OEC® Workstation for FlexiView

Operator Manual

Part Number 00-884239-01

GE OEC Medical Systems, Inc.

384 Wright Brothers Dr,
Salt Lake City, Utah 84116

801/328-9300

Text Manual Revision History

Rev	Dash	Date	Change Description
A	-01	Nov 2001	First-Release
B	-01	April 2002	Updated Release

CAUTION!
US Federal law restricts this device to sale by, or on the order of, a physician.

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The text of this manual was originally written, approved, and published by the manufacturer in English (part number 00-884239-01).

This manual contains descriptions, instructions, and procedures which apply only to the OEC Workstation.

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Chapter 1

Introduction and Safety

Overview

This manual describes operation for the specified product only. It is intended for qualified medical personnel who have been trained in the use of medical imaging equipment. It is not designed to replace or substitute for certified training in the radiological or medical field.

Functional capabilities and operation of the equipment are described here which can be used in a variety of diagnostic, therapeutic and surgical applications.

Owner Responsibilities

The owner has the responsibility to ensure system compatibility, operator qualifications and the continued compliance of equipment and operating specifications. Systems should only be used in designated use areas with approved AC receptacles. Unauthorized changes or modifications to any part of the system could have hazardous consequences. Changes or modifications must not be made unless specifically authorized by GE OEC Medical Systems, Inc.

System Compatibility

Damage may result to the system if incompatible components are connected. Read your operator manual thoroughly prior to connecting components that you are not certain are compatible.

Operator Qualifications

It is the responsibility of the owner to ensure that the system is operated only by properly trained, qualified personnel who have obtained credentials from the appropriate authorities.

Continued Compliance

The owner is responsible for verifying continued compliance with all applicable regulations and standards. Consult local, state, federal and/or international agencies regarding specific requirements and regulations applicable to the use of this type of medical electronic equipment.

Unauthorized Modifications

When properly assembled this equipment meets US Federal regulations and International standards. Unauthorized modifications to the equipment may impact adherence to these standards and make the equipment unsafe to operate. Never make any modifications or adjustments to the equipment unless directed by a qualified GE OEC representative.

GE OEC Responsibilities

GE OEC Medical Systems, Inc. certifies each system and X-ray source assembly. After-sale operating practices and safety are the responsibility of the owner/operator.

X-ray Equipment Certification

GE OEC Medical Systems, Inc. certifies that when assembled according to manufacturer's instructions, the X-ray equipment complies with the US Federal Performance standard 21 CFR Subchapter J and applicable international standards.

After-sale Operating and Safety Practices

GE OEC Medical Systems, Inc. assumes no responsibility or liability for after-sale operating and safety practices; nor can it be responsible for personal injury or damage resulting from misuse of its systems.

Communication Center Telephone Numbers

If the system does not operate properly or fails to respond to the controls as described in your operator’s manual, call GE OEC Medical Systems, Inc. to request service. The communication center's telephone numbers are listed below:

US: 800 874-7378
China: 800 810-8188
All others: Contact local GE Medical Systems, Inc. office.

You may also call these numbers to order circuit diagrams, component part lists, calibration instructions or other information which will assist qualified service engineers to repair the system.

Ordering Consumable Items

You may order GE OEC consumables such as steri-drapes and printer paper, by phone, fax, or on-line.

Phone

1. Call the number that corresponds to your geographical location.

   US: 800 558-5102

   Canada: 800 668-0732

   China: 800 810-8188

   All other locations: Contact your local sales representative.

2. Establish an account with the customer service representative.

3. Place your order.

Fax

If you have a catalog and a GE Fax Order form, complete the form and fax the form to the fax number listed on the form. If you do not have a catalog or forms, you can obtain them by dialing the number listed for your geographical location.

On-line

You can order consumables on the GE Medical System, Inc. web site from any geographical location but prior to ordering you must register on-line to open an account. Registration is free.

1. Go to *www.gemedicalsystems.com*.

2. Register to open an account.

NOTE: *Record your user name and password for future account access.*

3. Login using the user name and password that you established when you registered.

4. Browse through the on-line catalog and locate the OEC Supplies that you want to purchase.

NOTE*: If you have difficulties, dial the telephone number listed previously for your geographical location or contact your local sales representative.*

Safety Hazards

Potential hazards exist in the use of medical electronic devices and X-ray systems. Operators using the equipment should understand the safety issues, emergency procedures, and the operating instructions provided.

Questions and comments regarding safety should be addressed to the GE OEC Medical Systems, Inc. service organization nearest them. Unresolved problems should be referred to:

Vice President of Quality and Regulatory Affairs
GE OEC Medical Systems, Inc.
P.O. Box 25296
Salt Lake City, Utah 84125-0296
(801) 328-9300

GE OEC Medical Systems has designated the following entity to act as the European Union (EU) representative in matters dealing with the Medical Devices Directive under Annexes I and II:

GE OEC Medical Systems, GmbH
Wilhelm-Maisel Strasse 14
90530 Wendelstein, Germany
Phone: 011-49-9129-282830
Fax: 011-49-9129-270972

The following pages describe hazardous and potentially hazardous conditions, and how to adequately protect yourself and others from possible injury.

Safety Hazard Alerts

There are three hazard classifications, which are denoted and prioritized by the alert words:

1. Danger
2. Warning
3. Caution

This list describes the use of each classification:

Alert	**Circumstances for Use**
DANGER	Danger indicates an **imminently** hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Warning indicates a **potentially** hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Caution indicates a **potentially** hazardous situation which, if not avoided, may result in moderate to minor injury, equipment damage or loss of data.

Explosion

If your system complies with the requirements of IEC 60601-1 regarding Anesthetic Proof (AP) equipment, an AP label will be located on the equipment. An AP label means that under normal conditions certain components may be operated safely in close proximity to flammable gases.

However, if an abnormal condition occurs, such as the room fills with flammable gas, steps must be taken to prevent the gas from coming in contact with non AP rated components within the equipment. Follow these guidelines:

1. Do not turn the system off or unplug it from the AC receptacle.

2. Do not operate any other electrically powered equipment.

3. Evacuate all personnel from the area and ventilate with fresh air. Avoid operating any automated (electrically operated) doors or windows.

4. Contact your local fire department as soon as possible.

Implosion

If your equipment has a Cathode Ray Tube (CRT) do not locate objects so that they might fall and strike the tube causing it to implode. Use caution when working around the tube. The coating on the glass can also produce toxic dust and fumes. If a CRT implodes:

1. Remove power immediately.
2. Evacuate the area.
3. Contact an appropriate staff member that is familiar with hazardous material disposal.
4. Request service to replace the monitor.

Equipment Stability and Positioning

If your system is mounted on wheels and casters and it is moved or operated improperly it could roll out of control. Follow these guidelines:

- Two people should maintain control of the equipment when moving up or down an incline.
- Place all mechanical assemblies in their most compact (transport) position and lock brake handles prior to moving the equipment.
- Use the handles designed for moving the equipment and mechanical assemblies.
- Never attempt to move the system up or down steps.
- Do not operate the equipment on unlevel floors.
- Do not lock the wheel brakes and leave the equipment unattended on unlevel floors.
- Always apply the wheel locks when the system is in its final position.
- Do not move the equipment if the casters or wheels are not functioning properly.
- Mechanical shocks to the equipment while disk drives are accessing information may cause damage to the disk drive.

Motorized Mechanical Movement

If your equipment has motorized mechanical assemblies follow these guidelines:

- Always observe mechanical assemblies when operating the motor to avoid pinching or collision with a person or object.
- Use care when working around equipment to avoid unintentional motor actuation. Do not carelessly place objects on the equipment or bump or lean against the equipment.
- Observe and prevent articles of clothing from getting caught in moving parts.

Improperly Attached Equipment

If your equipment accommodates a film cassette holder or some other piece of equipment that can be attached or removed, follow these guidelines:

- Use only equipment supplied by GE OEC Medical Systems, Inc.
- Attach the equipment properly. Incorrectly attached equipment could fall, causing injury to the patient or operator.

***NOTE**: Refer to the Technical Reference Chapter for the correct dimensions of items that may be used in conjunction with this product, such as radiographic film cassettes.*

Electrical Shock

Observe the following safety procedures to avoid electric shock or serious injury to operators and patients and to avoid system malfunction.

- Make all electrical connections to equipment while outside the patient environment. Do not touch a connector and the patient at the same time.
- Do not bypass, jumper or otherwise disable the safety interlocks.
- Do not remove any of the assembly covers. Only trained service representatives should perform repairs.
- Do not place food or beverage containers on any part of the equipment. If spilled they can cause short circuits.
- Always remove power to the equipment before cleaning. Use a slightly damp cloth or sponge for cleaning.
- Only qualified service engineers are allowed to service or repair a system.

WARNING

Electrical circuits inside the equipment may use voltages which are capable of causing serious injury or death from electric shock. To avoid this hazard, never remove any of the cabinet covers.

Electrical Fire

In the event of electrical fire perform the following emergency procedure:

***NOTE**: Any emergency procedure developed by the owner, for the area in which the system is used, should include these safety measures:*

- Remove electrical power to the system by placing the power switch in the off position.
- Unplug the power cord from the AC receptacle.
- Evacuate personnel from the area.
- Only use a fire extinguisher that is approved for use on electrical fires.
- Call your local fire department for help if necessary.

WARNING

The use of the wrong type of fire extinguisher presents electrical shock and burn hazards. To avoid these hazards, a fire extinguisher which meets applicable regulations and standards must be available in the room where the equipment is being used. Remember that equipment that is equipped with batteries is a source of electrical current, even when AC power is disconnected.

Ground Fault

If the operating room has a ground fault alarm and the alarm is actuated:

1. Do **not** operate the system.
2. Call a qualified service technician.

Radiation Exposure

General Protection

WARNING
This equipment either produces or is used in the vicinity of ionizing radiation. Observe proper safety practices during operation.

- The owner must designate areas suitable for safe operation and service of the equipment and ensure they are only used in those areas.
- The owner must ensure that all personnel wear appropriate protective clothing and radiation monitoring devices while using the equipment.
- Remain alert for visual indicators and audible alarms that are activated when ionizing radiation is being produced by equipment in the work area.

Source-to-Skin Distance

International regulations specify that a minimum source-skin distance be maintained, except for specific surgical applications. Some medical imaging equipment may have a skin spacer attached in order to meet this requirement.

WARNING

Removing the skin spacer may result in increased radiation exposure to the patient. The rate of exposure increases exponentially as the anatomy is positioned closer to the X-ray tube.

The skin spacer should only be removed on the instructions of a physician. The spacer should be reattached to the collimator assembly immediately following the procedure.

Ingress of Fluids

Excessive amounts of fluids such as antiseptics, cleaning solutions or bodily fluids may damage internal components if they are allowed inside the equipment. Use drapes, if necessary, to protect equipment when performing procedures and do not apply excessive amounts of fluid when cleaning.

WARNING

The X-ray system is not rated for water-tight operation. If liquids drip into the equipment, disconnect the power cord and do not operate the system until it can be cleaned and inspected by a qualified service engineer.

Cooling Efficiency

Draping some X-ray equipment may restrict airflow to components that provide heat sinking and to vents designed to cool the equipment. Drape equipment and cover vents only when exposure to excessive fluids is unavoidable and extended use of the equipment is not required.

Burns

Extended use of imaging equipment may cause components such as X-ray tubes to reach temperatures capable of inflicting burns. Use care when positioning equipment to avoid placing hot components in close proximity to patients and personnel. An anesthetized or unconscious patient is incapable of sensing and reacting to a hot component.

Electromagnetic Compatibility Statement

This equipment may generate and use radio frequency energy. The equipment must be installed and used according to the manufacturer's instructions in order to avoid radio frequency interference. If this equipment generates or receives interference do the following to correct the problem:

- Verify that the equipment is the cause by turning the system on and off.
- In the event of unintended motor actuation, immediately remove power to the equipment.
- In the event of unintended X-ray actuation, immediately remove power to the equipment.
- Reorient the equipment until the interference stops.
- Relocate the equipment with respect to other equipment in the room.
- Plug the equipment into a different outlet so that the equipment and the receiver are on different branch circuits.
- Use only input/output (I/O) cables supplied by GE OEC Medical Systems, Inc.

Equipment Malfunction

If either the hospital or equipment circuit breakers trip, an equipment malfunction may be indicated. Do not attempt to operate the equipment until it has been checked by a qualified service engineer.

If any of the equipment controls fail to respond as indicated in this manual, you should:

1. Remove power to the equipment by placing the power switch in the off position and unplugging the power cord from the AC receptacle.

2. Notify a qualified service engineer.

3. Do not operate the equipment until the service technician advises that it is operating properly.

External Devices

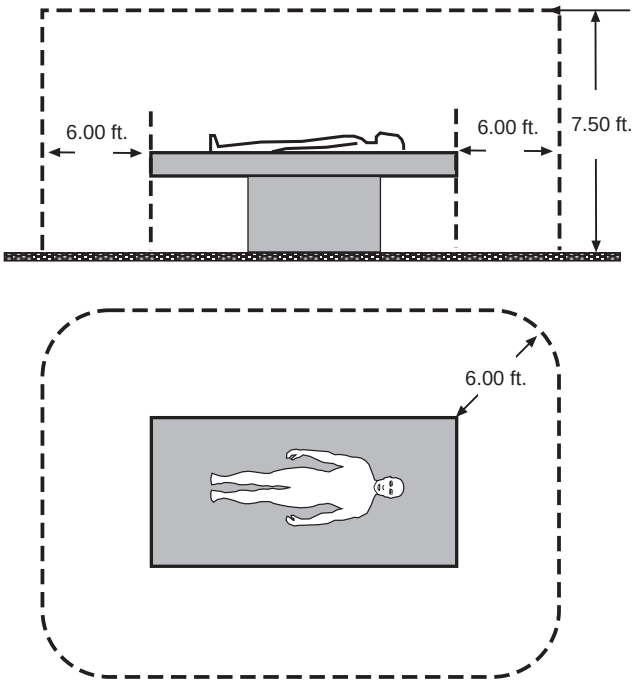
To ensure patient safety, only connect external equipment that has been approved by GE OEC Medical Systems, Inc. All equipment attached to the external interface connections must meet the requirements of IEC 60601-1 when operated within the patient environment. When used outside of the patient environment, each externally connected device must comply with the relevant IEC/ISO requirements for that device. In any case, the combination of all externally connected equipment shall not cause the leakage current of any device used within the patient environment to exceed the limits stated in IEC 60601-1.

Patient Environment

Within the United States

Within the US the Patient Environment is defined by NFPA 99 and UL 2601-1. In areas in which patients are normally cared for, the patient environment is the space with surfaces likely to be contacted by the patient or an attendant who can touch the patient.

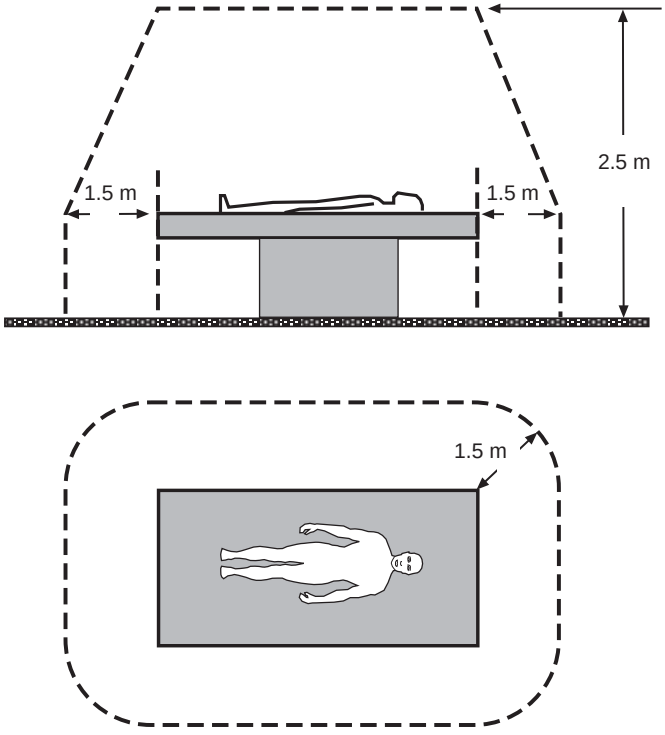
This encloses a space within the room 6 ft. beyond the perimeter of the bed (examination table, dental chair, treatment booth, etc.) in its intended location, and extending vertically 7.5 ft. above the floor.



Outside the United States

Outside the US the patient environment is defined by IEC 60601-1-1. In areas in which patients are normally cared for, the patient environment is the space with surfaces likely to be contacted by the patient or an attendant who can touch the patient.

This encloses a space within the room 1.5 m beyond the perimeter of the bed (examination table, dental chair, treatment booth, etc.) in its intended location, and extending vertically 2.5 m above the floor.



Chapter 2

Setup and Positioning

Overview

This chapter describes:

- Workstation components
- Moving the OEC Workstation
- Adjusting the brake
- Turning the system ON
- Turning the system OFF

Workstation Components

If the OEC Workstation will be used as an independent Workstation, plug it in an approved AC receptacle and power on.

The Workstation is used in conjunction with a number of generators. Some generators are hard-wired to the Workstation and will not require being connected each time the system is used. Other generators, such as the mobile units, are connected with the interconnect cable and disconnected after each use.

Please refer to your appropriate generator operator manual to determine if connecting with the interconnect cable is necessary. The generator operator manual will contain instructions for connecting that generator to the OEC Workstation.

CAUTION

The OEC Workstation should only be used in conjunction with an approved compatible and appropriately configured OEC generator. Damage may result to the system if incompatible components are connected. This workstation is not compatible with SERIES 9600, or 2600 and earlier products.

The items listed below identify the location of components used on an OEC Workstation during setup and positioning for a mobile system.

1. Interconnect cable
2. Wheel lock pedal
3. Power switch (green illuminated pushbutton)
4. Workstation handle and cable hanger (one each side)
5. Power cable

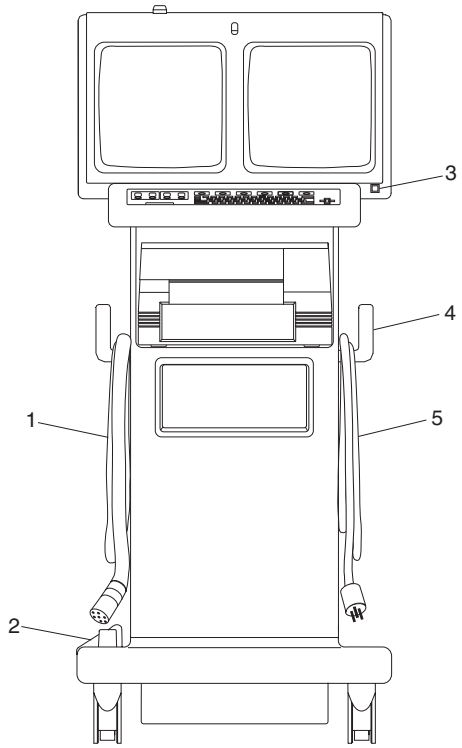


***Figure 2-1**. Workstation Component Identification.*

The Workstation back panel has a green indicator light showing the Workstation is being powered.

Circuit breakers are located below the green indicator light and on the right side of the back panel. See Chapter 14, "Technical Reference" for more details on each circuit breaker.

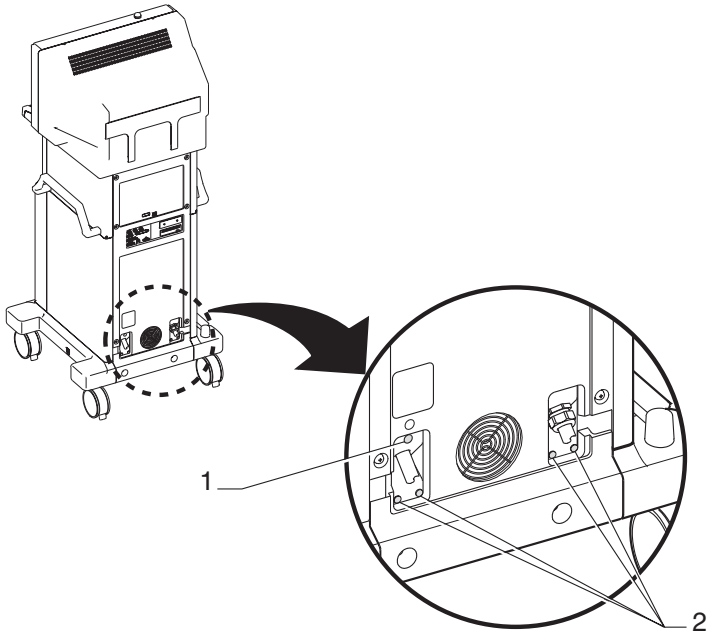


Figure 2-2. *Workstation Back Panel.*

1 Green Indicator Light

2 Circuit Breakers

Brake Pedal

The Workstation brake pedal has three positions that control wheel movement. The pedal is located on the left side of the Workstation. The pedal positions are:

Position	Description
1	The wheels close to the pedal roll in a straight line, and the wheels opposite pivot freely. Place the brake pedal in this position to move the Workstation long distances.
2	Allows all the wheels to pivot freely. Place the brake pedal in this position to easily maneuver the Workstation during final positioning.
3	Prevents all four wheels from pivoting or rolling.

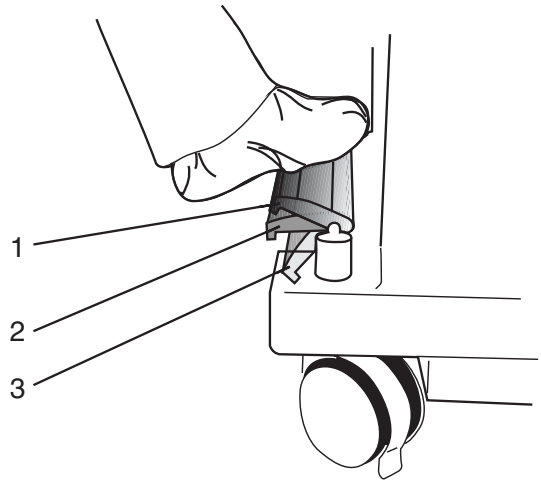


Figure 2-3. *The OEC Workstation brake pedal.*

Moving the Workstation

CAUTION
Familiarize yourself with the location and mechanical operation of all controls prior to moving the system.

1. Press the Workstation power switch to turn the system off.
2. If using a mobile system, unplug the Workstation power cord. Disconnect the interconnect cable from the generator. Coil and secure the cables around the Workstation's handles.
3. Unlock the pedal brakes on the Workstation.
4. Guide the Workstation to its destination using the handles as shown in Figure 2-4.
5. When you reach your destination, apply the wheel brakes on the Workstation (see Figure 2-3).

CAUTION
Two people should maintain control of the Workstation when moving up or down and incline. Do not move the Workstation over inclines greater than 10 degrees.
Do not move the Workstation up or down stairs or steps.
Do not lock the Workstation in place on an incline greater than 5 degrees.

