TABLE OF CONTENTS

Description - This procedure describes the setup and calibration of the communications pin driver (CPD) assembly for the 1.0T and 1.5T RF/PEN II cabinet.

Note

This procedure is to be used for systems that contain an RF/PEN II Cabinet (5.5 and later). See procedure for *Dynamic Disable / TR Driver board adjustments* for systems with both RF and Penetration cabinets (5.4 and prior). See procedure for *Pin Switch Driver Board Set Up And Calibration* for RF/PEN cabinets.

1- OPEN SSM CHASSIS IN BODY MODE ONLY

The system must be setup for a Body mode protocol and the [Prepare to Scan] softkey selected initially. Pulse Body mode once at TG of 0. Do Not open the SSM top cover for 1 minute (after the system has transitioned from Head, Surface, M/C or MNS mode to Body mode). Failure to follow these directions has resulted in the Dynamic Disable IGBT Circuitry (Direct Drive, Body1, Body2) overheating and shorting resulting in CPD replacement.

1. Remove the RF Cabinet front cover.

2. Remove the 4 screws holding the SSM (system support module) to the front side rails.

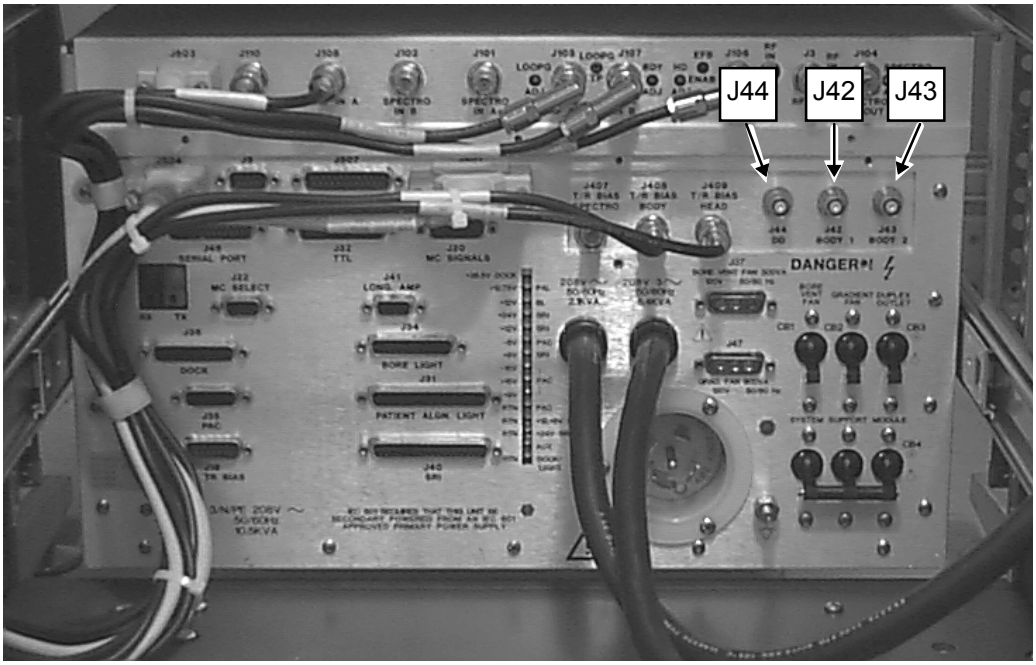
3. Pull out to extend the SSM chassis. Allow sufficient cable slack to avoid pinching or straining.

4. Set up a Body mode protocol. Select [Prepare to Scan]. Verify TG is set to 0 (zero). Pulse the system once to allow the Dynamic Disable circuitry to switch over the the 500/1000 VDC mode. In this mode the 3 Dynamic Disable circuits are not sinking current.

5. Open the SSM top cover lids. When the lids are open the air flow cooling is interrupted, however, there should not be a problem when the system is properly switched to the Body mode.

2- DD OPEN CIRCUIT THRESHOLD ADJUSTMENT

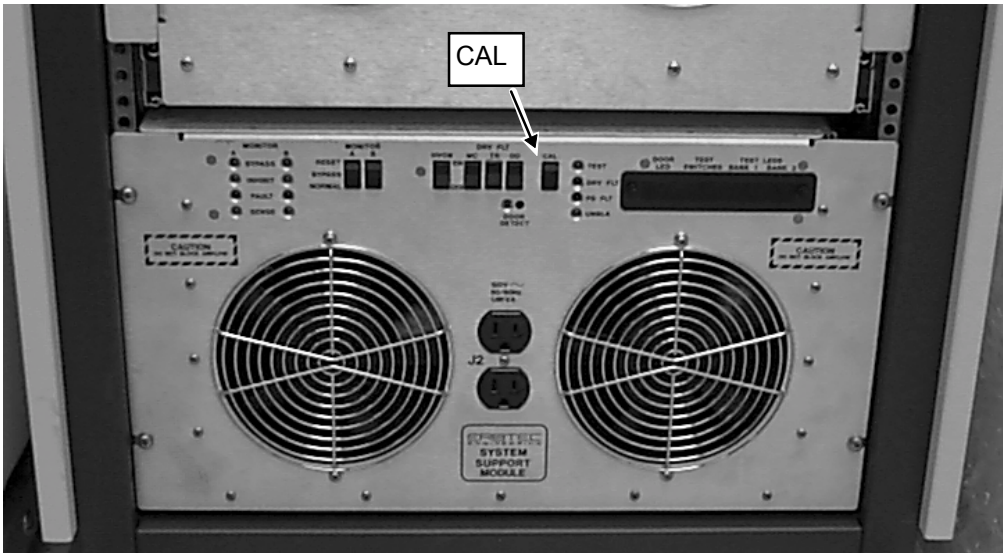
1. Ensure that the correct Dynamic Disable cables are connected to J42 (Body 1), J43 (Body 2), and J44 (Direct Drive); see Illustration 2-1. Swapping either of the Body cables with the DD cable will often result in hardware replacement (if the system was switched to a mode other than the Body mode) at the Body Splitter Assembly or the Dynamic Switch Boards in the Body Coil.



