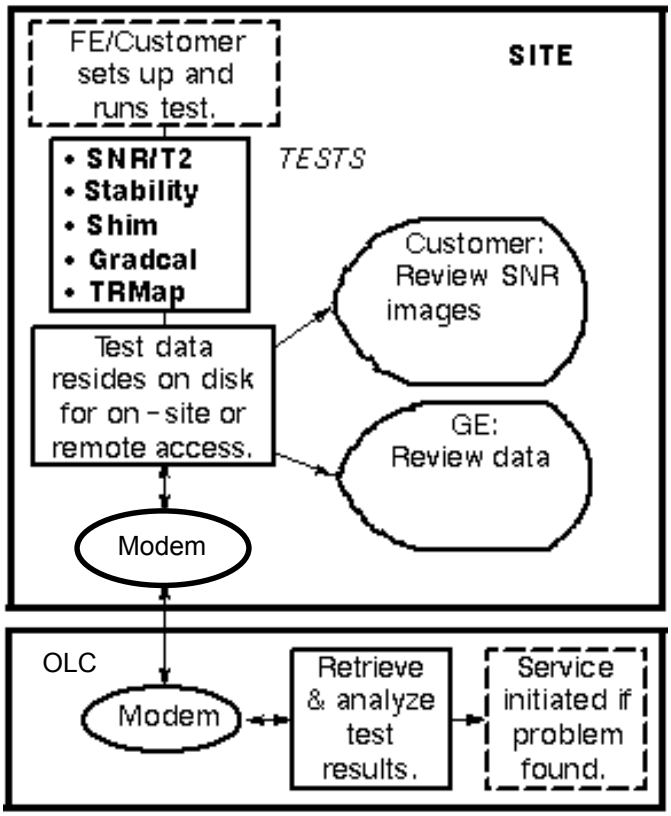
TABLE OF CONTENTS

INTRODUCTION

The Top Level Test (TLT) is intended for top-level performance screening of all hardware in a Signa system that is used for data collection and image creation. Illustration L1400A shows the tests executed by TLT, along with the means to view/obtain test results. TLT may be run by a Service Engineer, or set up as a quality assurance test for the customer to run (only for sites with an InSite Package Agreement).



TOP LEVEL TEST OVERVIEW
ILLUSTRATION L1400A

1- BODY TLT

Note

TLT stability results are sensitive to temperature fluctuations of the TPS Receiver. The System Cabinet cover MUST be in place for at least 0.5 hour before running TLT.

1-1 Required Tools

Phantoms required:

- $NiCl_2$ TLT Body Sphere, 46-265635G6
- Long Body Loader, 46-287902G1 or SPT Body Loader, 2135652-2

1-2 Body Coil Scan

CAUTION

Equipment damage possibility. 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 head coil if present.

2. At the Operator Workspace, select the scan icon in the desktop control panel.

3. If necessary, exit out of any previous exams by selecting **[End Exam].**

4. Click on **[New Pt]** and enter the following:
   Id: **geservice**
   Name: **tlt body**
   Weight (Lb.): **111**

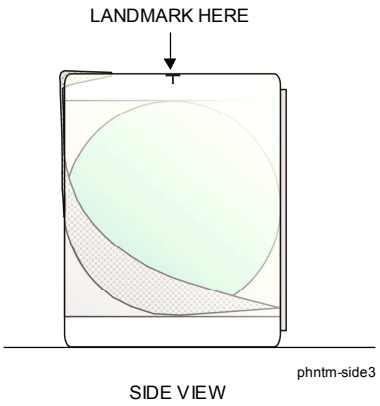
Note

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.)

WARNING!

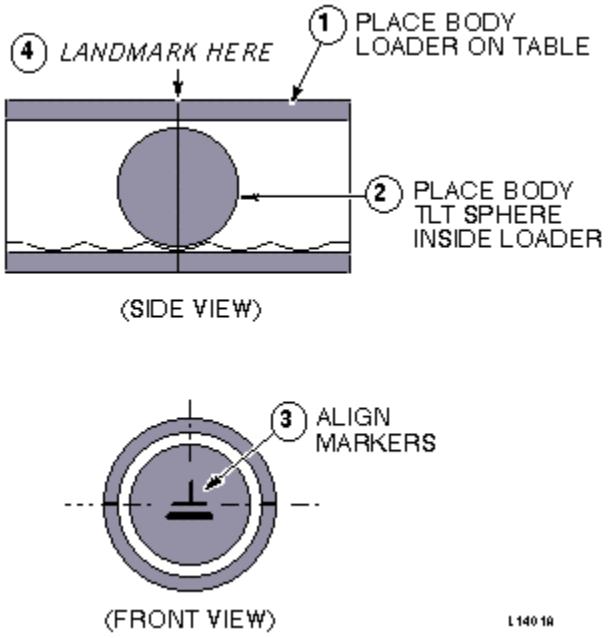
POISON HAZARD! THE PHANTOM CONTAINS NICKEL CHLORIDE, A SUSPECT CARCINOGEN. DO NOT INGEST. DISPOSE OF AS A HAZARDOUS WASTE ACCORDING TO STATE AND FEDERAL REGULATIONS.

5a. *Setup using SPT Loader:* Position the SPT body loader and TLT sphere on the table and landmark per Illustration 1-1A.



SPT BODY LOADER AND TLT PHANTOM SETUP
ILLUSTRATION 1-1A

5b. *Setup using Long Body Loader*. Position the body TLT sphere in the center of the long body loader and landmark per Illustration 1-1B.



LONG BODY LOADER AND TLT PHANTOM SETUP
ILLUSTRATION 1-1B

6. Set Patient Protocols to **Service**.

7. In the Protocol field, Type **o.2.1** (o=Other, 2=protocol number, 1=series number).
   OR
   Click on "Other" and select protocol **2** and series **1** from the menu.

8. Click on **[Accept]** to load the protocol.

Note

The table cradle design with round "twist-to-release" handle has less padding and different support ribs. Site vibration can cause the body loader to rock on the cradle, causing TLT stability problems. If TLT Stability fails, rerun the test with a pad 1/4-inch (6 mm) or less in thickness (e.g., black foam rubber pad, 46-320868P1 used for body coil soundproofing) placed under the Body Loader. If TLT Stability test now passes, use the pad when running TLT at the site (the instability is table related).

9. Change the following User CV test selections: Shim Test=1, Grafimage=4, SNR/T2=4, TRMAP=1, Stability=4, Gradcal=1 & ASC Analysis=0. Refer to Table 1 for test options.

TABLE 1
TLT TEST OPTIONS

OPTION (USER CV)	DESCRIPTION	PSD TIME (Min:Sec)
SHIM (Body only)	0=TEST OFF 1=TEST ON	- - 0:30
GRAFIMAGE (Body only)	0=TEST OFF 1=AXIAL, 2=SAG, 3=COR 4=ALL AXES	- - 1:28 4:25
SNR & T2 (T2 only for Body, Head)	0=TEST OFF 1=AXIAL, 2=SAG, 3=COR 4=ALL PLANES - 1=NOISE ONLY	- - 1:15 3:29 0:07
TR MAP	0=TEST OFF 1=AXIAL, 2=SAG, 3=COR	- - 2:14
STABILITY (Body, Head)	0=TEST OFF 1=Z AMP, 2=X AMP, 3=Y AMP 4=ALL PLANES	- - 2:18 6:48
GRADCAL (Body, Head)	0=TEST OFF 1=ALL PLANES	- - 1:24
ASC Analysis	This option is no longer supported. It was not Y2K compatible.	

Note

Total time for all Body TLT tests is ~20 minutes (including Analysis time).

10. Click on **[Accept]**, **[Save Series]**, then **[Prepare to Scan]**.

11. Click on **[Auto Prescan]**. If R1=11 and R2=14, then proceed with next step. Otherwise, right click **[Research Operations]**, select Setup Params and set R1=11, R2=14, then **[Done]**. (Important! This is to ensure that SNR and other TLT results will be valid.)

12. Click on **[Scan]**.

Note

Important! Don't start a new TLT scan until the previous TLT analysis is finished or analysis for the new scan may fail to start (only one set of scan data can be analyzed at a time).

13. When scanning and image reconstruction completes, automatic TLT data analysis begins in a window on the desktop. The analysis provides messages that identify each test as its data are analyzed. When analysis completes, place cursor inside the window and press **<Enter>** to close the window.

Note

SNR mean and T2 mean values are displayed in the Analysis Window for Head and Body SNR scans. New Series with annotated SNR images are NOT created.

14. On the Service Desktop, select **[Utilities]**, then **[Report Manager]** to view TLT results. Refer to section 5 for additional analysis information.

15. Record results in Section 7, Data Sheet 1.5T or Data Sheet 1.0T.

16. For additional TLT body scans, click on **[New Series]** and repeat steps 9-15.

17. When finished with TLT, delete all unneeded TLT exams to maximize image disk space for the customer.

2- HEAD TLT

Note

TLT stability results are sensitive to temperature fluctuations of the TPS Receiver. The System Cabinet cover MUST be in place for at least 0.5 hour before running TLT.

2-1 Required Tools

Phantoms required:

- $NiCl_2$ TLT Head Sphere, 46-265826G6
- Head Loader, 46-287899G1
- Head Coil Tuning Ring, 46-287416G1 (**1.5T** only)

2-2 Head Coil Scan

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: **tlt head**
   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.)

4. Install the head coil on the cradle (be sure coil is securely seated on base).

5. **1.5T only**: Install the Tuning Ring in the head coil with the Velcro® connector at top of coil (so Velcro doesn't rub on head holder when coil top is positioned). See Illustration 2-1.

