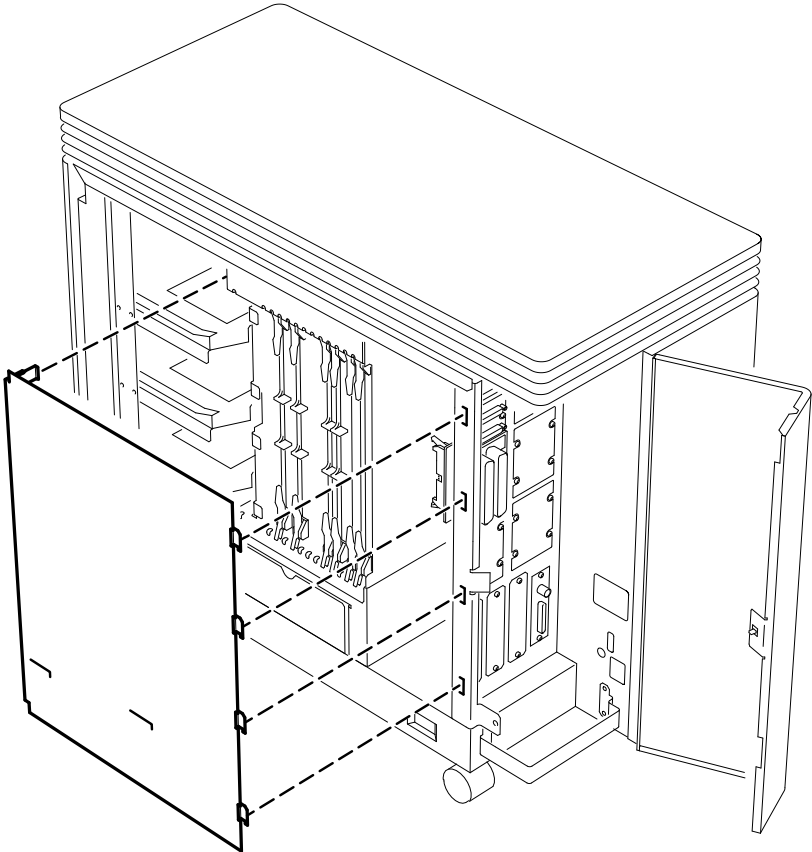


NEWER SYSTEMS

MA-X0035-88

6. Newer systems also have an inner panel. To remove, unscrew the two 1/4-turn fasteners at the base of the panel (Figure 2–17).
7. Older systems have a card cage door instead of an inner panel (Figure 2–18). Remove the door by releasing the two clasps at the front end of the door and swinging the door open.

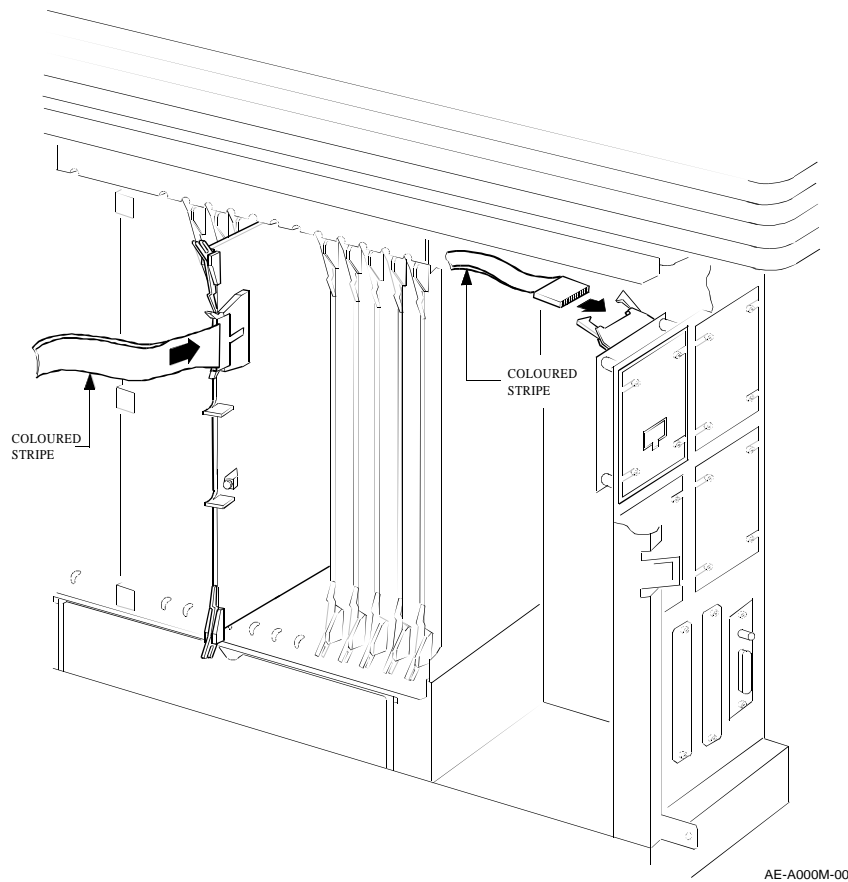
Figure 2-18: Removing the BA123 Card Cage Door



OLDER SYSTEMS

MA-X0036-88

Figure 2–19: Installing the Module in the BA123

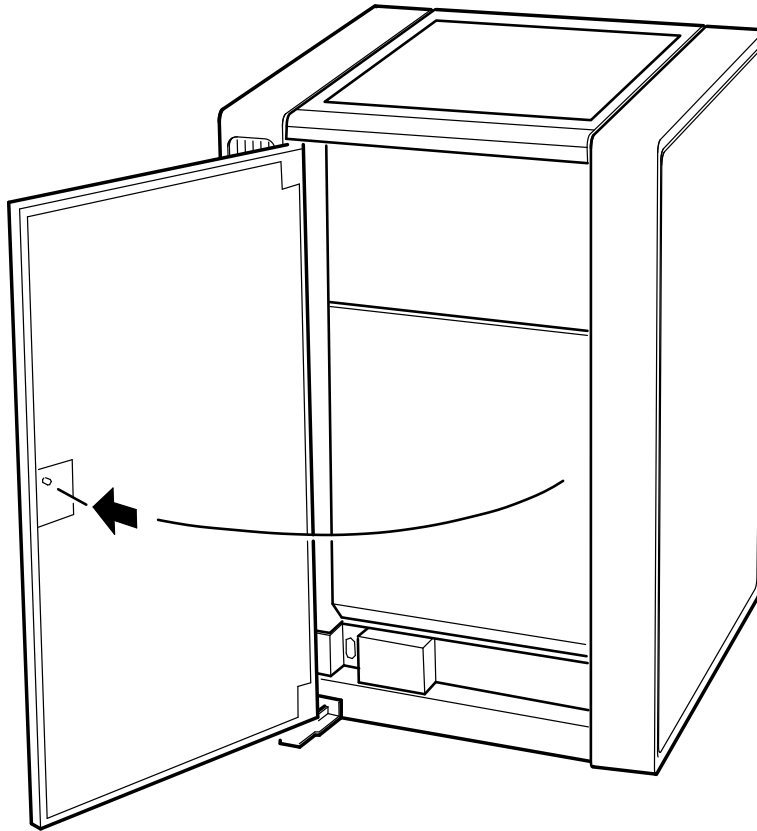


8. Connect the ribbon cable from the kit to connector J1 on the DIV32-M module (Figure 2–19). The cable connector is keyed to prevent incorrect installation. Fold the cable neatly, so it does not interfere with other modules or cables.
9. Insert the DIV32-M module into the appropriate backplane slot (Figure 2–19), using the recommended module order listed in Section 2.4.3.
10. Mount the H3071 interface panel in any selected position on the I/O distribution panel (Figure 2–15).

11. Connect the other end of the ribbon cable to the H3071 interface panel.
12. Plug the mains (power) cable into a mains outlet and turn the power switch on (|).
13. After 15 seconds, check that the module's green self-test LED is on. This indicates that the self-test was successful.
14. If the green self-test LED does not turn on, make sure the module is correctly inserted. If the LED still does not turn on, see Chapter 6 of the *MicroVAX Systems Maintenance Guide* for troubleshooting procedures.
15. Turn the power switch off (○) and remove the mains (power) cable from the mains outlet.
16. To complete the installation, reverse steps 1 to 7.

2.9.3 H9642 Enclosure

Figure 2–20: Opening the H9642 Rear Door



MA-X0037-88

Install the DIV32-M module in the H9642 enclosure as follows:

WARNING

For installation of the DIV32 in the UK, note the following disclaimer:

“The ports indicated do not provide isolation sufficient to satisfy the requirements of the relevant parts of BS6301. Apparatus connected to these ports must have either been approved to the relevant parts of BS6301 or have previously been evaluated against British Telecom (Post Office) Technical Guides 2 or 26 and given permission to attach. Other usage will invalidate any approval given to this apparatus.”

The DIV32-M must be installed in enclosure type H9642, BA23 or BA123 supplied by Digital Equipment Company under the terms of General Approval NS/G/1234/J/100003.

No card or assembly which generates or uses a voltage in excess of 42.4V peak or DC may be fitted in adjacent Q-Bus slots of the enclosure in which the DIV32-M is fitted.

For further details, see Appendix A.

IMPORTANT

Make sure you are wearing an earthed antistatic wrist strap when you remove or install modules.


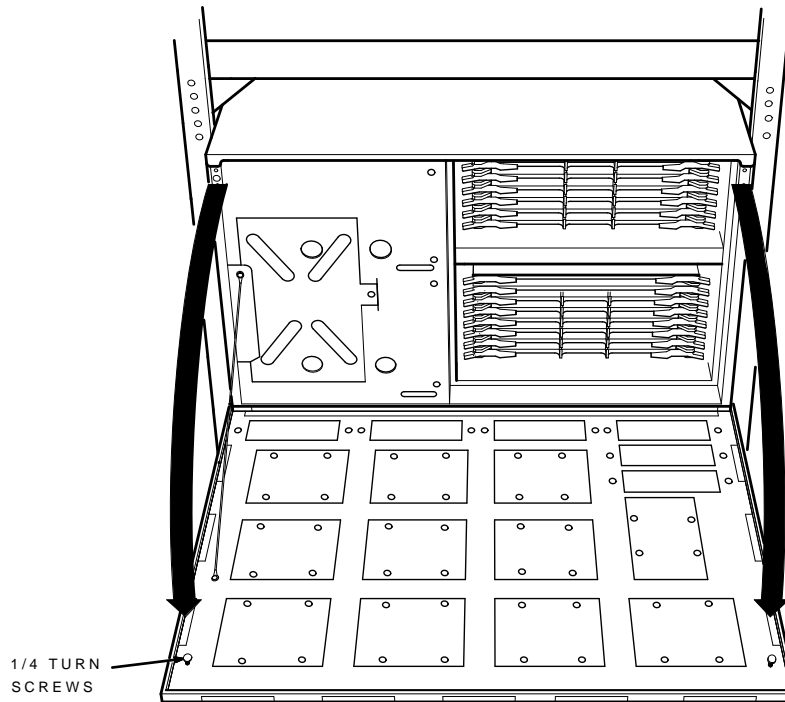
1. Turn the  power switch off (○) and remove the mains (power) cable from the mains outlet.
2. Use the Allen key (hex wrench) supplied with the system to unlock the rear door. Open the rear door (Figure 2-20).
3. Use a screwdriver to loosen the two 1/4-turn fasteners in the upper-left and upper-right corners of the rear I/O distribution panel. Lower the I/O distribution panel (Figure 2-21).

