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GE Medical Systems

Technical Publications

Direction 2131751
Revision 2

Signa® 1.5T General Purpose Flex Coil

Operating Documentation

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.

Immediately complete a "Damage Loss Claim Form", available via MS Exchange Mail, after the damage is found.

MS Exchange Path:

Outlook/Public Folder/All Public Folders/Medical Systems/!Global Initiatives/Information Management/Forms/ Common Forms/DAMAGE LOSS CLAIM FORM.

Send the completed form to the email address listed in the form.

For more information about the Transportation Claim Procedure, access the GE Medical Systems Intranet and enter the following URL address (case sensitive):

FTP://3.87.40.2/GLOBEPRO/QUALSYS/DOCS/190016MF.PDF

Rev. 11/15/2000

W A R N I N G

- **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 ENTRAINER 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 SOLO EXISTE EN INGLES**
- **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.**

ATENÇAO

- **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 TENTE REPARAR O EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO ESTE MANUAL DE ASSISTÊNCIA TÉCNICA.**
- **O NÃO CUMPRIMENTO DESTE 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しかありません。
- 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うものとさせていただきます。
- 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、操作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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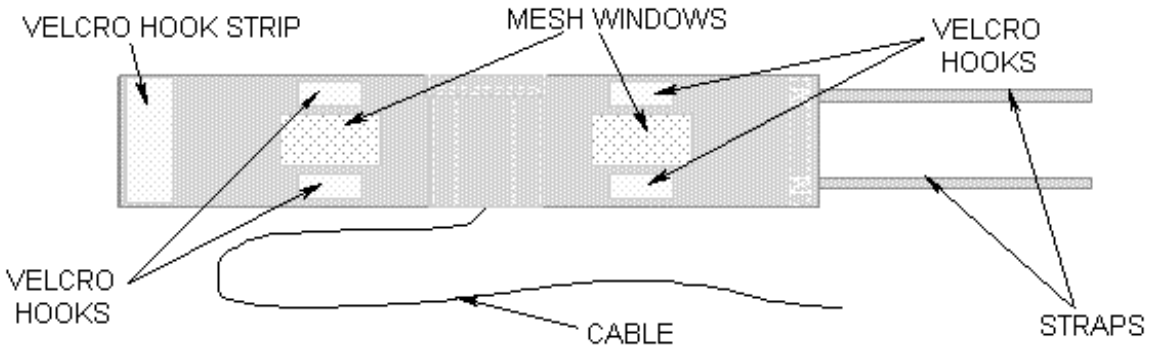
SECTION 1 - INTRODUCTION

1-1 How the GP Flex Coil Operates

The Signa General Purpose (GP) Flex coil design is a linear, receive-only flexible coil. The GP Flex Coil consists of two 13 cm x 17 cm (5 in x 6.5 in) loops that are serially connected to create a corotating "saddle coil" pair. When aligned properly, this "saddle" design provides exceptional uniformity across the sensitive volume of the coil and a minimum of bright spots or high-intensity areas. If the loops are positioned in a more open fashion (i.e., they move farther away from each other, toward a planar, or flat configuration), the image uniformity decreases. For close positioning do not overlap the coil ends. Doing so will not damage the coil, but the performance will suffer. For optimal positioning the circular shape should be maintained with the two mesh windows 10 cm (4 in) apart and the coil ends 5 cm (2 in) apart. Some deviation from the optimal position will not significantly degrade the uniformity. Therefore, this coil can be used in anatomical areas such as the hip, brachial plexus, larger knees and ankle.

The coil consists of one major assembly (see Illustration 1-1). The two loops are in a flexible material, covered with fabric. This allows the GP Flex Coil to bend in one direction, making it easy to wrap around the anatomy of interest.



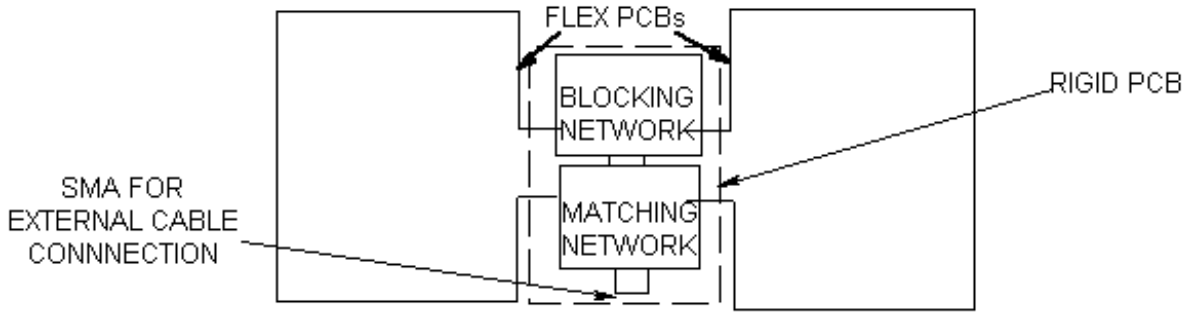
GP FLEX COIL
ILLUSTRATION 1-1

The unit is 53 cm (21 in) long (not including straps) by 21 cm (8 in) wide. It has two mesh "windows" which indicate the open center of the two coils and which aid in positioning.

Two 76 cm (30 in) long straps are attached to one end of the coil fabric. The undersides of these straps are covered with Velcro which attach to a Velcro hook strip at the other end of the coil and to four Velcro hooks located above and below the mesh windows.

A 183 cm (72 in) long RF cable exits the material on one of the long sides and has a BNC connection that attaches to the *Surface Coil* quick-disconnect box.

The Functional Block Diagram of the antenna electronics is shown in Illustration 1-2. The two flex PCB wings on either side of the rigid PCB form the loops. The rigid PCB has a matching network that matches the loaded antenna to 50 ohms, and an active blocking network. The blocking network consists of a single PIN diode and a tuned LC network. The diode is forward biased whenever the body coil transmits. The external cable is connected to the antenna via a right angle SMA jack.



GP FLEX COIL FUNCTIONAL BLOCK DIAGRAM
ILLUSTRATION 1-2

1-2 Compatibility

The GP Flex Coil is compatible with the following hardware configurations:

- Signa® 1.5T System
- Signa® Advantage™ 1.5T System
- Signa® Horizon™ 1.5T System

1-3 Related Documents

- Direction 15300, Signa® Advantage™ System
- Direction 15304, Signa® Advantage™ 1.5T, 1.0T, & 0.5T System
- Direction 15400, Signa® Advantage™ 1.5T, 1.0T, & 0.5T System
- Direction 15404, Signa® Advantage™ 1.5T, 1.0T, & 0.5T Renewal Parts

1-4 Organization of this Document

This manual is divided into five sections:

1- Introduction

Describes how the GP Flex Coil operates and when and where it can be used.

