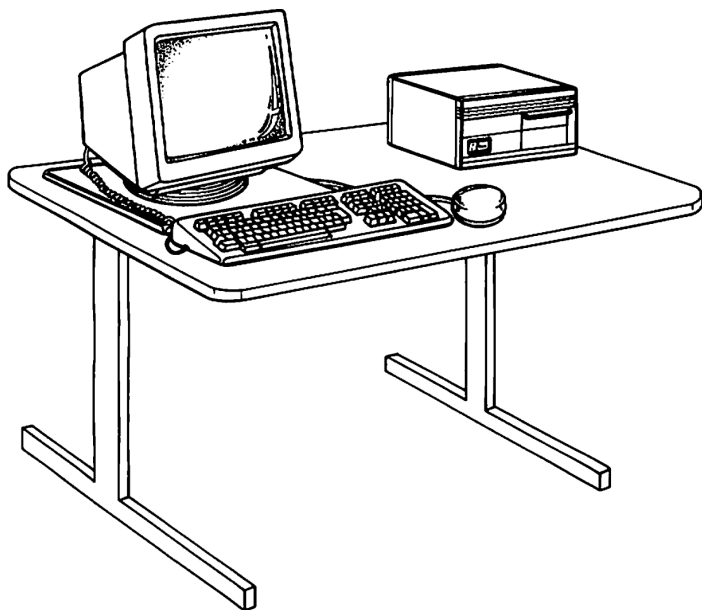


# **VAXstation 2000**

## **Hardware Option Guide for the 4-Plane Graphics Coprocessor**

Order Number EK-VAXAA-4P-001



**digital equipment corporation**  
**maynard, massachusetts**

---

November 1987

---

The information in this document is subject to change without notice and should not be construed as a commitment by Digital Equipment Corporation.

Digital Equipment Corporation assumes no responsibility for any errors that may appear in this document.

The software, if any, described in this document is furnished under a license and may be used or copied only in accordance with the terms of such license. No responsibility is assumed for the use or reliability of software or equipment that is not supplied by Digital Equipment Corporation or its affiliated companies.

---


Copyright ©1987 by Digital Equipment Corporation.

All Rights Reserved.  
Printed in U.S.A.

---

The READER'S COMMENTS form on the last page of this document requests the user's critical evaluation to assist in preparing future documentation.

The following are trademarks of Digital Equipment Corporation:

DEBET	DIBOL	ThinWire
DEC	MASSBUS	ULTRIX-32
DECconnect	MicroVAX	ULTRIX-32m
DECmate	MicroVMS	UNIBUS
DECnet	PDP	VAX
DECUS	P/OS	VAXcluster
DECwriter	Professional	VAXstation
DELNI	Q-bus	VMS
DEMPR	Rainbow	VT
DEQNA	RSTS	Work Processor
DESTA	RSX	
DEUAN	RT	

ML-S857

FCC NOTICE: The equipment described in this manual generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A Computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such radio frequency interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case the user at his own expense may be required to take measures to correct the interference.

---

# Contents

---

<b>Preface</b>	<b>v</b>
<b>Setting Up the Color or Gray-Scale 4-Plane Graphics Option</b>	<b>1</b>
<b>Installing the Video Cable Assembly on a Monochrome Monitor</b>	<b>1</b>
VR260 Monochrome Monitor with 4-Plane Graphics Coprocessor . . .	2
VR150 Monochrome Monitor with 4-Plane Graphics Coprocessor . . .	4
<b>Connecting the Monitor Cable to the System Unit</b>	<b>6</b>
<b>Testing Your System</b>	<b>8</b>
A Note on Diagnostics . . . . .	8
TEST 50 Mnemonics . . . . .	9
Monitor Screen Pattern Tests . . . . .	10
Color Monitor . . . . .	11
Gray-Scale Patterns . . . . .	12
Restarting the System After Running Tests . . . . .	13
Summary of TEST Commands . . . . .	13
<b>Figures</b>	
1 Color Video Cable Assembly, BC19S . . . . .	2
2 Connecting G Cable Connector, VR260 Monochrome Monitor . . . .	3
3 Video Cable Assembly Knob . . . . .	4
4 Mounting Video Cable Assembly on VR150 Monitor, Color Cable . .	5
5 Connecting G Cable Connector, VR150 Monitor . . . . .	6
6 Connecting the Monitor Cable to the System Unit . . . . .	7
7 Tightening the Thumbscrews on the Monitor Cable . . . . .	8
8 Color Bars . . . . .	12