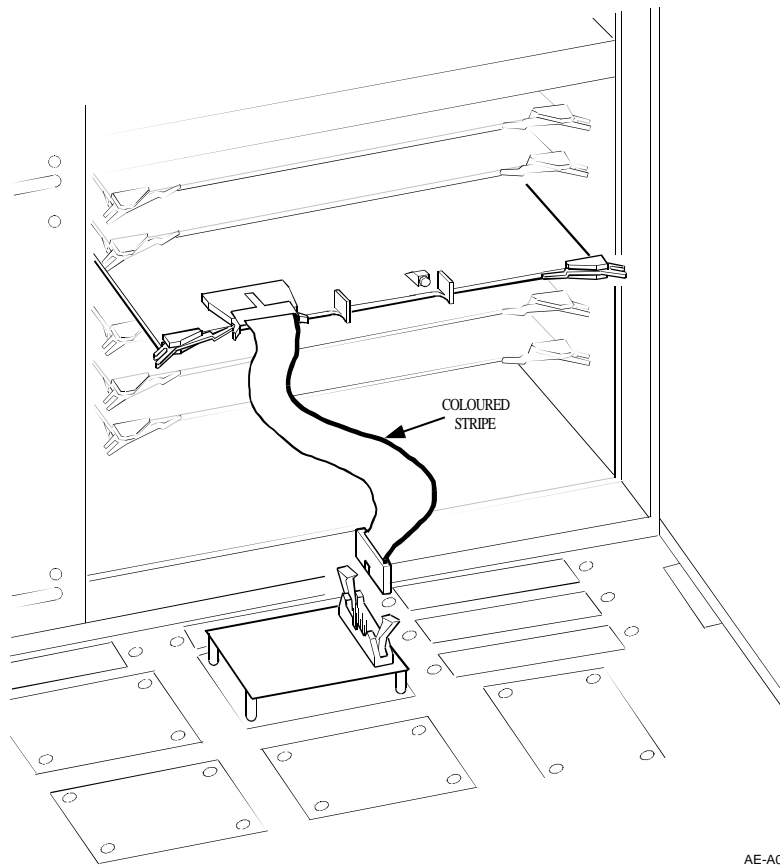
Figure 2–21: Lowering the H9642 Rear I/O Distribution Panel



MA-X0038-88

4. Connect the ribbon cable from the kit to connector J1 on the DIV32-M module (Figure 2–22). The cable connector is keyed to prevent incorrect installation. Fold the cable neatly, so it does not interfere with other modules or cables.
5. Insert the DIV32-M module into the appropriate backplane slot (Figure 2–22), using the recommended module order listed in Section 2.4.3.
6. Mount the H3071 interface panel in any selected position on the I/O distribution panel (Figure 2–15).

Figure 2–22: Installing the Module in the H9642



AE-A000K-00

7. Connect the other end of the ribbon cable to the H3071 interface panel.
8. Plug the mains (power) cable into a mains outlet and turn the power switch on (|).
9. After 15 seconds, check that the module's green self-test LED is on. This indicates that the self-test was successful.

10. If the green self-test LED does not turn on, make sure the module is correctly inserted. If the LED still does not turn on, see Chapter 6 of the *MicroVAX Systems Maintenance Guide* for troubleshooting procedures.
11. Turn the power switch off (○) and remove the mains (power) cable from the mains outlet.
12. To complete the installation, reverse steps 1 to 3.

Chapter 3

Installing the DIV32-S

This chapter concerns the -S version only. If you are not installing the DIV32 in a BA200 series enclosure, ignore this chapter; refer instead to Chapter 2.

WARNING

The following installation instructions provide specific directions for the safe installation of the module kit. For your protection from possible shock or energy hazards, do not attempt to access or disassemble parts of the equipment other than those specified. Refer other servicing to qualified personnel.

ATTENTION

Suivre les instructions pour installer le module en toute sécurité. Afin d'éviter tout risque d'électrocution, ne manipuler que les pièces indiquées. Pour toute autre opération, faire appel à du personnel qualifié.

VORSICHT

Um das Modul richtig und gefahrlos zu installieren, gehen Sie unbedingt nach den folgenden Anweisungen vor: Hantieren Sie auf keinen Fall an anderen als den angegebenen Teilen, oder versuchen Sie nicht, diese zu entfernen. Es könnte sonst Berührungsspannung auftreten. Wartungsarbeiten dürfen ausschließlich von geschultem Fachpersonal ausgeführt werden.

PRECAUCIÓN

Las siguientes instrucciones de instalación ofrecen directrices específicas para una segura instalación del juego de módulos. Para evitar posibles descargas eléctricas o cualquier tipo de riesgo, no intente acceder o desarmar ninguna parte del equipo que no sean las especificadas. En caso de cualquier duda, consulte a personal cualificado.

WAARSCHUWING

Volg onderstaande instructies voor het veilig installeren van de kaart. Om risico's of elektrische schokken te voorkomen, alleen werkzaamheden verrichten aan de gespecificeerde onderdelen. Laat onderhouds- en reparatiewerkzaamheden over aan gekwalificeerd personeel.

ATTENZIONE

Le seguenti istruzioni per l'installazione forniscono informazioni per una corretta installazione del modulo. Onde evitare possibili pericoli di scariche di corrente, non tentare di accedere o smontare parti diverse da quelle indicate. Consultare, per qualsiasi ulteriore necessità, personale qualificato.

ADVARSEL

Følgende installasjonsveiledning viser nøyaktig fremgangsmåte for en korrekt og trygg installasjon av modulen. For å unngå elektrisk støt eller andre personskader, er det viktig at man ikke berører eller prøver å ta fra hverandre deler av utstyret. Utfør bare det som er anvist i håndboken. Overlat all annen reparasjon og service til kvalifisert fagfolk.

注意：

モジュール・キットを安全にインストールするために、必ず本書の指示に従ってください。ここで示されている箇所以外の部分に手を触れたり、部品等を取り外したりするとたいへん危険です。電圧等によるショックやけがのもととなりますから絶対におやめください。他の部分についての修理、変更は、当社技術部にご相談ください。

VARNING

Följande installationsanvisning innehåller exakt vägledning för en säker installation av modulen. För att undvika elektriska stötar eller annan fara, bör man inte försöka komma åt eller

montera isär andra delar av utrustningen, än de angivna. För övrig service, kontakta en fackman.

VAROITUS

Seuraavat asennusohjeet varmistavat moduulikitin turvallisen asennuksen. Jotta vaaratilanteilta vältytään, ei pidä koskea muihin laitteiston osiin kuin ohjeissa on mainittu eikä pyrkiä purkamaan niitä. Muut ylläpitotoimet on jätettävä koulutetun ylläpitohenkilöstön huoleksi.

ADVARSEL

Følgende installationsprocedure giver vejledning i sikker installation af modulet. Forsøg ikke at berøre eller adskille andre dele af udstyret, da der kan være risiko for højspænding. Yderligere service bør udføres af autoriseret personale.

AVISO

As instruções que se seguem explicam a forma de proceder, com segurança, à instalação de um "kit" de módulo. Não tente, de forma alguma, aceder ou abrir as partes do equipamento que não se refiram aqui, para que não corra o risco de choques eléctricos. Qualquer outro tipo de serviços que necessite, exija a presença de pessoal qualificado.

אזהרה

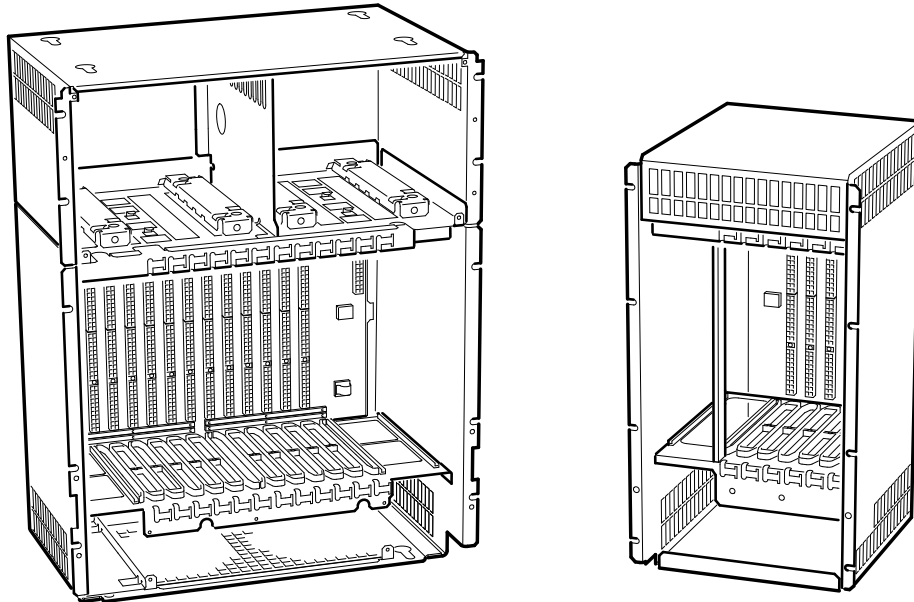
הוראות ההתקנה המובאות להלן נועדו
להביא להתקנה בטוחה.

3.1 BA200 Series Enclosures

The BA200 series enclosures have a 6- or 12-slot Q22-bus backplane. Figure 3-1 shows the 12-slot BA213 and the 6-slot BA214 enclosure chassis. The BA213 has one or two modular power supplies, and the BA214 has one power supply.

The backplane implements the Q22-bus on rows A and B of each slot. The MicroVAX Memory Interconnect is implemented on rows C and D of each slot. Fixed disk drives face the rear of the enclosure, providing

Figure 3-1: BA200 Series Enclosures



BA213 ENCLOSURE

BA214 ENCLOSURE

MA-X0008-88

easy access to the drive signal and power cables. A TK tape drive faces the front of the enclosure.

The major difference between the BA200 series enclosure and other microsystem enclosures is the way you connect external devices to the system. Modules in the BA200 series enclosure connect directly to external devices through I/O connectors on the module handles. Other enclosures require an insert panel and internal cabling between the module and the device.

There are two main differences between the modules used in the BA200 series enclosure and the modules used in the other microsystem enclosures:

3-4 Installing the DIV32-S

1. Modules with external I/O connectors have attached bulkhead handles. These handles replace the insert panels and internal cabling found in the BA23 and BA123 enclosures.
2. Non-I/O modules (such as memory modules) have blank bulkhead covers.

In addition, BA200 series enclosures use a special I/O connecting cover that fits over the CPU module. The H3600-SA cover has a two-piece ribbon cable that plugs into the console SLU and power-up configuration connectors on the CPU.

The module handles and blank covers form an electrical seal that complies with regulations for electromagnetic interference (EMI) for both keeping radio frequency interference generated by the system in the enclosure, and preventing external radio frequencies from entering the enclosure. The module handles and blank covers also help guarantee proper airflow.

For more information: See the *MicroVAX Systems Maintenance Guide* to learn more about BA200 series enclosures.

3.2 Pre-installation: Site Preparation

The DIV32-S uses one quad slot in the backplane. Before continuing, check that there is one such slot available.

Check that the ISDN access point (the female connector on the wall) is close enough to the VAX for connection with the supplied ISDN cable.

3.3 The Kit

3.3.1 Unpacking the Kit

Unpack the shipment and check the contents as follows:

1. Look for external damage on the shipping container, such as dents, holes, or crushed corners.
2. Do not dispose of the packing material until you have installed the module and tested the system successfully.

IMPORTANT

Use the Static-Dissipative Field Service Kit (Part Number 29-26246) for the next step. If you have another antistatic kit, follow the instructions with the kit.

3. Put on your antistatic wrist strap. Attach the crocodile clip to the metal chassis of the system enclosure. Place the antistatic mat on your work surface. The earth wire has a press stud (snap) that connects to the mat.
4. Use Table 3-1 or Table 3-2 to identify the contents of the DIV32 kit. The check-list numbers correspond to the numbered items in Figure 3-2 or Figure 3-3.
5. Remove the DIV32 module from the antistatic bag.
6. Inspect the module for shipping damage. Carefully check for cracks, breaks, and loose components.
7. Place the DIV32 module on the antistatic mat.

