

TROUBLESHOOTING GUIDANCE FOR 16BEAT - HNU COIL

HNU Coil Failure modes identified from SV16 systems :

1. HNU Coil not detected (SV16): This was due to faulty LPCA bezel. Issue was solved on replacing the bezel.
2. Grainy images during head scans using HNU (SV16): This was due to high external noise due to CCTV camera installed in the magnet room.
3. HNU Coil not detected (SV16): This issue was solved by replacing the coil cable assembly.

HNU Coil Failure modes identified from SV8 systems

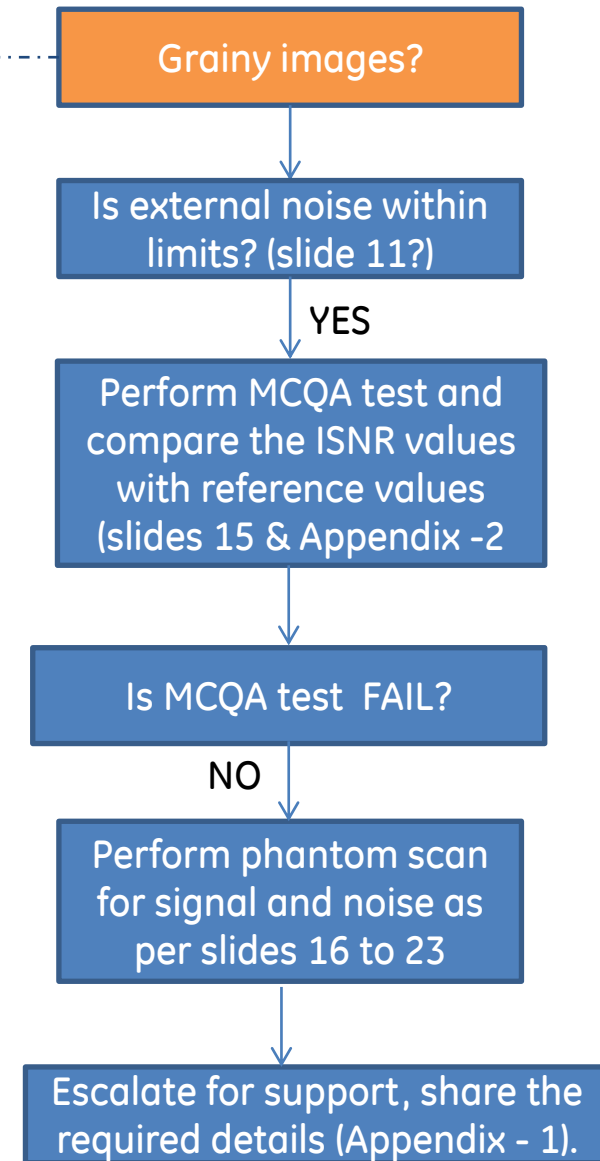
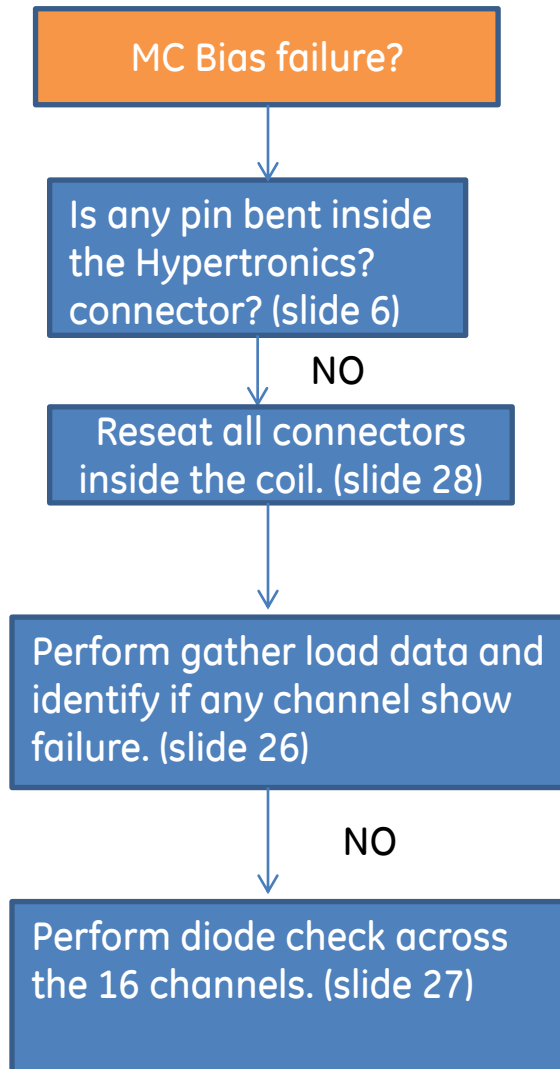
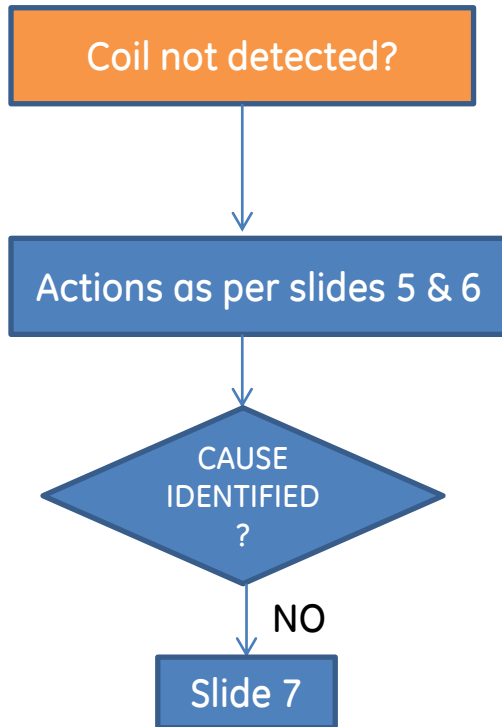
(which can be applicable to 16BEAT HNU coil):

1. HNU Coil giving grainy image (SV8): This was due to faulty RF-DC cable. Issue was solved on replacing the cables. This fault was not detected by MCR-3 tool.

Note: When escalating to MR Online Engineer** for technical support, please provide the required details as specified in Appendix 1 for Initial Engineering Evaluation.

** Follow Local regional Service procedure for field reporting with Online Engineers
For EU Region contact: OLC - by phone at +33130831000, or by email at OLCDispatchCenter@ge.com

Failure modes:



Grainy image issue has occurred in SV8 systems due to faulty RF-DC cable. This was not detected during MCR-3 tests.

COIL NOT DETECTED

NORMAL CONDITION:

For a coil to be detected normally:

1. Ensure that the connector fits firmly into LPCA and there is no gap between the coil side connector and LPCA.

2. LED status: If connector engagement is GOOD as per step 1:

- Ideal case:

- when the coil side connector is connected into LPCA, RED and GREEN LEDs glow simultaneously at first. Within a few seconds, the RED LED will turn off and GREEN LED glows consistently as long as there is no change in coil configuration and the coil is kept connected to LPCA coil.