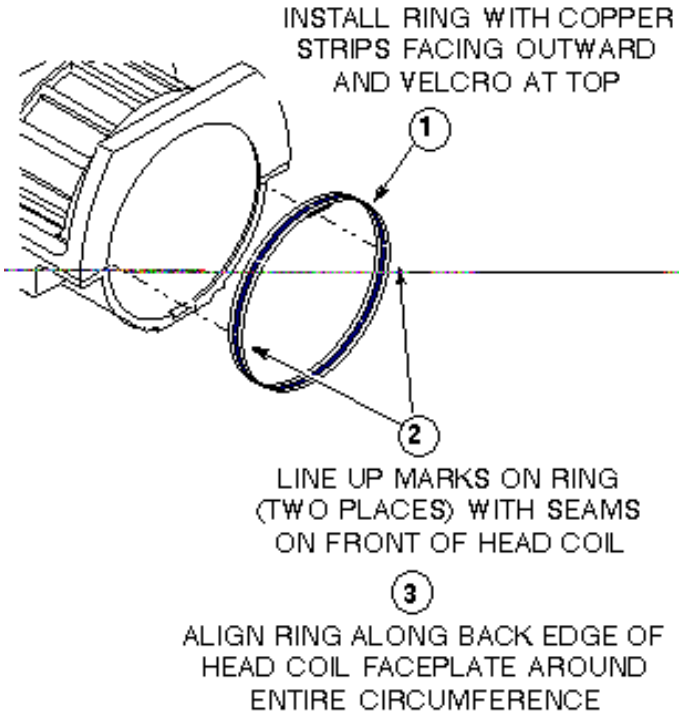


ILLUSTRATION 2-1
TUNING RING INSTALLATION (1.5T)

6. Install the head holder. See Illustration 2-2.

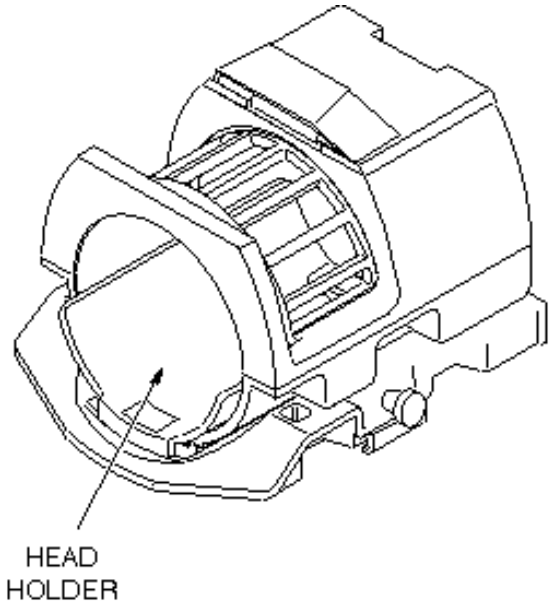
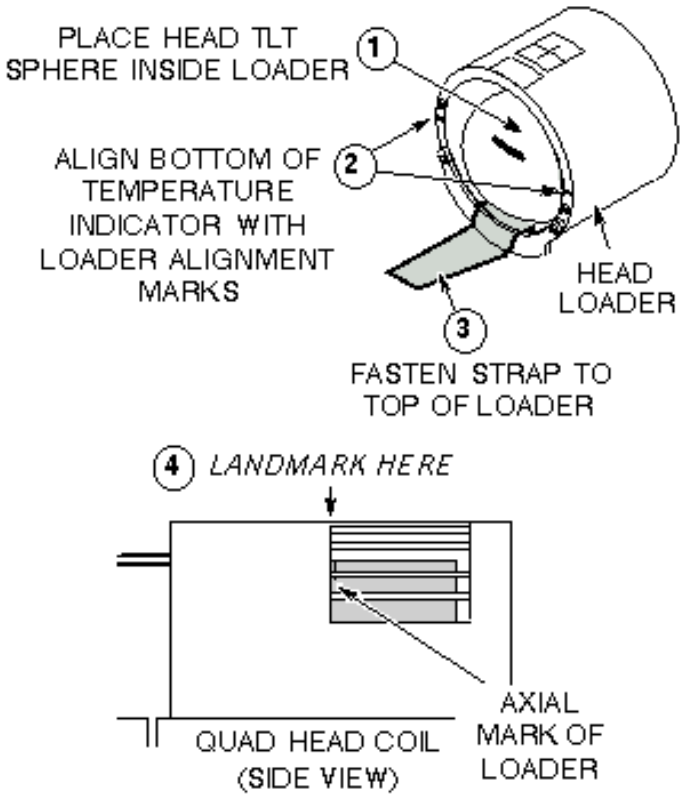


ILLUSTRATION 2-2
HEAD HOLDER PLACEMENT

WARNING!

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

7. Place the Head TLT Sphere in Head Loader and landmark per Illustration 2-3.



HEAD TLT PHANTOM SETUP
ILLUSTRATION 2-3

8. Set Patient Protocols to **Service**.

9. In the Protocol field:
   Type **o.2.2** (o=Other, 2=protocol number, 2=series number).
   OR
   Click on "Other" and select protocol **2** and series **2** from the menu.

10. Click on **[Accept]** to load the protocol.

11. Change the following User CV test selections: SNR/T2=4, TRMAP=1, Stability=4, Gradcal=1 & ASC Analysis=0). Refer to Table 1 in Section 1 for test options.

Note

Total time for all Head TLT tests is ~14 minutes (including Analysis time).

12. Click on **[Accept]**, **[Save Series]**, then **[Prepare to Scan]**.

13. Click on **[Auto Prescan]**. If R1=11 and R2=14, then proceed with next step. Otherwise, right click **[Research Operations]**, select Setup Params and set R1=11, R2=14, then **[Done]**. (Important! This is to ensure that SNR and other TLT results will be valid.)

Note

Leave patient fan on during scanning unless you're troubleshooting a noise problem.

14. Click on **[Scan]**

Note

Important! Don't start a new TLT scan until the previous TLT analysis is finished or analysis for the new scan may fail to start (only one set of scan data can be analyzed at a time).

15. When scanning and image reconstruction completes, automatic TLT data analysis begins in a window on the desktop. The analysis provides messages that identify each test as its data are analyzed. When analysis completes, place cursor inside the window and press **<Enter>** to close the window.

Note

SNR mean and T2 mean values are displayed in the Analysis Window for Head and Body SNR scans. New Series with annotated SNR images are NOT created.

16. On the Service Desktop, select [Utilities], then [Report Manager] to view TLT results. (Refer to section 5, TLT Results if needed.)

17. Record results in Section 7, Data Sheet 1.5T, or Data Sheet 1.0T.

18. For additional TLT head scans, click on [New Series] and repeat steps 11-17.

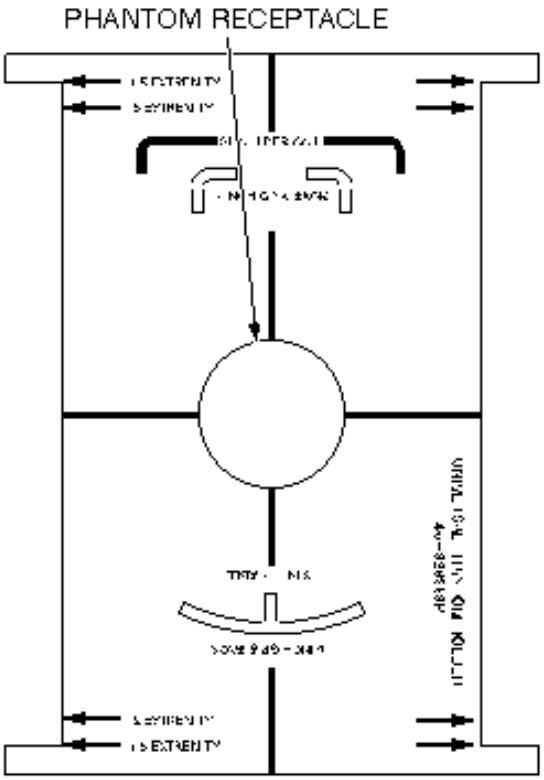
19. When finished with TLT, delete all unneeded TLT exams to maximize image disk space for the customer.

3- SURFACE COIL TLT

3-1 Required Tools

Phantoms required:

- Universal Phantom Holder, 46-328383P1 (See Illustration 3-1)



UNIVERSAL PHANTOM HOLDER
ILLUSTRATION 3-1

- 100-mm Sphere Phantom filled with $NiCl_2$ solution, 46-317586G1
- $NiCl_2$ TLT Head Sphere, 46-265826G6 (for Flex Coil)
- Head Loader, 46-287899G1 (for Flex Coil)

3-2 Surface Coil Scans

CAUTION

Equipment damage possibility. 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 head coil, if present.

2. At the Operator Workspace, select the scan icon in the desktop control panel.

3. If necessary, exit out of any previous exams by selecting **[End Exam].**

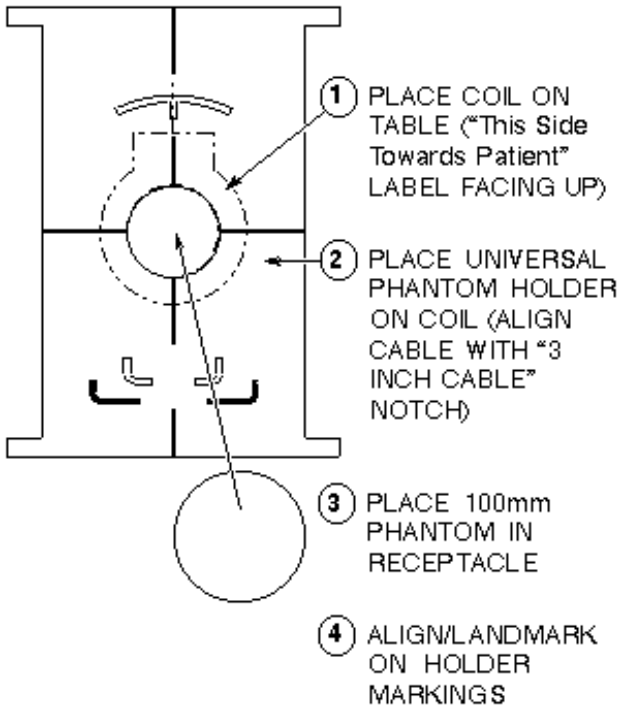
4. Click on **[New Pt]** and enter the following:
   Id: **geservice**
   Name: **tlt surface coil**
   Weight (Lb.): **111**

   Note

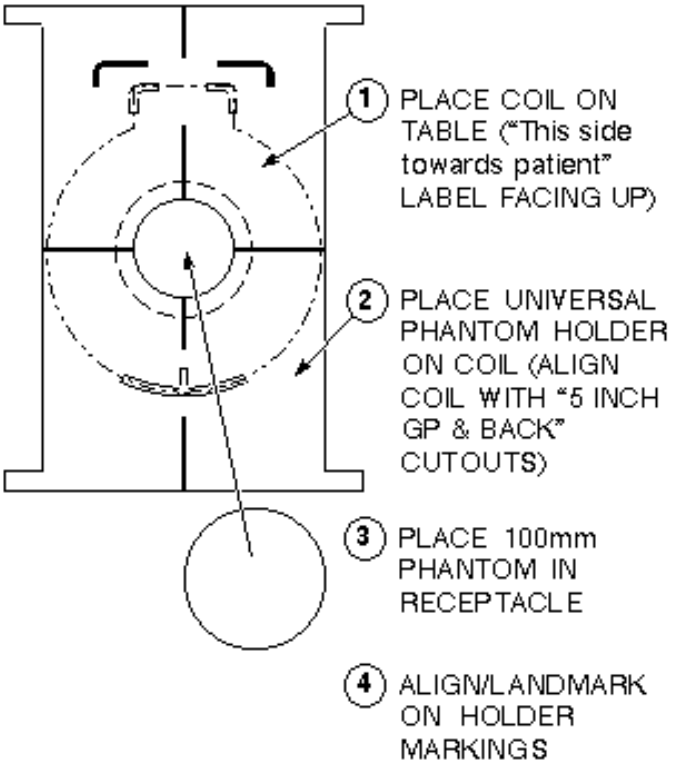
   On the *Patient Information* screen, up to 32 characters can be typed in the Exam description field as comments. On the *Patient Position* screen, up to 29 characters can be typed in the Series description field as comments. (Comments are displayed on the Report Header Info screen.)