If any item is missing or damaged, contact:

- the customer's sales representative
- the customer's delivery agent.

Figure 3–2: DIV32-SA Kit Contents

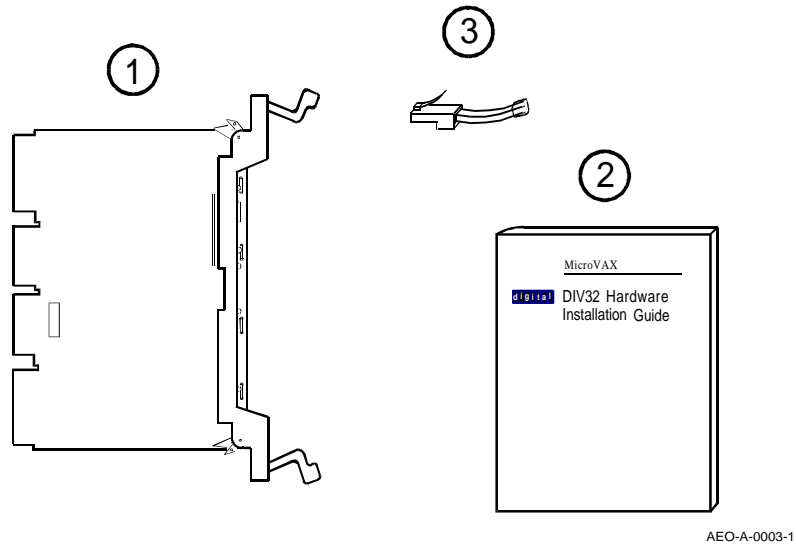


Table 3–1: DIV32-SA Kit Check-List

Part Description	Part Number
① DIV32-SA module	M7531-PA
② This Installation Guide	EK-DIV32-IN-002
③ Loopback plug	H3072

Figure 3–3: DIV32-SF Kit Contents

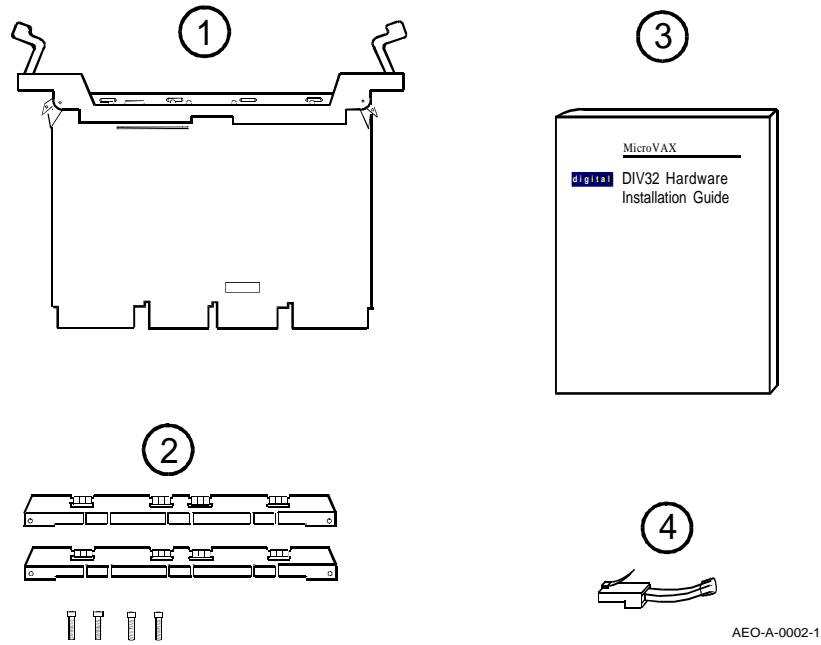


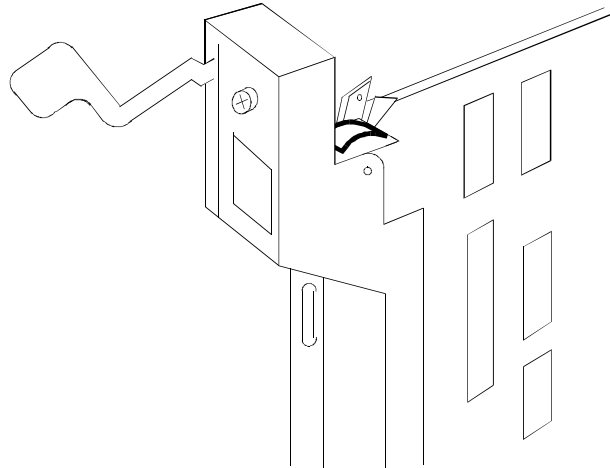
Table 3–2: DIV32-SF Kit Check-List

Part Description	Part Number
① DIV32-SF module	M7531-PA
② Two gap filler assemblies, consisting of two gap fillers and four flat-head screws	70-24505-01
③ This Installation Guide	EK-DIV32-IN-002
④ Loopback plug	H3072

3.3.2 Inspecting the EMI and EOS Clips

To comply with regulations on electromagnetic interference (EMI), the bulkhead handles, blank covers, and gap fillers have transient protection EMI and electrical overstress (EOS) clips. These clips are earthed through the module handle.

Figure 3–4: EOS Clips



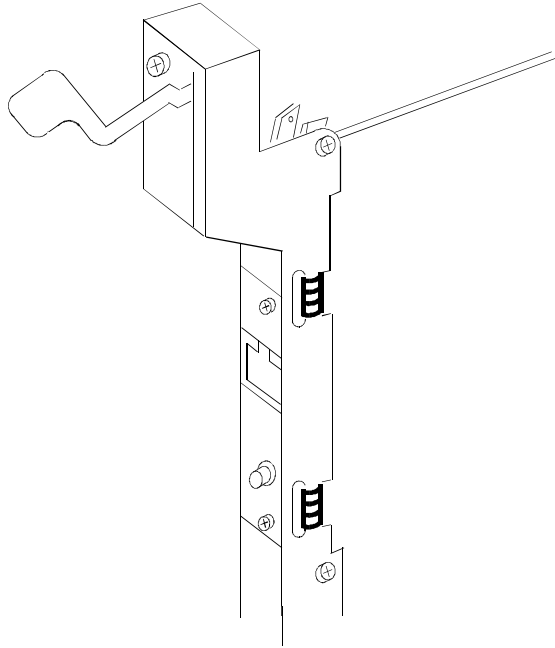
AEO-A-000J-1

1. Check the EMI and EOS clips on the DIV32-S for residue or corrosion. Figure 3–5 shows two of the four EMI clips, seen from the solder side of the board; Figure 3–4 shows one of the two EOS clips, seen from the components side of the board. Also check the EMI clips on the two gap fillers. Remove any residue or corrosion with alcohol.
2. Make sure the EMI and EOS clips are arched. When you press them slightly, they should return to their original shape.
3. If any clip is missing or broken, replace it.

EMI clip	Part Number 12-26340-01
EOS clip	Part Number 12-26922-01

4. Place the DIV32-SF module on the antistatic mat.

Figure 3-5: EMI Clips



AEO-A-000H-1

3.3.3 Software Backup

It is the customer's responsibility to perform a software backup.

Make sure that the software has been backed up before you continue.

3.4 Checking the System Configuration

Before you install the DIV32, you must complete a configuration worksheet for the BA200 series enclosure (see Figure 3–6). This step ensures that you do not exceed the system's limits for power and bus loads.

You need to gain access to the modules installed in the system backplane before you configure the system. Refer to the system documentation for procedures to help you remove any covers and gain access to the modules.

To check the system configuration, perform the following steps:

1. On the worksheet, list all the devices already installed in the system. Each module has an identifying label on the cover or handle.
2. List all the devices you plan to install in the system.
3. Fill in the information for each device, using the data listed in Table 3–3.
4. Add up the columns. Make sure the totals are within the limits for the enclosure.

Figure 3–6: BA200 Series Configuration Worksheets

12 SLOT ENCLOSURE						
RIGHT-HALF POWER SUPPLY					BUS LOADS	
SLOT (ABCD)	MODULE	CURRENT 5 V	AMPS 12 V	POWER (WATTS)	AC	DC
1						
2						
3						
4						
5						
6						
MASS STORAGE >>> TAPE 1					0.0	0.0
>>> DISK 1					0.0	0.0
TOTAL: RIGHT-HALF POWER SUPPLY					--	--
MUST NOT EXCEED		33.0	7.0	230.0	--	--
LEFT-HALF POWER SUPPLY					BUS LOADS	
SLOT (ABCD)	MODULE	CURRENT 5 V	AMPS 12 V	POWER (WATTS)	AC	DC
7						
8						
9						
10						
11						
12						
MASS STORAGE DISK					0.0	0.0
DISK					0.0	0.0
DISK					0.0	0.0
TOTAL: LEFT-HALF POWER SUPPLY						
MUST NOT EXCEED		33.0	7.0	230.0		
TOTAL BUS LOADS						
MUST NOT EXCEED					35.0	20.0
6 SLOT ENCLOSURE						
POWER SUPPLY					BUS LOADS	
SLOT (ABCD)	MODULE	CURRENT 5 V	AMPS 12 V	POWER (WATTS)	AC	DC
1						
2						
3						
4						
5						
6						
TOTAL: POWER SUPPLY						
MUST NOT EXCEED		33.0	7.0	230.0	--	--
TOTAL: BUS LOADS					--	--
MUST NOT EXCEED					35.0	20.0

NOTE: POWER SUPPLIES MAY DIFFER. CHECK YOUR POWER SUPPLY SPECIFICATIONS TO CONFIRM THE MAXIMUM WATTAGE.

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Table 3–3: Power and Bus Load Data for DIV32-S

		Current (Amps) (Max)		Power (Max)	Bus Loads	
Module		+5 V	+12 V	Watts	AC	DC
AAV11	A1009	1.8	0.0	9.0	2.1	0.5
ADV11	A1008	3.2	0.0	16.0	2.3	0.5
AXV11	A026	2.0	0.0	10.0	1.2	0.3
CXA16-M	M3118-YA	1.6	200 mA	10.4	3.0	0.5
CXB16-M	M3118-YB	2.0	0.0	10.0	3.0	0.5
CXY08-M	M3119-YA	1.8	300 mA	12.6	3.2	0.5
DELQA	M7516	2.7	0.5	19.5	2.2	0.5
DEQNA	M7504	3.5	0.50	23.5	2.2	0.5
DFA01	M3121	1.97	0.40	14.7	3.0	1.0
DIV32	M7531	5.5	0.0	27.5	3.9	1.0
DPV11	M8020	1.2	0.30	9.6	1.0	1.0
DRQ3B	M7658	4.5	0.0	22.5	2.0	1.0
DRV1J	M8049	1.8	0.0	9.0	2.0	1.0
DRV1W	M7651	1.8	0.0	9.0	2.0	1.0
DSV11	M3108	5.5	0.7	35.4	3.9	1.0
DZQ11	M3106	1.0	0.36	9.3	1.4	0.5
IBQ01	M3125	5.0	0.0	25.0	4.6	1.0
IEQ11	M8634	3.5	0.0	17.5	2.0	1.0
KA630	M7606	6.2	0.14	32.7	2.7	1.0
KA650	M7620	6.0	0.14	33.6	2.7	1.0
KDA50-Q	M7164	6.93	0.0	34.65	3.0	0.5
KDA50-Q	M7165	6.57	0.03	33.21	–	–