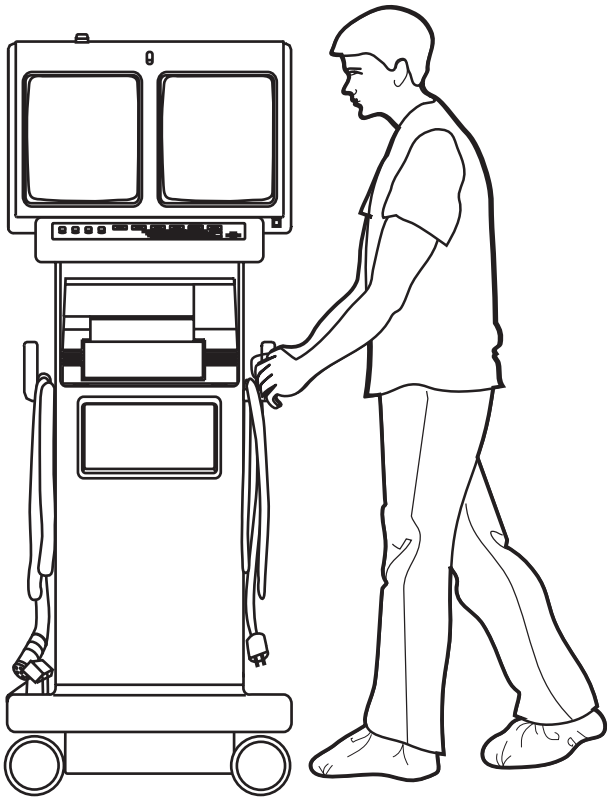


Figure 2-4. *Moving the Workstation.*

Turning the Workstation ON

Press the green Workstation power switch. The light within the switch will turn ON indicating the power is turned ON. The system will begin the power up sequence.

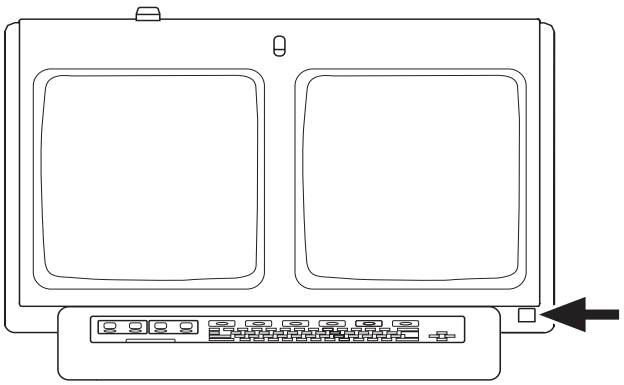


Figure 2-5. *Workstation monitor power switch.*

The Workstation is ready for operation when the PATIENT INFORMATION screen is displayed on the right monitor.

NOTE*: If the Workstation monitor fails to display the PATIENT INFORMATION screen on the right monitor, you must restart the system.*

To restart the system, press the power button, wait five seconds and then press the power button again. If restarting the system fails, call GE OEC Communication Center for service.

Turning the Workstation OFF

When the Workstation power button is in the OFF position, neither the Workstation nor the generator will operate.

Press the green Workstation power button. The light within the button will turn off indicating the power is turned OFF.

CAUTION
When you turn the system OFF, always wait at least 5 seconds before powering the system back ON. This will help prevent operational problems.

Mobile Systems

If pressing the power button fails to turn the Workstation OFF, unplug the power cord from the AC receptacle. Call for service.

CAUTION
All power to the system has not been removed until the Workstation is unplugged from the electrical outlet.

Fixed Room Systems

If pressing the power button fails to turn the Workstation OFF, press the Emergency OFF button. Call for service.

Please refer to the applicable generator operator manual for more information.

CAUTION
Power is not completely removed by pushing the power switch. Power is still being received by the Workstation until the main breaker is turned OFF.

Chapter 3

Using the Workstation Controls

Overview

This chapter describes how to use the OEC Workstation controls for imaging and post-processing. Before using the Workstation, you should become familiar with the controls located on the following components:

- Touchscreen
- Workstation keyboard
- Infrared (IR) Remote control

Refer to the applicable generator operator manual for instructions on using other controls that accompany the system you own. Familiarize yourself with all controls before using the system.

Touchscreen Controls

The right monitor provides a touchscreen for interacting with the Workstation. Using the touchscreen (and the keyboard for text-entry) you can:

- Enter and view patient information
- View and process images
- Configure the X-ray switches
- Set imaging parameters
- Annotate images

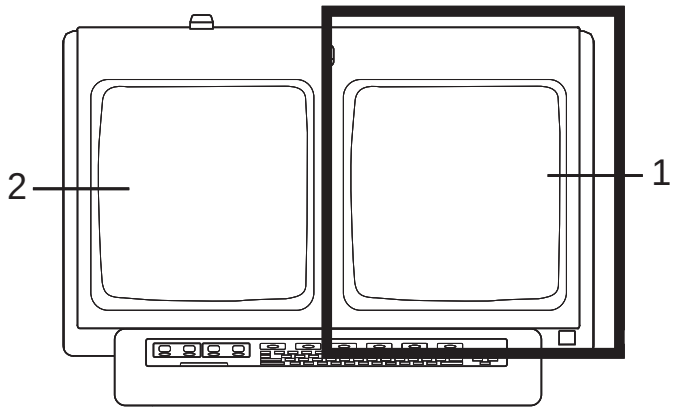


Figure 3-1. *Touchscreen monitor.*

1 Touchscreen monitor
2 Active image screen

To select a touchscreen button, or a field for text-entry, touch it and quickly remove your finger from the touchscreen.

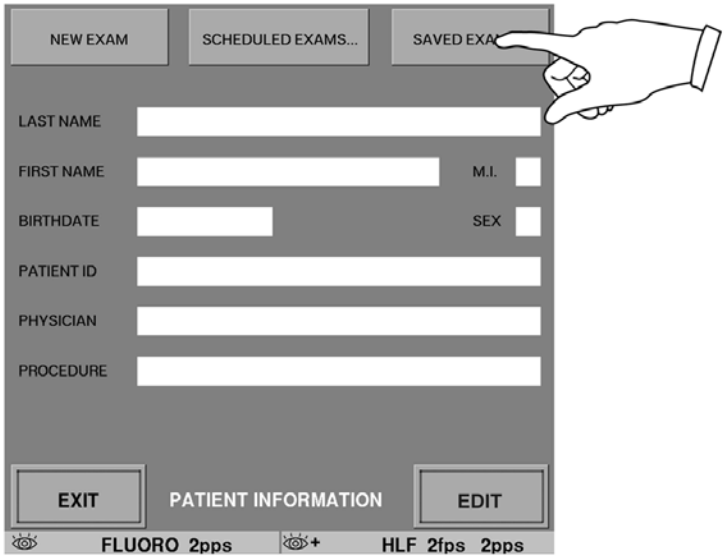


Figure 3-2. *Using the touchscreen.*

OEC Workstation Keyboard

The Workstation keyboard controls include navigation, text-entry, image processing, and function keys.

Two versions of the Workstation keyboard are available: text and icon. The layout and functionality of each keyboard is identical. Only labeling distinguishes text and icon versions of the keyboards.

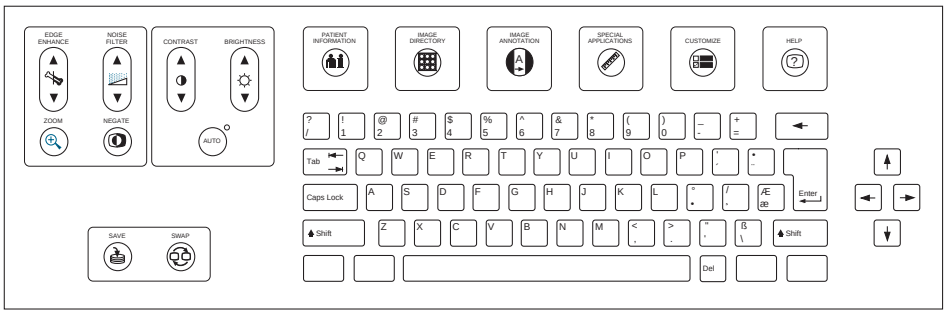


Figure 3-3. *OEC Workstation Text Keyboard Layout.*

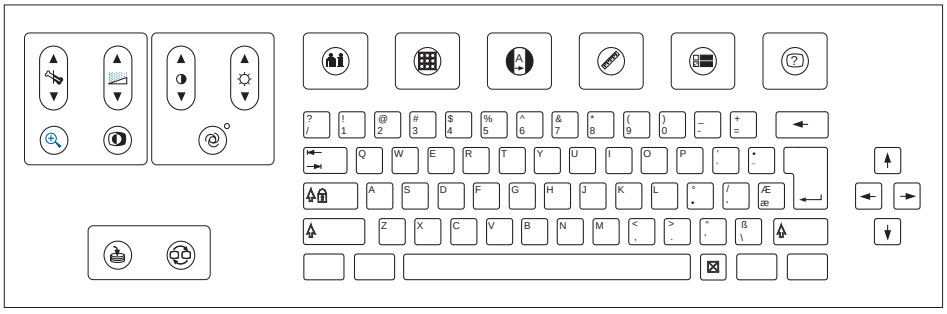


Figure 3-4. *OEC Workstation Icon Keyboard Layout.*

Navigation and Text-Entry Keys

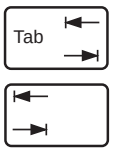
Workstation navigation keys allow you to move the cursor, edit text, and make button selections from the touchscreen.

To select a button, touch the button on the screen.

Touchscreen buttons can also be selected by using the tab key to move to a button. Once the button is selected and highlighted, press ENTER.

NOTE: *A touchscreen button possesses focus when its text label is outlined with a dotted border. Press ENTER to enact the button with focus. A button is active when it possesses the focus.*

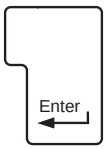
The text-entry keys allow you to enter text in upper and lower case letters.



TAB

Moves the cursor to the next text-entry field.

TAB also changes the focus to the next touchscreen button in left-to-right, top-to-bottom order.



ENTER

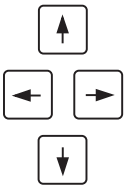
Moves the cursor to the next text-entry field. Also selects the touchscreen button that possesses the focus.

BACKSPACE

Deletes one character to the left of the cursor. Also deletes a selected marker or comment.

DELETE

Deletes a selected marker or comment in IMAGE ANNOTATION screen.



ARROWS

Used for fine positioning of image annotation and measurements on the touchscreen.

Diacritic Keys

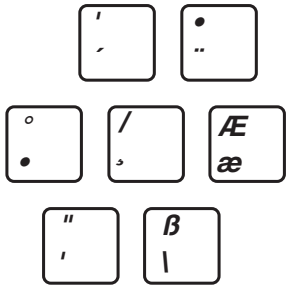


Figure 3-5*. Diacritic Keys on the Workstation Keyboard.*

Diacritic keys can be used in any language.

To use the Diacritic keys:

1. Press the diacritic key.
2. Press the letter to receive the diacritic mark.

Image Processing Keys

Image processing keys apply image processing attributes to images displayed on the left monitor.

Before applying image processing, always save the image. If Auto Save is not enabled on the Workstation, press the SAVE key.

The following pages describe how each image processing key operates.

EDGE ENHANCEMENT

Press ▲ or ▼ once to view the current level of edge enhancement. The current edge enhancement level is shown on the edge enhancement indicator bar displayed on the left monitor.

Edge Enhancement Display

Changes to edge enhancement are indicated by a corresponding rise or fall in the non-shaded portion of the indicator bar. Display of the indicator bar times-out two seconds after the button is released or immediately when any X-ray switch is pressed.

Edge enhancement emphasizes edges in an image. You can select an edge enhancement level from 0 to 100 in increments of 10.

Press ▲ to increase the amount of edge enhancement applied. Press ▼ to decrease amount of edge enhancement applied. Pressing and holding the key, or repeated pressing changes the value.

NOTE: *Edge Enhancement can be applied to static and dynamic images. This function can be applied to live and post-processed images.*

NOISE FILTER (Averaging)

Press ▲ or ▼ once to view the current noise filtering level. The noise filter level is shown on the noise filter indicator bar displayed on the left monitor.

Noise Filter Display

Changes to noise filtering are indicated by a corresponding rise or fall in the non-shaded portion of the indicator bar. Display of the indicator bar times-out two seconds after the ▲ or ▼ button is released, or immediately when any X-ray switch is pressed.

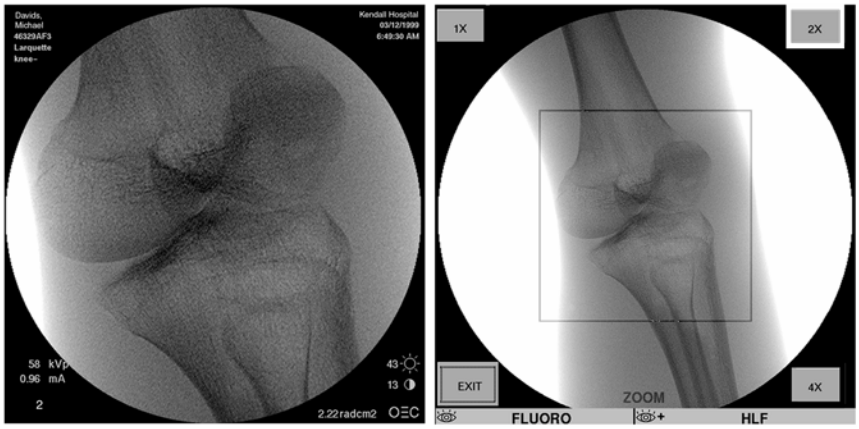
Press ▲ to increase the amount of noise filtering applied. Press ▼ to decrease the amount of noise filtering applied. No bar showing on the indicator bar means minimal filtering is applied.

Averaging provides image noise reduction to create a smoother image. Noise filter can be applied during live fluoro for all image modalities. Higher levels of noise filtering produce a smoother (or less noisy) image, but may also cause more lag when imaging moving objects or anatomy. You may choose from minimal, low, medium and high levels of filtering.

NOTE: *Noise filtering is a real-time processing function and cannot be adjusted on static images. The noise filtering level may be modified only during playback of 30 FPS (25 FPS on 50Hz systems) runs.*

ZOOM

Press the ZOOM key to activate the zoom function.



Magnified Image
Left monitor

Zoom Screen
Right Monitor

The left monitor image is copied to the right monitor and the left image is displayed by default at two times the magnification. A square box representing the region of interest is displayed on the right monitor. Drag (touch and move) the box to move the region of interest.

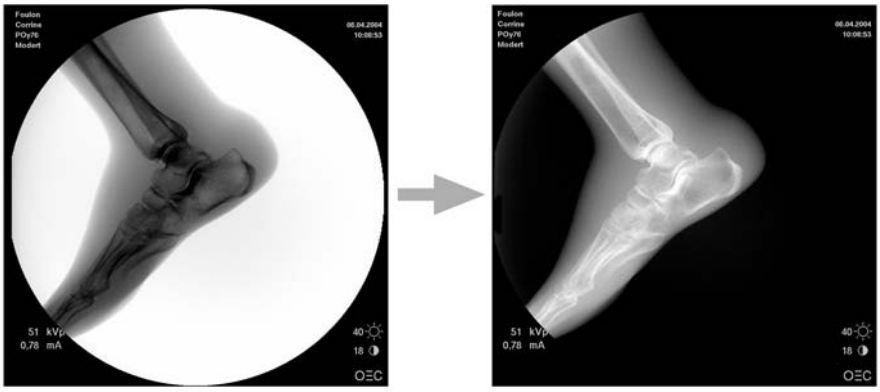
Select the 4X button to increase magnification to four times. Select the 1X button to restore the image to original size.

Select the EXIT button or press the ZOOM key to close the ZOOM screen. If the image is magnified when EXIT or ZOOM is selected, the left monitor image remains magnified until an X-ray switch is pressed or until another image is recalled.

If the Workstation is equipped with a cine disk, you can apply zoom to a single frame of a cine run.

NEGATE

Negate reverses the display of light and dark values in an image. Press the NEGATE key to activate the negate function.



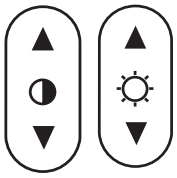
Positive image **Negated Image**

Negate is applied to the current image on the left monitor and to all subsequent images produced until negate is disabled.

Until disabled, each time Fluoro is pressed on the footswitch or handswitch, the image will be negated.

To disable negate, press the NEGATE key again.

NOTE: *Negate can be applied to static and dynamic images.*



CONTRAST and BRIGHTNESS

Press ▲ or ▼ once on either key to view the contrast (left key) and brightness (right key) level display.

Contrast and Brightness Display

Press either key again to change the level of contrast or brightness. Press ▲ to increase. Press ▼ to decrease. Short, quick presses of the key adjust the level one increment at a time. Pressing and holding the button down adjusts it more rapidly.

Changes are indicated by a corresponding rise or fall in the shaded portion of the indicator bar. Display of the indicator bar times-out two seconds after the ▲ or ▼ key is released or immediately when any X-ray switch is pressed.

The current contrast or brightness level is shown in a range from 0-100 on the indicator bar displayed on the left monitor and in a numeric value displayed on the lower right corner of the left monitor image.

AUTO

Enables automatic adjustment of contrast and brightness on the left monitor image. When enabled, the system automatically selects the optimum contrast and brightness values for the left monitor image. If the LED next to the AUTO key is illuminated, Auto is enabled.

To enable automatic contrast/brightness, press the AUTO key. To disable automatic contrast/brightness selection, press the AUTO key or contrast/brightness buttons. The Auto LED is not illuminated when Auto is disabled. Pressing AUTO after manually adjusting the levels will readjust the levels you have set.

You can enable AUTO from the generator control panel or Workstation keyboard.

SWAP

Press the SWAP key to exchange images between the left and right monitor. When only one image displays on the left monitor, SWAP will copy the image to the right monitor.

SAVE

Press the SAVE key to save the left monitor image on the system disk. Up to 400 static images can be stored on the system disk.

The image number is displayed on the bottom left corner of the left monitor screen. This number corresponds with the image number in the image directory for the exam displayed.

When storage capacity has been reached, each new image is saved over the oldest image on the disk.

Function Keys

Use the function keys located on the top row of the keyboard to display touchscreen menus on the right monitor.

PATIENT INFORMATION

Displays the PATIENT INFORMATION screen. Use this screen to enter patient information. Refer to Chapter 4, "Patient Information."

IMAGE DIRECTORY

Displays the IMAGE DIRECTORY screen. Image directory allows you to review, print, and archive stored images and dose information. Refer to Chapter 7, "Image Review, Hardcopy and Archive" for details.

IMAGE ANNOTATION

Displays the IMAGE ANNOTATION screen. Image Annotation allows you to place markers, add comments, and crop images. Refer to Chapter 9, "Annotating Images" for details.

SPECIAL APPLICATIONS

Displays the MEASUREMENT screen. This screen allows the user to place measurements on an image. Refer to Chapter 10, "Special Applications" for details.

CUSTOMIZE

Displays the CUSTOMIZE screen. Use the CUSTOMIZE screen to configure system setup options. Refer to Chapter 11, "Customizing" for details.

HELP

Displays system configuration information.

Remote Control

You may also use the optional infrared remote control to interact with the touchscreen.

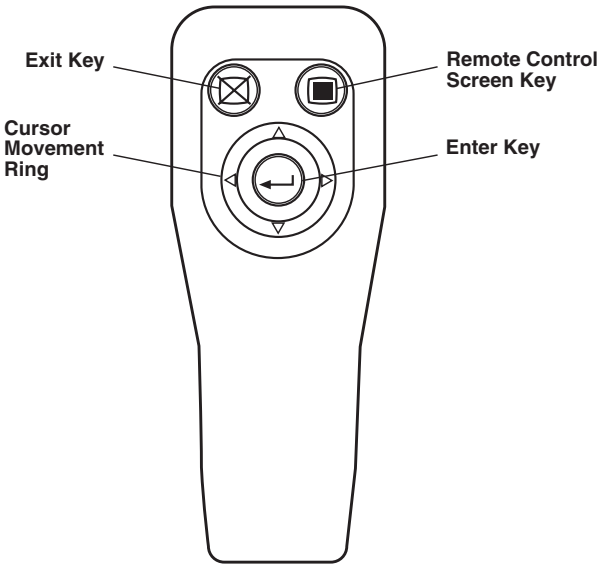
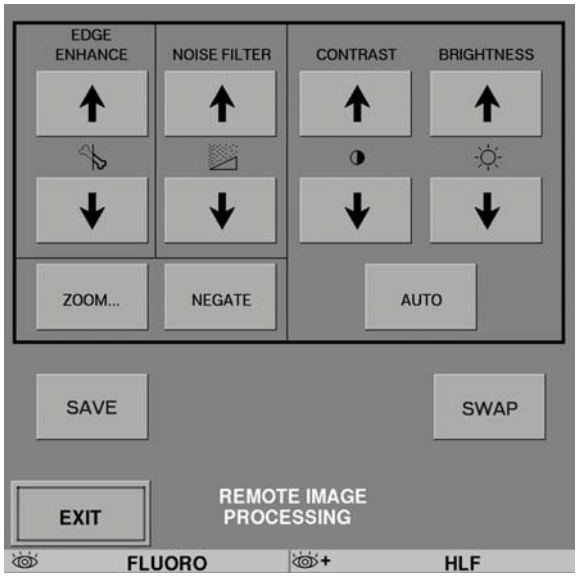


Figure 3-6. *Optional Remote Control.*

The REMOTE IMAGE PROCESSING screen allows remote access to edge enhancement, noise filter, contrast/brightness, negate and zoom functions. You may also save images displayed on the left monitor and swap images between monitors.

Press this key to display the REMOTE IMAGE PROCESSING screen.



Remote Control Screen

Press the arrows to move the cursor from button to button. The focus will move to the closest button in the direction of the arrow pressed.

Once the cursor is placed on a touchscreen button, the button will possess the focus. Press the ENTER key in the center of the ring to activate the button function. To move an item with the focus, such as a zoom box or marker, use the arrow keys. To remove the focus, press ENTER again.

NOTE: *The IR remote may be used to activate any touchscreen button.*

Chapter 4

Patient Information

Overview

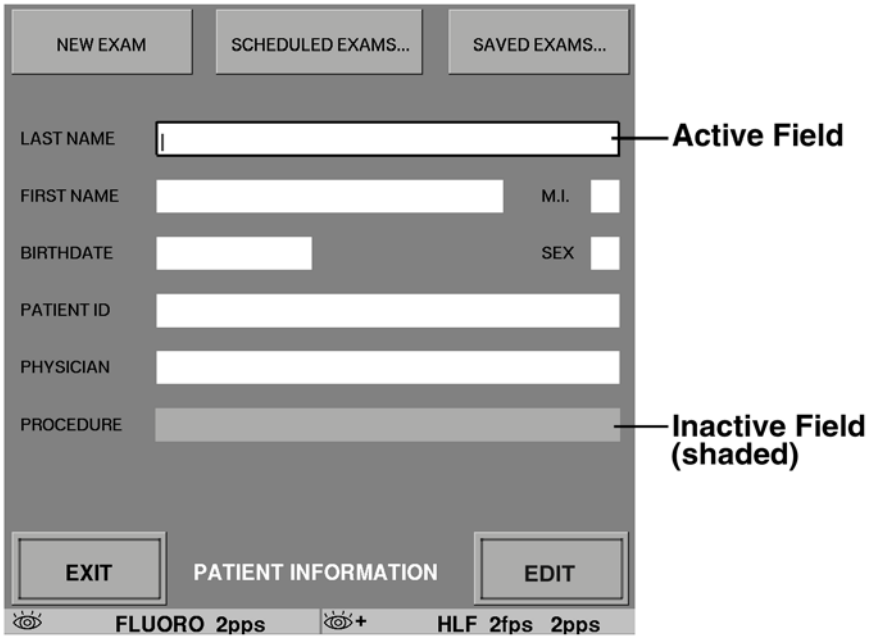
Use the PATIENT INFORMATION screen to:

- Enter patient information.
- Display SCHEDULED EXAMS screen and begin a new exam.
- Display SAVED EXAMS screen and select a previously saved exam containing images.
- Edit patient information.

