

Operator Manual Model M1085GF

1.5T GP Flex Coil Operator Manual



Manufactured for GE Medical Systems
By GE Medical Systems X-Ray (S. Asia) Ltd.
No. 122, (Part I), Export Promotion Industrial Park
Whitefield, Bangalore 560 066, India.



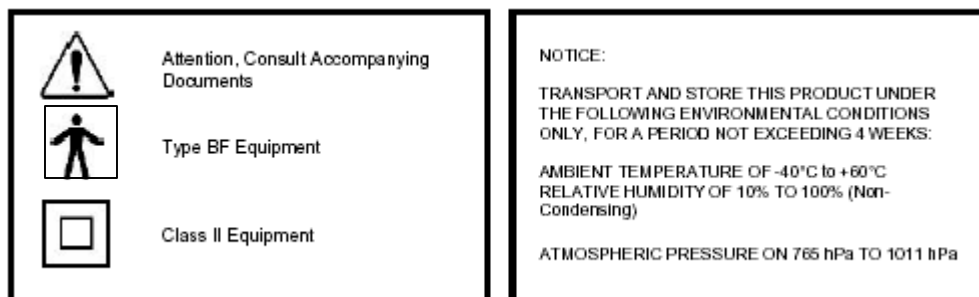
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Signa, and Signa system are registered trademarks of the General Electric Company. Proper performance of this coil is guaranteed only while the coil is being used on the MR system (hardware/software level) specified at the time of purchase. Upgrades or other modifications to the system software and /or hardware may affect compatibility. Prior to upgrading your MR system, Please contact your GE Medical representative to discuss coil compatibility issues. Failure to do so may void your warranty.

Medical Device Directive

These products conform to the requirements of council directive 93/42/EEC concerning medical devices when they bear the following CE mark of conformity:



Caution:
Federal law restricts this device to sale by or on the order of a physician.

Introduction

This manual describes the safety precautions, features, use and care of GP Flex Coil Model M1085GF, compatible with the GE Signa MRI System. Please review this manual thoroughly before using the device.

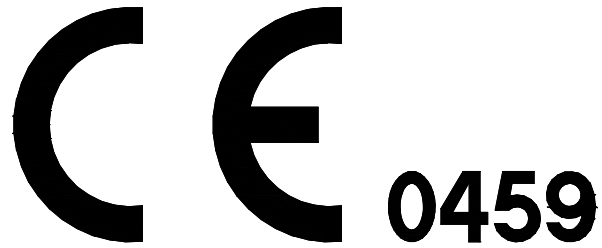
If you have any questions or comments on this manual, or need any assistance with the use of the product, Please contact your GE Medical systems representative at:

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Medical Device Directive

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The manufacturer is not responsible for any interference caused by using other than recommended interconnect cables or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the users' authority to operate the equipment.

Do not use devices, which intentionally transmit RF Signals (cellular phones, transceivers, or radio controlled products) in the vicinity of this equipment as they may cause performance outside the published specifications. Keep the power to these types of devices turned off when near this equipment.

The medical staff in charge of this equipment is required to instruct technicians, patients, and other people who may be around this equipment to fully comply with the above requirement.

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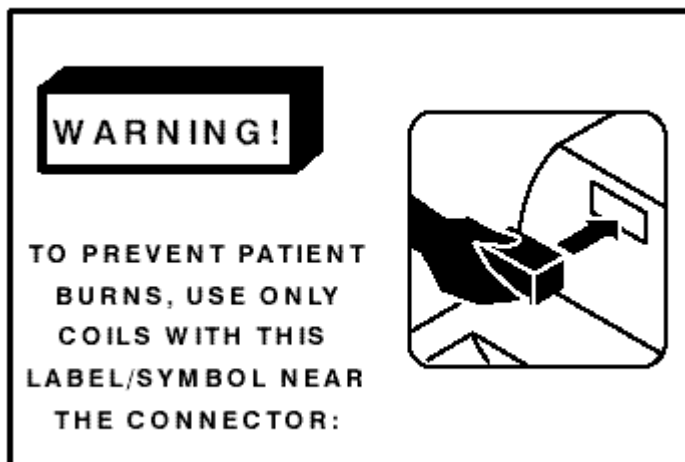
Chapter 1-Safety



WARNING: The coil is compatible with the Systems mentioned below.