**Tables**

1	Power-Up Error Messages . . . . .	9
2	Definitions of TEST 50 Mnemonics . . . . .	10
3	Summary of TEST Commands . . . . .	13

# Preface

---

The VAXstation 2000 4-plane graphics coprocessor provides a 4-plane video Subsystem for the VAXstation 2000 System. This guide is intended for users who are upgrading their VAXstation 2000 System to support a 4-plane graphics System with a monochrome monitor. If you have a color monitor, see the documentation packaged with the color monitor.

This guide describes the 4-plane graphics coprocessor and gives some diagnostic Information on this Option. It also describes how to install the color cable that is needed to use a monochrome monitor for gray-scale display.

The VAXstation 2000 4-plane graphics coprocessor is installed by a DIGITAL service representative.

## Recommended Reading Path

Read the VAXstation 2000 hardware and operating system Software documentation in the following order:

### 1. Hardware Installation Information

- (a) VAXstation 2000 Hardware Installation Guide (Order No. EK-VAXAC-IN-003.)
- (b) To install a monochrome monitor, see this guide, the VAXstation 2000 Hardware Option Guide for the 4-Plane Graphics Coprocessor (Order No. EK-VAXAA-4P-001.)
- (c) Workstations and MicroVAX 2000 Network Guide (Order No. EK-NETAB-UG)

### 2. Operating System Information

- (a) VAXstation 2000 Owner's Manual, Chapter 1 (Operating the VAXstation 2000) (Order No. EK-VAXAC-OM-003)
  - (b) MicroVMS VAXstation 2000/MicroVAX 2000 Installation Guide (Order No. AA-JR84A-TN)
- or
- ULTRIX-32W Basic Installation Guide for the VAXstation 2000 (Order No. AA-KU45A-TE)

### 3. Reference Information

- (a) VAXstation 2000 Owner’s Manual (Order No. EK-VAXAC-OM-003)
- (b) MicroVMS VAXstation 2000/MicroVAX 2000 Operations Guide (Order No. AA-JR83A-TN)

## Special Notices

The following notices appear throughout this guide:

- Notes - Contain general or supplemental information about a topic.
- Cautions - Contain information to prevent damage to equipment.

## Conventions Used in This Guide

Convention	Meaning
<b>Bold</b>	Notes, cautions and warnings appear in bold face. User input is also in bold.

## **Setting Up the Color or Gray-Scale 4-Plane Graphics Option**

If you have a monochrome monitor, use the instructions in this guide to install a color cable (packaged in the Upgrade kit) on the monitor. If you ordered a new monitor with your Upgrade kit, first set it up as described in the monitor installation documentation, packaged with the monitor. Then, after the Option is installed, follow the instructions in this guide.

The VAXstation 2000 4-plane graphics coprocessor provides a 4-plane video Subsystem for the VAXstation 2000 System. This raster scan video Subsystem provides a resolution of 1024 by 864 pixels, and displays up to 16 gray-scales or 16 colors from a palette of 4096.

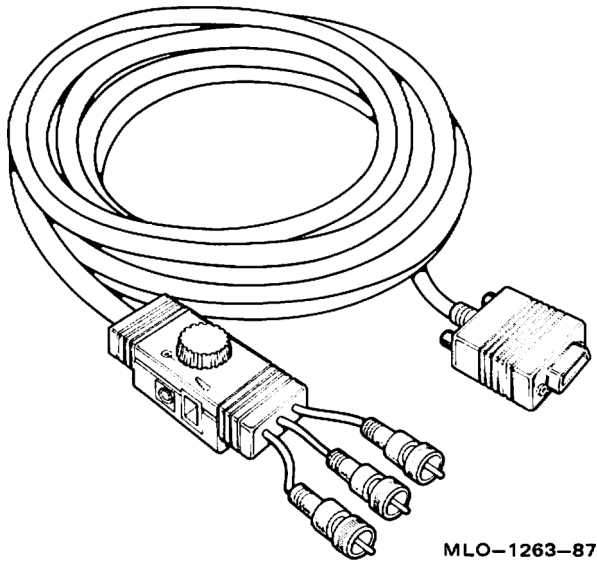
A bitmap display provides variable character size or positioning and inherent graphics capability. The display provides about 850,000 pixels refreshed on the screen at 60 Hertz, thus preventing the flicker and smear of an interlaced display.

