

# TABLE OF CONTENTS

<b>TABLE OF CONTENTS</b> .....	<b>1</b>
<b>1- INTRODUCTION</b> .....	<b>3</b>
1-1 Overview.....	3
1-2 Camera Vendor Participation .....	3
<b>2- VERIFY AMBIENT LIGHTING CONDITIONS</b> .....	<b>3</b>
<b>3- SETTING LCD MONITOR FREQUENCY RATE AND RESOLUTION</b> .....	<b>3</b>
3-1- Configuring the Frequency Rate (Frame Rate and Swap Rate) .....	3
<b>4- SIGNA HOST GAMMA SETUP- NEC 2010</b> .....	<b>4</b>
4-1 Gamma Configuration for all SGI Computers .....	7
4-1-1 Setting Gamma with the Patch CDROM – All Software versions 9.0 and below .....	7
4-1-2 Setting Gamma - 9.1, HF02 and HFO3.....	7
<b>5- SIGNA HOST GAMMA SETUP – NEC 2010X</b> .....	<b>9</b>
5-1 Gamma Configuration for all SGI Computers .....	10
5-1-1 Setting Gamma with the Patch CDROM – All Software versions 9.0 and below .....	10
5-1-2 Setting Gamma - 9.1, HF02 and HFO3.....	11
<b>6 - LCD MONITOR ADJUSTMENT OVERVIEW</b> .....	<b>14</b>
6-1 Model NEC 2010 LCD Color Monitor Adjustment Overview .....	14
6-2 Model NEC 2010X LCD Color Monitor Adjustment Overview.....	14
<b>7 – LCD MONITOR ADJUSTMENT PROCESS</b> .....	<b>15</b>
<b>8 – DISPLAYING THE SMPTE PATTERN</b> .....	<b>15</b>
<b>9 - FINAL ADJUSTMENT OF CONTRAST AND BRIGHTNESS</b> .....	<b>17</b>
9-1 Contrast and Brightness Adjustment For NEC 2010 AND NEC 2010X LCD Color Monitors .....	17
<b>10 - CAMERA CALIBRATION</b> .....	<b>18</b>
10-1 DASM Interpolation Setup .....	18
10-2 Camera Imaging Look-Up Table .....	18
10-3 Camera Maximum Optical Density.....	18
10-4 Camera Contrast .....	18
10-6 Anatomical Filming.....	19
<b>11 - CONTROL DESCRIPTIONS - NEC 2010 AND 2010X LCD Color Monitor</b> .....	<b>19</b>
11-1 Front Panel Controls .....	19
11-2 On-Screen Controls.....	20
<b>12 - TROUBLESHOOTING GUIDE</b> .....	<b>22</b>
12-1 Explanation of Default Gamma Settings .....	22
12-2 Complaint: Poor SNR, Dynamic Range Lack of Grayscale, Blotchy images .....	23
12-3 Complaint: Ghosting or Blurring images or Sheering alphanumeric LCD 's ONLY.....	23
12-4 Camera Film has changed after Monitor replacement/change .....	24
12-5 No Picture.....	24
12-6 Image Persistence.....	24
12-7 Image is unstable, unfocused, or swimming is apparent .....	25
12-8 LED on monitor is not lit (no green or amber color can be seen).....	25
12-9 Display image is not sized properly .....	25
12-10 Selected resolution is not displayed properly .....	25
12-11 Diagnostic Image Quality has been traced to problem with LCD setup. ....	25
12-13 Display image has a green cast to it .....	25
12-14 Image ghosting at transitions of Black and White .....	25
12-15 Diagnostic Image Quality has been traced to problem with LCD setup. (NEC 2010X Model only) .....	25
12-16 Setting The Focus .....	26
12-17 LCD FAQ's: .....	28
12-18 What is Gamma? .....	28
12-19 How do I set the correct gamma? .....	29
12-20 Can I use the gamma command to set gamma? .....	29
12-21 How do I determine if the correct gamma Table or setting is installed? .....	29
12-22 When I type "gamma" in a c-shell I see a number. Is that the gamma setting?.....	30
12-23 When I type "gamma 1.05" in a c-shell, the LCD changes in appearance. Why? .....	30
12-24 A gamma value of 1.05 is what we always used in the past can we still use it? .....	30
12-25 My customer does not like the gamma setting that the Gamma Table provides. ....	30

12-26 Single value optimization technique. .... 30

**REVISION HISTORY** ..... **32**

## 1- INTRODUCTION

### 1-1 Overview

The operator workspace monitor must be properly adjusted for the filmed image to accurately represent the console monitor displayed image. This procedure will describe how to adjust the monitor to match the camera. Once the monitor is re-calibrated, it is essential to re-calibrate the camera before the system is used for filming. **This procedure is only for the LCD color monitor and not for the CRT monitor.**

### 1-2 Camera Vendor Participation

Although the steps outlined below are possible for a qualified GE Service Engineer for both Camera and Display adjustments, it is recommended that the following procedure are performed with the Camera Vendor field engineer for camera adjustments. With the Camera adjustments, it is recommended that you have one of the Customer's filming specialists available for the fine tuning and quality review of the film/monitor conformance.

## 2- VERIFY AMBIENT LIGHTING CONDITIONS

In the review area and operator workspace area, verify that the ambient lighting conditions are adjusted to a minimum level. In the operator workspace area, there should be only sufficient light for safely operating the system.

In the review area and operator workspace area, verify that light-boxes are not emitting light, or are properly masked, when not displaying film. This will be a source of excessive glare.

In both review area and operator workspace area, verify that there is no source of glare for reviewing films or setting up the images for film. For example, windows should not allow direct light (blinds should be closed).

Note that both, the operator workspace area and the review area artificial lighting type should be the equivalent.

## 3- SETTING LCD MONITOR FREQUENCY RATE AND RESOLUTION

### 3-1- Configuring the Frequency Rate (Frame Rate and Swap Rate)



**THIS PROCEDURE NEEDS TO BE DONE EVERY TIME SOFTWARE HAS BEEN RELOADED. LINE RATE IS NOT CAPTURED ON THE SAVEINFO MOD AND IS NOT CAPTURED IN THE HEALTH PAGE STATUS OF THE SYSTEM.**

Monitor "Line Rate" or "Refresh Rate", is referred to as "Frame Rate" and Swap Rate", on SGI systems. For simplicity, the term "Line Rate" will be used in this document.

**Note:**

Failure to set the Line Rate to 60Hz for ALL LCD Host monitors will result In Image Ghosting and customer complaints. This procedure needs to be done EVERY TIME software has been reloaded. Line Rate is NOT captured on the SaveInfo MOD or in the Health Page Status of the system.

**Note:**

UNIX/IRIX is case sensitive. Use the commands exactly as shown as "root owner".

1. From the Desktop click on the **C-shell tool**
2. Switch to root owner. Type: **su root** [enter]; (Enter password)
3. Type: **chkconfig fixed72hz off** [enter]

**Note:**

If you get the following error you may have miss-typed the command. Re-type the command. If it appears the second time, IGNORE IT. Proceed with the step 4.

```
chkconfig: cannot set flag "fixed72hz": No such file or directory
use "chkconfig -f fixed72hz off" to create and set the flag
```

4. Type: **/usr/gfx/setmon -x -w 1280x1024\_60**
5. Type: **exit** [enter] to exit root
6. Type: **exit** [enter] to exit the C-shell
7. Select **System Shutdown**, (OK to shutdown)
8. Select **Restart**
9. **Choose Signa icon**, (Enter password)
10. Proceed to Section 4 : Signa Host Gamma Setup – NEC 2010, OR Section 5 : Signa Host Gamma Setup – NEC 2010X

**Note:**

To check line rate values, refer to Troubleshooting section at the end of this procedure.

#### **4- SIGNA HOST GAMMA SETUP- NEC 2010**

The GAMMA value is modified to optimize the contrast level of the image mid-tones to more closely represent the same contrast that is filmed.

**Note:**

**At time of System Installation:**

- As of July 28, 2003 all NEW LCD monitors will have a Gamma Software CDROM disk INCLUDED in the box, (GE Part # 2376768) which should be used for software versions based on 9.0 and below. Use this CDROM disk and the instructions it contains to setup gamma for those software versions.