Signa Horizon 1.5T
Signa Horizon LX 1.5T
Signa Twin Speed 1.5T
Signa Infinity 1.5T
Signa Infinity Twin Speed 1.5T
Signa CV/i 1.5T
Signa MR/i 1.5T

Older Signa Advantage coils are not compatible with Signa systems mentioned above and should not be used. The 1.5T GP Flex Coil compatible with the above systems can be identified by this label (This label is located on the coil itself and on the head carriage where the coil connector plugs in.):



For all Systems



WARNING: 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 coil 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).

Do not cross or loop cables; arcing and patient burns can result.

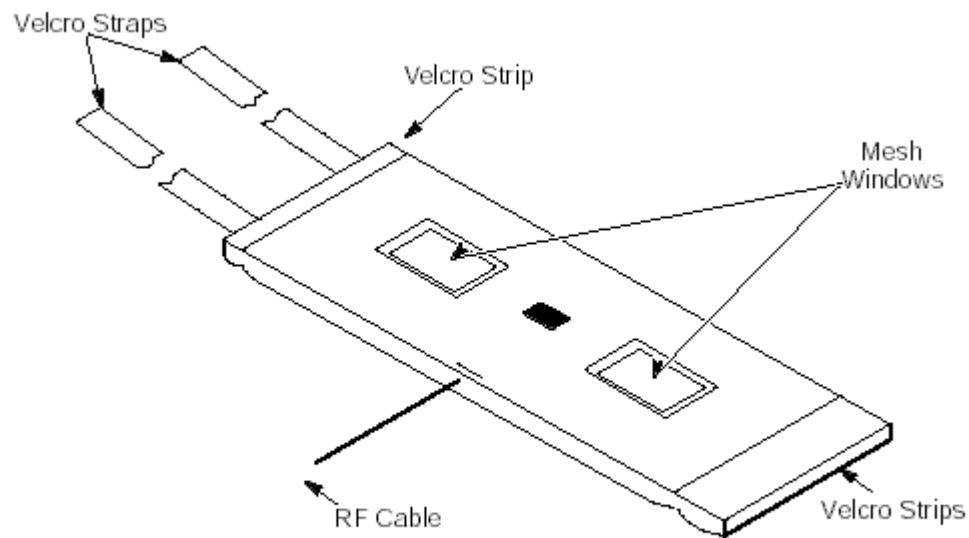
The GPFLEX Coil should not be used in Phased Array Mode.

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.

Chapter 2- Using the GP Flex Coil

Description

The General Purpose (GP) Flex Coil is a receive-only coil composed of a pair of electronically summed surface coils. The coil is flexible and wraps around the anatomy of interest.



Background

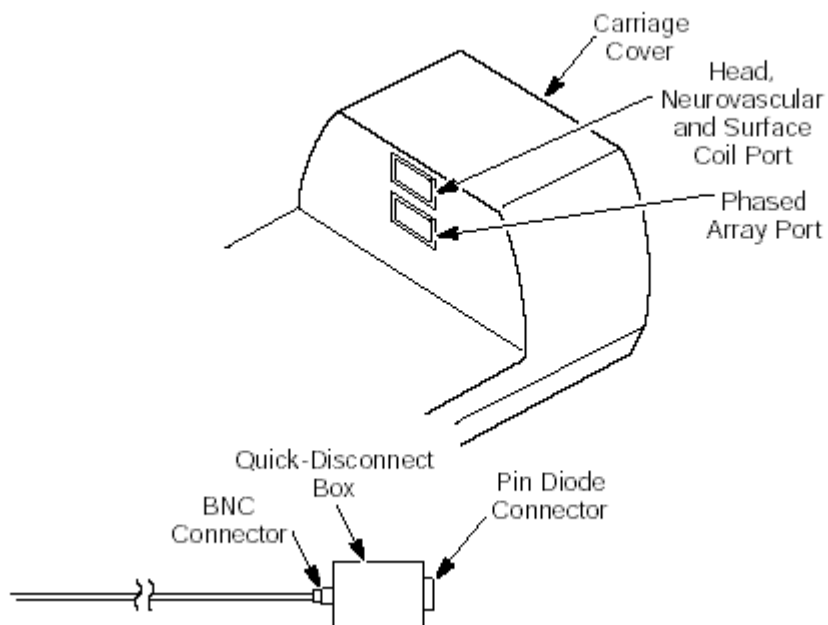
The General Purpose Flex Coil consists of two 5-inch by 6.5-inch (13 cm x 17 cm) surface coils that are electronically summed to create a corotating “saddle” coil pair.