- Coil ID Failure cases:

- GREEN and RED LEDs glow simultaneously at first, when the coil is connected. Within a few seconds, GREEN LED turns OFF and RED LED glows consistently.
- No LED glows at all when the coil is connected to the system.

3. Correct Port: 16BEAT HNU coil should be connected to **Port B only**. Also, 9E AA coil should be connected to **Port A only**. They will not be recognized by any other ports



Ideal case

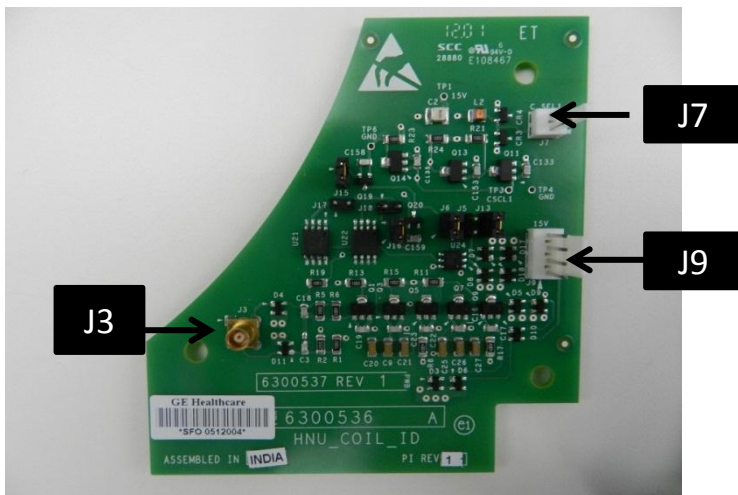


Coil ID Failure Case

IN CASE OF COIL NOT BEING DETECTED :

In case of coil not being detected, perform the following checks sequentially. Check if the coil is detected after each step:

1. Is the coil connected to the correct Port?
2. VISUAL CHECK: Visually check the coil side connector AND LPCA side connector for any broken/bent pins, loose pins, possibility of non-engagement due to loose pins etc.
3. Connect the issue coil to LPCA and type the command **hmrestart cim** in the C Shell and press ENTER. This is to aid in configuring the system to the coil, if it is being used for the first time.
4. Re-connect the connector at the respective port 4-5 times repeatedly and check if the coil is detected.
5. If the coil is still not detected, then open the posterior part of HNU coil. Reseat all connectors on the coil id: 3 connectors in total. Check for coil detection.



Connectors on the coil ID board



Normal Hypertronics connector

IF ISSUE STILL PERSISTS:

If the coil is not being detected after the above checks and **you require support to troubleshoot the issue, please escalate**. It is recommended that you maintain a record of the following, as long as the case is OPEN. Provide descriptions for clarity.

1. Coil details: Coil SN
2. Screen shot of the error message appearing in the error log, if any.
3. How the LED indicators respond when the coil is connected?
4. Is any other coil working normally at the port where the 'issue coil' is not detected?
5. History of error:
 - a. Is this the first time the error has occurred?
 - b. Has the coil worked normally anytime before the error occurred?
 - c. Was any change made to the system following which the coil started showing issue?

Note:

Coil id detected, can be verified from the file 'coilid.log' file. Location for the file is: /usr/g/service/log/

The coil ids for 16BEAT express coil are:

<u>PA coil:</u>	1.5T GBGL6d8ox42Mg3J9g5ObVMYT832YTQs
<u>16CH HNU coil:</u>	
Anterior	1.5T GBGLPf7aOJhVsIfAQJuk4VAoeirsBGDA
Adaptor	1.5T GBGLXiVcV6g9sJFA0gELPtZdn9iXEaQd
<u>9E AA coil:</u>	1.5T GBGLGTvnCocjWiYAeCmn9tPA8jg31qKO

Error reported by the system will be available in: Error log in the UI

Coilid.log file:

For reference only – No action required in field

Location: /usr/g/service/log/

Note: The unique serial number could be used to identify the coil. It is recommended that FE keeps a record of this unique serial number for any future reference or communication.

Date/Time	Connector	Status	BTE	SerialId
CoilId				
WED MAR 20 07:51:14 2013	MNS	OUT		
WED MAR 20 07:51:14 2013	C	OUT		
WED MAR 20 07:51:14 2013	A	OUT		
WED MAR 20 07:51:14 2013	B	IN		
WED MAR 20 07:51:14 2013	B	ID	1	
500000001156e70f GBGL6d8ox	t42Mg3J9g5ObVMYT832YTQs			
WED MAR 20 07:51:21 2013	B	ID	1	
500000001156e70f GBGL6d8ox	t42Mg3J9g5ObVMYT832YTQs			
WED MAR 20 07:51:22 2013	B	VALID		
WED MAR 20 07:54:50 2013	A	IN		
WED MAR 20 07:54:50 2013	A	ID	1	

PA coil id

Unique serial number of the coil (will vary from coil to coil)

GRAINY IMAGES

GRAINY IMAGES

Grainy images are caused due to loss of signal or high noise along the path of the signal.

From historical data, some of the causes identified for grainy images are:

- High external noise due to faulty power line filters of lighting, CCTV camera, white pixel noise etc.
- Short circuited preamp protection diodes
- Faulty diodes on the decoupling boards
- Faulty preamps

Isolate the system side using the following tests:

1. Perform MUX control check for Port B (both for channel 1-8 & channel 9-16) as per service manual.
2. Perform MCRIII tool check for B port after swapping J21 & J23 in the LPCA to test channels 9-16 of receive chain as per service manual.
3. Perform White pixel test for the system as per service manual.
4. Perform Body SPT test (including coherent noise test) for the system as per service manual.

Note: Before performing checks on the coil for IQ related issues, ensure that there is no failure on the system side, and external noise is within limits.

Check coil side:

1. Perform MCQA test with anterior or adapter, according to the failure symptom. Compare the ISNR values with the reference values provided in appendix.

Mux Control Line check: refer Service Manual

Proprietary to General Electric Company
Direction 5436922-2EN, Rev# 3
Optima MR360 / Brivo MR355 1.5T Service Methods
Module Version 1.0, Version Date 9/20/12

Coil Mux Control Lines

1 Diagnostic Link

Diagnostics >> System Function >> RF >> Coil Mux Control Lines

Diagnostics >> Hardware Location >> System Cabinet >> RF >> Coil Mux Control Lines

Illustration 1: Coil Mux Control Lines

The screenshot shows the 'MR Service Desktop - Insite_Browser' interface. The top navigation bar includes 'Error Logs', 'Diagnostics' (highlighted with a yellow box), 'Image Quality', 'Calibration', 'Configuration', 'Utilities', 'Replacement', 'PM', and 'Home'. Below this, a row of icons represents various diagnostic categories. The main content area is titled 'Coil Mux Control Lines' and contains a 'Test Selections' section with three radio buttons: 'Port A' (selected), 'Port B', and 'EXPRESS Coil(UNO)'. Below this is an 'Options' section with a label 'Data Summary File' and a text input field containing 'rxOsc_Summary.log'.

