
USER'S
GUIDE

EK-TCOUG-TC-001

TURBOchannel Options

User's Guide

digital equipment corporation
maynard, massachusetts

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Using This Guide

This guide explains how to operate the TURBOchannel options that are in your system.

- Chapter 1, *Using TURBOchannel Options*, tells you what TURBOchannel options are and how they can be combined in a system.
- Each of the later chapters describes an individual option that your system has. Each chapter tells you
  - About the hardware for the option
  - How to install and remove the option
  - How to make sure that the option is operating properly

Conventions Used in This Guide

Table 1.

Convention	Use
Monospace type	Anything that appears on your monitor screen is set in monospace type like this.
Boldface type	**Anything that you are asked to type is set in boldface type like this.**

1

Using TURBOchannel Options

This chapter explains

- What TURBOchannel options are
- How TURBOchannel options connect to the base system of your workstation
- Where to find detailed installation and testing information about specific TURBOchannel options.

A Look at TURBOchannel Options

TURBOchannel options include TURBOchannel modules that connect to your base system and the devices that those modules support.

These options operate on any base system that supports TURBOchannel. The number of TURBOchannel modules that a system supports depends on the specific system.

TURBOchannel modules can have different widths, but all TURBOchannel modules have similar connectors that attach to TURBOchannel expansion slots on the system module or an intermediate module that connects to the system module. An opening in the wall of the system unit allows the TURBOchannel module to connect to an external device.

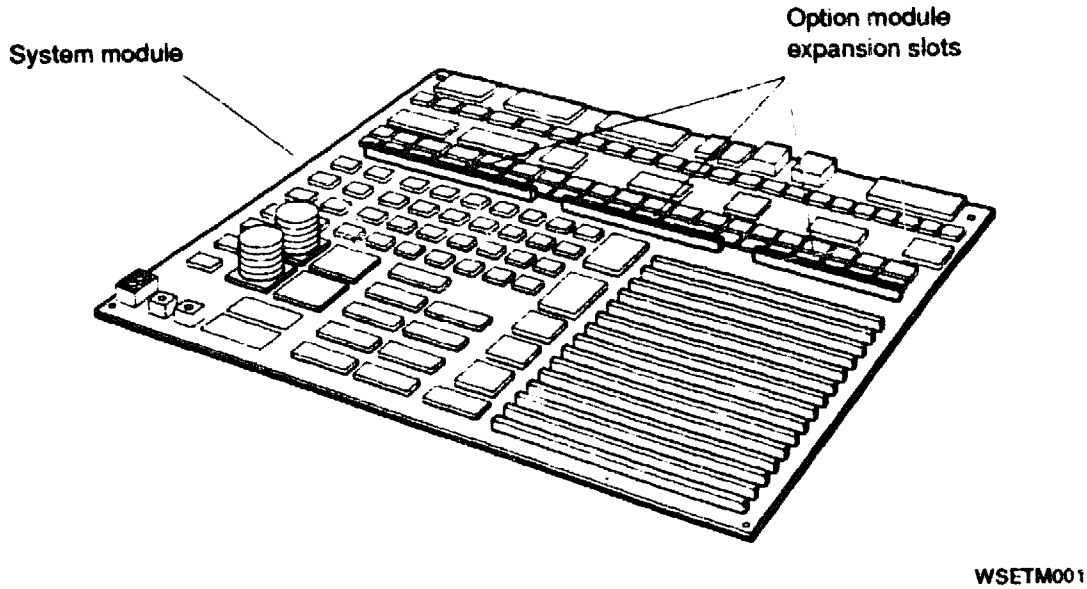


Figure 1-1. TURBOchannel connectors on a typical system module

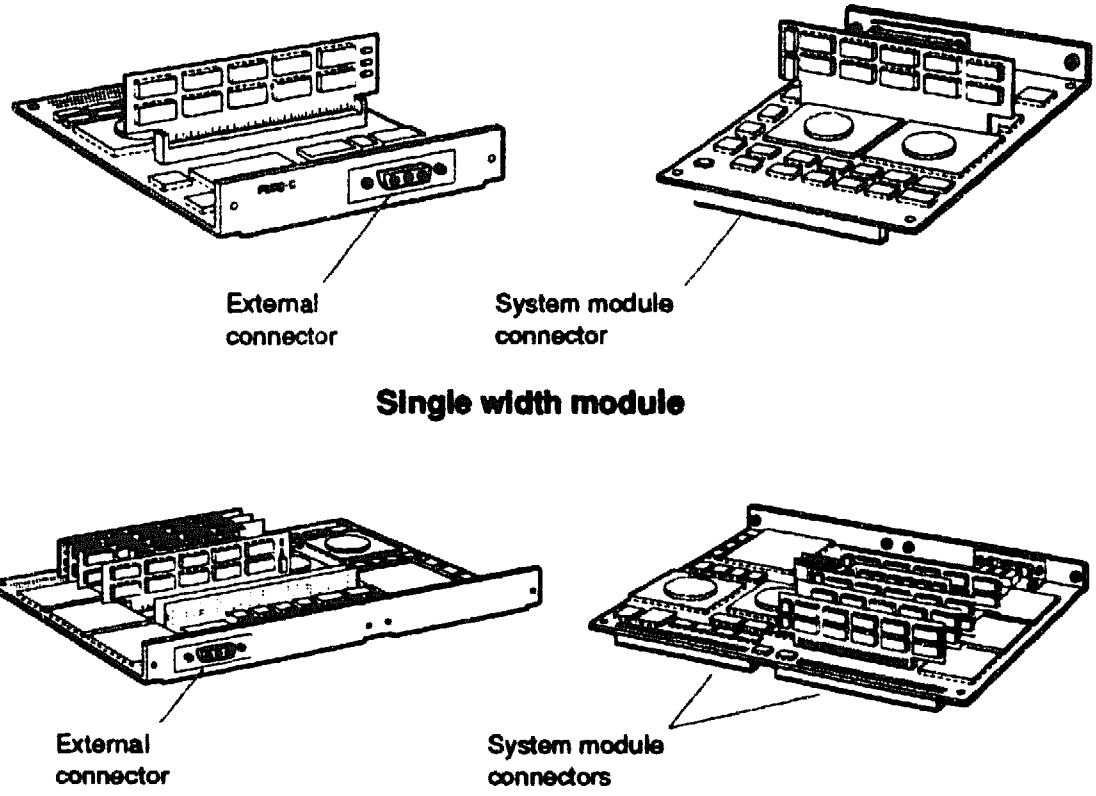
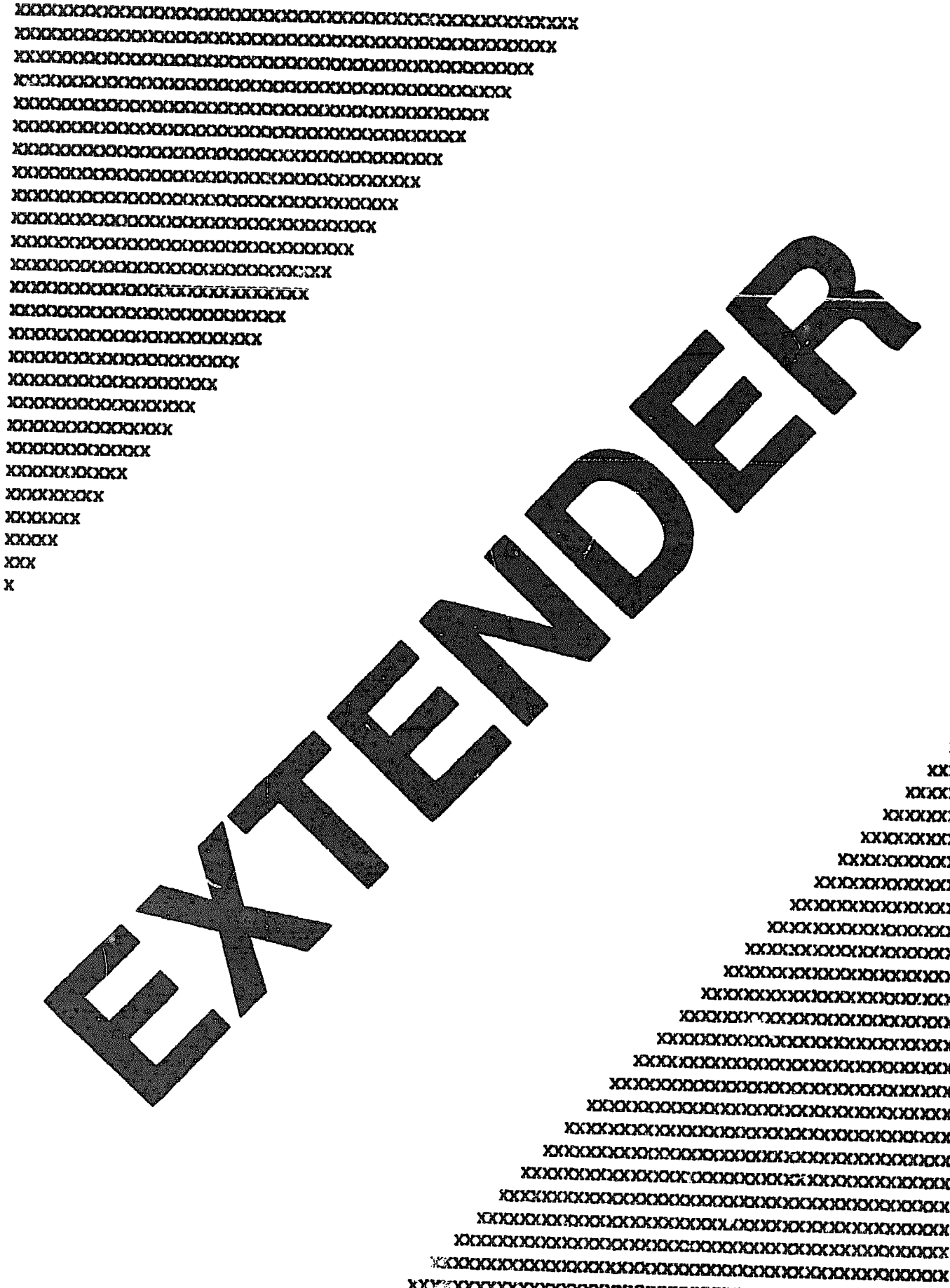


Figure 1-2. Typical TURBOchannel modules

For Further Information

For detailed information about a specific TURBOchannel option in your workstation, see the chapter later in this guide that describes that TURBOchannel option.


EXTENDER

December 1991

TURBOchannel Extender (TCE) Option Module

EK-TCEIM-TC-001

This chapter about the TURBOchannel extender (TCE) option module tells you

- Basic information about (TCE) option module hardware
- How to install a TCE option module
- How to remove a TCE option module
- How to check whether the TCE option module is operating properly

TCE Module Option Hardware

The TCE option module links the TURBOchannel interface module in the TCE box to the system module of your workstation. The TCE interface cable attaches to the TCE connector on the TCE option module.

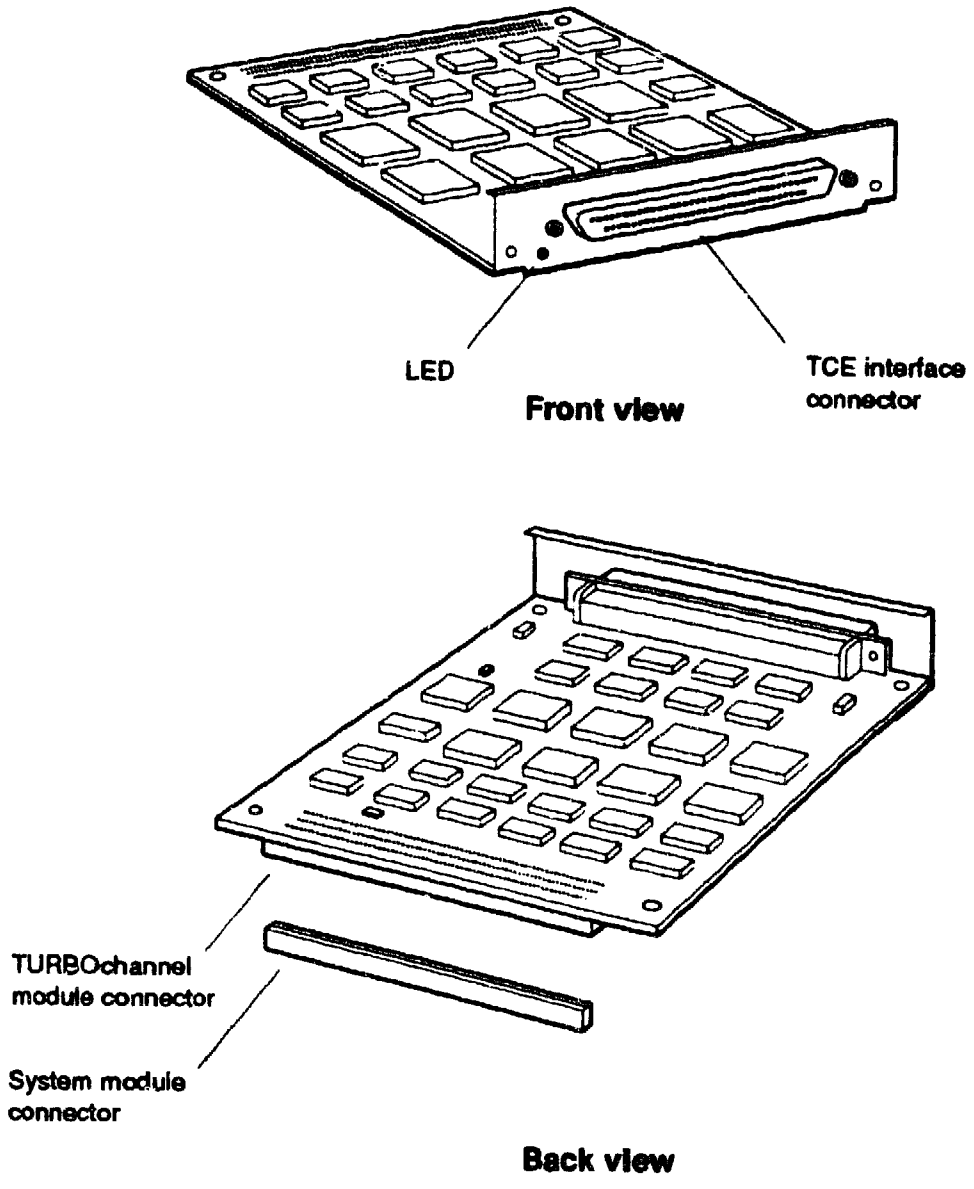


Figure 1. TCE option module

To Install a TCE Option Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the System Unit Cover

See the operator's or user's guide that came with your workstation for directions on how to remove the system unit cover.

Attach the Antistatic Wrist Strap

Caution: *Always attach the antistatic wrist strap when handling any module in your workstation or any other static-sensitive material. Using the antistatic wrist strap protects the module from static discharge.*

1. Unfold the antistatic wrist strap.
2. Wrap the adhesive end of the strap around your wrist twice.
3. Peel the cover off the copper end of the strap. Then press the copper end of the strap against the metal frame of the unit into which you are installing the module.

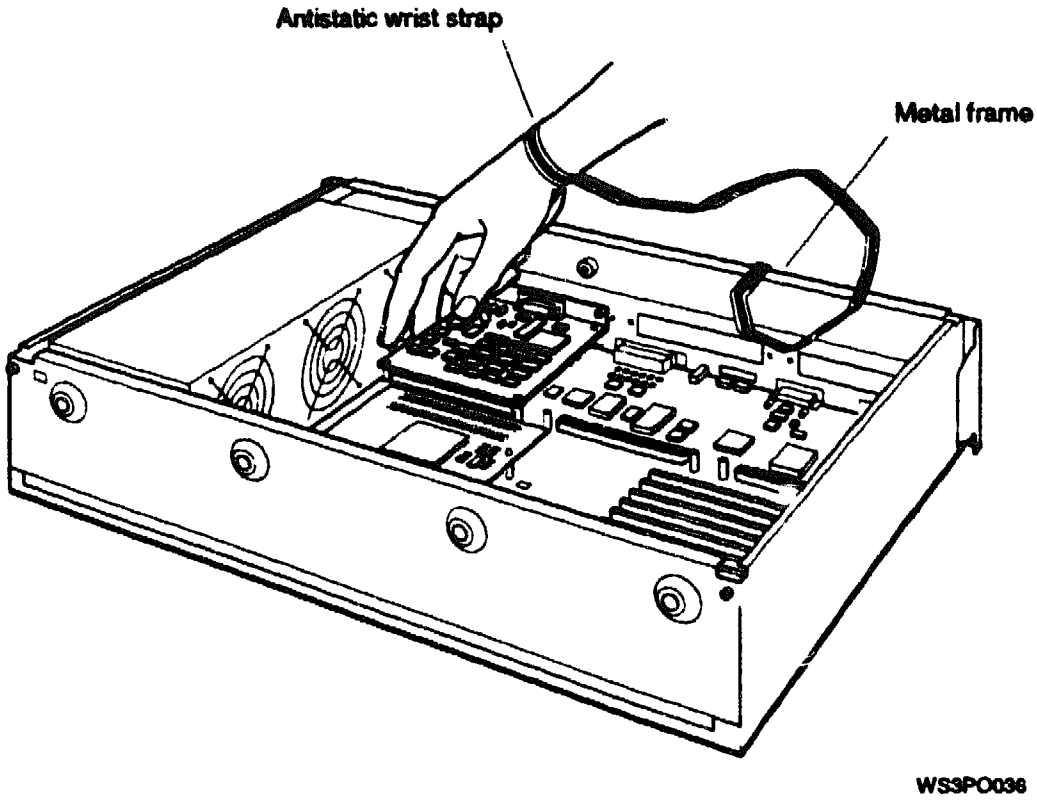


Figure 2. Using the antistatic wrist strap

Insert the TCE Option Module

Caution: *System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.*

1. Choose any available TURBOchannel expansion slot.
2. If the back of the system unit has a metal plate over the option slot you want to use, remove the screws that hold the plate. Then remove the plate.

   Save the plate. You will need to replace the plate if you ever remove the module.
3. Hold the TCE option module so that the system module connector faces the TURBOchannel expansion slot on the system module and the TCE connector faces the option slot opening on the back of the system unit.
4. Pass the TCE connector through the option slot opening in the back of the system unit.
5. Push the system module connector into the TURBOchannel expansion slot on the system module.
6. Use the screws that came with the module to fasten the TCE option module to the support posts.
7. Use the screws that held the metal plate over the option slot to attach the opposite end of the module to the wall of the system unit.

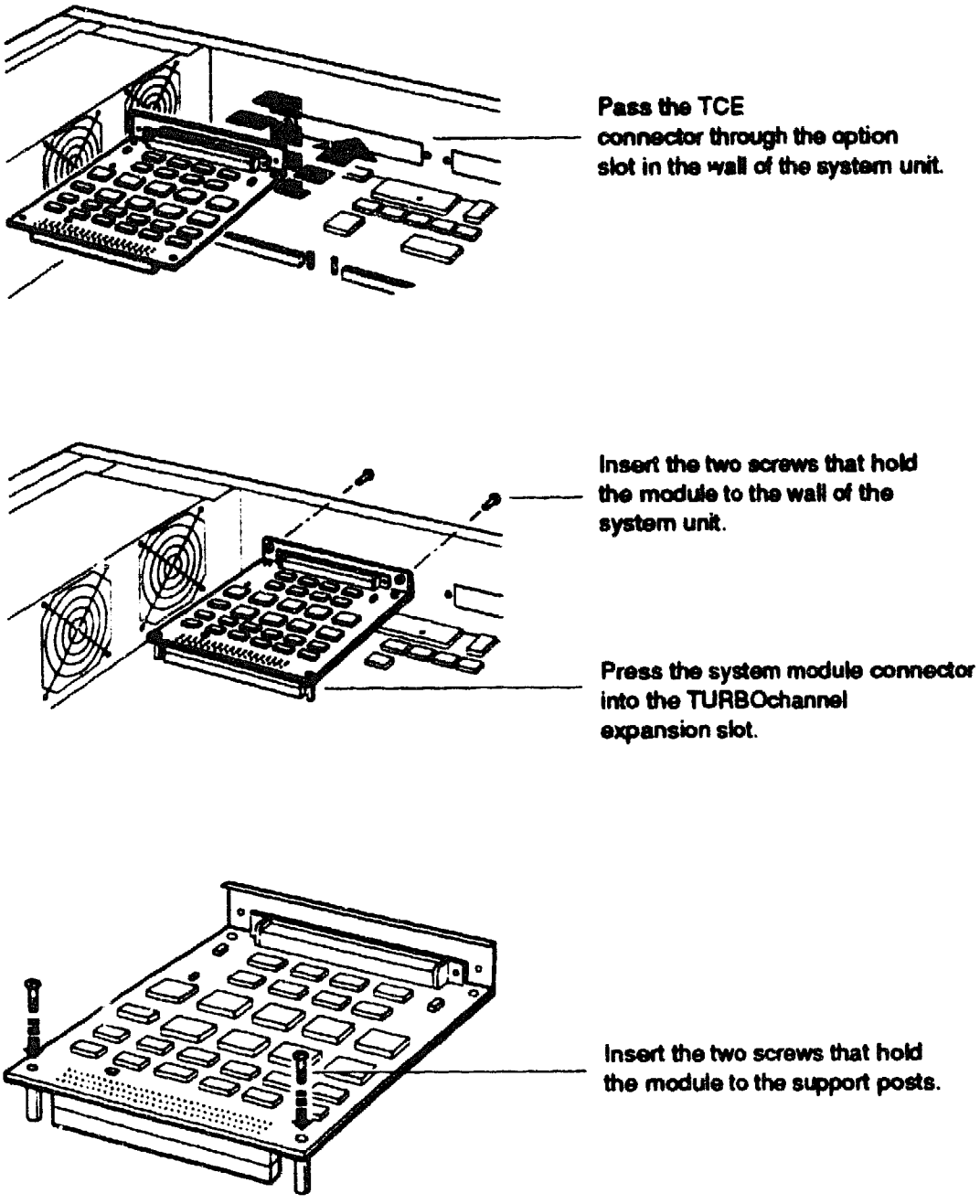


Figure 3. Installing a TCE option module

Replace the System Unit Cover

1. Remove the antistatic wrist strap from your wrist and from the system unit.
2. Replace the system unit cover. For directions, see the operator's or user's guide that came with your workstation.

Make Sure the TCE Option Module Operates Properly

1. Turn on the monitor and any other devices connected to the system unit.
2. Turn on the system unit.
3. Make sure the TCE option module appears in the configuration display and reports no errors. See "To Check the TCE Option Module" later in this chapter for directions.

To Remove a TCE option Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the System Unit Cover

See the operator's or user's guide that came with your workstation for directions on how to remove the system unit cover.

Put On the Antistatic Wrist Strap

See "Attach the Antistatic Wrist Strap" on page 3 of this chapter for directions.

Remove the TCE Option Module

Caution: *System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.*

1. Loosen the two screws that hold the cable to the TCE box connector. Then pull the cable off the connector.
2. Remove the screws that hold the TCE option module to the wall of the system unit.
3. Remove the screws that hold the TCE option module to the support posts.
4. Grip the end of the TCE option module near the support posts. Then pull the end of the module out of the TURBOchannel expansion slot on the system module.
5. Place the TCE option module in an antistatic bag or on an antistatic mat.
6. If you are installing no other TURBOchannel module in the option slot, replace the metal plate that covered the option slot.

Replace the System Unit Cover

1. Remove the antistatic wrist strap from your wrist and from the system unit.
2. Replace the system unit cover. For direftions, see the operator's or user's guide that came with your workstation.

To Check the TCE Option Module

Make Sure The System Recognizes the TURBOchannel Module In the TCE Box

1. If the TCE box contains a graphics module, check the indicator light on the TCE option module. The light glows green when the module is connected correctly and the system unit and the TURBOchannel graphics module in the TCE box is operating.

   If the indicator light does not glow green, make sure

   a. The TCE option module is inserted tightly in the TURBOchannel expansion slot.

   b. The system unit and TCE box are on and receiving power.

   c. The TCE box cable is connected correctly to the TCE option module and the TCE box.

   If the green LED on the TCE option module still does not glow, move the TCE option module to another TURBOchannel expansion slot. If the problem persists, contact your Digital service representative.

2. Type **cnfg** at the console prompt. Then press Return. A display with information about the modules in your system then appears on the monitor.