The two coils are in a flexible material, covered with fabric. This allows the General Purpose Flex Coil to bend in one direction, making it easy to wrap around the anatomy of interest. The coil is labeled with “THIS SIDE TOWARD PATIENT,” to ensure proper placement of the coil. The General Purpose Flex Coil has the following specifications:

Dimensions: 56 cm wide (not including straps) by 22 cm wide.

It has two mesh “windows” which indicate the open center of the two coils and aid in positioning.

Two 30 inch (76 cm) straps are attached to one end of the coil fabric;



the undersides of these straps are covered with Velcro. The other end and the center of the coil have Velcro hook strips.

The long RF cable has a BNC connection that attaches to the surface coil's Quick Disconnect Box and inserts into the Surface Coil Port for

- Signa Horizon 1.5T
- Signa Horizon LX 1.5T
- Signa Twin Speed 1.5T
- Signa Infinity 1.5T
- Signa Infinity Twin Speed 1.5T
- Signa CV/i 1.5T
- Signa MR/i 1.5T

MR systems.

The General Purpose Flex Coil selection in scan is [GP FLEX].

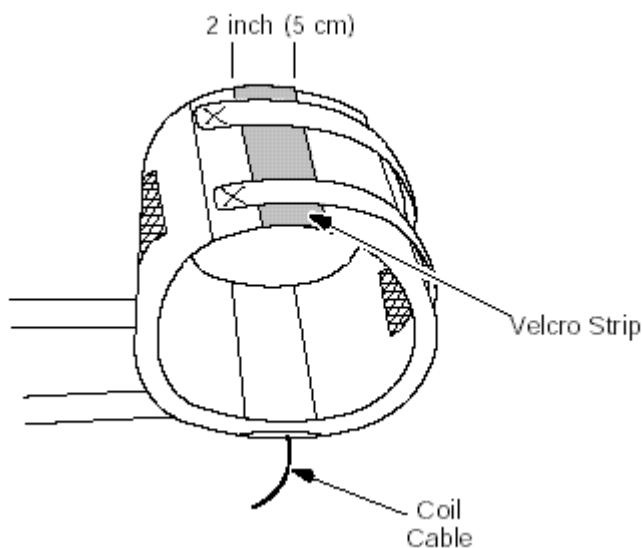
Aligned properly, the coil pair provides exceptional uniformity across the sensitive volume of the coil, with a minimum of bright spots or high-intensity areas. Some deviation from the optimal position of the coil does not significantly degrade the uniformity.

Applications

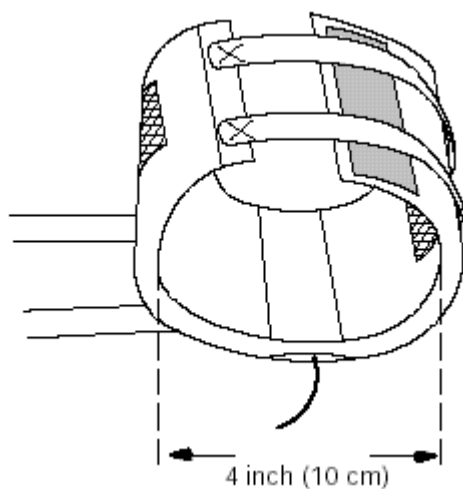
Imaging irregularly shaped anatomy such as brachial plexus, hips, shoulders, thighs, elbows, and kidneys.

Considerations

Do not overlap the coil when positioning the Flex Coil on the patient. Overlapping the coil reduces the coil's performance. Use pads or foam to keep the coil from overlapping or folding onto itself. Keep the edges of the coil a minimum of 2 inches (5 cm) from each other. Use the Velcro hook strip on the end of the fabric as a 2 inch (5 cm) guide. Keep body part in the center of the coil.



