MRI DEVICES CORPORATION

Technical Report

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TITLE: **GE MEDICAL SYSTEMS SERVICE MANUAL – OEM VERSION – OPEN BREAST COIL**

REPORT #: **TR0013S**

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PARENT PART:

APPROVED BY: **_____ MRIDC Project Leader**

SCOPE: This is a service manual for the Open Breast Coils for 1.5T and 1.0T.

REVISION HISTORY

Rev Level	Date	Change Description	
A	1/27/99	First issue	
1.1	2/15/99	Workcenter release	
1.2	4/5/99	Modification	
1.3	4/19/99	Modification	
1.4	6/14/99	Modification	
1.5	7/9/99	Modification	
1.6	7/28/99	Modification	
1	8/23/99	Workcenter release / approval	

I. Scope

This is a service manual for the Open Breast Coils for 1.5T and 1.0T.

II. Reference Documents

2202492GSP	GE Medical Systems Surface Coil ECAT Requirements Specification
2111842DRS	GE Medical Systems Design Requirements Specification for Surface Coils
TR0013B	MRIDC OEM Design Specification – GE Open Breast Coils
2124201-3	GE Service Documentation
2160623-3	GE Service Documentation

III. Products Included

MRIDC No.		GE Part No.
800040	1.5T Open Breast Coil System	2246360
800041	1.0T Open Breast Coil System	2246360-2

IV. Service Information

Theory of operation: (refer to block diagram)

The Phased Array Open Breast Coils consist of one coil with 4 elements. Two of the elements are saddle coils and two of the elements are Helmholtz coils. Each element contains items 1, 2, and 3. Item 1 is a tuning and decoupling circuit, which uses passive decoupling via back to back fast acting diodes which are enabled by the RF pulses. When the diodes short, the network creates a high impedance block to eliminate decoupling artifact and interaction with the excitation field. Item 2 is a tuning, matching, and decoupling circuit which not only tunes and matches the coil to the system resonant frequency and matches the coil to 50 ohms when loaded, it also provides decoupling when the DC bias on the center conductor of the input cable is positive. Item 3 provides the proper phase shift between the system preamplifier and item 2 to create the phased array decoupling required during receive.

Configuration file and setup/calibration information for 5X software:

The configurations below are for programming soft keys for the *Open Breast Coil* on the plasma display console.

1. If not already in C Shell window touch **[UTILITIES]** then **[C Shell]** at operator's console to open up a tty window.

2. **Touch the Touch Screen** in the window to get input control, then perform the following in the window.

> cd /w/config enter
> addcoil enter

C O I L C O N F I G
Add A New Coil!

The computer will query you for the fourteen values that must be supplied to add a new coil to the CoilConfig.cfg file. Then, you will be asked whether or not to actually update the files. Enter ^c (control c) at any time to exit the program and cancel. Entering a blank line for a value gets you help information.

CoilName (8 characters or less): **R_BREAST**
korecName (4 characters or less): Enter a space return
CoilType (l-Head 2-Body 3-Surface): **3** enter
Extremity Coil (yes, no): **no**

	1.5T LX	**1.5T Genesis 60 cm**	**1.0T LX**	**1.0T Genesis 60 cm**
Cable loss(float)	1.05	1.05	1.24	1.24
Coil loss(float)	1.72	1.72	0.549	0.549
Recon scale	1.56	1.56	1.282	1.282

Linear vs Quadrature (0 or l): **1**
Multiple Receiver Coil? [yes, no]: **yes**
Number of Receivers: **2**
Starting Receiver ID (integer): **2**
Ending Receiver ID (integer): **3**
mcPortEnable (an integer): **2**
mcErrorEnable (an integer): **2**
XMITATTEN (An integer from 1 to 100, units are tenths of dB: **0**
NumFastRec: **0**
StartFastRec: **4**
End FastRec: **4**
fastTGstartTA: **90**
fastTGstartRG: **12**

(Coil values you have just entered are displayed.)
Write these values to the config files? (yes/no): **yes**
Config files updated.
You can add another coil or quit. Add another coil? (yes/no) **yes**

CoilName (8 characters or less): **L_BREAST**
korecName (4 characters or less): Enter a space return
CoilType (l-Head 2-Body 3-Surface): **3** enter
Extremity Coil (yes, no): **no**

	1.5T LX	**1.5T Genesis 60 cm**	**1.0T LX**	**1.0T Genesis 60 cm**
Cable loss(float)	1.05	1.05	1.24	1.24
Coil loss(float)	1.72	1.72	0.549	0.549
Recon scale	1.56	1.56	1.282	1.282

Linear vs Quadrature (0 or l): **1**
Multiple Receiver Coil? [yes, no]: **yes**
Number of Receivers: **2**
Starting Receiver ID (integer): **0**
Ending Receiver ID (integer): **1**
mcPortEnable (an integer): **4**
mcErrorEnable (an integer): **4**
XMITATTEN (An integer from 1 to 100, units are tenths of dB: **0**
NumFastRec: **0**
StartFastRec: **4**
End FastRec: **4**
fastTGstartTA: **90**
fastTGstartRG: **12**