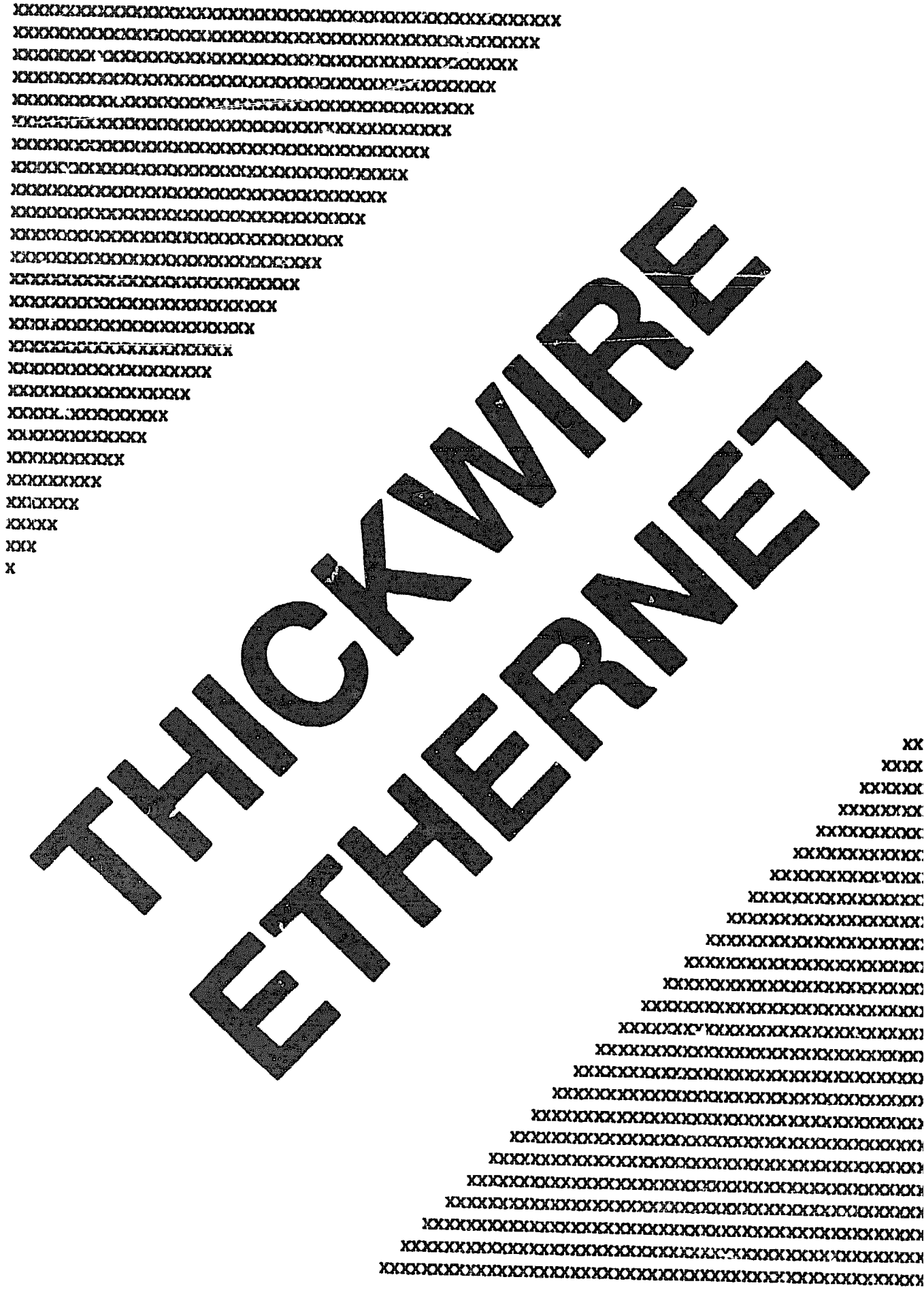
   The overall display can differ, but the line that describes the TURBOchannel module in the TCE box is the same for every workstation. This is a sample configuration for display for the DECstation 5000 Model 100:

```
3: KN02-BA DEC V5.2c TCF0  ( 24 MB)
                           (enet:08-00-2b-0c-e0-d1)
                           (scsi = 7)
2: PMAD-AA DEC V5.1f TCF0  (enet: 08-00-2b-0f-43-31)
1: PMAZ-AA DEC V5.3a TCF0  (scsi=7)
0: PMAG-DA DEC V5.3a TCF0  (EA: PXG -- D=8, Z=24)
```

   Numbers in the first column are the slot numbers for the modules in your system. If the configuration display has no line for the slot that contains the TCE option module, check the TCE box. See the *TURBOchannel Extender Operator's Guide* for troubleshooting directions.

For Further Information

For information about the TCE box, see the *TURBOchannel Extender Operator's Guide.*


THICKWIRE
ETHERNET

December 1991

The ThickWire Ethernet TURBOchannel Module

EK-TWETH-TC-001

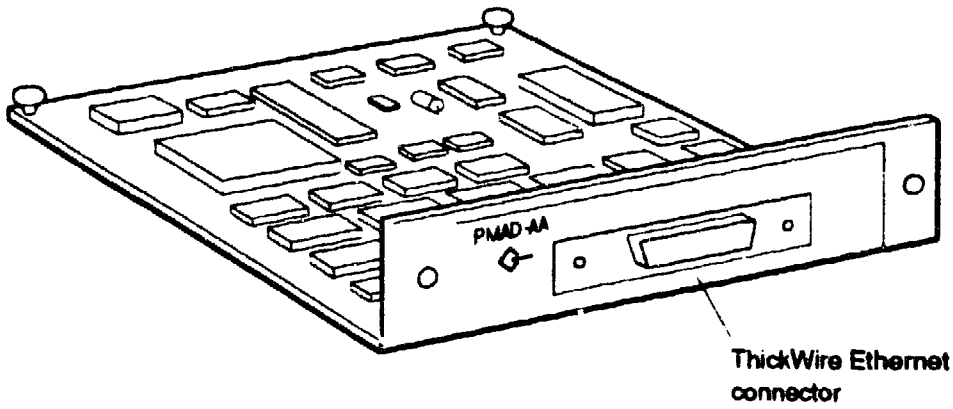
This chapter about the ThickWire Ethernet TURBOchannel module tells you

- Basic information about ThickWire Ethernet TURBOchannel module hardware
- How to install a ThickWire Ethernet TURBOchannel module
- How to remove a ThickWire Ethernet TURBOchannel module
- How to check whether the ThickWire Ethernet TURBOchannel module is operating properly

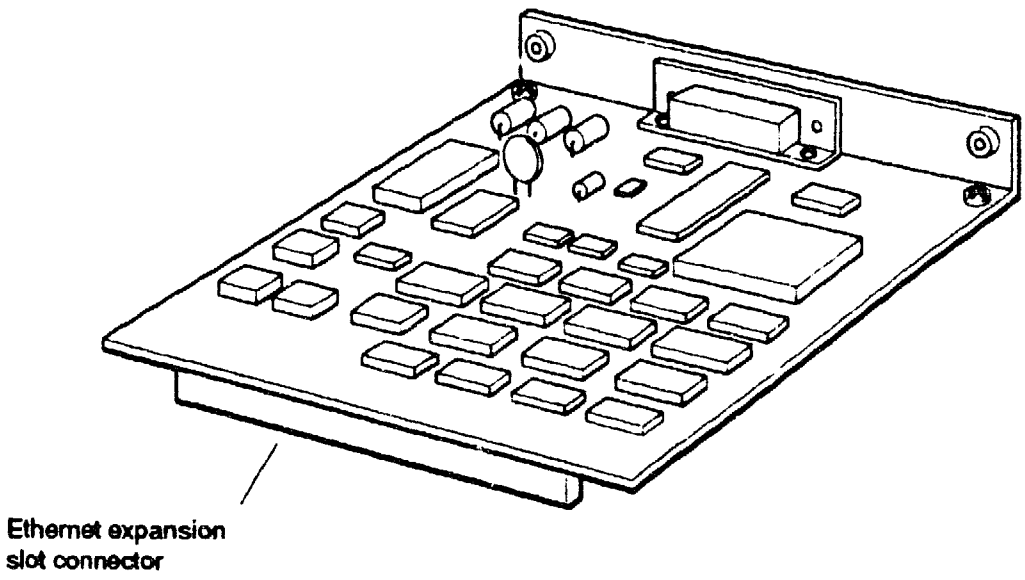
ThickWire Ethernet TURBOchannel Option Module Hardware

Each ThickWire Ethernet TURBOchannel option module provides a ThickWire Ethernet connection. The ThickWire Ethernet cable attaches to the connector on the back of the option module.

The workstation can support as many ThickWire Ethernet modules as there are available option slots.



Front view



Back view

WSETU014

Figure 1. ThickWire Ethernet TURBOchannel option module

To Install a ThickWire Ethernet TURBOchannel Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the System Unit Cover

See the operator's or user's guide that came with your workstation for directions on how to remove the system unit cover.

Attach the Antistatic Wrist Strap

Caution: *Always attach the antistatic wrist strap when handling any module in your workstation or any other static-sensitive material. Using the antistatic wrist strap protects the module from static discharge.*

1. Unfold the antistatic wrist strap.
2. Wrap the adhesive end of the strap around your wrist twice.
3. Peel the cover off the copper end of the strap. Then press the copper end of the strap against the metal frame of the system unit.

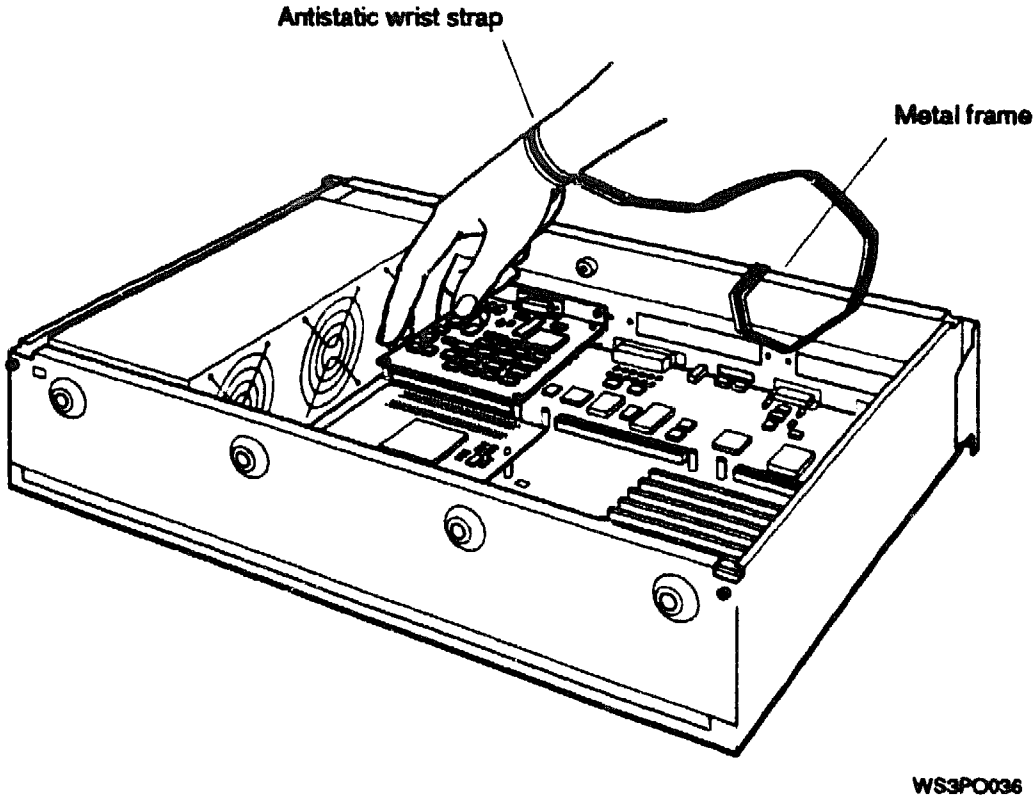


Figure 2. Using the antistatic wrist strap

Insert the ThickWire Ethernet TURBOchannel Module

Caution: *System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.*

1. Choose any unused TURBOchannel option slot on the back of the system unit to hold the ThickWire Ethernet TURBOchannel module.
2. If the back of the system unit has a metal plate over the option slot you want to use, remove the screws that hold the plate. Then remove the plate.

   Save the plate. You will need to replace the plate if you ever remove the TURBOchannel module.
3. Hold the ThickWire Ethernet TURBOchannel module so that the system module connector faces the TURBOchannel expansion slot on the system module and the ThickWire Ethernet connector faces the option slot opening on the back of the system unit.
4. Pass the ThickWire Ethernet connector through the option slot opening in the back of the system unit.
5. Push the system module connector into the TURBOchannel expansion slot on the system module.
6. Use the screws that came with the module to fasten the ThickWire Ethernet TURBOchannel module to the support posts.
7. Use the screws that held the metal plate over the option slot to attach the module to the system unit wall.

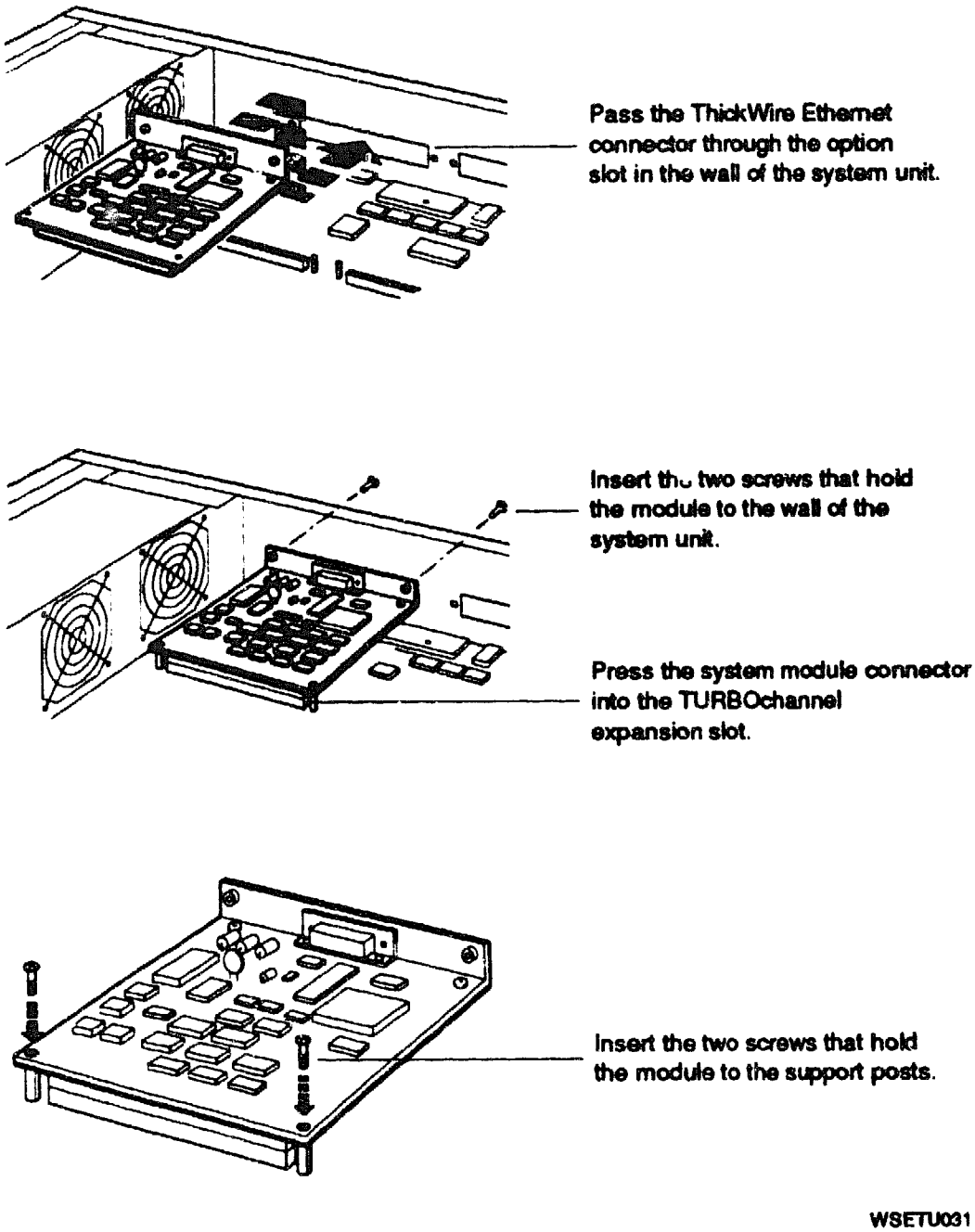


Figure 3. Installing a ThickWire Ethernet TURBOchannel module

Connect the ThickWire Ethernet or Attach a Loopback Connector

To connect the ThickWire Ethernet TURBOchannel module to the Ethernet,

1. Align the wide end of the ThickWire cable with the wide end of the connector on the module.
2. Press the end of the cable onto the ThickWire connector on the module.
3. Tighten the two screws that hold the cable end to the connector on the module.

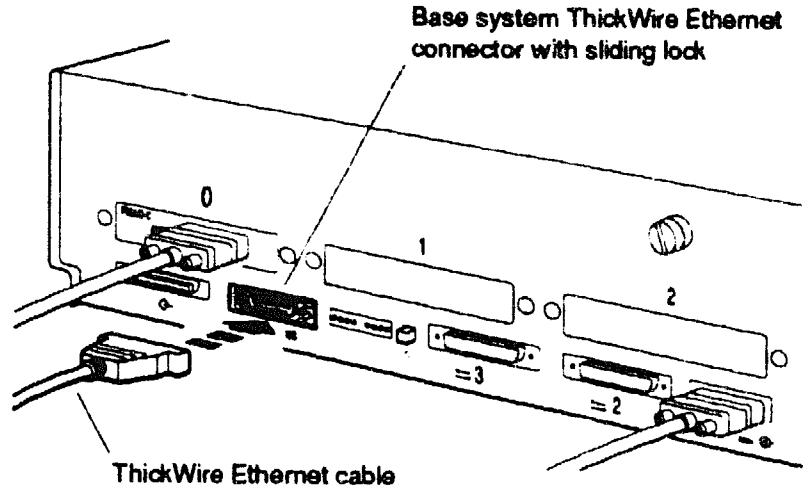


Figure 4. Attaching a ThickWire Ethernet cable

If you want to use your workstation without connecting it to a ThickWire Ethernet network, attach a ThickWire loopback connector to the ThickWire Ethernet connector on the module before you turn on your workstation.

1. Hold the ThickWire loopback connector so the wide end of the connector is on top.
2. Firmly press the ThickWire loopback connector onto the ThickWire Ethernet connector.

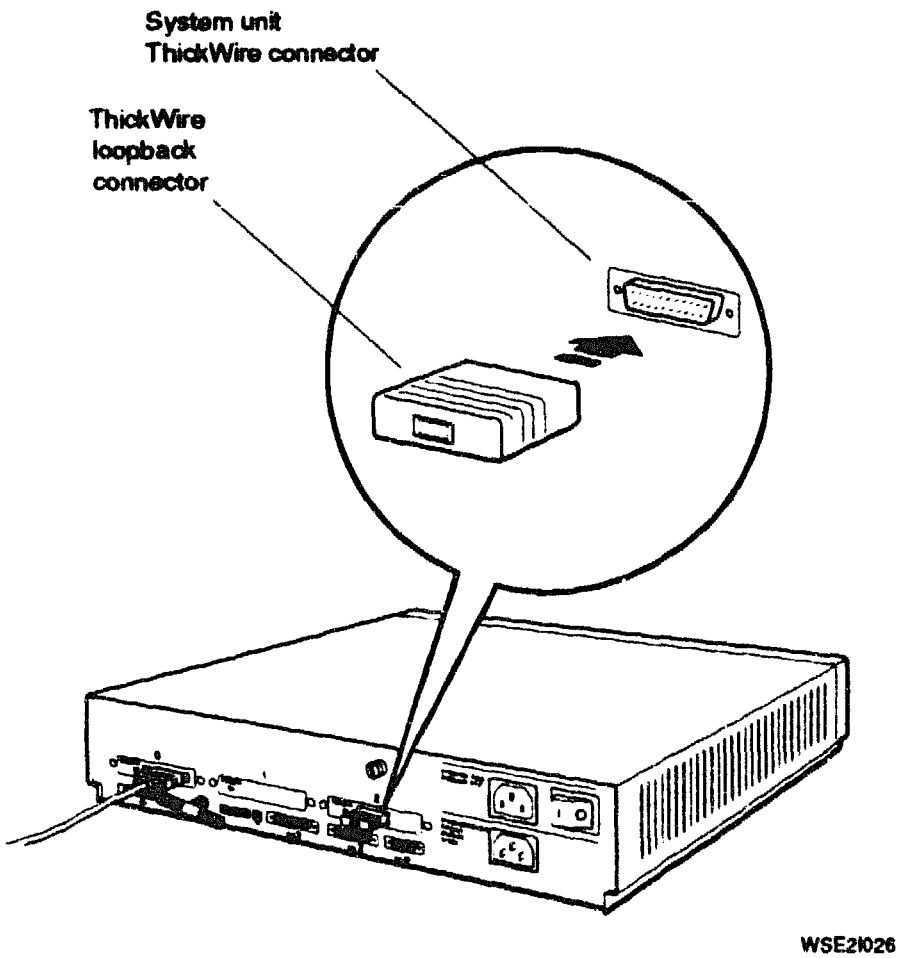


Figure 5. Attaching a ThickWire loopback connector

Replace the System Unit Cover

1. Remove the antistatic wrist strap from your wrist and from the system unit.
2. Replace the system unit cover. See the operator's or user's guide that came with your workstation for directions.

Make Sure the ThickWire Ethernet TURBOchannel Module Operates Properly

1. Turn on the monitor and any other devices connected to the system unit.
2. Turn on the system unit.
3. Make sure the ThickWire Ethernet module appears in the configuration display and reports no errors. See "To Check the ThickWire Ethernet TURBOchannel Module" on page 12 of this chapter for directions.

To Remove a ThickWire Ethernet TURBOchannel Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the System Unit Cover

See the operator's or user's guide that came with your workstation for directions on how to remove the system unit cover.

Put On the Antistatic Wrist Strap

See "Attach the Antistatic Wrist Strap" on page 3 of this chapter for directions.

Remove the ThickWire Ethernet TURBOchannel Module

Caution: System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.

1. Disconnect the ThickWire Ethernet cable or ThickWire loopback connector from the ThickWire Ethernet TURBOchannel module.
2. Remove the screws that hold the module to the wall of the system unit.
3. Remove the screws that hold the ThickWire Ethernet TURBOchannel module to the support posts.
4. Grip the end of the ThickWire Ethernet TURBOchannel module near the support posts. Then pull the end of the module out of the TURBOchannel expansion slot on the system module.
5. Place the ThickWire Ethernet TURBOchannel module in an antistatic bag or on an antistatic mat.
6. If you are installing no other TURBOchannel module in the option slot, replace the metal plate that covered the option slot.

Replace the System Unit Cover

1. Remove the antistatic wrist strap from your wrist and from the system unit.
2. Replace the system unit cover. See the operator's or user's guide that came with your workstation for directions.

To Check the ThickWire Ethernet TURBOchannel Module

Make Sure the System Recognizes the ThickWire Ethernet TURBOchannel Module

To make sure that the system recognizes the ThickWire Ethernet TURBOchannel module, type **cnfg** at the console prompt. Then press Return. A display with information about the modules in your system then appears on the monitor.

The overall display can differ, but the line that describes the ThickWire Ethernet TURBOchannel module is the same for every workstation. This is a sample configuration display for the DECstation 5000 Model 100:

```
3:   KN02-BA   DEC   V5.2c   TCF0   ( 24 MB)
                                    (enet:08-00-2b-0c-e0-d1)
                                    (scsi = 7)
2:   PMAD-AA   DEC   V5.1f   TCF0   (enet: 08-00-2b-0f-43-31)
1:   PMAZ-AA   DEC   V5.1e   TCF0   (scsi = 7)
0:   PMAG-BA   DEC   V5.2a   TCF0   (CX -- d=8)
```

Look for the line that has PMAD in the second column. This is the line that describes the ThickWire Ethernet TURBOchannel module.

The number to the left of PMAD is the slot number for the ThickWire Ethernet TURBOchannel module. This sample display shows that the ThickWire Ethernet TURBOchannel module is in slot 2

The phrase in parentheses at the right end of the line lists the Ethernet address of the module.

If the ThickWire Ethernet TURBOchannel module does not appear in the configuration display, move the module to another slot. If the module still does not appear in the configuration display, contact your Digital service representative.

Check the Self-Test Results

This is a sample self-test error message for a ThickWire Ethernet TURBOchannel module:

```
?TFL 1/cllsn (1:rd ESAR err)
```

- The number immediately after `?TFL` is the slot number of the module that reported the error.
- The term to the right of the slash (/) is the name of the test that detected a problem.
- The phrase in parentheses at the end of the message is an additional message that describes the error.

This sample error message reports that the cllsn test detected a problem in the ThickWire Ethernet module in option slot 1.

If a self-test reports a problem in a ThickWire Ethernet TURBOchannel module, make sure the module is inserted tightly in its slot and that a ThickWire Ethernet cable or loopback connector is attached securely to the cable connector on the module.

If the problem persists, check the self-test error message and find the name of the failed test. Table 1 describes how to respond to each failed self-test.

Table 1. Self-Test Error Messages for Ethernet Modules

Test Listed in the Error Message	How to Respond
cllsn crc esar init int-lb m-cst promisc ram regs	Replace the Ethernet module. The slot number in the error message is the number of the slot that contains the problem Ethernet module.
ext	Make sure the Ethernet cable is connected. If the test still fails, the problem is in the Ethernet module. Replace the ThickWire Ethernet module.


SCSI

December 1991

The SCSI TURBOchannel Module

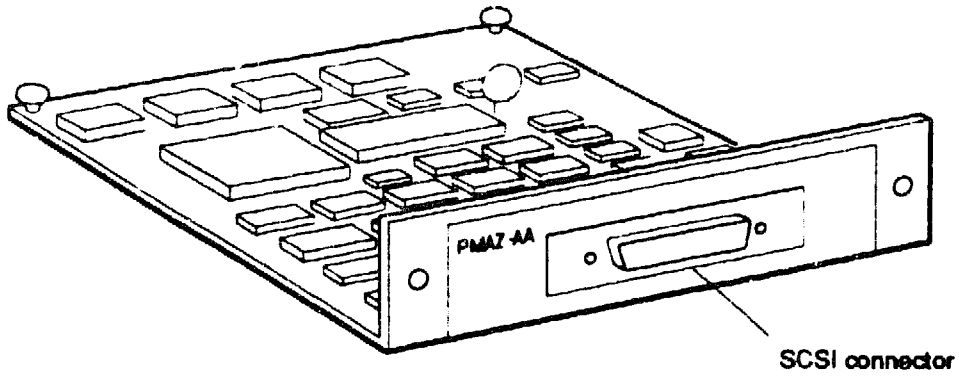
EK-USCSI-TC-001

This chapter about the small computer systems interface (SCSI) TURBOchannel module tells you

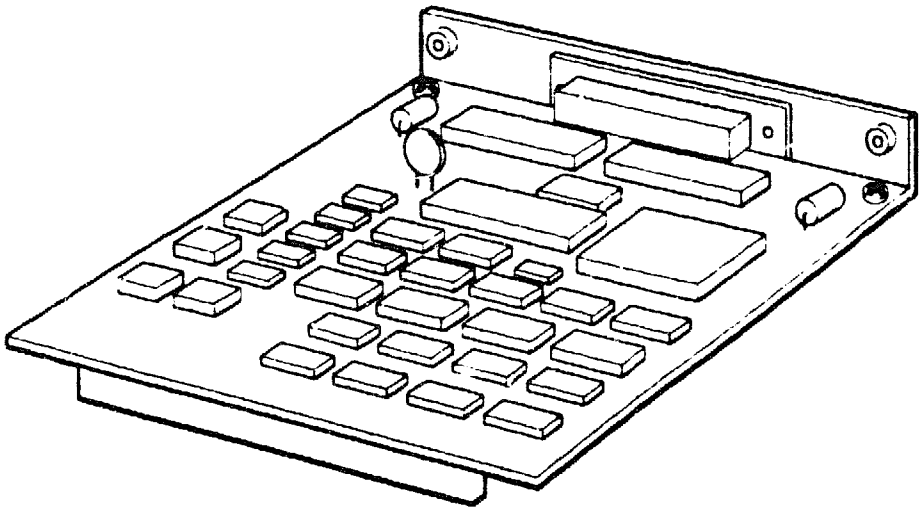
- Basic information about SCSI TURBOchannel module hardware
- How to install a SCSI TURBOchannel module
- How to remove a SCSI TURBOchannel module
- How to check whether the SCSI TURBOchannel module is operating properly

SCSI TURBOchannel Module Hardware

The SCSI TURBOchannel module links the system unit to drives in expansion boxes. The workstation can support as many SCSI modules as there are available TURBOchannel slots.