Test Selections:	<input checked="" type="radio"/> Port A <input type="radio"/> Port B <input type="radio"/> EXPRESS Coil(UNO)
Options:	Data Summary File rxOsc_Summary: <input type="text" value="log"/>

MCR III tool to isolate Port A, Port B and PA coil cables: refer Service Manual

Proprietary to General Electric Company
 Direction 5435522-2EN, Rev# 3
 Optima MR360 / Brivo MR355 1.5T Service Methods
 Module Version 2.0, Version Date 3/4/11

MCR III Tool

[Click Here for Summary Version](#)

1 Personnel Requirements

Required Persons	Preliminary Reqs	Procedure	Finalization
1	Not Applicable	60 mins	Not Applicable

2 Overview

The Multicoil Receive Chain Tool provides a means of diagnosing problems in Multicoil Receive (MCR) chain hardware, without use of coils. The tool sends signals down the individual paths to isolate specific channels in the receive chain. The tool's Graphical User Interface (GUI) guides the user through the various steps involved in running the tool and troubleshooting the problem. The GUI has built-in instructions and detailed setup instructions, troubleshooting flowcharts and documents that will help facilitate rapid diagnosis of the problem. There are two levels of tests that can be run using the MCR III tool: Default and Individual. Once you've decided to use MCR III tool, determine which level of test your situation requires. The default and port-specific levels of tests offer increased user-friendly automation that is been omitted from the individual tests by design. Therefore, it is imperative to identify which level of tests you need to perform and then follow the instructions for that specific level.

- Port A Default Tests**
 - This test must be passed during the MR installation.
 - In most scenarios, this is the first test that should be run when using the MCR tool.
 - If this test fails, individual tests can be run to further isolate the failing component.
- Port A Individual Tests**
 - These tests are designed to run after the default test indicates a failure.
- Uno Coil Test For Fixed Table**

Proprietary to General Electric Company
 Direction 5435522-2EN, Rev# 3
 Optima MR360 / Brivo MR355 1.5T Service Methods
 Module Version 2.0, Version Date 3/4/11

MCR III Chain Tool Troubleshooting

[Click Here for Summary Version](#)

1 Personnel Requirements

Required Persons	Preliminary Reqs	Procedure	Finalization
1	Not Applicable	Not Applicable	Not Applicable

2 Overview

3 Preliminary Requirements

3.1 Safety

DANGER
STRONG MAGNETIC FIELD:
FERROUS MATERIALS CAN BECOME DANGEROUS PROJECTILES IN THE PRESENCE OF THE MAGNETIC FIELD PRODUCED BY THE SIGMA MAGNET.
DO NOT BRING ANY FERROMAGNETIC TOOLS OR EQUIPMENT INTO THE MAGNET ROOM.

4 Procedure

4.1 Failures after Running Port A Default Tests

- If you find errors after running the default tests (see [MCR III Tool](#)) refer to [Table 1](#) to determine your response:

Table 1: Default Test Troubleshooting

White pixel test: refer Service Manual

GE Exclusive Use Only
 Direction 5436922-2EN, Rev# 3
 Optima MR380 / Brivo MR355 1.5T Service Methods
 Module Version 2.0, Version Date 4/4/10

- Home | Search
- Read me
- Safety
- Pre-Installation
- Installation
- Adjust/Cals
- Functional Cks
- Software
- Theory
- Sys Diagrams
- Planned Maintenance
- Troubleshooting
 - Diagnostics
 - Troubleshooting Steering Guide
 - Image Quality Troubleshooting Tools
 - Diffusion Weighted Echo Planar Ima
 - EPI White Pixel Test - Full Mode**
 - EPI White Pixel Troubleshooting
 - High Speed Stability (HSS) Procedu
 - Gradlong Standalone Eddy Current
 - Image Guided Troubleshooting
 - MCR III Tool
 - MCR III Chain Tool Troubleshooting
 - RFA Loopback Test
 - System Performance Test (SPT)
 - SPT Stability Viewer
 - Multi-Coil Quality Assurance (MCQ
- Parts
- Replacement

EPI White Pixel Test - Full Mode

[\(Click Here for Summary Version\)](#)

1 Personnel Requirements

Required Persons	Preliminary Reqs	Procedure	Finalization
1	Not Applicable	45 mins	Not Applicable

2 Overview

This procedure uses echo planar image (EPI) scans and the raw data mode of recon to analyze the raw data for white pixel artifacts. These raw data artifacts can exhibit themselves as corduroy artifacts in images. There are two modes of operation for the EPI White Pixel Test.

- Mode 1 creates 48 images while iterating on Readout Axis (X, Y, Z), (readout gradient fundamentals frequency), and placement of the data acquisition window over the attack "knee" and decay "knee" of the readout trains positive and negative lobes. In addition, Mode 1 generates various report fields and plot files that can be used to analyze white pixels. Mode 1 has been incorporated in the echo planar test (EPT) test to be run as a single test.
- Mode 2 prompts you to enter an image number that generated the most white pixels from the Mode 1 test, and allows you to use the real time display feature of EPI to loop on that condition for troubleshooting purposes.

3 Preliminary Requirements

3.1 Required Conditions

Condition	Reference	Effectivity
Service protocols need to be loaded	-	-
Service key installed	-	-

Multi Coil Quality Assurance (MCQA) : refer Service Manual

This tool shows whether any element in the coil is dead or not. The phantom position is very critical since it determines the ISNR value obtained from the test. Please refer the operator manual attached for correct phantom positioning and land marking directions.

Result of the test will be available at: /export/home/signa/tools/mc_qa_tool/XXXXXXXXX.mcqa

Note: Always send the .mcqa file whenever communicating IQ issues. Also, backup MCQA test result for any new coil, before handing them over to customer.

Proprietary to General Electric Company
Direction 5436922-2EN, Rev# 3
Optima MR360 / Brivo MR365 1.5T Service Methods
Module Version 13.2, Version Date 2/1/13

Multi-Coil Quality Assurance (MCQA) Tool

[\(Click Here for Summary Version\)](#)

1 Personnel Requirements

Required Persons	Preliminary Reqs	Procedure	Finalization
1	Coil Dependent	Coil Dependent	Not Applicable

2 Overview

The Multi-Coil Quality Assurance (MCQA) tool simplifies data acquisition and SNR analysis for surface coils. It helps detect dead coil elements, and helps develop improved integrated signal-to-noise ratio (ISNR) specifications for all multi-coils, independent of scanner instabilities.

The MCQA tool does not rely on ROI placement like other SNR tools in the past. Instead, it chooses slice locations based on coil geometry, acquires one spin echo image, and turns off RF to gather a noise image. The noise mean of the 2D noise-only image is subtracted from the 2D intermediate image.

The summed signal (2D intermediate image minus noise mean) is calculated, and this signal is divided by the standard deviation of the noise for all pixels of the noise-only image, resulting in the ISNR.

The summed signal (2D intermediate image minus noise mean) is calculated, and then the signal is divided by the Standard Deviation of the Noise of all pixels of the noise-only-image to give the ISNR.