NOTE: *For proper documentation of images, you should always enter patient information before beginning a new exam. If a patient name is not entered, images will be saved under the default name "UNNAMED."*

Patient Information Screen

The PATIENT INFORMATION screen is displayed automatically at system start-up.



PATIENT INFORMATION screen

Press the PATIENT INFORMATION key on the Workstation keyboard to display this screen at any time.

The active fields are defined in the CUSTOMIZE PATIENT INFORMATION screen in the Customize function. Inactive fields are "ghosted" and cannot be selected. (Refer to Chapter 11, "Customizing" for details.)

A cursor indicates which field you are in. Use the TAB or ENTER key, or touch the next box to move the cursor to the next active field. Each field containing information will be displayed on all static and live images for the patient.

Once you begin imaging, switch screens or select EXIT, the fields are locked. To edit the fields, you must select EDIT on the PATIENT INFORMATION screen.

Enter Patient Information

Enter patient information immediately before a procedure.

At system startup:

1. Using the keyboard letters, enter patient last name.
2. Move through the fields to complete patient information.
3. Select the EXIT or NEW EXAM button on the screen when you have finished entering patient information.

   If you select EXIT: The PATIENT INFORMATION screen closes and the MAIN screen is displayed. The system is ready for you to begin taking X-rays for the patient you have just entered.

   If you select NEW EXAM: The patient information you just entered is saved in the SCHEDULED EXAMS list and the PATIENT INFORMATION screen is cleared.

Once you have entered patient information, you may immediately begin taking X-rays for that patient. The patient information screen will automatically close and display the MAIN screen.

Each time you choose NEW EXAM or SCHEDULED EXAMS, the generator settings are reset to default parameters. This includes the cine overwrite warning, fluoro timer, contrast/brightness, noise filtering and mode settings. The collimator leaves and iris will adjust to a full open position.

Settings will not be retained with the exam information. When the current patient is changed, any imaging parameters set will reset. Parameters will need to be reset when returning to re-image the patient. See Chapter 11,"Customizing" for any settings that can be pre-determined for default.

Scheduled Exams Feature

The scheduled exams feature allows you to enter patient information prior to exams and retrieve it at the beginning of the procedure.

Patient information can be stored in SCHEDULED EXAMS for 48 hours. If X-rays are not taken within 48 hours, the record is deleted. Once X-rays have been taken, the patient record is moved to SAVED EXAMS.

Set up the Scheduled Exams feature

NOTE: *To update the worklist from the hospital network, please refer to your DICOM supplement for instructions.*

1. Complete the PATIENT INFORMATION screen.

2. Press NEW EXAM to send the information to the SCHEDULED EXAMS screen. An empty PATIENT INFORMATION screen will display.

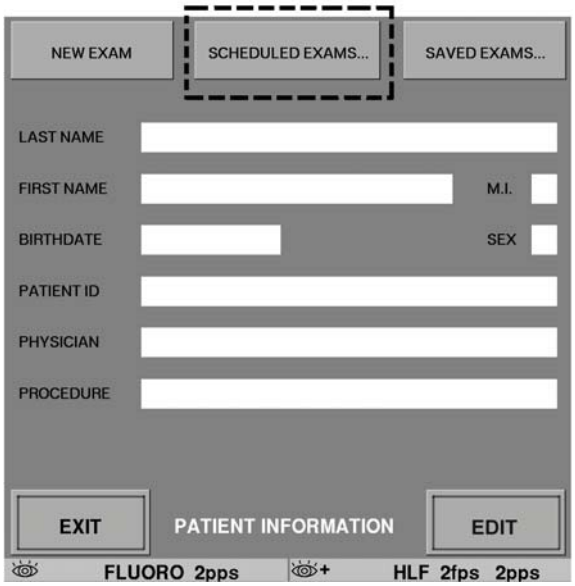
3. Repeat steps 1 and 2 for each patient's information to be saved in SCHEDULED EXAMS. X-rays for each patient must be taken within 48 hours.

4. When completed, press NEW EXAM to send the last patient information entered to the SCHEDULED EXAMS list, or EXIT to begin imaging that patient.

NOTE: *If you perform this function during or prior to an exam, reselect the current patient being imaged before continuing exam.*

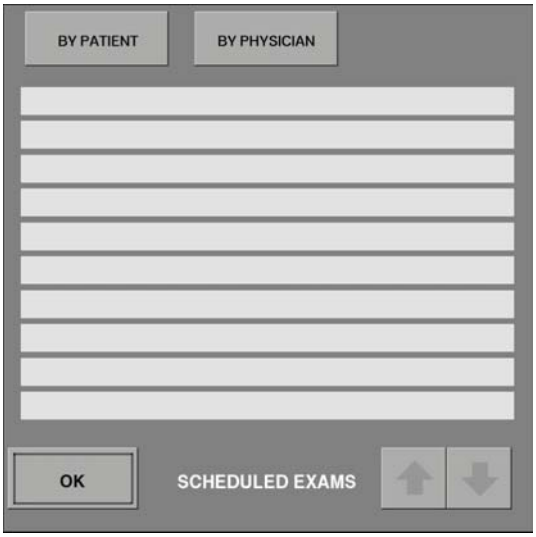
Select a patient from Scheduled Exams

1. Select SCHEDULED EXAMS from the PATIENT INFORMATION screen.



PATIENT INFORMATION screen

The SCHEDULED EXAMS screen displays.



SCHEDULED EXAMS screen

The SCHEDULED EXAMS screen displays an alphabetical list of scheduled patients. To list by physician, select the BY PHYSICIAN button on the screen.

2. Touch a patient field.

3. Select the OK button to close the SCHEDULED EXAMS screen and display the PATIENT INFORMATION screen for the selected patient.

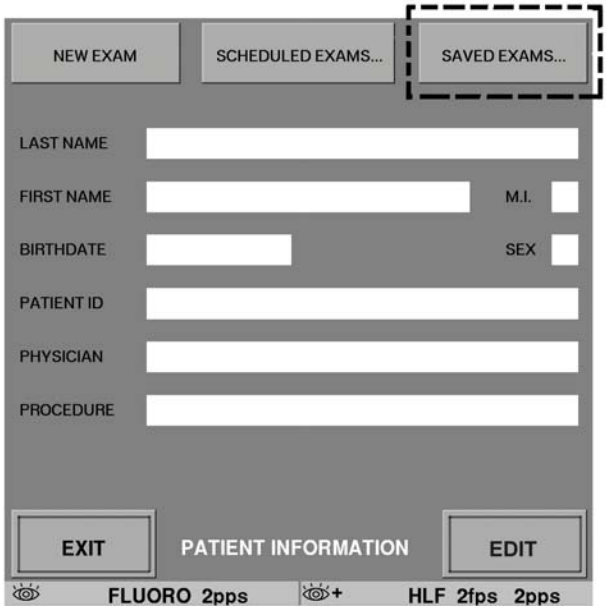
You may begin taking X-rays for the selected patient.

NOTE: *Always ensure the correct patient name is displayed on the PATIENT INFORMATION screen.*

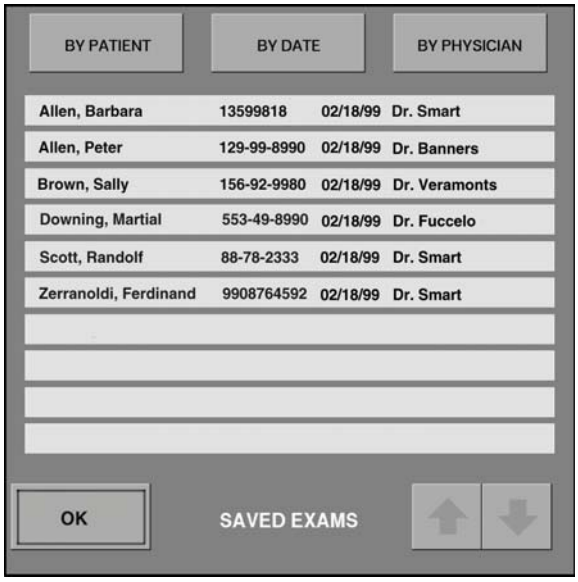
Select a Patient from Saved Exams

The SAVED EXAMS screen contains a list of previously saved exams. If no images were saved during an exam, the system will not save the patient information. If a last name was not entered for the patient before X-rays were produced, images are stored under the last name "UNNAMED."

1. Select the SAVED EXAMS button from the PATIENT INFORMATION screen to view a list of patients examined.



PATIENT INFORMATION screen



SAVED EXAMS screen

The SAVED EXAMS list displays patients alphabetically, by last name.

- Select the BY DATE button to display the list chronologically.
- Select the BY PHYSICIAN button to display the list alphabetically, by doctor.

2. Touch a patient field and then select the OK button to display the PATIENT INFORMATION screen for that patient.

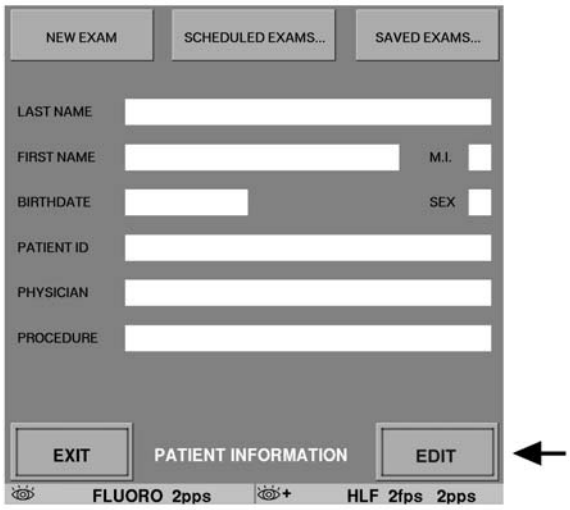
   The PATIENT INFORMATION screen now contains all the information stored for the selected patient's exam. You can:

   - Edit information in the patient record you just recalled.
   - Produce additional X-rays. Images will be saved using the date and time of the original exam.

NOTE: ***Always ensure the correct patient is displayed on the PATIENT INFORMATION screen before producing X-rays****. Otherwise, images may be stored under the incorrect patient name.*

Edit Patient Information

By selecting the EDIT button on the PATIENT INFORMATION screen, you can edit the displayed patient's information.



PATIENT INFORMATION screen EDIT button

NOTE: *Editing patient information modifies information stored with all images for that patient exam.*

To edit information

1. Highlight the patient field to be edited.
2. Edit information as needed.
3. Touch the EXIT button to update and return to the MAIN screen.

NOTE: *To edit patient information on a previously saved record in SCHEDULED EXAMS or SAVED EXAMS, recall the exam and follow the instructions for editing information.*

Chapter 5

Fluoro Imaging

Overview

This chapter describes basic fluoro features of all systems. All systems provide standard fluoroscopy modes.

Only fluoroscopy mode is available on the GSP and ESP models of the Workstation. Vascular, and Neuro-Vascular systems provide basic fluoro as well as vascular features. For an explanation of vascular imaging features, refer to Chapter 6, "Vascular Imaging."

NOTE: The MODE switch is inactive on standard fluoroscopy-only systems. Screens vary based on model configuration.

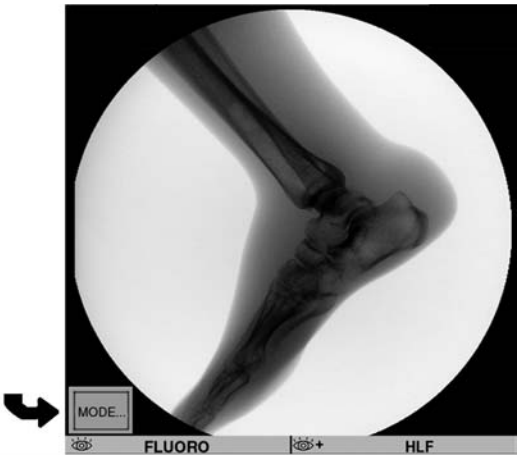
X-Ray Switch Setup

The Workstation allows you to choose between HLF and SNAPSHOT mode for standard fluoroscopy uses. Fluoro is available at all times.

MODE Screen

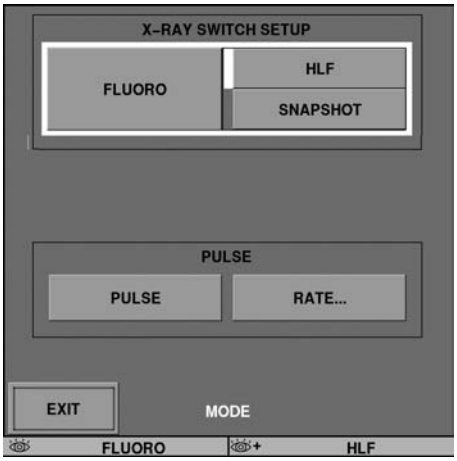
A MODE screen is provided to enable you to set up your choice of imaging pairs and select pulse rates. The following examples display how to set up mode and pulse rate for standard fluoroscopy using an ESP screen.

To display the MODE screen, select the MODE button on the MAIN screen.



MAIN Screen

The MODE screen will display on the right monitor.



MODE Screen

From this screen, you may select HLF or SNAPSHOT and enable pulsed operation. The status bar will indicate which mode you are in.

The left X-ray switch initiates fluoro imaging.

The right X-ray switch initiates HLF or SNAPSHOT, whichever is active.

To change the active mode, select the button. The highlighted bar will display next to the button and the status bar will reflect the change.

Status Bar

The status bar is located on the bottom right monitor display. During an exam, the configured active mode pair is displayed on the status bar.

The status bar below shows:

- A Fluoro shot can be initiated by pressing the left (👁) X-ray switch.
- A High Level Fluoro (HLF) shot can be initiated by pressing the (👁+) X-ray switch.

All information next to the (👁) icon describes what imaging, and pulse or cine rate is applied using the X-ray switch with that label.

All information next to the (👁+) icon describes what imaging, and pulse or cine rate is applied using the X-ray switch with that label.

If film mode is selected, the film icon is displayed in the status bar.

NOTE: *For producing film shots, refer to your generator operator manual.*

Fluoro Imaging

Fluoro mode displays live fluoroscopic images on the left monitor. After the image has been obtained, image attributes such as edge enhancement, contrast or brightness can be modified.

To produce a Fluoro image

1. Verify FLUORO is displayed on the status bar.

2. Select pulsed X-ray or low dose if desired. Use the MODE screen or the generator PULSE key to switch between continuous and pulsed X-rays.

3. Press the left () X-ray switch on the footswitch, handswitch or the X-ray ON button on the generator.

High Level Fluoro Imaging

High Level Fluoro (HLF) mode decreases noise level and improves image quality by increasing fluoroscopic mA.

Continuous HLF uses mA levels up to 12 mA.

Pulsed HLF ranging from 1-8 PPS provides pulsed fluorography. mA can increase up to 16 mA.

Automatic termination of HLF and pulsed HLF exposure occurs after each 30-second interval of continuous use. Automatic exposure termination reduces unnecessary X-ray exposure and was designed to comply with X-ray tube ratings.

WARNING!
HLF should not be used for general purpose imaging.

During cotinuous HLF, the MA can increase to as much as 12 mA. During pulsed HLF the mA can increase to as much as 16 mA. This can subject the patient and those working around the X-ray field to a significantly larger dose of radiation than they would receive during normal pulsed operation. To minimize X-ray exposure hazards, use HLF with discretion.

Standard HLF

To produce a standard HLF image

1. Verify HLF is displayed on the status bar. If SNAPSHOT is displayed, use the MODE screen to select HLF.

2. Select pulsed X-ray generation on the MODE screen or generator control panel, if desired. Continuous X-ray is the default. If pulsed operation is chosen, the pulse rate will display on the status bar.

3. Press the left () X-ray switch on the footswitch or handswitch to observe patient anatomy to confirm positioning.

4. Release the footswitch.

5. Press the () X-ray switch on the footswitch or handswitch to make HLF exposures.

SNAPSHOT Imaging

Snapshot mode creates a short-duration, single exposure to produce a high quality single image.

After the image has been obtained, image attributes such as edge enhancement, contrast, or brightness can be modified. Pulsed operation is not allowed in snapshot mode.

To produce a SNAPSHOT image

1. Select the SNAPSHOT button from the MODE screen. Verify SNAPSHOT is displayed on the status bar.

2. Press the left (👁) X-ray switch on the footswitch, handswitch or the X-ray ON button to confirm positioning.

3. When the desired image appears on the monitor, release the left (👁) X-ray switch and then press and hold the (👁+) X-ray switch to obtain the snapshot image.

Enable Pulsed X-ray

This section describes how to select and change pulse rates, and switch between continuous and pulsed imaging.

Pulsed mode generates a preset number of x-ray pulses each second while the x-ray switch is pressed. Pulsed x-rays can be used to reduce total radiation.

Please refer to Chapter 6, "Vascular Imaging" for a description of synchronized pulse mode.

When continuous mode is active, no pulse rate (PPS) will be displayed on the status bar.

- To enable pulsed operation at the currently selected pulse rate, press the PULSE key on the generator or select the PULSE button on the MODE screen.

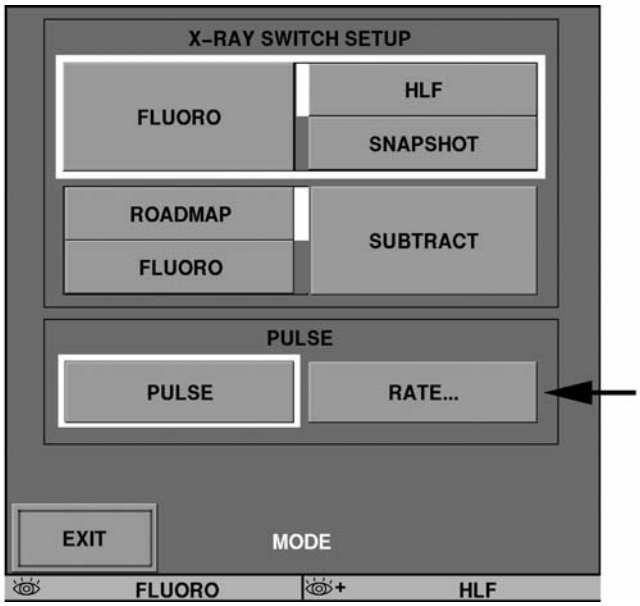
  When pulse is enabled, the PULSE button on the MODE screen will be highlighted and the pulse rate (PPS) will display on the status bar.

  The default pulse rate is 8 PPS.

NOTE: To reselect continuous operation, press the PULSE key on the generator control panel or select the PULSE button on the MODE screen. The pulse rates will no longer display on the status bar and the PULSE button on the MODE screen will not be highlighted.

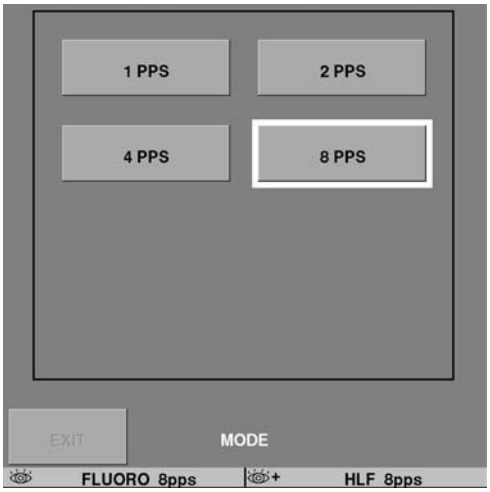
To change pulse rate

1. Select the RATE button from the MODE screen.



MODE screen with pulse enabled

The pulse rate pop-up screen will display.



Pulse Rate Pop-up

2. Select a pulse rate from the pulse rate pop-up screen.

The selected pulse rate will automatically display on the status bar and the pop-up screen will automatically close.

3. Select the EXIT button on the MODE screen to return to the MAIN screen.

Saving Images

To save the last image held on the left monitor display, press the SAVE key.

An auto save feature may be enabled that will automatically save the last image held on the left monitor display during imaging. When the auto save feature is enabled, the currently displayed image on the monitor when the x-ray switch is released will be automatically saved by the system.

See Chapter 11, "Customizing" for information on enabling the auto save feature.

Chapter 6

Vascular Imaging

Overview

This chapter explains how to produce images using vascular imaging modes. Vascular, and Neuro-vascular systems include all standard fluoroscopy features.

This chapter describes vascular imaging features including:

- Subtraction
- Roadmapping
- Synchronized pulse mode

Refer to Chapter 5, "Fluoro Imaging" for basic fluoro information. Chapter 5, "Fluoro Imaging" should be read before beginning vascular imaging procedures.

X-Ray Switch Setup

On vascular systems, two image modalities (standard fluoroscopy and vascular) are simultaneously available at start-up. Press the MODE key on the X-ray switches or generator control panel to change from one pair of imaging modes to another.

To verify which group is active and which mode pairs are available, always check the status bar display on the right monitor.

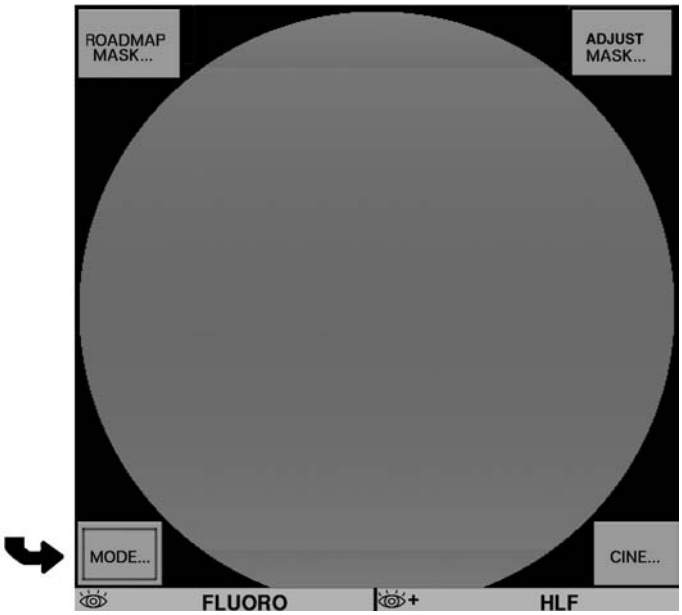
MODE Screen

A MODE screen is provided to enable you to set up your choice of imaging pairs available during a procedure.

Use the MODE screen to:

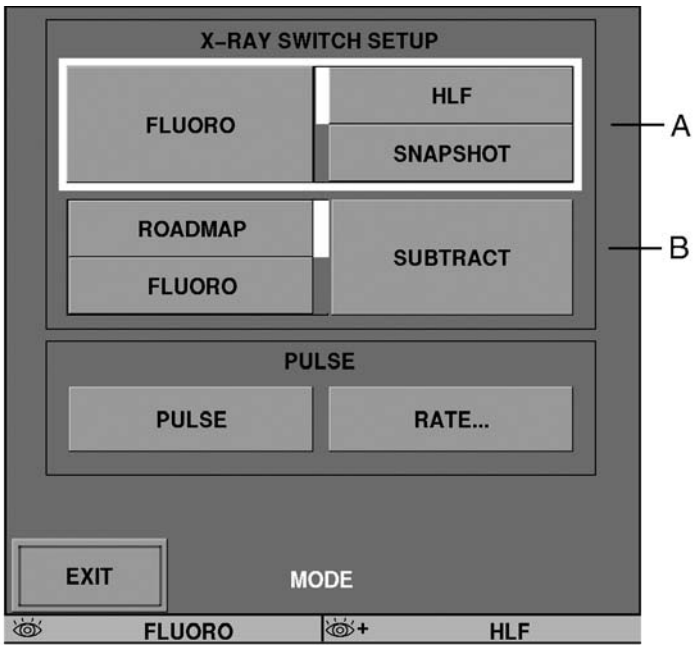
- Change imaging mode pairs that will be available from the X-ray switches during a procedure.
- Select pulse rates.