5. Use Surface Coil Adapter to connect surface coil cable to Head Assembly.

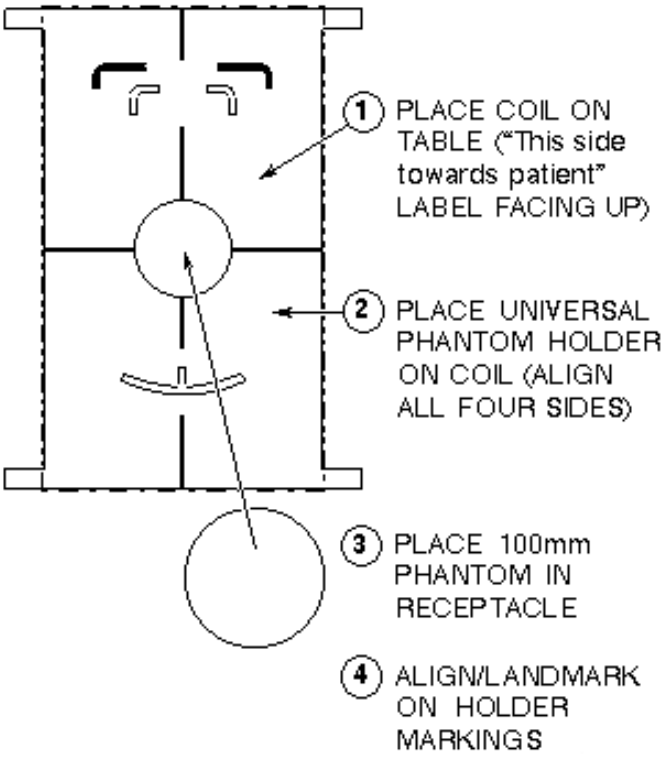
6. Position/landmark coil, phantom, and holder per appropriate illustration:
   - 3 inch - Illustration 3-2
   - 5 inch Back and 5 inch GP - Illustration 3-3
   - 5x11 - Illustration 3-4
   - Anterior Neck - Illustration 3-5
   - Breast - Illustration 3-6
   - C-Spine - Illustration 3-7
   - Extremity - Illustration 3-8
   - GP Flex - Illustration 3-9
   - Quad T/L - Illustration 3-10
   - Shoulder - Illustration 3-11



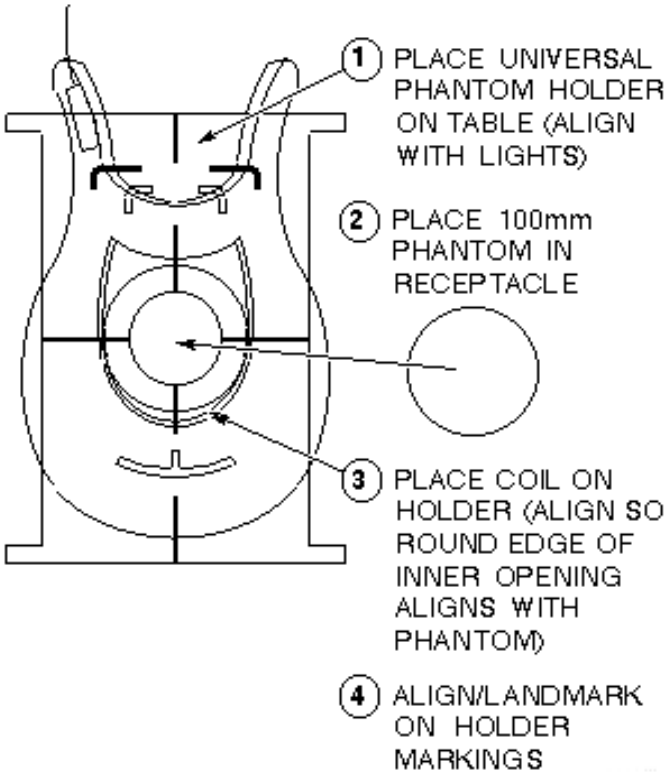
3 INCH COIL PHANTOM SETUP
ILLUSTRATION 3-2



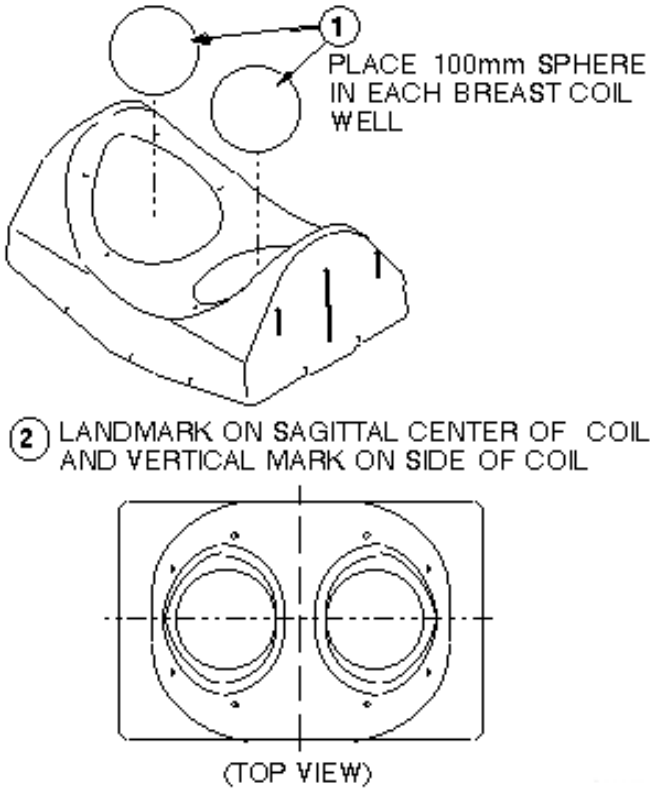
5" GP & 5" BACK COIL PHANTOM SETUP
ILLUSTRATION 3-3



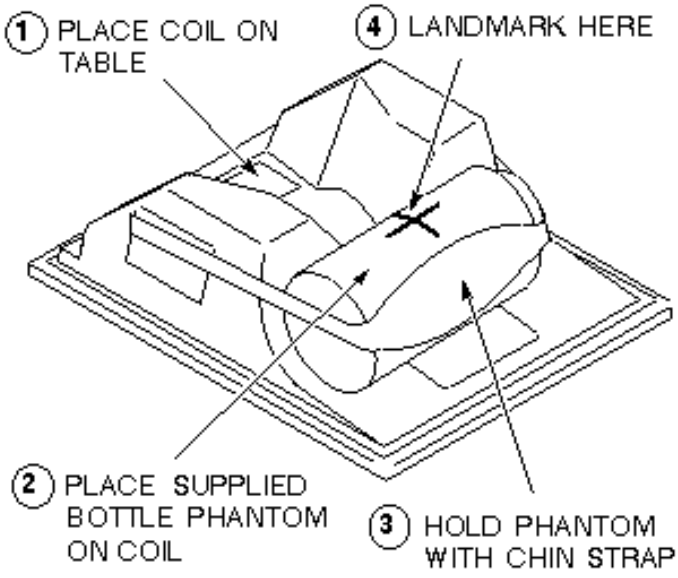
5X11 COIL PHANTOM SETUP
ILLUSTRATION 3-4



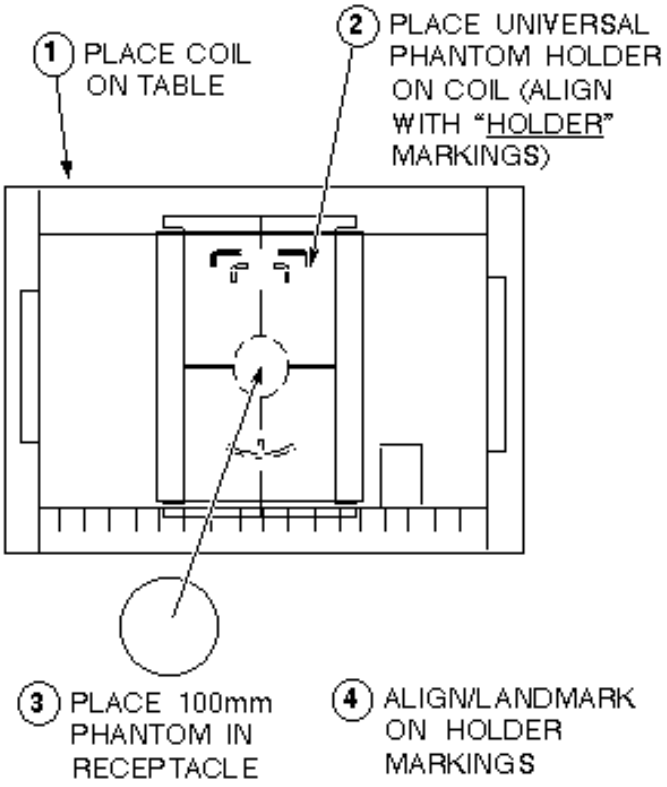
ANTERIOR NECK COIL PHANTOM SETUP
ILLUSTRATION 3-5



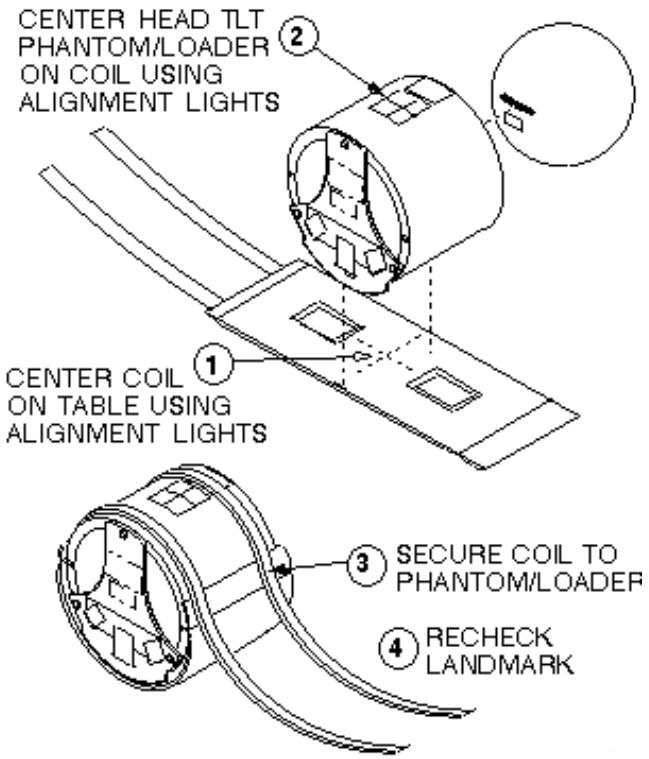
BREAST COIL PHANTOM SETUP
ILLUSTRATION 3-6



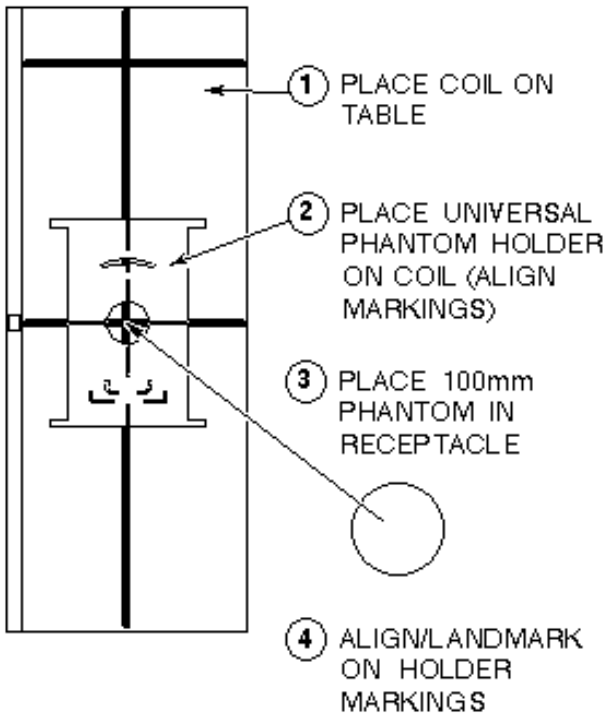
C-SPINE COIL PHANTOM SETUP
ILLUSTRATION 3-7



