

TABLE OF CONTENTS

1- OVERVIEW	2
2- BODY SCANS	2
2-1 Tools Required	2
2-2 Initial Conditions	2
2-3 Body Scan Procedure.....	2
3- HEAD SCANS	8
3-1 Tools Required	エラー!ブックマークが定義されていません。
3-2 Initial Conditions	エラー!ブックマークが定義されていません。
3-3 Head Scans Procedure	エラー!ブックマークが定義されていません。
4- SURFACE COIL SNR	8
4-1 Tools Required	エラー!ブックマークが定義されていません。
4-2 Procedure	エラー!ブックマークが定義されていません。
5- SNR IMAGE ANALYSIS	8
5-1 Introduction.....	8
5-2 Procedure	8
6 - DATA SHEETS	11
REVISION HISTORY	12

1- OVERVIEW

Procedure for checking body and head signal-to-noise values.

Note

Proprietary procedures (SPT and **TLT**) are available for GE use and to customers with a valid Advanced Service Package Limited License. For Head and Body, refer to SPT Full Test Mode procedure. For Surface Coils, refer to **TLT procedure**.

In this measurement, two back-to-back scans are performed. The SNR Tool uses an ROI that covers 80% of the phantom image, and measures a mean pixel value minus 1024. The result is the *signal value*. The two images are then subtracted to obtain the *noise image*. The 80% ROI is placed on the noise image and the standard deviation divided by the square root of two is the *noise value*. The signal-to-noise ratio (SNR) is the signal divided by the noise. No image artifacts are allowed in any SNR scan.

2- BODY SCANS

2-1 Tools Required

Note

The Body SNR Sphere Phantom, **46-265635G4**, is not provided with the System. If the Body SNR sphere is needed, the customer must order it. A Body Loader is provided with the system.

- Body SNR Sphere, **46-265635G4**
- SPT Body Loader, **2135652-2**

2-2 Initial Conditions

- No image artifacts
- System Gain Calibration complete
- Gradient Calibration complete and in spec

2-3 Body Scan Procedure

1. At the Operator Workspace, select the scan icon in the desktop control panel.
2. If necessary, exit out of any previous exams by selecting **[End Exam]**.
3. Click on **[New Pt]** and enter the following:
Id: **geservice**
Name: **snr check**
Weight (Lb.): **111**

Note

On the *Patient Information* screen, up to 32 characters can be typed in the Exam description field as comments. On the *Patient Position* screen, up to 29 characters can be typed in the Series description field as comments. (The comments are displayed on the Report Header Info screen.)

CAUTION

Possible equipment damage. Completely remove the Head Coil from the cradle before performing any body scans. Failure to do so may damage the Head Coil T/R Network.

- 4. Remove head coil from cradle, if present.

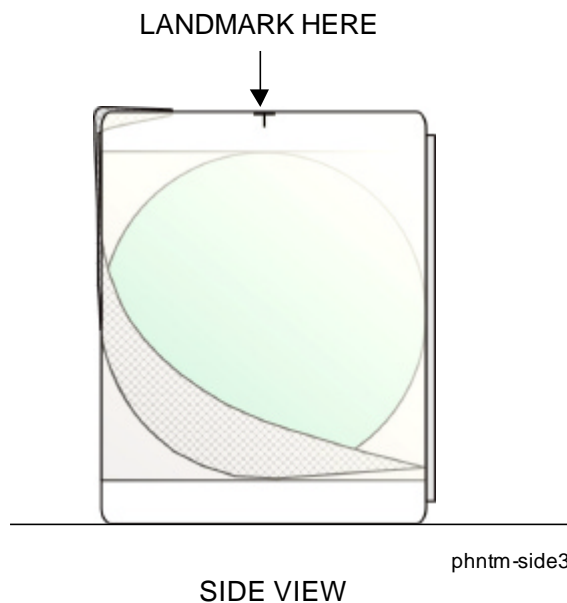
WARNING!

POISON HAZARD! THE PHANTOM CONTAINS NICKEL , A SUSPECT CARCINOGEN. DO NOT INGEST. DISPOSE OF AS A HAZARDOUS WASTE ACCORDING TO STATE AND FEDERAL REGULATIONS.

- 5a. *Setup using SPT Loader:* Position the SPT body loader and body SNR sphere on the table and LANDMARK per Illustration 2-1A. Check the temperature indicator on SNR sphere. Make sure that the temperature is $22^{\circ} C \pm 2^{\circ} C$ before starting procedure.
- 6. Press the MOVE TO SCAN button. **Allow phantom solution to settle for 20 minutes before starting scan.**

Note

SNR scans are particularly susceptible to flow artifacts. Artifacts appear as ovals or swirls in phantom image on subtracted image. They will cause excessively high noise measurements. If a problem exists, allow phantom to settle for an additional 15-20 minutes and rescan using same settings.