Refer to the appropriate section for the version of MCQA tool running on the system:

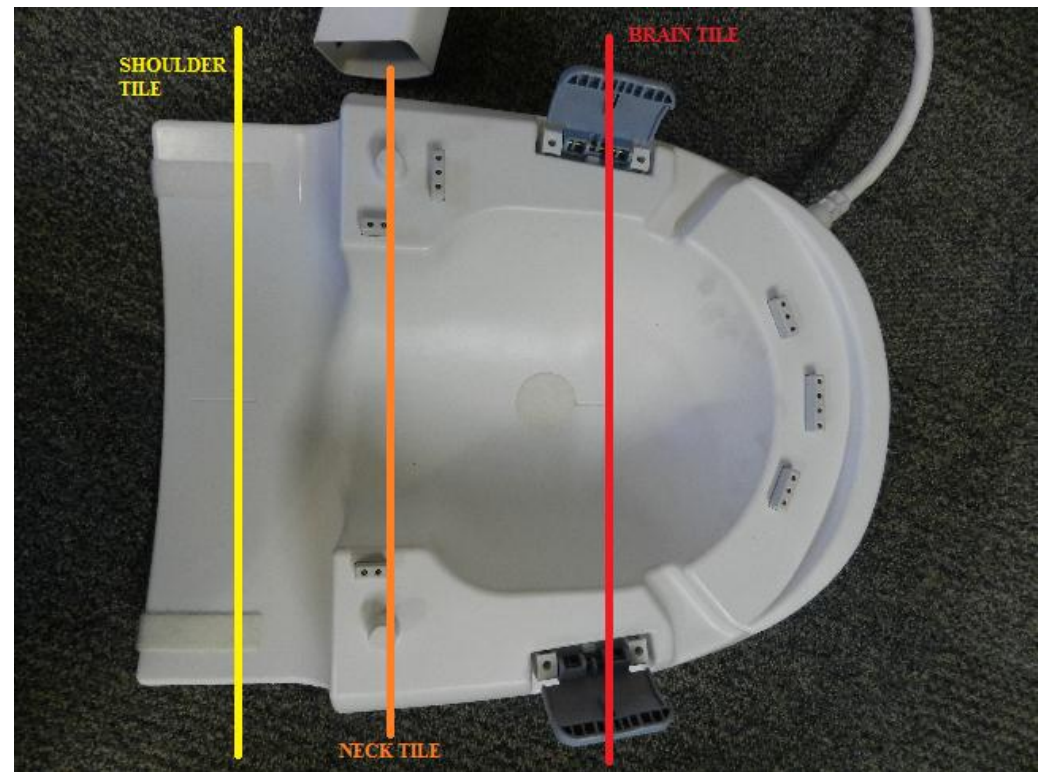
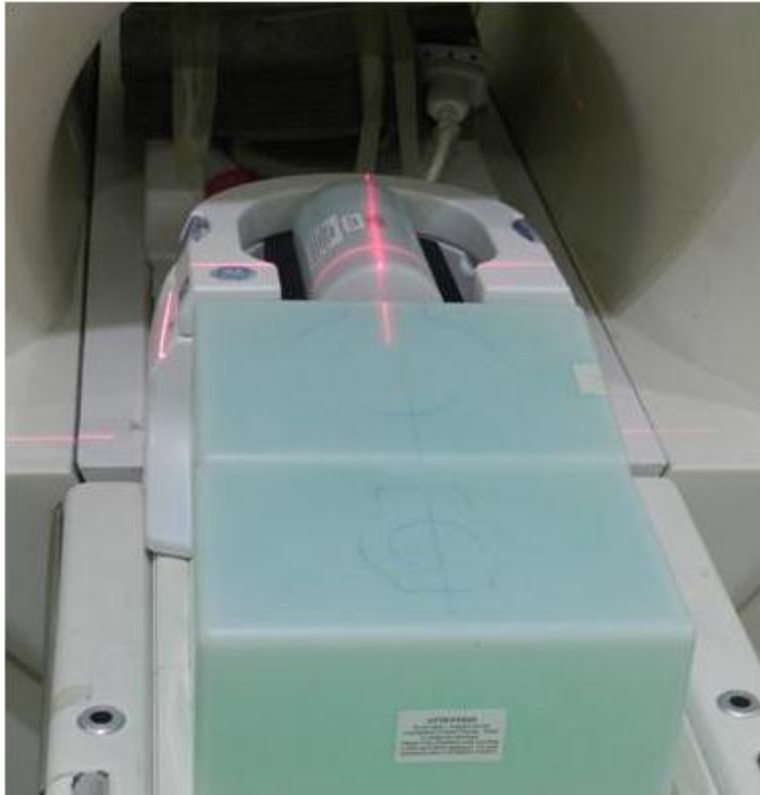
- (For systems running software version earlier than 15.0 M4 SP2) See [MCQA Tool - Software Versions Earlier than 15.0 M4 SP2](#).
- (For systems running software version 15.0 M4 SP2 or higher) See [MCQA Tool - Software Versions 15.0 M4 SP2 and Later](#).

3 Preliminary Requirements

Phantom Scans: for SNR calculation

For issues when scanned using HNA adapter: Perform scans using the shown phantom arrangement and land marking, to obtain signal and noise images. Use CSPINE adaptor mode.

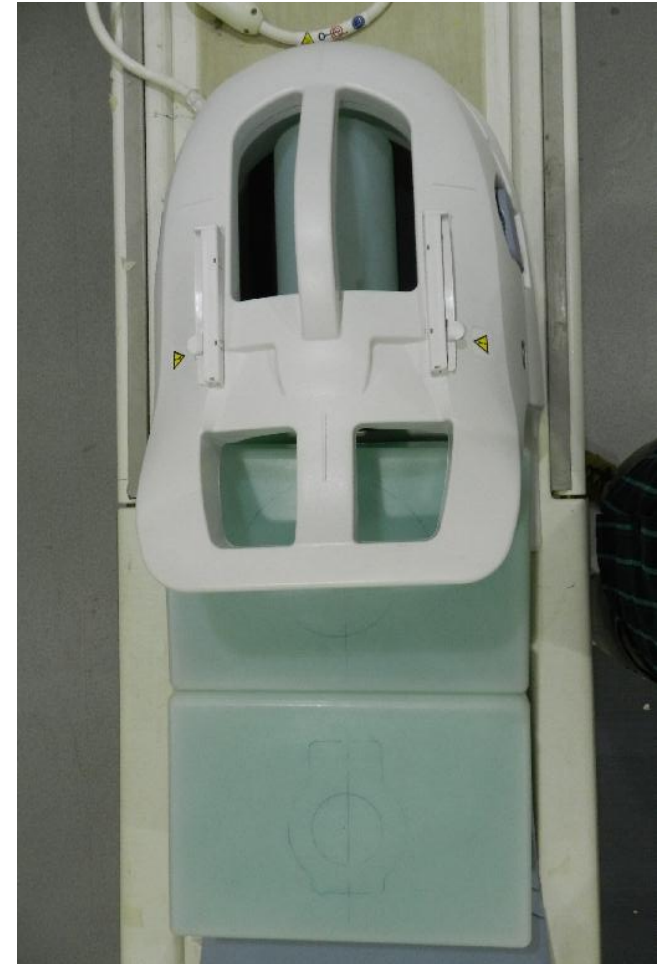
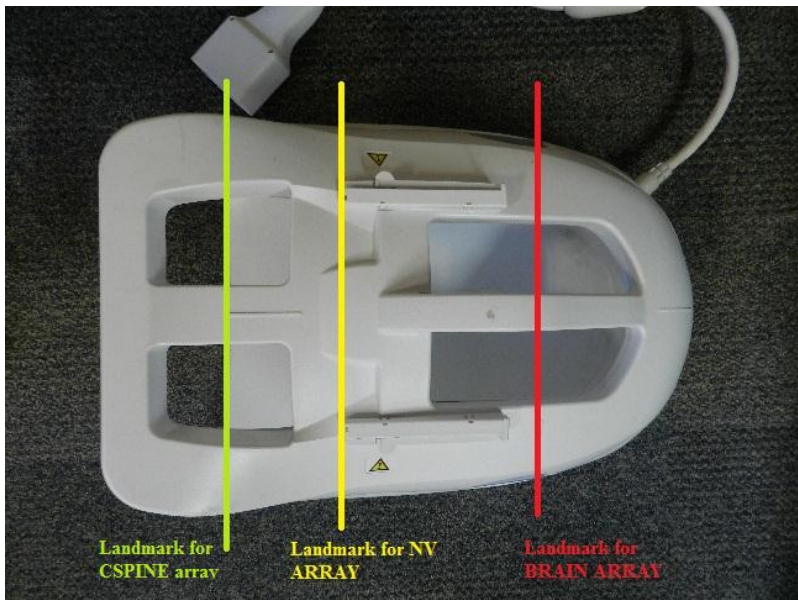
For each landmark, follow the same protocols as explained in the following slides. In the end, we shall have 3 sets of signal and 3 sets of corresponding noise images.