## **Installing the Video Cable Assembly on a Monochrome Monitor**

If you have a VR260 or VR150 monochrome monitor with a 4-plane graphics coprocessor to display gray-scale on your screen, you will need to install a color video cable assembly on your monitor.

First, locate the video cable assembly shown in Figure 1 (part no. BC19S).

**Figure 1: Color Video Cable Assembly, BC19S**



The following sections describe the installation process for the VR260 and VR150 respectively.

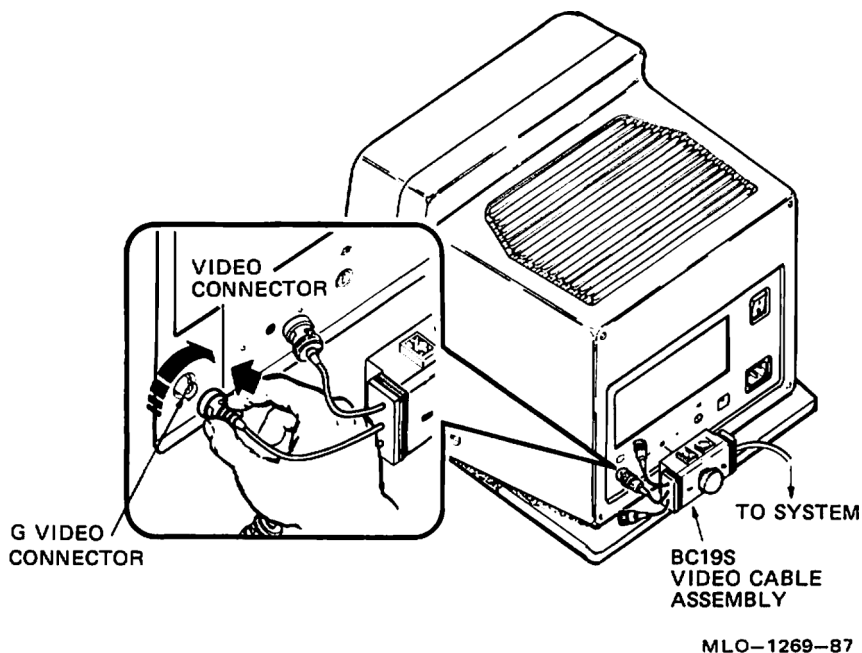
### **VR260 Monochrome Monitor with 4-Plane Graphics Coprocessor**

1. Make sure the monitor's power supply is turned off.
2. Insert only the G video cable connector of the color video cable assembly (BC19S) into the socket on the back of the monitor (Figure 2).
3. Turn the connector clockwise to fasten.

