EPSON® PROFESSIONAL *Series II*
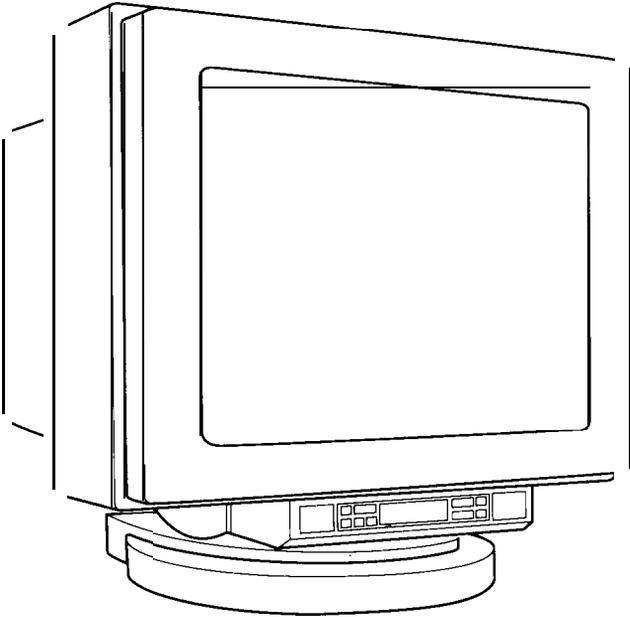
USER'S GUIDE

FCC COMPLIANCE STATEMENT
FOR AMERICAN USERS

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

FOR CANADIAN USERS

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de Classe A prescrites dans le règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

EPSON®

Professional Series II
20″ Monitor
User's Guide

Important Safety Instructions

1. Read all of these instructions and save them for later reference.

2. Follow all warnings and instructions in this manual.

3. The monitor contains shock hazard potential. Do not attempt to open or remove any covers, and do not attempt to service the monitor yourself. Refer all servicing to authorized service personnel.

4. Never push objects of any kind into the monitor through cabinet slots.

5. Do not expose the monitor to liquids, such as rain or spills.

6. Because of the monitor's weight, two people are required to lift it; do not lift it alone. Do not place the monitor on the computer.

7. Do not place the monitor on an unstable cart, stand, or table, and be careful not to drop it.

8. Do not place the monitor near heating appliance or in direct sunlight. Intense heat can damage the monitor's circuitry.

9. Slots and openings on the top and back of the cabinet are provided for ventilation; do not block or cover these openings.

I0. Be careful not to damage the power cord or plug.

11. Voltages outside the monitor's specified line voltage range may harm the monitor. The monitor should be operated from the type of power source indicated on the rear panel marking label.

12. Plug the power cord only into a grounding-type wall outlet.

13. Make sure the combined amperage rating for all products plugged into the wall outlet used for the monitor does not exceed the amperage rating of the wall outlet.

11. Do not replace the interface cable with a non-shielded cable.

15. Unplug the monitor from the wall outlet and the computer before cleaning. Use a damp cloth for cleaning.

16. Excessive brightness for long periods may permanently imprint an image on the screen.

17. To avoid picture distortion or color disturbance, do not put devices that generate magnetism (such as telephones, televisions, speakers, or magnetic screwdrivers) near the monitor.

18. When you finish using the monitor, turn it off by pressing the power button. (Always wait at least five seconds before you turn it back on.) When the monitor will not be used for a long period of time, unplug the power cord.

19. Unplug the monitor from the wall outlet and refer servicing to authorized service personnel under the following conditions:

A. If the power cord or plug is damaged.

B. If the monitor has come into contact with any liquids, such as rain or spills.

C. If the monitor does not operate normally when the operating instructions are followed. Adjust only those controls that are covered by the operating instructions; improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal operation.

D. If the monitor has been dropped or the cabinet or glass faceplate has been damaged.

E. If the monitor exhibits a distinct change in performance

Contents

Introduction

Your Epson®Professional Series II monitor is a high-performance, multifrequency, autoscan color monitor for use with graphic video controllers. The monitor is ideal for applications that require a large screen size and high resolution, such as CAD/CAM/CAE and desktop publishing. It offers the following features:

❏ 20-inch Trinitron® color CRT display with superior brightness and resolution

❏ High-resolution display of up to 1280 x 1024 pixels at a fast, stable, flicker-free refresh rate (vertical frequency) of up to 76 Hz

❏ Fourteen factory-set video modes, including VGA, 132 column, Super VGA 800 x 600, interlaced 1024 x 768 (8514/A), non-interlaced 1024 x 768, and 1280 x 1024 with a refresh rate of up to 76 Hz

❏ Storage space for up to eight user-defined video modes

❏ Automatic scanning of all horizontal frequencies from 30 to 82 KHz and all vertical frequencies from 50 to 160 Hz

❏ LCD display which allows you to view the number of the current video mode, easily adjust display parameters, and perform other tasks

❏ Three video sync formats: composite sync on green, composite horizontal and vertical sync at TTL level, or separate horizontal and vertical sync at TTL level

❏ Three color temperatures which let you determine the shade of white displayed on the screen: 9300° K (Kelvin), 6500° K, or a user-defined color temperature

❏ Compliance with the latest Swedish magnetic emissions guidelines (MPR-2, VLF/ELF)

❏ Anti-glare HEA panel

❏ Tilt and swivel base

❏ One 15-pin, D-Sub miniature, VGA connector and five BNC connectors, which provide a variety of video interface cable connection options and the possibility of connecting two or more monitors to one video controller.

This manual provides instructions on how to set up and use the monitor. It describes how to use the control panel buttons to modify, recall, and create video modes, adjust the vertical and horizontal convergence, select or define a color temperature, and perform other tasks. It also lists the monitor's 14 factory-set video modes and provides troubleshooting information and specifications.

Where to Get Help

If you purchased your monitor in the United States, Epson America provides local customer support and service through a nationwide network of authorized Epson dealers and Service Centers. Epson also provides the following support services through the Epson Customer Support Center at (800) 922-8911:

❏ Technical assistance with the installation, configuration, and operation of Epson products

❏ Assistance in locating your nearest Authorized Epson Reseller or Service Center

❏ Sales of ribbons, supplies, parts, documentation, and accessories for your Epson product

❏ Customer Relations

ل Epson Fax Back technical information service-also available directly by calling the toll number (310) 782-3214

ل Product literature with technical specifications on our current and new products

ل User group locations.

If you purchased your monitor outside the United States, please contact your dealer or the marketing location nearest you for customer support and service. International marketing locations are listed inside the back cover of this manual.

Unpacking the Monitor

When you unpack your monitor, make sure you have the items shown below.

> WARNING
> Because the monitor weighs approximately 81 lbs, two people are needed to lift it. To avoid injury, do not lift the monitor alone. Place the monitor only on a strong table or desk; do not place it on your computer.

monitor

video interface cable   AC power cord
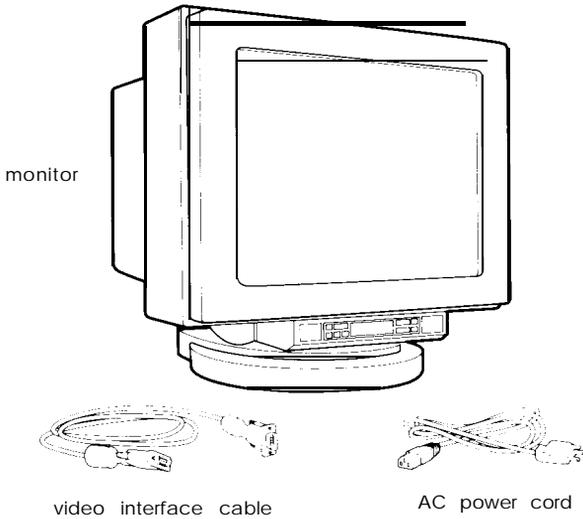
If anything is missing or looks damaged, contact your Epson dealer immediately.

In addition, make sure you have a warranty card and a registration card. Complete the registration card and return it to Epson so you'll receive update information. Keep the warranty card for your records.

> **Note**
> Be sure to keep the monitor's original box and packing
> materials in case you need to transport the monitor later.

Setting Up the Monitor

When you select a location for the monitor, keep the following
in mind:

❏ Follow the safety instructions listed at the beginning of this
   manual.

❏ Use one or more sturdy desks that are strong enough to
   support the weight of your computer, monitor, and
   peripheral devices and provide ample space to hold your
   equipment and work materials.

❏ Do not place the monitor on your computer.

❏ For your comfort, it is best to place the monitor directly in
   front of you and sit about an arm's length away from it.

