

## SECTION 1 – INTRODUCTION

### 1-1 HOW THE CTL PHASED ARRAY COIL OPERATES

The Cervical Thoracic Lumbar (CTL) Multicoil Array is a receive only MRI antenna designed to be used in 1.5T Signa MRI systems equipped with the Multicoil Compatibility Kit (M1090PA).

The CTL array was designed and optimized for use in imaging the entire human spine. The array provides the high SNR of smaller MRI surface coils with the large field of view (FOV=48cm) of larger MRI surface coils. The array consists of six individual antenna loop elements, each of which can be used simultaneously within the limits of the system architecture.

The overall length of the antenna portion of the array is 74.42 cm. This allows for three modes of operation, each providing a 48 cm FOV. The CTLTOP mode utilizes antenna elements 1 through 4. The CTLMID mode utilizes antenna elements 2 through 5. And finally, the CTLBOT mode utilizes antenna elements 3 through 6.

The Coil consists of four major assemblies: (See Illustration 1-1.)

- Phase Adjustment Circuit Board (1) 2121448
- CTL Input Daughter Board (6) 2121446, 2121446-2, 2121446-3, 2121446-4, 2121446-5, and 2121446-6
- T/L Antenna Circuit Board (1) 2121444
- Cervical Multicoil Flexible Circuit (1) 46-307883P1

Each antenna loop element consists of an input daughter board and an antenna loop circuit. The input daughter boards contain the input circuitry for each element, while the loop circuit defines the antenna geometry for each element.

The antenna Loop circuits for elements 1 & 2 are located primarily on the contoured Cervical Multicoil Flexible Circuit Board. A small portion of the antenna loop circuit for element 2 is located on the rigid T/L Antenna Circuit Board. The antenna loop circuit for elements 3 through 6 are entirely contained on the T/L Antenna Board.

Antenna elements 1 and 2 are contoured and irregularly shaped while elements 3 through 6 are flat and rectangular in shape. Each individual loop element is capacitively loaded with lumped element chip capacitors to reduce patient loading effects. The total capacitance value of all the series chip capacitors combined is chosen in conjunction with the input capacitor  $C_{in}$  to allow for a matched impedance ( $Z_{in}=50\Omega$ ) at the antenna input. When the coil is loaded, a tuning capacitor is placed in parallel with one of the lumped element chip capacitors to allow for final tuning of the loop input impedance.

The input circuitry on the six Input Daughter boards includes an input matching network and a transmit blocking network for each antenna element.

The input circuitry on each board is identical, with the exception of component values, for all six array elements. The input circuitry was put on separate boards so the heat producing components (PIN diodes) could be distanced away from the patient surface without moving the antenna loop.

The function of the input matching network on this board is to match the input impedance of the individual antenna loop element to the value desired by the preamp. The match is accomplished by a simple L section circuit. The input capacitor,  $C_{in}$ , in conjunction with the antenna itself transforms the loaded input impedance up to 50 ohms and the inductor,  $L_{in}$ , removes any minor reactive component of the impedance.

**1-1 HOW THE CTL PHASED ARRAY COIL OPERATES (continued)**

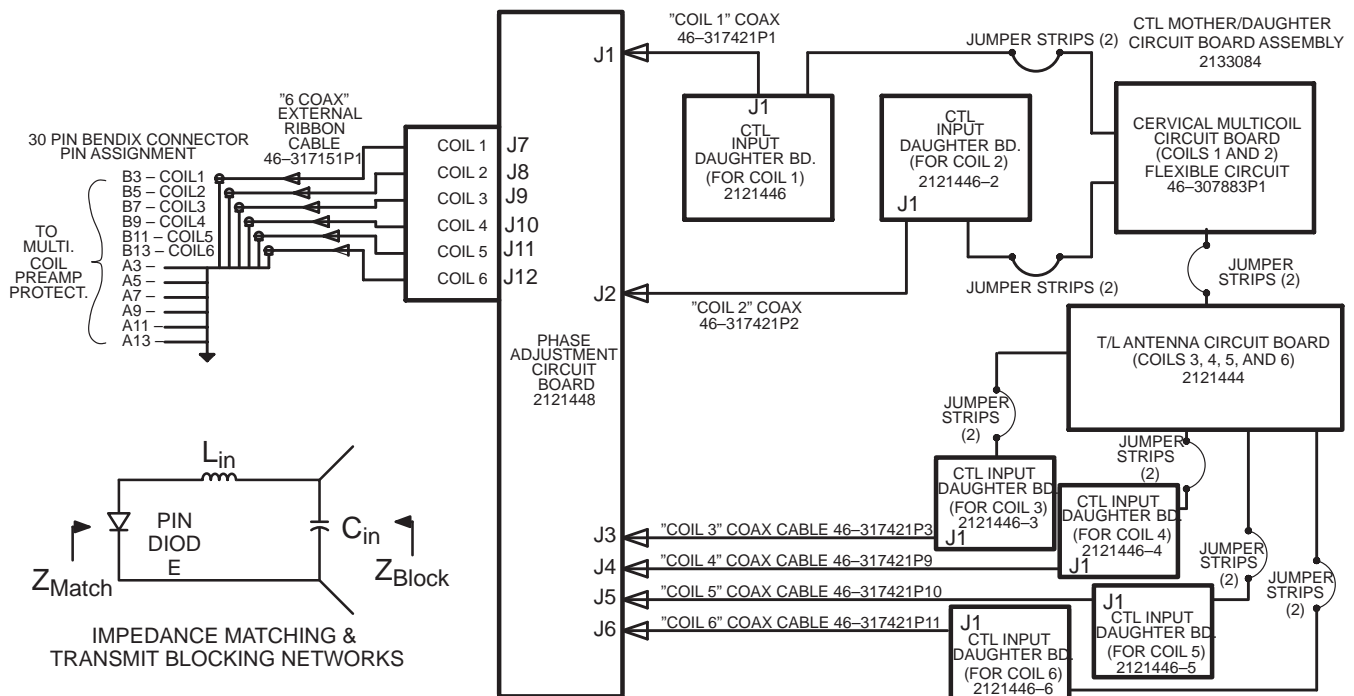
A second function of the daughter boards is that of transmit blocking, which is performed by both the input matching network and the transmit blocking network. When the PIN diodes are in the "on" state, the networks form high impedances which are placed in series with the coil loop. This minimizes circulating currents in the loop and therefore minimizes the magnetic field distortion during body coil transmit conditions.

The success of the blocked condition is dependent on the magnitude of the reactive impedances of  $C_{in}$  &  $L_{in}$  being equal and the total resistance of the diode – inductor combinations being low. Equal reactances are guaranteed by tuning the inductors to maximize blocked impedances and low resistance is guaranteed by correct DC bias of the diode and correct tuning of the inductor.

During receive mode operation, it is important to the overall performance of the CTL array to decouple the individual antenna loop elements. This is accomplished through two different methods.

For adjacent antenna loop elements, the decoupling is accomplished geometrically. The magnetic flux linking two adjacent loops is cancelled by adjusting the overlap spacing between them. For both adjacent and non-adjacent antenna elements, a second method of decoupling is used. The 1.5T low noise preamplifier used in the Signa MRI system has a very small real input impedance (less than  $6\Omega$ ). If the electrical length of the system between the preamp input and the input matching network of the antenna loop is kept at a multiple of a half-wavelength, then the impedance seen at the diode terminals of the antenna loop's input matching network will also be small and real. This small real impedance at the diode terminals combined with  $L_{in}$  and  $C_{in}$  of the input matching network form a "lossy" parallel LC blocking network similar to the transmit blocking network. This "receive mode" blocking impedance reduces the individual antenna loop current which in turn reduces the magnetic flux produced by the loop. This reduction in magnetic flux in turn reduces the coupling between antenna elements.

The function of the phase adjust circuit board is to insure that the electrical length between the preamp and the antenna loop input is a multiple of a half wavelength, so that the second method of receive decoupling is working. The phase adjustment is made with sections of microstrip line in the board.



**BLOCK DIAGRAM FOR CTL PHASED ARRAY COIL**  
ILLUSTRATION 1-1

**1-2 COMPATIBILITY**

The CTL Phased Array Coil is compatible with the following hardware configurations:

- Signa Advantage™ (4.5 or higher)
- Signa Advantage™ 1.5T (1.5T only)
- Signa Horizon™ 1.5T (1.5T only)

**1-3 RELATED DOCUMENTS**

- *Direction 2124201, MR Release 5.x Signa Service Methods MR CD-ROM*
  
- *Direction 15400, Signa Advantage 1.5T, 1.0T, & 0.5T System*
- *Direction 15300, Signa Advantage System*

**1-4 ORGANIZATION OF THIS DOCUMENT**

This manual is divided into the following sections:

Section 1, INTRODUCTION, describes how the CTL Phased Array Coil operates and when and where the CTL Phased Array Coil can be used.

Section 2, SET UP AND CALIBRATION, describes installation procedures.

Section 3, FUNCTIONAL CHECKS, describes the normal power-up sequence.

Section 4, REPLACEMENT/MAINTENANCE, describes field maintenance procedures.

Section 5, RENEWAL PARTS, lists field replaceable parts.

**1-5 ENVIRONMENTAL REQUIREMENTS**

Operate and store the CTL Phased Array Coil in the Scanner Room.

**1-6 SPECIFICATIONS**

PARAMETER	VALUE
COIL DESIGN	Six element receive only antenna array for human spine imaging
TUNED FREQUENCY	63.86 MHz (factory set)
OPTIMUM FIELD OF VIEW	Group of four antenna loops out of six providing 48cm FOV
OPERATING AND STORAGE ENVIRONMENT	Operate and store the CTL Phased Array Coil in the Scanner Room



## SECTION 2 – SET UP AND CALIBRATION

### 2-1 CHECKING THE SHIPPING LIST

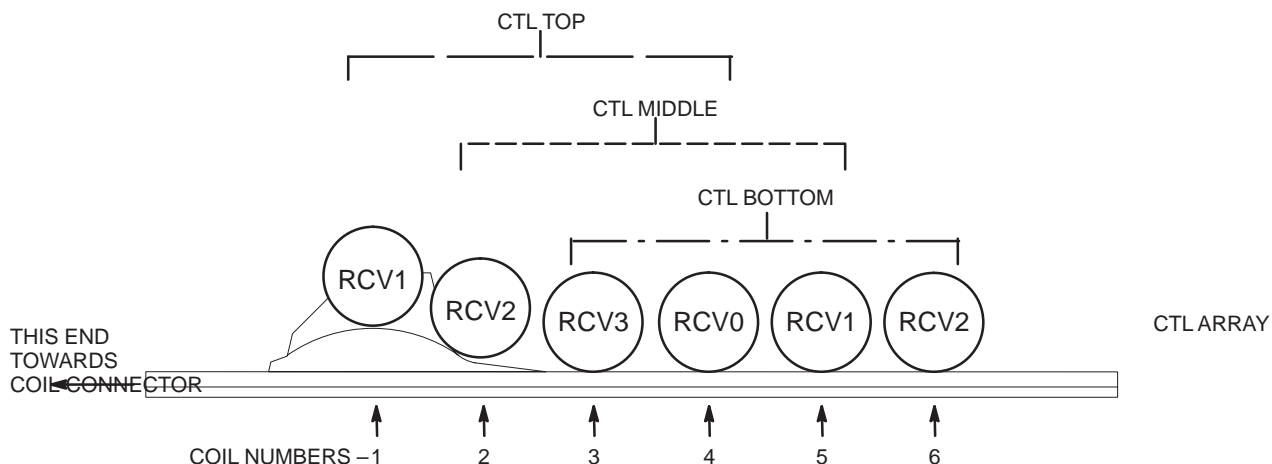
Table 2-1 lists the M1087CT Signa Advantage 1.5T CTL Phased Array Coil parts. Check that all parts have been shipped.