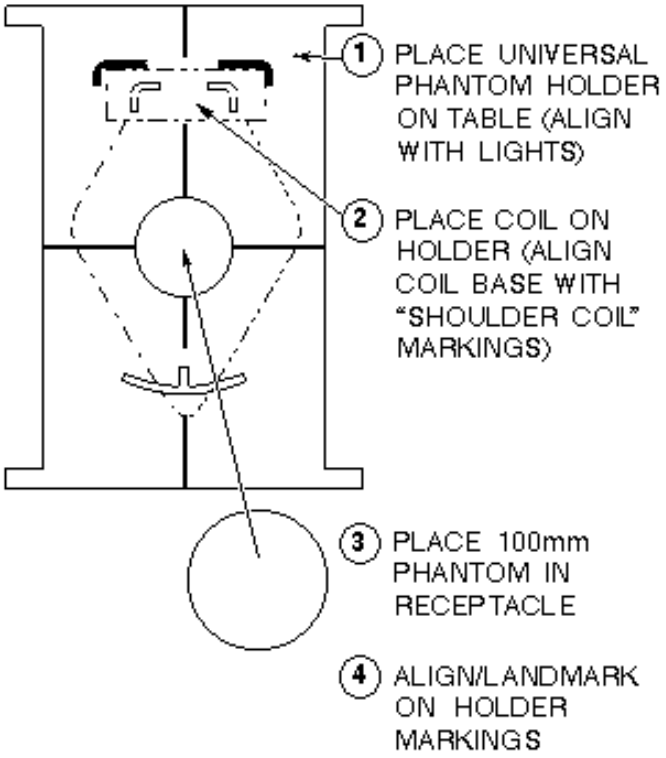
EXTREMITY COIL PHANTOM SETUP
ILLUSTRATION 3-8



GP FLEX COIL PHANTOM SETUP
ILLUSTRATION 3-9



QUAD T/L COIL PHANTOM SETUP
ILLUSTRATION 3-10



SHOULDER COIL PHANTOM SETUP
ILLUSTRATION 3-11

7. Set Patient Protocols to **Service**.

8. In the Protocol field:
   Type **o.2.3** (o=Other, 2=protocol number, 3=series number).
   OR
   Click on "Other" and select protocol **2** and series **3** from the menu.

9. Click on **[Coils]**. Select coil to test and click on **[Accept]**; then **[Accept]**, again, to load the protocol.

Note

If the site coil name differs from the GE name, the Surfmap file must be edited with the custom name. Refer to System: Software Utilities: SURFMAP for details. (To change the coil name for TLT, go to the procedure *System Level Procedures: Software Utilities: Surfmap Surface Coil Mapping.*)

10. Change the following User CV test selections: SNR/T2=1 (axial), TRMAP=1 (axial), & ASC Analysis=0). Refer to Table 1 in Section 1 for additional test options.

Note

Total time for all Surface TLT tests is ~3 minutes (including Analysis time).

11. Click on **[Accept]**, **[Save Series]**, then **[Prepare to Scan]**.

12. Click on **[Auto Prescan]**. If R1=11 and R2=14, then proceed with next step. Otherwise, right click **[Research Operations]**, select Setup Params and set R1=11, R2=14, then **[Done]**. (Important! This is to ensure that SNR and other TLT results will be valid.)

13. Click on **[Scan].**

Note

Important! Don't start a new TLT scan until the previous TLT analysis is finished or analysis for the new scan may fail to start (only one set of scan data can be analyzed at a time).

14. When scanning and image reconstruction completes, automatic TLT data analysis begins in a window on the desktop. The analysis provides messages that identify each test as its data are analyzed. When analysis completes, place cursor inside the window and press **<Enter>** to close the window.

Note

SNR mean values are displayed in the Analysis Window for Surface Coil and Phased Array SNR scans. New Series with annotated SNR images are NOT created.

15. On the Service Desktop, select **[Utilities]**, then **[Report Manager]** to view TLT results. (Refer to section 5, TLT Results for additional information.)

16. Record results in Section 7, Data Sheet 1.5T, or Data Sheet 1.0T.

17. For additional TLT head scans, click on **[New Series]** and repeat steps 10-16.

18. When finished with TLT, delete all unneeded TLT exams to maximize image disk space for the customer.

4- PHASED ARRAY COIL TLT

4-1 Required Tools

Phantoms required:

- CTL Coil Positioner with phantoms, 46-317605G1
- Pelvic Coil Positioner with phantoms, 46-317626G1
- Dual Coil Positioner, 46-317604G1

4-2 Phased Array Coil TLT Scan

Equipment damage possibility. 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 head coil, if present.

2. At the Operator Workspace, select the scan icon in the desktop control panel.

3. If necessary, exit out of any previous exams by selecting **[End Exam].**

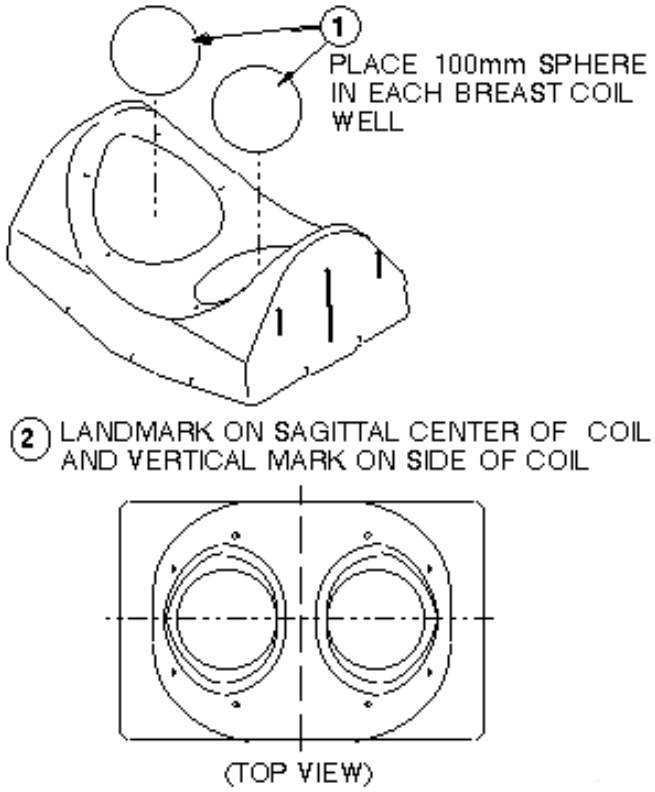
4. Click on **[New Pt]** and enter the following:
   Id: **geservice**
   Name: **tlt pa**
   Weight (Lb.): **111** (If kg, use **50** to prevent download error.)

   Note

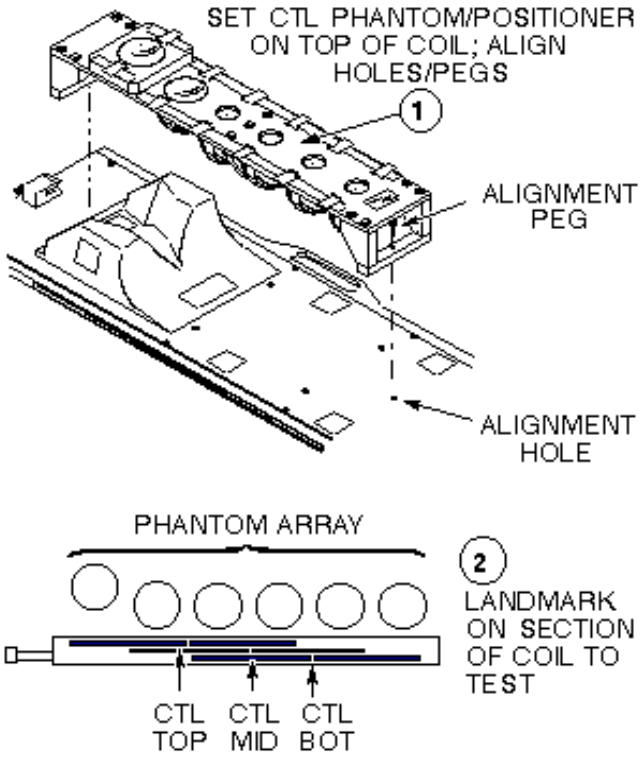
   On the *Patient Information* screen, up to 32 characters can be typed in the Exam description field as comments. On the *Patient Position* screen, up to 29 characters can be typed in the Series description field as comments. (Comments are displayed on the Report Header Info screen.)

5. Connect Phased Array Coil Connector to Head Assembly.

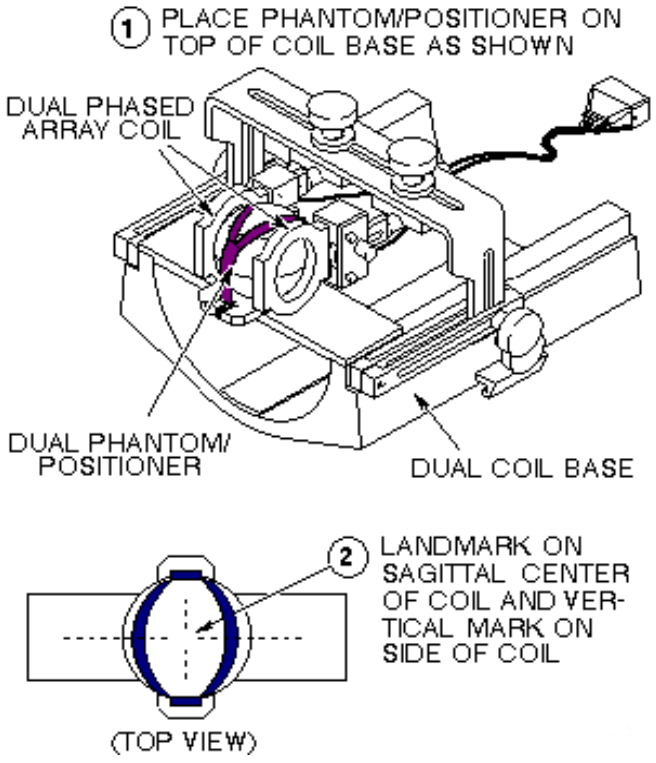
6. Position/landmark coil, phantom, and holder per appropriate illustration:
   - Breast - Illustration 4-1
   - CTL - Illustration 4-2
   - Dual - Illustration 4-3
   - Pelvic-Urinary - Illustration 4-4