Table 3–3 (Cont.): Power and Bus Load Data for DIV32-S

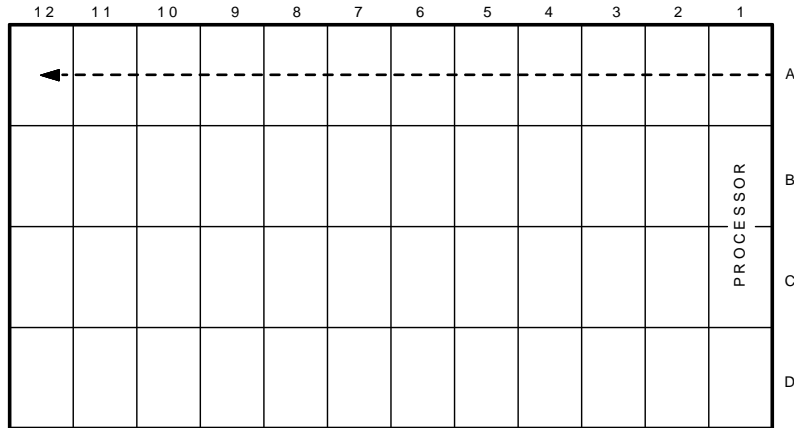
	Module	Current (Amps) (Max)		Power (Max)	Bus Loads	
		+5 V	+12 V	Watts	AC	DC
KLESI	M7740	3.0	0.0	15.0	2.3	1.0
KMV1A	M7500	2.6	0.2	15.4	3.0	1.0
KWV11	M4002	2.2	13 mA	11.156	1.0	0.3
LPV11	M8086	1.6	0.0	8.0	1.8	0.5
M9060		5.3	0.0	26.5	0.0	0.0
MRV11	M7942	1.6 ¹	0.0	8.0	3.0	0.5
MS630-AA	M7607	1.0	0.0	5.0	–	–
MS630-BA	M7608	1.3	0.0	6.5	–	–
MS630-CA	M7609	2.1	0.0	10.5	–	–
MS650	M7621	2.7	0.0	13.5	–	–
RA70		3.3	2.9	69.4	–	–
RD53		0.9	2.5	34.5	–	–
RD54		1.3	1.34	23.7	–	–
TK50		1.35	2.4	35.6	0.0	0.0
TK70		1.3	2.4	35.3	–	–
TQK50	M7546	2.9	0.0	14.5	2.8	0.5
TQK70	M7559	3.5	0.0	17.5	4.3	0.5
TSV05	M7196	6.5	0.0	32.5	3.0	1.0

¹Value is for the unpopulated module only.

3.4.1 Bus Continuity

Bus grant signals pass through each installed module, using the A connectors of each slot. Figure 3-7 shows the path of the bus grant signals. To ensure the continuity of this path, use bus grant continuity cards (M9047) in empty backplane slots.

Figure 3-7: Bus Grant Continuity Path



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3.4.2 Power Supplies

The BA200 series enclosure contains one or two 230 watt power supplies.

- A 6-slot enclosure has one power supply, to the left of the backplane.
- A 12-slot enclosure normally has two power supplies.
 - If however there is only one power supply, it is to the right of the backplane.
 - If there are two power supplies, the one to the right of the backplane powers slots 1 through 6, and the one to the left of the backplane powers slots 7 through 12.

Each power supply in the enclosure must have a minimum 5 amp load on the 5 volt output to maintain regulation. If a power supply does not meet the minimum load requirement, you *must* install an M9060-YA load module in one of the open backplane slots powered by that power supply. Otherwise, the power supply enters an error mode and shuts down the system.

If a power supply meets the minimum load requirement, you should remove an existing load module. See Section 3.9 for procedures on installing or removing a load module.

3.4.3 Module Order

The order of modules in the backplane depends on four factors:

- the relative use of devices in the system
- the expected performance of each device relative to other devices
- the ability of a device to tolerate delays between bus requests and bus grants (delay tolerance)
- the tendency of a device to prevent devices farther from the CPU from accessing the bus.

Use the following recommended module order as a guideline for installing modules in a BA200 enclosure. Read across, like normal text.

KA620/KA630/KA650	MS630/MS650	AAV11	ADV11
AXV11	KWV11	DRV1J	TSV05
DMV11		DEQNA/DELQA/DESQLA	DPV11
DIV32	DSV11	KMV1A	DZQ11
DFA01	CXY08	CXB16	CXA16
CXF32	LPV11	VCB02	
DRV1W	IEQ11	ADQ32	DRQ3B
IBQ01	KLESI	TQK50	TQK70
KDA50	RQDX3	KFQSA	M9060

3.5 Finding CSR Addresses and Interrupt Vectors

When you add a DIV32 module to the backplane, you need to configure the new module and reconfigure the modules already installed. Use the following procedures to find the new CSR addresses and interrupt vectors for the modules.

For modules in a MicroVAX system, you can either use the CONFIG program, or you can manually calculate CSR addresses and interrupt vectors. To calculate values manually, see Chapter 5 of the *MicroVAX Systems Maintenance Guide*.

The CONFIG program is in the MicroVMS or VMS SYSGEN utility. When you type in a list of the devices in the system, CONFIG automatically provides CSR address and interrupt vector information. Table 3-4 lists the devices supported by this utility.

If you have a non-Digital device, see the device documentation for configuration information.

Table 3–4: Devices Supported by SYSGEN

Device	Enter at DEVICE> Prompt
CXA16	DHV11
CXY08	DHV11
DELQA	QNA
DEQNA	QNA
DPV11	DPV11
DRV1W	DR11W
DSV11	DSV11
DIV32	DIV32
DZQ11	DZ11
IEQ11	IEQ11
RQDX3	UDA
TQK50	TU81
TQK70	TU81
TSV05	TS11

To use the SYSGEN utility, follow these steps:

1. With VMS or MicroVMS running, log in to the system account.
2. Type the following command at the system command prompt:

```
MCR SYSGEN
```
3. Press . The utility responds with the prompt

```
SYSGEN>
```
4. At the prompt, type

```
CONFIGURE
```
5. Press . The utility responds with the prompt

```
DEVICE>
```
6. Enter the abbreviation for each system device (Table 3–4). Include those devices already installed and those you intend to install.

Enter one abbreviation per line, then press **[Return]**. The *DEVICE>* prompt prompts you for another entry. If you are installing more than one unit of a particular device, enter a space and the number of devices after the abbreviation. For example, **DHV11 2** indicates two DHV11 modules.

7. After you have entered all devices, press **[Ctrl Z]**. The program displays the following information for each device you entered:

- CSR address and vector
- the name assigned to the device by the operating system
- the operating system support status (yes or no)

The program uses an asterisk (*) to indicate a floating address or vector. If a particular device has several units, the first address refers to the first device to be installed.

8. To exit from the SYSGEN utility, type **EXIT** at the SYSGEN prompt and press **[Return]**.
9. Log out of the system account.

3.6 Configuring the DIV32-S Module

You select the CSR address for the DIV32 by using the DIL switch (S1) on the module (Figure 3-8). The CSR address is floating. The factory setting for the DIV32 is 17761250₈. If the system has other options with floating addresses, you may need to change the factory setting.

Figure 3-8: DIV32-S DIP Switch Positioning

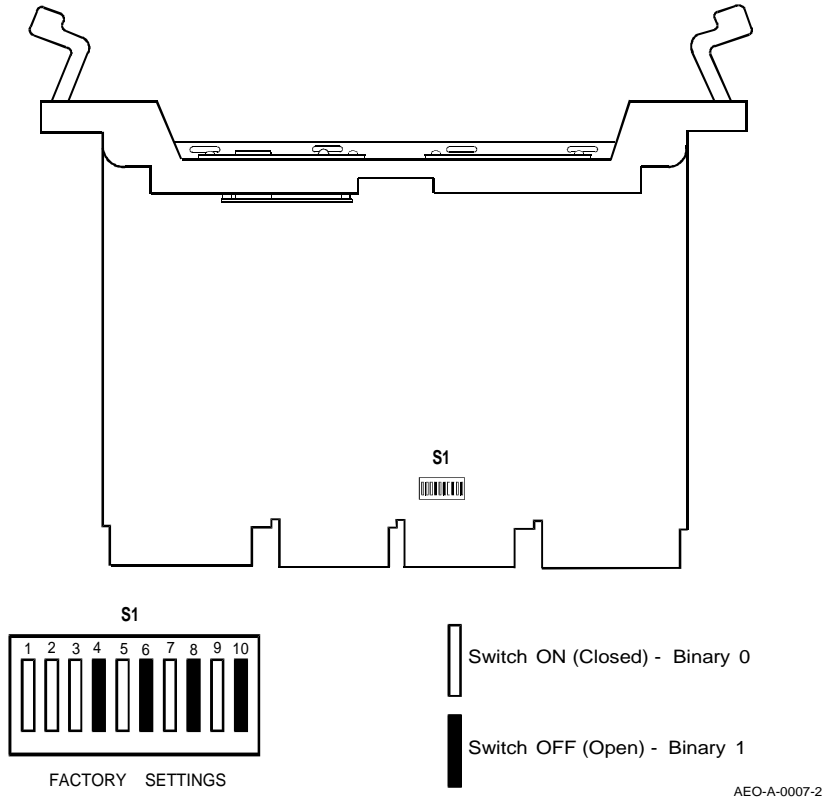
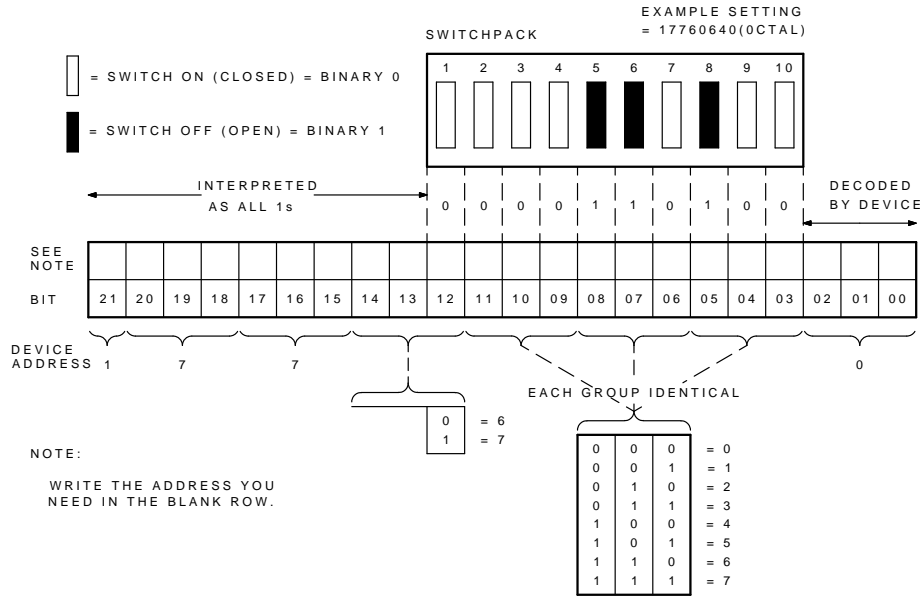


Figure 3–9: CSR Address Switch Setting Guide



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To calculate the CSR address for the DIV32, see Section 3.5. Use Figure 3–9 as a guide in setting the switches.

The interrupt vector is also floating. It is set by the software and cannot be changed by switches.



3.7 Operating System Shutdown

It is the customer’s responsibility to shut down the operating system software.

Make sure that the operating system software has been shut down before you continue. Leave the system power on.

3.8 Testing the Existing System

You need to gain access to the system controls before you can test the existing system. Refer to the system documentation for procedures to help you gain access to the system controls. Test the existing MicroVAX system as follows:

1. Insert the MicroVAX diagnostic monitor (MDM) diagnostic tape cartridge or diskette into the system drive.
2. Boot MDM.
3. Test the existing system to make sure it is running properly. See the *MicroVAX Systems Maintenance Guide* for information on testing and troubleshooting. Chapter 4 of this guide also has information on testing and troubleshooting.
4. After the test runs successfully, remove the tape cartridge or diskette and turn the  power switch off (position ). Unplug the mains (power) cable from the mains outlet.