CABLES CONNECTED TO CORRECT LOCATIONS ON BODY COIL
ILLUSTRATION 2-1

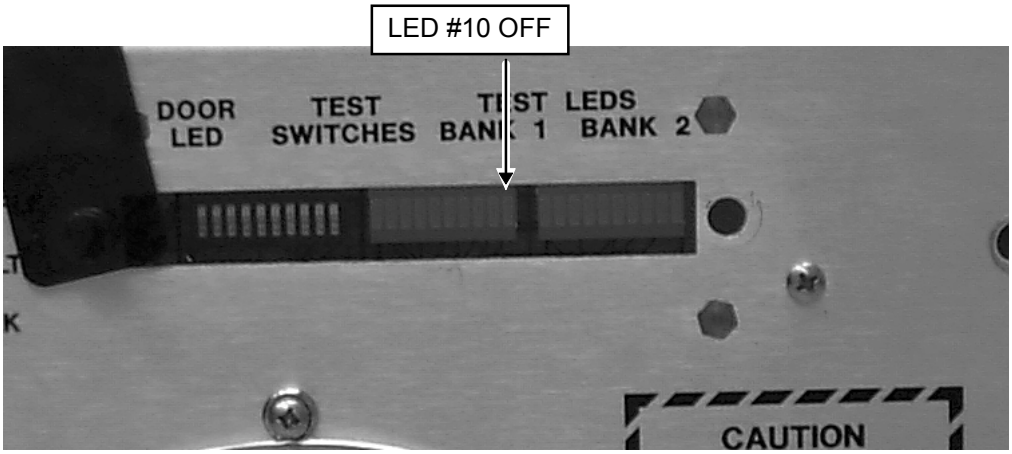
2- DD OPEN CIRCUIT THRESHOLD ADJUSTMENT (continued)

2. Press and release the CAL switch on the front of the SSM (see Illustration 2-2). This samples the open circuit fault detect signals and adjusts the threshold accordingly. The LEDs labeled TEST, DRV FLT, and PS FLT will light while the CAL switch is pressed. This provides feedback that the calibration procedure is being executed but does not indicate a fault.



CAL SWITCH LOCATION
ILLUSTRATION 2-2

3. Remove the plastic cover, and view the front panel LEDs. Ensure that LED #10 is off (see Illustration 2-3). This LED indicates whether or not the adjustment process was successful.

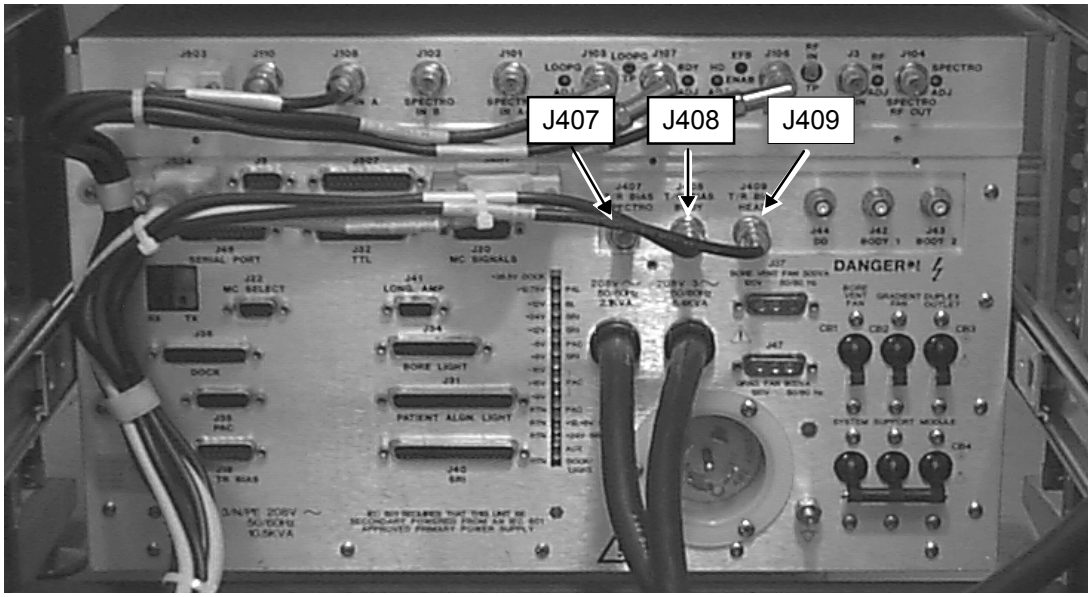


FRONT PANEL LEDS
ILLUSTRATION 2-3

3- TR VOLTAGE ADJUSTMENT

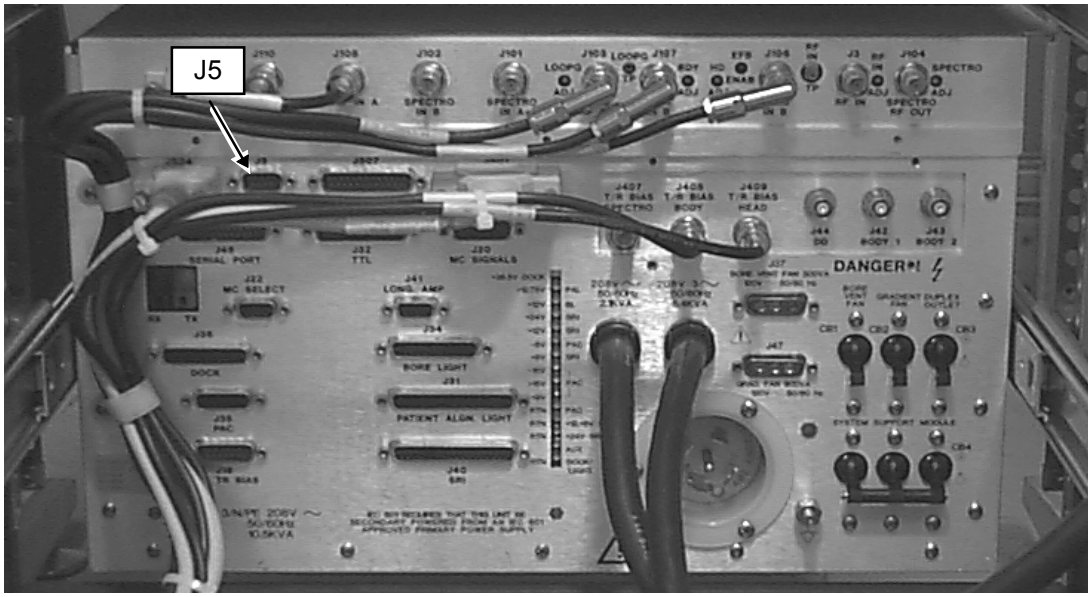
1. Ensure that the correct cables are connected to J409 (Head TR) and J408 (Body TR). See Illustration 3-1.

2. If the Multi-Nuclear Spectroscopy option is installed verify J407 (Spectro TR). See Illustration 3-1.



CABLES CONNECTED TO CORRECT LOCATIONS ON TR
ILLUSTRATION 3-1

2. Disconnect J5 (unblank enable); see Illustration 3-2.



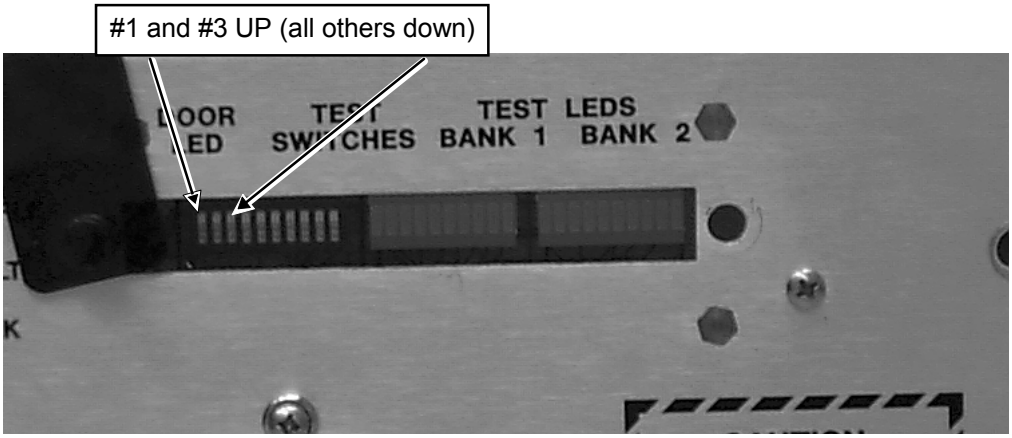
J5 LOCATION
ILLUSTRATION 3-2

3- TR VOLTAGE ADJUSTMENT (continued)

3. Configure the front panel DIP switches as shown in Illustration 3-3. This should generate a periodic unblank pulse train. Refer to Table 3-1 for the test switch and test LED definitions.

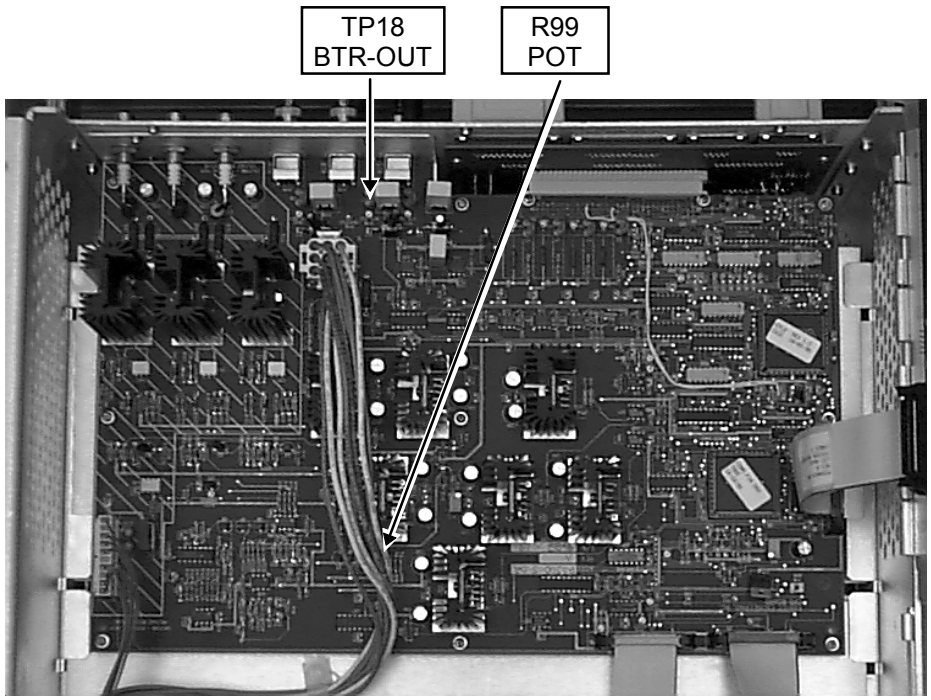
Note

Order of DIP switch placement is important otherwise system will not recognize changes. Place DIP Switch #3 in the UP position first and then Switch #1 in the UP position.



DIP SWITCH CONFIGURATION
ILLUSTRATION 3-3

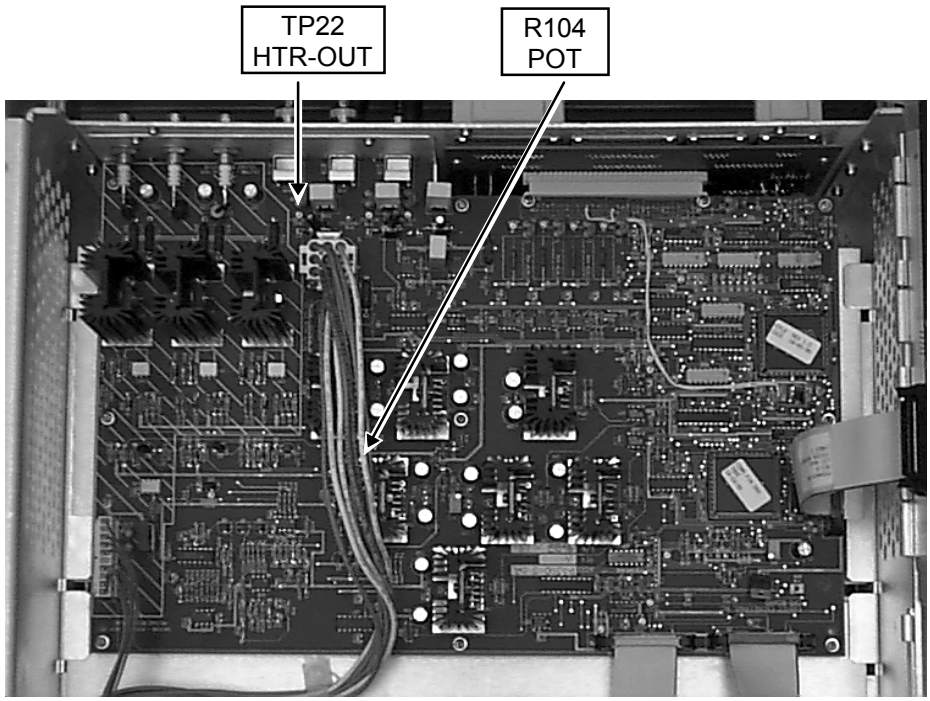
4. Connect an oscilloscope to TP18 (Body TR) on the CPD Board; see Illustration 3-4. Adjust R99 until the positive going portion of the pulse is 4.0Vp above chassis ground level.



TR VOLTAGE ADJUSTMENT/BODY TR TEST POINT
ILLUSTRATION 3-4

3- TR VOLTAGE ADJUSTMENT (continued)

5. Connect an oscilloscope to TP22 (Head TR); see Illustration 3-5. Adjust R104 until the positive going portion of the pulse is 8.0Vp above chassis ground level.



TR VOLTAGE ADJUSTMENT/HEAD TR TEST POINT
ILLUSTRATION 3-5

6. For MNSpectro TR adjustments please refer to the appropriate Multi-Nuclear Spectroscopy Subsystem Setup and Calibration Tab.

7. Place DIP switch #1 in the Down position. Place all other switches in the Down position, and reconnect J5.

3- TR VOLTAGE ADJUSTMENT (continued)

TABLE 3-1
TEST SWITCH AND TEST LED DEFINITIONS

Task	Switch Number	Position	Item Controlled	LED Bank 1	LED Bank 2
Normal Operation:	1	Down		MDS comm status	Head T/R fault
	2	--------	(When one	NB comm status	Body T/R fault
	3	--------	of these 10 is in use, the others	Monitor A comm status	Spectro T/R fault
	4	--------	are inactive)	Monitor B comm status	Body Coil 1 fault
	5	--------		PS fault	Dyn Disable fault
	6	--------		top cover open	Body Coil 2 fault
	7	--------		MC faults disabled	Multi-coil 1 fault
	8	--------		T/R faults disabled	Multi-coil 2 fault
	9	--------		DD faults disabled	Multi-coil 3 fault
	10	--------		DD open ckt adj failure	Multi-coil 4 fault
Static Control of Drivers:	1	UP		Head T/R open	Dyn Disable open
	2	DOWN		Head T/R short	Dyn Disable short
	3	DOWN		Body T/R open	Multi-coil 1 short
	4	DOWN		Body T/R short	Multi-coil 1 open
	5	UP	MC1 drv enable	Spectro T/R open	Multi-coil 2 short
	5	DOWN	MC1 drv disable		
	6	UP	MC2 drv enable	Spectro T/R short	Multi-coil 2 open
	6	DOWN	MC2 drv disable		
T/Rs Disabled:	7	UP	MC3 drv enable	Body Coil 1 open	Multi-coil 3 short
	7	DOWN	MC3 drv disable		
	8	UP	MC4 drv enable	Body Coil 1 short	Multi-coil 3 open
	8	DOWN	MC4 drv disable		
	9	UP	Source Mode	Body Coil 2 open	Multi-coil 4 short
	10	UP			
	9	DOWN	Sink Mode	Body Coil 2 short	Multi-coil 4 open
	10	DOWN			

3- TR VOLTAGE ADJUSTMENT (continued)

TABLE 3-1 (CONTINUED)
TEST SWITCH AND TEST LED DEFINITIONS

Task	Switch Number	Position	Item Controlled	LED Bank 1	LED Bank 2
PS Override Tests	1	UP		Dock enable	--------
	2	DOWN		PAC 8V	--------
	3	DOWN		PAC 9V	–5V Supply too high
	4	UP			–15V Supply too high
	5	UP	Dock disable	Bore vent	+15V Supply too high
	5	DOWN	Dock enable		
	6	UP	PAC 9V	Patient Alignment Light	HV Sense too high
	6	DOWN	PAC 8V		
	7	UP	Bore light enable	Bore light	–5V Supply too low
	7	DOWN	Bore light disable		
	8	UP	PAL enable	--------	–15V Supply too low
	8	DOWN	PAL disable		
	9	UP	Bore vent enable	MCD enable	+15V Supply too low
	9	DOWN	Bore vent disable		
	10	--------		--------	HV sense too low
				Monitor A	Monitor B
Monitor Fault Summary	1	UP		RF without unblank	RF without unblank
	2	UP		–15V Supply fault	–15V supply fault
	3	DOWN		Body Pwr limit fault	Body pwr limit fault
	4	UP		Head Pwr limit fault	Head pwr limit fault
	5	--------		Spectro Pwr limit fault	Spectro pwr limit fault
	6	--------		Duty Cycle fault	Duty cycle fault
	7	--------		RF Pulse Width fault	RF pulse width fault
	8	--------		+15V Supply fault	+15V supply fault
	9	--------		Body Cable fault	Body cable fault
	10	--------		Head/Spectro Cable fault	Head/spectro cable fault

3- TR VOLTAGE ADJUSTMENT (continued)

TABLE 3-1 (CONTINUED)
TEST SWITCH AND TEST LED DEFINITIONS

Task	Switch Number	Position	Item Controlled	LED Bank 1	LED Bank 2
Pulse Control of Drivers:	1	UP		Head T/R open	Dyn Disable open
	2	DOWN		Head T/R short	Dyn Disable short
	3	UP		Body T/R open	Multi-coil 1 short
	4	DOWN		Body T/R short	Multi-coil 1 open
	5	UP	MC1 drv enable	Spectro T/R open	Multi-coil 2 short
	5	DOWN	MC1 drv disable		
	6	UP	MC2 drv enable	Spectro T/R short	Multi-coil 2 open
	6	DOWN	MC2 drv disable		
	7	UP	MC3 drv enable	Body Coil 1 open	Multi-coil 3 short
	7	DOWN	MC3 drv disable		
	8	UP	MC4 drv enable	Body Coil 1 short	Multi-coil 3 open
	8	DOWN	MC4 drv disable		
	9	UP	Source Mode	Body Coil 2 open	Multi-coil 4 short
	10	UP			
	9	DOWN	Sink Mode	Body Coil 2 short	Multi-coil 4 open
	10	DOWN			
Multi-coil Configuration	1	UP		Multi-coil 1 enable	--------
	2	DOWN		Multi-coil 2 enable	--------
	3	UP		Multi-coil 3 enable	--------
	4	UP		Multi-coil 4 enable	--------
	5	UP	MC1 enable	--------	--------
	5	DOWN	MC1 disable		
	6	UP	MC2 enable	--------	--------
	6	DOWN	MC2 disable		
	7	UP	MC3 enable	--------	--------
	7	DOWN	MC3 disable		
	8	UP	MC4 enable	--------	--------
	8	DOWN	MC4 disable		
	9	--------		--------	--------
	10	UP, then DOWN	Program	--------	--------

3- TR VOLTAGE ADJUSTMENT (continued)

TABLE 3-1 (CONTINUED)
TEST SWITCH AND TEST LED DEFINITIONS

Task	Switch Number	Position	Item Controlled	LED Bank 1	LED Bank 2
Monitor Type Configuration	1	UP		--------	--------
	2	UP		Monitor A 1.0T	Monitor B 1.0T
	3	UP		--------	--------
	4	UP		Monitor A 1.5T w/EFB	Monitor A 1.5T w/EFB
	5	UP, 6 DOWN=1.0T		--------	--------
	5	UP AND 6 UP=1.5T		--------	--------
	7	--------		--------	--------
	8	--------		--------	--------
	9	--------		--------	--------
	10	UP, then DOWN	Program	--------	--------

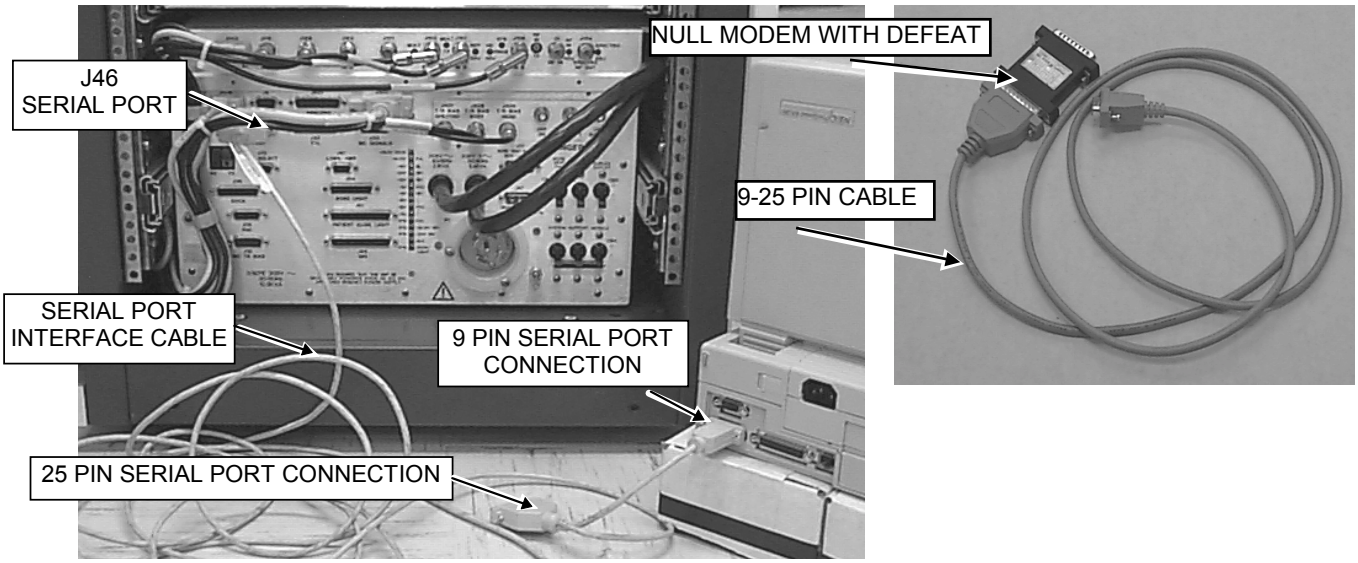
4- MULTI-COIL ADJUSTMENT

Multi-coils can be enabled and disabled in one of two ways: an alternate proprietary GE procedure via the laptop diagnostic software (Section 4-1) or via the front panel switches (Section 4-2). Each is shipped from the factory with all four coils enabled. The only time that they should be disabled is in case the site does not support multi-coil drivers.

4-1 Via the Software (Alternate Proprietary GE Procedure)

1. Turn on the main breaker (CB4) of the SSM.

2. Connect the laptop to J46 of the SSM via the null modem serial cable. See Illustration 4-1.



LAPTOP CONNECTED TO SSM
ILLUSTRATION 4-1

4-1 Via the Software (Alternate Proprietary GE Procedure) (continued)

3. Run the program CPD.EXE. See Table 4-1.

TABLE 4-1
ALTERNATE PROPRIETARY PROCEDURE — LAPTOP SOFTWARE

1. Start the software diagnostic program MONS.EXE on the laptop.

Note

The CPD.exe program if not loaded on the service laptop can be loaded from the MR Service CD-ROM 2160623 for 8x and 2124201 for 5x. Insert your latest CD into the CD ROM drive. Under Windows 95 use the cursor to select "**Start**" and then "**Run**". In the edit box type the following.

d:\mrtools\mrtools_setup.exe

Follow the instructions of the setup program to install the Service Tools. The CPD.EXE must be run from DOS. In Windows95 perform the following steps:
1) **[Start]**, **[Shut Down...]**, **Restart the computer in MS-DOS mode?**, **[Yes]**
2) At the C:\Windows> prompt, type **cd..<ENTER>**
3) Type **cd Cclass<ENTER>**
4) At the C:\CCLASS> prompt, type **cd erbtec<ENTER>**
5) At the C:\CCLASS\ERBTEC> prompt type **cpd.exe<ENTER>**

4. Enter the password per the screen instructions.

5. Select the *C) Perform Special Operations* menu.

6. Select *F) Change Multi-coil Configuration*.

7. Answer the questions. See Illustration 4-2.

```
Current Multi-coil configuration is :  0F
    Multi-coil   1          ENABLED
    Multi-coil   2          ENABLED
    Multi-coil   3          ENABLED
    Multi-coil   4          ENABLED
Do you wish to change any of them?  y or n

Enter the numbers of the Multi-coils you wish to change state separated by spaces
(i.e.  1  3 will change Multi-coils 1 and 3)
Enter 0 to leave the Multi-coils as they are
```

F) CHANGE MULTI-COIL CONFIGURATION
ILLUSTRATION 4-2

8. Press **<Esc>** twice to exit to DOS. To return to Windows, type **exit<ENTER>**.

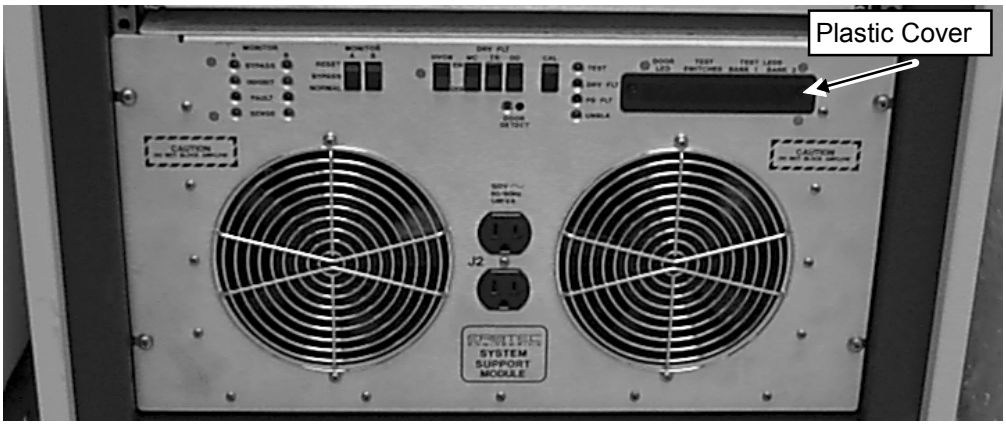
9. Recycle the main breaker on the SSM by turning off then on, doing so applies the changes to the system.

10. Go to Section 4-3 Multi-coil TR Adjustments to continue the multi-coil procedure.

4-2 Via the Front Panel Switches

1. Turn on the main breaker (CB4) of the SSM.

2. Remove the plastic cover from the Test Switch and Test LEDS window on the front of the SSM. See Illustration 4-3.



TEST SWITCH AND TEST LEDS WINDOW
ILLUSTRATION 4-3

Note

Place DIP Switch #1 in the UP position last. Order of DIP switch placement is important otherwise system will not recognize changes.

3. Place switches 3, 1, and 4 in the Up position. Ensure that all other switches are in the Down position.

4. Place switches in the appropriate positions. Refer to Table 3-1 for the switch positions and definitions for each multi-coil.
   a. To disable all multi-coils, place switches 5, 6, 7, & 8 in the Down position and proceed to step 5.
   b. To disable multi-coils 3 & 4, place switches 5 & 6 in the Up position and proceed to step 5.
   c. To enable all multi-coils, place switches 5, 6, 7, & 8 in the Up position and proceed to step 5.

5. Place switch #10 in the Up position, followed by the Down position. Bank 1 LEDs 1, 2, 3, & 4 are on and remain on once switch #10 is in Down position.

6. Place switch #1 in the Down position. Bank 1 LEDs 3 & 4 should be on.

7. Recycle the main breaker on the SSM by turning off then on, doing so applies the changes to the system.

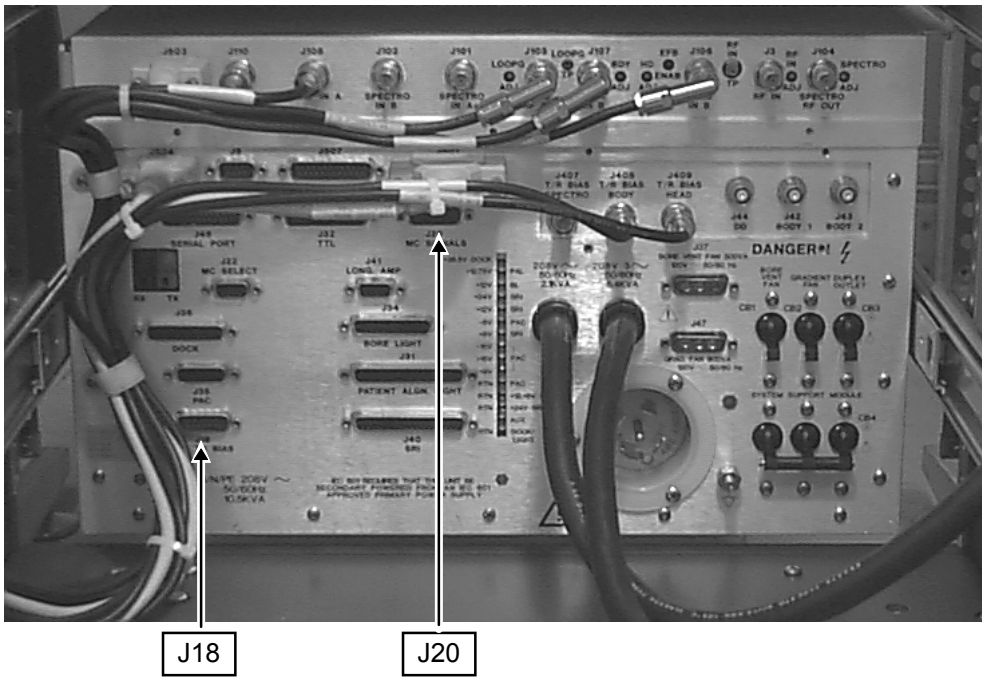
8. Place all other switches in Down position.

9. Replace the plastic cover on the front of the SSM.

10. Go to Section 4-3 Multi-coil TR Adjustments to continue the multi-coil procedure.

4-3 Multi-coil TR Adjustments

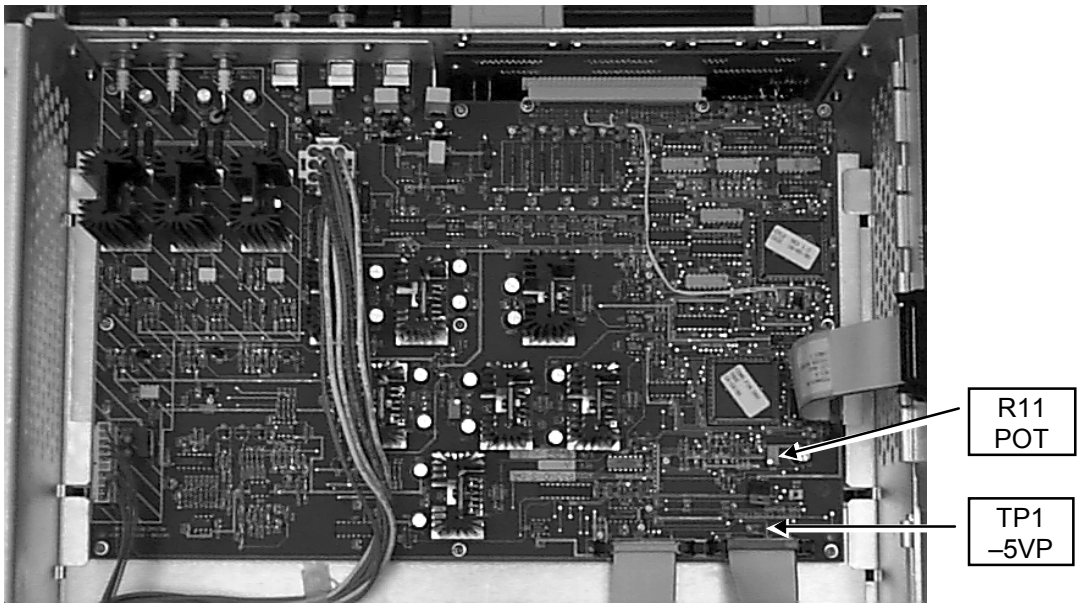
1. Ensure that the correct cables are connected to J20 (multi-coil signals) and J18 (multi-coil TR bias); see Illustration 4-4.



CABLES CONNECTED TO CORRECT LOCATIONS — MULTI-COIL
ILLUSTRATION 4-4

4-3 Multi-coil TR Adjustments (continued)

2. Connect an oscilloscope or a volt meter to TP1 (–5V); see Illustration 4-5. Adjust R11 until the voltage is –5.000V ± 5 mV.



MULTI-COIL ADJUSTMENT/ –5V TEST POINT
ILLUSTRATION 4-5

5- PAC 8/9V CONFIGURATION

The PAC 8/9V can be set up in one of two different ways: an alternate proprietary GE procedure via the laptop diagnostic software (Section 5-1) or via the front panel switches (Section 5-2). The PAC is preset to 9V at the factory. Systems with a fiber optic repeater at the Pen wall need to set the PAC voltage to 9 Volts. Systems without a fiber optic repeater need to set the PAC voltage to 8 Volts.

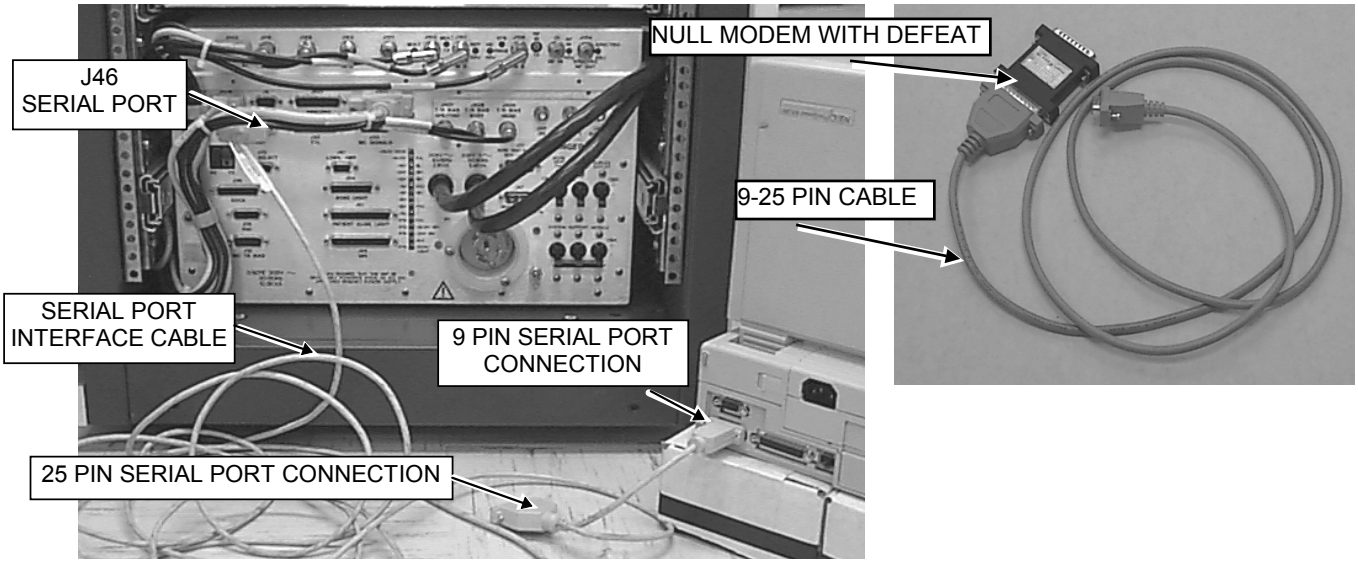
5-1 Via the Software (Alternate Proprietary GE Procedure)

Note

The alternate proprietary GE procedure via the laptop software does not work properly, but can be used to verify current PAC voltage setting. The following steps display the PAC voltage setting. To change settings use section 5-2 Via the Front Panel Switches.

1. Turn on the main breaker (CB4) of the SSM.

2. Connect the laptop to J46 of the SSM via the null modem serial cable. See Illustration 5-1.



LAPTOP CONNECTED TO SSM
ILLUSTRATION 5-1

5-1 Via the Software (Alternate Proprietary GE Procedure) (continued)

3. Run the program CPD.EXE. See Table 5-1.

TABLE 5-1
ALTERNATE PROPRIETARY PROCEDURE — LAPTOP SOFTWARE

1. Start the software diagnostic program MONS.EXE on the laptop.

Note

The CPD.exe program if not loaded on the service laptop can be loaded from the MR Service CD-ROM 2160623 for 8x and 2124201 for 5x. Insert your latest CD into the CD ROM drive. Under Windows 95 use the cursor to select "**Start**" and then "**Run**". In the edit box type the following.

d:\mrtools\mrtools_setup.exe

Follow the instructions of the setup program to install the Service Tools. The CPD.EXE must be run from DOS. In Windows95 perform the following steps:

1) **[Start]**, **[Shut Down...]**, **Restart the computer in MS-DOS mode?**, **[Yes]**
2) At the C:\Windows> prompt, type **cd..<ENTER>**
3) Type **cd Cclass<ENTER>**
4) At the C:\CCLASS> prompt, type **cd erbtec<ENTER>**
5) At the C:\CCLASS\ERBTEC> prompt type **cpd.exe<ENTER>**

4. Enter the password per the screen instructions.

5. Select the *C) Perform Special Operations* menu.

6. Select *H) Change PAC Power Supply Voltage (8V, 9V)*.

7. The current PAC configuration is shown (see Illustration 5-2).

```
Current PAC  8/9  V configuration is :  9V

Do you wish to change it? <Y> or <N>
```

H) CHANGE PAC POWER SUPPLY VOLTAGE (8V, 9V)
ILLUSTRATION 5-2

8. Type **N<ENTER>**.

9. Press **<Esc>** twice to exit to DOS. To return to Windows, type **exit<ENTER>**.

5-2 Via the Front Panel Switches

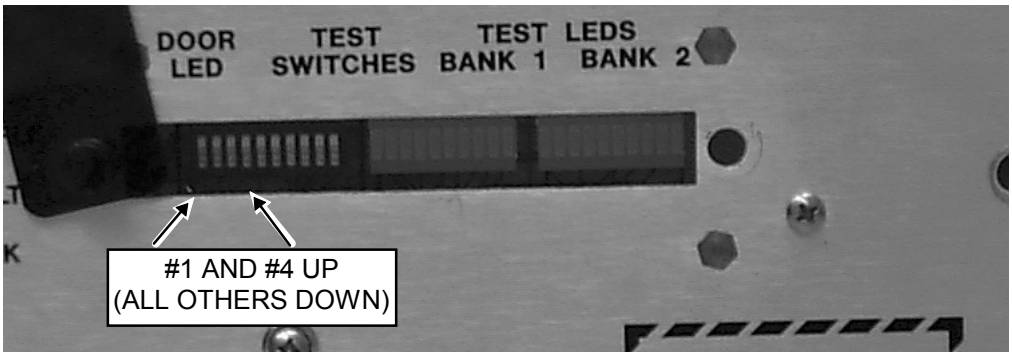
1. Turn on the main breaker (CB4) of the SSM.

2. Remove the plastic cover on the front of the SSM.

Note

Place DIP Switch #1 in the UP position last. Order of DIP switch placement is important otherwise system will not recognize changes.

3. To change setting to 8V, place switches 4 and 1 in the Up position. Ensure that all other switches are in the Down position (see Illustration 5-3). Bank 1 LEDs 1, 2, &5 should be on.



DIP SWITCH CONFIGURATION FOR PAC 8V
ILLUSTRATION 5-3

4. Place switch 1 in the Down position.

5. Recycle the main breaker on the SSM by turning off then on, doing so applies the changes to the system.

6. Place all other switches in the Down position.

7. Replace the plastic cover on the front of the SSM.

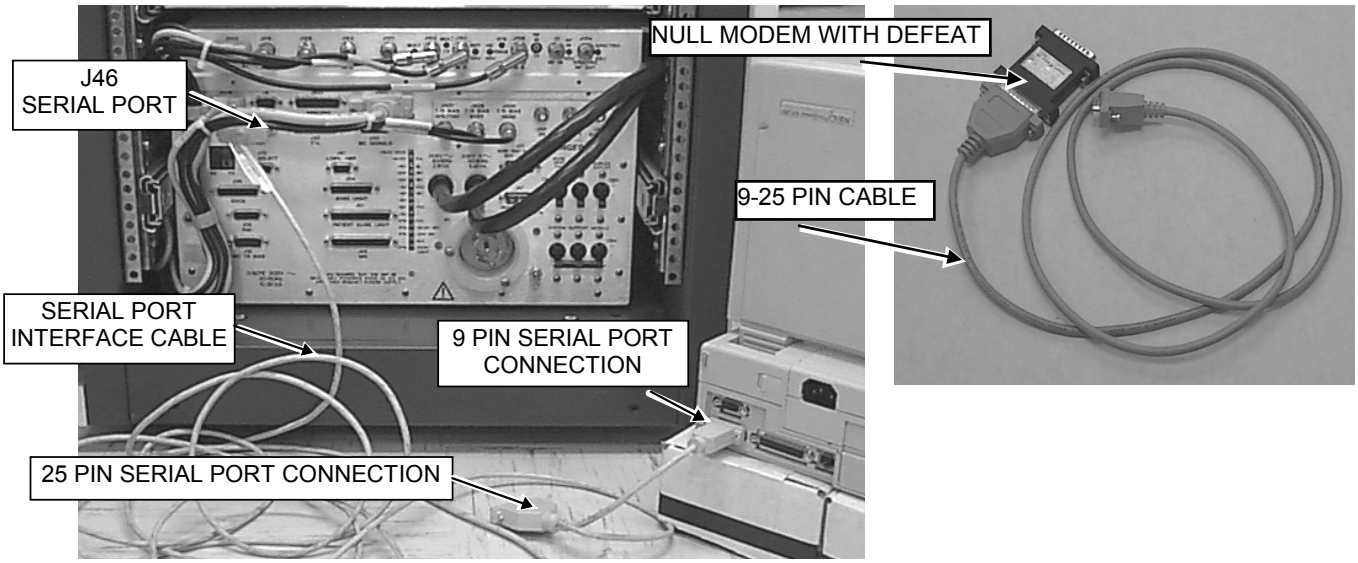
6- POWER MONITOR TYPE CONFIGURATION

The power monitor type is preset to 1.5T or 1.0T, depending on what type of cabinet it is placed in. For spares, the type is set to 1.5T. The power monitor type can be changed one of two ways: an alternate proprietary GE procedure via the laptop diagnostic software (Section 6-1) or via the front panel switches (Section 6-2).

6-1 Via the Software (Alternate Proprietary GE Procedure)

1. Turn on the main breaker (CB4) of the SSM.

2. Connect the laptop to J46 of the SSM via the null modem serial cable. See Illustration 6-1.



LAPTOP CONNECTED TO SSM
ILLUSTRATION 6-1

6-1 Via the Software (Alternate Proprietary GE Procedure) (continued)

3. Run the program CPD.EXE. See Table 6-1.

TABLE 6-1
ALTERNATE PROPRIETARY PROCEDURE — LAPTOP SOFTWARE

1. Start the software diagnostic program MONS.EXE on the laptop.

Note

The CPD.exe program if not loaded on the service laptop can be loaded from the MR Service CD-ROM 2160623 for 8x and 2124201 for 5x. Insert your latest CD into the CD ROM drive. Under Windows 95 use the cursor to select "**Start**" and then "**Run**". In the edit box type the following.

d:\mrtools\mrtools_setup.exe

Follow the instructions of the setup program to install the Service Tools. The CPD.EXE must be run from DOS. In Windows95 perform the following steps:
1) **[Start]**, **[Shut Down...]**, **Restart the computer in MS-DOS mode?**, **[Yes]**
2) At the C:\Windows> prompt, type **cd..<ENTER>**
3) Type **cd Cclass<ENTER>**
4) At the C:\CCLASS> prompt, type **cd erbtec<ENTER>**
5) At the C:\CCLASS\ERBTEC> prompt type **cpd.exe<ENTER>**

4. Enter the password per the screen instructions.

5. Select the *C) Perform Special Operations* menu.

6. Select *G) Change Power Monitor Type*.

7. Type **y<ENTER>** and type letter of power monitor type. See Illustration 6-2.

```
Current Power Monitor Configuration is :  1.0T

Do you wish to change it? <Y> or <N>  y

Choose one of the following configurations:
A)  0.5T
B)  1.0T
C)  1.5T
D)  1.5T w/efb
```

G) CHANGE POWER MONITOR TYPE (1.0T, 1.5T)
ILLUSTRATION 6-2

8. Press **<Esc>** twice to exit to DOS. To return to Windows, type **exit<ENTER>**.

9. Recycle the main breaker on the SSM by turning off then on.

6-2 Via the Front Panel Switches

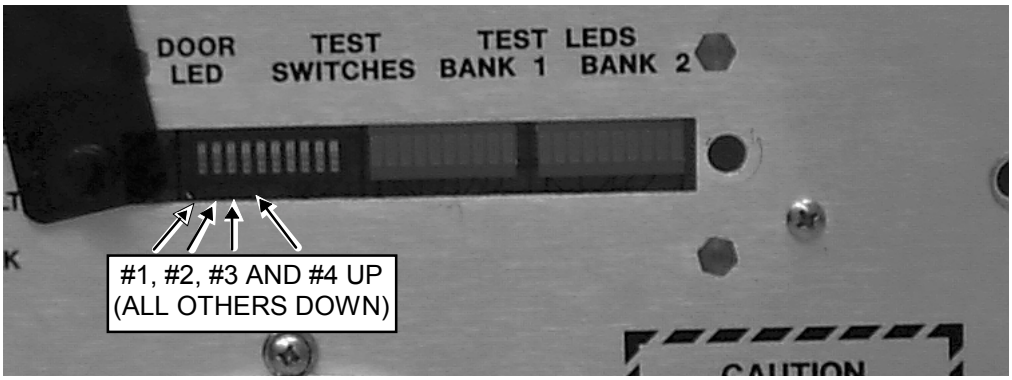
1. Turn on the main breaker (CB4) of the SSM.

2. Remove the plastic cover on the front of the SSM.

Note

Place DIP Switch #1 in the UP position last. Order of DIP switch placement is important otherwise system will not recognize changes.

3. Place switches 3, 2, 4, and 1 in the Up position. Ensure that all other switches are in the Down position (See Illustration 6-3). LED BANK 1 and LED BANK 2 should each have LED #4 (fourth from the left) lit.



DIP SWITCH CONFIGURATION FOR SETTING POWER MONITOR TYPE
ILLUSTRATION 6-3

a. To set the type to a 1.0T, place switch 5 in the Up position and switch 6 in the Down position. LED BANK 1 and LED BANK 2 LED #4 (fourth from the left) should remain lit.

b. To set the type to a 1.5T, place switch 5 in the Up position and switch 6 in the Up position. LED BANK 1 and LED BANK 2 should have LED #4 & #2 lit. Switches

one through four should still be in the Up position.

4. Place switch #10 in the Up position followed by the Down position.

5. Place switch #1 in the Down position. LED BANK 1 and LED BANK 2 should each have LED #4 (fourth from the left) off.

6. Recycle the main breaker on the SSM by turning off then on, doing so applies the changes to the system.

7. Place all other switches in the Down position.

8. Replace the plastic cover on the front of the SSM.

7- SYSTEM RESTORATION

1. Close the lids, replace all the lid screws, slide the SSM chassis back into the rack, replace the four front screws, and install the front door.

The system must be setup for a Body mode protocol and the [Prepare to Scan] softkey selected initially. Pulse Body mode once at TG of 0. Do Not open the SSM top cover for 1 minute (after the system has transitioned from Head, Surface, M/C or MNS mode to Body mode). Failure to follow these directions has resulted in the Dynamic Disable IGBT Circuitry (Direct Drive, Body1, Body2) overheating and shorting resulting in CPD replacement.

2. Perform a TPS reset.

3. Perform a Head Scan, Body Scan, and Multi-coil scan to verify the system is scanning normally.

REVISION HISTORY

REV	DATE	AUTHOR	PRIMARY REASONS FOR CHANGE
0	June 10, 1998	Erbtec Engineering	Initial toolbook conversion to Word. (KK)
1	November 3, 1998	K. Keshena	Updated Proprietary GE Procedures for Windows95.
2	Sept. 2, 1999	Resa Lambert	Added IGBT Body mode caution for SSM cover open.
3	Feb. 15, 1999	Bob Schmidt	Updated page 13, 18 & 21 with correct path for loading CPD.exe program as well as latest CD-ROM part #'s for 5x & 8.x. Page 22 steps 6-2-3, 6-2-3-a, & 6-2-5 were validated and corrected per SPR's MRIge56704 & MRIge56649 in which LED 4 is illuminated, not LED 2.