For issues when scanned using HNA anterior: Perform scans using the shown phantom arrangement and land marking, to obtain signal and noise images.

Follow the same protocols as explained in the following Slides. 3 slices shall be obtained for each mode, so that all the elements could be analyzed from the images.

Note: Follow the same protocol setup for modes using HNA adapter and HNA anterior. Ensure the correct phantom setup and land marking for correct measurements.



Perform a 3-plane localiser:

Add Task>> Add sequence>>Template>>3-Plane 2D Localiser

The screenshot displays a medical software interface with the following components:

- Task List (Left Panel):**

Status	Description	Time
Done	1: Body Coil SE	01:23
Done	2: HNU PURE CAL	00:12
Done	3: HNU PURE SE	01:23
Done	4: HNU PURE SE	01:23
Done	5: SAVE ENTER	01:23
Done	6: Body Coil SE	01:23
ACT	Body Coil SE	01:23
- Protocol Library (Top):** HDxt M3, **GE**, Service
- Body Model (Center):** A 3D anatomical model of a human skeleton.
- Filter List (Right):**
 - Application: 2D, 3D
 - Cine: MRS
- Sorted by Alphabetical (List):**
 - 30.9-2D Echo Planar Imaging
 - 30.3-2D Fast Spin Echo
 - 30.8-2D Gradient Echo
 - 30.14-2D MNS
 - 30.7-2D Propeller
 - 30.17-2D Spin Echo
 - 30.16-2D Spiral
 - 30.4-2D Vascular
 - 30.18-3-Plane 2D Localizer
 - 30.13-3D Fast Spin Echo
 - 30.11-3D Gradient Echo
 - 30.15-3D Vascular
 - 30.2-Applications
 - 30.10-Calibration
 - 30.6-Cine Gradient Echo
 - 30.5-Cine Vascular
 - 30.1-MRS Spectroscopy
 - 30.12-Multi Station
- Multi Protocol Basket (Right):** 30.18-3-Plane 2D Localizer
- Buttons (Bottom Left):** Setup, Add Task (highlighted with a red arrow), Run, View, Research Mode, Auto Scan, Scan, Save Rx, Coils, BODY, Head First, Supine, Imaging Options...
- Buttons (Bottom Right):** Accept, Cancel
- Patient Information (Bottom Center):**

Patient Name : HNU strain relief Patient ID : geservice
DOB : Patient Age :
Sex : Weight : 110.23Lbs/50.0Kgs
Accession : Exam Description :
- Status Bar (Bottom):** SAR Est: 0.09 Peak: 0.17 Mode:First dB/dt:First

Select the pulse sequence (FGRE) and select SETUP. Give parameters as shown and SCAN.

The screenshot displays the MRI console interface with three main sections:

- Task List (Left):** A table showing the sequence of tasks. The 'InRx' task 'FGRE' is highlighted in yellow. A red arrow points to this task.
- Setup Panel (Bottom Left):** Contains buttons for 'Setup', 'Add Task', 'Run', 'View', 'Auto Scan', 'Save Rx', and 'Imaging Options...'. A red arrow points to the 'Setup' button.
- FGRE Setup Panel (Bottom Center):** Shows parameters for the 'FGRE' sequence. A red arrow points to the 'Freq. Dir' dropdown menu.
- Scan Details Panel (Bottom Right):** Shows various scan parameters such as Frequency, Phase, NEX, Bandwidth, Shim, and Phase Correct.

Task List:

Status	Description	Time
Done	1: Body Coil SE	01:23
Done	2: HNU PURE CAL	00:12
Done	3: HNU PURE SE	01:23
Done	4: HNU PURE SE	01:23
Done	5: SAVE ENTER	01:23
Done	6: Body Coil SE	01:23
ACT	Body Coil SE	01:23
InRx	FGRE	00:07

FGRE Setup Parameters:

- Scan Plane: 3-Plane
- Freq. Dir: Unswap
- Freq. FOV: 40.0
- Phase FOV: 1.00
- Slice Thickness: 0.7
- Center: 0.0, 0.0, 0.0
- Spacing: 5.0, 5.0, 5.0
- # Slices: 1, 1, 1
- Chem SAT: None
- Contrast:

Scan Details:

- # of TE(s) per Scan: 1.0
- TE: 3.2
- Frequency: 128
- Phase: 128
- NEX: 1.00
- Bandwidth: 31.2
- Shim: Auto
- Phase Correct: Off
- Table Delta: 0.00

System Information:

- 52071 HNU1 01:30
- Exam Edit End
- Task Series Data
- Signal: HDxt 1.5T 35465454 A 149
- HDxt M3
- Se: 6 HNU, strain relief geservice
- In: 1
- Ax S0,0
- 01 Feb 2013 07:15:26 PM Mag = 1.0
- 01 Feb 2013 07:15:26 F Mag = 1.0
- SE TR:300 TE:30 EC:1/1 15.6kHz
- BODY FOV:30x30 5.0thk/0.0sp/C 1/01:23 256x256/1.00 NEX
- P 149 W = 4951 L = 2480
- Graphic Rx Toolbar: Locs SAT Shim
- 2D Gradient Echo Seq, Fast
- SAR Est: 0.00 Peak: 0.05 Coil: 0.02 Mode: First dB/dt: First
- Minimum TE: 3.2 Maximum TE: 3.2

Protocols and scan parameters for phantom scan:

Add Task>> Add sequence>>Template>>2D Gradient Echo

The screenshot displays a medical imaging software interface. On the left, a 'Task' table lists various sequences. The 'Add Task' button is highlighted with a red arrow. The main window shows a 'Protocol Library' with 'GE' selected. A 'Template' button is also highlighted with a red arrow. A list of protocols is shown, with '30.8-2D Gradient Echo' selected in the 'Multi Protocol Basket'. Patient information is displayed at the bottom, including name, ID, age, sex, and weight. The status bar at the bottom shows 'SAR ES: 0.09 Peak: 0.17 Mode: First' and 'dB/dE: First'.