2- Setup and Calibration

Describes installation procedures.

3- Functional Checks

Describes the normal power-up sequence.

4- Replacement/ Maintenance

Describes field maintenance procedures.

5- Renewal Parts

Lists field replaceable parts.

1-5 Environmental Requirements

Operate and store the GP Flex Coil in the Scanner Room.

Dimensions: 53 cm x 21 cm x 4 cm (21 in x 8 in x 1.5 in).

SECTION 2 - SETUP AND CALIBRATION

2-1 Checking the Shipping List

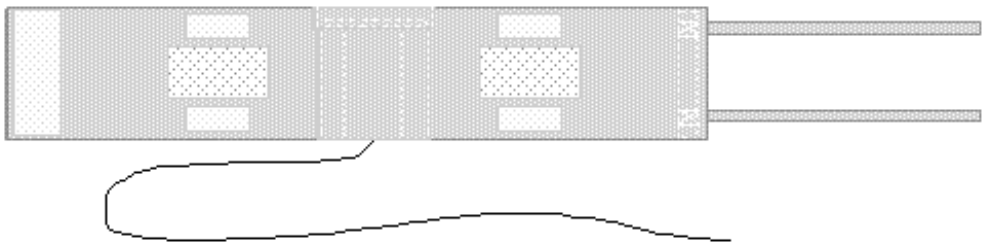
Table 2-1 lists the M1085GR Signa GP Flex Coil parts. Check that all parts have been shipped.

TABLE 2-1
SHIPPING LIST

QTY.	ITEM	PART NUMBER
1	1.5T GP Flex Coil	2128554
1	Service Direction	2131751
1	Operator Manual	2133202

2-2 Installing the GP Flex Coil

At the Boot Terminal, install a new soft key. This key will be used by the operator to select GP Flex Coil imaging. Name the key "GPFLEX". See Illustration 2-1.



GP FLEX COIL
ILLUSTRATION 2-1

Refer to the Signa & Signa Advantage System Manuals for information on installing soft keys (use Coil/Phased Array default values in Table 2-2 and 2-3).

TABLE 2-2
COIL VALUES

SYSTEM	COIL NAME	COIL TYPE	EXTREMITY COIL	CABLE LOSS	COIL LOSS	RECON SCALE FACTOR	XMIT COIL	MULTI-COIL
1.5T, 55cm Low Pass	GPFLEX	SURFACE	NO 1.05	1.05	0.313	Head Coil Recon Scale Factor x 0.75	QUAD	NO
1.5T, 60cm Low Pass	GPFLEX	SURFACE	NO 1.05	1.05	1.720	Head Coil Recon Scale Factor x 0.75	QUAD	NO

TABLE 2-3
PHASE ARRAY VALUES

NUMBER OF RECEIVERS	START RECEIVER	STOP RECEIVER	PORT ENABLE MASK	ERROR ENABLE MASK
0	0	0	0	0

2-3 Functional Checks

1. Perform a Body Coil SNR verification. Refer to **Section 3-1 Body Coil SNR Verification.**

2. Perform a GP Flex Coil SNR verification. Refer to **Section 3-2 GP Flex Coil SNR Verification.**

2-4 Periodic Quality Assurance Check

On a periodic basis, such as during planned maintenance, perform the quality assurance checks outlined below to ensure that the coil is operating properly.

1. Check the external cable for cracks or breaks once a week. Refer to **Section 4-5, Checking the External Cables**.

2. Perform a coil SNR verification. Refer to **Section 3-2 GP Flex Coil SNR Verification.**

3. Record the date and SNR value calculated in **Section 3-3 SNR Image Analysis** in columns 1 and 2 of the **Data Table (following Section 5 Renewal Parts**)**,** as instructed.

4. Divide the SNR value, obtained in the periodic QA check, by the original SNR value and record in column 3 of the **Data Table**.

5. If this ratio is not greater than 85%, then there may be a problem in the coil system. Contact your local GE Service Representative.

SECTION 3 - FUNCTIONAL CHECKS

3-1 Body Coil SNR Verification

Note
An alternate proprietary procedure is available for GE use and to customers with a valid Advanced Service Package Limited License. Refer to *System Level Procedures: Troubleshooting: TLT Procedure.*

Phantom Required

- Body TLT Phantom, 46-265635G6 or Body SPT Phantom, 2298119
- Body TLT Loader, 46-287902G1 or SPT Short Loader, 2125244

Setup Procedure

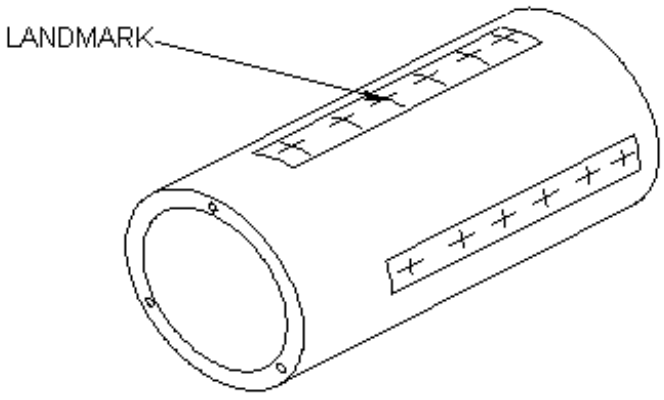
CAUTION

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.

1. Remove Quad Head Coil (if present) from cradle.

2. Select **[NEW STUDY] (4.x)** or **[New Exam] (5.x)** to allow a new Landmark to be set.

3. Position the Body Phantom in the center of the Body Loader at the center of the cradle. Landmark the center of the phantom and advance to isocenter using the **[ADVANCE TO SCAN]** button. See Illustration 3-1.



BODY PHANTOM/LOADER SETUP
ILLUSTRATION 3-1

4a. **For 4.x:** Setup Scan Prescription as shown in Table 3-1.