SPT BODY LOADER AND BODY SNR SPHERE PHANTOM SETUP
ILLUSTRATION 2-1A

The following three steps are **proprietary** and only available for GE use, and to sites with a valid Advanced Service Package Limited License. The non-proprietary procedure is listed after these steps.

7. At the Operator Workspace, set Patient Protocols to **Service**.
8. In the Protocol field, Type **o.13.1** (o=Other, 13=protocol number, 1=series number).
OR
Click on "Other" and select protocol **13** and series **1** from the menu.
9. Click on **[Accept]** to load the SNR Check (Body, Axial) protocol.

Non-proprietary procedure:

At the Operator Workspace, prepare the system for a "SNR Check (Body, Axial)" scan using the scan protocol (**o.13.1**) shown in the "Service Protocols" procedure located on the service methods CD-ROM.

10. Click on **[Autoview]**, just below the Autoview image display screen; your images will display automatically.
11. Click on **[Save Series]**, then **[Prepare to Scan]**.
12. Click on **[Auto Prescan]**. After prescan, check R_1 value. R_1 must equal 11 to get valid results. Record R_1 , R_2 , TG, and system frequency values in Data Sheet 1, Body SNR Data. If R_1 does not equal 11, some of the items to check are the following:
 - a. Check for proper cable length to preamp.
 - b. Ensure that GRADCAL has been performed.
 - c. Ensure that Slice Thickness is within specification.
 - d. Download TPS again, on the **Service Desktop** click on **[Reset TPS]**. Repeat steps 1 through 11.
13. Click on **[Scan]**. After scan #1 completes, click on **[Scan]** again (two back-to-back scans).
14. After the series #1 back-to-back scans are complete, click on **[New Series]**.

The following two steps are **proprietary** and only available for GE use, and to sites with a valid Advanced Service Package Limited License. The non-proprietary procedure is listed after these steps.

15. In the Protocol field, Type **o.13.2** (o=Other, 13=protocol number, 2=series number).
OR
Click on "Other" and select protocol **13** and series **2** from the menu.
16. Click on **[Accept]** to load the SNR Check (Body, Sagittal) protocol.

Non-proprietary procedure:

At the Operator Workspace, prepare the system for a "SNR Check (Body, Sagittal)" scan using the scan protocol (o.13.2) shown in the "Service Protocols" procedure located on the service methods CD-ROM.

17. Click on [**Save Series**], then [**Prepare to Scan**].
18. [**Auto Prescan**]. After prescan, check R_1 value. If R_1 does not equal 11, refer to step 12 for items to check. Record R_1 , R_2 , TG, and system frequency values in Data Sheet 1.
19. Click on [**Scan**]. After the first scan of series #2 completes, click on [**Scan**] again (two back-to-back scans).
20. After the series #2 back-to-back scans are complete, click on [**New Series**].

*The following two steps are **proprietary** and only available for GE use, and to sites with a valid Advanced Service Package Limited License. The non-proprietary procedure is listed after these steps.*

