GE Medical Systems

Technical Publications

Direction 46–322538
Revision 5

Advance™ PET Imaging System Clinical Walk Through Procedure

Service Documentation

NOTICE

All electrical Installations that are preliminary to positioning of the equipment at the site prepared for the equipment shall be performed by licensed electrical contractors. In addition, electrical feeds into the Power Distribution Unit shall be performed by licensed electrical contractors. Other connections between pieces of electrical equipment, calibrations and testing shall be performed by qualified GE Medical personnel. The products involved (and the accompanying electrical installations) are highly sophisticated, and special engineering competence is required. In performing all electrical work on these products, GE will use its own specially trained field engineers. All of GE's electrical work on these products will comply with the requirements of the applicable electrical codes. The purchaser of GE equipment shall only utilize qualified personnel (i.e., GE's field engineers, personnel of third–party service companies with equivalent training, or licensed electricians) to perform electrical servicing on the equipment.

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Complete instructions regarding claim procedure are found in Section S of the Policy & Procedures Bulletins.

14 July 1993

GE Medical Systems

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REVISION HISTORY

REV	DATE	Reason For Change
0	22 June 1993	First product release.
1	11 October 1993	Second product release to include Release 1.5 software upgrade, ‘G2’ gantry improvement and other minor corrections.
2	3 October 1994	Release 2.0 Software and ‘Extended Table Travel’ feature, new backplanes and APs and no–tilt gantry, plus amendments and additions indicated by revision bars.
3	26 February 1996	Clinical Walk Through Procedure cleanup and improvements.
4	1 October 1997	PCN 192080; Declassification from Class C Proprietary to Class A Non–proprietary.
5	15 May 2000	General updates.

Notes

Chapter 1
Clinical Walk Through: Set Up

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SECTION 1
SCOPE

This test plan covers the typical clinical procedures that are available with Released software. The purpose is to evaluate the system (operator's console, analysis console, gantry, table) in a manner that emulates clinical utilization. It is not the intent to replicate the system and subsystem level tests, although some overlap inevitably exists. This test plan targets protocols which stress the timing, limits, and interaction of parameters, and yet are representative clinical procedures. Although real tracers may or may not be used, in all cases the timing of tracer administration is considered. Table 1–1 below defines the five test procedures:

Table 1–1
CLINICAL TEST PROCEDURES

TEST CODE	PROCEDURE	ACQUISITION TYPE	PHANTOM (DOSE)	DURATION	MECHANICAL STRESSES	ATTENUATION CORRECTION	ANALYSIS TYPE
A	F–18 Dynamic FDG Brain Study	Dynamic	Flood *2mCi*	17 minutes	1 Table Position	CAC (ROI placement)	Quantitative with Plotting
B	F–18 FDG Whole Body Scan	Whole Body	Flood Bottle *2mCi* each	48 minutes	Full Table (with flip)	MAC	Quantitative with Whole Body Orthogonal
C	F–18 FDG Brain Study (with Hi Resolution Mode)	Static with single FOV	Attenuation *2mCi*	45 minutes	Tilt	MAC	Quantitative with Image Math
D	Gated Heart Study	Gated	Gated Simulator *<1mCi* Pin	45 minutes	1 Table Position	MAC	Qualitative with Cine
E	F–18 FDG Brain/Heart Study	Static with multiple FOV	Attenuation *2mCi* EC Phantom *1mCi*	60 minutes	2 Table Positions	MAC	Quantitative with Cardiac Reformat

SECTION 2
TEST SET UP

Begin by cleaning up the database. This will allow sufficient memory space and also to begin the Clinical Walk Through with “new” raw data. Any data that needs to be saved should be archived to DAT tape. The system will then be calibrated as would be performed on a daily basis in a clinical site. The Normalization scan performed is routinely performed more on a PM basis, however, it will be performed here to ensure that the latest counting variations of the system are taken into consideration.

CAUTION **It is ESSENTIAL that ALL the initial test set up scans are performed as described by this procedure. This will allow you to speed up the Clinical Walk Through by accepting the default values created by these initial set ups in later scans. If these initial steps are not followed the QUANTITATION RESULTS DISPLAYED AND CALCULATED WILL NOT BE CORRECT, and the images produced may appear noisy and strange artifacts may appear.**

2.1 Login

From the graphical interface, login as service by typing:

`service` Return

<service password> Return

At this point the PET software will start and the view controller will be across the top of the screen.

2.2 Clean Up of SHARC/DRAGON Database

The database and sharc disk data will be deleted

1. Select Archive from the view controller to save all scan (raw) and image data needed from the system. Also, verify that any calibration correction data is archived.
2. Delete all data from the database via the Delete function.
   - raw, image and all from patient data area
   - calibration data (WC, Norm and Blank)

CAUTION **This will DESTROY all data on the disk, ensure all data that is desired to be saved is archived to DAT tape.**

3. Remove any orphan data from the sharc disk .

   a. Choose **`Service -> Terminal Interface Package -> SHARC`** from the view controller.

   b. Press Return to get to the -> prompt; then type the following.

   `diskInit "/dos"` Return

4. Set aside the sharc TIP window or close it at the prompt by typing (tilda dot)

   `~.` Return

2.3 Perform Update Gain Calibration

Perform the Update Gain Calibration section in the Advance Calibration Procedure DIR. 46–322537

2.4 Perform Normalization Correction

Perform the Normalization Correction section in the Advance Calibration Procedure DIR. 46–322537

2.5 Perform Blank Scan Correction

Perform the Blank Scan Correction section 10 in the Advance Calibration Procedure DIR. 46–322537

2.6 Perform Well Counter Correction

The purpose of the Well Counter (WC) correction is to relate the measured counts in each image pixel to the specific activity measured in physical units.

Perform the Activity and Sensitivity (Well Counter) Correction section in the Advance Calibration Procedure DIR. 46–322537

2.7 Perform 3D Corrections

If the 3D Reconstruction option is installed on this scanner, perform 3D Normalization, Activity and Sensitivity (Well Counter) Correction section in the Advance Calibration Procedure DIR. 46–322537

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Chapter 2
Clinical Walk Through: Test Procedure

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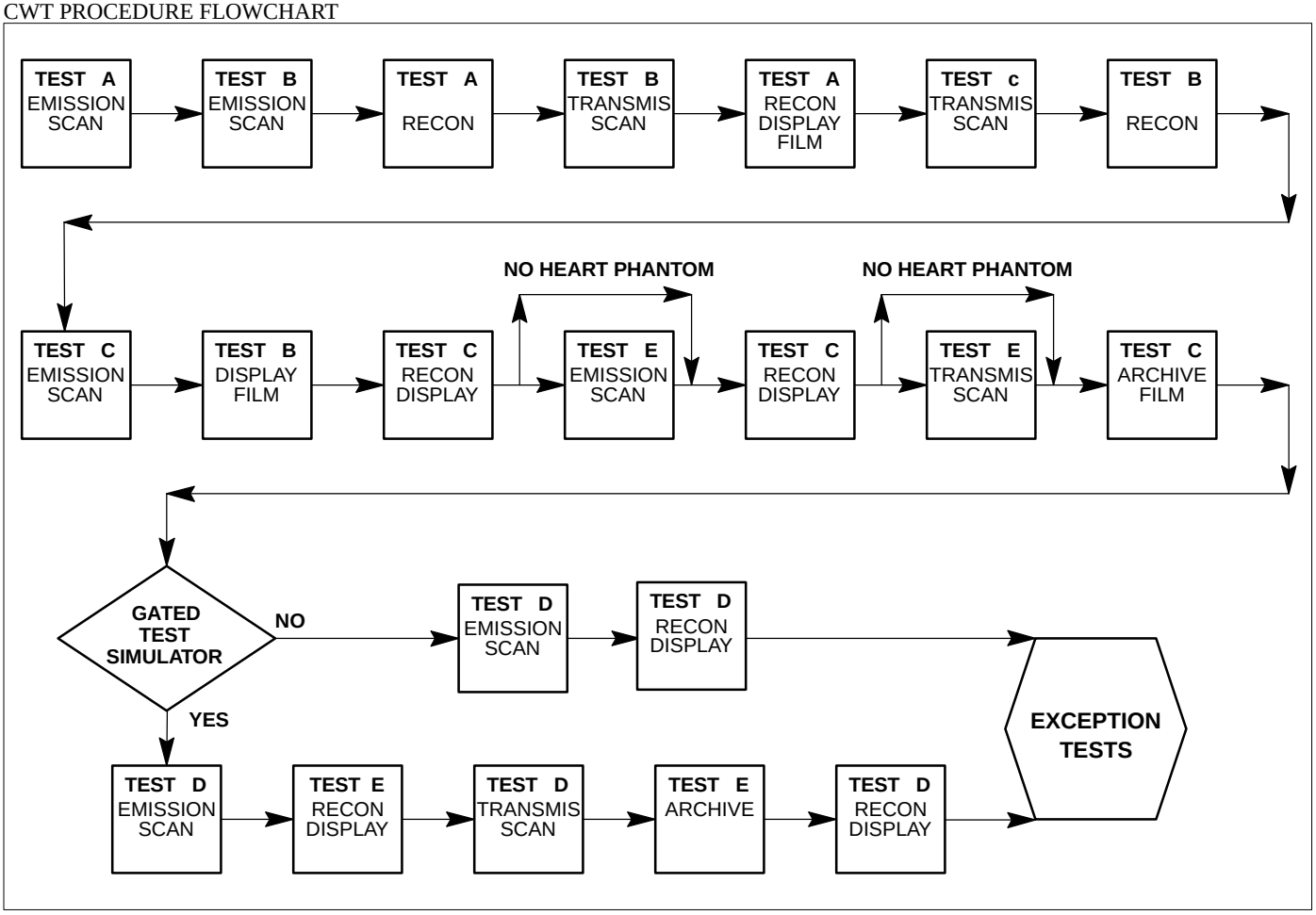
SECTION 1
TEST PROCEDURE

The following Acquisitions will involve the user to “go to” from one procedure to another. This will help the test to proceed at a much faster pace and also allow concurrent Acquisitions, Reconstructions, and Displays, thereby, exercising the system more thoroughly. To facilitate the ease at which the user can locate where a “go to” needs to occur, or where to return to once a ‘‘go to” has executed, the use of a GO TO/RETURN statement will be used to signify these locations.

Several of the tests in this procedure require special equipment or options which may not be available or applicable at a customer site. In these cases, if an alternate test is not specified, you are allowed to skip these tests. See Illustration 2–1.

Illustration 2–1
CWT PROCEDURE FLOWCHART



SECTION 2
DYNAMIC FDG BRAIN STUDY
(TEST CODE A)

This procedure is used to simulate a brain study case and uses the High Sensitivity (standard) mode of Acquisition. This acquisition is a Dynamic scan with 1 FOVs using CAC (ROI replacement) as the attenuation correction and the analysis is quantitative with plotting being performed. The system is also mechanically stressed by prescribing 1 couch position during acquisition. This procedure will require approximately 17 minutes of *acquisition* time.

2.1 Dynamic Emission Scan Simulation

1. Locate a Flood Phantom in the FOV with greater than 2mCi of activity. Use the sealed Ge68 phantom if available

Note *Record the Phantom Activity dose and measurement time for this scan in table in the Appendix chapter . Also note the Scan Start Time, this will be needed for the Quantitation Calculations.*

2. For systems with gantry tilt, verify tilt is at 0.0 degrees
3. Align the phantom utilizing the alignment lights, Reference Illustration 2–2 for details. Position the table as needed to align the phantom.
4. Once the phantom is aligned in the FOV, Landmark this position.
5. Using the Operator interface, from **Screens** select **ACQUISITION**.
6. From the Acquisition screen Select **New Procedure**.
7. Enter data in the following bars on the screen:

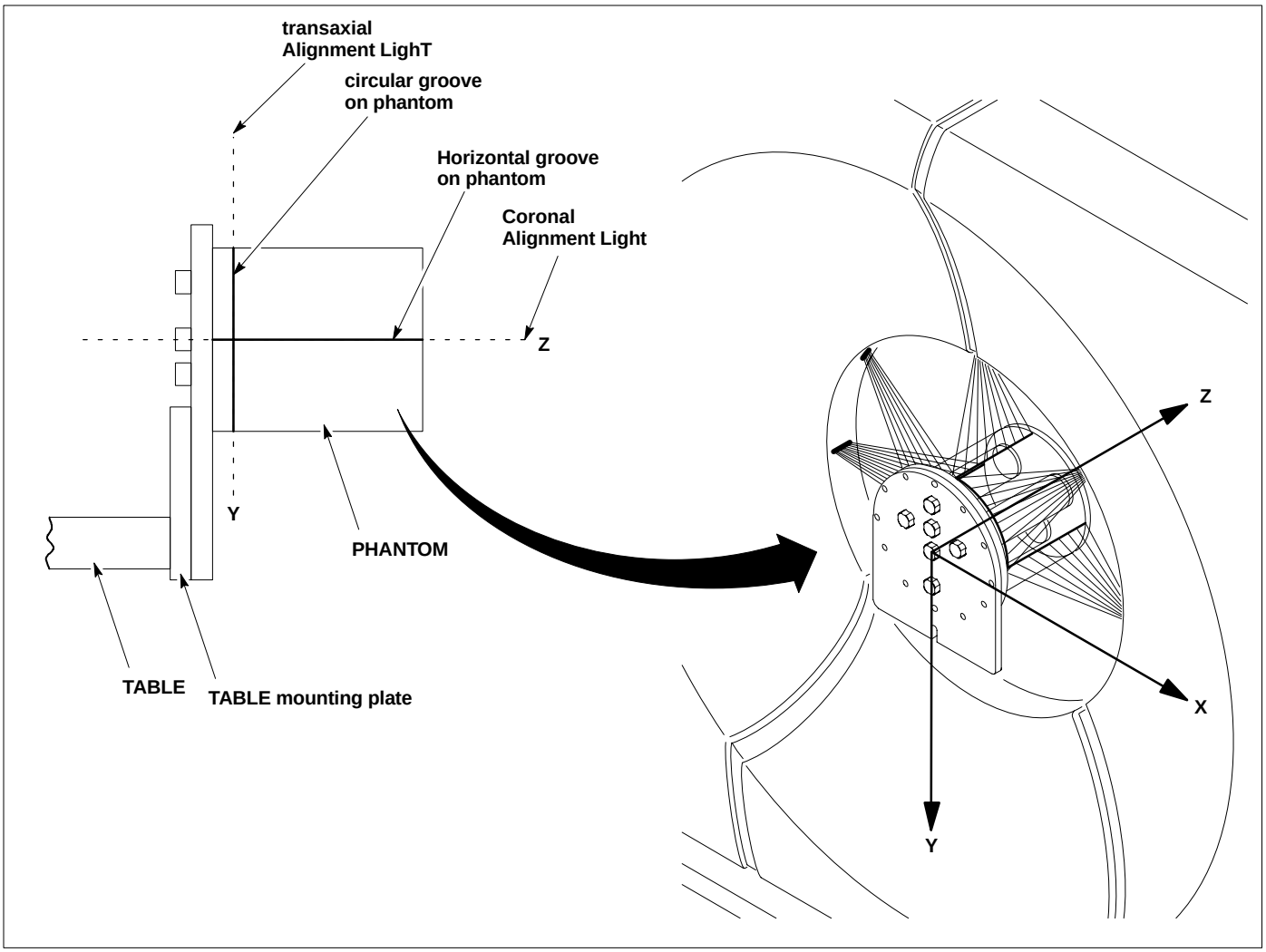
   Patient ID: **CWA *<date>***
   Patient Name: **Lance Rockjaw *<date & time>***
   Operator: ***<Your Initials>***

8. Select **OK**.
9. Select **New Scan**.
   a. In the New Scan Information window, Select New Scan Type, **Emission**.
   b. Then select Scan Mode, **Dynamic**.
   c. Select **OK**.