❏ To minimize glare and reduce eye fatigue, position the
   monitor so that sunlight, desk lamps, or overhead lights do
   not shine directly on the screen.

The monitor has one D-Sub (VGA) connector and five BNC
connectors. The video interface cable that comes with the
monitor has a VGA connector on each end; you can connect it
to the monitor's VGA connector and to a VGA connector on
your computer.

Alternatively, you can purchase your own video interface cable and connect it to the monitor's BNC connectors. See the BNC connector signals table on page 54 to determine which video interface cable(s) and BNC connectors to use with your system.

If your computer or video adapter card does not have a VGA connector, you cannot use the video interface cable that comes with the monitor. Determine the sync requirements of your video controller, see the BNC connector signals table on page 54, if necessary, and purchase the appropriate interface cable(s). Consult your dealer if you need help. Then connect the interface cable(s) to the appropriate connector(s).

Connecting the Monitor to Your Computer

Before you connect the monitor to your computer, you need to make sure your computer and/or video adapter card is set up for use with the monitor. If necessary, install an appropriate video adapter card in your computer and set any DIP switches or jumpers on the card to match the monitor. You may also need to change jumper settings inside the computer. See your computer and/or video adapter card manual for instructions.

Note
If you want to connect two or more monitors to one video controller, see page 10 for instructions.

Follow these steps to connect the monitor to your computer:

1. Before you connect any cables, make sure the monitor, computer, and all other peripheral devices are turned off. The monitor is off when the power button on the left side of the control panel extends out from the panel, as shown in the following illustration.

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power button
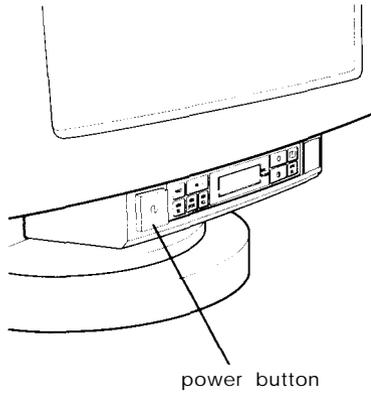
2. Turn the monitor around so you can see the back panel.

vents

VGA connector

BNC connectors

AC powerinlet

HIGH 75Ω

high impedance/
75 Ohm switch
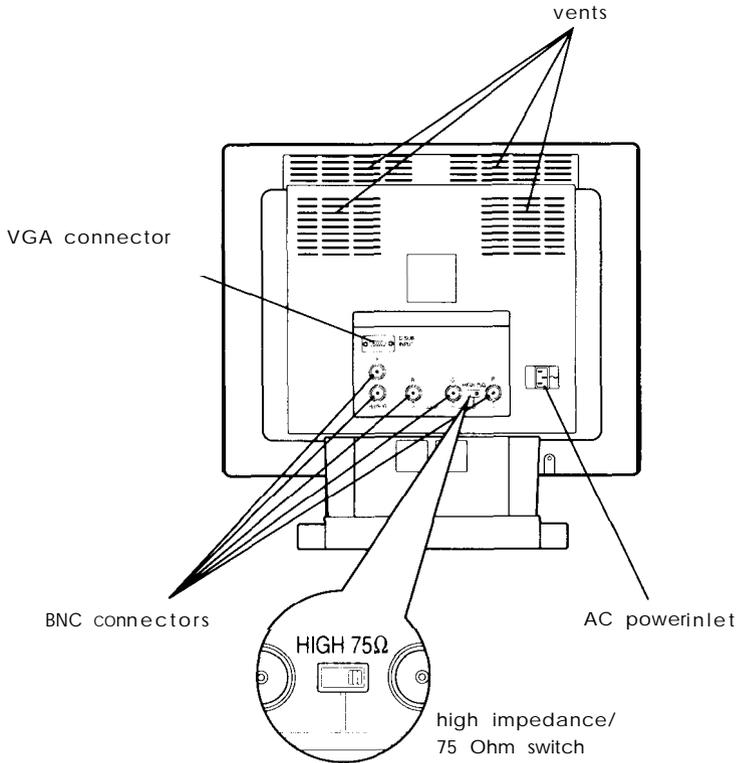
> **Note**
> If you are connecting only one monitor to the video
> interface, make sure the HIGH/75Ω switch is set to 75Ω
> (the factory setting). As long as you use only one
> monitor with your computer's video controller, do not
> set the HIGH/75Ω switch to HIGH because this causes
> excessive brightness and lowers the resolution.

3. Plug one end of the video interface cable that comes with the
   monitor into the VGA connector labeled D-SUB INPUT and
   tighten the screws on the cable connector.
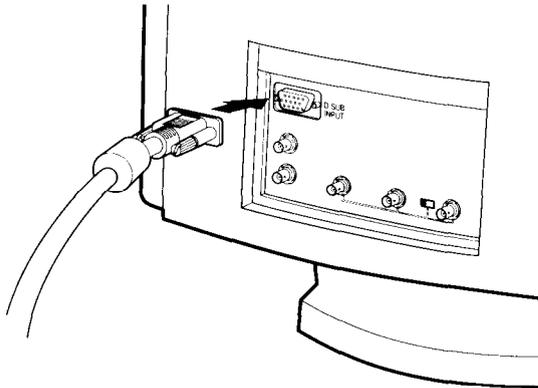
4. Plug the other end of the video cable into the video interface
   on your computer and tighten the connector screws. (See
   your computer and/or video adapter card manual for more
   detailed instructions.)

5. Plug the monitor's power cord into the AC power inlet on
   the back panel and then into a grounded (earthed) electrical
   outlet. The monitor contains a universal (90 to 264 VAC)
   power supply, so you do not need to check the voltage of
   your power supply.

Note
You can connect the monitor to an IT power system with a phase-to-phase voltage of 230 V. (An IT power system is a special way of connecting AC power lines at the power supply point.)

6. Turn the monitor around so the screen faces you and use the tilt and swivel base to position the screen at a good viewing angle. For comfortable viewing, the top of the screen should be slightly below eye level when you are sitting in front of the monitor. (Your line of sight to the screen should be about 10° to 20° below the horizontal.)
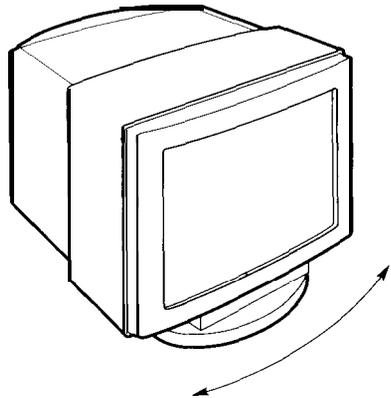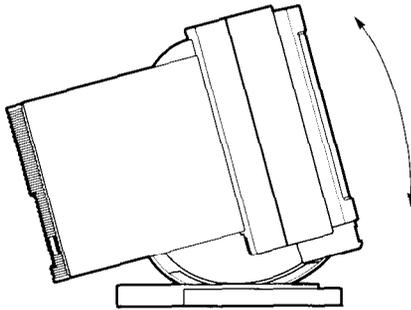
Connecting Two of More Monitors to One Video Controller

Using the monitor's BNC connectors, you can connect two or more monitors to a single video controller for demonstrations and other applications. To connect two or more monitors to one video controller, you need the following:

❏ One video interface cable with a VGA connector on one end and five color-coded cables with BNC connectors on the other

❏ Five 75Ω video interface cables with BNC connectors on both ends and five T-BNC connectors (called T connectors here) for each additional monitor.

These cables and connectors are available at computer and electronics stores. For best results, make sure the video interface cables for connecting the monitors to each other are the same length and impedance. Also, avoid using very long cables because this may affect the quality of the images displayed on the additional monitor(s).

> **Note**
> It is best to connect no more than three monitors to one video controller. If you connect more than three monitors, the image may deteriorate slightly on each additional monitor you connect.

75 Ω video Interface cable with one BNC connector on each end
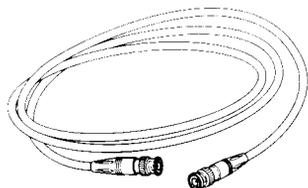
video interface cable with one VGA and five BNC connectors
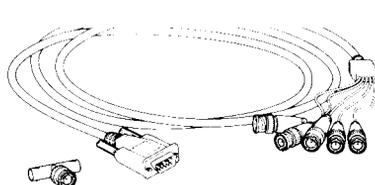
T connector

To connect two monitors to the video interface on your computer, follow the steps below. If you want to connect three monitors to the video interface, you can follow these steps, but first see "Connecting three monitors" on page 15.