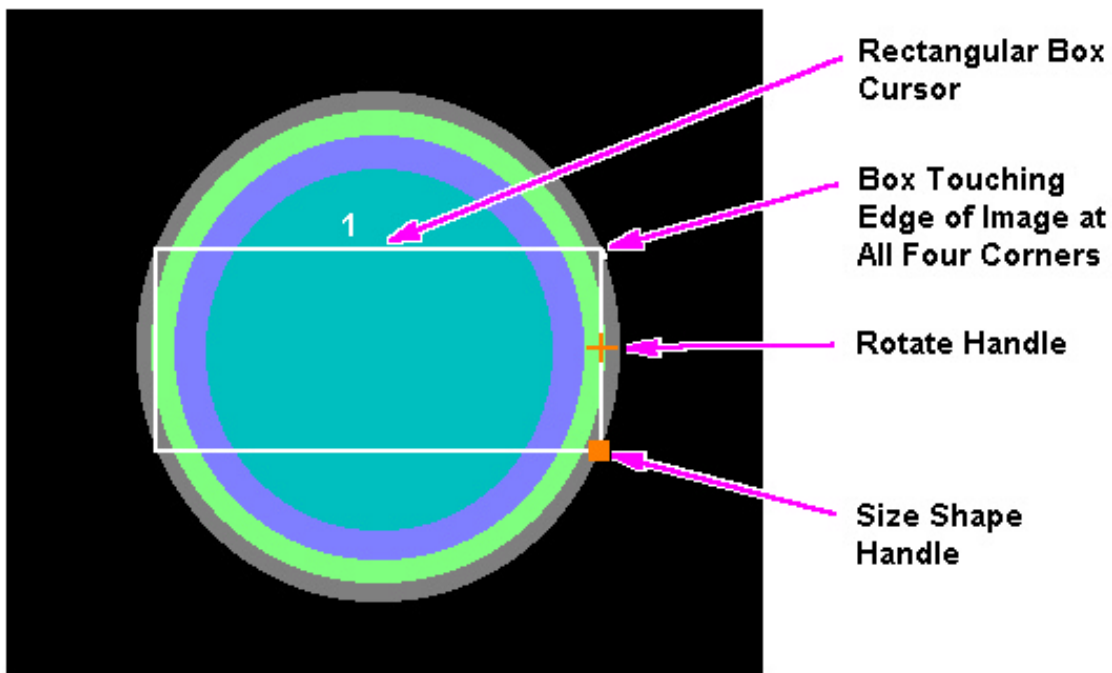
21. In the Protocol field, Type **o.13.3** (o=Other, 13=protocol number, 3=series number).
OR
Click on "Other" and select protocol **13** and series **3** from the menu.

22. Click on **[Accept]** to load the SNR Check (Body, Coronal) protocol.

Non-proprietary procedure:

At the Operator Workspace, prepare the system for a "SNR Check (Body, Coronal)" scan using the scan protocol (**o.13.3**) shown in the "Service Protocols" procedure located on the service methods CD-ROM.

23. Enter the anterior offset for Scanning Range start/end location. Find offset as follows:
a. Using the Image Browser, display the image of the axial scan (Series 1) by clicking on the viewer.
b. Click on **[Measure]** and select a rectangular cursor. Rotate the cursor box 90 degrees clockwise, by dragging the rotation handle, until the handle marker is placed on the display's right side. See Illustration 2-2.



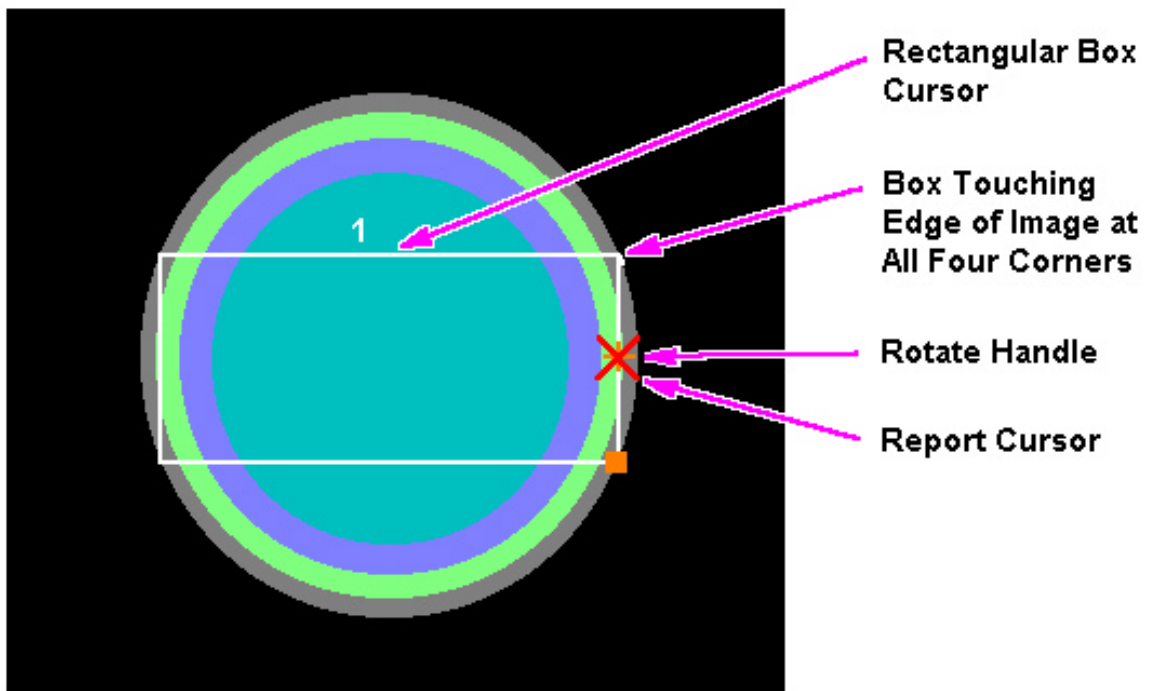
FINDING CENTER OF IMAGE - ROTATED BOX CURSOR
ILLUSTRATION 2-2

c. Adjust the rectangular cursor size, dragging the size/shape handle, so all four corners touch the edge of the image.

