ACQUISITION GUIDE

DSX/DS7 NEW LINE

735232-rev.C 11/99

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Revision History

Revision	Revision date	Description of Change
A	11/97	Original
B	03/99	ECN1545 Chapter 1: Safety. Pages 1-4, 1-5 & 1-6, rev.B.
C	11/99	ECN1551 Chapter 1: Safety. Page 1-8 & 1-9, rev.B

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Preface

About This Manual

This is SMV’s *Acquisition Guide* for the DS7 and DSX sophycameras. It is a companion piece to other related documents—the *System Guide* for each camera and the *XT Processing Guide*. Together, these volumes include all the information you need to operate the cameras on a daily basis.

Typographic Conventions

This manual uses several typographic conventions to convey information. These conventions are outlined in the following table.

Example	Explanation
<ENTER>	Capitalized words inside angle brackets refer to keys on the keyboard. “Press <ENTER>” means to press the Enter key on your keyboard.
<CTRL> + <X>	Two keys separated by a plus sign directs you to press and hold the first key, then press the next key. Release both keys simultaneously.
<CTRL>, <ALT>, <DEL>	A series of keys separated by commas directs you to press and hold each key in succession, then release them simultaneously.
Manual	Words in bold type refer to buttons on the screen or the hand control. “Select **Manual**” means to use the Rollermouse to move the cursor on the screen to the button marked Manual, then to select the button.
☒ **Note:**	Paragraphs beginning with this symbol point out additional information that applies in some, but not all, cases.
⚠ **Important:**	Paragraphs with this symbol alert you to the presence of important operating and maintenance instructions.
⚡	This symbol appears on equipment to alert you to the presence of uninsulated "dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock.
⚡ **Caution:**	This symbol appears on equipment to alert you to the presence of uninsulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock. This symbol is also used within the text to alert you to instructions you should follow to avoid damaging the equipment or injuring yourself or the patient.
✋ **Warning:**	This symbol alerts you to information you need to know to avoid injuring yourself or the patient.
☞ **Example:**	Paragraphs beginning with this symbol include examples and other explanatory text.

Nomenclature

This manual uses specialized terms to describe certain features of the camera. Also, several specialized terms are used to describe actions you must make to use the camera. These terms are described below.

Buttons and Boxes

Certain areas of each menu or screen appear on the monitor as raised squares or rectangles. If you press the touchscreen or use the Rollermouse to move the cursor to one of these areas, then press one of the Rollermouse buttons, the DSX/DS7 responds in some programmed way. For the purpose of this guide, these areas are divided into two types: buttons and boxes.

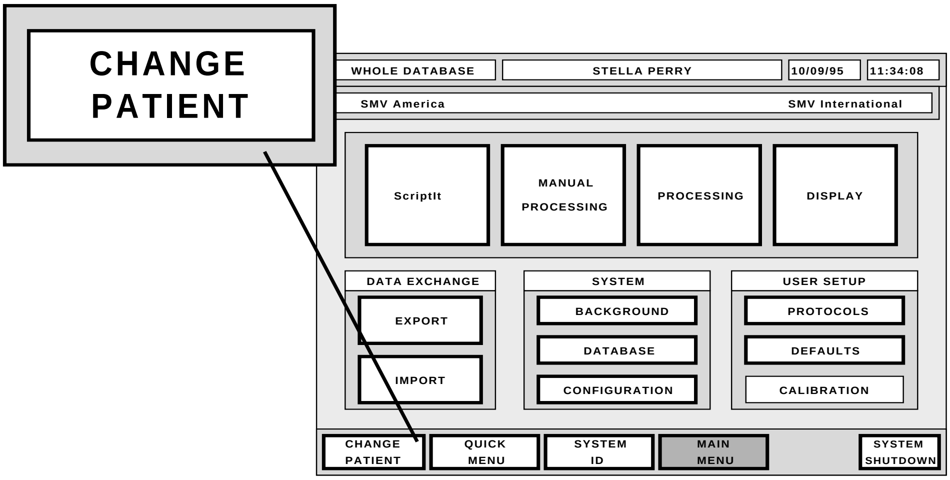
Boxes are areas that, when clicked or pressed, allow you to enter text or numbers. An example is the box where you enter a name when you add a new patient to the system.

Buttons, on the other hand, are areas on the screen that you can select to perform some function or to display another menu. There are four types of buttons, and each type acts in a different way.

Option Buttons These buttons present the options that are available on a menu or setup screen. When you press an option button, the system usually displays another screen or menu.

Example: The Change Patient button on the Main Menu (Figure 1).

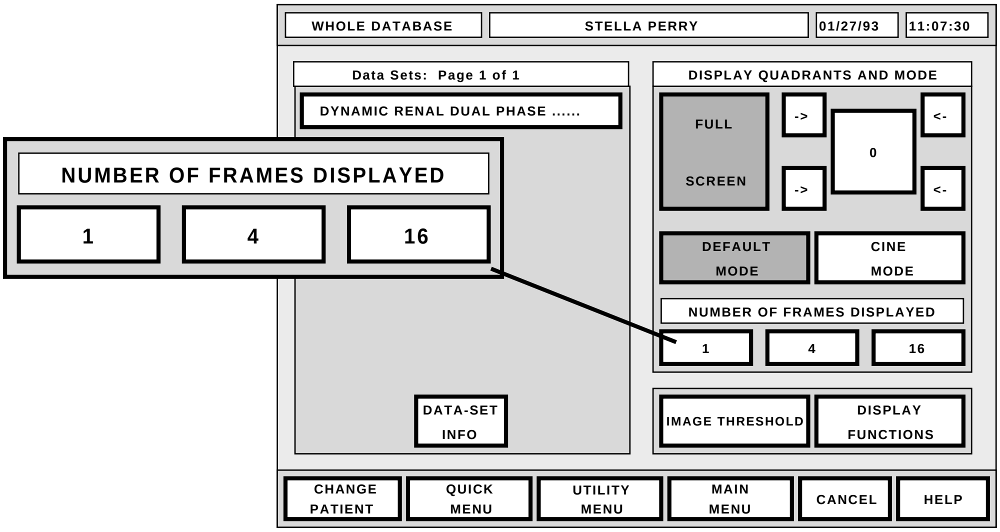
Figure 1: *Change Patient Button*



Multiple Choice Buttons These buttons usually appear as a set and act like the buttons on a car radio. When you press one button in the set, it becomes activated; the button that was previously highlighted becomes deactivated.

Example: The Number of Frames Displayed buttons on the Display Menu (Figure 2).

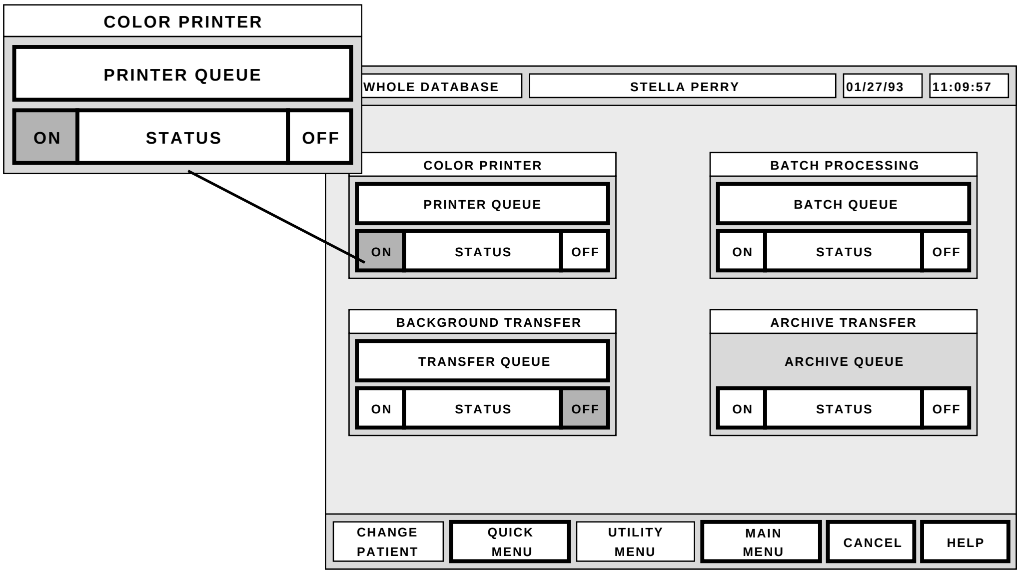
Figure 2: *Number of Frames Displayed Buttons*



Toggle Buttons This type of button acts like a toggle switch. Press the button once, and the parameter changes to another value. Press it again and the parameter changes back.

Example: The Color Printer Status button on the Background Setup Menu (Figure 3).

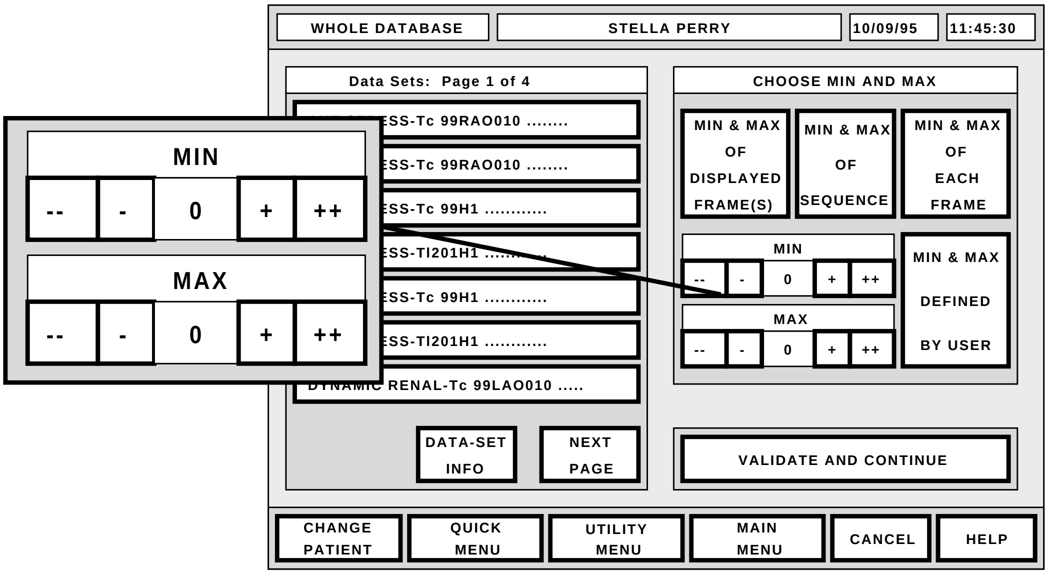
Figure 3: *Color Printer Status Button*



Increment Buttons These buttons come in three forms—plus/minus, arrow, and number—but all act to increase or decrease the value of a parameter. These buttons usually appear as a set of four, with the buttons on the left of the parameter decreasing the value and those on the right increasing it.

☞ **Example:** The Increment buttons used to set the minimum and maximum values on the Image Threshold Menu (Figure 4).

Figure 4: *Minimum and Maximum Buttons*



Communicating with SMV

If you have a question, a problem, or a suggestion, we encourage you to contact us at SMV. We have included two sample forms—one for reporting problems, the other for requesting enhancements. Please send these forms to the Software Release Manager.

Problem Report

Hospital or Site Name: ____

Phone #: (   ) _____- _________ Working Hours __________________________

Address:____

____

City: ____________________State:_________________ ZIP: _____________

Submitted by: ____

Title: ____

Computer: ___________________________Documentation:__________________

Camera: ___________________________________Software Rev: _____________

Can problem be repeated? Yes: ______________________No: ________________

Is there a way to work around the problem? _________________________________

____

____

Description: ____

____

____

____

____

____

send this form to the SMV office in your country

Enhancement Request

Hospital or Site Name: ____

Phone #: (   ) ______- ____________ Working Hours ______________________________

Address:____

____

City: __________________________________State: ___________ ZIP: _________

Submitted by: ____

Title: ____

Computer: ________________________________Hardware: ______________________

Camera: ___________________________________Software Rev: __________________

Description of Enhancement: ______________________________________

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send this form to the SMV office in your country

Safety

Introduction

This section contains safety information that physicians and operators need to know before they begin using the system.

General Warning

It is mandatory that the DSX/DS7 remain under the control of a qualified operator trained in its use whenever patients or non-departmental personnel are in the vicinity of the camera. This is especially important during the following procedures:

- ❑ when a patient is on the Scintibed
- ❑ when the gantry is performing automatic motions (for example, when you change a collimator)

The DSX/DS7 is equipped with a collision detector called safety pad. This safety pad only detects collisions that occur with the face of the collimator. As long as the safety pad is properly installed, it provides sufficient protection for patients during the acquisitions available with SMV’s acquisition protocols. However, be aware that it is possible to use the hand control to move the gantry or detector head so that the gantry or the sides of the detector head come into contact with the patient or the Scintibed. The safety pad cannot detect these types of collisions.

Intended Use

Use this system to generate anatomical and functional images. These images are generated when gamma photon energies are emitted by the body after a radioisotope is injected, ingested, or inhaled, then detected by the gamma camera, stored in computer memory, and displayed on the screen. Together with other computer-generated data, these images provide information that can be used by physicians to aid in their clinical diagnoses of patients.

It is the responsibility of each laboratory to establish normal ranges for each protocol so that proper diagnoses can be made. This system is intended for use only under the supervision of a licensed physician.

Contraindications

Patients who are restricted from having Nuclear Medicine studies (according to either the referring physician or the radiologist) are contraindicated.

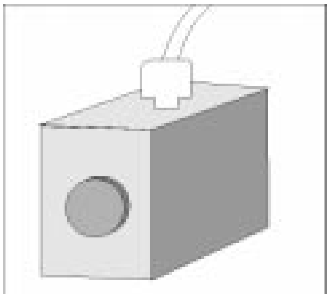
Also, operators should follow the guidelines and contraindications contained in the radiopharmaceutical package insert.

Patient Safety

DSX and DS7 Emergency Stop Buttons

Make certain that you are familiar with the location of all emergency stop buttons. One button is on the Acquisition console, the other is mounted in a remote user-selected location (Figure 1-1). Pressing any of the buttons immediately stops the motion of the gantry without shutting off the power to the detector head. Both buttons must be set to ON (the button in the user-selected location is dimmed when it is turned on; the other buttons must be pulled out) for the gantry to function.

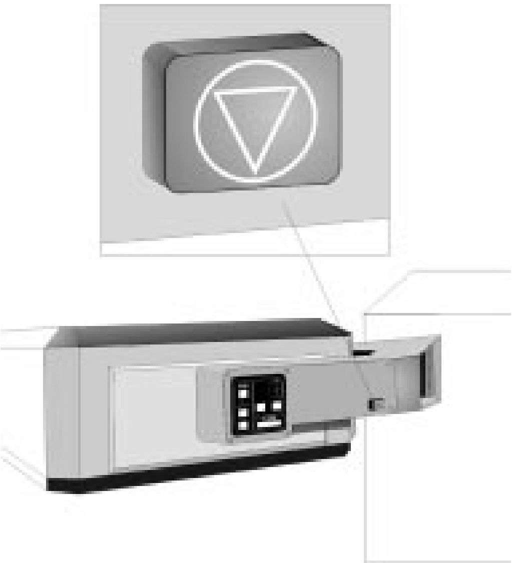
Figure 1-1: Remote Emergency Stop Button



Important: If you use one of these techniques to stop the gantry, you must reboot the system and perform a gantry index search before you acquire the study. This procedure is explained in Quality Assurance chapter of your camera's *System Guide.*

In addition, the DSX camera has emergency stop buttons located on each gantry arm (Figure 1-2).

Figure 1-2: DSX Gantry Arm Emergency Stop Button



Using the Safety Pad

Figure 1-3: DS7 Safety Pad

Figure 1-4: DS7 Safety Pad Button

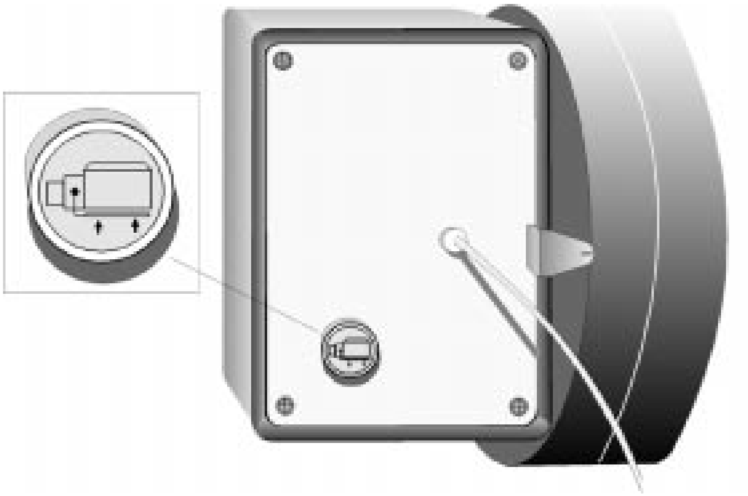


Figure 1-5: DSX Safety Pad

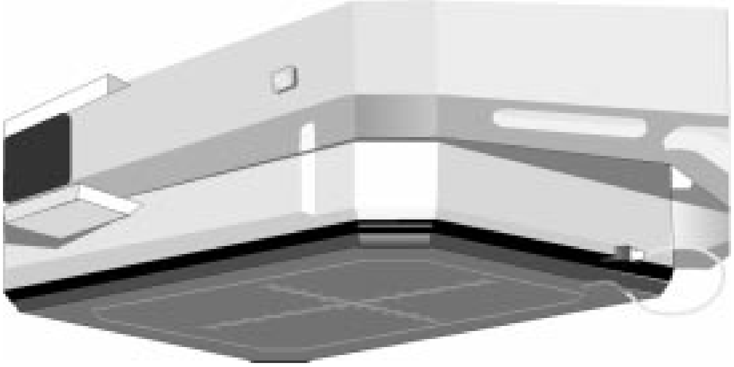
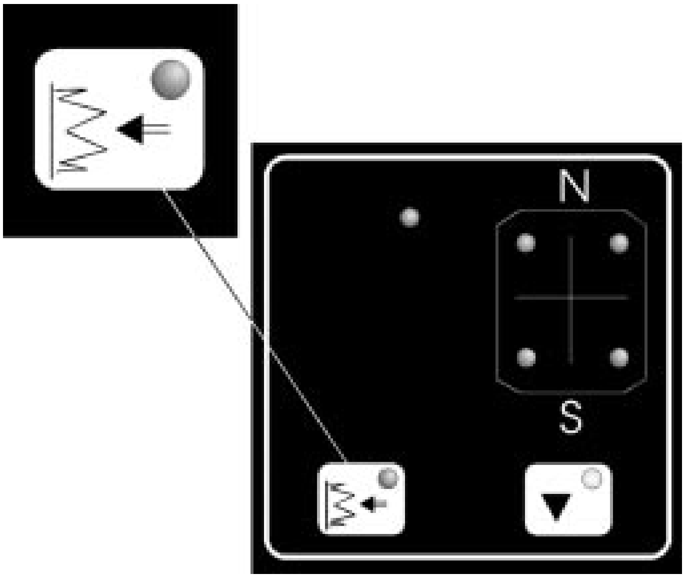


Figure 1-6: DSX Safety Pad Button



Warning: Before each acquisition, the operator has to check the safety pad is well hangged, and the connections are correct.

During Any Acquisition

Use the safety pad for every acquisition. The safety pad is designed so that any object that comes into contact with the pad stops the gantry's motion.

If you are using the camera without the safety pad installed (for example, during testing or research) and you are prompted to press the safety pad, press the Safety Pad button on the side of the gantry arm to continue (Figures 1-4 and 1-6).

During Tomographic or Whole Body Acquisitions

If an obstruction causes the safety pad to stop during an acquisition, clear the obstruction from the path of the gantry. You can resume the acquisition by pressing **Start** on the hand control. Press **Stop** to abort the acquisition (for example, if the patient moved).

Warning: Never leave a patient unattended during any acquisition in which the gantry or the detector head moves.

Note: If you cannot move the obstruction, you can move the gantry by pressing the Safety Pad button, which allows the gantry arm to move freely. You must restart the acquisition.

Using the Tomo Table

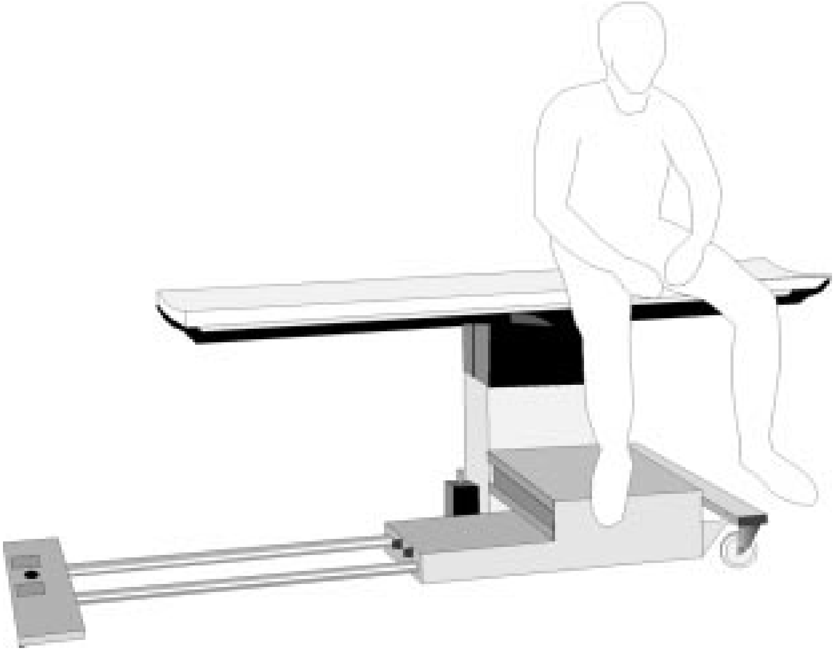
The tomo table must be locked into position before you place a patient on it.

Warning: The tomo table can support patients up to 297 lbs. (135 kg). Exceeding this limit could cause the table to tip over, potentially injuring you or the patient.

Important: Refer to the *System Guide* supplied with your camera for more information about using the tomo table.

Using the Scintibed

Figure 1-7: Using the Scintibed



The scintibed must be locked into position before you place a patient on it.

Warning: The scintibed can support patients up to 353 lbs. (160 kg). Exceeding this limit could cause the scintibed to tip over, potentially injuring you or the patient.

Do not let feet or any other object in the field of scintibed motion during manipulations.

It is forbidden to boot the camera with a patient installed on the bed.

The scintibed head rests must not be used with patients weighing over 220 lbs. (100 kg). You must follow these guidelines when using either head rest:

1. Do **not** place more than 6.5 lbs. (3.0 kg) on the head rest.
2. Do **not** allow the patient's head to drop abruptly onto the head rest.

3. Do **not** use the head rest to support the patient's head while lifting or moving the patient.
4. Do **not** allow the patient to change position without your assistance.
5. Do **not** allow anyone to sit on the head rest.

Important: Refer to the *System Guide* supplied with your camera for more information about using the scintibed.

Using the XYZ Table

The XYZ table must be locked into position before you place a patient on it.

Warning: The XYZ table can support patients up to 353 lbs. (160 kg). Exceeding this limit could cause the table to tip over, potentially injuring you or the patient.

Note: Refer to the *System Guide* supplied with your camera for more information about using the XYZ table.

Medical Emergencies

If a patient requires emergency medical attention during a procedure, follow these steps:

1. Press any of the emergency stop buttons (located on the console and the gantry) to end the scan.
2. Remove the patient from under the detector head.
3. Follow the emergency protocol written for your department.

Patient Cooperation

The quality of an image often depends as much on the cooperation of the patient as it does on the skill of the operator. You can sometimes allay a patient's fears by explaining the procedure in detail or allowing the patient to observe someone else undergoing a similar scan.

Some patients, because of either voluntary or involuntary movements, may need to be restrained or sedated during a procedure

To prevent for collision with external edge of the detectors, SMV recommends to attach patient's arms with the according straps.

Operational Guidelines

Operating Temperature

The camera and console are designed to operate in a room whose temperature is maintained at 68 - 74°F (20 - 23°C) with the humidity at 20 - 80% non-condensing. Make sure the vents on the system are not blocked and the fans are kept free of dust.

Magnetic Interference

Magnetic storage devices such as floppy disks should not be stored within 18 inches (.5 m) of equipment that generates a magnetic field. Typical sources of magnetic interference include video monitors and telephones.

Camera Safety

Caution: Make sure that everyone who uses the camera system follows these safety precautions.

- ☐ Do **not** eat, drink, or smoke near the camera or console.
- ☐ Do **not** allow the system's cables and electrical cords to interfere with foot traffic or the movement of equipment.

Caution: Turn the key switch to the O position and contact SMV's Service Department if any of the following occurs:

- ☐ liquid is spilled on or in the system
- ☐ the power cord or any of the cables becomes damaged or frayed
- ☐ the system is exposed to rain or water damage
- ☐ the system is dropped or otherwise damaged
- ☐ you notice a change in the sound made by system or if the system emits a burning odor.

Collimator Safety: DS7

Always make sure that the detector head is clear before attaching a collimator; otherwise, you may damage the crystal.

Always use the collimator cart to load and unload collimators. After you attach a collimator, make sure that the retaining bolts are twisted into the green marker.

After the collimator is locked in, lower the collimator cart slowly in case the collimator is not fully engaged.

Figure 1-8: DS7 Collimator Cart with Collimator

Warning: The pinhole collimator weighs 118 lbs (53,5 kg). Please use caution when lifting it.

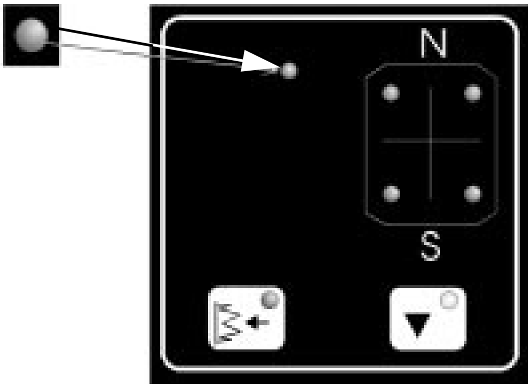
Note: Refer to the *System Guide* supplied with your camera for more information about changing collimators.

Collimator Safety: DSX

Always make sure that the detector head is clear and the mask is removed before attaching a collimator; otherwise, you may damage the crystal.

Always use the collimator cart to load and unload collimators. After you attach a collimator, make sure that the collimator lock status light is on (Figure 1-9).

Figure 1-9: DSX Collimator Lock Status Light



After the collimator is locked in, raise the collimator cart slowly in case the collimator is not fully engaged.

Figure 1-10: DSX Collimator Cart with Collimator

Warning: The pinhole collimator is 132 lbs. (60kg). Please use caution when lifting it.

Note: Refer to the *System Guide* supplied with your camera for more information about changing collimators.

Routine Maintenance

Keep vents and fans clear by dusting or vacuuming them. Periodically, check the system for frayed or discolored cables and external wiring. Notify SMV's Service Department if you find any visible damage to the system or if the equipment suffers a mechanical, electrical, or system malfunction.

Caution: Only properly trained personnel should be permitted access to any internal parts. Ensure that line disconnect switches are open and that any other appropriate precautions are taken before opening access doors, removing enclosure panels, or attaching accessories.

Electrical Grounding

Caution: This equipment must be connected to an earth-grounded electrical receptacle. The neutral side of the line is not equivalent to the ground.

Flammable Gases

Do not operate this system if flammable anesthetics or other explosive gases are present. Failure to heed this warning could result in an explosion or fire.

System Fire

If you detect either smoke or fire emanating from the system, immediately turn off the system. Follow the hospital's procedure for reporting a fire.

After the fire is extinguished, report the incident to SMV's Service Department.

Power Outages

The camera has an electrical power requirement of either 110V (± 10%) at 60 Hz (± 2%) or 220V (± 10%) at 50 Hz.

If the hospital lights flicker (for example, during an electrical storm), immediately turn off the camera.

Standard Acquisition Operations

Introduction

This chapter includes information about functions you perform routinely, regardless of the acquisition type. These functions include the following:

Camera Functions

- ❏ Calibrating the Touchscreen
- ❏ Changing the Collimators
- ❏ Selecting a Uniformity Matrix

Setting up an Acquisition

- ❏ Selecting a Patient File
- ❏ Managing Dataset Names
- ❏ Using Multiple Isotopes and Energy Levels
- ❏ Adjusting Energy Peaks and Windows
- ❏ Specifying the Zoom Factor
- ❏ Recording the Injected Dose
- ❏ Using the Persistence and Brightness Options
- ❏ Orienting the Image on the Persistence Screen
- ❏ Stopping and Restarting an Acquisition

Using Predefined Acquisition Protocols

- ❏ Backing Up Predefined Protocols
- ❏ Restoring Predefined Protocols
- ❏ Modifying a Predefined Protocol
- ❏ Deleting Predefined Protocols

Working with Chained Protocols

- ❏ Creating a Chained Protocol
- ❏ Using a Chained Protocol

Rather than repeat the instructions for these functions for each type of acquisition, the instructions are presented once in this chapter.

Accessing the Acquisition Utility Menu

Many of the operations in this chapter begin at the Acquisition Utility Menu. The following steps explain how to display this menu.

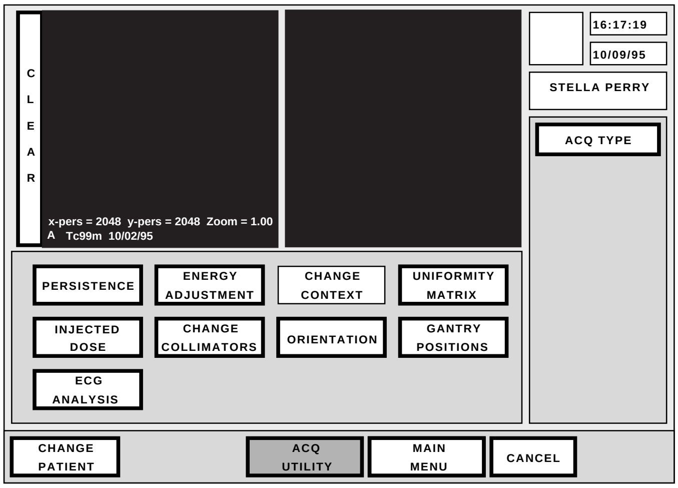
1. From the Main Menu of the Acquisition console, select **Manual Acquisition**.

   The Acquisition Type Menu is displayed.

2. From the bottom row of the menu, select **Acq Utility**.

   The Acquisition Utility Menu is displayed (Figure 2-1).

Figure 2-1: Acquisition Utility Menu



x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

Note: You can also access this menu from most other menus during acquisition setup by select **Acq Utility** from the bottom row of these menus.

Calibrating the Touchscreen

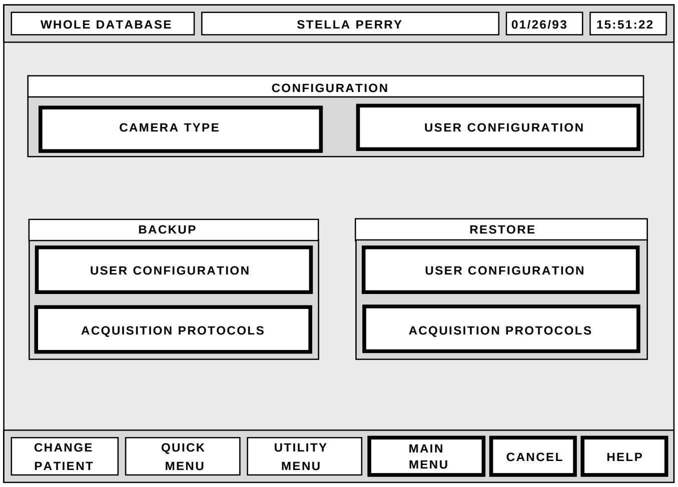
The touchscreen is a thin pressure-sensitive film that sits on top of the monitor of the Acquisition console. This means that the angle that you view the screen plays a role in how easy or hard it is to select an option. If you find that it takes you several tries to select an option, or that the wrong option is activated when you make a selection, you may want to calibrate the touchscreen.

The steps that follow explain how to calibrate the touchscreen.

1. From the Acquisition console's Main Menu, select **Configuration**.

   The Acquisition Configuration Menu is displayed (Figure 2-2).

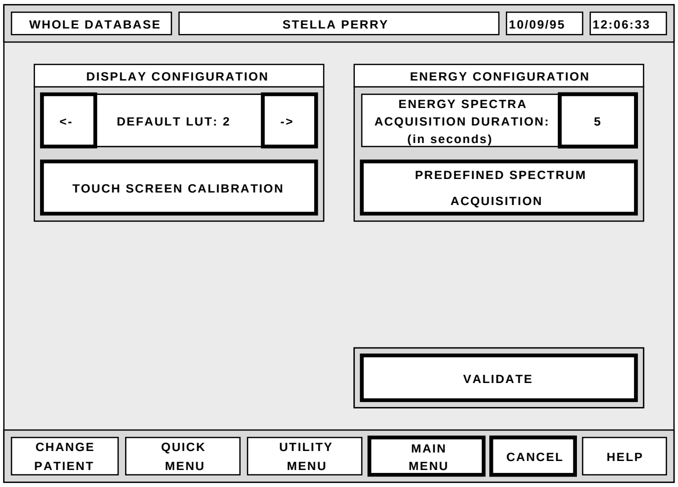
   Figure 2-2: Acquisition Configuration Menu



2. Under Configuration, select **User Configuration**.

   The User Configuration Menu is displayed (Figure 2-3).

   Figure 2-3: User Configuration Menu



3. Select **Touchscreen Calibration**.

   A button with Touch Me is displayed on the touchscreen.

4. Position yourself as you would when you use the system (sitting, standing, etc.), then press the button.
5. Three other buttons are displayed; press each one in turn.

   After you press the last button, the touchscreen is calibrated.
6. Press **Continue**.

   The User Configuration Menu is displayed again.

Changing Collimators

You can position the gantry either manually or by using the automated method (in which the system moves automatically to the predefined collimator changing position).

1. From the Acquisition Utility Menu, select **Change Collimators**.

   The system asks you to confirm that you want to move the gantry to the predefined collimator loading position.

2. Select **Yes**.

   A warning message is displayed.

3. Select **Start** when ready.

   The gantry moves to the predefined collimator loading position.

   You can now remove or load the collimator.

Selecting a Uniformity Matrix

A uniformity matrix is a quality assurance tool that, when used during an acquisition, ensures that the resulting image is the highest possible quality. The Quality Assurance chapter in your camera's *System Guide* explains how to acquire a uniformity matrix for each isotope.

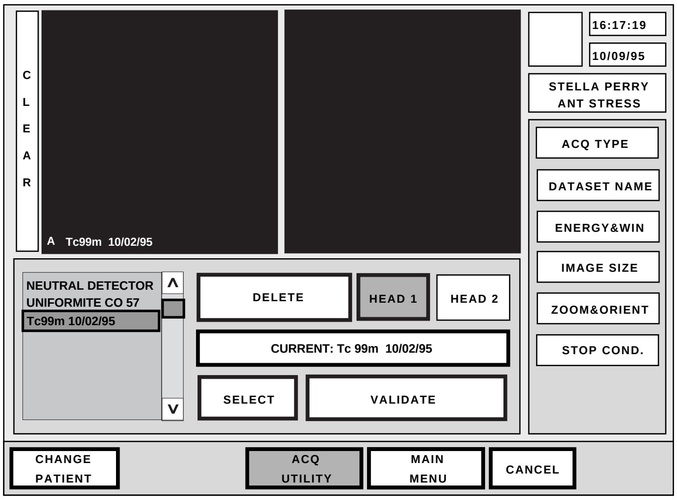
⚠ **Important:** When you select an isotope for an acquisition, the system automatically chooses a uniformity matrix. The name of the uniformity matrix is displayed in the detector's persistence screen and is marked with a red A (for Automatic).

The steps that follow explain how to select the uniformity matrix manually for your acquisition.

1. From the Acquisition Utility Menu, select **Uniformity Matrix**.

   The Uniformity Matrix Menu is displayed (Figure 2-4).

   Figure 2-4: Uniformity Matrix Menu



2. From the scrolling list, highlight the uniformity matrix that corresponds to the isotope you are using for this acquisition, then select **Select**.

   The new matrix name is displayed in the Current box.

3. Select **Validate**.

   The Acquisition Utility Menu is displayed again. The name of the uniformity matrix is displayed in the detector's persistence screen and is marked with a red M (for Manual).

Selecting a Patient File

Before you begin any acquisition, make sure that the name of the correct patient (called the “current patient”) is displayed at the top of the screen. If it is not, the two procedures below explain how to select the correct patient file.

- ❑ Create a new patient file if you are acquiring a study for the patient for the first time.
- ❑ Select an existing patient file if you are acquiring an additional study for a patient.

When you start the DSX/DS7, there is no current patient file. If you select an acquisition type before you select a patient file, the current patient partition is automatically displayed. From this menu, you can create a new patent file or select an existing file.

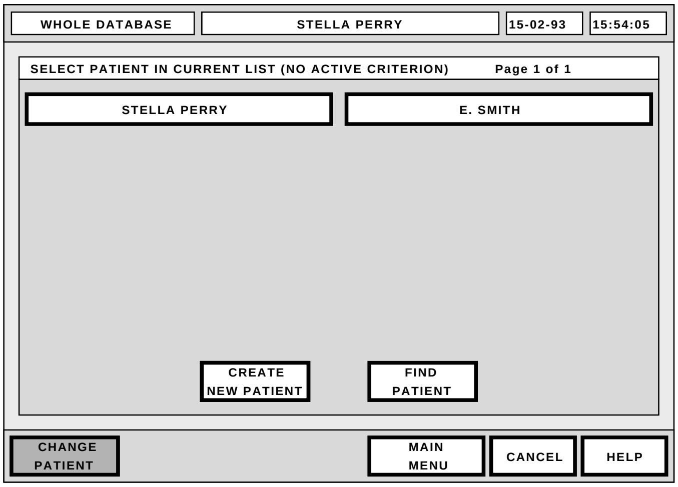
Creating a New Patient File

If you are acquiring a study for the patient for the first time today, create a new patient file by following this procedure.

1. From the Main Menu, select **Change Patient**.

   The Current Patient Partition is displayed (Figure 2-5).

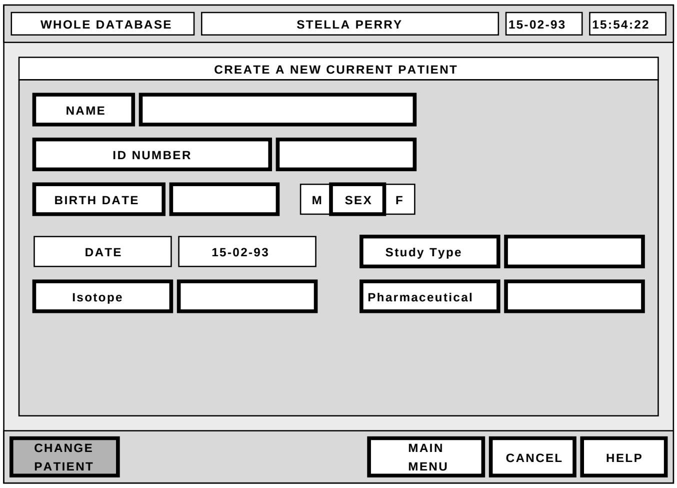
   Figure 2-5: Current Patient Partition



2. Select **Create New Patient**.

   The New Patient Menu is displayed (Figure 2-6).

Figure 2-6: New Patient Menu



WHOLE DATABASE | STELLA PERRY | 15-02-93 | 15:54:22

CREATE A NEW CURRENT PATIENT

DATE: 15-02-93

3. Enter the following information for the patient:

   - ❑ name (up to 31 characters)
   - ❑ ID number (up to 15 characters)
   - ❑ birth date (up to 12 characters)
   - ❑ sex (M or F)
   - ❑ study type (up to 14 characters)
   - ❑ isotope (up to 15 characters)
   - ❑ pharmaceutical (up to 15 characters)

   In addition, your department has the option of adding up to four other partitions for patient information. The date always defaults to the current date.

   Note: For more information about managing patient files, refer to “Patient and Database Management” in the *DSX/DS7 System Guide.*

4. Select **Validate** to create the patient file and to return to the Main Menu.

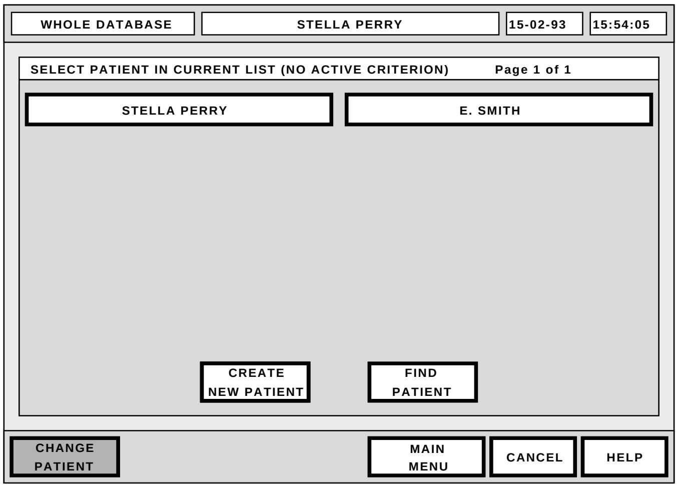
Selecting an Existing Patient File

If you are acquiring an additional study for a patient, you can select the existing patient file.

1. From the Main Menu, select **Change Patient**.

   The Current Patient Partition is displayed (Figure 2-7).

Figure 2-7: Current Patient Partition

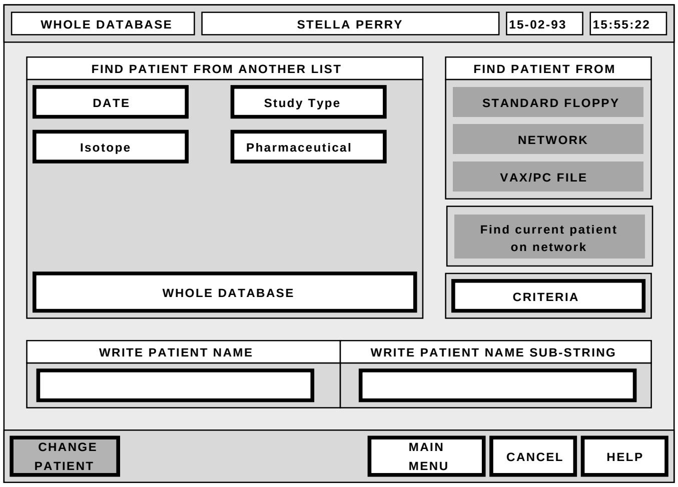


2. If the patient’s name is listed on this screen (or one of the previous pages), select it and return to the Main Menu.

   If the patient is not listed, select **Find Patient**.

   The Find Patient Menu is displayed (Figure 2-8).

Figure 2-8: Find Patient Menu



3. You have four options on this screen.
   ☐ Find the patient file based on another partition (such as all patients with the same Study Type or Isotope) or from the whole database.
   ☐ Find the patient file on a floppy disk or through the network.
   ☐ Search for the file based on all or part of the patient’s name.
   ☐ Use Criteria Management to build a list of matching patient files.
4. Use the method of your choice to find the patient’s file. Select the patient’s name to select the file and return to the Main Menu.

Note: For more information about managing patient files, refer to “Patient and Database Management” in the *DSX/DS7 System Guide*.

Managing Dataset Names

The dataset name is the name assigned to a study when it is acquired. The Dataset Name Menu lets you select a name from a list of predefined names or manually assign one as you set up the acquisition.

Note: If you use the Preset Gantry option when you acquire a study, the system automatically appends the acquisition angle and the name of the isotope to the dataset name.

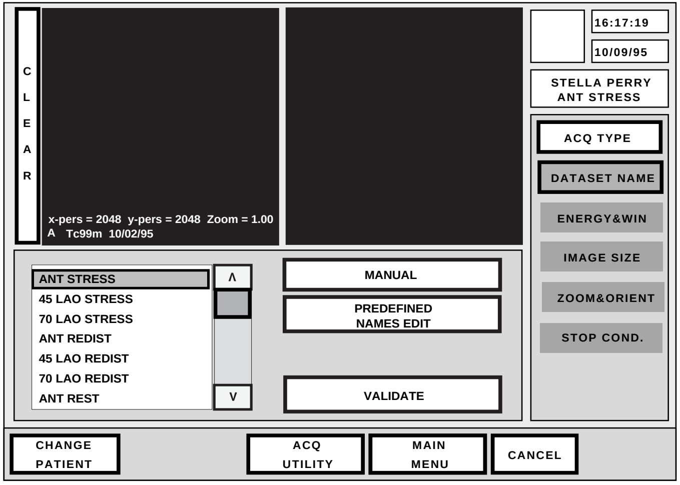
In addition, you can create new dataset names (up to a total of 14 for each acquisition type), edit existing names, and delete names you no longer use. Each of these functions is explained in its own section below.

You can also back up dataset names onto floppy disk to ensure that they are not lost if your system's hard disk is damaged. The procedure is explained in the "Introduction to System Functions" chapter of your *DSX/DS7 System Guide*.

Creating Dataset Names

The following steps explain how to create a dataset name.

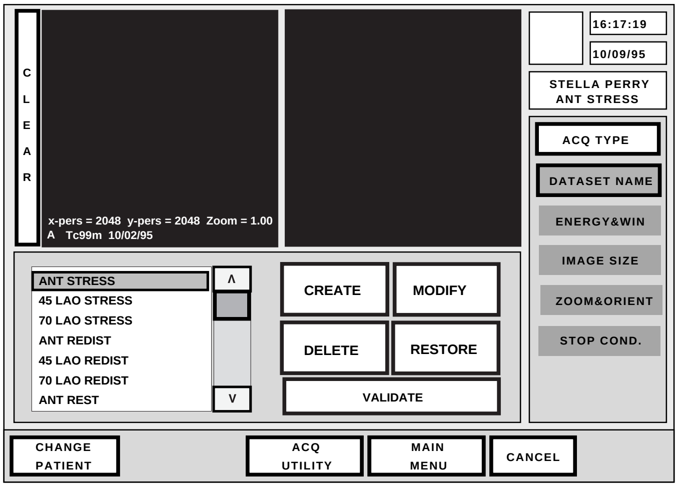
Figure 2-9: Dataset Names Menu



1. With the Dataset Names Menu (Figure 2-9) displayed for any acquisition type, select **Predefined Names Edit**.

   The options on the menu change allowing you to create, edit, and delete dataset names (Figure 2-10).

Figure 2-10: Dataset Names Menu: New Options



2. Select **Create**.

   A blank box is displayed on the menu.

   Note: The Create button is not selectable if there are already 14 existing dataset names for this type of acquisition.

3. Enter a new dataset name (4 to 18 characters) and press <ENTER>.

4. Select **Validate**.

   The new name is added to the list of predefined dataset names.

Editing a Predefined Dataset Name

The following steps explain how to edit an existing dataset name.

1. From the Dataset Names Menu, select **Predefined Names Edit**.

   The options on the menu change allowing you to create, edit, and delete dataset names.

2. Use the Arrow buttons to highlight the name you want to change.

3. Select **Modify**.

   Use <BACKSPACE> to erase the existing name, then type a new one (4 to 18 characters). Press <ENTER>.

4. Select **Validate**.

   The modified name is displayed in the list of predefined dataset names.

Deleting a Predefined Dataset Name

The following steps explain how to delete a predefined dataset name.

1. From the Dataset Names Menu, select **Predefined Names Edit**.

   The options on the menu change allowing you to create, edit, and delete dataset names.

2. Use the Arrow buttons to highlight the name you want to delete.
3. Select **Delete**.
4. Select **Validate**.

   The dataset name is deleted from the list of predefined names.

Using Multiple Isotopes and Energy Levels

Depending upon the type of acquisition, you can use the DS7 or the DSX to acquire multiple images using multiple isotopes at the same time. In fact, you can use either camera to acquire any of the following combinations:

☐ multiple energy levels for a single or multiple isotopes
☐ multiple isotopes in a single image
☐ multiple isotopes in multiple images

For example, you can acquire a parathyroid study faster if you acquire two images simultaneously—one using technetium and the other thallium.

You can use multiple isotopes and energy levels for most types of acquisitions performed on sophycameras. The following table lists the acquisition types and the number of images you can acquire simultaneously.

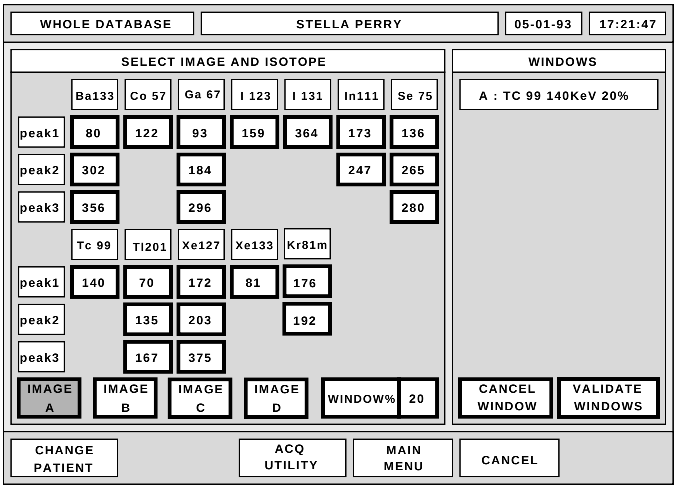
Acquisition Type	Number of Images
Static	4
Dynamic	4
List Mode	1
Gated	2
Tomographic	2
Gated Tomo	2
Whole Body	2

You can also improve the resolution of acquisitions by collecting the multiple energy levels emitted by an isotope.

The steps that follow explain how to select multiple isotopes and energy levels for an acquisition.

The steps that follow explain how to select multiple isotopes and energy levels for an acquisition.

Figure 2-11: Isotope Menu



WHOLE DATABASE | STELLA PERRY | 05-01-93 | 17:21:47

SELECT IMAGE AND ISOTOPE

	Ba133	Co 57	Ga 67	I 123	I 131	In111	Se 75
peak1	80	122	93	159	364	173	136
peak2	302		184			247	265
peak3	356		296				280

	Tc 99	Tl201	Xe127	Xe133	Kr81m
peak1	140	70	172	81	176
peak2		135	203		192
peak3		167	375		

WINDOWS

A : TC 99 140KeV 20%

WINDOW% 20

1. When the Isotope Menu is first displayed (Figure 2-11), the isotope and energy combination that was used most recently for the acquisition type is displayed in the Windows column. To select a different combination, select **Cancel Window**, then the name of the isotope.

2. The number of images that you can acquire simultaneously is displayed along the bottom of the menu. The images are labeled Image A, Image B, and so on.

   Make sure that **Image A** is highlighted.

3. The Isotope Menu shows up to three energy levels (or peaks) for each of eleven isotopes. Select the energy level you want to use for the first image.

   The name of the isotope and energy level is displayed in the Windows column. The width of the window around the energy peak is also displayed (as a percentage of the peak).

   Note: You can identify up to eight combinations of isotopes and energy levels for a single acquisition, so long as the energy levels do not overlap. For example, the following combinations overlap: a peak of 100 KeV with a 20% window (that is, 90 to 110 KeV) and a peak of 120 KeV with a 25% window (105 to 135 KeV).

4. If other energy levels are available for this isotope, (and they are appropriate for your study) select these levels also.

5. Select **Image B**, then identify the isotope and energy levels for the second image.

   Repeat this process for any additional images you want to acquire up to the limit for the acquisition type.