IMPORTANT

Always remove the tape cartridge or diskette before turning power off.

3.9 Relocating Modules in the BA200 Series Enclosure

Check the recommended module order listed in Section 3.4.3 to determine which slot you should install the DIV32-SF module in. If you need to relocate modules in the backplane, use the following procedures and keep the modules in their original order.

3.9.1 Modules with Blank Covers

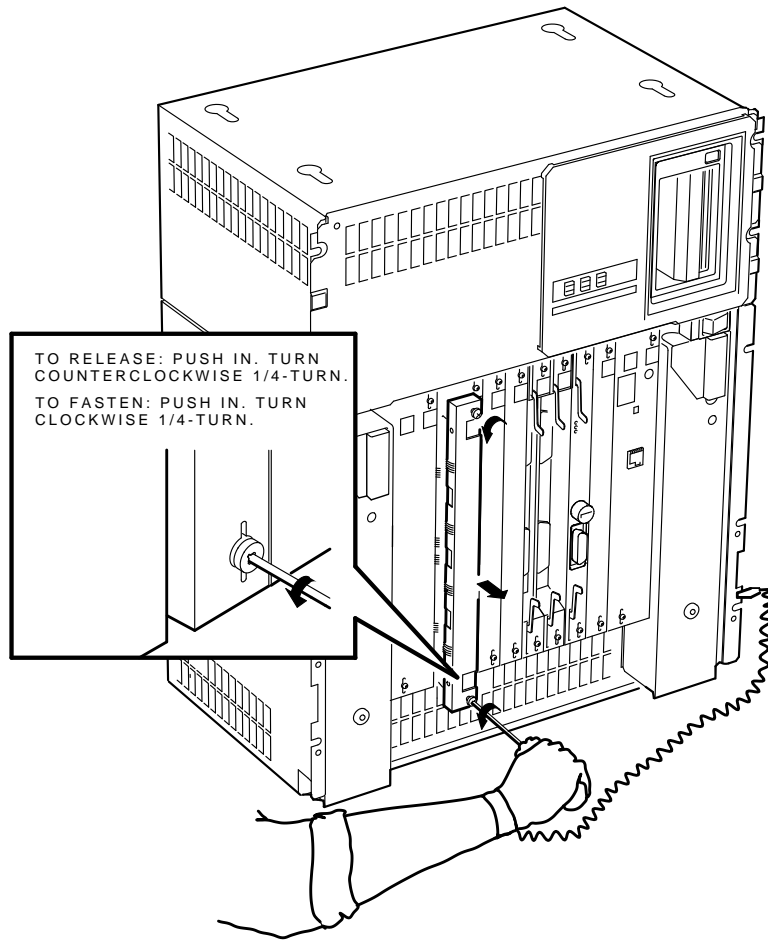
After testing the system and switching off as described in Section 3.8, use the following procedure to remove and install modules with blank covers:

IMPORTANT

Make sure you are wearing an earthed antistatic wrist strap when you remove or install modules. Place modules only on an earthed antistatic mat.

1. Release the two 1/4-turn captive screws that hold the blank cover to the card cage (Figure 3–10).
2. Pull the blank cover away from the card cage.
3. Note the orientation of any internal cables connected to the module. Some connectors are not keyed. Carefully label and disconnect the internal cables.
4. Unlock the module's release levers by simultaneously pulling up on the top lever and pulling down on the bottom lever (Figure 3–11). For a module with a plastic handle, pull out on the plastic handle.
5. Carefully pull the module out of the card cage. Be careful not to disturb any DIL switches on the module.
6. Confirm the module's CSR address and interrupt vector (Section 3.5). If necessary, change the module's jumper or switch settings.
7. Install the module in its new location by reversing the steps in this procedure. Do not fasten the 1/4-turn screws yet.

Figure 3–10: Removing the Blank Covers



NOTE:

THIS ILLUSTRATION SHOWS HOW TO RELEASE CAPTIVE SCREWS ON ALL BLANK COVERS AND BULKHEAD HANDLES.

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3.9.2 Modules with Handles

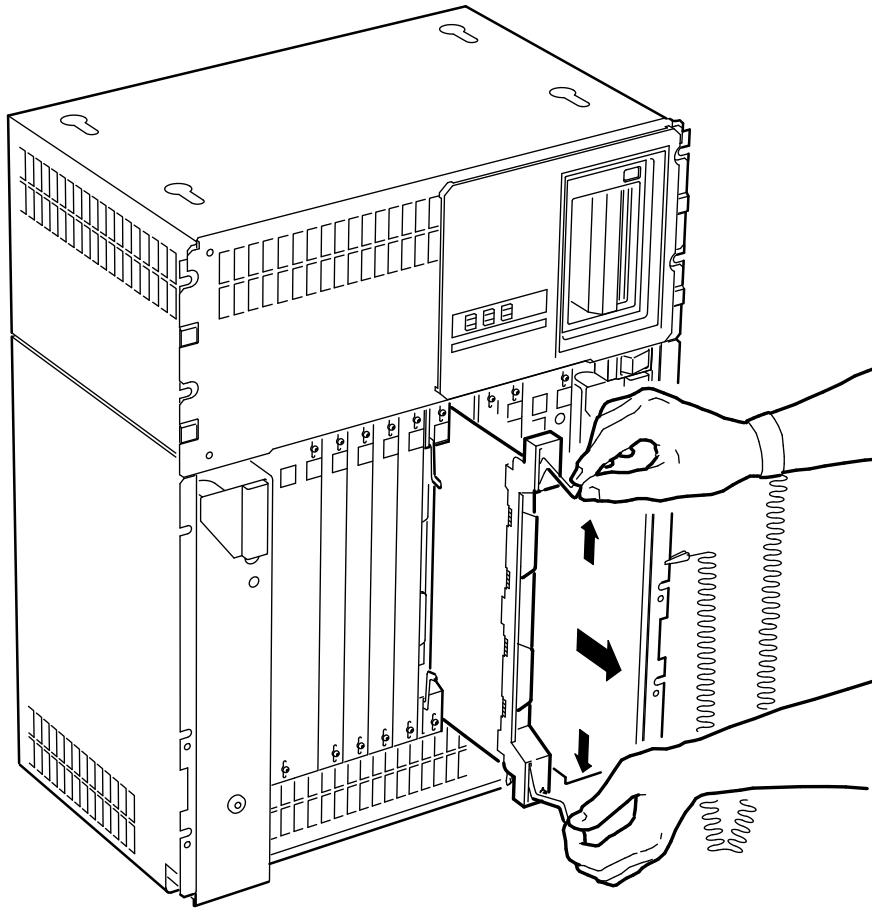
Use the following procedure to remove and install modules with handles:

IMPORTANT

Make sure you are wearing an earthed antistatic wrist strap when you remove or install modules.

1. Note the orientation of external cables connected to the module. **Carefully** label the cables, then disconnect them.
2. Release the two 1/4-turn captive screws that hold the module's handle to the card cage (Figure 3-10).
3. Unlock the release levers by simultaneously pulling up on the top lever and pulling down on the bottom lever (Figure 3-11).
4. Pull out on the module's handle and remove the module from the card cage. Be careful not to disturb any DIL switches on the module.
5. Confirm the module's CSR address and interrupt vector (Section 3.5). If necessary, change the module's jumper or switch settings.
6. Install the module in its new location by reversing the steps in this procedure. Do not fasten the 1/4-turn screws yet.

Figure 3-11: Unlocking the Release Levers



NOTE:

THIS ILLUSTRATION SHOWS HOW TO UNLOCK
RELEASE LEVERS AND REMOVE ALL MODULES
WITH ATTACHED HANDLES.

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3.10 Installing the DIV32-S Module

Install the DIV32-S module as follows:

WARNING

For installation of the DIV32 in the UK, note the following disclaimer:

“The ports indicated do not provide isolation sufficient to satisfy the requirements of the relevant parts of BS6301. Apparatus connected to these ports must have either been approved to the relevant parts of BS6301 or have previously been evaluated against British Telecom (Post Office) Technical Guides 2 or 26 and given permission to attach. Other usage will invalidate any approval given to this apparatus.”



The DIV32-S must be installed in enclosure type BA213, BA214 or BA215 supplied by Digital Equipment Company under the terms of General Approval NS/G/1234/J/100003.

No card or assembly which generates or uses a voltage in excess of 42.4V peak or DC may be fitted in adjacent Q-Bus slots of the enclosure in which the DIV32-S is fitted.

For further details, see Appendix A.

IMPORTANT

Be careful not to snag the module's components on the card guides or adjacent modules.

1. Turn the  power switch off (○) and remove the mains (power) cable from the mains outlet.
2. Insert the DIV32-S module into the appropriate slot, using the recommended module order listed in Section 3.4.3.
3. Grasp the module's top and bottom release levers. Lock the module in place by simultaneously pushing the top lever down and pulling the bottom lever up (Figure 3-12).
4. Do not fasten the 1/4-turn captive screws yet.
5. Plug the mains (power) cable into a mains outlet and turn the  power switch on (|).
6. After 15 seconds, check that the module's green self-test LED is on. This indicates that the self-test was successful.

7. If the green self-test LED does not turn on, make sure the module is correctly inserted. If the LED still does not turn on, see Chapter 6 of the *MicroVAX Systems Maintenance Guide* for troubleshooting procedures.
8. Turn the power switch off (○) and remove the mains (power) cable from the mains outlet.

3.11 Verifying the Earth Connections

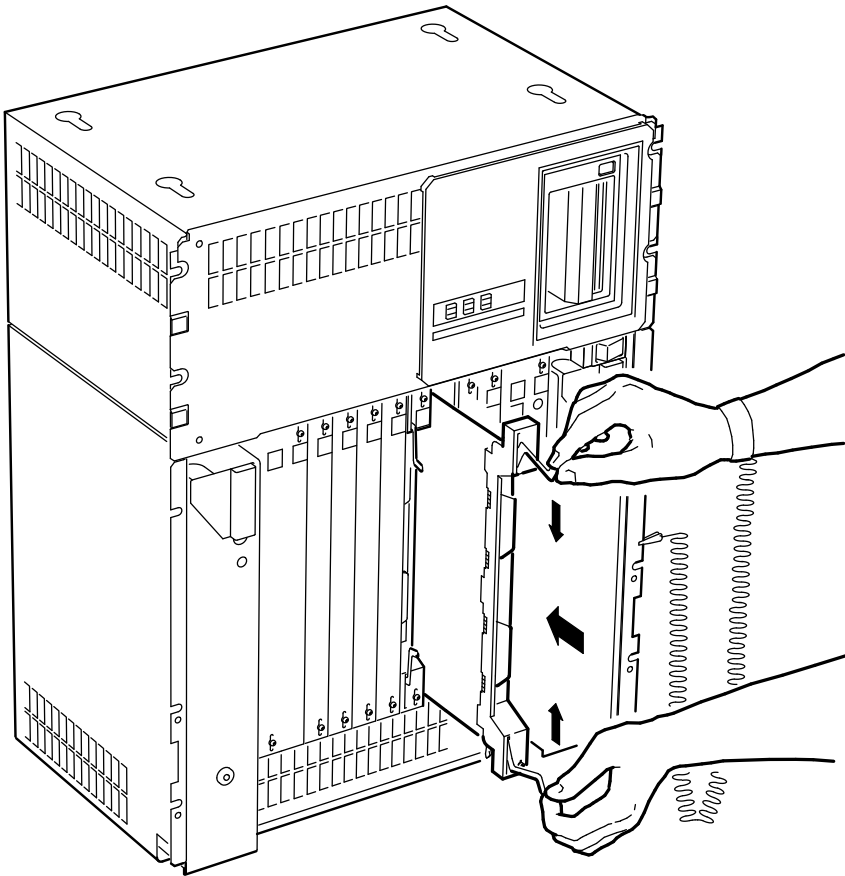
When you install a module with a blank cover or flush handle next to a recessed-handle module, you *must* install a gap filler assembly between the modules to meet EMI regulations. Without the gap filler, circuitry on the blank-cover or flush-handle module is exposed.

