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Description - This section contains an overview of the diagnostic procedures and troubleshooting methods for the 0.7T GRFD Power cabinet, using both the laptop software and the front panel LEDs and switches.

1- LAPTOP TROUBLESHOOTING SOFTWARE

1-1 Overview

Two programs are intended for troubleshooting the cabinet, using the standard GE issue laptop computer. These programs are:

- CPD.EXE
- MONS.EXE

These programs can be run from the CD-ROM, or they can be copied to the hard drive and run from there.

These programs require an IBM PC compatible computer or laptop with:

- DOS 5.0 or later; or Windows 95
- 1.0M of RAM
- VGA monitor
- RS-232 serial port

These programs communicate via the auxiliary serial port (J46) on the system support module (SSM) of the cabinet.

Prior to running any of the programs, set up the communications port of the computer, and connect a null modem serial cable between the laptop and J46 on the rear of the cabinet.

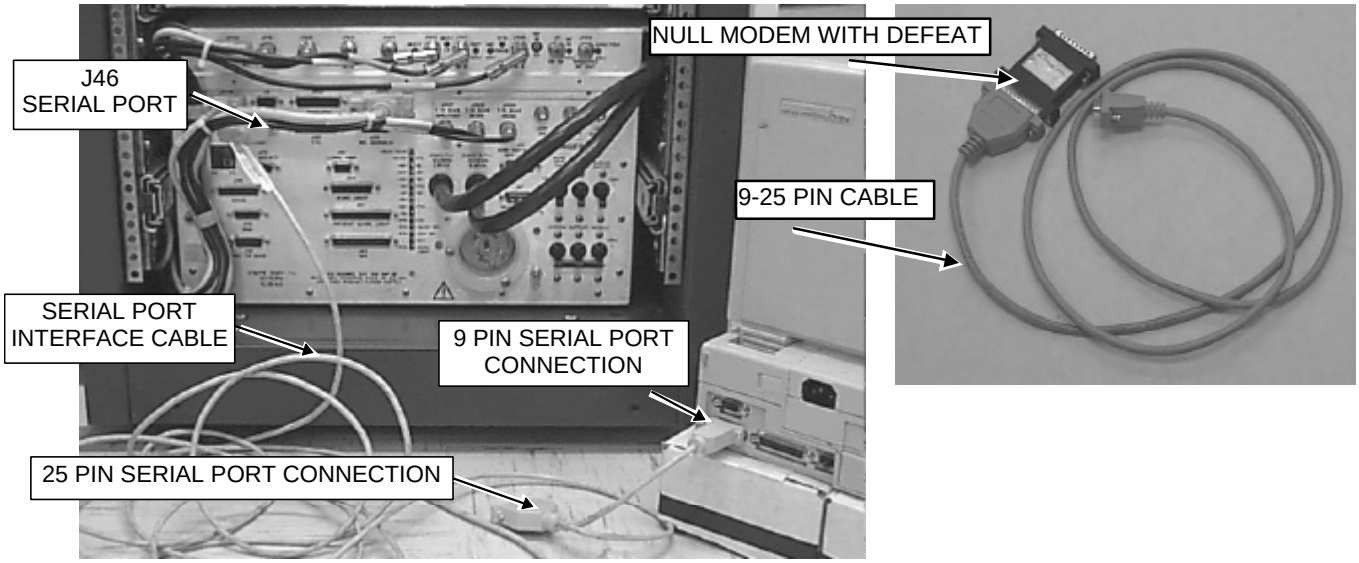
To set up the communications port COM1 of the laptop; open a DOS prompt by clicking **[Start]**, **Programs**, and **MS-DOS Prompt**, at the DOS prompt type:

MODE COM1:9600,N,8,1

This sets up COM1 for 9600 baud, no parity, 8 data bits, and 1 stop bit.

1-1 Overview (continued)

Use the serial port interface cable that is supplied with every cabinet, part number 2124497-46 (shown in Illustration 1-1), for the connection between the laptop serial port and the cabinet. If this cable is not available, a suitable null modem and cable adapters can be used. See Illustration 1-1.



LAPTOP CONNECTED TO SSM
ILLUSTRATION 1-1

The following error message will print if a serial communications error occurs in any of the programs:

> An RS-232 serial error has occurred
> Check the manual for the correct cabling and then check the cabling
> Please press a key to continue, 'esc' to exit to DOS

If you receive this message, check the RS-232 serial communications hookup between the laptop and J46 of the SSM. The connections should look similar to Illustration 1-1. Check to see that the cabinet is powered on (breaker CB4 on the rear of the SSM is on).