Back in the Acquisition Screen (in the left portion of the window) under Patient Position:

10. Select **Specify Tilt at 0** , and **Supine**, Head First.
11. Select the **Set LandMark** (middle left portion of the window).
    a. In the LandMark Window, Select **OM** (Orbital Meatal Line).
    b. Then Select **OK**.

llustration 2–2
HANTOM POSITIONING



12. In the Scan Information section (lower left portion of the window):
13. Select Randoms: **Delayed Event Subtraction**
14. Select Element Size: **Word** Mode.
15. Select **Standard** Mode.
16. Type ***<bold>*** on the following bars on the screen.

    Scan Description: **CWA, Dynamic Flood Emission**

17. In the Scan Range section (in the right portion of the window):
    a. Select **Prescribe Scan Range**

       In the Dynamic Scan Range Rx window:

       i. Select **Read Start**

ii. Input the following:

```
First Slice at: 0 toward head.
Input Group #: 1
# of Frames in Group: 4
Pre–Frame Delay: 0
Duration on each Frame: 00:00:15 (15 seconds)
```

Note *Increase acquisition times in relation to amount of activity in phantom ie, double times if 1mCi activity vs. 2 mCi.*

iii. Select **ADD** .

Inputting the previous and following data sets up the scan for the various dynamic acquisitions. Relative couch position remains the same however, each scan time is increased.

```
First Slice at: 0 toward head.
Input Group #: 2
# of Frames in Group: 4
Pre–Frame Delay: 0
Duration on each Frame: 00:00:30 (30 seconds)
```

iv. Select **ADD** .

```
First Slice at: 0 toward head.
Input Group #: 3
# of Frames in Group: 4
Pre–Frame Delay: 0
Duration on each Frame: 00:01:00 (1 minute)
```

v. Select **ADD** .

```
First Slice at: 0 toward head.
Input Group #: 4
# of Frames in Group: 4
Pre–Frame Delay: 0
Duration on each Frame: 00:02:00 (2 minutes)
```

vi. Select **ADD** .

vii. Select **OK**

b. Select Nuclide: **^{68}Ga or ^{68}Ge**

c. Select Tracer: **Unspecified**

18. Select **Accept Setup**

The system will then respond with:

```
Press "Start Scan" button
```

19. Press Start scan button.

This acquisition should complete normally with no errors recorded in the ErrLog. To ensure that the scan is progressing correctly, open the ErrLog and **Update Errors** to verify that the scan has not “hung” or terminated prematurely.

20. Go to to Section 3 on page 2–9.

2.2 Reconstruction To Produce Uncorrected Images

1. Select the **RECONSTRUCTION** M–con.
2. From the Reconstruction screen Select **Next Recon**.
3. Select Include Data: **RAW**.
4. Select the Emission Scan Images performed in Section 2.1 (Lance Rockjaw Emssn Scan).
5. Select in Scan Type the Dynamic Emission scan (simply click on the line).
6. Input the following:

   Frame: **16 to 16**
   Slices: **1 to 35**
   Increment: **1**

7. Select **OK**.
8. On the Reconstruction Screen select the following:
   a. Output: **Image**.
   b. Matrix Size: **128 x 128**.
   c. Filter: **Shepp–Logan**.
   d. Diameter: **25.0**.
   e. Cutoff (mm): **4.0**.
   f. Type ***<bold>*** on the following bars on the screen.

      Image Set Description: **CWT Dyn Flood w/o CAC*<date>***
9. Accept the Prescription with the remaining settings at their default values and Select **Submit to Bottom**.

Note *The number of slices will scroll from 0 to the number prescribed, once both numbers are equal the reconstruction is complete and will deselect the data automatically. This will be displayed in the queue status window.*

10. Select Options: **Set Aside Screen**.

Note *Staging, Go to Section 2.5, page 2–7, Steps 1. through 5.*

11. Go to to Section 3.2 page 2–12, and begin next Acquisition.

2.3 Define CAC Limits

1. Select **DISPLAY** from the M–con.
2. Create a MID (use default 128 x 128 and 5 x 7 layout).
3. Select **LOAD** on the MID window.
4. Select the Images CWT Dyn Flood without CAC created in Section 2.2, page 2–5.
5. Window level to best visibility and choose an image where phantom edge can be clearly distinguished. Scroll through all images in order to best view the phantom edge.

6. Create a circular ROI in that image, size of 101 (pixels) and position it to get as precise a match with the phantom edge as is possible with the naked eye. (The sizing of the ROI can be accomplished in the EDIT OBJECT: mid tool that pops up when a ROI is selected. Simply under the SIZE bar, change the value to 101 pixels, for both Height and Width). Refer to Illustration 2–3.
7. Cut the ROI, select all images, and paste the ROI onto all images.
8. Select **OPTIONS–>SAVE** on the MID tool.
9. Select Options: **Set Aside Screen**.

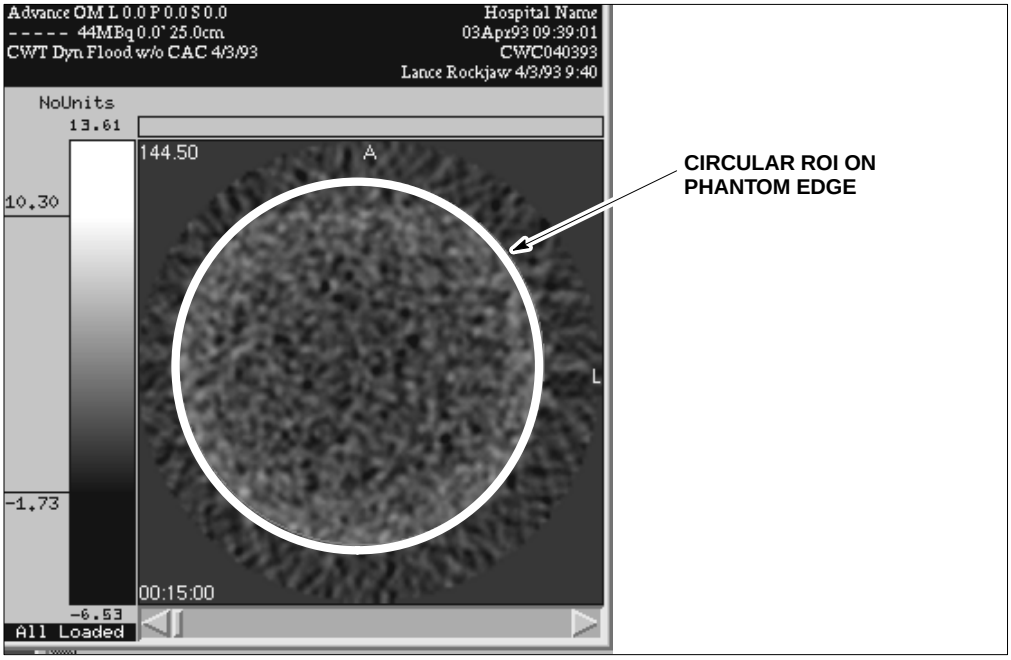
Should display without errors and should load without errors.

2.4 Reconstruction to produce CAC images

1. Select the **RECONSTRUCTION** M–con.
2. From the Reconstruction screen Select **Next Recon**.
3. Select Include Data: **RAW**
4. Select the Emission Scan Images performed in Section 2.1, page 2–2 (Lance Rockjaw Emssn Scan).
5. Select in Scan Type the Dynamic Emission scan (simply click on the line).
6. Type ***<bold>*** on the following bars on the screen.

   Frame: **1 to 16**
   Slices: **6 to 10**
   Increment: **1**

Illustration 2–3
CWT DYN FLOOD W/O CAC EXAMPLE



7. Select **OK**.
8. On the Reconstruction Screen select the following:
   a. Output: **Image**.
   b. Matrix Size: **128 x 128**.
   c. Filter: **Shepp–Logan**.
   d. Diameter: **25.0**.
   e. Cutoff (mm): **4.0**.
   f. Type **<*bold*>** on the following bars on the screen.

   `Image Set Description:` **CWT Dyn Flood w/ CAC<*date*>**
9. Accept the Prescription with the remaining settings at their default values and Select **Submit to Bottom**.

Note *The number of slices will scroll from 0 to the number prescribed, once both numbers are equal the reconstruction is complete and will deselect the data automatically. This will be displayed in the queue status window.*

10. Select Options: **Set Aside Screen**.

2.5 Display Images

1. Select **DISPLAY** from the M–con.
2. Create a MID, with a 128 x 128 matrix and 5 rows x 7 columns.
3. Select **LOAD** on the MID window.
4. Select the Images for **<*CWT Dyn Flood without CAC, date*>**.
5. Select **OK**.
6. Select **OPTIONS–>Select All ROIs–>In All Images** in MID tool

Note *Staging, Stop Here!*

7. Cut 101 pixel size ROIs.
8. Create a circular ROI centered in any image the size of 80 pixels.
9. Cut the ROI, select all images, and paste the ROI onto all images.
10. Select top row of images, then select all ROI's in selected images and show statistics (**OPTIONS–>SHOW STATS** in MID tool).
11. Create an ROI curve with name **CWA<*date*>** Y: averages, X: time, to graph tool.
12. Select **OK**.
13. Cancel to close the stats tool.
14. Select the bottom row of images, then select all ROI's in selected images and show statistics.
15. Create an ROI curve with name **CWT<*date*>** Y: averages, X: time, to graph tool.
16. In the plot tool, select **OPTIONS–>Axis Properties** and adjust Y axis for best visibility of curves.

Resulting graph should be flat. ROI values should match (+/–5%) expected values as calculated using the formulas below. However, use the following value for ROIvalues. Second series of statistics on bottom row of images should result in a second line on the plot tool. The two graphs should be in “reasonable” agreement. First four images should show more statistical variation than later images.

$$ROIvalues = \frac{A}{V}$$

A = the activity level at the start of the scan

V = the volume of the phantom **Flood phantom volume = 5640ml**

$$A = d(WC\ measured\ activity)$$ **[1mCi = 37MBq]**

t = scan start time – well counter measurement time

d = Decay correction for ^{68}Ga or ^{68}Ge <– Note: the time reference for each differs

^{68}Ga

$$d = e^{\frac{-t}{97.8}}$$ **(”t” in minutes)**

^{68}Ge

$$d = e^{\frac{-t}{390.63}}$$ **(”t” in days)**

2.6 Filming

1. On the **DISPLAY** palette window, Select **OPTIONS–>PREFERENCES–>HARDCOPY**.
2. Select the following:

   `Hard Copy Device:` **KODAK 7720**

3. Select **Define Region**, use the cursor to define the borders of the plot tool.
4. Select **APPLY** from Hardcopy palette.

Note *Select Noted when the Alarm Information window regarding the hardcopy annotation appears.*

5. Select **CAPTURE REGION**.
6. Select **SUBMIT PAGES**.

Should complete without errors.

7. Go to Section 4 on page 2–17 and begin next Acquisition.

SECTION 3
WHOLE BODY STUDY
(TEST CODE B)

This procedure is used to simulate a whole body study case and uses the Standard Sensitivity mode of Acquisition. A transmission scan in the presence of emission is also done. This acquisition is a Whole Body scan with 1 FOVs using MAC as the attenuation correction and the analysis is quantitative with whole body orthogonal being performed. This procedure will require approximately 48 minutes of *acquisition* time.

3.1 Whole Body Emission Scan Simulation

This scan will detect the activity in both of the two phantoms located on the couch simulating a patient. There are 2 different scan ranges specified, this is in order to be able to scan the “patient” going into the bore head first, then the “patient” is turned around and enters the bore feet first. Note that the phantoms are not moved once placed into position, the prescribed scans simply simulate the “patient” repositioning.

1. Locate two phantoms with minimum of 2mCi each in the FOV, one Flood Phantom near the end of the cradle with its long axis in the vertical direction and a bottle phantom next to it lying lengthwise on the table reference Illustration 2–4. Use the sealed Ge68 phantom if available

Note *Record the Phantom Activity dose and measurement time for this scan. in table in the Appendix chapter. Also note the Scan Start Time, this will be needed for the Quantitation Calculations.*

Important Note that any bottle may be used in the FIELD for service, the only changes required is to weigh the bottle once filled to determine the internal volume. Use this new volume number in the quantitation calculation in Section 3.5, page 2–14.