Two gap filler assemblies (Part Number 70-24505-01) are provided with the kit. Each gap filler assembly includes one gap filler and two screws. Use as many of the assemblies as you need for your configuration. You may not need any.

Check that the earth connections are correctly in place as follows:

1. Check the backplane to see if any recessed-handle module is next to a module with a blank cover or a flush handle. There should not be any open spaces between modules in the backplane.

Figure 3-12: Inserting the Module

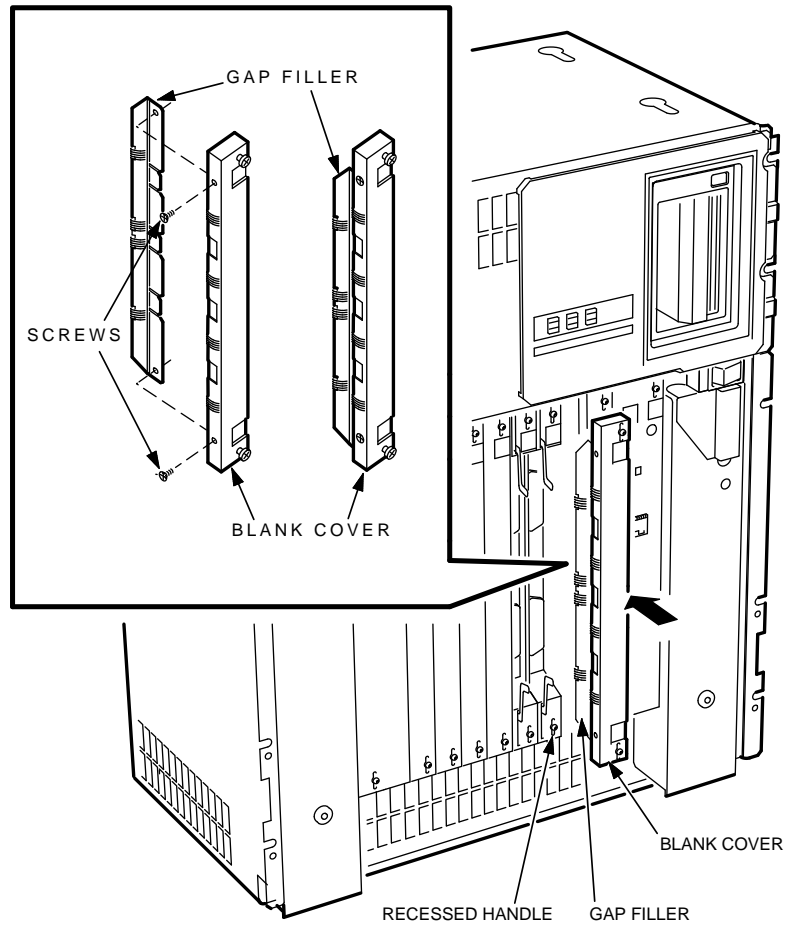


NOTE:

THIS ILLUSTRATION SHOWS HOW TO INSERT ALL MODULES WITH ATTACHED HANDLES AND LOCK RELEASE LEVERS.

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Figure 3-13: Earth Connections



NOTE:

THE GAP FILLER IS MOUNTED ONTO THE BLANK COVER TO CLOSE THE OPEN SPACE BETWEEN THE RECESSED MODULE AND THE BLANK COVER.

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2. If so, make sure a gap filler assembly is installed on the side of the blank cover or flush handle that is next to the recessed-handle module (Figure 3-13).

NOTE

There should not be any open spaces between the modules in the backplane.

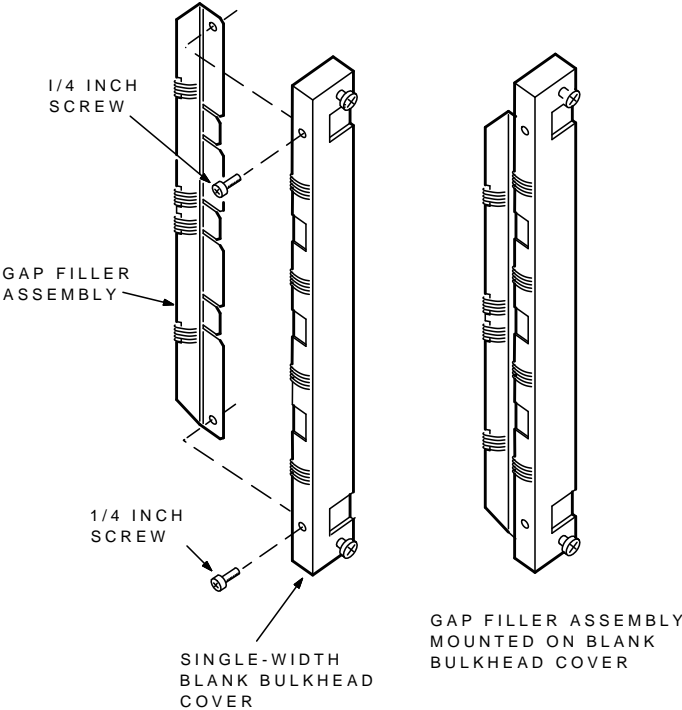
- a. If there are no open spaces, you do not need the gap filler assemblies. Fasten the 1/4-turn captive screws on all handles and covers in the backplane.
- b. If there are open spaces, make sure a gap filler assembly is installed on the side of the blank cover or flush handle that is next to the recessed-handle module (Figure 3-13).

Figure 3-12 shows how to insert the module.

3. Install the gap filler assembly, if needed, as follows:
 - a. Fit the gap filler (Part Number 70-24505-01) onto the side of the blank cover or flush-handle module that is next to the recessed-handle module. Make sure the gap filler's tabs fit into the tab indentations on the blank cover or flush handle (Figure 3-14). Use the two screws that come with the assembly to attach the gap filler at the top and bottom.
 - b. If you have a blank cover, place the blank cover with the gap filler over the card cage slot.

If you have a flush-handle module, insert the module into the card slot.
 - c. Make sure there is correct earth (no open spaces) between the two modules.
 - d. Fasten the 1/4-turn captive screws on all handles and covers in the backplane.

Figure 3-14: Attaching the Gap Filler Assembly



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Chapter 4

Running Diagnostics and Hardware Troubleshooting

WARNING

Always unplug the ISDN TE lead before touching components on the DIV32.

4.1 Testing Overview

This section describes the tests you should use to make sure the DIV32 and the MicroVAX system are operating correctly.


Use the CPU ROM-based diagnostics and the MicroVAX diagnostic monitor (MDM) to test a MicroVAX system. Release 129 or later of MDM supports the DIV32. The name by which the DIV32 is known to the diagnostics is **NADIA**. The MDM software provides the following five groups of menu-driven tests:

Verify mode functional tests	user or Field Service
Verify mode exerciser tests	user or Field Service
Service mode functional tests	Field Service
Service mode exerciser tests	Field Service
Utility tests	Field Service

NOTE

For BA214 enclosures, use the Ethernet Server Kit (part number ZNA07-CM, -CP, or -C5) to test the system.

To verify the system, do the following:

1. Plug the mains (power) cable into the wall outlet and turn the  power switch on (position |).

Do not connect the ISDN TE cable to the DIV32.

2. After 15 seconds, check that the module's green self-test LED is on. This indicates that the self-test was successful. If the green self-test LED did not turn on, make sure the module is correctly inserted. If the LED still does not turn on, refer to Section 4.4, DIV32-M Troubleshooting or Section 4.5, DIV32-S Troubleshooting.
3. Insert the MDM tape cartridge or diskette into the drive.
4. Boot the MDM drive.
5. Type **2** at the main menu to display a list of devices in the system. Look at the list of devices displayed to make sure the new module is listed along with the existing modules and devices. If not, repeat the installation sequence and make sure you have set the module switches correctly. Check the list to make sure the new module is included. If not, repeat the installation sequence and make sure you have set the module switches correctly.
6. Type **1** at the main menu to run the basic system test. This test should complete without error. If an error occurs, see Section 4.4, DIV32-M Troubleshooting or Section 4.5, DIV32-S Troubleshooting.
7. Return to the main menu and type **1**, to select the DIV32 Functional Service Test. Connect the loopback plug and run this test. If the test fails, refer to Section 4.4, DIV32-M Troubleshooting or Section 4.5, DIV32-S Troubleshooting; if the test succeeds, remove the loopback plug.
8. Connect the ISDN TE cable to the DIV32. If this cable has been provided by Digital, connect the ISDN loopback (provided with the cable) to the network end of the cable.

Run the DIV32 Functional Service Test again. If it fails, then one or more of the following must be true:

- the cable is not connected properly
- the cable is faulty
- the ISDN female connector is faulty.

Refer to Section 4.4, DIV32-M Troubleshooting or Section 4.5, DIV32-S Troubleshooting. If the test succeeds, remove the loopback connector and connect the cable to the ISDN network wall socket (jack).

9. Remove the tape cartridge or diskette from the drive.
10. Turn the power switch off (position).

4.2 DIV32 MDM Diagnostics Overview

"FV" stands for "Functional Verify" in the following tests.

4.2.1 Test FV1 - Self-Test and Register Read/Write Test

This test checks that the Self-Test works correctly and that the reset without Self-Test works. It also checks the DIV32 registers and access to the DIV32 internal command memory.

4.2.2 Test FV2 - Device Initialisation Test

This test checks that the DIV32 can be initialised for the processing of commands.

4.2.3 Test FV3 - Basic Command List Test

This test checks that the DIV32 can read command blocks from the command list and properly place them on the response list after processing. It also checks that the Commands Available, Command Queue Valid and Responses Available flags in the flags register work correctly.

4.2.4 Test FV4 - Interrupt Test

This test checks that the DIV32 interrupts through the correct vector when the interrupt enable flag is set. It also checks that clearing the interrupt enable flag prevents the DIV32 from generating any more interrupts.

4.2.5 Test FV5 - Extended Command List Test

This test checks that the DIV32 can start processing commands with a non-empty response list and that it processes multiple commands correctly.

4.2.6 Test FV6 - Simple Data Transmission Test on channels B1 and B2

This test checks that a block of data can be transferred through the internal loopback at FIFO level, on channel B1 and B2, and received without the data being corrupted.

A 512-byte block of data is transmitted and received on each channel. The DDCMP protocol is used.

4.2.7 Test FV7 - Buffer Addressing Test

This test checks that bits 0 to 17 (the low 18 bits) of the Q-Bus DMA address register in the QIC can be set to both 0 and 1.

In this test two 65535-byte data buffers are allocated and a maximum size data block is transferred via the internal loopback over the B-Channels, using the HDLC protocol.

4.2.8 Test FV8 - Multiple Data Transmission Test on channels B1, B2, and D

This test checks that a block of data can be transferred and received without the data being corrupted, through internal loopback at SBC level.

4.2.9 Functional Service Test FS1 - ISDN External Loopback

There is only one Functional Service test.

The ISDN external loopback allows the diagnostics to check the signal continuity from the ISDN line driver/receiver up to the user connector. This ensures that the signal path is neither cut, nor has shorts. However, this does not check the interface in its normal mode of operation.

NOTE

This test requires either one of the ISDN external loopbacks to be fitted. It must be done first with the loopback plug, and repeated with the loopback socket (jack) at the end of the DIV32 TE cable to isolate failures on this cable.