TABLE 2-1  
CTL PHASED ARRAY COIL SHIPPING LIST

QTY.	.5 1	PART NO.
1	CTL Phased Array Coil and Cable	2104799
1	Neck Coil Pad	46-307593P1
1	Back Coil Pad	46-301961P1
5	Forehead Strap	46-317677P1
5	Chin Strap	46-317676P1
1	Positioner and six (6) Spherical Phantoms	46-317605G1
1	Operator's Manual	2144814
1	Service Manual	46-003014

### 2-2 INSTALLING THE CTL PHASED ARRAY COIL

At the Boot Terminal, install a new soft key. This key will be used by the operator to select CTL TOP (elements 1-4), CTL MIDDLE (elements 2-5), or CTL BOTTOM (elements 3-6) imaging. Name the keys "CTL TOP", "CTL MID" or "CTL BOT". See Illustration 2-1.



CTL PHASED ARRAY COIL TO TPS RECEIVER CORRESPONDENCE  
ILLUSTRATION 2-1

M4074A

**2-2 INSTALLING THE CTL PHASED ARRAY COIL (continued)**

Refer to references in Section 1-3, RELATED DOCUMENTS, for information on installing soft keys (use Coil/Phased Array default values in Table 2-2 and 2-3).

TABLE 2-2  
COIL VALUES

SYS-TEM	COIL NAME	COIL TYPE	EXTREM-ITY COIL	CABLE LOSS	COIL LOSS	RECON SCALE FACTOR	XMIT COIL TYPE	MULTI-COIL
1.5T	CTLTOP	surface	no	1.05	0.313 (55cm Bore) 1.72 (60cm Bore)	Head Coil Recon Scale Factor x 1.00	quad	yes
	CTLMID	surface	no	1.05	0.313 (55cm Bore) 1.72 (60cm Bore)	Head Coil Recon Scale Factor x 1.00	quad	yes
	CTLBOT	surface	no	1.05	0.313 (55cm Bore) 1.72 (60cm Bore)	Head Coil Recon Scale Factor x 1.00	quad	yes
	CS12	surface	no	1.05	0.313 (55cm Bore) 1.72 (60cm Bore)	Head Coil Recon Scale Factor x 1.00	quad	yes
	LS45	surface	no	1.05	0.313 (55cm Bore) 1.72 (60cm Bore)	Head Coil Recon Scale Factor x 1.00	quad	yes
	LS56	surface	no	1.05	0.313 (55cm Bore) 1.72 (60cm Bore)	Head Coil Recon Scale Factor x 1.00	quad	yes

TABLE 2-3  
PHASED ARRAY VALUES

MULTI-COIL NAME	NUMBER OF RECEIVERS	START RECEIVER	STOP RECEIVER	PORT ENABLE MASK	ERROR ENABLE MASK
CTLTOP	4	0	3	7	7
CTLMID	4	0	3	6	6
CTLBOT	4	0	3	14	14
CS12	2	1	2	3	3
LS45	2	0	1	4	4
LS56	2	1	2	12	12

**2-3 FUNCTIONAL CHECKS**

1. Perform a Body coil scan SNR verification. Refer to Section 3–1, BODY COIL SNR VERIFICATION.
2. Perform a CTL Phased Array Coil SNR Verification. Refer to Section 3–2, CTL PHASED ARRAY COIL SNR VERIFICATION.

**2-4 PERIODIC QUALITY ASSURANCE CHECK**

On a periodic basis, such as during planned maintenance, perform the quality assurance check outlined below to ensure that the CTL Phased Array Coil is operating properly with no appreciable degradation of image quality.

1. Perform a CTL Phased Array Coil SNR Verification. Refer to Section 3–2, CTL PHASED ARRAY COIL SNR VERIFICATION.
2. Record the date and values calculated in Section 3–3, SNR IMAGE ANALYSIS in columns 2–7 under “SNR Data QA Check” of the Data Table as is instructed.
3. As is instructed in the Data Table, divide the SNR value obtained in the periodic QA check (recorded in columns 2–7) by the original SNR value and record in column 8 of the Data Table.
4. If this ratio is not greater than 85%, then there may be a problem in the Multicoil system. Contact your local GE Service Representative.

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DIRECTION 46-003014

# SECTION 3 – FUNCTIONAL CHECKS

## 3-1 BODY COIL SNR VERIFICATION

### Note

An alternate proprietary procedure is available for GE use and to customers with a valid Advanced Service Package Limited License. Refer to "TLT PROCEDURE" calibration procedure located in Direction 2124201, *MR Release 5.x Signa Service Methods* or Direction 2124202, *Release 4.x/3.x MR Signa Service Methods*.

**Phantom Required** (shipped with each corresponding CTL Phased Array Coil)

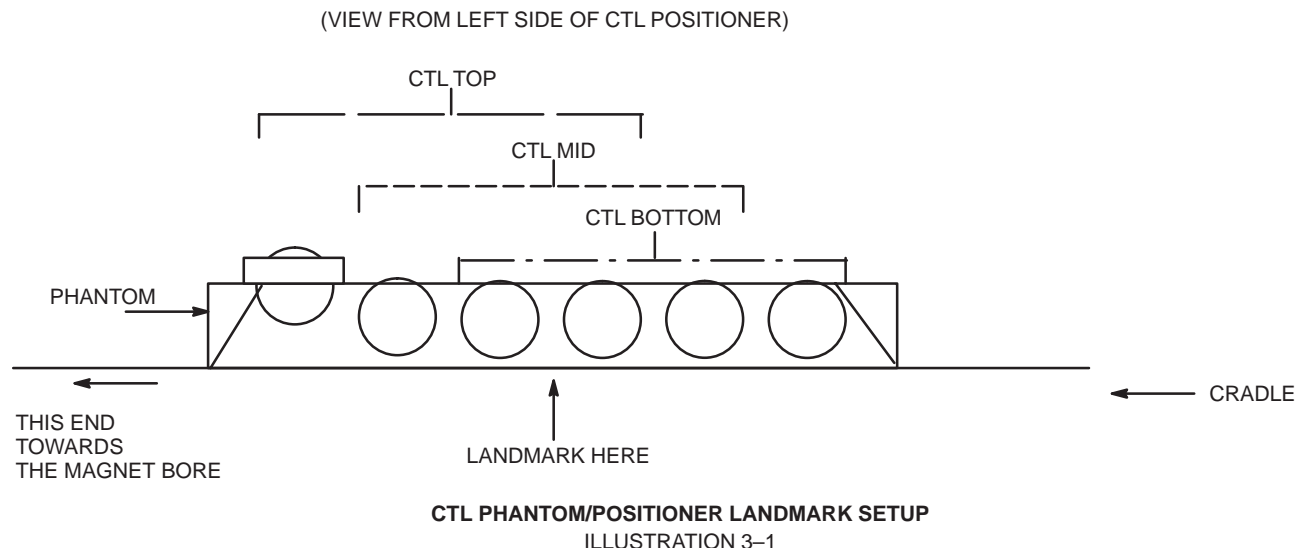
- CTL Phased Array Coil Positioner with phantoms (CTL Phantom/Positioner), 46-317605G1

### Setup Procedure



**The Quad Head Coil must be completely removed from the cradle before performing any body scans. Failure to do this may result in damage to the Head Coil T/R Network.**

1. Remove Quad Head Coil (if present) from cradle.
2. Select **[New Exam]** to allow a new Landmark to be set.
3. Position the CTL Phantom/Positioner with phantoms in the center of the cradle. Landmark the center of the positioner and advance the positioner with phantoms to isocenter using the **[ADVANCE TO SCAN]** button. See Illustration 3-1.



**3-1 BODY COIL SNR VERIFICATION (continued)**

- 4. Setup Scan Prescription as shown in Table 3-1 (4.x) or Table 3-2 (5.x).

TABLE 3-1  
**BODY COIL SNR – SCAN PROTOCOL (4.x)**

<b>SCAN PRESCRIPTION (4.x)</b>	
<p><u>MAIN MENU</u>                      <b>[NEW STUDY]</b></p> <p><u>PATIENT STUDY PARAMETERS</u></p> <p>          ID:           <b>GESERVICE</b> See Note 1</p> <p>          Monitor SAR?   <b>N</b></p> <p>                                  <b>[NEXT PAGE]</b> (twice)</p> <p><u>PATIENT POSITION</u></p> <p>          Patient Entry   <b>[Head First]</b></p> <p>          Patient Position <b>[Supine]</b></p> <p>          Coil Type       <b>[Body Coil]</b></p> <p>          Axial/Sag. Landmark <b>[Sternal Notch]</b></p> <p>                                  <b>[NEXT PAGE]</b></p> <p><u>IMAGING PARAMETERS</u></p> <p>          Image Mode     <b>[Single Scan]</b></p> <p>          Scan Plane     <b>[Sagittal]</b></p> <p>          Pulse Sequence <b>[Multiple Echo]</b></p> <p>          Imaging Option <b>[None]</b></p> <p>          Enter PSD Filename:</p> <p>                                  <b>[NEXT PAGE]</b></p>	<p><u>SCAN TIMING</u></p> <p>          Number of Echoes   <b>[1]</b></p> <p>          Echo Time (TE)   <b>[30 msec]</b></p> <p>          Rep Time (TR)   <b>[300 msec]</b></p> <p>                                  <b>[NEXT PAGE]</b></p> <p><u>SCANNING RANGE</u></p> <p>          Field of View     <b>[48 cm]</b></p> <p>          Scan Thickness   <b>[3 mm]</b></p> <p>          Scan Location    <b>(S/I) 0</b></p> <p>          FOV Center       <b>(R/L) RO (A/P) A0</b></p> <p>                                  <b>[NEXT PAGE]</b></p> <p><u>ACQUISITION TIME</u></p> <p>          Acq. Matrix       <b>[256 x 256]</b></p> <p>          Imaging Time     <b>[1 NEX 1:58]</b></p> <p>          Frequency Direction <b>[R/L]</b></p> <p>          Contrast          <b>[NO]</b></p> <p>          Table Delta:      0</p> <p>                                  <b>[NEXT PAGE]</b></p> <p><u>REVIEW</u>                           <b>[NEXT PAGE]</b></p> <p><u>SCAN OPERATIONS</u></p>
<p>Note 1: GESERVICE ID automatically activates the research mode.</p>	

3-1 BODY COIL SNR VERIFICATION (continued)

TABLE 3-2  
BODY COIL SNR – SCAN PROTOCOL (5.x)

SCAN PRESCRIPTION (5.x)	
<u>MAIN MENU</u>	<b>[New Exam]</b>
<u>PATIENT/EXAM INFORMATION</u>	
ID:	<b>geservice</b>
Name:	<b>body snr</b>
Weight:	<b>300</b>
	<b>[Patient Position]</b>
<u>PATIENT POSITION</u>	
Patient Entry	<b>[Head First]</b>
Patient Position	<b>[Supine]</b>
Axial/Sag. Landmark	<b>[Sternal Notch]</b>
Coil Type	<b>[Body Coil]</b>
Scan Plane	<b>[Sagittal]</b>
	<b>[Imaging Params]</b>
<u>IMAGING PARAMETERS</u>	
Image Mode	<b>[2D]</b>
(K SAR must be "On" K)	<b>[Monitor SAR]</b>
Pulse Sequence	<b>[Spin Echo]</b>
Imaging Option	<b>[None]</b>
Enter PSD Filename:	<b>[Next Screen] [Scan Timing]</b>
<u>SCAN TIMING</u>	
Number of Echoes	<b>[1]</b>
Echo Time (TE)	<b>[30 msec]</b>
Rep Time (TR)	<b>[300 msec]</b>
	<b>[Scanning Range]</b>
<u>SCAN SET-UP</u>	
Prescan Options	none
Auto CF	<b>[Peak]</b>
	<b>[Scanning Range]</b>
<u>SCANNING RANGE</u>	
Field of View	<b>[48 cm]</b>
Scan Thickness	<b>[3 mm]</b>
Interscan Spacing	<b>[Other] 0</b>
Start Loc: (I/S)	<b>0</b>
End Loc: (I/S)	<b>0</b>
No. of Scan locations	<b>1</b>
FOV Center: (L/R)	<b>0 (P/A) 0</b>
	<b>[↩] [Acq Time]</b>
<u>ACQUISITION TIME</u>	
Acq. Matrix (freq.)	<b>[256]</b>
Acq. Matrix (phase)	<b>[256]</b>
Frequency Direction	<b>[A/P]</b>
Phase FOV	<b>[1.00 48cm]</b>
Imaging Time	<b>[1 NEX 1:58]</b>
Contrast	<b>[NO]</b>
Table Delta:	<b>0 mm</b>
	<b>[Scan Ops]</b>
<u>SCAN OPERATIONS</u>	

5. Select **[Auto Prescan]** to properly calibrate the RF power level for the 90 degree and 180 degree pulses.
6. Select **[Scan]**. Observe the resulting images. Ensure that there are no artifacts of any sort in the resulting image. Record the Exam number and Series number for SNR Calculations.
7. Select **[Scan]** again. This second image will be used for determination of Body Coil mode SNR.
8. Select **[Cancel]**. Refer to Section 3-3 for SNR image analysis.