1. Make sure your monitors, the computer, and all other peripheral devices are turned off.

2. If one monitor is already connected to your computer, unplug its power cord from the electrical outlet and the AC power inlet. Then disconnect the video interface cable(s) from the monitor and the computer.

3. Connect each of the five T connectors to the first monitor's five BNC connectors, as shown below. To do this, align the cutouts in the T connector with the tabs on the monitor connector and plug in the T connector. Then push it in while turning it clockwise as far as possible until it fits in place.
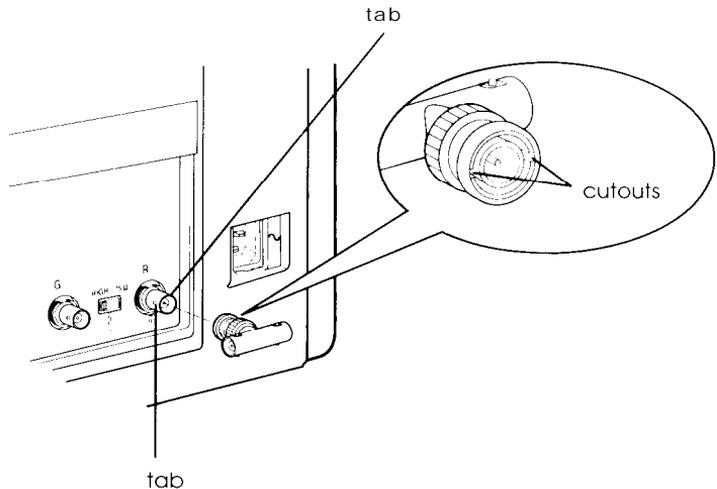
4. Using the same method as described in step 3, connect each of the five color-coded cables to the appropriate T connector on the first monitor, as shown below. The table following the illustration shows how to match each color-coded cable with the appropriate T connector.
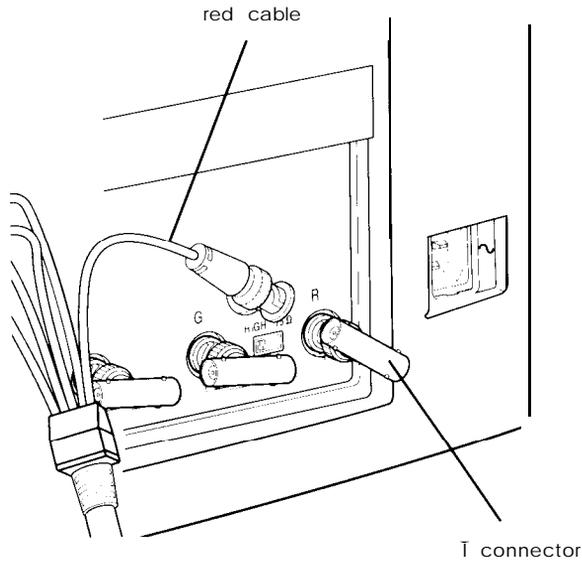
Connecting the co/or-coded cables

Cable	Connect cable to the T connector labeled
B l a c k	v
White or grey	H / (H + V)
B l u e	B
G r e e n	G
R e d	R

5. Plug the VGA connector on the color-coded video cable into the computer's VGA interface and tighten the connector screws.

6. Connect one 75Ω video interface cable to each T connector on the first monitor, as shown below.

T connector

75 Ω video interface cable
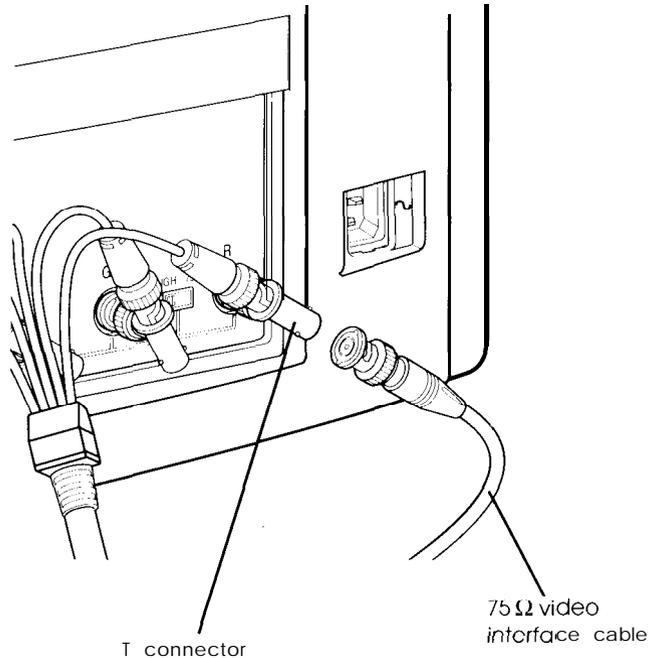
7. Then connect each 75Ω video interface cable to the appropriate BNC connector on the second monitor. Connect the cable from the T connector labeled V to the BNC connector labeled V, the cable from the T connector labeled H/(H†V) to the BNC connector labeled H/(H+V), and so on. The illustration on the next page shows two monitors connected to the computer's video interface.

8. Set the first monitor's HIGH/75Ω switch to HIGH and the second monitor's HIGH/75Ω switch to 75Ω, as shown below.
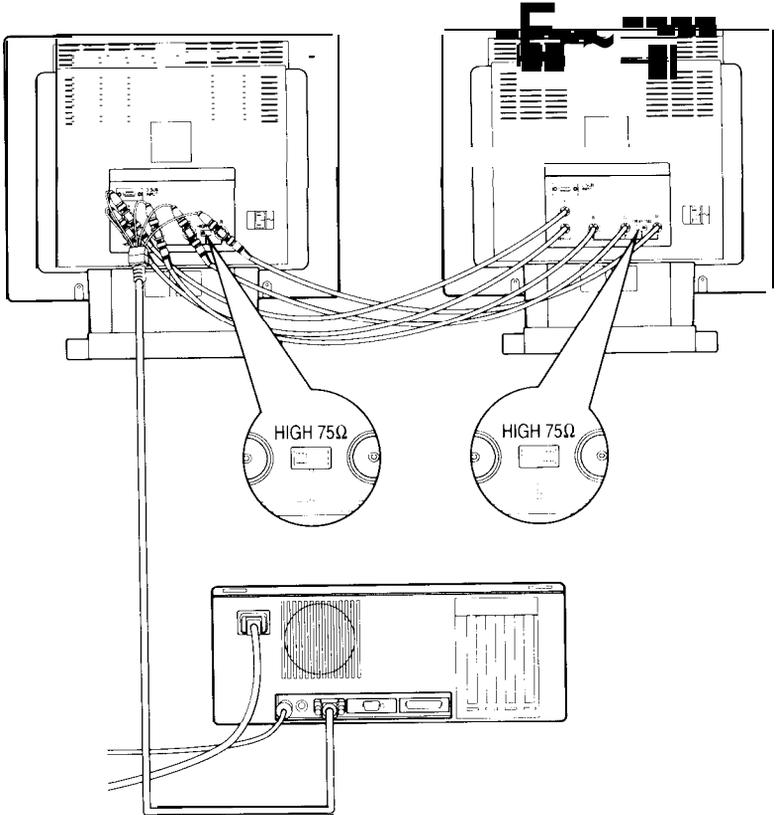
To maximize the brightness of all the monitors you connect, always set the HIGH/75Ω switches to HIGH on all the monitors except the last one and set the last monitor's switch to 75R. For example, if you connect three monitors to one video controller, set the switches on the monitors as shown below. If one of the monitors you are connecting does not have a HIGH/75Ω switch, it is probably permanently set to 7512; use it only as the last monitor (monitor 3 below).

computer	monitor 1	monitor 2	monitor 3
	HIGH	HIGH	75 Ω
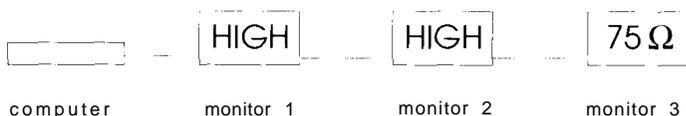
9. Plug each monitor's power cord into the AC power inlet on its back panel and then into a grounded (earthed) electrical outlet.

Connecting three monitors

To connect three monitors to one video interface, follow the appropriate steps above as well as these general guidelines:

❏ Connect T connectors to the BNC connectors on the first and second monitors.

❏ Connect the color-coded video interface cable to the computer's video interface and the appropriate T connectors on the first monitor.