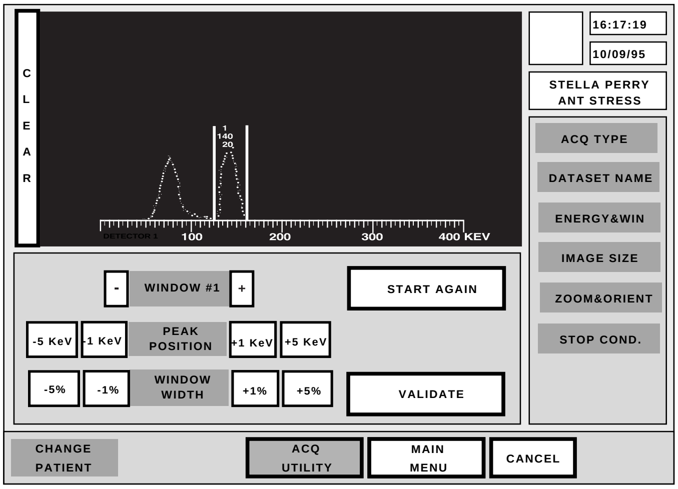
6. Select **Validate Windows** to accept your entries.

Adjusting Energy Peaks and Windows

1. From the Acquisition Utility Menu, select **Energy Adjustment**.

   The Energy Adjustment Menu is displayed (Figure 2-12).

   Figure 2-12: Energy Adjustment Menu



16:17:19
10/09/95
STELLA PERRY
ANT STRESS

2. You can use this menu to adjust the energy peak and window width for any of the isotope's energies. Use the Plus/Minus buttons next to Window # to specify the energy window you want to adjust.

3. To adjust the peak value, use the Increment buttons (-5, -1, +1, +5 KeV) next to Peak Position.

4. To increase or decrease the width of the energy window, use the Increment buttons (-5, -1, +1, +5%) next to Window Width.

   ⚠ **Important:** The width is expressed as a percentage of the peak value. Therefore, if you set the percentage at 20% then increase the peak value, the window width increases.

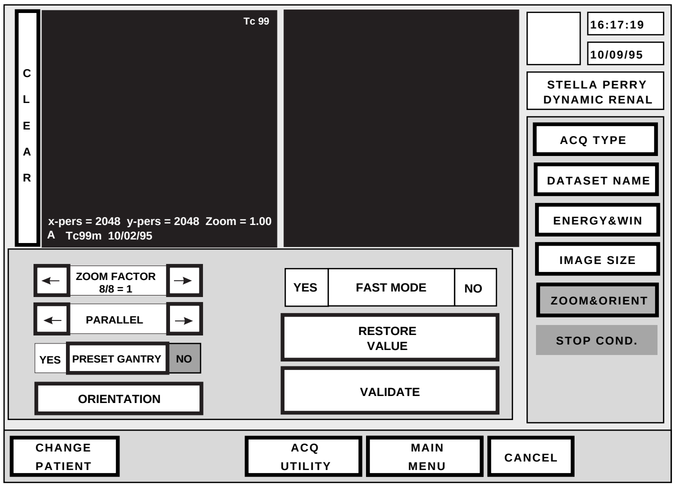
5. Select **Validate**.

   The energy window is updated and the Acquisition Utility Menu is displayed again.

Specifying the Zoom Factor

The DSX/DS7 is capable of automatically enlarging or reducing images as they are acquired. You can specify any of these zoom factors on the Zoom & Orientation Menu by selecting the Arrow button on either side of **Zoom Factor** (Figure 2-13).

Figure 2-13: Zoom & Orientation Menu



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DYNAMIC RENAL
x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95
ZOOM FACTOR
8/8 = 1

The following zoom factors enlarge the resulting images.

- ❑ 8/8 (1.00)
- ❑ 8/7 (1.14)
- ❑ 8/6 (1.33)
- ❑ 8/5 (1.60)
- ❑ 8/4 (2.00)
- ❑ 8/3 (2.66)
- ❑ 8/2 (4.00)
- ❑ 8/1 (8.00)

The following zoom factors reduce the resulting images.

- ❑ 8/9 (0.88)
- ❑ 8/10 (0.80)
- ❑ 8/11 (0.72)
- ❑ 8/12 (0.66)
- ❑ 8/13 (0.61)
- ❑ 8/14 (0.57)
- ❑ 8/15 (0.53)
- ❑ 8/16 (0.50)

Recording the Injected Dose

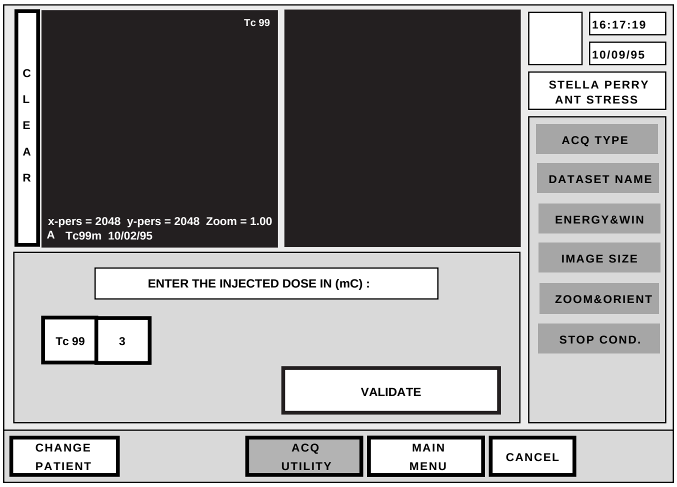
As an option, you can use the Injected Dose Menu to record the amount of isotope introduced into the patient.

The steps that follow explain how to record the injected dose.

1. From the Acquisition Utility Menu, select **Injected Dose**.

   The Injected Dose Menu is displayed (Figure 2-14).

Figure 2-14: Injected Dose Menu



x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95

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ANT STRESS

ENTER THE INJECTED DOSE IN (mC) :

Tc 99 3

2. The isotope you selected for the acquisition is automatically displayed on the menu. Select the isotope and enter the injected dose (0 to 254) in mCi, then press <ENTER>.
3. Select **Validate**.

   The Acquisition Utility Menu is displayed again.

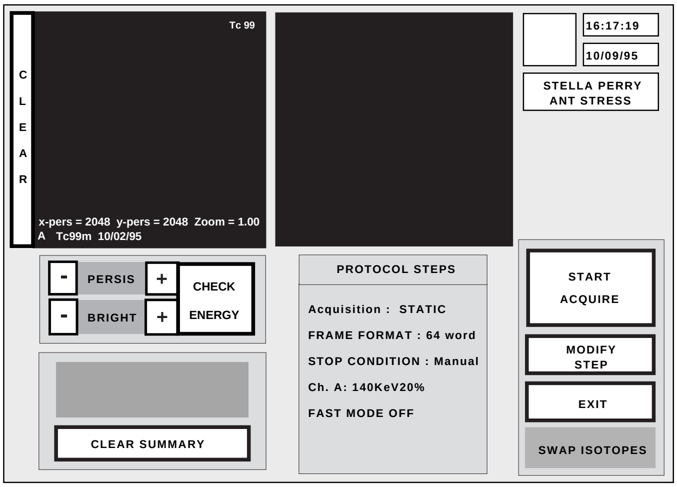
Using the Persistence and Brightness Options

You can use the persistence and brightness options to assist you with positioning the patient in the DSX/DS7's field of view. After you adjust the persistence and brightness percentages, they are retained until you change them again or shut down the system.

During Acquisition Preparation

The Start Acquisition Menu includes three options that control the brightness and persistence of the dots that appear on the persistence screen as you prepare the patient for the acquisition. Each option is explained below.

Figure 2-15: Persistence and Brightness Options



x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95

STELLA PERRY
ANT STRESS

Acquisition : STATIC
FRAME FORMAT : 64 word
STOP CONDITION : Manual
Ch. A: 140KeV20%
FAST MODE OFF

Persistence

The Persistence option determines how long the dots will remain on the persistence screen. Select the Plus/Minus buttons to increase or decrease the persistence of the dots between 4% and 100%. The default is 4%.

Brightness

The Brightness option determines how bright the dots will appear on the persistence screen. Select the Plus/Minus buttons to increase or decrease the brightness of the dots from 1% to 100%. The default is 1%.

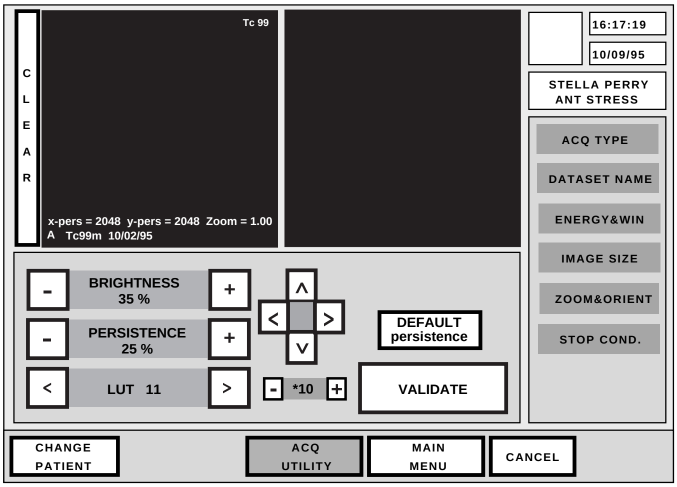
Clear

Select **Clear** to clear the activity on the persistence screen.

On the Persistence Menu

The Persistence Menu (Figure 2-16) is available through the Acquisition Utility Menu. Use the Persistence Menu to change the brightness and persistence levels and color scale for the persistence screen. You can also center the image on the persistence screen.

Figure 2-16: Persistence Menu


16:17:19
10/09/95
STELLA PERRY
ANT STRESS
Tc 99
x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95
BRIGHTNESS 35 %
PERSISTENCE 25 %
LUT 11
*10

Persistence

The Persistence option determines how long the dots will remain on the persistence screen. Select the Plus/Minus buttons to increase or decrease the persistence of the dots between 4% and 100%. Select **Default Persistence** to return to the default, which is 4%.

Brightness

The Brightness option determines how bright the dots will appear on the persistence screen. Select the Plus/Minus buttons to increase or decrease the brightness of the dots from 1% to 100%. Select **Default Persistence** to return to the default, which is 1%.

LUT

The LUT option determines which color scale is used for the pixels on the persistence screen. Use the Arrow buttons to scroll through the 13 color scales until the color scale you want to use is displayed.

Centering the Image

The Arrow buttons shift the image vertically and horizontally. The Multiplier value (*1, *10, and *100) indicates by how many pixels the image is shifted each time you select an Arrow button.

The steps that follow explain how to use the centering options on the Persistence Menu.

1. From the Acquisition Utility Menu, select **Persistence**.

   The Persistence Menu is displayed.

2. Select the Multiplier value, then select the Arrow button for the direction you want to move the image on the persistence screen.

   Note: For tomographic acquisitions, only the Up/Down Arrow buttons are selectable.

3. When you are finished, select **Validate**.

   The Acquisition Utility Menu is displayed again.

Orienting the Image on the Persistence Screen

Because the DSX/DS7's detector head can be placed at any angle, you must be especially careful to orient the patient image correctly on the persistence screen before beginning an acquisition.

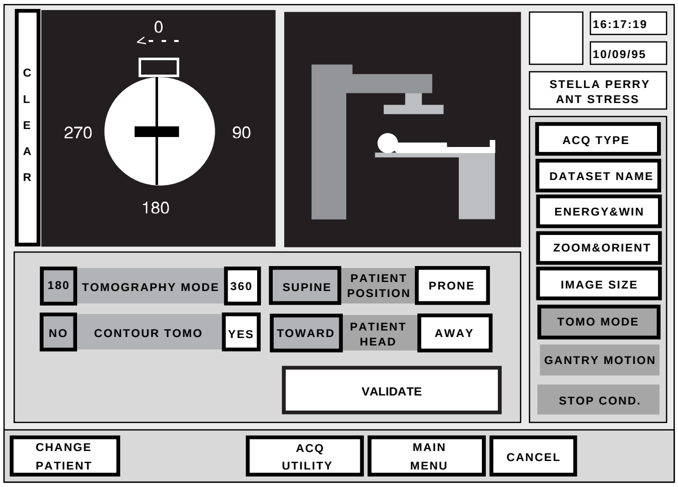
The easiest way to identify the patient's orientation is to place two point sources next to the patient, one at the top of the field of view, the other on the left side of the field of view. The points will appear on the resulting image making it possible to determine the patient's orientation.

The DSX/DS7 also provides other methods for ensuring the correct orientation on the persistence screen and resulting image. Each method is explained in its own section below.

Orienting Tomographic Images

For tomographic and gated tomographic studies, you specify the patient position on the Tomography Mode Menu (Figure 2-17) either during the acquisition setup or when you set up a predefined protocol.

Figure 2-17: Tomography Mode Menu



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10/09/95
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As long as you make sure the patient is positioned on the bed the same way the acquisition is set up (prone or supine, head toward or away from the gantry), the resulting image will be correctly oriented.

Orienting Whole Body Images

For whole body studies, you implicitly specify the patient's position just before you begin the acquisition: you are asked to move the detector just above/under the patient's head.

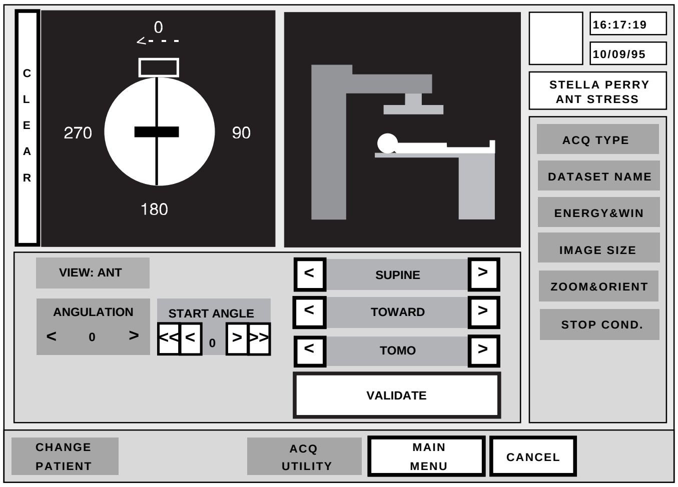
Orienting Other Images

Static, dynamic, list mode, and gated acquisitions use an Orientation Controls Menu that includes options to help you orient the image on the persistence screen.

1. From the Zoom & Orientation Menu, select **Orientation**.

   The Orientation Controls Menu is displayed (Figure 2-18).

   Figure 2-18: Orientation Controls Menu

   16:17:19
   10/09/95
   STELLA PERRY
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   VIEW: ANT

2. Under the patient graphic, use the Arrow buttons to select the Scintibed position: Tomo or Whole Body.

   The patient graphic is updated on the menu.

3. Specify the patient position. First use the Arrow buttons to display Prone or Supine. Then, use the Arrow buttons to specify the patient position relative to the gantry.

   Note: The choices that are available depend upon the Scintibed position you selected: Toward or Away for the Tomo position; Right or Left for the Whole Body position.

   The patient graphic is updated on the menu.

4. Specify the gantry position you want to use.

   Note: The start angle values that are available depend upon the Scintibed position you selected: 0°, 180° or 360° start angle only for the Whole Body position.

   The detector head graphic is updated on the menu.

5. Select **Validate**.

   The Zoom & Orientation Menu is displayed again.

6. Specify whether you want to be prompted to move the gantry and detector heads to their proper orientation. Select **Preset Gantry**. The highlight toggles between Yes and No. Highlight Yes if you want to be prompted to move the gantry before you start the acquisition; highlight No if you do not.

Using the Rotation & Symmetry Controls

The symmetry and rotation controls provide another method for orienting images on the persistence screen.

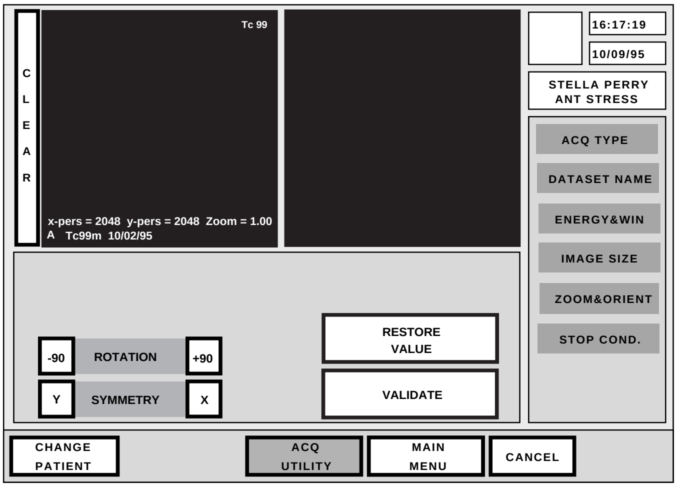
Important: These controls function independently of the orientation controls or the options on the Tomography Mode Menu.

The best way to use these controls is in conjunction with the patient positioned under the camera and point sources placed in known locations in the camera’s field of view. The following steps explain how to use the rotation and symmetry controls.

1. With the Acquisition Utility Menu displayed, select **Orientation**.

   The Symmetry & Rotation Menu displayed (Figure 2-19).

   Figure 2-19: Symmetry & Rotation Menu

2. To orient the images on the persistence screen, use the rotation and symmetry controls to set the orientation correctly.
3. Select **Validate**.

   The Acquisition Utility Menu is displayed again.

Stopping and Restarting an Acquisition

Under most circumstances, when you set up an acquisition you identify the parameters (number of counts, number of seconds, etc.) that terminate the acquisition. However, you can stop any acquisition before the preset stop conditions are met and select one of the following options from the Stop Acquisition Menu (Figure 2-20):

- save the acquisition
- abort the acquisition
- resume the acquisition
- restart the acquisition

Figure 2-20: Stop Acquisition Menu

Tc 99

16:17:19

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x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

Kcounts : 60

Time (sec) : 11.84

Kcount/s (total) : 3.0

REMAINING TIME (sec) : 31

The sections that follow explain how to stop an acquisition and how to use each option.

Stopping the Acquisition

After you select **Start Acquire** and the Acquisition Menu is displayed, the acquisition begins. To stop the acquisition before the stop conditions are reached, select **Stop Acquisition**. Four options are displayed on the screen:

- Save Acquisition
- Abort Acquisition
- Resume
- Restart

Save Acquisition

Select this button to save the acquired image. The following message is displayed:

Acquisition Step Completed Successfully

At this point, you can acquire another image, modify the acquisition parameters, or return to the Main Menu.

Abort Acquisition

Select this button to halt the acquisition without saving any information. The following message is displayed:

Acquisition Not Saved

Select **Confirm** to abort the acquisition; select **Cancel** if you want to save the dataset or restart the acquisition.

Resume

Select this button if you want to resume the acquisition at the point where you stopped it. For example, if the acquisition was defined to stop after 60 seconds, but you selected **Stop Acquire** after 30 seconds, selecting **Resume** continues the final 30 seconds of the acquisition.

⚠ **Important:** Do not use the Resume option if the patient has moved. This option is not available for dynamic and list mode acquisitions.

Restart

Select this button if you want to restart the acquisition using the same parameters, but without saving any of the partially acquired data.

Stopping a Whole Body Acquisition

If you select **Stop Acquisition** during the first side acquisition, five options are displayed on the screen:

- ☐ Save and Continue
- ☐ Save and Abort
- ☐ Abort Acquisition
- ☐ Resume
- ☐ Restart

Select **Save and Continue** to save the acquired image and continue with the second side acquisition.

Select **Save and Abort** to halt the acquisition with saving the acquired image.

If you select **Stop Acquisition** during the second side acquisition, five options are displayed on the screen:

- ☐ Save and Abort
- ☐ Abort Acquisition
- ☐ Resume
- ☐ Restart
- ☐ Restart Side # 2

Select **Save and Abort** to halt the acquisition with saving the acquired images.

Select **Restart Side # 2** to restart the second side acquisition without saving any of the partially acquired data of the second side.

Working with Predefined Acquisition Protocols

This section includes the following procedures for working with predefined acquisition protocols:

- Backing Up Predefined Protocols
- Restoring Predefined Protocols
- Modifying a Predefined Protocol
- Deleting a Protocol

Backing Up Predefined Protocols

SMV recommends that for an extra measure of safety you copy these user-defined protocols onto a blank, formatted floppy disk, then store the disk in a safe location away from the DSX/DS7. That way, if your protocols are accidentally erased from the internal hard disk, you can restore them from the floppy disk rather than creating them again.

The following steps explain how to save user-defined acquisition protocols onto a floppy disk.

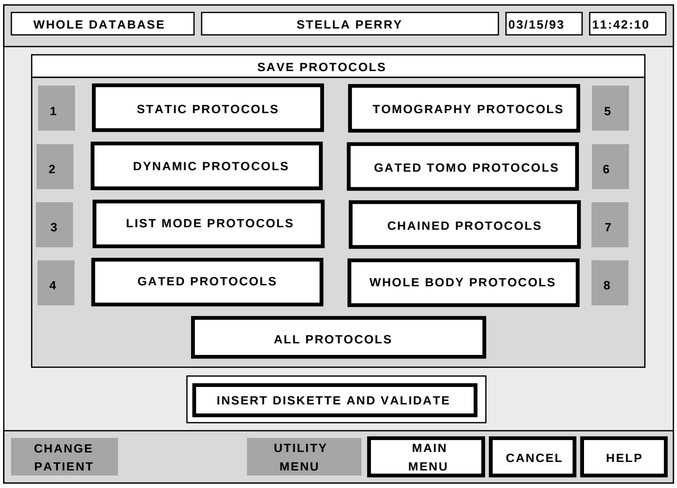
1. From the Acquisition console’s Main Menu, select **Configuration**.

   The Acquisition Configuration Menu is displayed.

2. Under Backup, select **Acquisition Protocols**.

   The Backup Acq Protocols Menu is displayed (Figure 2-21).

Figure 2-21: Backup Acq Protocols Menu



WHOLE DATABASE
STELLA PERRY
03/15/93
11:42:10

3. Select the individual protocols you want to save or select **All Protocols**.

4. Insert a disk into the floppy disk drive, then select **Insert Diskette and Validate**.

   The protocols you selected are copied to the floppy disk. Store the disk in a safe place away from the DSX/DS7.

5. To return to the Main Menu, select **Main Menu**.

Restoring Predefined Protocols

The following steps explain how to restore predefined acquisition protocols from a floppy disk.

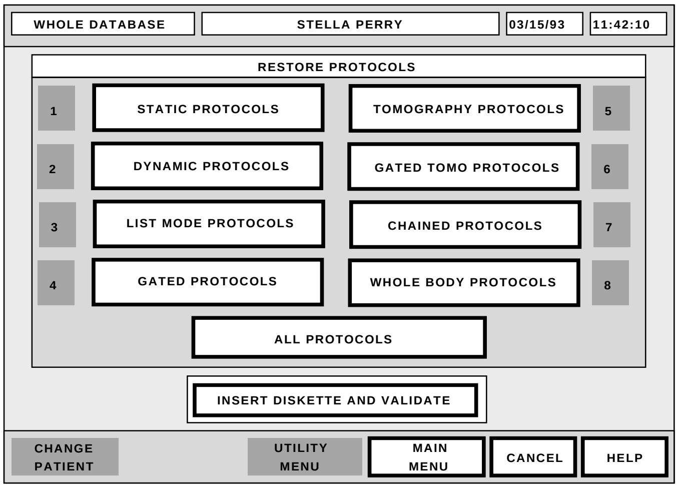
1. From the Acquisition console's Main Menu, select **Configuration**.

   The Acquisition Configuration Menu is displayed.

2. Under Restore, select **Acquisition Protocols**.

   The Restore Acq Protocols Menu is displayed (Figure 2-22).

   Figure 2-22: Restore Acq Protocols Menu



3. Select the individual protocols you want to restore or select **All Protocols**.
4. Insert a disk into the floppy disk drive, then select **Insert Diskette and Validate**.

   The protocols you selected are copied from the floppy disk onto the internal hard disk.

5. To return to the Main Menu, select **Main Menu**.

Modifying a Predefined Protocol

A predefined acquisition protocol is a set of acquisition parameters that have been defined and can be used over again. A predefined protocol saves time because you bypass the setup phase of the acquisition. You can also be sure all subsequent studies that use the protocol will be acquired the same way. On the other hand, you can easily change the one or more of the aspects of a protocol if you must acquire a study with slightly different set of parameters.

You may find that a protocol you previously created no longer meets your changing needs. For example, if you find that you always change the stop conditions for a certain type of static acquisition, you can modify the predefined protocol you use to match the new criterion.

The following steps explain how to modify a predefined protocol permanently.

1. From the Acquisition console's Main Menu, select **Acquisition Protocol**.

The Protocol Type Menu is displayed.

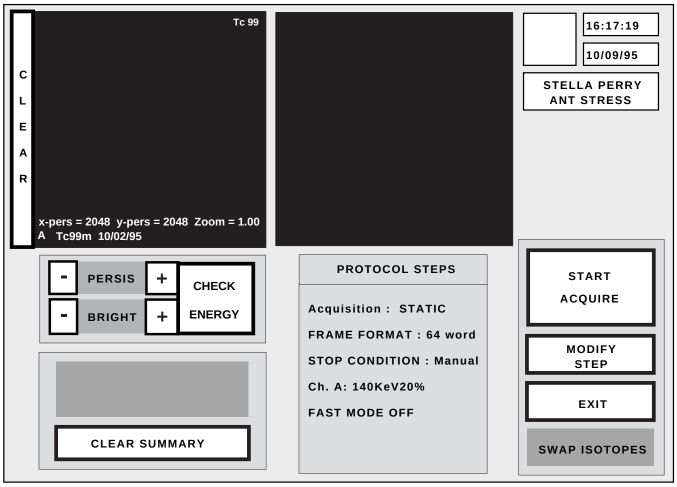
2. Select the type of protocol you want to modify.

   A menu with existing protocols is displayed.

3. Select the protocol you want to modify.

   The Start Acquisition Menu is displayed (Figure 2-23).

Figure 2-23: Start Acquisition Menu



Acquisition : STATIC
FRAME FORMAT : 64 word
STOP CONDITION : Manual
Ch. A: 140KeV20%
FAST MODE OFF

4. Select **Modify Step**.

   The Acquisition Summary Menu is displayed.

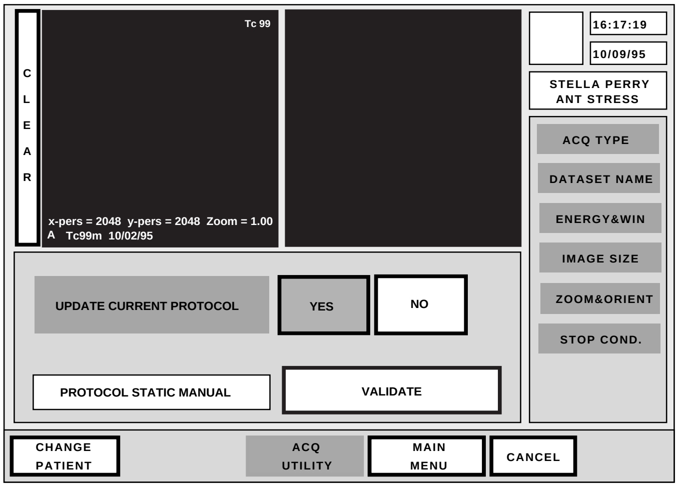
5. Make the required changes to the protocol.

   After each change you make, the Acquisition Summary Menu is displayed again.

6. After you make the final change to the protocol, select **Update Current Protocol**.

   The Update Protocol Menu is displayed (Figure 2-24). The name of the current protocol is displayed on the menu.

Figure 2-24: Update Protocol Menu



7. You have two options.

   ☐ To modify the protocol with the changes you have made, select **Yes**, then **Validate**.

   ☐ To retain the original protocol, select **No**, then **Validate**.

   The Acquisition Summary Menu is displayed again.

8. Select **Return to Acquire**.

   The Start Acquisition Menu is displayed again. You can acquire the study using the new parameters.

Deleting Predefined Protocols

The DSX/DS7 has a feature that allows you to delete an acquisition protocol when you no longer need it. For example, your department uses a cardiac first pass protocol using one set of parameters, but now wants to use a different set. You can delete the first protocol and create a new one with the same name.

The following steps explain how to delete an existing predefined protocol.

1. From the Main Menu of the Acquisition console, select **Protocol Mgmt**.

   You are prompted to enter the system password.

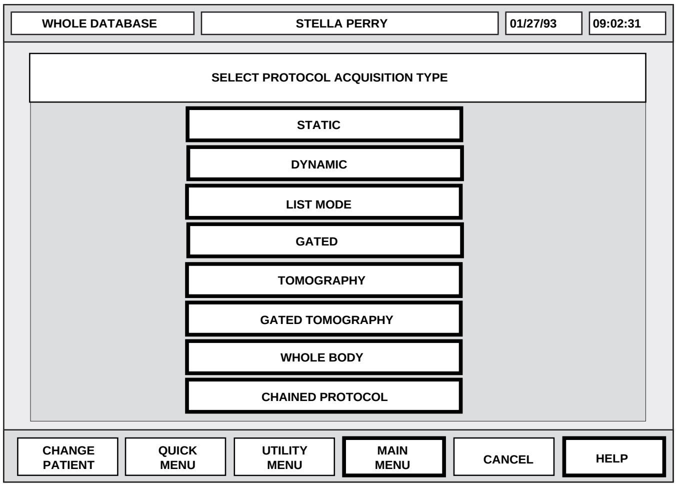
2. Type the system password and press <ENTER>.

   The User Protocol Management Menu is displayed.

3. Under Acquisition, select **Delete**.

   The Protocol Type Menu is displayed (Figure 2-25).

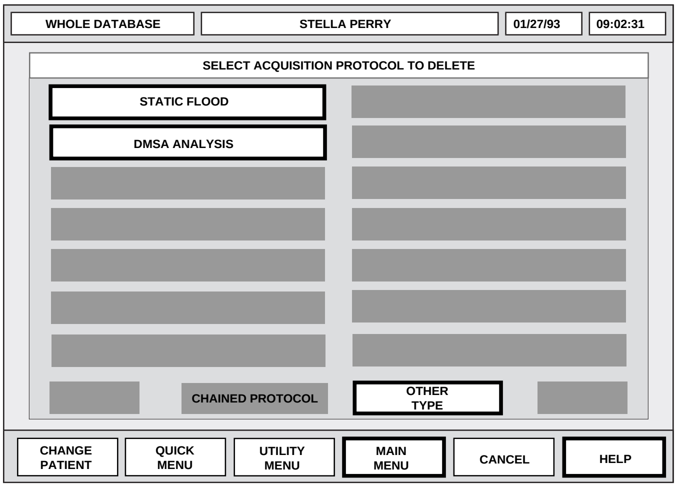
   Figure 2-25: Protocol Type Menu



4. Select the type of protocol you want to delete.

   The Delete Protocol Menu is displayed (Figure 2-26).

Figure 2-26: Delete Protocol Menu



5. Select the protocol you want to delete.

   You are prompted to confirm your choice.

6. Select **Yes**.

   The protocol is deleted. The Delete Protocol Menu is displayed again.

Working with Chained Protocols

Introduction

The DSX/DS7's software lets you store a set of parameters for an acquisition and recall the parameters later for a similar acquisition. The parameters are saved in what is called a "protocol."

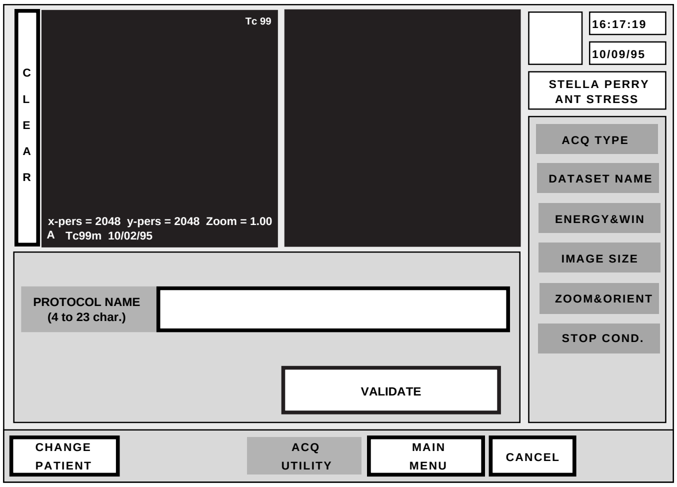
The type of information stored in a protocol varies with the type of acquisition. For example, a static protocol includes information about the number of isotopes used, the stop conditions, and the zoom factor. A tomography protocol includes all that information, plus the rotation and patient position settings.

When you create a protocol, you have the option of linking it, or "chaining" it, to another protocol. For example, you could create a dynamic renal acquisition and chain it to a static acquisition of the bladder. The system gives you the option of chaining the protocol.

Creating a Chained Protocol

For each type of acquisition, the option to chain the protocol appears after you name it on the Protocol Handling Menu (Figure 2-27).

Figure 2-27: Protocol Handling Menu



Tc 99

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95

STELLA PERRY
ANT STRESS

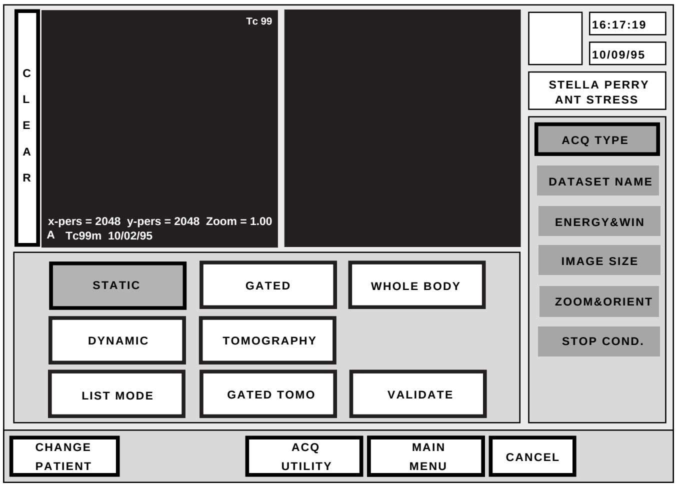
The steps that follow explain how to chain a protocol.

1. On the Protocol Handling Menu, enter a name (4 to 24 characters) for this part of the chained protocol and press <ENTER>. Select **Validate**.
2. As an option, you can enter an additional message (less than 24 characters) that will appear on the Start Acquisition Menu. Press <ENTER>. Select **Validate**.

   A message asks if you want to chain to another protocol.
3. Select **Yes**, then select **Validate**.

The Acquisition Type Menu is displayed (Figure 2-28).

Figure 2-28: Acquisition Type Menu



4. Select the type of acquisition you want to define for the next part of the chained protocol.
5. Define all the necessary parameters for the acquisition.

   When you reach the Acquisition Summary Menu, select **Protocol Handling**.

   Once again, the Protocol Handling Menu is displayed.
6. Give a name to this part of the chained protocol and, optionally, enter an additional message (less than 24 characters each).

   Once again, you ar asked if you want to chain another protocol.
7. If you want to chain another protocol to this one, select **Yes** and repeat Steps 4 through 6.

   If you do not, select **No**. You are prompted to name the chained protocol as a whole.
8. Enter a name for the chained protocol (4 to 24 characters) and press <ENTER>.

   The chained protocol is ready for use.

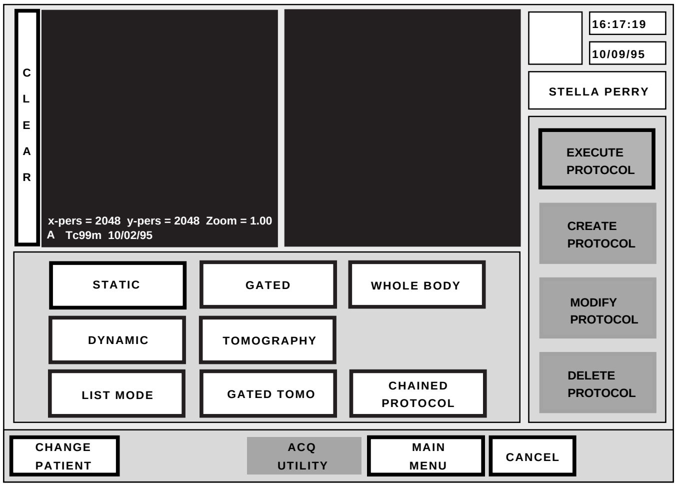
Using a Chained Protocol

Using a chained protocol is similar to using any other predefined protocol. The main difference is that you quickly execute each of the protocols that make up the chain.

1. Select the patient for whom you want to acquire the dataset.
2. From the Main Menu, select **Acquisition Protocol**.

   The Protocol Type Menu is displayed (Figure 2-29).

Figure 2-29: Protocol Type Menu



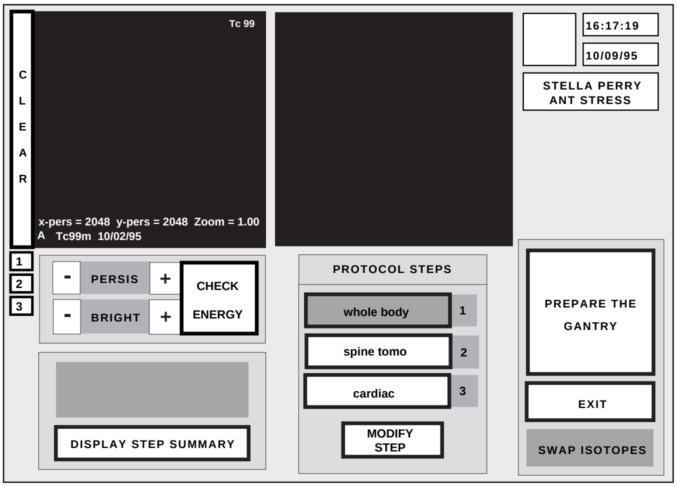
3. Select **Chained Protocol**.

   A menu with existing chained protocols is displayed.

4. Select the protocol you want to use.

   The Start Chained Protocol Menu is displayed (Figure 2-30).

Figure 2-30: Start Chained Protocol Menu



5. The individual protocols that make up the chained protocol are displayed as protocol steps. Select the protocol you want to start with, then select **Execute Step**.

   Note: If the protocol step is a tomographic or whole body acquisition, or if it is a planar protocol with the Preset Gantry option set to Yes, then the button is labeled **Prepare the Gantry** instead. If the protocol step is a planar protocol with the Preset Gantry option set to No, then the button is labeled **Safety Pad Test Procedure** until the safety pad test procedure is performed.

   The acquisition begins and the Acquisition Menu is displayed.

6. When this part of the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

7. Select the next protocol that you want to use, then select **Execute Step**. The acquisition begins and the Acquisition Menu is displayed again.
8. Continue to select the protocols you want to use, until the chained protocol is completed.

Performing Static Acquisitions

Introduction

Static acquisition protocols allow you to acquire a single image. As a quality control measure, after the acquisition you can view the image through the Display function.

Static images can be acquired until a preset time limit or count limit is reached. You can also stop the acquisition manually at any time.

These protocols are based on operator-defined values for parameters such as the number of isotopes and energy levels, the duration for the acquisition, and the zoom factor. After your department agrees on the parameters for a specific type of study, the parameters can be saved in a predefined protocol and used repeatedly.

This chapter includes three major sections.

- ☐ **Acquiring Static Studies** explains how to use the DSX/DS7 to acquire a static image and to create a predefined static acquisition protocol.
- ☐ **Using a Predefined Static Protocol** explains how to use a static acquisition protocol that has been previously defined.
- ☐ **Using the Static Image Display** explains how to display static studies with the Acquisition console’s Display option.

Acquiring Static Studies

This section explains how to use the DSX/DS7 to acquire static studies.

The steps for acquiring a static image include the following:

1. Select a patient, acquisition type, and dataset name.
2. Specify the isotopes and energy levels.
3. Select a matrix size.
4. Define the zoom and orientation parameters.
5. Define the stop conditions.
6. Specify other parameters.
7. Complete the acquisition.

The section concludes with an explanation of how to create a static acquisition protocol.

Selecting the Patient, Acquisition Type and Dataset Name

1. The name of the currently selected patient is displayed at the top of the Main Menu. To select a different patient, select **Change Patient**.

   Note: If there is no current patient, you can select one now. If you do not, you will be prompted to select one after you select the acquisition type in Step 3.

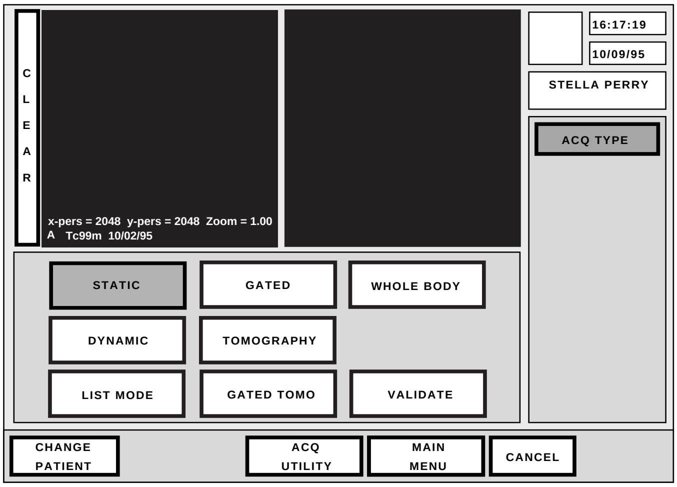
   You can search for a patient under a number of different criteria (select **Find Patient**), or enter a new patient (select **Create New Patient**).

   After you select a patient, the Main Menu is displayed again.

2. From the Main Menu, select **Manual Acquisition**.

   The Acquisition Type Menu is displayed (Figure 3-1).

Figure 3-1: Acquisition Type Menu



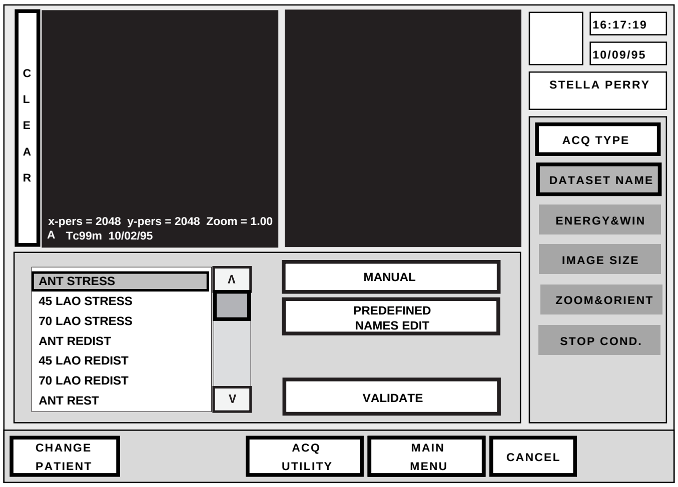
16:17:19
10/09/95
STELLA PERRY

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

3. Select **Static**, then **Validate**.

The Dataset Name Menu is displayed (Figure 3-2).

Figure 3-2: Dataset Name Menu



16:17:19
10/09/95
STELLA PERRY

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

ANT STRESS
45 LAO STRESS
70 LAO STRESS
ANT REDIST
45 LAO REDIST
70 LAO REDIST
ANT REST

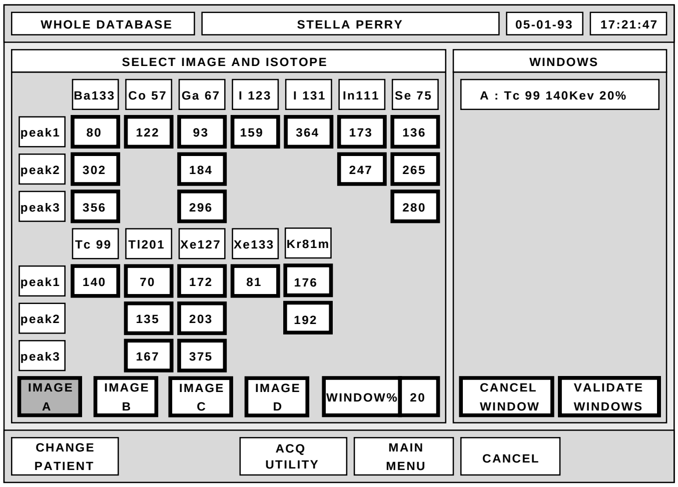
4. Select an existing dataset name from the scrolling list, or select **Manual** and enter a new one (4 to 18 characters). Select **Validate**.

Note: You can use this menu to create and edit predefined dataset names. Refer to “Managing Dataset Names” in the chapter entitled “Standard Acquisition Operations” for more information.

The Isotope Menu (also called the Energy & Window Menu) is displayed (Figure 3-3).

Selecting the Isotope and Matrix Size

Figure 3-3: Isotope Menu



WHOLE DATABASE
STELLA PERRY
05-01-93
17:21:47

	Ba133	Co 57	Ga 67	I 123	I 131	In111	Se 75
peak1	80	122	93	159	364	173	136
peak2	302		184			247	265
peak3	356		296				280

	Tc 99	Tl201	Xe127	Xe133	Kr81m
peak1	140	70	172	81	176
peak2		135	203		192
peak3		167	375		

WINDOW% 20

A : Tc 99 140Kev 20%

You can acquire up to four static images simultaneously, each with its own isotope. Further, you can specify up to a combined total of eight energy levels for all isotopes (so long as none of the energy windows overlap).

The steps that follow explain how to select a single isotope and energy level. For information about using multiple isotopes, refer to “Using Multiple Isotopes and Energy Levels” in the “Standard Acquisition Operations” chapter.

1. The name of the most recently used isotope and energy level appears in the Windows column of the Isotope Menu. If you do **not** want to acquire the image using this combination, select **Cancel Window**, then select the name of the isotope in the Windows column.
2. On the left side of the menu, Image A should be highlighted. If it is not, select **Image A**.
3. Select the isotope and energy peak you want to use for this acquisition.

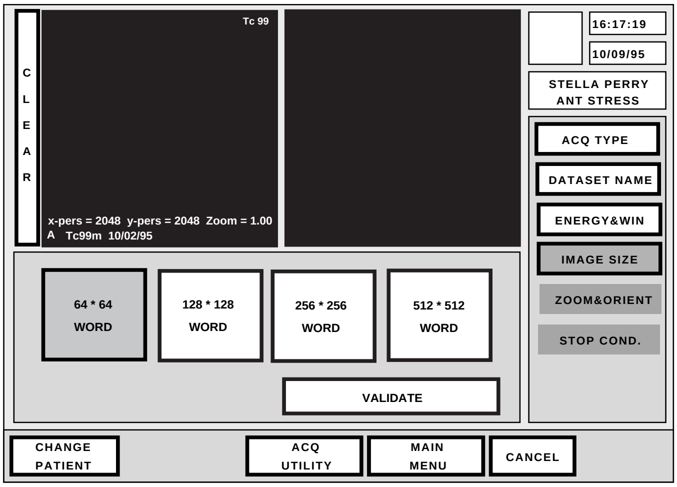
   The isotope name is displayed in the Windows column.

   Note: Up to three energy peaks are displayed for the isotopes. You can use up to eight energy peaks for a single image.
4. Select **Validate Windows** to accept the isotope and energy level.

   Important: When you select an isotope, the system automatically chooses a uniformity matrix. The uniformity matrix is displayed in the detector’s persistence screen. Refer to the “Standard Acquisition Operations” chapter for information about manually changing the uniformity matrix.

   The name of the isotope is displayed in the persistence screen. The Matrix Size Menu (also called the Image Size Menu) is displayed (Figure 3-4).

   Figure 3-4: Matrix Size Menu



5. Select a matrix size. The options for static acquisitions are:

   ☐ 64 x 64 Word

   ☐ 128 x 128 Word

❑ 256 x 256 Word

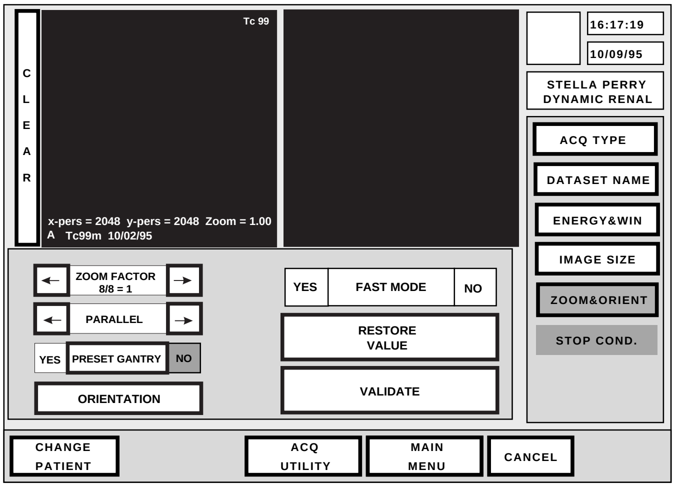
❑ 512 x 512 Word

6. Select **Validate**.

   The Zoom & Orientation Menu is displayed (Figure 3-5).

Defining the Zoom and Orientation

Figure 3-5: Zoom & Orientation Menu



Tc 99

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95

STELLA PERRY
DYNAMIC RENAL

ZOOM FACTOR 8/8 = 1

PARALLEL

1. If you want to use a zoom factor, select the Arrow button on either side of **Zoom Factor**.

   Note: For more information about zoom factors on the DSX/DS7, refer to “Specifying the Zoom Factor” in the chapter entitled “Standard Acquisition Operations.”

2. If you want to specify a different collimator, select the Arrow button on either side of the collimator name to scroll through the options (parallel or mono-diverging, DS7 only).

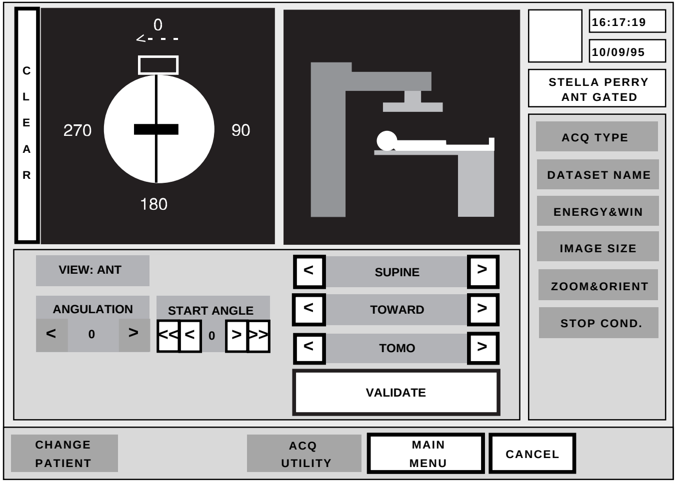
   Important: Make sure that the collimator name matches the collimator on the camera; otherwise, the image will be distorted.

3. To revert to the original selections for zoom and collimator, select **Restore Value**.

4. To specify the gantry starting angle, and patient position, select **Orientation**.

   The Orientation Controls Menu is displayed (Figure 3-6).

Figure 3-6: Orientation Controls Menu



5. Use the options on this menu to specify the gantry's starting angle, and the patient's position in relation to the gantry.

   Note: For more information, refer to "Orienting the Image on the Persistence Screen" in the chapter entitled "Standard Acquisition Operations."

6. Select **Validate**.

   The Zoom and Orientation Menu is displayed again.