Front view



Back view

WSE2M029

Figure 1. SCSI TURBOchannel module hardware

To Install a SCSI TURBOchannel Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the System Unit Cover

See the operator's or user's guide that came with your workstation for directions on how to remove the system unit cover.

Attach the Antistatic Wrist Strap

Caution: *Always attach the antistatic wrist strap when handling any module in your workstation or any other static-sensitive material. Using the antistatic wrist strap protects the module from static discharge.*

1. Unfold the antistatic wrist strap.
2. Wrap the adhesive end of the strap around your wrist twice.
3. Peel the cover off the copper end of the strap. Then press the copper end of the strap against the metal frame of the unit into which you are installing the module.

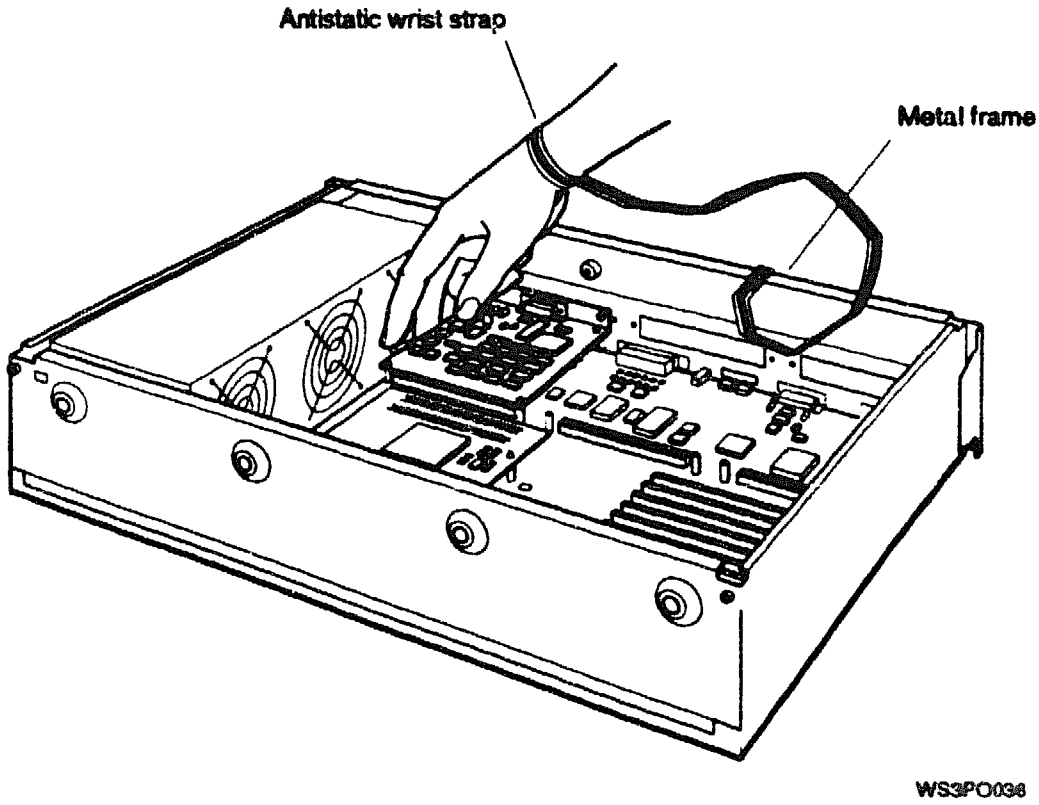


Figure 2. Using the antistatic wrist strap

Insert the SCSI TURBOchannel Module

Caution: *System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.*

1. Choose any available TURBOchannel expansion slot.
2. If the back of the system unit has a metal plate over the option slot you want to use, remove the screws that hold the plate. Then remove the plate.

   Save the plate. You will need to replace the plate if you ever remove the TURBOchannel module.
3. Hold the SCSI TURBOchannel module so that the system module connector faces the TURBOchannel expansion slot on the system module and the external SCSI connector faces the option slot opening on the back of the system unit.
4. Pass the external SCSI connector through the option slot opening in the back of the system unit.
5. Push the system module connector into the TURBOchannel expansion slot on the system module.
6. Use the screws that came with the module to fasten the SCSI TURBOchannel module to the support posts.
7. Use the screws that held the metal plate over the option slot to attach the module to the inside of the system unit wall.

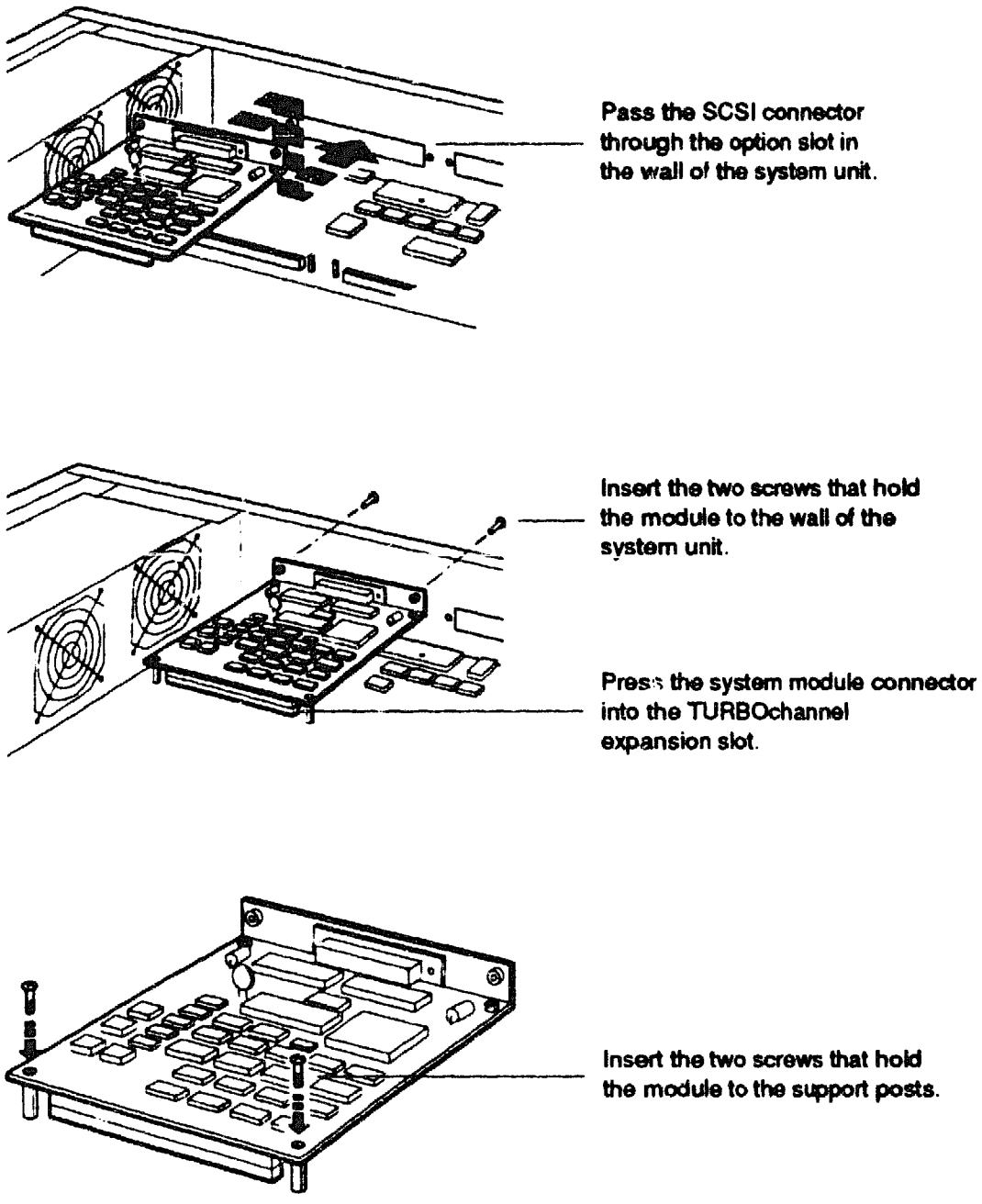


Figure 3. Installing a SCSI TURBOchannel module

Replace the System Unit Cover

1. Remove the antistatic wrist strap from your wrist and from the system unit.
2. Replace the system unit cover. See the operator's or user's guide that came with your workstation for directions.

Make Sure the SCSI TURBOchannel Module Operates Properly

1. Turn on the monitor and any other devices connected to the system unit.
2. Turn on the system unit.
3. Make sure the SCSI TURBOchannel module appears in the configuration display and reports no errors. See "To Check the SCSI TURBOchannel Module" later in this chapter for directions.

To Remove a SCSI TURBOchannel Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the System Unit Cover

See the operator's or user's guide that came with your workstation for directions on how to remove the system unit cover.

Put on the Antistatic Wrist Strap

See "Attach the Antistatic Wrist Strap" on page 3 of this chapter for directions.

Remove the SCSI TURBOchannel Module

Caution: *System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.*

1. Disconnect the SCSI cable from the SCSI TURBOchannel module.
2. Remove the screws that hold the module to the wall of the system unit.
3. Remove the screws that hold the SCSI TURBOchannel module to the support posts.
4. Grip the end of the SCSI TURBOchannel module near the support posts. Then pull the end of the module out of the TURBOchannel expansion slot on the system module.
5. Place the SCSI TURBOchannel module in an antistatic bag or on an antistatic mat.
6. If you are installing no other TURBOchannel module in the option slot, replace the metal plate that covered the option slot.

Replace the System Unit Cover

1. Remove the antistatic wrist strap from your wrist and from the system unit.
2. Replace the system unit cover. See the operator's or user's guide that came with your workstation for directions.

To Check the SCSI TURBOchannel Module

Make Sure the System Recognizes the SCSI TURBOchannel Module

To make sure that the system recognizes the SCSI TURBOchannel module, type **cnfg** at the console prompt. Then press Return. A display with information about the modules in your system then appears on the monitor.

The overall display can differ, but the line that describes the SCSI TURBOchannel module is the same for every workstation. This is a sample configuration display for the DECstation 5000 Model 100:

```
>>cnfg
 3:   KN02-BA   DEC   V5.2c   TCF0   ( 24 MB)
                                      (enet:08-00-2b-0c-e0-d1)
                                      (scsi = 7)
 2:   PMAD-AA   DEC   V5.1f   TCF0   (enet: 08-00-2b-0f-43-31)
 1:   PMAZ-AA   DEC   V5.1e   TCF0   (scsi = 7)
 0:   PMAG-BA   DEC   V5.2a   TCF0   (CX -- d=8)
```

Look for the line that has PMAZ in the second column. This is the line that describes the SCSI TURBOchannel module.

The number to the left of PMAZ is the slot number for the SCSI TURBOchannel module. This sample display shows that the SCSI TURBOchannel module is in slot 1.

If the SCSI TURBOchannel module does not appear in the configuration display, move the module to another slot. If the module still does not appear in the configuration display, contact your Digital service representative.

Check the Self-Test Results

This is a sample self-test error message for a SCSI TURBOchanne module:

```
?TFL 1/cntl (inval arg)
```

- The number immediately after `?TFL` is the slot number of the module that reported the error.
- The term to the right of the slash (/) is the name of the test that detected a problem.
- The phrase in parentheses at the end of the message is an additional message that describes the error.

This sample error message reports that the cntl test detected a problem in the SCSI TURBOchannel module in option slot 1.

If a self-test reports that a SCSI TURBOchannel module is faulty, make sure the module is inserted tightly in its slot and that anything connected to it is connected correctly.

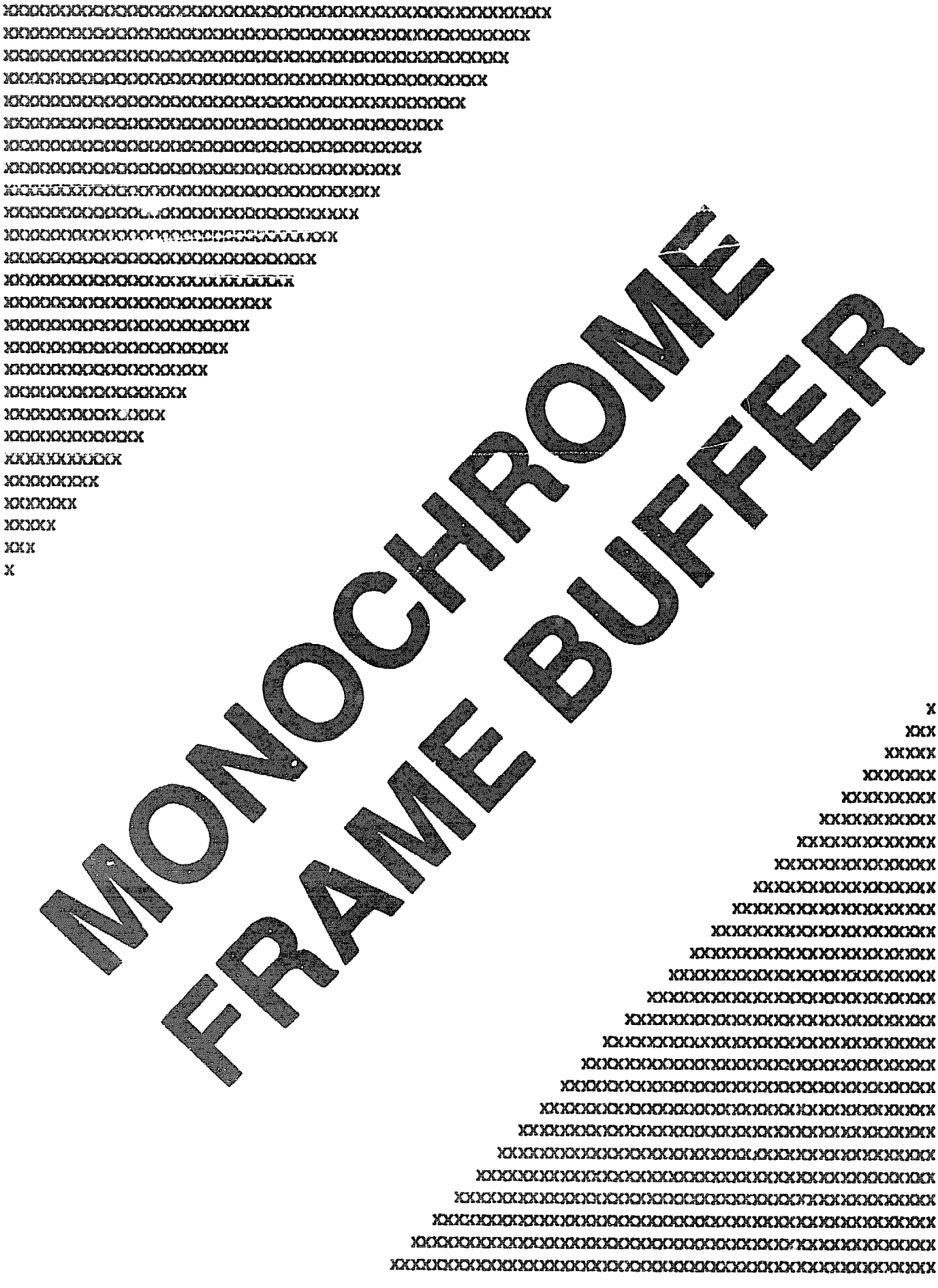
If the problem continues, check the test error message for the name of the failed test. Table 1 describes how to respond to each failed self-test.

Table 1. Self-Test Error Messages for SCSI Modules

Test Listed in the Error Message	How to Respond
cntl sram	Replace the problem SCSI connector option module. The slot number in the error message is the number of the slot that contains the problem SCSI connector option module.
sdiag	The problem is in the SCSI controller or a drive connected to the SCSI controller. Contact your Digital service representative.

For Further Information

For information about connecting drives to SCSI TURBOchannel modules, see the operator's or user's guide that came with your workstation.


MONOCHROME
FRAME BUFFER

December 1991

The Monochrome Frame Buffer TURBOchannel Module

EK-MFBOM-TC-001

This chapter about the monochrome frame buffer TURBOchannel module tells you

- Basic information about monochrome frame buffer TURBOchannel module hardware
- How to install a monochrome frame buffer TURBOchannel module
- How to remove a monochrome frame buffer TURBOchannel module
- How to check whether the monochrome frame buffer TURBOchannel module is operating properly

Monochrome Frame Buffer TURBOchannel Module Hardware

The monochrome frame buffer TURBOchannel module generates monochrome graphics.

Your workstation can support as many monochrome frame buffer graphics modules as there are available option slots on the system module, but you cannot combine the monochrome frame buffer with other types of graphics modules.

To operate monochrome frame buffer option modules, your workstation must use ULTRIX version 4.2 or higher.

Combining Monochrome Frame Buffer Modules and Monitors

The following 72-Hz monitors can display graphics generated by the monochrome frame buffer graphics module:

- VR319-DA monochrome monitor
- VRM17-AA monochrome monitor

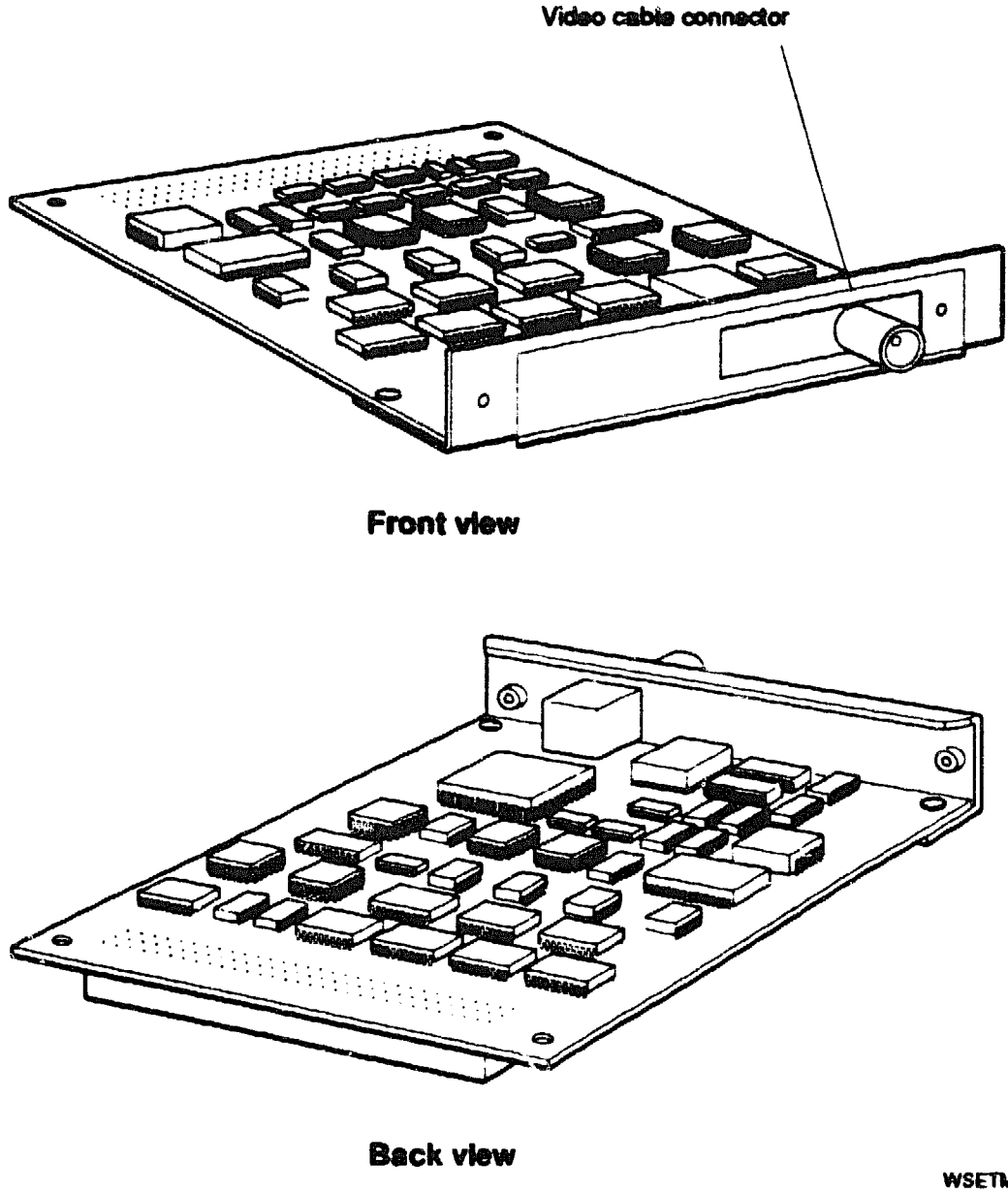


Figure 1. Monochrome frame buffer TURBOchannel module

To Install a Monochrome Frame Buffer TURBOchannel Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the Cover

Remove the cover. For directions, see the operator's or user's guide that came with the unit into which you want to install the module.

Attach the Antistatic Wrist Strap

Caution: *Always attach the antistatic wrist strap when handling any module in your workstation or any other static-sensitive material. Using the antistatic wrist strap protects the module from static discharge.*

1. Unfold the antistatic wrist strap.
2. Wrap the end of the strap around your wrist twice.
3. Peel the cover off the copper end of the strap. Then press the copper end of the strap against the metal frame of the unit into which you are installing the module.

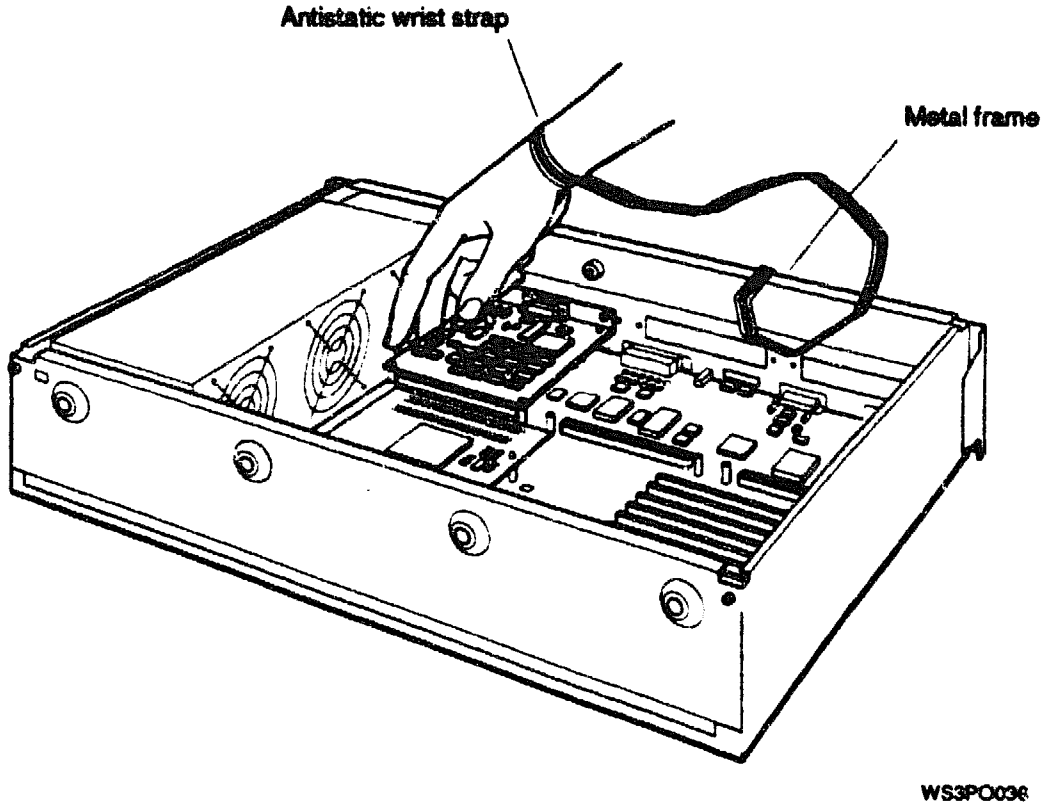


Figure 2. Using the antistatic wrist strap

Insert the Monochrome Frame Buffer TURBOchannel Module

Caution: *System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.*

1. Choose any unused TURBOchannel expansion slot to hold the monochrome frame buffer module.
2. If the back of the system unit has a metal plate over the option slot you want to use, remove the screws that hold the plate. Then remove the plate.

   Save the plate. You will need to replace the plate if you ever remove the TURBOchannel module.
3. Position the monochrome frame buffer TURBOchannel module. The system module connector should face the TURBOchannel expansion slot and the video cable connector should face the option slot opening.
4. Pass the video cable connector through the option slot opening.
5. Push the system module connector into the TURBOchannel expansion slot on the system module.
6. Use the screws that came with the module to fasten the monochrome frame buffer TURBOchannel module to the support posts.
7. Use the screws that held the metal plate over the option slot to attach the module to the system unit wall.
8. Connect the video cable to the monochrome frame buffer module and the monitor. For directions, see the chapter later in this guide that describes the monitor to which you want to connect the monochrome frame buffer.