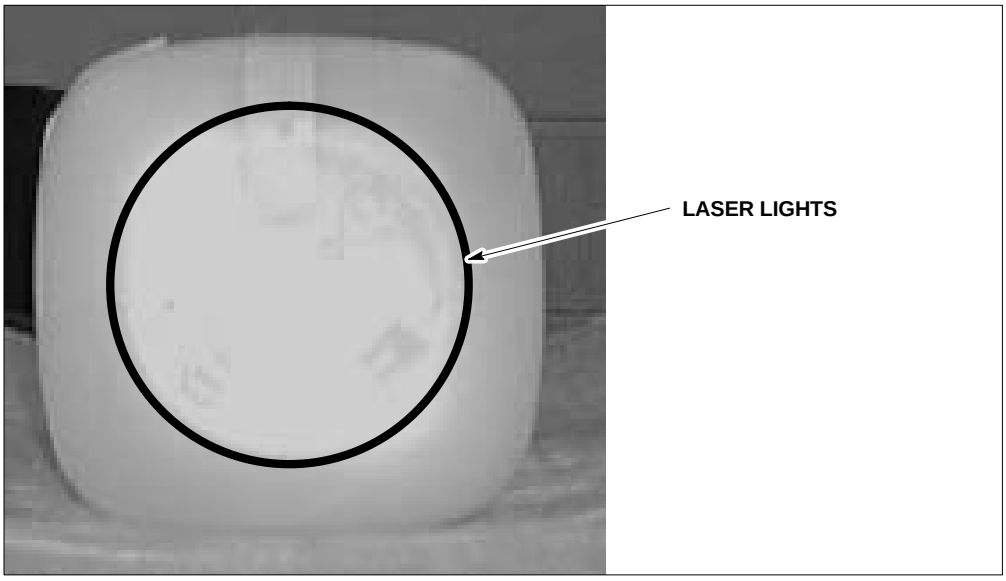
2. For systems with gantry tilt, verify tilt is at 0.0 degrees
3. Align the phantom utilizing the alignment lights, Position the table as needed to align the phantom.
4. Identify a landmark position at the edge of the bottle phantom furthest from the cradle’s edge (with respect to the head) . Press Landmark to landmark the cradle at that position reference Illustration 2–5.
5. Select the **ACQUISITION** M–con.
6. From the Acquisition screen Select **New Procedure**.
7. Enter data in the following bars on the screen:

   Patient ID: **CWB *<date>***
   Patient Name: **Dick Enjaine *<date & time>***
   Operator: ***<Your Initials>***

8. Select **OK**.

Illustration 2–4
FLOOD AND BOTTLE PHANTOM SIMULATING A WHOLE BODY STUDY

Illustration 2–5
BOTTOM OF BOTTLE PHANTOM DEPICTING LASER ALIGNMENT LIGHT POSITION



9. Select **New Scan**.
   a. In the New Scan window, Select New Scan Type, **Emission**.
   b. Then select Scan Mode, **Whole Body**.

c. Select **OK**.

10. Back in the Acquisition Screen (in the left portion of the window) under Patient Position:
11. Select **Specify Tilt at 0** , and **Supine**, Head First.
12. Select the **Set LandMark** (middle left portion of the window).
    a. In the LandMark Window, Select **UB** (Umbilicus).
    b. Then Select **OK**.
13. In the Scan Information section (lower left portion of the window):
    a. Select Randoms: **Delayed Event Subtraction**
    b. Select Element Size: **Word** Mode
    c. Select **Standard** Mode
    d. On screen, type in a description of the phantoms used for: `Scan Description: For example:`

       CWB, Flood/Bottle Ga WB
14. In the Scan Range section (in the right portion of the window):
    a. Select **Prescribe Scan Range**

       In the Whole Body Scan Range Rx window:

       i. Select **Prescribe Start**

       ii. Interleaved NOT selected.

       iii. Type ***<bold, italicized>*** on the following bars on the screen.

```
Group #: 1
AFOVs in group: 4
First Slice at: 0 toward head.
Duration on each AFOV: 00:03:00 (3 minutes)
Delay: 0
```

Note *Increase acquisition times in relation to amount of activity in phantom ie, double times if 1mCi activity vs. 2 mCi.*

       iv. Select **ADD** .

```
Group #: 2
AFOVs in group: 4
First Slice at: -4 toward feet.
Duration on each AFOV: 00:03:00 (3 minutes)
Delay: 0
```

       v. Select **ADD** .

       vi. Select **OK**

    b. Select Nuclide: **^{68}Ga or ^{68}Ge**
    c. Select Tracer: **Unspecified**
15. Select **Accept Setup**

The system will respond with:

```
Initialization in progress: Please stand by...
```

16. Press and *Hold* the → Move to Scan push button every three minutes to move the scanner to each field of view.
17. For second group, move the cradle back to realign to the landmark indicated on the bottle phantom and re–landmark.
18. Push the | Start push button again and then press and *Hold* the → Move to Scan to move the cradle to the –4 mm position of the second group.

Note *Staging, Skip to Section 3.3.*

19. Return to Section 2.2 on page 2–5.

3.2 Whole Body Transmission Scan Simulation

1. Leave the phantoms in same position as they were in the Emission scans.
2. Return cradle to original landmark position and re–landmark the cradle at that point.
3. Select **New Scan**.
   a. In the New Scan window, Select New Scan Type, **Transmission**
   b. Then select Scan Mode, **Whole Body**
   c. Select **OK**

No further changes to the prescription are necessary, just verify the following settings: Back in the Acquisition Screen (in the left portion of the window) under Patient Position:

4. Select **Specify Tilt at 0** , and **Supine**, Head First.
5. Select the Set LandMark (middle left portion of the window).
   a. In the LandMark Window, Select **UB** (Umbilicus).
   b. Then Select **OK**.
6. In the Scan Information section (lower left portion of the window):
   a. Select Randoms: **Delayed Event Subtraction**
   b. Select Element Size: **Word Mode**
   c. Select **Standard Mode**
   d. Enter a Scan Description: **CWB, Flood/Bottle Tmssn**
7. In the Scan Range section (in the right portion of the window):
   a. Select **Prescribe Scan Range**

      In the Static Scan Range Rx window:

      i. Select **Prescribe Start**
      ii. Interleaved NOT selected.
      iii. Input the following:

```
Group #: 1
AFOVs in group: 4
```

```
First Slice at: 0 toward head.
Duration on each AFOV: 00:03:00 (3 minutes)
```

iv. Select **ADD** .

```
Group #: 2
AFOVs in group: 4
First Slice at: -4 toward feet.
Duration on each AFOV: 00:03:00 (3 minutes)
```

v. Select **ADD** .

vi. Select **OK**

8. Select **Accept Setup**

   System will respond with:

   ```
   Emission Activity Present?
   ```

   a. Select **Yes**

   ```
   Transmission Scan exposes patient to radiation..
   ```

   b. Select **OK**

   System will respond with:

   ```
   Initialization in progress: Please Stand By...
   ```

9. Press **Start Scan** .

This acquisition should complete normally with no errors recorded in the ErrLog. To ensure that the scan is progressing correctly, open the ErrLog and **Update Errors** to verify that the scan has not “hung” or terminated prematurely.

CAUTION **The Transmission Acquisition must complete before proceeding with Section 3.3, page 2–13.**

10. Go to section 2.3 on page 2–5.

3.3 Reconstruction To Produce Emission Images

1. Select the **RECONSTRUCTION** M–con.
2. From the Reconstruction screen Select **Next Recon**.
3. Select Include Data: **RAW**
4. Select the Emission Scan Images performed in Section 3.1, page 2–9 (Dick Enjaine Emssn Scan).
5. Select in Scan Type the 280 slices of Raw Data (simply click on the line), loading all frames and slices.
6. Select **OK**.

Note *An information popup stating that landmark dates do not match can be ignored. Select NOTED to continue.*

7. Accept the Prescription with the remaining settings at their default values and Select **Submit to Bottom**.

Note *The number of slices will scroll from 0 to the number prescribed, once both numbers are equal the reconstruction is complete and will deselect the data automatically. This will be displayed in the queue status window.*

8. Select Options: **Set Aside Screen**.

3.4 Display Images

1. Select **DISPLAY** from the M–con.
2. Select **REFORMAT** Tool from the Display palette.
3. Select **Orthogonal** (Whole Body) option.
4. Select **LOAD** on the Whole Body Reformat Tool window.
5. Select the Images for ***<Dick Enjaine>***.
6. Set number of slices in coronal and sagittal reformat to 11, minimum slice thickness.
7. Select **Re–Slice Both**.
8. Review the resulting re–slices.
9. Select **Options–> Save** on the Coronal Images.

   Enter an Image Set Description and select **OK**.

Should get reformat tool and the Images should load without errors. Should be able to see four phantoms in the coronal reslice, in sequence (from top to bottom) flood/bottle/bottle/flood. Reference Illustration 2–6.

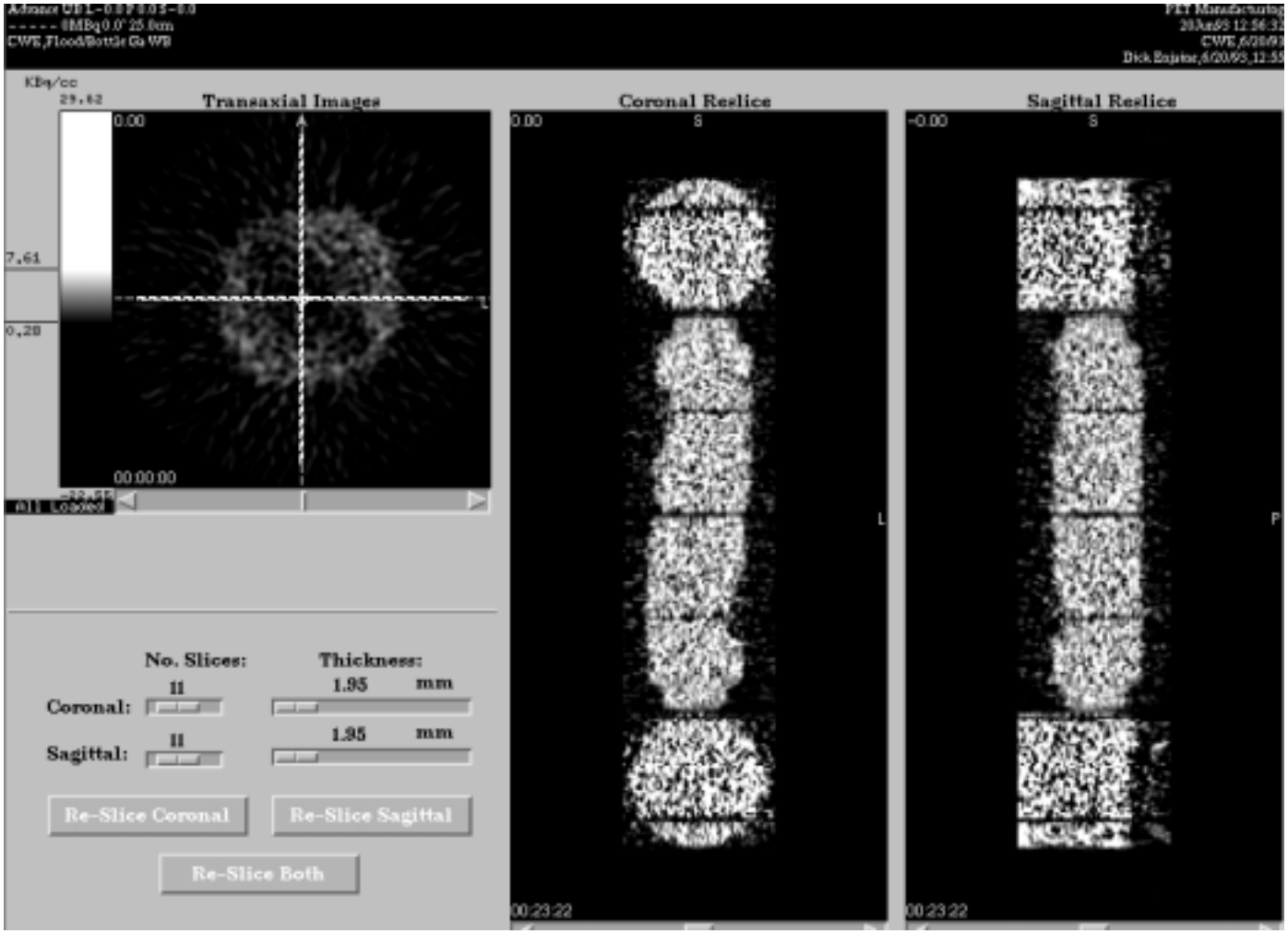
Note *Staging, Skip to Section 5.*

10. Go to section 4.2 on page 2–20 to start the next acquisition.

3.5 Image Analysis

1. Select **DISPLAY** from the M–con.
2. Create a MID, select **Resolution–>Other** with a 128 x 384 matrix and 2 rows x 6 columns.
3. Select **LOAD** on the MID window.
4. Select the Coronal Images for ***<Dick Enjaine>***.
5. Select **OK**.
6. Select the Square ROI tool.
7. Place the largest square ROI that will fit in the active center of the “top” Bottle phantom in the first Image.
8. Cut the ROI.

Illustration 2–6
REFORMAT TOOL DEPICTING WHOLE BODY IMAGES



9. Select all Images and paste the ROI.
10. Select the Square ROI tool.
11. Place the largest square ROI that will fit in the active center of the “bottom” Bottle phantom in the first Image.
12. Cut the ROI.
13. Select all Images and paste the ROI.
14. Select the Circular ROI tool.
15. Place the largest circular ROI that will fit in the active center of the “top” Flood phantom in the first Image.
16. Cut the ROI.
17. Select all Images and paste the ROI.
18. Select the Circular ROI tool.

