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1- OVERVIEW

In this measurement, a spin echo, 48-cm FOV body scan is performed on a Body T₂ sphere phantom. The T₂ Tool reconstructs an image from the four-echo images produced by the scan. Each pixel in the reconstructed image represents the computed T₂ value of the pixel from the scan image. An analysis ROI covering 80% of the phantom is used to calculate the mean T₂ value and relative deviation.

Note

An alternate proprietary procedure (TLT) is available for GE use, and to customers with a valid Advanced Service Package Limited License. Refer to the procedure for TLT.

For **TwinSpeed**, the T₂ check does not need to be repeated with both gradient coils, but it is important to use the same **GradMode**, either **WHOLE** or **ZOOM** throughout any particular test section.

2- BODY SCANS

2-1 Tools Required

- Body T₂ Sphere, 46-265635G2
- Long Body Loader, 46-287902G1, or SPT Body Loader, 2135652-2

Note

The Body T₂ sphere phantom, 46-265635G2, is not provided with the System. If the Body T₂ sphere is needed, it must be ordered by the customer. One of the two Body Loaders is provided with the System.

2-2 Initial Conditions

- No image artifacts

2-3 Body Scan Procedures



Possible equipment damage. Completely remove the quad head coil from the cradle before performing any body scans. Failure to do so may damage the head coil T/R network.

1. Remove the quad head coil (if present) from cradle.
2. Position the Body T₂ sphere in the Body Loader, centered on axial and sagittal, LANDMARK, then MOVE TO SCAN. **Allow the phantom solution to settle for 15-20 minutes before starting the scan.**

Note

Flow in the phantom will affect T_2 measurement. T_2 is not as sensitive as SNR, but let the phantom solution settle for 15 to 20 minutes.

3. At the operator workspace, select the scan icon in the desktop control panel, if you have not already done so.
4. Click on **[Autoview]**, just below the Autoview image display screen; your images will be automatically displayed.
5. At the operator workspace, prepare the system for a **T_2 Body Axial** scan using the *Service Protocols* procedure located on the service methods CD-ROM, or, for the alternate proprietary procedure, see below.

This alternate proprietary procedure is available for GE use, and to sites with a valid Advanced Service Package Limited License.

- a. Click on **[New Pt]**, and press **<Enter>**.
Id: **geservice**
Name: **body t2**
Weight (lb): **111**
Set Patient Protocols to **Service**.
- b. In the Protocol field, type **o.21.1** (o=Other, 1=series number) to load the protocol.
- c. For **TwinSpeed**, select the **GradMode**.
- d. Set Bandwidth2 to **15.63**.
- e. Click on **[Save Series]** then **[Prepare to Scan]**.
6. Click on **[Auto Prescan]**. After auto prescan completes, record R1, R2, and TG values in Data Sheet 1, under Axial Scan Data. Click on **[Scan]**.
7. When the scan is complete, click on **[New Series]**. Prepare a **T_2 Body Sagittal** scan using the *Service Protocols* procedure located on the service methods CD-ROM, or, for the alternate proprietary procedure, see below.

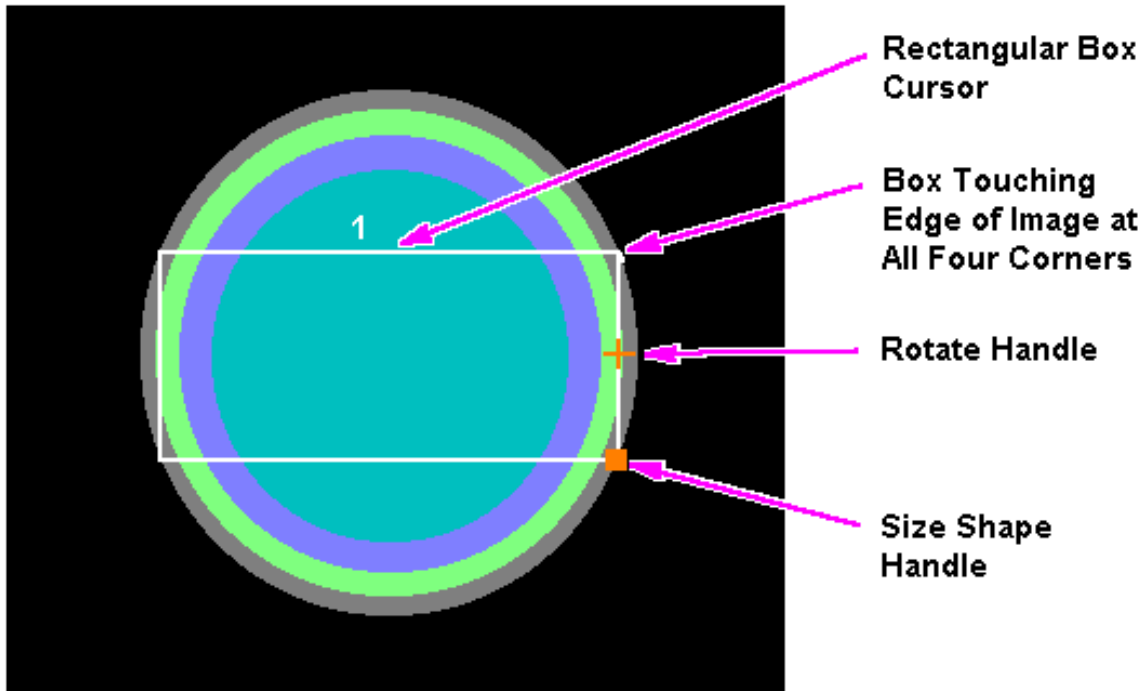
This alternate proprietary procedure is available for GE use, and to sites with a valid Advanced Service Package Limited License.