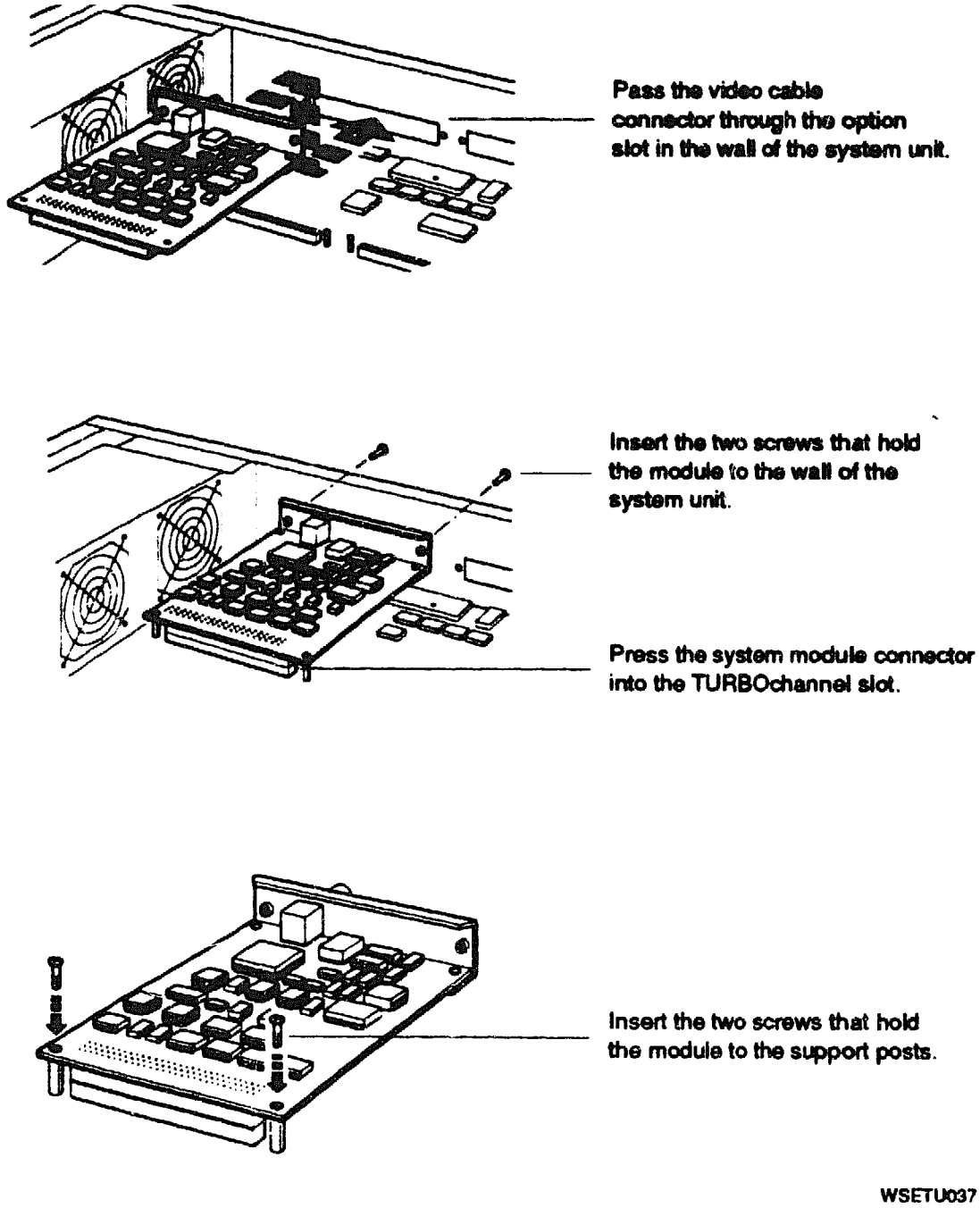


Figure 3. Installing a monochrome frame buffer TURBOchannel module

Replace the Cover

1. Remove the antistatic wrist strap from your wrist and from the unit.
2. Replace the cover. See the operator's or user's guide that came with the unit for directions.

Make Sure the Monochrome Frame Buffer TURBOchannel Module Operates Properly

1. Turn on the monitor and any other devices connected to the system unit.
2. Turn on the system unit.
3. Make sure the monochrome frame buffer module appears in the configuration display and reports no errors. See "To Check the Monochrome Frame Buffer TURBOchannel Module" on page 11 of this chapter for directions.

To Remove a Monochrome Frame Buffer TURBOchannel Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the Cover

For directions, see the operator's or user's guide that came with the unit into which you are installing the module.

Put on the Antistatic Wrist Strap

See "Attach the Antistatic Strap" on page 4 of this chapter for directions.

Remove the Monochrome Frame Buffer TURBOchannel Module

Caution: System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.

1. Disconnect the video cable from the monochrome frame buffer TURBOchannel module.
2. Remove the screws that hold the module to the wall of the system unit.
3. Remove the screws that hold the monochrome frame buffer TURBOchannel module to the support posts.
4. Grip the end of the monochrome frame buffer TURBOchannel module near the support posts. Then pull the end of the module out of the TURBOchannel slot.
5. Place the Monochrome Frame Buffer TURBOchannel module in an antistatic bag or on an antistatic mat.
6. If you are installing no other TURBOchannel module in the option slot, replace the metal plate that covered the option slot.

Replace the Cover

1. Remove the antistatic wrist strap from your wrist and from the unit.
2. Replace the cover. See the operator's or user's guide that came with the unit for directions.

To Check the Monochrome Frame Buffer TURBOchannel Module

Make Sure the System Recognizes the Monochrome Frame Buffer TURBOchannel Module

To make sure that the system recognizes the monochrome frame buffer TURBOchannel module, type **cnfg** at the console prompt. Then press Return. A display with information about the modules in your system then appears on the monitor.

The overall display can differ, but the line that describes the monochrome frame buffer TURBOchannel module is the same for every workstation. This is a sample configuration display for the DECstation 5000 Model 100:

```
3:  XN02-BA  DEC  V5.2c  TCF0   ( 24 MB)
                               (enet:08-00-2b-0c-e0-d1
                               (scsi = 7)
2:  PMAD-AA  DEC  V5.1f  TCF0   (enet: 08-00-2b-0f-43-3
1:  PMAZ-AA  DEC  V5.1e  TCF0   (scsi = 7)
0:  PMAG-AA  DEC  V5.2a  TCF0   (MX -- d=1)
```

Look for the line that has PMAG-AA in the second column. This line describes the monochrome frame buffer TURBOchannel module.

The number to the left of PMAG-AA is the slot number for the monochrome frame buffer TURBOchannel module. This sample display shows that the monochrome frame buffer TURBOchannel module is in slot 0.

If your workstation has more than one monochrome frame buffer module, the configuration display appears on the monitor connected to the monochrome frame buffer module in the lowest numbered TURBOchannel slot. The configuration display has one line for every monochrome frame buffer module that the workstation recognizes.

If the monochrome frame buffer module does not appear in the display, turn off the monitor and the system unit. Make sure the video cable is connected firmly to the system unit and the monitor and that the module is firmly in place in the option slot connectors inside the system unit.

Turn on the monitor and then the system unit. Then at the console prompt, type **cnfg** and press Return again. If the module still does not appear in the display, contact your Digital service representative.

Check the Self-Test Results

This is a sample self-test error message for a monochrome frame buffer TURBOchannel module:

```
?TFL 0/vdac (1: addr=30002400, exp=54003400, act=4387000)
```

- The number immediately after `?TFL` is the slot number of the module that reported the error.
- The term to the right of the slash (/) is the name of the test that detected a problem.
- The phrase in parentheses at the end of the message is an additional message that describes the error.

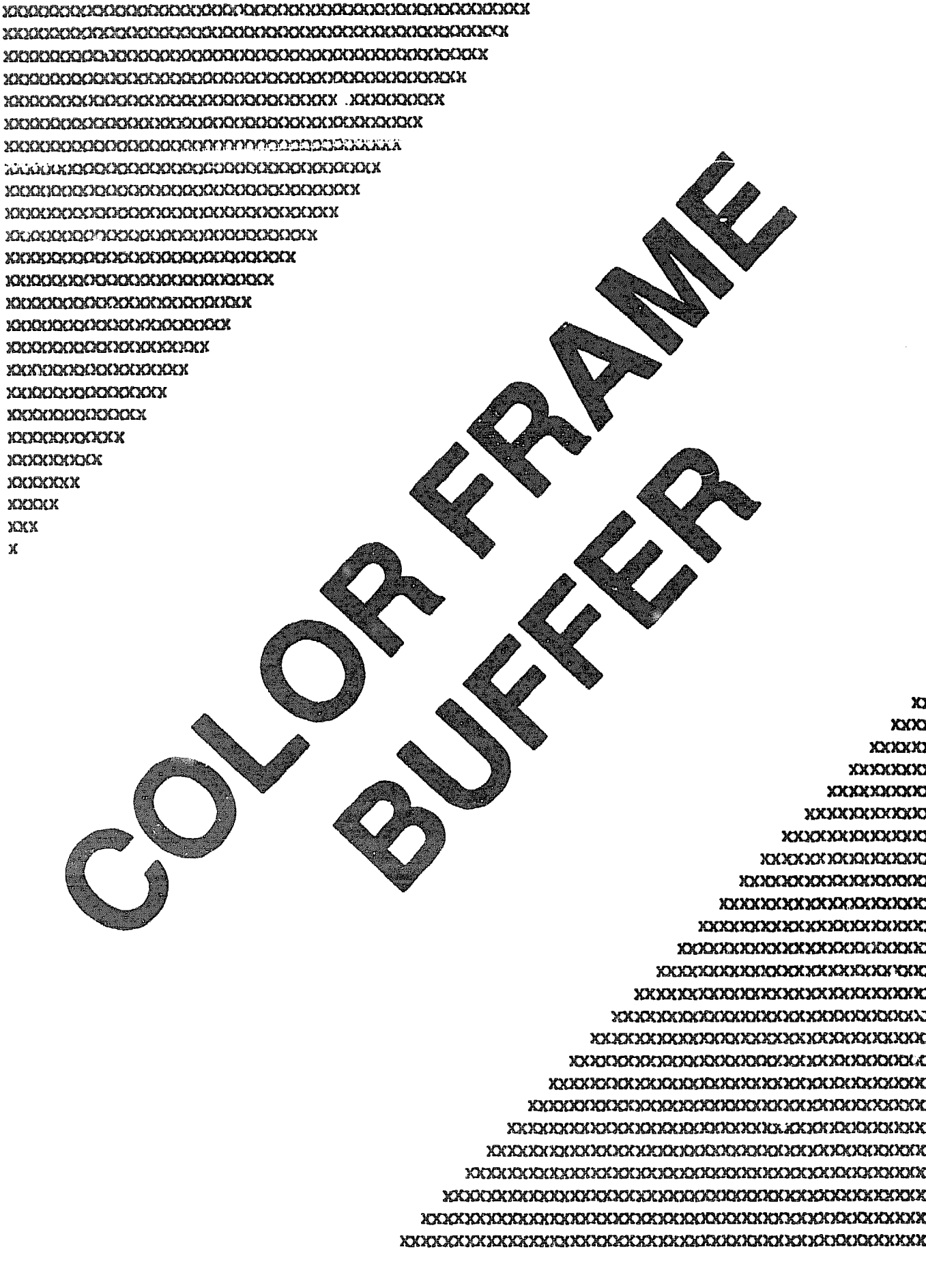
This sample error message reports that the vdac test detected a problem in the monochrome frame buffer module in option slot 0.

If a self-test reports that a monochrome frame buffer TURBOchannel module is faulty, make sure the module is inserted tightly in its slot and that the video cable is connected correctly.

If the problem persists, check the self-test error message and find the name of the failed test. Table 1 describes how to respond to each failed self-test.

Table 1. Self-Test Error Messages for Monochrome Frame Buffer Modules

Test Listed in the Error Message	How to Respond
curs int vdac	Replace the monochrome frame buffer module.
ptrn	The problem is in the monitor or video cable. Try a new video cable. If the problem continues, try a new monitor.


COLOR FRAME
BUFFER

December 1991

The Color Frame Buffer TURBOchannel Module

EK-CFBOM-TC-001

This chapter about the color frame buffer TURBOchannel module tells you

- Basic information about color frame buffer TURBOchannel module hardware
- How to install a color frame buffer TURBOchannel module
- How to remove a color frame buffer TURBOchannel module
- How to check whether the color frame buffer TURBOchannel module is operating properly

Color Frame Buffer TURBOchannel Module Hardware

Color frame buffer TURBOchannel modules generate two-dimensional color graphics.

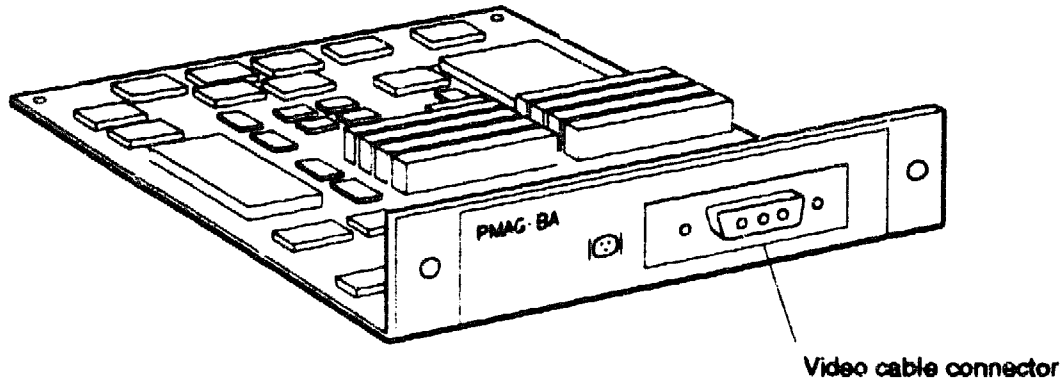
The workstation can support as many color frame buffer modules as there are available TURBOchannel slots on the system module. However, you cannot combine color frame buffer graphics modules with any other type of graphics module.

To operate more than one color frame buffer module, your workstation must use ULTRIX version 4.2 or higher.

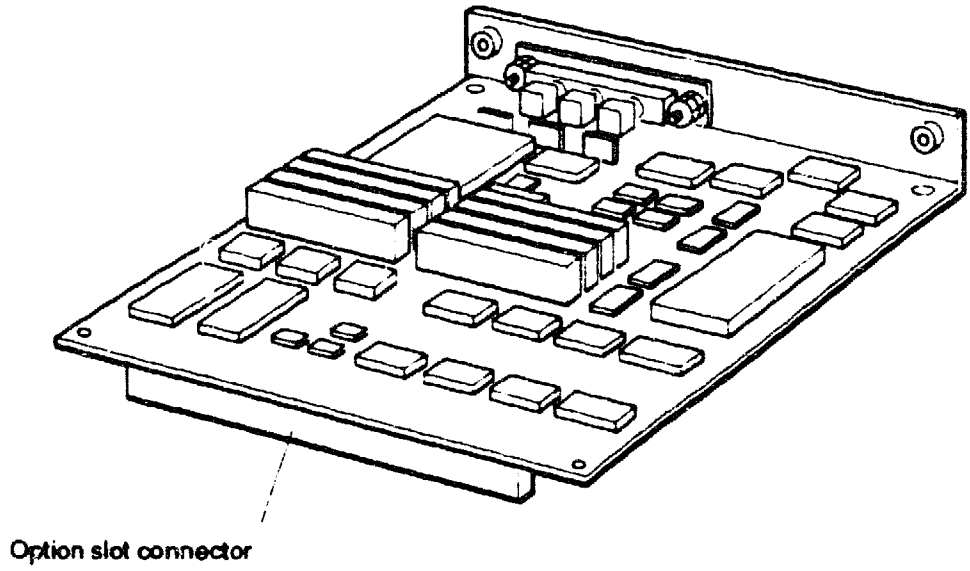
Combining Color Frame Buffer Modules and Monitors

There are two types of color frame buffer TURBOchannel modules. The module type is printed on the front of the color frame buffer modules.

- Module type PMAG-BA operates at 60 Hz. The following monitors can display graphics generated by the PMAG-BA color frame buffer module:
  - VR297-DA color monitor
  - VR299-DA color monitor
  - VR262-AA gray-scale monitor
- Module type PMAG-JA, also known as the true color frame buffer module, operates at 72 Hz. The following monitors can display graphics generated by the PMAG-BJ true color frame buffer module:
  - VRT16-HA color monitor
  - VRT19-HA color monitor
  - VR320-CA color monitor
  - VR319-DA monochrome monitor



Front view



Back view

WSE2M027

Figure 1. Color frame buffer TURBOchannel module

To Install a Color Frame Buffer TURBOchannel Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the Cover

See the operator's or user's guide that came with the unit into which you want to install the color frame buffer module for directions on how to remove the cover.

Attach the Antistatic Wrist Strap

Caution: *Always attach the antistatic wrist strap when handling any module in your workstation or any other static-sensitive material. Using the antistatic wrist strap protects the module from static discharge.*

1. Unfold the antistatic wrist strap.
2. Wrap the end of the strap around your wrist twice.
3. Peel the cover off the copper end of the strap. Then press the copper end of the strap against the metal frame of the unit into which you are installing the module.

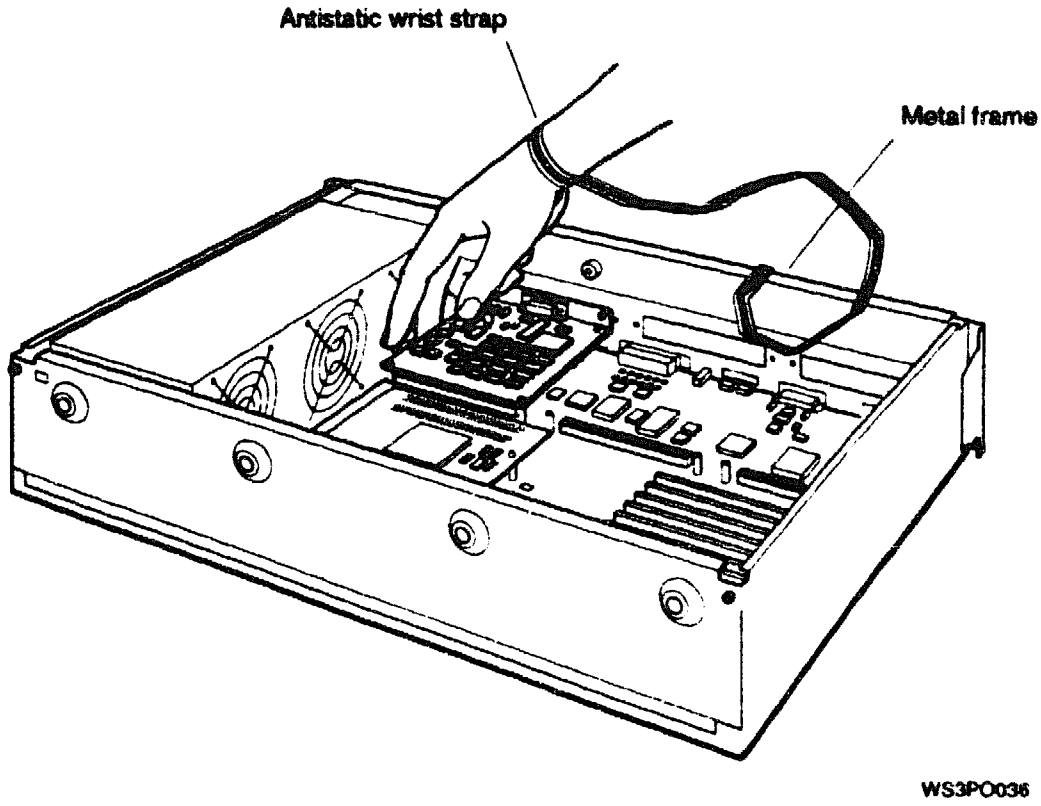


Figure 2. Using the antistatic wrist strap

Insert the Color Frame Buffer TURBOchannel Module

Caution: System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.

1. Choose any unused TURBOchannel expansion slot to hold the color frame buffer module.
2. If the back of the unit has a metal plate over the option slot you want to use, remove the screws that hold the plate. Then remove the plate.

   Save the plate. You will need to replace the plate if you ever remove the TURBOchannel module.
3. Hold the color frame buffer TURBOchannel module so that the system module connector faces the TURBOchannel expansion slot and the video cable connector faces the option slot opening in the back of the unit.
4. Pass the video cable connector through the option slot opening in the back of the system unit.
5. Push the system module connector into the TURBOchannel expansion slot on the system module.
6. Use the screws that came with the module to fasten the color frame buffer TURBOchannel module to the support posts.
7. Use the screws that held the metal plate over the option slot to attach the module to the system unit wall.
8. Attach the video cable to the color frame buffer module and monitor. For directions, see the chapter later in this guide that describes the monitor to which you want to connect the color frame buffer module.

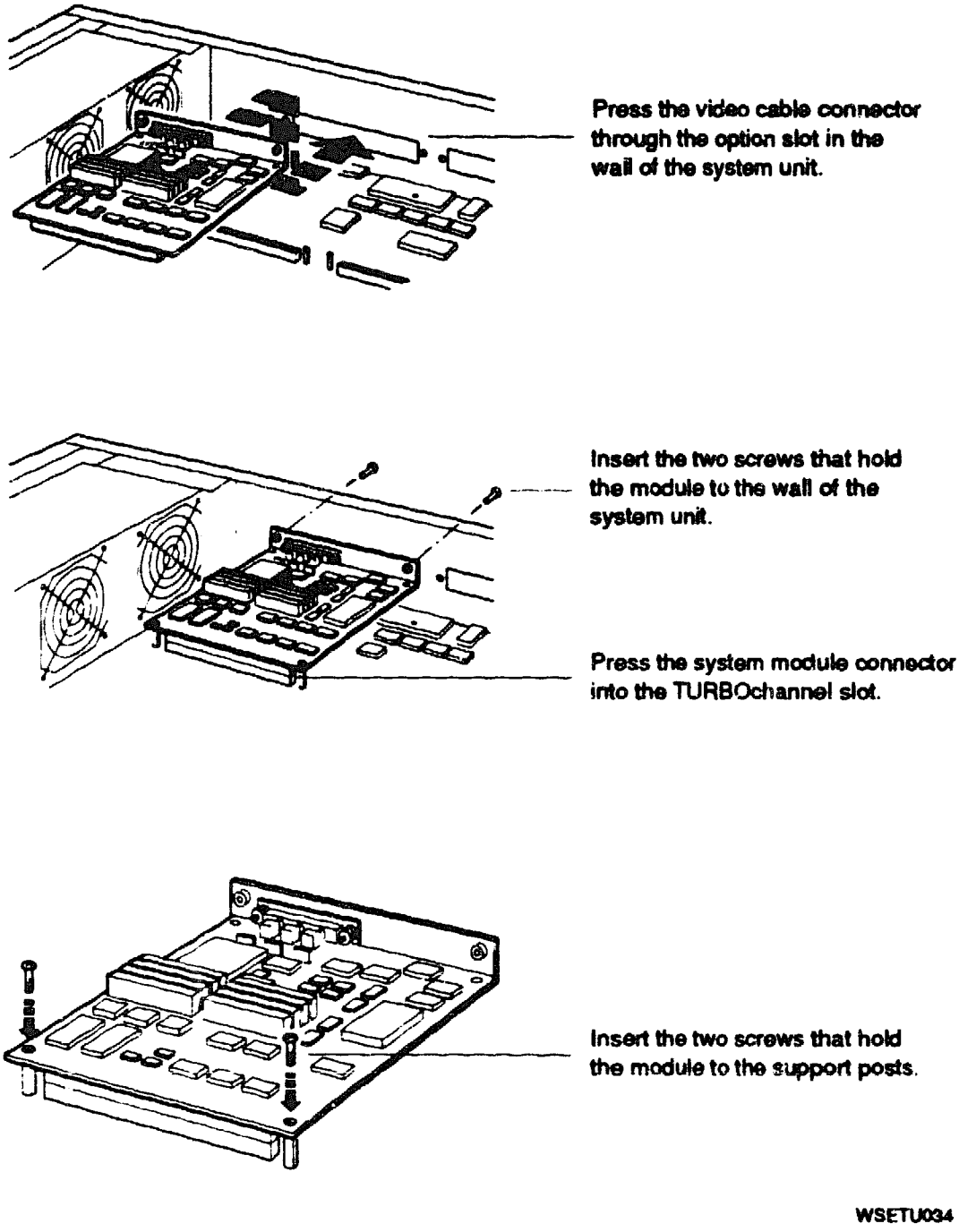


Figure 3. Installing a color frame buffer TURBOchannel module

Replace the Cover

1. Remove the antistatic wrist strap from your wrist and from the unit.
2. Replace the cover. See the operator's or user's guide that came with the unit into which you installed the module for directions.

Make Sure the Color Frame Buffer TURBOchannel Module Operates Properly

1. Turn on the monitor and any other devices connnected to the system unit.
2. Turn on the system unit.
3. Make sure the color frame buffer TURBOchannel module appears in the configuration display and reports no errors. See "To Check the Color Frame Buffer TURBOchannel Module" on page 11 of this chapter for directions.

To Remove a Color Frame Buffer TURBOchannel Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the System Unit Cover

See the operator's or user's guide for the unit that contains the color frame buffer module for directions on how to remove the cover.

Put on the Antistatic Wrist Strap

See "Attach the Antistatic Wrist Strap" on page 4 of this chapter for directions.

Remove the Color Frame Buffer TURBOchannel Module

Caution: System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.

1. Disconnect the video cable from the color frame buffer TURBOchannel module.
2. Remove the screws that hold the module to the wall of the system unit.
3. Remove the screws that hold the color frame buffer TURBOchannel module to the support posts.
4. Grip the end of the color frame buffer TURBOchannel module near the support posts. Then pull the end of the module out of the TURBOchannel expansion slot on the system module.
5. Place the color frame buffer TURBOchannel module in an antistatic bag or on an antistatic mat.
6. If you are installing no other TURBOchannel module in the option slot, replace the metal plate that covered the option slot.

Replace the Cover

1. Remove the antistatic wrist strap from your wrist and from the unit.
2. Replace the cover. For directions, see the operator's or user's guide that came with the unit into which you installed the module.

To Check the Color Frame Buffer TURBOchannel Module

Make Sure the System Recognizes the Color Frame Buffer TURBOchannel Module

To make sure that the system recognizes the color frame buffer TURBOchannel module, type **cnfg** at the console prompt. Then press Return. A display with information about the modules in your system then appears on the monitor.