19. Place the largest circular ROI that will fit in the active center of the “bottom” Flood phantom in the first Image.
20. Cut the ROI.
21. Select all Images and paste the ROI.
22. Select the top circular ROI in any image, and select all ROI’s of the same name.
23. Show statistics on the selected ROI’s (Options/Show Stats in MID tool).
24. Repeat for other 3 ROI sets.

ROI values should match expected values as calculated using the formulas listed. However, use the following values for the different ROIvalues of each phantom.

$$ROIvalues = \frac{A}{V}$$

A = the activity level at the start of the scan

V = the volume of the phantom

Flood phantom volume = 5640ml

Production Bottle Phantom volume = 4480ml

Attenuation Phantom volume = 4520ml

Heart Phantom volume = 305ml

$$A = d(WC\ measured\ activity)$$

t = scan start time – well counter measurement time

d = Decay correction for ^{68}Ga or ^{68}Ge <–Note: the time reference for each differs

^{68}Ga

$$d = e^{\frac{-t}{97.8}}$$ **(“t” in minutes)**

^{68}Ge

$$d = e^{\frac{-t}{390.63}}$$ **(“t” in days)**

$$ROIvalues = \frac{A}{Volume\ in\ ml}$$ **Use this equation if a different bottle phantom is used; determine volume of the bottle by weighing the bottle filled with water.**

3.6 Filming

1. On the **DISPLAY** window, Select **OPTIONS–>PREFERENCES–>HARDCOPY**.
2. Select the following:

   `Hard Copy Device:` **KODAK 7720**

3. Select **Define Region**, use the cursor to define the borders of the MID tool with the Coronal Images.
4. Select **APPLY**.
5. Select **CAPTURE REGION**.
6. Select **SUBMIT PAGES**.

Should complete without errors.

7. Go to section 4.3 on page 2–21

SECTION 4
STATIC FDG BRAIN STUDY –2D/3D (TEST CODE C)

This procedure is used to simulate a brain study case and uses the High Resolution mode or 3D of Acquisition. This acquisition is a Static scan with 1 FOV using MAC as the attenuation correction and the analysis is quantitative with Image Math performed. The system is also mechanically stressed by tilting the gantry during acquisition. This procedure will require approximately 45 minutes of *acquisition* time.

4.1 Head Transmission Scan Simulation

The Transmission scan simulation is used to calculate the attenuation of the phantom in the FOV. This scan is displayed to indicate that the system is acquiring data and is operational. Once displayed, the images should show good statistics and no artifacts, more detail is given at the end of this procedure.

1. Log In as **OPERATOR**.
2. Locate a water filled Attenuation Phantom in the FOV. Illustration 2–7 shows a front view of the phantom.
3. With gantry tilt at 0^{o} , align the phantom utilizing the alignment lights, Reference Illustration 2–8 below for details. Position the table as needed to align the phantom.
4. Once the phantom is aligned in the FOV, Landmark this position, then retract the table so that the Phantom is out of the FOV.
5. Tilt the Gantry top AWAY from the table by 8 degrees (if applicable)

Illustration 2–7
ATTENUATION PHANTOM DEPICTING THE ATTENUATION PINS (front view)

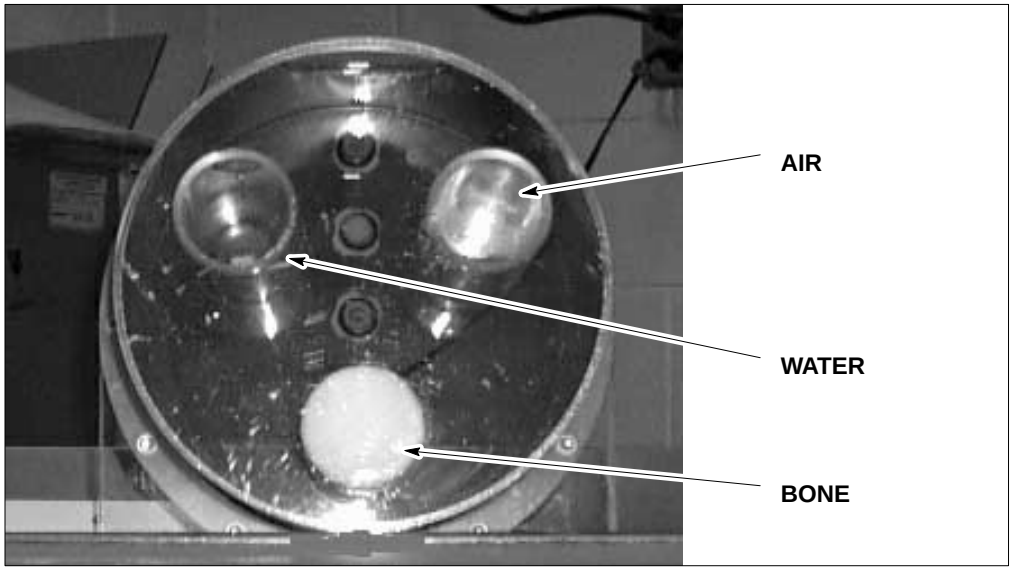
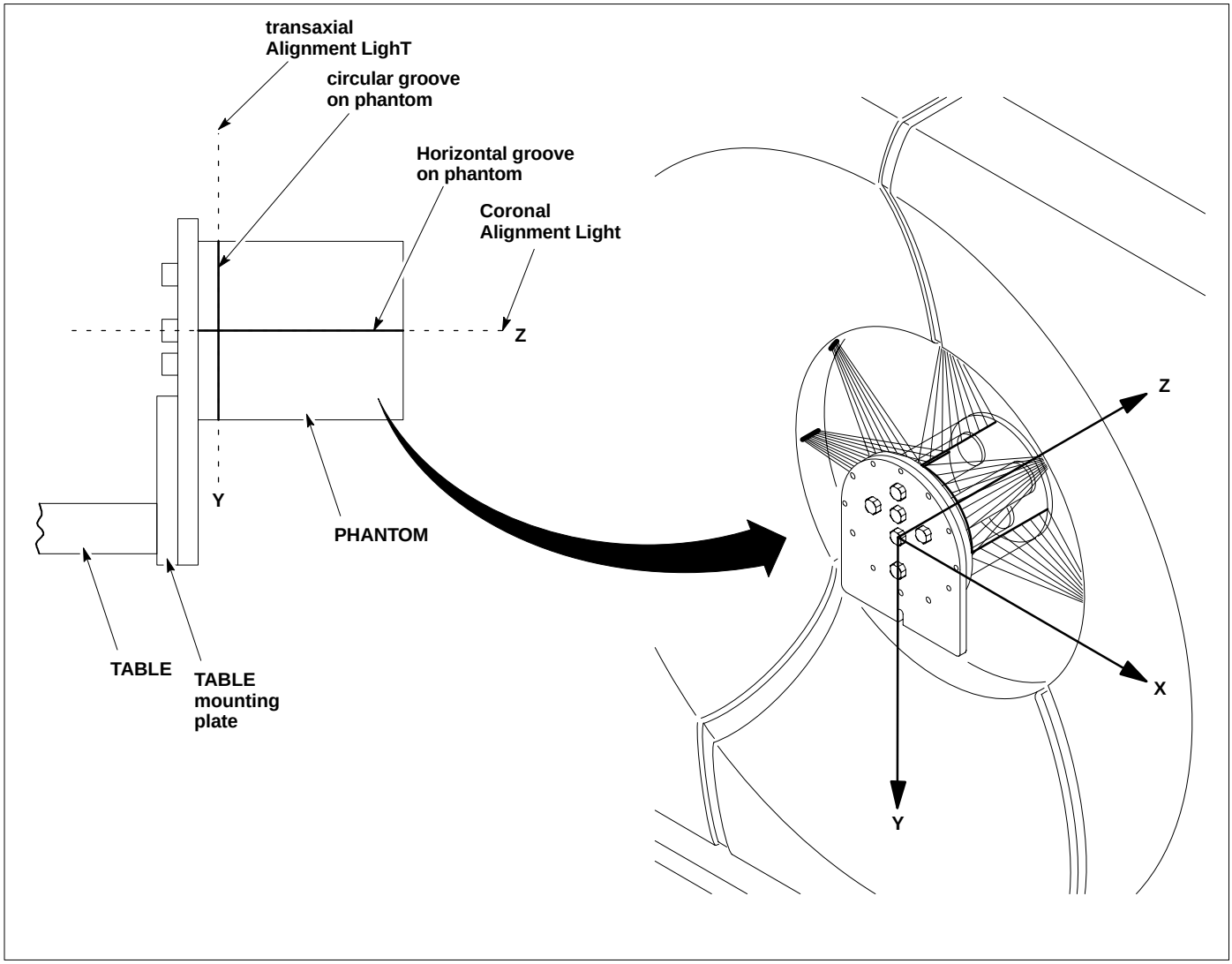


Illustration 2–8
PHANTOM POSITIONING



6. Advance the table into the Gantry to align the phantom into the center of the FOV with the Gantry tilted. (Move the couch back to the Landmark position – 0.0)

Note *The alignment lights will look slightly out of position, however, place the phantom as accurately as possible into the FOV.*

7. Note the position of the table when the phantom is aligned (it will be used in Section 4.2, page 2–20).
8. Using the Operator interface, from **`Screens`** select **`ACQUISITION`**.
9. From the Acquisition screen Select **`New Procedure`**.
10. Type ***`<bold, italicized>`*** on the following bars on the screen.

Patient ID: **CWC <*date*>**
Patient Name: **Amanda Quigley <*date & time*>**
Operator: **<*Your Initials*>**

11. Select **OK**.
12. Select **New Scan**.
    a. In the New Scan window, Select New Scan Type, **Transmission**.
    b. Then select Scan Mode, **Static**.
    c. Select **OK**.

Back in the Acquisition Screen (in the left portion of the window) under Patient Position:

13. Select **Read Tilt** , and **Supine**, Head First.
14. Select **Select LandMark** (middle left portion of the window).
    a. In the LandMark Window, Select **OM** (Orbital Meatal Line).
    b. Then Select **OK**.
15. In the Scan Information section (lower left portion of the window):
    a. Select Randoms: **RealTime Subtraction**.
    b. Select Element Size: **Word** Mode.
    c. Select **High Resolution** Mode.
    d. On screen, type in the the following for: Scan Description:

       CWC, date Tilted Attn Phan Xmssn.
16. In the Scan Range section (in the right portion of the window):
    a. Select **Prescribe Scan Range**

       In the Static Scan Range Rx window:

       i. Select **Read Start**
       ii. Interleaved NOT selected.
       iii. Input the following:

Group #: **1**
AFOVs in group: **1**
Duration on each AFOV: **00:15:00** (15 minutes)

       iv. Select **ADD**
       v. Select **OK**
17. Select **Accept Setup**

    System will respond with:

Emission Activity Present?

    a. Select **No**

Transmission Scan exposes patient to radiation..

    b. Select **OK**

System will respond with:

```
Initialization in progress: Please Stand By...
```

18. For tilting gantry's, a note will appear stating:

```
Current gantry tilt is incompatible with landmark tilt. Restore tilt to 0.0
or set new landmark
```

Press landmark button on gantry and continue.

19. Press Start

This acquisition should complete normally with no errors recorded in the ErrLog. To ensure that the scan is progressing correctly, open the ErrLog and verify that the scan has not "hung" or terminated prematurely.

20. Return to Section 3.3 on page 2–13.

4.2 Head Emission Scan Simulation

This simulation will detect the actual activity that has been injected into the attenuation phantom. Statistics can then be verified to ensure the system is acquiring data correctly (calculated vs system statistics are verified).

1. Inject the attenuation phantom (used in Section 4.1 above) with a minimum of 2mCi of activity.

Note *Record the Phantom Activity dose and measurement time for this scan in table in the Appendix chapter . . Also note the Scan Start Time, this will be needed for the Quantitation Calculations.*

2. Realign the phantom in the FOV. (Align the Phantom into the exact couch position recorded in Section 4.1, Step 7. on page 2–18).
3. From the Acquisition screen Select **New Scan**.
   a. In the New Scan window, Select New Scan Type, **Emission**
   b. Then select Scan Mode, **Static**
   c. Select **OK**

Back in the Acquisition Screen (in the left portion of the window) under Patient Position:

4. Select **Read Tilt** , and **Supine**, Head First.
5. Select the **Set LandMark** (middle left portion of the window).
   a. In the LandMark Window, Select **OM** (Orbital Meatal Line)
   b. Then Select **OK**
6. In the Scan Information section (lower left portion of the window):
   a. Select Randoms: **RealTime Subtraction**
   b. Select Element Size: **Word** Mode.
   c. Select **High Resolution** or **3D** Mode.
   d. On screen, type in the the following for: `Scan Description:`

CWC, date Tilted Attn Phan Emssn.

7. In the Scan Range section (in the right portion of the window):
   a. Select **Prescribe Scan Range**

      In the Static Scan Range Rx window:

      i. Select **Read Start** .

      ii. Interleaved NOT selected.

      iii. Input the following:

```
Group #: 1
AFOVs in group: 1
Duration on each AFOV: 00:15:00 (15 minutes)
```

      iv. Select **ADD**.

```
Group #: 2
AFOVs in group: 1
Duration on each AFOV: 00:15:00 (15 minutes)
```

      v. Select **ADD**.

      vi. Select **OK**

   b. Select Nuclide: **^{68}Ga**

   c. Select Tracer: **Unspecified**

8. Select **Accept Setup**

   System will respond with:

```
Initialization in progress: Please Stand By...
```

9. Press | Start |.

This acquisition should complete normally with no errors recorded in the ErrLog. To ensure that the scan is progressing correctly, open the ErrLog to verify that the scan has not “hung” or terminated prematurely.