To display the MODE screen, touch the MODE button on the MAIN screen.



MAIN Screen

Vascular and Neuro-Vascular Systems



MODE Screen

There are two available mode groups:

A Standard Fluoroscopy
B Vascular

Mode Pairs

A mode pair can be selected from each imaging group.

Only one mode pair is active at a time. The active mode pair is displayed on the status bar.

Continuous X-ray is the default. See *Enable Pulsed X-rays* in Chapter 5, "Fluoro Imaging" for more information on enabling and setting pulse rates. Refer to the *Synchronized Pulse Mode* section in this chapter for more information on setting synchronized pulse rates.

Switching Mode Pairs

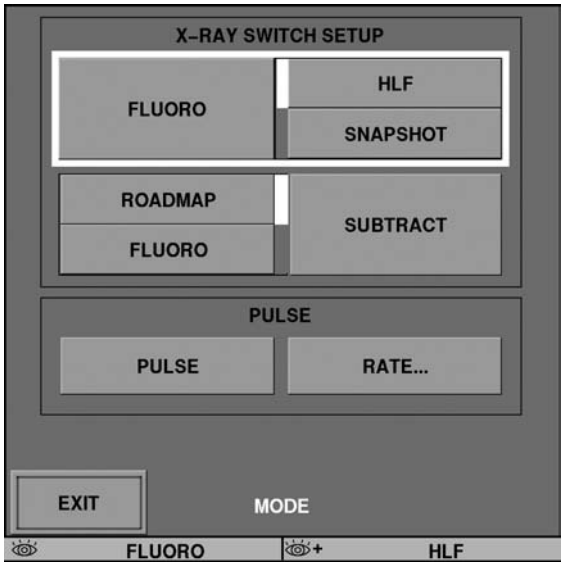
Press the MODE switch to change between fluoroscopy and vascular mode groups. Modes can also be switched using the MODE screen on the Workstation.

Please refer to your generator operator manual for locations of the MODE switch on the system being used.

To change the imaging mode pairs available during a procedure, use the MODE screen on the Workstation. Always refer to the status bar to determine the active modes available.

Vascular and Neuro-Vascular Systems

When the system is first turned on, the default imaging modes available will display on the status bar. For a description of how to use the status bar, please refer to Chapter 5, "Fluoro Imaging."

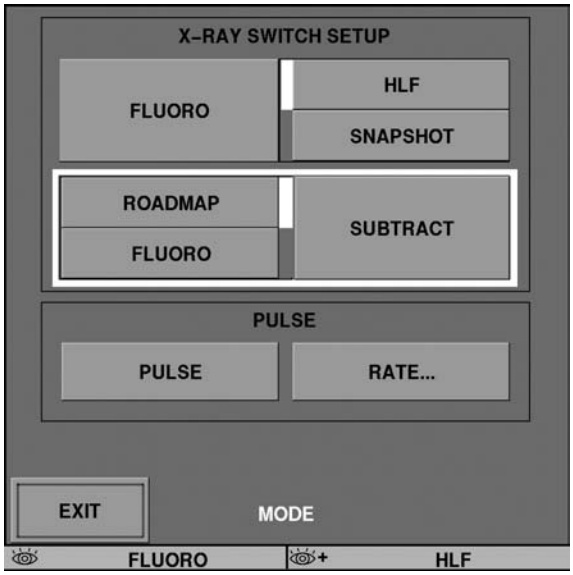


Vascular MODE Screen with fluoroscopy active

Press the left X-ray switch to initiate a fluoro shot.

Press the right X-ray switch to initiate an HLF shot or Snapshot image (when SNAPSHOT is displayed on the status bar).

To switch to vascular imaging, press the MODE key on the X-ray switch or control panel.



Vascular MODE screen with vascular active

With vascular active, the status bar will display ROADMAP and SUBTRACT or FLUORO and SUBTRACT.

Press the left X-ray switch to initiate a roadmap or fluoro shot.

Press the right X-ray switch to intitate a subtraction.

For more complete instructions on creating a roadmap or subtraction, see the imaging sections titled *Roadmap* or *Subtraction* later in this chapter.

To set up imaging modes available during the exam

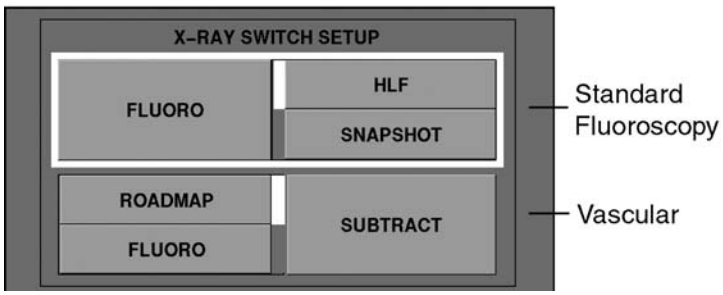
In this example, a basic fluoro image and a roadmap need to be taken.

1. Select the MODE button on the MAIN screen.

A. The default setting for standard fluoroscopy is FLUORO/HLF.

The highlighted center bar should display next to the HLF button. Your active fluoroscopy pair is FLUORO/HLF.

If the bar is highlighted next to SNAPSHOT, select the HLF button to activate HLF in the standard fluoroscopy group.



Mode pairs on MODE screen

B. The default setting for vascular is ROADMAP/SUBTRACT. Select the FLUORO button on the screen to switch to FLUORO/SUBTRACT. The highlighted bar should display next to FLUORO.

2. Select EXIT to close the MODE screen. You are now ready to begin imaging.

3. Verify the modes available on the status bar. If the vascular mode pair (FLUORO/SUBTRACT) is displayed, press the MODE switch to display the fluoroscopy pair (FLUORO/HLF).

4. Complete the fluoro part of the exam to view the patient anatomy.

5. Press the MODE switch to display ROADMAP and SUBTRACT on the status bar.

6. Complete the roadmap procedure. For more information on completing a subtraction procedure, please refer to the *Roadmap* section of this chapter.

Subtraction Imaging

Real time subtraction provides images that are the difference between current fluoroscopic images and a mask image obtained at the start of the subtraction process. The result is displayed on the left monitor. The live, unsubtracted fluoro image is displayed on the right monitor. By default, subtracted images are acquired to the cine disk. Real-time subtraction is primarily used for contrast studies, such as angiography.

The noise filtering level can be modified during the subtraction phase. Peak opacification can be applied during post-processing.

NOTE: The noise filtering level may only be modified during playback of a 30 FPS (25 FPS on 50 Hz) Cine run.

Some systems come with 8 or 15 fps, instead of 30. The default rate for Subtract mode will then be the highest frame rate available.

Sequence of Events During Subtraction

The software automatically performs several steps during real-time subtraction. To illustrate the process, a timeline diagram of a typical subtraction is illustrated in the following figure.

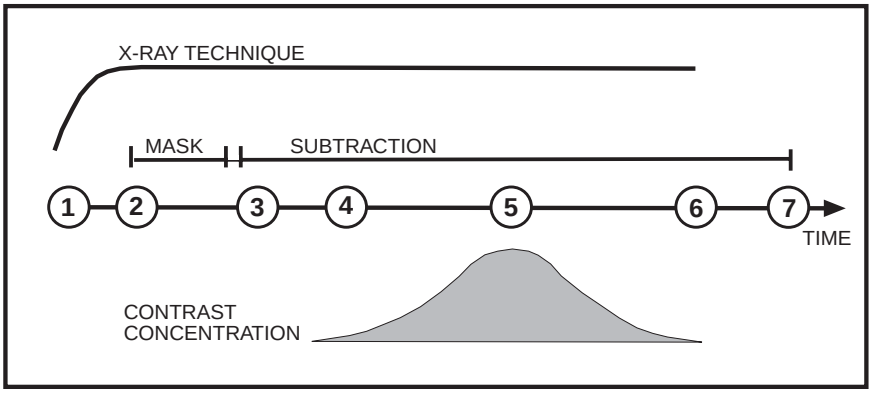
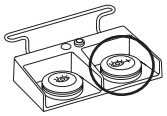


Figure 6-1. Event Sequence During Subtraction.

The sequence of events shown on the timeline includes:



1. The (+) X-ray switch is depressed to begin the exposure. The X-ray technique adjusts.

2. The mask is being acquired, and technique is locked.

NOTE: Any movement results in a blurred mask.

3. Mask image has been acquired and the subtraction process begins.

   The left monitor displays a uniform gray result and the system begins subtracting images. As long as the subtraction continues, new images are subtracted from the mask obtained at the beginning of the cine run.

4. Contrast is injected, and the subtracted images are displayed on the left monitor. Vessels are outlined with contrast.

5. The contrast concentration peaks.

6. Contrast concentration then decreases to a minimum.

7. When the footswitch is released, the last subtracted image is displayed on the left monitor.

NOTE: Releasing the X-ray switch at any time during this entire procedure will terminate the subtraction process.

Subtraction Procedure

1. Verify FLUORO is displayed on the status bar.

2. Press the left (👁) X-ray switch to create a fluoro image to confirm position.

3. Press the MODE key to activate vascular mode, if necessary.

4. Verify SUBTRACT is displayed on the status bar.

5. Cine is automatically set. To change dynamic recording rate, use the CINE SETUP screen. Refer to Chapter 8, "Dynamic Recording" for more information.

6. Press the (👁+) X-ray switch to begin the subtraction process and automatically create a mask. After the mask is acquired, continue pressing the (👁+) X-ray switch to subtract subsequent images from the mask.

7. An injection icon will appear on the left monitor, signaling the operator to inject a contrast media. If an approved injector is properly connected to the Workstation, a signal will be sent to the injector.

8. View the results on the left monitor. The contrast concentration will peak and then decrease to a minimum.

9. Release the X-ray switch to end the subtraction.

The cine run will automatically play back on the left monitor unless auto cine playback has been disabled.

See Chapter 11, "Customizing" for details on auto playback. Refer to *Reviewing a Cine Run* in Chapter 8, "Dynamic Recording" for a description of the CINE PLAYBACK screen.

Adjusting the Mask

NOTE: This feature is available for subtraction and roadmapping imaging.

Registration

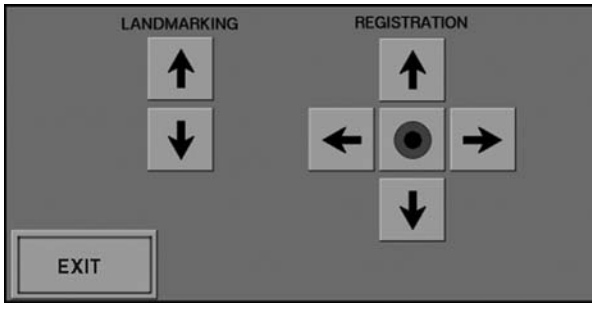
If the patient moves during the procedure, misalignment of the mask and incoming images could cause a poor roadmap image. Registration allows you to move the mask image to produce an accurate registration. You can realign the mask during the procedure, or during playback if the images are saved.

To register the roadmap mask

1. Select the ADJUST MASK button on the MAIN screen or the CINE PLAYBACK screen. The ADJUST MASK screen is displayed.

2. Use the mask registration ↑↓←→ buttons to align the mask image with the incoming images.

   Select ◉ (reset) onscreen to restore the mask to its original position.



ADJUST MASK Screen

Landmarking

In some subtracted images, it may be necessary to see the position of vessels in relation to certain background anatomies. Landmarking allows you to vary the percentage of background anatomy that is displayed on a subtracted image. This function is available for subtraction and roadmapping.

To vary the percentage of background anatomy:

1. Select ADJUST MASK on the MAIN screen or the CINE PLAYBACK screen.

2. Select the Landmarking ⬆⬇ buttons.

3. Touch the EXIT button to close the ADJUST MASK screen.

Each press of the landmark button will adjust in 5% increments.

Roadmap Imaging

Roadmap mode provides a subtracted image on the left monitor that is the difference between the current fluoroscopic image and a mask image. The result on the left monitor is a roadmap of the vasculature showing the catheter or contrast as it moves. During roadmapping, the right monitor displays the live, unsubtracted image.

Peak opacification is automatically enabled during the first phase of roadmapping (mask acquisition). When peak opacification is applied, each pixel is compared, as it is acquired, to its counterpart in the previous image. If the new pixel is darker than in the previous image, the old pixel is replaced. When this process is complete, the resulting image contains the darkest pixels acquired for each point. Opacification is turned off during the second phase of roadmapping.

Roadmapping can be used in both continuous and pulsed X-ray modes.

NOTE: If using a mechanical contrast injector, no signal from the Workstation will be sent when the injection icon displays on the left Workstation screen. The injection of contrast should be manually initiated.

Sequence of Events During Roadmapping

The software automatically performs several steps during roadmapping. The following timeline illustrates the roadmap process.

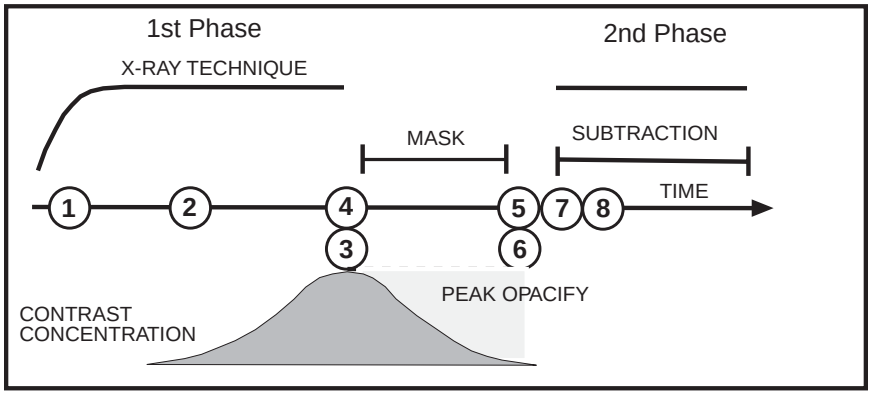


Figure 6-2. The Roadmapping Process.

Roadmap 1st Phase

1. When the left () footswitch is pressed, the X-ray technique adjusts and stabilizes.

2. The inject icon displays on the left monitor. The contrast injection should begin, after which the contrast concentration in the image increases.

3. An image of the vessels and contrast is displayed on the left monitor at or near peak concentration.

4. The footswitch is released. (The footswitch can be released anytime during step four. Peak opacification is automatically applied.)

5. The last image is automatically saved as the mask, and the X-ray technique is frozen.

6. Peak opacification causes the areas darkened by the contrast to retain their darkest values in the mask image.

Roadmap 2nd Phase

7. The roadmap subtraction begins when the left (👁) X-ray switch is pressed again.

8. The X-ray technique remains the same as it was during the mask acquisition. Pressing the left (👁) X-ray switch continues roadmapping. As roadmapping continues, new incoming images are subtracted from the mask image. The result is displayed on the left monitor.

Roadmap Procedure

1. Verify FLUORO is displayed on the status bar.

2. Press the left (👁) X-ray switch to create a fluoro image to confirm position.

3. Press the MODE key to activate roadmap mode. Verify ROADMAP is displayed on the status bar.

4. Optional: Use the CINE SETUP screen to enable cine acquisition. Refer to Chapter 8, "Dynamic Recording" for more information.

5. Press the left (👁) X-ray switch to initiate the first phase of roadmapping.

   A fluoro image is displayed on the left monitor.

6. Inject contrast media when the inject icon displays on the left monitor.

7. Release the left (👁) X-ray switch when a satisfactory image is displayed on the left monitor and the contrast is at, or near, peak concentration in the area of interest.

The roadmap mask is automatically created and displayed on the left monitor for phase 2.

8. Press the left (👁) X-ray switch again to begin roadmapping. The saved mask is subtracted from the new fluoro images. The resulting roadmap is displayed on the left monitor. The X-ray technique is locked.

9. Continue the roadmap subtractions as many times as necessary by pressing the left switch. The original contrast image is used as the mask for each subtraction.

10. To exit roadmap mode, press the MODE key.

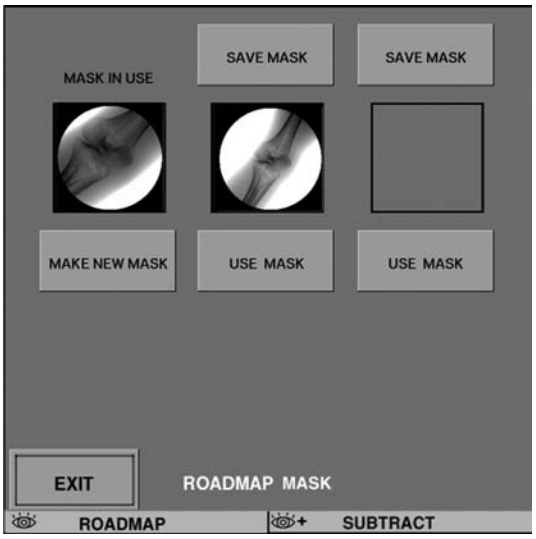
Selecting and Clearing a Roadmap Mask

The ROADMAP MASK screen allows you to save and use up to two roadmap mask images.

To eliminate additional contrast injection, use a mask saved from:

- The current roadmap procedure
- A previous cine run
- A subtraction procedure

To create and save a mask from a previous procedure, see Chapter 7, "Image Review, Hardcopy and Archive."



ROADMAP MASK Screen

Using a Saved Mask

The two most recent mask images from the current patient exam are automatically saved to disk and displayed on the ROADMAP MASK screen under the SAVE MASK buttons.

To perform a roadmap procedure using a saved mask:

1. Select ROADMAP MASK from the MAIN screen.

2. Select USE MASK beneath the image of the mask you want to use. The saved mask will be recalled when the second phase of the roadmap shot is started.

3. When ROADMAP-2 is displayed on the status bar, indicating that the second phase of roadmapping is occuring, the chosen mask will be displayed on the left monitor.

4. Press the left () X-ray switch. The technique will stabilize and subtraction will begin using the recalled image as the mask.

5. If necessary, select ADJUST MASK from the MAIN screen to adjust registration.

Clearing the Current Mask

To clear the left monitor and begin a new roadmap procedure:

1. Select the NEW MASK button on the ROADMAP MASK screen.
2. Repeat the roadmap procedure.

The current mask can also be cleared using the footswitch:

1. Press the MODE key on the footswitch to select fluoro mode.
2. Press the left (👁) X-ray switch to take a brief exposure.
3. Press the MODE key again to reselect roadmap mode.

Produce a Roadmap Mask from a Subtraction Cine Run

You can create a roadmap mask from a stored subtraction run. Once the mask is created, save it on the ROADMAP MASK screen and retrieve it as the mask for the roadmap procedure. This method avoids additional contrast injection and reduces patient exposure.

Patient positioning must be the same as it was when the recalled mask was created. However, slight movement can be compensated for by using the ADJUST MASK screen to register the image. (See "Adjusting the Mask" for information about mask registration.)

To prepare a roadmap mask from a stored subtraction run:

1. Touch the preview image representing the subtraction cine run on the IMAGE DIRECTORY screen. The cine run begins playback on the left monitor. The CINE screen displays on the right monitor.

2. Select the VIEW SUBTRACTED button on the CINE screen to display the run in its unsubtracted form. (VIEW SUBTRACTED will not be highlighted.)

3. Select PEAK OPACIFY to enable peak opacification.

4. Use the playback buttons to display the frame you want to use as the mask on the left monitor.

5. Select ROADMAP MASK from the CINE screen.

6. Select SAVE MASK.

7. Select USE MASK beneath the image of the mask you just created. The mask will be recalled to the left monitor and the system will enter the second phase of roadmapping.

8. Depress the left () X-ray switch. The technique will stabilize and subtraction will begin using the recalled image as the mask.

Synchronized Pulse Mode

On Vascular Workstations, 1-8 PPS in HLF mode provides Synchronized Pulse operation.

Synchronized Pulse Mode combines pulsed fluoro with higher mA values to reduce image motion artifacts.

To provide optimum images:

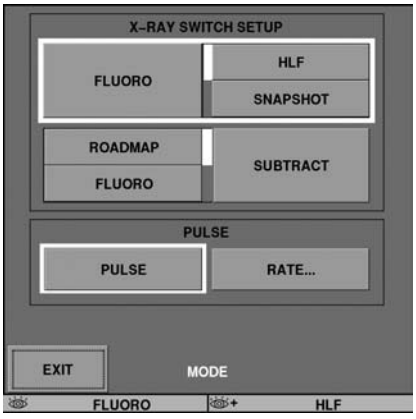
- Camera gain is reduced and the mA increases to as much as 16 mA.
- There is no dose reduction.
- Averaging is turned OFF and noise reduction cannot be used.

WARNING

During pulsed HLF, the mA can increase to as much as 16 mA. This can subject the patient and those working around the X-ray field to a significantly larger dose of radiation than they would receive during normal pulsed fluoro operation. To minimize X-ray exposure hazards, use HLF with discretion.

Create a Synchronized Pulse Mode Image

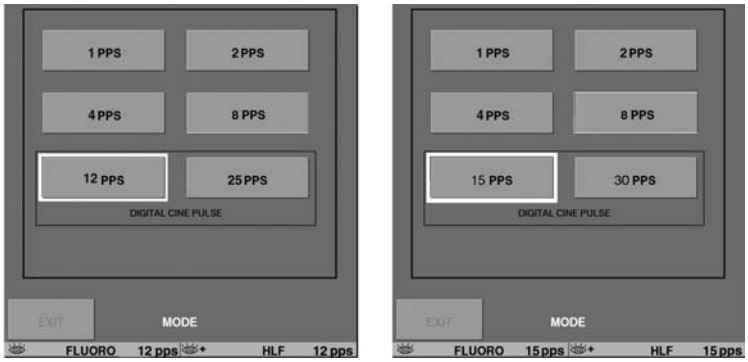
1. Verify HLF is displayed on the status bar.
   - If SUBTRACT is displayed, press the MODE key to activate HLF mode.
   - If SNAPSHOT is displayed, use the MODE screen to select HLF.
2. Select the PULSE button on the MODE screen to enable pulsed operation. The PULSE button will be highlighted when active.



MODE screen

3. Select the RATE button to set a pulse rate of from 1-8 PPS from the pulse rate screen. Verify the selected pulse rate is displayed on the status bar.

The frame rate displayed will be the same as the pulse rate. Acquisition will occur at that rate.



Vascular Pulse Rate Screen

4. Press the right (+) X-ray switch. The synchronized pulse image is automatically acquired to the cine disk.

NOTE: Pulse rate screens may vary slightly dependant upon which product the Workstation was purchased with.

Chapter 7

Image Review, Hardcopy and Archive

Overview

Image directory allows you to review, hardcopy, and archive images, patient summaries, and dose information.

Image Directory

The IMAGE DIRECTORY screen allows you to display static images and cine runs for review or modification.

To display the IMAGE DIRECTORY screen, press the IMAGE DIRECTORY key on the Workstation keyboard.

