



GE Healthcare

Service Manual

Document 5263552TPH

Revision 1

GE Signa® 1.0T 3-inch coil

GE Signa® 1.5T 3-inch coil

GE Signa® 1.5T 5-inch coil

GE Part Number: 46-307144G6 (1.0T 3-inch coil)
2127315 (1.5T 3-inch coil)
2127316 (1.5T 5-inch coil)

Damage in Transportation

All packages should be closely examined at time of delivery. If damage is apparent, have notation "**damage in shipment**" written on **all** copies of the freight or express bill **before** delivery is accepted or "signed for" by a General Electric representative or a hospital receiving agent. Whether noted or concealed, damage **MUST** be reported to the carrier **immediately** upon discovery, or in any event, within **14** days after receipt, and the contents and containers held for inspection by the carrier. A transportation company will not pay a claim for damage if an inspection is not requested within this **14**-day period.

File a report with

- Call 1-800-548-3366 and use option 8.
http://data.supportcentral.ge.com/books/15478/B9560/doc_102920.doc
- Contact your local service coordinator for more information on this process.

Language Policy For Service Documentation (Dir. 2128126)

WARNING

- THIS SERVICE MANUAL IS AVAILABLE IN ENGLISH ONLY.
- IF A CUSTOMER'S SERVICE PROVIDER REQUIRES A LANGUAGE OTHER THAN ENGLISH, IT IS THE CUSTOMER'S RESPONSIBILITY TO PROVIDE TRANSLATION SERVICES.
- DO NOT ATTEMPT TO SERVICE THE EQUIPMENT UNLESS THIS SERVICE MANUAL HAS BEEN CONSULTED AND IS UNDERSTOOD.
- FAILURE TO HEED THIS WARNING MAY RESULT IN INJURY TO THE SERVICE PROVIDER, OPERATOR OR PATIENT FROM ELECTRIC SHOCK, MECHANICAL OR OTHER HAZARDS.

AVERTISSEMENT

- CE MANUEL DE MAINTENANCE N'EST DISPONIBLE QU'EN ANGLAIS.
- SI LE TECHNICIEN DU CLIENT A BESOIN DE CE MANUEL DANS UNE AUTRE LANGUE QUE L'ANGLAIS, C'EST AU CLIENT QU'IL INCOMBE DE LE FAIRE TRADUIRE.
- NE PAS TENTER D'INTERVENTION SUR LES EQUIPEMENTS TANT QUE LE MANUEL SERVICE N'A PAS ETE CONSULTE ET COMPRIS.
- LE NON-RESPECT DE CET AVERTISSEMENT PEUT ENTRAÎNER CHEZ LE TECHNICIEN, L'OPERATEUR OU LE PATIENT DES BLESSURES DUES A DES DANGERS ELECTRIQUES, MECANIQUES OU AUTRES.

WARNUNG

- DIESES KUNDENDIENST-HANDBUCH EXISTIERT NUR IN ENGLISCHER SPRACHE.
- FALLS EIN FREMDER KUNDENDIENST EINE ANDERE SPRACHE BENÖTIGT, IST ES AUFGABE DES KUNDEN FÜR EINE ENTSPRECHENDE ÜBERSETZUNG ZU SORGEN.
- VERSUCHEN SIE NICHT, DAS GERÄT ZU REPARIEREN, BEVOR DIESES KUNDENDIENST-HANDBUCH NICHT ZU RATE GEZOGEN UND VERSTANDEN WURDE.
- WIRD DIESE WARNUNG NICHT BEACHTET, SO KANN ES ZU VERLETZUNGEN DES KUNDENDIENSTTECHNIKERS, DES BEDIENERS ODER DES PATIENTEN DURCH ELEKTRISCHE SCHLÄGE, MECHANISCHE ODER SONSTIGE GEFAHREN KOMMEN.

AVISO

- ESTE MANUAL DE SERVICIO SÓLO EXISTE EN INGLÉS
- SI ALGÚN PROVEEDOR DE SERVICIOS AJENO A GEMS SOLICITA UN IDIOMA QUE NO SEA EL INGLÉS, ES RESPONSABILIDAD DEL CLIENTE OFRECER UN SERVICIO DE TRADUCCIÓN.
- NO SE DEBERÁ DAR SERVICIO TÉCNICO AL EQUIPO, SIN HABER CONSULTADO Y COMPRENDIDO ESTE MANUAL DE SERVICIO.
- LA NO OBSERVANCIA DEL PRESENTE AVISO PUEDE DAR LUGAR A QUE EL PROVEEDOR DE SERVICIOS, EL OPERADOR O EL PACIENTE SUFRAN LESIONES PROVOCADAS POR CAUSAS ELÉCTRICAS, MECÁNICAS O DE OTRA NATURALEZA.
- ESTE MANUAL DE ASSISTÊNCIA TÉCNICA SÓ SE ENCONTRA DISPONÍVEL EM INGLÊS.

ATENÇÃO

- ESTE MANUAL DE ASSISTÊNCIA TÉCNICA SÓ SE ENCONTRA DISPONÍVEL EM INGLÊS.
- SE QUALQUER OUTRO SERVIÇO DE ASSISTÊNCIA TÉCNICA, QUE NÃO A GEMS, SOLICITAR ESTES MANUAIS NOUTRO IDIOMA, É DA RESPONSABILIDADE DO CLIENTE FORNECER OS SERVIÇOS DE TRADUÇÃO.
- NÃO TENHA TENTADO REPARAR O EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO ESTE MANUAL DE ASSISTÊNCIA TÉCNICA.
- O NÃO CUMPRIMENTO DESTA AVISO PODE POR EM PERIGO A SEGURANÇA DO TÉCNICO, OPERADOR OU PACIENTE DEVIDO A CHOQUES ELÉTRICOS, MECÂNICOS OU OUTROS.

AVVERTENZA

- IL PRESENTE MANUALE DI MANUTENZIONE È DISPONIBILE SOLTANTO IN INGLESE.
- SE UN ADDETTO ALLA MANUTENZIONE ESTERNO ALLA GEMS RICHIEDE IL MANUALE IN UNA LINGUA DIVERSA, IL CLIENTE È TENUTO A PROVVEDERE DIRETTAMENTE ALLA TRADUZIONE.
- SI PROCEDA ALLA MANUTENZIONE DELL'APPARECCHIATURA SOLO DOPO AVER CONSULTATO IL PRESENTE MANUALE ED AVERNE COMPRESO IL CONTENUTO.
- NON TENERE CONTO DELLA PRESENTE AVVERTENZA POTREBBE FAR COMPIERE OPERAZIONI DA CUI DERIVINO LESIONI ALL'ADDETTO ALLA MANUTENZIONE, ALL'UTILIZZATORE ED AL PAZIENTE PER FOLGORAZIONE ELETTRICA, PER URTI MECCANICI OD ALTRI RISCHI.