TABLE 3-1
BODY COIL SNR - SCAN PROTOCOL (4.X)

Id:	geservice	Echo Time (TE):	[20 msec]
Name:	body snr	Rep Time (TR):	[2000 msec]
Patient Weight:	300	Auto CF:	[Peak]
Patient Entry:	[Head First]	Field of View:	[48 cm]
Patient Position:	[Supine]	Scan Thickness:	[3 mm]
Axial/Sag Landmark:	[Sternal Notch]	Scan Location:	(S/I) 0
Coil Type:	[Body Coil]	FOV Center:	(R/L) R0 (A/P) A0
Scan Plane:	[Axial]	Acq. Matrix:	[256 x 256]
Image Mode:	[Single Scan]	Frequency Direction:	[A/P]
Pulse Sequence:	[Multiple Echo]	Imaging Time:	[1 NEX 8:58]
Imaging Options:	[None]	Contrast:	[No]
or enter PSD filename		Table Delta:	0 mm
Number of Echoes:	[1]		

4b. **For 5.x:** Setup Scan Prescription as shown in Table 3-2.

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

Id:	geservice	Rep Time (TR):	[2000 msec]
Name:	body snr	Auto CF:	[Peak]
Patient Weight:	300	Field of View:	[48 cm]
Patient Entry:	[Head First]	Scan Thickness:	[3 mm]
Patient Position:	[Supine]	Interscan Spacing:	[Other] 0
Axial/Sag Landmark:	[Sternal Notch]	Scan Loc (I/S): 0	End Loc (S/I): 0
Coil Type:	[Body Coil]	No. of Scan Location:	1
Scan Plane:	[Axial]	FOV Center (L/R):	0 (A/P) 0
Image Mode:	[2D]	Acq. Matrix (freq.):	[256]
Pulse Sequence:	[Spin Echo]	Acq. Matrix (phase):	[256]
Imaging Options:	[None]	Frequency Direction:	[A/P]
or enter PSD filename		Imaging Time:	[1 NEX 8:58]
Number of Echoes:	[1]	Contrast:	[No]
Echo Time (TE):	[20 msec]	Table Delta:	0 mm

5. Select **[Auto Prescan]** to properly calibrate the RF power level for the 90 degree and 180 degree pulses.

6. Select **[Scan]**. Observe the resulting images to ensure that they do not contain artifacts of any sort. Record the Exam number and Series number for SNR Calculations.

7. Select **[Scan]** again. This second image will be used for determination of Body Coil mode SNR.

8. Select **[Cancel]**. Refer to **Section 3-3 SNR Image Analysis** for SNR image analysis.

3-2 GP Flex Coil SNR Verification

Note
An alternate proprietary procedure is available for GE use and to customers with a valid Advanced Service Package Limited License. Refer to *System Level Procedures: Troubleshooting: TLT Procedure.*

Phantom Required

- NiCl TLT Head Coil Sphere Phantom, 46-265826G6
- Head Coil Loader, 46-287899G1

WARNING!

PHANTOM CONTAINS NICKEL - A SUSPECTED CARCINOGEN. DO NOT INGEST! DISPOSE OF AS A HAZARDOUS WASTE ACCORDING TO STATE AND FEDERAL REGULATIONS.

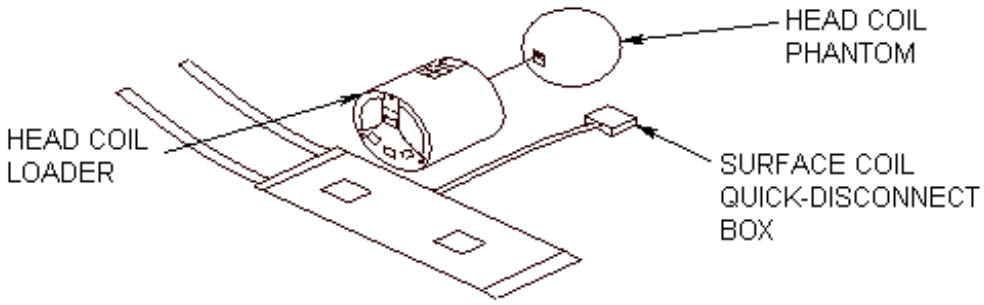
Setup Procedure

1. Select **[NEW STUDY] (4.x)** or **[New Exam] (5.x)** to allow a new Landmark to be set.

CAUTION

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. Remove Quad Head Coil (if present) from cradle.
3. Connect the GP Flex Coil to the surface coil quick-disconnect box and then plug the box into the carriage assembly.
4. Lay the GP Flex Coil, "Patient Side" up, on the table. Use the alignment lights to center the coil.
5. Place the Head Coil phantom in the loader. See Illustration 3-2.

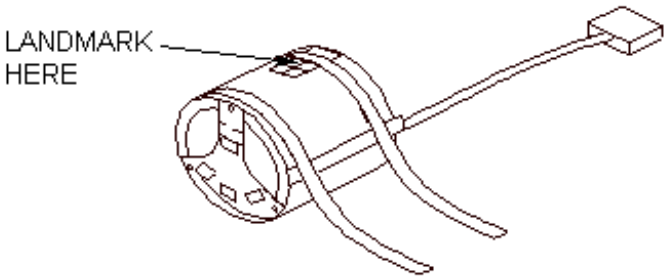


GP FLEX COIL PHANTOM SETUP
ILLUSTRATION 3-2

6. Center the loader on the Flex Coil using the alignment lights and the markings on the top of the Head Coil Loader.

7. Secure the coil onto the loader using the coil straps. Use foam wedges on the sides to stablize the coil and phantom.

8. Landmark using the cross hairs on the phantom (see Illustration 3-3) and advance to scan.



GP FLEX COIL PHANTOM LANDMARK
ILLUSTRATION 3-3

9a. **For 4.x:** Setup Scan Prescription as shown in Table 3-3.