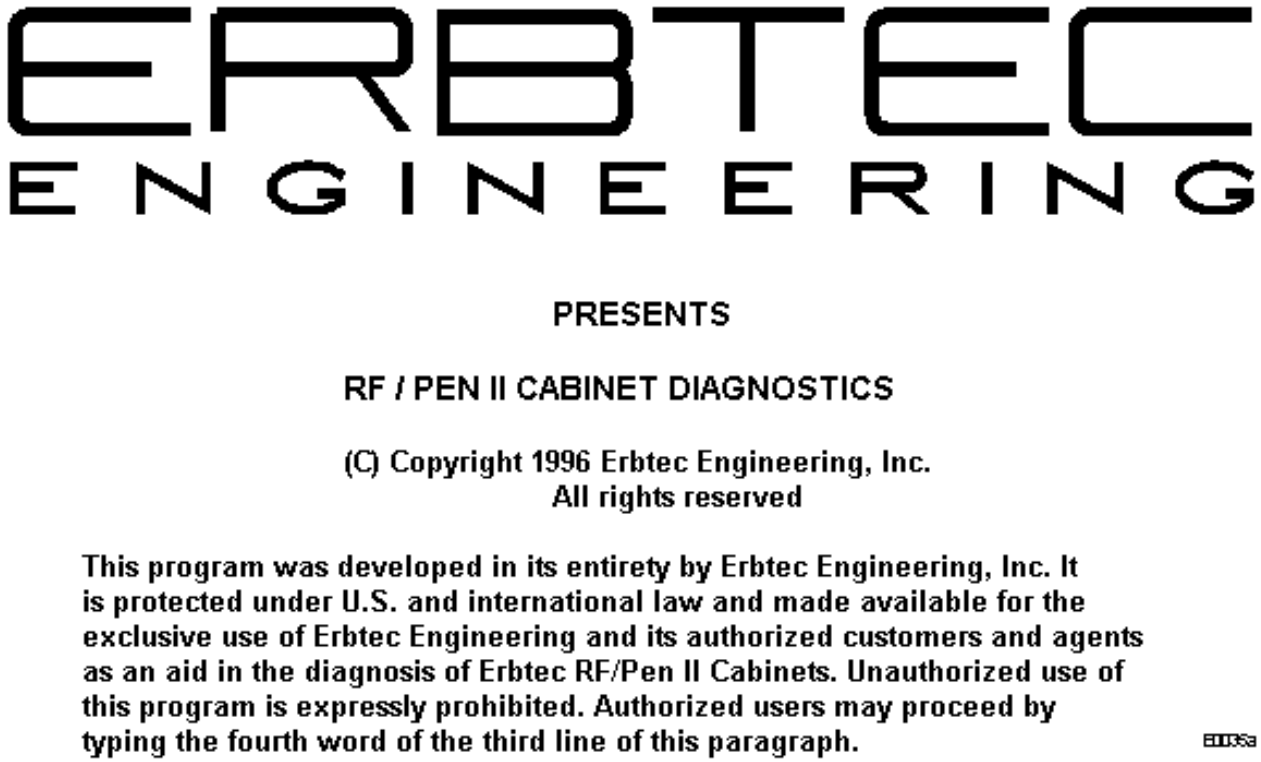
The MONS.EXE & CPD.EXE must be run from DOS. In Windows95 perform the following steps to run the programs:

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. To run the MONS.EXE program, see A. To run the CPD.EXE, see B.
   A.) At the C:\CCLASS\ERBTEC> prompt type **mons <ENTER>.**
   B.) At the C:\CCLASS\ERBTEC> prompt type **cpd <ENTER>.**

Each program comes with command line options that are described later.

1-1 Overview (continued)

Each program begins with a copyright statement (see Illustration 1-2). If you agree with the conditions, simply follow the instructions printed on the screen, and continue into the program.



ERBTEC COPYRIGHT STATEMENT
ILLUSTRATION 1-2

Each of the two programs is useful for troubleshooting the SSM in different ways. Each program takes a different part of the system and displays characteristics about it in a meaningful way.

CPD.EXE is useful for observing front panel display information without having to remove the front door. It can be used in a manner similar to the front panel interaction with the ten test dip switches. The program also provides TR, multi-coil, and DD information and allows the user to know general information about the system without having to remove any covers from the cabinet.

MONS.EXE is useful for interacting with the power monitors. It can be used to troubleshoot problems associated with the power monitoring function of the SSM.

1-2 CPD.EXE

This program is useful for debugging the communications pin driver board in the SSM. It also simulates the front panel display interaction, which is very useful for debugging without having to remove any covers.

This program can be used for the following special operations:

- View EEPROM variables
- Run self-test of the system
- Set DD open circuit tolerance
- Change RF amp AFT status
- Change RF amp tube serial number
- Change Multi-coil configuration (0-4 Multi-coils present)
- Change power monitor type (1.0T, 1.5T)
- Change PAC power supply voltage (8V, 9V)
- Adjust Multi-coil and TR circuits (requires opening the SSM to adjust pots)
- Create a test unblank signal
- Remove test unblank signal

It also shows current pin driver (TR, DD, Multi-coil) information and current front panel configuration and information.