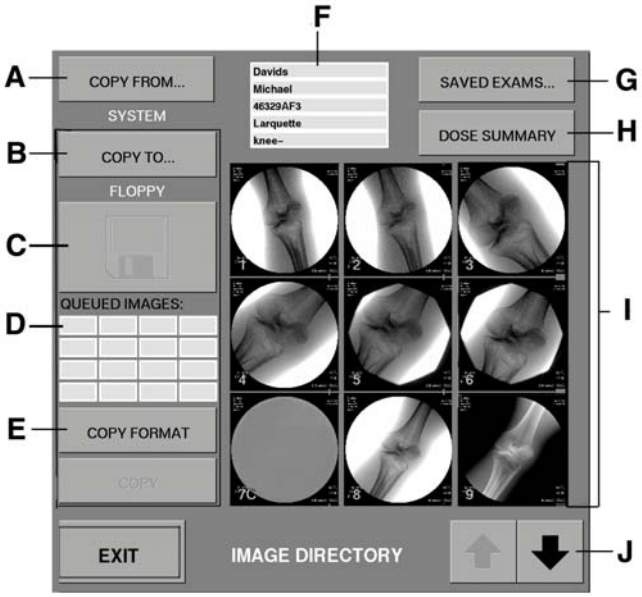


IMAGE DIRECTORY screen features

A The COPY FROM button is used to select the drive to copy from.

B The COPY TO button is used to select the drive to copy to.

C COPY TO device icon.

D Queue layout for copying or printing.

E The COPY FORMAT or LAYOUT button will display here.

F This is the patient summary/information box. When selected, this information will display on the active (left) monitor. When displayed, this information may be placed in the queue for copying or printing.

G The SAVED EXAMS button is provided for recalling images that have been previously saved.

H The DOSE SUMMARY button is provided to display the dose summary information on the left monitor. When displayed, this information may be placed in the queue for copying or printing.

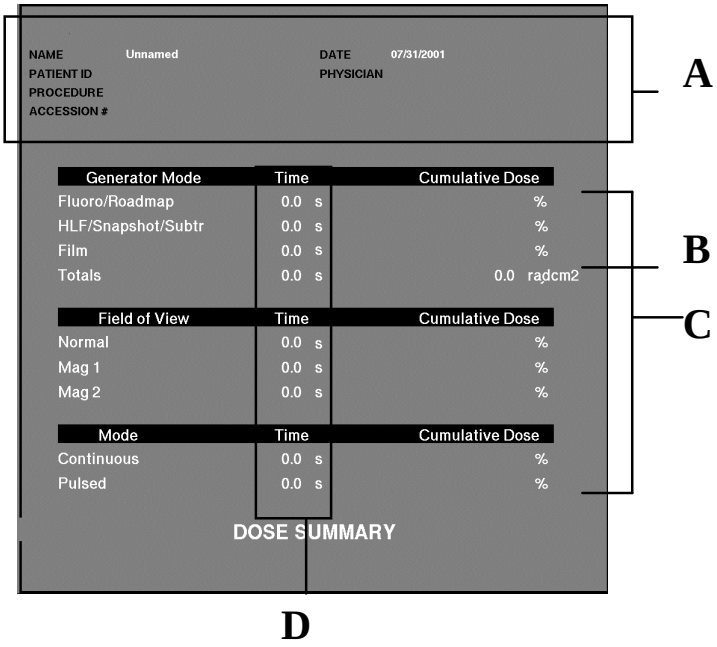
I Set of 9 preview images. Preview cine runs have a C located next to the image number.

J Use the up and down arrow buttons to scroll through all preview images. You may also use the keyboard to enter the image number, then press ENTER to display the preview image.

Review Dose Information

The DOSE SUMMARY screen contains X-ray exposure data.

To display the DOSE SUMMARY screen on the left monitor, select the DOSE SUMMARY button from the IMAGE DIRECTORY screen.



The Dose Summary Screen

The DOSE SUMMARY screen contains the following information about the patient session:

A Patient information.

B Calculated dose.

The calculated dose is a measure of what is emitted by the X-ray tube and does not represent the radiation absorbed by the patient. Actual dosage a patient receives may be smaller.

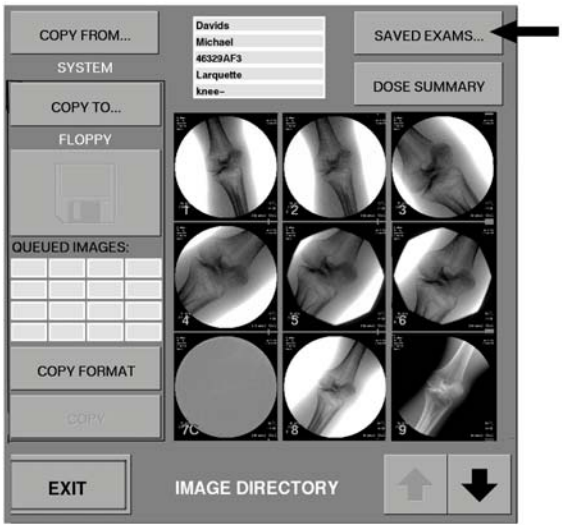
C Percentage of total exposure in each mode or field of view.

D Total time of exposure for each imaging mode.

Retrieve a Saved Exam

During a procedure, images are saved in the saved exams feature of the system. Images are indexed by the patient name, doctor name, and date of the exam.

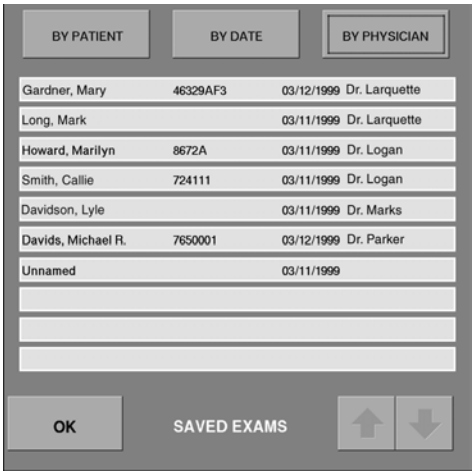
1. Select SAVED EXAMS from the IMAGE DIRECTORY screen.



SAVED EXAMS button

An alphabetic list of patients for the currently selected COPY FROM device is displayed.

- To view the list of patients by date, select the BY DATE button.
- To view the list of patients by physician, select the BY PHYSICIAN button.



SAVED EXAMS screen

Use PAGE UP and PAGE DOWN buttons to page through the patient list.

2. Select the patient name.

3. Select OK to exit the SAVED EXAMS screen. The patient information will be displayed on the image directory.

4. Select an image displayed in the image directory for review. The image will display on the left monitor.

Image Directory preview image

NOTE: *When you access the saved exams list from image directory and select a patient, the current patient does not change. If you make and save an exposure while a saved exam is displayed on the IMAGE DIRECTORY screen, the image will be saved with the current patient's exam, not with the saved exam displayed on the IMAGE DIRECTORY screen.*

Image Review

The following information is displayed with the left monitor image:

A Information entered on the PATIENT INFORMATION screen.

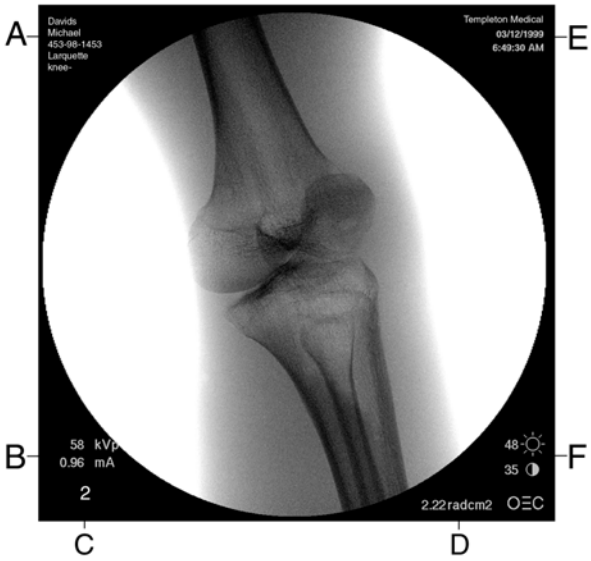
B Technique used during the exposure.

C Number assigned to image in image directory.

D Dose information.

E Hospital name and exposure date and time. (See Chapter 11, "Customizing," for details on setting this information.)

F Brightness and contrast values.



Sample Image

Hardcopy/Print Images

The OEC Workstation supports a variety of optional hardcopy devices. You can send images, patient information, and the dose summary to these hardcopy devices:

- Instant Film/Paper Printer
- DICOM Printer
- Direct Digital Printer Interface
- Thermal Printer

Detailed instructions for using each optional device are provided in the documentation supplements for the device. This section explains, in general, how to select and send to a device.

For more information on any of these devices, please call the Communications Center or your local sales representative. Refer to Chapter 1, "Introduction and Safety" for telephone numbers.

Select a Device

Use the COPY TO screen to select a hardcopy device.

1. Select the COPY TO button on the IMAGE DIRECTORY screen.

   The COPY TO screen lists the available print and storage devices.

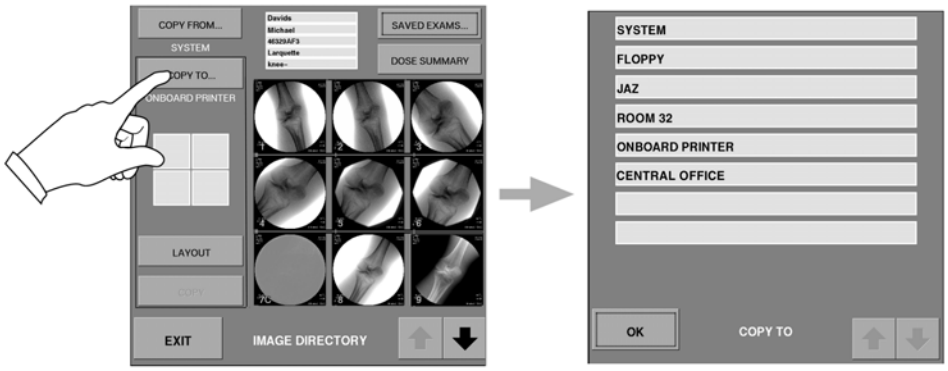


Image Directory and Copy To Screens

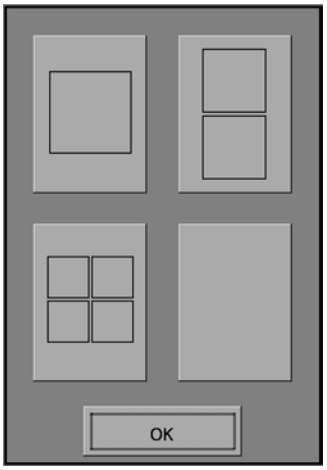
2. Select the name of the print device.

3. Select the OK button to confirm your selection and return to the IMAGE DIRECTORY screen. The icon and default layout will display under the COPY TO button.

Select a Layout

You can choose a print layout from one of four layouts. Layouts available are determined by the device selected. For DICOM layout selection and setup, refer to the DICOM supplement, Print Server configuration.

1. Select the LAYOUT button on the IMAGE DIRECTORY screen. The layout pop-up screen is displayed.



Layout Pop-up Screen

2. Select the icon representing the layout you want to use.

3. Select the OK button to close the layout pop-up screen. The layout selected will display on the IMAGE DIRECTORY screen.

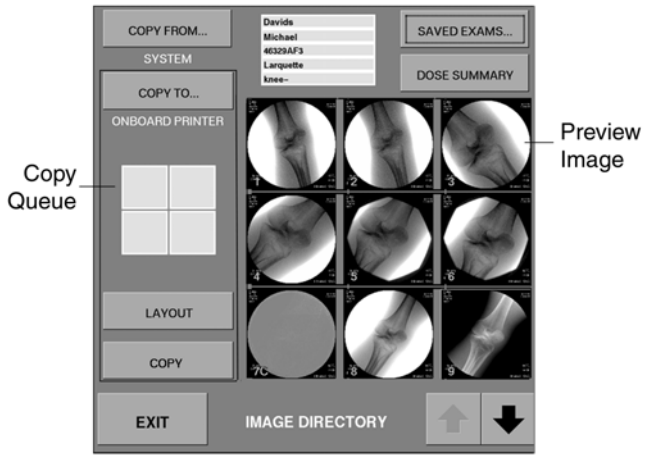
Print

For printing from the thermal printer, please refer to the supplement. Use these steps to print on an Instant Film/Paper or DICOM printer.

1. Select the Instant Film/Paper or DICOM printer from the COPY TO screen. Press OK to exit.

2. Choose a layout format. (See "Select a layout," earlier in this chapter.)

3. If the image you want to hardcopy is already displayed on the left monitor, go to Step 4. Otherwise, select the preview image. The image is displayed on the left monitor.



Print Queue and Preview Image

4. Select a box in the copy queue to send the image to the queue. The boxes represent the hardcopy layout and location of images on the media. You can place images into the boxes in any order.

5. Select the COPY button.

The number of images you hardcopy at one time depends on the device type and print format selected. You can continue to select images and load them into the queue until all available positions are filled.

If you select a preview image and then touch a box already containing an image, you will replace the existing image with the preview image you touched most recently.

As images are sent to the hardcopy device, the message PLEASE WAIT is displayed. To cancel the copy process, touch the CANCEL button on the message screen. Once the process has been cancelled, a PLEASE WAIT message with no CANCEL button will display until it has completed the cancel command.

Hardcopy/Print the Dose Summary

1. Select DOSE SUMMARY on the IMAGE DIRECTORY screen**.**

   The dose summary is displayed on the left monitor.

2. Select a box in the copy queue to send the dose summary to the queue.

3. Select the COPY button.

NOTE: *This can be placed in a queue with images.*

Hardcopy/Print Patient Summary

1. Select the box containing patient information at the top of the IMAGE DIRECTORY screen.

   The patient summary is displayed on the left monitor.

2. Select a box in the copy queue to send the patient summary to the queue.

3. Select the COPY button.

NOTE: *This can be placed in a queue with images.*

Clear the Copy Queue

You can clear the copy queue using any of the following methods:

- Select a different destination device from the COPY TO screen.
- Select a different print layout from the layout pop-up screen.
- Exit the IMAGE DIRECTORY screen.

Copy (Archive) Images

The Workstation supports a variety of archive options. You can archive images, patient information, and the dose summary.

Available storage options include:

- Jaz® Disk (Removable Dynamic Digital Disk)
- Floppy Disk
- DICOM Storage

Detailed instructions for DICOM storage is provided in the documentation supplement. This section explains, in general, how to select and send to a device.

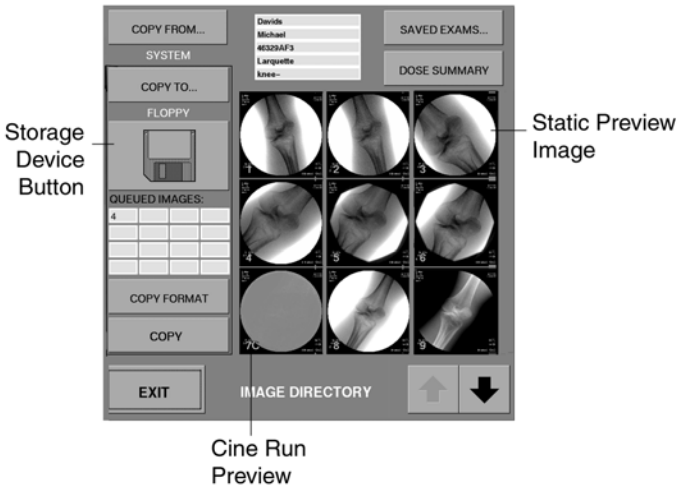
Please refer to the warnings and cautions in this chapter and the JAZ supplement for more information on the care and use of the optional JAZ drive.

For more information on available storage options, please call the Communications Center or your local sales representative. Refer to Chapter 1, "Introduction and Safety" for telephone numbers.

Overview

You can archive saved static images from the system disk and cine runs saved on the cine disk.

The storage device button displayed on the IMAGE DIRECTORY screen is unique for each available storage device. The following example shows the button displayed for a 3.5-inch diskette.



Device Queue and Preview Images

The number of images you can archive on the device media depends on the selected file format and storage capacity of the media.

A 1.44 MB floppy disk can store one static image. A 2GB removable dynamic digital disk (Jaz™) can store approximately 1,500 static images.

When archiving images, patient and dose summary information are automatically archived with the images.

Select a Storage Device

Use the COPY TO screen to select an archive device.

1. Select the COPY TO button on the IMAGE DIRECTORY screen.

The COPY TO screen lists the available print and storage devices.

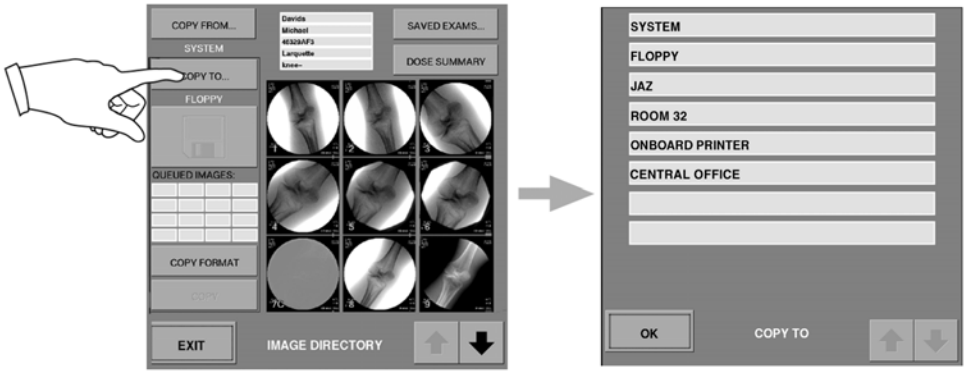


Image Directory and Copy To Screens

2. Select the name of the storage device.

NOTE: When selecting JAZ storage, please follow the guidelines in the JAZ supplement and the warnings and cautions on the next page.

3. Select the OK button to confirm your selection and return to the IMAGE DIRECTORY screen.

WARNING
NEVER insert a disk in the JAZ drive when power is off. Before turning power off or moving the Workstation, ALWAYS eject the JAZ disk. Completely remove it from the drive after ejection.
NEVER leave a JAZ disk partially inserted. ALWAYS insert or eject completely.

CAUTION
Leaving a fully inserted disk in the drive for extended idle time can result in damage to the disk or drive.

Select a Copy Format

There are two formats for archiving to choose from: OEC and bitmap (BMP).

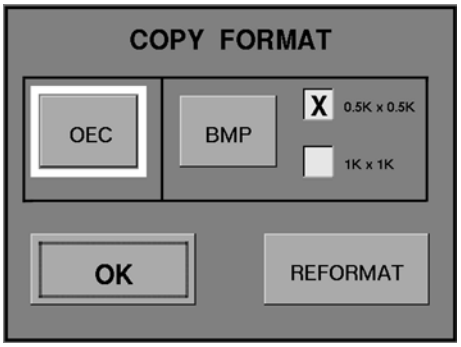
- Select OEC to store the chosen images in OEC file format. OEC file formats can be read, saved, and enhanced by an OEC Workstation. OEC format always stores as 1k x 1k images.

- Select BMP and a file size of .5k or 1k to store the queued images in bitmap file format. Bitmap images cannot be read by an OEC Workstation. This file format (.bmp) is provided for use with PC software programs that use bitmap format. An image copied in bitmap format cannot be copied back to the OEC Workstation.

To choose a Copy Format

1. Select the COPY FORMAT button to choose a file format.

The COPY FORMAT pop-up is displayed.



COPY FORMAT Pop-up Screen

2. Choose OEC or BMP. If choosing BMP, choose a file size.

3. Select the REFORMAT button on the COPY FORMAT pop-up if you want to format the storage media. Reformatting erases all images stored on the media.

NOTE: Jaz® disk storage must be formatted before images or patient data can be copied to it.

4. Select the OK button to close the COPY FORMAT pop-up screen.

Copy to Archive Device

Static Images

1. Select a storage device from the COPY TO screen.

NOTE: *Make certain you have chosen the proper format. Use the COPY FORMAT button.*

2. Select the preview image you want to archive.

3. Touch the queue box to send the image to the queue. As you queue images, the image number is added to the copy queue.

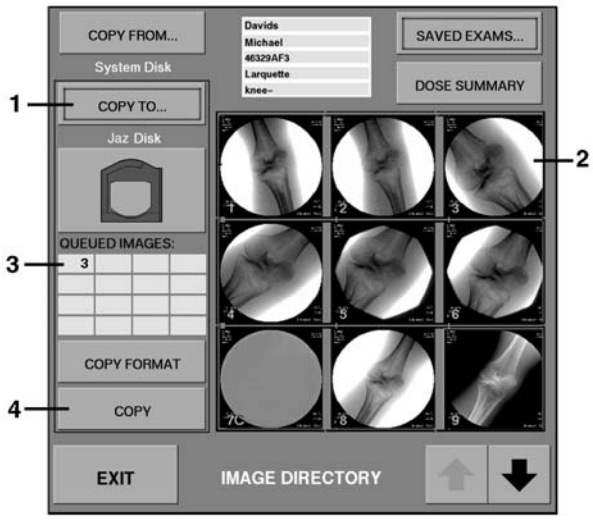


IMAGE DIRECTORY

Repeat step 2 and 3 for each image you want to archive until each box in the queue contains a number. When the queue is full, the device button becomes inactive.

4. Select COPY on the IMAGE DIRECTORY screen to copy the queued images.

As images are sent to the storage device, the message PLEASE WAIT is displayed. To cancel the copy process, touch the CANCEL button on the message screen. Once the process has been cancelled, a PLEASE WAIT message with no CANCEL button will display until it has completed the cancel command.

You can continue to copy images to a media until the message DISK FULL is displayed. To continue copying images, insert another disk and touch the OK button.

Cine Runs

The preview image of a cine run contains an image number and the letter C.

1. Select the preview image of the cine run. The cine run plays on the left monitor and the CINE screen is displayed on the right monitor.
2. Select the EXIT button on the CINE screen to close the CINE screen.
3. Select the layout box on the IMAGE DIRECTORY screen.
4. Select the COPY button.

NOTE: *If cues are set, only the active portion of the cine run between the cues will be archived.*

Clear the Storage Device Queue

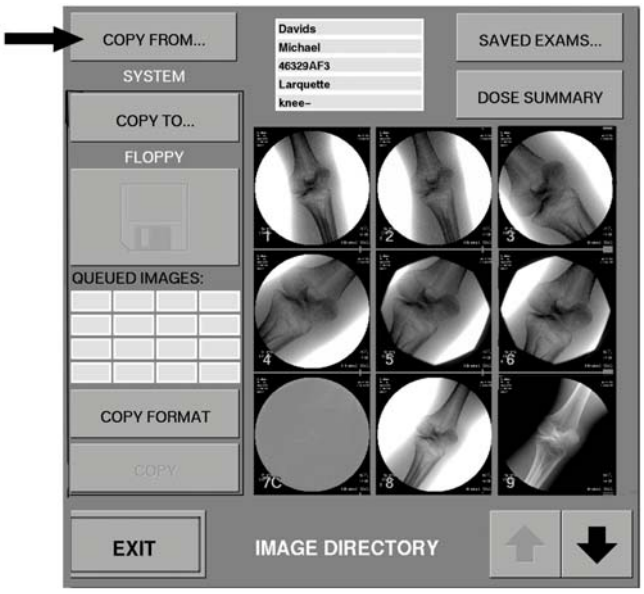
You can clear the copy queue using any of the following methods:

- Select a different destination device from the COPY TO screen.
- Select a different print layout from the COPY FORMAT pop-up screen.
- Exit the IMAGE DIRECTORY screen.