TABLE 3-3
GP FLEX COIL SNR - SCAN PROTOCOL (4.X)

Id:	geservice	Echo Time (TE):	[20 msec]
Name:	gp flex snr	Rep Time (TR):	[2000 msec]
Patient Weight:	300	Auto CF:	[Peak]
Patient Entry:	[Head First]	Field of View:	[48 cm]
Patient Position:	[Supine]	Scan Thickness:	[3 mm]
Axial/Sag Landmark:	[Sternal Notch]	Scan Location:	(S/I) 0
Coil Type:	[Other Coil] [GPFLEX]	FOV Center:	(R/L) R0 (A/P) A0
Scan Plane:	[Axial]	Acq. Matrix:	[256 x 256]
Image Mode:	[Single Scan]	Frequency Direction:	[A/P]
Pulse Sequence:	[Multiple Echo]	Imaging Time:	[1 NEX 8:58]
Imaging Options:	[None]	Contrast:	[No]
or enter PSD filename		Table Delta:	0 mm
Number of Echoes:	[1]		

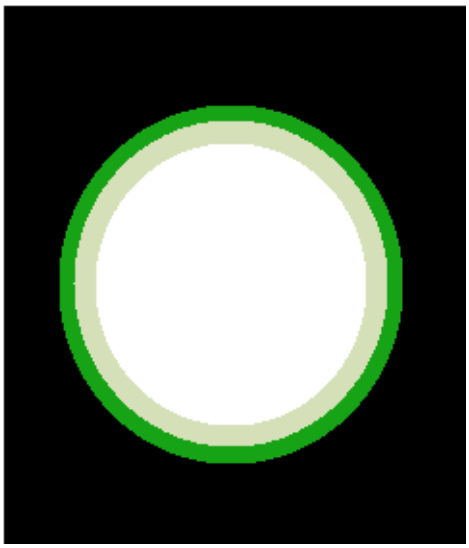
9b. **For 5.x:** Setup Scan Prescription as shown in Table 3-4.

TABLE 3-4
GP FLEX COIL SNR - SCAN PROTOCOL (5.X)

Id:	geservice	Rep Time (TR):	[2000 msec]
Name:	gp flex snr	Auto CF:	[Peak]
Patient Weight:	300	Field of View:	[48 cm]
Patient Entry:	[Head First]	Scan Thickness:	[3 mm]
Patient Position:	[Supine]	Interscan Spacing:	[Other] 0
Axial/Sag Landmark:	[Sternal Notch]	Scan Loc (I/S): 0	End Loc (S/I): 0
Coil Type:	[Other Coils][GPFLEX]	No. of Scan Location:	1
Scan Plane:	[Axial]	FOV Center (L/R):	0 (A/P) 0
Image Mode:	[2D]	Acq. Matrix (freq.):	[256]
Pulse Sequence:	[Spin Echo]	Acq. Matrix (phase):	[256]
Imaging Options:	[None]	Frequency Direction:	[A/P]
or enter PSD filename		Imaging Time:	[1 NEX 8:58]
Number of Echoes:	[1]	Contrast:	[No]
Echo Time (TE):	[20 msec]	Table Delta:	0 mm

10. Select **[Auto Prescan]** to properly calibrate the RF power level for the 90 degree and 180 degree pulses.

11. Select **[Scan]**. Observe the resulting image of the sphere. See Illustration 3-4 (normal image). Ensure that there are no artifacts of any sort in the sphere image. Record the Exam number and Series number for SNR Calculations.



GP FLEX COIL IMAGE
ILLUSTRATION 3-4

12. Select **[Scan]** again. This second image of the sphere will be used for determination of GP Flex Coil mode SNR.

13. Select **[Cancel]**. Refer to **Section 3-3 SNR Image Analysis,** for SNR image analysis.

3-3 SNR Image Analysis

3-3-1 SNR Image Analysis (Release 4.x)

(See Section 3-3-2 for Release 5.x)

Description

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

Procedure

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

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

Enter the number of your selection: ..............1 [ENTER]
                        1 = Operator console
                        2 = Remote1
                        3 = Remote2
                        4 = Exit

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

           IP selected is at the operator console.

Do you wish to boot the Image Processor? (Y or N) ........Y [ENTER]
```

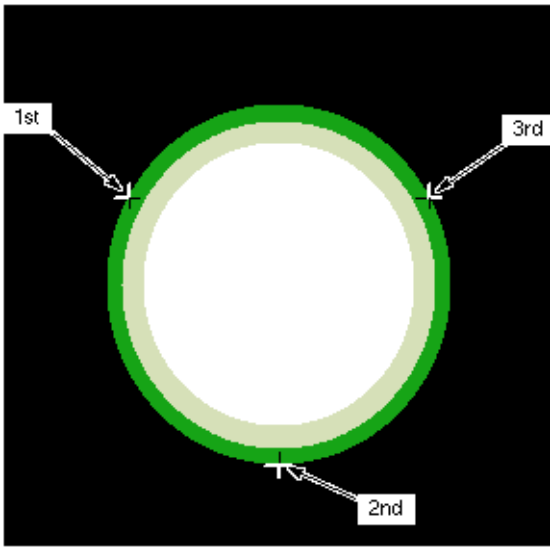
You do not have to reboot the IP each time you enter.

```
Welcome to the Command Line Image Processing System (CLIPS)

CLIPS > .........................................LIST(STUDY); [ENTER]


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

```
-------------------------------------------------------------------------

CURRENT DEFAULTS --- PATIENT ID =                      /  /

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

choice ?.....................................................S [ENTER]
ENTER STUDY NUMBER --.....................................1 [ENTER]  Enter
                                                                    appropriate
                                                                    number.

CLIPS > .....................................................LIST(SERIES); [ENTER]

                            SERIES LIST
=========================================================================
 SERIES #         # OF IMAGES             SERIES TYPE      PULSE TYPE
-------------------------------------------------------------------------
   001                 002                    AXIAL            ME
   002                 002                    SAG              ME
-------------------------------------------------------------------------
CURRENT DEFAULTS --- PATIENT ID = SNR            0000S/00S/001
                            N - NEXT PAGE
                            P - PREVIOUS PAGE
                            S - SELECT SERIES
                            C - CANCEL

choice ? ....................................................S [ENTER]
ENTER SERIES NUMBER --.....................................1 [ENTER]  Enter
                                                                    appropriate
                                                                    number.

CLIPS > .....................................................DIS; [ENTER] or you could
                                                                    LIST (IMAGE); to
                                                                    select the image
                                                                    you want.

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

     THIS MACRO CALCULATES THE SNR USING THE GE HEAD OR BODY PHANTOM.
     ENTER THE NUMBER OF THE FIRST IMAGE OF THE TWO-IMAGE SET AND !
     EXAMPLE INPUT> 1!
     Please start entering data.  Type an ! to end input mode.
     CLIPS INPUT> ..........................................1! [ENTER]
```

Correct positioning of the SNR analysis ROI depends on finding the center of the phantom. You will be prompted to identify three points at the edge of the phantom. Care should be taken to pick three points as far away from each other as possible (i.e., 10, 6 and 2 o'clock) and to avoid flat spots and irregularities on the edge.

See Illustration 3-5.