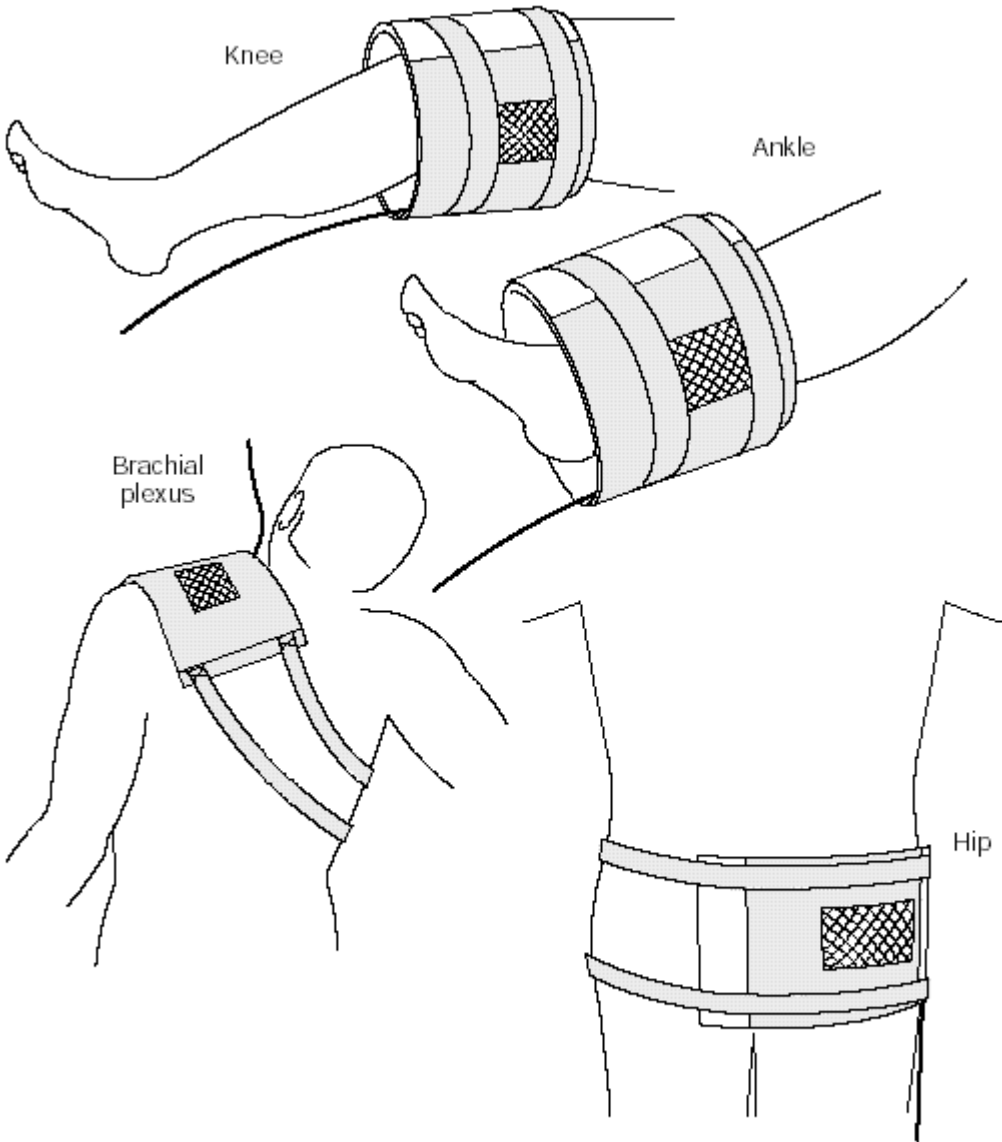
Keep the centers of the coils (mesh openings in the fabric) a minimum of 4 inches (10 cm) apart. When fastening the coil to the patient, try to maintain a circular shape in the coil.



If possible, route the cable straight away from the fabric edge of the coil assembly. As a general rule, keep the cable away from the coil fabric.

Positioning the GP Flex Coil

1. Remove the Quadrature Head Coil and its base and/or any other surface coil from the table or magnet bore.
2. Lower the table and transfer the patient onto the table.
3. Position the patient prone or supine, head or feet first, depending on the application.
4. Raise the table to the full up position.
5. Wrap the coil around the area to be imaged, aligning both mesh openings in the coil fabric directly opposite one another and centered over the anatomy of interest. Position the body part as close to isocenter as possible.
6. Fasten the Velcro straps to the Velcro hook strips to secure the coil.