- a. Click on **[New Pt]**
Id: **geservice**
Name: **body t2**
Weight (Lb): **111**
Set Patient Protocols to **Service**.
- b. In the Protocol field, type **o.21.2** (o=Other, 2=series number) for scan #2.
- c. For **TwinSpeed**, select the same **GradMode**.

- d. Set Bandwidth2 to **15.63**.
- e. Click on [**Save Series**], then [**Prepare to Scan**].
8. Click on [**Auto Prescan**] and record R1, R2, and TG values in the Data Sheet under Sagittal Scan Data. Click on [**Scan**].
9. When the scan is complete, click on [**New Series**]. Prepare a **T₂ Body Coronal** scan using the *Service Protocols* procedure located on the service methods CD-ROM, or, for the alternate proprietary procedure, see below.

This alternate proprietary procedure is available for GE use, and to sites with a valid Advanced Service Package Limited License.

- a. Click on [**New Pt**]
Id: **geservice**
Name: **body t2**
Weight (Lb): **111**
- b. In the Protocol field, type **o.21.3** for scan #3
- c. For **TwinSpeed**, select the same **GradMode**
- d. Set Bandwidth2 to **15.63**
- e. To determine the anterior offset, find the center of the image on the axial scan as follows:
 1. Using the Image Browser, display the image of the axial scan (series 1).
 2. Select a rectangular cursor under [**Measuring**]. 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 2-1.