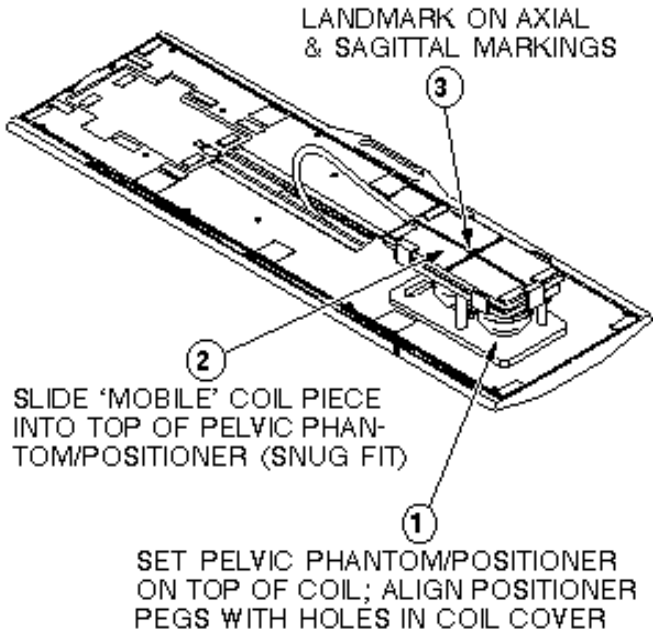
BREAST COIL PHANTOM SETUP
ILLUSTRATION 4-1



CTL COIL PHANTOM SETUP
ILLUSTRATION 4-2



DUAL COIL PHANTOM SETUP
ILLUSTRATION 4-3



PELVIC/URINARY COIL PHANTOM SETUP
ILLUSTRATION 4-4

7. Set Patient Protocols to **Service**.

8. In the Protocol field:
   Type **o.2.4** (o=Other, 2=protocol number, 4=series number) for an ***sagittal*** scan *OR* **o.2.5** (o=Other, 2=protocol number, 5=series number) for an ***axial*** scan.
   OR
   Click on "Other" and select protocol **2** and series **4** (sagittal) *OR* **5** (axial) from the menu.

9. Click on **[Coils]**. Select coil to test and click on **[Accept]**; then **[Accept]**, again, to load the protocol.

Note

If the site coil name differs from the GE name, the Surfmap file must be edited with the custom name. Refer to System: Software Utilities: SURFMAP for details. (To change the coil name for TLT, go to the procedure *System Level Procedures: Software Utilities: Surfmap Surface Coil Mapping.*)

10. Change the following User CV test selections:
    SNR/T2=**2** (series 4 protocol), SNR/T2=**1** (series 5 protocol)
    TRMAP=**2**, (series 4 protocol), TRMAP=**1** (series 5 protocol)
    ASC Analysis=0 (both series)
    (Refer to Table 1 in Section 1 for additional test options.)

11. Click on **[Accept]**, **[Save Series]**, then **[Prepare to Scan]**.

12. Click on **[Auto Prescan]**. If R1=11 and R2=14, then proceed with next step. Otherwise, right click **[Research Operations]**, select Setup Params and set R1=11, R2=14, then **[Done]**. (Important! This is to ensure that SNR and other TLT results will be valid.)

13. Click on **[Scan].**

Note

Important! Don't start a new TLT scan until the previous TLT analysis is finished or analysis for the new scan may fail to start (only one set of scan data can be analyzed at a time).

14. When scanning and image reconstruction completes, automatic TLT data analysis begins in a window on the desktop. The analysis provides messages that identify each test as its data are analyzed. When analysis completes, place cursor inside the window and press **<Enter>** to close the window.

Note

SNR mean values are displayed in the Analysis Window for Surface Coil and Phased Array SNR scans. New Series with annotated SNR images are NOT created.

15. On the Service Desktop, select **[Utilities]**, then **[Report Manager]** to view TLT results. (Refer to section 5, TLT Results for additional information.)

16. Record results in Section 7, Data Sheet 1.5T, or Data Sheet 1.0T.

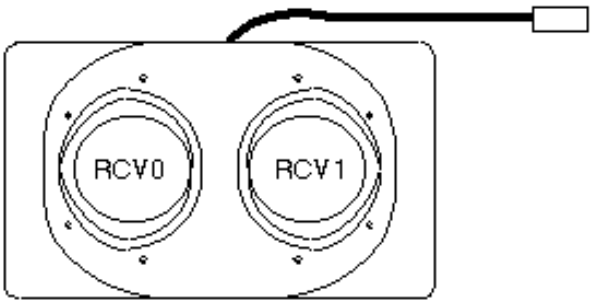
17. For additional TLT head scans, click on **[New Series]** and repeat steps 10-16.

18. When finished with TLT, delete all unneeded TLT exams to maximize image disk space for the customer.

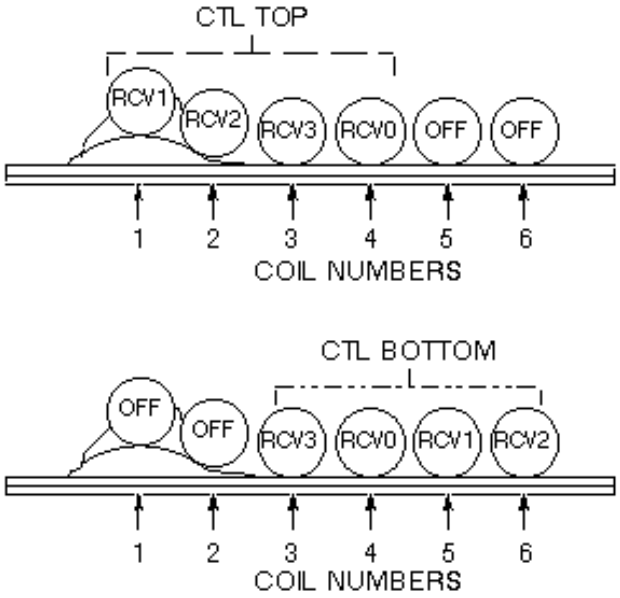
4-3 PA Coil Receiver Paths

The phased array coils have multiple individual coils inside the assembly; the TPS chassis has multiple receivers (RCV1-RCV4). TLT analysis provides SNR and TRMAP results for each receiver used, plus a combined image result (RCVC). To determine which individual coil(s) correspond to which TPS Receiver when viewing the TLT results with the Report tool, refer to the following illustrations:

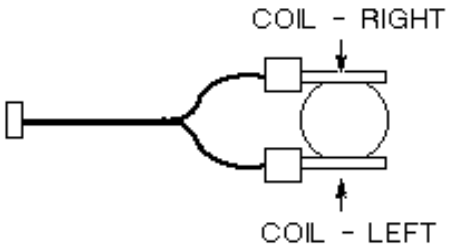
- Breast Coil - Illustration 4-5
- 1.5T/1.0T CTL Coil - Illustration 4-6
- Dual Coil - Illustration 4-7
- Pelvic/Urinary Coil- Illustration 4-8



BREAST COIL TO TPS RECEIVER (TOP VIEW)
ILLUSTRATION 4-5

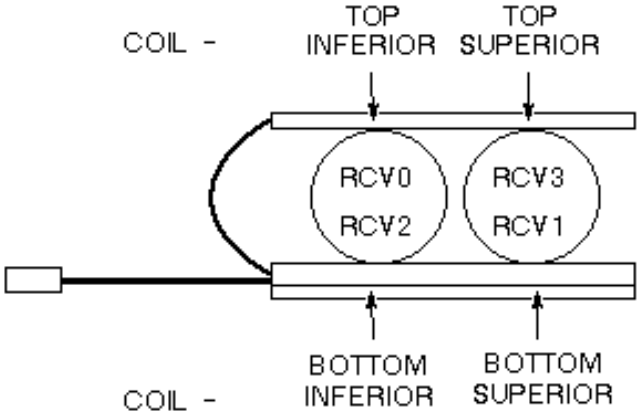


1.5T/1.0T CTL COIL TO TPS RECEIVER
ILLUSTRATION 4-6



NOTE: TO DETERMINE WHICH COIL CORRESPONDS TO WHICH TPS RECEIVER BOARD, REMOVE ONE COIL AND RE-SCAN. THE REMAINING COIL SHOULD HAVE THE SAME DATA RESULTS AS BEFORE.

DUAL COIL TO TPS RECEIVER (TOP VIEW)
ILLUSTRATION 4-7

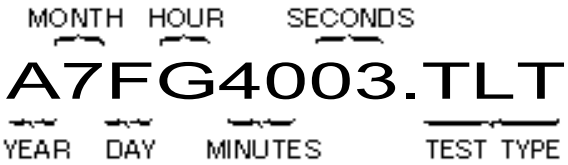


P/U COIL TO TPS RECEIVER (LEFT SIDE)
ILLUSTRATION 4-8

5- TLT RESULTS

TLT results can be displayed with both graphics and text. Refer to Report Manager Tool procedure to view the result files.

See Illustration 5-1 for an example file name. Refer to Table 5-1 for data file naming convention.



*EXAMPLE FILE CREATED: JULY 15, 2000 at 16:40:03

EXAMPLE TLT FILE NAME
ILLUSTRATION 5-1

TABLE 5-1
DATA FILE NAMING CONVENTION

YEAR	MONTH	DAY		HOUR		MINUTES, SECONDS
0 = 1990	1 = JAN.	1 = 01	H = 17	0 = 00:00	D = 13:00	0 to 59
1 = 1991	2 = FEB.	2 = 02	I = 18	1 = 01:00	E = 14:00	
2 = 1992	3 = MAR.	3 = 03	J = 19	2 = 02:00	F = 15:00	
3 = 1993	4 =APR.	4 = 04	K = 20	3 = 03:00	G = 16:00	
4 = 1994	5 = MAY	5 = 05	L = 21	4 = 04:00	H = 17:00	
5 = 1995	6 = JUN.	6 = 06	M = 22	5 = 05:00	I = 18:00	
6 = 1996	7 = JUL.	7 = 07	N = 23	6 = 06:00	J = 19:00	
7 = 1997	8 = AUG.	8 = 08	O = 24	7 = 07:00	K = 20:00	
8 = 1998	9 = SEP.	9 = 09	P = 25	8 = 08:00	L = 21:00	
9 = 1999	A = OCT.	A = 10	Q = 26	9 = 09:00	M = 22:00	
A = 2000	B = NOV.	B = 11	R = 27	A = 10:00	N = 23:00	
B= 2001	C = DEC.	C = 12	S = 28	B = 11:00	O = 24:00	
:		D = 13	T = 29	C = 12:00		
Z= 2026		E = 14	U = 30			
		F = 15	V = 31			
		G = 16				

5-1 Example TLT Report Screens

The following example screens contain example TLT body test results:

Scan Header – Screen 5-1

SCREEN 5-1
SCAN HEADER

```
AGR93912.TLT/0 Header Info RDF/GRP Revision:   1.0  /43
=======================================================
SITENAME    = BAY 12
USN         = B15B0C0
MLN         = 9999
SRVCONFIG   = 06/15/00  15:28:55
EXCITER     = 000
RECEIVER    = S0/E0/PE0
XMTRFCOIL   = BODY
RCVRFCOIL   = 3INCH
FREQ        = 63866811 Hz
TIME        = 06/27/00  09:24:00
BASERUN     = 44032
CONFIGCODE  = 001
SOFTREV     = 8.4
NUCLIDE     = 000
HEADERCODE  = 0x00000000
RCVCOILGAIN = 1.880  R1 = 6  R2 = 14  TG = 135
-------  Exam description  -------
NO  COMMENT
-------  Series description  -------
3INCH, Ax, 2D, SE
-------------------------------------------------------
```

Gradcal - Screen 5-2

SCREEN 5-2
GRADCAL (3 PLANES)

```
A7JE1325.TLT/1                GRADCAL
=========================================================
      Axis                Diameter (mm)       Center (mm)
---------------------------------------------------------
       X                      270.1                 1.2
       Y                      270.7                -1.9
       Z                      271.7                  .9
---------------------------------------------------------
Gradcal diameter is Normalized
---------------------------------------------------------

Select (Help, Group #, Previous, Next, Files, Quit)  [N]:
```

Record Diameter on data sheet

Reads **"UnNormalized"** for initial TLT scan (results are not valid for spec then).