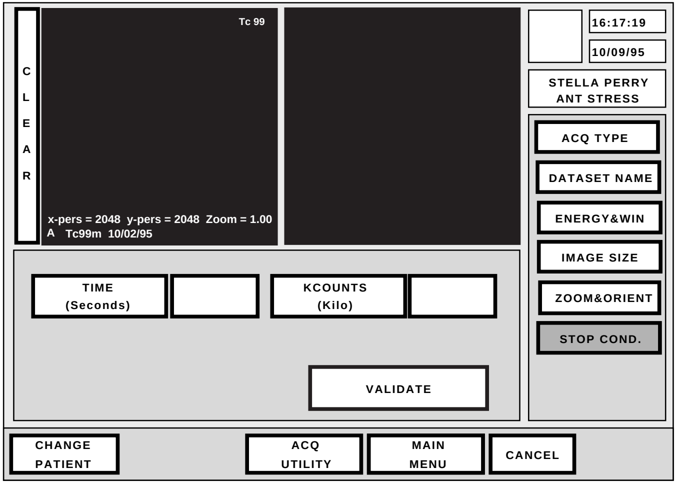
7. Specify whether you want the gantry and detector head to move automatically to their proper position. Select **Preset Gantry**. The highlight toggles between Yes and No. Highlight Yes if you want to be prompted to move the gantry before you start the acquisition; highlight No if you do not.

8. Select **Validate**.

   The Stop Conditions Menu is displayed (Figure 3-7).

Defining the Stop Conditions

Figure 3-7: Stop Conditions Menu



You can define the end of a static acquisition by specifying either the elapsed time (in seconds) or the number of counts (in Kcounts). If you enter a value for both parameters, the acquisition ends when the first stop condition is met.

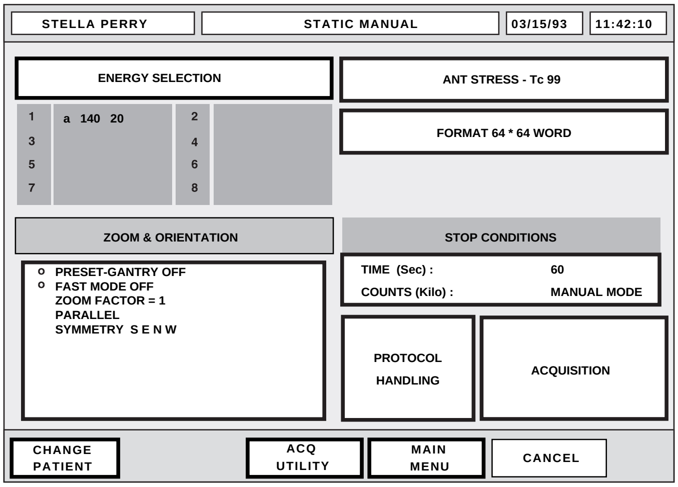
⚠ **Important:** You can also plan to stop the acquisition manually. Do not enter a value for either parameter, then, while the acquisition is in progress, select **Stop Acquisition**.

1. To stop the acquisition after a specific period of time, select **Time**. Type the number of seconds (1 to 3600) for the acquisition and press <ENTER>.
2. To stop the acquisition after a specific number of counts have been acquired, select **Kcounts**. Type the number of Kcounts (1 to 99,000) for the acquisition and press <ENTER>.
3. Select **Validate**.

   The Acquisition Summary Menu is displayed (Figure 3-8).
4. You have two options.
   - ❑ If you are acquiring a static image, continue with the next procedure.
   - ❑ If you are creating a predefined protocol, continue with the procedure entitled “Creating a Predefined Protocol.”

Preparing for the Acquisition

Figure 3-8: Acquisition Summary Menu



STELLA PERRY | STATIC MANUAL | 03/15/93 | 11:42:10

ENERGY SELECTION

1 a 140 20

ANT STRESS - Tc 99

FORMAT 64 * 64 WORD

ZOOM & ORIENTATION

o PRESET-GANTRY OFF
o FAST MODE OFF
ZOOM FACTOR = 1
PARALLEL
SYMMETRY S E N W

STOP CONDITIONS

TIME (Sec) : 60
COUNTS (Kilo) : MANUAL MODE

The Acquisition Summary Menu lists the parameters you selected for your acquisition.

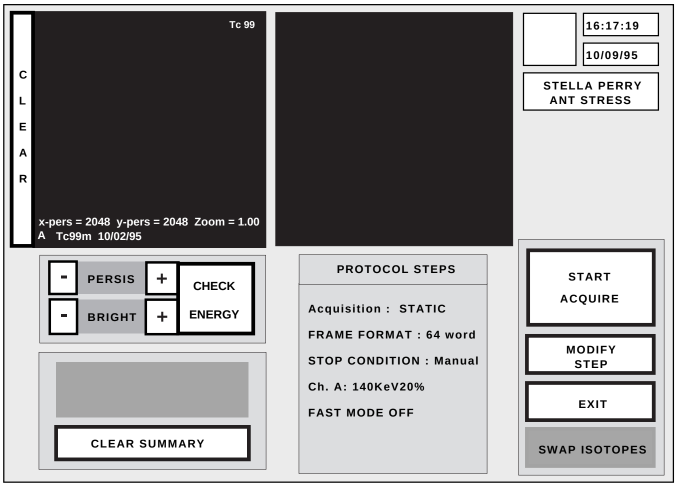
1. To change a parameter, select the button containing information for that parameter.

☞ **Example:** If you want to choose a different isotope, select the button labeled **Energy Selection** above the isotope list.

2. To continue, select **Acquisition**.

   The Start Acquisition Menu is displayed (Figure 3-9).

   Figure 3-9: Start Acquisition Menu



x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95
STELLA PERRY
ANT STRESS

Acquisition : STATIC
FRAME FORMAT : 64 word
STOP CONDITION : Manual
Ch. A: 140KeV20%
FAST MODE OFF

3. To check the energy before beginning the acquisition, place a point source with the correct isotope under the detector head. Select **Check Energy**.

   An energy spectrum appears on the monitor.

4. A summary of the acquisition parameters including the isotope, matrix, and stop conditions is displayed in the center of the menu. Select **Clear Summary** to remove the list.

   To display the list again, select **Display Step Summary**.

5. To change any of the parameters for this acquisition, select **Modify Step**.

   The Acquisition Summary Menu is displayed again. You can change any parameter, then select **Return to Acquire**.

6. The persistence screen displays the persistence for Image A. If you are acquiring more than one image, you can select **Swap Isotopes** to view the persistence for Image B.

7. Depending upon your selection for Preset Gantry, there are two possibilities:

   ❏ If you selected the Yes option for Preset Gantry, continue with the procedure entitled “Using Preset Gantry Positioning.”

   ❏ If you selected the No option for Preset Gantry, continue with the procedure entitled “Using Manual Gantry Positioning.”

Using Preset Gantry Positioning

By using the Preset Gantry option you can be sure that the gantry and detector will be positioned correctly before the acquisition begins.

Warning: Always use the safety pad when you scan a patient.

1. Select **Prepare the Gantry**.

   When you are prompted, press the safety pad.

   If the current starting angle or head angulation do not match that which was specified on the Orientation Controls Menu, the gantry will automatically move to the correct position. Make sure you follow the on-screen prompts carefully.

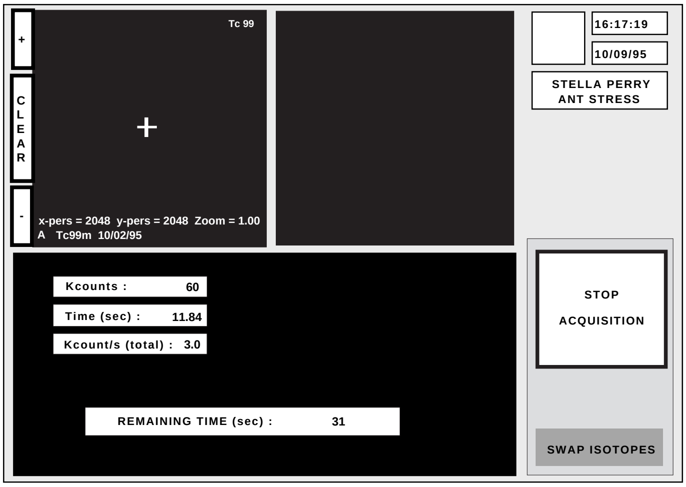
   Note: On the DS7, the head angulation positioning is manual.

   The Start Acquisition Menu is displayed again.

2. Select **Start Acquire**.

   A short beep signals the beginning of the acquisition. The Acquisition Menu is displayed (Figure 3-10).

Figure 3-10: Acquisition Menu



16:17:19
10/09/95
STELLA PERRY
ANT STRESS
x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95
Kcounts : 60
Time (sec) : 11.84
Kcount/s (total) : 3.0
REMAINING TIME (sec) : 31

3. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

4. You have three options after the acquisition is complete.

   - Select **Exit** to return to the Main Menu.
   - Select **Prepare the Gantry** to acquire another image.
   - Select **Modify Step** to change the acquisition parameters before acquiring another image.

Using Manual Gantry Positioning

Warning: Always use the safety pad when you scan a patient.

1. Position the patient under the detector.

   The persistence screen shows the patient's position in the field of view. If it is necessary, select **Clear** to clear the screen.

2. By convention, for anterior images the patient's head should appear at the top and the patient's left side on the right of the persistence monitor. If it is necessary, use the Rotation and Symmetry controls to flip or rotate the image on the persistence monitor.

   Note: The Rotation and Symmetry controls are explained in the "Standard Acquisition Operation" chapter in the section entitled "Using the Rotation and Symmetry Controls". The Persistence, Rotate, Up/Down Arrows and Left/Right Arrows buttons of the hand control have no effect.

3. Use the Brightness and Persistence controls to assist with final patient positioning.

4. Select **Start Acquire**.

   A short beep signals the beginning of the acquisition. The Acquisition Menu is displayed (Figure 3-11).

Figure 3-11: Acquisition Menu

Tc 99
16:17:19
10/09/95
STELLA PERRY
ANT STRESS
x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95
Kcounts : 60
Time (sec) : 11.84
Kcount/s (total) : 3.0
REMAINING TIME (sec) : 31

5. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

6. You have three options after the acquisition is complete.

   ☐ Select **Exit** to return to the Main Menu.

   ☐ Select **Start Acquire** to acquire another image.

   ☐ Select **Modify Step** to change the acquisition parameters before acquiring another image.

Creating a Predefined Protocol

When you create a protocol, you have the option of “chaining” it to another protocol. For example, you could create a dynamic renal acquisition and chain it to a static acquisition of the bladder. You have the option of chaining a protocol when you save it.

The values for the following parameters are saved with the protocol:

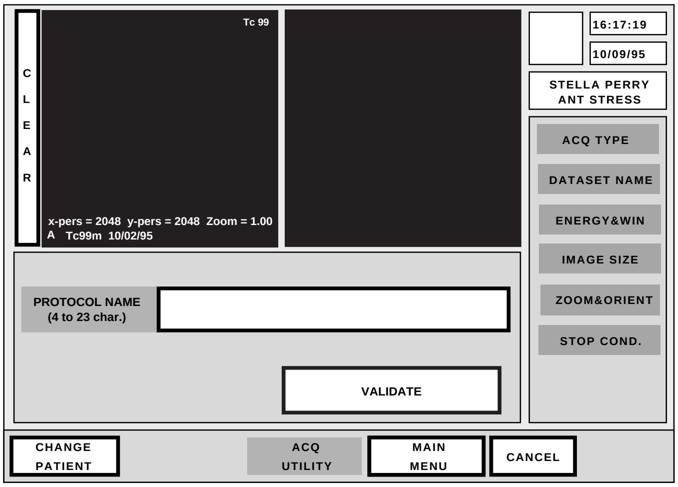
- ☐ protocol name
- ☐ dataset name
- ☐ matrix size
- ☐ isotopes and energy levels
- ☐ zoom factor
- ☐ stop conditions
- ☐ patient orientation

Follow the steps below to save the parameters as a new protocol.

1. Select **Protocol Handling**.

   The Protocol Handling Menu is displayed (Figure 3-12).

   Figure 3-12: Protocol Handling Menu



16:17:19
10/09/95
STELLA PERRY
ANT STRESS

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

2. The box labeled **Enter Protocol Name** is highlighted. Enter a name (4 to 24 characters) for the protocol, press <ENTER> and select **Validate**.

3. The box labeled **Enter Additional Prompt Message** is highlighted. You can enter an optional message (less than 24 characters) in this box. Press <ENTER> and select **Validate**.

   The message will appear on the Start Acquisition Menu the next time someone uses the protocol.

4. If you want to chain this to another protocol, select **Yes**; otherwise, select **No**. Select **Validate.**

   ☐ If you chain the protocol, a serie of screens, which allow you to define another protocol, is displayed. For more information about chaining protocols, refer to the section entitled “Working with Chained Protocols” in the “Standard Acquisitions Operations” chapter.

- ❏ If you do not chain the protocol, the Main Menu is displayed.

Using a Predefined Static Protocol

The procedure for using a predefined static acquisition protocol follows these general guidelines:

1. Select the patient.
2. Select the predefined protocol.
3. Start the acquisition.

You also have the option to modify the protocol before you begin the acquisition.

Selecting the Patient

The name of the currently selected patient is displayed at the top of the Main Menu. Use the following steps to select a different patient.

1. Select **Change Patient**.

   The Patient Directory Menu is displayed.

2. Select the patient for whom you want to acquire the dataset.

   You can search for a patient under a number of different criteria, or enter a new patient.

3. After you select a patient, the Main Menu is displayed again.

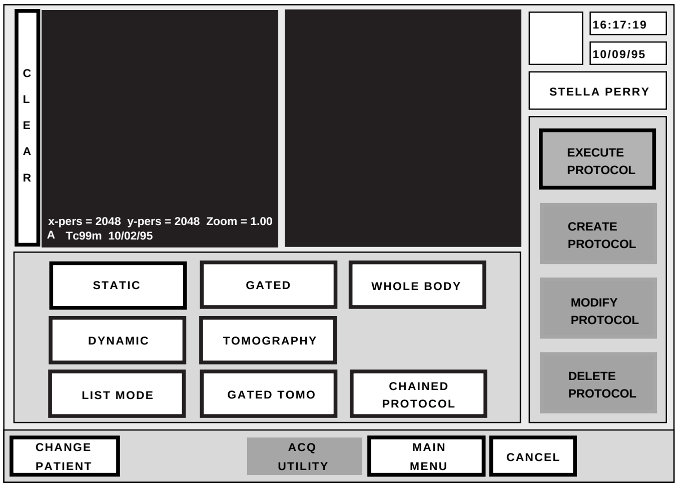
Selecting the Predefined Protocol

After you select the correct patient and return to the Main Menu, you can select the protocol you want to use. Follow the steps below.

1. From the Main Menu, select **Acquisition Protocol**.

   The Protocol Type Menu is displayed (Figure 3-13).

   Figure 3-13: Protocol Type Menu



16:17:19
10/09/95
STELLA PERRY

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

2. Select **Static**.

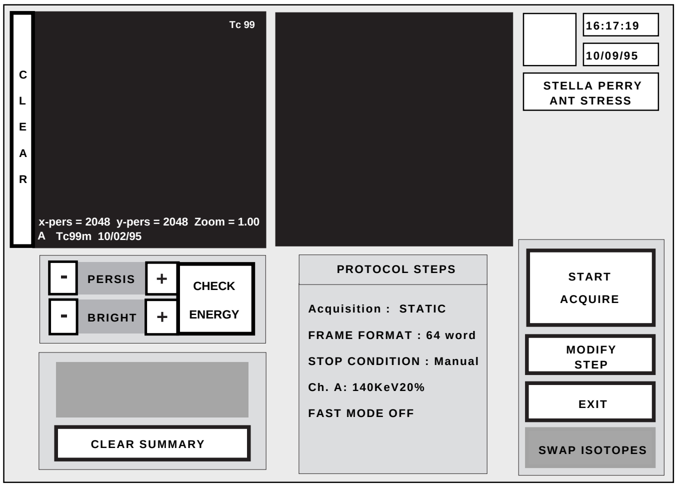
A menu with predefined static acquisition protocols is displayed.

3. Select the protocol you want to use.

   The Start Acquisition Menu is displayed (Figure 3-14).

Starting the Acquisition

Figure 3-14: Start Acquisition Menu



Acquisition : STATIC
FRAME FORMAT : 64 word
STOP CONDITION : Manual
Ch. A: 140KeV20%
FAST MODE OFF

The Start Acquisition Menu allows you to start the acquisition protocol. In addition, you can review the protocol's parameters.

1. To check the energy before beginning the acquisition, place a point source with the correct isotope under the detector head. Select **Check Energy**.

   An energy spectrum appears on the monitor.

2. A summary of the acquisition parameters including the isotope, matrix, and stop conditions is displayed in the center of the menu. Select **Clear Summary** to remove the list.

   To display the list again, select **Display Step Summary**.

3. To change any of the parameters for this acquisition, select **Modify Step**.

   The Acquisition Summary Menu is displayed. You can change any parameter, then select **Return to Acquire**.

4. The persistence screen displays the persistence for Image A. If you are acquiring more than one image, you can select **Swap Isotopes** to view the persistence for Image B.

5. Depending upon the setting for Preset Gantry, there are two possibilities:

   - If you selected the Yes option for Preset Gantry, continue with the procedure entitled "Using Preset Gantry Positioning."
   - If you selected the No option for Preset Gantry, continue with the procedure entitled "Using Manual Gantry Positioning."

Using Preset Gantry Positioning

By using the Preset Gantry option, you can be sure that the gantry and detector will be positioned correctly before the acquisition begins.

Warning: Always use the safety pad when you scan a patient.

1. Select **Prepare the Gantry**.

   When you are prompted, press the safety pad.

   If the current starting angle or head angulation do not match that which was specified on the Orientation Controls Menu, the gantry will automatically move to the correct position. Make sure you follow the on-screen prompts carefully.

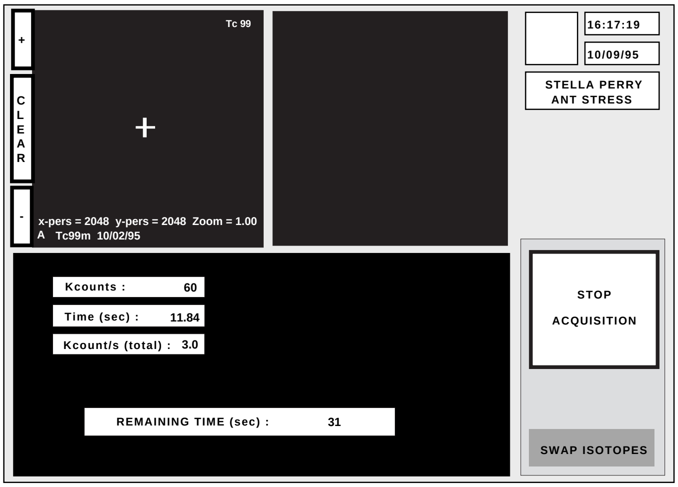
   Note: On the DS7, the head angulation positioning is manual.

   The Start Acquisition Menu is displayed again.

2. Select **Start Acquire**.

   A short beep signals the beginning of the acquisition. The Acquisition Menu is displayed (Figure 3-15).

Figure 3-15: Acquisition Menu



16:17:19
10/09/95
STELLA PERRY
ANT STRESS

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

Kcounts : 60
Time (sec) : 11.84
Kcount/s (total) : 3.0

REMAINING TIME (sec) : 31

3. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

4. You have three options after the acquisition is complete.

   ☐ Select **Exit** to return to the Main Menu.

   ☐ Select **Prepare the Gantry** to acquire another image.

   ☐ Select **Modify Step** to change the acquisition parameters before acquiring another image.

Using Manual Gantry Positioning

Warning: Always use the safety pad when you scan a patient.

1. Position the patient under the detector.

The persistence screen shows the patient's position in the field of view. If it is necessary, select **Clear** to clear the screen.

2. By convention, for anterior images the patient's head should appear at the top and the patient's left side on the right of the persistence monitor. If it is necessary, use the Rotation and Symmetry controls to flip or rotate the image on the persistence screen.

   Note: The Rotation and Symmetry controls are explained in the "Standard Acquisition Operation" chapter, in the section entitled "Using the Rotation and Symmetry Controls." The Persistence, Rotate, Up/Down Arrows and Left/Right Arrows buttons of the hand control have no effect.

3. Use the Brightness and Persistence controls to assist with final patient positioning.

4. Select **Start Acquire**.

   A short beep signals the beginning of the acquisition. The Acquisition Menu is displayed (Figure 3-16).

Figure 3-16: Acquisition Menu

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95

STELLA PERRY
ANT STRESS

Kcounts : 60
Time (sec) : 11.84
Kcount/s (total) : 3.0

REMAINING TIME (sec) : 31

5. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

6. You have three options after the acquisition is complete.

   - ❏ Select **Exit** to return to the Main Menu.
   - ❏ Select **Start Acquire** to acquire another image.
   - ❏ Select **Modify Step** to change the acquisition parameters before acquiring another image.

Using the Static Image Display

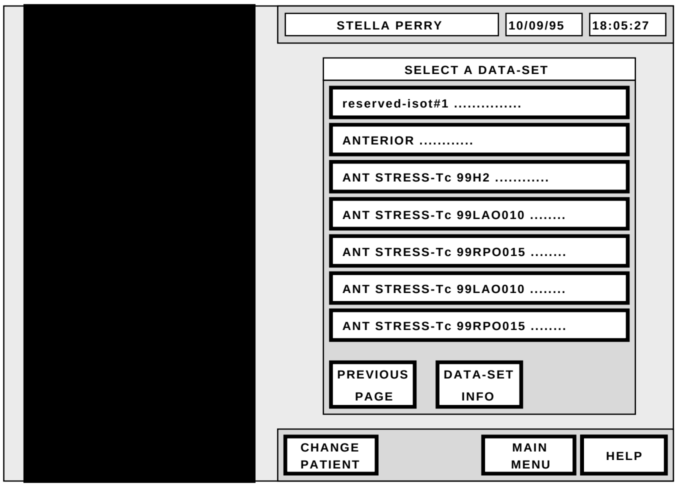
The Acquisition console includes an option to display one or more static images after you acquire them, adjust the display parameters, and print or save the display.

Displaying the Images

1. From the Acquisition console’s Main Menu, select **Display**.

   The Dataset Selection Menu is displayed (Figure 3-17).

   Figure 3-17: Dataset Selection Menu



STELLA PERRY 10/09/95 18:05:27

SELECT A DATA-SET

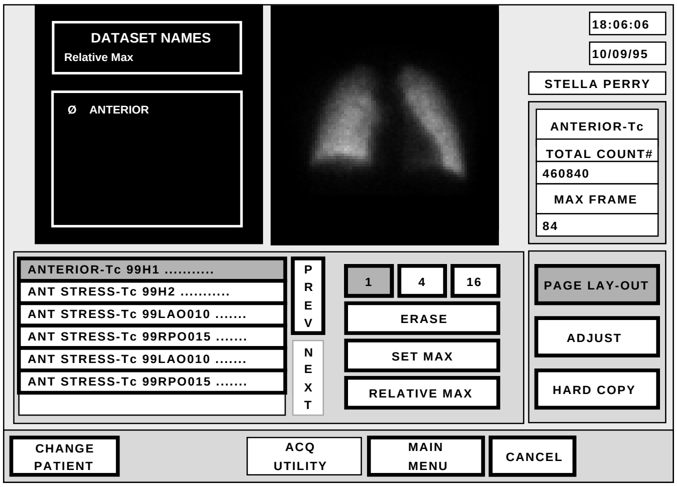
- reserved-isot#1 ....
- ANTERIOR ....
- ANT STRESS-Tc 99H2 ....
- ANT STRESS-Tc 99LAO010 ....
- ANT STRESS-Tc 99RPO015 ....
- ANT STRESS-Tc 99LAO010 ....
- ANT STRESS-Tc 99RPO015 ....

2. Select the dataset you want to display.

   Note: You can use **Previous Page** and **Next Page** to view additional datasets.

   The Static Page Layout Menu is displayed (Figure 3-18).

   Figure 3-18: Static Page Layout Menu



18:06:06
10/09/95
STELLA PERRY

DATASET NAMES
Relative Max

Ø ANTERIOR

ANTERIOR-Tc
TOTAL COUNT# 460840
MAX FRAME 84

- ANTERIOR-Tc 99H1 ....
- ANT STRESS-Tc 99H2 ....
- ANT STRESS-Tc 99LAO010 ....
- ANT STRESS-Tc 99RPO015 ....
- ANT STRESS-Tc 99LAO010 ....
- ANT STRESS-Tc 99RPO015 ....

3. Select the number of images you want to view at one time: **1**, **4**, or **16**.

4. Select a dataset from the list on the left, then select the portion of the screen in which you want the image to appear.

   Note: You can display a different number of images in each quadrant. For example, you can select **4**, then place an image in the upper right quadrant. Next, you can select **16**, then place four different images in the upper left quadrant.

   The maximum and total counts for the dataset are listed on the screen.

5. To erase part of the screen, select **Erase** then select that part of screen.

   Example: To erase a quadrant, select **4**, select **Erase**, then select the quadrant you want to erase.

6. After you have loaded the datasets you want to display, you can normalize the display in either of two ways.

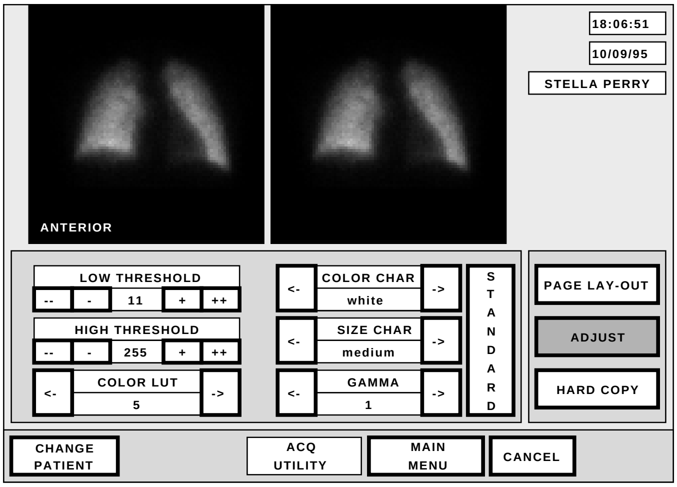
   - To normalize the entire display to its maximum pixel, select **Set Max**.
   - To normalize each image to its own maximum pixel value, select **Relative Max**.

7. To adjust the appearance of the images that appear on the screen, select **Adjust**.

   The Static Display Adjustment Menu is displayed (Figure 3-19). Follow the procedure in the section entitled "Adjusting the Static Image Display."

Adjusting the Static Image Display

Figure 3-19: Static Image Adjustment Menu



18:06:51
10/09/95
STELLA PERRY

LOW THRESHOLD 11
HIGH THRESHOLD 255
COLOR LUT 5
COLOR CHAR white
SIZE CHAR medium
GAMMA 1

You can adjust the display parameters for all or part of the Static Image Display. The following table lists the default value for each parameter.

Parameter	**Default**
Low Threshold	1
High Threshold	255
Color Scale (LUT)	1
Text Color (Color Char)	White
Text Size (Size Char)	Medium
Gamma	1.0

The following steps explain how to adjust the display parameters for the static images on the screen.

1. Select either the whole screen (by selecting the center of the display) or the single quadrant you want to adjust.
2. To change the threshold, select the Plus/Minus buttons associated with the threshold you want to change: Low Threshold or High Threshold.

   The threshold is changed on the portion of the screen you selected.
3. To change the color scale on the portion of the screen you selected, select the Arrow buttons on either side of Color LUT to display the color scale number (1 to 23).

   The color scale is updated on the screen.
4. To change the appearance of the dataset names in the portion of the screen you selected, select the Arrow buttons associated with Color Char and Size Char.

   Color Char controls the color of the text: White, Transparent, Blue, Black, or Red. Size Char controls the size of the text: Small, Medium, or Large.
5. To change the gamma correction for the portion of the screen you selected, select the Arrow buttons associated with Gamma.

   You can choose from 12 different gamma correction values.
6. To return the selected portion of the display to its default appearance, select **Standard**.
7. To add text annotations to the display, select **Hard Copy**.

   The Hard Copy Menu is displayed. Continue with the procedure entitled "Annotating the Static Image Display." If you want to print or save a copy of the display without annotations, skip to the procedure entitled "Saving and Printing the Static Image Display."

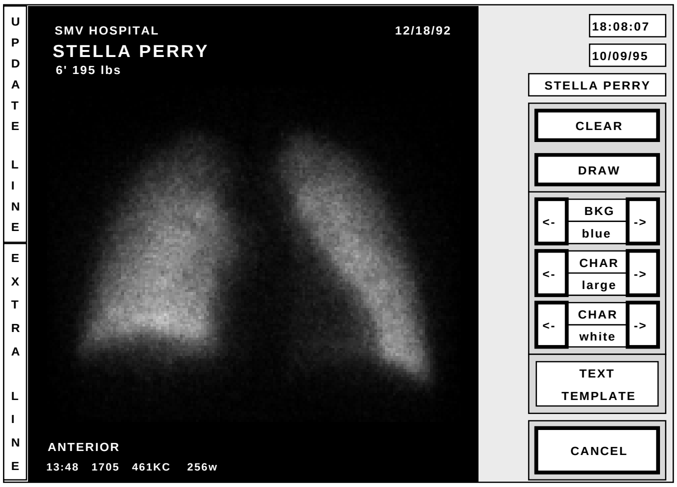
Annotating the Static Image Display

The following steps explain how to add text annotations to the display.

1. With the Hard Copy Menu displayed, select **Annotations**.

   The Annotation Menu is displayed (Figure 3-20).

   Figure 3-20: Annotation Menu



SMV HOSPITAL 12/18/92
STELLA PERRY
6' 195 lbs
ANTERIOR
13:48 1705 461KC 256w

18:08:07
10/09/95
STELLA PERRY

2. Use the associated Arrow buttons to specify the text color, text size, and background color for the text. The following table lists the options for each parameter.

Parameter	**Options**
Text (Char) Color	White, Blue, Black, Red, or Gray
Text (Char) Size	Small, Medium, Large
Background Color	Transparent, Blue, Black, Red, Gray, White

3. Move the cursor to the beginning location for the text, then press either of the upper buttons on the Rollermouse twice. Type the annotation and press <ENTER>.
4. To change the text you just typed, select **Update Line**.
5. To add another line of text, select **Extra Line**. Type the new text and press <ENTER>.
6. To draw a line from the annotation to a specific structure on the displayed image, select **Draw**.

   Rotate the trackball to move the cursor to the structure on the displayed image, then press lower left Rollermouse button.

   Rotate the trackball to draw a line to the text, then press either upper button to end the line.
7. To erase text and drawings from the display, select **Clear**.

   A rectangle is displayed on the screen. Rotate the trackball to move the rectangle so that its lower left corner is located at the lower left edge of the region you want to erase.

Press The lower left Rollermouse button, then rotate the trackball to resize the rectangle. Make sure the rectangle encloses only the part of the text and drawing you want to erase, then press the upper right Rollermouse button.

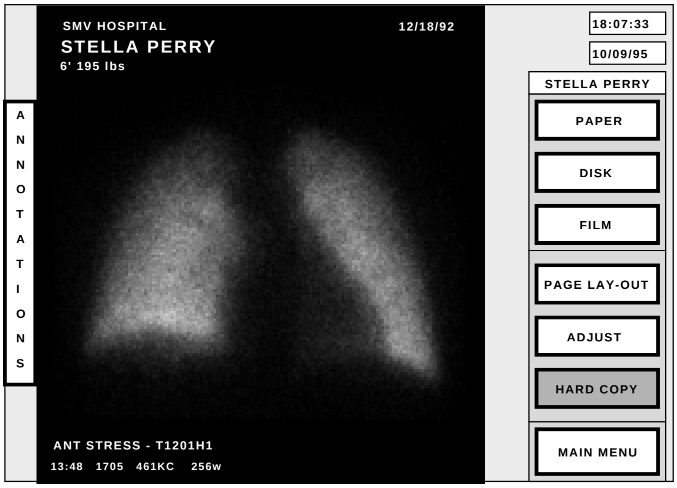
The text and drawing within the rectangle are erased.

8. To return to the Hard Copy Menu, select **Cancel**.

   The Hard Copy Menu is displayed (Figure 3-21). Continue with the next section.

Saving and Printing the Static Image Display

Figure 3-21: Hard Copy Menu



You can use the options on the Hard Copy Menu to print the displayed image on a color printer, a video imager, or a digital imager. You can also save the image in its own dataset that you can print or view later.

1. To save the image in its own dataset, select **Disk**.

   Select the box under Save As, then type a name for the dataset (4 to 14 characters). Press <ENTER>.

   The new dataset is saved in the patient database.

2. To print on a local or remote color printer, select **Paper**.

   Select the number of copies you want to print (1 to 10), then select the background color (Black or White).

   The image is sent to the color printer.

3. To print on a video imager, select **Film**.

   - ☐ If your system includes both a video and a digital imager, select **Video**.

     The display is adjusted to appear as it will on the film. Press any alphanumeric key to print the image and continue.

   - ☐ If your system includes only a video imager, the display is adjusted to appear as it will on the film. Press any alphanumeric key to print the image and continue.

4. To print on a digital imager, select **Film**, then select **Setup**.

   Set up the imager parameters for the image, then select **Validate**. The previous menu options are available again. Select **Print**.

   The image is sent to the Imager queue.

5. To return to the Hard Copy Menu, select **Cancel**.

Performing Dynamic Acquisitions

Introduction

Dynamic acquisition protocols allow you to acquire multiple images over time. As a quality control measure, after the acquisition you can view the images through the Display function.

Dynamic images can be acquired until a preset time limit or count limit is reached. You can also stop the acquisition manually at any time.

These protocols are based on operator-defined values for parameters such as the number of isotopes and energy levels, the duration for the acquisition, and the zoom factor. After your department agrees on the parameters for a specific type of study, the parameters can be saved in a predefined protocol and used repeatedly.

Warning: To ensure data integrity, you should suspend the following activities during dynamic acquisitions faster than one frame per second:

- ❏ color printing
- ❏ transfers to and from optical disks
- ❏ transfers to and from floppy disks

This chapter includes three major sections.

- ❏ **Acquiring Dynamic Studies** explains how to use the DSX/DS7 to acquire dynamic studies and to create a predefined dynamic acquisition.
- ❏ **Using a Predefined Dynamic Protocol** explains how to use a dynamic acquisition protocol that has been previously defined.
- ❏ **Using the Dynamic Display Option** explains how to use the Acquisition console’s Display option to display, adjust, annotate, and print dynamic studies.

Acquiring Dynamic Studies

This section explains how to use the DSX/DS7 to acquire a dynamic study.

The steps for acquiring a dynamic study include the following:

1. Select a patient, acquisition type, and dataset name.
2. Specify the isotopes and energy levels.
3. Select a matrix size.
4. Define the zoom and orientation parameters.
5. Define the stop conditions.
6. Specify other parameters.
7. Complete the acquisition.

The section concludes with an explanation of how to create a dynamic acquisition protocol.

Selecting the Patient, Acquisition Type and Dataset Name

1. The name of the currently selected patient is displayed at the top of the Main Menu. To select a different patient, select **Change Patient**.

   Note: If there is no current patient, you can select one now. If you do not, you will be prompted to select one after you select the acquisition type in Step 3.

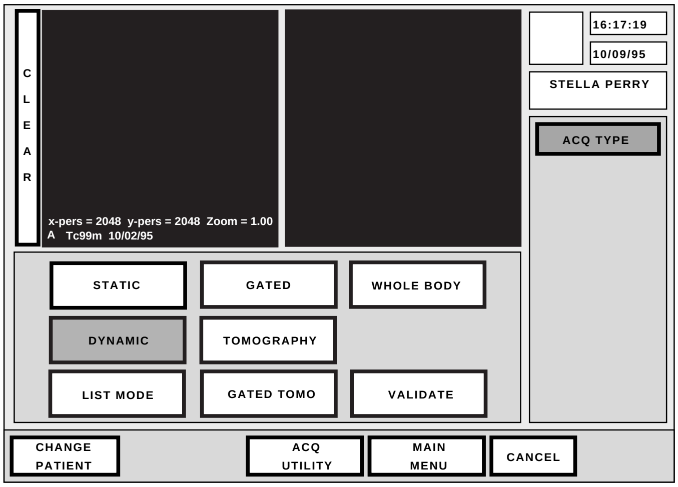
   You can search for a patient under a number of different criteria (select **Find Patient**), or enter a new patient (select **Create New Patient**).

   After you select a patient, the Main Menu is displayed again.

2. From the Main Menu, select **Manual Acquisition**.

   The Acquisition Type Menu is displayed.

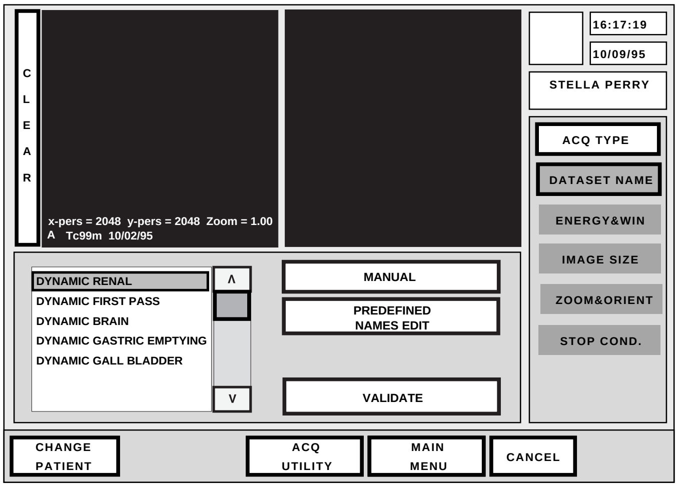
   Figure 4-1: Acquisition Type Menu



3. Select **Dynamic** (Figure 4-1), then **Validate**.

   The Dataset Name Menu is displayed (Figure 4-2).

Figure 4-2: Dataset Name Menu



4. Select an existing dataset name from the scrolling list, or select **Manual** and enter a new one (4 to 18 characters). Select **Validate**.

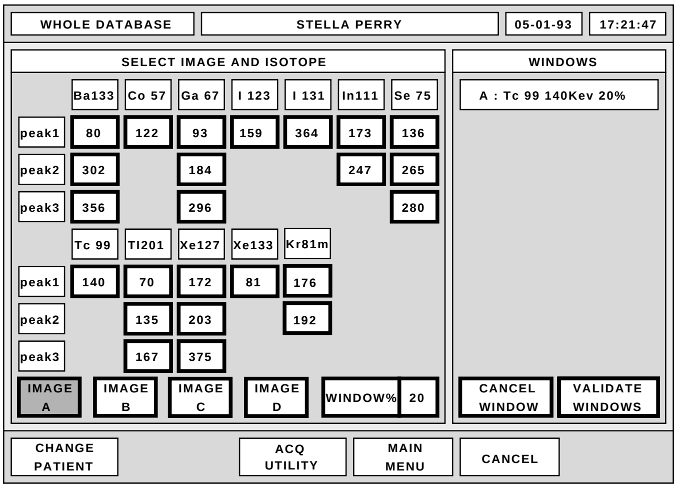
   Note: You can use this menu to create and edit predefined dataset names. Refer to “Managing Dataset Names” in the chapter entitled “Standard Acquisition Operations” for more information.

   The Isotope Menu (also called the Energy & Window Menu) is displayed (Figure 4-3).

Selecting the Isotope and Matrix Size

You can acquire up to four dynamic images simultaneously, each with its own isotope. Further, you can specify up to a combined total of eight energy levels for all isotopes so long as none of the energy windows overlap.

Figure 4-3: Isotope Menu



The steps that follow explain how to select a single isotope and energy level. For information about using multiple isotopes, refer to “Using

Multiple Isotopes and Energy Levels" in the "Standard Acquisition Operations" chapter.

1. The name of the most recently used isotope and energy level appears in the Windows column of the Isotope Menu. If you do **not** want to acquire the image using this combination, select **Cancel Window**, then select the name of the isotope in the Windows column.
2. On the left side of the menu, Image A should be highlighted. If it is not, select **Image A**.
3. Select the isotope and energy peak you want to use for this acquisition.

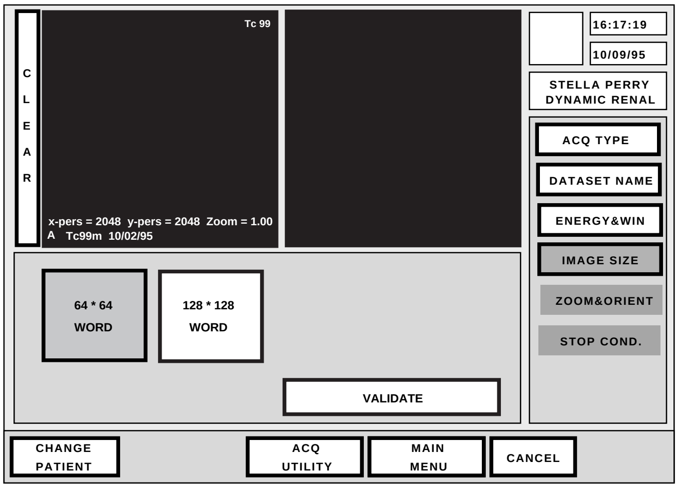
   The isotope name is displayed in the Windows column.

   Note: Up to three energy peaks are displayed for the isotopes. You can use up to eight energy peaks for a single image.
4. Select **Validate Windows** to accept the isotope and energy level.

   The Matrix Size Menu (also called the Image Size Menu) is displayed (Figure 4-4).

   Important: When you select an isotope, the system automatically chooses a uniformity matrix, which is displayed in the detector's persistence screen. Refer to the "Standard Acquisition Operations" chapter for information about manually changing the uniformity matrix.

Figure 4-4: Matrix Size Menu



Tc 99

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95

STELLA PERRY
DYNAMIC RENAL

5. With the Matrix Size Menu displayed, select a matrix size. The options for dynamic acquisitions are:

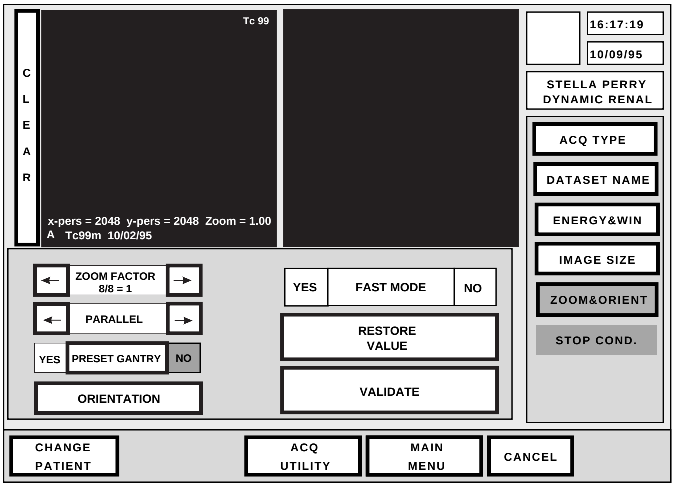
   ☐ 64 x 64 Word

   ☐ 128 x 128 Word
6. Select **Validate**.

The Zoom & Orientation Menu is displayed (Figure 4-5).

Defining the Zoom and Orientation

Figure 4-5: Zoom & Orientation Menu



Tc 99

16:17:19

10/09/95

STELLA PERRY
DYNAMIC RENAL

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

ZOOM FACTOR
8/8 = 1

PARALLEL

PRESET GANTRY: YES NO

FAST MODE: YES NO

1. If you want to use a zoom factor, select the Arrow button on either side of **Zoom Factor**.

   Note: For more information about zoom factors on the DSX/DS7, refer to “Specifying the Zoom Factor” in the Standard Acquisition Operations” chapter.

2. If you want to specify a different collimator, select the Arrow button on either side of the collimator name to scroll through the options (parallel or mono-diverging, DS7 only).

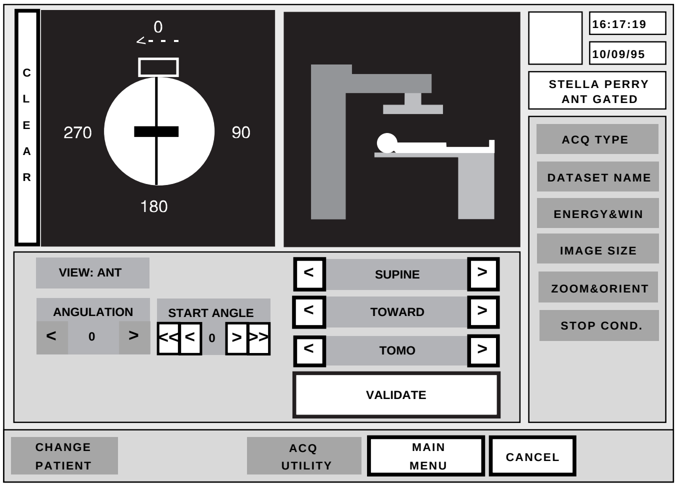
   Important: Make sure that the collimator name matches the collimator on the camera; otherwise, the image will be distorted.

3. To revert to the original selections for zoom and Collimator, select **Restore Value**.

4. To specify the gantry starting angle and patient position, select **Orientation**.

   The Orientation Controls Menu is displayed (Figure 4-6).

Figure 4-6: Orientation Controls Menu



5. Use the options on this menu to specify the gantry's starting angle, and the patient's position in relation to the gantry.

   Note: For more information, refer to "Orienting the Image on the Persistence Screen" in the "Standard Acquisition Operations" chapter.

6. Select **Validate**.

   The Zoom and Orientation Menu is displayed again.

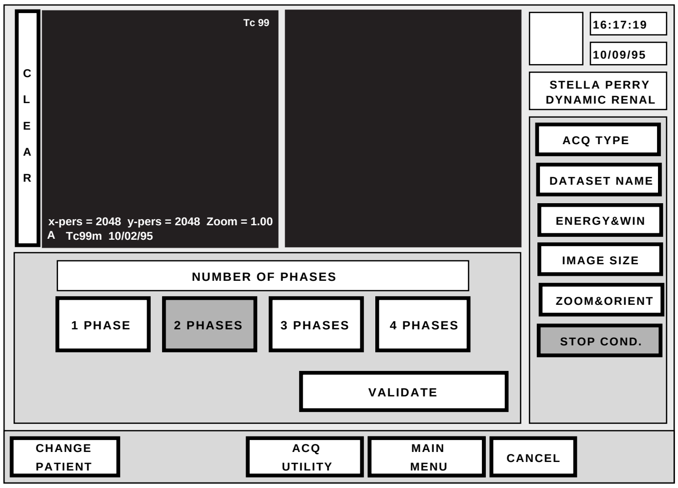
7. Specify whether you want the gantry and detector head to move automatically to their proper position. Select **Preset Gantry**. The highlight toggles between Yes and No. Highlight Yes if you want to be prompted to move the gantry before you start the acquisition; highlight No if you do not.

8. Select **Validate**.

   The Phase Menu is displayed.

Defining the Stop Conditions

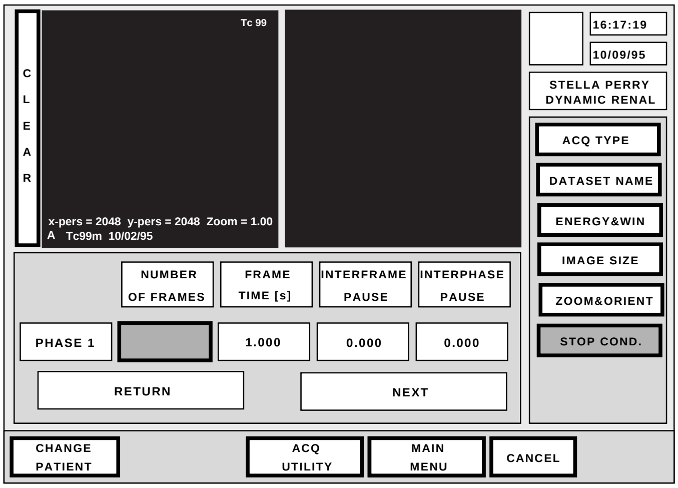
Figure 4-7: Phase Menu



1. Select the number of phases that the acquisition requires (Figure 4-7). You can specify up to four separate phases for the acquisition.
2. Select **Validate**.

   The Frame Menu is displayed (Figure 4-8).

   Figure 4-8: Frame Menu



	NUMBER OF FRAMES	FRAME TIME [s]	INTERFRAME PAUSE	INTERPHASE PAUSE
PHASE 1		1.000	0.000	0.000

3. The box under Number of Frames is highlighted. Enter the number of frames (1 to 1024) for this phase and press <ENTER>.

   The box under Frame Time is highlighted.

4. Enter the time per frame in seconds and press <ENTER>.

   The minimum time per frame depends upon the number of images, and the matrix size. The following table lists the minimum time per frame in seconds for each possible combination.

Matrix	# Images	Time per Frame (seconds)
64 X 64	1	0.025
	2	0.125
	3 or 4	0.200
128 X 128	1	0.075
	2	0.400
	3 or 4	0.600

Note: If you select a time per frame of less than one second, the count rate and number of counts are not displayed during the acquisition.

The box under Interframe Pause is highlighted.

5. Enter the number of seconds (0 to 3600) for the pause between frames and press <ENTER>.

   If you specified more than one phase, the box under Interphase Pause is highlighted.

6. Enter the number of seconds (0 to 3600) that the system will pause between phases and press <ENTER>.

7. You have three options.

   ❏ If you specified more than one phase for the study, select **Next** and repeat Steps 3 through 6 for the remaining phases.

   ❏ To return to the Phase Menu, select **Return**.

   ❏ If you have defined the stop conditions for all the phases in the study, select **Validate**.

8. Select **Validate**.

   The Acquisition Summary Menu is displayed (Figure 4-9).

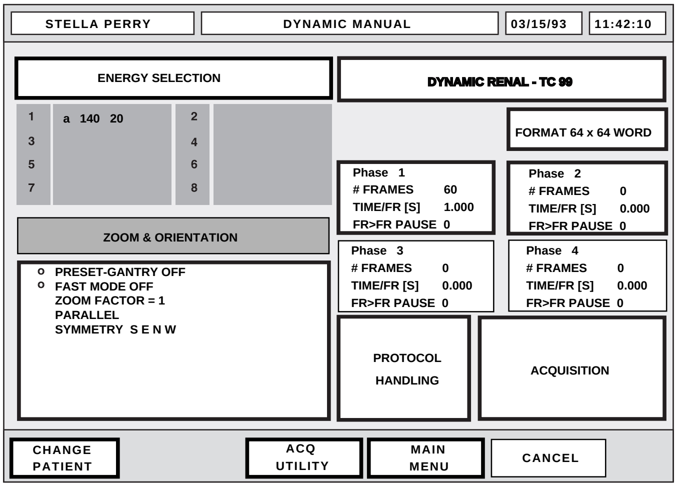
9. You have two options.

   ❏ If you are acquiring a dynamic study, continue with the next procedure.

   ❏ If you are creating a predefined protocol, continue with the procedure entitled “Creating a Predefined Protocol.”

Preparing for the Acquisition

Figure 4-9: Acquisition Summary Menu



STELLA PERRY | DYNAMIC MANUAL | 03/15/93 | 11:42:10

1 a 140 20
2
3
4
5
6
7
8

DYNAMIC RENAL - TC 99

FORMAT 64 x 64 WORD

Phase 1
FRAMES 60
TIME/FR [S] 1.000
FR>FR PAUSE 0

Phase 2
FRAMES 0
TIME/FR [S] 0.000
FR>FR PAUSE 0

Phase 3
FRAMES 0
TIME/FR [S] 0.000
FR>FR PAUSE 0

Phase 4
FRAMES 0
TIME/FR [S] 0.000
FR>FR PAUSE 0

○ PRESET-GANTRY OFF
○ FAST MODE OFF
ZOOM FACTOR = 1
PARALLEL
SYMMETRY S E N W

The Acquisition Summary Menu lists the parameters you selected for your acquisition.