SNR CURSOR POSITIONS
ILLUSTRATION 3-5

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

```
POSITION CURSOR AT FIRST POINT AND ENTER !
```
Place cursor at 10:00 position on edge of image.

```
   Please start entering data.  Type an ! to end input mode.
   CLIPS INPUT> ..........................................! [ENTER]
```

```
POSITION CURSOR AT SECOND POINT AND ENTER !
```
Place cursor at 6:00 position.

```
   Please start entering data.  Type an ! to end input mode.
   CLIPS INPUT> ..........................................! [ENTER]
```

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

```
   Please start entering data.  Type an ! to end input mode.
   CLIPS INPUT> ..........................................! [ENTER]
PHANTOM POINTS AND RADIUS OK.  BEGIN ANALYSIS.
```
The program will then perform the analysis and display the final values on the image monitor. Record Signal, Noise and Signal to Noise in Data Table.

```
DO YOU WANT TO SAVE THIS DATA?
ENTER A  1! FOR YES, A  0! FOR NO.
Please start entering data.  Type an ! to end input mode.
CLIPS INPUT>..................................... 0! [ENTER]

DATA NOT SAVED
CLIPS >  .....................................LIST(SERIES); [ENTER]
```
Select the next series and repeat the above

analysis for each image pair. Type BYE; when completed to exit CLIPS.

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

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

3. Record the date and the calculated SNR value in columns 1 and 2 of the **Data Table** (following **Section 5 Renewal Parts**), as instructed.

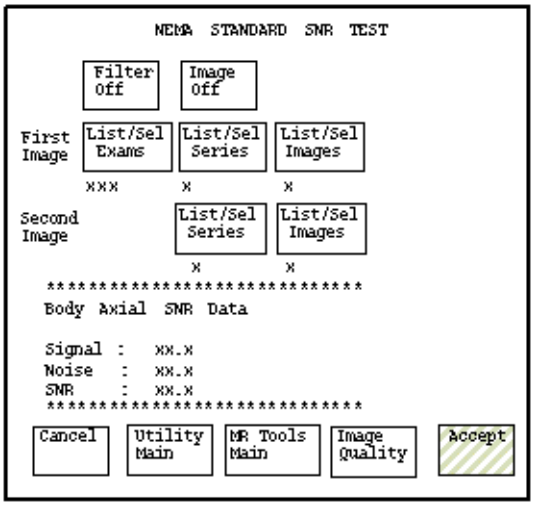
3-3-2 SNR Image Analysis (Release 5.x)

Description

The SNR tool retrieves two operator selected images. Signal value is computed as the mean pixel value in a ROI covering 80% of the image. The image is analyzed to determine the center of the image for positioning the ROI. A difference image is created by subtracting the second image from the first and the same ROI is used to calculate noise from the subtracted image. The signal value, noise value, and signal to noise ratio are reported. There is an option to save the difference image with the results annotated.

Procedure

1. Touch **[UTILITIES]**, **[MR Tools]**, **[Image Quality]**, then **[SNR Test]**. The SNR Test screen is displayed. See Illustration 3-6.



SNR TEST SCREEN
ILLUSTRATION 3-6

2. Enter image exam, series, and image numbers. If exam, series, or image numbers are not known, select **[List Exams]**, **[List Series]**, or **[List Images]** to display list to choose from.

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

3. If high pass filtering is desired to be performed on data, touch **[Filter Off]** which will highlight and change to **[Filter On]**.

4. If the difference image annotated with data is to be created, touch **[Image Off]** which will highlight and change to **[Image On]**.

5. Touch **[Accept]** to begin analysis. The final values are displayed on the touch screen, see Illustration 3-6 (see previous screen).

6. Touch **[Continue]** then select the next exam and repeat the above analysis for each image pair.

7. Record the date and the calculated SNR value in columns 1 and 2 of the **Data Table** (following **Section 5 Renewal Parts**), as instructed.

3-4 Checking the PIN Diodes with Digital Multimeter (DMM)

Note
There is only one PIN diode in this antenna. This procedure will indicate if the PIN diode is defective.

1. Select the DIODE TEST function on the Digital Multimeter (DMM).

2. Connect the POSITIVE lead of the DMM to the center pin of the BNC on the external cable. Connect the NEGATIVE lead to the main housing/ground of the BNC.

3. A reading of 0.400 to 0.600 should be observed on the DMM.

4. If a reading below 0.400 is observed in either direction, either the output cable is shorted or the PIN diode is bad.

5. If a reading above 0.600 is observed in step 3, the PIN diode is defective.

6. Connect the POSITIVE lead of the DMM to the main housing/ground of the BNC on the external cable. Connect the NEGATIVE lead to the center pin of the BNC.

7. A reading of INFINITY should be observed on the DMM.

8. If a reading of INFINITY is observed in both directions, either the output cable is open or the PIN diode is open.

9. If any of the above conditions fails, replace the PIN diode. **Refer to Section 4-3 Replacing the PIN Diode.**

3-5 Checking the External Cable

1. Select the DIODE TEST function on the DMM.

2. Connect the POSITIVE lead of the DMM to the center pin of the BNC on the external cable. Connect the NEGATIVE lead to the main housing/ground of the BNC.

3. Flex the external cable, especially near the connectors and the strain relief, and observe that a reading of 0.400 to 0.600 should remain on the DMM, with no instability or fluctuations.

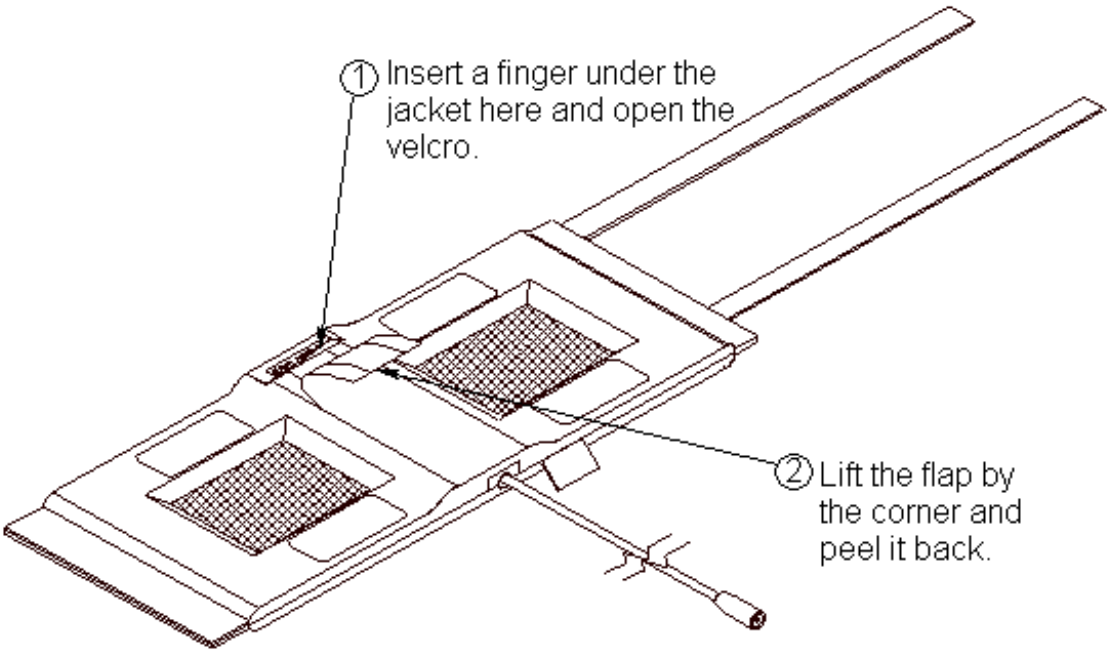
4. Connect the POSITIVE lead of the DMM to the main housing/ground of the BNC on the external cable. Connect the NEGATIVE lead to the center pin of the BNC.

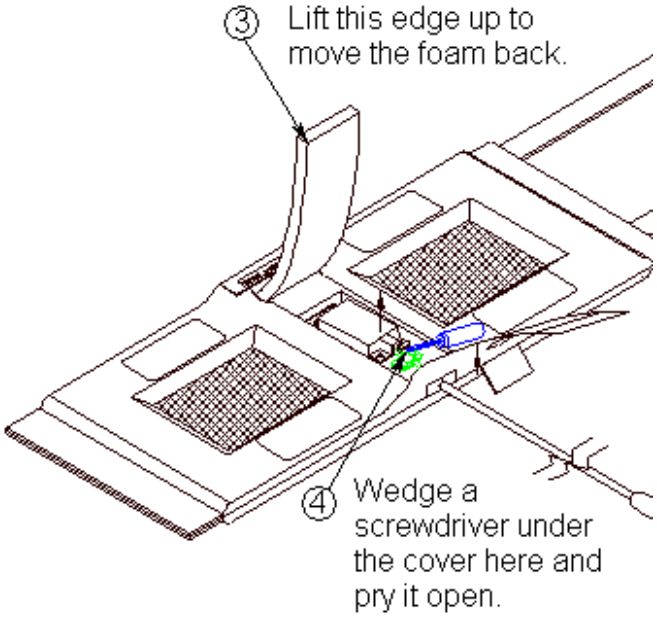
5. Flex the external cable, especially near the connectors and the strain relief, and observe that a reading of INFINITY should remain on the DMM, with no instability or fluctuations.

6. If the cable fails any of the above tests, replace it. Refer to **Section 4-2 replacing the External Cable.**

SECTION 4 - REPLACEMENT / MAINTENANCE

4-1 Disassembly / Assembly of GP Flex Coil





⑤ To re-assemble **put the cover back on** the posts and press on it till it snaps back into place. Push the foam flap under the jacket. Carefully put the fabric flap into place making sure that the velcro on the edges lines up with the velcro on the jacket. Tuck the end of the flap under the jacket. Press over the velcro while making sure that **no edges are left open**.

REPLACEMENT / MAINTENANCE
ILLUSTRATION

4-2 Replacing the External Cable

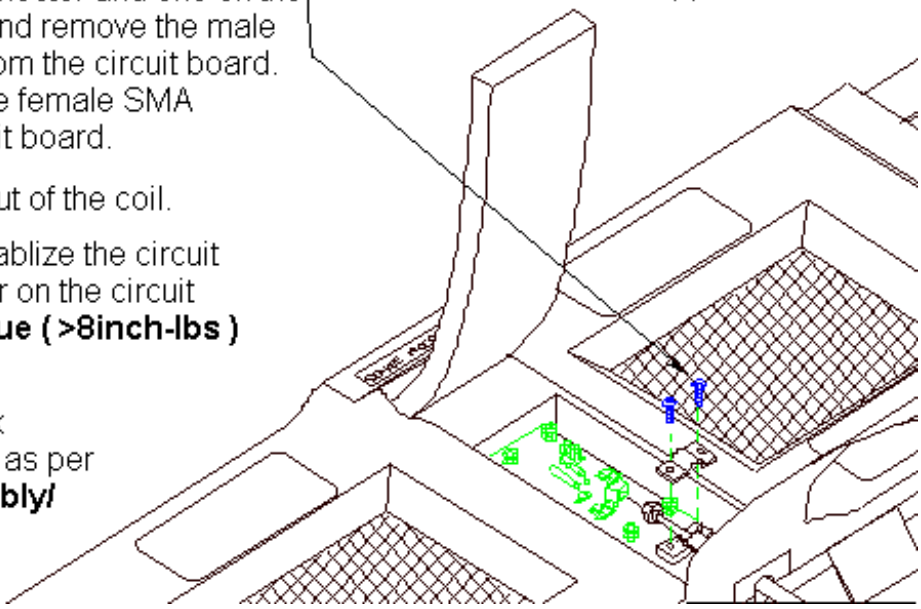
① Disassemble the coil as per **Section 4-1 Disassembly/Assembly of GP Flex Coil**. Unscrew the two nylon screws and remove the strain relief upper cover.

② Unscrew (use two 8mm wrenches, one on the circuit board female connector and one on the male cable connector) and remove the male SMA cable connector from the circuit board. Be careful not to twist the female SMA connector from the circuit board.

③ Pull the external cable out of the coil.

④ Install the new cable. Stablize the circuit board and the connector on the circuit board. **Too much torque (>8inch-lbs) can cause damage.**

⑤ Put the strain relief back on.Reassemble the coil as per **Section 4-1 Disassembly/ Assembly of GP Flex Coil**.