警告

- ・このサービスマニュアルは英語版がありません。
- ・GEMS以外でサービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行っていただきます。
- ・このサービスマニュアルを熟読し、理解せずに装置のサービスを行わないでください。
- ・この警告に従わない場合、サービスを担当される方、傍観員あるいは患者さんが、感電や機械的又はその他の危険により負傷する可能性があります。

注意:

- 本维修手册仅存有英文本。
- 非 GEMS 公司的维修员要求非英文本的维修手册时，客户需自行负责翻译。
- 未详细阅读和完全了解本手册之前，不得进行维修。
- 忽略本注意事项会对维修员，操作员或病人造成触电，机械伤害或其他伤害。

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SECTION 1 – INTRODUCTION

1.1 Safety Notices

The following safety notices are used to emphasize certain safety instructions. This guide uses the international symbol along with the danger, warning, or caution message. This section also describes the purpose of a Note.



Danger is used to identify conditions or actions for which a specific hazard is known to exist which will cause severe personal injury, death, or substantial property damage if the instructions are ignored.



Warning is used to identify conditions or actions for which a specific hazard is known to exist which may cause severe personal injury, death, or substantial property damage if the instructions are ignored.



Caution is used to identify conditions or actions for which a potential hazard may exist which will or can cause minor personal injury or property damage if the instructions are ignored.



Do Not Loop Cable Caution is used to identify conditions or actions for which a potential hazard of crossing or looping coil cables may exist which will or can cause minor personal injury or property damage if the instructions are ignored.

NOTE: A Note provides additional information that is helpful to you. It may emphasize certain information regarding special tools or techniques, items to check before proceeding, or factors to consider about a concept or task.

For all systems:



Observe the following warnings when using surface coils:

- Remove unplugged surface coils or unused accessory devices from the magnet bore; a patient burn can result.
- Remove blue wire-type ECG gating cables from the magnet bore before scanning with surface coils.
- Do not use blue wire-type ECG leads when you are doing gated surface coils scans. When they are used in the presence of a surface coil cable, the potential for heating increases. Use peripheral gating or thin-film ECG leads rather than blue wire-type ECG leads when you are doing gated surface coil scans.
- When using any coil, make sure the patient's body does not touch the magnet bore. Use thermal resistant material or padding

between the patient and the magnet to prevent burns that could be caused by patient contact with the interior of the magnet bore.

- Use only GE or GE-authorized accessory coils and cables.
- Do not use surface coils with exposed metal conductors or damaged insulation. Skin contact with metal conductors can cause burns.
- Use only accessories that are in good condition. If you suspect that an accessory is not in good condition, discontinue its use and contact your local GE service engineer.
- Keep the length of cable in the bore to a minimum. Avoid bending the cable 180 degrees, and route cables out of the bore in the most direct way.
- Route cables through the center of the magnet bore. Place cables under the cushion whenever possible. Routing near the sides of the bore increases the likelihood of cable heating (from induced currents).

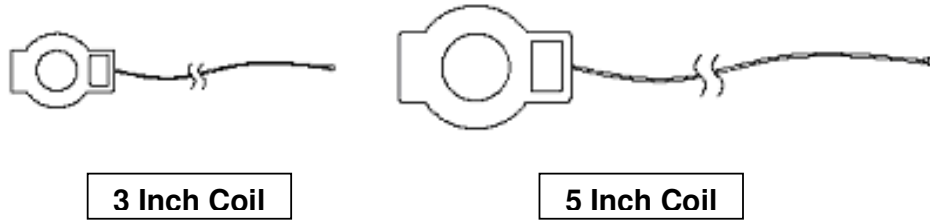


CAUTION

Do not cross or loop cables; arcing and patient burns can result. Do not allow the surface coil cable to touch the patient; patient burns can result. Use a thermal resistant material or pad to keep the cable from touching the patient.

1.2 Product Identification and Shipping List

This is a service manual for the GE SIGNA 1.0T 3-inch/1.5T 3-inch/1.5T-5-inch circular coils.



SHIPPING LIST – 1.0T 3-inch Circular Coil (M1885AG)

Description	GE Part#	QTY
1.0T 3 INCH COIL	46-307144G6	1
OPERATOR MANUAL	2162885-299	1

SHIPPING LIST – 1.5T 3-inch Circular Coil (M1085GA)

Description	GE Part#	QTY
1.5T 3 INCH COIL	2127315	1
OPERATOR MANUAL	2162885-299	1

SHIPPING LIST – 1.5T 5-inch Circular Coil (M1085HA)

Description	GE Part#	Qty
1.5T 5 INCH COIL	2127316	1
OPERATOR MANUAL	2162885-299	1

1.3 Compatibility

This coil is compatible with the following hardware configurations:

MR System	1.0T Coil	1.5T Coil
Signa [®] Horizon and LX Horizon 1.0T	✓	
Signa [®] Infinity 1.0T	✓	
Signa [®] Advantage 1.5T		✓
Signa [®] Horizon and LX Horizon 1.5T		✓
Signa [®] Twin <i>Speed 1.5T</i>		✓
Signa [®] Infinity 1.5T		✓
Signa [®] EXCITE 1.5T		✓
Signa [®] 1.5T HDx		✓
Signa [®] 1.5T HDe		✓

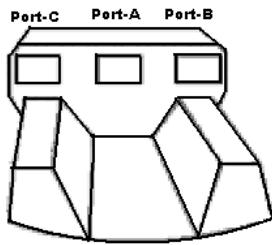
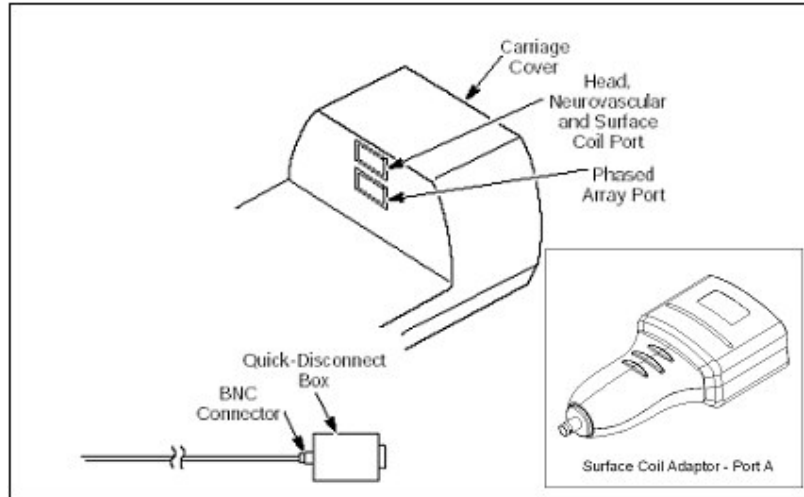
Circular Coils can be used in three configurations:

- Single Coil
- Dual Array (on systems with the Phased Array option)
- Dual Combiner (To be used only on Signa Advantage and earlier systems.)

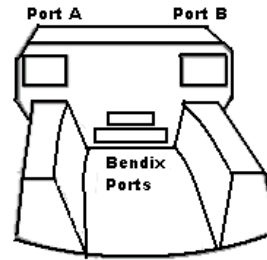


Dual Combiner Imaging of coils is not compatible with Signa Horizon and newer systems. The Dual Combiner Quick Disconnect should not be used on Signa Horizon and newer systems. Use of the Dual Combiner Quick Disconnect with surface coils may cause local patient warming. Always connect two loop coils to the Dual Array Adaptor during scanning, as scanning cannot be done with only one Loop coil connected to Dual Array Adaptor.

The Circular Coils include a cable, which attaches to the Surface Coil Quick-Disconnect (QD) box. The QD box plugs into the Surface Coil Port on the carriage cover. In a system equipped with the Phased Array option, the carriage cover includes a Phased Array Port. In HDx system carriage cover has three ports (A, B and C) whereas in HDe system there is only one port i.e. A-port.



Carriage cover for HDx



Carriage cover for upgraded HDx

Following are the Surface Coil Adaptor Part nos. to be used with different MR systems

Adaptor Part #	System	Port
46-317222G6	1T Systems	Surface Coil Port
2383623	1.5 Excite	Surface Coil Port
5140888	1.5T HDx/ HDe	Port A

Dual coils are typically mounted to the surface coil positioner, connected to the dual coil combiner box, and applied to the anatomy of interest.

The optional surface coil positioner holds two 3-inch or two 5-inch coils.

The Dual Array Adapter connects two surface coils to a phased array connector with a zippered/Velcro® sleeve to keep cables from crossing or looping. The Array configuration greatly improves the signal to noise performance.

Following are the Dual Array Adaptor Part nos. to be used with different MR systems

Adaptor Part #	System	Port
46-328215P2	1T Systems	Surface Coil Port
46-328215P1	1.5 Excite	Surface Coil Port
5140889	1.5T HDx/ HDe	Port A

1.4 Related Documentation

Signa® 3-inch & 5-inch Circular Coils Operator Manual CD, 2162885-299

1.5 Environmental Requirements

Storage Requirements

Category	Value
Ambient Temperature	-40 to 70 °C
Relative Humidity	10% to 100 %
Atmospheric Pressure	500 hPa to 1060 hPa

Dimensions (For reference only)

Description	Part No.	Inner Diameter	Outer Diameter
Loop Coil 1.0T 3-inch	46-307144G6	6.48 cm (2.55 in)	10.67 cm (4.20 in)
Loop Coil 1.5T 3-inch	2127315	6.48 cm (2.55 in)	10.67 cm (4.20 in)
Loop Coil 1.5T 5-inch	2127316	10.87 cm (4.28 in)	18.14 cm (7.14 in)

Weight (For reference only)

Description	Part No.	Weight (Max)
Loop Coil 1.0T 3-inch	46-307144G6	280gms (0.62lb)
Loop Coil 1.5T 3-inch	2127315	285gms (0.63lb)
Loop Coil 1.5T 5-inch	2127316	440gms (0.97lb)

1.6 Theory of Operation

The circular coils are receive only coil. The body coil transmits the RF signal and circular coil receives the signal generated by the anatomy of interest. The circular coil includes a cable, which attaches to the surface coil Quick-Disconnect (QD) box. The QD box plugs into the surface coil port on the carriage cover.

- The coils are circular in shape and placed on the anatomy of interest.
- The coils are labeled with "THIS SIDE TOWARD PATIENT," to ensure proper placement of the coil.
- 3-inch coils (1.0T/1.5T) can be combined with another 3-inch GP for dual TMJ, Orbit and IAC (Internal Auditory Canal) imaging.

The coil are indicated for use, on the order of a physician in conjunction with respective MR scanner, as an accessory to produce images of various body parts not limited to extremity imaging in both 2D and 3D scan modes.

The sensitive volume, and uniform signal intensity of the 3 inch GP Coil provides possible evaluation of the following anatomy: Orbit, foot, hand, IAC, ankle, wrist and spines.

The 5-inch circular coil is a medium size surface coil used for variety of imaging applications. This allows improved SNR for imaging of medium-sized parts and/or parts near the surface of the body.

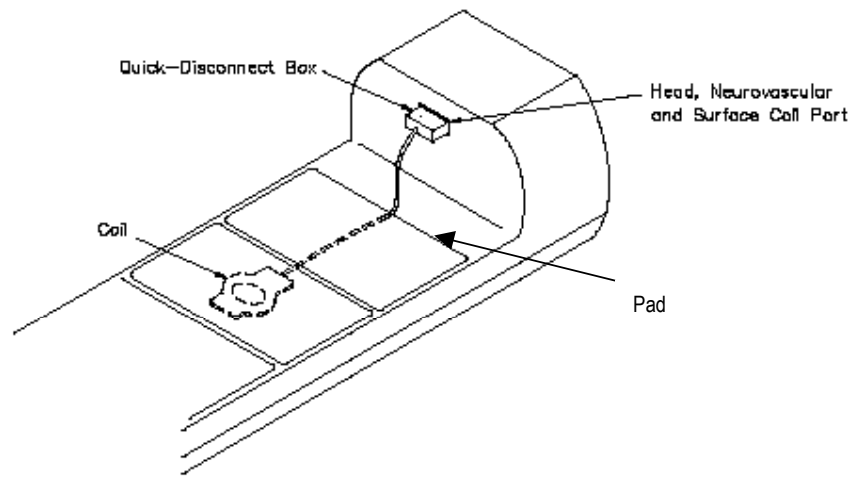
The sensitive volume, and uniform signal intensity of the 5-inch GP Coil provides possible evaluation of the following anatomy:

Cervical Spine
Thoracic Spine
Lumbar Spine
Shoulder
Ankle
Foot

SECTION 2 - SETUP PROCEDURE

2.1 Single Coil Set-Up Procedure

1. Place the Coil in the bottom of the circular coil pad, with the smooth side or the side with the "THIS SIDE TOWARD PATIENT" LABEL FACING THE PATIENT" label facing the patient.
2. Route the coil cable through the slots in the bottom of the pad.

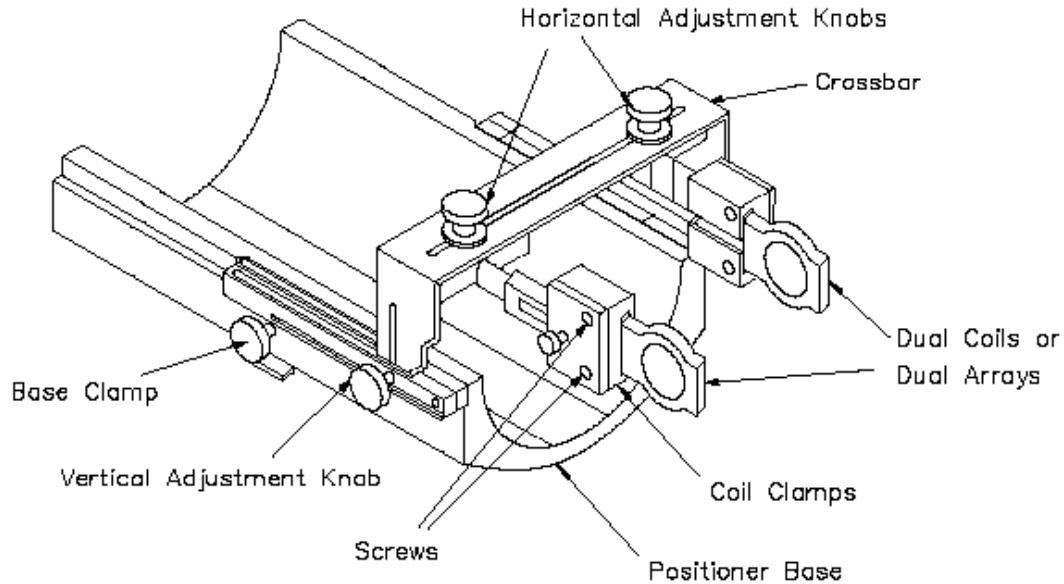


3. Secure the coil with the Velcro® strap.
4. Anchor the circular coil pad.
 - Slide the small tabs, located on the pad, into the grooves on the sides of the patient table.
 - Secure the pad with the Velcro® straps.
5. Use additional pads on the patient table, as needed, for patient comfort.
6. Connect the coil cables to the Quick-Disconnect Box, and then plug the box into the Surface Coil Port on the patient table.
7. Provide earplugs for the patient.
8. Landmark the center of the coil using the two intersecting lines on the top of the coil pad.
9. Press Advance To Scan.
10. Proceed with scan protocol, selecting the appropriate surface coil key.