**Note:** The R and B connectors will hang freely — do not connect them to anything.

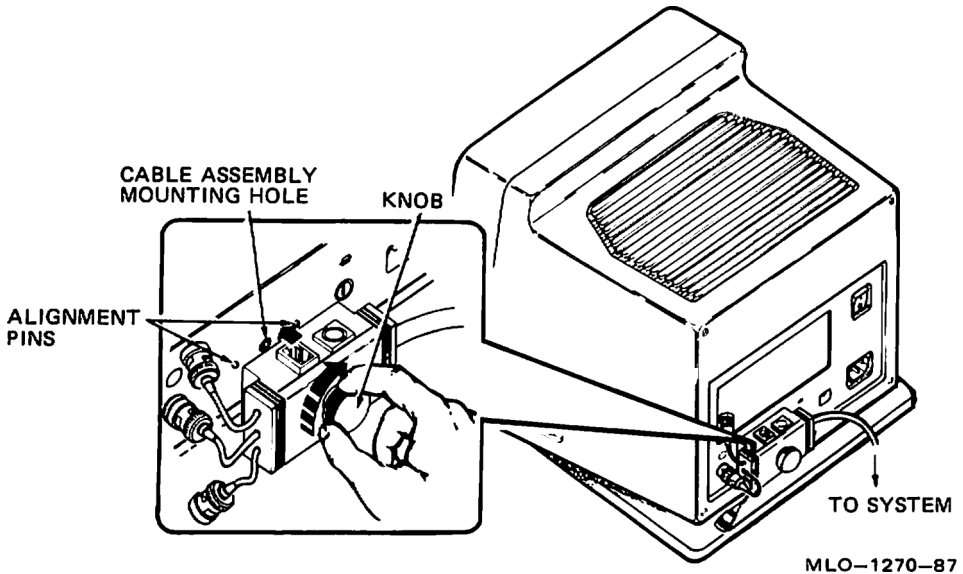


**Figure 2: Connecting G Cable Connector, VR260 Monochrome Monitor**



4. Locate the shorter of the two knobs that come with the color video cable.
5. Insert the shorter knob into the color video cable assembly.
6. Turn the knob on the video cable assembly clockwise to secure it to the monitor (Figure 3).

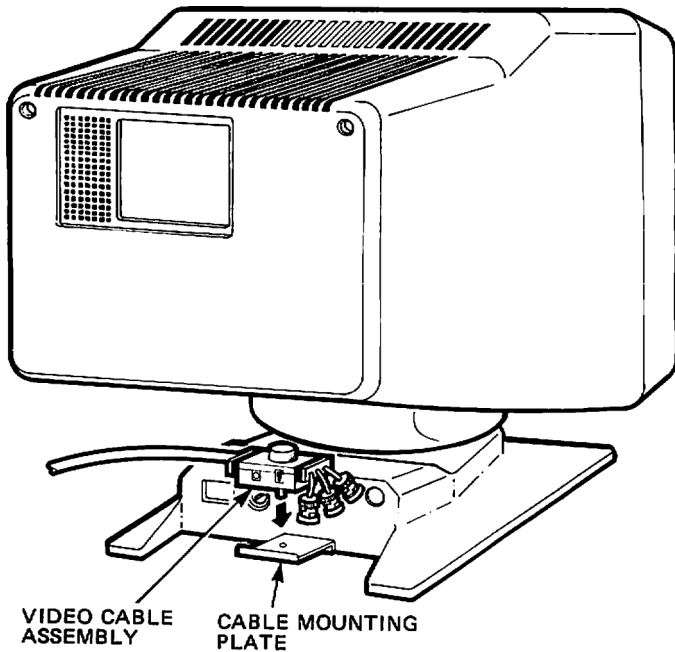
**Figure 3: Video Cable Assembly Knob**



### **VR150 Monochrome Monitor with 4-Plane Graphics Coprocessor**

1. Make sure the monitor's power supply is turned off.
2. Locate the shorter of the two knobs that come with the color video cable.
3. Insert the shorter knob into the color video cable assembly.
4. Turn the knob on the video cable assembly clockwise to secure it to the monitor (Figure 3).
5. Screw the video cable assembly into the cable mounting plate (Figure 4).

**Figure 4: Mounting Video Cable Assembly on VR150 Monitor, Color Cable**

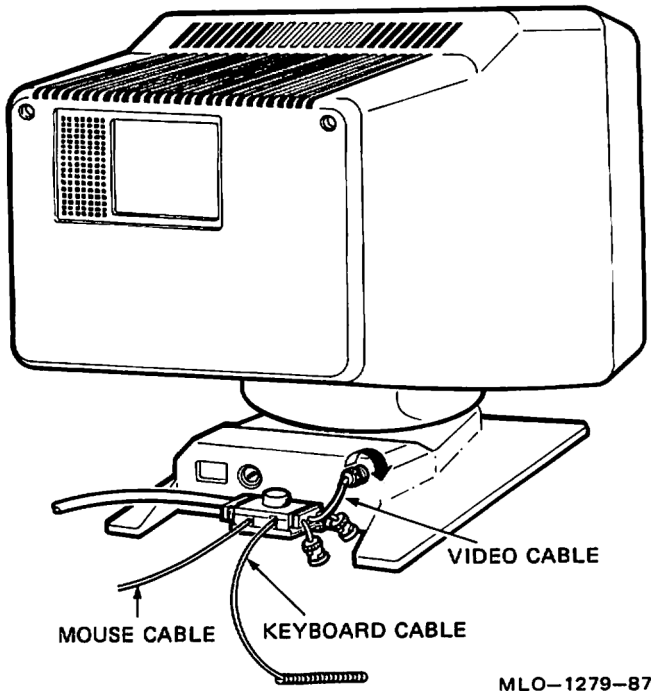


**Caution:** Failure to secure the video cable assembly to the cable mounting plate may strain the cable and may also cause radio emissions in excess of FCC guidelines.

6. Connect only the G video cable to the video connector on the rear panel (Figure 5).
7. Push the cable in and turn the connector clockwise to lock it in place.

**Note:** The R and B connectors will hang freely — do not connect them to anything.

**Figure 5: Connecting G Cable Connector, VR150 Monitor**



## Connecting the Monitor Cable to the System Unit

Use the color video cable assembly (part no. BC19S) to connect your monitor to the System unit.

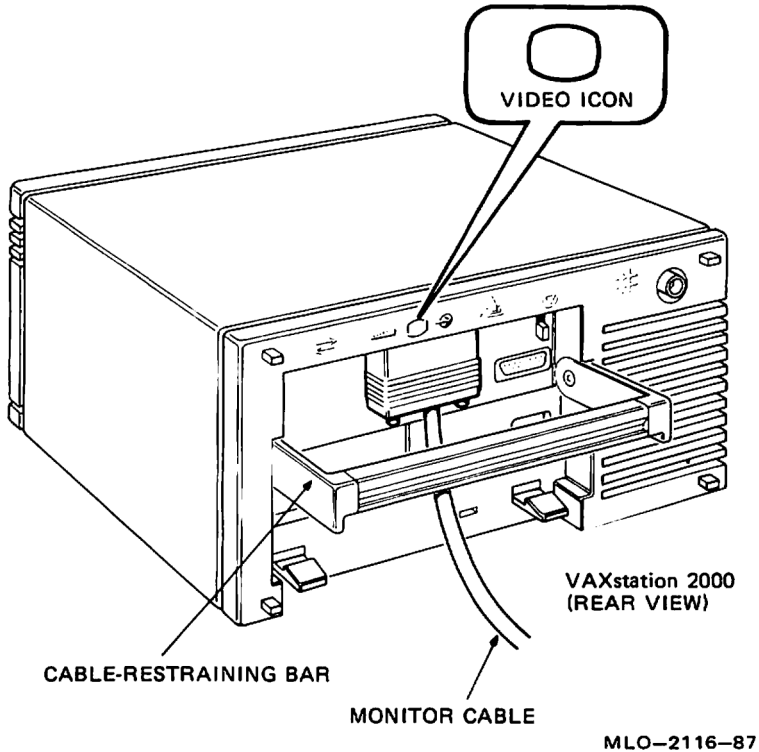
Connect the monitor cable to the System unit as follows:

**Caution:** When installing the cables into the rear of the VAXstation 2000 system unit, do not place the System unit on its front, as it may damage the drive door.

1. Make sure the power supplies for the monitor and System unit are turned off.

2. Lift up the cable-restraining bar on the rear of the VAXstation 2000 System unit (Figure 6).

**Figure 6: Connecting the Monitor Cable to the System Unit**

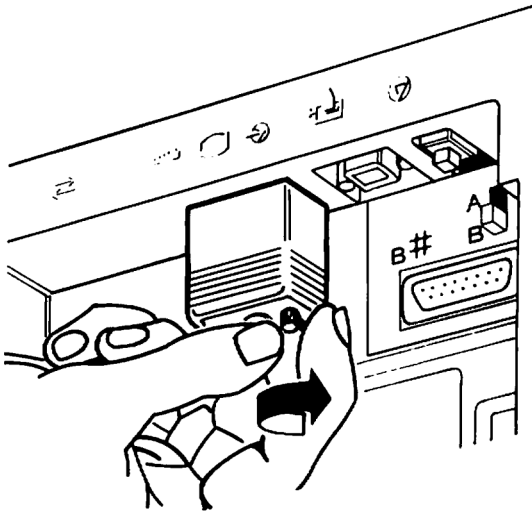


**Note:** If you plan to connect the printer and modem cables, leave the cable-restraining bar up until you have connected those options.