❏ Use 75Ω video interface cables to connect the first monitor to the second monitor and the second monitor to the third monitor.

❏ Set the monitors' HIGH/75Ω switches as described at the top of this page.

Turning On the Monitor

Follow these steps to turn on your computer and monitor(s):

1. Turn on your computer. (If you turn on the monitor before the computer, the monitor's LCD may display an error message until you turn **on** the computer.)

2. To turn on the monitor, press the power button on the left side of the control panel. The LCD first displays W a i t . . . . **Start** up and then **F/w release n.nn,** where *n.nn* is your monitor's firmware release number. Then you see the message **Test in progress** for two or three seconds while the monitor performs internal tests.

control panel

power button   LCD
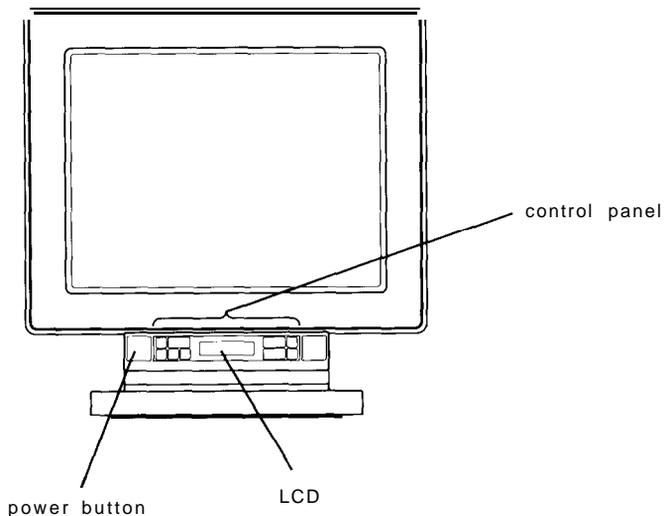
If the monitor recognizes your computer's video mode, the LCD displays **Video Mode** : *n,* where *n* is the number of current video mode.

If the monitor does not recognize the current video mode, the LCD displays the message **Mode not found.** This means the display parameter settings for the current video mode have not been stored in the monitor's memory. If you want to store display parameter settings for the current video mode, you can create a user-defined video mode, as described on page 28. (The monitor operates properly even if you do not create a user-defined video mode and the LCD continues to display **Mode not found.)**

If the LCD displays **H/V SYNC OFF, H SYNC OFF,** or **V SYNC OFF,** see page 39 in "Troubleshooting." If it displays another error message, see the appropriate section in "Troubleshooting."

You first see an image on the screen when the LCD displays the number of the current video mode or **Mode not found.**

Note

If you do not touch the power button or any control panel buttons for about 30 seconds, the monitor automatically turns off the LCD. When the LCD is off, you can still see a dim image on it.

To turn the LCD back on when it dimly displays the number of the current video mode or **Mode not found, press** the - or + (left or right) side of the Brightness or Contrast button. To turn the LCD back on when it dimly displays **Mem Select,** press **MEM SEL.**

The Control Panel

The control panel buttons are shown below. The table after the illustration describes their functions.
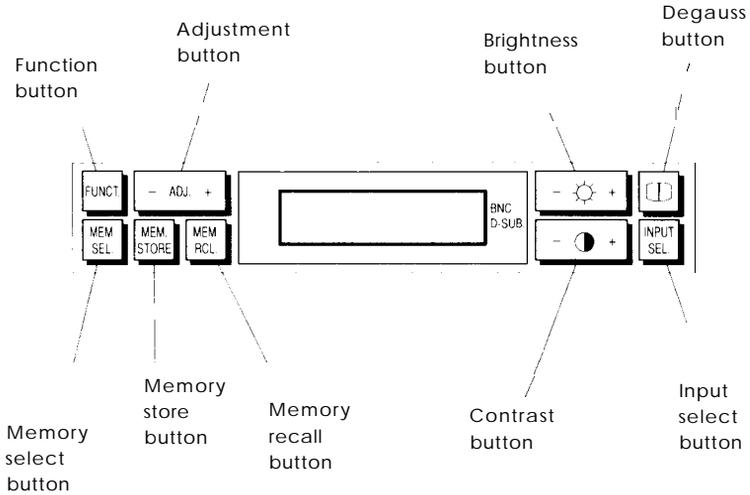
Control panel buttons

Button	Name	Function
FUNCT.	Function	Selects a display parameter to adjust
– ADJ. +	Adjustment	Changes a display parameter or other setting
MEM. SEL.	Memory select	Allows you to modify, recall, or create a video mode
MEM. STORE	Memory store	Stores the display parameter settings for a video mode
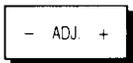
Control ,pane/ buttons . (continued)

Button	Name	Function
MEM. RCL.	Memory recall	Restores the factory settings of a video mode
– ☼ +	Brightness	Adjusts the background intensity
– ◑ +	Contrast	Adjusts the intensity of the displayed image
⬓	Degauss	Minimizes distortion and color impurity caused by magnetic fields
INPUT SEL.	Input select	Selects D-sub or BNC video input
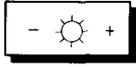
The following sections provide detailed information on how to use the control panel buttons.

Note
While you are using the control panel buttons to adjust the image, the LCD display changes. If you do not press any buttons for 10 seconds, however, the LCD redisplays the number of the current video mode or Mode not found. To return to the adjustment you were making, press FUNCT.

Setting the Type of Video Input

The Input select button allows you to change the monitor's video input setting to match the type of video input the monitor is using. The monitor has two possible video input settings: D-SUB or BNC. If your video interface cable is connected to the monitor's VGA connector, the video input setting should be D-SUB. If your video interface cable(s) are connected to the monitor's BNC connectors, the video input setting should be BNC.

The arrow at the right end of the LCD points to the current video input setting. (If the LCD is off, press the Brightness or Contrast button to turn it back on.) For example, in the illustration below, the arrow points to D-SUB.
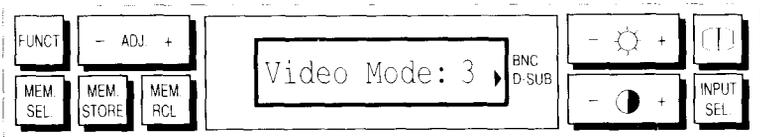
If the video input setting matches the type of video input the monitor is using, the LCD displays the number of the current video mode, such as **Video Mode: 3, or Mode not found.** For example, if you connected your video interface cable to the monitor's VGA connector and the video input setting is D-SUB, the arrow points to D-SUB, as shown above.

If the video input setting does not match the type of video input the monitor is using, the LCD flashes the error message **H/V SYNC OFF. Press** INPUT SEL once to select the correct video input setting. You briefly see the correct setting and then the LCD displays the number of the current video mode or **Mode not found.** If **you** do not touch any control panel buttons for 20 seconds, the monitor saves the new video input setting.

> **Note**
> If the LCD still flashes **H/V SYNC OFF** after you press
> **INPUT SEL**, see page 39 in "Troubleshooting."

Adjusting the Brightness and Contrast

To make the image on the screen clear and easy-to-read, use the
Brightness and Contrast buttons (shown below) to adjust and
save the monitor's brightness and contrast settings. The
Brightness button controls the screen's background (raster)
intensity and the Contrast button controls the intensity of the
displayed image.
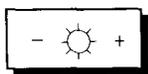
Brightness button   Contrast button

To adjust the brightness and contrast, follow these steps:

1. To adjust the brightness, press the - or + side of the
    Brightness button. The LCD displays a scale composed of
    vertical bars, such as **Brght : IIIII**.

    Press and hold down the + side of the Brightness button to
    increase the brightness or the - side to decrease it. When
    you reach the minimum brightness setting, a small square
    replaces the scale of vertical bars. At the maximum setting,
    an arrow appears on the right side of the scale.

2. When you are satisfied with the brightness of the image, release the Brightness button. After 10 seconds, the LCD displays the number of the current video mode or **Mode not found.** If you do not touch any control panel buttons for 20 seconds, the monitor saves your brightness setting. Your setting remains in effect (even after you turn off the monitor) until you adjust the brightness again.

3. To adjust the contrast, repeat steps 1 and 2 using the Contrast button.

Using Video Modes

A video mode is a collection of display parameter settings that define how the monitor displays an image. The Epson Professional Series II monitor is a multifrequency monitor that can use up to 22 industry-standard and user-defined video modes.

The monitor's memory contains fourteen factory-set video modes (described on page 44). In addition, you can create up to eight user-defined video modes.