Velcro® is a registered trademark of Velcro Industries B.V.

2.2 Dual Array and Dual Coil Set-Up Procedure

Preparing the Eye/Ear surface Coil Holder



Eye/Ear Surface Coil Holder

1. Place the Eye/Ear Surface Coil Holder on the patient table, aligning the patient table locks with the cutouts at the docking end of the table.
2. Turn the locking mechanism clockwise until tight. Hand tighten only.

Note: In some applications, it is necessary to reverse the Eye/Ear holder on the patient table 180 degrees horizontally to enhance patient comfort.

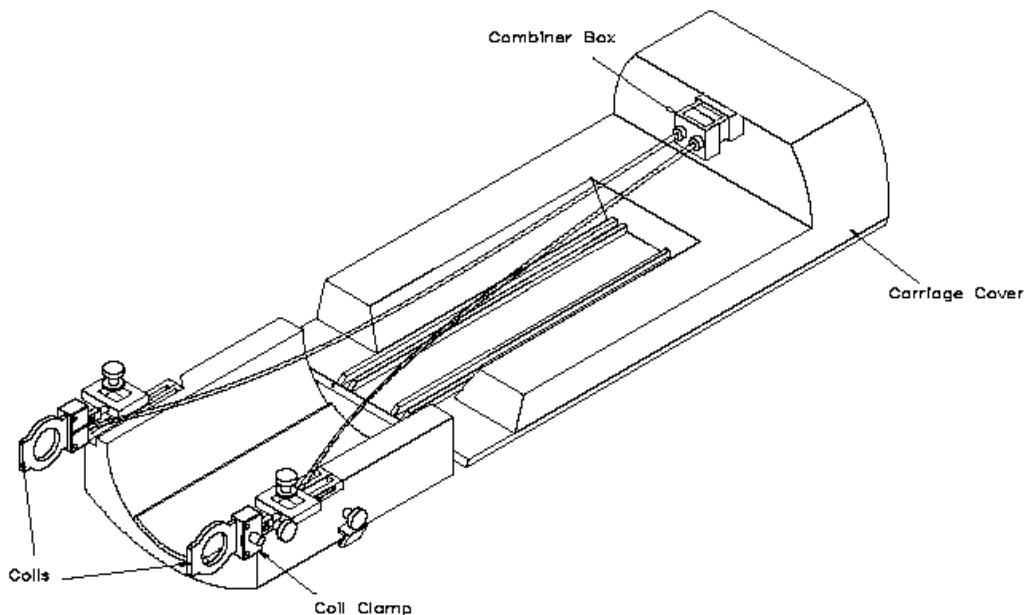
3. To insert coils into the positioner.
 - a. Loosen the two side screws on the positioner.
 - b. Insert the coils and re-tighten the side screws. The coils should be mounted in the adjustable clamps with the side labeled, "THIS SIDE TOWARD PATIENT" facing toward the patient.
 - c. Mount the 3-inch (7.5 cm) coils with the sides labeled, "THIS SIDE TOWARD PATIENT" facing each other, or
 - d. Mount the 5-inch (12.5 cm) coils like spoons, with both sides labeled, "THIS SIDE TOWARD PATIENT" facing in the same direction.
4. Position the coils parallel to the anatomy of interest, bringing them as close as possible without actually touching the patient.
 - a. If necessary, adjust the crossbar vertically, horizontally, or at an angle by loosening and tightening the vertical and horizontal adjustment knobs on either side of the bar.

- b. Adjust the clamp holding each coil to any position along the length of the crossbar by loosening the knob on the top of the clamp.
- c. To angle a coil up or down as well as side-to-side. Slide the adjustable surface coil clamp out to the end of its extension.



When positioning coils using the Eye/Ear Surface Coil Holder, hold the crossbar in one hand while releasing each adjustment screw. This prevents bar from falling or angling over the patient's face.

5. Provide earplugs for the patient. If needed, assist patient with earplug insertion.
6. Immobilize the anatomy of interest with the positioning sponges provided with the Eye/Ear Surface Coil Holder.
7. Connect the coil cables to the dual coil Combiner Box, or Dual Array adapter for phased arrays.
8. Plug the box into the Surface Coil Port, or the phased Array Port for phased arrays, on the carriage cover.



9. Landmark to the center of the coils
10. Press Advance To Scan.
11. Proceed with scan protocol, selecting the appropriate surface coil for the coil window, or entering the appropriate type-in command.

SECTION 3 – QUALITY ASSURANCE (QA)

Description: Check the coil for imaging integrity every day it is used. Perform the Quality Assurance (QA) check during the morning QA routine.

The QA check includes the QA scan, a Visual inspection of the coil phantom image and a calculation of the signal-to-noise ratio at the center of the field of view.

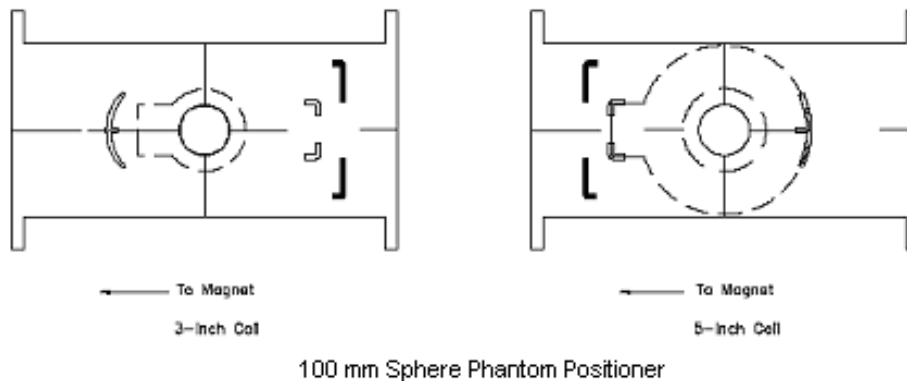
3.1 Signa Horizon and Earlier Systems

3.1.1 Single Coil QA Setup

1. When scanning phantoms with coils, always remove the Head Coil or any other coil from the patient table.
2. Position each coil with the cable-end of the coil facing the magnet bore.
3. Place the Circular Coil under the Common Positioner.
4. Place a 100 mm Sphere Phantom (Part No. 46-317586G1) on top of the positioner.
5. The Cable exiting the Circular Coil aligns with the cutout on the positioner.