10. Select Options: **Set Aside Screen**.

Note *Although the Acquisition screen is set aside, the scan will continue normally. The next step is immediately started to begin concurrent Acquisition with Reconstruction.*

11. Go to section 3.5 on page 2–14 to display images during acquisition.

4.3 Reconstruction of Head Transmission Images

1. Using the Operator interface, from **Screens** select **Reconstruction**.
2. From the Reconstruction screen Select **Next Recon**.
3. Select Include Data: **RAW**
4. Select the Transmission Scan Images performed in Section 4.1 (Amanda Quigley Xmssn Scan).

5. Select in Scan Type the 35 slices of Raw Data (simply click on the line).
6. Type **<bold>** on the following bars on the screen.

   Slices: **1** to **35**
   Increment:**1**

7. Select **OK**.
8. On the Reconstruction Screen select the following:
   a. Output: **Image**.
   b. Matrix Size: **256 x 256**.
   c. Filter: **Ramp**.
   d. Diameter: **25.0**.
   e. Cutoff (mm): **4.0**.
   f. Type **<bold>** on the following bar on the screen.

   Image Set Description: **CWC<*date*>Transmission Images**

9. Accept the Prescription with the remaining settings at their default values and Select **Submit to Bottom**.

Note *The number of slices will scroll from 0 to the number prescribed, once both numbers are equal the reconstruction is complete and will deselect the data automatically. This will be displayed in the queue status window.*

10. Set Aside Recon Window.

Reconstruction should complete with NO errors.

4.4 Display Head Transmission Images

1. Using the Operator interface, from **Screens** select **Display**.
2. Select a Single Image Display (SID), with a 256 x 256 matrix.
3. Select **LOAD** on the SID window.
4. Select the Images produced in Section 4.3 (page 2–21), ALL 35 Images.
5. Scroll through the entire set of Images and Window/Level to best visibility.
6. Create a 2nd SID, it will be labeled **SID:1**.

   Move each subsequent SID as it is created so that all SIDs can be viewed.

7. Select the MathTool.
8. Select **Image Set Summation**.
9. Select **OK** .
10. Sum the Images in the 1st SID together and direct to **SID:1** and Apply.
11. Select the Elliptical ROI tool.
12. Place an elliptical ROI over each of the 3 attenuation pins (including the water pin), in **SID:1**.

13. Set Aside the Display Window.

This test should show the SID(s) displays and load the images with NO errors. The high and low density pins should be visible without artifacts. In the **SID:1** tool, (once the MathTool is used), the transmission image should have a much reduced noise content. Once the ROIs are placed, full ROI statistics should be displayed with NO errors.

Note *At this point, check to see if the Acquisition started in Section 4.2 has completed, if it has immediately go to to the next Acquisition noted below.*

14. If a heart phantom is available, go to Section 6 on page 2–38, and commence next Acquisition. If no heart phantom is available, continue to next step.

4.5 Reconstruction of Head Emission Images

1. Select the **RECONSTRUCTION**, window set aside earlier.
2. From the Reconstruction screen Select **Next Recon**.
3. Select Include Data: **RAW**
4. Select the Emission Scan Images performed in Section 4.2 (Amanda Quigley Emssn Scan).
5. Select in Scan Type the 70 slices of Raw Data (simply click on the line).
6. Type ***<bold>*** on the following bars on the screen.

   Slices: **1** to **35**
   Increment:**1**

7. Select Sort by: **Time** then **Location**.
8. Select **OK**.
9. On the Reconstruction Screen select the following:
   a. Output: **Image**.
   b. Matrix Size: **128 x 128**.
   c. Filter: **Ramp**.
   d. Diameter: **25.0**.
   e. Cutoff (mm): **4.0**.
   f. Type ***<bold>*** on the following bar on the screen.

   Image Set Description: **CWC<*date*>Emission Frame 1**

10. Accept the Prescription with the remaining settings at their default values and Select **Submit to Bottom**.

Note *The number of slices will scroll from 0 to the number prescribed, once both numbers are equal the reconstruction is complete and will deselect the data automatically. This will be displayed in the queue status window.*

11. Select **Next Recon** on the Reconstruction screen.
12. Select the Emission Scan Images performed in Section 4.2 (Amanda Quigley Emssn Scan).

13. Select in Scan Type the 70 slices of Raw Data (simply click on the line).
14. Type **<*bold*>** on the following bars on the screen.

    Slices: **36** to **70**
    Increment:**1**

15. Select **Time** then **Location**.
16. Select **OK**.
17. On the Reconstruction Screen select the following:
    a. Output: **Image**.
    b. Matrix Size: **128 x 128**.
    c. Filter: **Ramp**.
    d. Cutoff (mm): **4.0**.
    e. Diameter: **25.0**.
    f. Type **<*bold*>** on the following bar on the screen.

    Image Set Description: **CWC<*date*>Emission Frame 2**

18. Accept the Prescription with the remaining settings at their default values and Select **Submit to Bottom**.

Note *The number of slices will scroll from 0 to the number prescribed, once both numbers are equal the reconstruction is complete and will deselect the data automatically. This will be displayed in the queue status window.*

19. Set Aside Recon Window.

Reconstruction should complete with NO errors.

4.6 Display Head Emission Images

1. Select **DISPLAY** from the M–con.
2. Create a 3rd SID, labeled **SID:2**.
3. Select **LOAD** on the SID window.
4. Select the Images **<*CWC, date Emission Frame 1*>**, produced in Section 4.5. on page 2–23.
5. Scroll through the entire set of Images and Window/Level to best visibility.
6. Create a 4th SID, it will be labeled **SID:3**.
7. Select the MathTool.
8. Select **Image Set Summation**.
9. Select **OK** .
10. Sum the Images in **SID:2** together and direct to **SID:3**.
11. Select all the ROIs in **SID:1** and cut them.

12. Paste the ROIs cut above into **SID:3**.
13. Select each ROI in **SID:3** and use Edit Object Tool to check the statistics in each one.
14. Create the largest elliptical ROI that will fit in the active center of the 7th Image in **SID:2**.
15. Check the average value reported in the Edit Object tool, and note the value.
16. Create a 5th SID **SID:4**.
17. Select **LOAD** on the SID window.
18. Select the ***<CWC, date Emission Frame 2>*** images created in Section 4.5. on page 2–23.
19. Copy the elliptical ROI just created in **SID:2** and paste to the 7th image in **SID:4**.
20. Check the average value reported in the Edit Object tool, and note the value.
21. Bring up math tool.
22. Select **Image Set with Image Set** .
23. Select **OK** .
24. Sum the image set in **SID:2** with the image set in **SID:4** with the result directed into **SID:4**. Apply then select continue on the alarm pop–up.
25. Copy the elliptical ROI just created in **SID:2** and paste to the 7th image in **SID:4**.
26. Check the average value reported in the Edit Object tool, and verify that it equals the sum of the previously noted values.

This test should show the SID(s) displays and loads the images with NO errors. The high and low density pins should be visible without artifacts. In the **SID:1** tool, (once the MathTool is used), the transmission image should have a much reduced noise content. Once the ROIs are placed, full ROI statistics should be displayed with NO errors. Cold spots should also be visible without artifacts and emission images with much reduced noise content. Average ROIs should be equal or near zero (0).

Note *The average value should match expected values calculated using the formulas in box below.*

27. If a heart phantom is available, go to Section 6.2 on page 2–40, and commence the next Acquisition if previous Acquisition has completed. If no heart phantom is available, continue to next step.

4.7 Archive Images to DAT

Archive Emission and Transmission Images to DAT Tape:

1. Using the Operator interface, from **Screens** select **ARCHIVE ->DAT**.
2. Select **READY** when Tape is inserted.
3. Type ***<bold, italicized>*** on the following bars on the screen.

   Enter Volume Name: ***<Name for DAT Tape>***
   Select Tape Length: **90mm**

$$ROIvalues = \frac{A}{V}$$

A = the activity level at the start of the scan

V = the volume of the phantom **Attenuation Phantom volume = 4520ml**

$$A = d(WC\ measured\ activity)$$ **[1mCi = 37MBq]**

t = scan start time – well counter measurement time

d = Decay correction for ^{68}Ga or ^{68}Ge <–Note: the time reference for each differs

^{68}Ga

$$d = e^{\frac{-t}{97.8}}$$ **("t" in minutes)**

^{68}Ge

$$d = e^{\frac{-t}{390.63}}$$ **("t" in days)**

$$ToConvertBq => Ci = \frac{ROIvalues}{37x10^9} \quad FINAL\ VALUE\ in\ Ci$$

4. Select **Label Volume**.
5. Select the following:

   Type of Operation: **SAVE**
   Type of Data: **PATIENT**
   Include Data: **IMAGE**
   Sort By: **PATIENT NAME**

6. Select ***<Amanda Quigley>*** scan description.
7. Select ALL Images produced in above procedures (both Emission and Transmission Images) for ***<Amanda Quigley>***.
8. Select **START**.
9. In Confirmation window, select **ARCHIVE ITEMS**.
10. When the Archiving is complete, verify images are on tape.
    a. Select the following:

    Type of Operation: **Restore**
    Type of Data: **PATIENT**
    Include Data: **IMAGE**

    b. Select ***<Amanda Quigley>*** scan description.
    c. Select **EXPAND** to verify all imagesets have been saved.
11. Select **REMOVE MEDIA**.
12. When tape is ejected from the drive, select **Quit Archive**.

4.8 Delete Images from Database

1. Using the Operator interface, from **Utilities** select **DELETE**.

1. Select the following:

   Type of Data: **PATIENT**
   Include Data: **IMAGE**
   Sort By: **PATIENT NAME**

2. Select ***<Amanda Quigley>*** scan description.
3. Select ALL Images produced in above procedures (both Emission and Transmission Images) for ***<Amanda Quigley>***.
4. Select **SELECT**.
5. Select **DELETE SELECTIONS**.
6. Select **DELETE ITEMS**.
7. Quit the **DELETE** screen when completed.

Should complete without errors.

4.9 Restore Images from DAT Tape

1. Using the Operator interface, from **Screens** select **ARCHIVE ->DAT**.
2. Select **READY** when Tape is inserted.
3. Select the following:

   Type of Operation: **RESTORE**
   Type of Data: **PATIENT**
   Include Data: **IMAGE**

4. Select all the Images for ***<Amanda Quigley>*** (both Emission and Transmission Images).
5. Select **START**.
6. In Confirmation window, select **OK**.
7. When the Restoring is complete, Select **REMOVE MEDIA**.

Should complete without errors.

4.10 Display Restored Images

1. Select **DISPLAY** from the M–con.
2. Create a MID, with a 128 x 128 matrix and 5 rows x 7 columns.
3. Select **LOAD** on the MID window.
4. Select the Images for ***<Amanda Quigley>*** restored from the DAT Tape.
5. Select **OK**.

Should display without errors and should load without errors, images displayed should be same as those in Section 4.6 on page 2–24.

4.11 Film Image Set

1. On the **DISPLAY** window, Select **OPTIONS–>PREFERENCES**.
2. Select the following:

   Hard Copy Device: **GE LaserCam**
   Format: ***<28 on 1>***

3. Select **APPLY**.

   Note that the film page in the display palette is now divided into 28 tiles. (7 x 4)

4. Select **Options–>Select for Print–>Displayed Image**. in the MID.

   Note that the 28 tiles on P1 turn from white to gray and the first 7 tiles on P2 also turn gray.

5. Click on **Clear Page P2**

   We now have 1 full page for print.

6. Select **SUBMIT PAGES**.

Should complete without errors.

7. If a gated test fixture is available, go to section 5.1 . Otherwise proceed to section 5.7 on page 2–34.

SECTION 5
GATED HEART STUDY
(TEST CODE D)

This procedure is used to simulate a cardiac gated study. If a gated simulator (factory) is available, do sections 5.1 thru 5.6. If an ECG machine is available, do sections 5.7 thru 5.9

Important Test Code D for SERVICE applications can be found beginning in Section 5.7. on page 2–34.

5.1 Gated Emission Scan Simulation – Requires Gated test fixture

1. Set up the cardiac gating simulator with three triggers per counterclockwise rotation, the line source at the 10 cm position, with a two second revolution.

1. Set up the cardiac gating simulator as follows;
   a. Turn on the simulator. It will take ~10 minutes to warmup so that it will rotate and 30 minutes total on time to stabilize rotation RPMs.
   b. Enable three triggers per rotation. Set pulse trigger switches at positions 10, 1 and 4
   c. Install cables for the simulator.
      i. Interconnect cable between the rotation device and the simulator box.
      ii. Install ECG bnc cable between the rotation device and the table ECG input.
   d. Place the line source positions at the 10 cm position.

Note *Staging, Skip to Step 3.*

2. Place an aluminum block 50mm to 75mm (2in to 3in) thick (radial direction), 75mm to 100mm (3in to 4in) high (tangential direction), and 125mm to 150mm (5in to 6in) long (axial direction) in the field of view, outside the path of rotation of the simulator source.
3. Load the simulator with a weak rod source (<1mCi) at the home position and a dummy pin at the other 10 cm position to balance the simulator rotation.
   a. With the simulator slowly rotating, move the home/run switch to home position.
   b. The simulator will stop at the *home* position. Load the active source pin.
   c. Move the home/run switch to run position.
   d. Stop rotation and insert the dummy pin in the other location.
4. Start the simulator rotation and set for 30 RPMs +/–.5
5. Select the **ACQUISITION** M–con.
6. From the Acquisition screen Select **New Procedure**.
7. Enter data in the following bars on the screen:

Patient ID: **CWD <date>**
Patient Name: **Wilma Flintstone <date & time>**
Operator: **<Your Initials>**

8. Select **OK**.
9. Select **New Scan**.
   a. In the New Scan window, Select New Scan Type, **Emission**
   b. Then select Scan Mode, **Gated**
   c. Select **OK**

Back in the Acquisition Screen (in the left portion of the window) under Patient Position:

10. Select **Specify Tilt at 0**, and **Supine**, Head First.
11. Select the **Set LandMark** (middle left portion of the window).
    a. In the LandMark Window, Select **XY** (Xyphoid).
    b. Then Select **OK**
12. In the Scan Information section (lower left portion of the window):
    a. Select Randoms: **Delayed Event Subtraction**
    b. Select Element Size: **Word** Mode.
    c. Select **Standard Resolution** Mode.
13. Type **<bold>** on the following bars on the screen.