Oxford Shim - Screen 5-3

SCREEN 5-3
OXFORD MAGNET SHIM

```
A7JE1325.TLT/2          OXFORD MAGNET QUICK SHIM
=========================================================
Homogeneity of 20.0 cm DSV     Std Dev  =     10.0 Hz
                               Pk to Pk =     79.0 Hz

Expansion Coefficients (Zero to Peak)
---------------------------------------------------------
Z1 Z2 Z3 Z4          3.0       31.5        3.4       -1.1
X Y                 -6.5       -4.6
ZX ZY X2-Y2 XY      -1.0        -.6       -1.4        3.5
Z2X Z2Y               .5        3.3
---------------------------------------------------------
Select (Help, Group #, Previous, Next, Files, Quit)  [N]:
```

Record Std Dev & P-P on data sheet

GE Shim - Screen 5-4

SCREEN 5-4
GE MAGNET SHIM (1.5T EXAMPLE)

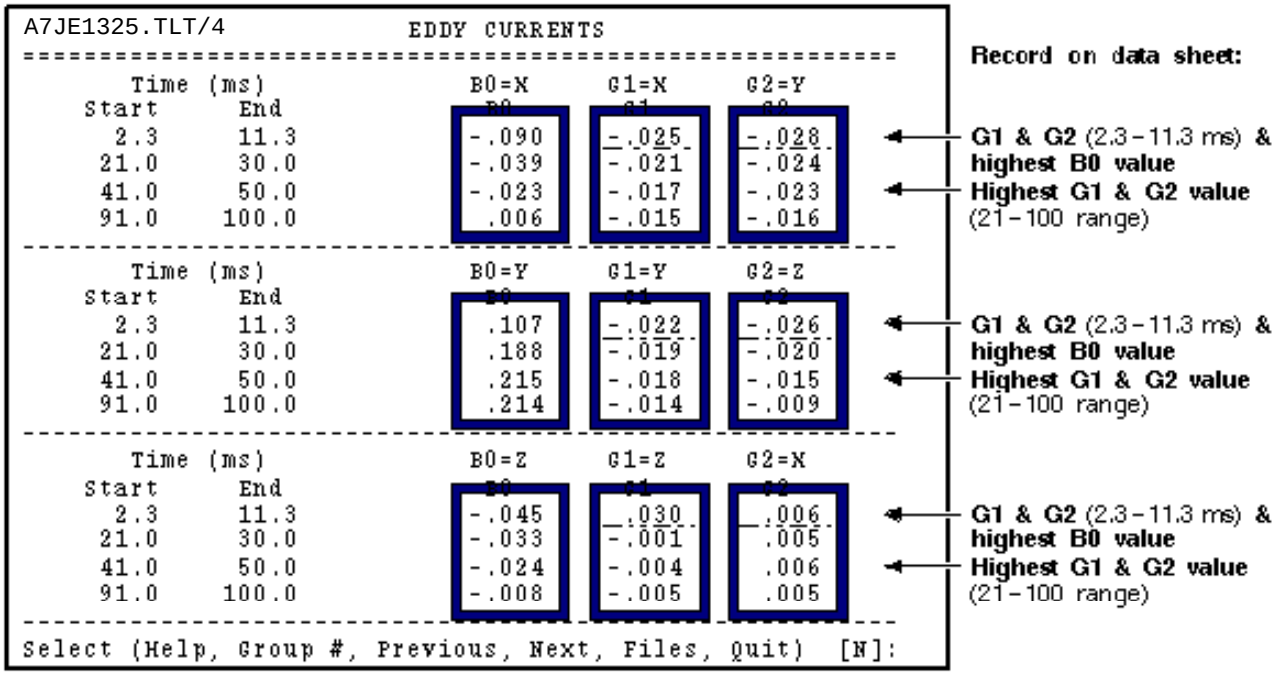
```
A7JE1325.TLT/3             GE MAGNET QUICK SHIM
=========================================================
Homogeneity of 20.0 cm DSV     Std Dev  =     12.8 Hz
                               Pk to Pk =     96.0 Hz

Expansion Coefficients (Zero to Peak)
---------------------------------------------------------
Z1 Z2 Z3 Z4          7.6       55.7       -1.3       48.2
Z5 Z6               -3.1       85.7
X Y                  1.9        9.5
ZX ZY X2-Y2 XY      -8.5        -.7        5.5        9.3
Z2X Z2Y             -2.0        2.6
Z(X2-Y2) ZXY          .2        1.8
X3 Y3                -.6       -3.2
---------------------------------------------------------
Select (Help, Group #, Previous, Next, Files, Quit)  [N]:
```

Record Std Dev & P-P on data sheet

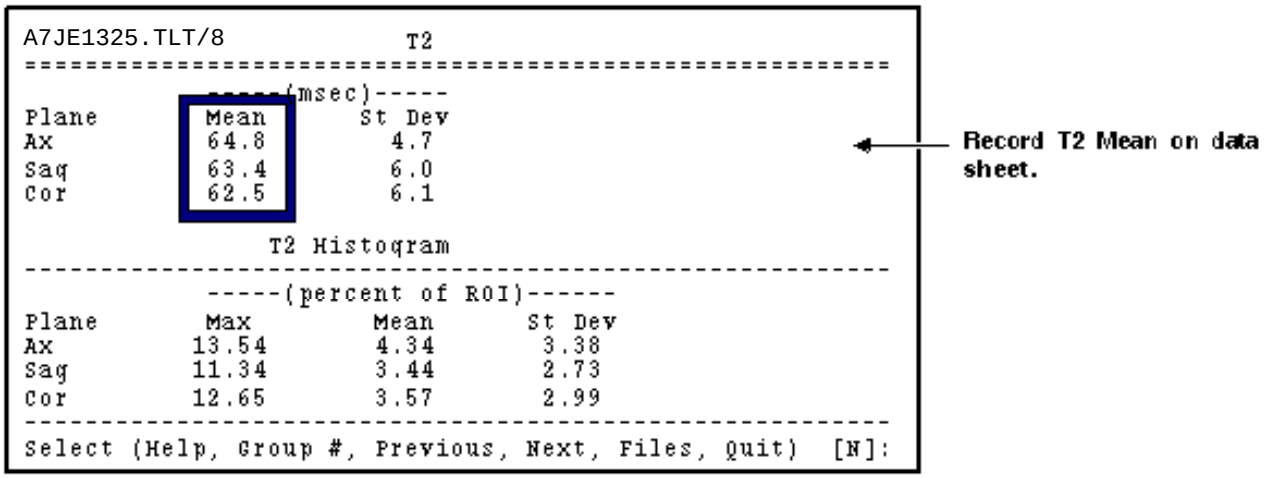
Grafimage (3 planes) - Screen 5-5

SCREEN 5-5
GRAFIMAGE (3 PLANES)



T2 (3 planes) - Screen 5-6

SCREEN 5-6
T2 (3 PLANES)



SNR (3 planes) - Screen 5-7

SCREEN 5-7
SNR (3 PLANES)

```
A7JE1325.TLT/12              SNR
=============================================================
          Noise     Inoise     Qnoise
           1.85      1.85       1.85

          Pk UB      Av UB      Pk Bl      Av Bl
           Sig        Sig        Sig        Sig
         5102.11    3490.88     8.06       2.34

Plane     Signal      SNR        Area     Hot Pixel
Ax         232.7     125.3      16565       262
Sag        235.6     126.9      16257       264
Cor        230.6     124.2      15839       263

     SNR Histograms
-------------------------------------------------------------
Plane       Max        Mean      St Dev
Ax          11.2        4.7       2.95
Sag         15.5        4.1       3.66
Cor         11.3        4.1       2.69
-------------------------------------------------------------
Select (Help, Group #, Previous, Next, Files, Quit)  [N]:
```

Record Noise on data sheet

Record SNR on data sheet

TR Map (1 plane) - Screen 5-8

SCREEN 5-8
TR MAP (1 PLANE)

```
A7JE1325.TLT/16             AXIAL TR MAP
=============================================================
Pixels In Object / Pixels in FOV =   25.8 %
-------------------------------------------------------------
Flip Angle Range Summary (Degrees vs % of object)
89-91     88-92     87-93     86-94     85-95
  7.5 %    12.6 %    17.6 %    22.7 %    28.1 %

80-100    75-105    70-110    65-115
 54.2 %    73.1 %    91.5 %    99.3 %
-------------------------------------------------------------
Flip Angle Map Histogram (Degrees)
    Mean      St Dev       P-P
    81.4        9.0        58.0
-------------------------------------------------------------
Receive Map Histogram (Pixel Intensity)
    Mean      St Dev       P-P
   185.3       39.0       233.0
-------------------------------------------------------------
Difference Map Histogram (Pixel Intensity)
    Mean      St Dev       P-P
    16.4       10.2        74.0
-------------------------------------------------------------
Select (Help, Group #, Previous, Next, Files, Quit)  [N]:
```

Record on data sheet:

Flip Angle Ranges.
(Note: Ranges used depend on coil)

Flip Angle Mean

Receiver Mean

Difference Mean

TR Map Profiles (1 plane) - Screen 5-9

SCREEN 5-9
TR MAP PROFILES (1 PLANE)

```
A7JE1325.TLT/17              AXIAL TR MAP PROFILES
=================================================
Flip Angle T/R Map Profile (Mean Pixel Value for ROI)
Position - Value
-------------------------------------------------------------
1    88.2       2    87.9       3    88.4       4    87.3
5    87.1       6    86.7       7    86.4       8    88.0
         Center      89.5
-------------------------------------------------------------
Receive T/R Map Profile (Mean Pixel Value for ROI)
Position - Value
-------------------------------------------------------------
1   162.6       2   163.4       3   165.8       4   165.0
5   165.4       6   163.9       7   161.4       8   160.4
         Center     172.9
-------------------------------------------------------------
Difference T/R Map Profile (Mean Pixel Value for ROI)
Position - Value
-------------------------------------------------------------
1     7.2       2     7.1       3     6.7       4     6.6
5     6.7       6     4.8       7     5.7       8     5.9
         Center       6.1
-------------------------------------------------------------
Select (Help, Group #, Previous, Next, Files, Quit)  [N]:
```

Stability (1 plane) - Screen 5-10

SCREEN 5-10
STABILITY (1 PLANE)

```
A7JE1325.TLT/22              AXIAL STABILITY
=============================================================
Echo Pos.    Maq.  Drift     Freq. Drift     Phase  Drift
 (msec)      P-P (%)  RMS    P-P (Hz)  RMS   P-P (Deg) RMS
             ------------    ------------    ----------
  3.97        1.37    0.20    0.46     .09    2.05
-------------------------------------------------------------
Select (Help, Group #, Previous, Files, Quit)  [P]:
```

Record Std Dev & P-P for each axis on data sheet

Note

PROBLEM: TLT "Phase Drift" intermittently fails with a value of 7°-8° (one or more narrow spikes in the data plot). SOLUTION: Cycle power to the TPS chassis then rerun TLT stability. If stability now passes, then ignore the initial failure. If stability still fails, power down the TPS for 30 minutes, then power up the chassis and rerun TLT. If stability now passes, then ignore the initial failure. The root cause of this problem is not known.