3. Connect the end of the BC19S video cable to the video port on the rear of the VAXstation 2000 System unit. The video port is identified by a video icon. Insert the cable with the video-icon side of the monitor cable facing you.
4. Tighten the thumbscrews on the monitor video cable by turning them clockwise with your fingers (Figure 7).

**Caution:** Before connecting the monitor cable to the System, make sure the system's power supply is turned off.

**Figure 7: Tightening the Thumbscrews on the Monitor Cable**



MLO-2117-87

## Testing Your System

The VAXstation 2000 diagnostic tests are stored in the VAXstation 2000 read-only memory. After every power up, the VAXstation 2000 automatically Starts the System tests, which check the components of your System. The following section describes some of the diagnostic tests available on the VAXstation 2000. For more information, see the *VAXstation 2000 Hardware Installation Guide*.

If you are going to perform diagnostic tests, make sure that both the monitor and System unit power supplies are turned on.

### A Note on Diagnostics

In diagnostics, a Single question mark precedes additional Status information. An example of Status information is:

? 4 00D0 0009.0213

This example indicates that there is a 4-plane coprocessor present in the System with a monochrome monitor and a color cable.

If the 4-plane module has a fatal error, the monitor screen will remain blank.

**Note:** If your monitor does not display any information on the screen after the power-up test sequence, you may have a failure in your video board and/or other failures. Check the LEDs on your keyboard for secondary power-up error messages. If any of the LEDs in Table 1 are lit, call your service representative.

**Table 1: Power-Up Error Messages**

If	Then there is a
The Hold Screen keyboard LED is lit	System failure
The Lock keyboard LED is lit	Video board failure
The Compose keyboard LED is lit	Communication option failure

## TEST 50 Mnemonics

When you run TEST 50, information about the system is displayed using the mnemonics listed in Table 2.

**Table 2: Definitions of TEST 50 Mnemonics**

Mnemonic	Device
CLK	System clock
4PLN	4-plane graphics coprocessor
DZ	Serial line controller
FP	Floating point
HDC	Disk controller
IT	Interval timer
MEM	Memory
MM	Memory management
MONO	Monochrome video circuits on system module
NVR	Nonvolatile RAM
SYS	Interrupt controller and Ethernet ID ROM
TPC	Tape controller

The HDC mnemonic represents the disk Controller. The first group of numbers after the HDC line in the screen display tells you what type of device is installed.

### Monitor Screen Pattern Tests

Screen pattern tests are useful if you suspect a malfunction in your monitor. Record what you see and report it to your Service representative.

**Note:** Check your Software documentation for shutdown procedures before halting your System.

Put the VAXstation 2000 in console mode by pressing the halt button on the rear of the System. Then run any of the tests listed. When you have finished, type **BOOT** (or **BOOT** followed by the name of the device that contains operating System Software) at the console prompt and press Return to return to normal operation.



## Color Monitor

1. Screen of Es Pattern

Type **TEST 81** and press Return.

The monitor displays a full screen of Es. Press Return to stop the display and return to the console prompt.

2. White Screen

Type **TEST 82** and press Return.

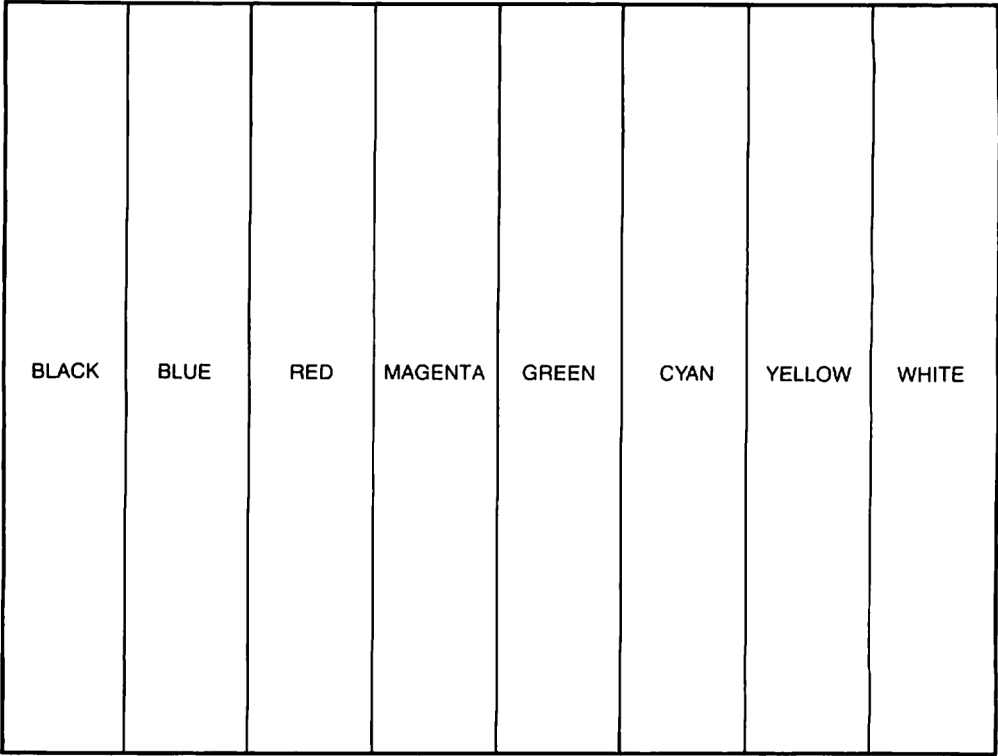
The monitor displays a white screen. Press Return to stop the display and return to the console prompt.

3. Eight Color Bars

Type **TEST 87** and press Return.

The monitor display eight color bars (Figure 8).

**Figure 8: Color Bars**



MLO-1312-87

**Gray-Scale Patterns**

If you are using gray-scale on your monochrome monitor and suspect a malfunction in your monitor, use the following test for gray-scale patterns:

- Eight Gray-Scale Bars  
Type **TEST 88** and press Return.  
The monitor displays eight gray-scale bars from black to white. Press Return to stop the display and return the console mode prompt.

## Restarting the System After Running Tests

While you are running any of the tests or procedures in this chapter, you are in console mode. To resume normal Operation of the VAXstation 2000, you must reenter program mode. The two ways to do this are:

1. Type **BOOT** at the console prompt and press Return. The System then searches each device in turn for operating System Software.
2. Type **BOOT** followed by a space and the name of the device that contains operating System Software and then press Return, as shown in this example:

```
>> BOOT DUA0
```

This procedure lets the System boot the operating System Software immediately, without searching.

See your Software documentation for more information.

## Summary of TEST Commands

A list of all TEST commands and the tests or Utility programs they execute is shown in Table 3.

**Table 3: Summary of TEST Commands**

Command	Test or Utility Program
TEST 0	System exersizer
TEST F-1	Self-tests of each device in the system
TEST 50	Configuration
TEST 51	Sets default boot device
TEST 52	Sets default boot flags (operating system dependent)
TEST 53	Sets default recovery action
TEST 54	Sets keyboard language
TEST 70	Diskette and fixed-disk formatter
TEST 71	Fixed-disk verifier
TEST 81	Screen of Es (color monitor)
TEST 82	White screen (color monitor)
TEST 87	IEight color bars (color monitor)
TEST 88	Eight gray-scale bars (color or monochrome monitor)

## HOW TO ORDER

### ADDITIONAL DOCUMENTATION

From	Call	Write
Alaska, Hawaii, or New Hampshire	603-884-6660	Digital Equipment Corporation P.O. Box CS2008 Nashua, NH 03061
Rest of U.S.A and Puerto Rico*	800-258-1710	
* Prepaid orders from Puerto Rico must be placed with DIGITAL's local subsidiary (0809-754-7575)		
Canada	800-267-6219 (for software documentation)  613-592-5111 (for hardware documentation)	Digital Equipment of Canada Ltd. 100 Herzberg Road Kanata, Ontario, Canada K2K 2A6 Attn: Direct Order desk
Internal orders (for Software documentation)	-	Software Distribution Center (SDC) Digital Equipment Corporation Westminster, MA 01473
Internal orders (for hardware documentation)	617-234-4323	Publishing & Circulation Serv. (P&CS) NR03-1/W3 Digital Equipment Corporation Northboro, MA 01532