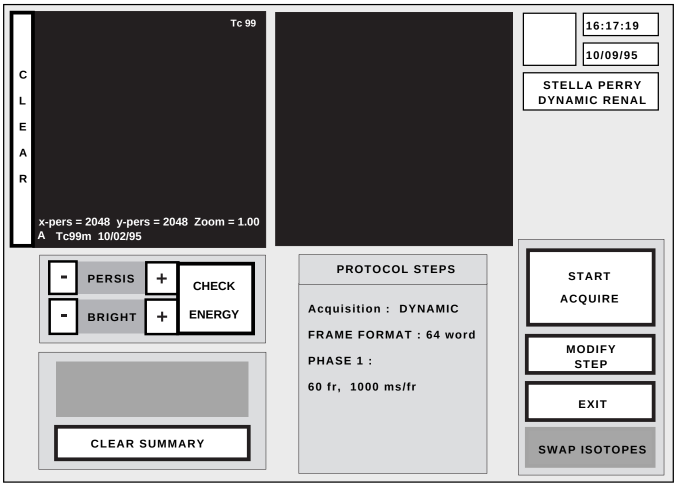
1. To change a parameter, select the button containing information for that parameter.

   ☞ **Example:** If you want to choose a different isotope, select the button labeled **Energy Selection** above the isotope list.

2. To continue, select **Acquisition**.

   The Start Acquisition Menu is displayed (Figure 4-10).

   Figure 4-10: Start Acquisition Menu



Tc 99

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95
STELLA PERRY
DYNAMIC RENAL

PROTOCOL STEPS
Acquisition : DYNAMIC
FRAME FORMAT : 64 word
PHASE 1 :
60 fr, 1000 ms/fr

3. To check the energy before beginning the acquisition, place a point source with the correct isotope under the detector head. Select **Check Energy**.

   An energy spectrum appears on the monitor.

4. A summary of the acquisition parameters including the matrix, and stop conditions is displayed in the center of the menu. Select **Clear Summary** to remove the list.

   To display the list again, select **Display Step Summary**.

5. To change any of the parameters for this acquisition, select **Modify Step**.

   The Acquisition Summary Menu is displayed again. You can change any parameter, then select **Return to Acquire**.

6. The persistence screen display the persistence for Image A. If you are acquiring more than one image, you can select **Swap Isotopes** to view the persistence for Image B.

7. Depending upon your selection for Preset Gantry, there are two possibilities:

   ❏ If you selected the Yes option for Preset Gantry, continue with the procedure entitled “Using Preset Gantry Positioning.”

   ❏ If you selected the No option for Preset Gantry, continue with the procedure entitled “Using Manual Gantry Positioning.”

Using Preset Gantry Positioning

By using the Preset Gantry option you can be sure that the gantry and detector will be positioned correctly before the acquisition begins.

Warning: Always use the safety pad when you scan a patient.

1. Select **Prepare the Gantry**.

When you are prompted, press the safety pad.

If the current starting angle or head angulation do not match that which was specified on the Orientation Controls Menu, the gantry will automatically move to the correct position. Make sure you follow the on-screen prompts carefully.

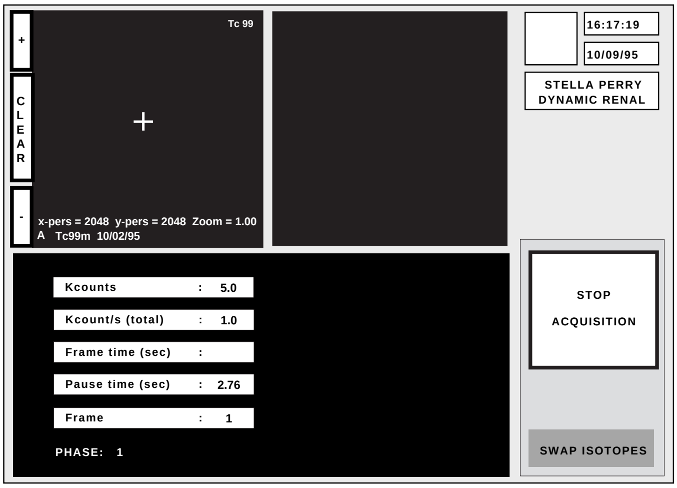
Note: On the DS7, the head angulation positioning is manual.

The Start Acquisition Menu is displayed again.

2. Select **Start Acquire**.

   A short beep signals the start of the acquisition. The Acquisition Menu is displayed (Figure 4-11).

Figure 4-11: Acquisition Menu



16:17:19
10/09/95
STELLA PERRY
DYNAMIC RENAL

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

Kcounts : 5.0
Kcount/s (total) : 1.0
Frame time (sec) :
Pause time (sec) : 2.76
Frame : 1
PHASE: 1

3. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

4. You have three options after the acquisition is complete.

   ☐ Select **Exit** to return to the Main Menu.

   ☐ Select **Prepare the Gantry** to acquire another image.

   ☐ Select **Modify Step** to change the acquisition parameters before acquiring another image.

Using Manual Gantry Positioning

Warning: Always use the safety pad when you scan a patient.

1. Position the patient under the detector.

   The persistence screen shows the patient's position in the field of view. If it is necessary, select **Clear** to clear the screen.

2. By convention, for anterior images the patient's head should appear at the top and the patient's left side on the right of the

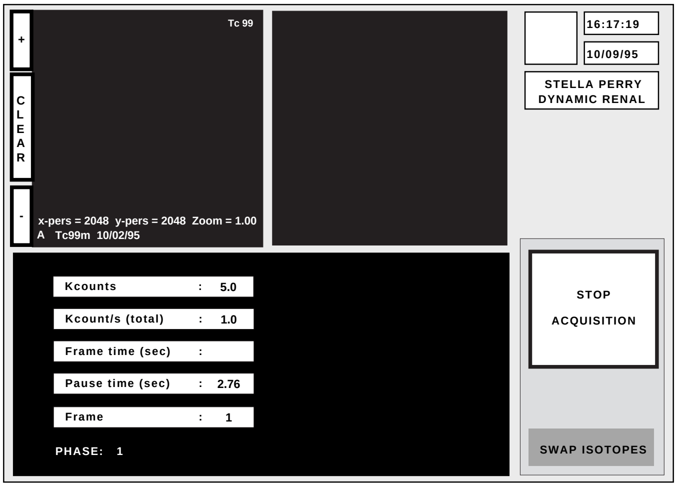
persistence monitor. If it is necessary, use the Rotation and Symmetry controls to flip or rotate the image on the persistence monitor.

Note: The Rotation and Symmetry controls are explained in the “Standard Acquisition Operation” chapter in the section entitled “Using the Rotation and Symmetry Controls”. The Persistence, Rotate, Up/Down Arrows and Left/Right Arrows buttons of the hand control have no effect.”

3. Use the Brightness and Persistence controls to assist with final patient positioning.
4. Select **Start Acquire**.

   A short beep signals the start of the acquisition. The Acquisition Menu is displayed (Figure 4-12).

Figure 4-12: Acquisition Menu



x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95

STELLA PERRY
DYNAMIC RENAL

Kcounts : 5.0
Kcount/s (total) : 1.0
Frame time (sec) :
Pause time (sec) : 2.76
Frame : 1
PHASE: 1

5. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

6. You have three options after the acquisition is complete.
   - ❑ Select **Exit** to return to the Main Menu.
   - ❑ Select **Start Acquire** to acquire another image.
   - ❑ Select **Modify Step** to change the acquisition parameters before acquiring another image.

Creating a Predefined Protocol

When you create a protocol, you have the option of “chaining” it to another protocol. For example, you could create a dynamic renal acquisition and chain it to a static acquisition of the bladder. You have the option of chaining a protocol when you save it.

The values for the following parameters are saved with the protocol:

- ❑ protocol name

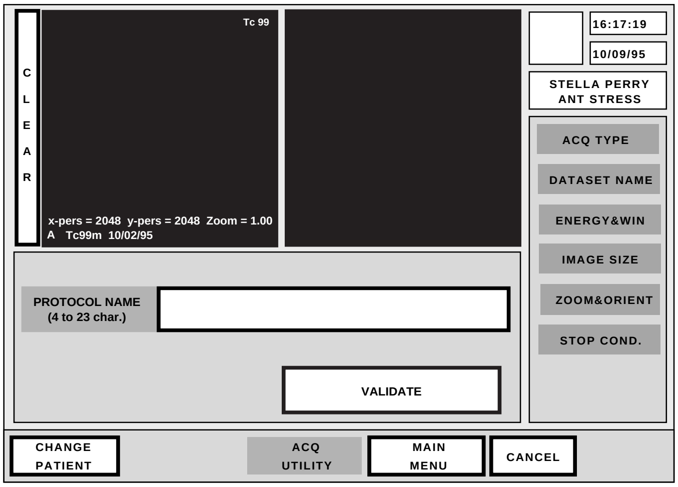
- dataset name
- matrix size
- isotopes and energy levels
- zoom factor
- stop conditions
- patient orientation

Follow the steps below to save the parameters as a new protocol.

1. Select **Protocol Handling**.

   The Protocol Handling Menu is displayed (Figure 4-13).

   Figure 4-13: Protocol Handling Menu

   Tc 99

   x-pers = 2048 y-pers = 2048 Zoom = 1.00
   A Tc99m 10/02/95

   16:17:19
   10/09/95
   STELLA PERRY
   ANT STRESS

   PROTOCOL NAME (4 to 23 char.)

2. The box labeled **Enter Protocol Name** is highlighted. Enter a name (4 to 24 characters) for the protocol, press <ENTER> and select **Validate**.

3. The box labeled **Enter Additional Prompt Message** is highlighted. You can enter an optional message (less than 24 characters) in this box. Press <ENTER> and select **Validate**.

   The message will appear on the Start Acquisition Menu the next time someone uses the protocol.

4. If you want to chain this to another protocol, select **Yes**; otherwise, select **No**. Select **Validate.**

   - If you chain the protocol, a series of screens, which allow you to define another protocol, is displayed. For more information about chaining protocols, refer to the section entitled “Working with Chained Protocols” in the “Standard Acquisition Operations” chapter.
   - If you do not chain the protocol, the Main Menu is displayed.

Using a Predefined Dynamic Protocol

The procedure for using a predefined dynamic acquisition protocol follows these general guidelines.

1. Select the patient.
2. Select the predefined protocol.
3. Start the acquisition.

You also have the option to modify the protocol before you begin the acquisition.

Selecting the Patient

The name of the currently selected patient is displayed at the top of the Main Menu. Use the following steps to select a different patient.

1. Select **Change Patient.**

   The Patient Directory Menu is displayed.

2. Select the patient for whom you want to acquire the dataset.

   You can search for a patient under a number of different criteria, or enter a new patient.

3. After you select a patient, the Main Menu is displayed again.

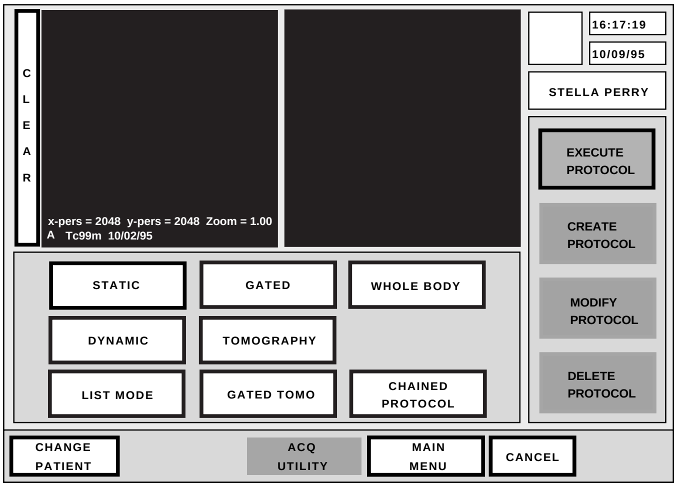
Selecting the Predefined Protocol

After you select the correct patient and return to the Main Menu, you can select the protocol you want to use. Follow the steps below.

1. From the Main Menu, select **Acquisition Protocol**.

   The Protocol Type Menu is displayed (Figure 4-14).

   Figure 4-14: Protocol Type Menu



2. Select **Dynamic**.

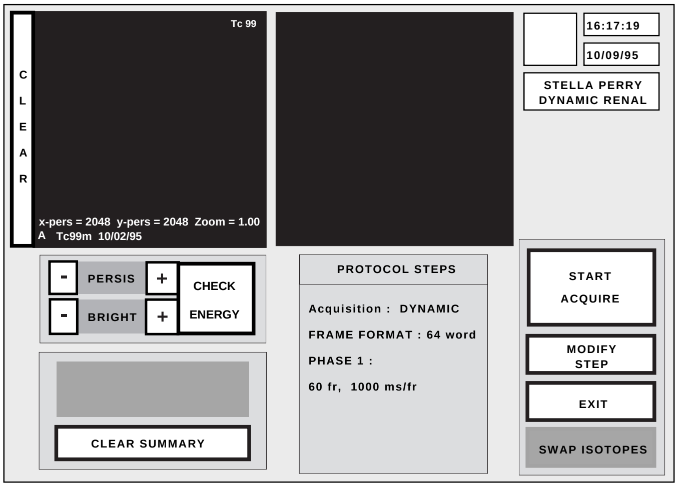
A menu with predefined dynamic acquisition protocols is displayed.

3. Select the protocol you want to use.

   The Start Acquisition Menu is displayed (Figure 4-15).

Starting the Acquisition

Figure 4-15: Start Acquisition Menu



x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

Acquisition : DYNAMIC
FRAME FORMAT : 64 word
PHASE 1 :
60 fr, 1000 ms/fr

The Start Acquisition Menu allows you to start the acquisition protocol. In addition, you can review the parameters that the protocol uses.

1. To check the energy before beginning the acquisition, place a point source with the correct isotope under the detector head. Select **Check Energy**.

   An energy spectrum appears on the monitor.

2. A summary of the acquisition parameters including the matrix, and stop conditions is displayed in the center of the menu. Select **Clear Summary** to remove the list.

   To display the list again, select **Display Step Summary**.

3. To change any of the parameters for this acquisition, select **Modify Step**.

   The Acquisition Summary Menu is displayed. You can change any parameter, then select **Return to Acquire**.

4. The persistence screen display the persistence for Image A. If you are acquiring more than one image, you can select **Swap Isotopes** to view the persistence for Image B.

5. Depending upon your selection for Preset Gantry, there are two possibilities:

   ❑ If you selected the Yes option for Preset Gantry, continue with the procedure entitled “Using Preset Gantry Positioning.”

   ❑ If you selected the No option for Preset Gantry, continue with the procedure entitled “Using Manual Gantry Positioning.”

Using Preset Gantry Positioning

By using the Preset Gantry option you can be sure that the gantry and detector will be positioned correctly before the acquisition begins.

Warning: Always use the safety pad when you scan a patient.

1. Select **Prepare the Gantry**.

   When you are prompted, press the safety pad.

   If the current starting angle or head angulation do not match that which was specified on the Orientation Controls Menu, the gantry will automatically move to the correct position. Make sure you follow the on-screen prompts carefully.

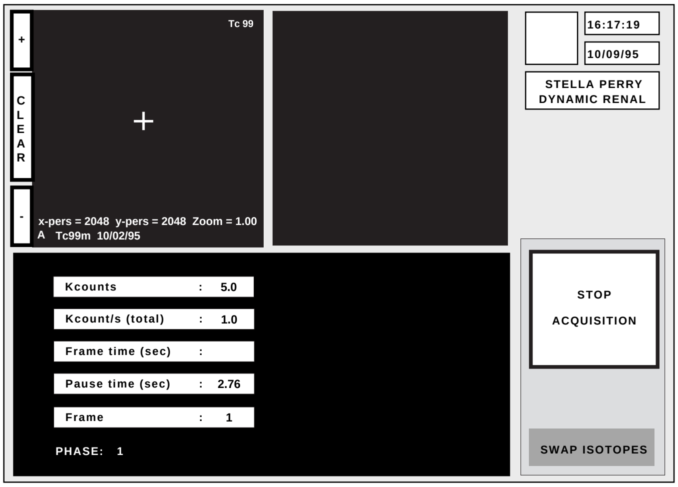
   Note: On the DS7, the head angulation positioning is manual.

   The Start Acquisition Menu is displayed again.

2. Select **Start Acquire**.

   A short beep signals the start of the acquisition. The Acquisition Menu is displayed (Figure 4-11).

Figure 4-16: Acquisition Menu



x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95

STELLA PERRY
DYNAMIC RENAL

Kcounts : 5.0
Kcount/s (total) : 1.0
Frame time (sec) :
Pause time (sec) : 2.76
Frame : 1

PHASE: 1

3. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

4. You have three options after the acquisition is complete.

   - Select **Exit** to return to the Main Menu.
   - Select **Prepare the Gantry** to acquire another image.
   - Select **Modify Step** to change the acquisition parameters before acquiring another image.

Using Manual Gantry Positioning

Warning: Always use the safety pad when you scan a patient.

1. Position the patient under the detector.

   The persistence screen shows the patient’s position in the field of view. If it is necessary, select **Clear** to clear the screen.

2. By convention, for anterior images the patient’s head should appear at the top and the patient’s left side on the right of the persistence monitor. If it is necessary, use the Rotation and Symmetry controls to flip or rotate the image on the persistence monitor.

   Note: The Rotation and Symmetry controls are explained in the “Standard Acquisition Operation” chapter in the section entitled “Using the Rotation and Symmetry Controls”. The Persistence, Rotate, Up/Down Arrows and Left/Right Arrows buttons of the hand control have no effect.”

3. Use the Brightness and Persistence controls to assist with final patient positioning.

4. Select **Start Acquire**.

   A short beep signals the start of the acquisition. The Acquisition Menu is displayed (Figure 4-12).

Figure 4-17: Acquisition Menu

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95

STELLA PERRY
DYNAMIC RENAL

Kcounts : 5.0
Kcount/s (total) : 1.0
Frame time (sec) :
Pause time (sec) : 2.76
Frame : 1

PHASE: 1

5. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

6. You have three options after the acquisition is complete.

   - Select **Exit** to return to the Main Menu.
   - Select **Start Acquire** to acquire another image.
   - Select **Modify Step** to change the acquisition parameters before acquiring another image.

Using the Dynamic Display Option

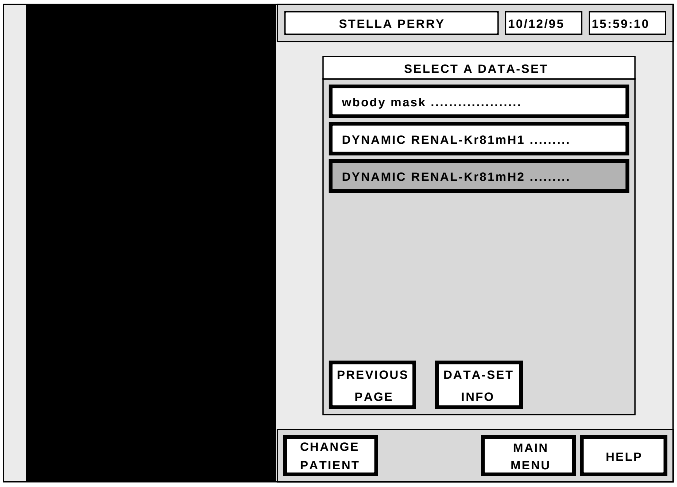
The Acquisition console includes an option to display one or more dynamic images after you acquire them, adjust the display parameters, then print or save the display.

Displaying the Images

1. From the Acquisition console's Main Menu, select **Display**.

   The Dataset Selection Menu is displayed (Figure 4-18).

   Figure 4-18: Dataset Selection Menu

   STELLA PERRY
   10/12/95
   15:59:10

   wbody mask ....
   DYNAMIC RENAL-Kr81mH1 ....
   DYNAMIC RENAL-Kr81mH2 ....

2. Select the dataset you want to display.

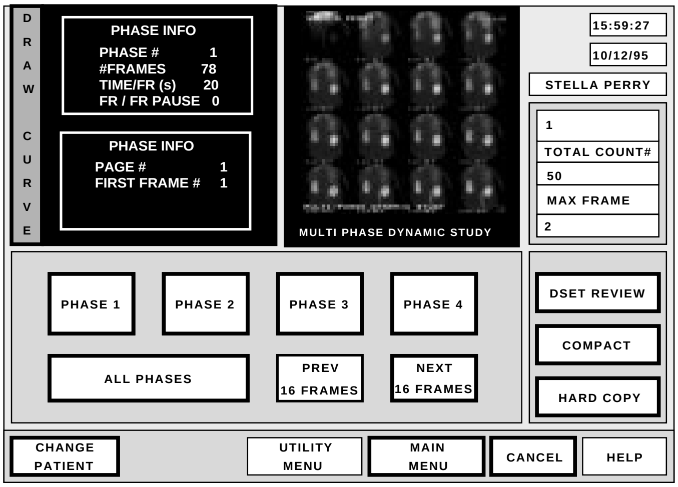
   Note: You can use **Previous Page** and **Next Page** to view additional datasets.

   The Dynamic Display Menu is displayed.

3. Select **QC Protocol**.

   The Dynamic Dataset Review Menu is displayed (Figure 4-19). The first 16 frames of the first phase are displayed on the screen, together with information about the phase and the first frame.

   Figure 4-19: Dynamic Dataset Review Menu

   PHASE INFO
   PHASE # 1
   #FRAMES 78
   TIME/FR (s) 20
   FR / FR PAUSE 0

   PHASE INFO
   PAGE # 1
   FIRST FRAME # 1

   15:59:27
   10/12/95
   STELLA PERRY
   1
   TOTAL COUNT#
   50
   MAX FRAME
   2

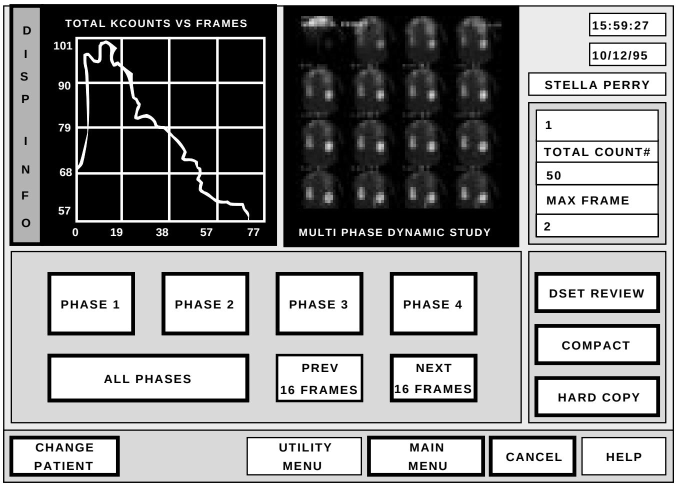
4. To review information about a different fame, select it from the display. If the frame you want to review is not displayed, select **Next 16 Frames** until the frame is visible.

5. If the study has more than one phase, select the button representing the phase you want to review: **Phase 2**, **Phase 3**, or **Phase 4**. To review all the phases at once, select **All Phases**.

6. To generate a curve for the selected phase, select **Draw Curve**.

   The curve is displayed on the menu (Figure 4-20).

   Figure 4-20: Dynamic Curve Review Menu

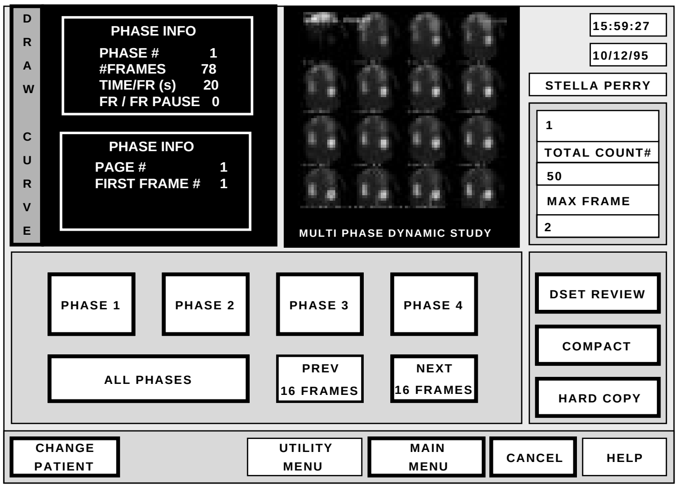


15:59:27
10/12/95
STELLA PERRY
1
TOTAL COUNT#
50
MAX FRAME
2

7. You have three other options.
   - ❏ To compact the display of the dataset so that it fits onto as few pages as possible, skip to the procedure entitled "Compacting the Dynamic Display."
   - ❏ To annotate the display, skip to the procedure entitled "Annotating the Dynamic Display."
   - ❏ To print or save the screen in its own dataset, skip to the procedure entitled "Saving and Printing the Dynamic Display."

Compacting the Dynamic Display

Figure 4-21: Dynamic Image Adjustment Menu



PHASE INFO
PHASE # 1
#FRAMES 78
TIME/FR (s) 20
FR / FR PAUSE 0

PHASE INFO
PAGE # 1
FIRST FRAME # 1

15:59:27
10/12/95
STELLA PERRY

1
TOTAL COUNT#
50
MAX FRAME
2

You can compact a multi-phase dynamic display so that the images appear on as few pages as possible.

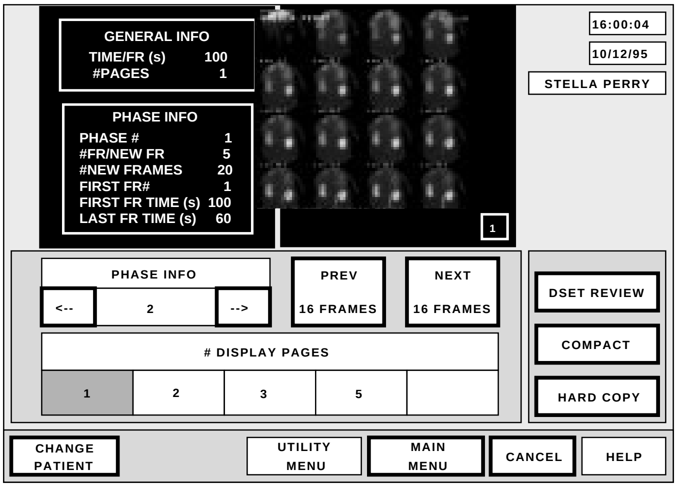
Example: Consider a dual phase study where the first phase includes 60 frames at 1 second per frame, and the second phase includes 30 frames at 2 seconds per frame. You can use the **Compact** option to sum the first phase into 30 frames with each containing 2 seconds of activity.

The following steps explain how to compact a multi-phase dataset.

1. Select **Compact**.

   The Compact Dynamic Dataset Menu is displayed (Figure 4-22).

Figure 4-22: Compact Dynamic Dataset Menu



GENERAL INFO
TIME/FR (s) 100
#PAGES 1

PHASE INFO
PHASE # 1
#FR/NEW FR 5
#NEW FRAMES 20
FIRST FR# 1
FIRST FR TIME (s) 100
LAST FR TIME (s) 60

16:00:04
10/12/95
STELLA PERRY

2. To view information for each phase of the compacted display, use the Arrow buttons.
3. To view additional frames in the phase, select **Prev 16 Frames** or **Next 16 Frames**.

4. To view additional display pages, select the page number.
5. You have two other options.
   - ❑ To annotate the display, skip to the procedure entitled "Annotating the Dynamic Display."
   - ❑ To print or save the screen in its own dataset, skip to the procedure entitled "Saving and Printing the Dynamic Display."

Annotating the Dynamic Display

The following steps explain how to add text annotations to the display.

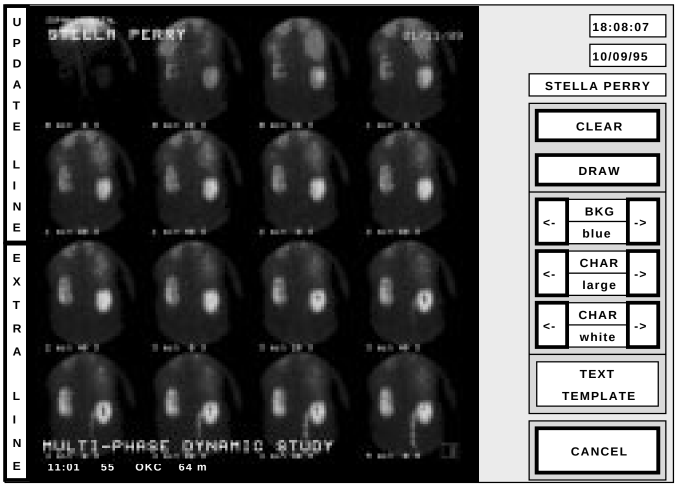
1. Select **Hard Copy**.

   The Hard Copy Menu is displayed.

2. Select **Annotations**.

   The Annotation Menu is displayed (Figure 4-23).

Figure 4-23: Annotation Menu



3. Use the associated Arrow buttons to specify the text color, text size, and background color for the text. The following table lists the options for each parameter.

Parameter	**Options**
Text (Char) Color	White, Blue, Black, Red, or Gray
Text (Char) Size	Small, Medium, Large
Background Color	Transparent, Blue, Black, Red, Gray, White

4. Move the cursor to the beginning location for the text, then press either of the upper buttons on the Rollermouse twice. Type the annotation and press <ENTER>.
5. To change the text you just typed, select **Update Line**.

6. To add another line of text, select **Extra Line**. Type the new text and press <ENTER>.

7. To draw a line from the annotation to a specific structure on the displayed image, select **Draw**.

   Rotate the trackball to move the cursor to the structure on the displayed image, then press lower left Rollermouse button.

   Rotate the trackball to draw a line to the text, then press either upper button to end the line.

8. To erase text and drawings from the display, select **Erase**.

   A rectangle is displayed on the screen. Rotate the trackball to move the rectangle so that its lower left corner is located at the lower left edge of the region you want to erase.

   Press The lower left Rollermouse button, then rotate the trackball to resize the rectangle. Make sure the rectangle encloses only the part of the text and drawing you want to erase, then press the upper right Rollermouse button.

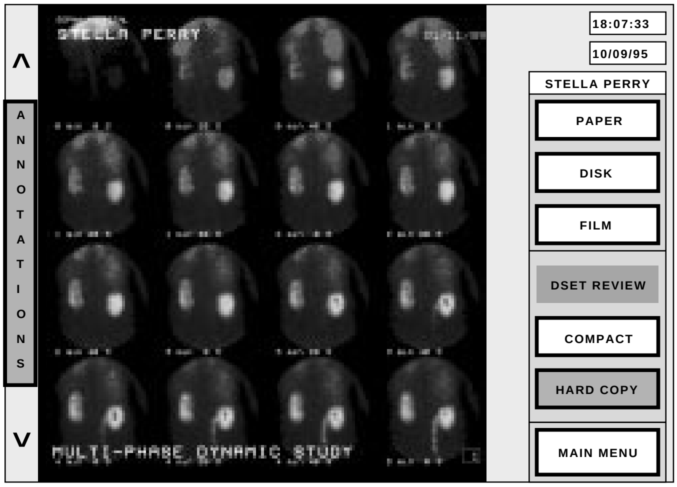
   The text and drawing within the rectangle are erased.

9. To return to the Hard Copy Menu, select **Cancel**.

   The Hard Copy Menu is displayed (Figure 4-24). Continue with the next section.

Saving and Printing the Dynamic Display

Figure 4-24: Hard Copy Menu



You can use the options on the Hard Copy Menu to print the displayed image on a color printer, a video imager, or a digital imager. You can also save the image in its own dataset that you can print or view later.

1. To save the image in its own dataset, select **Disk**.

   Select the box under Save As, then type a name for the dataset (4 to 14 characters). Press <ENTER>.

   The new dataset is saved in the patient database.

2. To print on a local or remote color printer, select **Paper**.

   Select the number of copies you want to print (1 to 10), then select the background color (Black or White).

   The image is sent to the color printer.

3. To print on a video imager, select **Film**.

   ❏ If your system includes both a video and a digital imager, select **Video**.

   The display is adjusted to appear as it will on the film. Press any alphanumeric key to print the image and continue.

   ❏ If you system includes only a video imager, the display is adjusted to appear as it will on the film. Press any alphanumeric key to print the image and continue.

4. To print on a digital imager, select **Film**, then select **Setup**.

   Set up the imager parameters for the image, then select **Validate**. The previous menu options are available again. Select **Print**.

   The image is sent to the Imager queue.

5. To return to the Hard Copy Menu, select **Cancel**.

Performing List Mode Acquisitions

Introduction

A list mode acquisition records data as photon counts within the field of view over time. As the system records the data, it stamps it with a time marker every millisecond. After processing, the data is stored in a 256 x 256 Word matrix.

List mode protocols are based on operator-defined values for parameters such as the stop conditions, and the zoom factor. After your department agrees on the parameters for a specific type of study, the parameters can be saved in a predefined protocol and used repeatedly.

Warning: To ensure data integrity, you should suspend the following activities during list mode acquisitions:

- ❏ color printing
- ❏ transfers to and from optical disks
- ❏ transfers to and from floppy disks

This chapter includes two major sections.

- ❏ **Acquiring List Mode Studies** explains how to use the camera to acquire list mode studies and to create a predefined list mode acquisition protocol.
- ❏ **Using a Predefined List Mode Protocol** explains how to use a list mode acquisition protocol that has been previously defined.

Acquiring List Mode Studies

This section explains how to use the camera to acquire list mode images.

The procedure for acquiring a list mode series includes the following:

1. Select a patient, acquisition type, and dataset name.
2. Specify the isotopes and energy levels.
3. Define the zoom and orientation parameters.
4. Define the stop conditions.
5. Define other parameters.
6. Complete the acquisition.

Selecting the Patient, Acquisition Type and Dataset Name

1. The name of the currently selected patient is displayed at the top of the Main Menu. To select a different patient, select **Change Patient**.

   Note: If there is no current patient, you can select one now. If you do not, you will be prompted to select one after you select the acquisition type in Step 3.

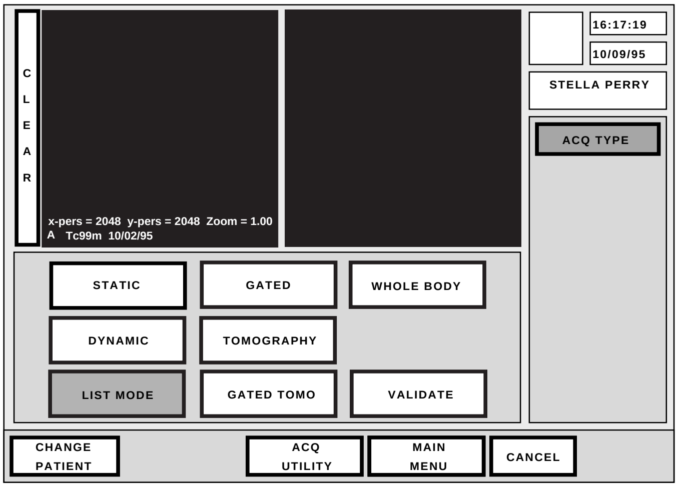
   You can search for a patient under a number of different criteria (select **Find Patient**), or enter a new patient (select **Create New Patient**).

   After you select a patient, the Main Menu is displayed again.

2. From the Main Menu, select **Manual Acquisition**.

   The Acquisition Type Menu is displayed.

Figure 5-1: Acquisition Type Menu

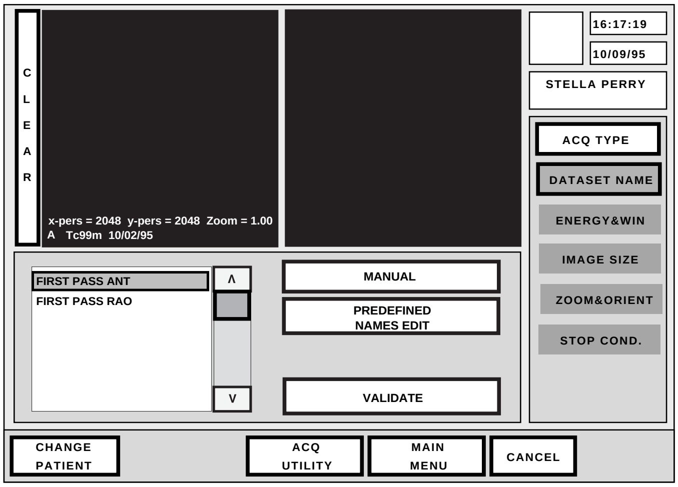


16:17:19
10/09/95
STELLA PERRY
x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

3. Select **List Mode** (Figure 5-1), then **Validate**.

The Dataset Name Menu is displayed (Figure 5-2).

Figure 5-2: Dataset Name Menu



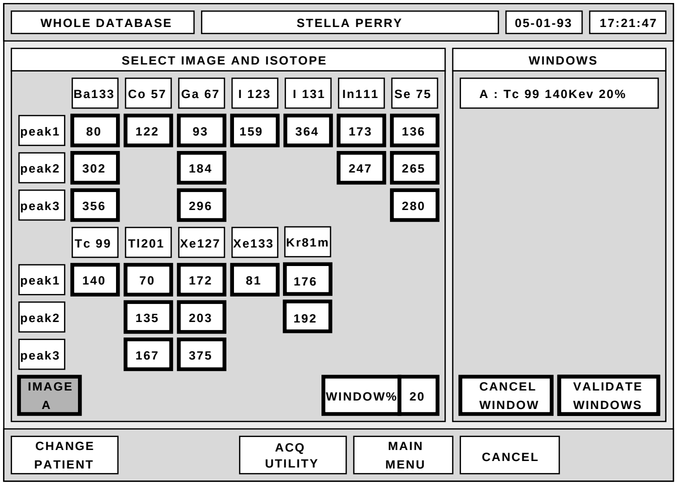
4. Select an existing dataset name from the scrolling list, or select **Manual** and enter a new one (4 to 18 characters). Select **Validate**.

   Note: You can use this menu to create and edit predefined dataset names. Refer to “Managing Dataset Names” in the chapter entitled “Standard Acquisition Operations” for more information.

   The Isotope Menu (also called the Energy & Window Menu) is displayed (Figure 5-3).

Selecting the Isotope and Matrix Size

Figure 5-3: Isotope Menu



	Ba133	Co 57	Ga 67	I 123	I 131	In111	Se 75
peak1	80	122	93	159	364	173	136
peak2	302		184			247	265
peak3	356		296				280

	Tc 99	Tl201	Xe127	Xe133	Kr81m
peak1	140	70	172	81	176
peak2		135	203		192
peak3		167	375		

WINDOW% 20

A : Tc 99 140Kev 20%

You can specify up to a combined total of eight energy levels for the isotope so long as none of the energy windows overlap. The steps that follow explain how to select a single isotope and energy level. For information about using multiple energy levels, refer to the section entitled “Using Multiple Isotopes and Energy Levels” in the Standard Acquisition Operations chapter.

1. The name of the most recently used isotope and energy level appears in the Windows column of the Isotope Menu. If you do **not** want to acquire the image using this combination, select **Cancel Window**, then the name of the isotope in the Windows column.

2. Select the isotope and energy peak you want to use for this acquisition.

   The isotope name is displayed in the Windows column.

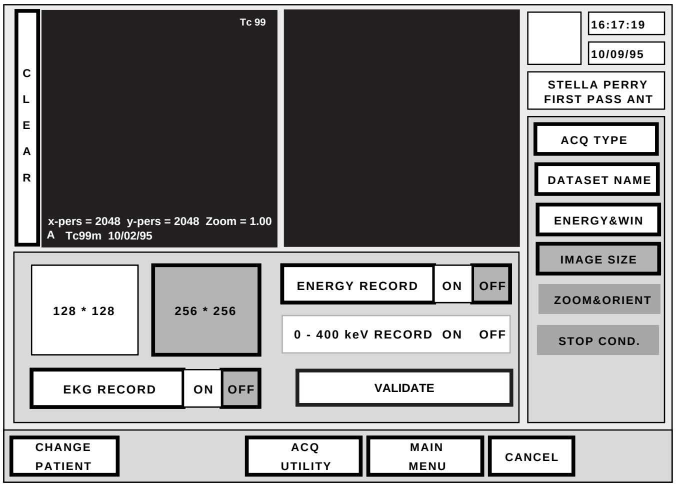
   Note: Up to three energy peaks are displayed for the isotopes. You can use up to eight energy peaks for a single image.

3. Select **Validate Windows** to accept the isotope and energy level.

   Important: When you select an isotope, the system automatically chooses a uniformity matrix, which is displayed in the detector’s persistence screen. Refer to the “Standard Acquisition Operations” chapter for information about manually changing the uniformity matrix.

   The name of the isotope is displayed in the persistence screen. The Matrix Size Menu (also called the Image Size Menu) is displayed (Figure 5-4).

   Figure 5-4: Matrix Size Menu



16:17:19
10/09/95
STELLA PERRY
FIRST PASS ANT

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

   The matrix size is automatically selected: 256 x 256 Word.

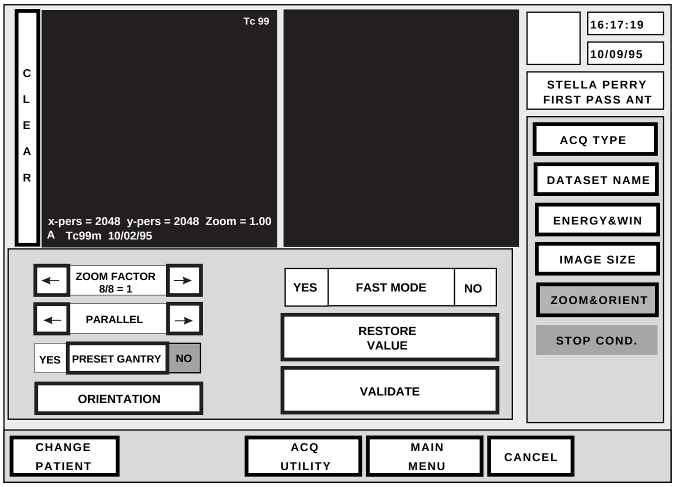
4. To perform a gated list mode study, select **EKG Record** until On is highlighted.

5. Select **Validate**.

   The Zoom & Orientation Menu is displayed (Figure 5-5).

Defining the Zoom and Orientation

Figure 5-5: Zoom & Orientation Menu



16:17:19
10/09/95
STELLA PERRY
FIRST PASS ANT

Tc 99
x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

ZOOM FACTOR 8/8 = 1
PARALLEL

1. If you want to use a zoom factor, select the Arrow button on either side of **Zoom Factor**.

   Note: For more information about zoom factors on the DSX/DS7, refer to “Specifying the Zoom Factor” in the “Standard Acquisition Operations” chapter.

2. If you want to specify a different collimator, select the Arrow button on either side of the collimator name to scroll through the options (parallel or mono-diverging, DS7 only).

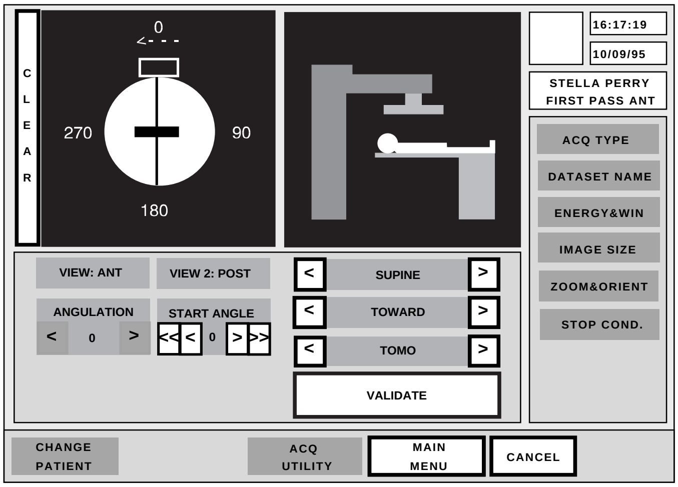
   Important: Make sure that the collimator name matches the collimator on the camera; otherwise, the image will be distorted.

3. To revert to the original selections for zoom and collimator, select **Restore Value**.

4. To specify the gantry starting angle and patient position, select **Orientation**.

   The Orientation Controls Menu is displayed (Figure 5-6).

Figure 5-6: Orientation Controls Menu



16:17:19
10/09/95
STELLA PERRY
FIRST PASS ANT

VIEW: ANT
VIEW 2: POST
ANGULATION 0
START ANGLE 0
SUPINE
TOWARD
TOMO

5. Use the options on this menu to specify the gantry's starting angle, and the patient's position in relation to the gantry.

   Note: For more information, refer to "Orienting the Image on the Persistence Screen" in the chapter entitled "Standard Acquisition Operations."

6. Select **Validate**.

   The Zoom and Orientation Menu is displayed again.

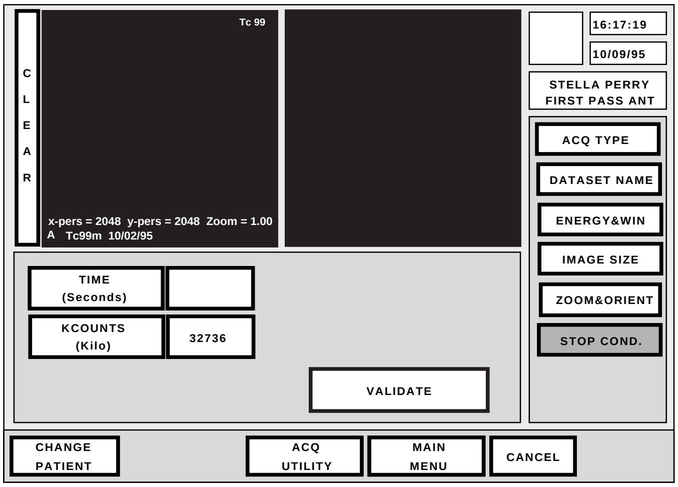
7. Specify whether you want the gantry and detector head to move automatically to their proper position. Select **Preset Gantry**. The highlight toggles between Yes and No. Highlight Yes if you want to be prompted to move the gantry before you start the acquisition; highlight No if you do not.

8. Select **Validate**.

   The Stop Conditions Menu is displayed (Figure 5-7).

Defining the Stop Conditions

Figure 5-7: Stop Conditions Menu



Tc 99

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95

STELLA PERRY
FIRST PASS ANT

KCOUNTS (Kilo): 32736

You can define the end of a list mode acquisition by specifying one or both of the following parameters:

- ❑ dataset size (in kilobytes)
- ❑ elapsed time (in seconds)

If you enter a value for more than one parameter, the acquisition ends when either of the conditions is met.

Important: You can also plan to stop the acquisition manually. Do not enter a value for either parameter, then, while the acquisition is in progress, select **Stop Acquisition**.

1. To stop the acquisition after a specific period of time, select **Time**. Enter the length of time in seconds (0 to 3600).

2. To stop the acquisition after a specific amount of disk space is used, select **Dataset Size**. Enter the amount of disk space in kilobytes (32 to 32736 KB).

   Note: An average first pass study (30 – 40 seconds) occupies 2000 – 2400 KB.

3. Select **Validate**.

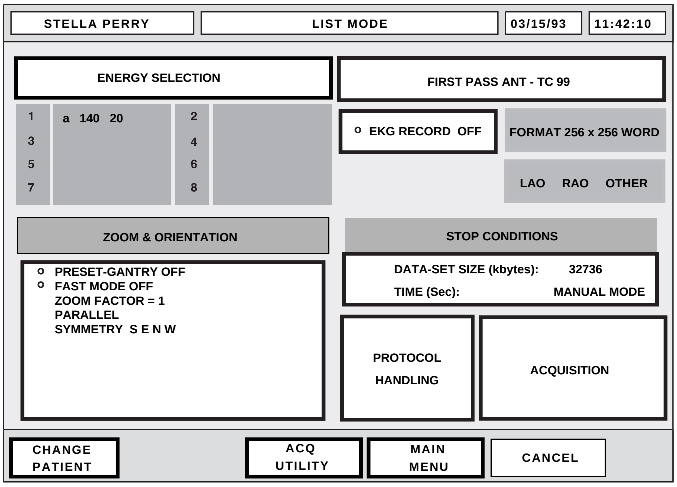
   The Acquisition Summary Menu is displayed (Figure 5-8).

4. You have two options.

   - ❑ If you are acquiring a list mode study, continue with the next procedure.
   - ❑ If you are creating a predefined protocol, continue with the procedure entitled “Creating a Predefined Protocol.”

Preparing for the Acquisition

Figure 5-8: Acquisition Summary Menu



STELLA PERRY
LIST MODE
03/15/93
11:42:10

FIRST PASS ANT - TC 99

1 a 140 20
3
5
7
2
4
6
8

o EKG RECORD OFF
FORMAT 256 x 256 WORD
LAO RAO OTHER

o PRESET-GANTRY OFF
o FAST MODE OFF
ZOOM FACTOR = 1
PARALLEL
SYMMETRY S E N W

DATA-SET SIZE (kbytes): 32736
TIME (Sec): MANUAL MODE

The Acquisition Summary Menu lists the parameters you selected for your acquisition.

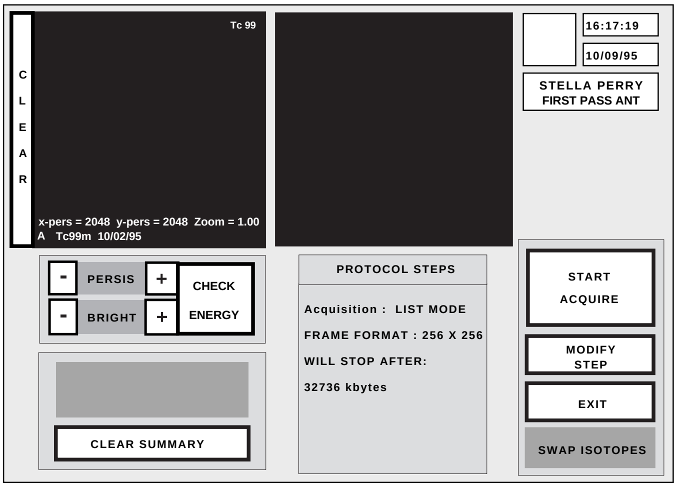
1. To change a parameter, select the button containing information for that parameter

   Example: If you want to choose a different isotope, select the button labeled **Energy Selection** above the isotope list.

2. To continue, select **Acquisition**.

   The Start Acquisition Menu is displayed (Figure 5-9).

Figure 5-9: Start Acquisition Menu



Acquisition : LIST MODE
FRAME FORMAT : 256 X 256
WILL STOP AFTER:
32736 kbytes

3. To check the energy before beginning the acquisition, place a point source with the correct isotope under the detector head. Select **Check Energy**.

   An energy spectrum appears on the monitor.

4. A summary of the acquisition parameters including the matrix and stop conditions is displayed in the center of the menu. Select **Clear Summary** to remove the list.

   To display the list again, select **Display Step Summary**.

5. To change any of the parameters for this acquisition, select **Modify Step**.

   The Acquisition Summary Menu is displayed again. You can change any parameter, then select **Return to Acquire**.

6. Depending upon your selection for Preset Gantry, there are two possibilities:

   - If you selected the Yes option for Preset Gantry, continue with the procedure entitled "Using Preset Gantry Positioning."
   - If you selected the No option for Preset Gantry, continue with the procedure entitled "Using Manual Gantry Positioning."

Using Preset Gantry Positioning

By using the Preset Gantry option you can be sure that the gantry and detector will be positioned correctly before the acquisition begins.

Warning: Always use the safety pad when you scan a patient.

1. Select **Prepare the Gantry**.

   When you are prompted, press the safety pad.

   If the current starting angle or head angulation do not match that which was specified on the Orientation Controls Menu, the gantry will automatically move to the correct position. Make sure you follow the on-screen prompts carefully.