4.2.10 Exerciser Test

The same exerciser test is used by both Service and Verify modes of MDM.

The aim of the Exerciser test is to operate the MicroVAX system in a way similar to normal system operation. By running several exerciser tests together, faults in system design and operational problems can usually be isolated and corrected.

The Exerciser test will simulate the normal operation of the DIV32 by using the following features in internal loopback mode:

1. Interrupts (same as test FV4)
2. Multiple data transfers on the three channels simultaneously.

4.2.11 Utility Test - Run Specified Self-Test Routine

This test is useful only for people in Manufacturing or Repair centres, to isolate faults to the logic level and to aid in the repair of the faulty modules. There is no need to run the Utility test at installation time or when repairing the DIV32 on site.

4.3 Running MDM

The MicroVAX system manuals describe how to load MDM into the MicroVAX and run MDM diagnostics. All Verify mode diagnostics and Service mode diagnostics, including Utility tests, can be run from the test menus that are displayed when MDM is booted. You will only need to use the command line interface to MDM (selected from the service menu) if you need to run individual tests, or if the system is not configured with all devices at their correct floating addresses.

The rest of this section describes operation of the diagnostics with release 128 of MDM. Later releases of MDM may operate slightly differently. Refer to the *MicroVAX Diagnostic Monitor Users Guide* for full details of MDM.

4.3.1 Running Service Mode Tests

The service mode functional and exerciser tests are executed by making the following menu selections from the MDM Main Menu:

1. Select "Display the service menu" from the Main Menu.
2. Select "Display the device menu" from the Service Menu.
3. Select the DIV32 unit to test from the Device Menu.
4. Select either "Perform all functional tests" or "Perform the exerciser test" from the selected device menu.

The Service Setup is executed when service mode tests are run for the first time after loading the MDM system, or after selecting the "Display system configuration and devices" from the Main Menu.

The service setup prompts the operator to connect the H3072 loopback plug and press the **RETURN** key.

4.3.2 Running Utility Tests

The Utility tests are executed by making the following menu selections from the MDM Main Menu:

1. Select "Display the service menu" from the Main Menu.
2. Select "Display the device menu" from the Service Menu.
3. Select the DIV32 unit to test from the Device Menu.
4. Select "Display the device utilities menu" from the selected device menu.
5. Select "Run specified self-test" from the device utilities menu.

4.4 DIV32-M Troubleshooting

4.4.1 DIV32-M FRUs

The DIV32-M comprises the following items:

- the M7531-00 module
- one 17-00712 flat cable
- the H3071 interface panel
- the H3072 loopback plug

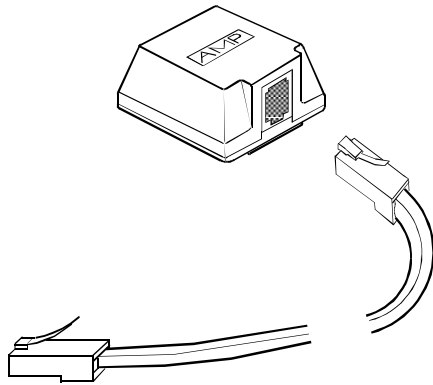
As a separate order, any of the following items can be ordered:

- The BC23T ISDN TE cable, for use outside Germany. This is available in two lengths: 10 feet and 25 feet, the full part numbers being BC23T-10 and BC23T-25 respectively.
- The H3073 loopback female connector, for use outside Germany.
- The BC23U ISDN TE cable, for use in Germany only. This is available in two lengths: 10 feet and 25 feet, the full part numbers being BC23U-10 and BC23U-25 respectively.
- The H3074 loopback female connector, for use in Germany only.

Alternatively, a TE cable from another vendor may be used with the DIV32.

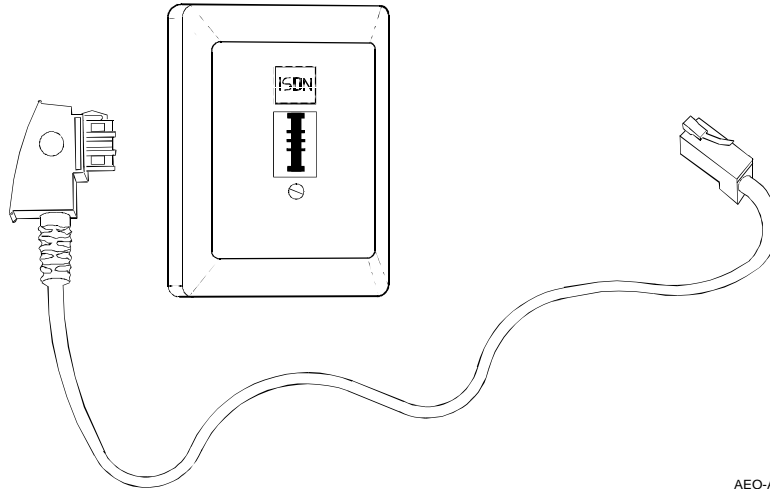
These optional items are illustrated in Figure 4–1 and Figure 4–2.

Figure 4–1: The BC23T ISDN TE Cable and H3073 Loopback



AEO-A-0004-1

Figure 4-2: The BC23U ISDN TE Cable and H3074 Loopback



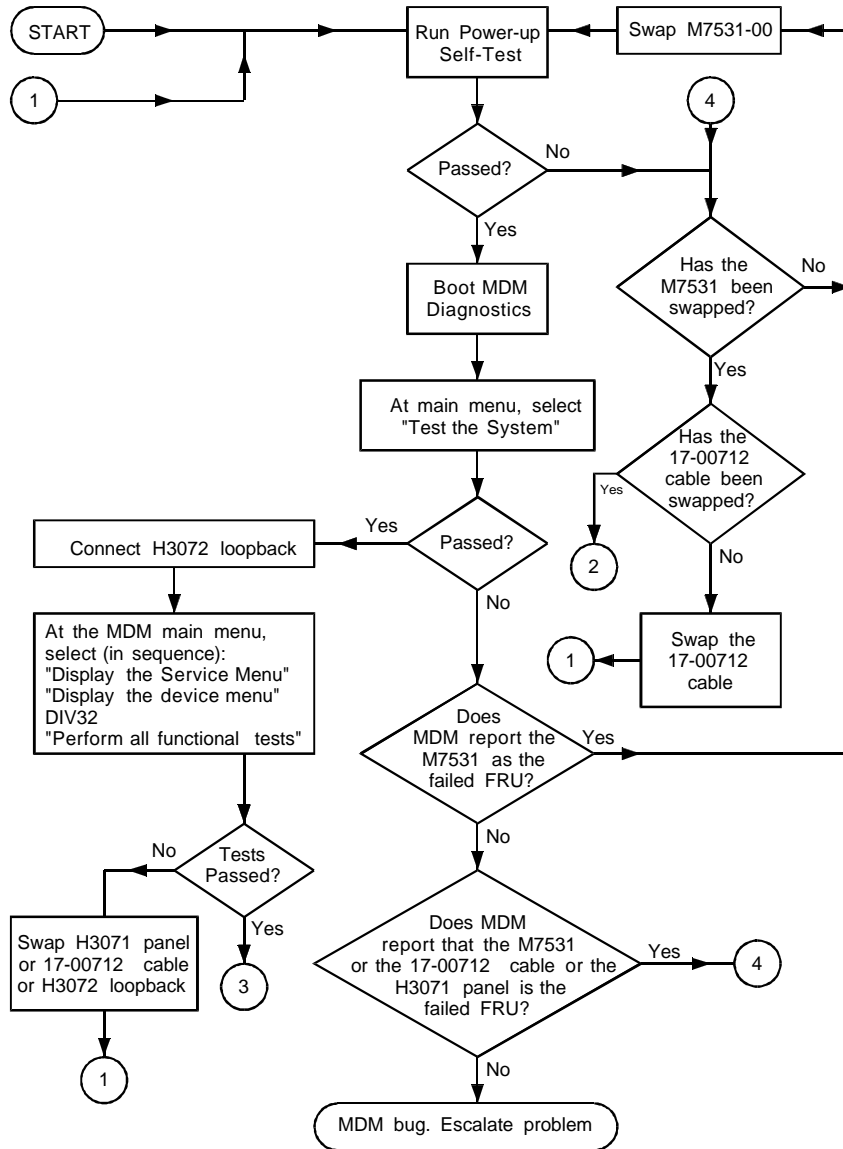
4.4.2 DIV32-M MDM FRU Report

Any of the above-mentioned parts may be the cause of a DIV32 failure. However, as the H3071 interface panel provides the M7531 module with the ISDN interface clock, there is no way for the diagnostics to isolate a failure among the module, the flat cable and the H3071 interface panel (and the loopback), should the ISDN interface fail.

4.4.3 DIV32-M Troubleshooting Flowchart

For systematic troubleshooting of the DIV32-M, use the following flowchart:

Figure 4-3: DIV32-M Troubleshooting Flowchart



AE-A000F-01

Figure 4-3 Cont'd. on next page

Figure 4-3 (Cont.): DIV32-M Troubleshooting Flowchart

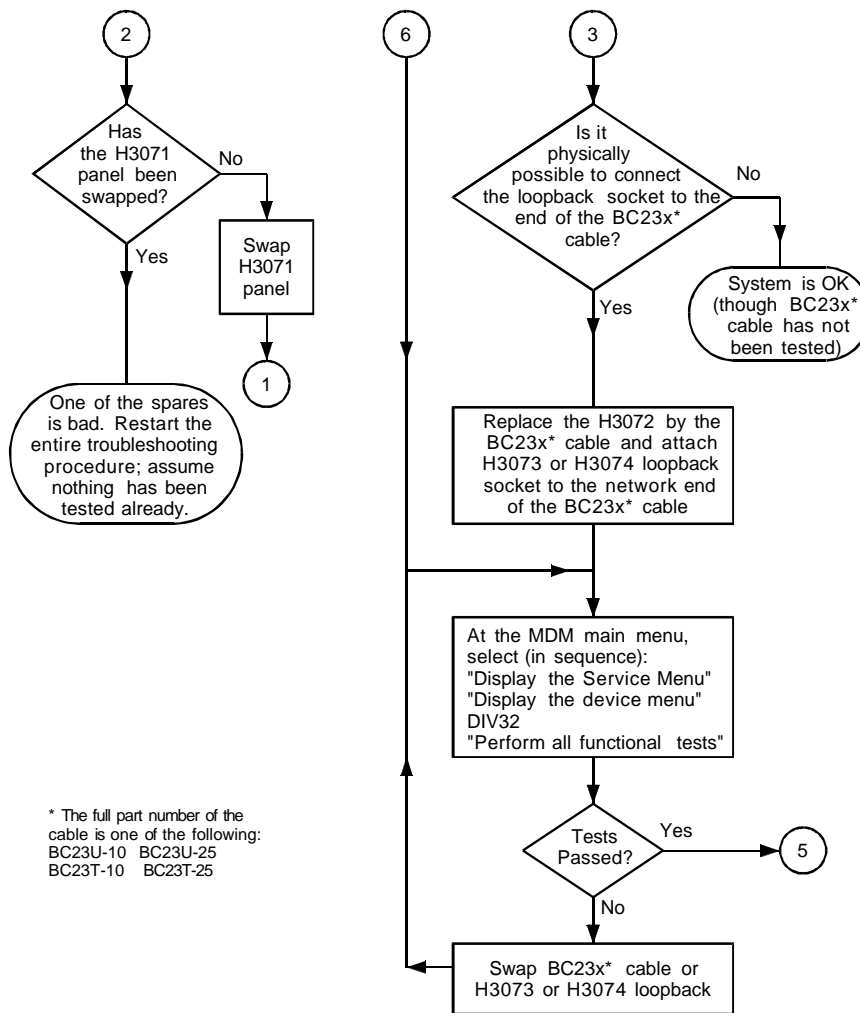
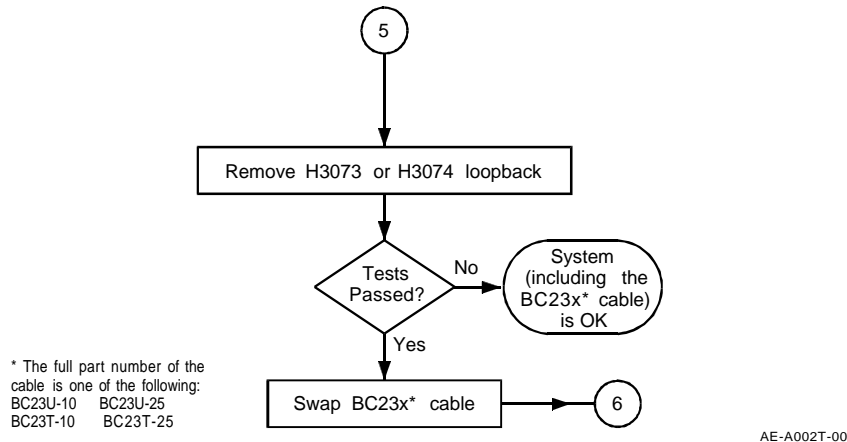


Figure 4-3 Cont'd. on next page

Figure 4–3 (Cont.): DIV32-M Troubleshooting Flowchart



Once the FRU has been identified and replaced, the MDM diagnostics must be run again, in case there is another faulty FRU.