### 3-2 CTL PHASED ARRAY COIL SNR VERIFICATION

#### Note

An alternate proprietary procedure is available for GE use and to customers with a valid Advanced Service Package Limited License. Refer to "TLT PROCEDURE" calibration procedure located in Direction 2124201, *MR Release 5.x Signa Service Methods* or Direction 2124202, *Release 4.x/3.x MR Signa Service Methods*.

**Phantom Required** (shipped with each corresponding Phased Array Coil)

- CTL Phased Array Coil Positioner with phantoms (CTL Phantom/Positioner), 46-317605G1

#### Setup Procedure

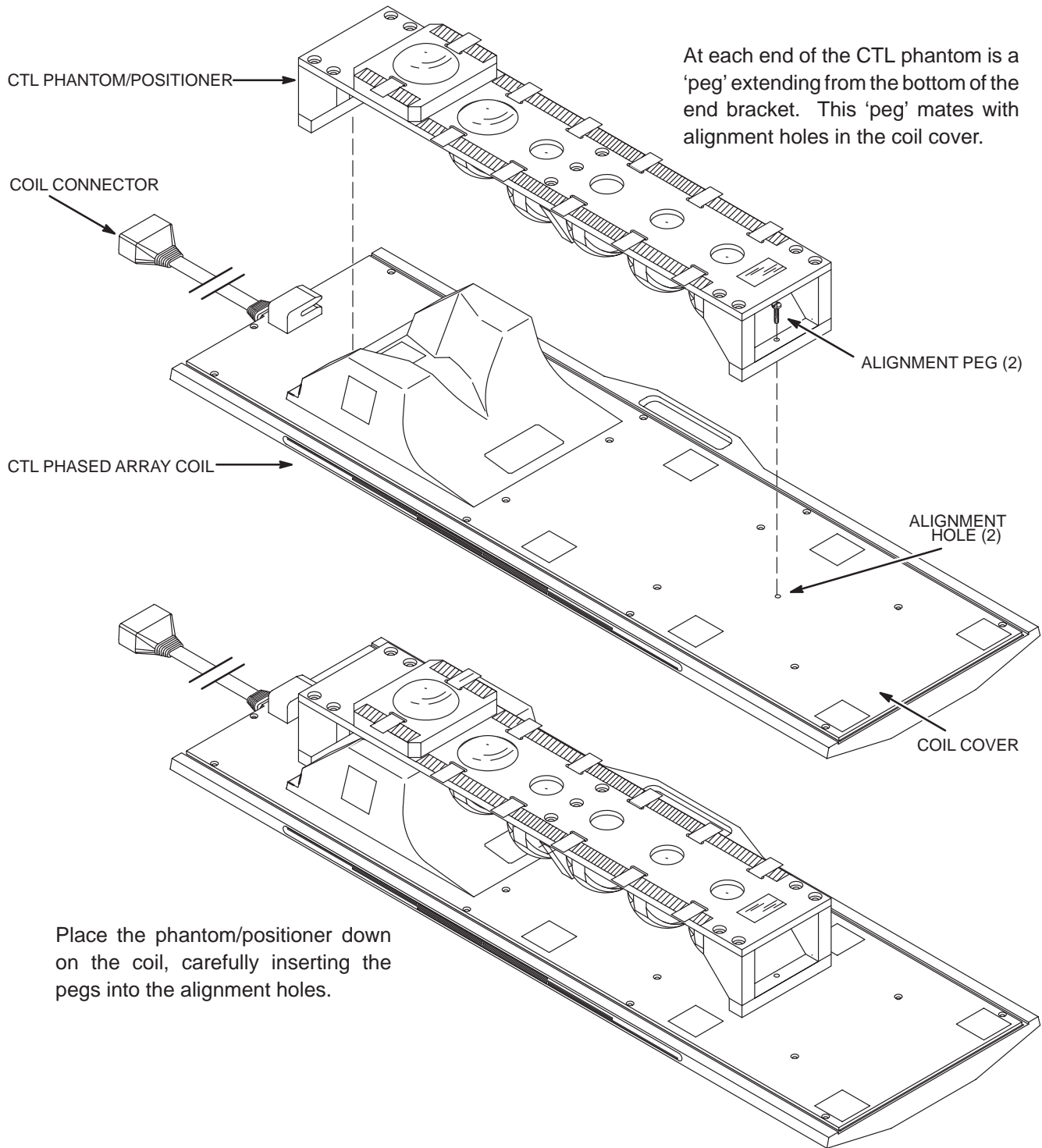
1. Select **[New Exam]** to allow a new Landmark to be set.



**The Quad head Coil must be completely removed from the cradle before performing any body scans. Failure to do this may result in damage to the Head Coil T/R Network.**

2. Remove Quad Head Coil (if present) from cradle.
3. Place CTL Phased Array Coil to be tested onto table.
4. Connect CTL Phased Array Coil connector to its mating connector in the Carriage Assembly.
5. Place the phantom/positioner down on the CTL Coil. Ensure the two pegs on the bottom of the positioner mate with two positioning holes on the top cover of the CTL Coil Array. See Illustration 3-2.

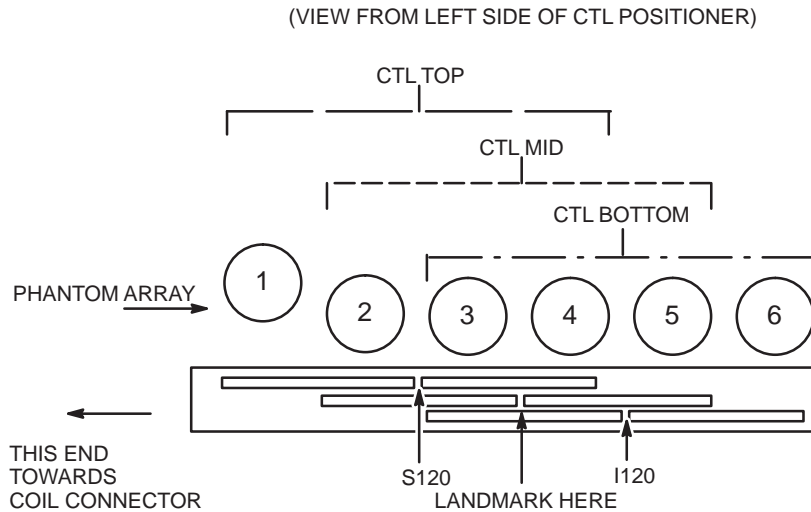
3-2 CTL PHASED ARRAY COIL SNR VERIFICATION (continued)



CTL PHANTOM/POSITIONER SETUP  
ILLUSTRATION 3-2

**3-2 CTL PHASED ARRAY COIL SNR VERIFICATION (continued)**

- Position the CTL Phased Array Coil and Positioner with phantoms in the center of the cradle. Landmark for CTL MID and advance the positioner with phantoms to isocenter using the **[ADVANCE TO SCAN]** button. See Illustration 3-3.



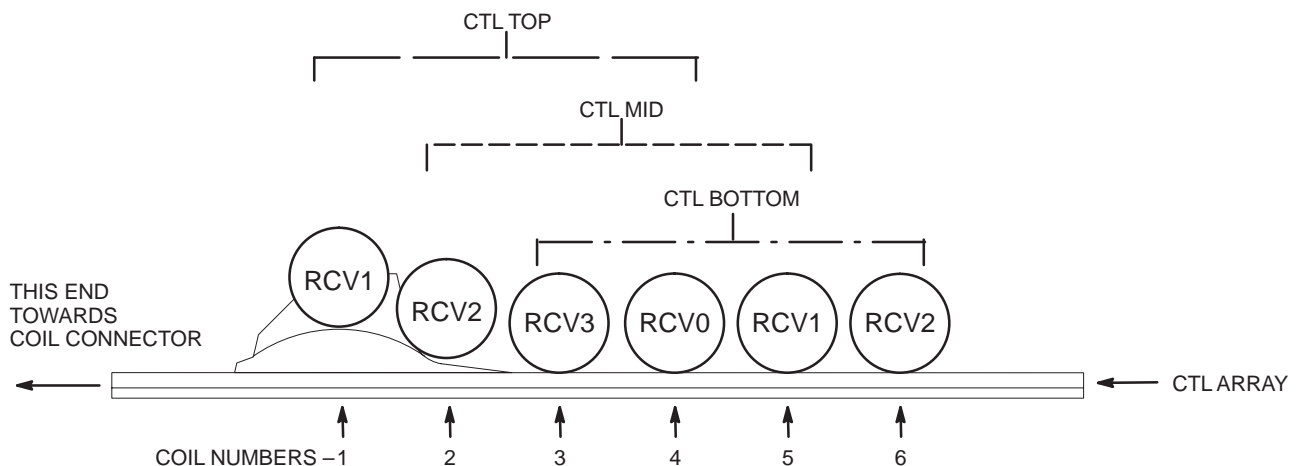
**Note:** Testing the CTL coil requires two scans. Landmark in the center of the coil (between the 3rd and 4th phantom in the mid region). First scan the CTL Top (S120), this tests the top (end towards the coil connector) half of the array. Then scan the CTL Bot (I120), this tests the bottom (end away from the coil connector) half of the array. The phantom spheres are on 120mm centers.

**Note:** The CTL array contains six coils (only four are used at one time). Three regions are designated (landmarks for each region are marked on the side of the array). The CTL Top array uses coils 1 through 4 (Black Marking) (counting from the head end). CTL Mid uses coils 2 through 5 (Blue Marking). CTL Bot uses coils 3 through 6 (Black Marking). If CTL Coil is landmarked as above, then Scan Location for CTL Top is S120 and CTL Bot is I120.

**CTL PHANTOM/POSITIONER LANDMARK SETUP (CTL TOP)**  
ILLUSTRATION 3-3

**Phased Array Coil Receiver Paths**

The Phased Array Coils have multiple individual antenna loop elements inside the assembly; the TPS chassis has multiple receivers (RCV0-RCV3). See Illustration 3-4.



**CTL PHASED ARRAY COIL TO TPS RECEIVER CORRESPONDENCE**  
ILLUSTRATION 3-4

M4074A

3-2 CTL PHASED ARRAY COIL SNR VERIFICATION (continued)

7. Setup Scan Prescription as shown in Table 3-3 (4.x) or Table 3-4 (5.x).

TABLE 3-3  
CTL PHASED ARRAY COIL SNR – SCAN PROTOCOL (4.x)

SCAN PRESCRIPTION (4.x)	
<u>MAIN MENU</u>	<b>[NEW STUDY]</b>
<u>PATIENT STUDY PARAMETERS</u>	
ID:	<b>GESERVICE</b> See Note 1
Monitor SAR?	<b>N</b>
	<b>[NEXT PAGE]</b> (twice)
<u>PATIENT POSITION</u>	
Patient Entry	<b>[Head First]</b>
Patient Position	<b>[Supine]</b>
Coil Type	<b>[Other Coils] [CTL TOP]</b>
Axial/Sag. Landmark	<b>[Sternal Notch]</b>
	<b>[NEXT PAGE]</b>
<u>IMAGING PARAMETERS</u>	
Image Mode	<b>[Single Scan]</b>
Scan Plane	<b>[Sagittal]</b>
Pulse Sequence	<b>[Multiple Echo]</b>
Imaging Option	<b>[None]</b>
Enter PSD Filename:	<b>[NEXT PAGE]</b>
<u>SCAN TIMING</u>	
Number of Echoes	<b>[1]</b>
Echo Time (TE)	<b>[30 msec]</b>
Rep Time (TR)	<b>[300 msec]</b>
	<b>[NEXT PAGE]</b>
<u>SCANNING RANGE</u>	
Field of View	<b>[48 cm]</b>
Scan Thickness	<b>[3 mm]</b>
Scan Location	<b>(S/I) S120</b>
FOV Center	<b>(R/L) RO (A/P) A0</b>
	<b>[NEXT PAGE]</b>
<u>ACQUISITION TIME</u>	
Acq. Matrix	<b>[256 x 256]</b>
Imaging Time	<b>[1 NEX 1:58]</b>
Frequency Direction	<b>[R/L]</b>
Contrast	<b>[NO]</b>
Table Delta:	<b>0</b>
	<b>[NEXT PAGE]</b>
<u>REVIEW</u>	<b>[NEXT PAGE]</b>
<u>SCAN OPERATIONS</u>	
Note 1: GESERVICE ID automatically activates the research mode.	