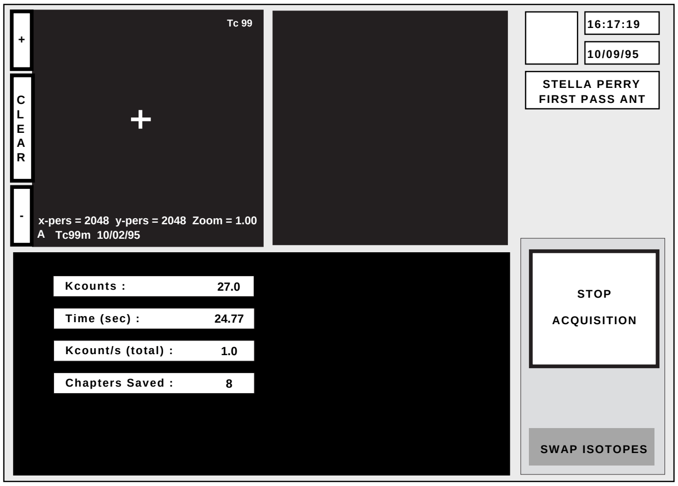
Note: On the DS7, the head angulation positioning is manual.

The Start Acquisition Menu is displayed again.

2. Select **Start Acquire**.

   A short beep signals the beginning of the acquisition. The Acquisition Menu is displayed (Figure 5-10).

Figure 5-10: Acquisition Menu



x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95

STELLA PERRY
FIRST PASS ANT

Kcounts : 27.0
Time (sec) : 24.77
Kcount/s (total) : 1.0
Chapters Saved : 8

3. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

4. You have three options after the acquisition is complete.

   ❏ Select **Exit** to return to the Main Menu.

   ❏ Select **Prepare the Gantry** to acquire another image.

   ❏ Select **Modify Step** to change the acquisition parameters before acquiring another image.

Using Manual Gantry Positioning

Warning: Always use the safety pad when you scan a patient.

1. Position the patient under the detector.

   The persistence screen shows the patient’s position in the field of view. If it is necessary, select **Clear** to clear the screen.

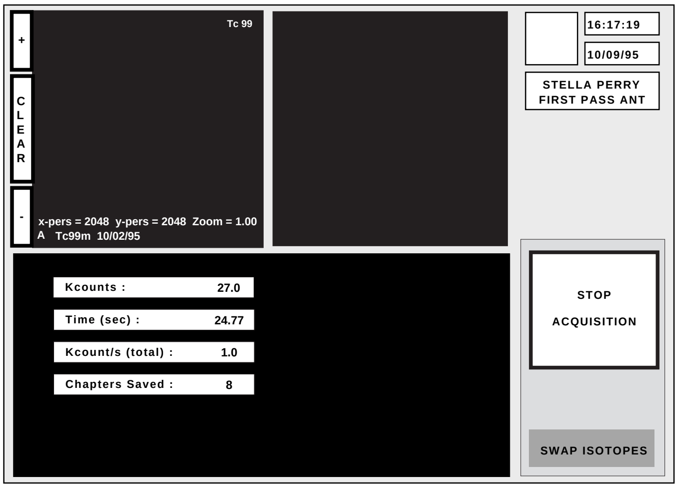
2. By convention, for anterior images the patient’s head should appear at the top and the patient’s left side on the right of the persistence monitor. If it is necessary, use the Rotation and Symmetry controls to flip or rotate the image on the persistence monitor.

Note: The Rotation and Symmetry controls are explained in the “Standard Acquisition Operation” chapter in the section entitled “Using the Rotation and Symmetry Controls”. The Persistence, Rotate, Up/Down Arrows and Left/Right Arrows buttons of the hand control have no effect.

3. Use the Brightness and Persistence controls to assist with final patient positioning.
4. Select **Start Acquire**.

   A short beep signals the beginning of the acquisition. The Acquisition Menu is displayed (Figure 5-11).

Figure 5-11: Acquisition Menu



16:17:19
10/09/95
STELLA PERRY
FIRST PASS ANT

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

Kcounts : 27.0
Time (sec) : 24.77
Kcount/s (total) : 1.0
Chapters Saved : 8

5. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

6. You have three options after the acquisition is complete.
   - Select **Exit** to return to the Main Menu.
   - Select **Start Acquire** to acquire another image.
   - Select **Modify Step** to change the acquisition parameters before acquiring another image.

Creating a Predefined Protocol

The values for the following parameters are saved with the protocol:

- protocol name
- dataset name
- matrix size
- isotope
- stop conditions
- zoom factor

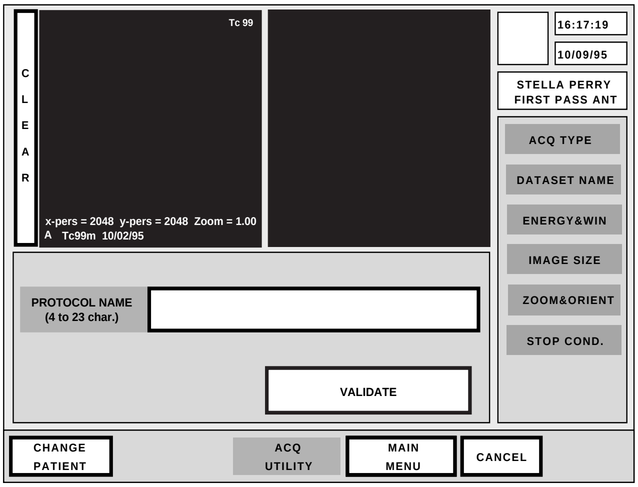
- patient orientation

Follow the steps below to save the parameters as a new protocol.

1. Select **Protocol Handling**.

   The Protocol Handling Menu is displayed (Figure 5-12).

   Figure 5-12: Protocol Handling Menu



16:17:19
10/09/95
STELLA PERRY
FIRST PASS ANT
x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

2. The box labeled **Enter Protocol Name** is highlighted. Enter a name (4 to 24 characters) for the protocol, press <ENTER> and select **Validate**.
3. The box labeled **Enter Additional Prompt Message** is highlighted. You can enter an optional message (less than 24 characters) in this box. Press <ENTER> and select **Validate**.

   The message will appear on the Start Acquisition Menu the next time someone uses the protocol.

4. If you want to chain this to another protocol, select **Yes**; otherwise, select **No**. Select **Validate.**
   - If you chain the protocol, a serie of screens, which allow you to define another protocol, is displayed. For more information about chaining protocols, refer to the section entitled “Working with Chained Protocols” in the “Standard Acquisitions Operations” chapter.
   - If you do not chain the protocol, the Main Menu is displayed.

Using a Predefined List Mode Protocol

The procedure for using a predefined list mode acquisition protocol follows these general guidelines.

1. Select the patient.
2. Select the predefined protocol.
3. Start the acquisition.

You also have the option to modify the protocol before you begin the acquisition.

Selecting the Patient

The name of the currently selected patient is displayed at the top of the Main Menu. Use the following steps to select a different patient.

1. Select **Change Patient.**

   The Patient Directory Menu is displayed.

2. Select the patient for whom you want to acquire the dataset.

   You can search for a patient under a number of different criteria (select **Find Patient**), or enter a new patient (select **Create a New Patient**).

   After you select a patient, the Main Menu is displayed again.

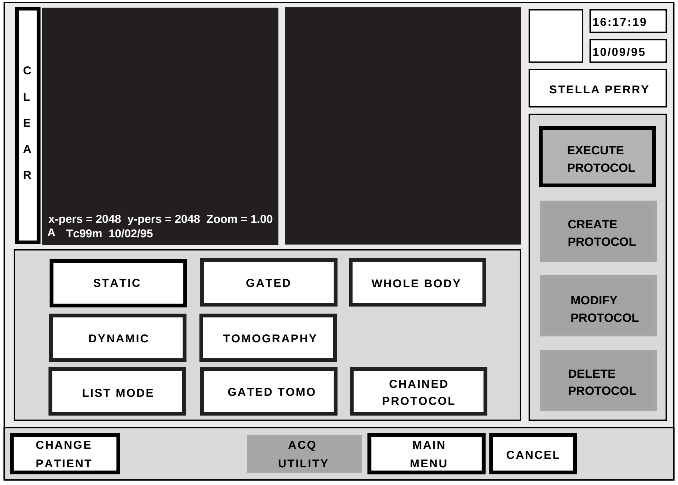
Selecting the Predefined Protocol

After you select the correct patient and return to the Main Menu, you can select the protocol you want to use. Follow the steps below.

1. From the Main Menu, select **Acquisition Protocol**.

   The Protocol Type Menu is displayed (Figure 5-13).

Figure 5-13: Protocol Type Menu



16:17:19
10/09/95
STELLA PERRY
x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

2. Select **List Mode**.

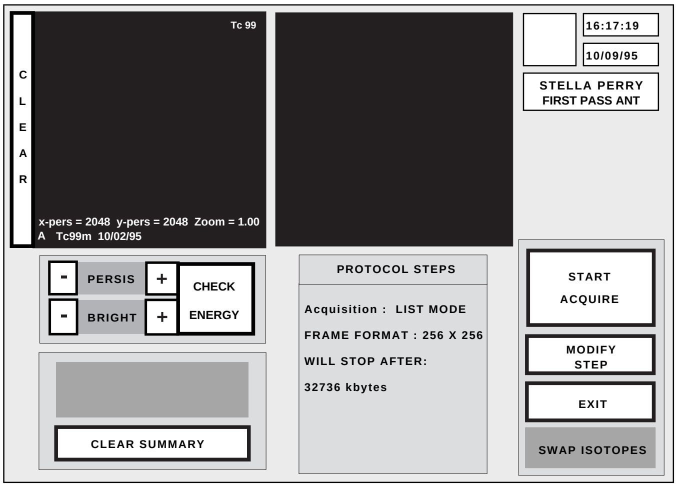
A menu with existing list mode acquisition protocols is displayed.

3. Select the protocol you want to use.

   The Start Acquisition Menu is displayed (Figure 5-14).

Starting the Acquisition

Figure 5-14: Start Acquisition Menu



Tc 99
x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95
16:17:19
10/09/95
STELLA PERRY
FIRST PASS ANT
Acquisition : LIST MODE
FRAME FORMAT : 256 X 256
WILL STOP AFTER:
32736 kbytes

The Start Acquisition Menu allows you to start the acquisition protocol. In addition, you can review the parameters that the protocol uses.

1. To check the energy before beginning the acquisition, place a point source with the correct isotope under the detector head. Select **Check Energy**.

   An energy spectrum appears on the monitor.

2. A summary of the acquisition parameters including the matrix and stop conditions is displayed in the center of the menu. Select **Clear Summary** to remove the list.

   To display the list again, select **Display Step Summary**.

3. To change any of the parameters for this acquisition, select **Modify Step**.

   The Acquisition Summary Menu is displayed. You can change any parameter, then select **Return to Acquire**.

4. Depending upon your selection for Preset Gantry, there are two possibilities:

   - ☐ If you selected the Yes option for Preset Gantry, continue with the procedure entitled “Using Preset Gantry Positioning.”
   - ☐ If you selected the No option for Preset Gantry, continue with the procedure entitled “Using Manual Gantry Positioning.”

Using Preset Gantry Positioning

By using the Preset Gantry option you can be sure that the gantry and detector will be positioned correctly before the acquisition begins.

Warning: Always use the safety pad when you scan a patient.

1. Select **Prepare the Gantry**.

   When you are prompted, press the safety pad.

   If the current starting angle or head angulation do not match that which was specified on the Orientation Controls Menu, the gantry will automatically move to the correct position. Make sure you follow the on-screen prompts carefully.

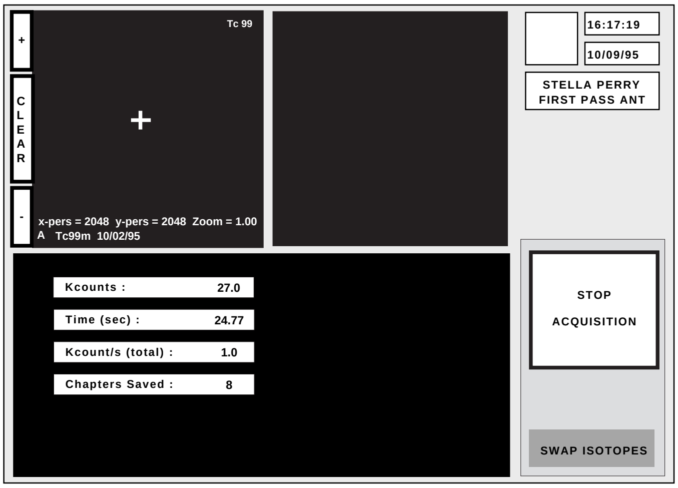
   Note: On the DS7, the head angulation positioning is manual.

   The Start Acquisition Menu is displayed again.

2. Select **Start Acquire**.

   A short beep signals the beginning of the acquisition. The Acquisition Menu is displayed (Figure 5-15).

   Figure 5-15: Acquisition Menu



x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95

STELLA PERRY
FIRST PASS ANT

Kcounts : 27.0
Time (sec) : 24.77
Kcount/s (total) : 1.0
Chapters Saved : 8

3. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

4. You have three options after the acquisition is complete.

   ❏ Select **Exit** to return to the Main Menu.

   ❏ Select **Prepare the Gantry** to acquire another image.

   ❏ Select **Modify Step** to change the acquisition parameters before acquiring another image.

Using Manual Gantry Positioning

Warning: Always use the safety pad when you scan a patient.

1. Position the patient under the detector.

   The persistence screen shows the patient's position in the field of view. If it is necessary, select **Clear** to clear the screen.

2. By convention, for anterior images the patient's head should appear at the top and the patient's left side on the right of the persistence monitor. If it is necessary, use the Rotation and Symmetry controls to flip or rotate the image on the persistence monitor.

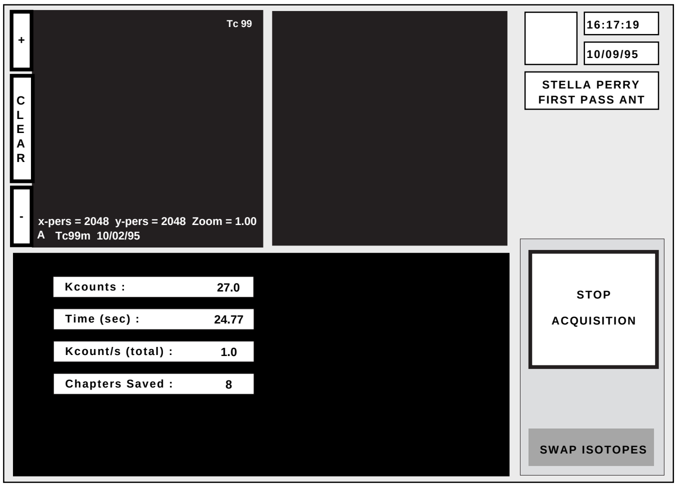
   Note: The Rotation and Symmetry controls are explained in the "Standard Acquisition Operation" chapter in the section entitled "Using the Rotation and Symmetry Controls". The Persistence, Rotate, Up/Down Arrows and Left/Right Arrows buttons of the hand control have no effect.

3. Use the Brightness and Persistence controls to assist with final patient positioning.

4. Select **Start Acquire**.

   A short beep signals the beginning of the acquisition. The Acquisition Menu is displayed (Figure 5-16).

   Figure 5-16: Acquisition Menu



16:17:19
10/09/95
STELLA PERRY
FIRST PASS ANT

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

Kcounts : 27.0
Time (sec) : 24.77
Kcount/s (total) : 1.0
Chapters Saved : 8

5. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

6. You have three options after the acquisition is complete.

   ❏ Select **Exit** to return to the Main Menu.

   ❏ Select **Start Acquire** to acquire another image.

   ❏ Select **Modify Step** to change the acquisition parameters before acquiring another image.

Performing Gated Acquisitions

Introduction

A gated acquisition links the capture of images to the R-to-R interval of a patient's heart beat. This type of acquisition requires that you connect the leads of the EKG gate to the patient before you begin defining the acquisition parameters. You must ensure that a strong signal appears on the monitor of the gate.

Acquisition protocols are based on operator-defined values for parameters such as the number of images in an R-to-R interval, the length of time for each acquisition, and the zoom factor. After your department agrees on the parameters for a specific type of study, the parameters can be saved in a predefined protocol and used repeatedly.

This chapter includes three major sections.

- ❏ **Acquiring Gated Studies** explains how to use the camera to acquire gated studies and to create a predefined gated acquisition protocol.
- ❏ **Using a Predefined Gated Protocol** explains how to use a gated acquisition protocol that has been previously defined.
- ❏ **Defining Two Heart Rate Windows** explains how to prepare the ECG Analysis for patients who exhibit two distinct heart rates when you want to capture information from both rates.

Acquiring Gated Images

This section explains how to use the camera to acquire gated images.

The steps for acquiring gated images include the following:

1. Prepare the EKG gate.
2. Select a patient, acquisition type and dataset name.
3. Specify the isotopes and energy levels.
4. Select a matrix size and number of frames per R-to-R interval.
5. Define the zoom and orientation parameters.
6. Specify the stop conditions.
7. Complete the acquisition.

Preparing the EKG Gate

Before you begin the acquisition, you must ensure that the EKG gate is attached and functioning. Refer to the instructions that were supplied with the gate to determine the best method for placing the leads on the patient.

When the gate is properly attached, switch it on.

Selecting a Patient, Acquisition Type and Dataset Name

1. The name of the currently selected patient is displayed at the top of the Main Menu. To select a different patient, select **Change Patient**.

   Note: If there is no current patient, you can select one now. If you do not, you will be prompted to select one after you select the acquisition type in Step 3.

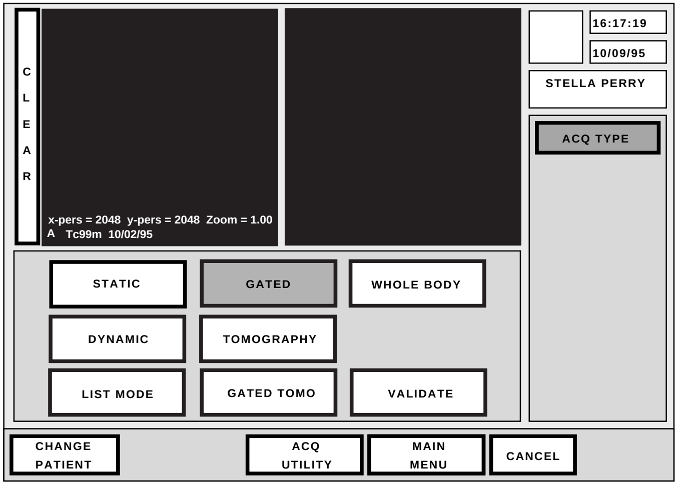
   You can search for a patient under a number of different criteria (select **Find Patient**), or enter a new patient (select **Create New Patient**).

   After you select a patient, the Main Menu is displayed again.

2. From the Main Menu, select **Manual Acquisition**.

   The Acquisition Type Menu is displayed.

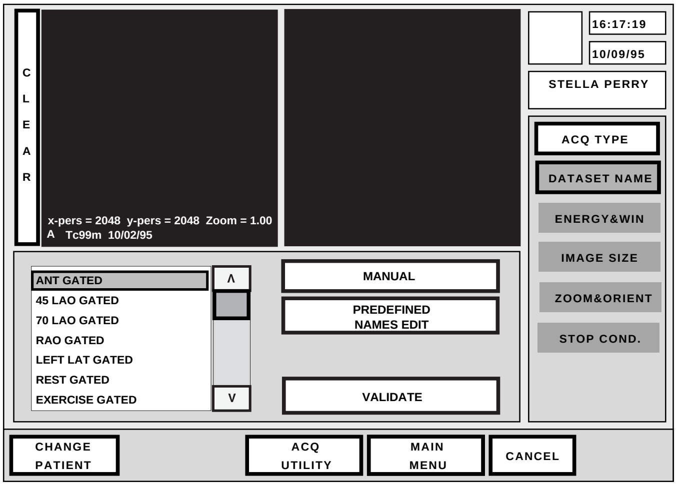
Figure 6-1: Acquisition Type Menu



3. Select **Gated** (Figure 6-1), then **Validate**.

   The Dataset Name Menu is displayed (Figure 6-2).

Figure 6-2: Dataset Name Menu



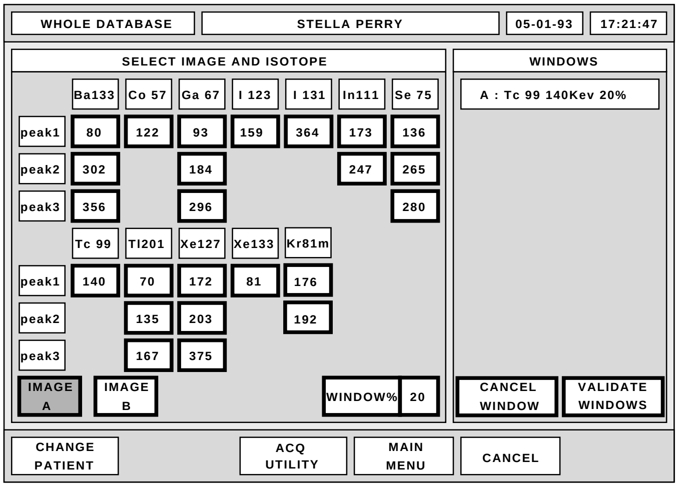
4. Select an existing dataset name from the scrolling list, or select **Manual** and enter a new one (4 to 18 characters). Select **Validate**.

   Note: You can use this menu to create and edit predefined dataset names. Refer to “Managing Dataset Names” in the chapter entitled “Standard Acquisition Operations” for more information.

   The Isotope Menu (also called the Energy & Window Menu) is displayed (Figure 6-3).

Selecting the Isotope

Figure 6-3: Isotope Menu


WHOLE DATABASE
STELLA PERRY
05-01-93
17:21:47

SELECT IMAGE AND ISOTOPE

	Ba133	Co 57	Ga 67	I 123	I 131	In111	Se 75
peak1	80	122	93	159	364	173	136
peak2	302		184			247	265
peak3	356		296				280

	Tc 99	Tl201	Xe127	Xe133	Kr81m
peak1	140	70	172	81	176
peak2		135	203		192
peak3		167	375		

WINDOWS
A : Tc 99 140Kev 20%

WINDOW% 20

You can acquire up to two static images simultaneously, each with its own isotope. Further, you can specify up to a combined total of eight energy levels for all isotopes (so long as none of the energy windows overlap).

The steps that follow explain how to select a single isotope and energy level. For information about using multiple isotopes, refer to the section entitled “Using Multiple Isotopes and Energy Levels” in the Standard Acquisition Operations chapter.

1. The name of the most recently used isotope and energy level appears in the Windows column of the Isotope Menu. If you do **not** want to acquire the image using this combination, select **Cancel Window**, then the name of the isotope in the Windows column.

2. On the left side of the menu, Image A should be highlighted. If it is not, select **Image A**.

3. Select the isotope and energy peak you want to use for this acquisition.

   The isotope name is displayed in the Windows column.

   Note: Up to three energy peaks are displayed for the isotopes. You can use up to eight energy peaks for a single image.

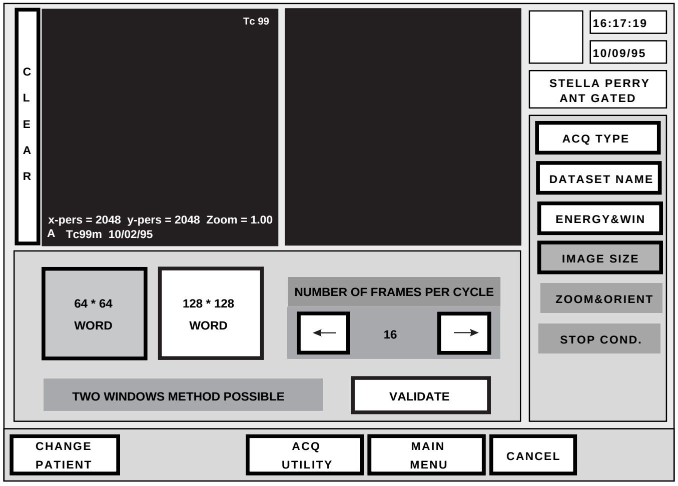
4. Select **Validate Windows** to accept the isotope and energy level.

   Important: When you select an isotope, the system automatically chooses a uniformity matrix, which is displayed in the detector’s persistence screen. Refer to the “Standard Acquisition Operations” chapter for information about manually changing the uniformity matrix.

   The name of the isotope is displayed in the persistence screen. The Matrix Size Menu (also called the Image Size Menu) is displayed (Figure 6-4).

Selecting the Matrix Size and Frames per Cycle

Figure 6-4: Matrix Size Menu



16:17:19
10/09/95
STELLA PERRY
ANT GATED
x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95
NUMBER OF FRAMES PER CYCLE: 16

You can acquired gated studies in a 64 X 64 or a 128 X 128 matrix. You can also specify from 8 to as many as 64 frames per cycle (in increments of 4) for the study. The limit for the number of frames per cycle depends upon the number of images you previously specified. The following table lists the various combinations of images and matrix size and the resulting frames per cycle that are available. The table also indicates the number of frames per cycle available if you must acquire the study with two heart rate windows.

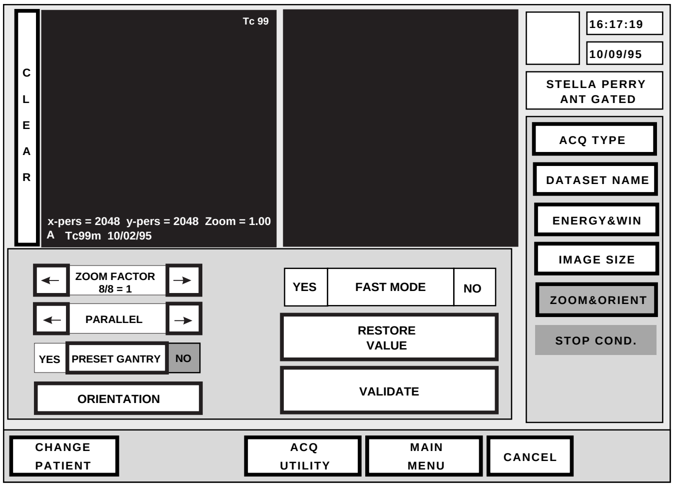
Matrix Size	# Images	# Windows	Frames per Cycle
64 x 64	1	1	8 to 64
		2	8 to 64
	2	1	8 to 64
		2	8 to 64
128 x 128	1	1	8 to 64
		2	8 to 56
	2	1	8 to 56
		2	8 to 28

1. With the Matrix Size Menu displayed, select a matrix size—**64 x 64 Word** or **128 x 128 Word**.
2. Select the number of frames per cycle (per R-to-R interval).
3. Select **Validate**.

   The Zoom & Orientation Menu is displayed (Figure 6-5).

Defining the Zoom and Orientation

Figure 6-5: Zoom & Orientation Menu



16:17:19
10/09/95
STELLA PERRY
ANT GATED

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

1. If you want to use a zoom factor, select the Arrow button on either side of **Zoom Factor**.

   Note: For more information about zoom factors on the DSX/DS7, refer to “Specifying the Zoom Factor” in the “Standard Acquisition Operations” chapter.

2. If you want to specify a different collimator, select the Arrow button on either side of the collimator name to scroll through the options (parallel or mono-diverging, DS7 only).

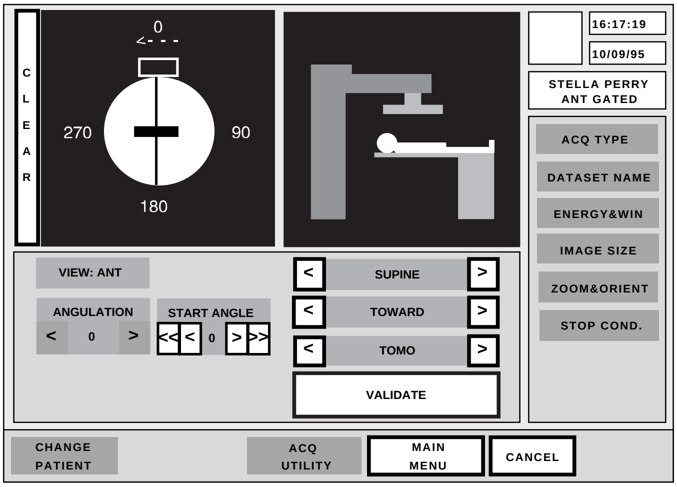
   Important: Make sure that the collimator name matches the collimator on the camera; otherwise, the image will be distorted.

3. To revert to the original selections for zoom and collimator, select **Restore Value**.

4. To specify the gantry starting angle and patient position, select **Orientation**.

   The Orientation Controls Menu is displayed (Figure 6-6).

Figure 6-6: Orientation Controls Menu



5. Use the options on this menu to specify the gantry's starting angle, and the patient's position in relation to the gantry.

   Note: For more information, refer to "Orienting the Image on the Persistence Screen" in the chapter entitled "Standard Acquisition Operations."

6. Select **Validate**.

   The Zoom and Orientation Menu is displayed again.

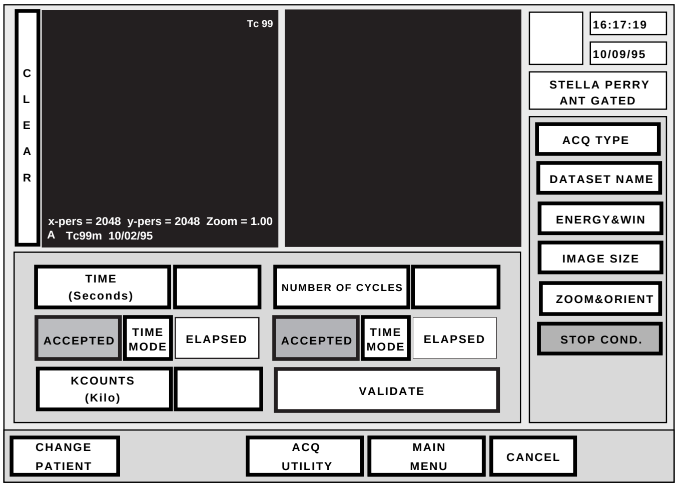
7. Specify whether you want the gantry and detector head to move automatically to their proper position. Select **Preset Gantry**. The highlight toggles between Yes and No. Highlight Yes if you want to be prompted to move the gantry before you start the acquisition; highlight No if you do not.

8. Select **Validate**.

   The Stop Conditions Menu is displayed (Figure 6-7).

Specifying the Stop Conditions

Figure 6-7: Stop Conditions Menu



You can define the end of a gated acquisition by specifying one or more of the following parameters:

☐ length of time
☐ number of heartbeats
☐ number of Kcounts per frame

If you enter a value for more than one parameter, the acquisition ends when any of the conditions is met.

⚠ **Important:** You can also plan to stop the acquisition manually. Do not enter a value for any parameter, then, while the acquisition is in progress, select **Stop Acquisition**.

1. To stop the acquisition after a specific length of time, select **Time**.

   Note: Time Mode toggles between two options: Elapsed and Accepted. Elapsed time is measured from the beginning of the acquisition. Accepted time is measured only during the time that accepted heartbeats (beats whose R-waves reach the trigger threshold within the heart rate window) are being recorded.

   Enter the number of seconds (up to 3600) that the acquisition should run.

2. To stop the acquisition after a specific number of heartbeats, select **Number of Cycles**.

   Note: Cycle Mode toggles between two options: Elapsed and Accepted. Elapsed cycles are counted from the beginning of the acquisition. Accepted cycles are counted only if the cycle occurs within the heart rate window.

   Enter the number of cycles (up to 3600) that the acquisition should run.

3. To stop the acquisition after a specific number of counts per frame are acquired, select **Kcounts**. Enter the number of counts (up to 99,000 Kcounts) that the acquisition should run.

4. Select **Validate**.

   The Acquisition Summary Menu is displayed (Figure 6-8).

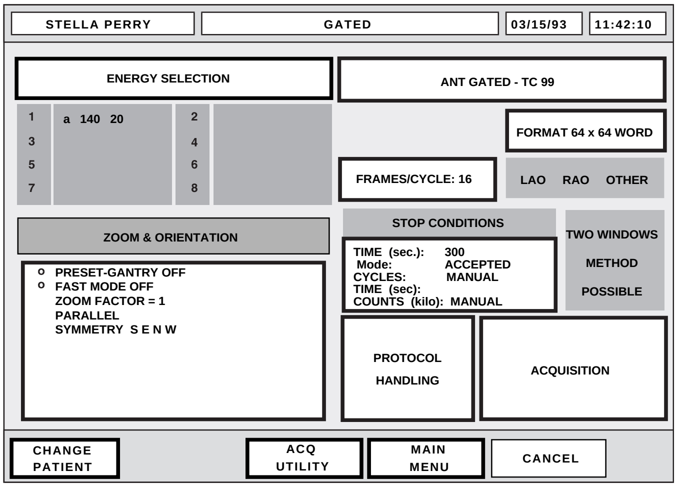
5. You have two options.

   ☐ If you are acquiring a gated image, continue with the next procedure.

   ☐ If you are creating a predefined protocol, continue with the procedure entitled “Creating a Predefined Protocol.”

Preparing for the Acquisition

Figure 6-8: Acquisition Summary Menu



STELLA PERRY
GATED
03/15/93
11:42:10

ANT GATED - TC 99
FORMAT 64 x 64 WORD
FRAMES/CYCLE: 16

1 a 140 20

PRESET-GANTRY OFF
FAST MODE OFF
ZOOM FACTOR = 1
PARALLEL
SYMMETRY S E N W

TIME (sec.): 300
Mode: ACCEPTED
CYCLES: MANUAL
TIME (sec):
COUNTS (kilo): MANUAL

TWO WINDOWS METHOD POSSIBLE

The Acquisition Summary Menu lists the parameters you selected for your acquisition.

1. To change a parameter, select the button containing information for that parameter.

   ☞ **Example:** If you want to choose a different isotope, select the button labeled **Energy Selection** above the isotope list.

2. To continue, select **Acquisition**.

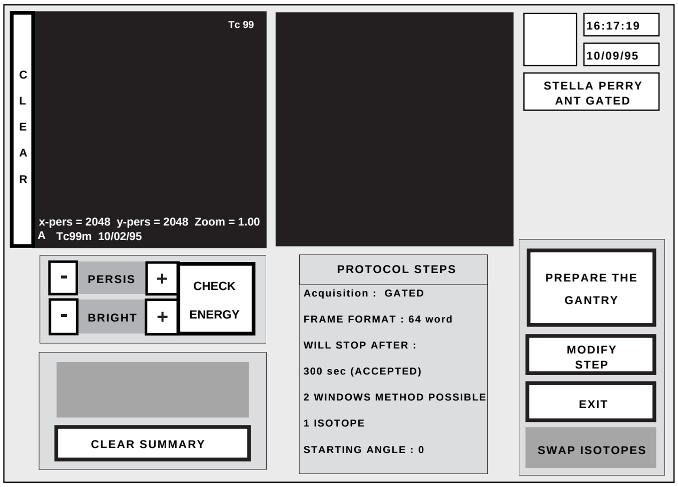
   Depending upon your selection for Preset Gantry, there are two possibilities:

   ❏ If you selected the Yes option for Preset Gantry, continue with the procedure entitled “Using Preset Gantry Positioning.”

   ❏ If you selected the No option for Preset Gantry, continue with the procedure entitled “Using Manual Gantry Positioning.”

Using Preset Gantry Positioning

Figure 6-9: Start Acquisition Menu: Preset Gantry



16:17:19
10/09/95
STELLA PERRY
ANT GATED

Tc 99
x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

PROTOCOL STEPS
Acquisition : GATED
FRAME FORMAT : 64 word
WILL STOP AFTER :
300 sec (ACCEPTED)
2 WINDOWS METHOD POSSIBLE
1 ISOTOPE
STARTING ANGLE : 0

By using the Preset Gantry option you can be sure that the gantry and detector will be positioned correctly before the acquisition begins.

Warning: Always use the safety pad when you scan a patient.

1. To check the energy before beginning the acquisition, place a point source with the correct isotope under the detector head. Select **Check Energy**.

   An energy spectrum appears on the monitor.

2. A summary of the acquisition parameters including the matrix and stop conditions is displayed in the center of the menu. Select **Clear Summary** to remove the list.

   To display the list again, select **Display Step Summary**.

3. To change any of the parameters for this acquisition, select **Modify Step**.

   The Acquisition Summary Menu is displayed again. You can change any parameter, then select **Return to Acquire**.

4. To prepare the gantry for the acquisition, select **Prepare the Gantry**.

   When you are prompted, press the safety pad.

   If the current starting angle or head angulation do not match that which was specified on the Orientation Controls Menu, the gantry will automatically move to the correct position. Make sure you follow the on-screen prompts carefully.

   Note: On the DS7, the head angulation positioning is manual.

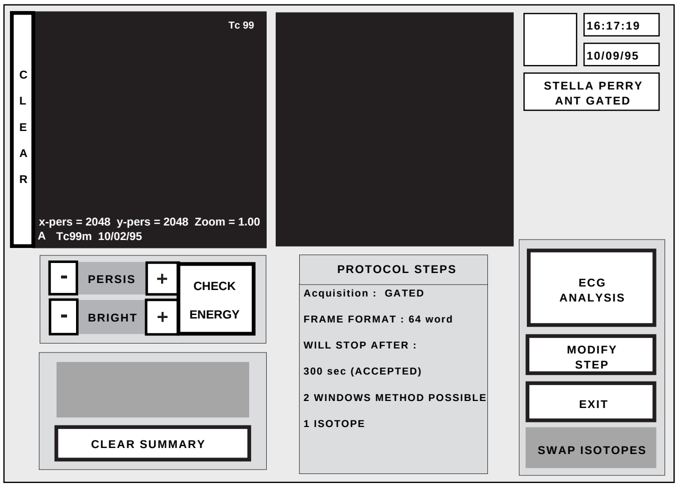
   The Start ECG Menu is displayed.

5. Select **ECG Analysis**.

   The ECG Analysis Menu is displayed (Figure 6-11). Skip to the section entitled "Defining the Heart Rate Window."

Using Manual Gantry Positioning

Figure 6-10: Start Acquisition Menu: Manual Gantry



x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95
STELLA PERRY
ANT GATED

PROTOCOL STEPS
Acquisition : GATED
FRAME FORMAT : 64 word
WILL STOP AFTER :
300 sec (ACCEPTED)
2 WINDOWS METHOD POSSIBLE
1 ISOTOPE

Warning: Always use the safety pad when you scan a patient.

1. Position the patient under the detector.

   The persistence screen shows the patient's position in the field of view. If it is necessary, select **Clear** to clear the screen.

2. By convention, for anterior images the patient's head should appear at the top and the patient's left side on the right of the persistence monitor. If it is necessary, use the Rotation and Symmetry controls to flip or rotate the image on the persistence monitor.

   Note: The Rotation and Symmetry controls are explained in the "Standard Acquisition Operation" chapter in the section entitled "Using the Rotation and Symmetry Controls". The Persistence, Rotate, Up/Down Arrows and Left/Right Arrows buttons of the hand control have no effect.

3. Use the Brightness and Persistence controls to assist with final patient positioning.

4. To check the energy before beginning the acquisition, place a point source with the correct isotope under the detector head. Select **Check Energy**.

   An energy spectrum appears on the monitor.

5. A summary of the acquisition parameters including the matrix and stop conditions is displayed in the center of the menu. Select **Clear Summary** to remove the list.

   To display the list again, select **Display Step Summary**.

6. To change any of the parameters for this acquisition, select **Modify Step**.

   The Acquisition Summary Menu is displayed again. You can change any parameter, then select **Return to Acquire**.

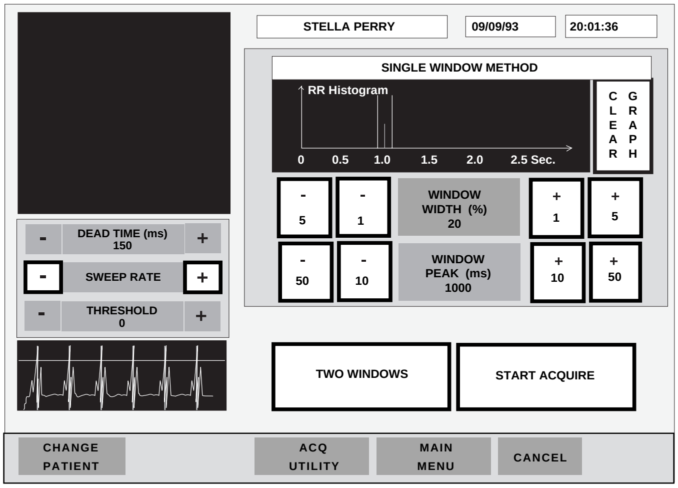
7. The persistence screen displays the persistence for Image A. If you are acquiring more than one image, you can select **Swap Isotopes** to view the persistence for Image B.

8. Select **ECG Analysis**.

   The ECG Analysis Menu is displayed (Figure 6-11). Continue with the section entitled "Defining the Heart Rate Window."

Defining the Heart Rate Window

Figure 6-11: ECG Analysis Menu



STELLA PERRY
09/09/93
20:01:36

SINGLE WINDOW METHOD

DEAD TIME (ms) 150

THRESHOLD 0

WINDOW WIDTH (%) 20

WINDOW PEAK (ms) 1000

You can use the ECG Analysis Menu to define the heart rate window. The patient’s EKG is displayed on the lower left of the menu. Red vertical lines indicate what the system identifies as R-waves.

Important: To complete a gated acquisition, you must ensure that the R-wave is the tallest wave on the display. If the R-wave is not consistently the tallest wave, adjust the gain on the EKG gate or reposition the leads.

On the upper right of the menu, the system displays a histogram of the patient’s heartbeats, with the interval between R-waves on the x-axis and the number of intervals on the y-axis. Use this part of the menu to identify the range of heart rates that will be accepted during the acquisition.

Note: Depending upon the parameters you specified for the acquisition, you may be able to take advantage of the dual heart rate option if your patient exhibits two distinct heart rates. To access the dual heart rate window option, select **Two Windows**. For more information about this option, refer to the section entitled "Defining Two Heart Rate Windows."

The following steps explain how to set the heart rate window.

1. You can control the frequency of the R-to-R intervals as they sweep across the screen. Select the **Sweep Rate** buttons to adjust the frequency.

   Note: If the patient has a fast heart rate, select the Minus buttons to lower the sweep rate and display more beats in the EKG window. Conversely, if the patient’s heart rate is slow, you can select the Plus buttons to raise the sweep rate.

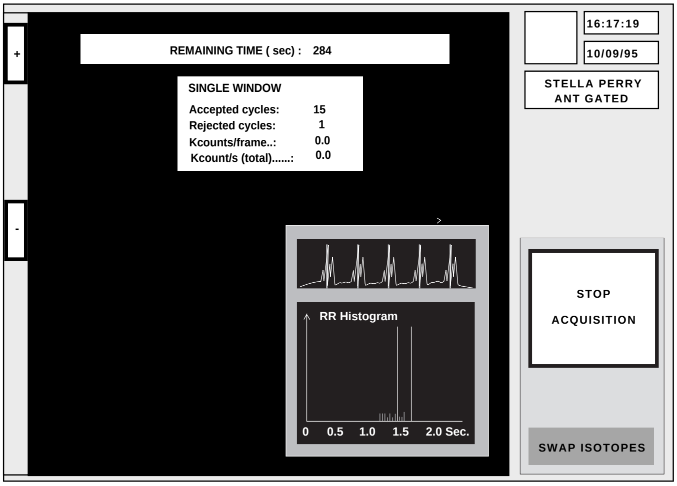
2. Define the peak and width the window. Select the **Window Peak** buttons to move the center of the heart rate window to the peak of the histogram (200 to 3000 msec.).

3. Select the **Window Width** buttons to adjust the range of heartbeats that will be accepted during the acquisition (1% to 99%).

4. Select **Start Acquire**.

   A short beep signals the start of the acquisition. The Acquisition Menu is displayed (Figure 6-12).

   Figure 6-12: Acquisition Menu

   REMAINING TIME (sec) : 284

   SINGLE WINDOW
   Accepted cycles: 15
   Rejected cycles: 1
   Kcounts/frame..: 0.0
   Kcount/s (total)......: 0.0

   16:17:19
   10/09/95

   STELLA PERRY
   ANT GATED

5. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

6. You have three options after the acquisition is complete.

   - Select **Exit** to return to the Main Menu.
   - Select **ECG Analysis** or **Prepare the Gantry** to acquire another study.
   - Select **Modify Step** to change the acquisition parameters before acquiring another image.

Creating a Predefined Protocol

The values for the following parameters are saved with the protocol:

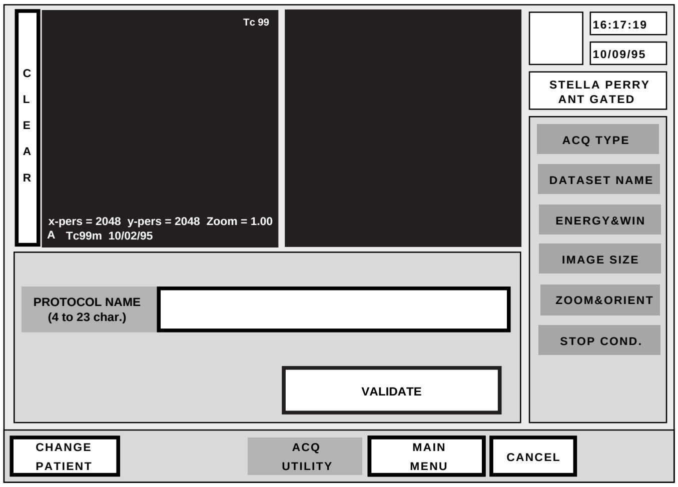
- protocol name
- dataset name
- matrix size
- number of frames per interval
- stop conditions
- zoom factor
- patient orientation

Follow the steps below to save the parameters as a new protocol.

1. Select **Protocol Handling**.

The Protocol Handling Menu is displayed (Figure 6-13).

Figure 6-13: Protocol Handling Menu



16:17:19
10/09/95
STELLA PERRY
ANT GATED

Tc 99
x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

2. The box labeled **Enter Protocol Name** is highlighted. Enter a name (4 to 24 characters) for the protocol, press <ENTER> and select **Validate**.

3. The box labeled **Enter Additional Prompt Message** is highlighted. You can enter an optional message (less than 24 characters) in this box. Press <ENTER> and select **Validate**.

   The message will appear on the Start Acquisition Menu the next time someone uses the protocol.

4. If you want to chain this to another protocol, select **Yes**; otherwise, select **No**. Select **Validate.**

   ☐ If you chain the protocol, a serie of screens, which allow you to define another protocol, is displayed. For more information about chaining protocols, refer to the section entitled “Working with Chained Protocols” in the “Standard Acquisitions Operations” chapter.

   ☐ If you do not chain the protocol, the Main Menu is displayed.

Using a Predefined Gated Protocol

The procedure for using a predefined gated acquisition protocol follows these general guidelines:

1. Prepare the EKG gate.
2. Select the patient.
3. Select the predefined protocol.
4. Start the acquisition.

You also have the option to modify the protocol before you begin the acquisition.

Preparing the EKG Gate

Before you begin the acquisition, you must ensure that the EKG gate is attached and functioning.

Refer to the instructions that were supplied with the gate to determine the best method for placing the leads on the patient.

When the gate is properly attached, switch it on.

Selecting the Patient

The name of the currently selected patient is displayed at the top of the Main Menu. Use the following steps to select a different patient.

1. Select **Change Patient**.

   The Patient Directory Menu is displayed.

2. Select the patient for whom you want to acquire the dataset.

   You can search for a patient under a number of different criteria (select **Find Patient**), or enter a new patient (select **Create a New Patient**).

3. After you select a patient, the Main Menu is displayed again.

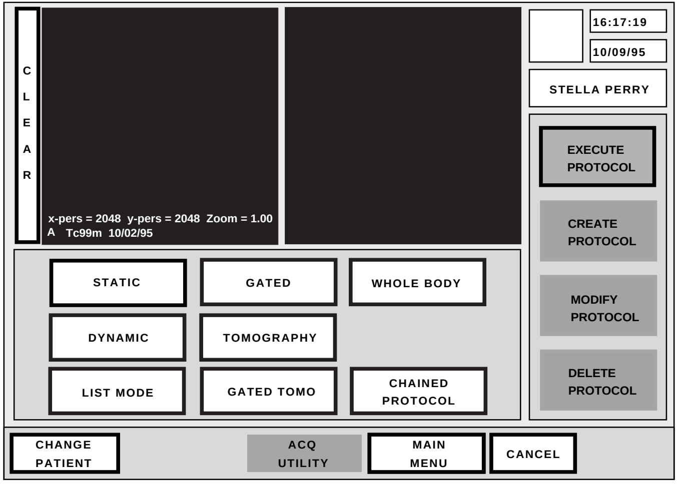
Selecting the Predefined Protocol

After you select the correct patient and return to the Main Menu, you can select the protocol you want to use. Follow the steps below.

1. From the Main Menu, select **Acquisition Protocol**.

   The Protocol Type Menu is displayed (Figure 6-14).

Figure 6-14: Protocol Type Menu



2. Select **Gated**.

   A menu with existing gated acquisition protocols is displayed.

3. Select the protocol you want to use.

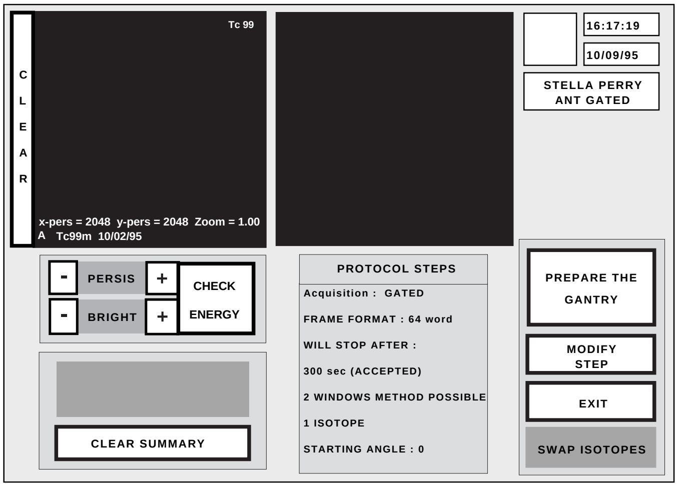
   Depending upon the setting for Preset Gantry, there are two possibilities:

   ☐ If the Preset Gantry option is set to Yes, continue with the procedure entitled “Using Preset Gantry Positioning.”

   ☐ If the Preset Gantry option is set to No, continue with the procedure entitled “Using Manual Gantry Positioning.”

Using Preset Gantry Positioning

Figure 6-15: Start Acquisition Menu: Preset Gantry



Acquisition : GATED
FRAME FORMAT : 64 word
WILL STOP AFTER :
300 sec (ACCEPTED)
2 WINDOWS METHOD POSSIBLE
1 ISOTOPE
STARTING ANGLE : 0

By using the Preset Gantry option you can be sure that the gantry and detector will be positioned correctly before the acquisition begins.

Warning: Always use the safety pad when you scan a patient.

1. To check the energy before beginning the acquisition, place a point source with the correct isotope under the detector head. Select **Check Energy**.

   An energy spectrum appears on the monitor.

2. A summary of the acquisition parameters including the matrix and stop conditions is displayed in the center of the menu. Select **Clear Summary** to remove the list.

   To display the list again, select **Display Step Summary**.

3. To change any of the parameters for this acquisition, select **Modify Step**.

   The Acquisition Summary Menu is displayed again. You can change any parameter, then select **Return to Acquire**.

4. To prepare the gantry for the acquisition, select **Prepare the Gantry**.

   When you are prompted, press the safety pad.

   If the current starting angle or head angulation do not match that which was specified on the Orientation Controls Menu, the gantry will automatically move to the correct position. Make sure you follow the on-screen prompts carefully.

   Note: On the DS7, the head angulation positioning is manual.