Copy From an Archive Device

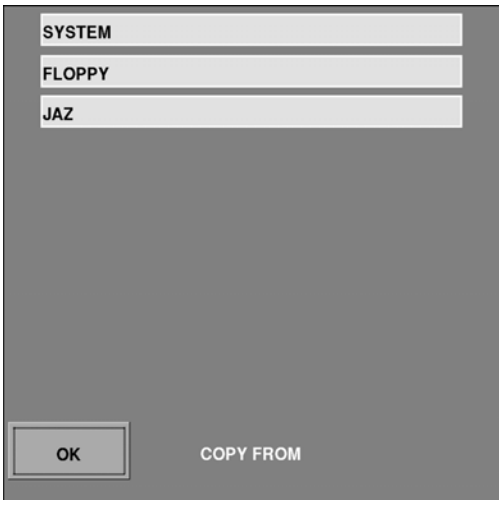
You can display archived exams on the Workstation, and then copy images to the system and make hardcopies.

1. Select COPY FROM... on the IMAGE DIRECTORY screen.



COPY FROM button

The COPY FROM screen displays a list of available source devices.



COPY FROM screen

2. Select the name of the device containing the patient exam.
3. Select the OK button to confirm your choice.

   The SAVED EXAMS list for the selected device is displayed.
4. Select the patient name for the exam you want to display.

5. Select OK to confirm your choice and close the COPY FROM screen.

   The IMAGE DIRECTORY screen is displayed for the selected patient.

You can copy images to the available destination devices, however, the source and destination device must be different.

NOTE: *When the high capacity disk drive (Jaz™) is chosen as the COPY FROM device, you cannot eject the disk. To eject the disk, you must exit the image directory or select another source device first.*

Chapter 8

Dynamic Recording

Overview

Vascular and Neuro-Vascular OEC Workstations are equipped with a dynamic recording (cine) disk that allows you to record a series of dynamic images. The CINE SETUP screen allows you to enable and disable cine acquisition for the image modes and set cine acquisition rates.

WARNING

Use caution while Workstation is in use. The cine disk is always running during operation of the Workstation. Any sudden, intense impact can damage the cine disk and could result in loss of previously recorded cine runs and prevent further imaging.

Cine Options

The CINE SETUP screen provides the ability to enable cine acquisition, and change the recording rate (frame rate). Check the configuration of your system to determine the cine disk size.

During acquisition, images are recorded to the cine disk until the available storage area is full. When 30 seconds of acquisition time remains before the disk is full, a warning message will display on the right monitor.

When the disk is full, or when a new patient exam begins:

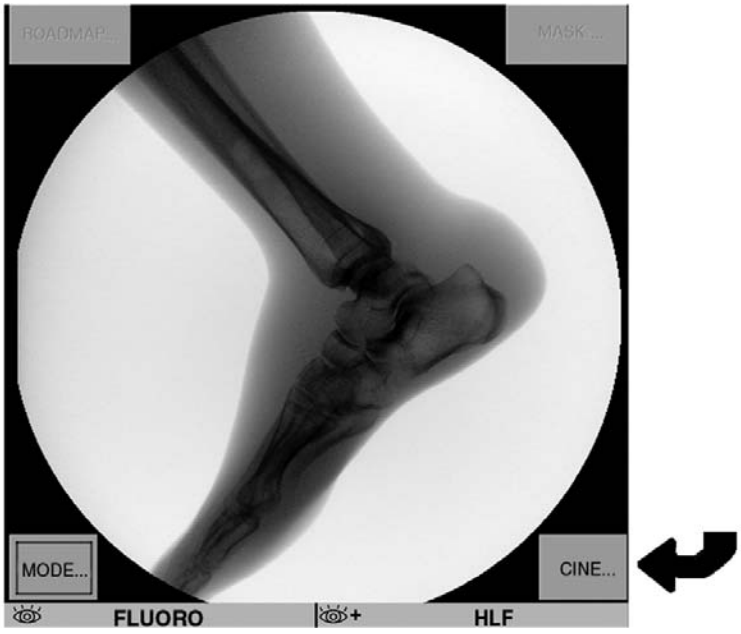
Time is automatically reset to the full amount and the existing cine runs begin to be overwritten.

When a single run fills all available time:

X-rays will continue to be taken as long as you are pressing the switch, but the acquisition of shots will discontinue.

The CINE SETUP screen displays the storage time remaining in number of seconds. This number is displayed adjacent to the RATE button for each mode and on the left monitor.

To display the CINE screen, select the CINE button from the MAIN screen.

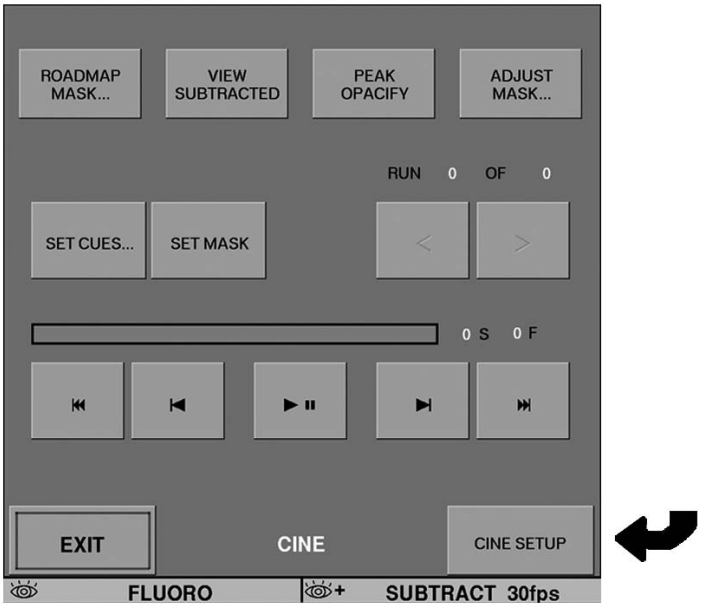


MAIN Screen

The CINE screen displays.

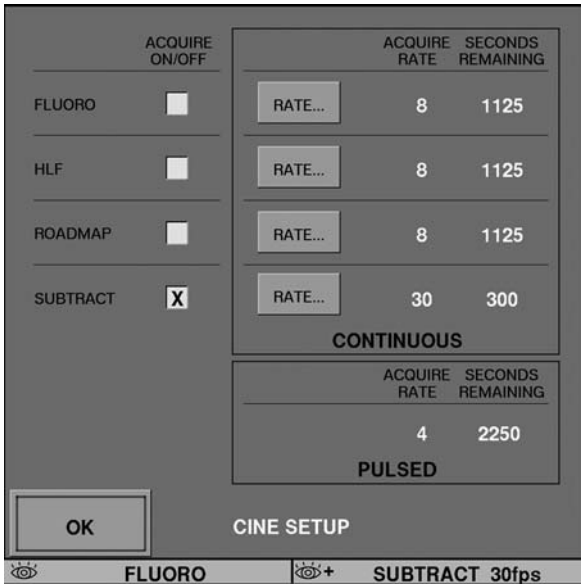
To activate the cine disk

1. Select the CINE SETUP button from the CINE screen.



CINE Screen

The CINE SETUP screen displays.

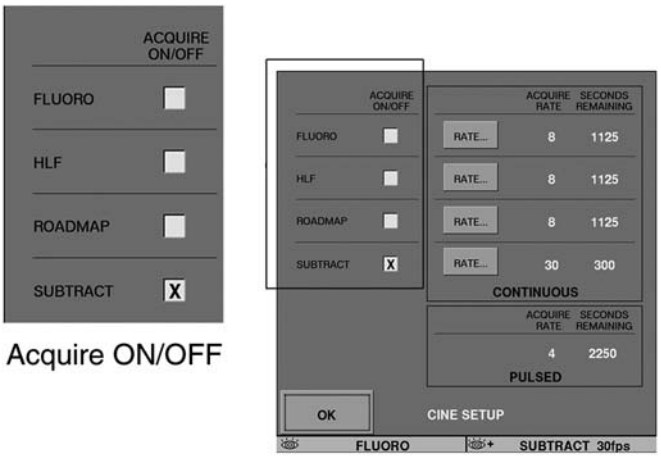


CINE SETUP screen

2. Use the checkboxes and buttons on the CINE SETUP screen to turn cine acquisition on for each mode and set continuous acquisition rate.

Acquire ON/OFF

Touch the box ☐ next to the corresponding image mode to enable and disable cine acquisition. Acquire is on if the box is checked ☒.



CINE SETUP Screen-Acquire ON/OFF

If the shot type is digital cine, acquisition is automatically enabled and cannot be turned off.

By default, acquisition is enabled for subtract mode.

To change continuous acquisition rate

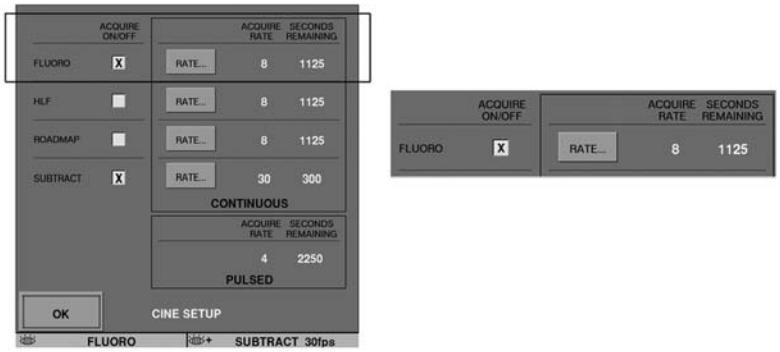
The current acquisition rate is displayed adjacent to the RATE button for the corresponding mode.

The acquisition default for fluoro, HLF, and roadmap mode is 8 FPS. For Subtraction, the highest frame rate available is the default .

If pulse is enabled, the acquisition rate equals the pulse rate.

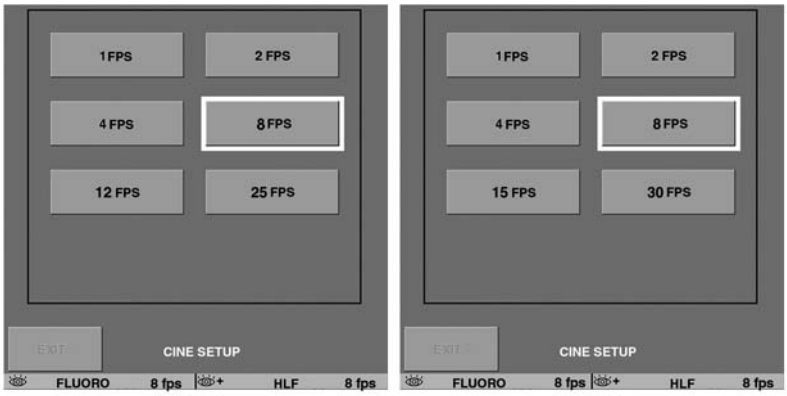
The available acquisition time varies according to the acquisition rate. Select a lower rate to increase the amount of acquisition time.

1. Select the RATE button next to the mode.



CINE SETUP screen-Rate

The acquisition rate pop-up screen will display.



Cine Acquisition Rate Pop-up Screen

2. Select an acquisition rate. The acquisition rate pop-up screen will automatically close. The status bar shows the acquisition rate (fps) when cine acquire is on.

3. To close the CINE SETUP screen, select the OK button.

Cine Run Review

The preview image of a cine run includes the letter C next to the image number in image directory. Cine runs display the same exam information as static images and you can apply any of the post-processing functions to a single frame of a cine run.

The CINE screen allows you to review a cine run, set cues, adjust landmark and registration, and digitally create a roadmap mask. You can select a mask at any point in the run to reprocess a subtraction.

Review a Cine Run

If the patient exam containing the cine run you want to review is not displayed, follow the steps for *Retrieve a Saved Exam* in Chapter 7, “Image Review, Hardcopy and Archive.”

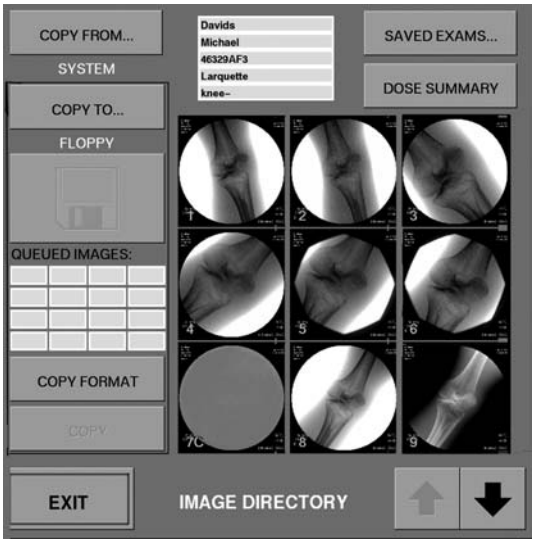
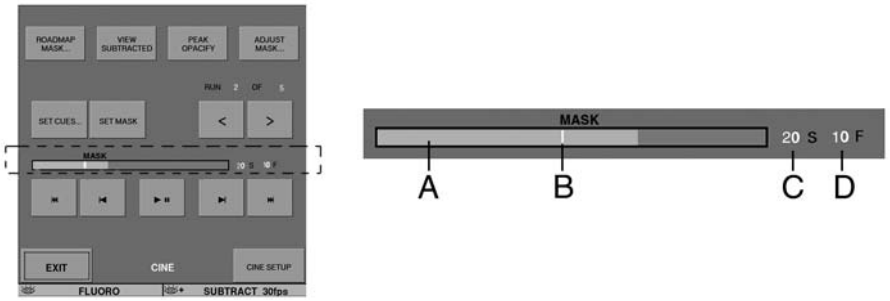


IMAGE DIRECTORY screen with cine preview image (7C)

1. Touch the preview image of the cine run on the IMAGE DIRECTORY screen. Cine playback occurs on the left monitor and the CINE screen is displayed on the right monitor.

2. As playback progresses through the acquired images, the frame number (D) changes to indicate the position of the frame within the run.



Cine Playback and Mask Indicator Bar

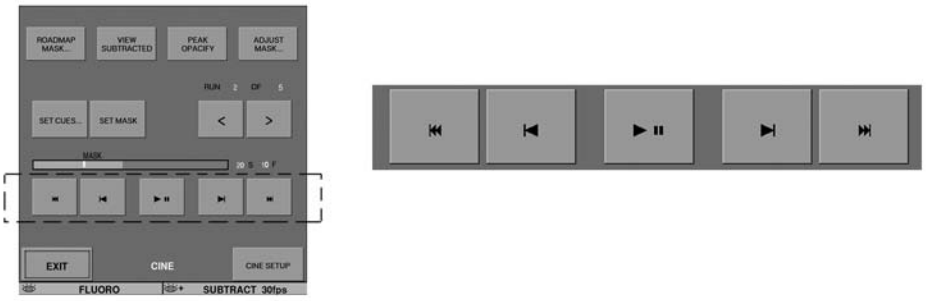
A Playback progresses through images (horizontal grey bar)

B Position of mask (vertical white bar)

C Amount of time (in seconds) elapsed from start of cine run

D Frame number display

3. Replay continues to loop until you select the ▶II (play/pause) button to pause the run and view a single frame.

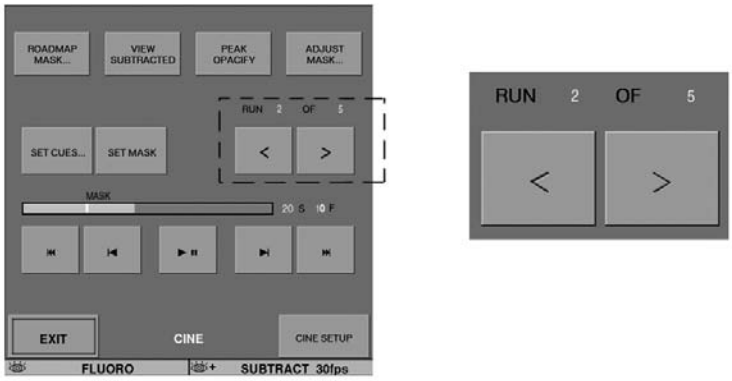


Cine Playback buttons

- Select ▶| to move forward by a single frame.
- Select |◀ to move back by a single frame.
- Select ▶▶| to move forward by 10 frames.
- Select |◀◀ to move back by 10 frames.
- Select ▶II to begin or pause cine playback.

Select Cine Runs from the CINE Screen

You can use the CINE screen to view each cine run for a single patient.



Cine Run selection buttons

- Select **<** to review the previous cine run for the current patient session.
- Select **>** to review the next cine run for the current patient session.

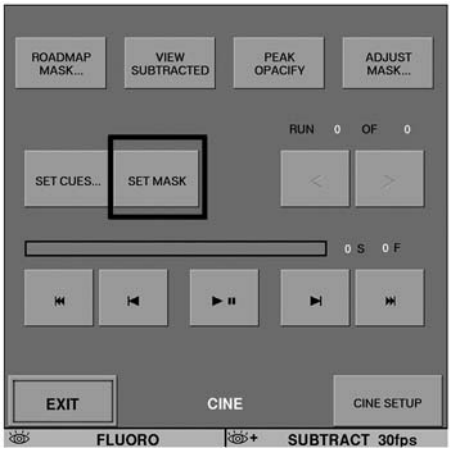
The total number of runs is noted as **RUN X OF X**. This number does not correspond with the image number of the cine run in the IMAGE DIRECTORY. The run number indicates which order in the total number of runs each run is located.

Set Mask

During post-processing you can select a specific frame of a subtraction run to be used as the mask:

1. Use the playback buttons to display the frame you want to use as the mask on the left monitor.

2. Touch the SET MASK button.



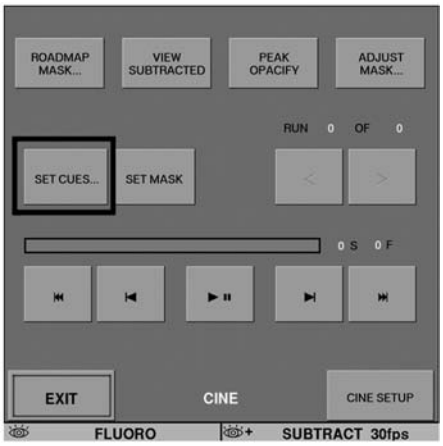
SET MASK button

Use the playback buttons to review the run.

Set Cues

The SET CUES function allows you to select a portion of a cine run for playback.

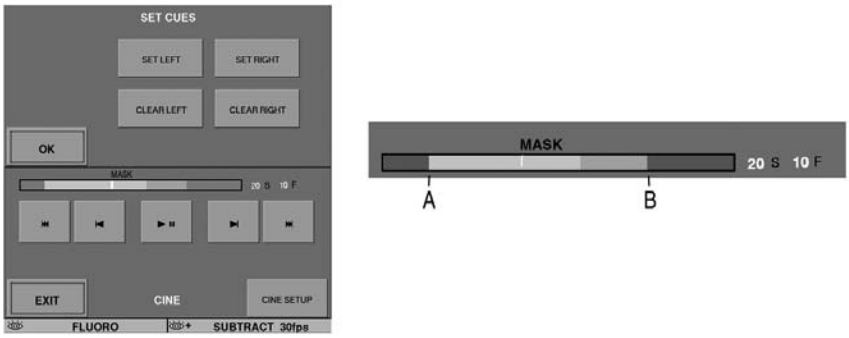
1. Select the SET CUES button.



SET CUES button

The SET CUES pop-up is displayed on the CINE screen.

2. Pause the run. Use the playback buttons to display the frame in the cine run that will be the beginning cue.



Mask Indicator Bar with Set Cues (A and B)

A Select SET LEFT to set the beginning cue.

B Advance to the chosen ending frame. Select SET RIGHT to set the ending cue.

Playback will display the images located between the cues.

3. To delete the cues, select CLEAR LEFT or CLEAR RIGHT.

4. Select the OK button to close the pop-up screen.

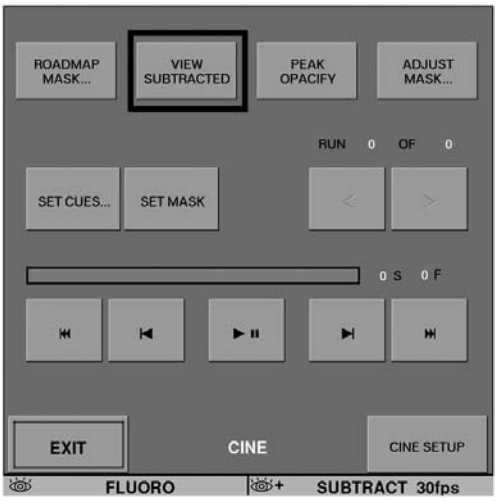
NOTE: *The cues remain set on the cine run until they are deleted. If you archive the run with the cues set, only the portion of the session between the set cues will archive to the external media.*

Viewing Options

The CINE screen offers the following options:

- View a cine run in subtracted or unsubtracted form.
- Perform a post-processing subtraction from a fluoro or HLF run.
- Apply peak opacification to a subtracted/unsubtracted run.

View in Subtracted and Unsubtracted Form



VIEW SUBTRACTED button

If the VIEW SUBTRACTED button is highlighted, the cine run is displayed in subtracted form.

To view the run in unsubtracted form, select the VIEW SUBTRACTED button. The button is no longer highlighted and the cine run is displayed unsubtracted.

Enable and disable subtracted view by selecting the VIEW SUBTRACTED button.

NOTE: You cannot display a roadmap unsubtracted.

Perform a Post-processing Subtraction

If contrast has been injected during acquisition of fluoro or HLF images, you can playback the run, select a mask, and use the SET MASK and VIEW SUBTRACTED buttons to display a post-processing subtraction on the left monitor.

To perform a post-processing Subtraction using a Fluoro or HLF run:

1. Display the run you want to use as the mask on the left monitor.

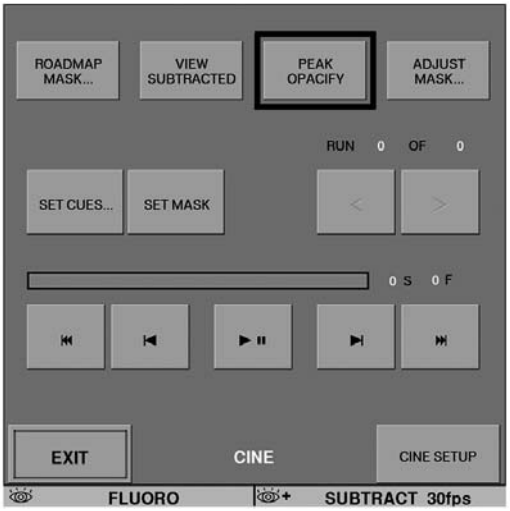
2. Select the SET MASK button.

3. Select the VIEW SUBTRACTED button.

The fluoro or HLF run is displayed as a subtraction on the left monitor. Use the cine playback buttons to review the run.