3-2 CTL PHASED ARRAY COIL SNR VERIFICATION (continued)

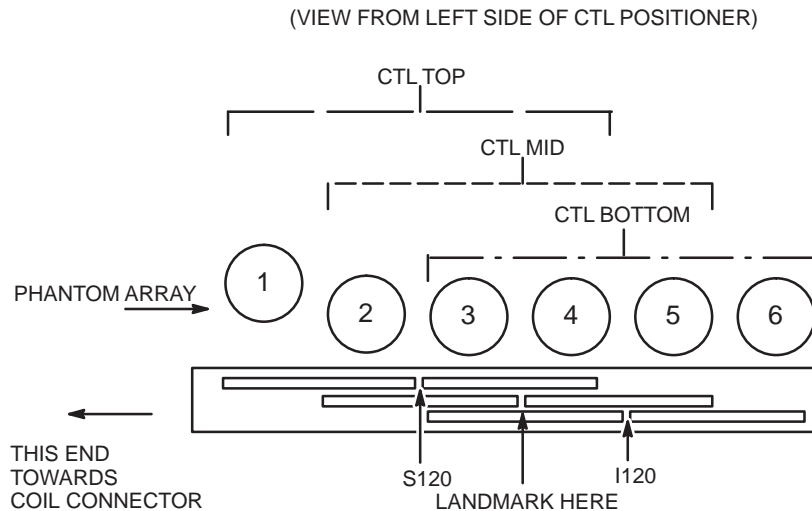
TABLE 3-4  
CTL PHASED ARRAY COIL SNR – SCAN PROTOCOL (5.x)

SCAN PRESCRIPTION (5.x)	
<u>MAIN MENU</u>	[New Exam]
<u>PATIENT/EXAM INFORMATION</u>	
ID:	geservice
Name:	body snr
Weight:	300
	[Patient Position]
<u>PATIENT POSITION</u>	
Patient Entry	[Head First]
Patient Position	[Supine]
Axial/Sag. Landmark	[Sternal Notch]
Coil Type	[Other Coils] [CTL TOP]
Scan Plane	[Sagittal]
	[Imaging Params]
<u>IMAGING PARAMETERS</u>	
Image Mode	[2D]
(K SAR must be "On" K)	[Monitor SAR]
Pulse Sequence	[Spin Echo]
Imaging Option	[None]
Enter PSD Filename:	[Next Screen] [Scan Timing]
<u>SCAN TIMING</u>	
Number of Echoes	[1]
Echo Time (TE)	[30 msec]
Rep Time (TR)	[300 msec]
	[Scan Set-Up]
<u>SCAN SET-UP</u>	
Prescan Options	None
Auto CF	[Peak]
	[Scanning Range]
<u>SCANNING RANGE</u>	
Field of View	[48 cm]
Scan Thickness	[3 mm]
Interscan Spacing	[Other] 0
Start Loc: (I/S)	S120
End Loc: (I/S)	S120
No. of Scan locations	1
FOV Center: (L/R)	0 (P/A) 0
	[↩] [Acq Time]
<u>ACQUISITION TIME</u>	
Acq. Matrix (freq.)	[256]
Acq. Matrix (phase)	[256]
Frequency Direction	[R/L]
Phase FOV	[1.00 48cm]
Imaging Time	[1 NEX 1:58]
Contrast	[NO]
Table Delta:	0 mm
	[Scan Ops]
<u>SCAN OPERATIONS</u>	

8. Select **[Auto Prescan]** to properly calibrate the RF power level for the 90 degree and 180 degree pulses.
9. Select **[Scan]**. Observe the resulting image of the spheres. Ensure that there are no artifacts of any sort in the sphere images. Record the Exam number and Series number for SNR Calculations.
10. Select **[Scan]** again. This second image of the spheres will be used for determination of CTL TOP mode SNR.
11. Select **[Cancel]** and **[New Series]**.

**3-2 CTL PHASED ARRAY COIL SNR VERIFICATION (continued)**

12. Ensure the landmark is still for CTL MID. See Illustration 3-5.



**Note:** Testing the CTL coil requires two scans. Landmark in the center of the coil (between the 3rd and 4th phantom in the mid region). First scan the CTL Top (S120), this tests the top (end towards the coil connector) half of the array. Then scan the CTL Bot (I120), this tests the bottom (end away from the coil connector) half of the array. The phantom spheres are on 120mm centers.

**Note:** The CTL array contains six coils (only four are used at one time). Three regions are designated (landmarks for each region are marked on the side of the array). The CTL Top array uses coils 1 through 4 (Black Marking) (counting from the head end). CTL Mid uses coils 2 through 5 (Blue Marking). CTL Bot uses coils 3 through 6 (Black Marking). If CTL Coil is landmarked as above, then Scan Location for CTL Top is S120 and CTL Bot is I120.

**CTL PHANTOM/POSITIONER LANDMARK SETUP (CTL BOTTOM)**  
ILLUSTRATION 3-5

13. Select **[Patient Position]**, **[Other Coils]**, **[CTL BOT]**.
14. Select **[Scanning Range]**, Scan Location as **I120** (4.x) or Start & End Loc as **I120** (5.x), and **[Accept]**. Advance to SCAN OPERATIONS.
15. Select **[Auto Prescan]** to properly calibrate the RF power level for the 90 degree and 180 degree pulses.
16. Select **[Scan]**. Observe the resulting image of the spheres. Ensure that there are no artifacts of any sort in the sphere images. Record the Exam number and Series number for SNR Calculations.
17. Select **[Scan]** again. This second image of the spheres will be used for determination of CTL BOT mode SNR.
18. Select **[Cancel]**. Refer to Section 3-3 for SNR image analysis.

3-3 SNR IMAGE ANALYSIS

3-3-1 SNR Image Analysis (Release 4.X) (See Section 3-3-2 For Release 5.X)

Description

The CLIPS macro will ask for the first image in the series to analyze. The macro assumes you have done two back-to-back scans, and will take the designated image and the next image in the series (i.e. if you give it image 3, it will take 3 and 4). It will also ask you to designate three points on the border of the phantom image to use in positioning the analysis ROI. If your image is too big, too small, or the three points were selected too close together, the macro will inform you.

Procedure

- 1. Touch [UTILITIES], then [Clips].

CLIPS

-----

- 1 Run CLIPS
2 Save files
3 Restore files
4 Remove files
5 Exit

Enter the number of your selection 1 [ENTER]

- 1 = Operator console
2 = Remot1
3 = Remote2
4 = Exit

Which image processor would you like to use (1 2 or 3) ? 1 [ENTER]

IP selected is at the operator console.

Do you wish to boot the Image Processor? (Y or N)

Y [ENTER]

You do not have to reboot the IP each time you enter.

Welcome to the Command Line Image Processing System (CLIPS)

CLIPS > LIST(STUDY); [ENTER]

3-3-1 SNR Image Analysis (Release 4.X)(continued)

STUDY LIST

```

=====
STUDY #          PATIENT NAME          PATIENT I.D.          DATE
-----
00001           BDY_SNR              GESERVICE             9-JULY-89
00002           HD_SNR              GESERVICE             9-JULY-89
=====

```

CURRENT DEFAULTS — PATIENT ID = / /

- N - NEXT PAGE
- P - PREVIOUS PAGE
- S - SELECT STUDY
- C - CANCEL

choice ?

S

ENTER STUDY NUMBER --

1

Enter appropriate study number.

CLIPS > LIST(SERIES);

SERIES LIST

```

=====
SERIES #          # OF IMAGES          SERIES TYPE          PULSE TYPE
-----
001              002                 AXIAL               ME
002              002                 SAG                 ME
003              002                 COR                 ME
=====

```

CURRENT DEFAULTS — PATIENT ID = SNR 0000S/00S/001

- N - NEXT PAGE
- P - PREVIOUS PAGE
- S - SELECT SERIES
- C - CANCEL

choice ?

S

ENTER SERIES NUMBER --

1

Enter appropriate series number.

CLIPS > DIS;

or you could LIST(IMAGE); to select the image you want.

3-3-1 SNR Image Analysis (Release 4.X)(continued)

CLIPS > EXECUTE(SNR); **ENTER** or just EXE(SNR); **ENTER**.

THIS MACRO CALCULATES THE SNR USING THE GE HEAD OR BODY PHANTOM.

ENTER THE NUMBER OF THE FIRST IMAGE OF THE TWO-IMAGE SET AND !

EXAMPLE INPUT> 1!

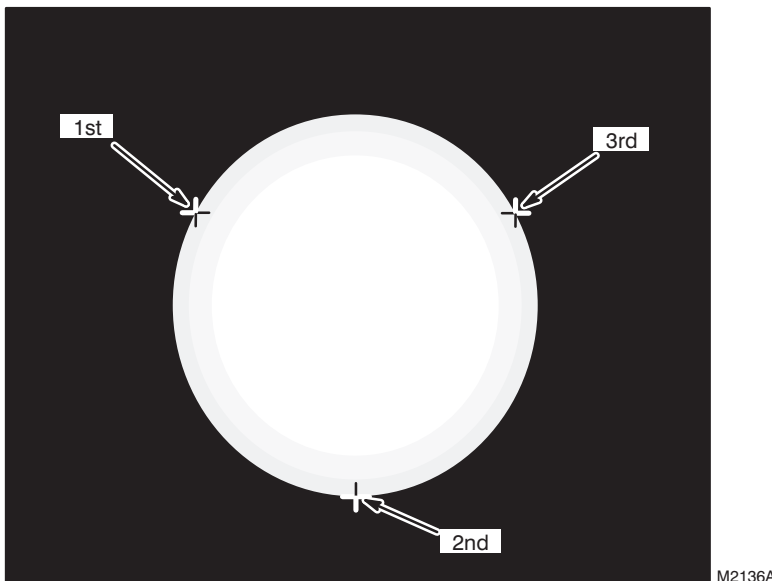
Please start entering data. Type an ! to end input mode.

CLIPS INPUT> 1! **ENTER**

CORRECT POSITIONING OF THE SNR ANALYSIS ROI DEPENDS ON FINDING THE CENTER OF THE PHANTOM. YOU WILL BE PROMPTED TO IDENTIFY THREE POINTS AT THE EDGE OF THE PHANTOM. CARE SHOULD BE TAKEN TO PICK THREE POINTS AS FAR AWAY FROM EACH OTHER AS POSSIBLE (I.E. 2, 6, AND 10 O'CLOCK) AND AVOID FLAT SPOTS AND IRREGULARITIES ON THE EDGE. See Illustration 3-6.

Note

The order of cursor placement must be 10, 6, then 2 o'clock positions. Using a different order may give an error.



SNR CURSOR POSITIONS  
ILLUSTRATION 3-6

POSITION CURSOR AT FIRST POINT AND ENTER !

Place cursor at 10:00 position on edge of image.

Please start entering data. Type an ! to end input mode.

CLIPS INPUT> ! **ENTER**

POSITION CURSOR AT SECOND POINT AND ENTER !

Place cursor at 6:00 position.

Please start entering data. Type an ! to end input mode.