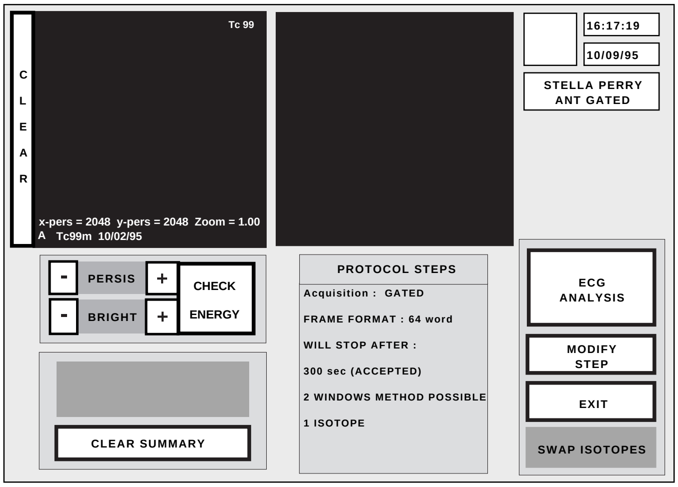
   The Start ECG Menu is displayed.

5. Select **ECG Analysis**.

   The ECG Analysis Menu is displayed (Figure 6-17). Skip to the section entitled "Defining the Heart Rate Window."

Using Manual Gantry Positioning

Figure 6-16: Start Acquisition Menu: Manual Gantry



Tc 99

x-pers = 2048 y-pers = 2048 Zoom = 1.00

A Tc99m 10/02/95

16:17:19

10/09/95

STELLA PERRY
ANT GATED

PROTOCOL STEPS

Acquisition : GATED

FRAME FORMAT : 64 word

WILL STOP AFTER :

300 sec (ACCEPTED)

2 WINDOWS METHOD POSSIBLE

1 ISOTOPE

Warning: Always use the safety pad when you scan a patient.

1. Position the patient under the detector.

The persistence screen shows the patient's position in the field of view. If it is necessary, select **Clear** to clear the screen.

2. By convention, for anterior images the patient's head should appear at the top and the patient's left side on the right of the persistence monitor. If it is necessary, use the Rotation and Symmetry controls to flip or rotate the image on the persistence monitor.

   Note: The Rotation and Symmetry controls are explained in the "Standard Acquisition Operation" chapter in the section entitled "Using the Rotation and Symmetry Controls". The Persistence, Rotate, Up/Down Arrows and Left/Right Arrows buttons of the hand control have no effect.

3. Use the Brightness and Persistence controls to assist with final patient positioning.

4. To check the energy before beginning the acquisition, place a point source with the correct isotope under the detector head. Select **Check Energy**.

   An energy spectrum appears on the monitor.

5. A summary of the acquisition parameters including the matrix and stop conditions is displayed in the center of the menu. Select **Clear Summary** to remove the list.

   To display the list again, select **Display Step Summary**.

6. To change any of the parameters for this acquisition, select **Modify Step**.

   The Acquisition Summary Menu is displayed again. You can change any parameter, then select **Return to Acquire**.

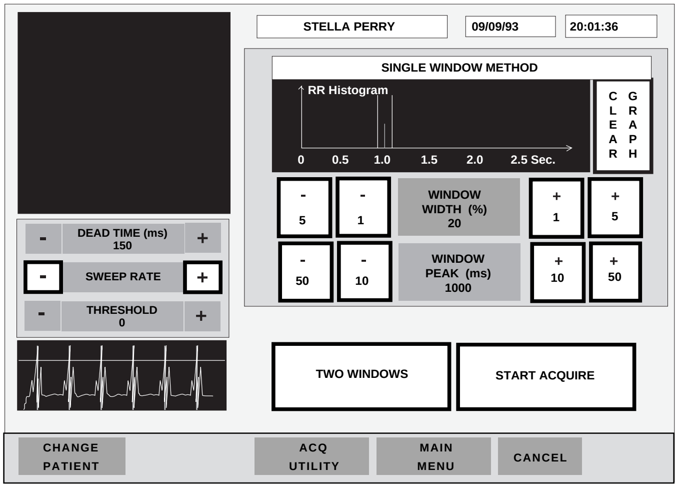
   The persistence screen displays the persistence for Image A. If you are acquiring more than one image, you can select **Swap Isotopes** to view the persistence for Image B.

7. Select **ECG Analysis**.

   The ECG Analysis Menu is displayed (Figure 6-17). Continue with the section entitled "Defining the Heart Rate Window."

Defining the Heart Rate Window

Figure 6-17: ECG Analysis Menu



STELLA PERRY 09/09/93 20:01:36

SINGLE WINDOW METHOD

DEAD TIME (ms) 150

THRESHOLD 0

WINDOW WIDTH (%) 20

WINDOW PEAK (ms) 1000

You can use the ECG Analysis Menu to define the heart rate window. The patient's EKG is displayed on the lower left of the menu. Red vertical lines indicate what the system identifies as R-waves.

Important: To complete a gated acquisition, you must ensure that the R-wave is the tallest wave on the display. If the R-wave is not consistently the tallest wave, adjust the gain on the EKG gate or reposition the leads.

On the upper right of the menu, the system displays a histogram of the patient's heartbeats, with the interval between R-waves on the x-axis and the number of intervals on the y-axis. Use this part of the menu to identify the range of heart rates that will be accepted during the acquisition.

Note: Depending upon the parameters you specified for the acquisition, you may be able to take advantage of the dual heart rate option if your patient exhibits two distinct heart rates. To access the dual heart rate window option, select **Two Windows**. For more information about this option, refer to the section entitled "Defining Two Heart Rate Windows."

The following steps explain how to set the heart rate window.

1. You can control the frequency of the R-to-R intervals as they sweep across the screen. Select the **Sweep Rate** buttons to adjust the frequency.

   Note: If the patient has a fast heart rate, select the Minus buttons to lower the sweep rate and display more beats in the EKG window. Conversely, if the patient's heart rate is slow, you can select the Plus buttons to raise the sweep rate.

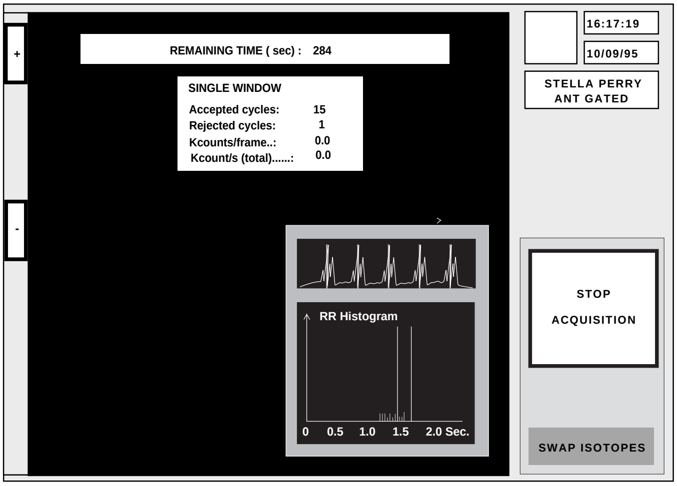
2. Define the peak and width the window. Select the **Window Peak** buttons to move the center of the heart rate window to the peak of the histogram (200 to 3000 msec.).

3. Select the **Window Width** buttons to adjust the range of heartbeats that will be accepted during the acquisition (1% to 99%).

4. Select **Start Acquire**.

   A short beep signals the start of the acquisition. The Acquisition Menu is displayed (Figure 6-18).

   Figure 6-18: Acquisition Menu



REMAINING TIME (sec) : 284

SINGLE WINDOW
Accepted cycles: 15
Rejected cycles: 1
Kcounts/frame..: 0.0
Kcount/s (total)......: 0.0

16:17:19
10/09/95

STELLA PERRY
ANT GATED

5. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

6. You have three options after the acquisition is complete.

   ❏ Select **Exit** to return to the Main Menu.

   ❏ Select **ECG Analysis** or **Prepare the Gantry** to acquire another study.

   ❏ Select **Modify Step** to change the acquisition parameters before acquiring another image.

Defining Two Heart Rate Windows

Depending upon the parameters you specified for the acquisition, you may be able to take advantage of the dual heart rate window option if your patient exhibits two distinct heart rates. This menu functions similarly to the single window method: you can adjust the Window Peak and Window Width for each heart rate window.

Note: The system defines the faster of the two heart rates as Window #1 and the slower as Window #0.

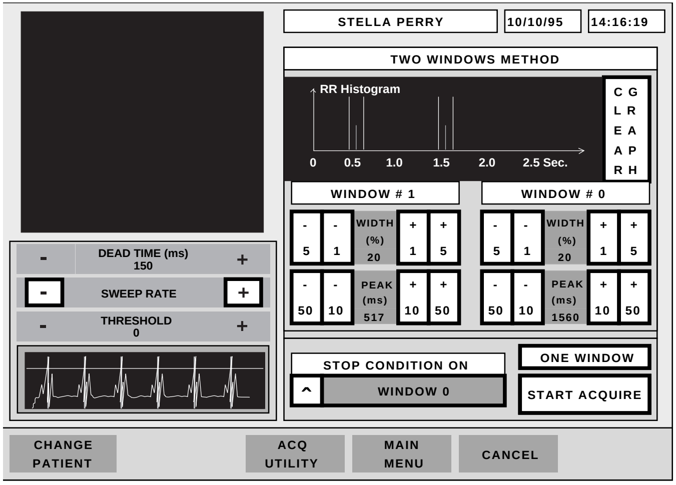
If the stop conditions for this acquisition are based on accepted cycles (that is, heart beats that fall within the heart rate window), you must specify in which window (Window #0, Window #1, or some combination) the accepted cycles are counted. The following is a list of the possible combinations. Assume for this example that the acquisition requires 60 accepted heart beats.

- Window 0: The required number of heart beats must occur in Window #0. If Window #0 accumulates 60 beats and Window #1 accumulates 15 beats, the acquisition ends.
- Window 1: The required number of heart beats must occur in Window #1. If Window #0 accumulates 15 beats and Window #1 accumulates 60 beats, the acquisition ends.
- 0 + 1: The required number of heart beats can occur in either window. If Window #0 accumulates 45 beats and Window #1 accumulates 15 beats, the acquisition ends.
- 0 and 1: The heart beats must occur in both windows. If Window #0 accumulates 75 beats and Window #1 accumulates 60 beats, the acquisition ends.
- 0 or 1: The stop conditions must be met in either window. If Window #0 accumulates 45 beats and Window #1 accumulates 60 beats, the acquisition ends.

1. To access the dual heart rate window option, with the ECG Analysis Menu displayed select **Two Windows**.

   The Two Window Menu is displayed (Figure 6-19).

Figure 6-19: Two Window Menu



STELLA PERRY
10/10/95
14:16:19

TWO WINDOWS METHOD

DEAD TIME (ms) 150
THRESHOLD 0

WINDOW # 1
WIDTH (%) 20
PEAK (ms) 517

WINDOW # 0
WIDTH (%) 20
PEAK (ms) 1560

STOP CONDITION ON
WINDOW 0

2. If necessary, adjust the Sweep Rate.
3. Adjust the Window Width and Window Peak for both Window #1 and Window #0.
4. Display the Stop Condition option that the acquisition requires. Under Stop Condition On, select the Up Arrow button to display the Heart Rate window combination you want to use.
5. Select **Start Acquire**.

   A short beep signals the start of the acquisition. The acquisition stops when your stop conditions are met.

Performing Tomographic Acquisitions

Introduction

The tomographic acquisition protocol allows you to acquire a series of static images that can be reconstructed into a representation of a three-dimensional structure. Later, these images can be displayed individually, in groups, or in a cine format through the Display function.

These protocols are based on operator-defined values for parameters such as the number of images in a study, the duration for each image, and the zoom factor. After your department agrees on the parameters for a specific type of study, the parameters can be saved in a predefined protocol and be used repeatedly.

This chapter includes two major sections.

- ☐ **Acquiring Tomographic Studies** explains how to use the camera to acquire tomographic studies and to create a predefined tomographic protocol.
- ☐ **Using a Predefined Tomographic Protocol** explains how to use a tomographic acquisition protocol that has been previously defined.

Acquiring Tomographic Studies

This section explains how to use the camera to acquire tomographic studies.

The steps for acquiring tomographic studies include the following:

1. Select a patient, acquisition type, and dataset name.
2. Specify the isotopes and energy levels.
3. Select a matrix size.
4. Define the tomographic parameters.
5. Specify the stop conditions.
6. Define other parameters.
7. Complete the acquisition.

The section concludes with an explanation of how to create a tomographic acquisition protocol.

Selecting the Patient, Acquisition Type and Dataset Name

1. The name of the currently selected patient is displayed at the top of the Main Menu. To select a different patient, select **Change Patient**.

   Note: If there is no current patient, you can select one now. If you do not, you will be prompted to select one after you select the acquisition type in Step 3.

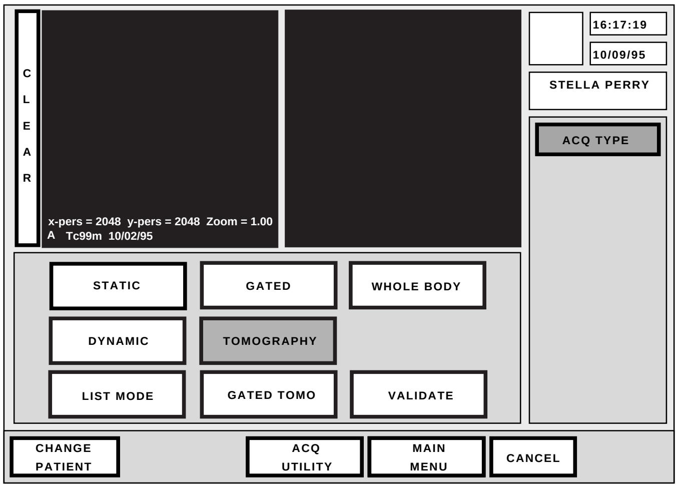
   You can search for a patient under a number of different criteria (select **Find Patient**), or enter a new patient (select **Create New Patient**).

   After you select a patient, the Main Menu is displayed again.

2. From the Main Menu, select **Manual Acquisition**.

   The Acquisition Type Menu is displayed.

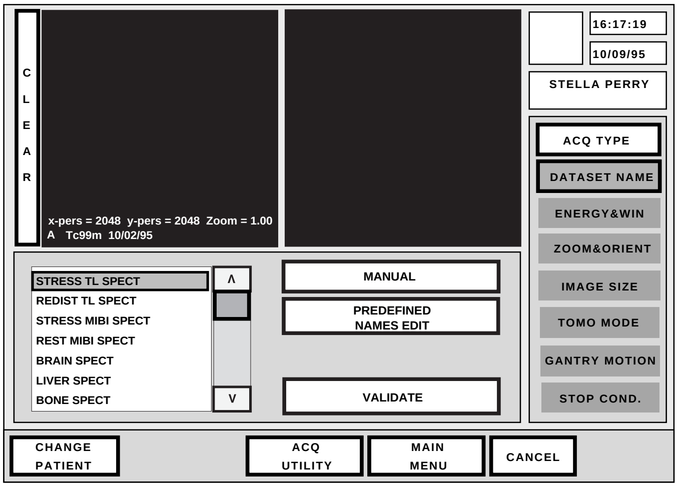
Figure 7-1: Acquisition Type Menu



3. Select **Tomography** (Figure 7-1), then **Validate**.

   The Dataset Name Menu is displayed (Figure 7-5).

Figure 7-2: Dataset Name Menu



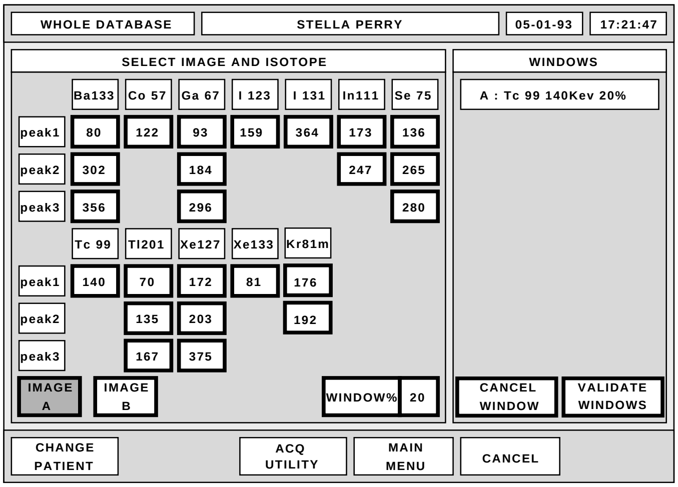
4. Select an existing dataset name from the scrolling list, or select **Manual** and enter a new one (4 to 18 characters). Select **Validate**.

   Note: You can use this menu to create and edit predefined dataset names. Refer to “Managing Dataset Names” in the chapter entitled “Standard Acquisition Operations” for more information.

   The Isotope Menu (also called the Energy & Window Menu) is displayed (Figure 7-3).

Selecting the Isotope

Figure 7-3: Isotope Menu



WHOLE DATABASE | STELLA PERRY | 05-01-93 | 17:21:47

	Ba133	Co 57	Ga 67	I 123	I 131	In111	Se 75
peak1	80	122	93	159	364	173	136
peak2	302		184			247	265
peak3	356		296				280

	Tc 99	Tl201	Xe127	Xe133	Kr81m
peak1	140	70	172	81	176
peak2		135	203		192
peak3		167	375		

WINDOW% 20

A : Tc 99 140Kev 20%

You can acquire up to two tomographic images simultaneously, each with its own isotope. Further, you can specify up to a combined total of eight energy levels for all images (so long as none of the energy windows overlap).

The steps that follow explain how to select a single isotope and energy level. For information about using multiple isotopes, refer to the section entitled “Using Multiple Isotopes and Energy Levels” in the “Standard Acquisition Operations” chapter.

1. The name of the most recently used isotope and energy level appears in the Windows column of the Isotope Menu. If you do **not** want to acquire the image using this combination, select **Cancel Window**, then select the name of the isotope in the Windows column.
2. On the left side of the menu, Image A should be highlighted. If it is not, select **Image A**.
3. Select the isotope and energy peak you want to use for this acquisition.

   The isotope name is displayed in the Windows column.

   Note: Up to three energy peaks are displayed for the isotopes. You can use up to eight energy peaks for a single image.
4. Select **Validate Windows** to accept the isotope and energy level.

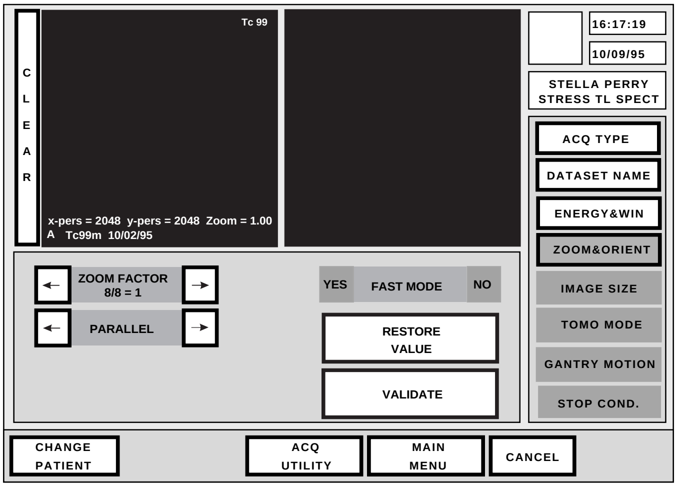
   Important: When you select an isotope, the system automatically chooses a uniformity matrix, which is displayed in the detector’s persistence screen. Refer to the “Standard Acquisition Operations” chapter for information about manually changing the uniformity matrix.

   The name of the isotope is displayed in the persistence screen.

   The Zoom & Orientation Menu is displayed (Figure 7-4).

Defining the Zoom and Orientation

Figure 7-4: Zoom & Orientation Menu



x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

ZOOM FACTOR 8/8 = 1

PARALLEL

1. If you want to use a zoom factor, select the Arrow button on either side of **Zoom Factor**.

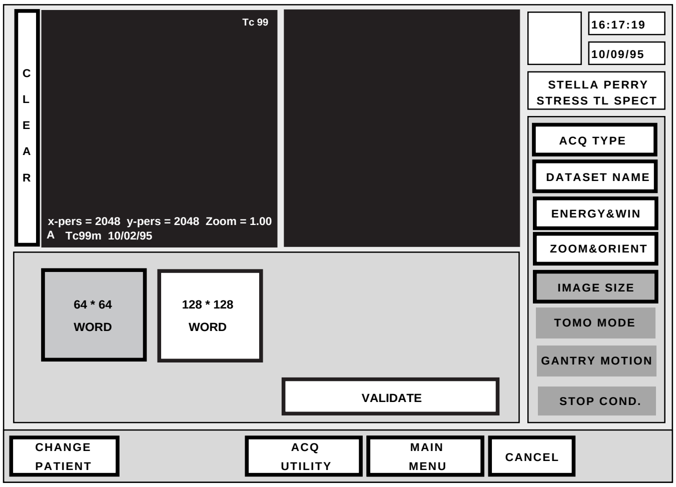
   Note: For more information about zoom factors on the DSX/DS7, refer to “Specifying the Zoom Factor” in the “Standard Acquisition Operations” chapter.

2. Use the Arrow buttons to change the name of the collimator to match the type of collimator you attached to the detectors.

3. Select **Validate**.

   The Matrix Size Menu (also called the Image Size Menu) is displayed (Figure 7-5).

Figure 7-5: Matrix Size Menu



x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

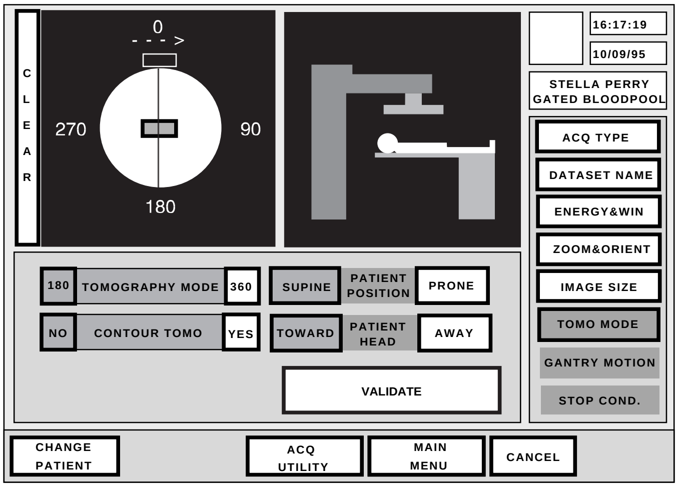
4. Select one of the two options for tomographic acquisitions:
   64 x 64 Word or **128 x 128 Word**.

5. Select **Validate**.

   The Tomography Mode Menu is displayed (Figure 7-6).

Defining the Tomography Mode

Figure 7-6: Tomography Mode Menu



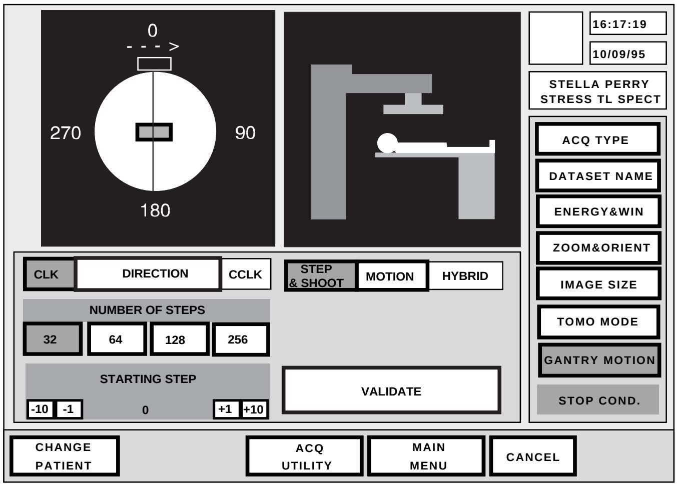
16:17:19
10/09/95
STELLA PERRY
GATED BLOODPOOL

1. Select **Tomography Mode** to specify whether the acquisition will be gathered in 180° or a full 360°. The highlighted box toggles between 180° and 360°.
2. Select **Contour Tomo** to define the camera path. The highlighted box toggles between No (Circular orbit) and Yes (Non Circular orbit).
3. Select **Patient Position** to define whether the patient will be prone or supine during the acquisition. The highlighted box toggles between Supine and Prone.
4. Select **Patient Head** to define whether the patient’s head is toward or away from the gantry. The highlighted box toggles between Toward and Away.
5. Select **Validate**.

   The Gantry Motion Menu is displayed (Figure 7-7).

Defining the Gantry Motion

Figure 7-7: Gantry Motion Menu



16:17:19
10/09/95
STELLA PERRY
STRESS TL SPECT

1. Select **Direction** to define the direction in which the gantry will rotate. The highlighted box toggles between CLK (clockwise) and CCLK (counterclockwise).
2. Select the number of steps, or images, that will make up the tomographic acquisition.

   For 180° acquisitions, you can select **32**, **64** and **128** steps. For 360° acquisitions, you can select **32**, **64**, **128** and **256** steps.
3. Select **Motion** to specify how the gantry motion and acquisition are coordinated.
   - Highlight Step & Shoot if you want the gantry to move to the next step before the next image is acquired.
   - Highlight Hybrid if you want the acquisition of the next image to begin while the gantry is moving to the next step.

   Note: By using the Hybrid motion option you can reduce the total acquisition time
4. Use the Plus/Minus buttons to define the Starting Step (that is, the starting angle for the camera). The following table lists the options, which depend upon the other gantry parameters.

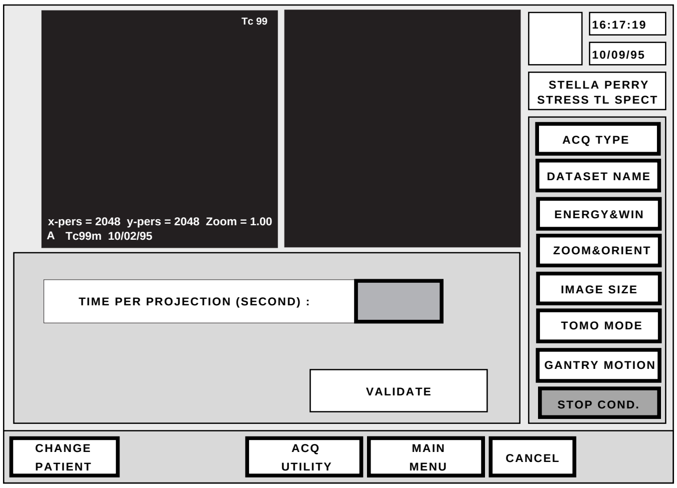
Tomo Mode	Direction	Starting Angle
180°	CLK	0° to 360°
	CCLK	180° to 540°
360°	CLK	0° to 180°
	CCLK	360° to 540°

5. Select **Validate**.

   The Stop Conditions Menu is displayed (Figure 7-8).

Defining the Stop Conditions

Figure 7-8: Stop Conditions Menu



Tc 99

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95

STELLA PERRY
STRESS TL SPECT

TIME PER PROJECTION (SECOND) :

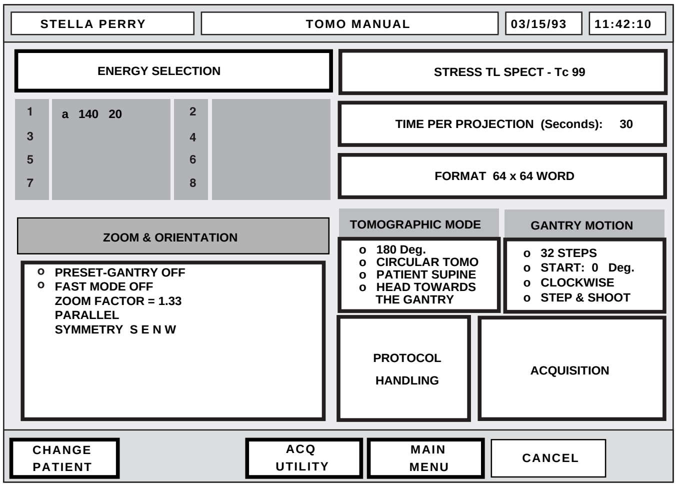
You can define the end of a tomographic acquisition by specifying the elapsed time (in seconds) per step, or projection.

1. The box labelled **Time per Projection** is highlighted. Enter the time (2 to 3600 seconds) for the tomographic acquisition at each gantry step.
2. Select **Validate**.

   The Acquisition Summary Menu is displayed (Figure 7-9).
3. You have two options.
   - ❑ If you are acquiring a tomographic study, continue with the next procedure.
   - ❑ If you are creating a predefined protocol, continue with the procedure entitled “Creating a Predefined Protocol.”

Preparing for the Acquisition

Figure 7-9: Acquisition Summary Menu



STELLA PERRY
TOMO MANUAL
03/15/93
11:42:10

STRESS TL SPECT - Tc 99

1 a 140 20
2
3
4
5
6
7
8

TIME PER PROJECTION (Seconds): 30

FORMAT 64 x 64 WORD

o PRESET-GANTRY OFF
o FAST MODE OFF
ZOOM FACTOR = 1.33
PARALLEL
SYMMETRY S E N W

o 180 Deg.
o CIRCULAR TOMO
o PATIENT SUPINE
o HEAD TOWARDS THE GANTRY

o 32 STEPS
o START: 0 Deg.
o CLOCKWISE
o STEP & SHOOT

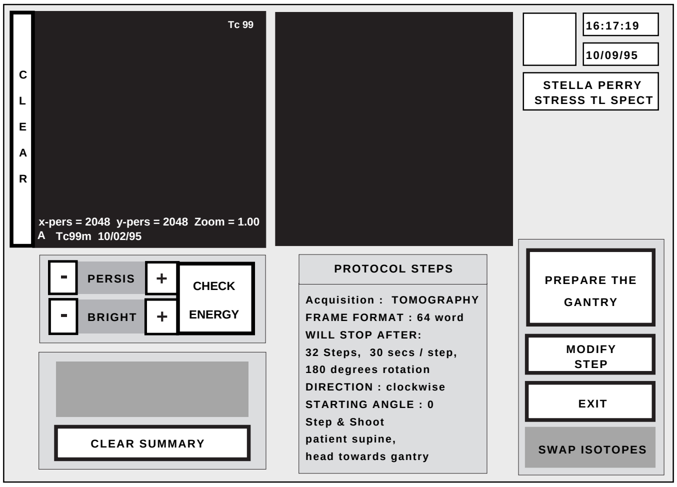
The Acquisition Summary Menu lists the parameters you selected for your acquisition.

1. To change a parameter, select the button containing information for that parameter.

   ☞ **Example:** If you want to choose a different isotope, select the button labeled **Energy Selection** above the isotope list.
2. To continue, select **Acquisition**.

   The Start Acquisition Menu is displayed (Figure 7-10).

Figure 7-10: Start Acquisition Menu



16:17:19
10/09/95
STELLA PERRY
STRESS TL SPECT

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

Acquisition : TOMOGRAPHY
FRAME FORMAT : 64 word
WILL STOP AFTER:
32 Steps, 30 secs / step,
180 degrees rotation
DIRECTION : clockwise
STARTING ANGLE : 0
Step & Shoot
patient supine,
head towards gantry

3. To check the energy before beginning the acquisition, place a point source with the correct isotope under the detector head. Select **Check Energy**.

   An energy spectrum appears on the monitor.

4. A summary of the acquisition parameters including the matrix and stop conditions is displayed. Select **Clear Summary** to remove the list from the screen.

   To display the list again, select **Display Step Summary**.

5. To change any of the parameters for this acquisition, select **Modify Step**.

   The Acquisition Summary Menu is displayed again. You can change any parameter, then select **Return to Acquire**.

6. The persistence screen displays the persistence for Image A. If you are acquiring more than one image, you can select **Swap Isotopes** to view the persistence for Image B.

7. Depending upon your selection for tomo contour, there are two possibilities :

   - ☐ If you selected the No option for the Tomo contour, continue with the procedure entitled “Using the circular orbit”.
   - ☐ If you selected the Yes option for Tomo contour, continue with the procedure entitled “Using the non-circular orbit”.

Using the Circular Orbit

Warning: Always use the safety pad when you scan a patient.

1. To prepare the gantry for the acquisition, select **Prepare the Gantry**.

2. When the system beeps and you are prompted, press the safety pad.

Note: If the gantry is not at the starting angle you specified, remove all obstacles from the path of the gantry and press **Start** on the hand control. The system beeps and the gantry rotates to the starting position.

If you are using the DS7 and the detector head is not at the 0° position, you are prompted to move it to that location.

You are prompted to define the starting radius.

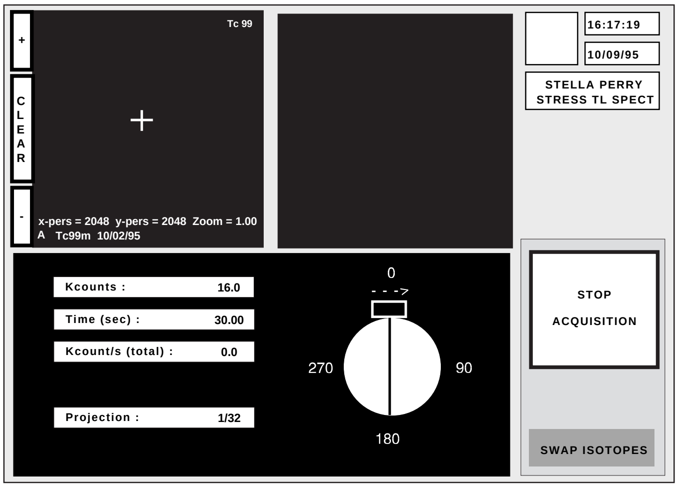
3. Use the Up or Down Arrow button to adjust the gantry radius, then press **Enter** on the hand control.

   The gantry preparation is complete, the Start Acquisition Menu is displayed again.

4. Select **Start Acquire**.

   A single beep signals the start of the acquisition. The Acquisition Menu is displayed (Figure 7-11).

Figure 7-11: Acquisition Menu



Tc 99
x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95
STELLA PERRY
STRESS TL SPECT

Kcounts : 16.0
Time (sec) : 30.00
Kcount/s (total) : 0.0
Projection : 1/32

5. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

6. You have three options after the acquisition is complete.

   - ☐ Select **Exit** to return to the Main Menu.
   - ☐ Select **Prepare the Gantry** to acquire another study.
   - ☐ Select **Modify Step** to change the acquisition parameters before acquiring another image.

Using the Non-Circular Orbit

Warning: Always use the safety pad when you scan a patient.

1. To prepare the gantry for the acquisition, select **Prepare the Gantry**.
2. When the system beeps and you are prompted, press the safety pad.

   Note: If the gantry is not at the starting angle you specified, remove all obstacles from the path of the gantry and press **Start** on the hand control. The system beeps and the gantry rotates to the starting position.

   If you are using the DS7 and the detector head is not at the 0° position, you are prompted to move it to that location.

   You are prompted to define the starting radius.
3. Use the Up or Down Arrow button to define the starting radius for the gantry, then press **Enter** on the hand control.

   You are prompted to define the patient's body contour.
4. Press **Start** on the hand control.

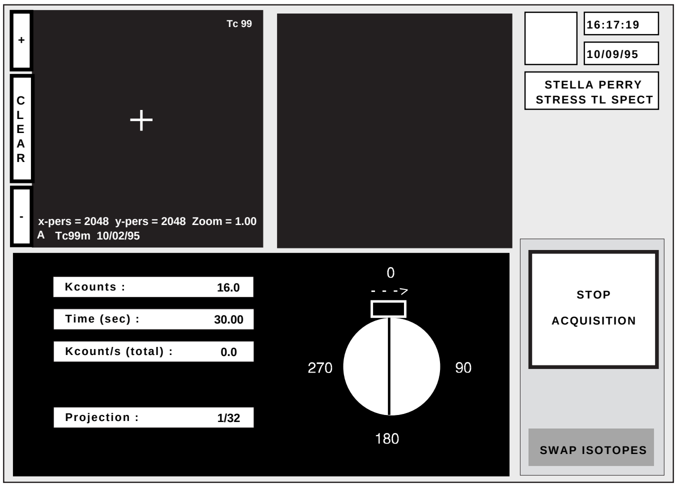
   The system beeps three times and the gantry begins to rotate around the patient.
5. Use the Up and Down Arrow buttons to adjust the gantry radius so that the distance between the detector head and the patient is a small as possible without allowing the detector head to touch the patient.

   After the you define the patient's body contour, you are prompted to remove all obstacles around the gantry.
6. Make sure the gantry area is clear, then press **Start** on the hand control.

   The system beeps three times and the gantry moves to its starting position.
7. The gantry preparation is complete. The Start Acquisition Menu is displayed again.
8. Select **Start Acquire**.

   A single beep signals the start of the acquisition. The Acquisition Menu is displayed (Figure 7-12).

Figure 7-12: Acquisition Menu



x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95

STELLA PERRY
STRESS TL SPECT

Kcounts : 16.0
Time (sec) : 30.00
Kcount/s (total) : 0.0
Projection : 1/32

9. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

10. You have three options after the acquisition is complete.

    ☐ Select **Exit** to return to the Main Menu.

    ☐ Select **Prepare the Gantry** to acquire another study.

    ☐ Select **Modify Step** to change the acquisition parameters before acquiring another image.

Creating a Predefined Protocol

When you create a protocol, you have the option of “chaining” it to another protocol. For example, you could create a dynamic renal acquisition and chain it to a static acquisition of the bladder. You have the option of chaining a protocol when you save it.

The values for the following parameters are saved with the protocol:

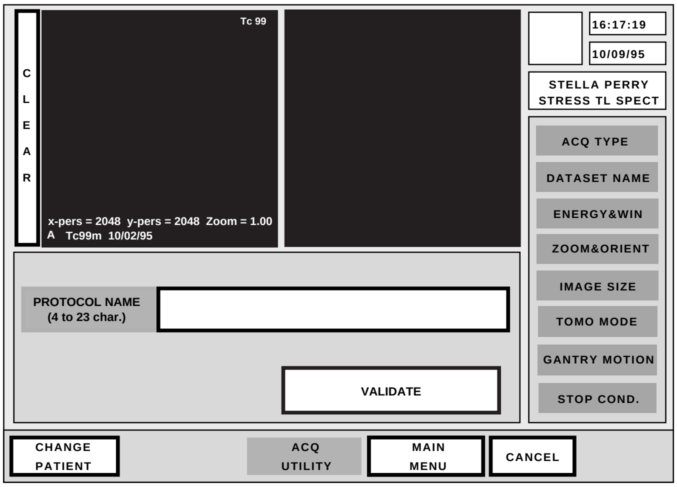
☐ protocol name
☐ dataset name
☐ matrix size
☐ number of steps
☐ number of seconds per step
☐ rotation parameters
☐ patient position
☐ names of the isotopes
☐ zoom factor
☐ patient orientation

Follow the steps below to save the parameters as a new protocol.

1. Select **Protocol Handling**.

The Protocol Handling Menu is displayed (Figure 7-13).

Figure 7-13: Protocol Handling Menu



2. The box labeled **Enter Protocol Name** is highlighted. Enter a name (4 to 24 characters) for the protocol, press <ENTER> and select **Validate**.

3. The box labeled **Enter Additional Prompt Message** is highlighted. You can enter an optional message (less than 24 characters) in this box. Press <ENTER> and select **Validate**.

   The message will appear on the Start Acquisition Menu the next time someone uses the protocol.

4. If you want to chain this to another protocol, select **Yes**; otherwise, select **No**. Select **Validate.**

   ❏ If you chain the protocol, a serie of screens, which allow you to define another protocol, is displayed. For more information about chaining protocols, refer to the section entitled “Working with Chained Protocols” in the “Standard Acquisitions Operations” chapter.

   ❏ If you do not chain the protocol, the Main Menu is displayed.

Using a Predefined Tomographic Protocol

The procedure for using a predefined tomographic acquisition protocol follows these general guidelines:

1. Select the patient.
2. Select the predefined protocol.
3. Start the acquisition.

You also have the option to modify the protocol before you begin.

Selecting the Patient

The name of the currently selected patient is displayed at the top of the Main Menu. Use the following steps to select a different patient.

1. Select **Change Patient.**

   The Patient Directory Menu is displayed.

2. Select the patient for whom you want to acquire the dataset.

   You can search for a patient under a number of different criteria (select **Find Patient**), or enter a new patient (select **Create a New Patient**).

   After you select a patient, the Main Menu is displayed again.

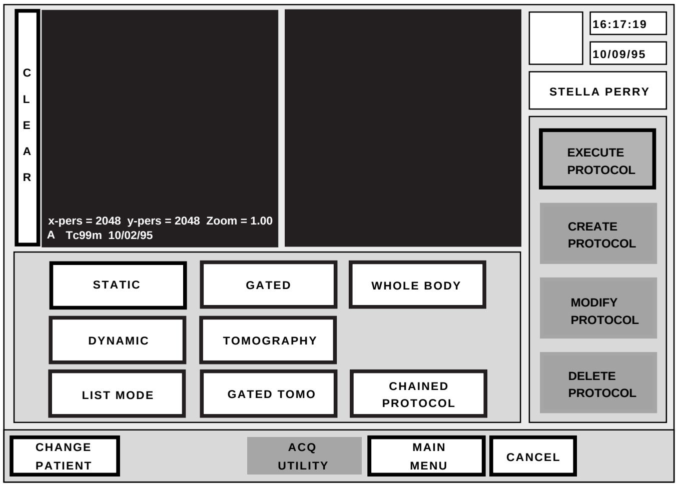
Selecting the Predefined Protocol

After you select the correct patient and return to the Main Menu, you can select the protocol you want to use. Follow the steps below.

1. From the Main Menu, select **Acquisition Protocol**.

   The Protocol Type Menu is displayed (Figure 7-14).

Figure 7-14: Protocol Type Menu



2. Select **Tomography**.

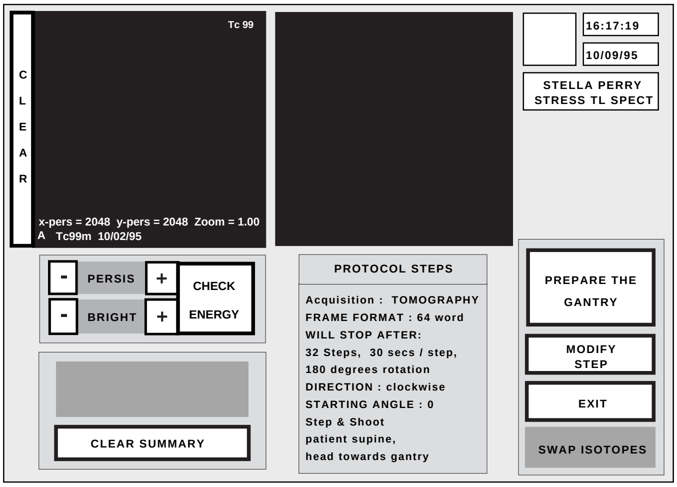
   A menu with existing tomography acquisition protocols is displayed.

3. Select the protocol you want to use.

   The Start Acquisition Menu is displayed (Figure 7-15).

Acquiring the Study

Figure 7-15: Start Acquisition Menu



x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

Acquisition : TOMOGRAPHY
FRAME FORMAT : 64 word
WILL STOP AFTER:
32 Steps, 30 secs / step,
180 degrees rotation
DIRECTION : clockwise
STARTING ANGLE : 0
Step & Shoot
patient supine,
head towards gantry

4. To check the energy before beginning the acquisition, place a point source with the correct isotope under the detector head. Select **Check Energy**.

   An energy spectrum appears on the monitor.

5. A summary of the acquisition parameters including the matrix and stop conditions is displayed. Select **Clear Summary** to remove the list from the screen.

   To display the list again, select **Display Step Summary**.

6. To change any of the parameters for this acquisition, select **Modify Step**.

   The Acquisition Summary Menu is displayed again. You can change any parameter, then select **Return to Acquire**.

7. The persistence screen displays the persistence for Image A. If you are acquiring more than one image, you can select **Swap Isotopes** to view the persistence for Image B.

8. Depending upon your selection for tomo contour, there are two possibilities :

   ❏ If you selected the No option for the Tomo contour, continue with the procedure entitled “Using the circular orbit”.

   ❏ If you selected the Yes option for Tomo contour, continue with the procedure entitled “Using the non-circular orbit”.

Using the Circular Orbit

Warning: Always use the safety pad when you scan a patient.

1. To prepare the gantry for the acquisition, select **Prepare the Gantry**.
2. When the system beeps and you are prompted, press the safety pad.

   Note: If the gantry is not at the starting angle you specified, remove all obstacles from the path of the gantry and press **Start** on the hand control. The system beeps and the gantry rotates to the starting position.

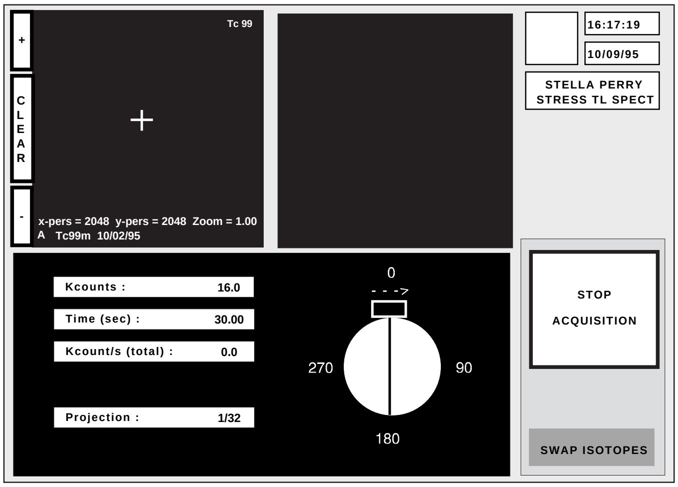
   If you are using the DS7 and the detector head is not at the 0° position, you are prompted to move it to that location.

   You are prompted to define the starting radius.
3. Use the Up or Down Arrow button to adjust the gantry radius, then press **Enter** on the hand control.

   The gantry preparation is complete, the Start Acquisition Menu is displayed again.
4. Select **Start Acquire**.

   A single beep signals the start of the acquisition. The Acquisition Menu is displayed (Figure 7-16).

Figure 7-16: Acquisition Menu



x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95
STELLA PERRY
STRESS TL SPECT

Kcounts : 16.0
Time (sec) : 30.00
Kcount/s (total) : 0.0
Projection : 1/32

5. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully
6. You have three options after the acquisition is complete.
   - ☐ Select **Exit** to return to the Main Menu.
   - ☐ Select **Prepare the Gantry** to acquire another study.
   - ☐ Select **Modify Step** to change the acquisition parameters before acquiring another image.

Using the Non-Circular Orbit

Warning: Always use the safety pad when you scan a patient.

1. To prepare the gantry for the acquisition, select **Prepare the Gantry**.
2. When the system beeps and you are prompted, press the safety pad.

   Note: If the gantry is not at the starting angle you specified, remove all obstacles from the path of the gantry and press **Start** on the hand control. The system beeps and the gantry rotates to the starting position.

   If you are using the DS7 and the detector head is not at the 0° position, you are prompted to move it to that location.

   You are prompted to define the starting radius.
3. Use the Up or Down Arrow button to define the starting radius for the gantry, then press **Enter** on the hand control.

   You are prompted to define the patient’s body contour.
4. Press **Start** on the hand control.

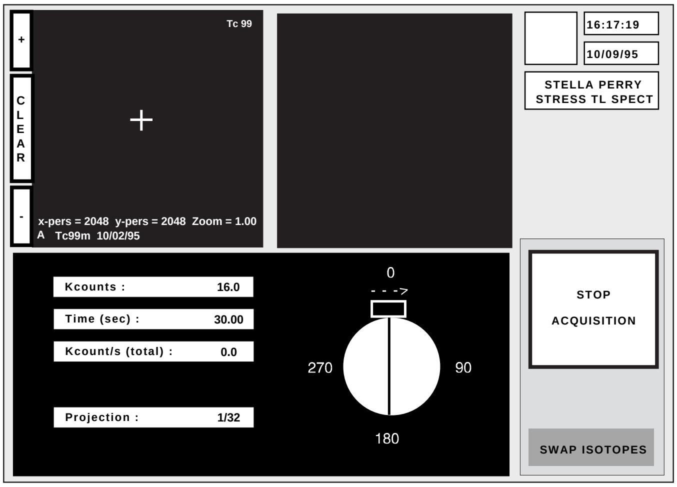
   The system beeps three times and the gantry begins to rotate around the patient.
5. Use the Up and Down Arrow buttons to adjust the gantry radius so that the distance between the detector head and the patient is a small as possible without allowing the detector head to touch the patient.

   After the you define the patient’s body contour, you are prompted to remove all obstacles around the gantry.
6. Make sure the gantry area is clear, then press **Start** on the hand control.

   The system beeps three times and the gantry moves to its starting position.
7. The gantry preparation is complete. The Start Acquisition Menu is displayed again.
8. Select **Start Acquire**.

   A single beep signals the start of the acquisition. The Acquisition Menu is displayed (Figure 7-17).

Figure 7-17: Acquisition Menu



Tc 99

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95

STELLA PERRY
STRESS TL SPECT

Kcounts : 16.0
Time (sec) : 30.00
Kcount/s (total) : 0.0
Projection : 1/32

9. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

10. You have three options after the acquisition is complete.
    - ❑ Select **Exit** to return to the Main Menu.
    - ❑ Select **Prepare the Gantry** to acquire another study.
    - ❑ Select **Modify Step** to change the acquisition parameters before acquiring another image.

Performing Gated Tomographic Acquisitions

Introduction

A gated tomographic acquisition allows you to acquire a serie of static images that can be reconstructed into a representation of a three-dimensional structure. The images themselves are acquired as gated images. That is, the acquisition links the capture of images to the R-wave to R-wave interval from a patient's EKG. Later, these images can be displayed individually, in groups, or in a cine format through the Display function.

Note: This type of acquisition requires you to attach an EKG gate to the patient and connect the gate to the camera.

Acquisition protocols are based on operator-defined values for parameters such as the number of images in an R-to-R interval, the duration for each image, the zoom factor, and the isotope.

After your department agrees on the parameters for a specific type of study, the parameters can be saved in a predefined protocol and used repeatedly.

This chapter includes two major sections.

- ❑ **Acquiring Gated Tomographic Studies** explains how to use the camera to acquire gated tomographic studies and how to create a predefined gated tomographic protocol.
- ❑ **Using a Predefined Gated Tomographic Protocol** explains how to use a gated tomographic acquisition protocol that has been previously defined.

Acquiring Gated Tomographic Images

This section explains how to use the camera to acquire gated tomographic studies.

The steps for acquiring gated tomographic studies include the following:

1. Prepare the EKG gate.
2. Select the patient, acquisition type and dataset name.
3. Specify the isotopes and energy levels.
4. Select the number of frames per R-to-R interval.
5. Define the tomographic parameters.
6. Specify the stop conditions.
7. Complete the acquisition.

Preparing the EKG Gate

Before you begin the acquisition, you must ensure that the EKG gate is attached and functioning. Refer to the instructions that were supplied with the gate to determine the best method for placing the leads on the patient.

When the gate is properly attached, switch it on.

Selecting a Patient, Acquisition Type, and Dataset Name

1. The name of the currently selected patient is displayed at the top of the Main Menu. To select a different patient, select **Change Patient**.

   Note: If there is no current patient, you can select one now. If you do not, you will be prompted to select one after you select the acquisition type in Step 3.