    Scan Description: **CWD, Gated Emission**

14. In the Scan Range section (in the right portion of the window):
    a. Select **Prescribe Scan Range**

       In the Gated Scan Range Rx window:

       i. Select **Prescribe Start**
       ii. Input the following:

Note *Staging use the following parameters.*

Input Group #: **1**
Number of Bins: **20** for 2 DHMs **10** for 1 DHM
Duration on each Bin: **01:00** (100 milliseconds)
Duration of Scan: **00:03:00** (3 minutes)

Note *Field use the following parameters.*

Input Group #: **1**
Number of Bins: **20** for 2 DHMs **10** for 1 DHM
Duration on each Bin: **00:25** (25 milliseconds)
Duration of Scan: **00:30:00** (30 minutes)

   b. Select from Beat Rejection Mode **Bad Beat**

      i. Input the following:

Avg Beats/Minute: **120**
% Deviation Allowed: **30%**

c. Select **ADD**.

d. Select **OK**

e. Select Nuclide: **^{68}Ge**

f. Select Tracer: **Unspecified**

15. Select **Accept Setup**

The system will then respond with:

```
Press "Start Scan" button
```

Note *At this point the Current Heart Rate will become active along with the Average Heart Rate, before pushing the* Start *pushbutton, ensure that the Current Heart Rate is approximately 120 bpm. Adjust the gating simulator to achieve the desired pulse rate. Once completed, continue with the scan.*

16. Press Start button.

This acquisition should complete normally with no errors recorded in the ErrLog. To ensure that the scan is progressing correctly, open the ErrLog and **Update Errors** to verify that the scan has not "hung" or terminated prematurely.

Note *Staging, Go to Section 5.5*

17. Go to section 6.3 on page 2–41 and start Recon.

5.2 Transmission Scan Simulation

1. Unload and store the rod source, and remove the cardiac gating simulator from the FOV.
2. Leave the aluminum block in place.
3. Select **New Scan**.
   a. In the New Scan window, Select New Scan Type, **Transmission**
   b. Then select Scan Mode, **Static**
   c. Select **OK**

Back in the Acquisition Screen (in the left portion of the window) under Patient Position:

4. In the Scan Information section (lower left portion of the window):
   a. Select Randoms: **Delayed Event Subtraction**
   b. Select Element Size: **Word** Mode.
   c. Select **Standard Resolution** Mode.
5. Type ***<bold>*** on the following bars on the screen.

   Scan Description:**CWD, Gated Transmission**

6. In the Scan Range section (in the right portion of the window):
   a. Select **Prescribe Scan Range**

In the Gated Scan Range Rx window:

i. Select **Prescribe Start**

ii. Interleaved NOT selected.

iii. Input the following:

```
Input Group #:  1
# of Frames in  group:  1
Duration of each Frame:  00:15:00  (15 minutes)
```

iv. Select **ADD**.

v. Select **OK**

7. Accept prescription with the remaining settings at their default values.
8. Select **Accept Setup**.

System will respond with:

```
Emission Activity Present?
```

a. Select **No**

```
Transmission Scan exposes patient to radiation..
```

b. Select **OK**.

System will respond with:

```
Initialization in progress:  Please Stand By...
```

9. Press | Start |.

This acquisition should complete normally with no errors recorded in the ErrLog. To ensure that the scan is progressing correctly, open the ErrLog and **Update Errors** to verify that the scan has not “hung” or terminated prematurely.

10. Go to section 6.5 on page 2–43.

5.3 Reconstruction to Produce Emission Images

1. Select the **RECONSTRUCTION** M–con.
2. From the Reconstruction screen Select **Next Recon**.
3. Select Include Data: **RAW**
4. Select the Emission Scan Images performed in Section 5.1 on page 2–29 (Wilma Flintstone Emssn Scan).
5. Select in Scan Type the number of slices of Raw Data (simply click on the line).
6. Type ***<bold>*** on the following bars on the screen.

```
Load Bins:   1 to 1
Slices:  1 to 35
Increment: 1
```

7. Select **OK**.

8. Type **<bold>** on the following bars on the Reconstruction Screen.

   Image Set Description: **<Gated Bin 1>**.

9. Accept the Prescription with the remaining settings at their default values and Select **Submit to Bottom**.

Note *The number of slices will scroll from 0 to the number prescribed, once both numbers are equal the reconstruction is complete and will deselect the data automatically. This will be displayed in the queue status window.*

10. Select Options: **Set Aside Screen**.

5.4 Display Images

1. Select **DISPLAY** from the M–con
2. Create a MID, with a 128 x 128 matrix and 5 rows x 7 columns.
3. Select **LOAD** on the MID window.
4. Select the Images for Wilma Flintstone, **<Gated Bin 1>**.
5. Select **OK**.
6. Review all Images produced.

Should get a MID display and the Images should load without errors. One should be able to see two rod sources at top and right side of all images without streaking artifacts.

5.5 Emission Images Reconstruction

1. Select the **RECONSTRUCTION** M–con.
2. From the Reconstruction screen Select **Next Recon**.
3. Select Include Data: **RAW**
4. Select the Emission Scan Images performed in Section 5.1 on page 2–29 (Wilma Flintstone Emssn Scan).
5. Select in Scan Type the number of slices of Raw Data (simply click on the line).
6. Type **<bold>** on the following bars on the screen.

   Load Bins: **1 to 20** <--(**10**if 1 DHM)
   Slices: **7 to 14**
   Increment: **1**

7. Select **OK**.
8. Type **<bold>** on the following bars on the Reconstruction Screen.

   Image Set Description: **Gated All Bins, Slices 7–14**

9. Accept the Prescription with the remaining settings at their default values and Select **Submit to Bottom**.

Note *The number of slices will scroll from 0 to the number prescribed, once both numbers are equal the reconstruction is complete and will deselect the data automatically. This will be displayed in the queue status window.*

10. Select Options: **Set Aside Screen**.

5.6 Display Images

1. Select **DISPLAY** from the M–con.
2. Create a MID, with a 128 x 128 matrix and 5 rows x 7 columns.
3. Select **LOAD** on the MID window.
4. Select the Images for ***<Gated All Bins, Slices 7–14 >***.
5. Type ***<bold>*** on the following bars on the screen.

Note *Staging use the following parameters.*

```
Load Bins:  1 to 5
Images:  1 to 8
```

Note *Field use the following parameters.*

```
Load Bins:  1 to 20  <--(10if 1 DHM )
Images:  1 to 8
```

6. Select **OK**.
7. Review all Images produced.
8. Create a SID Tool with a 256 x 256 matrix.
9. Select the Images for ***<Gated All Bins, Slices 7–14 >***.
10. Type ***<bold>*** on the following bars on the screen.

Note *Staging use the following parameters.*

```
Load Bins:  1 to 5
Images:  1 to 1
```

Note *Field use the following parameters.*

```
Load Bins:  1 to 20
Images:  1 to 1
```

11. Select **OK**.
12. Select **CINE** control.
13. Select **PLAY** and increment speed from 15 Frames/sec to 30 Frames/sec. Verify that the speed increases to 30.

Should get a MID display and the Images load without errors. Should be able to see two rod sources in each image, 90° apart. Sources in MID should exhibit an incremental shift by 4.5° in adjacent images proceeding counterclockwise.. Cine images should show each source moving over ~90° arc.

14. Go to section 7 on page 2–48

5.7 Gated Emission Scan Simulation – Requires ECG machine

1. Place a low activity pin source near the end of the fully elevated couch and place in the FOV.

2. Align as best as possible to the center of the FOV using the alignment lights.
3. Landmark this position.
4. Connect an ECG machine to the foot switch base assembly where indicated on the assembly. (The race–way that connects the Gantry to the Table). Ensure that the cable is long enough so that the ECG machine is easily accessible from the OWS.
5. Select the **ACQUISITION** M–con.
6. From the Acquisition screen Select **New Procedure**.
7. Enter data in the following bars on the screen:

   Patient ID: **CWD *<date>***
   Patient Name: **Wilma Flintstone–Service *<time>***
   Operator: ***<Your Initials>***

8. Select **OK**.
9. Select **New Scan**.
   a. In the New Scan window, Select New Scan Type, **Emission**
   b. Then select Scan Mode, **Gated**
   c. Select **OK**

Back in the Acquisition Screen (in the left portion of the window) under Patient Position:

10. Select **Specify Tilt at 0**, and **Supine**, Head First.
11. Select the **Set LandMark** (middle left portion of the window).
    a. In the LandMark Window, Select **XY** (Xyphoid)
    b. Then Select **OK**
12. In the Scan Information section (lower left portion of the window):
    a. Select Randoms: **Delayed Event Subtraction**
    b. Select Element Size: **Word** Mode.
    c. Select **Standard Resolution** Mode.
13. Type ***<bold>*** on the following bars on the screen.

    Scan Description:**CWD, Gated Emission–Service**

14. In the Scan Range section (in the right portion of the window):
    a. Select **Prescribe Scan Range**.
    b. Select from Beat Rejection Mode **Bad Beat**.
       i. Input the following:

    Avg. Beats/Minute:**70**
    % Deviation Allowed:**30%**

    c. In the Gated Scan Range Rx window:
       i. Select **Prescribe Start**
       ii. Input the following:

```
Input Group #: 1
Number of Bins: 4
Duration on each Bin: 50 (50 milliseconds)
Duration of Scan: 00:01:00 (1.0 minutes)
```

15. Select **ADD**.

```
Input Group #:  2
Number of Bins:  2
Duration on each Bin:  100  (100 milliseconds)
```

16. Select **ADD**.

```
Input Group #:  3
Number of Bins:  2
Duration on each Bin:  200  (200 milliseconds)
```

17. Select **ADD**.

```
Input Group #:  4
Number of Bins:  2
Duration on each Bin:  100  (100 milliseconds)
```

18. Select **ADD**.
19. Select **OK**
    a. Select Nuclide: **^{68}Ga or ^{68}Ge**
    b. Select Tracer: **Unspecified**
20. Select **Accept Setup**

The system will then respond with:

```
Press ″Start Scan″ button
```

Note *At this point the Current Heart Rate will become active along with the Average Heart Rate, before pushing the "Start Scan" push button, ensure that the Current Heart Rate is approximately 70 bpm by pushing the test mode button on the ECG machine. This button must be held active until the Acquisition is complete.*

21. Press and *HOLD* the test mode button on the ECG machine.
22. Press **Start Scan** button.

This acquisition should complete normally with no errors recorded in the ErrLog. To ensure that the scan is progressing correctly, open the ErrLog and **Update Errors** to verify that the scan has not "hung" or terminated prematurely.

5.8 Emission Images Reconstruction

1. Select the **RECONSTRUCTION** M–con.
2. From the Reconstruction screen Select **Next Recon**.
3. Select Include Data: **RAW**
4. Select the Emission Scan Images performed in Section 5.7 on page 2–34 (Wilma Flintstone Emssn Scan).

5. Select in Scan Type the 350 slices of Raw Data (simply click on the line).
6. Type **<bold>** on the following bars on the screen.

   Load Bins: **1 to 10**
   Slices: **17 to 17**
   Increment:**1**

7. Select **OK**.
8. Select **Hanning – 4.0**.
9. Type **<bold>** on the following bars on the Reconstruction Screen.

   Image Set Description: ***<Service All Bins, Slice 17>***

10. Select **Diameter – 25.0** cm.
11. Select **P – 4.0**.
12. Select **Attenuation Correction – NONE**.
13. Accept the Prescription with the remaining settings at their default values and Select **Submit to Bottom**.

Note *The number of slices will scroll from 0 to the number prescribed, once both numbers are equal the reconstruction is complete and will deselect the data automatically. This will be displayed in the queue status window.*

14. Select Options: **Set Aside Screen**.

5.9 Display Images

1. Select **DISPLAY** from the M–con.
2. Create a MID, with a 128 x 128 matrix and 5 rows x 7 columns.
3. Select **LOAD** on the MID window.
4. Select the Images for ***<Wilma Flinstone–Service–Service All Bins, Slice 17>***.
5. Select **OK**.
6. Review all Images produced.
7. Window level to best view.
8. Place a circular ROI around a single pin image and fit as best as possible.
9. Cut this ROI.
10. Select all images and paste the ROI on all images.
11. Select **OPTIONS–Select ROIs–In all Images**.
12. Select **OPTIONS–Show Stats** on all the ROIs.

Should get a MID display and the Images should load without errors.

13. Viewing the “Sinogram Counts” in the Stats Tool, verify the following.

The measured activity level between the different groups should vary as follows: Images for Bins 1–4 should have counts proportional to their duration. Groups 5–6 should have *approximately* double the number of counts than Bins 1–4, Bins 7–8 should have *approximately* double the number of counts in Bins 5–6, Bin 9 should have *approximately* 7–8% more counts of a Group 1 bin, and in Group 4, Bin 2 (Bin10) should be empty.

SECTION 6
STATIC FDG BRAIN AND HEART STUDY (TEST CODE E)

Important Test Code E is only to be performed if a heart phantom is available.