The overall display can differ, but the line that describes the color frame buffer TURBOchannel module is the same for every workstation. This is a sample configuration display for the DECstation 5000 Model 100:

```
3:  KN02-BA  DEC  V5.2c  TCF0  ( 24 MB)
                               (enet:08-00-2b-0c-e0-d1)
                               (scsi = 7)
2:  PMAD-AA  DEC  V5.1f  TCF0  (enet: 08-00-2b-0f-43-31)
1:  PMAZ-AA  DEC  V5.3a  TCF0  (scsi=7)
0:  PMAG-BA  DEC  V5.3a  TCF0  (CX -- d=8)
```

Look for the line that has PMAG-BA in the second column. This is the line that describes the color frame buffer TURBOchannel module.

The number to the left of PMAG-BA is the slot number for the color frame buffer TURBOchannel module. This sample display shows that the color frame buffer TURBOchannel module is in slot 0.

If your workstation has more than one color frame buffer module, the configuration display appears on the monitor connected to the color frame buffer module in the lowest numbered TURBOchannel slot. The configuration display has one line for every color frame buffer module that the workstation recognizes.

If the color frame buffer TURBOchannel module does not appear in the configuration display, make sure the video cable is connected correctly to the color frame buffer TURBOchannel module and the monitor. If the module still does not appear in the configuration display, contact your Digital service representative.

Check the Self-Test Results

This is a sample self-test error message for a color frame buffer TURBOchannel module:

```
?TFL 0/vram (1: addr=30002400, exp=54004330, act=43870000) PMAG-
```

- The number immediately after `?TFL` is the slot number of the module that reported the error.
- The term to the right of the slash (/) is the name of the test that detected a problem.
- The phrase in parentheses at the end of the message is an additional message that describes the error.

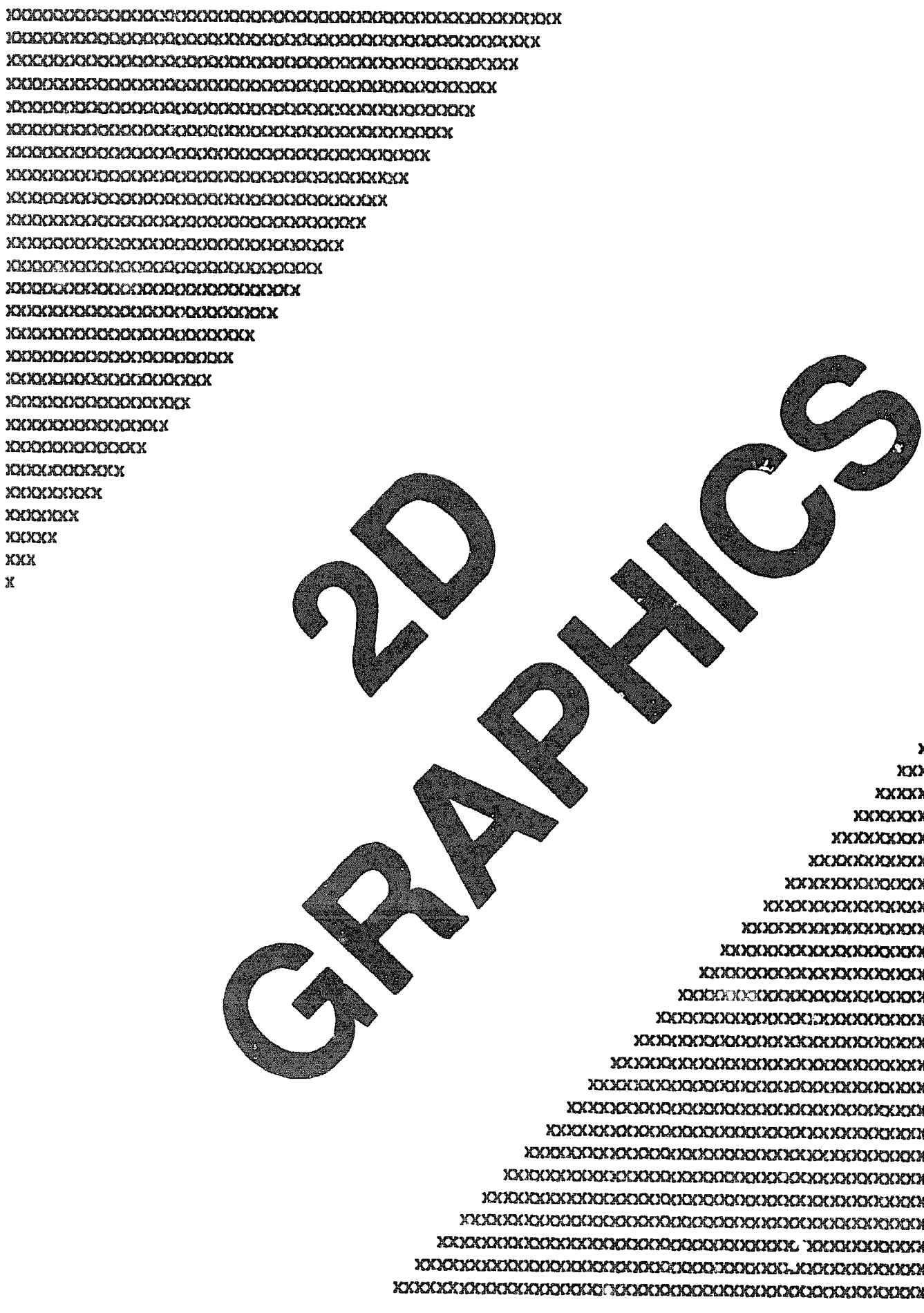
This sample error message reports that the vram test detected a problem in the color frame buffer module in option slot 0.

If a self-test reports that the color frame buffer module is faulty, make sure the module is inserted tightly in its slot and that the video cable is connected correctly.

If the problem persists, check the test error message and find the name of the failed test. Table 1 describes how to respond to each failed color frame buffer graphics module self-test.

Table 1. Self-Test Error Messages for Color Frame Buffer Modules

Test Listed in the Error Message	How to Respond
curs int vdac	Replace the color frame buffer module.
ptrn	The problem is in the monitor or video cable. Try a new video cable. If the problem persists, try a new monitor.


2D
GRAPHICS

December 1991

digital

Two-Dimensional (2D) Graphics Accelerator TURBOchannel Module

EK-2DAOM-TC-001

This chapter about the two-dimensional (2D) graphics accelerator TURBOchannel module tells you

- Basic information about 2D graphics accelerator TURBOchannel module hardware
- How to install a 2D graphics accelerator TURBOchannel module
- How to remove a 2D graphics accelerator TURBOchannel module
- How to check whether the 2D graphics accelerator TURBOchannel module is operating properly

2D Graphics Accelerator TURBOchannel Module Hardware

The 2D graphics accelerator module generates high-resolution, 2D, color graphics. The top of the 2D graphics accelerator module holds one video serial inline memory module (VSIMM).

The workstation can support as many 2D graphics accelerator modules as there are available TURBOchannel slots on the system module. However, you cannot combine the 2D graphics accelerator module with any other type of graphics module.

For the 2D graphics accelerator module to work correctly, your workstation must use ULTRIX version 4.0 or higher.

Combining 2D Graphics Accelerator Modules and Monitors

The following 66-Hz monitors can display graphics generated by the 2D graphics accelerator TURBOchannel module:

- VRT16-DA color monitor
- VRT16-HA color monitor
- VRT19-DA color monitor
- VRT19-HA color monitor
- VR319-CA monochrome monitor
- VR320-CA color monitor

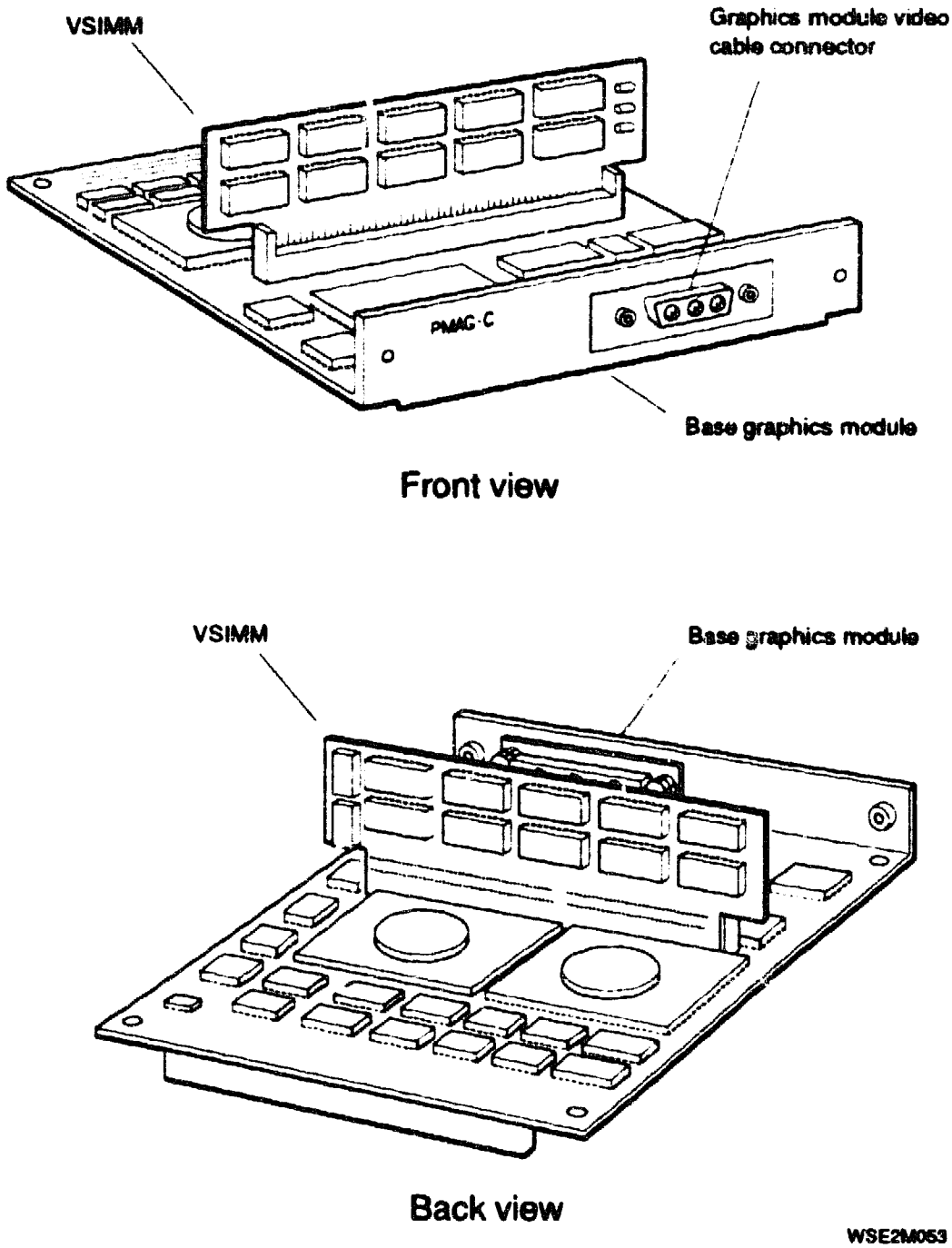


Figure 1. 2D graphics accelerator option module

To Install a 2D Graphics Accelerator TURBOchannel Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the Cover

See the operator's or user's guide that came with the unit into which you want to install the 2D graphics accelerator module for directions on how to remove the cover.

Attach the Antistatic Wrist Strap

Caution: *Always attach the antistatic wrist strap when handling any module in your workstation or any other static-sensitive material. Using the antistatic wrist strap protects the module from static discharge.*

1. Unfold the antistatic wrist strap.
2. Wrap the end of the strap around your wrist twice.
3. Peel the cover off the copper end of the strap. Then press the copper end of the strap against the metal frame of the unit into which you are installing the module.

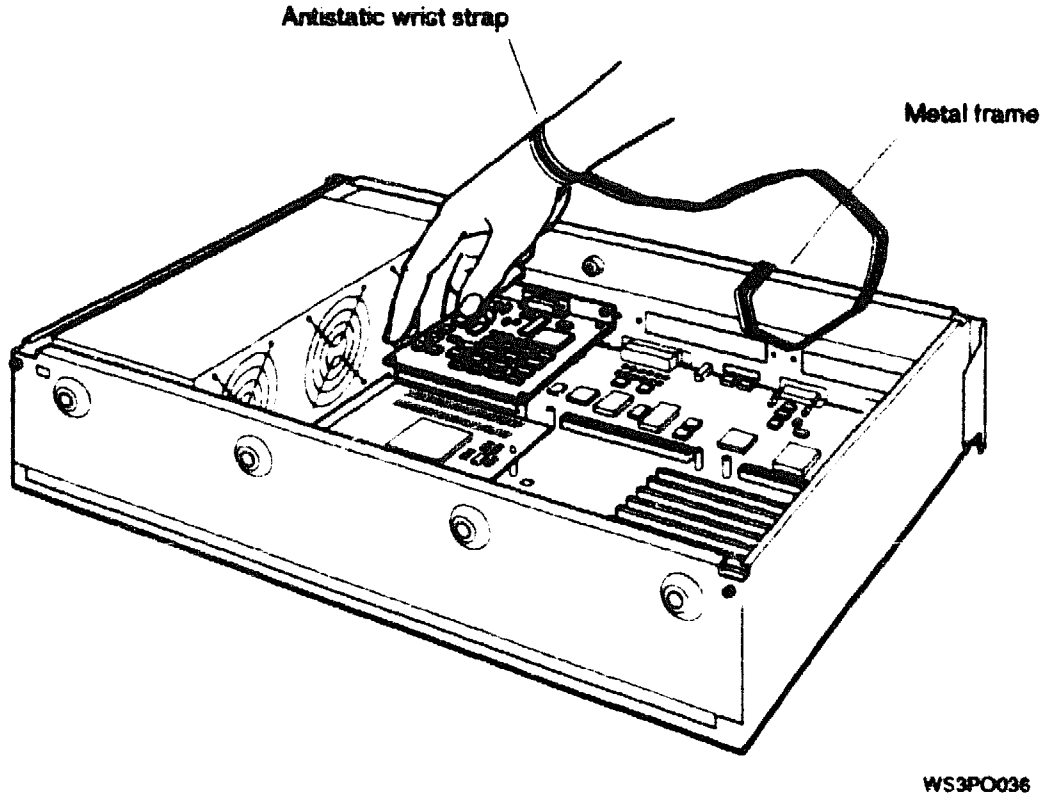


Figure 2. Using the antistatic wrist strap

Insert the 2D Graphics Accelerator TURBOchannel Module

Caution: *System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.*

1. Remove any graphics modules that are not 2D graphics accelerator modules from the system unit.
2. Choose any unused TURBOchannel expansion slot to hold the 2D graphics accelerator module.
3. If the back of the system unit has a metal plate over the option slot you want to use, remove the screws that hold the plate. Then remove the plate.

   Save the plate. You will need to replace the plate if you ever remove the TURBOchannel module.
4. Hold the 2D graphics accelerator TURBOchannel module so that the system module connector faces the TURBOchannel expansion slot on the system module and the video cable connector faces the option slot opening on the back of the system unit.
5. Pass the video cable connector through the option slot opening in the back of the system unit.
6. Push the system module connector into the TURBOchannel expansion slot on the system module.
7. Use the screws that came with the module to fasten the 2D graphics accelerator TURBOchannel module to the support posts.
8. Use the screws that held the metal plate over the option slot to attach the module to the the system unit wall.
9. Connect the video cable to the 2D graphics accelerator module and the monitor. For directions, see the chapter later in this guide that describes the monitor to which you want to connect the 2D graphics accelerator module.

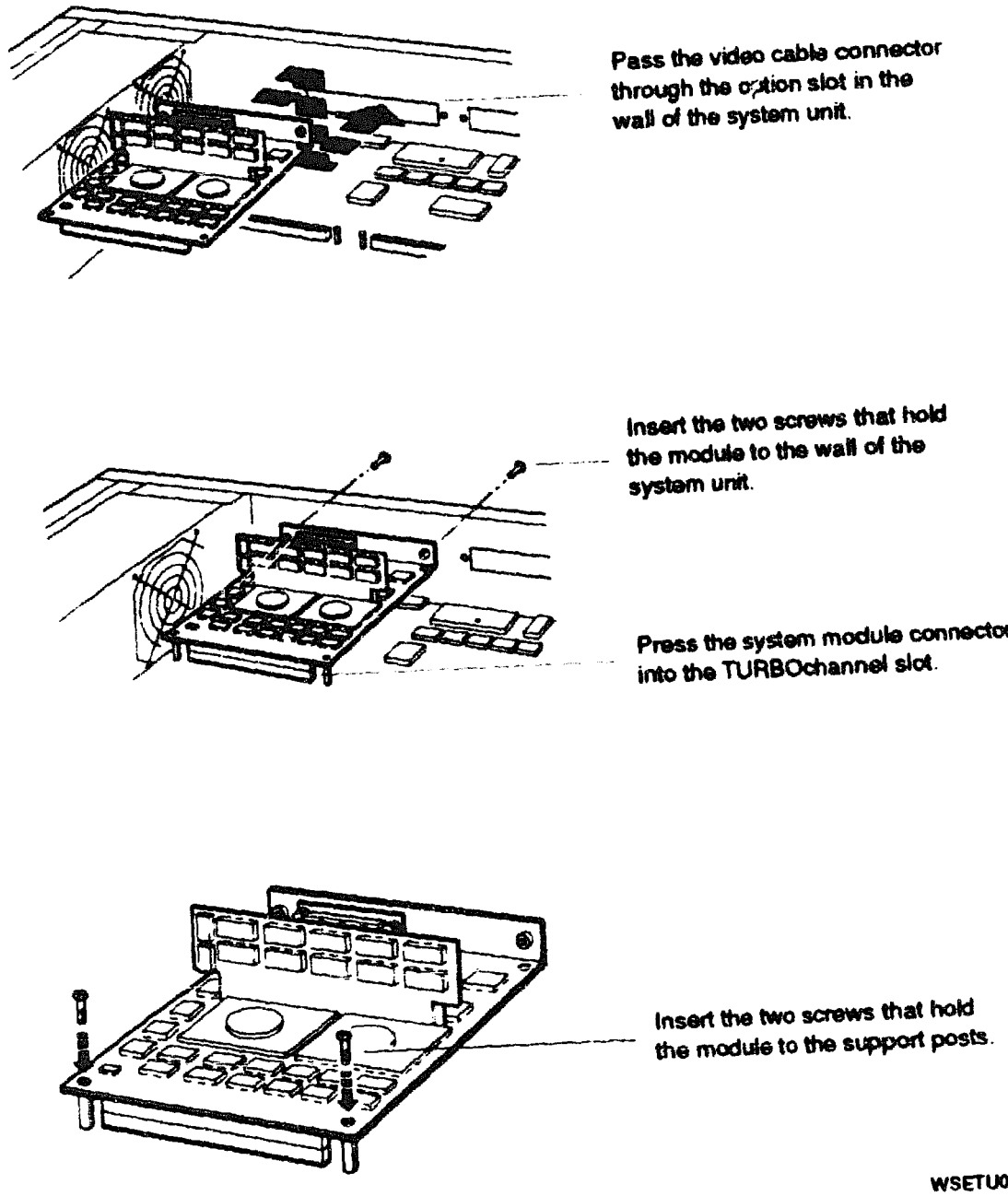


Figure 3. Installing a 2D graphics accelerator module

Replace the Cover

1. Remove the antistatic wrist strap from your wrist and from the unit.
2. Replace the cover. See the operator's or user's guide that came with the unit for directions.

Make Sure the 2D Graphics Accelerator TURBOchannel Module Operates Properly

1. Turn on the monitor and any other devices connected to the system unit.
2. Turn on the system unit.
3. Make sure the 2D graphics accelerator module appears in the configuration display and reports no errors. For directions, see "To Check the 2D Graphics Accelerator TURBOchannel Module" on page 11 of this chapter.

To Remove a 2D Graphics Accelerator TURBOchannel Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the Cover

See the operator's or user's guide that came with the unit into which you want to install the 2D graphics accelerator for directions on how to remove the cover.

Put on the Antistatic Wrist Strap

See "Attach the Antistatic Wrist Strap" on page 4 of this chapter for directions.

Remove the 2D Graphics Accelerator TURBOchannel Module

Caution: System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.

1. Disconnect the video cable from the 2D graphics accelerator TURBOchannel module.
2. Remove the screws that hold the 2D graphics accelerator module to the wall of the system unit.
3. Remove the screws that hold the 2D graphics accelerator TURBOchannel module to the support posts.
4. Grip the end of the 2D graphics accelerator TURBOchannel module near the support posts. Then pull the end of the module out of the TURBOchannel expansion slot on the system module.
5. Place the 2D graphics accelerator TURBOchannel module in an antistatic bag or on an antistatic mat.
6. If you are installing no other TURBOchannel module in the option slot, replace the metal plate that covered the option slot.

Replace the Cover

1. Remove the antistatic wrist strap from your wrist and from the unit.
2. Replace the cover. See the operator's or user's guide that came with the unit for directions.

To Check the 2D Graphics Accelerator TURBOchannel Module

Make Sure the System Recognizes the 2D Graphics Accelerator TURBOchannel Module

To make sure that the system recognizes the 2D graphics accelerator TURBOchannel module, type **cnfg** at the console prompt. Then press Return.

A display with information about the modules in your system then appears on the monitor. If the system has more than one monitor, the display appears on the monitor connected to the graphics module that has the lowest slot number.

The overall display can differ, but the line that describes the 2D graphics accelerator TURBOchannel module is the same for every workstation. This is a sample configuration display for the DECstation 5000 Model 100:

```
3:   KN02-BA   DEC   V5.2c   TCF0   ( 24 MB)
                                    (enet:08-00-2b-0c-e0-d1)
                                    (scsi = 7)
2:   PMAD-AA   DEC   V5.1f   TCF0   (enet: 08-00-2b-0f-43-31
1:   PMAZ-AA   DEC   V5.1e   TCF0   (scsi = 7)
0:   PMAG-CA   DEC   V5.3a   TCF0   (PX -- D=8, Z=24)
```

Look for the line that has PMAG-CA in the second column. This is the line that describes the 2D graphics accelerator TURBOchannel module.

The number to the left of PMAG-CA is the slot number for the 2D graphics accelerator TURBOchannel module. This sample display shows that the 2D graphics accelerator TURBOchannel module is in slot 0.

If the 2D graphics accelerator TURBOchannel module does not appear in the configuration display, move the module to another slot. If the module still does not appear in the configuration display, contact your Digital service representative.

Check the Self-Test Results

This is a sample self-test error message for a 2D graphics accelerator TURBOchannel module:

```
?TFL 0/dmaaddrs (1: sticEOP=0, exp=1)
```

- The number immediately after `?TFL` is the slot number of the module that reported the error.
- The term to the right of the slash (/) is the name of the test that detected a problem.
- The phrase in parentheses at the end of the message is an additional message that describes the error.

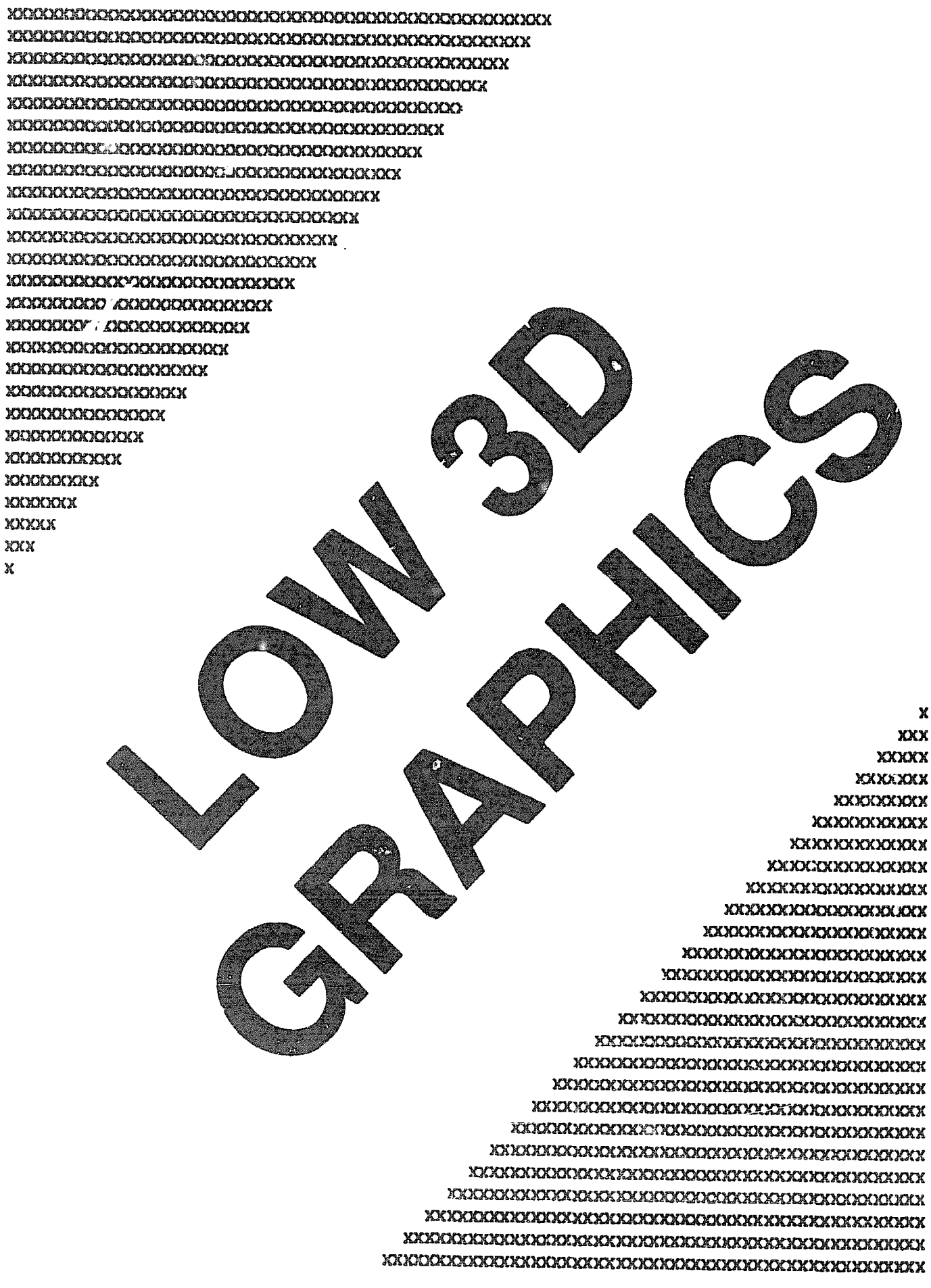
This sample error message reports that the dmaaddrs test detected a problem in the 2D graphics accelerator module in option slot 0.