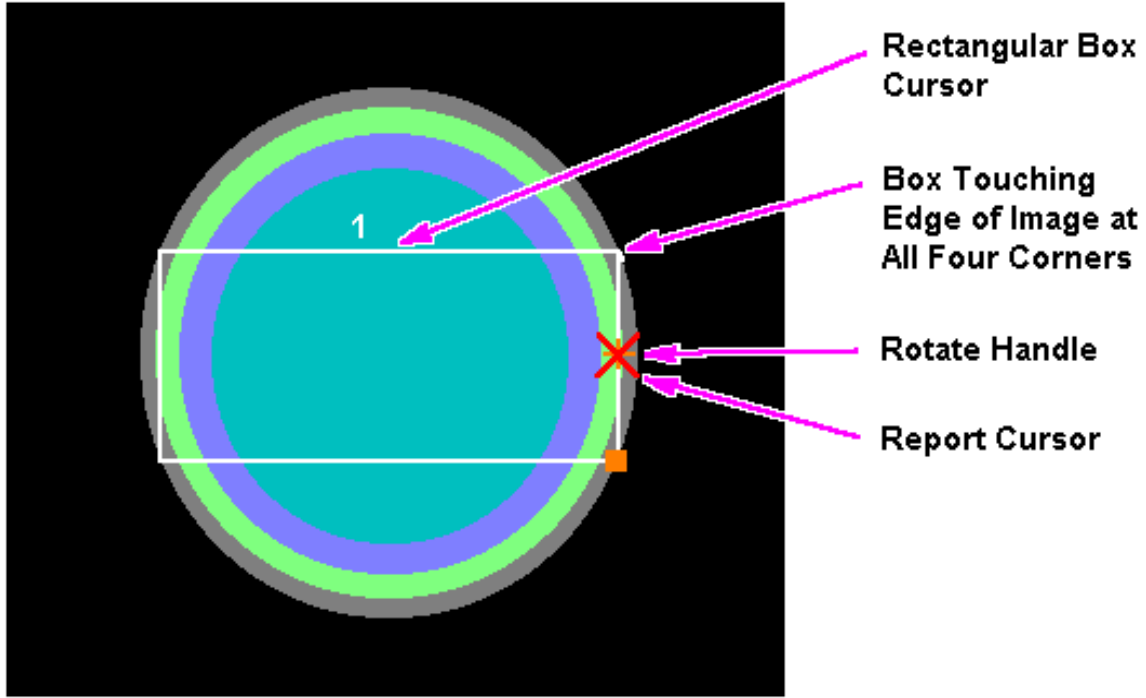
FINDING CENTER OF IMAGE - ROTATED BOX CURSOR
ILLUSTRATION 2-1

3. Adjust the rectangular cursor size, dragging the size/shape handle, so that all four corners touch the edge of the sphere.

Note

A horizontal rectangle provides more accuracy in the horizontal direction.

4. Select the report cursor under **[Measuring]** and place it on top of the rotation handle of the rectangular cursor box. Read the A and P locations. See Illustration 2-2.



FINDING CENTER OF IMAGE - REPORT CURSOR
ILLUSTRATION 2-2

5. Enter that value for the anterior (start and end) offset of the coronal scan.
- e. Click on **[Save Series]**, then **[Prepare to Scan]**.
10. Click on **[Auto Prescan]** and record R1, R2, and TG, System Frequency values in the Data Sheet under Coronal Scan Data. Click on **[Scan]**.
11. For analysis, see Section 3 - *T₂ Uniformity Image Analysis*.