CLIPS INPUT> ! **ENTER**

**3-3-1 SNR Image Analysis (Release 4.X)(continued)**

POSITION CURSOR AT THIRD POINT AND ENTER ! Place cursor at 2:00 position.

Please start entering data. Type an ! to end input mode.

CLIPS INPUT> ! **ENTER**

PHANTOM POINTS AND RADIUS OK. BEGIN ANALYSIS.

The program will then perform the analysis and display the final values on the image monitor. Record Signal, Noise and Signal to Noise in Data Table.

DO YOU WANT TO SAVE THIS DATA?

ENTER A 1! FOR YES, A 0! FOR NO.

Please start entering data. Type an ! to end input mode.

CLIPS INPUT> 0! **ENTER**

DATA NOT SAVED

CLIPS > **LIST(SERIES);** **ENTER**

Select the next series and repeat the above analysis for each image pair. Type **BYE;** **ENTER** when completed to exit CLIPS.

- 2. When all analyses are complete, reset Auto Center Frequency mode by touching **[SCAN MODES]**, **[Default Auto CF]**, then **[EXECUTE]**.

**Note**

You do not have to reset the Auto Center Frequency mode if you are proceeding on to more image quality scans.

- 3. Record the date and value calculated in column 2 under "SNR Data QA Check" of the Data Table on page DT-1 (following Section 5, RENEWAL PARTS) as is instructed.

**3-3-2 SNR Image Analysis (Release 5.X)**

**Description**

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. A difference image is created by subtracting the second image from the first 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.

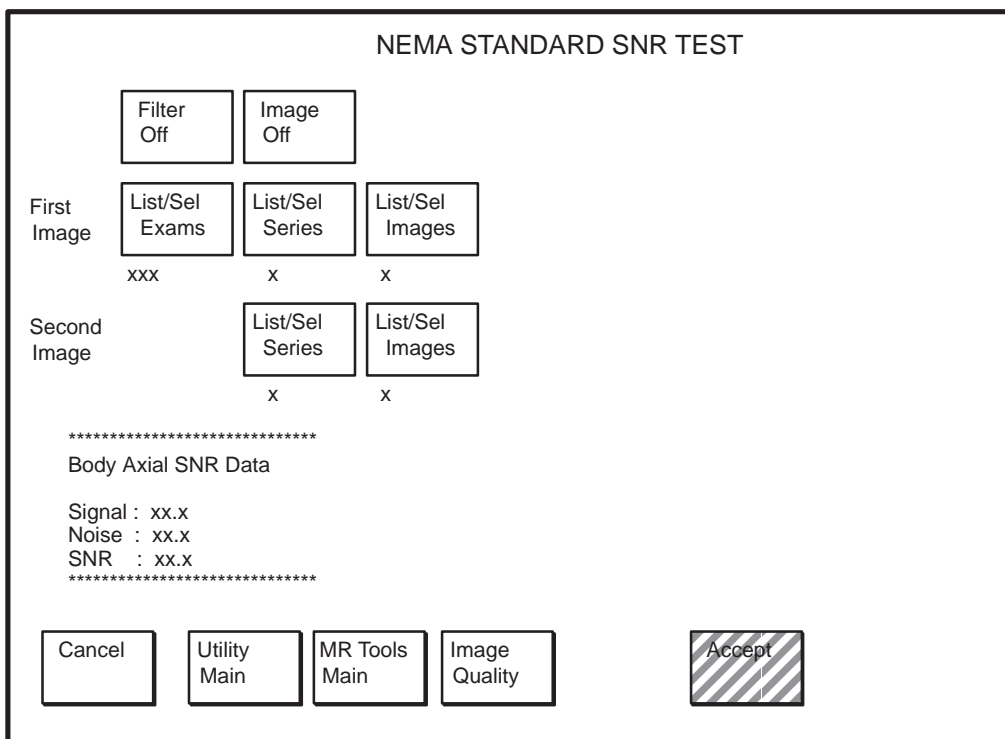
**Procedure**


1. Touch **[UTILITIES]**, **[MR Tools]**, **[Image Quality]**, then **[SNR Test]**. The SNR Test screen is displayed; see Illustration 3-7.
2. Enter first image exam, series, and image numbers. If exam, series, or image numbers are not known, select **[List Exams]**, **[List Series]**, or **[List Images]** to display list to choose from.

**Note**

Image number selection must be back lit (highlighted) to be able to enter information. Use Switch key on keyboard to transfer control from left to right side of Touch Screen.

3. Enter second image series and image numbers. If series or image numbers are not known, select **[List Series]** or **[List Images]** to display list to choose from. The second image Exam Number is defaulted to the same as first image.



 Note: Accept changes to continue only after an analysis has been performed.

**SNR TEST SCREEN**  
ILLUSTRATION 3-7

**3-3-2 SNR Image Analysis (Release 5.X) (continued)**

4. If high pass filtering is desired to be performed on data, touch **[Filter Off]** which will highlight and change to **[Filter On]**.
5. If the difference image annotated with data is to be created, touch **[Image Off]** which will highlight and change to **[Image On]**.
6. Touch **[Accept]** to begin analysis. The final values are displayed on the touch screen, see Illustration 3-7.
7. Touch **[Continue]** then select the next exam and repeat the above analysis for each image pair.
8. Record the date and value calculated in columns 2-7 under "SNR Data QA Check" of the Data Table on page DT-1 (following Section 5, RENEWAL PARTS) as is instructed.

**3-4 CHECKING THE PROTECTION PIN DIODES WITH DIGITAL MULTIMETER (DMM)**

**Note**

Due to the fact that there are two PIN diodes in parallel for each antenna element, this procedure will not indicate if **one** of the PIN diodes is defective, only if **both** are defective.

1. Select the DIODE TEST function on the Digital Multimeter (DMM).
2. Connect the NEGATIVE lead of the DMM to the external cable connector row A. Connect the POSITIVE lead to the external cable connector row B. Refer to Table 3-5.
3. A reading of 0.400 to 0.900 should be observed on the DMM.
4. If a reading below 0.400 is observed in either direction, either the output cable is shorted or bad PIN diode.
5. If a reading above 0.900 is observed in step 2, both PIN diodes are defective.
6. Connect the NEGATIVE lead of the DMM to the external cable connector row B. Connect the POSITIVE lead to the external cable connector row A. Refer to Table 3-5.
7. A reading of INFINITY should be observed on the DMM.
8. If a reading of INFINITY is observed in both directions, either the output cable is open or **both** PIN diodes are open.
9. If any of the above conditions fails, replace the coil. **The Pin diodes are not FRU's.**

TABLE 3-5  
DIODE TEST CONNECTIONS

COIL NUMBER	POSITIVE LEAD CONNECTION		NEGATIVE LEAD CONNECTION	
	FOR STEP 2	FOR STEP 4	FOR STEP 2	FOR STEP 4
1	B3	A3	A3	B3
2	B5	A5	A5	B5
3	B7	A7	A7	B7
4	B9	A9	A9	B9
5	B11	A11	A11	B11
6	B13	A13	A13	B13

**3-5 CHECKING THE EXTERNAL CABLE**

1. Select the DIODE TEST function on the Digital Multimeter (DMM).
2. Connect the NEGATIVE lead of the DMM to the external cable connector row A. Connect the POSITIVE lead to the external cable connector row B. Refer to Table 3-5.
3. Flex the external cable, especially near the connectors and the strain relief, and observe that a reading of 0.400 to 0.900 should remain on the DMM, with no instability or fluctuations.
4. Connect the NEGATIVE lead of the DMM to the external cable connector row B. Connect the POSITIVE lead to the external cable connector row A. Refer to Table 3-5.
5. Flex the external cable, especially near the connectors and the strain relief, and observe that a reading of INFINITY should remain on the DMM, with no instability or fluctuations.
6. If the cable fails any of the above tests, it should be replaced.

Blank

DIRECTION 46-003014

## SECTION 4 – REPLACEMENT/MAINTENANCE

### Note

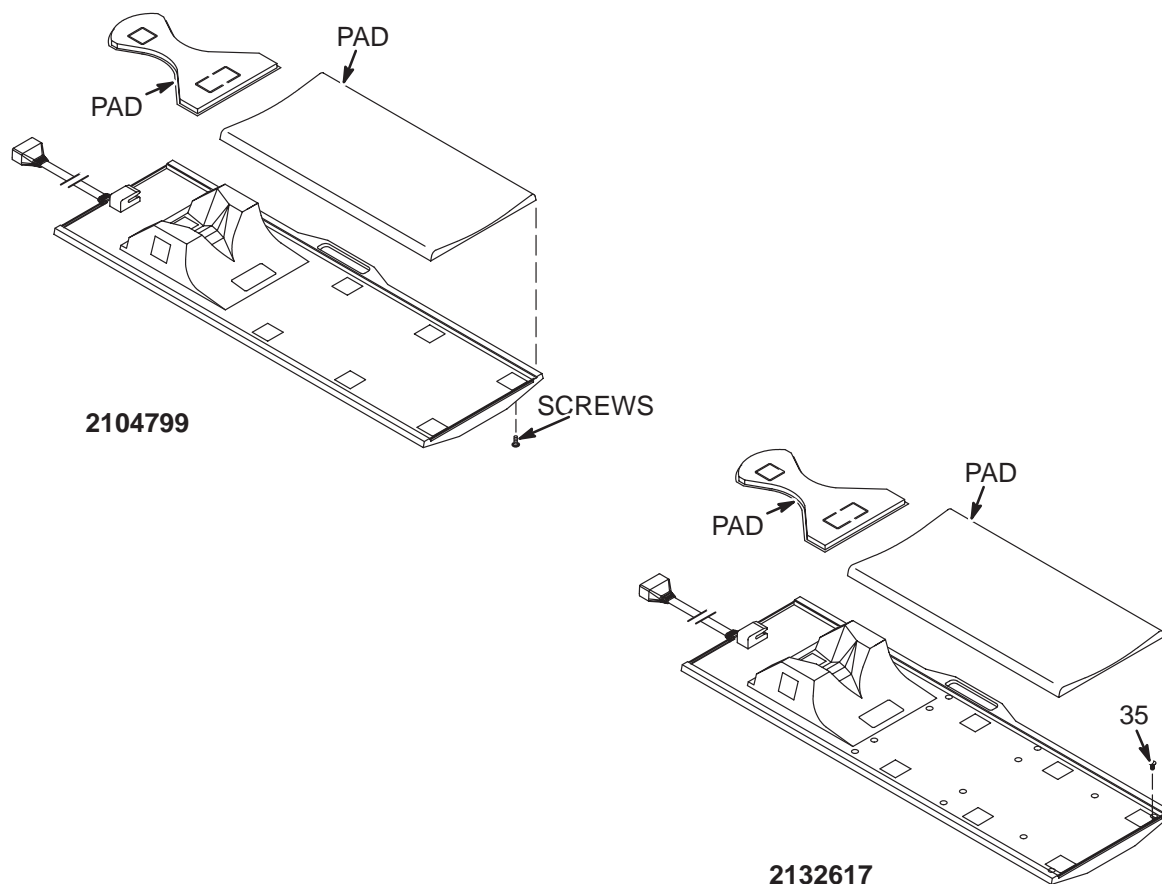
Each antenna loop element is tuned at the factory to provide the proper input impedance. Since antenna elements 1 and 2 are contained on three separate circuit boards, none of these boards are field replaceable. These circuits must remain together as a matched set.

### 4-1 DISASSEMBLY/ASSEMBLY OF CTL PHASED ARRAY COIL

1. Remove the two foam pads. See Illustration 4-1.
2. Remove the sixteen screws holding the top and bottom housing together.
3. Separate the two housings from each other.
4. To reassemble, put the two housings together and **lightly** tighten the sixteen screws.

### Note

The screws are very susceptible to breakage from overtightening.