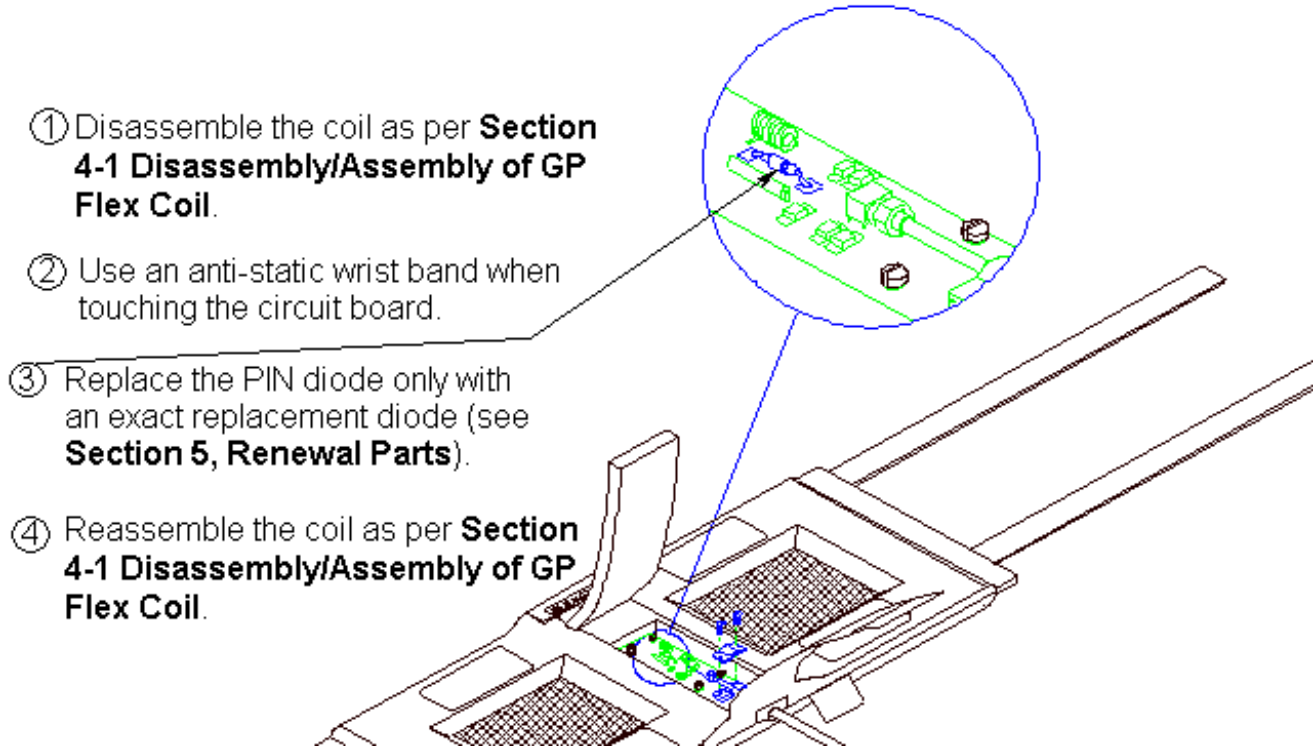
REPLACING EXTERNAL CABLE
ILLUSTRATION

4-3 Replacing the PIN Diode

CAUTION

Use a 25W solder iron and protect the circuit board from static electricity. Be careful not to damage the circuit board by overheating the solder.

Note
Antenna is tuned at the factory to provide the proper input impedance. Circuit board is **not** field replaceable. PIN diode is the only field replaceable component on the circuit board.



REPLACING EXTERNAL CABLE
ILLUSTRATION

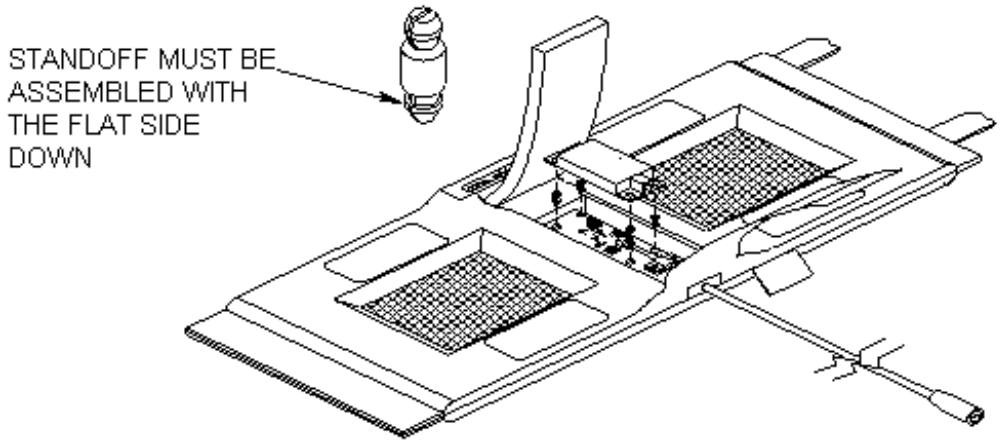
4-4 Replacing the Mechanical Hardware

1. Refer to **Section 5 Renewal Parts** for the hardware kit part number.

2. To replace the cover assembly refer to **Section 4-1 Disassembly/Assembly of GP Flex Coil.**

3. To replace the upper strain relief block and the two screws refer to **Section 4-2 Replacing the External Cable**.

4. If a plastic standoff breaks it can be pulled out using a needle nose plier. Insert a new standoff in its place while making sure that the flat end goes in first. See Illustration 4-1.



STANDOFF REPLACEMENT
ILLUSTRATION 4-1

4-5 Checking the External Cable

1. Inspect the external cables for cracks or breaks once each week. Replace the external cable per **Section 4-2 Replacing the External Cable** if any damage or wear is found. See **Section 5 Renewal Parts,** for cable part number.

4-6 Cleaning the Coil

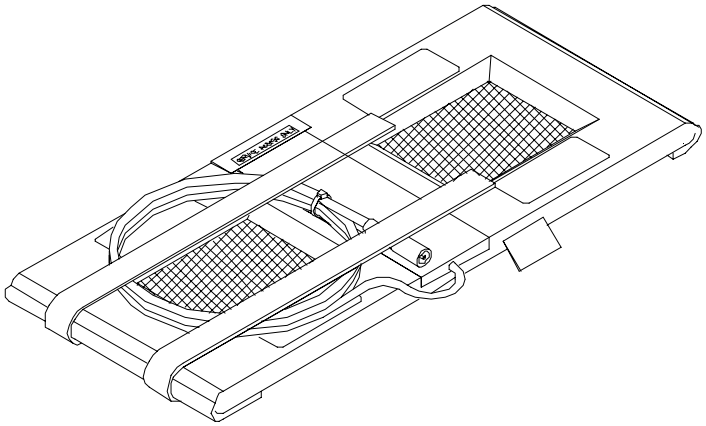
CAUTION

Avoid damaging sensitive electronic parts. Do not spray or pour any solution directly onto the GP Flex Coil, or external cable. Do not use alcohol or disinfectant or any chemical cleaner except mild liquid detergents to clean the GP Flex Coil. Avoid using bleach solution as it will degrade the fabric jacket. Never submerge the GP Flex Coil in any liquid.