Note

A horizontal rectangle provides more accuracy in the horizontal direction.

d. Select the report cursor under **[Measure]** and place on top of the rotation handle of the rectangular cursor box. Record the A or P value displayed to the right of the image. See Illustration 2-3.



FINDING CENTER OF IMAGE - REPORT CURSOR
ILLUSTRATION 2-3

- e. Using this value for anterior offset of the coronal scan, enter it into both the Start and End locations at the Scan Desktop.
24. Click on **[Save Series]**, then **[Prepare to Scan]**.
25. Click on **[Auto Prescan]**. After prescan, check R_1 value. If R_1 does not equal 11, refer to step 12 for items to check. Record R_1 , R_2 , TG, and system frequency values in Data Sheet 1.
26. Click on **[Scan]**. After the first scan of series #3 completes, click on **[Scan]** again (two back-to-back scans).
27. For analysis, see Section 5- SNR Image Analysis.

3- HEAD SCANS

For the proper procedure for a Head Scan SNR Check, please refer to the "System and Surface Coils" Section of this Service Methods CD-ROM.

4- SURFACE COIL SNR

For the proper procedures for checking SNR on surface coils, please refer to the "System and Surface Coils" Section of this Service Methods CD-ROM.

5- SNR IMAGE ANALYSIS

5-1 Introduction

The SNR tool retrieves two operator selected images. Signal value is computed as the mean pixel value in a ROI covering 80% of the image. The image is analyzed to determine the center of the image for positioning the ROI. Subtracting the second image from the first creates a difference image and the same ROI is used to calculate noise from the subtracted image. The signal value, noise value, and signal to noise ratio are reported. There is an option to save the difference image with the results annotated.

5-2 Procedure

1. Select **Image Quality**, under **[Cal/Checks]** on the Service Desktop, then click on **[Start]**.
2. A *NEMA Image Quality* window will appear on the desktop. Type **1 <Enter>** for Signal to Noise Check. See Illustration 5-1.

```
<<< NEMA Image Quality Analysis >>>
```

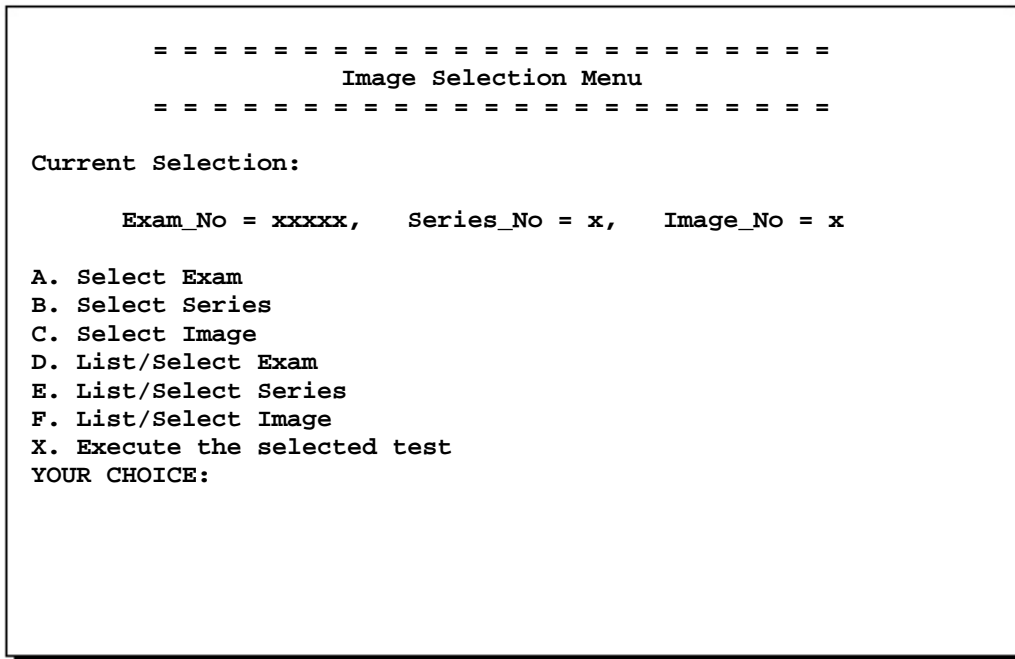
1. Signal to Noise Check
2. Slice Offset Checks
3. Slice Thickness/Resolution Check
4. T2 Uniformity Check
5. Full Field Distortion Check
6. Exit NEMA Test

```
Select Test: 1<Enter>
```

NEMA IMAGE QUALITY MENU

ILLUSTRATION 5-1

- 3. Enter first image exam, series, and image numbers. Execute the selected test by typing **X** <Enter>. See Illustration 5-2.