If a self-test reports that a 2D graphics accelerator TURBOchannel module is faulty, make sure the 2D graphics accelerator TURBOchannel module is inserted tightly in its slot and the video cable is connected correctly.

If the problem persists, check the self-test error message and find the name of the failed test. Table 1 describes how to respond to each failed self-test.

Table 1. Self-Test Error Messages for 2D Graphics Accelerator Modules

Test Listed in the Error Message	How to Respond
stic	The problem is in the 2D graphics accelerator module or the system module Move the 2D graphics accelerator module to another option slot. If the test no longer fails, replace the system module. If the stic test is still listed in the new error message, replace the 2D graphics accelerator module.
dmaaddrs intr-dma shade stamp vdac vdacsig	Replace the 2D graphics accelerator module.
ff fbfill	Contact your Digital service representative.


LOW 3D
GRAPHICS

December 1991

The Low Three-Dimensional (3D) Graphics TURBOchannel Module

EK-L3DOM-TC-001

This chapter about the low three-dimensional (3D) graphics TURBOchannel module tells you

- Basic information about low 3D graphics TURBOchannel module hardware
- How to install a low 3D graphics TURBOchannel module
- How to remove a low 3D graphics TURBOchannel module
- How to check whether the low 3D graphics TURBOchannel module is operating properly

Low 3D Graphics TURBOchannel Module Hardware

The workstation can support one low 3D graphics TURBOchannel module, which provides three-dimensional color graphics.

The top of the low 3D graphics module has one video serial inline memory module, known as a VSIMM. The low 3D graphics can also have two optional z-buffer modules, which enhances generation of 3D graphics.

For the low 3D graphics accelerator module to work correctly, your workstation must use ULTRIX version 4.1 or higher.

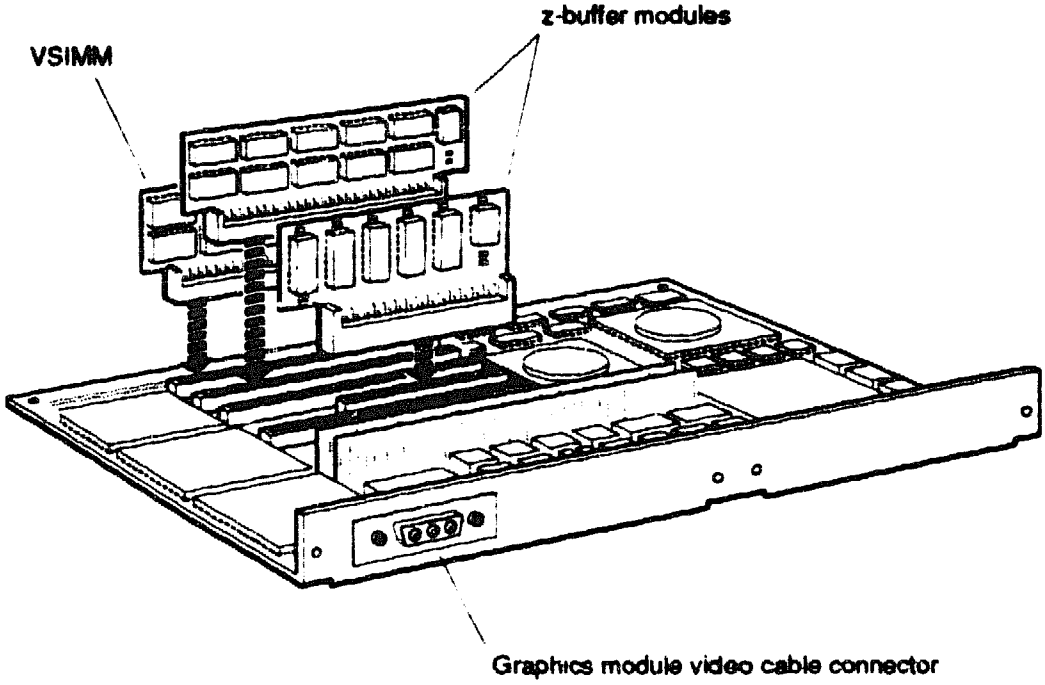


Figure 1. Low 3D graphics TURBOchannel module

Combining Low 3D Graphics Modules and Monitors

There are three types of low 3D graphics TURBOchannel modules, which operate at different frequencies and require different monitors to display graphics. The module type is printed on the front of the low 3D graphics module.

- Module types PMAG-DA and PMAGB-DC operate at 66 Hz. Module PMAGB-DC is also called the low 3D graphics plus module. The following monitors can display graphics generated by the PMAG-DA and PMAGB-DC graphics modules:
  - VRT16-DA color monitor
  - VRT16-HA color monitor
  - VRT19-DA color monitor
  - VRT19-HA color monitor
  - VR319-CA monochrome monitor
  - VR320-CA color monitor
- Module type PMAGB-DA operates at 72 Hz, and is also known as the low 3D graphics plus module. The following monitors can display graphics generated by the PMAGB-DA graphics module:
  - VRT16-HA color monitor
  - VRT19-HA color monitor
  - VR319-DA monochrome monitor
  - VR320-DA color monitor
  - VRM17-AA monochrome monitor

To Install a Low 3D Graphics TURBOchannel Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the Cover

For directions, see the operator's or user's guide that came with the unit into which you want to install the graphics module.

Attach the Antistatic Wrist Strap

Caution: *Always attach the antistatic wrist strap when handling any module in your workstation or any other static-sensitive material. Using the antistatic wrist strap protects the module from static discharge.*

To attach the antistatic wrist strap,

1. Unfold the antistatic wrist strap.
2. Wrap the end of the strap around your wrist twice.
3. Peel the cover off the copper end of the strap. Then press the copper end of the strap against the metal frame of the unit into which you are installing the module.

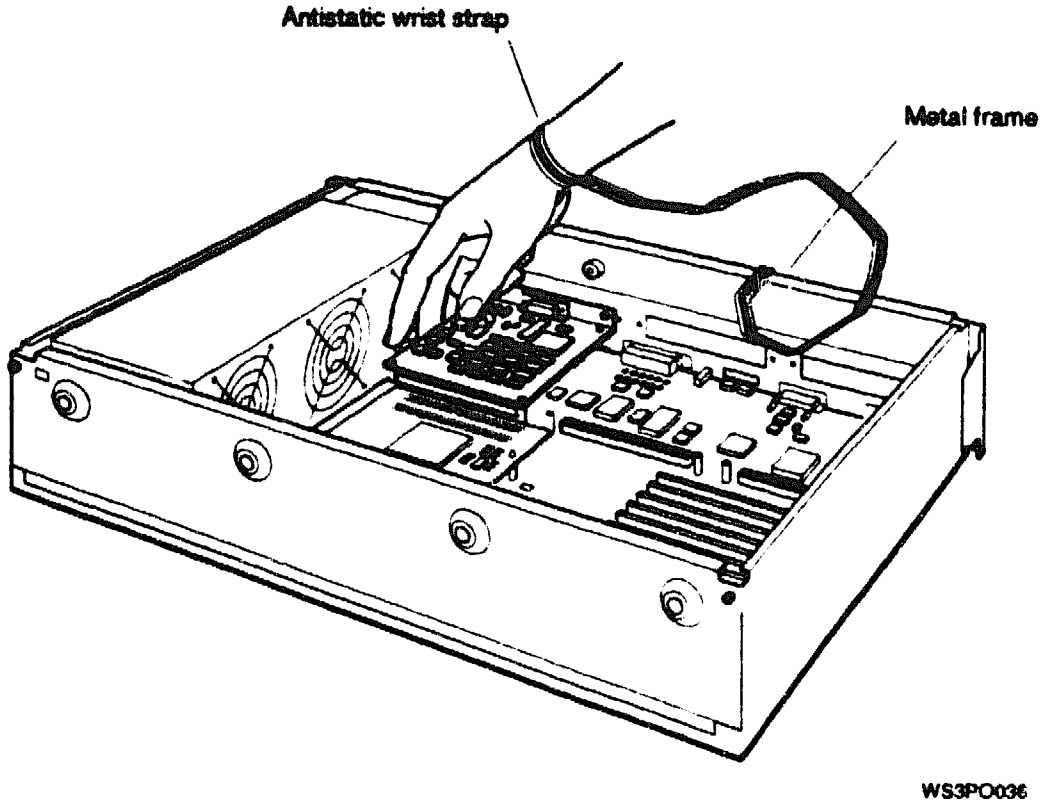


Figure 2. Using the antistatic wrist strap

Insert the Low 3D Graphics TURBOchannel Module

Caution: *System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.*

1. Remove any other graphics TURBOchannel modules that are already in the workstation. See page 9 of this guide for directions on how to remove a graphics option module.
2. Choose any two unused TURBOchannel expansion slots that are next to each other to hold the low 3D graphics module.

   Note that the low 3D graphics TURBOchannel module fills two TURBOchannel slots.
3. If the back of the system unit has metal plates over the option slots you want to use, remove the screws that hold the plates. Then remove the plates.

   Save the plates. You will need to replace the plates if you ever remove the TURBOchannel module.
4. Hold the low 3D graphics TURBOchannel module so that the system module connectors face the TURBOchannel expansion slots and the video cable connector faces the option slot opening.
5. Pass the video cable connector through the option slot opening in the back of the system unit.
6. Push the system module connectors into the TURBOchannel expansion slots on the system module.
7. Use the screws that came with the module to fasten the low 3D graphics TURBOchannel module to the support posts.
8. Use the screws that held the metal plates over the option slot to attach the module to the system unit wall.
9. Connect the video cable to the low 3D graphics module and the monitor. For directions, see the chapter later in this guide that describes the monitor to which you want to connect the graphics module.

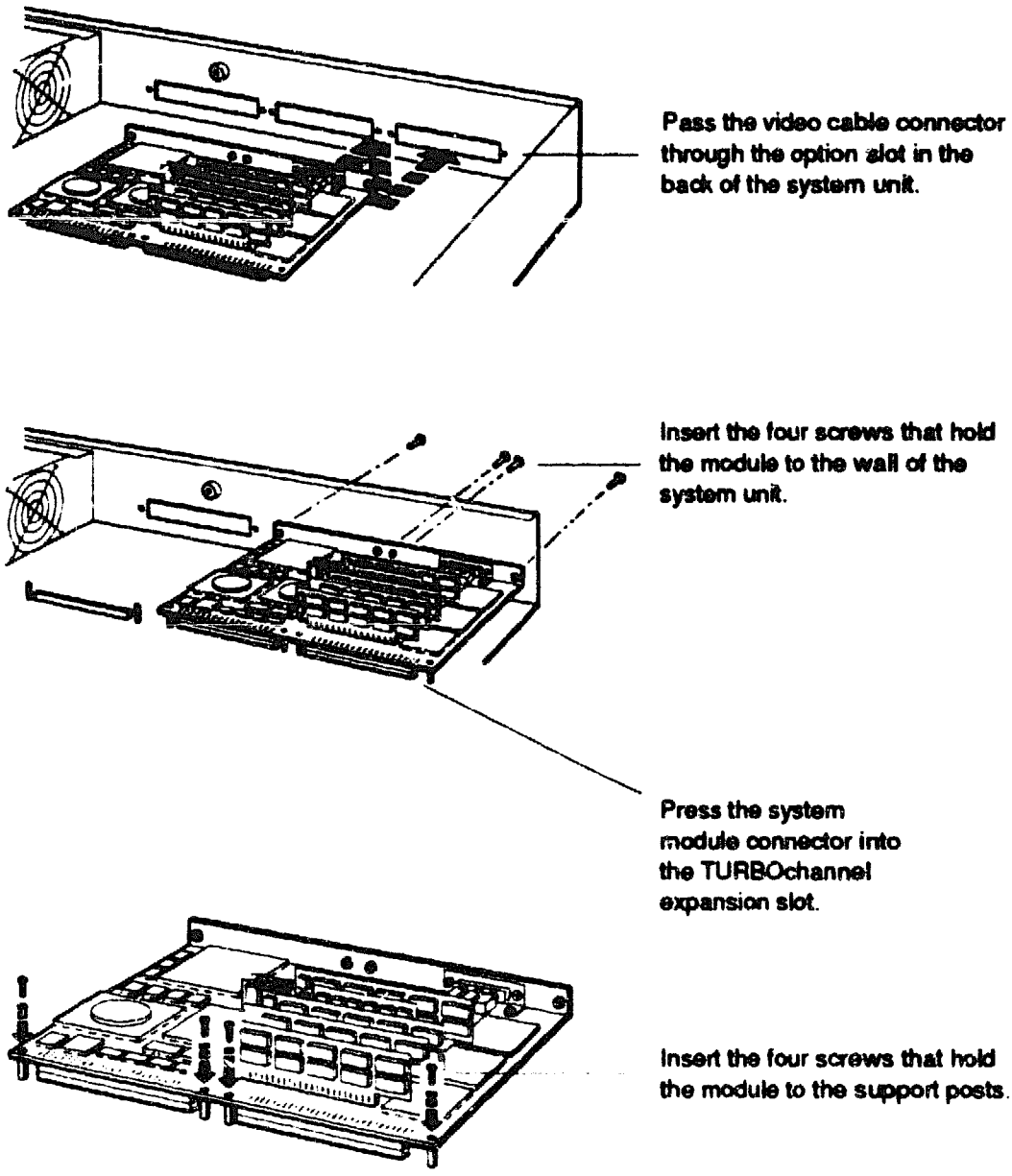


Figure 3. Installing a low 3D graphics TURBOchannel module

Replace the Cover

1. Remove the antistatic wrist strap from your wrist and from the unit.
2. Replace the cover. See the operator's or user's guide that came with the unit for directions.

Make Sure the Low 3D Graphics TURBOchannel Module Operates Properly

1. Turn on the monitor and any other devices connected to the system unit.
2. Turn on the system unit.
3. Make sure the low 3D graphics module appears in the configuration display and reports no errors. See "To Check the Low 3D Graphics Module" on page 11 of this chapter for directions.

To Remove a Low 3D Graphics TURBOchannel Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the Cover

For directions, see the operator's or user's guide that came with the unit that contains the low 3D graphics module.

Put on the Antistatic Wrist Strap

See "Attach the Antistatic Wrist Strap" on page 4 of this chapter for directions.

Remove the Low 3D Graphics TURBOchannel Module

Caution: System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.

1. Disconnect the video cable from the low 3D graphics TURBOchannel module.
2. Remove the screws that hold the low 3D graphics module to the wall of the system unit.
3. Remove the screws that hold the low 3D graphics TURBOchannel module to the support posts.
4. Grip the end of the low 3D graphics TURBOchannel module near the support posts. Then pull the end of the module out of the TURBOchannel expansion slot.
5. Place the low 3D graphics TURBOchannel module in an antistatic bag or on an antistatic mat.
6. If you are installing no other TURBOchannel module in the option slot, replace the metal plate that covered the option slot.

Replace the Cover

1. Remove the antistatic wrist strap from your wrist and from the unit.
2. Replace the cover. See the operator's or user's guide that came with the unit for directions.

To Check the Low 3D Graphics TURBOchannel Module

Make Sure the System Recognizes the Low 3D Graphics TURBOchannel Module

To make sure that the system recognizes the low 3D graphics TURBOchannel module, type **cnfg** at the console prompt. Then press Return. A display with information about the modules in your system then appears on the monitor.

The overall display can differ, but the line that describes the low 3D graphics TURBOchannel module is the same for every workstation. This is a sample configuration display for the DECstation 5000 Model 100:

```
3:   KN02-BA   DEC   V5.2c   TCF0   ( 24 MB)
                                    (enet:08-00-2b-0c-e0-d1)
                                    (scsi = 7)
2:   PMAD-AA   DEC   V5.1f   TCF0   (enet: 08-00-2b-0f-43-31)
1:   PMAG-DA   DEC   V5.3A   TCF0   (DA: PXG -- D=8, Z=24)
```

Look for the line that has PMAG-DA, PMAGB-DA, or PMAGB-DC in the second column. This is the line that describes the low 3D graphics accelerator option module.

- PMAG-DA indicates that the module is a low 3D graphics module.
- PMAGB-DA or PMAGB-DC indicates that the module is a low 3D plus graphics module.

The number to the left of PMAG-DA, PMAGB-DA, or PMAGB-DC is the slot number for the option module. This sample display shows that the low 3D graphics accelerator option module slot number is 1.

Although the graphics module connector is located in option slots 0 and 1, the system recognizes the low 3D graphics module in option slot 1. Information about option slot 0 does not appear in the configuration display.

If the graphics module does not appear in the configuration display, make sure the module is inserted tightly. If the module still does not appear in the configuration display, move the module to another option slot.

If the module does not appear in the configuration display after you move the module to another slot, contact your Digital service representative.

The letters in parentheses at the end of each option slot display line show what kind of option module is in that slot. DA: PXG indicates that a low 3D graphics module is in that slot.

The number that follows Z= indicates whether the z-buffer modules are operating properly. If the number 24 does not appear after Z=, there is a problem in one or more of the z-buffer modules attached to the top of the graphics module. Make sure the z-buffer modules are inserted tightly.

If the z-buffer modules still do not appear in the configuration display, contact your Digital service representative.

Check the Self-Test Results

This is a sample self-test error message for a low 3D graphics TURBOchannel module:

```
?TFL 1/vdacsig (1: ?dma= sticbsy)
```

- The number immediately after `?TFL` is the slot number of the module that reported the error.
- The term to the right of the slash (/) is the name of the test that detected a problem.
- The phrase in parentheses at the end of the message is an additional message that describes the error.

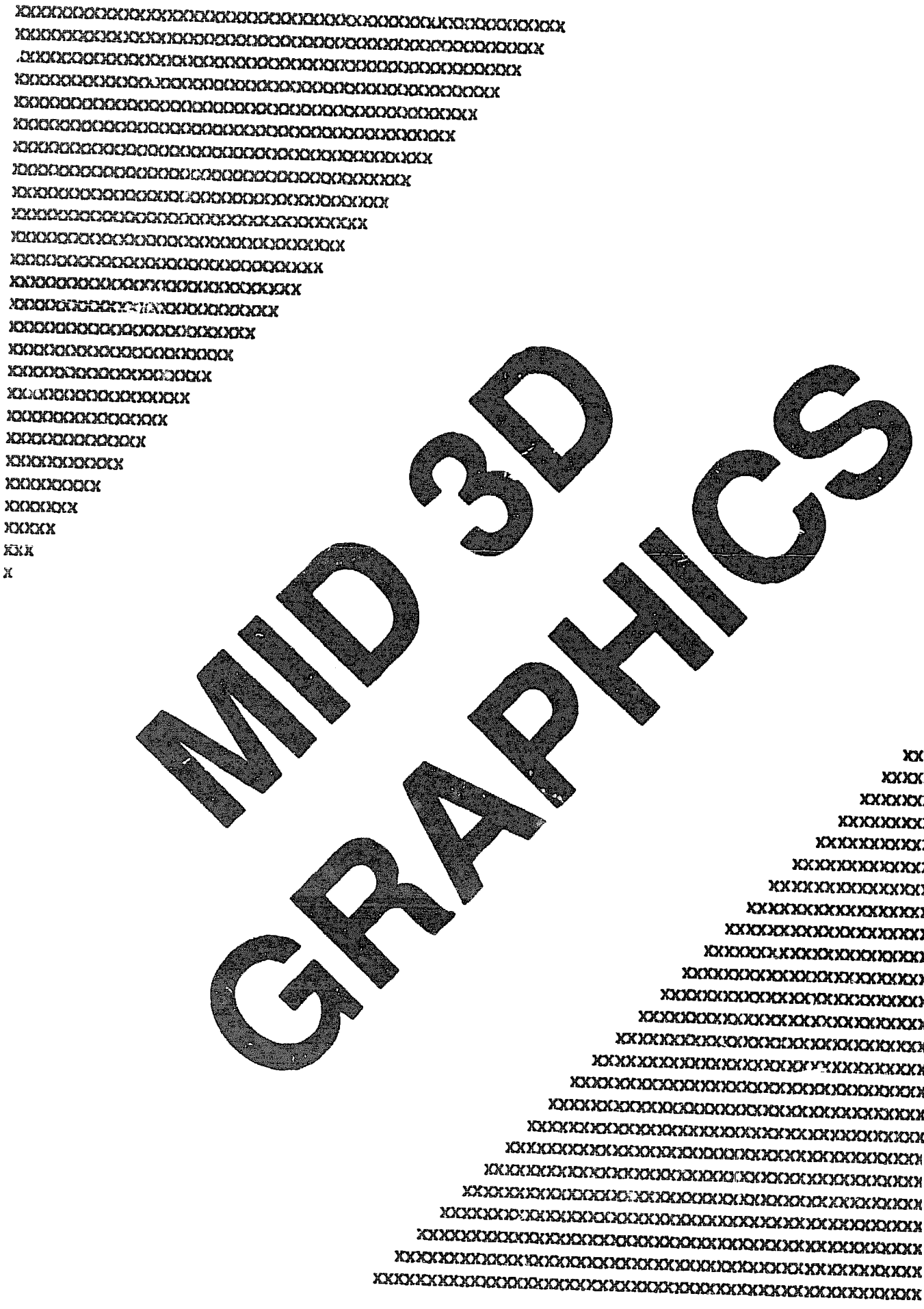
This sample error message reports that the vdacsig test detected a problem in the low 3D graphics module in option slot 1.

If a self-test reports that a low 3D graphics TURBOchannel module is faulty, make sure the module is inserted tightly in its slot and the video cable is connected correctly.

If the problem persists, check the self-test error message and find the name of the failed test. Table 1 describes how to respond to each failed self-test.

Table 1. Self-Test Error Messages for Low 3D Graphics Accelerator Modules

Test Listed in the Error Message	How to Respond
fb fbfill	Contact your Digital service representative.
vdacsig	If the error message does not end with the phrase vsimm=*number*, replace the graphics module. If the error message contains the phrase vsimm=*number*, contact your Digital service representative.
intrdma i860 patrns sdmaddrs shade stamp stic-reg vdacreg	The problem is in the graphics module or the system module. Contact your Digital service representative.


MID 3D
GRAPHICS

December 1991

The Mid Three-Dimensional (3D) Graphics TURBOchannel Module

EK-M3DOM-TC-001

This chapter about the mid three-dimensional (3D) graphics TURBOchannel module tells you

- Basic information about mid 3D graphics TURBOchannel module hardware
- How to install a mid 3D graphics TURBOchannel module
- How to remove a mid 3D graphics TURBOchannel module
- How to check whether the mid 3D graphics TURBOchannel module is operating properly

Mid 3D Graphics TURBOchannel Module Hardware

The workstation can support one mid 3D graphics accelerator module. Three video serial inline memory modules (VSIMMs) attach to the top of the mid 3D graphics module. The mid 3D graphics module can also have two optional z-buffer modules, which enhance 3D graphics generation.

For the mid 3D graphics accelerator module to work correctly, your workstation must use ULTRIX version 4.1 or higher.

Combining Mid 3D Graphics Modules and Monitors

There are three types of mid 3D graphics TURBOchannel modules. Module type PMAG-EA is called a mid 3D graphics module. Module types PMAGB-EA and PMAGB-EC are called mid 3D graphics plus modules. The module type is printed on the front of the mid 3D graphics module.

- Module types PMAG-EA and PMAGB-EC operate at 66 Hz. The following monitors can display graphics generated by the PMAG-EA and PMAGB-EC graphics modules:
  - VRT16-DA color monitor
  - VRT16-HA color monitor
  - VRT19-DA color monitor
  - VRT19-HA color monitor
  - VR319-CA monochrome monitor
  - VR320-CA color monitor
- Module type PMAGB-EA operates at 72 Hz. The following monitors can display graphics generated by the PMAGB-EA graphics module:
  - VRT16-HA color monitor
  - VRT19-HA color monitor
  - VR320-DA color monitor
  - VRM17-AA monochrome monitor

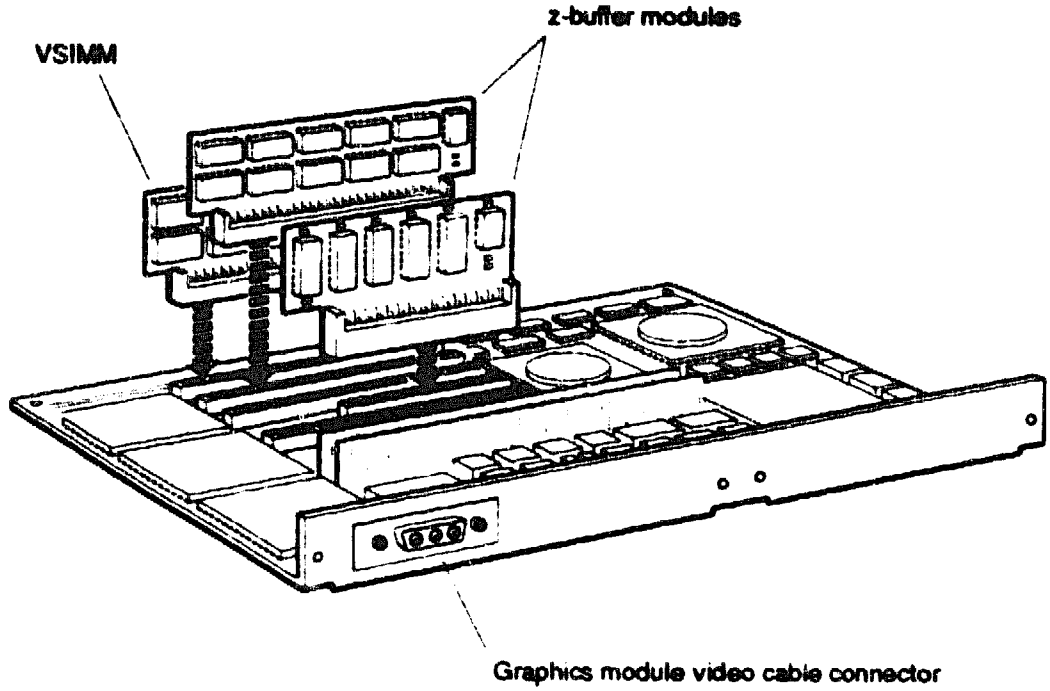


Figure 1. Mid 3D graphics TURBOchannel option module

To Install a Mid 3D Graphics TURBOchannel Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the Cover

See the operator's or user's guide that came with the unit into which you want to install the graphics module for directions on how to remove the cover.