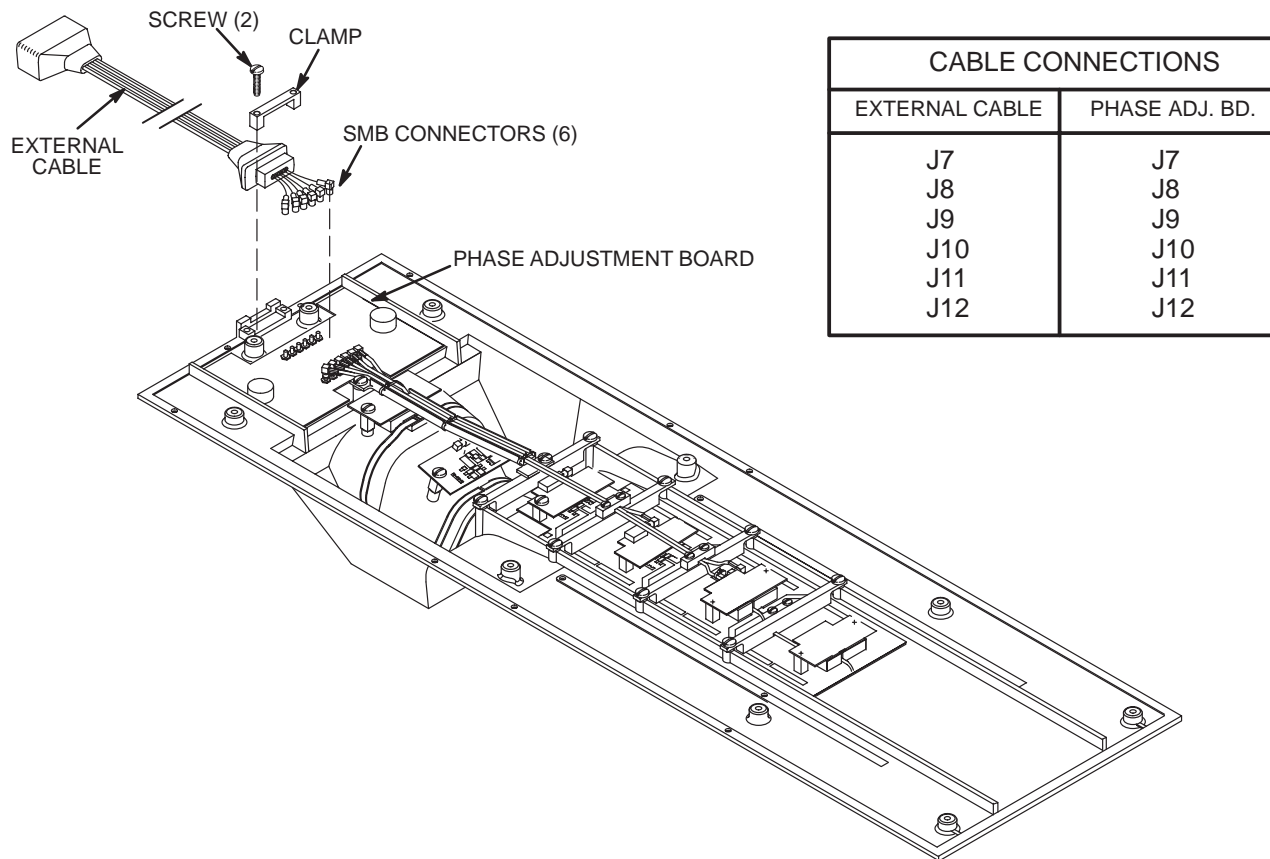


DISASSEMBLY/ASSEMBLY OF CTL PHASED ARRAY COIL

ILLUSTRATION 4-1

**4-2 REPLACING THE EXTERNAL CABLE**

1. Disassemble the top and bottom housings. Refer to Section 4-1.
2. Remove the two screws and remove the clamp holding the external cable in place.
3. Disconnect the six SMB connectors on the external cable from the Phase Adjustment Board. See Illustration 4-2.
4. Remove the bad external cable.
5. Install the new external cable in place. See Illustration 4-2.
6. Install the clamp and screws in place.
7. Reconnect the six SMB connectors to the Phase Adjustment Board in the proper order.
8. Assemble the top and bottom housings together. Refer to Section 4-1.



M301800A  
SHT 2

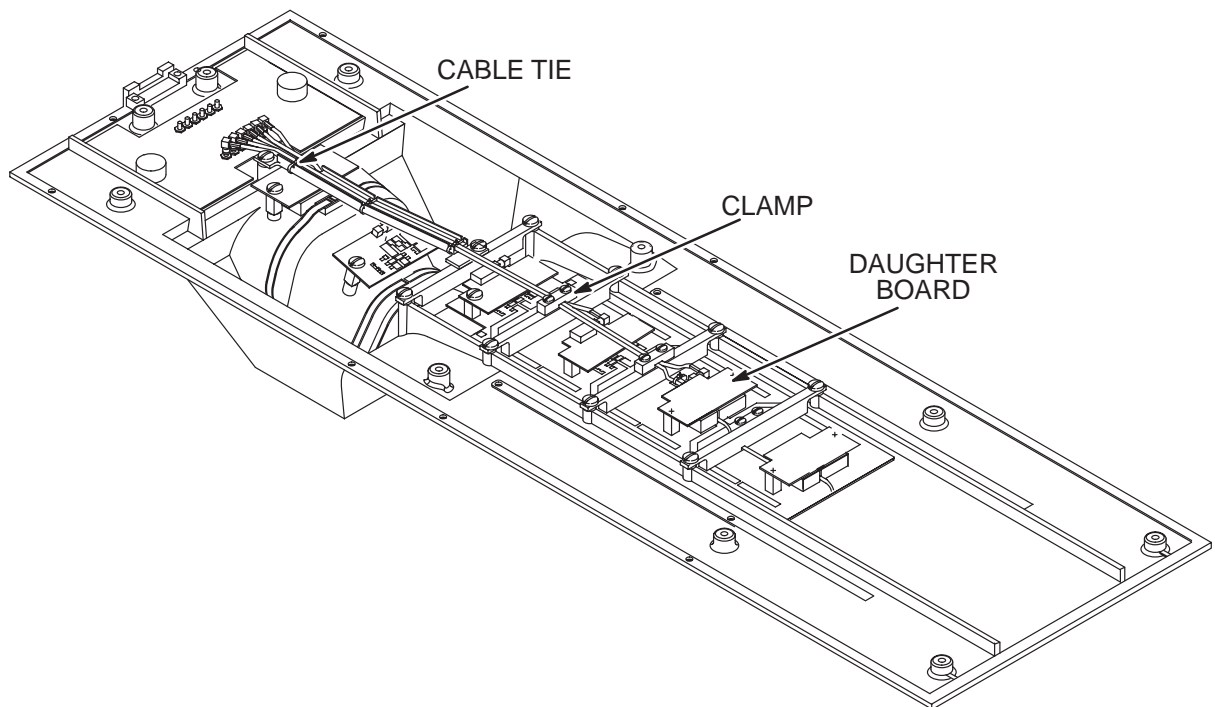
**REPLACEMENT OF EXTERNAL CABLE**  
ILLUSTRATION 4-2

**4-3 REPLACING THE INTERNAL CABLES**

**Note**

Cable lengths are tuned. Therefore, internal cable replacement must involve the correct replacement cable of appropriate length.

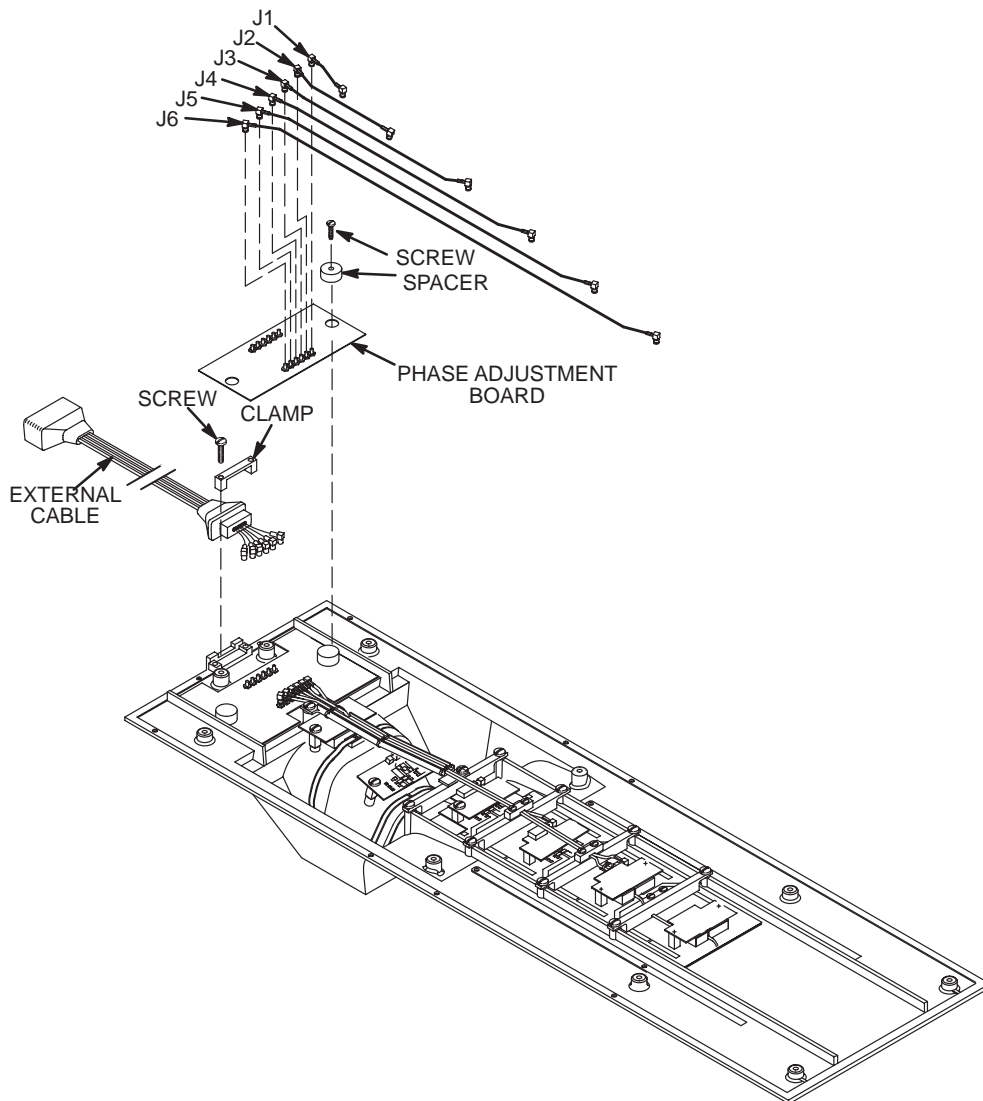
1. Disassemble the top and bottom housings. Refer to Section 4-1.
2. Remove the cable ties and the clamps holding the internal cables in place.
3. Disconnect the bad cable from the Phase Adjustment Board and appropriate coil board. See Illustration 4-3.
4. Remove the bad internal cable.
5. Install the new internal cable to the Phase Adjustment Board and appropriate coil board. See Illustration 4-3.
6. Install the clamps and cable ties in place. **Use non-magnetic cable ties (46-208758P8).**
7. Assemble the top and bottom housings together. Refer to Section 4-1.



**REPLACEMENT OF INTERNAL CABLES**  
ILLUSTRATION 4-3

**4-4 REPLACING THE PHASE ADJUSTMENT CIRCUIT BOARD**

1. Disassemble the top and bottom housings. Refer to Section 4-1.
2. Disconnect the twelve SMB connectors from the Phase Adjustment Board. See Illustration 4-4.
3. Remove the two screws and spacers holding the Phase Adjustment Board in place.
4. Remove the bad Phase Adjustment Board (2121448).
5. Install the new Phase Adjustment Board in place. See Illustration 4-4.
6. Install the spacers and screws on the Phase Adjustment Board.
7. Reconnect the twelve SMB connectors to the Phase Adjustment Board.
8. Assemble the top and bottom housings together. Refer to Section 4-1.



**REPLACEMENT OF PHASE ADJUSTMENT BOARD**

ILLUSTRATION 4-4

#### 4-5 REPLACING THE PROTECTION PIN DIODES



**As coil tuning and decoupling tuning may be affected by PIN diode replacement, field replacement of the PIN diodes will not be performed.**

#### 4-6 REPLACING THE MECHANICAL HARDWARE

1. Disassemble the top and bottom housings, if necessary. Refer to Section 4-1.
2. Disconnect and remove the bad part. Refer to Section 5, Renewal Parts, for part numbers.
3. Install the new part in place.
4. Assemble the top and bottom housings together. Refer to Section 4-1.

#### 4-7 CHECKING THE CABLES

Check the external cable for cracks or breaks once each week. Replace the external cable if any damage or wear is found. Refer to Section 4-2, REPLACING THE EXTERNAL CABLE, for external cable replacement procedure.

#### 4-8 CLEANING THE CTL PHASED ARRAY COIL



**Avoid damaging sensitive electronic parts. Do not spray or pour dishwashing solution directly onto the CTL Phased Array Coil, or external cable. Do not use alcohol to clean the CTL Phased Array Coil. Never submerge the CTL Phased Array Coil in any liquid.**

Clean the CTL Phased Array Coil and external cable with a mild dishwashing liquid and water solution. Wet a soft cloth with the solution and proceed to clean.

The removable pads can be cleaned with a 10% bleach solution.

Blank

DIRECTION 46-003014

## SECTION 5 – RENEWAL PARTS



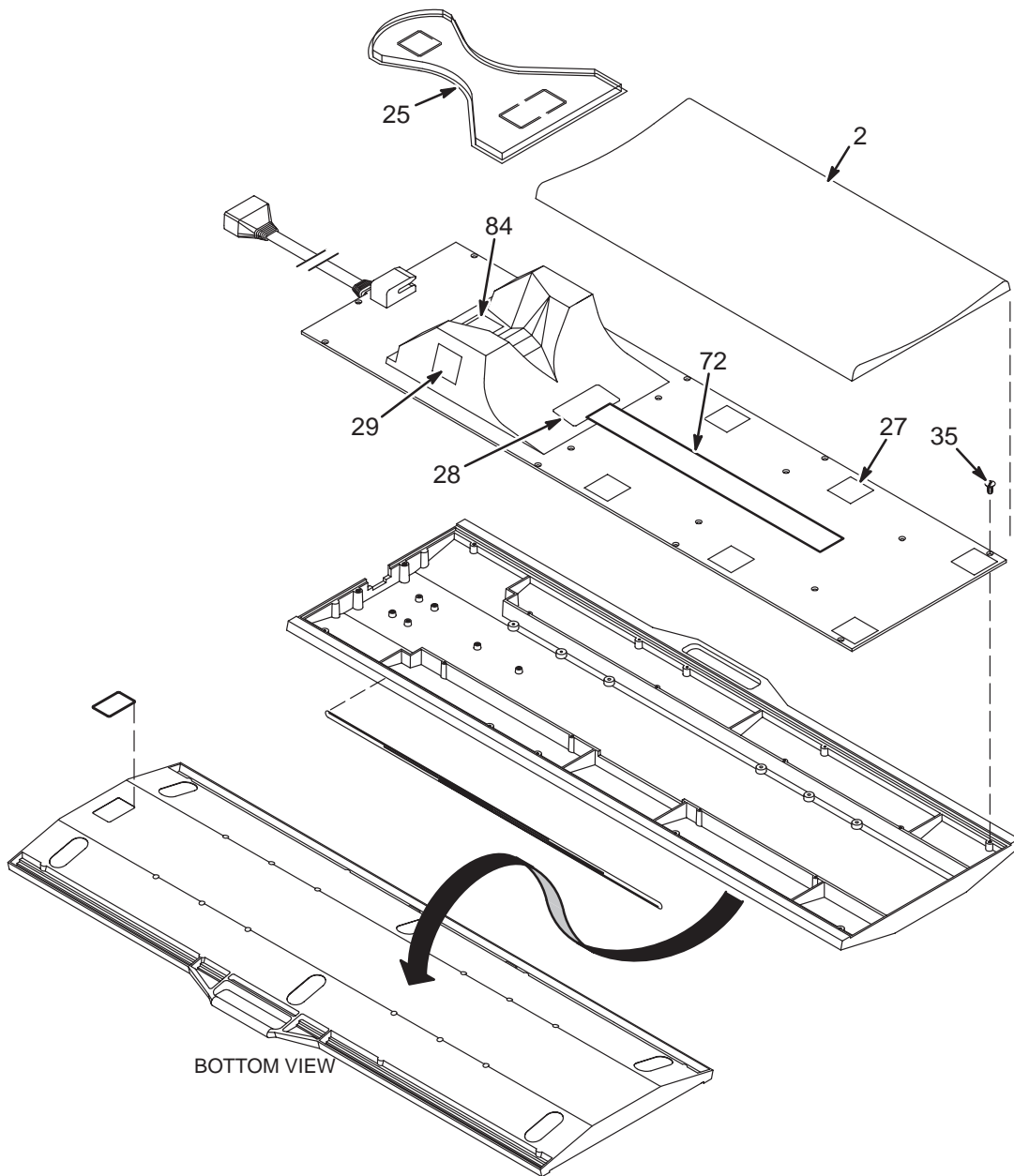
**BIO HAZARD! EQUIPMENT BEING RETURNED FROM USE IN A CLINICAL SETTING MUST BE CLEAN AND FREE OF BLOOD AND OTHER INFECTIOUS SUBSTANCES. THE DEPARTMENT OF TRANSPORTATION (DOT) HAS RULED THAT “ITEMS THAT WERE SATURATED AND/OR DRIPPING WITH HUMAN BLOOD THAT ARE NOW CAKED WITH DRIED BLOOD; OR WHICH WERE USED OR INTENDED FOR USE IN PATIENT CARE” ARE “REGULATED MEDICAL WASTE” FOR TRANSPORTATION PURPOSES AND MUST BE TRANSPORTED AS A HAZARDOUS MATERIAL. UNDER NO CIRCUMSTANCES SHOULD A PART OR EQUIPMENT WITH VISIBLE BODY FLUIDS BE TAKEN OR SHIPPED FROM A CLINIC OR SITE (FOR EXAMPLE, SURFACE COILS).**

1. Employees shall follow proper decontamination procedures for clean up of bloodborne pathogens. Refer to Section 4–8, CLEANING THE CTL PHASED ARRAY COIL. It is the responsibility of the GEMS employee to insure the part/equipment has been properly decontaminated prior to shipment.

CTL PHASED ARRAY COIL

2132617

(SEE PAGE 5-4 FOR PARTS LIST)

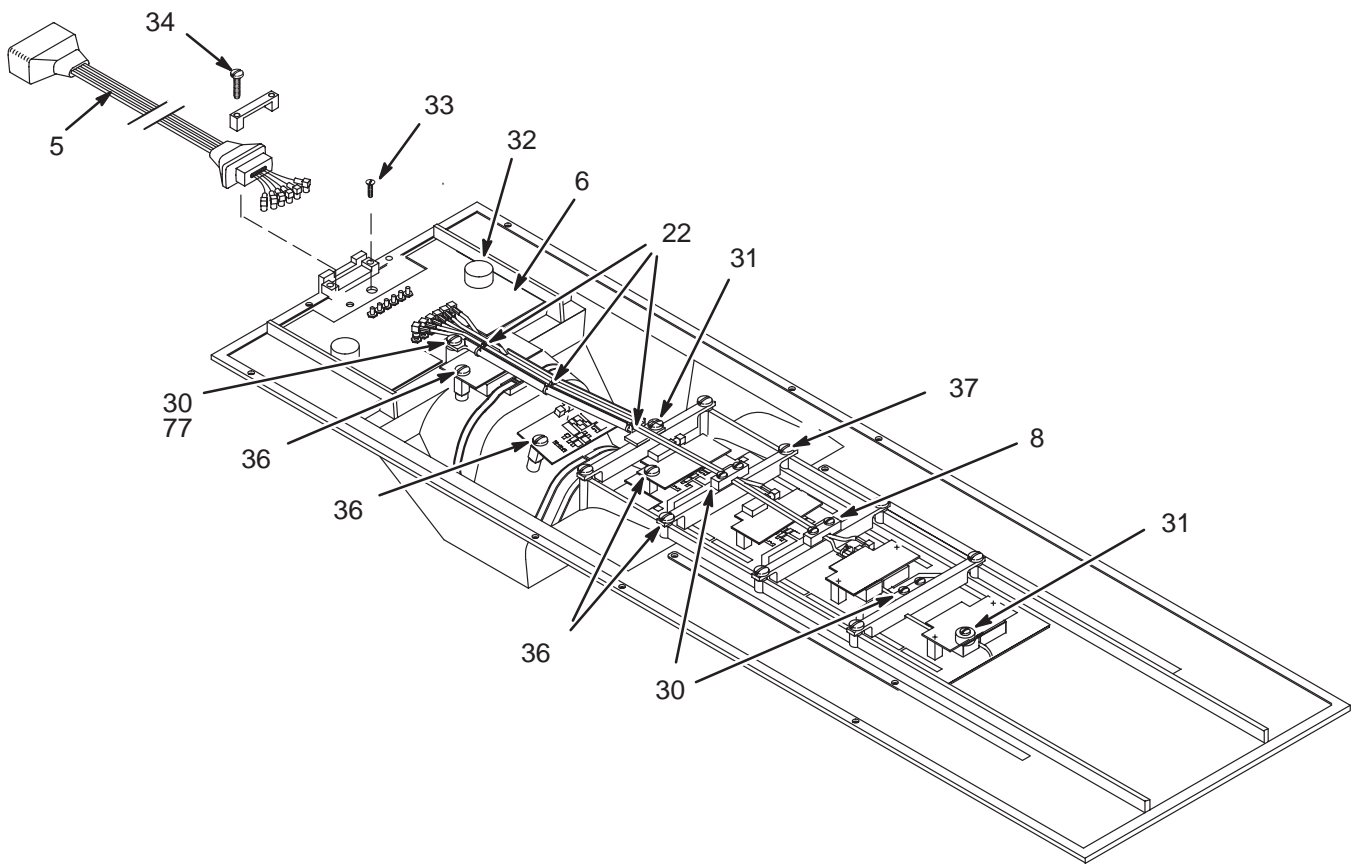


M2132617A  
SHT 1

CTL PHASED ARRAY ARRAY

2132617

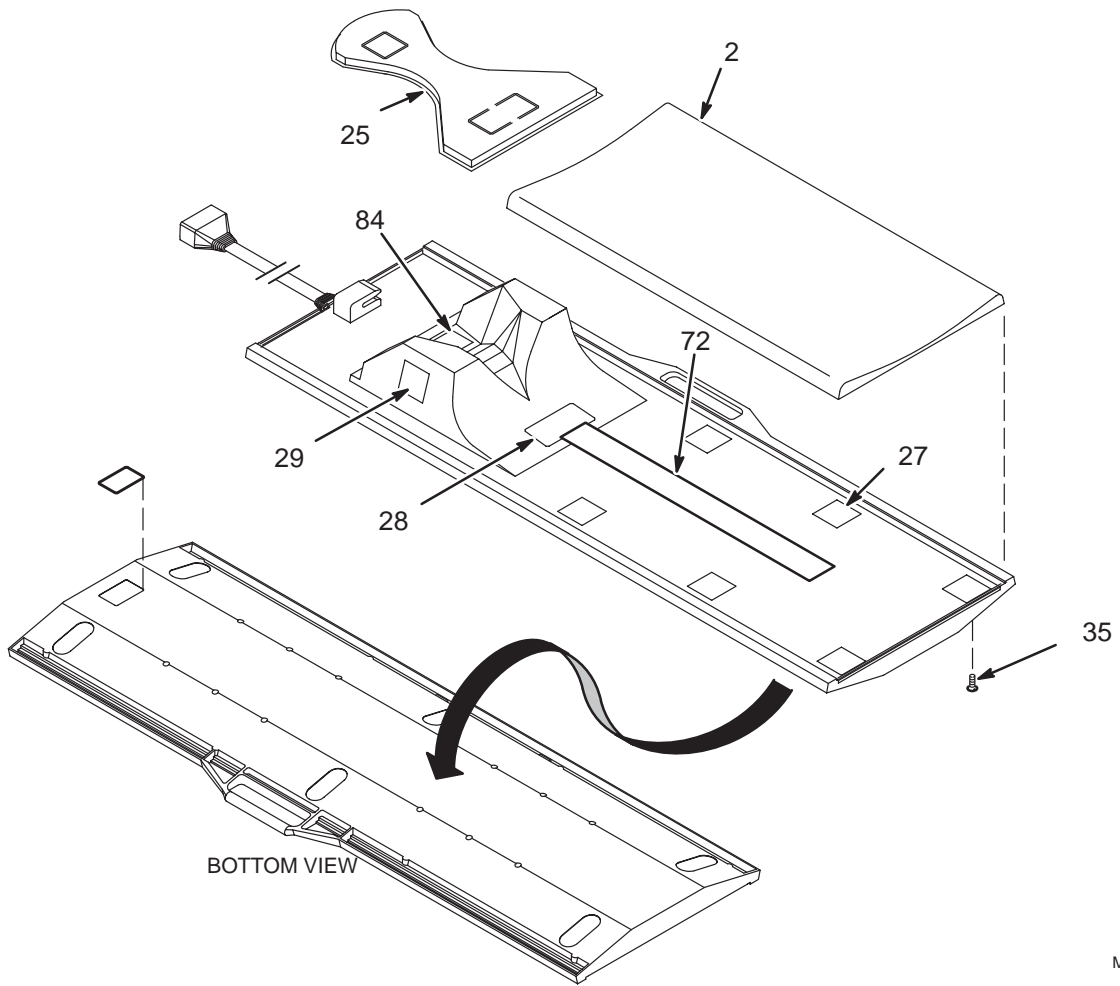
(ILLUSTRATION CONT'D FROM PG 5-1)