(Coil values you have just entered are displayed.)
Write these values to the config files? (yes/no): **yes**
Config files updated.
You can add another coil or quit. Add another coil? (yes/no) **yes**

CoilName (8 characters or less): **2_BREAST**
korecName (4 characters or less): Enter a space return
CoilType (l-Head 2-Body 3-Surface): **3** enter
Extremity Coil (yes, no): **no**

	1.5T LX	**1.5T Genesis 60 cm**	**1.0T LX**	**1.0T Genesis 60 cm**
Cable loss(float)	1.05	1.05	1.24	1.24
Coil loss(float)	1.72	1.72	0.549	0.549
Recon scale	1.56	1.56	1.282	1.282

Linear vs Quadrature (0 or l): **1**
Multiple Receiver Coil? [yes, no]: **yes**
Number of Receivers: **4**
Starting Receiver ID (integer): **0**
Ending Receiver ID (integer): **3**
mcPortEnable (an integer): **6**
mcErrorEnable (an integer): **6**
XMITATTEN (An integer from 1 to 100, units are tenths of dB: **0**
NumFastRec: **0**
StartFastRec: **4**
End FastRec: **4**
fastTGstartTA: **90**
fastTGstartRG: **12**

(Coil values you have just entered are displayed.)
Write these values to the config files? (yes/no): **yes**
Config files updated.
You can add another coil or quit. Add another coil? (yes/no) **no**

After changing the configuration file, the Signa system must be shut down and rebooted.

Scanner and coil verification testing procedures:

Be sure that you choose the correct coil, and activate the desired coils from the menu selection on the surface coil screen. The coil chosen must be **R_BREAST, L_BREAST, or 2_BREAST**.

Position the Breast Coil in the center of the patient cradle. Place two phantom holders and two 4.38" diameter sphere phantoms (provided with your Signa System Part No. 46-317586G1) in the left and right coil. Activate one of the above coil settings from your operator's console.

Use the following spin echo sequence, TE=20mS, TR=300mS, 32cm FOV axial, 5mm thick, 5mm spacing, 256x128, and 1 NEX or equivalent sequence. Scan using Auto Pre-scan. If Auto Pre-scan does not complete successfully, do not use the coil clinically. Upon completion of pre-scan, execute the scan. Window the scan as you normally would (window levels vary from system to system depending upon your hardware revision level).

If the image has signal voids, distortions, or black streaks, discontinue use of the coil. If the image is excessively noisy, repeat the scan using the **GE 5 inch general purpose coil for 1.5T or alternate coil for 1.0T** supplied with your system. If the 5 inch coil image or alternate coil image exhibits similar artifacts, the problem likely lies with the MRI system.

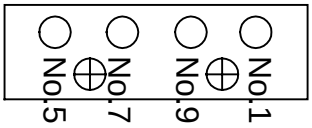
Cable trouble shooting section:

Remove bottom rib (eight brass screws) and unplug the first SMB, labeled No. 5, from the SMB connector block. Use a digital Multimeter to measure from center conductor of SMB to pin number 5 (see drawing below) of system connector. Multimeter should read < 3 ohms . If reading is different, replace system cable. Measure from SMB shield to ground pin on system connector (see drawing below). Multimeter should read < 3 ohms . If reading is different, replace system cable. Measure from center conductor of SMB to ground pin on system connector. Multimeter reading should be open, if different reading occurs, replace system cable. If readings are correct, reconnect SMB to SMB connector block and proceed with next SMB. Repeat the above measurements for all remaining SMBs. The drawing below is showing the pin configuration for all four channels.

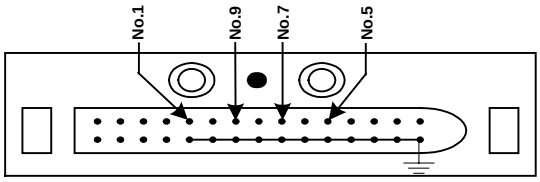
PIN Diode trouble shooting section:

Unplug the first SMB, labeled No. 5, from the SMB connector block. Measure with a digital Multimeter from center conductor of SMB in the connector block (see drawing below) to the shield of the SMB (GND) in the connector block. A single PIN diode drop of ~0.7 volts should be seen according to the block diagram. If reading is different, the coil must be replaced. Reversing the leads should read an open circuit. If reading is different, the coil must be replaced. If readings are correct, reconnect SMB to SMB connector block and proceed with next SMB. The scanner will typically detect a shorted channel and display a scan error. The back to back passive diodes cannot be checked external to the coil.

SMB connector block



System connector



List of applicable FRUs:

MRIDC No.		GE Part No.
100313 (OBC-63SIG)	Open Breast Coil, 1.5T	2246360
100314 (OBC-42SIG)	Open Breast Coil, 1.0T	2246360-2
100580	System Cable Open Breast Coil 1.5T	2246360-3
100581	System Cable Open Breast Coil 1.0T	2246360-4
100679	Phantom Holder	2246369-9

List of accessories:

MRIDC No.		GE Accessory Part No.	GE Part No.
100578	Ramp Pad	E8801LR	2246360-5
100584	Sternum Pad	E8801LS	2246360-6

Block Diagram: