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1- INTRODUCTION

The TwinSpeed system is designed with a set of Whole Body (WB) Gradients with standard performance and large volume coverage, and with a set of Zoom (ZM) Gradients characterized by high gradient amplitudes and fast slew-rates within a smaller volume. Both gradient coils are powered from the same gradient driver, a single ACGD unit, with switching between gradient coils handled by a Gradient Switch (GSW), controlled via the GP of the ACGD.

With the new Gradient Switch (GSW) feature of the TwinSpeed product, there is a need to accommodate scanner operation without a faulty GSW, where calibrations/diagnostic tests and even normal clinical scanning can continue with the use of a single gradient from the TRM coil.

This document describes the routine needed for converting the system to work without the GSW and emulating out one of the gradient coils, while making a direct cable connection between the gradient driver outputs and either the Zoom (ZM) or Whole-Body (WB) gradient coils.

An emulated scanner will display any previously saved site protocols with the GradMode field insensitive. If the WB is being used (ZM emulation) the scanner will resemble a HighSpeed, and if the ZM (WB emulation) the scanner will resemble a CVi.

2- PREREQUISITES

1. **SAVE INFO.** must be performed prior to any changes. This will be used to restore the system back to a TwinSpeed.

2. Follow the standard INSTALL instructions to run a **SAVE INFO.** Confirm that the SAVE INFO data is on the media. Failure of the SAVE INFO process will result in a complete system recalibration.

3. Ensure that all the gradient cables on the back panel of the GSW (within the TAC) are labeled, so that the correct cables are moved and returned afterwards.

DO NOT PROCEED unless these prerequisites are completed successfully.

3- EMULATION OF THE ZOOM COIL

This will enable the scanner to be used with the Whole-Body gradient coil only.

3-1 Software changes required

1. From the Service Desktop, select **[C Shell]**.

2. At the sdc prompt type: **cd /w/config <Enter>**

3. To edit the file type either: **jot ipg_stage <Enter>** (easy-to-use text editor), or type **vi ipg_stage <Enter>** (command-based editor).

4. The file ipg_stage contains the following lines relevant to TRM ZM emulation:

   F -> emulate ZOOM gradient of TRM. The system will be restricted to direct connection to WHOLE-BODY gradient without the gradient switch. Note: After removing this flag, Restore Info in Guided Install must be performed.

5. Add to the first line of the file the letter **F**, such that it looks like:-

   axxF - where **xx** may represent other letters emulating other devices

6. **SAVE** this change and exit the file.

7. The system must then be shutdown completely.

3-2 Hardware changes required

1. Ensure the system is shutdown, including the PC.

2. Turn OFF the PDU to its OFF (0) state by rotating the handle on its front panel from 1 to 0.

Please ensure that all necessary safety measures are taken before proceeding, as high voltage and high current carrying cables are to be handled. Follow the normal Service and Installation guidelines to ensure there is no power into the scanner.

The rest of the hardware instructions in this section involve changes ONLY inside the **Twin Accessory Cabinet** (TAC), and specifically to the **GSW back panel**.

Make sure you have the correct tools and enough accessibility to the GSW back panel. Ensure there is some slack in the three output gradient cables. Two inches or five centimeters is sufficient.

3. Remove any safety covers from the GSW back panel.

4. Disconnect the 115 VAC power cable on the GSW back panel, **J8**.

5. Disconnect the GP RS232 port connector, **J5**.

6. Unscrew the gradient cable **XWB-** (X Whole-Body minus) on the left hand side and attach it to the **X-** (X minus) cable directly (by removing first the bolts) on the right hand side. Rescrew the bolts on this **X-** side to ensure good connection. The GSW will now have two cables attached directly to the **X-** terminal.

7. Unscrew the gradient cable **YWB-** (Y Whole-Body minus) on the left hand side and attach it to the **Y-** (Y minus) cable directly (by removing first the bolts) on the right hand side. Rescrew the bolts on this **Y-** side to ensure good connection. The GSW will now have two cables attached directly to the **Y-** terminal.

8. Unscrew the gradient cable **ZWB-** (Z Whole-Body minus) on the left hand side and attach it to the **Z-** (Z minus) cable directly (by removing first the bolts) on the right hand side. Rescrew the bolts on this **Z-** side to ensure good connection. The GSW will now have two cables attached directly to the **Z-** terminal.

9. Reattach any safety covers and close the TAC rack.

10. Power-up the scanner as normal, including booting of the host and PC.

11. Log-in as usual via the Signa ICON.

12. Run a simple Head coil and DQA phantom test to ensure the single gradient coil of the TRM is operational, and that it has the correct polarity, orientation, and size. Refer to document ***sysfca1*** for details.

4- RETURNING THE SCANNER TO A FULL TWINSPEED

4-1 Software changes required

1. From the Service Desktop, select **[C Shell]**.

2. At the sdc prompt type: **cd /w/config <Enter>**

3. To edit the file type either: **jot ipg_stage <Enter>** (easy-to-use text editor), or type **vi ipg_stage <Enter>** (command-based editor).

4. Remove from the first line of the file the letter **F**, such that it looks like:-

   axx - where **xx** may represent other letters emulating other devices

5. **SAVE** this change and exit the file.

6. **RESTORE INFO.** must be performed. This will be used to restore the system back to the full TwinSpeed configuration. Follow the standard INSTALL instructions to run a **RESTORE INFO.**

7. The system must then be shutdown completely.

4-2 Hardware changes required

1. Ensure the system is shutdown, including the PC.

2. Turn OFF the PDU to its OFF (0) state by rotating the handle on its front panel from 1 to 0.

Please ensure that all necessary safety measures are taken before proceeding, as high voltage and high current carrying cables are to be handled. Follow the normal Service and Installation guidelines to ensure there is no power into the scanner.

The rest of the hardware instructions in this section involve changes ONLY inside the **Twin Accessory Cabinet** (TAC), and specifically to the **GSW back panel**.

Make sure you have the correct tools and enough accessibility to the GSW back panel. Ensure there is some slack in the three output gradient cables. Two inches or five centimeters is sufficient.

3. Remove any safety covers from the GSW back panel.

4. Unscrew the gradient cable **ZWB-** (Z Whole-Body minus) attached currently to the **Z-** (Z minus) on the left hand side and attach it back to its nominal position for **ZWB-** on the right hand side. Re-screw and tighten the bolts to both **ZWB-** and **Z-**. This will leave the **Z-** cable from the ACGD attached to the **Z-** terminal.

5. Unscrew the gradient cable **YWB-** (Y Whole-Body minus) attached currently to the **Y-** (Y minus) on the left hand side and attach it back to its nominal position for **YWB-** on the right hand side. Re-screw and tighten the bolts to both **YWB-** and **Y-**. This will leave the **Y-** cable from the ACGD attached to the **Y-** terminal.

6. Unscrew the gradient cable **XWB-** (X Whole-Body minus) attached currently to the **X-** (X minus) on the left hand side and attach it back to its nominal position for **XWB-** on the right hand side. Re-screw and tighten the bolts to both **XWB-** and **X-**. This will leave the **X-** cable from the ACGD attached to the **X-** terminal.

7. Connect the 115 VAC power cable on the GSW back panel, **J8**.

8. Connect the GP RS232 port connector, **J5**.

9. Reattach any safety covers and close the TAC rack.

10. Power-up the scanner as normal, including booting of the host and PC.

11. Log-in as usual via the Signa ICON.

12. Run a simple Head coil and DQA phantom test to ensure both gradient coils of the TRM are operational, use of the GSW and that each one has the correct polarity and orientation. Refer to document ***sysfca1*** for details.

5- EMULATION OF THE WHOLE-BODY COIL

This will enable the scanner to be used with the Zoom gradient coil only. The same procedure for emulation and recovery can be used as described in sections 3 and 4 with the following changes:-

1. For the software changes, use letter **E** (instead of F) in the **ipg_stage** file.

2. For the hardware changes, use **XZM-**, **YZM-** and **ZZM-** cables (instead of XWB-, YWB- and ZWB-).

REVISION HISTORY

REV	DATE	AUTHOR	PRIMARY REASONS FOR CHANGE
1	Dec 24, 2001	J. Gerber	New document describing procedure for hardware and software changes required in order to emulate the TRM gradient coil.
1.1	Dec 24, 2001	L. Golding	Updated the document for clarity.
2	Jan 15, 2002	P. Kargard	Minor wording changes