Status	Description	Time
Done	1: Body Coil SE	01:23
Done	2: HNU PURE CAL	00:12
Done	3: HNU PURE SE	01:23
Done	4: HNU PURE SE	01:23
Done	5: SAVE ENTER	01:23
Done	6: Body Coil SE	01:23
ACT	Body Coil SE	01:23
	FGRE	00:12
	FGRE IR-Prep	00:27
	Fiesta	00:28
	SSFSE	00:09

Protocol Library: HDxt M3 GE Service

Adult Pediatric

Head
Neck
Upper Extremities
Chest
Abdomen
Spine
Pelvis
Lower Extremities
Other
Template

Filter List by:
 Application 2D 3D
 Cine MRS

Sorted by: Alphabetical ▲

- 30.9-2D Echo Planar Imaging
- 30.3-2D Fast Spin Echo
- 30.8-2D Gradient Echo
- 30.14-2D MNS
- 30.7-2D Propeller
- 30.17-2D Spin Echo
- 30.16-2D Spiral
- 30.4-2D Vascular
- 30.18-3-Plane 2D Localizer
- 30.13-3D Fast Spin Echo
- 30.11-3D Gradient Echo
- 30.15-3D Vascular
- 30.2-Applications
- 30.10-Calibration
- 30.6-Cine Gradient Echo
- 30.5-Cine Vascular
- 30.1-MRS Spectroscopy
- 30.12-Multi Station

Multi Protocol Basket
 30.8-2D Gradient Echo

Save Rx

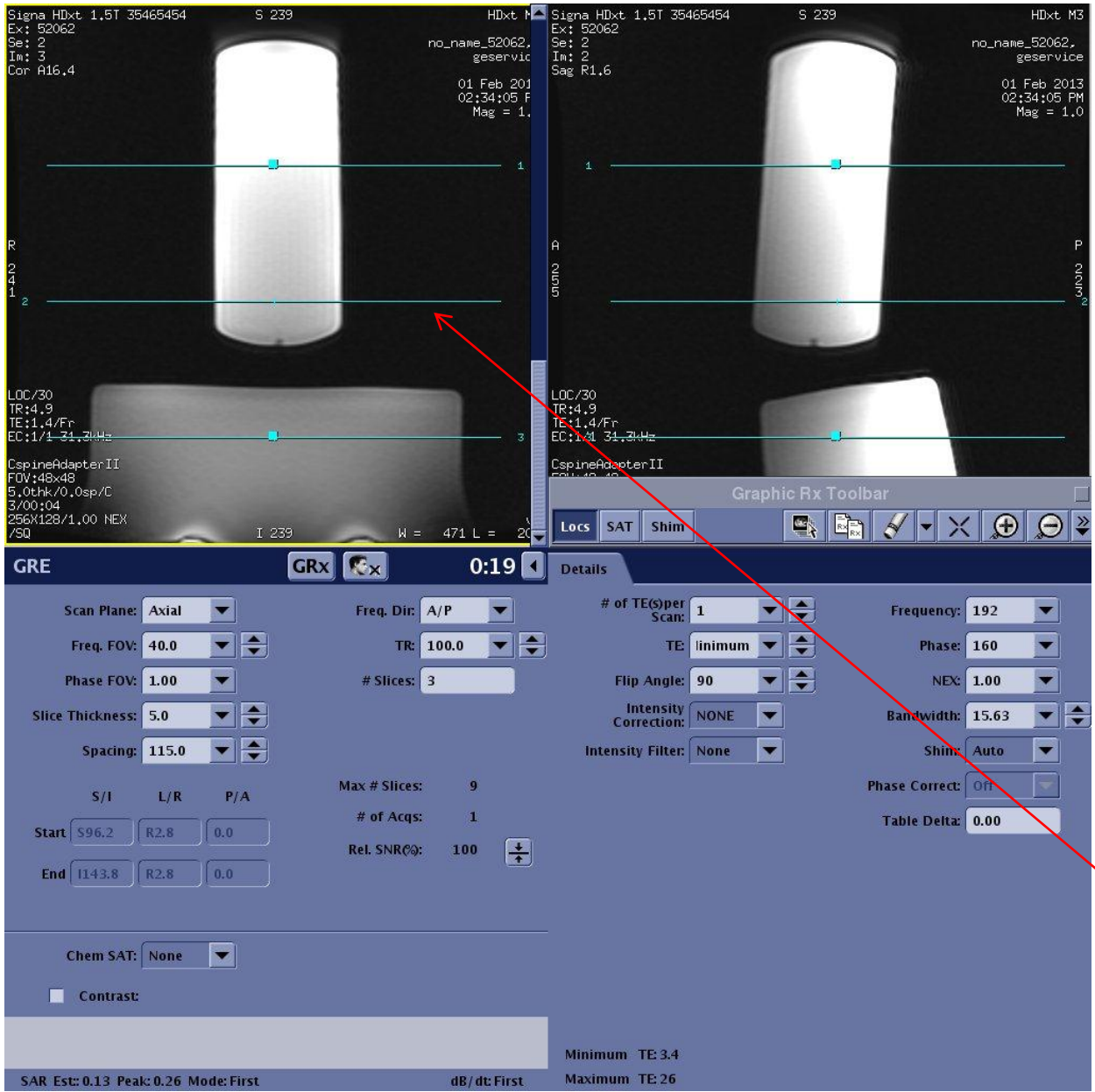
Coil...
 BODY
 Head First, Supine

Imaging Options...
 2D Spin Echo
 None

Patient Name : HNU strain relief
 Patient ID : geservice
 Patient Age :
 Sex :
 Weight : 110.23Lbs/50.0Kgs
 Accession :
 Exam Description :

Accept Cancel

SAR ES: 0.09 Peak: 0.17 Mode: First
 dB/dE: First



- Protocol: GRE
 - Head first
 - FOV: 40
 - # of slices: 3
 - Slice spacing: 115
 - TR: 100; TE: minimum
 - Flip: 90
 - Freq: 192; phase: 160
 - NEX: 1
 - BW: 15.63
- Set other parameters as shown
- Save Rx
 - Download

Slice position:
 Position the 2nd slice as shown in figure.

After the protocols are saved, set saveinter = 1 under Display CVs.

The screenshot displays a medical imaging software interface. On the left, a task list shows a sequence of tasks: 1: Body Coil SE (01:23), 2: HNU PURE CAL (00:12), 3: HNU PURE SE (01:23), 4: HNU PURE SE (01:23), 5: SAVE ENTER (01:23), and 6: Body Coil SE (01:23). The 'SAVE ENTER' task is highlighted. The main area shows three axial brain scan images. The bottom-left panel contains various controls, including a 'Scan' button with a red arrow pointing to it, and a 'Research Mode' indicator. The 'Scan' button is located in the 'View' section, below the 'Auto Scan' checkbox and the 'Save Rx' button. The 'Research Mode' indicator is also in the 'View' section, above the 'Scan' button. The 'Scan' button is labeled 'Scan' and has a small downward arrow next to it. The 'Research Mode' indicator is labeled 'Research Mode' and is in orange text. The 'Auto Scan' checkbox is checked. The 'Save Rx' button is labeled 'Save Rx'. The 'Coil...' button is labeled 'BODY' and 'Head First, Supine'. The 'Imaging Options...' button is labeled 'Imaging Options...'. The '2D Spin Echo' section is labeled 'None'. The 'SAR Est: 0.09 Peak: 0.17 Mode: First' and 'dB/dt: First' are displayed at the bottom.

- >> Click on the scroll down arrow
- >>select Research
- >>select Display CVs
- >>type "saveinter" in the box
- >>enter current value as 1
- >>Accept
- >>again, click on the scroll down arrow
- >>select Research
- >>Download
- >>Scan

Noise scan: Noise scans should be done immediately after EACH signal scan using identical phantom and protocol setups (eg. For brain array mode, perform the phantom scan with RF enable switch in ON position. Immediately after the scan, turn OFF the RF enable switch and perform noise scan). Change the RF enable switch to OFF or DISABLED position on the cabinet. Follow the sequence as below for noise scan:

- >> Copy paste the series used for Phantom scan (GRE sequence)
- >> Save Rx and Download
- >> Set saveinter = 1 and download, as explained before
- >> Turn "RF enable" switch to OFF or DISABLE position in the cabinet.

- >> **Perform MANUAL PRESCAN.** Do not change any value. Press **DONE.**
- >> **SCAN**

Note: Once the phantom scan and the noise scan are completed, please push the DICOM images to TREASURE bay at Bangalore (ip address: 3.204.36.151). Share the exam and series numbers.

It is recommended to share screen shots of the images obtained, in case of network connectivity issues.

MC Bias failure

MC Bias failure:

MC Bias fault occurs when any of the RF channels from LPCA draws a current less than the minimum current limit or more than the maximum current limit.

The current limits have been specified in the coil dB file.

Gatherload check: This check will provide the current drawn by each channel for OPEN CIRCUIT and SHORT CIRCUIT conditions. Use 7V for HNU coil.

Observe whether there is significant difference between the current drawn by each channel. 16CH HNU coil will show the same values for all 16 channels.

In case any channels shows significantly different value, then that channel is faulty.

The result is stored in the file: `usr/g/service/log/XXXXXX_mc.txt` (where XXXXX is the filename)

The image shows a screenshot of the MR Service Desktop software interface. On the left is a tree view of the software's menu structure. The 'Diagnostics' folder is expanded, showing 'System Function' and 'Hardware Location'. Under 'Hardware Location', 'System Cabinet' is expanded, and 'Driver Module Diagnostics' is selected. The main window displays the 'Gather Load Data Diagnostic' configuration screen. It has a 'Diagnostic Selections' section with 'Gather Load Data' checked. The 'Test Parameters' section includes 'Test Duration (Seconds)', 'Power Supply Data' (5 Volts, 7 Volts, Mixed 3 and 7 Volts), 'External Un-Blank', 'Internal Un-Blank', and 'Un-Blank Time'. There are 'Run' and 'Stop' buttons at the bottom.

Operating Documentation
Direction 5438922-2EN, Rev# 3
Optima MR380 / Brivo MR355 1.5T Service Methods
Module Version 2.0, Version Date 11/12/10

Gather Load Data Diagnostic

1 Diagnostic Link

Diagnostics >> System Function >> RF >> Driver Module Diagnostics

Diagnostics >> Hardware Location >> System Cabinet >> Driver Module Diagnostics

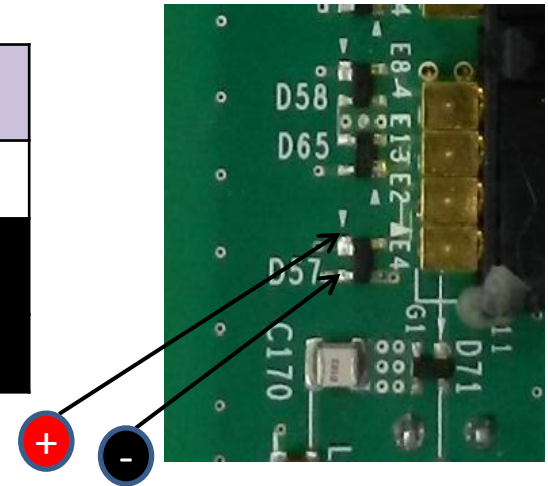
Illustration 1: Driver Module Diagnostics

Always backup the gather load data report in case of MC bias failure.

Diode check: Remove the coil from MR system and then place anterior on the posterior. Perform diode check across the 2 pins for diodes. Ideal values (in volts) are as follows:

D71 – CH12	D57 – CH10	D65 – CH3	D58- CH16	D64- CH4	D59 – CH11	D63 – CH5	D60 – CH8	D67 – CH2	D61 – CH7
1.76	1.76	1.26	1.76	1.26	1.76	1.26	1.76	1.26	1.26
D68 – CH14	D62 – CH1	D69 – CH9	D66 – CH6	D70 – CH15	D56 – CH13				
1.76	1.26	1.76	1.26	1.76	1.76				

In reverse bias, Multimeter reads OL.



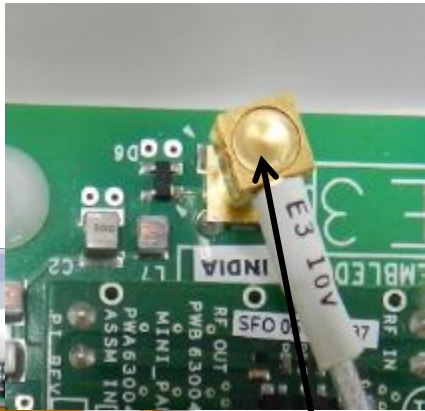
In case any of the channel readings observed are different from the Ideal values as given in the above table, then that channel is faulty .