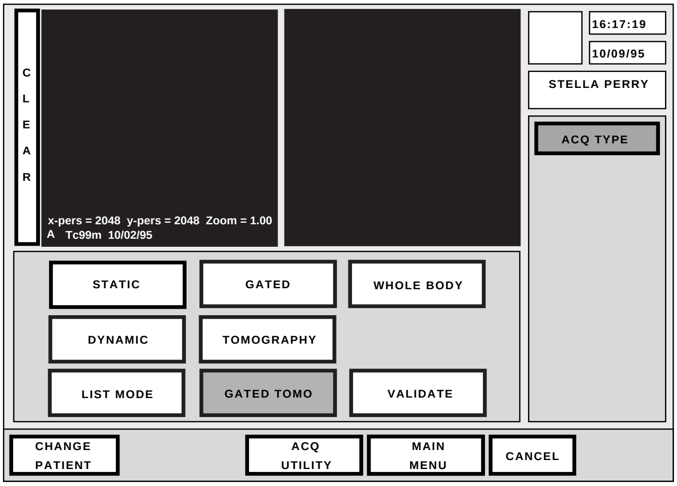
   You can search for a patient under a number of different criteria (select **Find Patient**), or enter a new patient (select **Create New Patient**).

   After you select a patient, the Main Menu is displayed again.

2. From the Main Menu, select **Manual Acquisition**.

   The Acquisition Type Menu is displayed.

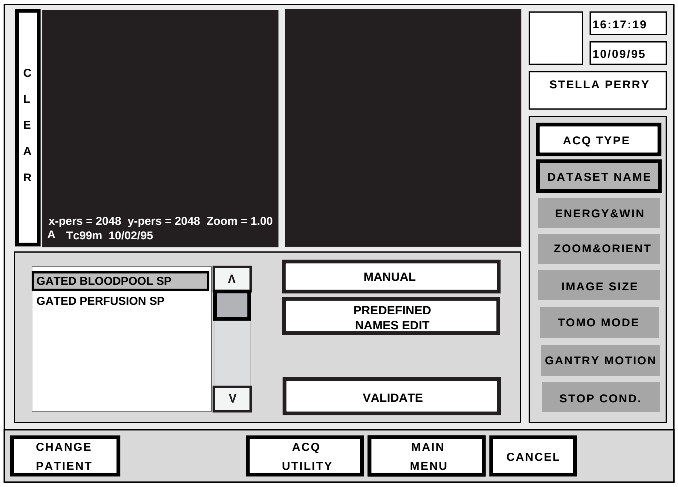
Figure 8-1: Acquisition Type Menu



3. Select **Gated Tomo** (Figure 8-1), then **Validate**.

   The Dataset Name Menu is displayed (Figure 8-2).

Figure 8-2: Dataset Name Menu



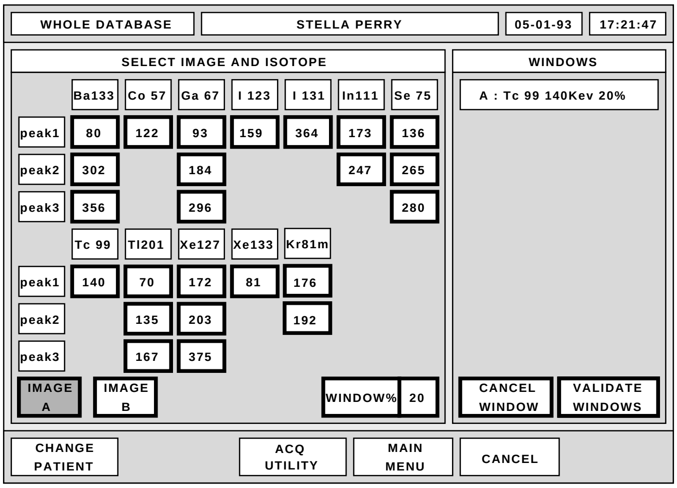
4. Select an existing dataset name from the scrolling list, or select **Manual** and enter a new one (4 to 18 characters). Select **Validate**.

   Note: You can use this menu to create and edit predefined dataset names. Refer to “Managing Dataset Names” in the chapter entitled “Standard Acquisition Operations” for more information.

   The Isotope Menu (also called the Energy & Window Menu) is displayed (Figure 8-3).

Selecting the Isotope

Figure 8-3: Isotope Menu



WHOLE DATABASE | STELLA PERRY | 05-01-93 | 17:21:47

	Ba133	Co 57	Ga 67	I 123	I 131	In111	Se 75
peak1	80	122	93	159	364	173	136
peak2	302		184			247	265
peak3	356		296				280

	Tc 99	Tl201	Xe127	Xe133	Kr81m
peak1	140	70	172	81	176
peak2		135	203		192
peak3		167	375		

WINDOW% 20

A : Tc 99 140Kev 20%

You can acquire up to two gated tomographic images simultaneously, each with its own isotope. Further, you can specify up to a combined total of eight energy levels for all isotopes (so long as none of the energy windows overlap).

The steps that follow explain how to select a single isotope and energy level. For information about using multiple isotopes, refer to the section entitled “Using Multiple Isotopes and Energy Levels” in the “Standard Acquisition Operations” chapter.

1. The name of the most recently used isotope and energy level appears in the Windows column of the Isotope Menu. If you do **not** want to acquire the image using this combination, select **Cancel Window**, then select the name of the isotope in the Windows column.
2. On the left side of the menu, Image A should be highlighted. If it is not, select **Image A**.
3. Select the isotope and energy peak you want to use for this acquisition.

   The isotope name is displayed in the Windows column.

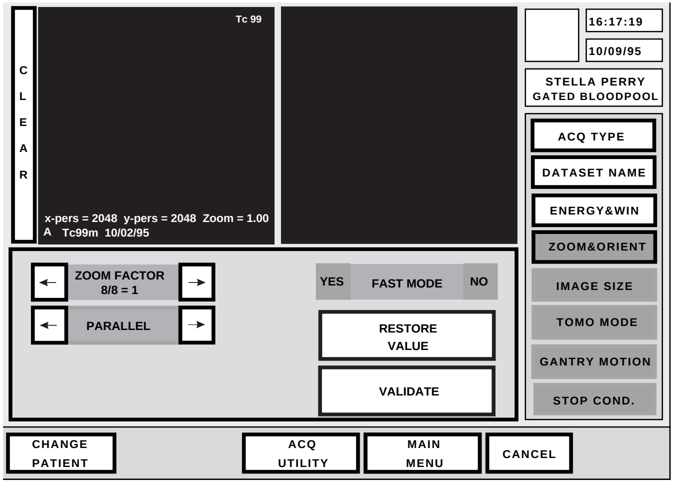
   Note: Up to three energy peaks are displayed for the isotopes. You can use up to eight energy peaks for a single image.
4. Select **Validate Windows** to accept the isotope and energy level.

   Important: When you select an isotope, the system automatically chooses a uniformity matrix, which is displayed in the detector’s persistence screen. Refer to the “Standard Acquisition Operations” chapter for information about manually changing the uniformity matrix.

   The Zoom & Orientation Menu is displayed (Figure 8-4).

Defining the Zoom and Orientation

Figure 8-4: Zoom & Orientation Menu



Tc 99

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95
STELLA PERRY
GATED BLOODPOOL

ZOOM FACTOR 8/8 = 1
PARALLEL
YES FAST MODE NO

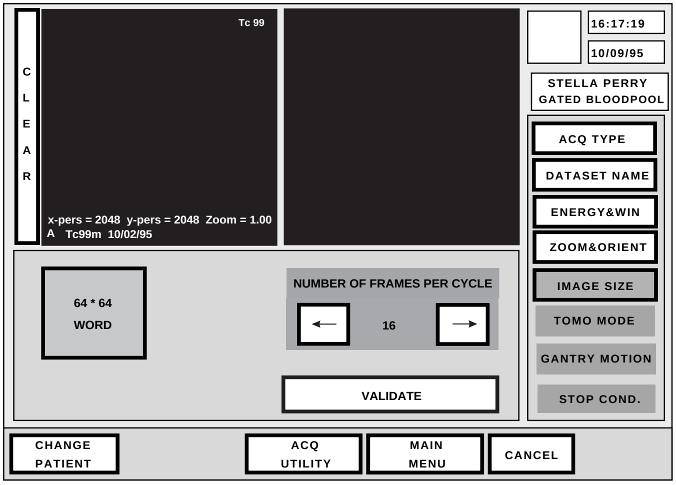
1. If you want to use a zoom factor, select the Arrow button on either side of **Zoom Factor**.

   Note: For more information about zoom factors on the DSX-DS7, refer to “Specifying the Zoom Factor” in the “Standard Acquisition Operations” chapter.

2. Use the Arrow buttons to change the name of the collimator to match the type of collimator you attached to the detectors.
3. Select **Validate**.

   The Matrix Size Menu (also called the Image Size Menu) is displayed (Figure 8-5).

Figure 8-5: Matrix Size Menu



Tc 99

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95
STELLA PERRY
GATED BLOODPOOL

64 * 64
WORD

NUMBER OF FRAMES PER CYCLE
16

4. With the Matrix Size Menu displayed, use the Arrow buttons to select the number of frames per cycle (or R-to-R interval)—8 to 32 in increments of 4.

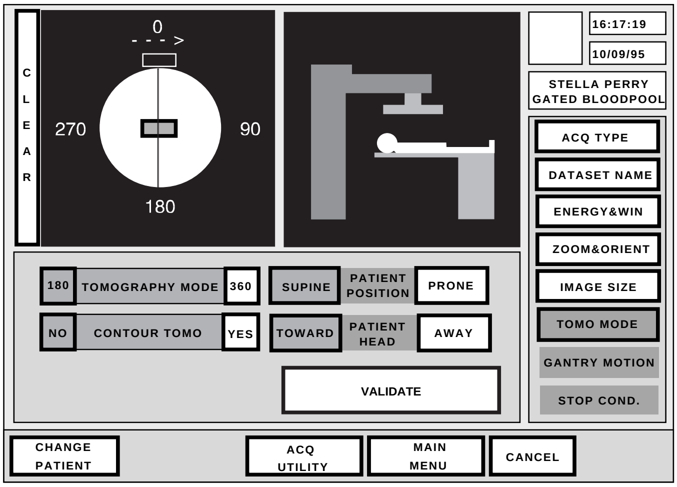
   Note: The only option for matrix size is preselected: 64 x 64 Word.

5. Select **Validate**.

The Tomography Mode Menu is displayed (Figure 8-6).

Defining the Tomography Mode

Figure 8-6: Tomography Mode Menu



16:17:19
10/09/95
STELLA PERRY
GATED BLOODPOOL

1. Select **Tomography Mode** to specify whether the acquisition will be gathered in 180° or a full 360°. The highlighted box toggles between 180° and 360°.
2. Select **Contour Tomo** to define the camera path. The highlighted box toggles between No (Circular orbit) and Yes (Non Circular orbit).
3. Select **Patient Position** to define whether the patient will be prone or supine during the acquisition. The highlighted box toggles between Supine and Prone.
4. Select **Patient Head** to define whether the patient's head is toward or away from the gantry. The highlighted box toggles between Toward and Away.
5. Select **Validate**.

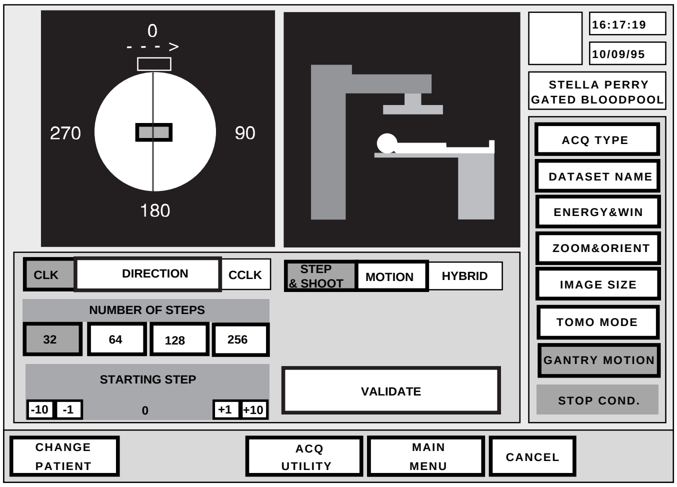
   The Gantry Motion Menu is displayed (Figure 8-7).

Defining the Gantry Motion

Figure 8-7: Gantry Motion Menu

1. Select **Direction** to define the direction in which the gantry will rotate. The highlighted box toggles between CLK (clockwise) and CCLK (counterclockwise).
2. Select the number of steps, or images, that will make up the tomographic acquisition.

   For 180° acquisitions, you can select **32**, **64** and **128** steps. For 360° acquisitions, you can select **32**, **64**, **128** and **256** steps.
3. Select **Motion** to specify how the gantry motion and acquisition are coordinated.



- Highlight Step & Shoot if you want the gantry to move to the next step before the next image is acquired.
- Highlight Hybrid if you want the acquisition of the next image to begin while the gantry is moving to the next step.

Note: By using the Hybrid motion option you can reduce the total acquisition time

4. Use the Plus/Minus buttons to define the Starting Step (that is, the starting angle for the camera). The following table lists the options, which depend upon the other gantry parameters.

Tomo Mode	Direction	Starting Angle
180°	CLK	0° to 360°
	CCLK	180° to 540°
360°	CLK	0° to 180°
	CCLK	360° to 540°

5. Select **Validate**.

   The Stop Conditions Menu is displayed (Figure 8-8).

Defining the Stop Conditions

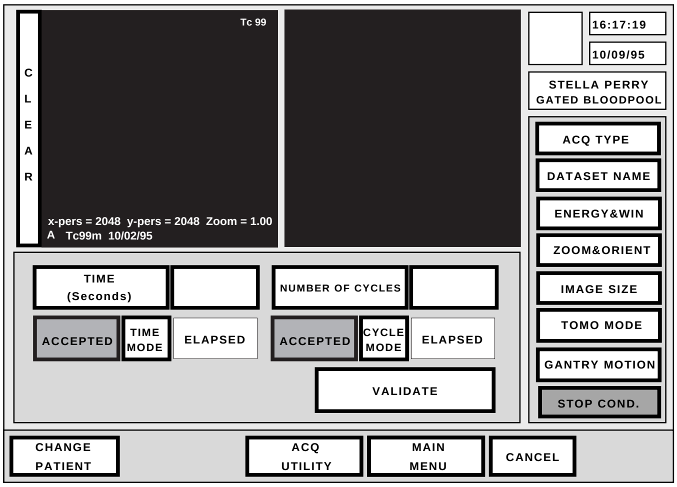
Figure 8-8: Stop Conditions Menu

You can define the end of a gated tomographic acquisition by specifying one or more of the following parameters:

- length of time
- number of heartbeats

If you enter a value for more than one parameter, the acquisition ends when any of the conditions is met.

1. To stop the acquisition after a specific length of time, select **Time**.



Note: Time Mode toggles between two options: Elapsed and Accepted. Elapsed time is measured from the beginning of the acquisition. Accepted time is measured only during the time that accepted heartbeats (beats whose R-waves reach the trigger threshold within the heart rate window) are being recorded.

Enter the number of seconds (up to 3600) that the acquisition should run.

2. To stop the acquisition after a specific number of heartbeats, select **Number of Cycles**.

   Note: Cycle Mode toggles between two options: Elapsed and Accepted. Elapsed cycles are counted from the beginning of the acquisition. Accepted cycles are counted only if the cycle occurs within the heart rate window.

   Enter the number of cycles (up to 3600) that the acquisition should run.

3. Select **Validate**.

   The Acquisition Summary Menu is displayed (Figure 8-9).

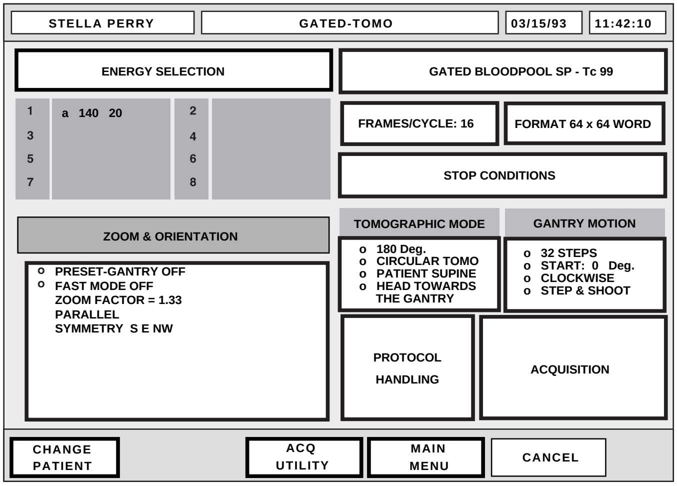
4. You have two options.

   ❑ If you are acquiring a gated tomographic study, continue with the next procedure.

   ❑ If you are creating a predefined protocol, continue with the procedure entitled “Creating a Predefined Protocol.”

Preparing for the Acquisition

Figure 8-9: Acquisition Summary Menu



STELLA PERRY
GATED-TOMO
03/15/93
11:42:10

GATED BLOODPOOL SP - Tc 99

1 a 140 20
3
5
7
2
4
6
8

FRAMES/CYCLE: 16
FORMAT 64 x 64 WORD

o PRESET-GANTRY OFF
o FAST MODE OFF
ZOOM FACTOR = 1.33
PARALLEL
SYMMETRY S E NW

o 180 Deg.
o CIRCULAR TOMO
o PATIENT SUPINE
o HEAD TOWARDS THE GANTRY

o 32 STEPS
o START: 0 Deg.
o CLOCKWISE
o STEP & SHOOT

1. To change a parameter, select the button containing information for that parameter.

   Example: If you want to choose a different isotope, select the button labeled **Energy Selection** above the isotope list.

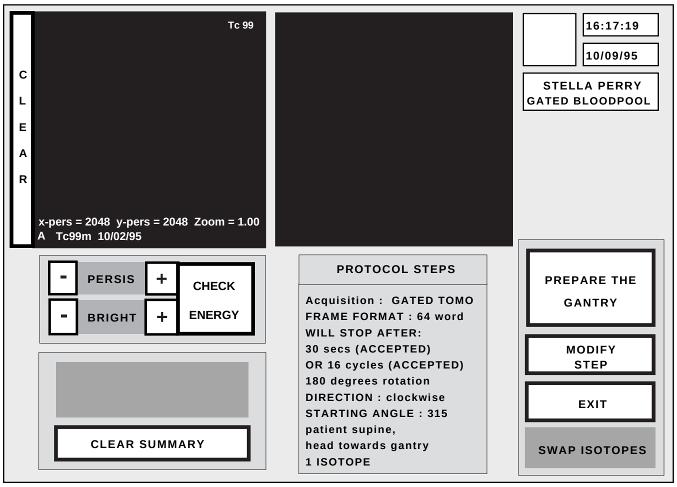
2. To continue, select **Acquisition**.

   The Start Acquisition Menu is displayed (Figure 8-10).

Starting the Acquisition

Preparing the Acquisition

Figure 8-10: Start Acquisition Menu



Tc 99
x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95
STELLA PERRY
GATED BLOODPOOL

Acquisition : GATED TOMO
FRAME FORMAT : 64 word
WILL STOP AFTER:
30 secs (ACCEPTED)
OR 16 cycles (ACCEPTED)
180 degrees rotation
DIRECTION : clockwise
STARTING ANGLE : 315
patient supine,
head towards gantry
1 ISOTOPE

The Start Acquisition Menu allows you to prepare for the acquisition. In addition, you can review the parameters that the protocol uses.

1. To check the energy before beginning the acquisition, place a point source with the correct isotope under the detector head. Select **Check Energy**.

   An energy spectrum appears on the monitor.

2. A summary of the acquisition parameters is displayed on the menu. To remove the list, select **Clear Summary**.

   To view the list again, select **Display Step Summary**.

3. To change any of the parameters for this acquisition, select **Modify Step**.

   The Acquisition Summary Menu is displayed. You can change any parameter, then select **Return to Acquire**.

4. The persistence screen displays the persistence for Image A. If you are acquiring more than one image, you can select **Swap Isotopes** to view the persistence for Image B.

5. Depending upon your selection for tomo contour, there are two possibilities :

   ❑ If you selected the No option for the Tomo contour, continue with the procedure entitled “Using the circular orbit”.

   ❑ If you selected the Yes option for Tomo contour, continue with the procedure entitled “Using the non-circular orbit”.

Using the Circular Orbit

Warning: Always use the safety pad when you scan a patient.

1. To prepare the gantry for the acquisition, select **Prepare the Gantry**.

2. When the system beeps and you are prompted, press the safety pad.

   Note: If the gantry is not at the starting angle you specified, remove all obstacles from the path of the gantry and press **Start** on the hand control. The system beeps and the gantry rotates to the starting position.

   If you are using the DS7 and the detector head is not at the 0° position, you are prompted to move it to that location.

   You are prompted to define the starting radius.

3. Use the Up or Down Arrow button to adjust the gantry radius, then press **Enter** on the hand control.

   The gantry preparation is complete, the Start ECG Analysis Menu is displayed.

4. Select **ECG Analysis**.

   The ECG Analysis Menu is displayed (Figure 8-11).

Using the Non-Circular Orbit

Warning: Always use the safety pad when you scan a patient.

1. To prepare the gantry for the acquisition, select **Prepare the Gantry**.

2. When the system beeps and you are prompted, press the safety pad.

   Note: If the gantry is not at the starting angle you specified, remove all obstacles from the path of the gantry and press **Start** on the hand control. The system beeps and the gantry rotates to the starting position.

   If you are using the DS7 and the detector head is not at the 0° position, you are prompted to move it to that location.

   You are prompted to define the starting radius.

3. Use the Up or Down Arrow button to define the starting radius for the gantry, then press **Enter** on the hand control.

   You are prompted to define the patient's body contour.

4. Press **Start** on the hand control.

   The system beeps three times and the gantry begins to rotate around the patient.

5. Use the Up and Down Arrow buttons to adjust the gantry radius so that the distance between the detector head and the patient is a small as possible without allowing the detector head to touch the patient.

   After the you define the patient's body contour, you are prompted to remove all obstacles around the gantry.

6. Make sure the gantry area is clear, then press **Start** on the hand control.

   The system beeps three times and the gantry moves to its starting position.

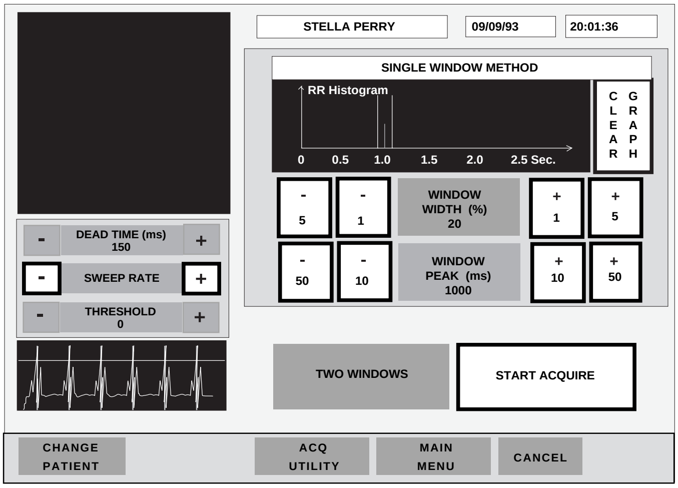
   The gantry preparation is complete. The Start ECG Analysis Menu is displayed.

7. Select **ECG Analysis**.

   The ECG Analysis Menu is displayed (Figure 8-11).

Defining the Heart Rate Window

Figure 8-11: ECG Analysis Menu



STELLA PERRY

09/09/93

20:01:36

DEAD TIME (ms) 150

THRESHOLD 0

WINDOW WIDTH (%) 20

WINDOW PEAK (ms) 1000

You can use the ECG Analysis Menu to define the heart rate window. The patient’s EKG is displayed on the lower left of the menu. Red vertical lines indicate what the system identifies as R-waves.

⚠ **Important:** To complete a gated acquisition, you must ensure that the R-wave is the tallest wave on the display. If the R-wave is not consistently the tallest wave, adjust the gain on the EKG gate or reposition the leads.

On the upper right of the menu, the system displays a histogram of the patient’s heartbeats, with the interval between R-waves on the x-axis and the number of intervals on the y-axis. Use this part of the menu to identify the range of heart rates that will be accepted during the acquisition.

The following steps explain how to set the heart rate window.

1. You can control the frequency of the R-to-R intervals as they sweep across the screen. Select the **Sweep Rate** buttons to adjust the frequency.

   Note: If the patient has a fast heart rate, select the Minus buttons to lower the sweep rate and display more beats in the EKG window. Conversely, if the patient’s heart rate is slow, you can select the Plus buttons to raise the sweep rate.

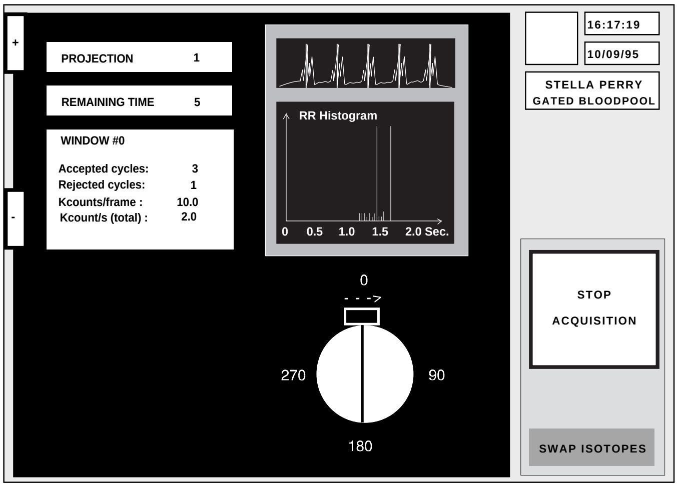
2. Define the peak and width the window. Select the **Window Peak** buttons to move the center of the heart rate window to the peak of the histogram (200 to 3000 msec.).

3. Select the **Window Width** buttons to adjust the range of heartbeats that will be accepted during the acquisition (1% to 99%).

4. Select **Start Acquire**.

   A single beep signals the start of the acquisition. The Acquisition Menu is displayed (Figure 8-12).

Figure 8-12: Acquisition Menu



PROJECTION 1

REMAINING TIME 5

WINDOW #0

Accepted cycles: 3
Rejected cycles: 1
Kcounts/frame : 10.0
Kcount/s (total) : 2.0

16:17:19
10/09/95

STELLA PERRY
GATED BLOODPOOL

5. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

6. You have three options after the acquisition is complete.
   - Select **Exit** to return to the Main Menu.
   - Select **Prepare the Gantry** to acquire another study.
   - Select **Modify Step** to change the acquisition parameters before acquiring another study.

Creating a Predefined Protocol

The values for the following parameters are saved with the protocol:

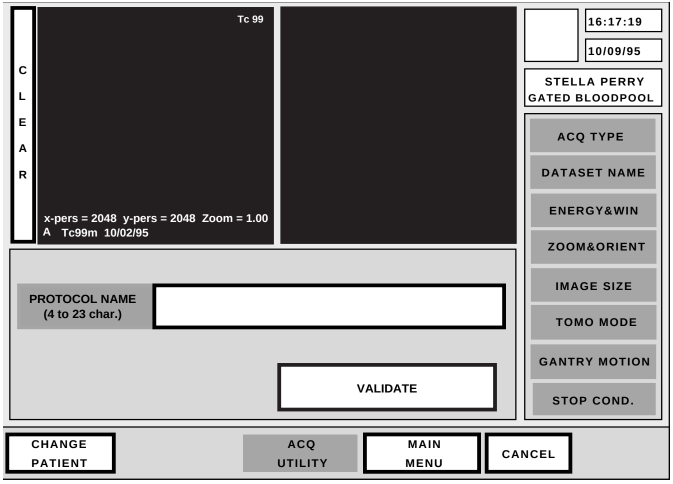
- protocol name
- dataset name
- matrix size
- number of frames per interval
- camera view
- stop conditions
- zoom factor
- patient orientation

Follow the steps below to save the parameters as a new protocol.

1. Select **Protocol Handling**.

   The Protocol Handling Menu is displayed (Figure 8-13).

Figure 8-13: Protocol Handling Menu



2. The box labeled **Enter Protocol Name** is highlighted. Enter a name (4 to 24 characters) for the protocol, press <ENTER> and select **Validate**.

3. The box labeled **Enter Additional Prompt Message** is highlighted. You can enter an optional message (less than 24 characters) in this box. Press <ENTER> and select **Validate**.

   The message will appear on the Start Acquisition Menu the next time someone uses the protocol.

4. If you want to chain this to another protocol, select **Yes**; otherwise, select **No**. Select **Validate.**

   ❑ If you chain the protocol, a serie of screens, which allow you to define another protocol, is displayed. For more information about chaining protocols, refer to the section entitled “Working with Chained Protocols” in the “Standard Acquisitions Operations” chapter.

   ❑ If you do not chain the protocol, the Main Menu is displayed.

Using a Predefined Gated Tomographic Protocol

The procedure for using a predefined gated tomographic acquisition protocol follows these general guidelines:

1. Prepare the EKG gate.
2. Select the patient.
3. Select the predefined protocol.
4. Start the acquisition.

You also have the option to modify the protocol before you begin the acquisition.

Preparing the EKG Gate

Before you begin the acquisition, you must ensure that the EKG gate is attached and functioning. Refer to the instructions that were supplied with the gate to determine the best method for placing the leads on the patient.

When the gate is properly attached, switch it on.

Selecting the Patient

The name of the currently selected patient is displayed at the top of the Main Menu. Use the following steps to select a different patient.

1. Select **Change Patient.**

   The Patient Directory Menu is displayed.

2. Select the patient for whom you want to acquire the dataset.

   You can search for a patient under a number of different criteria (select **Find Patient**), or enter a new patient (select **Create a New Patient**).

   After you select a patient, the Main Menu is displayed again.

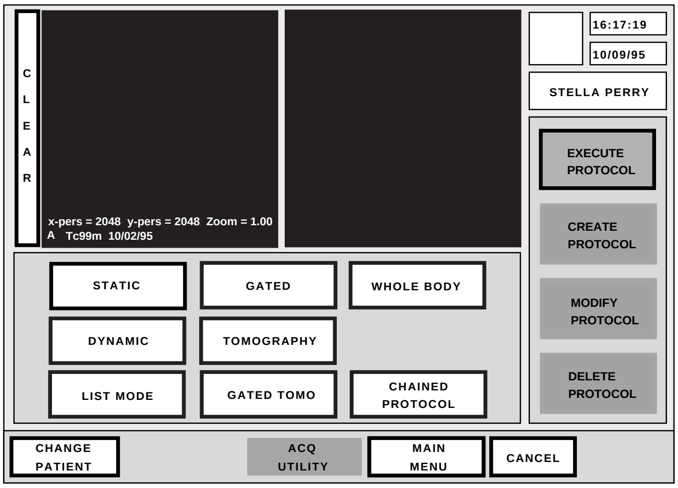
Selecting the Predefined Protocol

After you select the correct patient and return to the Main Menu, you can select the protocol you want to use. Follow the steps below.

1. From the Main Menu, select **Acquisition Protocol**.

   The Protocol Type Menu is displayed (Figure 8-14).

Figure 8-14: Protocol Type Menu



2. Select **Gated Tomo**.

   A menu with existing gated tomographic acquisition protocols is displayed.

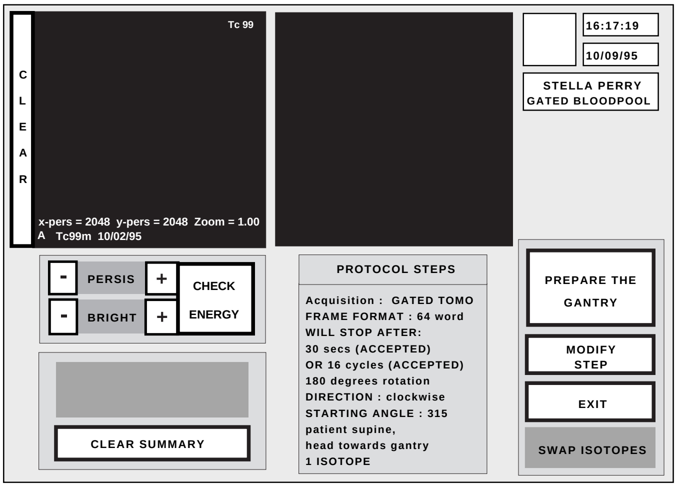
3. Select the protocol you want to use.

   The Start Acquisition Menu is displayed (Figure 8-15).

Starting the Acquisition

Preparing the Acquisition

Figure 8-15: Start Acquisition Menu



Acquisition : GATED TOMO
FRAME FORMAT : 64 word
WILL STOP AFTER:
30 secs (ACCEPTED)
OR 16 cycles (ACCEPTED)
180 degrees rotation
DIRECTION : clockwise
STARTING ANGLE : 315
patient supine,
head towards gantry
1 ISOTOPE

The Start Acquisition Menu allows you to prepare for the acquisition. In addition, you can review the parameters that the protocol uses.

1. To check the energy before beginning the acquisition, place a point source with the correct isotope under the detector head. Select **Check Energy**.

   An energy spectrum appears on the monitor.

2. A summary of the acquisition parameters is displayed on the menu. To remove the list, select **Clear Summary**.

   To view the list again, select **Display Step Summary**.

3. To change any of the parameters for this acquisition, select **Modify Step**.

   The Acquisition Summary Menu is displayed. You can change any parameter, then select **Return to Acquire**.

4. The persistence screen displays the persistence for Image A. If you are acquiring more than one image, you can select **Swap Isotopes** to view the persistence for Image B.

5. Depending upon your selection for tomo contour, there are two possibilities :

   ❑ If you selected the No option for the Tomo contour, continue with the procedure entitled “Using the circular orbit”.

   ❑ If you selected the Yes option for Tomo contour, continue with the procedure entitled “Using the non-circular orbit”.

Using the Circular Orbit

Warning: Always use the safety pad when you scan a patient.

1. To prepare the gantry for the acquisition, select **Prepare the Gantry**.

2. When the system beeps and you are prompted, press the safety pad.

   Note: If the gantry is not at the starting angle you specified, remove all obstacles from the path of the gantry and press **Start** on the hand control. The system beeps and the gantry rotates to the starting position.

   If you are using the DS7 and the detector head is not at the 0° position, you are prompted to move it to that location.

   You are prompted to define the starting radius.

3. Use the Up or Down Arrow button to adjust the gantry radius, then press **Enter** on the hand control.

   The gantry preparation is complete, the Start ECG Analysis Menu is displayed.

4. Select **ECG Analysis**.

   The ECG Analysis Menu is displayed (Figure 8-16).

Using the Non-Circular Orbit

Warning: Always use the safety pad when you scan a patient.

1. To prepare the gantry for the acquisition, select **Prepare the Gantry**.
2. When the system beeps and you are prompted, press the safety pad.

   Note: If the gantry is not at the starting angle you specified, remove all obstacles from the path of the gantry and press **Start** on the hand control. The system beeps and the gantry rotates to the starting position.

   If you are using the DS7 and the detector head is not at the 0° position, you are prompted to move it to that location.

   You are prompted to define the starting radius.
3. Use the Up or Down Arrow button to define the starting radius for the gantry, then press **Enter** on the hand control.

   You are prompted to define the patient's body contour.
4. Press **Start** on the hand control.

   The system beeps three times and the gantry begins to rotate around the patient.
5. Use the Up and Down Arrow buttons to adjust the gantry radius so that the distance between the detector head and the patient is a small as possible without allowing the detector head to touch the patient.

   After the you define the patient's body contour, you are prompted to remove all obstacles around the gantry.
6. Make sure the gantry area is clear, then press **Start** on the hand control.

   The system beeps three times and the gantry moves to its starting position.

   The gantry preparation is complete. The Start ECG Analysis Menu is displayed.
7. Select **ECG Analysis**.

   The ECG Analysis Menu is displayed (Figure 8-16).

Defining the Heart Rate Window

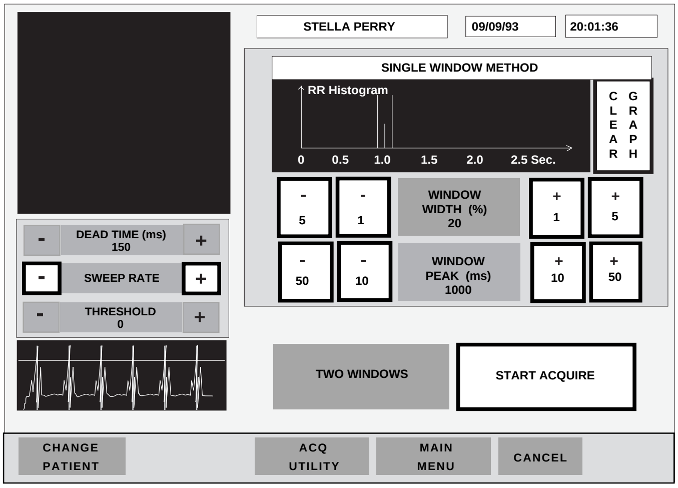


Figure 8-16: ECG Analysis Menu

STELLA PERRY 09/09/93 20:01:36

SINGLE WINDOW METHOD

DEAD TIME (ms) 150

THRESHOLD 0

WINDOW WIDTH (%) 20

WINDOW PEAK (ms) 1000

You can use the ECG Analysis Menu to define the heart rate window. The patient's EKG is displayed on the lower left of the menu. Red vertical lines indicate what the system identifies as R-waves.

Important: To complete a gated acquisition, you must ensure that the R-wave is the tallest wave on the display. If the R-wave is not consistently the tallest wave, adjust the gain on the EKG gate or reposition the leads.

On the upper right of the menu, the system displays a histogram of the patient's heartbeats, with the interval between R-waves on the x-axis and the number of intervals on the y-axis. Use this part of the menu to identify the range of heart rates that will be accepted during the acquisition.

The following steps explain how to set the heart rate window.

1. You can control the frequency of the R-to-R intervals as they sweep across the screen. Select the **Sweep Rate** buttons to adjust the frequency.

   Note: If the patient has a fast heart rate, select the Minus buttons to lower the sweep rate and display more beats in the EKG window. Conversely, if the patient's heart rate is slow, you can select the Plus buttons to raise the sweep rate.

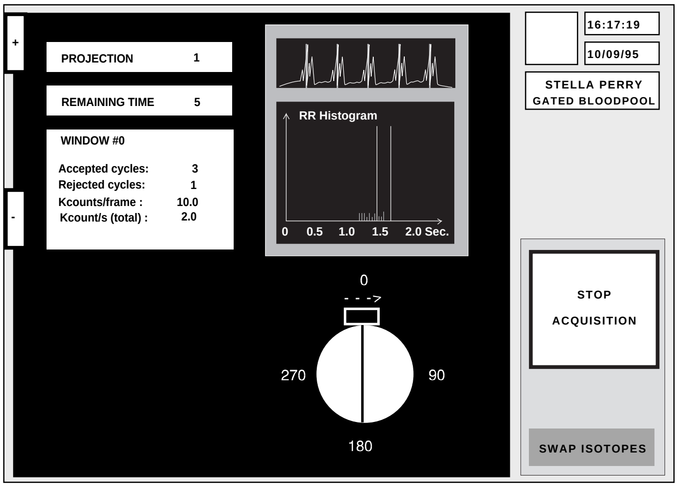
2. Define the peak and width the window. Select the **Window Peak** buttons to move the center of the heart rate window to the peak of the histogram (200 to 3000 msec.).

3. Select the **Window Width** buttons to adjust the range of heartbeats that will be accepted during the acquisition (1% to 99%).

4. Select **Start Acquire**.

   A single beep signals the start of the acquisition. The Acquisition Menu is displayed (Figure 8-17).

Figure 8-17: Acquisition Menu



PROJECTION 1

REMAINING TIME 5

WINDOW #0

Accepted cycles: 3
Rejected cycles: 1
Kcounts/frame : 10.0
Kcount/s (total) : 2.0

16:17:19
10/09/95

STELLA PERRY
GATED BLOODPOOL

5. When the acquisition is complete, the following message is displayed:

   Acquisition Step Completed Successfully

6. You have three options after the acquisition is complete.

   ☐ Select **Exit** to return to the Main Menu.

   ☐ Select **Prepare the Gantry** to acquire another study.

   ☐ Select **Modify Step** to change the acquisition parameters before acquiring another study.

Performing Whole Body Acquisitions

Introduction

Whole body acquisitions record images in two passes: Anterior and Posterior (although one pass is an option, too). This software also includes a Body Contour option. You can use this option to “train” the camera to follow the patient’s body contour. During the acquisition, the camera follows the same contour, decreasing the detector-to-patient distance, thereby improving the resolution of the study.

Whole body acquisitions are based on operator-defined values for parameters such as the isotope, the scanning speed, and the zoom factor. After your department agrees on the parameters for a specific type of study, the parameters can be saved in a predefined protocol and used repeatedly.

This chapter includes three major sections.

- ❑ **Acquiring Whole Body Studies** explains how to use the camera to acquire whole body study and how to create a predefined whole body acquisition protocol.
- ❑ **Using a Predefined Whole Body Protocol** explains how to use a whole body acquisition protocol that has been previously defined.
- ❑ **Using the Whole Body Display** explains how to display whole body studies with the Acquisition console’s Display option.

Acquiring Whole Body Studies

This section explains how to use the camera to acquire whole body studies.

The steps for acquiring whole body images include the following:

1. Select a patient, acquisition type, and dataset name.
2. Specify the isotopes and energy levels.
3. Define the whole body parameters.
4. Complete the acquisition.

Selecting the Patient, Acquisition Type and Dataset Name

1. The name of the currently selected patient is displayed at the top of the Main Menu. To select a different patient, select **Change Patient**.

   Note: If there is no current patient, you can select one now. If you do not, you will be prompted to select one after you select the acquisition type in Step 3.

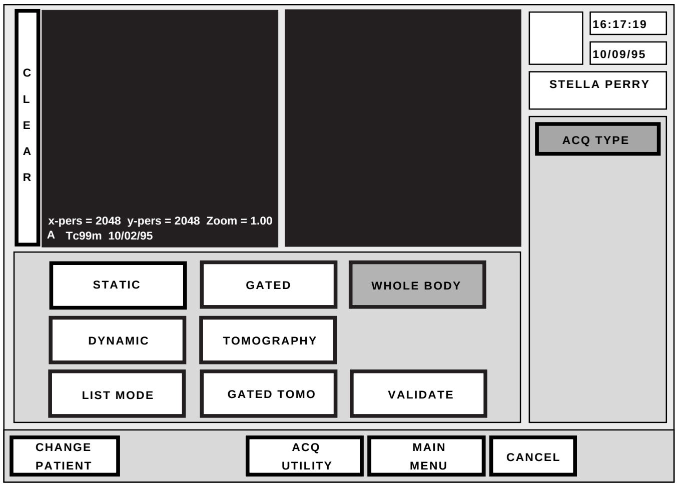
   You can search for a patient under a number of different criteria (select **Find Patient**), or enter a new patient (select **Create New Patient**).

   After you select a patient, the Main Menu is displayed again.

2. From the Main Menu, select **Manual Acquisition**.

   The Acquisition Type Menu is displayed.

Figure 9-1: Acquisition Type Menu



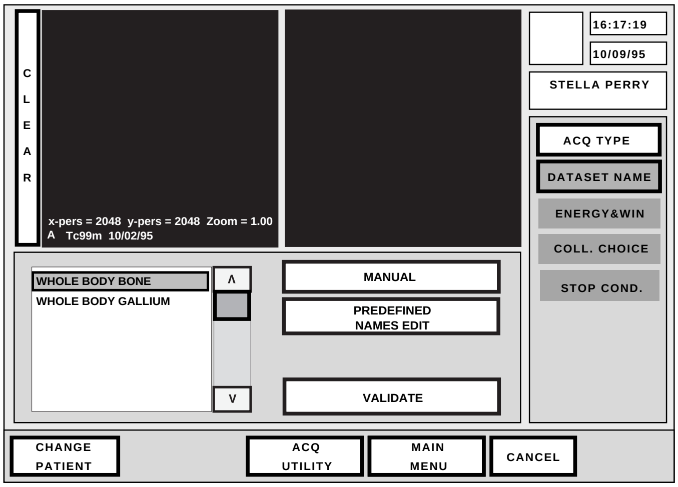
16:17:19
10/09/95
STELLA PERRY

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

3. Select **Whole Body** (Figure 9-1), then **Validate**.

   The Dataset Name Menu is displayed (Figure 9-2).

Figure 9-2: Dataset Name Menu



16:17:19
10/09/95
STELLA PERRY

x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

WHOLE BODY BONE
WHOLE BODY GALLIUM

Note: In the DSX case, there is no **Coll. Choice** box displayed.

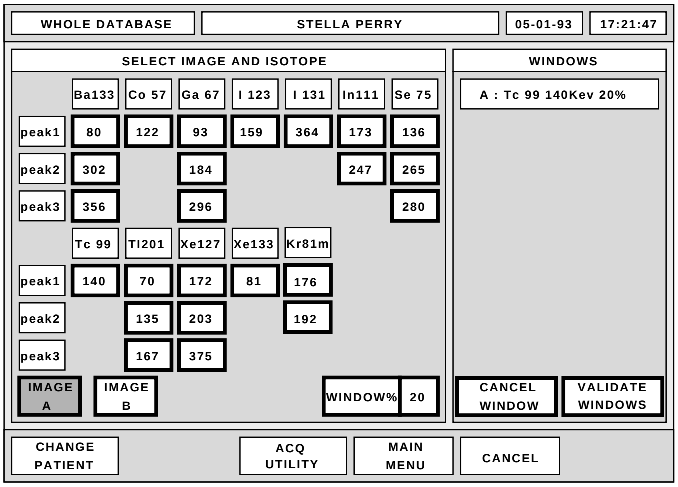
4. Select an existing dataset name from the scrolling list, or select **Manual** and enter a new one (4 to 18 characters). Select **Validate**.

Note: You can use this menu to create and edit predefined dataset names. Refer to "Managing Dataset Names" in the chapter entitled "Standard Acquisition Operations" for more information.

The Isotope Menu (also called the Energy & Window Menu) is displayed (Figure 9-3).

Selecting the Isotope

Figure 9-3: Isotope Menu



WHOLE DATABASE
STELLA PERRY
05-01-93
17:21:47

	Ba133	Co 57	Ga 67	I 123	I 131	In111	Se 75
peak1	80	122	93	159	364	173	136
peak2	302		184			247	265
peak3	356		296				280

	Tc 99	Tl201	Xe127	Xe133	Kr81m
peak1	140	70	172	81	176
peak2		135	203		192
peak3		167	375		

WINDOW% 20

A : Tc 99 140Kev 20%

You can acquire up to two images simultaneously, each with its own isotope. Further, you can specify up to a combined total of eight energy levels for all isotopes (so long as none of the energy windows overlap).

The steps that follow explain how to select a single isotope and energy level. For information about using multiple energy levels, refer to the section entitled “Using Multiple Isotopes and Energy Levels” in the “Standard Acquisition Operations” chapter.

1. The name of the most recently used isotope and energy level appears in the Windows column of the Isotope Menu. If you do **not** want to acquire the image using this combination, select **Cancel Window**, then select the name of the isotope in the Windows column.

2. Select the isotope and energy peak you want to use for this acquisition.

   The isotope name is displayed in the Windows column.

   Note: Up to three energy peaks are displayed for the isotopes. You can use up to eight energy peaks for a single image.

3. Select **Validate Windows** to accept the isotope and energy level.

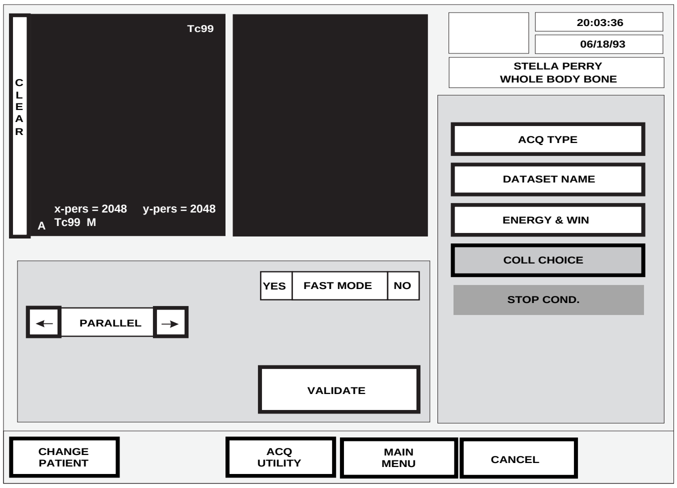
   Important: When you select an isotope, the system automatically chooses a uniformity matrix, which is displayed in the detector’s persistence screen. Refer to the “Standard Acquisition Operations” chapter for information about manually changing the uniformity matrix.

   In the DSX case the Stop Conditions Menu is displayed (Figure 9-5). Skip to “Defining the Stop Conditions”.

   In the DS7 case the Collimator Menu is displayed (Figure 9-4).

Selecting the Collimator

Figure 9-4: Collimator Menu



20:03:36
06/18/93
STELLA PERRY
WHOLE BODY BONE

x-pers = 2048 y-pers = 2048
Tc99 M

1. If you want to specify a different collimator, press the Arrow button on either side of the collimator name to scroll through the options: parallel or mono-diverging.

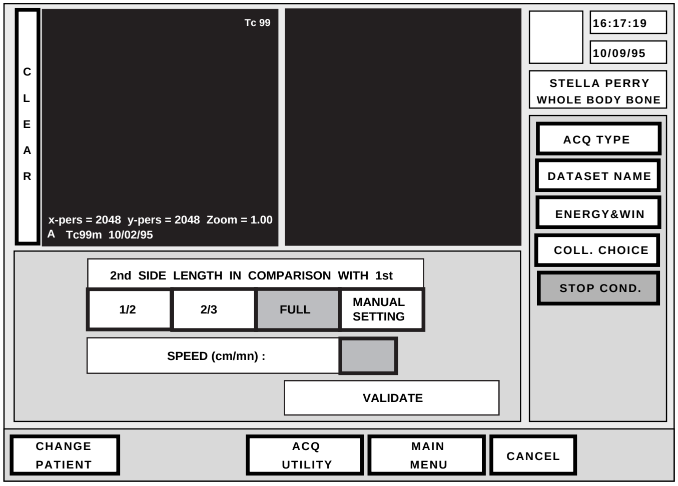
Note: Make sure that the collimator name matches the collimator on the detector; otherwise, the image will be distorted.

2. Select **Validate**.

   The Stop Conditions Menu is displayed (Figure 9-5)

Defining the Stop Conditions

Figure 9-5: Stop Conditions Menu



You can define the end of a continuous whole body acquisition by specifying the scan speed (in centimeters per minute).

1. Enter the scanning speed in centimeters per minute (2 to 80).

   Note: If you want to use body contouring, the DSX/DS7 is limited to scans no faster than 25 cm/minute.

2. Specify the length of the posterior image. You can select one-half, two-thirds, full length, or Manual.

   Note: The minimum travel length is 100 cm for the DSX and 90 cm for the DS7.

3. Select **Validate**.

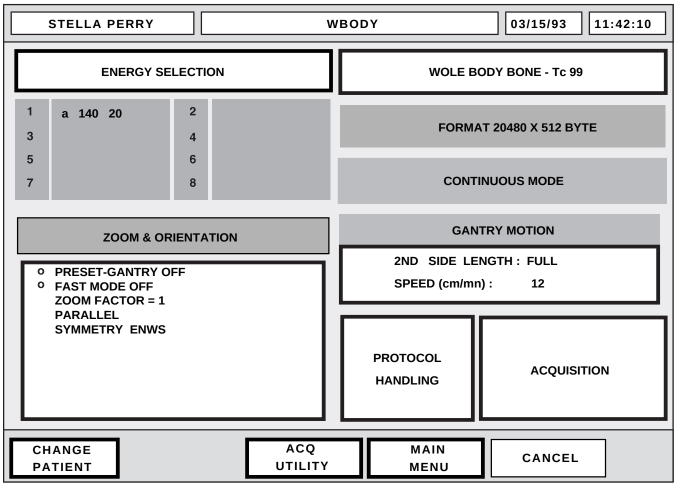
   The Acquisition Summary Menu is displayed (Figure 9-6).