Apply Peak Opacification during playback

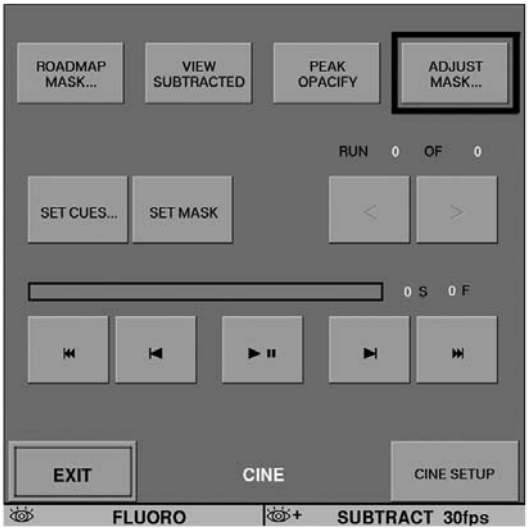
Peak opacification is a process automatically applied in roadmap mode during mask acquisition. Each pixel of a new frame is compared with its counterpart in the previous frame. If the new pixel is darker than in the previous image the old pixel is replaced. The resulting image contains the darkest pixels acquired for each point.



PEAK OPACIFY button

You can use the PEAK OPACIFY button during post-processing to view a subtraction run with opacification. The areas darkened by the contrast media will remain dark in the playback of the run, providing maximum vessel display.

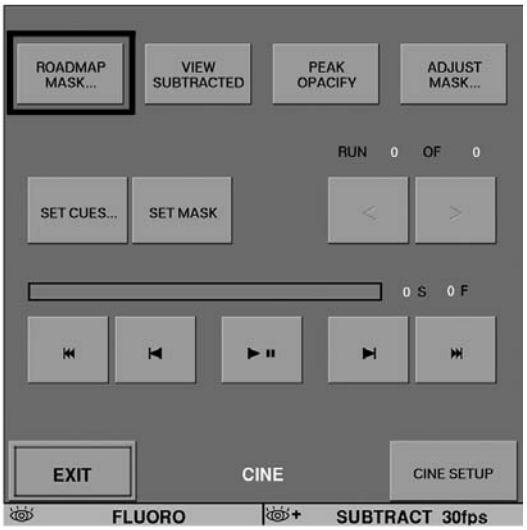
Adjust Mask



ADJUST MASK button

To adjust the mask or landmarking on an image, refer to *Adjusting the Mask* in Chapter 6, “Vascular Imaging.”

Roadmap Mask



ROADMAP MASK button

Use this button to select a roadmap mask from previously saved masks or create a mask from a subtraction cine run. Refer to *Produce a Roadmap Mask from a Subtraction Cine Run* in Chapter 6, “Vascular Imaging” for more information.

Chapter 9

Annotating Images

Overview

This chapter explains how to use image annotation to place markers, add comments, and crop images.

To display the IMAGE ANNOTATION screen, select the IMAGE ANNOTATION key from the Workstation keyboard.

IMAGE ANNOTATION screen

Markers

Place markers on an image

1. Select the MARKERS... button on the IMAGE ANNOTATION screen to display the MARKERS screen.

MARKERS screen

The markers object bar includes four directional arrows and L (left) and R (right) markers.

2. Touch a button in the object bar to select a marker. The marker is displayed on both the left and right monitors.

3. To position a marker, touch the marker displayed on the right monitor image, and drag it into position. Use the arrow keys on the Workstation keyboard to fine position a marker. One press of an arrow key moves a selected marker one pixel.

4. To add additional markers, repeat steps two and three. You can place up to five markers.

To delete a marker: touch it on the right monitor and press DELETE on the keyboard.

To save a copy of the image with the markers: press the SAVE key.

5. Select the OK button to close the MARKERS screen. The annotated image remains displayed on the left monitor until you press an X-ray switch or recall a saved image.

Comments

Add comments to an image

1. Select the COMMENT... button on the MAIN screen.

   The COMMENT screen is displayed.

COMMENT screen

2. Select the COMMENT button on the COMMENT screen.

   The comment box appears on the screen.

3. Enter text in the comment box. You can enter 40–80 characters.

To position the comment box on the image, touch the comment box on the right monitor and drag it. Use the keyboard arrow keys to fine position each comment box. Each press of an arrow key moves the box one pixel.

To add additional comments, select the COMMENT button and enter another comment. You can enter up to five comments per image.

To delete a comment: Select it and press the Workstation DELETE key.

To save a copy of the image with the comment: Press the SAVE key.

4. Touch the OK button to close the COMMENT screen. The commented image remains displayed on the left monitor until you press an X-ray switch or recall a saved image.

Crop

Crop shutters allowyou to shade out portions of the image on the left monitor.

Crop an image

1. Select the CROP... button from the IMAGE ANNOTATION screen.

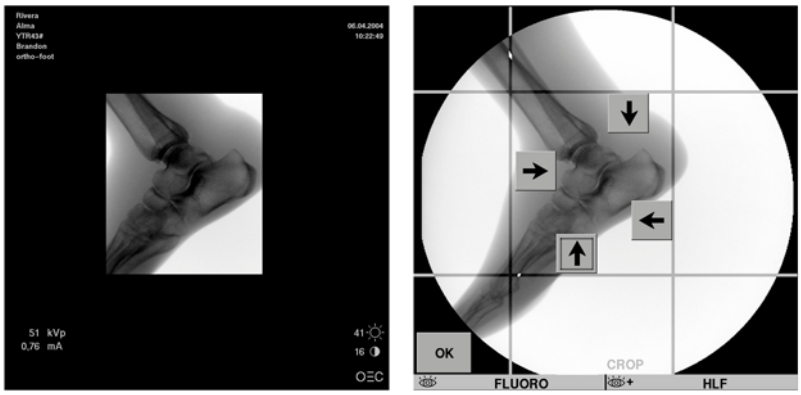
   The CROP screen displays four arrows attached to crop shutters.

CROP screen

2. Touch and drag the crop arrows to crop the image. As you move the arrows, the cropped area of the left monitor image is hidden from view.

To fine position a crop shutter, use the keyboard arrow keys. The arrow key will move a selected crop arrow one pixel.

The following illustration shows an example of a cropped image as it is displayed on the left and right monitors.



Cropped Image on Left and Right Monitor

3. To save a copy of the cropped image, press the SAVE key.

4. Select the OK button to close the CROP screen. The left monitor image remains cropped until you press the X-ray switch or display a saved image.

Chapter 10

Special Applications

Overview

Special applications include the following measurement options:

- Calibration
- Distance
- Stenosis

NOTE: *Measurement software is not available on GSP and SP models.*

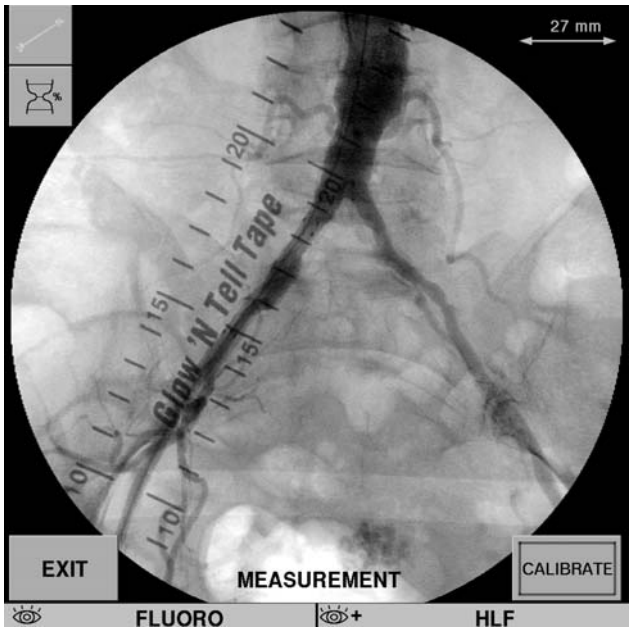
Measurements can be applied to a saved image, a single frame of a cine run, a recalled image, and the current image displayed. Zoom could be enabled before placing measurements for better accuracy.

Three distance, and one stenosis measurement may be placed on any one image.

When calibration is performed, the reference calibration value will display in the upper right hand corner of the MEASUREMENT screen.

You may touch and drag the measurement box for gross placement of the cursor. Use the keyboard arrows for fine positioning.

To display the MEASUREMENT screen, press the SPECIAL APPLICATIONS key on the Workstation keyboard.



Main MEASUREMENT screen

The left monitor image copies to the right monitor and displays in the MEASUREMENT screen.

Calibration must be performed before distance measurements can be placed. If stenosis is performed without prior calibration, then only the percent stenosis will be displayed. It is recommended to perform calibration before stenosis.

NOTE: *The MEASUREMENT screen exits when X-rays are enabled.*

Calibration

To perform a calibration between two points, a measuring device should be placed in the plane of interest. The distance on the image should be marked during calibration and the length value entered in the appropriate box. Once the value is entered in the mm or French box, the reference value for the fixed length will display in the upper right hand corner of the MEASUREMENT screen.

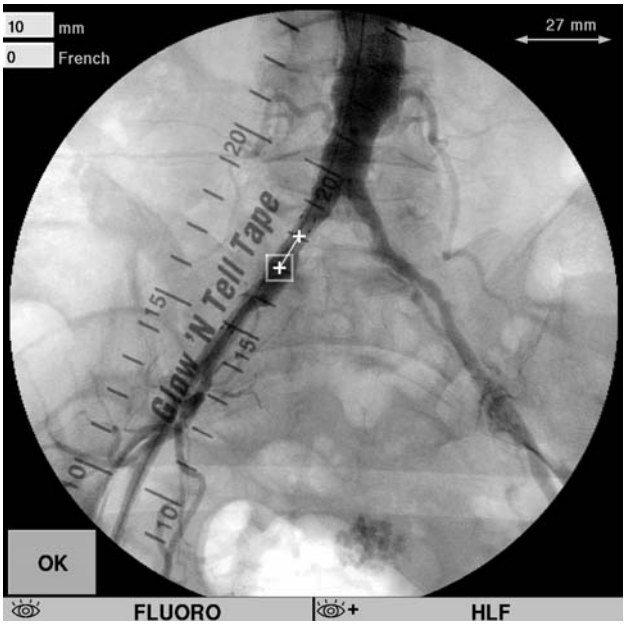
When calibration is changed during a procedure, the values in length for stenosis and distance will adjust to the new calibration values.

ON CINE RUN FRAMES: Each frame of a cine run will receive measurement calculations based on the same calibration values when measurements are applied. Once the frame is saved, it will be saved as a single frame with the current calibration and will not be modified when calibration is adjusted.

ZOOM: When zoom is enabled on an image, the reference calibration values will be scaled to match the zoom factor.

To Perform Calibration

1. Select the CALIBRATE button on the MEASUREMENT screen.



Calibration Display

2. Move the crosshairs to set the distance.

3. Enter the measured length or catheter size in the appropriate calibration input box.

NOTE: Calibration should be performed before distance or stenosis measurements are applied. Stenosis can only display a percentage if no calibration is performed.

Distance

A Calibration must be performed before distance measurements can be placed. The DISTANCE button will not be active until calibration is performed.

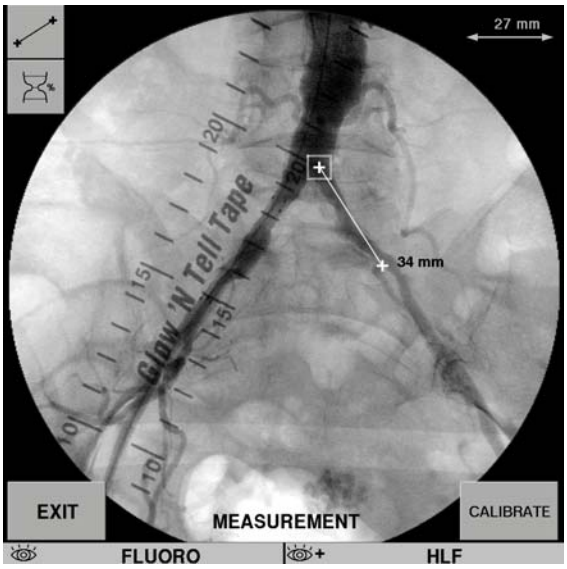
The distance calculation will display once both end points have been placed. This value will display adjacent to the end point.

When calibration is changed during the procedure, the distance measurements will be recalculated and display the new values.

To perform distance measurements

1. Perform Calibration.

2. Select the DISTANCE button. A default measurement line will display. This line is based on the calibration performed.



Distance Display

3. Select one crosshair at either end of the line and position the beginning point of measurement.

4. Select the second crosshair and position the end point of measurement. The distance measurement will display in millimetres adjacent to the end point.

NOTE: *Save the image in order to retain the displayed measurement information.For fine adjustments use up-down/left-right keys on Workstation*

Stenosis

The stenosis function is a ratio measurement of three distances. The ratio is the average of the lines drawn above and below a stenosis, and a dotted line bisecting the stenosis.

The dotted stenosis line is drawn across the stenotic region. The other two lines are drawn across normal vessel regions above and below the stenotic region.

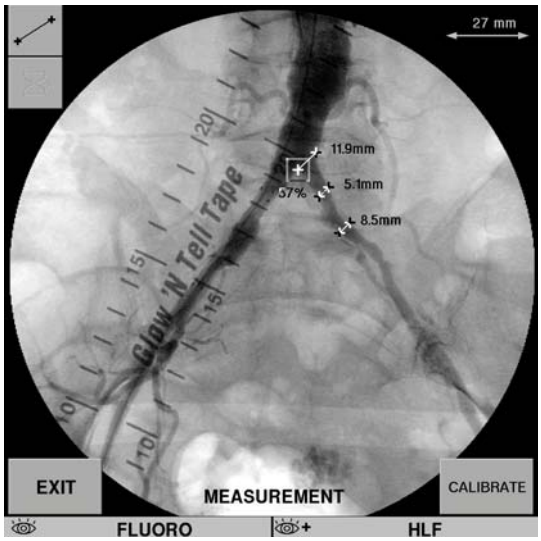
Once the lines have been placed, the percent stenosis will display adjacent the start point of the stenosis line. If calibration has been performed, the length of each line will display adjacent to the end point.

NOTE: *It is recommended that calibration be performed before applying stenosis lines. If calibration is not performed, only the percent stenosis can display. Calibration may be performed after the stenosis lines are placed.*

To perform stenosis

1. Perform Calibration.

2. Select the STENOSIS button on the MEASUREMENT screen. Three measurement lines will appear.



Stenosis Display

3. Place the shorter dotted default line to mark the stenotic area.

4. Place one longer line across a normal vessel above the stenotic region.

5. Place the other line below the stenotic region and across a normal vessel.

NOTE: *Save the image in order to retain the displayed measurement information.*

To delete measurements

1. Select the crosshair of the measurement.
2. Press DELETE on the keyboard.

Chapter 11

Customizing

Overview

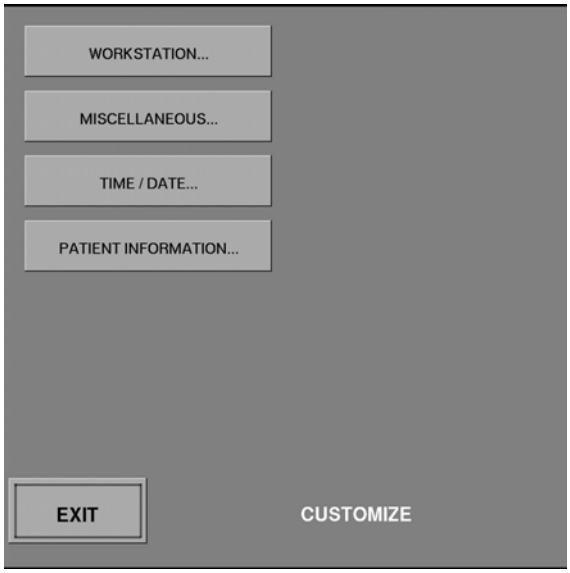
This chapter explains how to use the Customize function to tailor the setup of Workstation operation to your specific requirements. Features such as how decimals are displayed, enabling auto features, setting defaults, time and date and alarm tone are set through the customize function.

Some features are not available on all systems.

Customize Screen

To access Customize features

1. Press the CUSTOMIZE key on the Workstation keyboard.



CUSTOMIZE screen

2. Select the button for the function(s) you want to customize.

Workstation Options Screen

Use the CUSTOMIZE WORKSTATION screen to:

1. Enter the hospital name.
2. Select:
   - Dose unit display (Rad or mGy).
   - Decimal display (US or International).
   - Enable/disable automatic swap feature.
   - Enable/disable automatic save feature.
   - Enable/disable autoplayback of cine runs.
3. Set screensaver delay time.

CUSTOMIZE WORKSTATION screen

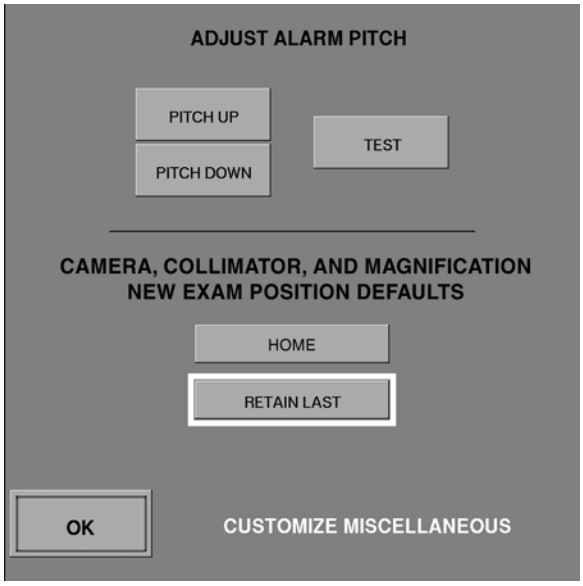
NOTE: *The Cine Autoplayback line on the CUSTOMIZE WORKSTATION menu will display only on systems equipped with a cine disk. The screen saver can be disabled by setting the delay time to zero.*

Miscellaneous Options Screen

Use the CUSTOMIZE MISCELLANEOUS screen to:

- Adjust the generator alarm tone.
- Set the default boot-up and new patient position for:
  - Camera rotation (9800/8800 C-Arm only)
  - Collimator rotation
  - Collimator iris
  - Collimator leaves
  - Magnification (Field Size)

Select the MISCELLANEOUS... button to display the CUSTOMIZE MISCELLANEOUS screen.



CUSTOMIZE MISCELLANEOUS screen

Adjust alarm tone

1. Select TEST to play the generator alarm.
2. Use PITCH UP and PITCH DOWN to adjust the pitch of the alarm.
3. Select OK to close the CUSTOMIZE MISCELLANEOUS screen and return to the CUSTOMIZE screen.
4. Select EXIT to close the CUSTOMIZE screen.

Set defaults

To set the default position for camera rotation, collimator rotation, collimator iris and leaf position and magnification:

NOTE: *For Uroview systems this selection applies only to collimator position and magnification default.*

1. Select HOME or RETAIN LAST for the default position.

   HOME returns the camera and collimator to the home position, opens the collimator iris and/or leaves to a fully open position, and returns magnification to normal.

   RETAIN LAST keeps the same settings for the next patient exam or at start-up.

2. Select OK to close the CUSTOMIZE MISCELLANEOUS screen and return to the CUSTOMIZE screen.

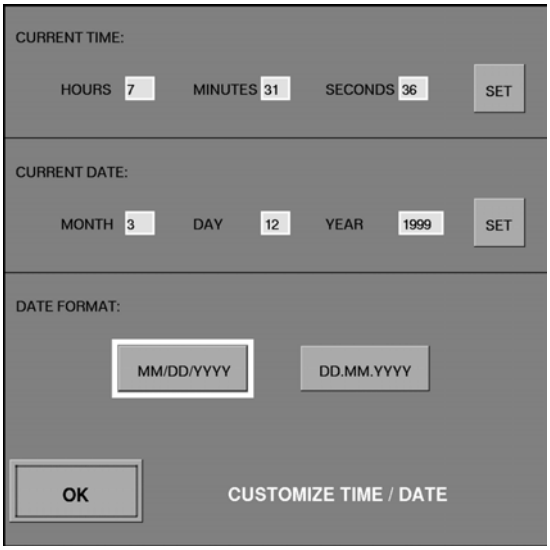
3. Select EXIT to close the CUSTOMIZE screen.

Time and Date

Select the TIME / DATE button to enter the current date and time, and to specify the format of the date display.

Set time and date

1. Touch TIME/DATE... on the CUSTOMIZE screen.



TIME/DATE Screen

The CUSTOMIZE TIME/DATE screen will display.

2. Enter the current time in hours, minutes and seconds using the keyboard, and then select the SET button on the screen.

3. Enter the current date in numeric characters for month, day, and year and then select the SET button.

4. Select either the MM/DD/YYYY button or the DD:MM:YYYY button to choose a format for the date display.

5. Select the OK button to close the CUSTOMIZE TIME/DATE screen and return to the CUSTOMIZE screen.

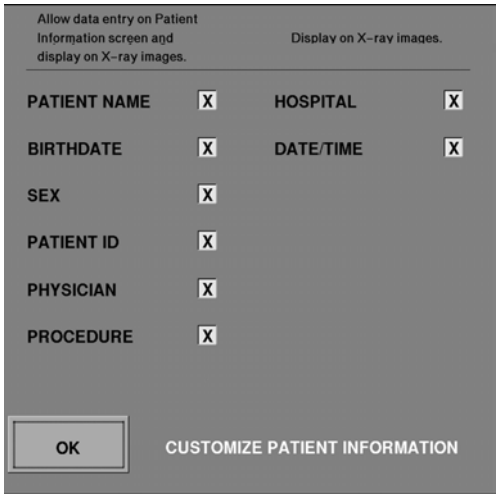
NOTE: *System default is MM/DD/YYYY.*

Patient Information Screen

You can define which data entry fields are active on the PATIENT INFORMATION screen and what information is displayed on images.

When an X is displayed in the box next to a patient information category, then that field is active on the PATIENT INFORMATION screen. By default, all fields are active. Data can be entered only in active fields. Patient information entered in active fields is displayed on left monitor images.

Select the PATIENT INFORMATION... button from the CUSTOMIZE screen.



CUSTOMIZE PATIENT INFORMATION screen

To make a data-entry field inactive, touch the box next to it. The X is removed.

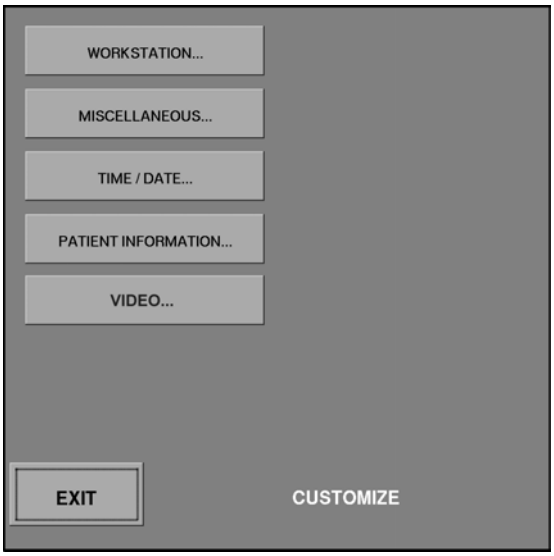
Customize Video

Some fixed room systems provide a third monitor that displays video from alternate sources in a secondary window. The "picture-in-picture" (PIP) option allows you to designate the location on that monitor for the secondary window to display.

For more information on video displays, refer to your generator operator manual.

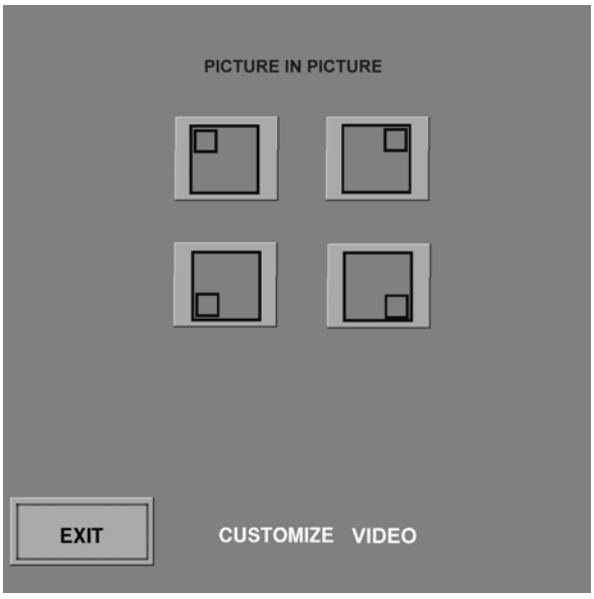
To set the location of the Picture in Picture display:

1. Press the CUSTOMIZE key on the Workstation keyboard.



CUSTOMIZE screen

2. Select VIDEO. The CUSTOMIZE VIDEO screen will display.



CUSTOMIZE VIDEO screen

3. Select location of PIP window.
4. Select OK.

Chapter 12

Maintenance

Overview

This section describes routine performance checks that you can perform to ensure that the OEC Workstation is operating correctly. The performance checks listed are not intended to substitute for scheduled periodic maintenance. If problems are found during these checks, contact a qualified service technician to troubleshoot and repair the system.

In addition to performance checks, safe cleaning practices are described, and a semi-annual periodic maintenance schedule has been provided. All periodic maintenance should be performed by a GE OEC Medical Systems, Inc. representative or a qualified service technician.

Prior to performing any of the performance checks in this section, it is important that potential hazards associated with these tasks are understood.

Review Chapter 1, "Introduction and Safety" of this manual before proceeding.

WARNING

Circuits inside the equipment use voltages which are capable of causing serious injury or death from electrical shock. Only GE OEC trained and qualified personnel should remove the covers or perform any type of service task.

Move the system into a safe operating area prior to beginning the performance checks, and observe all radiation safety precautions. These checks should be performed as often as equipment use and circumstances warrant.

Extensive use warrants increasing the frequency of performance checks. In addition, circumstances such as accidents during transport, or exposure to excessive fluids, may warrant that performance checks be performed to verify safe operation of the equipment.

In addition to the following checks, refer to your generator operator manual for additional maintenance involving the Workstation.

Performance Checks

Check Mechanical Performance

1. Check for proper control of the Workstation wheels. Check for ease of movement without excessive play.

2. Check the brake pedal for ease of movement and proper control of the wheels without excessive play.

Check Electrical Performance

1. Inspect the Workstation AC power cable and high voltage cable. Look for signs of wear or abrasion to the cable jackets.

2. Inspect the interconnect cable for sign of wear or abrasion, loose or missing connector pins, and worn strain reliefs.

3. Turn the system on and verify that the system successfully completes the power-up sequence.

4. Check that the fans located at the back of the Workstation are functioning.

Cleaning

CAUTION
Always turn the Workstation off and disconnect power before cleaning. Use a slightly damp cloth or sponge for cleaning.

- Clean the covers and panels periodically with a damp cloth.
- Keep the dark plastic bezel surrounding the touchscreen free from dirt. Use a mild detergent, if necessary, to remove scuffs and stains.
- Do not use any solvents which may damage or discolor paint finishes or plastic components.
- Do not spray the monitors with cleaner or liquid.
- Be careful not to drip liquids where they can enter electronic assemblies through panel or cover seams.

WARNING
Water, soap, or other liquids, if allowed to drip into the equipment, can cause electrical short circuits leading to electric shock and fire hazards.
If liquids should accidentally spill into the Workstation electronics, DO NOT connect the power cord to a power supply connection or turn the Workstation on until the liquids have dried or evaporated completely.

IR Remote Control

Replace the IR remote control battery when the IR REMOTE BATTERY LOW message displays on the Workstation. The remote control uses three alkaline AAA batteries.

NOTE: There are no user serviceable parts inside the main body of the IR remote control. Opening that compartment voids the warranty.

To replace the batteries

1. Remove the screw that secures the battery cover on the back of the IR remote control.
2. Remove the old batteries.
3. Insert three AAA batteries. (Use care to observe the correct polarity as indicated by the + symbols.)
4. Replace the cover.
5. Insert the battery cover screw, but avoid over-tightening.

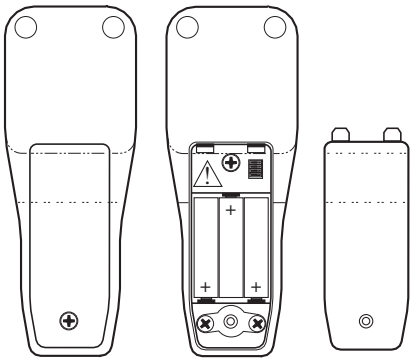


Figure 12-1. *IR Remote battery cover.*

Long-Term Storage or Shipment

To prepare the system for long-term storage (60 days or more) or shipment, observe the following recommendations:

1. Set all locks and brakes and remove all power. Coil the interconnect cable and store it on its hanger. Coil the power cable and store it on the Workstation handle.

2. Wrap the monitors with bubble wrap.

3. Cover the Workstation. Attach it to a solid supportive shipping base and enclose it in a protective container adequate for shipment or storage.

Periodic Maintenance Schedule

Routine periodic maintenance should be performed semi-annually. This maintenance should be performed by a GE OEC Medical Systems, Inc. certified service technician. The following periodic maintenance schedule is recommended.

Semi-Annual Maintenance

Semi-annual maintenance should be performed as described in the Periodic Maintenance Procedure. This procedure covers the following maintenance items:

Inspect Static Drag Wire
Perform Workstation Steering & Brake Test
Inspect and Clean Workstation Air Filters
Inspect AC Power Cable
Inspect Interconnect Cable and Connector
Measure Ground Continuity
Measure Line Voltage Regulation
Inspect/Adjust Workstation Power Supply Voltages
Perform Workstation Panel Diagnostics
Perform Workstation Functional Test
Perform IR Remote Functional Test
Perform Accessory Functional Test

Chapter 13

Troubleshooting

Overview

This chapter describes messages that appear on the right Workstation monitor when the system fails the start-up sequence or fails during system operation. Workstation failures may result in impaired system operation or automatic system shut-down. The messages are listed in alphabetical order on the following pages.

Error Recovery Steps

Perform the following error recovery procedure if you encounter problems during start-up or operation:

1. If a message occurs, place the Workstation power switch in the off position; wait five seconds, then place the power switch in the on position. If this fails to restore normal operation, then proceed with step 2.

2. Turn the power switch OFF, disconnect the power cord, and call for service. Refer to Chapter 1, "Introduction and Safety" for service dispatch telephone numbers. Do not continue using the system.

WARNING
Ignoring error and warning messages may result in equipment damage and personal injury.

Messages

The following messages may be displayed on the right monitor. To close the message display, touch the OK button.

CANNOT MAKE NETWORK CONNECTION. Verify that the Workstation is connected to the network.

COPY OR PRINT IN PROGRESS. Please wait.

DICOM SERVER IS OUT OF RESOURCES—TRY AGAIN LATER. This is a temporary condition caused by currently high usage of the server.

DISK FORMAT IS IN PROGRESS. The currently selected "Copy To" device is being reformatted.

DISK FULL. Insert another floppy disk and copy remaining images.

FORMATTING ERASES ALL DATA ON THE DISK. Select Yes to continue formatting, select No to cancel. Continue Formatting?

HIGH CAPACITY DISK FAILURE. Drive has failed or is not properly installed. The Jaz disk has not properly initialized.

INVALID YEAR. Enter a value from 1976 to 2075.

KEYBOARD FAILURE. Turn the Workstation off, wait five seconds, then restart the Workstation.

NO DISK IN DRIVE. Insert disk.

PLEASE WAIT. System is busy performing a function. Time varies for the accomplishment of each function.

PRINT FORMAT NOT SUPPORTED. Use Customize to select a format supported by this printer or contact the network administrator.

PRINTER ERROR. Check the printer error display and refer to the operating instructions provided for the printer for more information.

PRINTER IS OUT OF FILM OR PAPER. Replace film or paper.

PRINTER OFF-LINE. Place printer on-line and resubmit the print job.

REMOTE CONTROL BATTERY IS LOW. Replace battery.

SCHEDULED EXAM LIST IS FULL. NEW PATIENT INFORMATION WILL NOT APPEAR IN THE SCHEDULED EXAMS LIST. You may take X-rays for patient and save in Saved Exams.

SYSTEM ERROR DETECTED. Turn the Workstation off, wait five seconds, and then restart. If this message persists, call service.

SYSTEM FAILED TO CONNECT TO DICOM SERVER. Verify the target server is on-line and is configured properly through the CUSTOMIZE screen.

THE CINE DISK IS NOT AVAILABLE. Call service.

THE CURRENT SESSION CINE RUNS WILL BE OVERWRITTEN IN 30 SECONDS. The oldest previous runs of the current session will be overwritten first. *This message appears when several cine runs for a single patient have been run and filled the time available for cine acquisition.*

THE SELECTED FUNCTION IS NOT AVAILABLE ON THIS MODEL.

THIS DICOM SERVER VERIFIED SUCCESSFULLY.

TOUCH SCREEN FAILURE. Turn the Workstation off, wait five seconds, then restart the Workstation. If this message persists, call service.

TOUCH SCREEN OBSTRUCTION. Remove any object touching the touchscreen. Turn the Workstation off, wait five seconds, then restart. If this message persists call service.

VCR COMMUNICATION FAILURE. Turn the Workstation off, wait five seconds, and then restart. If this message persists, call service.

WORKSTATION AND GENERATOR ARE NOT COMPATIBLE. Connect the Workstation to a compatible generator or use it as an independent Workstation. Call service for assistance.

WORKSTATION KEYBOARD ERROR. Turn the Workstation off, wait five seconds, and then restart. If this message persists, call service.

Chapter 14

Technical Reference

Overview

The policy of GE OEC Medical Systems, Inc. is one of continual product development and improvement. For this reason, GE OEC Medical Systems, Inc. reserves the right to change the operating characteristics and specifications of newer products at any time, without prior notice, and without incurring any obligation relating to previously manufactured items.

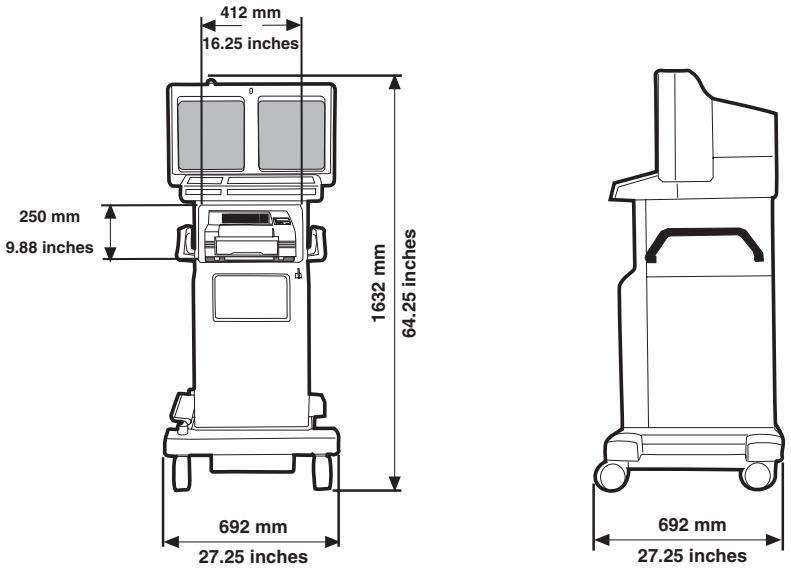
The specifications listed are limited to general performance and physical data. Specifications of optional equipment provided by other manufacturers are given in the applicable manuals provided with those options.

GE OEC Medical Systems, Inc. will make available, on request, circuit diagrams, component part lists, descriptions, calibration instructions, or other information which will assist properly trained and qualified technicians to repair those parts of the system which are designated as repairable.

Workstation Classification

Class I Equipment (as defined by IEC 60601-1)
Ordinary protection against ingress of water

Dimensions



Workstation: 163 cm x 69 cm x 69 cm
(64 1/4" H x 27 1/4" W x 27 1/4" D)

Workstation weight: 192.77 kg (424 lbs.)

Dose Area Product

The calculated dose area product is a measure of radiation emitted by the X-ray tube. This does not represent the radiation absorbed by the patient.

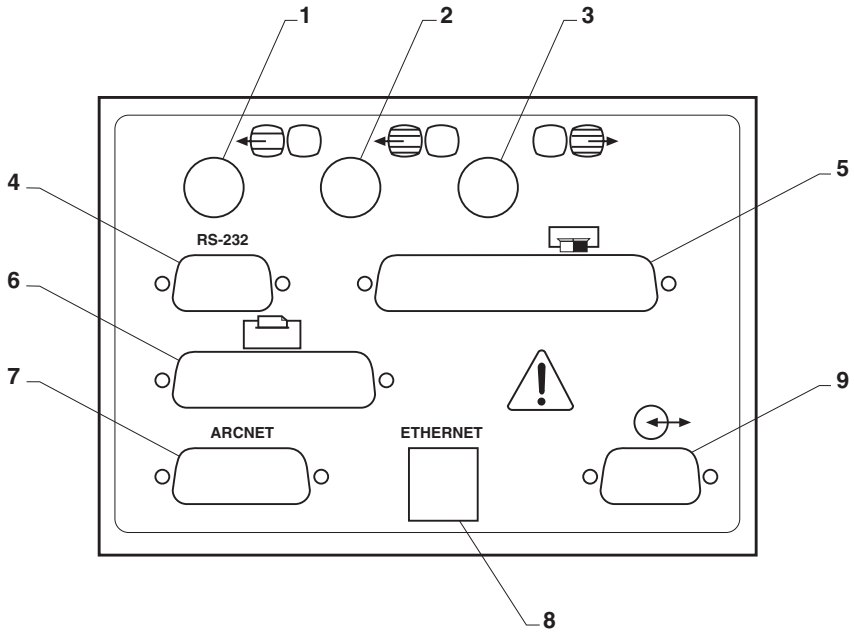
Please Note: The system complies with DAP display accuracy as required by IEC 601-2-43.

Iris and shutter collimated fields are at the image receptor plane (scatter grid surface). Collimated fields less than 5 cm at the surface of the image receptor may result in significantly greater error.

Environmental Requirements

Ambient Temperature	Operating: 10 to 35 degrees C 50 to 95 degrees F
Extended Storage and Transportation	0 to +40 degrees C (> 2 days) 32 to100 degrees F
Short-term Storage and Transportation	-10 to +55 degrees C (< 2 days) 32 to 104 degrees F
Altitude	10,000 ft. (3048 meters) maximum
Humidity	Operating: 20 to 80%, non-condensing Storage and transport: 10%-90%, condensing
Shock and Vibration	1G at 5-200 Hz for 2 hours

External Connections



Item	Description
1	Left Monitor Standard Video EIA 170 or CCIR output (standard resolution)
2	Left Monitor Fast Scan Video (high resolution)
3	Right Monitor Fast Scan Video (high resolution)
4	RS-232 serial communication (standard 9-pin D-type connector)
5	Direct Digital Printer Interface (DDPI) (37-pin D type) (not used)
6	Parallel printer port (standard 25-pin D type connector)
7	ARCNET connection
8	Ethernet connection
9	Input/Output - Switch/relay control for Injector, Room, Door, Control 1, Control 2 (See detail)

The OEC Workstation can provide a signal to an approved injector. This signal is sent when the injection icon displays during a procedure. A custom cable will need to be constructed or obtained from an approved injector manufacturer or GE OEC.

Below is a diagram of the pin numbers on the external connection that controls the injection signal.

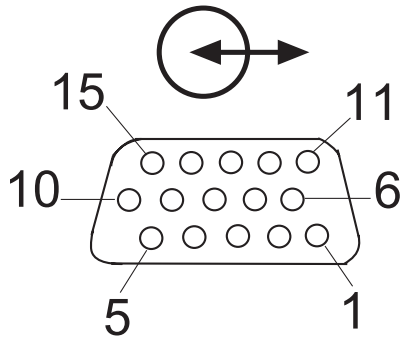


Figure 14-1. *Front View of Input/Output Relay Connection on back of Workstation.*

Pin 1 and 6 Power Contrast Injection Connector output. Isolated relay contacts normally open. Contacts close to provide a signal to the contrast media injector.

These relays are capable of switching 24V DC or 24V AC at a current of up to 2 amps. All other switches are currently undefined.

Call Technical Support for a list of approved injectors that work with the OEC Workstation. Communications Center phone numbers can be found in Chapter 1, "Introduction and Safety."

Labels and Symbols

Overview

The following section describes labels and symbols located on the OEC Workstation that are not described elsewhere.

Two types of labels are described: warning labels and regulatory certification labels.

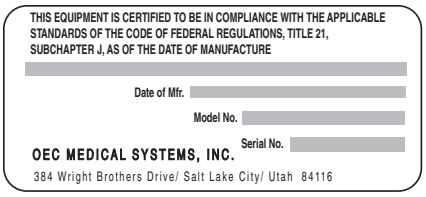
- Warning labels define potential hazards and advise against misuse that might result in personal injury. Familiarize yourself with these labels and their meaning in order to ensure a safe environment for both the patient and yourself.

- Regulatory labels indicate that the system meets the requirements of specific governmental, medical and industrial organizations.

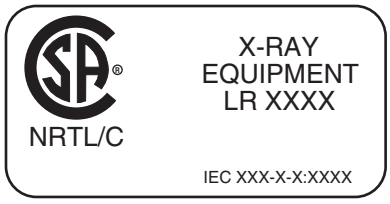
Symbols are provided to represent concepts such as locked and unlocked brake positions, or the proper transport position of the Workstation. Many of the symbols described here are listed in IEC 417 and ISO 7000. Those that are not were developed by GE OEC Medical Systems, Inc.

Labels

The system has been tested and certified by the VDE Testing and Certification Institute.

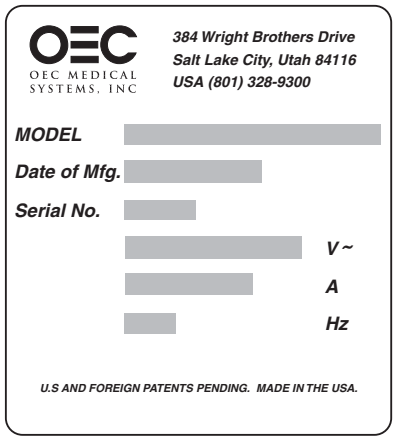


These labels (for the system and certified components) certify that the system meets applicable federal standards and regulations for X-ray equipment as of the date of manufacture.

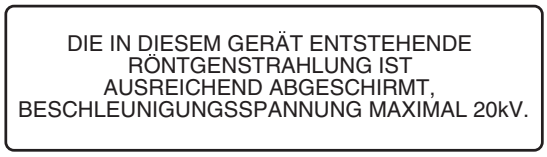


The system has been tested and certified by the Canadian Standards Association to comply with applicable U.S. and Canadian Standards.

This symbol indicates the system was tested by a Notified Body and was found to be in compliance with the requirements of all relevant directives and standards in effect within the European Union at the time of manufacture.



System nameplate/rating label. Indicates manufacturer information and input power requirements.



The system monitors are shielded to prevent exposure to X-ray radiation. (Label applied on European systems only.)

Symbols

Attention.

Near the power cord this symbol means that you must read the operator manual prior to turning the system on to familiarize yourself with proper operating procedures.

Near the I/O connectors on the Workstation this symbol means that all peripheral equipment must be approved by GE OEC Medical Systems, Inc.

Circuit breaker: push to reset circuit breaker for power to the system.

Circuit Breaker: push to reset circuit breaker for power to the system. (120 VAC systems only.)

Circuit Breaker: push to reset circuit breaker for power to the generator.

Circuit Breaker: push to reset circuit breaker for power to the Workstation.

An Equipotential terminal is provided on the Workstation. This allows connection between equipment and a potential equalization busbar of the facility.

IP68

The electrical switching mechanism within the footswitch is protected from exposure to dust and the effects of continuous immersion in water. However, placement inside a protective cover is recommended.

Standby. Identifies the switch or switch position by which part of the equipment is switched on in order to place it in the standby position.

Contrast adjustment.

Brightness adjustment.

Alternating current.

Indicates locked position of brake handle or pedal.

Indicates unlocked position of brake handle or pedal.

Material Safety Data Sheets

Manufacturer's Material Safety Data Sheets are available from the manufacturer upon request. Contact the following manufacturer's with regard to the materials listed:

Dow Corning R 5 Compound (Silicone) - Dow Corning Corporation, South Saginaw Road, Midland MI 48686, (517) 496-8306.

Shell Diala R Oil Ax (Oil MSDS No. 60030-5) - Shell, Inc., Product Safety and Compliance, PO Box 4320, Houston, TX 77210, (713) 473-9461.

Panasonic Sealed Lead Acid Battery - Matsushita Industrial Battery Co., Ltd, Battery Storage Division, 11-66 Honsyuku-Cho, Chigasaki, Kanagawa, Japan, (0467) 51-1121.

Sealed Lead Acid Battery - Hawker Energy Products, Inc., 1050 South Broadway, PO Box 5887, Denver, CO 80217, (303) 744-4806.

Optional Equipment

The following accessories have been tested with, and are known to work with the Workstation:

- Instant Film/Paper Printer
- Thermal Printers
- VCR
- Laser Camera Interface
- DICOM 3.0 Interfac

Power Requirements

System Input Power

The system operating voltage is changeable. If the operating voltage requires changing, this change must be made by a GE OEC Medical Systems, Inc. field service technician, or by qualified technical service personnel.

Line Frequency:	60/50 Hz
120 VAC (+/- 10%):	15 Amps
200/220/230/240 VAC (+/- 10%):	10 Amps

Maximum non-destructive voltages that can be connected to signal I/O ports: 7 Volts DC

ROOM I/O Port: +24V relay closures, +5V TTL logic levels

Technique Factors at Maximum Line Current Condition:
Peak current demand is independent of technique load factors. Depending on previous loading to the battery, peak demand is determined by the battery charger current limit.

Line Regulation (Percent): 15% at maximum radiographic exposure.

Line regulation is based on measurements made at the input (primary winding) of the isolation transformer under standby conditions and at maximum radiographic exposure by the following equation:

Line regulation = 100 (Vn - V1)/V1
Where Vn = no load voltage (standby), and V1 = loaded voltage (maximum radiographic exposure).

Maximum Continuous Power Dissipation: 4,253 BTUs (Based on a maximum real power value of 1,245 watts.)

Connector Output Voltages

Standard Video:	2 VAC point to point (p-p)
Fast Scan Video	2 VAC p-p
Printer:	centronix interface
Direct Digital Printer Interface:	centronix interface
RS-232 (COM1):	9-pin connector
DICOM:	ethernet interface
ARCNET:	+/- 5VAC

Given for three-phase, full-wave rectification, a reasonable approximation to the high frequency generator with minimal ripple.

Replacement Items

The following replacement items can be ordered:

- Film
- Printer paper
- Sterile drapes and covers

To receive more information on optional equipment or replacement items, please refer to Chapter 1, "Introduction and Safety" for ordering information or Communication Center phone numbers.

Video Signal

Composite video, EIA RS170A 60 Hz, 525 line, [International CCIR 50 Hz, 625 line] TTL Logic.

Index

Symbols

no entries

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no entries

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no entries

R

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T

U

V

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X

Y

no entries

Z