Upon replacement of a failed monitor:

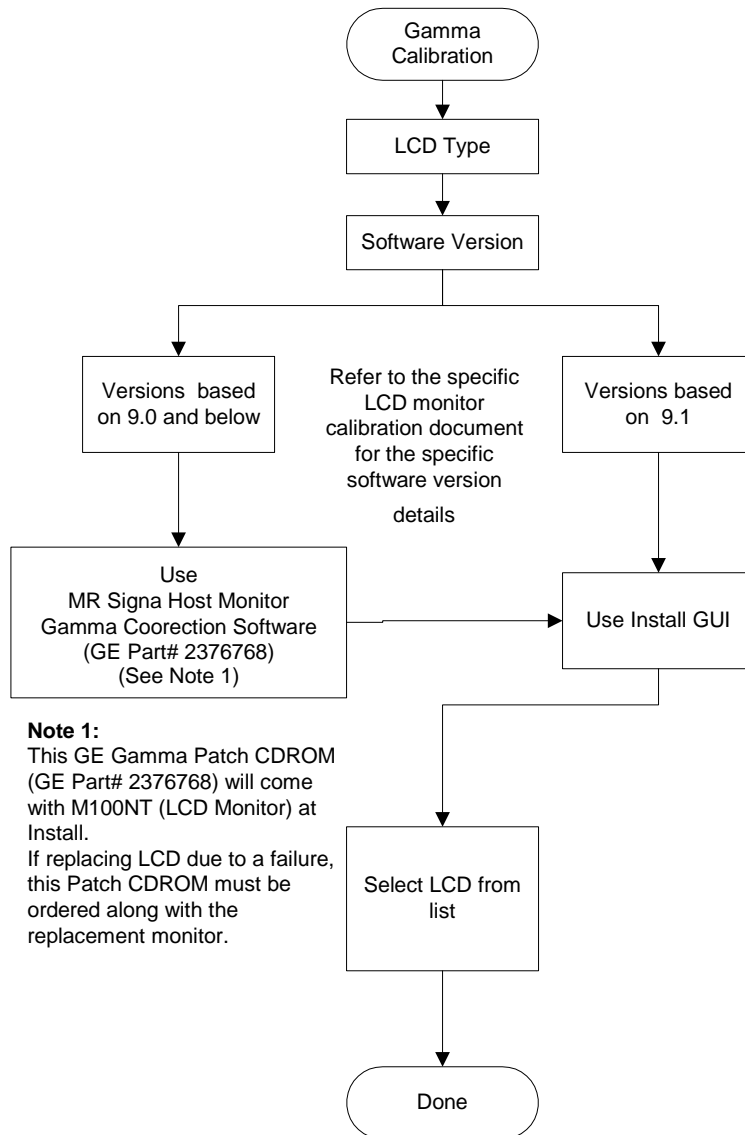
Make sure you also order:

GE Part # 2376768. This CDROM disk is labeled “MR Signa® Host Monitor Gamma Correction Software” contains the most up-to date gamma files needed to setup gamma. The software on the CDROM is required to install a replacement monitor. Follow the installation instructions included with the CDROM disk.



**WARNING!**

MR SIGNA® HOST MONITOR GAMMA CORRECTION SOFTWARE (GE PART # 2376768) SUPERCEDES ALL OTHER GAMMA FILES THAT MAY BE ON VERSION 14 AND 15 LX/8X SERVICE METHODS CDROM.



PROCESS FLOW CHART  
ILLUSTRATION 4-1

### 4-1 Gamma Configuration for all SGI Computers

Select the section to use based on your Computer type and Software version, using the table below:

GAMMA PROCEDURES BY SECTION

TABLE 4-1

Computer Type:	Software Version:	Gamma Setting:
All SGI computers	ALL Software versions 9.0 and below. Setting Gamma <u>with</u> the CDROM disk that came with the monitor.	See Section 4-1-1
Octane 1 and Octane 2	9.1, HFO2, HF03 Setting Gamma on monitors <u>without</u> a CDROM Disk	See Section 4-1-2

#### 4-1-1 Setting Gamma with the Patch CDROM – All Software versions 9.0 and below

- If you are Installing the NEC 2010 monitor for the first time a CDROM labeled: MR Signa<sup>®</sup> Host Monitor Gamma Correction Software is included in the Monitor box. The installation instructions are included with the CDROM disk and should be followed to load the gamma software on the system.
- If you are replacing a failed LCD Monitor, then a CDROM labeled: MR Signa<sup>®</sup> Host Monitor Gamma Correction Software, (GE Part # 2376768) should have been ordered along with the replacement monitor. The installation instructions are included with the CDROM disk and should be followed to load the gamma software on the system.
- This latest CDROM disk should be retained and re-used any time a reload of software occurs on the system.
- If you do not know the software version, type “getver” in a c-shell.

This option is used to configure an NEC 2010 LCD. To set gamma:

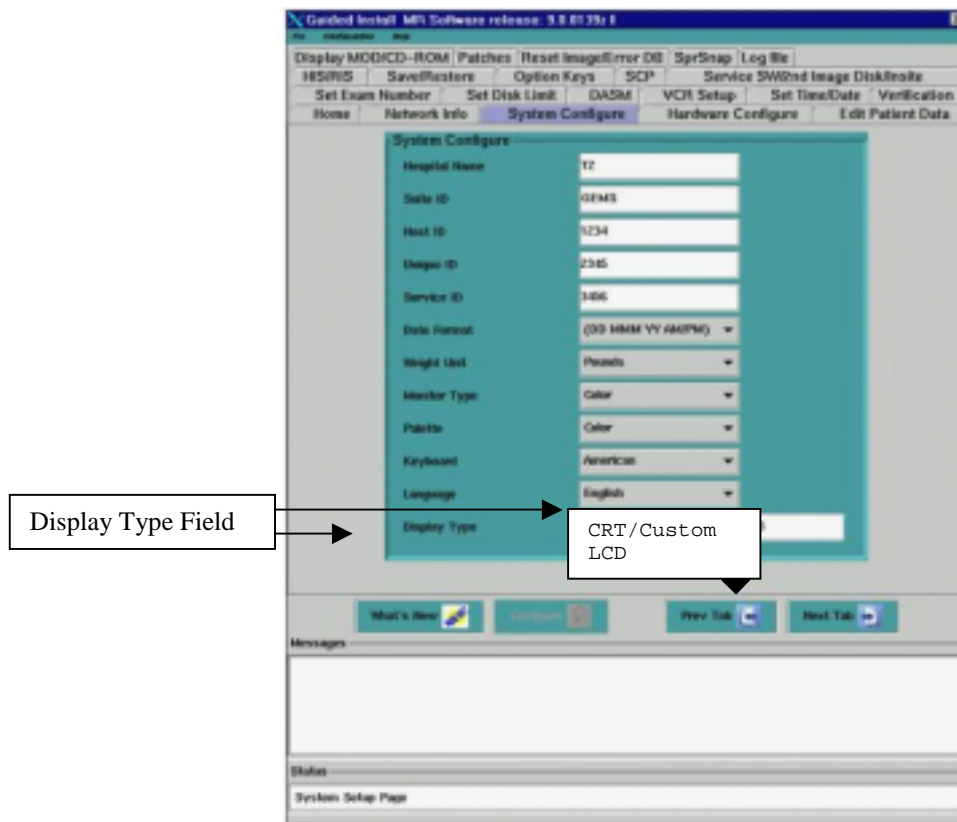
- **If you are replacing the NEC 2010 with another 2010 and have not reloaded software:** No gamma changes are necessary. Proceed to Subsection 6 in this document.
- **If you are replacing the NEC 2010 with the another 2010 and have reloaded software:** Proceed to STEP 1 below:
  1. Insert the “MR Signa<sup>®</sup> Host Monitor Gamma Correction” CDROM into the Host CDROM/DVDROM drive.
  2. Follow the instructions included with the CDROM to set the gamma for your monitor type.
  3. Proceed to section 6 in this document.

#### 4-1-2 Setting Gamma - 9.1, HF02 and HFO3

This option is used to configure an NEC 2010LCD. To set gamma:

- If you are replacing the NEC 2010 with another 2010 and have **not reloaded software**: No gamma changes are necessary. Proceed to Subsection 6 in this document.
- If you are replacing the NEC 2010 with the another 2010 and **have reloaded software**: Proceed to STEP 1 below:

1. Open Guided Install and select **System Configure** tab. Refer to illustration 4-1.
2. Look for the **“Display Type”** field. (See Illustration 5-1)



GUIDED INSTALL GUI “SYSTEM CONFIGURE” TAB- DISPLAY TYPE FIELD  
ILLUSTRATION 4-1

**Note:**

The “Display Type” Field has two choices:

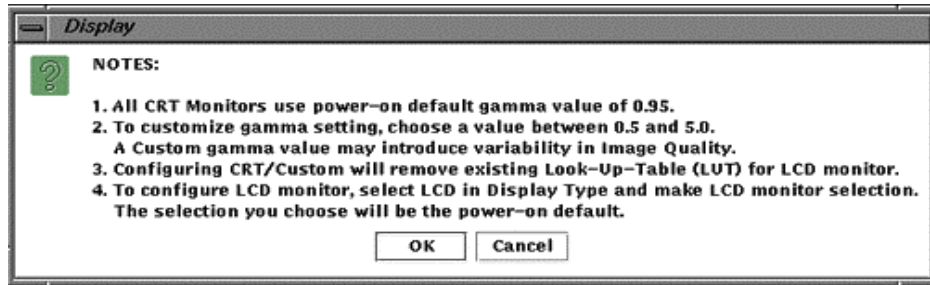
- **LCD – LCD** – This should be used to configure Gamma for a specific LCD listed in the dropdown box. (Preferred method)
- **CRT/Custom** – This should be used to set a Custom LCD or CRT Gamma setting.