4. You have two options.

   - ❑ If you are acquiring a whole body image, continue with “Preparing for the Acquisition.”
   - ❑ If you are creating a predefined protocol, continue with the procedure entitled “Creating a Predefined Protocol.”

Preparing for the Acquisition

Figure 9-6: Acquisition Summary Menu



STELLA PERRY
WBODY
03/15/93
11:42:10

WOLE BODY BONE - Tc 99

1 a 140 20
3
5
7
2
4
6
8

FORMAT 20480 X 512 BYTE
CONTINUOUS MODE

PRESET-GANTRY OFF
FAST MODE OFF
ZOOM FACTOR = 1
PARALLEL
SYMMETRY ENWS

2ND SIDE LENGTH : FULL
SPEED (cm/mn) : 12

The Acquisition Summary Menu lists the parameters you selected for your acquisition.

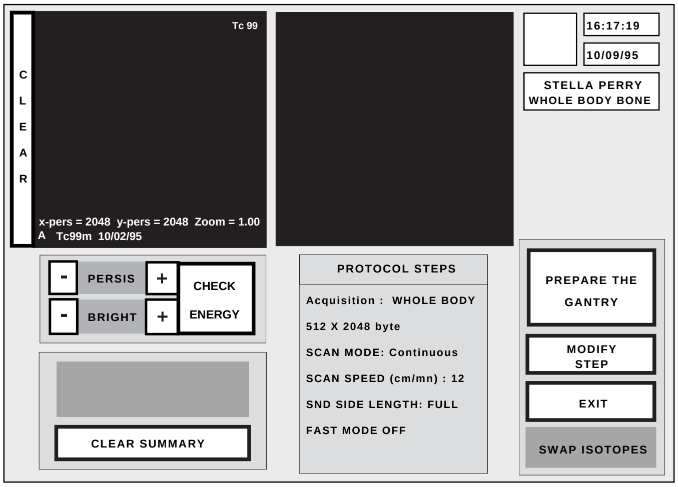
1. To change a parameter, select the button containing information for that parameter.

   Example: If you want to choose a different isotope, select the button labeled **Energy Selection** above the isotope list.

2. To continue, select **Acquisition**.

   The Start Acquisition Menu is displayed (Figure 9-7).

Figure 9-7: Start Acquisition Menu



Tc 99
x-pers = 2048 y-pers = 2048 Zoom = 1.00
A Tc99m 10/02/95

16:17:19
10/09/95
STELLA PERRY
WHOLE BODY BONE

PROTOCOL STEPS
Acquisition : WHOLE BODY
512 X 2048 byte
SCAN MODE: Continuous
SCAN SPEED (cm/mn) : 12
SND SIDE LENGTH: FULL
FAST MODE OFF

3. To check the energy before beginning the acquisition, place a point source with the correct isotope under the detector heads. Select **Check Energy**.

   An energy spectrum appears on the monitor.

4. A summary of the acquisition parameters including the matrix and stop conditions is displayed in the center of the menu. Select **Clear Summary** to remove the list.

   To display the list again, select **Display Step Summary**.

5. To change any of the parameters for this acquisition, select **Modify Step**.

   The Acquisition Summary Menu is displayed again. You can change any parameter, then select **Return to Acquire**.

Preparing the Gantry

1. To prepare the gantry for the acquisition, select **Prepare the Gantry**.

   A series of prompts appears on the monitor to guide you through the gantry preparation

   Warning: Always use the safety pad when you scan a patient.

1. When the system beeps and you are prompted, press the safety pad.

   Note: If the gantry is not at 0° rotation angle, remove all obstacles from the path of the gantry and press **Start** on the hand control. The system beeps and the gantry rotates to the starting position.

   If you are using the DS7 and the detector head is not at the 0° position, you are prompted to move it to that location.

   You are prompted to move the detector's field of view (FOV) over the patient's head.

2. Move the detector field of view to just above the patient's head, then press **Enter** on the hand control.

   You are prompted to define the scan length (also called the sweep length).

3. You can use the Yes or No button on the hand control to change the sweep length as it appears on the monitor. Press **Enter** on the hand control.

   If you have the scintibed option, a message asks if you want to chain the posterior scan automatically.

4. You have two options.

   ❏ Press **Yes** if you want the system to perform the posterior scan automatically. This is also called *Auto-Loop*.

   ❏ Press **No** if you want to position the gantry manually for the posterior scan.

   Note: If you answered Yes, a message asks if you want to automatically return the gantry to its starting point after the posterior scan is completed. If you press **No**, you must manually move the gantry after the scan is completed.

A message asks if you want to manually define the patient's body contour.

5. You have two options.

   ❏ Press **Yes** if you want to improve the quality of the scan by preceding the scan with a contouring pass.

   Continue with the procedure entitled "Acquiring the Study: With Body Contouring."

   ❏ Press **No** if you want to scan the patient without body contouring.

   Skip to the procedure entitled "Acquiring the Study: Without Body Contouring."

Acquiring the Study: With Body Contouring

Note: The maximum scanning speed possible with body contouring is 25 centimeters per minute.

1. You are prompted to define the starting radius. Use the Up or Down Arrow button to adjust the gantry radius so that the detector is as close as possible to the patient, then press **Enter** on the hand control.

   You are prompted to begin the body contouring phase.

2. Press **Start**.

   The gantry moves over the patient.

3. Use the Up Arrow and Down Arrow buttons to adjust the gantry radius so that the detector is as close as possible to the patient.

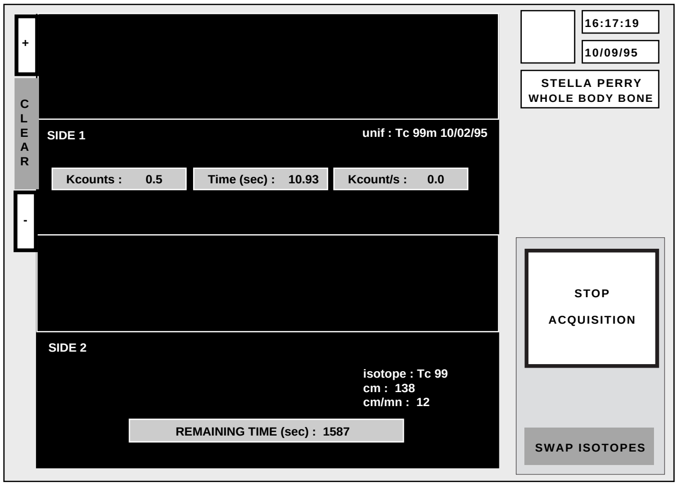
   Note: Press **+** to increase the gantry's speed; press **-** to decrease its speed. Press **Stop** to stop the gantry's motion.

4. When the gantry reaches the end of the defined scan, press **Start** to automatically return the gantry to its starting position

5. Select **Start Acquire**.

   A single beep signals the start of the acquisition. The Acquisition Menu is displayed (Figure 9-8).

Figure 9-8: Acquisition Menu



16:17:19
10/09/95
STELLA PERRY
WHOLE BODY BONE

SIDE 1
unif : Tc 99m 10/02/95
Kcounts : 0.5
Time (sec) : 10.93
Kcount/s : 0.0

SIDE 2
isotope : Tc 99
cm : 138
cm/mn : 12
REMAINING TIME (sec) : 1587

6. When the anterior scan is complete, there are two possibilities.

   ❏ If you chose to use Auto-Loop, the gantry automatically moves the detector under the patient, then completes the posterior scan.

   ❏ If you chose not to use Auto-Loop, you are prompted to rotate the gantry under the patient.

   Use the hand control buttons to move the gantry to the end of the bed, then rotate the gantry to 180°. Press **Start** to begin the posterior scan. (If you want to acquire only an anterior scan, press **Stop**).

   When the acquisition is complete, the system beeps once and the following message is displayed:

   Acquisition Step Completed Successfully

7. You have three options after the acquisition is complete.

   ❏ Select **Exit** to return to the Main Menu.

   ❏ Select **Prepare the Gantry** to acquire another image.

   ❏ Select **Modify Step** to change the acquisition parameters before acquiring another image.

Acquiring the Study: Without Body Contouring

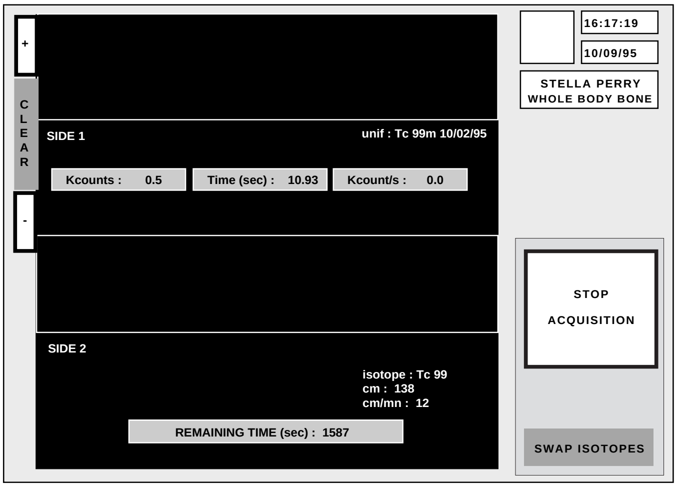
1. You are prompted to define the starting radius. Use the Up or Down Arrow button to adjust the gantry radius so that the detector is as close as possible to the patient, then press **Enter** on the hand control.

   The gantry preparation is complete.

2. Select **Start Acquire**.

   A short beep signals the start of the acquisition. The Acquisition Menu is displayed (Figure 9-9).

Figure 9-9: Acquisition Menu



16:17:19
10/09/95
STELLA PERRY
WHOLE BODY BONE

SIDE 1
unif : Tc 99m 10/02/95
Kcounts : 0.5
Time (sec) : 10.93
Kcount/s : 0.0

SIDE 2
isotope : Tc 99
cm : 138
cm/mn : 12
REMAINING TIME (sec) : 1587

3. When the anterior scan is complete, there are two possibilities.
   - If you chose to use Auto-Loop, the gantry automatically moves the detector under the patient, then completes the posterior scan.
   - If you chose not to use Auto-Loop, you are prompted to rotate the gantry under the patient.

     Use the hand control buttons to move the gantry to the end of the bed, then rotate the gantry to 180°. Press **Start** to begin the posterior scan. (If you want to acquire only an anterior scan, press **Stop**).

   When the acquisition is complete, the system beeps once and the following message is displayed:

   Acquisition Step Completed Successfully

4. You have three options after the acquisition is complete.
   - Select **Exit** to return to the Main Menu.
   - Select **Prepare the Gantry** to acquire another image.
   - Select **Modify Step** to change the acquisition parameters before acquiring another image.

Creating a Predefined Protocol

The values for the following parameters are saved with the protocol:

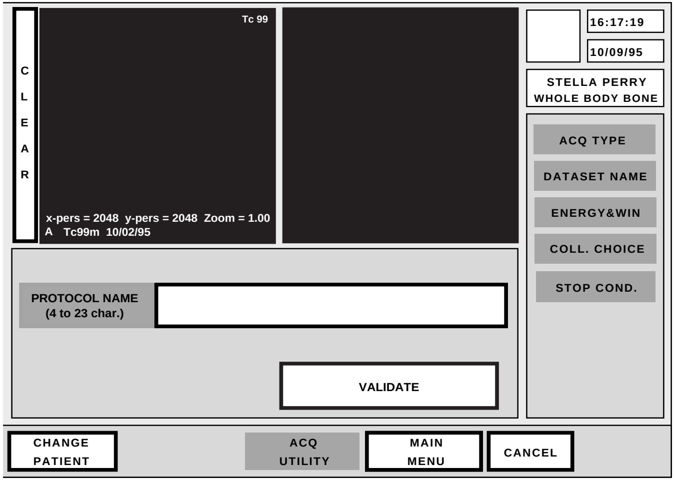
- protocol name
- dataset name
- matrix size
- isotope
- zoom factor
- second side length
- scan speed

Follow the steps below to save the parameters as a new protocol.

1. Select **Protocol Handling**.

   The Protocol Handling Menu is displayed (Figure 9-10).

   Figure 9-10: Protocol Handling Menu

2. The box labeled **Enter Protocol Name** is highlighted. Enter a name (4 to 24 characters) for the protocol, press <ENTER> and select **Validate**.

3. The box labeled **Enter Additional Prompt Message** is highlighted. You can enter an optional message (less than 24 characters) in this box. Press <ENTER> and select **Validate**.

   The message will appear on the Start Acquisition Menu the next time someone uses the protocol.

4. If you want to chain this to another protocol, select **Yes**; otherwise, select **No**. Select **Validate.**

   ❏ If you chain the protocol, a serie of screens, which allow you to define another protocol, is displayed. For more information about chaining protocols, refer to the section entitled “Working with Chained Protocols” in the “Standard Acquisitions Operations” chapter.

   ❏ If you do not chain the protocol, the Main Menu is displayed.

Using a Predefined Whole Body Protocol

The procedure for using a predefined whole body acquisition protocol follows these general guidelines:

1. Select the patient.
2. Select the predefined protocol.
3. Start the acquisition.

You also have the option to modify the protocol before you begin the acquisition.

Selecting the Patient

The name of the currently selected patient is displayed at the top of the Main Menu. Use the following steps to select a different patient.

1. Select **Change Patient.**

   The Patient Directory Menu is displayed.

2. Select the patient for whom you want to acquire the dataset.

   You can search for a patient under a number of different criteria (select **Find Patient**), or enter a new patient (select **Create a New Patient**).

   After you select a patient, the Main Menu is displayed again.

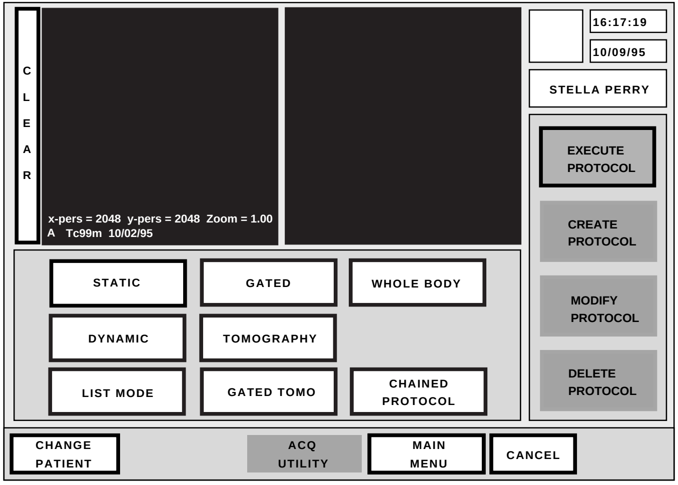
Selecting the Predefined Protocol

After you select the correct patient and return to the Main Menu, you can select the protocol you want to use. Follow the steps below.

1. From the Main Menu, select **Acquisition Protocol**.

   The Protocol Type Menu is displayed (Figure 9-11).

Figure 9-11: Protocol Type Menu



2. Select **Whole Body**.

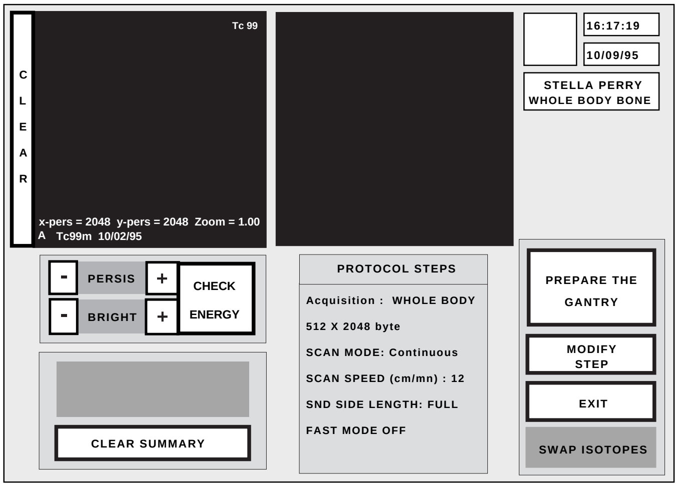
   A menu with existing whole body acquisition protocols is displayed.

3. Select the protocol you want to use.

   The Start Acquisition Menu is displayed (Figure 9-12).

Starting the Acquisition

Figure 9-12: Start Acquisition Menu



Tc 99

x-pers = 2048 y-pers = 2048 Zoom = 1.00

A Tc99m 10/02/95

16:17:19

10/09/95

STELLA PERRY
WHOLE BODY BONE

PROTOCOL STEPS

Acquisition : WHOLE BODY

512 X 2048 byte

SCAN MODE: Continuous

SCAN SPEED (cm/mn) : 12

SND SIDE LENGTH: FULL

FAST MODE OFF

The Start Acquisition Menu allows you to start the acquisition protocol. In addition, you can review the parameters that the protocol uses.

1. To check the energy before beginning the acquisition, place a point source with the correct isotope under the detector head. Select **Check Energy**.

   An energy spectrum appears on the monitor.

2. A summary of the acquisition parameters including the matrix and stop conditions is displayed in the center of the menu. Select **Clear Summary** to remove the list.

   To display the list again, select **Display Step Summary**.

3. To change any of the parameters for this acquisition, select **Modify Step**.

   The Acquisition Summary Menu is displayed. You can change any parameter, then select **Return to Acquire**.

Preparing the Gantry

1. To prepare the gantry for the acquisition, select **Prepare the Gantry**.

   A series of prompts appears on the monitor to guide you through the gantry preparation.

Warning: Always use the safety pad when you scan a patient.

1. When the system beeps and you are prompted, press the safety pad.

   Note: If the gantry is not at 0° rotation angle, remove all obstacles from the path of the gantry and press **Start** on the hand control. The system beeps and the gantry rotates to the starting position.

   If you are using the DS7 and the detector head is not at the 0° position, you are prompted to move it to that location.

   You are prompted to move the detector's field of view (FOV) over the patient's head.

2. Move the detector field of view to just above the patient's head, then press **Enter** on the hand control.

   You are prompted to define the scan length (also called the sweep length).

3. You can use the Yes or No button on the hand control to change the sweep length as it appears on the monitor. Press **Enter** on the hand control.

   If you have the scintibed option, a message asks if you want to chain the posterior scan automatically.

4. You have two options.

   ❏ Press **Yes** if you want the system to perform the posterior scan automatically. This is also called *Auto-Loop*.

   ❏ Press **No** if you want to position the gantry manually for the posterior scan.

   Note: If you answered Yes, a message asks if you want to automatically return the gantry to its starting point after the posterior scan is completed. If you press **No**, you must manually move the gantry after the scan is completed.

   A message asks if you want to manually define the patient's body contour.

5. You have two options.

   ❏ Press **Yes** if you want to improve the quality of the scan by preceding the scan with a contouring pass.

   Continue with the procedure entitled "Acquiring the Study: With Body Contouring."

   ❏ Press **No** if you want to scan the patient without body contouring.

   Skip to the procedure entitled "Acquiring the Study: Without Body Contouring."

Acquiring the Study: With Body Contouring

Note: The maximum scanning speed possible with body contouring is 25 centimeters per minute.

1. You are prompted to define the starting radius. Use the Up or Down Arrow button to adjust the gantry radius so that the detector is as close as possible to the patient, then press **Enter** on the hand control.

   You are prompted to begin the body contouring phase.

2. Press **Start**.

   The gantry moves over the patient.

3. Use the Up Arrow and Down Arrow buttons to adjust the gantry radius so that the detector is as close as possible to the patient.

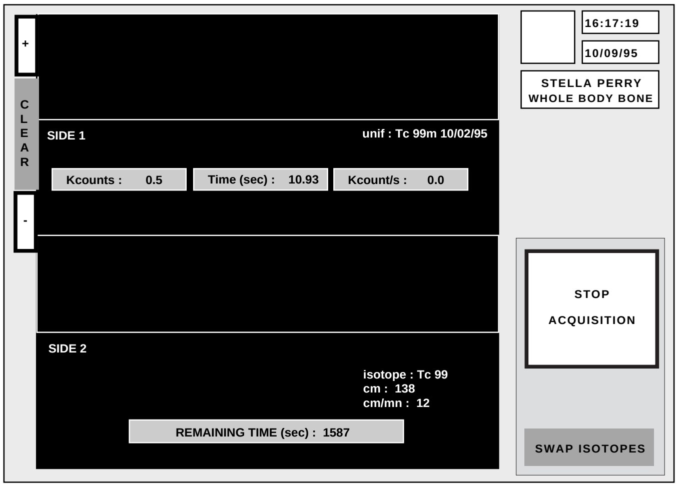
   Note: Press **+** to increase the gantry's speed; press **-** to decrease its speed. Press **Stop** to stop the gantry's motion.

4. When the gantry reaches the end of the defined scan, press **Start** to automatically return the gantry to its starting position

5. Select **Start Acquire**.

   A single beep signals the start of the acquisition. The Acquisition Menu is displayed (Figure 9-13).

Figure 9-13: Acquisition Menu



16:17:19
10/09/95
STELLA PERRY
WHOLE BODY BONE

SIDE 1
unif : Tc 99m 10/02/95
Kcounts : 0.5
Time (sec) : 10.93
Kcount/s : 0.0

SIDE 2
isotope : Tc 99
cm : 138
cm/mn : 12
REMAINING TIME (sec) : 1587

6. When the anterior scan is complete, there are two possibilities.

   ❑ If you chose to use Auto-Loop, the gantry automatically moves the detector under the patient, then completes the posterior scan.

   ❑ If you chose not to use Auto-Loop, you are prompted to rotate the gantry under the patient.

   Use the hand control buttons to move the gantry to the end of the bed, then rotate the gantry to 180°. Press **Start** to begin the posterior scan. (If you want to acquire only an anterior scan, press **Stop**.)

When the acquisition is complete, the system beeps once and the following message is displayed:

Acquisition Step Completed Successfully

7. You have three options after the acquisition is complete.

   ❏ Select **Exit** to return to the Main Menu.

   ❏ Select **Prepare the Gantry** to acquire another image.

   ❏ Select **Modify Step** to change the acquisition parameters before acquiring another image.

Acquiring the Study: Without Body Contouring

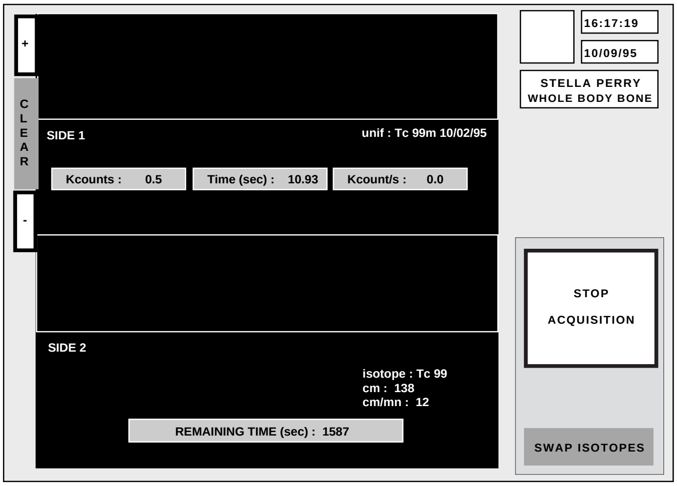
1. You are prompted to define the starting radius. Use the Up or Down Arrow button to adjust the gantry radius so that the detector is as close as possible to the patient, then press **Enter** on the hand control.

   The gantry preparation is complete.

2. Select **Start Acquire**.

   A short beep signals the start of the acquisition. The Acquisition Menu is displayed (Figure 9-14).

Figure 9-14: Acquisition Menu



16:17:19
10/09/95
STELLA PERRY
WHOLE BODY BONE

SIDE 1
unif : Tc 99m 10/02/95
Kcounts : 0.5
Time (sec) : 10.93
Kcount/s : 0.0

SIDE 2
isotope : Tc 99
cm : 138
cm/mn : 12
REMAINING TIME (sec) : 1587

3. When the anterior scan is complete, there are two possibilities.

   ❏ If you chose to use Auto-Loop, the gantry automatically moves the detector under the patient, then completes the posterior scan.

   ❏ If you chose not to use Auto-Loop, you are prompted to rotate the gantry under the patient.

   Use the hand control buttons to move the gantry to the end of the bed, then rotate the gantry to 180°. Press **Start** to begin the posterior scan. (If you want to acquire only an anterior scan, press **Stop**).

When the acquisition is complete, the system beeps once and the following message is displayed:

Acquisition Step Completed Successfully

4. You have three options after the acquisition is complete.

   ❏ Select **Exit** to return to the Main Menu.

   ❏ Select **Prepare the Gantry** to acquire another image.

   ❏ Select **Modify Step** to change the acquisition parameters before acquiring another image.

Using the Whole Body Display

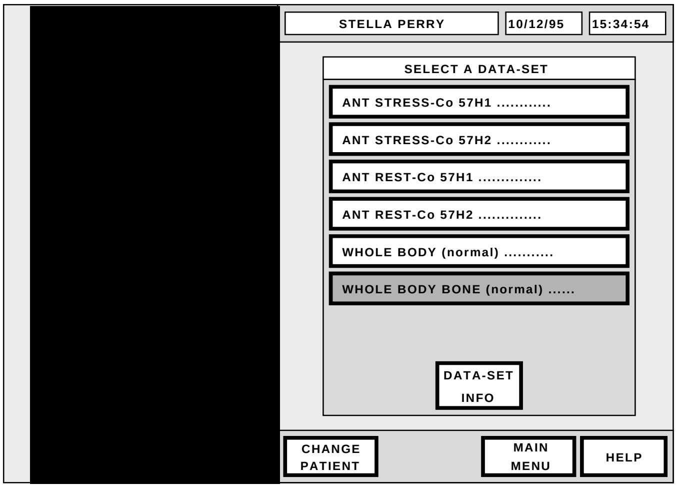
The Acquisition console includes an option to display the whole body images after you acquire them, adjust the display parameters, zoom or mask a specific area of the image, and print or save the display.

Displaying the Whole Body Images

1. From the Acquisition console's Main Menu, select **Display**.

   The Dataset Selection Menu is displayed (Figure 9-15).

   Figure 9-15: Dataset Selection Menu

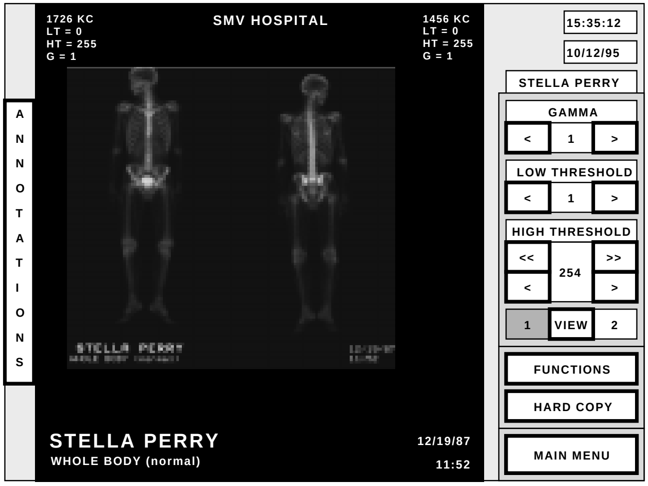


2. Select the dataset you want to display.

   Note: You can use **Previous Page** and **Next Page** to view additional datasets.

   The Whole Body Display Menu is displayed (Figure 9-16).

   Figure 9-16: Whole Body Display Menu



The following is listed for each image in the dataset:

- ❑ number of counts (in Kcounts)

- ❑ low threshold
- ❑ high threshold
- ❑ gamma correction value

3. To change the appearance of one of the images in the dataset, begin by selecting **View** to toggle the highlight to the number of the image you want to modify: 1 or 2.
4. To change the gamma correction for the image you selected, select the Arrow buttons associated with Gamma.

   You can choose from 13 different gamma correction values.
5. To change the low threshold for the image you selected, select the Arrow buttons associated with Low Threshold.
6. To change the high threshold for the image you selected, select the Arrow buttons associated with High Threshold.
7. You have three options.
   - ❑ To add text annotations to the display, continue with the procedure entitled "Annotating the Whole Body Display."
   - ❑ If you want to mask an area on an images or zoom in on a particular portion of an image, continue with the procedure entitled "Using the Zoom and Mask Options."
   - ❑ If you want to print or save a copy of the display without annotations, skip to the procedure entitled "Saving and Printing the Whole Body Display."

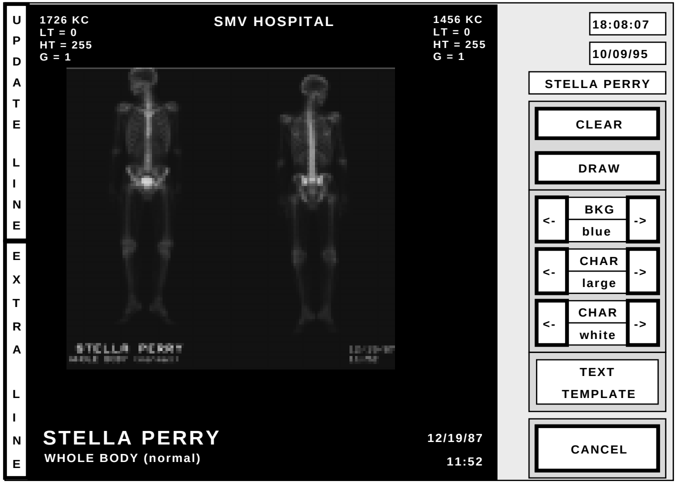
Annotating the Whole Body Display

The following steps explain how to add text annotations to the display.

1. With the Whole Body Display Menu displayed, select **Annotations**.

   The Annotation Menu is displayed (Figure 9-17).

Figure 9-17: Annotation Menu



2. Use the associated Arrow buttons to specify the text color, text size, and background color for the text. The following table lists the options for each parameter.

Parameter	**Options**
Text (Char) Color	White, Blue, Black, Red, or Gray
Text (Char) Size	Small, Medium, Large
Background Color	Transparent, Blue, Black, Red, Gray, White

3. Move the cursor to the beginning location for the text, then press either of the upper buttons on the Rollermouse twice. Type the annotation and press <ENTER>.
4. To change the text you just typed, select **Update Line**.
5. To add another line of text, select **Extra Line**. Type the new text and press <ENTER>.
6. To draw a line from the annotation to a specific structure on the displayed image, select **Draw**.

   Rotate the trackball to move the cursor to the structure on the displayed image, then press lower left Rollermouse button.

   Rotate the trackball to draw a line to the text, then press either upper button to end the line.
7. To erase text and drawings from the display, select **Erase**.

   A rectangle is displayed on the screen. Rotate the trackball to move the rectangle so that its lower left corner is located at the lower left edge of the region you want to erase.

   Press The lower left Rollermouse button, then rotate the trackball to resize the rectangle. Make sure the rectangle encloses only the part of the text and drawing you want to erase, then press the upper right Rollermouse button.

   The text and drawing within the rectangle are erased.
8. To return to the Whole Body Display Menu, select **Cancel**.

Using the Zoom and Mask Options

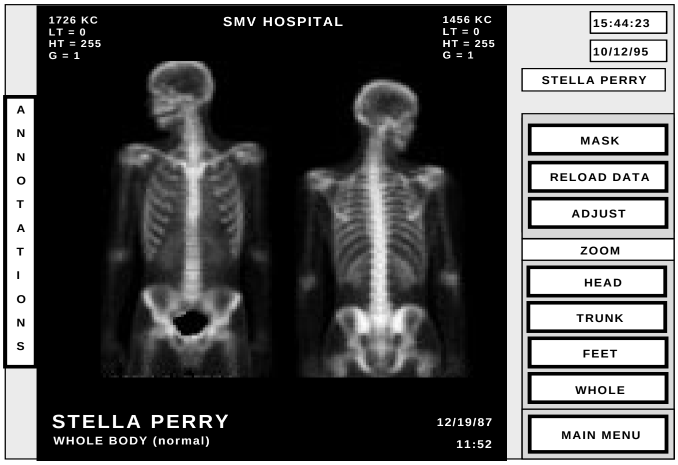
You can use the zoom options to enlarge a specific part of the whole body study (head, trunk, or feet) for closer review. You can use the mask option to mask a region of the whole body study, usually a high count area, so that lower count areas appear with more contrast. You can also zoom an area, then apply a mask to it.

After you use the mask or zoom options, you can annotate the images or return to the Whole Body Display Menu to access the print and save options.

1. With the Whole Body Display Menu displayed, select **Functions**.

   The Mask and Zoom Menu is displayed (Figure 9-18).

Figure 9-18: Mask and Zoom Menu



1726 KC
LT = 0
HT = 255
G = 1

SMV HOSPITAL

1456 KC
LT = 0
HT = 255
G = 1

15:44:23
10/12/95
STELLA PERRY

STELLA PERRY
WHOLE BODY (normal)
12/19/87
11:52

2. To zoom a portion of the display, select the appropriate button under Zoom: **Head**, **Trunk**, or **Feet**.

   The zoomed images are displayed on the screen.

   Note: To return to the unzoomed images, select **Whole**.

3. To mask an area of an image, select **Mask**.

   A cursor appears on the screen.

4. Move the cursor to the part of the image you want to mask and press one of the upper Rollermouse buttons.

   That area of the image is zoomed.

5. Move the cursor to the starting point and press one of the upper buttons. Rotate the trackball to draw a line, pressing the lower left button to end the segment.

6. Continue drawing line segments in this manner until you complete the mask. Press one of the upper buttons to close the mask and apply it to the image.

   The unzoomed images are displayed again.

7. You have four options.

   ☐ To view the images without the mask, select **Reload Data**.

   ☐ To modify the appearance of the images on the screen, select **Adjust**.

   Refer to the procedure entitled “Displaying the Whole Body Images” for more information.

   ☐ To annotate the images, select **Annotations**.

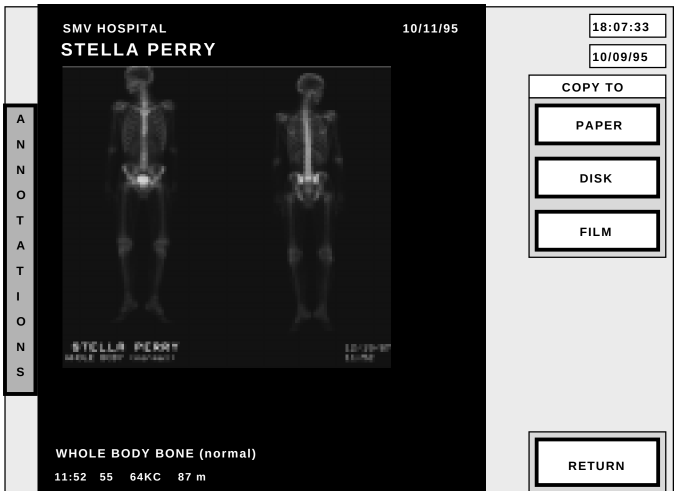
   Refer to the procedure entitled “Annotating the Whole Body Display” for more information.

   ☐ To print or save the images, select **Adjust**, then select **Hard Copy** from the Whole Body Display Menu.

   Refer to the procedure entitled “Saving and Printing the Whole Body Display” for more information.

Saving and Printing the Whole Body Display

Figure 9-19: Hard Copy Menu



SMV HOSPITAL 10/11/95
STELLA PERRY
WHOLE BODY BONE (normal)
11:52 55 64KC 87 m
18:07:33
10/09/95

You can use the options on the Hard Copy Menu to print the displayed image on a color printer, a video imager, or a digital imager. You can also save the image in its own dataset that you can print or view later.

1. To save the image in its own dataset, select **Disk**.

   Select the box under Save As, then type a name for the dataset (4 to 14 characters). Press <ENTER>.

   The new dataset is saved in the patient database.

2. To print on a local or remote color printer, select **Paper**.

   Select the number of copies you want to print (1 to 10), then select the background color (Black or White).

   The image is sent to the color printer.

3. To print on a video imager, select **Film**.

   - If your system includes both a video and a digital imager, select **Video**.

     The display is adjusted to appear as it will on the film. Press any alphanumeric key to print the image and continue.

   - If you system includes only a video imager, the display is adjusted to appear as it will on the film. Press any alphanumeric key to print the image and continue.

4. To print on a digital imager, select **Film**, then select **Setup**.

   Set up the imager parameters for the image, then select **Validate**. The previous menu options are available again. Select **Print**.

   The image is sent to the Imager queue.

5. To return to the Hard Copy Menu, select **Cancel**.

Suggested Clinical Protocols

Introduction

This chapter includes a series of tables with suggested clinical protocols. A clinical protocol is a set of parameters (such as the matrix, isotope, and acquisition type) for a specific type of study.

These clinical protocols are based on recommendations from our users—both physicians and technologists—together with input from our application support staff.

Note: These protocols are only recommendations. Based on your own clinical experience, you may find other parameters that work as well or better. With this in mind, space has been created at the end of each table so that you can record your own protocols.

The recommended zoom factors are for “average” body sizes. It is particularly important to selectively zoom images when the body size or body part (e.g., myocardium) is smaller than normal.

The following protocols are included in the tables:

Cardiac Planar Protocols

❑ Planar Thallium
❑ Cardiac First Pass
❑ Gated Bloodpool
❑ Exercise Gated Bloodpool

Cardiac SPECT Protocols

❑ Myocardial Perfusion Cardiolite
❑ Myocardial Perfusion Cardiotec
❑ Thallium SPECT
❑ PYP Myocardial SPECT

Renal Protocols

❑ Gates GFR
❑ Tauxe GFR
❑ Tauxe ERPF
❑ Oberhausen ERPF
❑ Schlegel ERPF
❑ Russell ERPF
❑ Bubeck ERPF

- ☐ Renal Blood Flow
- ☐ Renal Excretion
- ☐ DMSA Uptake

Brain Tomo Protocols

- ☐ Brain HMPAO
- ☐ Brain Iodoamphetamine

Lung Protocols

- ☐ Lung Ventilation
- ☐ Lung Perfusion
- ☐ Lung Ventilation & Perfusion
- ☐ Lung DTPA Clearance

Whole Body Protocols

- ☐ Whole Body Bone
- ☐ Whole Body Gallium
- ☐ Whole Body Iodine

Other Planar Protocols

- ☐ Gastric Emptying - Static
- ☐ Gastric Emptying - Dynamic
- ☐ GI Bleed - Static
- ☐ GI Bleed - Dynamic
- ☐ Biliary - Static
- ☐ Biliary - Dynamic
- ☐ Thyroid
- ☐ Parathyroid
- ☐ Indium WBC

Other SPECT Protocols

- ☐ Hemangioma
- ☐ Bone Tomography
- ☐ Liver Tomography

Cardiac Planar Protocols

	Planar Thallium	**First Pass**	**Gated Bloodpool**
Matrix	128 x128 Word	256 x 256 Word	64 x 64 Word
View	Ant, 45° LAO, 70° LAO	Ant, or RAO	Ant, 45° LAO, 70° LAO
Acquisition Type	Static	List Mode	Gated
Counts			300K/Frame
Time	2 mCi/480 secs or 3mCi/ 360 secs	Rest study: 30–40 secs Stress study: 15– 20 secs	480 secs
Frames	3 Stress & 3 Redist		
Zoom DS7/DSX	1.6/2.0	None/1.33	1.6/2.0
Gated?			Yes
Frames/R-R Interval			16
Isotope	Tl 201	20-25 mCi Tc 99m	Tc 99m
Miscellaneous		RV - use RAO only	

	Exercise Gated Bloodpool		
Matrix	64 x 64 Word		
View	Ant, 45° LAO, 70° LAO		
Acquisition Type	Gated		
Counts	200 K/Frame		
Time	180 secs		
Frames	1 baseline and1 for each exercise level		
Zoom DS7/DSX	1.6/2.0		
Gated?	Yes		
Frames/R-R Interval	16		
Isotope	Tc 99m		
Miscellaneous			

Cardiac SPECT Protocols

	Myocardial Perfusion/ Cardiolite	Myocardial Perfusion/ Cardiotec	Thallium SPECT
Matrix	64 x 64 Word	64 x 64 Word	64 x 64 Word
Patient Position	Head toward gantry	Head toward gantry	Head toward gantry
Acquisition Type	Tomography	Tomography	Tomography
# of Steps/Degrees	64/180°	32/180°	32/180°
Starting Angle	315°	315°	315°
Time	20 secs/step	10 to 20 secs/step	40 secs/step
Zoom DS7/DSX	None/1.33	None/1.33	None/1.33
Gated?			
Frames/R-R Interval			
Isotope	Tc 99m	Tc 99m	Tl 201
Miscellaneous		Begin scan within 2 minutes of injection	

	PYP Myocardial SPECT		
Matrix	64 x 64 Word		
Patient Position	Head toward gantry		
Acquisition Type	Tomography		
# of Steps/Degrees	64/180°		
Starting Angle	0°		
Time	40 secs/step		
Zoom DS7/DSX	None/1.33		
Gated?			
Frames/R-R Interval			
Isotope	Tc 99m PYP		
Miscellaneous			

Renal Protocols

	Gates GFR	**Tauxe GFR**	**Tauxe ERPF**
Matrix	64 x 64 Word	64 x 64 Word	64 x 64 Word
Patient Position/View	Supine/Posterior	Supine/Posterior	Supine/Posterior
Acquisition Type	Dynamic	Dynamic	Dynamic
# of Phases	1 Phase	1 Phase	1 Phase
Time (1st phase)	15 secs	15 secs	60 secs
# of Frames (1st phase)	30 Frames	30 Frames	27 Frames
Time (2nd phase)			
# of Frames (2nd phase)			
Zoom DS7/DSX	None/None	None/None	None/None
Isotope	Tc 99m DTPA	Tc 99m DTPA	OIH
Miscellaneous	Acquire pre- and post-injection static images of the syringe: 128 x 128 Word for 60 secs. 30 cm from detector.	Draw up to three plasma samples; sampling time depends on patient age and severity of disease.	Draw up to three plasma samples; time depends on patient age. Acquire static 64 x 64 Word of pre- and post-void bladder 35 min. post-injection.

	Oberhausen ERPF	**Schlegel ERPF**	**Russell ERPF**
Matrix	64 x 64 Word	64 x 64 Word	64 x 64 Word
Patient Position/View	Supine/Posterior	Supine/Posterior	Supine/Posterior
Acquisition Type	Dynamic	Dynamic	Dynamic
# of Phases	1 Phase	1 phase	1 Phase
Time (1st phase)	20 secs	60 secs	20 secs
# of Frames (1st phase)	80 Frames	24 Frames	80 Frames
Time (2nd phase)			
# of Frames (2nd phase)			
Zoom DS7/DSX	None/None	None/None	None/None
Isotope	OIH	OIH	Tc 99m MAG3
Miscellaneous	Draw two plasma samples: the first within 12 min., the second between 12 and 19.5 minutes post-injection.	Acquire pre- and post-injection static images of the syringe: 128 x 128 Word for 60 secs. 30 cm from detector.	Draw up to three plasma samples; time depends on patient age. Acquire static 64 x 64 Word of pre- and post-void bladder 35 min. post-injection.

	Bubeck ERPF	**Renal Blood Flow**	**Renal Excretion**
Matrix	64 x 64 Word	64 x 64 Word	64 x 64 Word
Patient Position/View	Supine/Posterior	Supine/Posterior	Supine/Posterior
Acquisition Type	Dynamic	Dynamic	Dynamic
# of Phases	1 Phase	1 Phase	2 Phases
Time (1st phase)	20 secs	1 sec	1 sec
# of Frames (1st phase)	80 Frames	60 Frames	60 Frames
Time (2nd phase)			30 secs
# of Frames (2nd phase)			60 Frames
Zoom DS7/DSX	None/None	None/None	None/None
Isotope	Tc 99m MAG3	Tc 99m DTPA or MAG3	Tc 99m DTPA, MAG3, or OIH
Miscellaneous	Draw two plasma samples 20 to 60 min. post-injection. Acquire static 64 x 64 Word of pre- and post-injection of syringe 30 cm from detector.	30 cm from detector	Supports Lasix injection at 20 min.

	DMSA Uptake		
Matrix	64 x 64 Word		
Patient Position/View	Supine/Posterior or Anterior & Posterior		
Acquisition Type	Dynamic		
# of Phases	1 Phase		
Time (1st phase)	15 secs		
# of Frames (1st phase)	40 Frames		
Time (2nd phase)			
# of Frames (2nd phase)			
Zoom DS7/DSX	None/None		
Isotope	1 mCi Tc 99m DTPA		
Miscellaneous	For absolute uptake, acquire static 128 x 128 Word pre- and post-injection images of syringe 30 cm from detector.		

Brain Tomo Protocols

	Brain HMPAO	**Brain Iodoamphetamine**	
Matrix	64 x 64 Word	64 x 64 Word	
Patient Position	Head toward gantry	Head toward gantry	
# of Frames/Degrees	64/360°	64/360°	
Starting Angle	0°	0°	
Acquisition Type	Tomographic	Tomographic	
Time	35 secs/Step	45 secs/Step	
Zoom DS7/DSX	None/1.33	None/1.33	
Isotope	Tc 99m	I 123	
Miscellaneous			

Matrix			
Patient Position			
# of Frames/Degrees			
Starting Angle			
Acquisition Type			
Time			
Zoom DS7/DSX			
Isotope			
Miscellaneous			

Lung Protocols

	Ventilation	**Perfusion**	**Ventilation & Perfusion**
Matrix	64 x 64 Word	64 x 64 Word	64 x 64 Word
Patient Position/View	Upright or Supine/ Posterior or Anterior	Ant, RAO, RPO, Post, LPO, LAO	Upright or Supine/ Posterior or Anterior
Acquisition Type	Dynamic	Static	Static
Counts		1000 K	500 K for each study
Time	15 to 30 secs		
# of Frames	20 to 40 frames		
Zoom DS7/DSX	None/None	None/None	None/None
Isotope	Xenon 133	Tc 99m	Xenon 133 or Tc 99m DTPA for ventilation; Tc 99m or In 113m for perfusion
Miscellaneous			Acquire ventilation study first.

	DTPA Clearance		
Matrix	64 x 64 Word or 128 x 128 Word		
Patient Position/View	Supine/Posterior or Anterior		
Acquisition Type	Dynamic		
Counts			
Time	30 or 60 secs.		
# of Frames	20 or 40 Frames		
Zoom DS7/DSX	None/None		
Isotope	Tc 99m DTPA		
Miscellaneous			

Whole Body Protocols

	Whole Body Bone	**Whole Body Gallium**	**Whole Body Iodine**
Matrix	512 x 2048 Word	512 x 2048 Word	512 x 2048 Word
View	Anterior, Posterior	Anterior, Posterior	Anterior, Posterior
Acquisition Type	Whole Body	Whole Body	Whole Body
Scanning Speed	12 cm/min	As slow as possible	As slow as possible
Zoom DS7/DSX	None/None	None/None	None/None
Isotope	Tc 99m	Gallium	Iodine 131
Miscellaneous			

Matrix			
View			
Acquisition Type			
Scanning Speed			
Zoom DS7/DSX			
Isotope			
Miscellaneous			

Other Planar Protocols

	Gastric Emptying- Static	Gastric Emptying - Dynamic	GI Bleed - Static
Matrix	64 x 64 Word or 128 x 128 Word	64 x 64 Word or 128 x 128 Word	256 x 256 Word
Patient Position/View	Supine/Anterior or Anterior & Posterior	Supine/Anterior or Anterior & Posterior	Ant. Abdomen
Acquisition Type	Static	Dynamic	Static
Counts			1000K
# of Phases		1 Phase	
Time	300 secs	60 secs	
# of Frames	15 Frames	60 to 90 min.	
Zoom DS7/DSX	None/None	None/None	None/None
Isotope	Tc 99m or In 113m	Tc 99m or In 113m	Tc RBC
Miscellaneous	Acquire an image every 5 to 10 min. for 2 hours	1st hour, then Delays	1st hour, then Delays

	GI Bleed - Dynamic	Biliary - Static	Biliary - Dynamic
Matrix	64 x 64 Word	256 x 256 Word	64 x 64 Word
Patient Position/View	Ant.	Ant. Liver	Ant.
Acquisition Type	Dynamic	Static	Dynamic
Counts		1000 K every 5 min.	
# of Phases	1 Phase		1 Phase
Time	20 secs		20 secs
# of Frames	180 Frames		180 Frames
Zoom DS7/DSX	None/None	None/None	None/None
Isotope	20 mCi Tc RBC	Tc 99m HIDA	5 mCi Tc HIDA
Miscellaneous			

	Thyroid	Parathyroid	Indium WBC

Matrix	128 x 128 Word	128 x 128 Word	256 x 256 Word
Patient Position/View	Ant, LAO, RAO	Ant,	Ant, Post
Acquisition Type	Static	Static	Static
Counts	200 K/Frame	100 K/Frame	1000K
# of Phases			
Time	600 secs		
# of Frames		2 Frames	
Zoom DS7/DSX	2.0/2.66	2.0/2.66	None/None
Isotope	Tc04, I131, or I 123	Tc and Tl	In 111 WBC
Miscellaneous	Pinhole collimator recommended	Pinhole collimator recommended	

Matrix			
Patient Position/View			
Acquisition Type			
Counts			
# of Phases			
Time			
# of Frames			
Zoom DS7/DSX			
Isotope			
Miscellaneous			

Matrix			
Patient Position/View			
Acquisition Type			
Counts			
# of Phases			
Time			
# of Frames			
Zoom DS7/DSX			
Isotope			
Miscellaneous			

Matrix			
Patient Position/View			
Acquisition Type			
Counts			
# of Phases			
Time			
# of Frames			
Zoom DS7/DSX			
Isotope			
Miscellaneous			

Matrix			
Patient Position/View			
Acquisition Type			
Counts			
# of Phases			
Time			
# of Frames			
Zoom DS7/DSX			
Isotope			
Miscellaneous			

Matrix			
Patient Position/View			
Acquisition Type			
Counts			
# of Phases			
Time			
# of Frames			
Zoom DS7/DSX			
Isotope			
Miscellaneous			

Other SPECT Protocols

	Hemangioma	**Bone Tomography**	**Liver Tomography**
Matrix	128 x 128 Word	64 x 64 Word	64 x 64 Word
Patient Position	Head toward gantry	Head toward gantry	Head toward gantry
# of Steps/Degrees	64/360°	64/360°	64/360°
Starting Angle	0°	0°	0°
Acquisition Type	Tomography	Tomography	Tomography
Time	30 secs/Step	30 secs/Step	20 sec/step
Zoom DS7/DSX	None/None	None/None	None/None
Gated?			
Frames/R-R Interval			
Isotope	Tc 99m Tagged RBCs	Tc MDP or Tc HDP	Tc - Sulfur Colloid
Miscellaneous			

Matrix			
Patient Position			
# of Steps/Degrees			
Starting Angle			
Acquisition Type			
Time			
Zoom DS7/DSX			
Gated?			
Frames/R-R Interval			
Isotope			
Miscellaneous			

Matrix			
Patient Position			
# of Steps/Degrees			
Starting Angle			
Acquisition Type			
Time			
Zoom DS7/DSX			
Gated?			
Frames/R-R Interval			
Isotope			
Miscellaneous			

Matrix			
Patient Position			
# of Steps/Degrees			
Starting Angle			
Acquisition Type			
Time			
Zoom DS7/DSX			
Gated?			
Frames/R-R Interval			
Isotope			
Miscellaneous			

Matrix			
Patient Position			
# of Steps/Degrees			
Starting Angle			
Acquisition Type			
Time			
Zoom DS7/DSX			
Gated/EKG			
Frames/R-R Interval			
Isotope			
Miscellaneous			

Matrix			
Patient Position			
# of Steps/Degrees			
Starting Angle			
Acquisition Type			
Time			
Zoom DS7/DSX			
Gated/EKG			
Frames/R-R Interval			
Isotope			
Miscellaneous			