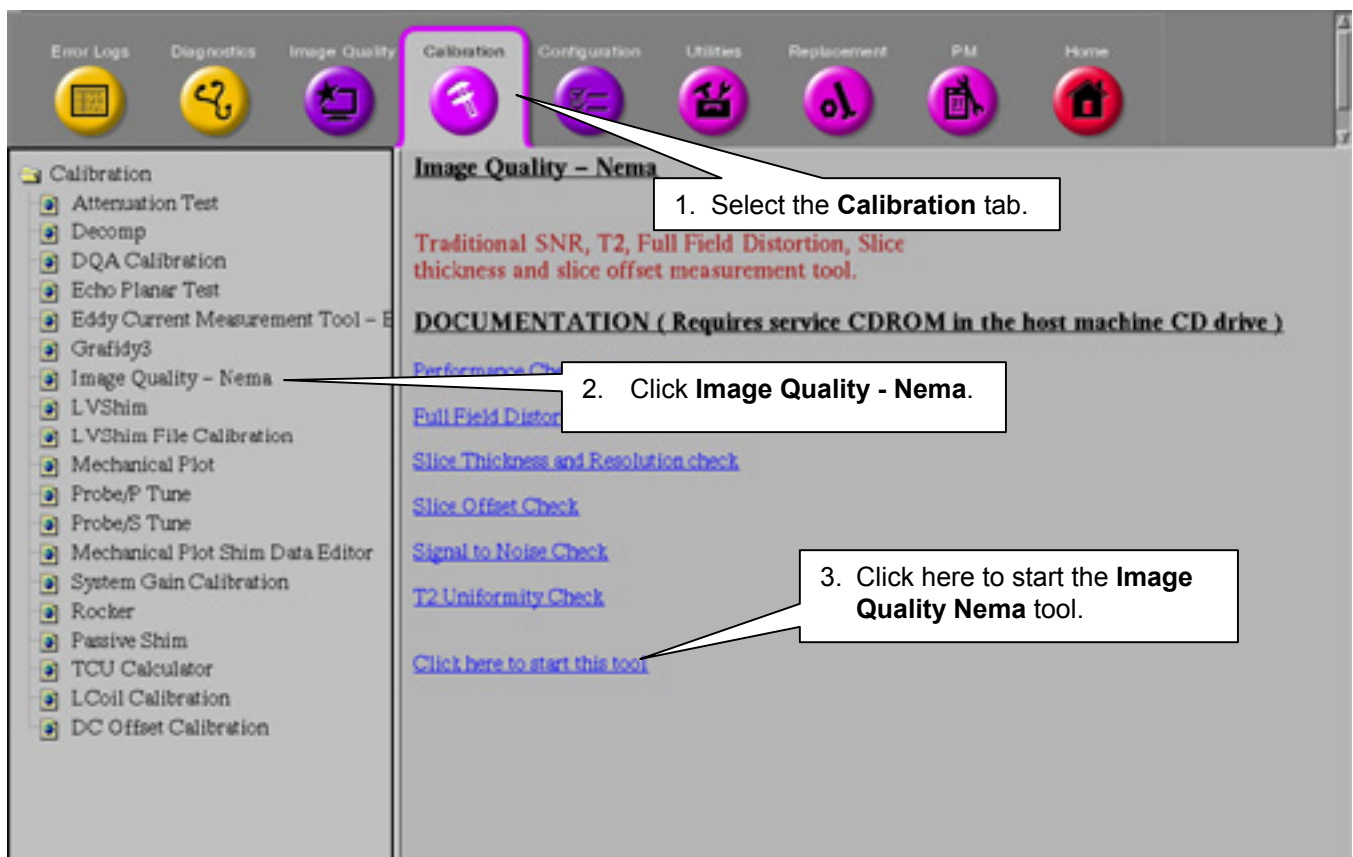
3- T₂ UNIFORMITY IMAGE ANALYSIS

3-1 Description

For image analysis, the operator specifies the first image from a spin echo scan. All the images in the echo are retrieved and a T₂ reconstruction is performed to generate a resultant image. In the resultant image, each pixel represents the T₂ at that point in the phantom. The center of the resultant image is determined to position an ROI and the mean T₂ value, standard deviation, and relative deviation are estimated and reported.

3-2 Procedure

1. On the Service Desktop Manager, click the **Service Browser** button. Follow the instructions on Illustration 3-1, below.



OPENING THE IMAGE QUALITY NEMA TOOL FROM THE COMMON SERVICE DESKTOP
ILLUSTRATION 3-1

2. For **TwinSpeed**, highlight the same **GradMode** as was used in section 2 above, then click on **[OK]**.
3. A **NEMA Image Quality** window will appear on the desktop, as shown in Illustration 3-2. At the Select Test prompt, type **4 <Enter>** for the T₂ Uniformity Check.

```
<<< 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: 4<Enter>
```

NEMA IMAGE QUALITY MENU
ILLUSTRATION 3-2

- 4. Enter the image exam, series, and the first of the four image numbers.
- 5. Analysis then begins. The final values are displayed on the screen as shown in Illustration 3-3.

```
*****
* Body Axial T2 Data *
* Mean T2 : xxx.xxx *
* Standard Deviation : xx.xxx *
* Relative Deviation : xx.xxx *
*****

<<< 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:
```

T2 UNIFORMITY RESULTS SCREEN
ILLUSTRATION 3-3

- 6. Record the Mean T_2 , Standard Deviation, and Relative Deviation in Data Sheet (Appendix A).
- 7. Repeat steps 3 through 6 above, for analysis of the remaining series.
- 8. Type **6** then press **<Enter>** to exit the NEMA IQ Analysis Menu.

APPENDIX A - T₂ UNIFORMITY DATA SHEET

AXIAL SCAN DATA							
EXAM/ SERIES/ IMAGES	R1/R2/TG	SYSTEM FREQUENCY	PARAMETER	T2 TOOL ANALYSIS	ACCEPTANCE SPECIFICATIONS		
					1.5T	1.0T	
_ / _ / _	_ / _ / _		MEAN T2		158<T2<176	192<T2<218	
			SD / RD	<i>l</i>			
SAGITTAL SCAN DATA							
EXAM/ SERIES/ IMAGES	R1/R2/TG	SYSTEM FREQUENCY	PARAMETER	T2 TOOL ANALYSIS	ACCEPTANCE SPECIFICATIONS		
					1.5T	1.0T	
_ / _ / _	_ / _ / _		MEAN T2		151<T2<170	192<T2<218	
			SD / RD	<i>l</i>			
CORONAL SCAN DATA							
EXAM/ SERIES/ IMAGES	R1/R2/TG	SYSTEM FREQUENCY	PARAMETER	T2 TOOL ANALYSIS	ACCEPTANCE SPECIFICATIONS		
					1.5T	1.0T	
_ / _ / _	_ / _ / _		MEAN T2		151<T2<170	192<T2<218	
			SD / RD	<i>l</i>			

REVISION HISTORY

REV	DATE	AUTHOR	PRIMARY REASONS FOR CHANGE
0	August 5, 1998	M. Whitlow	Initial conversion from Toolbook to Word.
1	Oct 15, 1998	M. Keber	Removed obsolete 8.1 information; style guide cleanup.
2	Feb. 16, 1999	K. Keshena	Updated per engineering bay validation.
3	Sept. 27, 1999	G. Boerner	Minor revisions and added SPT body loader info per SPR MR1ge55143.
4	August 30, 2001	J. Gerber	Updated for TwinSpeed scanners and Release 9.0 software.
5	Jan. 27, 2003	C. MacDonald	Minor edits per Don Thomé.