When the monitor is using a factory-set or user-defined video mode, the LCD displays **Video Mode : n, where** n is the number of the current video mode. (If the LCD is off, press the Brightness or Contrast button to turn it back on.) The factory-set video modes are 1 through 14 and the user-defined video modes are 15 through 22.

To customize the screen image, you can modify the display parameter settings for any factory-set or user-defined video mode. If you don't want to keep your changes to a factory-set video mode, you can recall the original factory settings.

The monitor automatically selects which video mode to use. It analyzes the signal input (the frequency and polarity of the horizontal and vertical sync pulses) from the computer, checks the video modes stored in its memory, and uses the most appropriate mode. The signal input depends on the computer, display adapter card, and application program you are using.

The sections below explain how to modify a video mode, recall a factory-set video mode, and create a user-defined video mode. For each mode, you can set any of the four display parameters listed in the following table. Refer to this table as you follow the steps below.

Display parameters

Parameter	Function
Horizontal phase	Centers the image horizontally. Press and hold down the side of the Adjustment button to move the image left, or the + side to move the image right.
Width	Adjusts the width of the image. Press and hold down the side of the Adjustment button to reduce the width of the image, or the + side to increase its width.
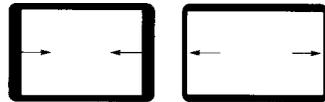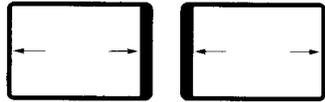
Parameter	Function
Vertical shift	Centers the image vertically. Press and hold down the - side of the Adjustment button to move the image downward, or the + side to move the image upward .
Height	Adjusts the height of the image. Press and hold down the side of the Adjustment button to reduce the height of the image, or the + side to increase its height. .

* A scale of 0 to 9 is available.

Note

In addition to the horizontal phase, width, vertical shift, and height, you can also adjust the monitor's vertical and horizontal convergence and color temperature. Changes you make to the settings of these parameters, however, affect the monitor as a whole and apply to all video modes. Sections later in this manual describe how to set the monitor's vertical and horizontal convergence and color temperature.

Modifying a Video Mode

When the monitor is using a factory-set or user-defined video mode, you can customize the screen image by adjusting the mode's display parameter settings. When the LCD displays the number of the current video mode, follow the steps below to modify its display parameter settings. (If the LCD is off, press the Brightness or Contrast button to turn it back on.)

Note

To customize the screen image when the LCD displays **Mode not found**, you can create a user-defined video mode as described on page 28.

---

1. Press FUNCT. The LCD displays the name of a display parameter you can adjust, such as **Hor Phase : 4.** The number next to the display parameter name indicates the current setting.

2. You can adjust the displayed parameter as described in step 3 or press FUNCT until you see the name of a parameter you want to adjust. For example, if you want to center the image vertically, press FUNCT until the LCD displays **Vert Shift.**

Pressing FUNCT accesses the display parameters in the order listed in the table below. You can press MEM RCL to move backward through the parameters.

Display parameter order

Parameter	LCD message
Horizontal phase	`Hor  Phase`
Width	`Width`
Vertical shift	`Vert  Shift`
Height	`Height`
Vertical convergence .	`Vert Conv`
Horizontal convergence *	`Horiz Conv`
Color temperature *	`Color Temp`

. Changes you make to these parameters apply to all video modes. Sections later in this manual describe how to set them.

Note
If you press FUNCT when the LCD displays
`Color Temp` : 3, the LCD displays a message such as
`RED adjust :` *5.* To exit from this display, press
MEM SEL twice.

---

3. Adjust the image using the Adjustment button as described in the table on pages 23 and 24.

4. Press FUNCT until you see the name of the next parameter (if any) you want to change and then adjust the image.

5. Repeat steps 3 and 4 until you are satisfied with the image you see.

6. When you are finished adjusting the image, press **MEM SEL.**
    The LCD displays Mem Select : *n*←, where *n* is the
    number of the current video mode. (If you do not want to
    save your changes to the current video mode, press
    MEM SEL again. The LCD displays the number of the current
    video mode.)

7. To save your setting(s), press **MEM STORE.** The LCD displays
    the number of the current video mode. (If you modified a
    factory-set video mode and you want to restore the factory
    settings, see the next section.)

Note
You cannot store the same display information for two
different factory-set video modes.

Recalling a Factory-set Video Mode

When the monitor is using a factory-set video mode you
modified, you can recall the original settings for the mode.
When the LCD displays a factory-set video mode number
(1 through 14), follow the steps in this section to restore its
factory settings. (If the LCD is off, press the Brightness or
Contrast button to turn it back on.)

Note
You can recall the original settings only for factory-set video
modes. If you press **MEM RCL** when the LCD displays a
user-defined video mode number (15 through 22) or Mode
not found, you see the message Rcl **unavailable!**
For factory-set video modes, you can recall only the original
horizontal phase, width, vertical shift, and height settings.
You cannot recall vertical convergence, horizontal
convergence, or color temperature settings.

---

1. Press **MEM SEL.** The LCD displays **Mem Select : *n*←** (where *n* is a number from 1 through 14 and indicates the current factory-set video mode).

2. Press **MEM RCL. You see** the message **Recall Confirm ?.**

> **Note**
> If you do not want to delete your changes and recall the factory settings for the current mode, press MEM SEL. The LCD displays the number of the current video mode.

3. To confirm that you want to recall the factory settings for the current video mode, press **MEM RCL** again. You briefly **see** the message **Recall Update** while the monitor restores the factory settings. Then the LCD displays the number of the current video mode.

Creating a User-defined Video Mode

When the LCD displays **Mode not found, you** can **enter** and save your own display parameter settings to create a user-defined video mode. (If the LCD is off, press the Brightness or Contrast button to turn it back on.)

Follow these steps to create a user-defined video mode:

1. Press **FUNCT.** The LCD displays the name of a display parameter you can adjust, such as **Hor Phase : 4. The** number next to the parameter name indicates the current setting.

2. You can adjust the displayed parameter as described in step 3 or press **FUNCT** until you see the name of a parameter you want to adjust. For example, if you want to center the image vertically, press **FUNCT** until the LCD displays **Vert Shift.**

Pressing FUNCT accesses the display parameters in the order listed in the table below. You can press MEM RCL to move backward through the parameters.

Display parameter order

Parameter	LCD message
Horizontal phase	Hor Phase
Width	Width
Vertical shift	Vert Shift
Height	Height
Vertical convergence	Vert Conv
Horizontal convergence	Horiz Conv
Color temperature	Color Temp

* Changes you make to these parameters apply to all video modes Sections later in this manual describe how to set them

> **Note**
> If you press FUNCT when the LCD displays
> **Color Temp:** 3, the LCD displays a message such as
> **RED adjust :** 5. To exit from this display, press
> MEM SEL twice.

3. Adjust the image using the Adjustment button as described in the table on pages 23 and 24.

4. Press FUNCT until you see the name of the next parameter (if any) you want to change and then adjust the image.

5 Repeat steps 3 and 4 until you are satisfied with the image you see.

6. When you are finished adjusting the image, press **MEM SEL.**
The LCD displays **Mem Select** : *n* (where *n* is a number
from 15 through 22 and represents the first available
user-defined video mode). If no arrow appears after the
user-defined video mode number, there is currently no
display information for this mode stored in the monitor's
memory.

Note

If the LCD displays **Mem Select : *n*←** (where ***n* is a**
number from 15 through 22), the monitor already
contains eight user-defined video modes. The arrow
after the user-defined video mode number indicates that
display information for this mode is stored in the
monitor's memory.

If you want to store your settings over the previous
display information for this mode, go to step 7. If you
want to store your settings over another user-defined
video mode, select another mode by pressing the + or -
side of the Adjustment button.

Before you go to step 7, make sure you want to store
your settings over the previous settings for the mode
you select. After you store new display information for a
user-defined video mode, you cannot recall the previous
display information for the mode.

(If you do not want to create a user-defined video mode at
this time, press **MEM SEL** again. The LCD redisplays
Mode not found.)

7. To save your settings for the displayed user-defined video
mode, press **MEM STORE.** The LCD displays the number of
the current user-defined video mode.

Adjusting the Vertical and Horizontal Convergence

You can adjust the monitor's vertical and horizontal convergence to sharpen the screen image. Optimum convergence produces the highest resolution and occurs when the red, green, and blue beams overlap.

Note

Changes you make to the monitor's vertical and horizontal convergence apply to all video modes.

To adjust the vertical and horizontal convergence settings, follow these steps:

1. Press **FUNCT.** The LCD displays the name of a display parameter you can adjust, such as **Hor Phase : 4.** The number next to the display parameter name indicates **the** current setting.