7. Use pads or cushions to keep the edges of the coils from touching each other. Use pads around the body part if needed to immobilize it.
8. If possible, route the cable away from the coil at a right angle to the fabric edge of the coil assembly. Place pads between the patient and the coil cable so that it does not come in contact with the patient or the magnet bore. There should be no loops in the surface coil cable.
9. Connect the coil cable to the Quick Disconnect Box, then plug the box into the Surface Coil Port on the carriage for

Signa Horizon 1.5T
Signa Horizon LX 1.5T
Signa Twin Speed 1.5T
Signa Infinity 1.5T
Signa Infinity Twin Speed 1.5T
Signa CV/i 1.5T
Signa MR/i 1.5T

MR Systems

10. Set the landmark over the desired anatomy.
11. Provide earplugs to the patient after all instructions have been given.
12. Proceed with the scan prescription.

Classification

1. This equipment is not protected against ingress of water.
2. This equipment is not suitable for use in the presence of a flammable anesthetic mixture with air or with Oxygen or Nitrous Oxide.
3. This equipment is rated for continuous operation.

Chapter 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.

The QA Setup

Signa Horizon 1.5T
Signa Horizon LX 1.5T
Signa Twin Speed 1.5T
Signa Infinity 1.5T
Signa Infinity Twin Speed 1.5T
Signa CV/i 1.5T
Signa MR/i 1.5T

SNR measurements for the GPFLEX coil require sets of signal and noise scans. Refer to the Data Sheet in Table-1 to understand the data required to calculate the SNR. All ROI measurements are made on the individual element images, **not** on the composite image.

The image quality check uses two different protocols for signal and noise image acquisition. The signal scan is an **FSE** sequence used to minimize susceptibility and B_0 inhomogeneity effects. The noise scan is a **GRE** sequence that has a Control Variable (do_noise) to eliminate the transmit RF completely during the scan. The signal scan **must** be run prior to the noise scan as the R1, R2, and TG values from the signal scan are used for the noise scan.

Signal Scan

The following procedure is specific to the LX platform but can be easily adapted for 5.x systems.

1. The Quad Head Coil must be completely removed from the cradle before performing any body or surface coil scans. Failure to do this may result in damage to the Quad Head Coil T/R network.
2. At the magnet, press "**Alignment Light**" button to turn on the light. Move the cradle to align the coil to the alignment lights as shown in illustration 3-1. Press "**Landmark**" button to landmark the alignment.
3. Move the coil to scan position by pushing the "**Move to Scan**" button, ensuring cable does not get snagged.
4. At the console, set the protocols as mentioned below.

SIGNAL PROTOCOL

Patient/Exam. Information

ID: **geservice**
Name: **GP Flex coil**
Patient Weight: **111 lbs. (50 kg)**

Patient Position

Patient position: **Supine**
Patient entry: **Head First**
Coil: **GP Flex**
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