**Note:**

It may be necessary to “Toggle” between the **“CRT/Custom”** and **“LCD”** options in the Display Type Field to select **“LCD”**.

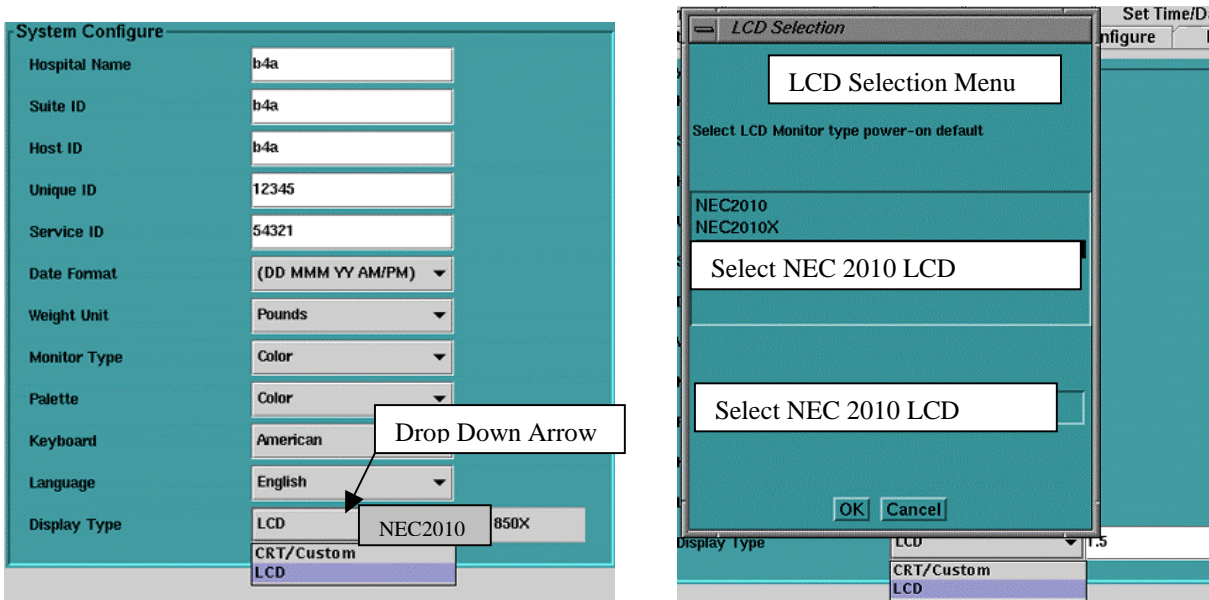
1. If **“CRT/Custom”** is displayed in the Field:
  - a. Click on the “Display Type” Field ▼
  - b. Drag your mouse over **LCD**

- c. A Popup Display message will appear, Select **[OK]** (See illustration 4-2)



MESSAGE BOX  
ILLUSTRATION 4-2

- d. The Field should change to [LCD].
- e. Select **LCD** again. The following menu will appear:



MONITOR CHOICES  
ILLUSTRATION 4-3

- f. **Scroll to the correct Display option (NEC2010) and release the mouse button.** The display selected will appear in the box to the right.
- g. Click on the **[Configure]** Button on the Install GUI to save the changes. You may see a slight change in the screen intensity when “Configure” is complete.
- h. A Popup message box will appear, Select **OK**.
- i. Select **File** and **Quit** and **OK** from the Install/Reconfigure GUI Window.
- j. **Reboot the System.** A reboot is required to activate the changes. This completes the Gamma Calibration process.
- k. Proceed to Sub-section 6- LCD Monitor Adjustment Overview.

### 5- SIGNA HOST GAMMA SETUP – NEC 2010X

The GAMMA value is modified to optimize the contrast level of the image mid-tones to more closely represent the same contrast that is filmed.

### 5-1 Gamma Configuration for all SGI Computers

Select the section to use based on your Computer type and Software version, using the table below:

**Note:**

**At time of System Installation:**

- As of July 28, 2003 all NEW LCD monitors will have a Gamma Software CDROM disk INCLUDED in the box, (GE Part # 2376768) which should be used for software versions based on 9.0 and below. Use this CDROM disk and the instructions it contains to setup gamma for those software versions.

**Upon replacement of a failed monitor:**

**Make sure you also order:**

- GE Part # 2376768.** This CDROM disk is labeled “MR Signa® Host Monitor Gamma Correction Software” contains the most up-to date gamma files needed to setup gamma. The software on the CDROM is required to install a replacement monitor. Follow the installation instructions included with the CDROM disk.



**MR SIGNA® HOST MONITOR GAMMA CORRECTION SOFTWARE (GE PART # 2376768) SUPERCEDES ALL OTHER GAMMA FILES THAT MAY BE ON VERSION 14 AND 15 LX/8X SERVICE METHODS CDROM.**

**GAMMA PROCEDURES BY SECTION**

TABLE 5-1

<b>Computer Type:</b>	<b>Software Version:</b>	<b>Gamma Setting:</b>
All SGI computers	ALL Software versions 9.0 and below. Setting Gamma <u>with</u> the CDROM disk that came with the monitor.	<b>See Section 5-1-1</b>
Octane 1 and Octane 2	9.1, HFO2, HF03 Setting Gamma on monitors <u>without</u> a CDROM Disk	<b>See Section 5-1-2</b>

#### 5-1-1 Setting Gamma with the Patch CDROM – All Software versions 9.0 and below

- If you are Installing the NEC 2010X monitor for the first time a CDROM labeled: MR Signa® Host Monitor Gamma Correction Software is included in the Monitor box. The installation instructions are included with the CDROM disk and should be followed to load the gamma software on the system.
- If you are replacing a failed LCD Monitor, then a CDROM labeled: MR Signa® Host Monitor Gamma Correction Software, (GE Part # 2376768) should have been ordered along with the replacement monitor. The installation instructions are included with the CDROM disk and should be followed to load the gamma software on the system.

- This latest CDROM disk should be retained and re-used any time a reload of software occurs on the system.
- If you do not know the software version, type “getver” in a c-shell.

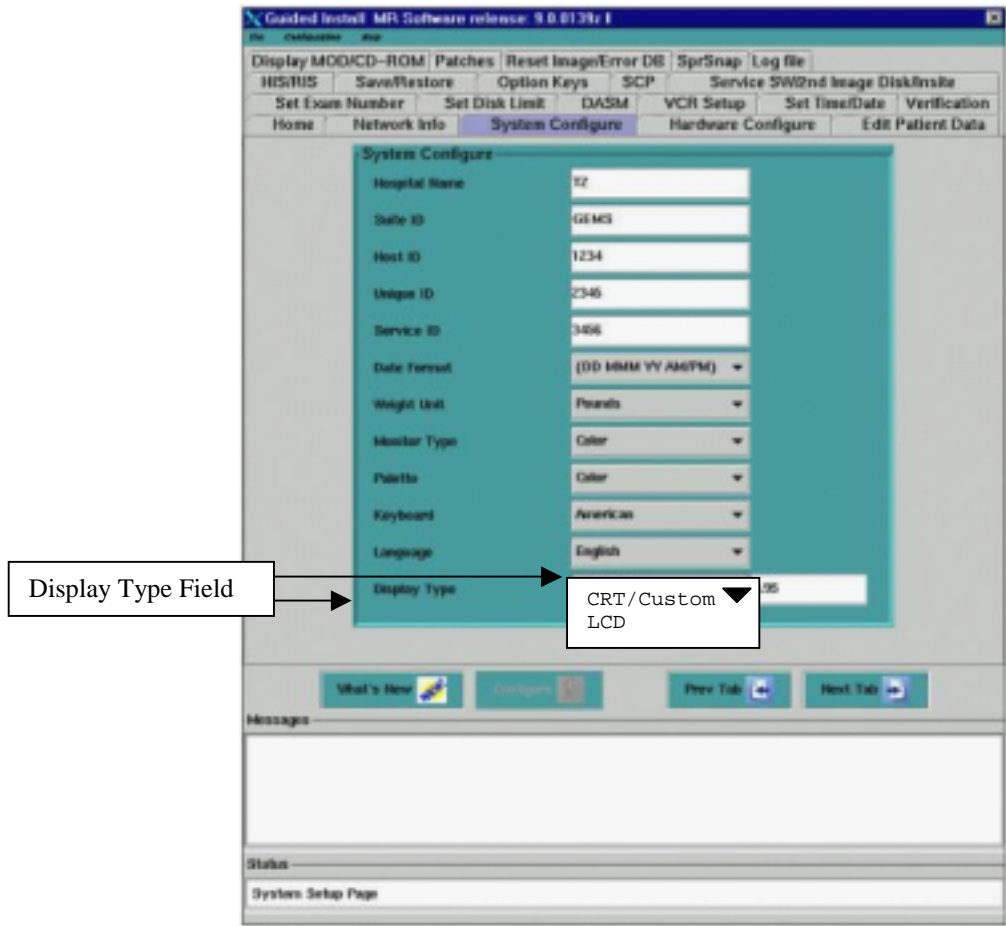
This option is used to configure an NEC 2010X LCD. To set gamma:

- **If you are replacing the NEC 2010X with another 2010X and have not reloaded software:** No gamma changes are necessary. Proceed to Subsection 6 in this document.
  - **If you are replacing the NEC 2010X with the another 2010X and have reloaded software:** Proceed to STEP 1 below:
4. Insert the “MR Signa<sup>®</sup> Host Monitor Gamma Correction” CDROM into the Host CDROM/DVDROM drive.
  5. Follow the instructions included with the CDROM to set the gamma for your monitor type.
  6. Proceed to section 6 in this document.

#### 5-1-2 Setting Gamma - 9.1, HF02 and HFO3

This option is used to configure an NEC 2010X LCD. To set gamma:

- **If you are replacing the NEC 2010X with another 2010X and have not reloaded software:** No gamma changes are necessary. Proceed to Subsection 6 in this document.
  - **If you are replacing the NEC 2010X with the another 2010X and have reloaded software:** Proceed to STEP 1 below:
3. Open Guided Install and select **System Configure** tab. Refer to illustration 5-1.
  4. Look for the “**Display Type**” field. (See Illustration 5-1)



GUIDED INSTALL GUI “SYSTEM CONFIGURE” TAB- DISPLAY TYPE FIELD  
ILLUSTRATION 5-1

**Note:**

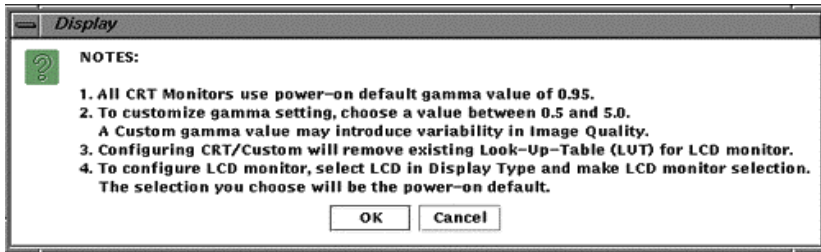
The “Display Type” Field has two choices:

- **LCD** – This should be used to configure Gamma for a specific LCD listed in the dropdown box. (Preferred method)
- **CRT/Custom** – This should be used to set a Custom LCD or CRT Gamma setting.

**Note:**

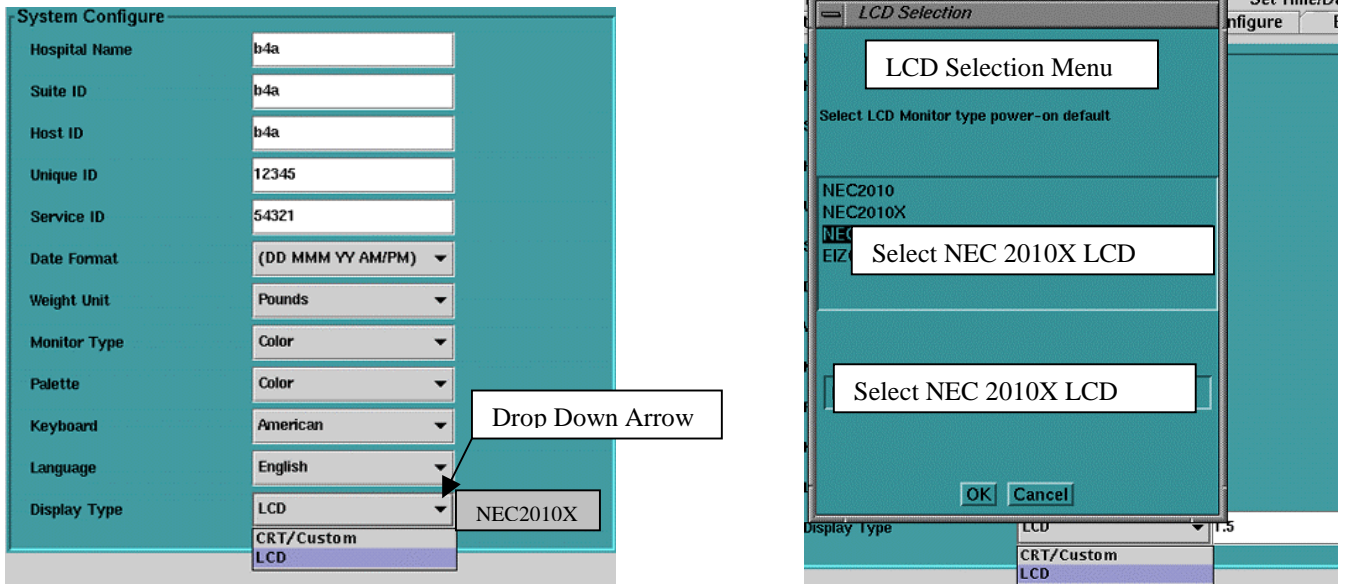
It may be necessary to “Toggle” between the “**CRT/Custom**” and “**LCD**” options in the Display Type Field to select “**LCD**”.

1. If “**CRT/Custom**” is displayed in the Field:
  - a. Click on the “Display Type” Field ▼.
  - b. Drag your mouse over **LCD**
  - c. A Popup Display message will appear, Select [OK] (See illustration 5-2)



MESSAGE BOX  
ILLUSTRATION 5-2

- d. The Field should change to [LCD].
- e. Select **LCD** again. The following menu will appear:



MONITOR CHOICES  
ILLUSTRATION 5-3

- f. **Scroll to the correct Display option (NEC2010X) and release the mouse button.** The display selected will appear in the box to the right.
- g. Click on the [**Configure**] Button on the Install GUI to save the changes. You may see a slight change in the screen intensity when "Configure" is complete.
- h. A Popup message box will appear, Select **OK**.
- i. Select **File** and **Quit** and **OK** from the Install/Reconfigure GUI Window.
- j. **Reboot the System.** A reboot is required to activate the changes. This completes the Gamma Calibration process.
- k. Proceed to Sub-section 6- LCD Monitor Adjustment Overview.

## 6 - LCD MONITOR ADJUSTMENT OVERVIEW

The monitor should be positioned no closer than 16 inches and no further away than 28 inches from your eyes. The optimal distance is 24 inches for either of the monitors.

### Note

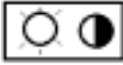


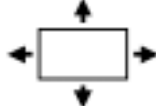

Allow the monitor to warm-up for 20 minutes before performing any adjustments.

### Note

The response time for the LCD monitor is 100 ms. It is normal to see a “trail” on the screen if the mouse is moved quickly.

### 6-1 Model NEC 2010 LCD Color Monitor Adjustment Overview

After the installation of the LCD monitor, the following adjustments must be performed:

- Auto Adjust Contrast → 
- Auto Adjust → 
- Image Adjust → 
- Position Control → 
- AccuColor™ set-up → 

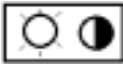


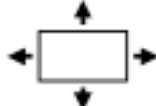
### Note

Manual Adjustment of the Position Control and Image Adjust H. Size/Fine controls may be required.

To access the On-Screen Manager OSM™, press any of the control buttons (▲, ▼, ◀, ▶) to get to the main menu.

### 6-2 Model NEC 2010X LCD Color Monitor Adjustment Overview

After the installation of the LCD monitor, the following adjustments must be performed:

- Auto Adjust Contrast → 
- Auto Adjust → 
- Image Adjust → 
- Position Control → 

- AccuColor™ set-up → 

**Note**

Manual Adjustment of the Position Control and Image Adjust H. Size/Fine controls may be required.

To access the On-Screen Manager OSM™, press any of the control buttons (▲, ▼, ◀, ▶) to get to the main menu.

**7 – LCD MONITOR ADJUSTMENT PROCESS**

Setting Focus is NOT recommended for all LCD Monitor types, this section is not necessary. Proceed to the next section.