2. To adjust the vertical convergence, press **FUNCT** until **the** LCD displays **Vert** Conv. Pressing **FUNCT** accesses the display parameters in the order listed in the table below. You can press **MEM RCL** to move backward through the parameters.

Display parameter order

Parameter	LCD message
Horizontal phase	**Hor Phase**
Width	**Width**
Vertical shift	**Vert Shift**
Height	**Height**
Vertical convergence	**Vert Conv**
Horizontal convergence	**Horiz Conv**
Color temperature	**Color Temp**

---

3. Using a horizontal green line as your reference, adjust the
    red and blue beams until the line is sharp, distinct, and
    completely white. To do this, press and hold down the
    – or + side of the Adjustment button to separate the red and
    blue beams or move them closer together, as shown in the
    table below. (The green beams remain in place.) A scale
    of 0 to 9 is available and the factory setting is 4.

Adjusting the vertical convergence

Adjustment button	Red beams move	Blue beams move
+	Down	Up
–	Up	Down

red

blue

green
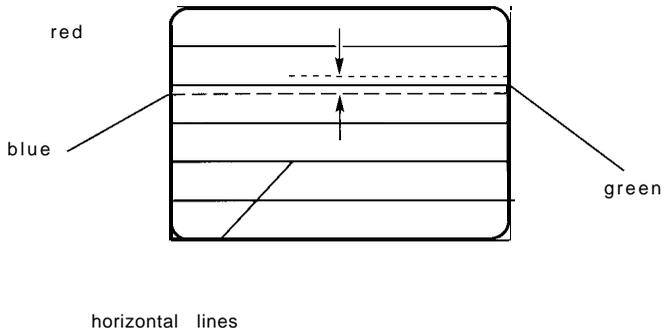
horizontal lines

4. To adjust the horizontal convergence, press **FUNCT** until
    the LCD displays Horiz Conv.

5. Using a vertical green line as your reference, adjust the red and blue beams until the line is sharp, distinct, and completely white. To do this, press and hold down the ⁻ or + side of the Adjustment button to separate the red and blue beams or move them closer together, as shown in the table below. (The green beams remain in place.) A scale of 0 to 9 is available and the factory setting is 4.

Adjusting the horizontal convergence

Adjustment button	Red beams move	Blue beams move
+	Right	Left
–	Left	Right
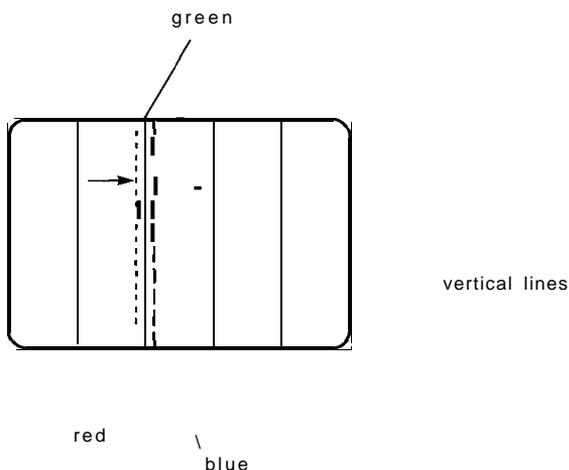
green

vertical lines

red

\
blue

After 10 seconds, the LCD displays the number of the current video mode or **Mode not found.** If you do not touch any control panel buttons for 30 seconds, the monitor saves your vertical and horizontal convergence settings. Your settings remain in effect (even after you turn off the monitor) until you adjust the convergence again.

Selecting the Color Temperature

The color temperature of the image determines the mix of red, green, and blue and therefore the shade of white on the screen. If you want to change the shade of white, you can choose between two factory-set color temperatures or define your own color temperature as described on page 36.

Of the factory-set color temperatures, color temperature 1 (9300° K) provides a bluer shade of white and color temperature 2 (6500° K) provides a more reddish shade of white.

Note

Changes you make to the monitor's color temperature apply to all video modes.

To select a color temperature, follow these steps:

1. Press FUNCT. The LCD displays the name of a display parameter you can adjust, such as **Hor Phase : 4.** The number next to the display parameter name indicates the current setting.

2. Press FUNCT until the LCD displays **Color Temp.** Pressing FUNCT accesses the display parameters in the order listed in the following table. You can press MEM RCL to move backward through the parameters.

Display parameter order

Parameter	LCD message
Horizontal phase	Hor Phase
Width	Width
Vertical shift	Vert Shift
Height	Height
Vertical convergence	vert Conv
Horizontal convergence	Horiz Conv
Color temperature	Color Temp

**Note**

If you press FUNCT when the LCD displays
Color Temp: 3, the LCD displays a message such as
RED adjust : 5. To exit from this display, press
MEM SEL twice.

---

3. When the LCD displays **Color Temp : 1,** the color
temperature setting is 9300° K. When the LCD displays
Color Temp : 2, the color temperature setting is 6500° K.
When the LCD displays Color Temp : 3, the user-defined
color temperature takes effect. (The next section describes
how to define your own color temperature.)

To select the color temperature you want, press the - side of
the Adjustment button to decrease the displayed number,
or the + side to increase it. The shade of white on the screen
changes when you change the color temperature setting.

After 10 seconds, the LCD displays the number of the current video mode or **Mode not found.** If you do not touch any control panel buttons for 30 seconds, the monitor saves your color temperature setting. Your setting remains in effect (even after you turn off the monitor) until you select another color temperature.

Defining Your Own Color Temperature

To define your own color temperature, follow these steps:

1. Follow steps 1 and 2 on page 34 to select **Color Temp.**

2. To select the user-defined color temperature, press the - or + side of the Adjustment button until the LCD displays **Color Temp: 3.**

3. Press FUNCT. The LCD displays a message such as **RED adjust : 5.** To select the color (red, green, or blue) **you want** to adjust, press FUNCT until the LCD displays its name.

4. To adjust the amount of the color the monitor displays, press and hold down **the** - or + side of the Adjustment button. A scale of 0 to 9 is available. As you adjust the amount of a color, the shade of white on the screen changes.

5. Press FUNCT to select the next color (if any) you want to adjust. Then adjust **the** amount of the color as described in step 4.

> **WARNING**
> It is best not to use the primary color blue on a dark background because the contrast between the characters and the background is poor. This makes the screen difficult to read and can cause eyestrain.

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6. When you are satisfied with the shade of white you see, do not touch any control panel buttons for at least 30 seconds. After 10 seconds, the LCD displays the number of the current video mode or Mode not found. After 30 seconds, the monitor saves the color temperature you defined as color temperature 3.

7. Press MEM SEL twice to exit from defining a color temperature. After 10 seconds, the LCD displays the number of the current video mode or Mode **not found.**

Reducing Color Impurity

You can use the Degauss button (shown below) to minimize distortion and color impurity, such as colored spots on the screen, caused by magnetic fields. If you notice distortion or color impurity on your screen, electromagnetic interference is present. Press the Degauss button to improve the screen image.

Degauss button

Note
To avoid electromagnetic interference, move any devices that generate magnetism (such as telephones, televisions, speakers, or magnetic screwdrivers) away from the monitor.

Cleaning the Monitor

To keep the monitor operating at its best, it is important to clean it regularly. Follow these steps:

1. Turn off the monitor.

2. Use a damp, lint-free cloth to wipe the monitor cabinet; do not use a wet cloth.

3. To clean the screen, spray a household glass cleaner on a cloth; then wipe the screen.

> **Caution**
> Do not use solvents or abrasives to clean the monitor. These may discolor the cabinet or damage the screen's anti-glare coating.

Troubleshooting

This section gives solutions to monitor problems you may encounter. If these procedures do not solve the problem, see page 3 for information on where to get help.

> **Note**
> Some of the error messages in this section are marked with an asterisk (*). The LCD may display these error messages for only one or two seconds. Depending on the sync switching procedure of your computer or display adapter card, you may also see any of these messages when the monitor changes from one video mode to another. If an error message appears for only one or two seconds, this does not indicate a problem with the monitor.

The screen and the LCD do not come on.

1. The monitor's power may not be on. Press the power button. The power is on when the button is pressed in.

2. Make sure the power cord is fully plugged into the AC inlet on the monitor's back panel and the electrical outlet.

3. Check the operation of the electrical outlet by plugging in a lamp or other electrical device to see if it works.

4. Contact your dealer or service representative; the monitor needs repair.

The screen is blank and the LCD displays
H/V SYNC **OFF*, H sync OFF*,** *or V SYNC OFF*.*

1. Make sure the computer is turned on.

2. Make sure the video interface cable is properly connected to the monitor's VGA connector and to the computer's video interface. If you are using the monitor's BNC connectors, make sure all your video interface cables are properly connected. See "Connecting the Monitor to Your Computer" on page 6 or "Connecting Two or More Monitors to One Video Controller" on page 10.