Attach the Antistatic Wrist Strap

Caution: *Always attach the antistatic wrist strap when handling any module in your workstation or any other static-sensitive material. Using the antistatic wrist strap protects the module from static discharge.*

To attach the antistatic wrist strap,

1. Unfold the antistatic wrist strap.
2. Wrap the end of the strap around your wrist twice.
3. Peel the cover off the copper end of the strap. Then press the copper end of the strap against the metal frame of the unit into which you are installing the module.

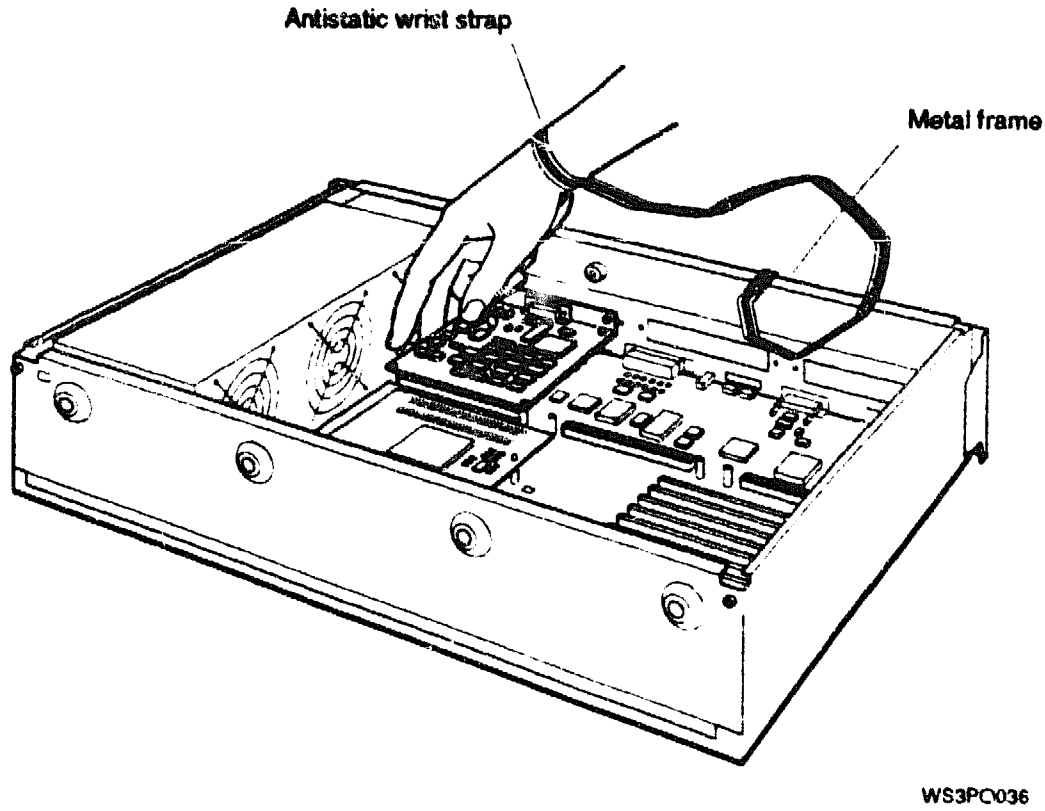


Figure 2. Using the antistatic wrist strap

Insert the Mid 3D Graphics TURBOchannel Module

Caution: *System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit.*

1. Remove any graphics modules that are already inside the system unit or TURBOchannel extender. See page 9 of this chapter for directions on how to remove a graphics options module.
2. Choose any two unused TURBOchannel expansion slots that are next to each other to hold the mid 3D graphics module.

   Note: *The mid 3D graphics module uses two TURBOchannel slots.*
3. If the back of the system unit has metal plates over the option slots you want to use, remove the screws that hold the plates. Then remove the plates.

   Save the plates. You will need to replace the plates if you ever remove the TURBOchannel module.
4. Hold the mid 3D graphics TURBOchannel module so that the system module connectors face the TURBOchannel expansion slots and the video cable connector faces the option slot opening on the back of the system unit.
5. Pass the video cable connector through the option slot opening in the back of the unit.
6. Push the system module connectors into the TURBOchannel expansion slot.
7. Use the screws that came with the module to fasten the mid 3D graphics TURBOchannel module to the support posts.
8. Use the screws that held the metal plates over the option slots to attach the module to the system unit wall.
9. Connect the video cable to the mid 3D graphics module and the monitor. For directions, see the chapter later in this guide that describes the monitor to which you want to connect the graphics module.

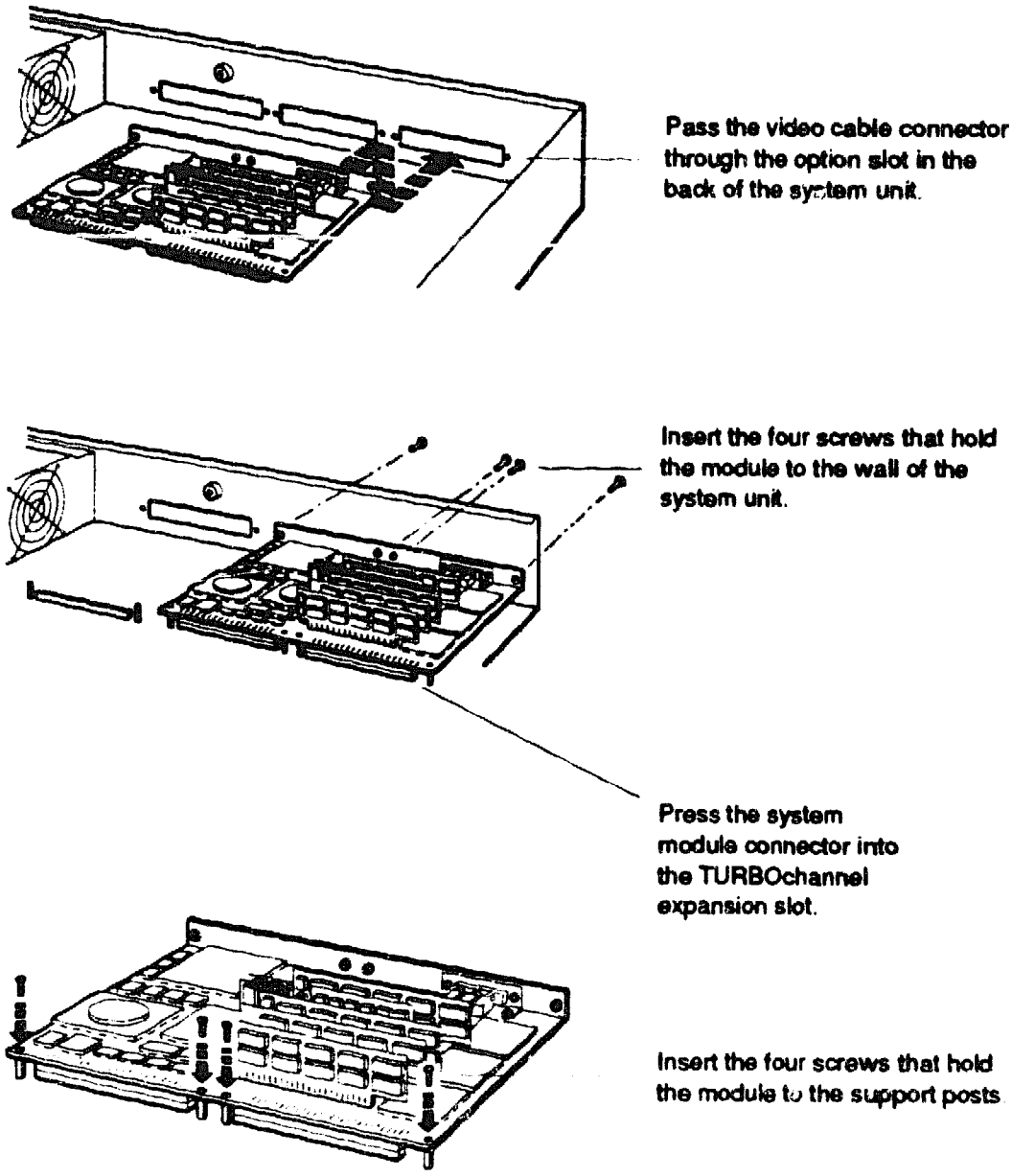


Figure 3. Installing a mid 3D graphics TURBOchannel module

Replace the Cover

1. Remove the antistatic wrist strap from your wrist and from the unit.
2. Replace the cover. See the operator's or user's guide that came with the unit for directions.

Make Sure the Mid 3D Graphics TURBOchannel Module Operates Properly

1. Turn on the monitor and any other devices connnected to the system unit.
2. Turn on the system unit.
3. Make sure the mid 3D graphics module appears in the configuration display and reports no errors. See "To Check the Mid 3D TURBOchannel Module" on page 11 of this chapter for directions.

To Remove a Mid 3D Graphics TURBOchannel Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the Cover

See the operator's or user's guide that came with the unit into which you want to install the mid 3D graphics module for directions on how to remove the cover.

Put on the Antistatic Wrist Strap

See "Attach the Antistatic Wrist Strap" on page 4 of this chapter for directions.

Remove the Mid 3D Graphics TURBOchannel Module

Caution: *System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.*

1. Disconnect the video cable from the mid 3D graphics TURBOchannel module.
2. Remove the screws that hold the mid 3D graphics module to the wall of the system unit.
3. Remove the screws that hold the mid 3D graphics TURBOchannel module to the support posts.
4. Grip the end of the mid 3D graphics TURBOchannel module near the support posts. Then pull the end of the module out of the TURBOchannel expansion slots.
5. Place the mid 3D graphics TURBOchannel module in an antistatic bag or on an antistatic mat.
6. If you are installing no other TURBOchannel module in the option slot, replace the metal plate that covered the option slot.

Replace the Cover

1. Remove the antistatic wrist strap from your wrist and from the unit.
2. Replace the cover. See the operator's or user's guide that came with the unit for directions.

To Check the Mid 3D Graphics TURBOchannel Module

Make Sure the System Recognizes the Mid 3D Graphics TURBOchannel Module

To make sure that the system recognizes the mid 3D graphics TURBOchannel module, type **cnfg** at the console prompt. Then press Return. A display with information about the modules in your system then appears on the monitor.

The overall display can differ, but the line that describes the mid 3D graphics TURBOchannel module is the same for every workstation. This is a sample configuration display for the DECstation 5000 Model 100:

```
3:  KN02-BA  DEC  V5.2c  TCF0  ( 24 MB)
                               (enet:08-00-2b-0c-e0-d1)
                               (scsi = 7)
2:  PMAD-AA  DEC  V5.1f  TCF0  (enet: 08-00-2b-0f-43-31
1:  PMAG-EA  DEC  V5.3A  TCF0  (EA: PXG -- D=8, Z=24)
```

Look for the line that has PMAG-EA in the second column. This is the line that describes the mid 3D graphics accelerator option module.

The number to the left of PMAG-DA is the slot number for the option module. This sample display shows that the mid 3D graphics accelerator option module slot number is 1.

Although the graphics module connector is located in option slots 0 and 1, the system recognizes the mid 3D graphics module in option slot 1. Option slot 0 does not appear on the configuration display.

If the graphics module does not appear in the configuration display, make sure the module is inserted tightly. If the module still does not appear in the configuration display, move the module to another option slot.

If the module does not appear in the configuration display after you move the module to another slot, contact your Digital service representative.

The letters in parentheses at the end of each option slot display line show what kind of option module is in that slot. EA: PXG indicates that a mid 3D graphics module is in slot 1.

The number that follows z= indicates whether the z-buffer modules are operating properly.

If the number 24 does not appear after z=, there is a problem in one or more of the z-buffer modules attached to the top of the graphics module. Make sure that the z-buffer modules are inserted tightly.

If the z-buffer modules still do not appear in the configuration display, contact your Digital service representative.

Check the Self-Test Results

This is a sample self-test error message for a mid 3D graphics TURBOchannel module:

```
?TFL 1/vdacsig (1: ?dma= sticbsy)
```

- The number immediately after `?TFL` is the slot number of the module that reported the error.
- The term to the right of the slash (/) is the name of the test that detected a problem.
- The phrase in parentheses at the end of the message is an additional message that describes the error.

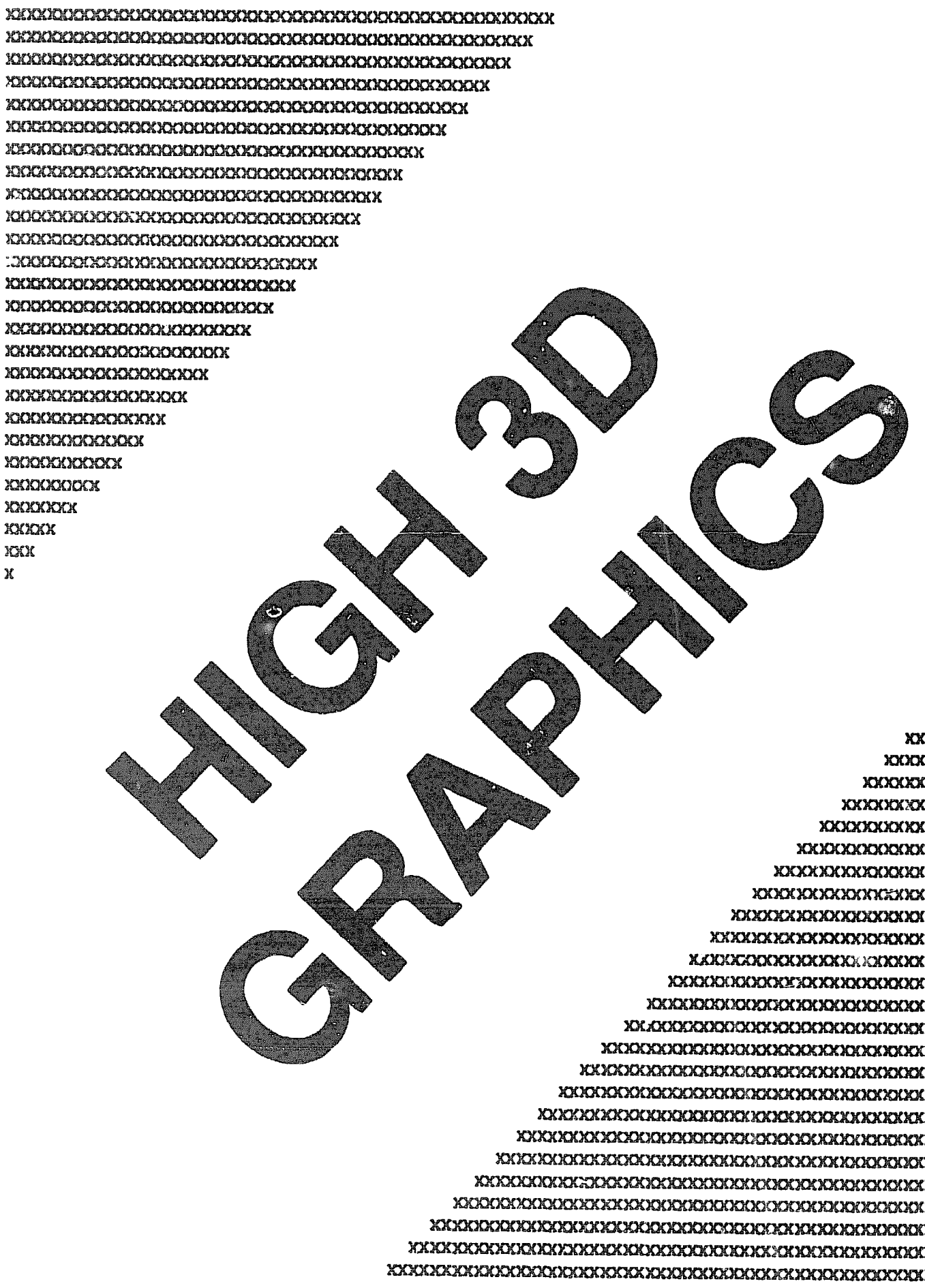
This sample error message reports that the vdacsig test found a problem in the mid 3D graphics module in option slot 1.

If a self-test reports that a mid 3D graphics TURBOchannel module is faulty, make sure the module is inserted tightly in its slot and that the video cable is connected correctly.

If the problem persists, check the self-test error message and find the name of the failed test. Table 1 describes how to respond to each failed self-test.

Table 1. Self-Test Error Messages for Mid 3D Graphics Accelerator Modules

Test Listed in the Error Message	How to Respond
fb fbfill	Contact your Digital service representative.
vdacsig	If the error message does not end with the phrase vsimm=*number*, replace the graphics module. If the error message contains the phrase vsimm=*number*, contact your Digital service representative.
intrdma i860 patrns sdmaddrs shade stamp stic-reg vdacreg	The problem is in the graphics module or the system module. Contact your Digital service representative.


HIGH 3D
GRAPHICS

December 1991

The High Three-Dimensional (3D) Graphics TURBOchannel Module

EK-H3DOM-TC-001

This chapter about the high three-dimensional (3D) TURBOchannel module tells you

- Basic information about high 3D graphics TURBOchannel module hardware
- How to install a high 3D graphics TURBOchannel module
- How to remove a high 3D graphics TURBOchannel module
- How to check whether the high 3D graphics TURBOchannel module is operating properly

High 3D Graphics TURBOchannel Module Hardware

The workstation can support one high 3D graphics accelerator module, which provides three-dimensional color graphics. Six video serial inline memory modules (VSIMMs) attach to the top of the high 3D graphics module.

For the high 3D graphics accelerator module to work correctly, your workstation must use ULTRIX version 4.1 or higher.

Combining High 3D Graphics Modules and Monitors

There are two types of high 3D graphics TURBOchannel modules, each of which requires different monitors to display graphics. The module type is printed on the front of the color frame buffer module.

- Module type PMAG-FA operates at 66 Hz. The following monitors can display graphics generated by the PMAG-FA high 3D graphics module:
  - VRT16-DA color monitor
  - VRT16-HA color monitor
  - VRT19-DA color monitor
  - VRT19-HA color monitor
  - VR319-CA monochrome monitor
  - VR320-CA color monitor
- Module type PMAGB-FA, also known as the high 3D plus graphics module, operates at 72 Hz. The following monitors can display graphics generated by the PMAGB-FA high 3D plus graphics module:
  - VRM17-AA monochrome monitor
  - VRT16-HA color monitor
  - VRT19-HA color monitor
  - VR319-DA monochrome monitor
  - VR320-DA color monitor

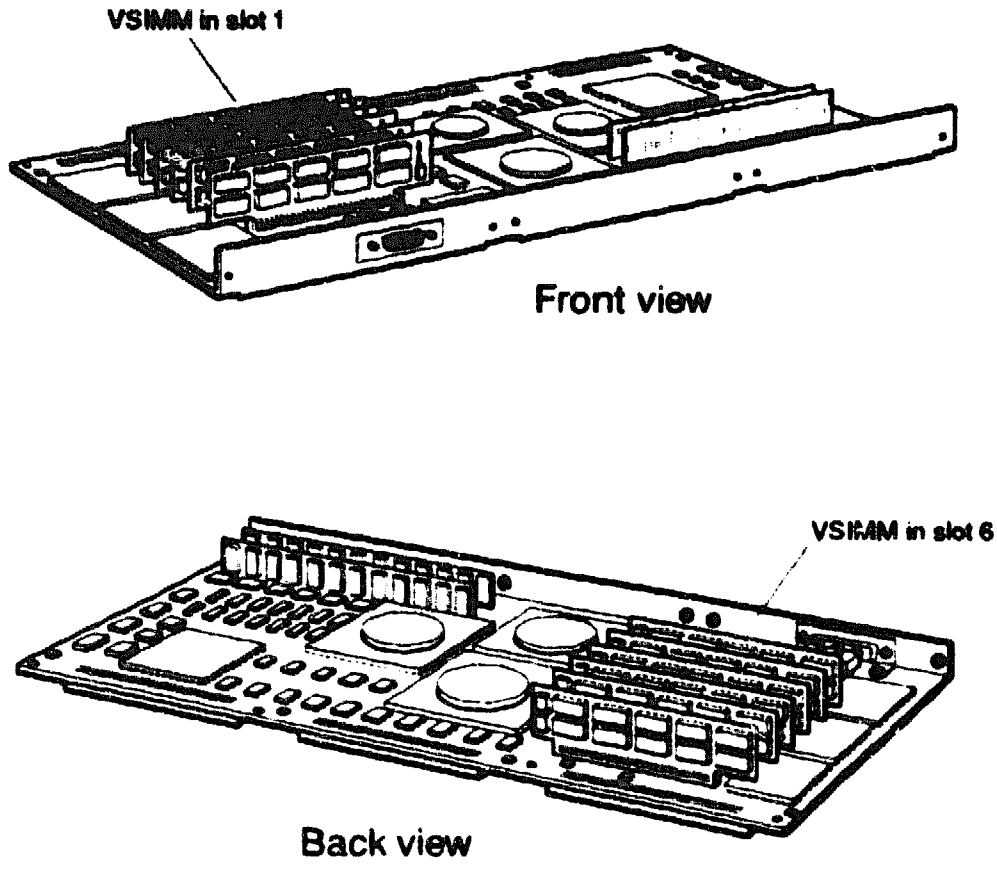


Figure 1. High 3D graphics TURBOchannel option module

To Install a High 3D Graphics TURBOchannel Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the Cover

Remove the cover. For directions, see the operator's or user's guide that came with the unit into which you want to install the module.

Attach the Antistatic Wrist Strap

Caution: *Always attach the antistatic wrist strap when handling any module or other static-sensitive material. Using the antistatic wrist strap protects the module from static discharge.*

1. Unfold the antistatic wrist strap.
2. Wrap the end of the strap around your wrist twice.
3. Peel the cover off the copper end of the strap. Then press the copper end of the strap against the metal frame of the unit into which you are installing the module.

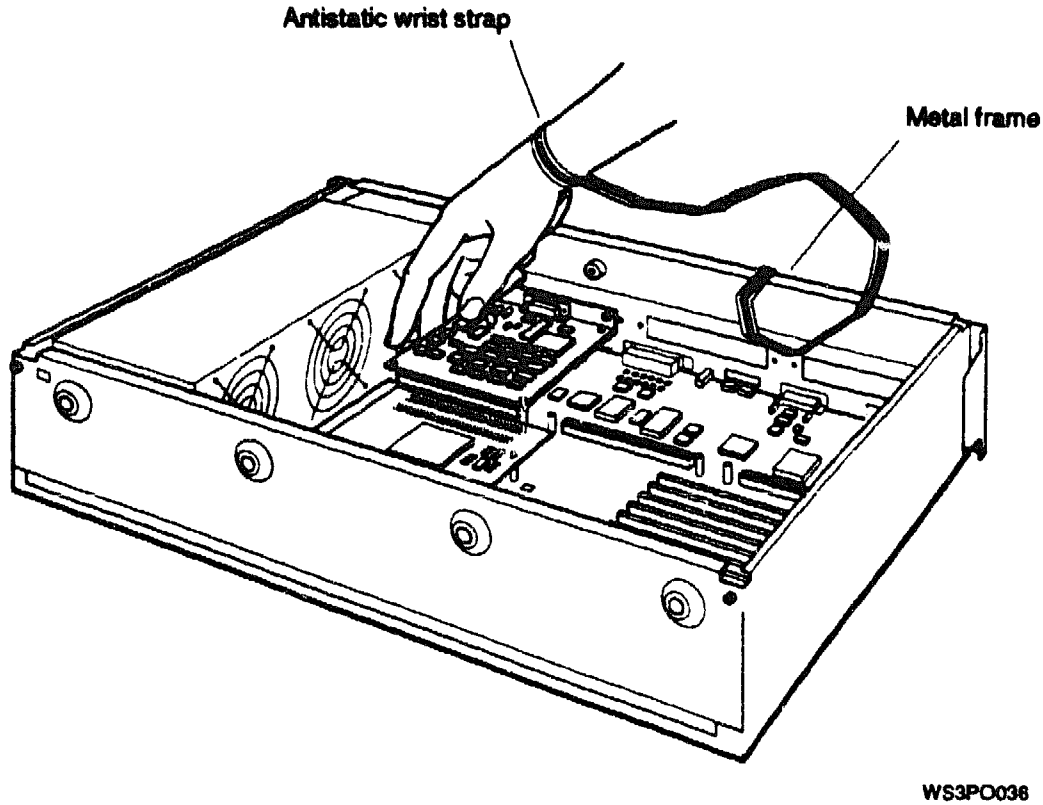


Figure 2. Using the antistatic wrist strap

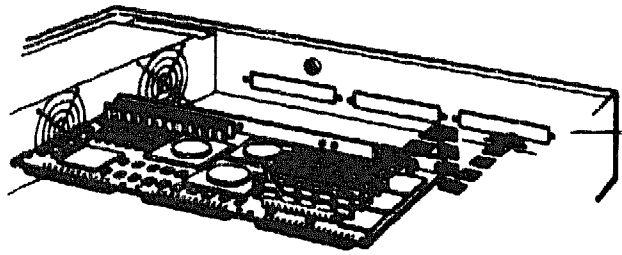
Insert the High 3D Graphics TURBOchannel Module

Caution: *System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.*

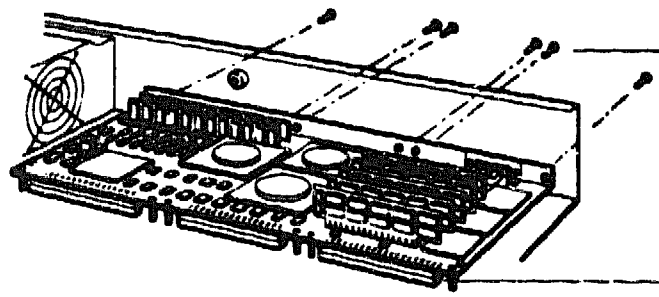
1. Remove any graphics modules that are already in the system unit or TURBOchannel extender.
2. Choose any three unused TURBOchannel expansion slots that are next to each other to hold the high 3D graphics TURBOchannel module.