**Note:**

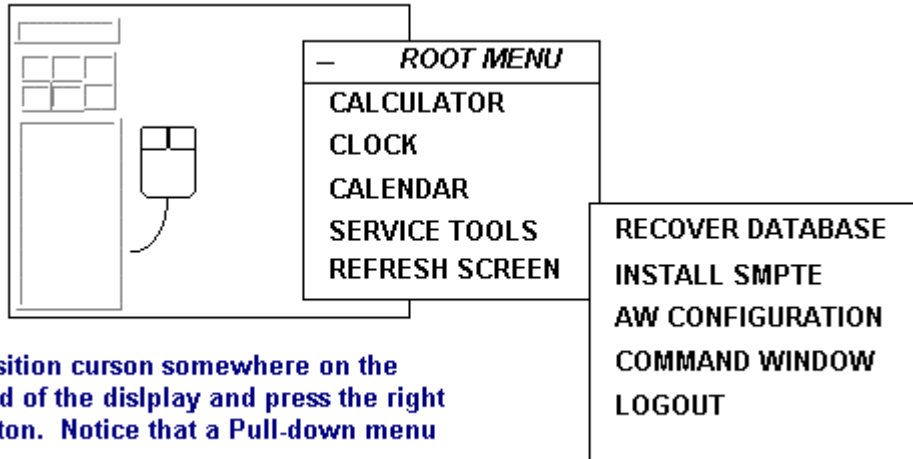
If Focusing becomes necessary, the procedure can be found in Section 12-Troubleshooting. Generally, focus problems with LCD monitors are caused by separation of the Thin Film. This results in unfocused regions on the LCD. Monitor replacement is usually the only solution.

**8 – DISPLAYING THE SMPTE PATTERN**

The SMPTE (Society of Motion Picture and Television Engineers) test pattern is used to provide a standard image for adjusting the monitor. Use this when first adjusting the monitor to achieve the best possible video display.

This test pattern is available on the Operator Workstation Host Computer after IRIX, the operating system, has booted, and after you have logged into the system.

1. Confirm that all the components in the Operators Workspace (OW), the host LCD monitor, PC LCD panel, and both the host computer and PC have power.
2. After IRIX has booted login at the login screen as **signa** using the password **adw2.0**. Press **<Enter>**.
3. After the host computer is at the applications level, install and display the SMPTE pattern. See Illustration 8-1 for installing and Illustration 8-2 for displaying SMPTE pattern. See Illustration 8-3 for sample test pattern.



**Step 1.** Position cursor somewhere on the background of the display and press the right mouse button. Notice that a Pull-down menu appears.

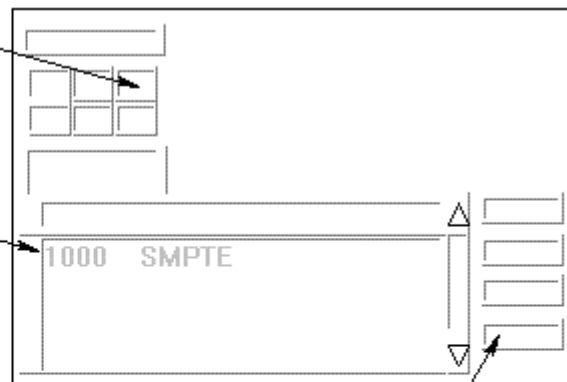
**Step 2.** Slide the mouse down to [Service Tools], and then over to [Install SMPTE]. This will load the SMPTE pattern into the database as Image 1000.

**INSTALLING THE SMPTE PATTERN  
ILLUSTRATION 8-1**

**Step 1.** Point to and click on the Display (AW) icon. Notice that the Browser comes up.

**Step 2.** After the Browser comes up, use the scroll bar on the right side of the display to find Image 1000 SMPTE.

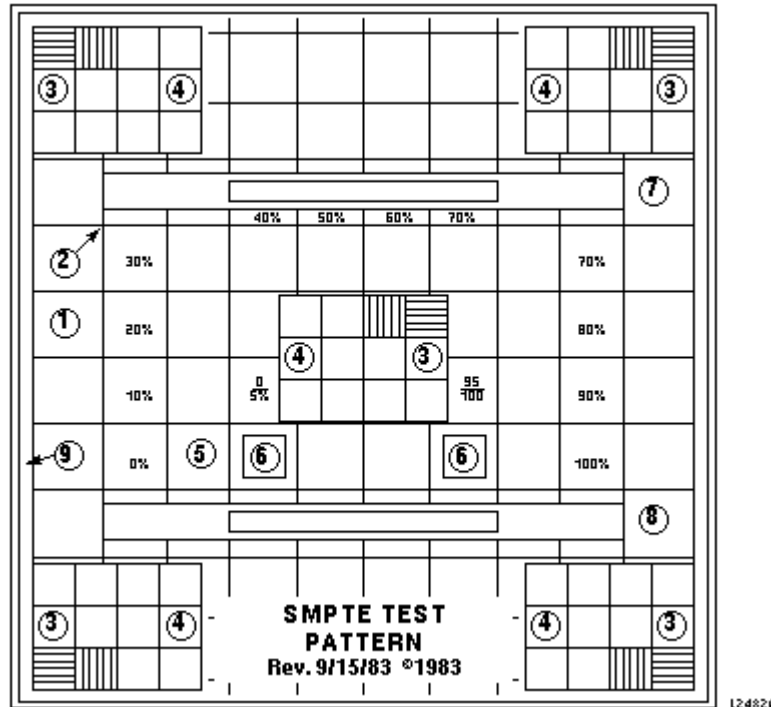
**Step 3.** Point to and single-click on the SMPTE entry.



**Step 4.** Point to and single-click on the Full Viewer to display the SMPTE so that it is full screen size.

**Step 5.** To get back from displaying the SMPTE pattern, hit <ESC>.

**DISPLAYING THE SMPTE PATTERN  
ILLUSTRATION 8-2**



**SAMPLE SMPTE TEST PATTERN**  
ILLUSTRATION 8-3

4. With the cursor inside the displayed image, hold down the middle mouse button and move the mouse in the horizontal plane. View the “window control” value at the base of the image and set the “window control” value to **100**.
5. With the cursor inside the displayed image, hold down the middle mouse button and move the mouse in the vertical plane. View the “level control” value at the base of the image and set “level control” value to **1024**.

## 9 - FINAL ADJUSTMENT OF CONTRAST AND BRIGHTNESS

The monitor should be positioned no closer than 16 inches and no further away then 28 inches from your eyes. The optimal distance is 24 inches for either of the monitors.

### Note

Allow the monitor to warm-up for 20 minutes before performing any adjustments.

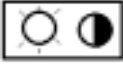
### Note

The response time for the LCD monitor is 100 ms. It is normal to see a “trail” on the screen if the mouse is moved quickly.

### 9-1 Contrast and Brightness Adjustment For NEC 2010 AND NEC 2010X LCD Color Monitors



1. From the Contrast and Brightness icon use the **Control** buttons to adjust the contrast lower if the maximum setting causes visible tearing or smearing of the pattern or alphanumeric characters (items 1,2,5-8 in Illustration 8-3).

2. From the Contrast and Brightness icon  use the **Control** buttons to adjust the brightness of the display monitor if the 5% and 95% patches are not visible (item 6 in Illustration 8-3).

**Note**

It may be necessary to re-adjust the contrast if tearing or smearing of the pattern or alphanumeric characters occurs (items 1,2,5-8 in Illustration 8-3).

## 10 - CAMERA CALIBRATION

This procedure describes the steps necessary to verify and set the camera parameters. Once the display is re-calibrated, it is essential to re-calibrate the camera before the system is used for filming. Although a qualified GE Service Engineer could perform the steps below, it is recommended that the following procedure be performed with the on-site assistance of the camera vendor field engineer.

### 10-1 DASM Interpolation Setup

1. Select the **Install** soft key from the Service Desktop. When prompted, login using the password **operator**.
2. Select the **DASM** folder from the top of the Guided Install GUI once it appears.
3. Set the DASM Interpolation method to linear.
4. Before exiting the GUI, insert the SaveInfo MOD or new MOD into the drive. Go to the top left corner of the Install GUI and select **<File>** and then **<Save GI Configuration to MOD>**. This process does not create a SaveInfo disk. It just creates a copy of the information already entered in the GUI tabs for use in the next software install.
5. Exit the install GUI by selecting **<File>** then **<Quit>**. If any error conditions still exist, you will be warned that no changes will be made before exiting.

### 10-2 Camera Imaging Look-Up Table

Verify with the camera vendor field engineer that the currently installed camera lookup table is designed to provide perceivably linear contrast for the light box conditions in the customer's viewing area. If not, request that the camera vendor field engineer replace it with the appropriate look-up table.