4.5 DIV32-S Troubleshooting

4.5.1 DIV32-S FRUs

The DIV32-S comprises the following items:

- the M7531-PA module
- the H3072 loopback plug

As a separate order, any of the following items can be ordered:

- The BC23T ISDN TE cable, for use outside Germany. This is available in two lengths: 10 feet and 25 feet, the full part numbers being BC23T-10 and BC23T-25 respectively.
- The H3073 loopback female connector, for use outside Germany.
- The BC23U ISDN TE cable, for use in Germany only. This is available in two lengths: 10 feet and 25 feet, the full part numbers being BC23U-10 and BC23U-25 respectively.

- The H3074 loopback female connector, for use in Germany only.

Alternatively, a TE cable from another vendor may be used with the DIV32.

These optional items are illustrated in Figure 4–1 and Figure 4–2.

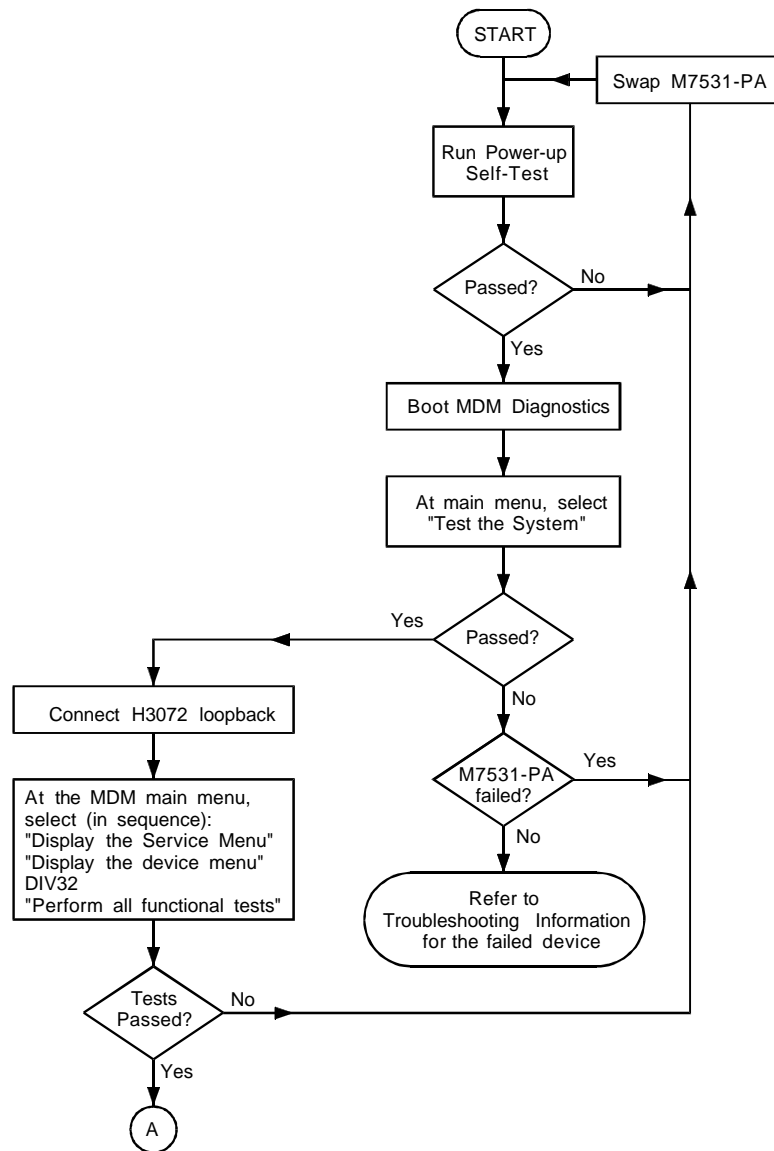
4.5.2 DIV32-S MDM FRU Report

Any of the above-mentioned parts may be the cause of a DIV32 failure.

4.5.3 DIV32-S Troubleshooting Flowchart

For systematic troubleshooting of the DIV32-S, use the following flowchart:

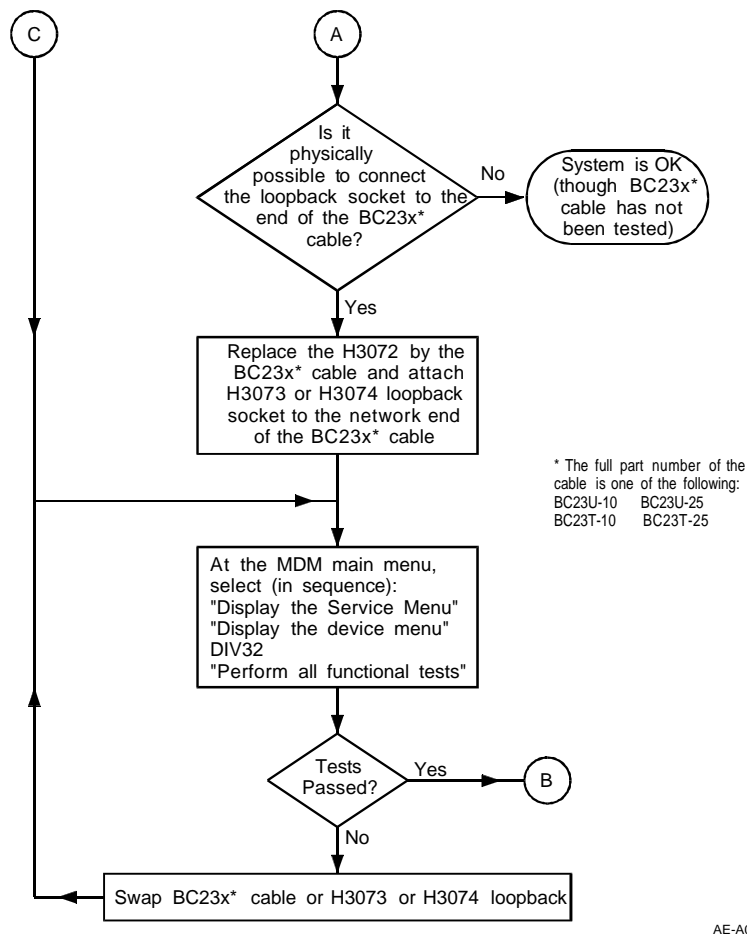
Figure 4-4: DIV32-S Troubleshooting Flowchart



AE-A000D-01

Figure 4-4 Cont'd. on next page

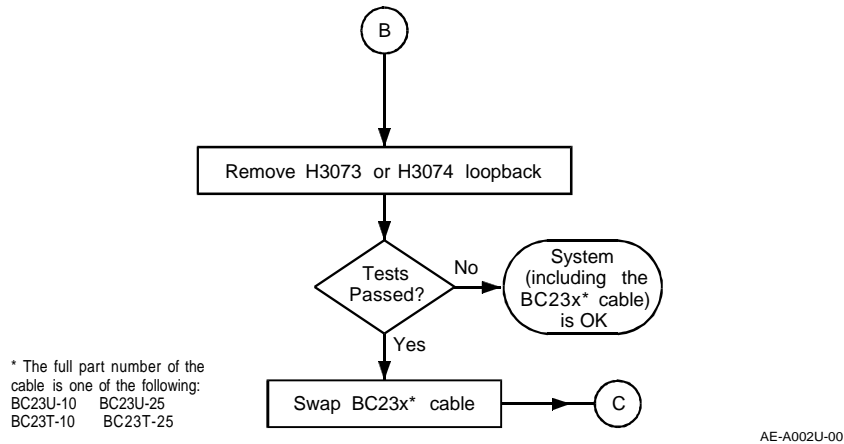
Figure 4-4 (Cont.): DIV32-S Troubleshooting Flowchart



AE-A000E-02

Figure 4-4 Cont'd. on next page

Figure 4-4 (Cont.): DIV32-S Troubleshooting Flowchart



Once the FRU has been identified and replaced, the MDM diagnostics must be run again, in case there is another faulty FRU.

Appendix A

UK Requirements for DIV32 Use

BABT is the British Approvals Board for Telecommunications.

Note

Failure to meet the following requirements will automatically cancel the BABT approval for connection of a DIV32 to the ISDN Network.

A.1 DIV32-M

For BABT approval for connection on the ISDN Network, the DIV32-M system configuration must meet the following criteria:

1. The adjacent boards (see Section A.3.1) to the DIV32 must not carry voltages in excess of 42.4V peak or DC.
2. The adjacent boards (see Section A.3.1) to the DIV32 must meet the following specifications:
 - The maximum component “skyline” height must not exceed 0.344 in. for uninsulated parts, and 0.375 in. for insulated parts.
 - On the other side of the board, leads must not protrude by more than 0.062 in.
 - The printed circuit board must be no thicker than 0.065 in.

If the adjacent board does not meet these specifications, it must be moved at least one slot away from the DIV32. Then either another board meeting these specifications or a grant module (see Section A.3.2) must be inserted between the DIV32 and the non-conformant board.

A.2 DIV32-S

For BABT approval for connection on the ISDN Network, the DIV32-S system configuration must meet the following criteria:

1. The adjacent boards (see Section A.3.1) to the DIV32 must not carry voltages in excess of 42.4V peak or DC.
2. The adjacent boards (see Section A.3.1) to the DIV32 must meet the following specifications:
 - The maximum component “skyline” height must not exceed 0.7 in. for uninsulated parts, and 0.75 in. for insulated parts.
 - On the other side of the board, leads must not protrude by more than 0.070 in.
 - The printed circuit board must be no thicker than 0.065 in.

If the adjacent board does not meet these specifications, it must be moved at least one slot away from the DIV32. Then either another board meeting these specifications or a grant module (see Section A.3.2) must be inserted between the DIV32 and the non-conformant board.

A.3 Definitions of Terms

A.3.1 Adjacent Boards

Boards which are inserted into the system in the Q-Bus slot on either side of the DIV32 are called “adjacent boards”. These are the closest modules to the DIV32.

A.3.2 Grant Modules

A grant module is a board which has no components. It comprises a blank printed circuit board with no tracks except for those which ensure the interrupt acknowledge and DMA grant signal continuity to the next board.

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