NEMA IMAGE SELECTION MENU
ILLUSTRATION 5-2

- 4. Enter second image series and image numbers. The second image exam number should be the same as first image. Again, execute the selected test by typing **X** <Enter>.
- 5. Analysis then begins. The final values are displayed on the screen, see Illustration 5-3.

```
*****
*                               SNR Results                               *
* Signal = xxx.xxxx Noise = xxx.xxxx SNR= xx.xxxx *
*****

<<< NEMA Image Quality Analysis >>>

1. Signal to Noise Check
2. Slice Offset Checks
3. Slice Thickness/Resolution Check
4. T2 Uniformity Check
5. Full Field Distortion Check
6. Exit NEMA Test

Select Test:
```

SNR RESULTS SCREEN

ILLUSTRATION 5-3

- 6. Record Signal, Noise, and Signal to Noise in Data Sheet 1.
- 7. Repeat steps 2 through 6 above, selecting the next exam for analysis of each remaining image pair.
- 8. Keep the completed data sheets with the system data sheets for future reference.
- 9. Type **6 <Enter>** to exit the NEMA Image Quality Analysis Menu.

6 - DATA SHEETS

Data Sheet 1

Body SNR Data

AXIAL SCAN DATA						
EXAM/ SERIES/ IMAGES	R1/R2/TG	SYSTEM FREQUENCY	PARAMETER/ ANALYSIS	ACCEPTANCE SPECIFICATIONS		
				1.5T SYSTEM	1.0T SYSTEM	
___/___/___	6/___/___		SIGNAL	N/A	N/A	
			SNR	74-97	39-53	
SAGITTAL SCAN DATA						
EXAM/ SERIES/ IMAGES	R1/R2/TG	SYSTEM FREQUENCY	PARAMETER/ ANALYSIS	ACCEPTANCE SPECIFICATIONS		
				1.5T SYSTEM	1.0T SYSTEM	
___/___/___	6/___/___		SIGNAL	N/A	N/A	
			SNR	74-97	39-53	
CORONAL SCAN DATA						
EXAM/ SERIES/ IMAGES	R1/R2/TG	SYSTEM FREQUENCY	PARAMETER/ ANALYSIS	ACCEPTANCE SPECIFICATIONS		
				1.5T SYSTEM	1.0T SYSTEM	
___/___/___	6/___/___		SIGNAL	N/A	N/A	
			SNR	74-97	39-53	

Head SNR Data

AXIAL SCAN DATA						
EXAM/ SERIES/ IMAGES	R1/R2/TG	SYSTEM FREQUENCY	PARAMETER/ ANALYSIS	ACCEPTANCE SPECIFICATIONS		
				1.5T SYSTEM	1.0T SYSTEM	0.5T SYSTEM
___/___/___	6/___/___	↳	SIGNAL	1050-1180	1000-1400	1045-1180
			SNR	76-102	57-65	23-31
SAGITTAL SCAN DATA						
EXAM/ SERIES/ IMAGES	R1/R2/TG	SYSTEM FREQUENCY	PARAMETER/ ANALYSIS	ACCEPTANCE SPECIFICATIONS		
				1.5T SYSTEM	1.0T SYSTEM	0.5T SYSTEM
___/___/___	6/___/___	↳	SIGNAL	N/A	N/A	N/A
			SNR	76-102	57-65	23-31
CORONAL SCAN DATA						
EXAM/ SERIES/ IMAGES	R1/R2/TG	SYSTEM FREQUENCY	PARAMETER/ ANALYSIS	ACCEPTANCE SPECIFICATIONS		
				1.5T SYSTEM	1.0T SYSTEM	0.5T SYSTEM
___/___/___	6/___/___	↳	SIGNAL	N/A	N/A	N/A
			SNR	76-102	57-65	23-31

REVISION HISTORY

REV	DATE	AUTHOR	PRIMARY REASONS FOR CHANGE
A	August 8, 2000	R. Liu	Initial Release – convert from 8x version