L2132617A

**CTL PHASED ARRAY ARRAY 2132617**

Item	Part Number	FRU	Name	Quantity	Description (Remarks)
1	2132617	1	CTL COIL	XXX	CTL PHASED ARRAY COIL
2	46-301961P1	2	PAD	1	GREY NYLON FABRIC W/VELCRO HOOKS
5	2133085	2	CABLE ASSEM	1	CTL COIL 6-COAX, 30" EXTERNAL CABLE
6	2121448	2	CIRCUIT BD	1	PHASE ADJUSTMENT CIRCUIT BOARD
22	46-208758P8	2	STRAP	4	1/16" TO 1-1/4" DIA. WIRE BUNDLE
25	46-307593P1	2	PAD	1	NECK COIL PAD, NYLON W/VELCRO HOOKS
27	46-317475P1	2	VELCRO PAD	6	2"W X 2"L, WHITE, ADHESIVE BACKED
28	46-317475P2	2	VELCRO PAD	1	2"W X 4"L, WHITE, ADHESIVE BACKED
29	46-317476P2	2	VELCRO PAD	2	2"W X 4"L, WHITE, ADHESIVE BACKED
30	46-230007P9	2	SCREW,MACH	5	10-32 X 5/8" BIND HEAD SLOT, DELRIN
31	46-230007P8	2	SCREW,MACH	5	10-32 X 3/8" BIND HEAD SLOT, DELRIN
32	46-220184P40	2	SCREW MACH	2	10-32 X 0.375 LG RD HD SLOT BRASS
33	46-208913P12	2	SCREW,MACH	2	10-32 X 0.50 LG SLOT FH BRS
34	46-220184P45	2	SCREW MACH	2	10-32 X 1.000 LG RD HD SLOT BRASS
35	46-220184P41	2	SCREW,MACH	16	10-32 X 0.500 BRASS
36	46-230007P13	2	SCREW,MACH	4	10-32 X 1 DELRIN AF
37	46-220184P42	2	SCREW MACH	8	10-32 X 0.625 LG RD HD SLOT BRASS
41	46-313398P1	2	SOLDER	AR	TIN 63/LEAD 37, ROSIN CORE, 0.062" DIA., 1 LB. SPOOL
47	46-317676P1	2	CHIN STRAP	5	24" LONG, WHITE VELCRO LOOP
48	46-317677P1	2	FORHEAD STRP	5	24" LONG, 1" WIDE, WHITE VELCRO LOOP
72	46-317475P4	2	VELCRO LOOP	1	2"W X 18"L, WHITE, ADHESIVE BACKED
77	46-307011P1	2	ROUND SPACER	1	0.312 OD, 0.193 ID, 0.25" LONG, NYLON
79	46-282389P1	2	ADHESIVE	AR	ADHESIVE TRANSFER TAPE, TYPE A-25
84	46-317475P5	2	VELCRO LOOP	1	2"W X 7"L, WHITE, ADHESIVE BACKED
	46-221735P1	2	DIODE	12	50V, 10W PIN DIODE
	46-317605G1	2	CTL PHANTOM	1	CTL POSITIONER/PHANTOM ASSEMBLY
	46-306629P2	2	FRICTION PAD	6	PART



M2104799A  
SHT 1



**CTL PHASED ARRAY ARRAY 2104799**

Item	Part Number	FRU	Name	Quantity	Description (Remarks)
1	2104799	1	CTL COIL	XXX	CTL PHASED ARRAY COIL
2	46-301961P1	2	PAD	1	GREY NYLON FABRIC W/VELCRO HOOKS
5	2133085	2	CABLE ASSEM	1	CTL COIL 6-COAX, 30" EXTERNAL CABLE
6	2121448	2	CIRCUIT BD	1	PHASE ADJUSTMENT CIRCUIT BOARD
22	46-208758P8	2	STRAP	4	1/16" TO 1-1/4" DIA. WIRE BUNDLE
25	46-307593P1	2	PAD	1	NECK COIL PAD, NYLON W/VELCRO HOOKS
27	46-317475P1	2	VELCRO PAD	6	2"W X 2"L, WHITE, ADHESIVE BACKED
28	46-317475P2	2	VELCRO PAD	1	2"W X 4"L, WHITE, ADHESIVE BACKED
29	46-317476P2	2	VELCRO PAD	2	2"W X 4"L, WHITE, ADHESIVE BACKED
30	46-230007P9	2	SCREW,MACH	5	10-32 X 5/8" BIND HEAD SLOT, DELRIN
31	46-230007P8	2	SCREW,MACH	5	10-32 X 3/8" BIND HEAD SLOT, DELRIN
32	46-220184P40	2	SCREW MACH	2	10-32 X 0.375 LG RD HD SLOT BRASS
33	46-208913P12	2	SCREW,MACH	2	10-32 X 0.50 LG SLOT FH BRS
34	46-220184P45	2	SCREW MACH	2	10-32 X 1.000 LG RD HD SLOT BRASS
35	46-220184P41	2	SCREW,MACH	10	10-32 X 0.500 BRASS
36	46-230007P13	2	SCREW,MACH	4	10-32 X 1 DELRIN AF
37	46-220184P42	2	SCREW MACH	8	10-32 X 0.625 LG RD HD SLOT BRASS
41	46-313398P1	2	SOLDER	AR	TIN 63/LEAD 37, ROSIN CORE, 0.062" DIA., 1 LB. SPOOL
47	46-317676P1	2	CHIN STRAP	5	24" LONG, WHITE VELCRO LOOP
48	46-317677P1	2	FORHEAD STRP	5	24" LONG, 1" WIDE, WHITE VELCRO LOOP
72	46-317475P4	2	VELCRO LOOP	1	2"W X 18"L WHITE, ADHESIVE BACKED
77	46-307011P1	2	ROUND SPACER	1	0.312 OD, 0.193 ID, 0.25" LONG, NYLON
79	46-282389P1	2	ADHESIVE	AR	ADHESIVE TRANSFER TAPE, TYPE A-25
84	46-317475P5	2	VELCRO LOOP	1	2"W X 7"L, WHITE, ADHESIVE BACKED
	46-221735P1	2	DIODE	12	50V, 10W PIN DIODE
	46-317605G1	2	CTL PHANTOM	1	CTL POSITIONER/PHANTOM ASSEMBLY
	46-306629P2	2	FRICTION PAD	6	PART

Blank

DIRECTION 46-003014

## DATA TABLE

Use the space provided below to record the calculated signal to noise ratio (SNR) data obtained from Section 3, FUNCTIONAL CHECKS. After recording the SNR data obtained during the initial Array installation, record subsequent SNR data in column 2 – 7 below and the date they were obtained in column number 1 as a periodic QA check. If the ratio of any of the coils found in column 8 is not greater than 85%, then there is a problem in the Multicoil system.

Original SNR data obtained at initial coil installation:

Body Coil SNR Value: \_\_\_\_\_

CTL Phased Array Coil SNR Value:

Coil 1 \_\_\_\_\_ Coil 2 \_\_\_\_\_ Coil 3 \_\_\_\_\_ Coil 4 \_\_\_\_\_  
 Coil 5 \_\_\_\_\_ Coil 6 \_\_\_\_\_

Date: \_\_\_\_\_

### SNR DATA QA (QUALITY ASSURANCE) CHECK:

1	2	3	4	5	6	7	8
Date:	Coil 1 QA SNR Value:	Coil 2 QA SNR Value:	Coil 3 QA SNR Value:	Coil 4 QA SNR Value:	Coil 5 QA SNR Value:	Coil 6 QA SNR Value:	New values divided by original values above: (avg.)
_____	_____	_____	_____	_____	_____	_____	_____ > 85% ?
_____	_____	_____	_____	_____	_____	_____	_____ > 85% ?
_____	_____	_____	_____	_____	_____	_____	_____ > 85% ?
_____	_____	_____	_____	_____	_____	_____	_____ > 85% ?
_____	_____	_____	_____	_____	_____	_____	_____ > 85% ?
_____	_____	_____	_____	_____	_____	_____	_____ > 85% ?
_____	_____	_____	_____	_____	_____	_____	_____ > 85% ?
_____	_____	_____	_____	_____	_____	_____	_____ > 85% ?
_____	_____	_____	_____	_____	_____	_____	_____ > 85% ?
_____	_____	_____	_____	_____	_____	_____	_____ > 85% ?
_____	_____	_____	_____	_____	_____	_____	_____ > 85% ?
_____	_____	_____	_____	_____	_____	_____	_____ > 85% ?

Make additional copies of this document as is needed.

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7a 3c7 B 12( ) ) 0. 1

# DEFECTIVE COIL RETURN FORM

### Note

To allow for proper assessment of defective returned coils, this form must be completely filled out and accompany all returned coils. Include films or prints of any image quality related complaints with a description of scan protocol used.

Date \_\_\_\_\_

Site Name \_\_\_\_\_

Site Address \_\_\_\_\_

Service Engineer \_\_\_\_\_

Coil Serial Number \_\_\_\_\_

Date Coil Installed \_\_\_\_\_

Description of Coil Problem \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### ELECTRICAL CHECKS

PIN Diode Test (Section 3-4)	
Diode Drop Forward Bias	
Diode Drop Reverse Bias	

**Note**

An alternate proprietary procedure is available for GE use and to customers with a valid Advanced Service Package Limited License. Refer to "TLT PROCEDURE" calibration procedure located in Direction 2124201, *MR Release 5.x Signa Service Methods* or Direction 2124202, *Release 4.x/3.x MR Signa Service Methods*. Use Table DR-1 and DR-2 to record the TLT results of the defective coil.

TABLE DR-1  
TLT DATA FOR DEFECTIVE PHASED ARRAY COIL

SITE:		NAME:	DATE:
TLT FILE NUMBER:			
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: (Combined Results)	89-91 (C)	%	%
	85-95 (C)	%	%
	65-115 (C)	%	%
	FLIP MEAN (C)		
	FLIP SDV (C)		
	RCV MEAN (C)		
	RCV SDV (C)		
	DIFF MEAN (C)		
DIFF SDV (C)			

TABLE DR-2  
TLT DATA FOR DEFECTIVE SURFACE COIL

SITE:		NAME:	DATE:
TLT FILE NUMBER:			
SNR:	NOISE		
	SNR MEAN		
	SNR SIGNAL		
	SNR AREA		
TR MAP:	89-91	%	%
	85-95	%	%
	65-115	%	%
FLIP MEAN			
FLIP SDV			
RCV MEAN			
RCV SDV			
DIFF MEAN			
DIFF SDV			