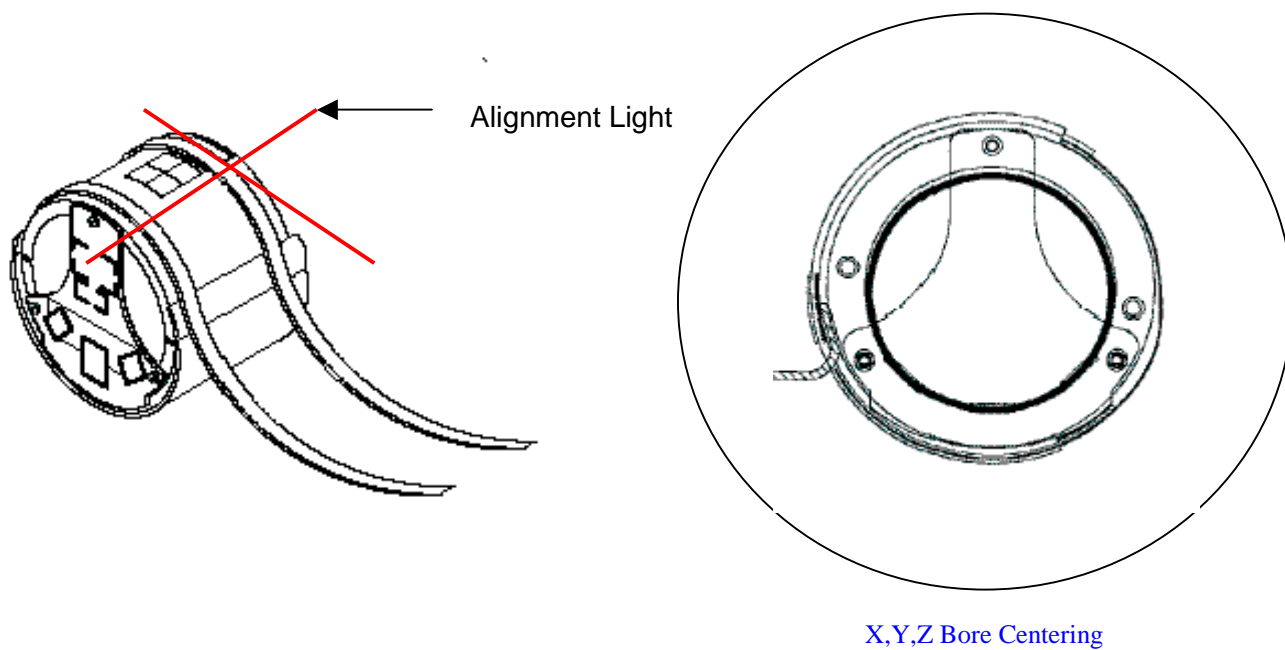
Acquisition Timing

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 B4 Pause: **0**

Scanning Range

FOV: **24**
Slice Thickness: **5**
Spacing: **32.5**
A/P S/I Center R/L Center: **0.00**
Start: **S75**
End: **I75**
Slices: **5**
Table Delta: **0.00**

5. Click [**Save Series**] to download the protocols, and then click [**Prepare to Scan**].
6. Run [**Auto Pre scan**]. Record the R1, R2 and TG values on the SNR Data Sheet (found at the end of this manual).
7. Run [**Scan**]



LANDMARK AND ALIGNMENT
Illustration 3-1

Noise Scan

A signal scan must be run **prior** to the noise scan as the same R1, R2 and TG values must be used for both the signal and noise scans. Do **not** run an Auto Pre scan prior to the noise scan, as the values will be changed.

1. Copy the signal scan series. Use [**Copy Series**] (highlight signal series and click right mouse button) and [**Paste Series**] in **RX Manager**.
2. Click [**View Edit**] and set the protocols as mentioned in below.

Patient Position

Patient position: **Supine**
Patient entry: **Head First**
Coil: **GP Flex**
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**

Scanning Range

FOV: **24**
Slice Thickness: **5**
Spacing: **32.5**
A/P S/I Center R/L Center: **0.00**
Start: **S75**
End: **I75**
Slices **5**
Table Delta: **0.00**

3. Click [**Save Series**] and click [**Prepare to Scan**].
4. Open [**Display CVs**] menu under [**Research Operations**]. Set the “**rhformat**”, and “**do_noise**” CVs to “**1**”.
5. Run [**Manual Prescan**], do **not** make any changes, and click [**Done**].
6. Run [**Scan**].

SNR Image Analysis

SNR Measurement

Regions of interest in both signal and noise images can be measured directly in the image browser. Click the user interface button *Measure*, select the circular or rectangular shape, and adjust its size and orientation when the shape is displayed in the selected image. Mean, standard deviation, and area of the ROI will appear in the lower right corner of the image.

$$\text{SNR}_{\text{Element}} = \frac{\text{Mean of Signal Within ROI}}{\text{Std. Dev. of Noise Within ROI}}$$

Note: The SNR calculation uses the **MEAN** of the signal image and **STANDARD DEVIATION** of the noise image. SNR is measured for each **element**, not on the composite image.

For the signal measurement, choose an ROI covering approximately 80% of the phantom. Also measure the noise with an ROI covering 80% of the FOV. Examples of typical ROIs are shown in illustration 3-2 and 3-3 below.

The QA Setup

The QA Scan Procedure

1. Perform [Auto Prescan] or [Auto Tuning].
 2. If [Auto Prescan] or [Auto Tuning] ends abnormally, confirm that the surface coil key 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] or [Auto Tuning] function again.
 5. If [Auto Prescan] or [Auto Tuning] fails a second time, perform a [Manual Prescan] or [Manual Tuning].
 6. Confirm that the scan parameters selected in [Manual Prescan] or [Manual Tuning] mode represent normal, proper coil operation.
 7. If [Manual Prescan] or [Manual Tuning] cannot be completed successfully, refer the coil to your GE service engineer and **DO NOT USE CLINICALLY**.
- Record successful Auto or Manual Prescan or Tuning values in your daily log sheet:
Center Frequency;
Transmit Gain
Receive Gain.