### 10-3 Camera Maximum Optical Density

Note that for optimal reviewing, the light box luminance of the diagnostic region of the film should be in the range of 50 to 500 nits. Vary the maximum optical density setting of the camera to compensate for the light box and to meet this value. A good starting position is a maximum density of 2.8.

### 10-4 Camera Contrast

1. With the maximum/minimum optical densities set to compensate for the review area's light box, select a look-up table for your camera that will produce a perceivably linear gray scale for the same light box and the overall ambient light conditions of the viewing area.

**Note**

The DICOM 3.14 Standard specifies the Barten's curve for linear perception. It is recommended that the manufacturer base perceptual linearity on this curve.

2. Film the SMPTE pattern on a 1-on-16 format display. Verify that the 5% and the 95% levels are visually equivalent. If not, perform a Contrast test with the SMPTE pattern. Select the new contrast setting from the contrast image set. A good value for the Imation DryView is 3. Use the camera's calibration procedure to set the contrast setting. Ensure that the camera maintains a perceivably linear gray scale.

**Note**

Filming the SMPTE pattern for contrast calibration may be optional for the camera vendor.

3. Ask the technologist to display a clinical image and set window and level controls for the desired appearance. A good image to start with is a sagittal or axial head image.
4. Capture the image on the keypad or host control interface.
5. Print a Contrast Test film. Ask the technologist to select the image that best matches the displayed image on the monitor.

**10-5 Camera Contrast (continued)**

6. Observe the image number below the selected image and set the Contrast control to this value.

**10-6 Anatomical Filming**

This portion of the procedure requires the technologist to verify the camera settings with true anatomical images.

1. Film representative anatomical images to confirm the settings. The image set should include T1 and T2 head images, joint images and c-spines.
2. Observe the accuracy of the low-tones, mid-tones and high-tones. If a filmed image is found to not be equivalent then re-calibrate the camera based on the customer's evaluation.

**11 - CONTROL DESCRIPTIONS - NEC 2010 AND 2010X LCD COLOR MONITOR**

**Note**

Adjustment information is not lost when the power is removed from the monitor.

**11-1 Front Panel Controls**

The functions of the OSM™ controls on the front of the monitor are described in Table 11-1. To access the OSM, press any of the control buttons (▲, ▼, ◀, ▶) or the PROCEED or EXIT button.

**Note**

When RESET is pressed, a warning window will appear allowing you to cancel the reset function.

TABLE 11-1  
FRONT PANEL CONTROL FUNCTIONS - MODEL LCD2010

Control	Main Menu	Sub-Menu
<b>EXIT</b>	Exits the OSM™ controls.	Exits to the OSM™ controls main menu.
<b>CONTROL ▲/▼</b>	Used to access main menu.  Moves the highlighted area up/down to select one of the controls.	Moves the highlighted area up/down to select one of the controls.
<b>CONTROL ◀/▶</b>	Has no function	Moves the bar in the + or - direction to increase or decrease the adjustment
<b>PROCEED</b>	Proceeds to the selected menu choice (indicated by the highlighted area).	Activates Auto Adjust feature. In Display Mode, opens additional window.
<b>RESET:</b> The currently highlighted control to the factory setting	Resets all the controls within the highlighted menu.	Resets the highlighted control.

### 11-2 On-Screen Controls

This section describes the adjustments available for the OSM controls. The controls labeled with “•” are required during the set-up of the monitor.

- **Brightness and Contrast** → 

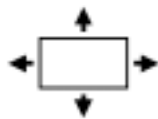
**Brightness:** Adjusts the overall image and background screen brightness.

**Contrast:** Adjusts the image brightness in relation to the background.

**Auto Adjust Contrast:** Adjusts the image displayed for non-standard video inputs.

- **Auto Adjust** → 

Automatically adjust the Image Position or the H. Size setting.



- **Position Controls** →

H. Position: Controls Horizontal Image Position within the display area of the LCD.

V. Position: Controls Vertical Image Position within the display area of the LCD.


**Auto:** Automatically sets the horizontal and vertical image position within the display area of the LCD.

- **Image Adjust Controls** → 

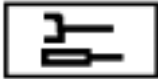
H. Size: Adjusts the horizontal size by increasing or decreasing this setting.

**Fine:** Improves focus, clarity, and image stability by increasing or decreasing the Fine setting.

**Auto Adjust Coarse:** Automatically adjusts the Coarse setting.

- **AccuColor® Control System** →   
Five color presets select the desired color setting. This setting must be set to selection **1 - 9300**. If a setting is adjusted, the name of the setting will change to Custom.

R, B, G: Increases or decreases the color depending upon which is selected. The change in color will appear on screen and the increase or decrease will be shown by the color bars.

- **OSM H POS./OSM V POS.** →   
You can choose where the OSM control image appears on the screen. Selecting OSM Location allows you to manually adjust the position.

### 11-3 On-Screen Controls (continued)

#### OSM Lock Out

This control completely locks out access to all OSM control functions. When attempting to activate controls while in Lock Out mode, a message screen will appear indicating that the controls are locked out.

- To enter the Lock Out mode, simultaneously press PROCEED and the ▼ button; the LOCK OUT window will appear.
- To activate the Lock Out function, simultaneously press and hold down the PROCEED and the ▲ button; the OSM window will disappear within seconds and the LOCK OUT function will be activated.
- To de-activate the Lock Out function, simultaneously press PROCEED and the ▲ button.

#### ALL RESET

This allows you to reset all OSM control settings back to the factory settings. Highlighting the setting and then pressing the RESET button can reset individual settings.



#### Information →

Indicates the current display resolution, frequency setting, and type of Sync signal of the monitor.

#### Note

Mode Change should only be used if the monitor does not recognize a resolution. This shouldn't ever be the case with our system. You can change to the appropriate resolution by selecting the Mode information and selecting (increase or decrease) the corresponding option.

#### Note

If the ◀ or the ▶ button is pressed while TYPE is highlighted then the Sync Type is switched between Separate Sync and Sync on Green.

## 12 - TROUBLESHOOTING GUIDE

### 12-1 Explanation of Default Gamma Settings

The Default gamma setting is different for different software versions. The Table below indicates the suggested nominal settings. The Software Default Settings are set at boot up. When a Look-Up-Table is installed, these default settings are ignored. If the "setgamma" command is used, the "colorPix.cfg file and the boot script (Startmon) is updated, with the new single value.

TABLE 9-1  
DEFAULT GAMMA SETTINGS

LCD Monitor	Nominal Gamma value
NEC 2010	0.96
NEC 2010X	0.69

As the Gamma setting gets lower, the display will become dimmer, (less contrast).

### 12-2 Complaint: Poor SNR, Dynamic Range Lack of Grayscale, Blotchy images

- It is important to note that the software default gamma setting of 1.5 causes extremely poor image quality on both the LCD and CRT. Customers complain of Ghosting or Poor SNR or lack of dynamic range in the grayscale. Before troubleshooting any system problem related to these symptoms check the Monitor Gamma Calibration, or make sure you have the correct Monitor Selected.
- Gamma Calibration tables (LUT's) are unique from one monitor type to another. DO NOT use a gamma table designed for a different monitor. If the gamma table or Monitor Type does not exist, start with a single gamma value of 1.0. It may be necessary to "tweak" this setting for your customer. Use the "setgamma" command to do so.

### 12-3 Complaint: Ghosting or Blurring images or Sheering alphanumeric LCD 's ONLY.

- Ghosting and blurring related to areas of gray in an image. This can be related to system problems but also can be attributed to monitor Frequency Rate (Frame and Swap rates). ALL LCD's should be set to 60Hz.

#### Checking the Frame Rate and Swap Rate Setting:

1. From the Desktop click on the **C-shell button**
2. Switch to root owner. Type: **su root** [enter]; (Enter password)
3. Type: **toolchest&** [enter]
4. Click on **Find → Control Panels**
5. **Double click on Display Icon** to open Display tools.
6. Verify: **Active Size (Pixels): = 1280x1024 and FRAME RATE and SWAP RATE =60.00 Hz** (Refer to Illustration below:



FRAME RATE AND SWAP RATE

ILLUSTRATION 9-1

7. If it is the Frame Rate and Swap Rate are not set to 60Hz:
8. Select **1280X1024\_60** from the left menu.
9. **Click on "Load" button.**
10. **Click on OK** when the Pop-up box asks you if you want to Load the setting now.
11. **Click on OK** when the pop-up box asks you if you want to keep the Format.