   Note that the high 3D graphics module fills three TURBOchannel slots.
3. If the back of the unit has metal plates over the option slots you want to use, remove the screws that hold the plates. Then remove the plates.

   Save the plates. You will need to replace the plates if you ever remove the TURBOchannel module.
4. Hold the high 3D graphics TURBOchannel module so that the system module connector faces the TURBOchannel expansion slots and the video cable connector faces the option slot opening on the back of the system unit.
5. Pass the video cable connector through the option slot opening.
6. Push the system module connectors into the TURBOchannel expansion slots.
7. Use the screws that came with the module to fasten the high 3D graphics TURBOchannel module to the support posts.
8. Use the screws that held the metal plates over the option slot to attach the module to the system unit wall.
9. Connect the video cable to the high 3D graphics module and the monitor. For directions, see the chapter later in this guide that describes the monitor to which you are connecting the high 3D graphics module.

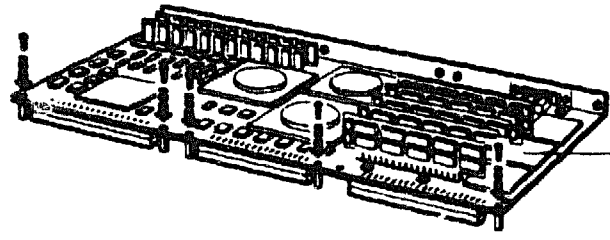


Pass the video cable connector through the option slot in the wall of the system unit.



Insert the six screws that hold the module to the wall of the system unit.

Press the system module connector into the TURBOchannel slot.



Insert the six screws that hold the module to the support posts.

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Figure 3. Installing a high 3D graphics TURBOchannel module

Replace the Cover

1. Remove the antistatic wrist strap from your wrist and from the unit.
2. Replace the cover. See the operator's or user's guide that came with the unit for directions.

Make Sure the High 3D Graphics TURBOchannel Module Operates Properly

1. Turn on the monitor and any other devices connnected to the system unit.
2. Turn on the system unit.
3. Make sure the high 3D graphics TURBOchannel module appears in the configuration display and reports no errors. See "To Check the High 3D Graphics TURBOchannel Module" on page 11 of this chapter for directions.

To Remove a High 3D Graphics TURBOchannel Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the Cover

Remove the cover. See the operator's or user's guide that came with the unit into which you want to install the module for directions.

Put on the Antistatic Wrist Strap

See "Attach the Antistatic Strap" on page 4 of this chapter for directions.

Remove the High 3D Graphics TURBOchannel Module

Caution: *System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.*

1. Disconnect the video cable from the high 3D graphics TURBOchannel module.
2. Remove the screws that hold the high 3D graphics module to the wall of the unit.
3. Remove the screws that hold the high 3D graphics TURBOchannel module to the support posts.
4. Grip the end of the high 3D graphics TURBOchannel module near the support posts. Then pull the end of the module out of the TURBOchannel expansion slots.
5. Place the high 3D graphics TURBOchannel module in an antistatic bag or on an antistatic mat.
6. If you are installing no other TURBOchannel module in the option slot, replace the metal plate that covered the option slot.

Replace the Cover

1. Remove the antistatic wrist strap from your wrist and from the unit.
2. Replace the cover. See the operator's or user's guide that came with the unit for directions.

To Check the High 3D Graphics TURBOchannel Module

Make Sure the System Recognizes the High 3D Graphics TURBOchannel Module

To make sure that the system recognizes high 3D graphics TURBOchannel module, type **cnfg** at the console prompt. Then press Return. A display with information about the modules in your system then appears on the monitor.

The overall display can differ, but the line that describes the high 3D graphics TURBOchannel module is the same for every workstation. This is a sample configuration display for the DECstation 5000 Model 100:

```
3:  KN02-BA  DEC  V5.2c  TCF0  ( 24 MB)
                               (enet:08-00-2b-0c-e0-d1)
                               (scsi = 7)
1:  PMAG-FA  DEC  V5.3a  TCF0  (FA: PXG_T -- D-24, Z=24)
```

Look for the line that has PMAG-FA in the second column. This is the line that describes the high 3D graphics accelerator module. Although the high 3D graphics accelerator module fills three option slots, the system recognizes the module in option slot 1.

If the graphics module does not appear in the display, make sure that the module is inserted tightly. If the module still does not appear in the configuration display, contact your Digital service representative.

The number that follows Z= indicates whether the z-buffer modules are operating properly. If the number 24 does not appear after Z=, there is a problem in one or more of the z-buffer modules attached to the top of the graphics module. Contact your Digital service representative.

Check the Self-Test Results

This is a sample self-test error message for a high 3D graphics TURBOchannel module:

```
?TFL 1/vdacsig (1: ?dma= sticbsy)
```

- The number immediately after ?TFL is the slot number of the module that reported the error.

- The term to the right of the slash (/) is the name of the test that found a problem.
- The phrase in parentheses at the end of the message is an additional message that describes the error.

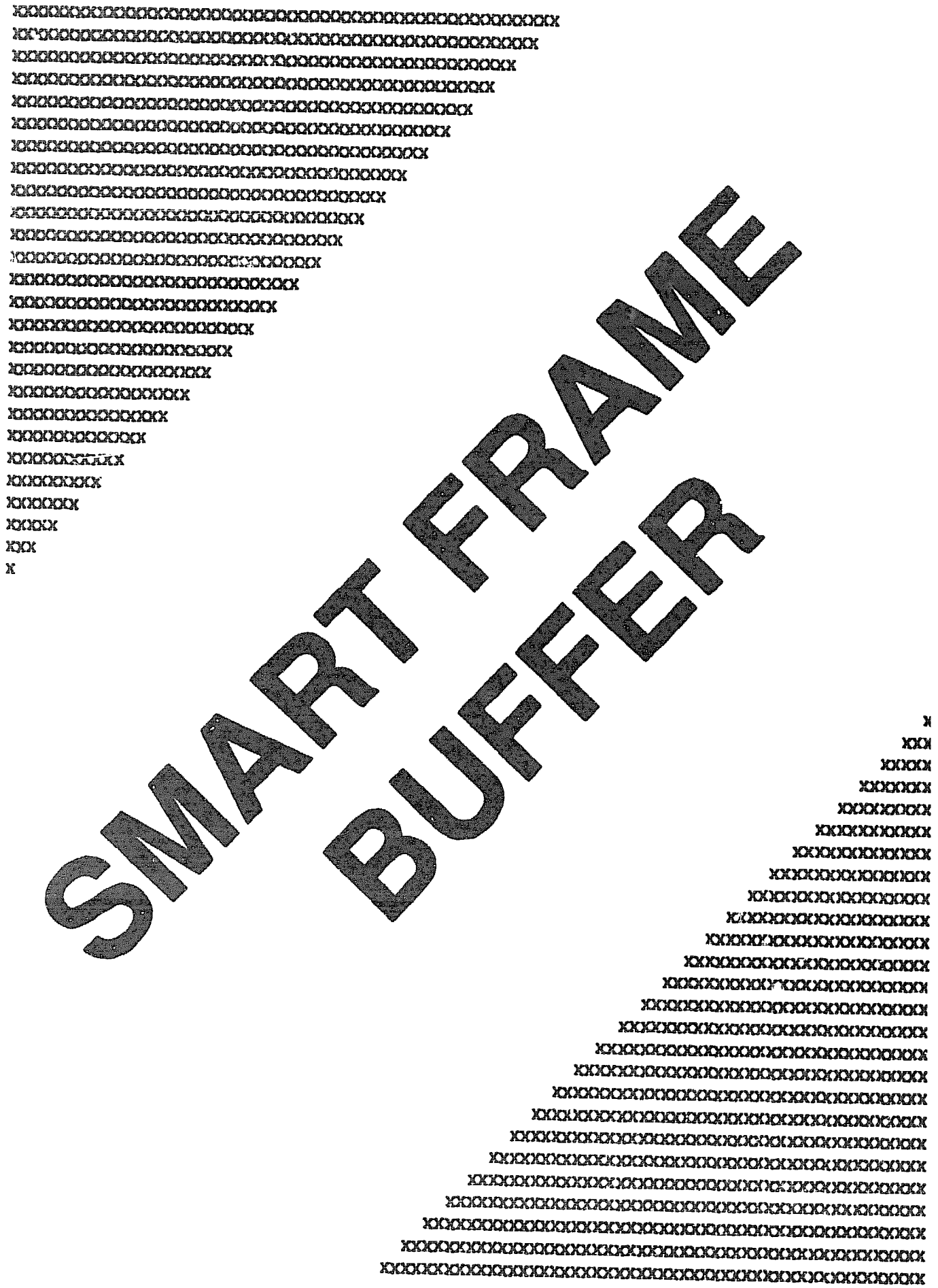
This sample error message reports that the vdacsig test found a problem in the high 3D graphics module in option slot 1.

If a self-test reports that the high 3D graphics module is faulty, make sure the module is inserted tightly in its slot and the video cable is connected correctly.

If the problem persists, check the test error message and find the name of the failed test. Table 1 describes how to respond to each failed self-test.

Table 1. Self-Test Error Messages for High 3D Graphics Modules

Test Listed in the Error Message	How to Respond
fb fbfill vdacsig	Check whether the error message ends with the term vsimm followed by a number. If the error message ends with the phrase vsimm=*number*, contact your Digital service representative. If the error message does not end with the phrase vsimm=*number*, replace the 3D graphics module.
intrdma i860 patrns sdmaddrs shade stamp stic-reg vdacreg	The problem is in the 3D graphics module or the system module. If you have another 3D module that you know is good, try it in the option slots. If the test no longer fails, replace the option module. If the test continues to fail, replace the system module. If you have no other 3D module, contact your Digital service representative.


SMART FRAME
BUFFER

December 1991

Smart Frame Buffer TURBOchannel Module

EK-SFBOM-TC-001

This chapter about the smart frame buffer TURBOchannel module tells you

- Basic information about smart frame buffer TURBOchannel module hardware
- How to install a smart frame buffer TURBOchannel module
- How to remove a smart frame buffer TURBOchannel module
- How to check whether the smart frame buffer TURBOchannel module is operating properly

Smart Frame Buffer TURBOchannel Module Hardware

The smart frame buffer module generates high-resolution, 2D, color graphics.

The workstation can support as many smart frame buffer modules as there are available TURBOchannel slots on the system module. However, you cannot combine a smart frame buffer module with a 2D graphics accelerator or 3D graphics modules.

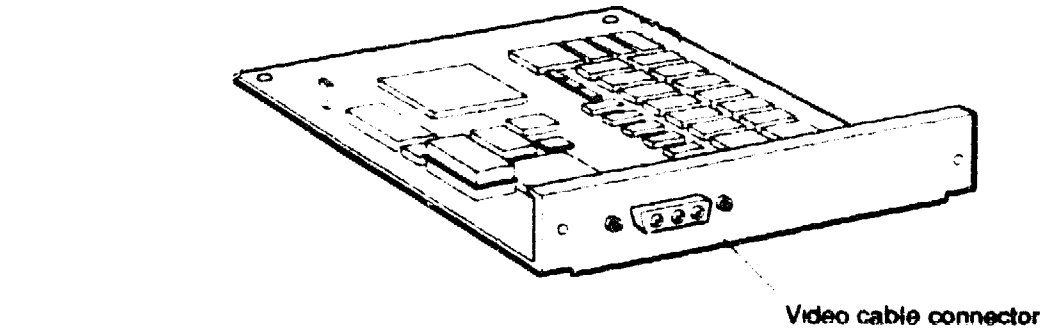
For the smart frame buffer module to work correctly, your workstation must use ULTRIX version 4.2a or higher.

Smart Frame Buffer Module Types

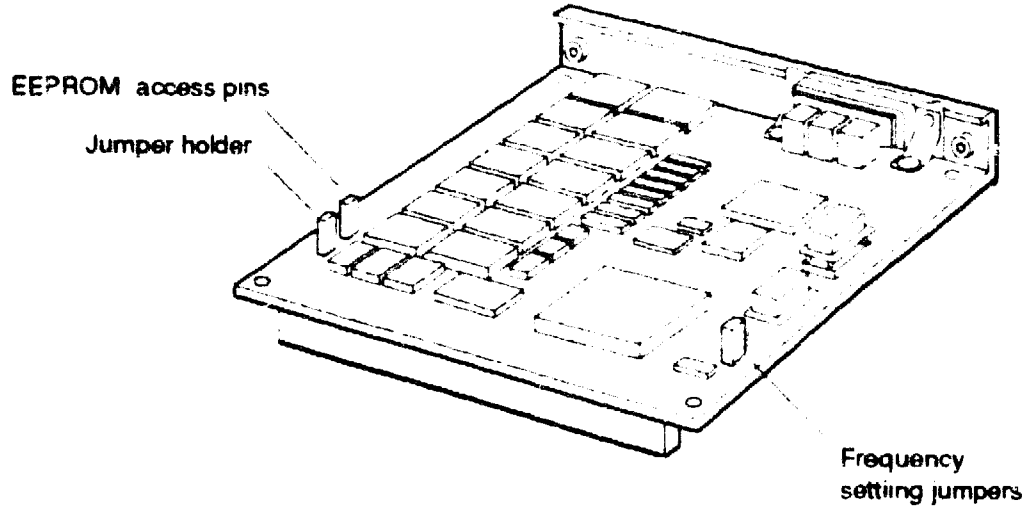
There are several types of smart frame buffer graphics module, each of which has frequency setting jumper pins that select the frequency and resolution of the video signal that the module produces.

- Module type PMAGB-BA always generates 1280 by 1024 pixels.
  - If a jumper is on the frequency pins, the module operates at 66 Hz.
  - If no jumper is on the frequency pins, the module operates at 72 Hz.
- Module type PMAGB-BC operates at one of two combinations of resolution and frequency.
  - If a jumper is on the pins, the module generates 1024 by 864 pixels at 60 Hz.
  - If no jumper is on the frequency setting pins, the module generates 1280 by 1024 pixels at 72 Hz.
- Module type PMAGB-BE always operates at 72 Hz.
  - If a jumper is on the frequency setting pins, the module generates 1024 by 768 pixels.
  - If no jumper is on the frequency setting pins, the module operates at 1280 by 1024 pixels.

The EEPROM access pins control whether the EEPROM can be programmed. If the pins have a jumper, you can program the EEPROM. If the pins have no jumper, you cannot program the EEPROM.



Front view



Back view

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Figure 1. Smart frame buffer TURBOchannel module

Combining Smart Frame Buffer Modules and Monitors

Table 1 lists the monitors that each type of smart frame buffer module can use to display graphics.

Table 1. Compatible Monitors and Smart Frame Buffer Modules

Smart Frame Buffer Module Type	Jumper on Frequency Setting Pins	Compatible Monitors
PMAGB-BA	Jumper off	VR320-DA, VRM17-DA, VRT16-HA, and VRT19-HA monitors
PMAGB-BA	Jumper on	VR320-CA, VRC16-CA, VRT16-DA, VRT16-HA, VRT19-DA, and VRT19-HA monitors
PMAGB-BC	Jumper off	VR320-DA, VRM17-DA, VRT16-HA, and VRT19-HA monitors
PMAGB-BC	Jumper on	VR262-AA, VR297-AA, and VR299-AA monitors
PMAGB-BE	Jumper off	VR320-DA, VRM17-DA, VRT16-HA, and VRT19-HA monitors
PMAGB-BE	Jumper on	VRC16-CA monitor

To Install a Smart Frame Buffer TURBOchannel Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the Cover

See the operator's or user's guide that came with your workstation for directions on how to remove the cover.

Attach the Antistatic Wrist Strap

Caution: Always attach the antistatic wrist strap when handling any module in your workstation or any other static-sensitive material. Using the antistatic wrist strap protects the module from static discharge.

1. Unfold the antistatic wrist strap.
2. Wrap the end of the strap around your wrist twice.
3. Peel the cover off the copper end of the strap. Then press the copper end of the strap against the metal frame of the unit into which you are installing the module.

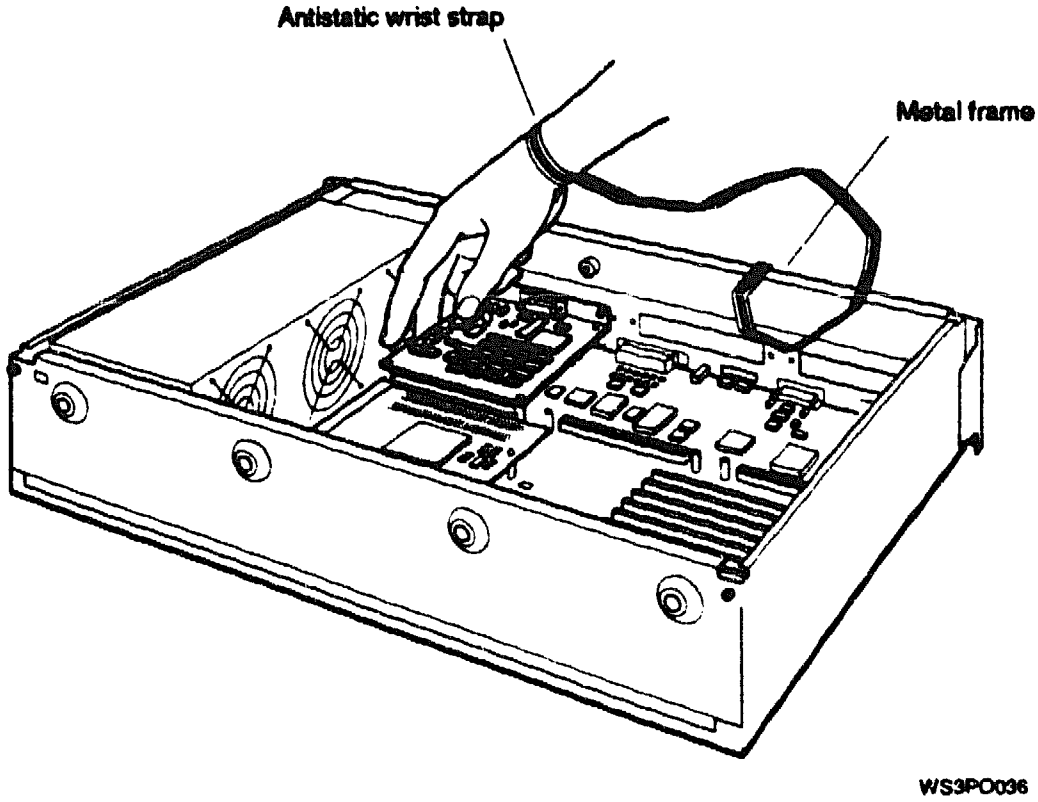


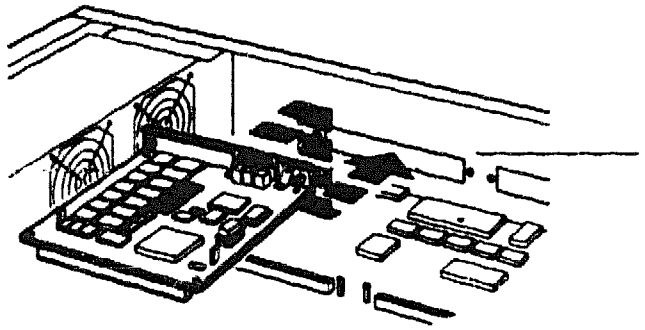
Figure 2. Using the antistatic wrist strap

Insert the Smart Frame Buffer TURBOchannel Module

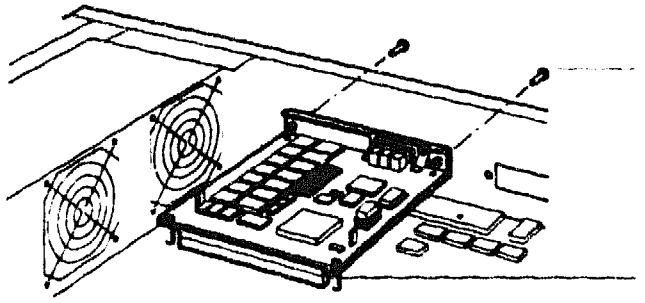
Caution: *System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.*

1. If a 2D graphiccs accelerator or 3D graphics module is already in the workstation, remove that module before you install the smart frame buffer module.
2. Choose any unused TURBOchannel expansion slot to hold the smart frame buffer module.
3. If the back of the system unit has a metal plate over the option slot you want to use, remove the screws that hold the plate. Then remove the plate.

   Save the plate. You will need to replace the plate if you ever remove the TURBOchannel module.
4. Hold the smart frame buffer TURBOchannel module so that the system module connector faces the TURBOchannel expansion slot on the system module and the video cable connector faces the option slot opening on the back of the system unit.
5. Pass the video cable connector through the option slot opening in the back of the system unit.
6. Push the system module connector into the TURBOchannel expansion slot on the system module.
7. Use the screws that came with the module to fasten the smart frame buffer TURBOchannel module to the support posts.
8. Use the screws that held the metal plate over the option slot to attach the external connector end of the module to the inside of the system unit wall.
9. Connect the video cable to the smart frame buffer module and the monitor. For directions, see the chapter later in this guide that describes the monitor to which you want to connect the smart frame buffer module.

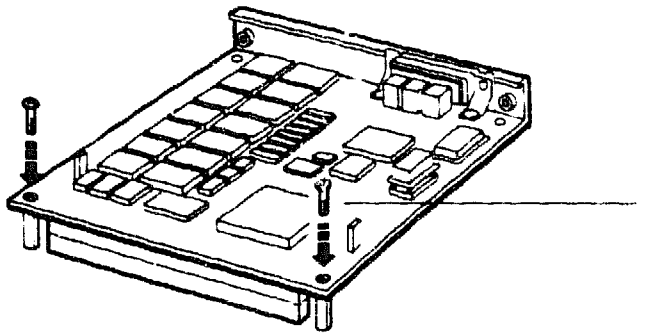


Pass the video cable connector through the option slot in the wall of the system unit.



Insert the two screws that hold the module to the wall of the system unit.

Press the system module connector into the TURBOchannel slot.



Insert the two screws that hold the module to the support posts.

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Figure 3. Installing a smart frame buffer TURBOchannel module

Replace the System Unit Cover

1. Remove the antistatic wrist strap from your wrist and from the system unit.
2. Replace the cover. See the operator's or user's guide that came with your workstation for directions.

Make Sure the Smart Frame Buffer TURBOchannel Module Operates Properly

1. Turn on the monitor and any other devices connected to the system unit.
2. Turn on the system unit.
3. Make sure the smart frame buffer module appears in the configuration display and reports no errors. See "To Check the Smart Frame Buffer TURBOchannel Module" later in this chapter for directions.

To Remove a Smart Frame Buffer TURBOchannel Module

Shut Down the Workstation Software

Shut down the workstation software by following the instructions that came with your workstation.

Remove the System Unit Cover

See the operator's or user's guide that came with your workstation for directions on how to remove the system unit cover.

Put on the Antistatic Wrist Strap

See "Attach the Antistatic Wrist Strap" earlier in this chapter for directions.

Remove the Smart Frame Buffer TURBOchannel Module

Caution: *System unit hardware can become hot during operation. Wait several minutes after you turn off the system unit before touching anything inside the system unit box.*

1. Disconnect the video cable from the smart frame buffer TURBOchannel module.
2. Remove the screws that hold the module to the wall of the system unit.
3. Remove the screws that hold the smart frame buffer TURBOchannel module to the support posts.
4. Grip the end of the smart frame buffer TURBOchannel module near the support posts. Then pull the end of the module out of the TURBOchannel expansion slot on the system module.
5. Place the smart frame buffer TURBOchannel module in an antistatic bag or on an antistatic mat.
6. If you are installing no other TURBOchannel module in the option slot, replace the metal plate that covered the option slot.

Replace the System Unit Cover

1. Remove the antistatic wrist strap from your wrist and from the system unit.
2. Replace the cover. See the operator's or user's guide that came with your workstation for directions.

To Check the Smart Frame Buffer TURBOchannel Module

Make Sure the System Recognizes the Smart Frame Buffer TURBOchannel Module

To make sure the system recognizes the smart frame buffer TURBOchannel module, type **cnfg** at the console prompt. Then press Return. A display with information about the modules in your system then appears on the monitor.

The overall display can be differ, but the line that describes the smart frame buffer TURBOchannel module is the same for every workstation. This is a sample configuration display for the DECstation 5000 Model 100:

```
3:   KN02-BA    DEC   V5.2c   TCF0   ( 24 MB)
                                      (enet:08-00-2b-0c-e0-d1)
                                      (scsi = 7)
2:   PMAD-AA    DEC   V5.1f   TCF0   (enet: 08-00-2b-0f-43-31)
1:   PMAZ-AA    DEC   V5.1e   TCF0   (scsi = 7)
0:   PMAGB-BA   DEC   V1.0    TCF0   (HX -- d=8)
```

Look for the line that has PMAGB-BA in the second column. This is the line that describes the smart frame buffer TURBOchannel module. All smart frame buffer modules list PMAGB-BA in the configuration display, regradless of the specific module type. For example, a PMAGB-BC smart frame buffer module would list PMAGB-BA in the configuration display.

The number to the left of PMAGB-BA is the slot number for the smart frame buffer TURBOchannel module. This sample display shows that the smart frame buffer TURBOchannel module is in slot 0.

If the smart frame buffer TURBOchannel module does not appear in the configuration display, move the module to another slot. If the module still does not appear in the configuration display, contact your Digital service representative.

Check Self-Test Results

This is a sample self-test error message for a smart frame buffer TURBOchannel module:

```
?TFL 0/patt
```

- The number immediately after `?TFL` is the slot number of the module that reported the error.
- The term to the right of the slash (/) is the name of the test that detected a problem.
- The phrase in parentheses at the end of the message is an additional message that describes the error.

This sample error message reports that the patt test detected a problem in the smart frame buffer module in option slot 0.

If a self-test error message lists patt as the test that failed, make sure the monitor is turned on and the video cable is connected correctly. If the problem persists, contact your Digital service representative.

If a smart frame buffer self-test other than the patt test reports an error, make sure the smart frame buffer TURBOchannel module is inserted tightly. If the problem persists, contact your Digital service representative.