1. Clean the GP Flex Coil and external cable with a mild liquid detergent and water solution. Wet a soft cloth with the solution and proceed to clean.

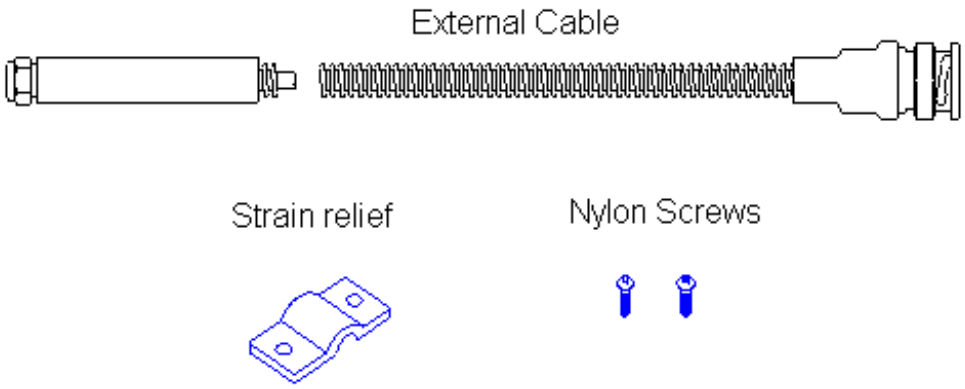
5- RENEWAL PARTS

1.5T SIGNA GP FLEX COIL WITH CABLE 2128554



ITEM	PART NO.	FRU	NAME	QTY.	DESCRIPTION (REMARKS)
1	2128554	1	1.5T GP FLEX COIL	1	FOR 1.5T SIGNA GP FLEX COIL

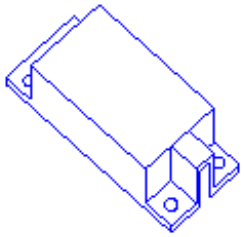
1.5T SIGNA GP FLEX COIL CABLE KIT 2128557



ITEM	PART NO.	FRU	NAME	QTY.	DESCRIPTION (REMARKS)
1	2128557	1	CABLE KIT	1	FOR 1.5T SIGNA GP FLEX COIL

1.5T SIGNA GP FLEX COIL HARDWARE KIT 2128557-2

Cover Assembly



Standoffs

ITEM	PART NO.	FRU	NAME	QTY.	DESCRIPTION (REMARKS)
1	2128557-2	2	HARDWARE KIT	1	FOR 1.5T SIGNA GP FLEX COIL

PIN DIODE 2128557-3

ITEM	PART NO.	FRU	NAME	QTY.	DESCRIPTION (REMARKS)
1	2128557-3	2	PIN DIODE	1	MA4P640 PIN DIODE

DATA TABLE

Use the space provided below to record the calculated signal to noise ratio (SNR) data obtained from **Section 3 Functional Checks**. Record the SNR data obtained during the initial coil installation on the lines indicated below. Record subsequent SNR data in the **Data Table** (following **Section 5 Renewal Parts**) as a periodic QA check. If the ratio of any of the coils found is not greater than 85%, then there is a problem in the coil or the MR system.

Original SNR data obtained at initial coil installation:

GP Flex Coil SNR Value:_____

Date: _____

SNR Data QA (Quality Assurance) Check:

1	2	3	4
Date	SNR Value	Divide the SNR value from column 2 by the original SNR.	Is the value in column 3 > 85%?
_____	_____	_____	Y / N
_____	_____	_____	Y / N
_____	_____	_____	Y / N
_____	_____	_____	Y / N
_____	_____	_____	Y / N
_____	_____	_____	Y / N
_____	_____	_____	Y / N
_____	_____	_____	Y / N
_____	_____	_____	Y / N
_____	_____	_____	Y / N

Make additional copies of this document as is needed.

DEFECTIVE COIL RETURN FORM

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

Date _____

Site Name _____

Site Address _____

Service Engineer _____

Coil Serial Number_____

Date Coil Installed _____

Description of Coil Problem _____

_____

_____

_____

_____

_____

ELECTRICAL CHECKS

PIN Diode Test

Meter Reading Forward Bias _____

Meter Reading Reverse Bias _____

Note
An alternate proprietary procedure is available for GE use and to customers with a valid Advanced Service Package Limited License. Refer to *System Level Procedures: Troubleshooting: TLT Procedure.* Use Table DR-1 and DR-2 to record the TLT results of the defective coil.

TABLE DR-1
TLT DATA FOR DEFECTIVE SURFACE COIL

SITE: _____ **NAME:** _____ **DATE:** _____

TLT FILE NUMBER: _____

SNR: NOISE_____

SNR MEAN_____

SNR SIGNAL_____

SNR AREA_____

TR MAP: 89-91_____ %

85-95_____ %

65-115_____ %

FLIP MEAN_____

TABLE DR-2
TLT DATA FOR DEFECTIVE PHASED ARRAY COIL (NOT APPLICABLE)

SITE: _____ **NAME:** _____ **DATE:** _____

TLT FILE NUMBER: _____

SNR: NOISE (0)_____

NOISE (1)_____

NOISE (2)_____

NOISE (3)_____

NOISE (C)_____

SNR MEAN (0)_____

SNR MEAN (1)_____

SNR MEAN (2)_____

SNR MEAN (3)_____

SNR MEAN (C)_____

TR MAP: 89-91 (C)_____ %

(Combined 85-95 (C)_____ %

Results) 65-115 (C)_____ %

FLIP MEAN (C)_____

FLIP SDV (C)_____

RCV MEAN (C)_____

RCV SDV (C)_____

REVISION HISTORY

REV	DATE	AUTHOR	PRIMARY REASONS FOR CHANGE
0	Aug 17, 1998	L. Loehrer (TL)	Converted Toolbook document to MS Word 7.0
1	May 20, 1999	S.M.Atladottir	Updated Procedure References for new GUI
2	Oct. 24, 2001	K. LaBarge	Updated procedure for SPT phantom and loader