12. **Click on OK** when the pop-up box asks you if you want to make this setting the Power-On Default.
13. Close the Graphics Backend Window: Click on **File** → **Exit**
14. Close the Control Panel Window: Click on Page → **Exit**
15. Close Toolchest Window: **Right Click and hold on the word Toolchest** at the top of the toolchest window.
16. Drag the mouse to **Close**
17. In the C-shell type: **exit** [enter] to exit root
18. Type: **exit** [enter] to exit the C-shell.
19. Reboot the system.

#### 12-4 Camera Film has changed after Monitor replacement/change

- Make sure that the Monitor and Camera Calibration procedures have been performed and the correct LUT or Gamma Value has been installed for the Monitor.
- For Kodak cameras try setting the Magnification type to “Bi-Linear”.
- For all other cameras try setting the Magnification type to “Replicate”.

Procedure:

1. Open the Image Browser
2. Open Film Composer
3. Select **configure**
4. Select remote printer being used by the site.
5. Select **Update**
6. Under magnification Type:  
Select "**replicate**" option. (Kodak ? Try Bi-Linear)  
Select **OK**
7. Select **Done**
8. Select **Quit**
9. Select **OK**
10. Return to original desktop.
11. Check film and adjust camera if necessary.

#### 12-5 No Picture

- The signal cable should be completely connected to the display card/computer.
- The display card should be completely seated in its slot.
- Power Switch and computer power switch should be in the ON position.
- Check the signal cable connector for bent or pushed-in pins.

#### 12-6 Image Persistence

- Image persistence is when a “ghost” of an image remains on the screen even after the monitor has been turned off. Unlike CRT monitors, the LCD monitor’s image persistence is not permanent.

#### Note

It is still recommended that a screen saver be used whenever the screen is idle.

### **12-7 Image is unstable, unfocused, or swimming is apparent**

- Signal cable should be completely attached to the computer.
- Check the monitor and your display card with respect to signal timings.
- Change the video mode to non-interlace and use a 50 Hz refresh rate.
- Use the OSM™ Image Adjust controls to focus and adjust display by increasing or decreasing the fine control. When the display mode is changed, the OSM™ Image Adjust settings may need to be re-adjusted.
- If your text is garbled, change the video mode to non-interlace and use a 50 Hz refresh rate.

### **12-8 LED on monitor is not lit (no green or amber color can be seen)**

- Power Switch should be in the ON position and power cord should be connected.
- Make certain the computer is not in a power saving mode.

### **12-9 Display image is not sized properly**

- For NEC 2000 - Use the OSM™ Image Adjust controls to increase or decrease the Coarse total.
- For NEC 2010 - Use the OSM™ Image Adjust controls to increase or decrease the H. Size.

### **12-10 Selected resolution is not displayed properly**

- For NEC 2000 - Use the OSM™ Display Mode to enter Mode Change sub-menu and confirm that the appropriate resolution has been selected. If not, select corresponding option.
- For NEC 2010 - Select the Display Resolution in the OSM™ Information menu to confirm that the appropriate resolution has been selected. If not, select the corresponding option by pressing the ◀ or ▶ control button.

### **12-11 Diagnostic Image Quality has been traced to problem with LCD setup.**

- Operator has adjusted the Brightness and Contrast of the monitor which has affected Camera/Film imaging. Re-calibration may be necessary. Start with Section 1 of this procedure.

### **12-13 Display image has a green cast to it**

- For NEC 2000 - Open the OSM™ Display Mode and press the “+” Control button.
- For NEC 2010 - Select “TYPE” in the OSM™ Information menu and press the ◀ or ▶ control button.
- Make sure that the Color Temperature is set to 9300K

### **12-14 Image ghosting at transitions of Black and White**

This could be caused by the Frame Rate being set at 72Hz. Check to make sure that the Frame and Swap Rate, (Horizontal refresh rate) is set to 60Hz for ALL LCD monitors. The tradeoff will be better Black & White Images at the sacrifice of color smoothness. Letters such as “V” and “W” will appear more jagged. (See Section 4.)

### **12-15 Diagnostic Image Quality has been traced to problem with LCD setup. (NEC 2010X**

**Model only)**

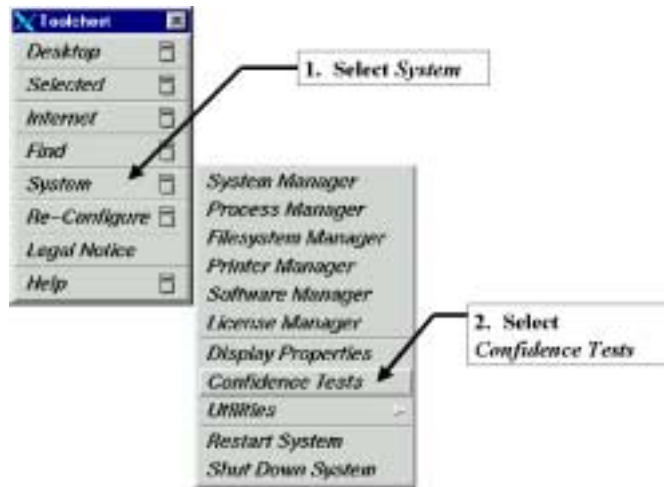
- For LCD2010X only (CAT # M1000NZ) - Insure you have a S-VGA cable, provided by GE Medical Systems Inc. A standard S-VGA cable purchased locally, is NOT compatible with the use of the NEC 2010X on Signa MR Scanners. It will cause problems with Image quality.

The LCD monitor adjustment process consists of two parts:

1. The first part involves making the course adjustments using the “Focus” background.
2. The second part involves using a SMPTE pattern to make finer contrast and brightness adjustments to ultimately satisfy the customers viewing needs.

**12-16 Setting The Focus**

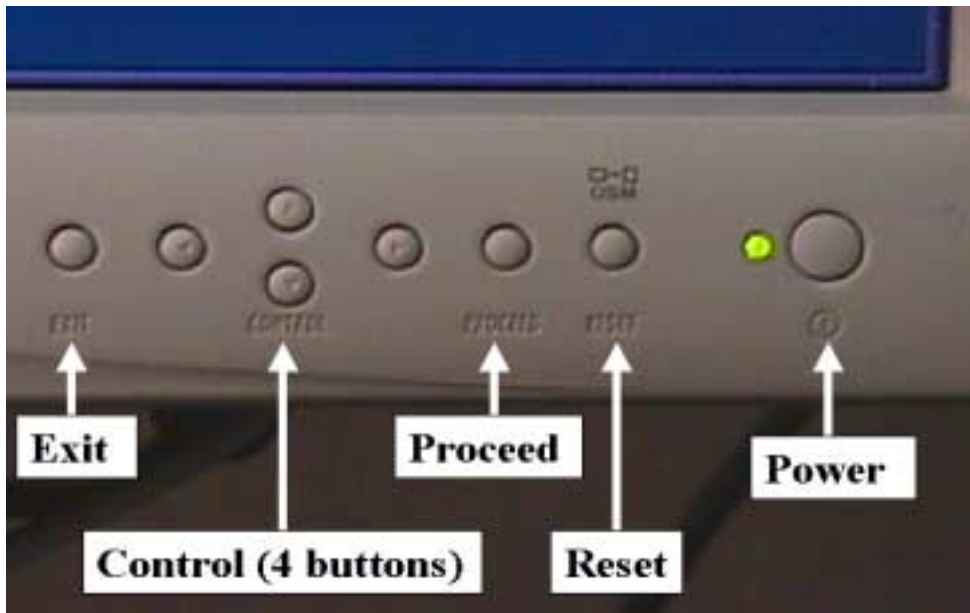
1. From the Service Desktop click on the **C-shell** soft key at the bottom of the window.
2. In the Winterm window login by typing **su <Enter>** and then typing in the password **operator <Enter>**.
3. At the Winterm prompt type **toolchest&**. A GUI menu like that shown will appear within 20 seconds. Select “System” and “Confidence Tests”.



TEST OPTIONS	
100% white field	
30% white field	
10% white field	
Black field	
Focus	← <b>4. Select Focus</b>
Gray scale	
Convergence	
VIDEO CONTROLS	
Red Video	on
Green Video	on
Blue Video	on

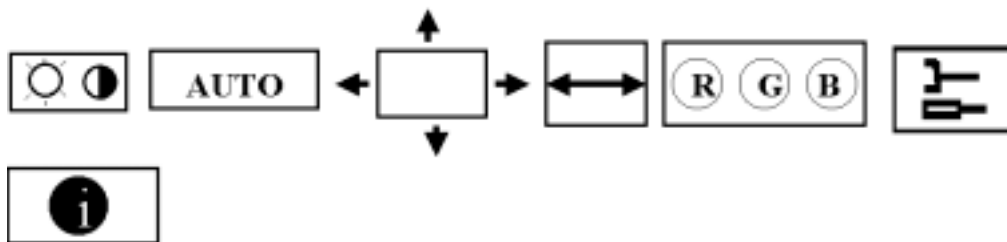
Invert Video
Quit

4. Select "Focus" under Test Options. The background will change to a pattern.
5. Press the middle mouse button to toggle the Test Options Menu off.
6. There should not be any visible variations (usually exhibited as alternating light and dark vertical bars) across the pattern of a properly adjusted monitor. If no variations are seen then skip ahead to section 8.