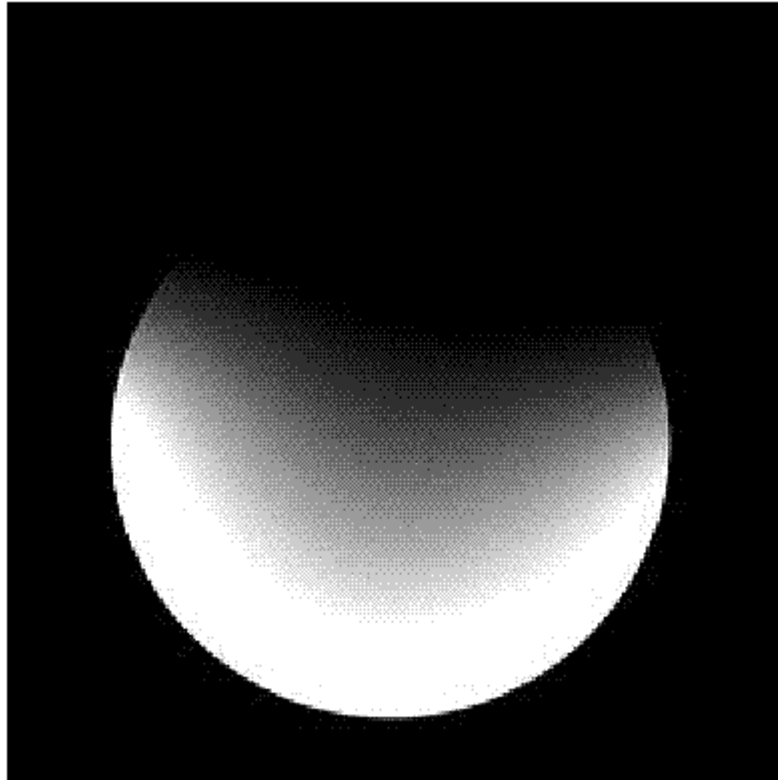
Refer to your system's Scan Reference Guide for further details on Auto Prescan or Manual Prescan or Tuning.

The QA Setup

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. **If there are artifacts in the visual image, contact a GE service engineer and do not use the surface coil for patient studies.**



General Purpose Flex Coil Image

The QA Setup

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.

Procedure

1. Select the phantom image.
2. Select the box or rectangular cursor.
3. Size the box cursor 's area to cover an area between 3,000 mm² and 4,000 mm².
4. Position the box 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. Reposition the same box 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.

For example:

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

Chapter 4- Maintenance

Cleaning Tips

The GP Flex Coil must be cleaned and stored using the following procedures once every week or sooner according to usage:

- To clean, use a mild soap and water solution. Wet a cloth with the solution and proceed to clean. Do not pour any cleaning solution directly on the coil.
- The coil should be stored in a protected area (from high temperatures) to prevent damage.
- If necessary, a 10% bleach solution can be used for more rigorous cleaning; however, some discoloration of the strap, cover or pad may occur.
- Do not soak the coil or apply excessive cleaning solution to the coil or the cable connection area.

Storage

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

To store the coil, a storage space of 40.0 cm/15.75 in (width) x 80.0 cm/31.5 in (depth) x 20.0 cm/8.0 in (height) is required.

Disposal

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



CAUTION:

To avoid possible damage to equipment, do not use solutions containing amines, strong alkalies, 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.

REVISION HISTORY

Rev	Date	Author	Primary Reason for Change
0	March 16, 2002	Santosh Sridhar	Initial Release
1	April 12, 2002	Santosh Sridhar	GE Catalogue No. changed from M1089GP to M1085GF (Sheet 1)
2	May 9, 2002	Santosh Sridhar	1. Front Page updated with new name. 2. Catalog No. changed from M1089GP to M1085GF (Sheet 3) 3. Page 5: Removed EMC references 4. Page 7, 10, 14 and 15: Updated system references 5. Rev No. changed from 0 to 1 for date April 12, 2002. (Sheet 27)
3	May 21, 2002	Santosh Sridhar	GE Catalog No. updated in Rev 2 of Revision History Sheet from M1085G to M1085GF.

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