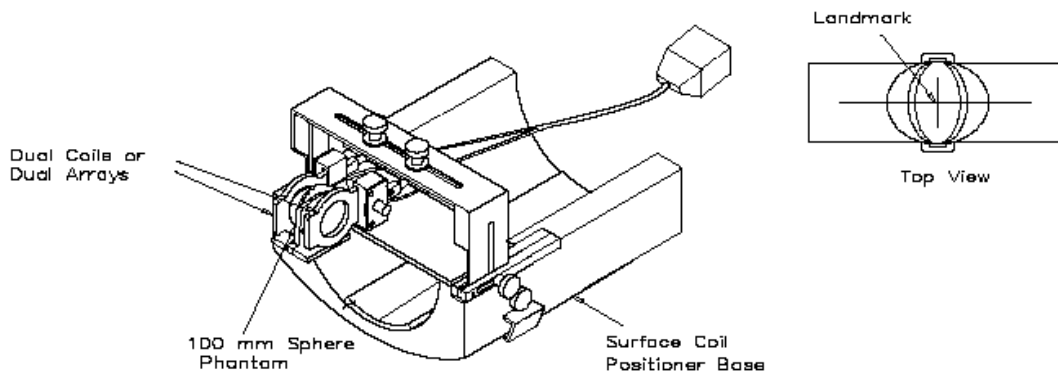
Note: The positioner orientation differs between coil sizes.

6. Landmark the center of the coil using the two intersecting lines on the positioner. This correlates to the center of the phantom.
7. Press Advance To Scan.
8. Proceed with scan protocol (section 3.1.3), selecting the appropriate surface coil.



3.1.2 Dual Array and Dual Coil QA Setup

1. Place the Eye/Ear Surface Coil Holder on the patient table, aligning the patient table locks with the cutouts at the docking end of the table.
2. Turn the locking mechanism clockwise until tight. **Hand tighten only.**
3. To insert coils into the positioner.
 - a. Loosen the two side screws on the positioner.
 - b. Insert the coils and re-tighten the side screws. The coils should be mounted in the adjustable clamps with the side labeled, "THIS SIDE TOWARD PATIENT" facing toward the patient.
 - c. Mount the 3-inch (7.5 cm) coils with the sides labeled, "THIS SIDE TOWARD PATIENT" facing each other, or
 - d. Mount the 5-inch (12.5 cm) coils like spoons, with both sides labeled, "THIS SIDE TOWARD PATIENT" facing in the same direction.
4. Position the coils parallel to each other.
5. Place the Phantom Positioner across the Surface Coil Positioner Base.



6. Mount a 100 mm Sphere Phantom (Part No. 46-317586G1) between the two parallel coils using the Phantom Positioner to secure the phantom.
7. Landmark on the sagittal center of the coil and vertical mark on the side of the coil.
8. Press Advance To Scan.
9. Proceed with the scan protocol (section 3.1.3) selecting the appropriate surface coil key.

3.1.3 The QA Scan Protocol

Procedure: The following is the QA scan protocol for this coil at all Horizon and earlier systems. Either build a protocol for this coil or prescribe the following scan parameters when running a QA phantom. Proceed with the QA scan procedure.

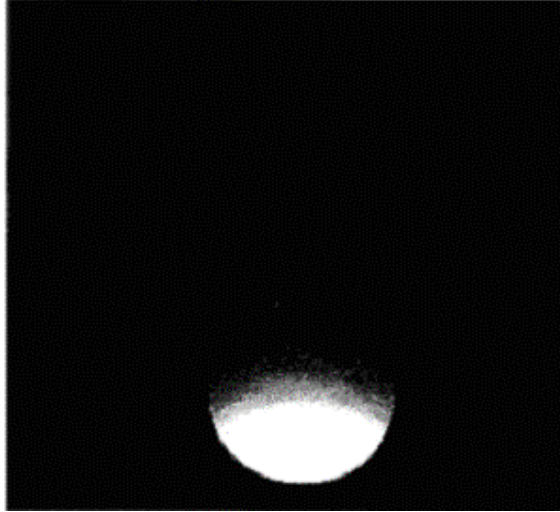
Screen	Parameter	Signa Value/Key Selection
Patient Register Area		[New Patient] / [New Exam]
Patient / Exam Information	ID	QA
	Name	(Type in the coil name)
	Patient Weight	100 lbs (45kg)
Patient Position	Patient Entry	[Head First]
	Patient Position	[Supine]
	Landmark	
	Coil Type	
	Scan Plane	[Axial]
Imaging Parameters	Image Mode	[2D]
	Pulse Sequence	[Spin Echo]
	Imaging Options	Variable Bandwidth
Scan Timing	Number of Echoes	[1]
	Echo Time (TE)	[25 msec]
	Rep Time (TR)	[300 msec]
	Bandwidth	15.63
Scan Range	Field of View (FOV)	[24 cm]
	Scan Thickness	[5 mm]
	Interscan Spacing	[0 mm]
	Start Location	0
	End Location	0
	No. of Scan Locations	1
	FOV Center	0 L/R 0 A/P
Acquisition Timing	Acq. Matrix (freq)	[256]
	Acq. Matrix (phase)	[256]
	Frequency Direction	[R/L]
	NEX	[2 NEX]
	Phase FOV	[24 cm] [1]
	Autoshim	[On]
	Auto CF	[Peak]

3.1.4 The QA Scan Procedure

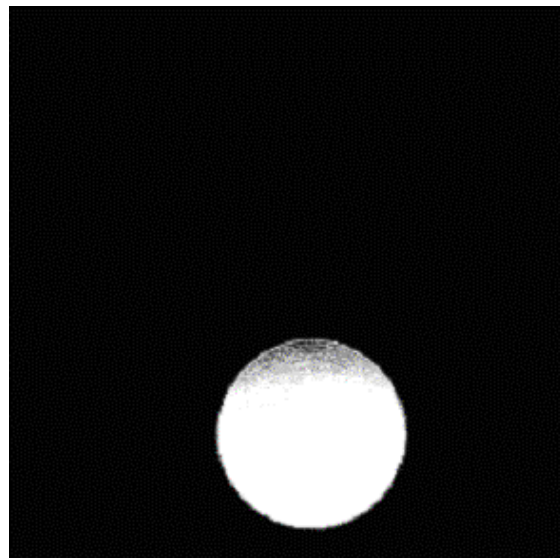
1. Perform [Auto Prescan].
2. If [Auto Prescan] ends abnormally, confirm that the surface coil name selected matches the coil.
3. If the entry is correct, enter the scan room and make sure the coil connector box is properly seated into the appropriate port.
4. Repeat the [Auto Prescan] function again.
5. If [Auto Prescan] fails second time, perform a [Manual Prescan].
6. Confirm that the scan parameters selected in [Manual Prescan] represent normal, proper coil operation.
7. If [Manual Prescan] cannot be completed successfully, refer the coil to your GE Service engineer and **DO NOT USE CLINICALLY**.
8. Record successful Auto or Manual Prescan in your daily log sheet:
 - Center Frequency;
 - Transmit Gain;
 - Receive Gain.
9. Refer to your system's Scan Reference Guide for further details on Auto prescan or Manual Prescan.
10. Proceed with the visual inspection.

3.1.5 Visual Inspection

Description: When a surface coil is working normally, a QA scan produces a normal image showing no holes or other artifacts. Determine a window width and window level to use for the daily visual inspection.