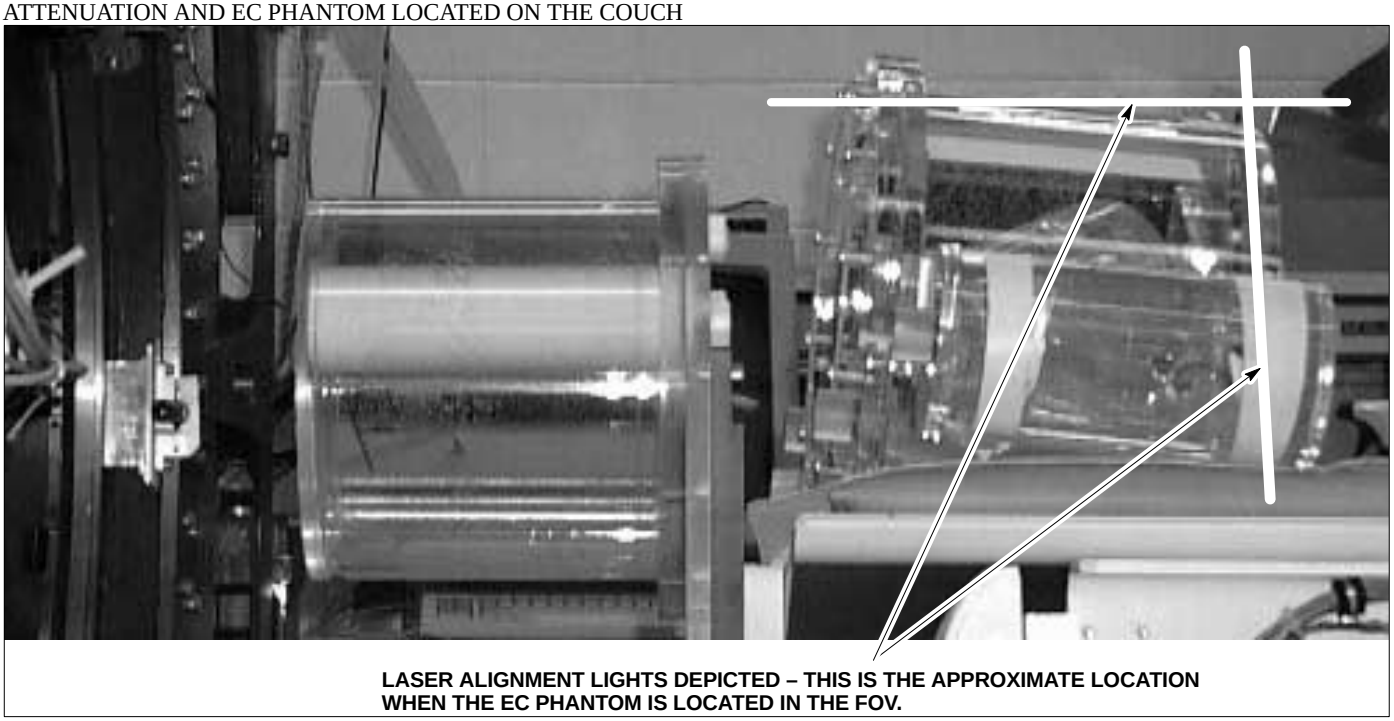
This procedure is used to simulate a brain/heart study case and uses the Standard Resolution mode or the 3D mode of Acquisition. This acquisition is a Static scan with multiple FOVs using MAC as the attenuation correction and the analysis is quantitative with cardiac reformat being performed. The system is also mechanically stressed by prescribing 2 couch positions during acquisition. This procedure will require approximately 60 minutes of *acquisition* time.

6.1 Head/Heart Emission Scan simulation – Requires heart phantom

1. Use the same Attenuation Phantom used in Section 4 on page 2–17, injected with a minimum of 2mCi of activity.
2. Ensure the Gantry is at zero tilt.
3. Align the Attenuation Phantom to the center of the FOV and landmark the Table as shown in Illustration 2–9.
4. Place an EC Phantom (with 1mCi of activity in the heart portion only) on the table and strap into position.

Note *Record the Phantom Activity dose and measurement time for this scan for both Phantoms in table in the Appendix chapter . Also note the Scan Start Time, this will be needed for the Quantitation Calculations.*

Illustration 2–9
ATTENUATION AND EC PHANTOM LOCATED ON THE COUCH



LASER ALIGNMENT LIGHTS DEPICTED – THIS IS THE APPROXIMATE LOCATION WHEN THE EC PHANTOM IS LOCATED IN THE FOV.

5. Verify that the heart phantom insert has been set at an angle. Align the EC phantom in the FOV, and note the position of the couch. Reference Illustration 2–9 for Laser Alignment positioning. Re–align the Attenuation Phantom in the FOV once completed.

Note *Record the table position required to place the EC phantom in the field of view and use that as the second AFOV position.*

6. Select the **ACQUISITION** M–con.
7. From the Acquisition screen Select **New Procedure**.
8. Type ***<bold, italicized>*** on the following bars on the screen.

   Patient ID: **CWE*<date>***
   Patient Name: **Hiram Oakbottom*<date & time>***
   Operator: ***<Your Initials>***

9. Select **OK**.
10. Select **New Scan**.
    a. In the New Scan window, Select New Scan Type, **Emission**.
    b. Then select Scan Mode, **Static**.
    c. Select **OK**.

Back in the Acquisition Screen (in the left portion of the window) under Patient Position:

11. Select **Read Tilt** , and **Supine**, Head First.
12. Select the **Set LandMark** (middle left portion of the window).
    a. In the LandMark Window, Select **OM** (Orbital Meatal Line)
    b. Then Select **OK**
13. In the Scan Information section (lower left portion of the window):
    a. Select Randoms: **Delayed Event Subtraction**
    b. Select Element Size: **Word** Mode.
    c. Select **Standard Resolution** or **3D** Mode.
    d. On screen, type in the the following for: Scan Description:

       CWE, Attn/EC Emission.
14. In the Scan Range section (in the right portion of the window):
    a. Select **Prescribe Scan Range**

       In the Static Scan Range Rx window:

       i. Select **Prescribe Start**
       ii. Interleaved NOT selected
       iii. Input the following:

Group #: **1**
AFOVs in group: **1**
Table Location of First Slice: **0.0**
Towards Head
Duration on each AFOV: **00:15:00** (15 minutes)

Note *Increase acquisition times in relation to amount of activity in phantom ie, double times if 1mCi activity vs. 2 mCi.*

iv. Select **ADD**.

```
Group #:  2
AFOVs in group:  1
Table Location of First Slice:Use position noted above in Step  5.
Towards Head
Duration on each AFOV:  00:15:00  (15 minutes)
```

v. Select **ADD**.

vi. Select **OK**

b. Select Nuclide: **^{68}Ga or ^{68}Ge**

c. Select Tracer: **Unspecified**

15. Select **Accept Setup**

System will respond with:

```
Initialization in progress:  Please Stand By...
```

16. Press **Start Scan** .

Note *The Operator will need to press and hold the "Advance to Scan" pushbutton to move the Table to the 2nd scan position. The pushbutton will illuminate and blink when this occurs, and also will be displayed in the queue status window.*

This acquisition should complete normally with no errors recorded in the ErrLog. To ensure that the scan is progressing correctly, open the ErrLog and **Update Errors** to verify that the scan has not "hung" or terminated prematurely.

17. Select Options: **Set Aside Screen**.

18. Return to Section 4.5 on page 2–23.

6.2 Head/Heart Transmission Scan Simulation

Note *Wait as long as possible for the Phantoms to cool and perform a Transmission scan of the two phantoms. In the case of sealed Ge68 phantoms, just proceed.*

1. Select the **ACQUISITION** M–con.
2. Select **OK**.
3. Select **New Scan**.
   a. In the New Scan window, Select New Scan Type, **Transmission**
   b. Then select Scan Mode, **Static**
   c. Select **OK**
4. Back in the Acquisition Screen (in the left portion of the window) under Patient Position:
5. Type ***<bold>*** on the following bars on the screen.

   Input Scan Description: **CWE, Attn/EC Transmission**

6. Accept prescription with the remaining settings at their default values.

7. Select **Accept Setup**

System will respond with:

```
Emission Activity Present?
```

a. Select **Yes**

```
Transmission Scan exposes patient to radiation..
```

8. Select **OK**

System will respond with:

```
Initialization in progress:  Please Stand By...
```

9. Press **Start Scan** .

Note *The Operator will need to press and hold the "Advance to Scan" pushbutton to move the Table to the 2nd scan position. The pushbutton will illuminate and blink when this occurs, and also will be displayed in the queue status window.*

This acquisition should complete normally with no errors recorded in the ErrLog. To ensure that the scan is progressing correctly, open the ErrLog and **Update Errors** to verify that the scan has not "hung" or terminated prematurely.

10. Return to Section 4.7 on page 2–25.

6.3 Head/Heart Emission Images Reconstruction

1. Select the **RECONSTRUCTION**, window set aside earlier.
2. From the Reconstruction screen Select **Next Recon**.
3. Select Include Data: **RAW**
4. Select the Emission Scan Images performed in Section 6.1 on page 2–38 (Hiram Oakbottom Emssn Scan).
5. Select in Scan Type the 70 slices of Raw Data (simply click on the line).
6. Type ***<bold>*** on the following bars on the screen.

```
Slices:  1 to 70
Increment: 1
```

7. Select **OK**.
8. On the Reconstruction Screen select the following:
   a. Output: **Image**.
   b. Matrix Size: **256 x 256**.
   c. Filter: **Shepp–Logan**.
   d. Diameter: **25.0**.
   e. Cutoff (mm): **4.0**.
9. Accept the Prescription with the remaining settings at their default values and Select **Submit to Bottom**.

Note *The number of slices will scroll from 0 to the number prescribed, once both numbers are equal the reconstruction is complete and will deselect the data automatically. This will be displayed in the queue status window.*

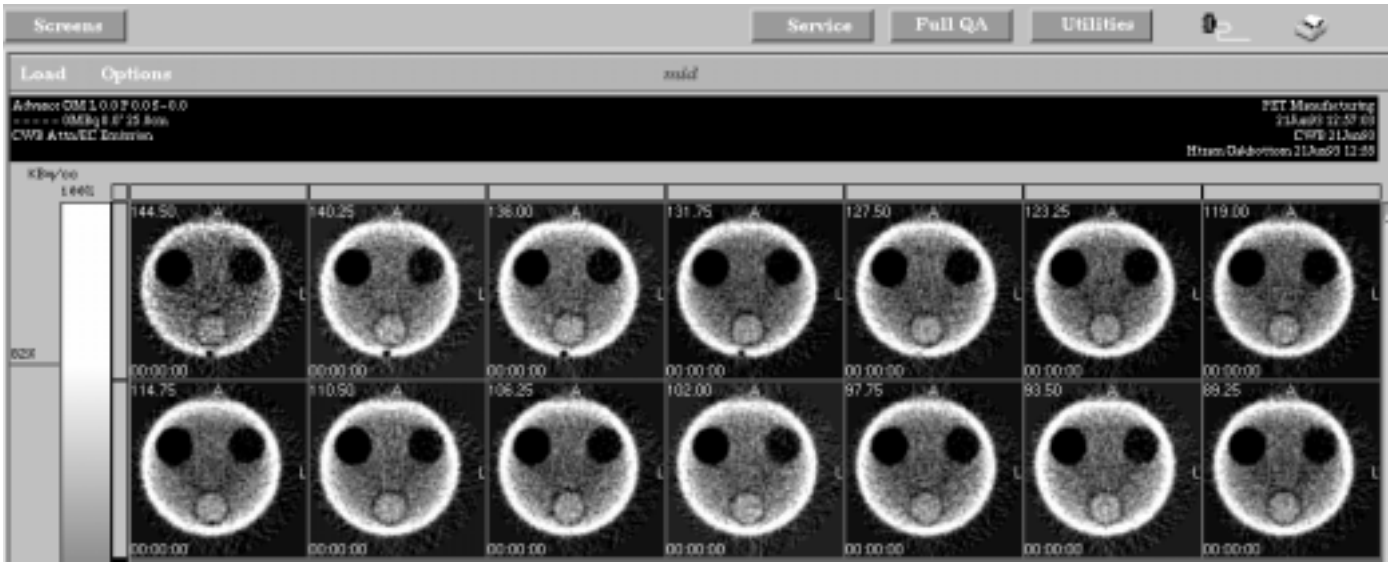
10. Set Aside Recon Window.

Reconstruction should complete with NO errors.

6.4 Display Head/Heart Emission Images

1. Select **DISPLAY** from the M–con window.
2. Select a Multiple Image Display (MID), with a 128 x 128 matrix and 5 rows x 7 columns.
3. Select **LOAD** on the MID window.
4. Select the Images produced in Section 6.3 on page 2–41, the first 35 “Head” Images.**CWE ....**
5. Select **OK** .
6. Scroll through the entire set of Images and Normalize the entire set (Select Options/Normalize/Over Loaded Images, Window/Level to best visibility. Reference Illustration 2–10 as an example.
7. Select the Square ROI tool.
8. Place the largest square ROI that will fit in the active center of a phantom image.
9. Cut the ROI.
10. Select all 35 Images and paste the ROI.
11. Select **OPTIONS** on the MID window.
12. Show **STATS** on the selected ROIs and verify that the numbers are correct using the formulas located in Section 4.6, Step 26. on page 2–25.

Illustration 2–10
HEAD IMAGES (only 2 rows shown)



13. Set Aside the Display Window.

This test should show the MID(s) displays and load the images with NO errors. Should be able to see cold spots and active regions without artifacts. Once the ROIs are placed, full ROI statistics should be displayed with NO errors. The ROI values shown should match expected values calculated above.

14. Return to Section 5.2 on page 2–31.

6.5 Cardiac Reformat

1. Select **REFORMAT**Tool from the Display palette.
2. Select **CARDIAC** then **OK**.
3. Select **LOAD** in the upper window.
4. Load the Images produced in Section 6.3 on page 2–41, slices 36–70.
5. Select **OK**.
6. Scroll quickly through the images in the first window and establish the “direction of motion” of the heart cylinder. Place the short axis of the cursor along the line of motion, centered in the cold spot in the middle of the heart. Align the long axis of the cursor along the “shadow” of the image as the image scrolls off the screen, Reference Illustration 2–11 for clarification.
7. Select **RESLICE**.
8. In the second window, line the long axis of the cursor up with the bars of activity and centered between the bars, size the box to enclose the bars Reference Illustration 2–12 for clarification.
9. Select **RESLICE**.
10. In the third window, center the cursor in the cold spot and align the short axis of the cursor with the direction of the bulge in the heart phantom reference Illustration 2–13 for clarification.
11. Select **RESLICE**.

Illustration 2–11
HEART IMAGES DEPICTING CURSOR ALIGNMENT

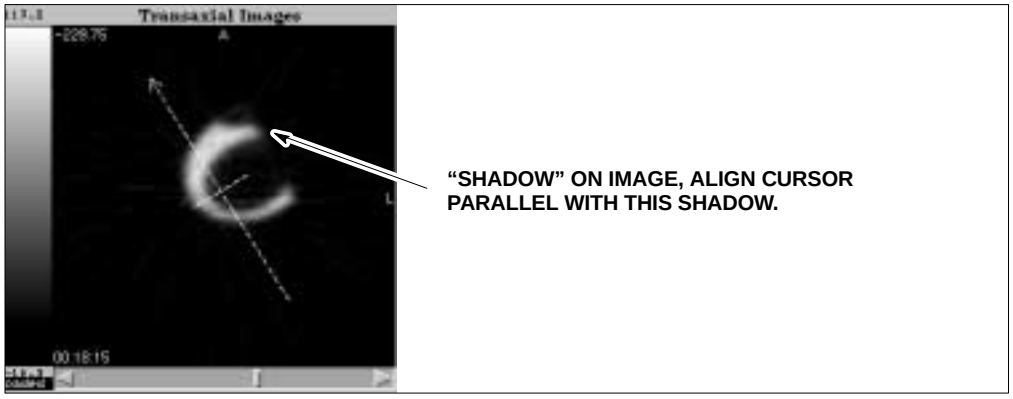


Illustration 2–12
FIRST RESLICE OF CARDIAC IMAGE DEPICTING CURSOR ALIGNMENT

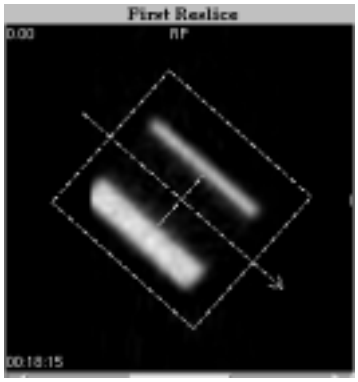
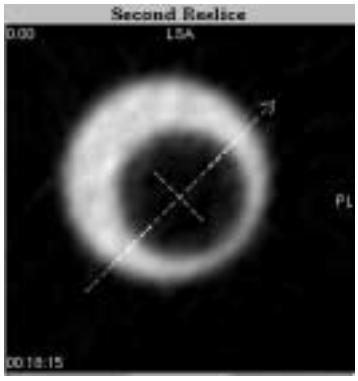


Illustration 2–13
SECOND RESLICE OF CARDIAC IMAGES DEPICTING CURSOR ALIGNMENT



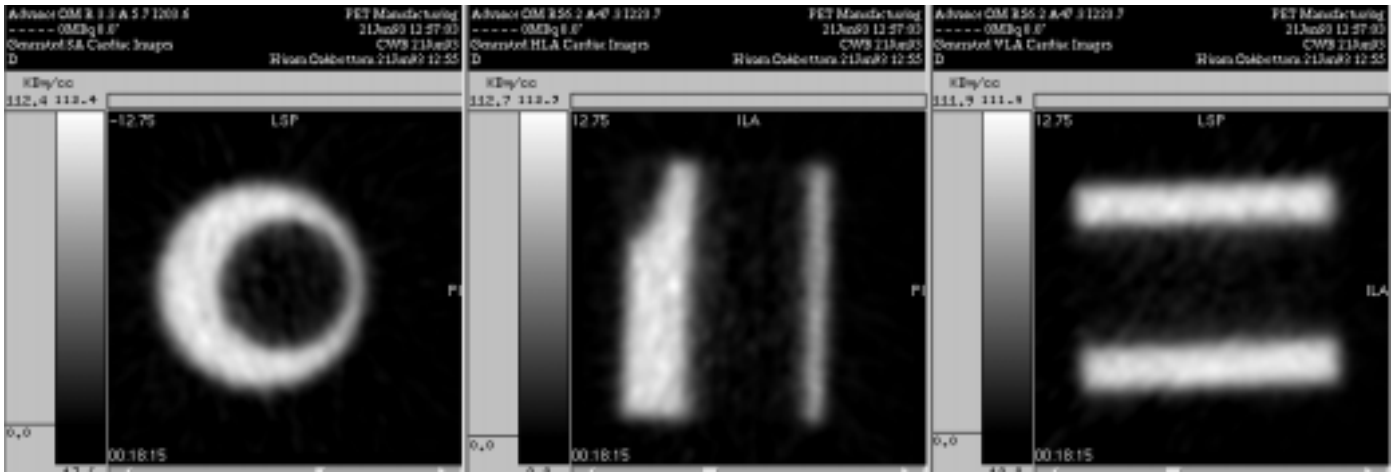
12. Select an image in the **HLA** window that provides a good cross–section of the thick wall of the phantom. Place the largest square ROI that can be fit in this region reference Illustration 2–14 for clarification for Image results.
13. On each of the SID windows, **SA, HLA, and VLA**, select **OPTIONS–>SAVE**.
    a. Enter an image set descriptor
14. Select Options: **Set Aside Screen**.

Three sets of images should be produced in the three windows above. The first set (left most) should provide a view down the axis of the "heart". Verify it does not shift as you scroll through the images. The second set should be a "coronal" set of images with the walls of the heart phantom oriented vertically. The third set (right most) should be a "sagittal" set with the walls of the heart phantom oriented horizontally.

Note *If the VLA Image is not horizontal, repeat Step 6. above and Reslice all Images again. The VLA Image should appear horizontal if cursor alignment in previous steps was performed correctly.*

Should be able to verify that ROI averages match expected values calculated using the formulas in Section 4.6, Step 26. on page 2–25. However, use the following value for ROIvalues.

Illustration 2–14
RESULTS OF THIRD CARDIAC RESLICE



$$ROIvalues = \frac{A}{Volume}$$

Heart Phantom volume = 305ml

6.6 Archive Saved Reformatted Images

Archive the Saved Reformatted Images to DAT Tape:

1. Using the Operator interface, from **Screens** select **ARCHIVE ->DAT**.
2. Select **READY** when Tape is inserted.
3. Use the DAT from a previous test if it has space and proceed to the next step. If a new tape is used, do the following.

   a. Type ***<bold, italicized>*** on the following bars on the screen.

   ```
   Enter Volume Name:  <Name for DAT Tape>
   Select Tape Length:  90mm
   ```

   b. Select **Label Volume**.
4. Select the following:

   ```
   Type of Operation:  SAVE
   Type of Data:  PATIENT
   Include Data:  IMAGE
   Sort By:  PATIENT NAME
   ```
5. Select ***<Hiram Oakbottom>*** scan description.
6. Select ALL Images produced in above procedures for ***<Hiram Oakbottom>***.
7. Select **START**.
8. In Confirmation window, select **ARCHIVE ITEMS**.
9. When the Archiving is complete, Select **REMOVE MEDIA**.

6.7 Delete Reformatted Images from the Database

1. Using the Operator interface, from **Utilities** select **DELETE**.
1. Select the following:

   Type of Data: **PATIENT**
   Include Data: **IMAGE**
   Sort By: **PATIENT NAME**

2. Select ***<Hiram Oakbottom>*** scan description.
3. Select ALL Images produced in above procedures) for ***<Hiram Oakbottom>***.
4. Select **SELECT**.
5. Select **DELETE SELECTIONS**.
6. Select **DELETE ITEMS**.
7. When delete operation is complete, verify that Patient Name ***Hiram Oakbottom*** does not exist for image data screen.
8. Quit the **DELETE** screen when completed.

Should complete without errors.

6.8 Restore Reformatted Images from DAT Tape

1. Click on the **ARCHIVE** Mcon to display the Archive screen.
2. Select **READY** when Tape is inserted.
3. Select the following:

   Type of Operation: **RESTORE**
   Type of Data: **PATIENT**
   Include Data: **IMAGE**

4. Select all the Images for ***<Hiram Oakbottom>***
5. Select **START**.
6. Select **OK** from Restore Confirmation window.
7. When the Restoring is complete, Select **REMOVE MEDIA**.

Should complete without errors.

6.9 Display Restored Images

1. Select **DISPLAY** from the M–con.
2. Create a MID, with a 128 x 128 matrix and 4 rows x 5 columns.
3. Select **LOAD** on the MID window.
4. Select the Images for ***<Hiram Oakbottom>*** restored from the DAT Tape.
5. Select **OK**.

Should display without errors and should load without errors, images displayed should be same as those in Section 6.4 on page 2–42.

6. Return to Section 5.3 on page 2–32.

SECTION 7
ADDITIONAL CONFIDENCE TESTS – *OPTIONAL*

These are additional system software confidence tests that will verify system operation during various patient situations that could occur. The same philosophy will be followed for these tests as in the previous Clinical Walk Through tests. That is, do recon and display of a previous acquisition during an acquisition for the next test.

7.1 Dynamic Scan Clinical Exceptions Testing – A

Repeat Dynamic scan tests from Sec. 2, page 2–2, with the following changes:

1. *"Pause" Emission Scan –*

   One minute into the second AFOV of the fourth group, press the Pause button (simulating Patient moved or had to get up from table). Wait for notification that the scan is paused, then hit the Start button.

17 Frames should be saved. Verify data can be Recon'd and Displayed using procedures described in sec. 2. In Recon, the database navigator should present a statement of **pause/resume sets exist**.

2. *Table Movement during Acquisition*

   Somewhere in the middle of the acquisition sequence, move the table longitudinally less than 20mm Verify that the table moves back to the original position and the scan is not interrupted. Note the frame that was interrupted.

   In another frame in the same acquisition, move the table longitudinally more than 20mm. Note the frame that was interrupted.

Verify that data for all frames up to and including the frame where table motion caused the scan to stop are stored. Verify data can be Recon'd and Displayed using procedures described in sec. 2.

7.2 Whole Body Clinical Exceptions Testing – B

Repeat Whole Body tests from Sec. 3 starting on page 2–9, exchanging the order of 3.1 and 3.2, use byte mode acquisition, and with the following changes:

1. *"Stop" Transmission Scan –*

   Five minutes into the Transmission acquisition, press the Stop scan button (simulating Patient moved or had to get up from table). Verify a Transmission data set is saved.

2. *"Stop" Emission Scan –*

   Ten minutes into the Emission acquisition, press the Stop scan button (simulating Patient moved or had to get up from table). Verify a Emission data set is saved.

3. Verify data can be Recon'd and Displayed using procedures described in sec. 3

7.3 Static Scan Clinical Exceptions Testing – C

Repeat Static scan tests from Sec. 4, page 2–17, with possible concurrently and patient interruptions.

1. *"Stop" Transmission Scan* – Five minutes into the Transmission acquisition, press the ○ Stop scan button (simulating Patient moved or had to get up from table).

   Verify a Transmission data set has been saved.

2. *"Stop" Emission Scan* – Ten minutes into the Emission acquisition, press the ○ Stop scan button (simulating Patient moved or had to get up from table).

   Verify a Emission data set has been saved.

3. Verify data can be Recon'd and Displayed using procedures described in sec. 4

7.4 Gated Heart Study Clinical Exceptions Testing – D

Repeat Gated tests from sec. 5, page 2–29, exchanging the order of Sections 5.2 and 5.3, use byte mode acquisition, and with the following changes:

1. *"Stop" Transmission Scan* –

   Ten minutes into the Transmission acquisition, press the ○ Stop scan button (simulating Patient moved or had to get up from table).

   Verify a Transmission data set is saved.

2. *"Stop" Emission Scan* –

   Fifteen minutes into the Emission acquisition, press the ○ Stop scan button (simulating Patient moved or had to get up from table).

   Verify a Emission data set is saved.

3. Verify data can be Recon'd and Displayed using procedures described in sec. 4

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Appendix A
Tracking Logs

Contents

Notes

SECTION 1
CLINICAL WALK THROUGH DATA TABLES

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2.1 Dyn Emis	2–2		
2.5 Display ROI	2–7		
3.1 Whole Body Emis	2–9		
3.5 Image Analysis	2–14		
4.1 Head Transmi s	2–17		
4.2 Head Emiss	2–20		
4.6 Display	2–24		
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SECTION 2
CLINICAL WALK THROUGH CHECKLIST

This checklist is available for recording Clinical Walk Through information

Section Number	Date / Initials	Pass Y/N	Record Comments / Problem Report number
2.2 Db cleanup			
2.3 Updt Gain cal			
2.4Norm Corr.			
2.5Blank Scan			
2.6 WCC/ 2D			
2.7 3D Corr.			
2.1 Dyn Emissn			
2.2 Recon			
2.3 Define CAC			
2.4 Recon CAC			
2.5 Display			
2.6 Filming			
3.1 W B Emissn			

Section Number	Date / Initials	Pass Y/N	Record Comments / Problem Report number
3.2 W B Transmis			
3.3 Recon Emissn			
3.4 Display			
3.5 Image analysis			
3.6 Filming			
4.1 Head Transmis			
4.2 Head Emissn			
4.3 Recon Transmis			
4.4 Display Transmis			
4.5 Recon Emissn			

Section Number	Date / Initials	Pass Y/N	Record Comments / Problem Report number
4.6 Display Emissn			
4.7 Archive			
4.8 Delete			
4.9 Restore			
4.10 Display			
4.11 Film			
5.1 ; 5.7 Gated Emissn			
5.2 Transmi s			
5.3 Recon 1bin			
5.4 Display			
5.5 ; 5.8 Recon			
5.6 ; 5.9 Display			

Section Number	Date / Initials	Pass Y/N	Record Comments / Problem Report number
6.1 Head /Heart Emissn			
6.2 Head /Heart Transmi s			
6.3 Recon			
6.4 Display			
6.5 Cardiac Reformt			
6.6 Archive			
6.7 Delete			
6.8 Restore			
6.9 Display			
7.1 Test A Except			
7.2 Test B Except			

Section Number	Date / Initials	Pass Y/N	Record Comments / Problem Report number
7.3 Test C Except			
7.4 Test D Except			

Notes

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