Note

When the Transient Noise Suppression (TNS) circuitry is on, it "blanks" detected spikes (by driving the MR signal toward 0 volts). This blanking can show up as downward spikes in TLT magnitude stability plots. (Remember, the TLT magnitude plot displays only the signal peaks (top of scale), not the entire 0-to-peak scale.) The amplitude and duration of the blanked spike determines the spike size in the TLT plot. Small blanked spikes might not show up in the TLT plot. When the TNS circuit is disabled, then typically the downward spikes caused by the TNS circuit are no longer seen in the TLT magnitude stability plots.

(Refer to Table 5-2 for a description of the items on the Header Parameters screen.)

TABLE 5-2
REPORT "HEADER INFO" SCREEN PARAMETERS

PARAMETER	LEGAL VALUES	SOURCE
SITENAME	SITE NAME	RAW HEADER
USN	UNIQUE SYSTEM NUMBER (GECARES ISSUED)	CONFIG FILE
MLN	MOBILE LOCATION NUMBER (9999 = NON-MOBIL)	MR CONFIG FILE
SRVCONFIG	DATE/TIME SRV CONFIG FILE LAST CHANGED	SRV CONFIG FILE
EXCITER	(NOT USED AT PRESENT)	(NON AT PRESENT)
RECEIVER	STARTING RCVR #, ENDING RCVR #; PORT ENABLE #	SCAN Rx; MR CONFIG FILE
XMTRFCOIL	BODY, HEAD	RAW HEADER
RCVRFCOIL	BODY, HEAD, <SURFACE COIL NAME>	RAW HEADER
FREQ	MAGNET FREQUENCY	RAW HEADER
TIME	YY/MM/DD HH:MM:SS	RAW HEADER
BASERUN	BASE RUN NUMBER OF SCAN	RAW HEADER
CONFIGCODE	(NOT USED FOR TLT)	RAW HEADER
SOFTREV	SOFTWARE REVISION	"mrswrev" SCRIPT
NUCLIDE	(NOT USED AT PRESENT)	(NONE AT PRESENT)
HEADERCODE	ERROR # IF PROBLEM CREATING THIS TEST HEADER	CREATED BY TEST ANALYSIS
RCVCOILGAIN	CALIBRATION VALUE (TYP. 1-10)	CONFIG FILE
R1, R2, TG	1-7, 1-30, 0-200	RAW HEADER
Exam Description	UP TO 22 CHARACTERS FROM EXAM DESCRIPTION.	IMAGE HEADER
Series Description	UP TO 29 CHARACTERS FROM SERIES DESCRIPTION.	IMAGE HEADER
"Comments"	UP TO 29 CHARACTERS FROM SERIES DESCRIPTION	IMAGE HEADER

The Service Config File information is displayed as the last two Report data screens.

5-2 Data Sheets & Specs Overview

Data sheets and test specifications for body, head, and some surface and phased array coils are listed in each coil test section. While these specs provide a good basis for identifying system problems, they do not provide a severity level indication, or comprehensive analysis of the results. Therefore, it is highly recommended that expert analysis be used for interpreting TLT results whenever possible prior to beginning any system troubleshooting.

Additional Stability Information

Table 5-3 provides a reference of the sensitivity of different scan PSDs and features to the stability of the system.

TABLE 5-3
TLT STABILITY VS FEATURE MATRIX (SHIELD COOLER ON)

PSD	Feature	Option	TLT Stability
SPECTROSCOPY CINE PC, CINE, 3D PC 2D PC, 3D SSFP 3D GRASS (VOLUME)		SPECTROSCOPY CINE MULTICOIL VASCULAR PACKAGE	Mag <1.0% Freq <1.0Hz Phase <3.0º
FAST SPIN ECHO MPGR, FMPSPGR FSPGRMPH, GRASS FGRPREP, FCMPIR FCPOMP, 2D/3D TOF	RESPIRATORY COMP FRACTIONAL NEX FRACTIONAL ECHO MEMP-high SNR / TR>1 VEMP-high SNR / TR>1	RAPID SCAN PACKAGE	Mag <2.0% Freq 1.2Hz Phase <4.0º
MPIR, POMP, FCMEMP			Mag <3.0% Freq <1.5Hz Phase <5.0º
CSMEMP MEMP	MEMP-low SNR / TR<1 VEMP-low SNR / TR<1 VARIABLE BW, GATING NO FREQ/PHASE WRAP INTERLEAVE, SAT, RECT./OFF CENTER FOV		Mag <5.0% Freq 2.0Hz Phase <6.0º

Note

The "Required TLT Stability" values in Table 5-3 are not specifications, but indicate what level of stability is necessary to achieve good image quality for the various PSDs/features listed. Be aware that there is overlap between the PSD, feature, and option columns vs. the required stability. Intuitive reasoning is required to use the information in Table 5-3. For example if you do a fractional NEX, CS MEMP scan the required stability will be <2.0%, <1.2 Hz, <4.0_, which is a tighter spec than the stability required for CSMEMP PSD in general.

5-3 Annotated SNR Images

SNR images are no longer annotated with mean SNR and mean T2. The SNR mean and T2 mean values are now displayed in the analysis window upon scan completion, for body and head SNR scans only.

6- TLT THEORY

Refer to procedure for TLT Theory.

7 - DATA SHEETS

1.5T TLT Body/Head Data

SITE:	NAME:		DATE:			
TLT FILE NUMBER:			**BODY SPECS**	**BODY TYPICAL**	**HEAD SPECS**	**HEAD TYPICAL**
COIL:	❑ BODY ❑ HEAD	❑ BODY ❑ HEAD	**(NiCl)**	**(NiCl)**	**(NiCl)**	**(NiCl)**
GRADCAL: X	mm	mm	268–272 mm	270	168.5–171.5 mm	170
Note: Specs not applicable Y	mm	mm	268–272 mm	270	168.5–171.5 mm	170
for normalization scan. Z	mm	mm	268–272 mm	270	168.5–171.5 mm	170
SHIM: STD DEV	Hz	Hz	16 Hz	14	– –	– –
P–P	Hz	Hz	125 Hz	110	– –	– –
EDDY CURRENTS: X – B_0*			0.200	0.08	– –	– –
(2.3–11.3 msec) X – G1			0.100	0.04	– –	– –
(2.3–11.3 msec) X – G2			0.100	0.01	– –	– –
(21–100 msec) X – G1*			0.07	0.03	– –	– –
(21–100 msec) X – G2*			0.07	0.01	– –	– –
Y – B_0*			0.200	0.116	– –	– –
(2.3–11.3 msec) Y – G1			0.100	0.04	– –	– –
(2.3–11.3 msec) Y – G2			0.100	0.06	– –	– –
(21–100 msec) Y – G1*			0.07	0.03	– –	– –
(21–100 msec) Y – G2*			0.07	0.05	– –	– –
Z – B_0*			0.200	0.10	– –	– –
(2.3–11.3 msec) Z – G1			0.100	0.03	– –	– –
(2.3–11.3 msec) Z – G2			0.100	0.01	– –	– –
(21–100 msec) Z – G1*			0.07	0.02	– –	– –
(21–100 msec) Z – G2*			0.07	0.01	– –	– –
* – Record highest value						
T2: AXIAL	msec	msec	64–76	70.3	64–76	70.7
headstdev<6.5 SAGITTAL	msec	msec	64–76	68.3	64–76	68.0
body stdev<9.5 CORONAL	msec	msec	64–76	67.6	64–76	67.7
SNR: NOISE			2.6	1.66	2.6	1.64
AXIAL			117–148.5	133.5	100 to 130	113.6
SAGITTAL			117–148.5	135.1	100 to 130	111.8
CORONAL			117–148.5	133.3	100 to 130	110.8
TR MAP (Axial specs): 89–91	%	%	6% to 10%	7.9	20% to 30%	25.4
75–105 (HEAD); 65–115 (BODY)	%	%	≥99%	99.7	≥97%	99.6
FLIP MEAN			82 to 89	86.4	85.5 to 91.5	88.4
RCV MEAN			150 to 300	203.3	170 to 370	272.7
STABILITY: Z (AXIAL) – MAG	P–P	P–P	3.0 P–P	0.64	3.0 P–P	0.53
Z (AXIAL) – FREQ	P–P	P–P	3.0 P–P	0.73	3.0 P–P	0.50
Z (AXIAL) – PHASE	P–P	P–P	5.5 P–P	1.73	5.5 P–P	1.56
X (SAGITTAL) – MAG	P–P	P–P	3.0 P–P	0.72	3.0 P–P	0.57
X (SAGITTAL) – FREQ	P–P	P–P	3.0 P–P	0.73	3.0 P–P	0.38
X (SAGITTAL) – PHASE	P–P	P–P	5.5 P–P	2.16	5.0 P–P	1.62
Y (CORONAL) – MAG	P–P	P–P	3.0 P–P	0.64	3.0 P–P	0.62
Y (CORONAL) – FREQ	P–P	P–P	3.0 P–P	0.48	3.0 P–P	0.44
Y (CORONAL) – PHASE	P–P	P–P	5.5 P–P	2.04	5.5 P–P	1.88

Note: The typical values are based on the mean values of several hundred 5.4 systems in the field. Systems with a BRM may have higher typical values for eddy currents than systems with Roemer coils. Systems that have a GRAM in the gradient drive system may also have higher typical stability numbers than systems that do not have a GRAM. However in all cases the systems should be within spec.