The QA Setup – Single Coil
Visual Inspection



The QA Setup - Dual Coils and Dual Array
Visual Inspection

3.1.6 Signal-To-Noise Check

Description

Since a significant decrease in the signal-to-noise ratio (SNR) may not be visually obvious on a phantom image, perform a daily ROI (region of interest) Check. Compare this SNR data with the last acquired data.

Considerations

The same scan parameters, phantom, coil position, table position and workstation must be used every time to be consistent with the baseline scan.

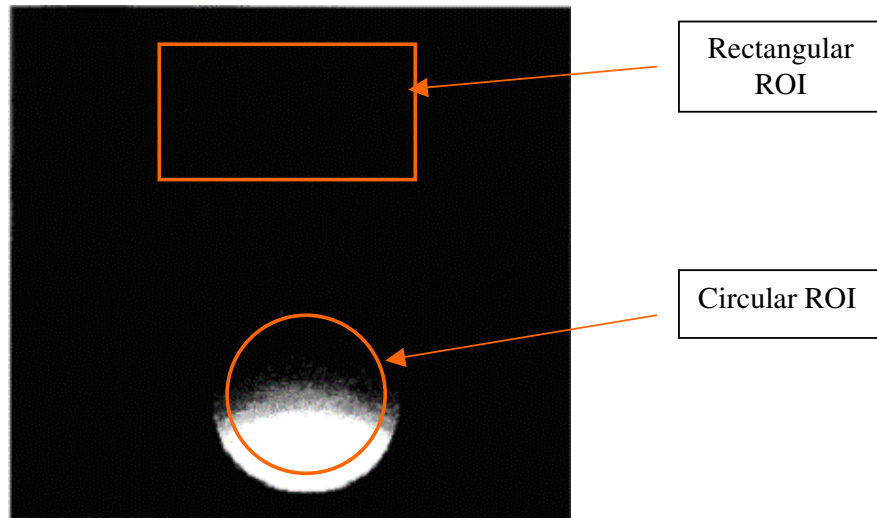
Procedure

1. Select the phantom image.
2. Select the circular cursor.
3. Select the ROI 80% of the phantom image.
4. Position the circular cursor at the center of the phantom image.
5. Perform a region of interest (ROI) on the phantom.
6. Record the phantom ROI's mean pixel value and standard deviation.
7. Position the rectangular cursor in the background of the phantom image in an area free of artifacts.
8. Perform an ROI on the background.
9. Record the background ROI's mean pixel value and standard deviation.
10. Calculate the image's signal-to-noise ratio using this equation: phantom mean pixel divided by background standard deviation.
11. Proceed with the filling of QA sheet (Page-33).

For example:

	Mean Pixel	Standard Deviation
Phantom ROI	176	5
Background ROI	55	1.5
Signal-to-Noise Ratio	$176 \div 1.5 = 117.3$	

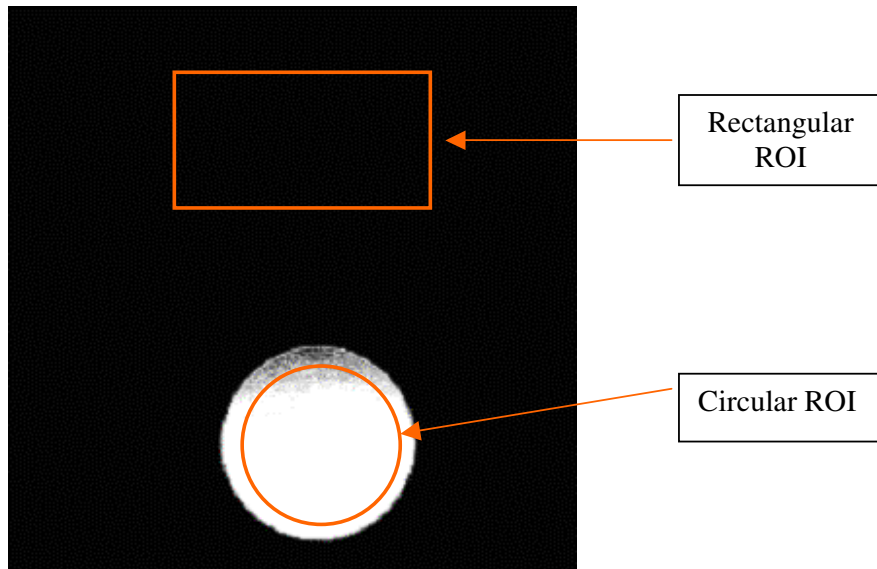
Signal-To-Noise Check, cont'd



Rectangular ROI

Circular ROI

The QA Setup – Single Coil
Signal to Noise Ratio Check



Rectangular ROI

Circular ROI

The QA Setup - Dual Coils and Dual Array
Signal to Noise Ratio Check

Example ROIs

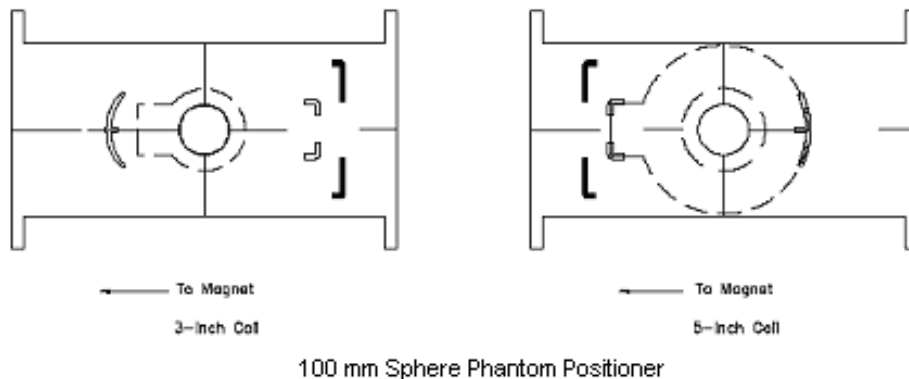
3.2 Signa Horizon and Later Systems

3.2.1 Single Coil QA Setup

1. When scanning phantoms with coils, always remove the Head Coil or any other coil from the patient table.
2. Position each coil with the cable-end of the coil facing the magnet bore.
3. Place the Circular Coil under the Common Positioner.
4. Place a 100 mm Sphere Phantom (Part No. 46-317586G1) on top of the positioner.
5. The Cable exiting the Circular Coil aligns with the cutout on the positioner.

Note: The positioner orientation differs between coil sizes.

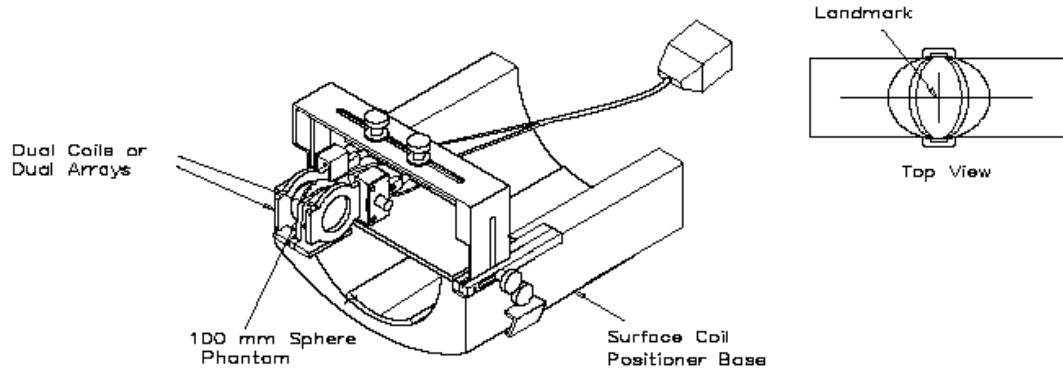
6. Landmark the center of the coil using the two intersecting lines on the positioner. This correlates to the center of the phantom.
7. Press Advance To Scan.
8. Proceed with scan protocol (section 3.2.3), selecting the appropriate surface coil.



3.2.2 Dual Array QA Setup

1. Place the Eye/Ear Surface Coil Holder on the patient table, aligning the patient table locks with the cutouts at the docking end of the table.
2. Turn the locking mechanism clockwise until tight. **Hand tighten only.**
3. To insert coils into the positioner.
 - a. Loosen the two side screws on the positioner.
 - b. Insert the coils and re-tighten the side screws. The coils should be mounted in the adjustable clamps with the side labeled, "THIS SIDE TOWARD PATIENT" facing toward the patient.
 - c. Mount the 3-inch (7.5 cm) coils with the sides labeled, "THIS SIDE TOWARD PATIENT" facing each other, or

- d. Mount the 5-inch (12.5 cm) coils like spoons, with both sides labeled, "THIS SIDE TOWARD PATIENT" facing in the same direction.
4. Position the coils parallel to each other.
5. Place the Phantom Positioner across the Surface Coil Positioner Base.



6. Mount a 100 mm Sphere Phantom (Part No. 46-317586G1) between the two parallel coils using the Phantom Positioner to secure the phantom.
7. Landmark on the sagittal center of the coil and vertical mark on the side of the coil.
8. Press Advance To Scan.
9. Proceed with the scan protocol (section 3.2.3) selecting the appropriate surface coil key.

3.2.3 The QA Scan Protocol

Procedure: The following is the QA scan protocol for this coil at all Horizon and later systems. Either build a protocol for this coil or prescribe the following scan parameters when running a QA phantom. Proceed with the scan procedure.

Signal Protocol

Patient Information

ID: **geservice**

Name: (Type in the coil name)

Patient Weight: **111 lbs.**

Patient Position

Patient position: **Supine**

Patient entry: **Head First**

Coil: (Type according to the coil used)

Series Description: **Signal**

Imaging Parameters

Plane: **Axial**

Mode: **2D**
Pulse Seq.: **FSE**
Imaging Options: **Fast**
PSD Name: *leave blank*
Protocol: *leave blank*

Scan Timing

of Echoes: **1**
TE: **17**
TR: **500**
Echo Train Length: **4**
Bandwidth: **15.63**

Additional Parameters

No entries required in this area

Acquisition Timing

Freq.: **256**
Phase: **256**
NEX: **1**
Phase FOV: **1.00**
Freq. DIR: **R/L**
Auto Center Freq.: **Peak**
Autoshim: **on**
Phase Correct: **on**
Contrast: **off**
of Reps Before Pause: **0**

Scan Range

FOV: **24**
Slice Thickness: **5**
Spacing: **10**
Start: **S15**
End: **I15**

Select [**Save Series**] then [**Prepare to Scan**]. Select [**Auto Prescan**]. Record the R1 R2 and TG values obtained, then select [**Scan**].

Noise Protocol

It is assumed that the previous signal series was just completed. The same R1, R2 .TG and Bandwidth, prescan values from the previous signal scan are used for the noise scan.

Patient Information

ID: **geservice**
Name: (Type in the coil name)
Patient Weight: **111 lbs.**

Patient Position

Patient position: **Supine**
Patient entry: **Head First**
Coil: (Type according to the coil used)

Series Description: **Noise**

Imaging Parameters

Plane: **Axial**

Mode: **2D**

Pulse Seq: **GRE**

Imaging Options: **None**

PSD Name: *leave blank*

Protocol: *leave blank*

Scan Timing

of Echoes: **1**

TE: **Min Full**

TR: **34**

Flip Angle: **1**

Bandwidth: **15.63**

Additional Parameters

No entries required in this area

Acquisition Timing

Freq: **256**

Phase: **256**

NEX: **1**

Phase FOV: **1.00**

Freq DIR: **R/L**

Auto Center Freq: **Peak**

Autoshim: **on**

Scan Range

FOV: **24**

Slice Thickness: **5**

Spacing: **10**

Start: **S15**

End: **I15**

Prior to the scan, open the **[Display CVs]** menu under *Research Operations*. To obtain the noise images, set the “**rhformat**”, and “**do_noise**” CVs to 1. Start **[Manual Prescan]** look at the power spectrum and verify R1, R2, TG, and Bandwidth have not changed from the previously completed signal scan. **[Select Done]** and exit without changing any parameters. **[Select Scan]**.

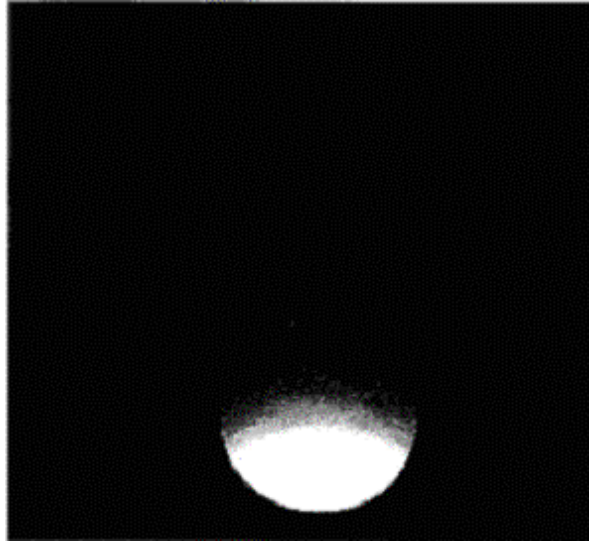
3.2.4 The QA Scan Procedure

1. Perform [Auto Prescan].
2. If [Auto Prescan] ends abnormally, confirm that the surface coil name selected matches the coil.
3. If the entry is correct, enter the scan room and make sure the coil connector box is properly seated into the appropriate port.
4. Repeat the [Auto Prescan] function again.
5. If [Auto Prescan] fails second time, perform a [Manual Prescan].
6. Confirm that the scan parameters selected in [Manual Prescan] represent normal, proper coil operation.
7. If [Manual Prescan] cannot be completed successfully, refer the coil to your GE Service engineer and **DO NOT USE CLINICALLY**.
8. Record successful Auto or Manual Prescan in your daily log sheet:
 - a. Center Frequency;
 - b. Transmit Gain;
 - c. Receive Gain.
9. Refer to your system's Scan Reference Guide for further details on Auto Prescan or Manual Prescan.
10. Proceed with the visual inspection.

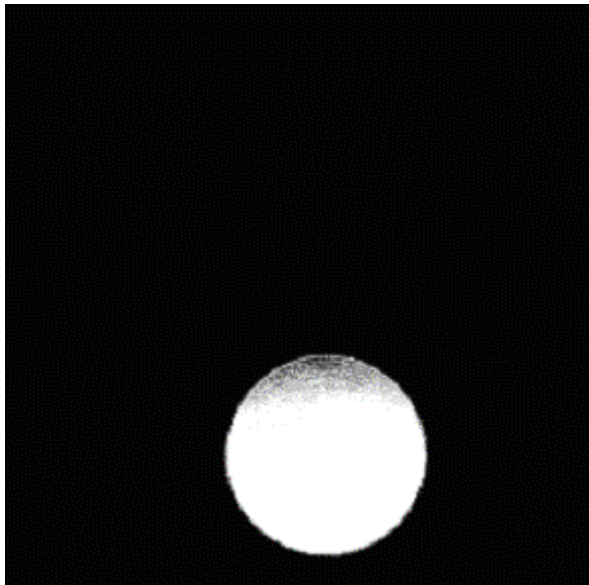
3.2.5 Visual Inspection

Description

When a surface coil is working normally, a QA scan produces a normal image showing no holes or other artifacts. Determine a window width and window level to use for the daily visual inspection.



The QA Setup – Single Coil
Visual Inspection



The QA Setup - Dual Coils and Dual Array
Visual Inspection

3.2.6 Signal-To-Noise Check

Description

Since a significant decrease in the signal-to-noise ratio (SNR) may not be visually obvious on a phantom image, perform a daily ROI (region of interest) check. Compare this SNR data with the last acquired data.

Considerations

The same scan parameters, phantom, coil position, table position and workstation must be used every time to have a consistent baseline.

Image Analysis

Regions of interest in both signal and noise images can be measured in the image browser.

Signal Analysis

1. Choose the image No.1 on the image obtained under the SIGNAL series
2. Click the button [measure]
3. Choose the circular shape under that
4. Choose ROI as 80%.
5. Note down the Signal mean value.
6. Similarly note down the signal mean value for image 2 and 3.
7. Make sure that image 1 and 3 are of the same size.

Noise Analysis

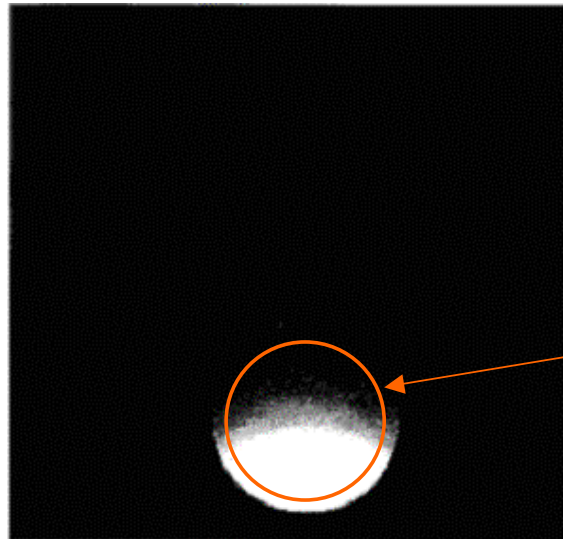
1. Choose the image No.1 on the image obtained under the NOISE Series.
2. Click the [measure] button
3. Choose the square shape under that.
4. Choose the ROI as 100%.
5. Note down the noise Std. Dev.
6. Similarly note down the noise Std. Dev. value for image 2 and 3
7. Proceed with the filling of QA sheet (Page-33).

$$\text{SNR} = (\text{Signal Mean Value})/(\text{Noise Std. Dev.})$$

Signal-To-Noise Check, cont'd

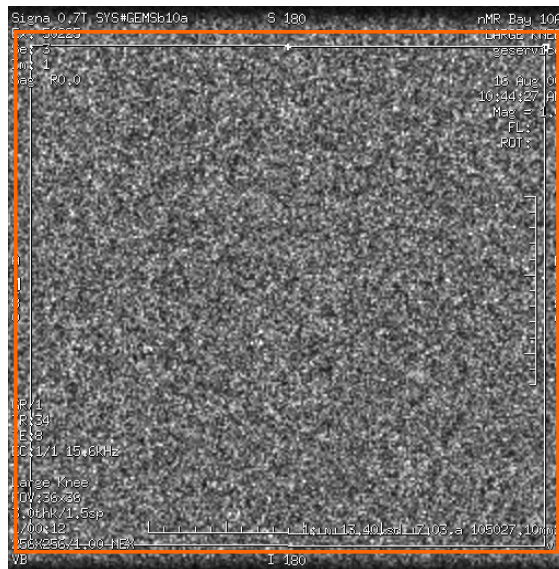
For example:

	Mean Pixel	Standard Deviation
Phantom ROI	176	5
Background ROI	55	1.5
Signal-to-Noise Ratio	$176 \div 1.5 = 117.3$	



SIGNAL SCAN

Circular ROI



NOISE SCAN

Rectangular ROI

3.3 SNR Specification

The SNR measurements must be greater than or equal to the following specifications:

SNR SPECIFICATIONS

Coil	SNR
1.0T 3-inch circular coil	460.0
1.5T 3-inch circular coil	450.0
1.5T 5-inch circular coil	430.0

3.4 External Cable Check

No cable continuity checking is recommended for the connector because of pin damage concerns.

3.5 PIN Diodes Check

Not Applicable

3.6 Mechanical Hardware Check

Not Applicable

3.7 Troubleshooting Tips

Not Applicable

SECTION 4 - MAINTENANCE

4.1 Cleaning Tips:

The Loop Coil must be cleaned and stored using the following procedures after every patient scan or sooner according to usage:

- To clean, use a mild soap and water solution.
- The Coil should be stored in a protected area (from both temperature and accessibility) to prevent damage.
- If necessary, a 10% bleach solution can be used for more rigorous cleaning; however, some discoloration of Coil may occur.
- Do not soak the coil or apply excessive cleaning solution to the coil or the cable connection area.

4.2 Storage:

Store the coil in an air-conditioned scan room or equipment room.

To store the coil, a storage space of 445 mm(Length) x 295 mm(Breadth) x 110 mm (height) is required.

4.3 Disposal

For the disposal of this coil at the end of its useful life, please contact the Service personnel.



This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact the manufacturer or other authorized disposal company to decommission your equipment.



To avoid possible damage to equipment, do not use solutions containing amines, strong alkalis, esters, iodine, aromatic or chlorinated hydrocarbons, or ketones. Do not use autoclaves or the industrial washers and dryers found in most hospitals or professional laundry services.

4.4 Special Care Requirements

None

SECTION 5 - REPLACEMENT

No replacement parts.

SECTION 6 - RENEWAL PARTS

Coil in itself is a Field Replaceable Unit.

Following is the list of spare parts:

Description	GE Part#
1.0T 3 Inch Coil	46-307144G6
1.5T 3 Inch Coil	2127315
1.5T 5 Inch Coil	2127316
Surface Coil Adaptor (1T Systems, Surface Coil Port)	46-317222G6
Surface Coil Adaptor (1.5 Excite, Surface Coil Port)	2383623
Surface Coil Adaptor (1.5T HDx/ HDe, Port A)	5140888
Dual Array Adaptor (1T Systems, Surface Coil Port)	46-328215P2
Dual Array Adaptor (1.5 Excite, Surface Coil Port)	46-328215P1
Dual Array Adaptor (1.5T HDx/ HDe, Port A)	5140889

REVISION HISTORY

Rev	Date	Author	Primary Reason for Change
1	07 th Jan 2008	Himanshu Pathak	Initial Release