NEC 2010 LCD FRONT PANEL MONITOR CONTROLS


- a. Press the **Proceed** button on the front of the LCD monitor to access the controls..



MONITOR ADJUSTMENT ICONS

- b. Use the left and right **Control** buttons (◀, ▶) to highlight the Auto Adjust icon **AUTO**
- c. Press the **Proceed** button on the front of the monitor. The screen will blank momentarily during the automatic adjustment process.

d. Use the ◀, ▶ **Control** buttons to manually make **Fine** adjustments under the Image Adjust icon  until the background looks satisfactory and does not exhibit any variations.

e. Select the **AccuColor® Control System** icon  and use the ▲, ▼ **Control** buttons to select the first entry row under this icon.

f. Use the ◀, ▶ **Control** buttons to select **1 - 9300**. It should not be necessary to adjust the individual color bars in the bottom row.

g. Press the **Exit** button on the front of the monitor to exit the adjustment icons window.

h. Press the middle mouse button to display the Test Options Menu.

i. Select **Quit** from the Test Options menu to exit the Focus Option.

3. Close the Confidence Tests window by selecting **File → Exit** from the top left corner of the window.

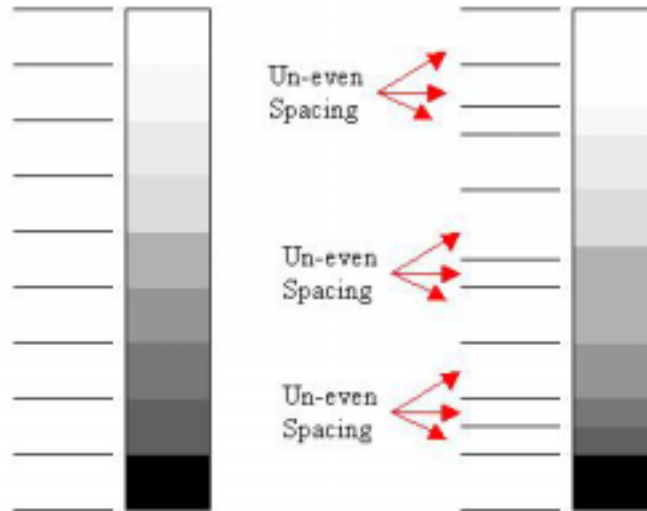
Close the Toolchest window by positioning the cursor over the **Toolchest** label and then left mouse click on the label and select **Close**.

### 12-17 LCD FAQ's:

- The Monitor calibration information is NOT saved during the SavInfo backup routine or accessible via Healthpage.
- There is a big difference between CRT and LCD monitors. CRT's are much less sensitive to a wrong gamma setting.
- Gamma Tables (Look-Up-Tables or "LUT's) are highly specific to the LCD model and should only be applied to the correct model they were designed for.
- Gamma Tables consist of thousands of luminescent data points that are used by the electronic circuitry to generate uniform transitions from one color or grayscale level to the next.
- All recent LCD's used in Signa have a "best fit - Single gamma value" as well as a complete Gamma Table to maximize flexibility when setting up the monitor.
- It is recommended that the Gamma Table always be used as a default.

### 12-18 What is Gamma?

Simply stated gamma normalizes the grayscale so each level is uniform in size and shape across the entire display:



**GRAYSCALE COMPARISON**  
ILLUSTRATION 9-1

Without getting into complicated equations “Gamma correction” adjust the grayscale or color gradient so each “step” is exactly the same size and shade of color or gray. If the “steps” are not uniform in size and color, the monitor will display the error as poor transitions from one step to the other. This appears to the eye as small ghosts or ragged edges.

**12-19 How do I set the correct gamma?**

- When the Monitor Type is selected in the Install GUI the correct gamma table (LUT) for that monitor is automatically loaded. The gamma LUT remains active even if a reboot occurs.

**12-20 Can I use the gamma command to set gamma?**

- NO. This command is no longer an effective way to change gamma permanently. This command should only be used if the need arises to temporarily change to a single gamma value, Overriding any previously installed Gamma LUT.
- In the past, we used to adjust gamma using this command. THIS HAS CHANGED. Using the gamma command on systems with an LCD will most likely CAUSE IMAGE QUALITY PROBLEMS.
- Using a Gamma Table will in most cases produce better display image quality than a single gamma value. A Single gamma value is much less effective on LCD's at providing a uniform grayscale.

**12-21 How do I determine if the correct gamma Table or setting is installed?**

- Open up the Install GUI. Look at the Display Type Field. To the right of the Option box it will either display a monitor type or a single number.
  - If a Monitor Type is in this box then a “Gamma Look-Up-Table” for that monitor is installed.

- If a “Single Value” is displayed, then the CRT/Custom Option was used to set a Single gamma value.

**12-22 When I type “gamma” in a c-shell I see a number. Is that the gamma setting?**

- NO. It is simply a “Meaningless number” that no longer holds any value. When a gamma table is installed, (By simply selecting the monitor Type in the Install GUI) This value is meaningless. It is a left over from earlier versions of software.

**12-23 When I type “gamma 1.05” in a c-shell, the LCD changes in appearance. Why?**

- This is complicated because IRIX Operating System Commands such as “gamma” take priority over the Signa Applications Software. The Install GUI Gamma Tools are written in IRIX Script and have less priority. Since the O/S gamma command was invoked with a value, that value will now OVERRIDE the Applications software. The Single Value of 1.05 temporarily overrides the gamma LUT until a reboot occurs. (Upon reboot, the Gamma LUT resumes control).

**12-24 A gamma value of 1.05 is what we always used in the past can we still use it?**

- The gamma value of 1.05 is no longer used. All LCD and CRT Monitors now use .95 which was determined to be the best default “Single value”.
- DO NOT USE THIS COMMAND ANY MORE. The process HAS CHANGED. Using the gamma command on systems with an LCD will most likely CAUSE IMAGE QUALITY PROBLEMS and filming problems.
- Using a Gamma Table rather than a single gamma value, (Such as 1.05) will in most cases produce much less IQ problems than a single gamma value.
- A Single gamma value is much less effective on LCD’s ,at providing a uniform grayscale.

**12-25 My customer does not like the gamma setting that the Gamma Table provides.**

- By all means change it! use the Install GUI, under Display Type” Select “CRT/Custom” and type in a “Single Gamma Value” you and the Customer agree on is satisfactory. A reboot will make the Single setting permanent.
- There is a Single optimized “Nominal” Gamma Value for each monitor type as well as a gamma table. Consult the Troubleshooting sections within the proper monitor calibration procedures to find the “Nominal” value for the monitor type.
- Note: Using a Single value affects the camera to a much higher degree than a Gamma Table does, so be prepared to adjust the camera as well.

**12-26 Single value optimization technique.**

- To minimize the time needed to find a Single gamma value that is acceptable by your customer, you can still temporarily use the IRIX O/S gamma command in a c-Shell to “Tweak” a single gamma value.

- Typing “gamma *n.nn*” (where *n.nn* is the nominal single gamma value for the monitor type. It will generate an immediate change to the monitor. (Increasing the value will increase brightness and contrast together. Decreasing it will have the opposite affect).
- Continue to adjust the gamma setting, checking images and films until you arrive at a setting you like. Note the final value.
- DON'T FORGET THIS STEP: To make the value permanent Open the Install GUI and under Display Type” Select “CRT/Custom” and type in the new “Single Gamma Value” .
- Reboot the system and this will now be the permanent setting.
- Note: If you open a c-Shell and type “gamma” it may not match what you installed in the Installation GUI. This is normal.

## REVISION HISTORY

REV	DATE	AUTHOR	PRIMARY REASONS FOR CHANGE
0	Sept. 25, 2002	C. MacDonald	Initial version.
1	Feb 22, 2003	D. Hofstetter	Added Octane 1 and Octane 2 gamma setup and also 9.1 information.
2	Feb 26, 2003	D. Hofstetter	Added Troubleshooting Section and Changed process for gamma adjust based on computer type and software version.
3	May 12, 2003	D. Hofstetter	Added Verification process in Section 3-Setting Frequency Rate.
4	June 4, 2003	D. Hofstetter	Updated section 3-2 line rate.
5	July 9, 2003	D. Hofstetter	Modified section 4-1-2-1 Checking for gamma correction scripts
6	July 25, 2003	D. Hofstetter	Removed references to old gamma scripts and added Troubleshooting info.