Reseat connectors:

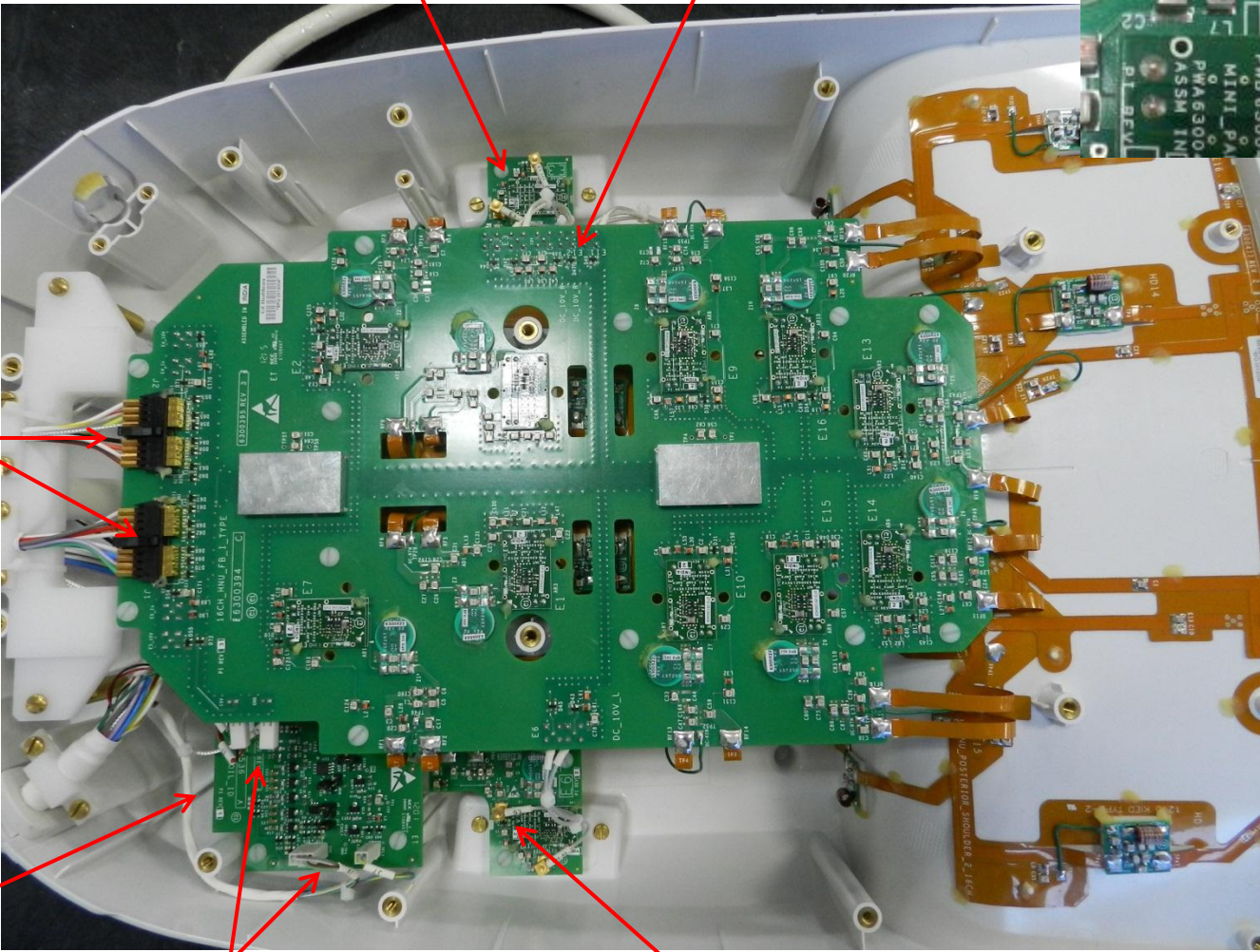
All Connectors shown shall be re-seated

2 PCX connectors

5 PCX connectors



PCX connector



2 MOLEX connectors

1 PCX connector on coil id

4 DC connectors

4 PCX connectors

APPENDIX

APPENDIX: 1

Please provide the below details for Initial Engineering Evaluation :

Basic Information required from site

1. Coil name + Serial number + manufacturing date or Photo of the coil rating plate label
2. Is this a FOA / FOI ?
3. Coil Installation date
4. MCQA report obtained when the coil was installed
5. What is the System ID, software version ?
6. Problem statement as told by customer
7. Is the issue reported is Intermittent or permanent ?
8. Is this a repeat issue at site ?
9. When was the last change done at system level ?
10. Is the reported issue observed in other coils in site ?

APPENDIX: 2

MCQA RESULT: HNA with anterior

Reference ISNR values



Test#	Sig_Img	Coil with Issue	Element #	ISNR Spec(LSL)	Coil Modes	Landmarking	ISNR reference values
1	1	HNA	E6-HNA	165	BrainArrayII	I0	322.6746
1	2	HNA	E3-HNA	193			319.5692
1	3	HNA	E4-HNA	202			360.3163
1	4	HNA	E5-HNA	168			313.7478
1	5	HNA	E1-HNA	135			251.0214
1	6	HNA	E8-HNA	109			208.6588
1	7	HNA	E2-HNA	134			220.2339
1	8	HNA	E7-HNA	133			284.3834
2	1	HNA	E9-HNA	84	CspineArrayII	I125	168.7194
2	2	HNA	E10-HNA	74			194.8313
2	3	HNA	E13-HNA	107			253.3307
2	4	HNA	E14-HNA	0			14.5243
2	5	HNA	E15-HNA	0			30.21855
2	6	HNA	E16-HNA	0			14.10884
2	7	HNA	E11-HNA	107			252.5771
2	8	HNA	E12-HNA	81			247.8695
2	9	HNA	E4-HNA	109			186.3411
2	10	HNA	E5-HNA	92			159.8693
2	11	HNA	E1-HNA	61			84.77776
2	12	HNA	E8-HNA	56			85.48732
3	1	HNA	E9-HNA	226	CspineArrayII	I250	485.8355
3	2	HNA	E10-HNA	221			443.8132
3	3	HNA	E13-HNA	212			461.1869
3	4	HNA	E14-HNA	397			1096.003
3	5	HNA	E15-HNA	415			1161.488
3	6	HNA	E16-HNA	351			972.8314
3	7	HNA	E11-HNA	346			686.4187
3	8	HNA	E12-HNA	331			707.8075
3	9	HNA	E4-HNA	48			81.06335
3	10	HNA	E5-HNA	34			60.13812
3	11	HNA	E1-HNA	33			81.97288
3	12	HNA	E8-HNA	32			84.79172
4	1	PA	E1-PA	40	SpineArray_12	I390	100.2836
4	2	PA	E3-PA	39			97.11848
4	3	PA	E4-PA	0			15.78777
4	4	PA	E6-PA	0			11.43798
4	5	PA	E5-PA	0			11.53895
4	6	PA	E2-PA	42			93.40969
5	1	PA	E1-PA	0	SpineArray_12	I575	17.43441
5	2	PA	E3-PA	0			17.16768
5	3	PA	E4-PA	36			76.51258
5	4	PA	E6-PA	34			67.05507
5	5	PA	E5-PA	35			66.20231
5	6	PA	E2-PA	0			16.73388

MCOA RESULT: HNA with adapter

Reference ISNR values



Test#	Sig_Img	Coil with Issue	Element #	ISNR Spec(LSL)	ISNR ref values	Coil Modes	Landmarking
1	1	HNA	E9-HNA	16	41.02192	Cspine_Adapter II	I0
1	2	HNA	E10-HNA	0	21.53275		
1	3	HNA	E13-HNA	14	34.95562		
1	4	HNA	E14-HNA	0	19.64795		
1	5	HNA	E15-HNA	0	19.122		
1	6	HNA	E16-HNA	0	16.67385		
1	7	HNA	E1-HNA	112	247.3663		
1	8	HNA	E8-HNA	94	219.092		
1	9	HNA	E2-HNA	136	307.3223		
1	10	HNA	E7-HNA	113	295.3823		