3. Press INPUT SEL (on the monitor's control panel) once to change the monitor's video input setting. See "Setting the Type of Video Input" on page 20.

4. Make sure your computer's video adapter is set up for use with the monitor and that any DIP switches or jumpers in the computer or on a display adapter card are set properly. See your computer and /or video adapter card manual for instructions.

5. Check if you need to set up your application program(s) to match your monitor.

6. Contact your dealer or service representative; the monitor needs repair.

The screen is blank and the LCD does not display a **sync off** *error message.*

1. Adjust the brightness and contrast as described on page 21.

2. Contact your dealer or service representative; the monitor needs repair.

There is an image on the screen but the LCD is dim.

The monitor is operating properly. If you do not touch the power button or any control panel buttons for about 30 seconds, the monitor automatically turns off the LCD. When the LCD is off, you can still see a dim image on it.

To turn the LCD back on when it dimly displays the number of the current video mode or **Mode not found,** press the - or + side of the Brightness or Contrast button. To turn the LCD back on when it dimly displays **Mem Select, press** MEM SEL.

The LCD displays **Mode not found.**

The display parameter settings for the current video mode have not been stored in the monitor's memory. You may create a user-defined video mode, as described on page 28, or continue working. The monitor operates properly even if you do not create a user-defined video mode and the LCD continues to display **Mode not found.**

The image is not centered on the screen.

Adjust the horizontal phase and/or vertical shift settings as described in "Using Video Modes" on page 22.

The image is too big or too small for the screen.

Adjust the width and/or height settings as described in "Using Video Modes" on page 22.

The image is fuzzy.

1. Adjust the vertical and horizontal convergence as described on page 31.

2. The monitor may need servicing.

You want to change the shade of white on the screen.

Select another color temperature as described on page 34 or define your own color temperature as described on page 36.

There are colored spots on the screen or the image is distorted.

There is bad color purity or distortion because electromagnetic interference is present. Press the Degauss button. Also move any devices that generate magnetism away from the monitor. See "Reducing Color Impurity" on page 37.

One of two colors are missing.

1. Make sure your video interface cable(s) are properly connected to the monitor connector(s).

2. Check your application program color settings.

You connected two or more monitors to one video controller and the image quality is poor.

1. If you connected two monitors, set their HIGH/75Ω switches according to step 8 on page 14. If you connected more than two monitors, set their HIGH/75Ω switches as described at the top of page 15.

2. Make sure the interface cables connecting the monitors to each other are the same length and impedance and as short as possible.

3. To maintain image quality, it is best to connect no more than three monitors to one video controller.

Additional error messages

Error message displayed on LCD	Description	Solution
H OUT OF RANGE*	The horizontal input signals are out of range.	Make sure the horizontal input signals of the computer's display adapter are within the monitor's horizontal frequency range (30 to 82 KHz).
V OUT OF RANGE*	The vertical input signals are out of range.	Make sure the vertical input signals of the computer's display adapter are within the monitor's vertical frequency range (50 to 160 Hz).
PLL UNLOCKED	The logic board in the monitor is defective.	Contact your dealer or service representative: the monitor needs repair
V DEF FAILURE	There is a local failure in the vertical deflection.	Contact your dealer or service representative; the monitor needs repair
H DEF FAILURE	There is a local failure in the horizontal deflection.	Contact your dealer or service representative; the monitor needs repair.
HI VOL FAILURE	There is a local failure in the high voltage generator	Turn off the monitor, wait five seconds, and then turn it back on. If this does not solve the problem, contact your dealer or service representative; the monitor needs repair
GEN FAILURE	There are two or more problems with the monitor	Contact your dealer or service representative, the monitor needs repair.

* See the note on page 38

Factory-set Video Modes

The table below lists the parameter settings for the 14 factory-set video modes.

Factory-set video modes

Parameter	Unit	VGA 1056x400 132 column		VGA 640 × 350		VGA 604 × 400	
Clock freq.	MHz	40.0		25.175		25.175	
Horizontal freq.	KHz	30.67		31.469		31.469	
Vertical freq.	Hz	68.16		70.086		70.086	
Horizontal		Time	Pixels	Time	Pixels	Time	Pixels
Total	μsec	32.600	1304	31.778	800	31.778	800
Active	μsec	26.400	1056	25.422	640	25.422	640
Blanking	μsec	6.200	248	6.356	160	6.356	160
Front porch	μsec	1.000	40	0.636	16	0.636	16
Sync width	μsec	4.000	160	3.813	96	3.813	96
Back porch	μsec	1.200	48	1.907	48	1.907	48
Vertical		Time	Lines	Time	Lines	Time	lines
Total	msec	14.637	449	14.268	449	14.268	449
Active	msec	13.040	400	11.122	350	12.711	400
Blanking	msec	1.597	49	3.146	99	1.557	49
Front porch	msec	0.424	13	1.176	37	0.381	12
Sync width	msec	0.065	2	0.064	2	0.064	2
Back porch	msec	1.108	34	1.906	60	1.112	35
Sync polarity							
Horizontal	±	−		+		−	
Vertical	±	+		−		+	
Video mode		2		3		4	

factory-set video modes (continued)

Parameter	Unit	VGA 640 × 480		SVGA 800 × 600		SVGA 800 × 600	
Clock freq.	MHz	25.175		36.0		40.0	
Horizontal freq.	KHz	31.469		35.156		37.879	
Vertical freq.	Hz	59.941		56.250		60.316	
Horizontal		*Time*	*Pixels*	*Time*	*Pixels*	*Time*	*Pixels*
Total	μsec	31.778	800	28.444	1024	26.400	1056
Active	μsec	25.422	640	22.222	800	20.000	800
Blanking	μsec	6.356	160	6.222	224	6.400	256
Front porch	μsec	0.636	16	0.667	24	1.000	40
Sync width	μsec	3.813	96	2.000	72	3.200	128
Back porch	μsec	1.907	48	3.556	128	2.200	88
Vertical		*Time*	*Lines*	*Time*	*Lines*	*Time*	*Lines*
Total	msec	16.683	525	17.778	625	16.579	628
Active	msec	15.253	480	17.067	600	15.840	600
Blanking	msec	1.430	45	0.771	25	0.739	28
Front porch	msec	0.318	10	0.028	1	0.026	1
Sync width	msec	0.064	2	0.057	2	0.106	4
Back porch	msec	1.05	33	0.626	22	0.607	23
Sync polarity							
Horizontal	±	−		−		+	
Vertical	±	−		−		+	
Video mode		5		6		7	

factory-set video modes (continued)

Parameter	Unit	SVGA 800 × 600		1024 × 768 Interlaced		1024 x 768	
Clock freq.	MHz	50.0		44.9		65.0	
Horizontal freq.	KHz	48.077		35.55		48.363	
Vertical freq.	Hz	72.187		86.92		60.000	
Horizontal		*Time*	*Pixels*	*Time*	*Pixels*	*Time*	*Pixels*
Total	μsec	20.800	1040	28.129	1263	20.677	1344
Active	μsec	16.000	800	22.806	1024	15.754	1024
Blanking	μsec	4.800	240	5.323	239	4.923	320
Front porch	μsec	1.120	56	0.178	8	0.369	24
Sync width	μsec	2.400	120	3.898	175	2.092	136
Back porch	μsec	1.280	64	1.247	56	2.462	160
Vertical		*Time*	*Lines*	*Time*	*Lines*	*Time*	*Lines*
Total	msec	13.853	666	11.505	409	16.667	806
Active	msec	12.480	600	10.802	384	15.880	768
Blanking	msec	1.373	66	0.703	25	0.786	38
Front porch	msec	0.770	37	0.014/ 0.000	0.5/ 0	0.062	3
Sync width	msec	0.125	6	0.112	4	0.124	6
Back porch	msec	0.478	23	0.5631 0.577	20/ 20.5	0.602	29
Sync polarity							
Horizontal	±	+		+		–	
Vertical	±	+		+		–	
Video mode		8		9		10	

Factory set video modes (continued)

Parameter	Unit	1024 × 768		1024 × 768		1280 × 1024	
Clock freq.	MHz	75.0		80.0		107.3	
Horizontal freq.	KHz	56.476		60.241		63.869	
Vertical freq.	Hz	70.069		74.927		59.970	
Horizontal		*Time*	*Pixels*	*Time*	*Pixels*	*Time*	*Pixels*
Total	μsec	17.707	1328	16.600	1328	15.675	1680
Active	μsec	13.653	1024	12.800	1024	11.929	1280
Blanking	μsec	4.053	304	3.800	304	3.728	400
Front porch	μsec	0.320	24	0.400	32	0.279	30
Sync width	μsec	1.813	136	1.000	80	1.006	108
Back porch	μsec	1.920	144	2.400	192	2.442	262
Vertical		*Time*	*Lines*	*Time*	*Lines*	*Time*	*Lines*
Total	msec	14.272	806	13.346	804	16.675	1065
Active	msec	13.599	768	12.749	768	16.033	1024
Blanking	msec	0.673	38	0.598	36	0.624	41
Front porch	msec	0.053	3	0.050	3	0.047	3
Sync width	msec	0.106	6	0.050	3	0.047	3
Back porch	msec	0.513	29	0.498	30	0.548	35
Sync polarity							
Horizontal	±		−	−		−	
Vertical	±		−	−		−	
Video mode		11		12		1	

Factory-set video modes (continued)

Parameter	Unit	1280x1024		1280 x 1024	
Clock freq.	MHz	125.0		135.0	
Horizontal freq.	KHz	74.405		81.129	
Vertical freq.	Hz	70.062		76.109	
Horizontal		*Time*	*Pixels*	*Time*	*Pixels*
Total	μsec	13.440	1680	12.326	1664
Active	μsec	10.240	1280	9.481	1280
Blanking	μsec	3.200	400	2.844	384
Front porch	μsec	0.256	32	0.237	32
Sync width	μsec	1.000	125	0.770	104
Back porch	μsec	1.944	243	1,837	248
Vertical		*Time*	*Lines*	*Time*	*Lines*
Total	msec	14.273	1062	13.139	1066
Active	msec	13.763	1024	12.622	1024
Blanking	msec	0.511	38	0.518	42
Front porch	msec	0.040	3	0.024	2
Sync width	msec	0.081	6	0.099	8
Back porch	msec	0.390	29	0.395	32
Sync polarity					
Horizontal		+	-		-
Vertical		±	-		-
Video mode		13		14	

Specifications

Trinitron CRT

Size	20 inches (508 mm) diagonal, 19 V (visible phosphor)
Pitch	0.31 mm
Phosphor persistence	Medium short
Light transmission	39%
Deflection angle	90°
Anti-glare treatment	HEA panel with antistatic coating

Display

Image size (landscape mode)	13.8 inches x 10.3 inches (350 mm x 263 mm) or 13.4 inches x 10.6 inches (342 mm x 270 mm), depending on video mode
Aspect ratio	4:3 or 5:4, depending on video mode
Video bandwidth	150 MHz, 3.5 ns (nanosecond) rise and fall time
Resolution	Up to 1280 x 1024 at 76 Hz refresh rate
Misconvergence	0.3 mm in center; 0.4 mm in comers
Intensity	25 fL ± 3 fL

Interfacing Requirements

Input signals	Video: RGB analog
	Input impedance: high or 75Ω (switch-selectable)
	Sync: Composite sync on green, composite horizontal and vertical sync at TTL level, or separate horizontal and vertical sync at TTL level
Video input	0 to 0.714 V maximum
Horizontal frequency	30 to 82 KHz; continuous range, autoscan
Vertical frequency (refresh rate)	50 to 160 Hz; continuous range, autoscan
Signal connectors	One 15-pin, D-Sub miniature, VGA connector; five BNC connectors: V, H/(H+V), B, G, and R (vertical, horizontal/ combined, blue, green, and red)

AC fine Voltage

Input power	135 Watts maximum; universal power supply and automatic line voltage selection
Input ranges	90 to 132 VAC and 180 to 264 VAC
Frequency	*48* to 63 Hz
Line voltage connector	CEE 22-6A

Environmental Requirements

Condition	Operating range	Non-operating range
Temperature	40°F to 95°F (5°C to 35°C)	-4°F to +140°F (–20°C to +60°C)
Humidity (non-condensing)	20% to 80% RH	5% to 90% RH
Altitude	10,000 ft (3.000 m)	40,000 ft (12.000 m) - - -	

Reliability

MTBF	Over 50,000 hours

Safety Standards

UL, CSA, DHHS, and VDE approved

External Controls

Front   Power button, Function button,
                                   Adjustment button, Memory select
                                   button, Memory store button,
                                   Memory recall button, Brightness
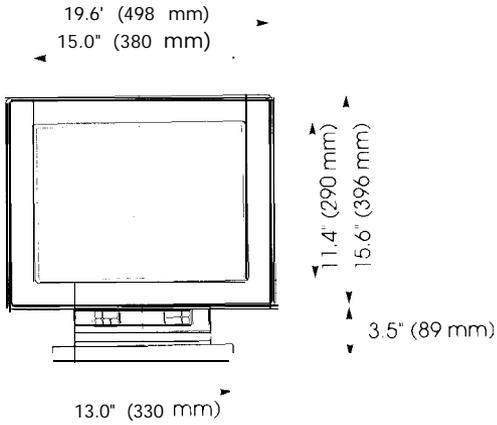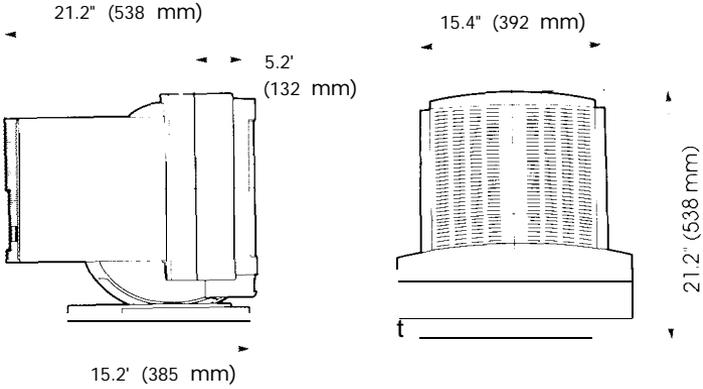   button, Contrast button, Degauss
                                   button, Input select button

Back   HIGH/75Ω switch

Adjustable Display Parameters

Horizontal phase, width, vertical shift, height, vertical
convergence, horizontal convergence, color temperature

Physical Characteristics

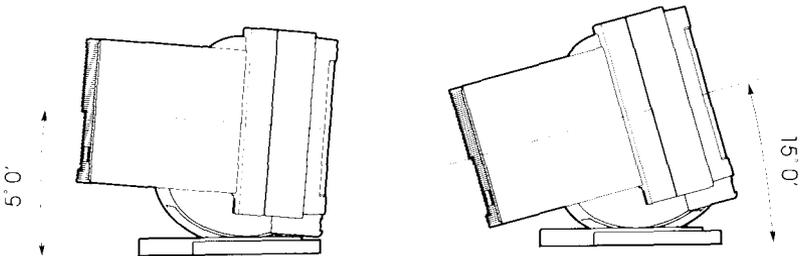Weight   81 lbs (37 kg)

Width   19.6 inches (498 mm)

Height   19.0 inches (485 mm)

Depth   21.2 inches (538 mm)

Dimensions

21.2" (538 mm)

5.2'
(132 mm)

15.4" (392 mm)

21.2' (538 mm)

15.2' (385 mm)

t

19.6' (498 mm)
15.0" (380 mm)

11.4" (290 mm)
15.6' (396 mm)

3.5" (89 mm)

13.0" (330 mm)

Tilt and swivel base

5° 0'

15° 0'

Inferface Connectors

Video interface cable
connectors   15-pin, D-Sub miniature, VGA

Mini D-sub connector pin signals

Pin	Signal	Pin	Signal
1	Red	9	Not connected
2	Green	10	Digital ground
3	Blue	11	Digital ground
4	Not connected	12	Not connected
5	Self test	13	Horizontal sync
6	Red return	14	Vertical sync
7	Green return	15	Not connected
8	Blue return		

If you want to use the monitor's BNC connectors, check the
table below to determine which video interface cable(s) and
BNC connectors to use with your system.

BNC connector signals

BNC connector	Separate horizontal and vertical sync	Composite sync on green	Composite sync
R	Red	Red	Red
G	Green	Green (sync)	Green
B	Blue	Blue	Blue
H/(H+V)	Horizontal	N/A	Vertical/horizontal
V	Vertical	N/A	N/A

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