1.0T TLT Body/Head Data

SITE:	NAME:		DATE:			
TLT FILE NUMBER:			**BODY SPECS**	**BODY TYPICAL**	**HEAD SPECS**	**HEAD TYPICAL**
COIL:	❑ BODY ❑ HEAD	❑ BODY ❑ HEAD	**(NiCl)**	**(NiCl)**	**(NiCl)**	**(NiCl)**
GRADCAL: X	mm	mm	268-272 mm	270	168.5 to 171.5 mm	170
Note: Specs not applicable Y	mm	mm	268-272 mm	270	168.5 to 171.5 mm	170
for normalization scan. Z	mm	mm	268-272 mm	270	168.5 to 171.5 mm	170
SHIM: STD DEV	Hz	Hz	16 Hz	14.8	- -	- -
P-P	Hz	Hz	115 Hz	98.1	- -	- -
EDDY CURRENTS: X - B_0*			0.200	0.096	- -	- -
(2.3-11.3 msec) X - G1			0.100	0.040	- -	- -
(2.3-11.3 msec) X - G2			0.100	0.010	- -	- -
(21-100 msec) X - G1*			0.07	0.023	- -	- -
(21-100 msec) X - G2*			0.07	0.008	- -	- -
Y - B_0*			0.200	0.050	- -	- -
(2.3-11.3 msec) Y - G1			0.100	0.055	- -	- -
(2.3-11.3 msec) Y - G2			0.100	0.047	- -	- -
(21-100 msec) Y - G1*			0.07	0.039	- -	- -
(21-100 msec) Y - G2*			0.07	0.038	- -	- -
Z - B_0*			0.200	0.122	- -	- -
(2.3-11.3 msec) Z - G1			0.100	0.049	- -	- -
(2.3-11.3 msec) Z - G2			0.100	0.007	- -	- -
(21-100 msec) Z - G1*			0.07	0.016	- -	- -
(21-100 msec) Z - G2*			0.07	0.005	- -	- -
* - Record highest value						
T2: AXIAL	msec	msec	69-78	74.1	69-78	73.2
head stdev<6.5 SAGITTAL	msec	msec	69-78	71.8	69-78	71.3
body stdev<9.5 CORONAL	msec	msec	69-78	71.6	69-78	71.0
SNR: NOISE			3.1	2.60	3.1	2.60
AXIAL			80-95	86.4	70 to 85	75.5
SAGITTAL			80-95	87.9	70 to 85	75.5
CORONAL			80-95	87.9	70-85	75.0
TR MAP (Axial specs): 89-91	%	%	18% to 23%	20.4	50% to 75%	61.4
75-105 (HEAD); 65-115 (BODY)	%	%	≥99%	99.9	≥96%	99.7
FLIP MEAN			87 to 91	88.8	87 to 91	89.1
RCV MEAN			160 to 240	201.0	200 to 340	262.5
STABILITY: Z (AXIAL) - MAG	P-P	P-P	3.0 P-P	0.57	3.0 P-P	0.33
Z (AXIAL) - FREQ	P-P	P-P	3.0 P-P	0.60	3.0 P-P	0.42
Z (AXIAL) - PHASE	P-P	P-P	5.5 P-P	2.02	5.5 P-P	2.03
X (SAGITTAL) - MAG	P-P	P-P	3.0 P-P	0.57	3.0 P-P	0.50
X (SAGITTAL) - FREQ	P-P	P-P	3.0 P-P	0.77	3.0 P-P	0.35
X (SAGITTAL) - PHASE	P-P	P-P	5.5 P-P	3.14	5.0 P-P	1.69
Y (CORONAL) - MAG	P-P	P-P	3.0 P-P	0.58	3.0 P-P	0.42
Y (CORONAL) - FREQ	P-P	P-P	3.0 P-P	0.43	3.0 P-P	0.39
Y (CORONAL) - PHASE	P-P	P-P	5.5 P-P	1.67	5.5 P-P	1.95

Note: The typical values are based on the mean values of several hundred 5.4 systems in the field. Systems with a BRM may have higher typical values for eddy currents than systems with Roemer coils. Systems that have a GRAM in the gradient drive system may also have higher typical stability numbers than systems that do not have a GRAM. However in all cases the systems should be within spec.

1.5T TLT Surface Coil Data

SITE:	NAME:		DATE:	
TLT FILE NUMBER:				
COIL:	❑ 3" ❑ 5" GP ❑ LP ❑ 5" Bk ❑ SHOULDER COIL ❑ ANT NECK	❑ 3" ❑ 5" GP ❑ LP ❑ 5" Bk ❑ SHOULDER COIL ❑ ANT NECK	❑ 3" ❑ 5" GP ❑ LP ❑ 5" Bk ❑ SHOULDER COIL ❑ ANT NECK	❑ 3" ❑ 5" GP ❑ LP ❑ 5" Bk ❑ SHOULDER COIL ❑ ANT NECK
SNR: NOISE				
SNR MEAN				
TR MAP: 89-91	%	%	%	%
85-95	%	%	%	%
65-115	%	%	%	%
FLIP MEAN				
FLIP SDV				
RCV MEAN				
RCV SDV				
DIFF MEAN				
DIFF SDV				

1.5T SURFACE COILS TLT SPECS

COIL SPECS:	3"*	5"	5 X 11 LP	5" BACK	SHOULDER	ANT. NECK
SNR: NOISE	1.04-1.94 (F) 1.04-2.21 (R/T)					
SNR MEAN	185 to 227					
TR MAP: 89-91						
85-95						
65-115						
FLIP MEAN						
FLIP SDV						
RCV MEAN						
RCV SDV						
DIFF MEAN						
DIFF SDV						

* **3" COIL** specs are valid for Release 5.2 with $CuSO_4$ TLT slab and loader. Use ASC for accurate analysis.

1.0T TLT Surface Coil Data

SITE:	NAME:		DATE:	
TLT FILE NUMBER:				
COIL:	❑ 3" ❑ QUAD T/L ❑ QUAD CSP ❑ QUAD EXT ❑ SHOULDER ❑ ANT NECK ❑ BREAST ❑ GP FLEX	❑ 3" ❑ QUAD T/L ❑ QUAD CSP ❑ QUAD EXT ❑ SHOULDER ❑ ANT NECK ❑ BREAST ❑ GP FLEX	❑ 3" ❑ QUAD T/L ❑ QUAD CSP ❑ QUAD EXT ❑ SHOULDER ❑ ANT NECK ❑ BREAST ❑ GP FLEX	❑ 3" ❑ QUAD T/L ❑ QUAD CSP ❑ QUAD EXT ❑ SHOULDER ❑ ANT NECK ❑ BREAST ❑ GP FLEX
SNR: NOISE				
SNR MEAN				
TR MAP: 89-91	%	%	%	%
85-95	%	%	%	%
65-115	%	%	%	%
FLIP MEAN				
FLIP SDV				
RCV MEAN				
RCV SDV				
DIFF MEAN				
DIFF SDV				

1.0T SURFACE COILS TLT SPECS

COIL SPECS:	3"	QUAD T/L	QUAD CSP	QUAD EXT	SHOUL-DER	ANT NECK	BREAST	GP FLEX
SNR: NOISE	1.76 to 2.14	1.42 to 3.72	0.9 to 1.8	1.6 to 3.0	1.2 to 2.0	0.6 to 3.0	0.6 to 1.4	0.9 to 2.7
SNR MEAN	1342 to 1893	630 to 896	555 to 955	975 to 1153	1036 to 1298	566 to 932	390 to 428	197 to 215
TR MAP: 89-91	1 to 9%	24 to 98%	0 to 6%	10 to 45%	39 to 79%	49 to 100%	3 to 12%	43 to 67%
85-95	61 to 70%	94 to 100%	10 to 59%	42 to 100%	89 to 100%	98 to 100%	48 to 68%	89 to 100%
65-115	97 to 100%	100%	100%	94 to 100%	100%	100%	100%	100%
FLIP MEAN	81.9 to 84.3	87.3 to 90.4	95.0 to 97.5	86.3 to 94.3	87.4 to 90.3	88.0 to 91.0	86.7 to 89.3	87.5 to 90.7
FLIP SDV	5.6 to 7.2	0.7 to 1.9	1.4 to 3.0	0 to 10.4	0.7 to 2.8	0.6 to 2.2	4.9 to 8.5	1.0 to 3.1
RCV MEAN	333 to 394	170 to 357	92 to 220	68 to 520	252 to 409	78 to 396	51 to 113	40 to 88
RCV SDV	352 to 418	97 to 229	52 to 160	58 to 354	95 to 209	73 to 174	21 to 50	5 to 50
DIFF MEAN	20.5 to 34.6	5.3 to 9.3	5.6 to 12.7	2.3 to 16.3	7.1 to 10.6	2.3 to 10.3	2.2 to 6.6	1.5 to 2.7
DIFF SDV	32.1 to 54.8	2.9 to 6.4	3.6 to 11.5	2.7 to 13	3.0 to 5.9	0.5 to 5.7	1.1 to 4.0	0.6 to 1.5

When available, use ASC for accurate analysis.

1.5T TLT Phased Array Coil Data

SITE:		NAME:		DATE:			
TLT FILE NUMBER:				CTL SPECS	PELVIC SPECS	DUAL SPECS	BREASTPA SPECS
COIL:		❑ CTL ❑ Pelvic ❑ Dual ❑ Breastpa	❑ CTL ❑ Pelvic ❑ Dual ❑ Breastpa				
SNR:	NOISE (0)						
	NOISE (1)						
	NOISE (2)						
	NOISE (3)						
	NOISE (C)						
	SNR MEAN (0)						
	SNR MEAN (1)						
	SNR MEAN (2)						
	SNR MEAN (3)						
	SNR MEAN (C)						
TR MAP:	89-91 (C)	%	%				
(Combined	85-95 (C)	%	%				
Results)	65-115 (C)	%	%				
	FLIP MEAN (C)						
	FLIP SDV (C)						
	RCV MEAN (C)						
	RCV SDV (C)						
	DIFF MEAN (C)						
	DIFF SDV (C)						

1.0T TLT Phased Array Coil Data

SITE:		NAME:		DATE:			
TLT FILE NUMBER:							
COIL:		❑ CTL ❑ Pelvic ❑ Dual ❑ Breastpa	❑ CTL ❑ Pelvic ❑ Dual ❑ Breastpa	CTL SPECS	PELVIC SPECS	DUAL SPECS	BREASTPA SPECS
SNR:	NOISE (0)						
	NOISE (1)						
	NOISE (2)						
	NOISE (3)						
	NOISE (C)						
	SNR MEAN (0)						
	SNR MEAN (1)						
	SNR MEAN (2)						
	SNR MEAN (3)						
	SNR MEAN (C)						
TR MAP:	89-91 (C)	%	%				
(Combined	85-95 (C)	%	%				
Results)	65-115 (C)	%	%				
	FLIP MEAN (C)						
	FLIP SDV (C)						
	RCV MEAN (C)						
	RCV SDV (C)						
	DIFF MEAN (C)						
	DIFF SDV (C)						

REVISION HISTORY

REV	DATE	AUTHOR	PRIMARY REASONS FOR CHANGE
0	August 5, 1998	M. Whitlow	Initial conversion from Toolbook to Word.
1	Sept 3, 1998	M. Keber	Removed obsolete Release 8.1 information.
2	Nov 11, 1998	M. Keber	Added data sheets; misc. style guide cleanup.
3	May 20, 1999	S.M.Atladottir	Updated Procedure Reference for New GUI
4	Sept. 27, 1999	G. Boerner	Added SPT body phantom info/illustration per SPR MRige55143. Also updated per 8.3 bay validation.
5	Oct 14, 1999	M. Keber	Added correct proprietary heading to document.
6	Dec. 22, 1999	G. Boerner	Corrected landmarking per SPR MRIge56065. Removed Quick Reference procedures to eliminate redundancy and confusion.
7	July 5, 2000	M. Jones	Deleted references to ASC analysis. Removed redundant “proprietary vs. non-proprietary” references. Updated data file name examples.