Several command line options can be invoked to make the program more useful as a debugging tool. If no command line options are specified, the default mode is invoked. The command line options are as follows:

SYNTAX: CPD {/? /(D,A) /(1-4)}

Where:

/? = syntax help
/D = debug communications on
/A = auxiliary port communications
/(1-4) = laptop serial communications port (COM1-COM4)

The default mode is: CPD /A /1

The /D option is useful only if there is no cabinet present. It shows what is available via the program. This is useful for training purposes, but does not provide any real data.

Only the last option listed for /A, /D, and /1,/2,/3,/4 will be accepted.

If the /? option is invoked at any location in the command line, it takes precedence over all other options, and exits to the DOS prompt after displaying the syntax options.

1-2 CPD.EXE (continued)

Note

If you receive a CRC value error, press **<ENTER>** and proceed with procedure.

The main screen is a menu. Choosing an option from this screen invokes other screens or menus. Illustration 1-4 shows the main screen, Illustration 1-5 shows a sample front panel screen (choice A from the main menu), Illustration 1-6 shows a sample pin driver screen, and Illustration 1-7 shows the menu for special operations. The illustrations are to be used as examples only, settings for each system may vary.

CPD.EXE Rev 1.3 CRC 0000

A) Show Current Front Panel Information
B) Show Current Pin Driver Information
C) Perform a Special Operation
D) Help Regarding This Program
E) Exit to DOS (or press 'esc')

Choice:

MAIN SCREEN OF CPD.EXE
ILLUSTRATION 1-4

Note

If you experience problems viewing the "Current Front Panel Information" screen, press the "A" key and hold until screen view stabilizes.

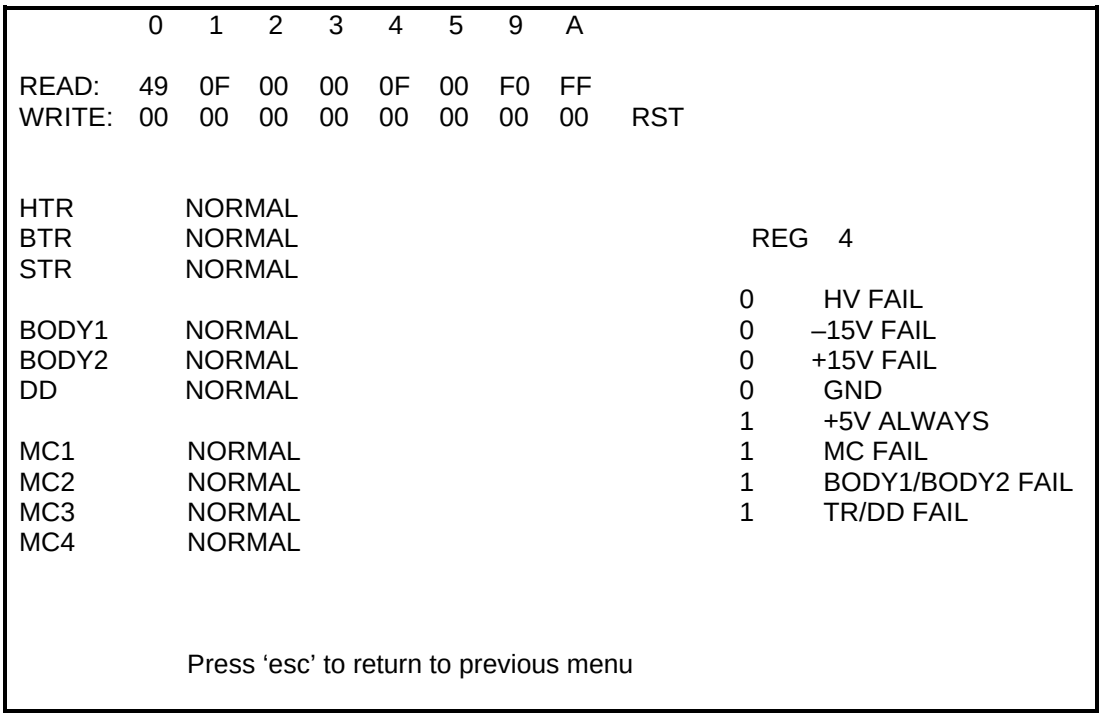
				MON A		MON B
MON A	NORMAL					
MON B	NORMAL	ACCESS LED	ON			
		TEST LED	OFF	OFF	BYPASS	OFF
MC EN	DISABLED	DRV FLT	OFF	OFF	INHIBIT	OFF
TR EN	DISABLED	PS FLT	OFF	OFF	FLT	OFF
DD EN	DISABLED			OFF	SENSE	OFF

DIP SWITCHES	LED BAR 1		LED BAR 2	
0	MDS comm	OFF	Head TR flt	OFF
0	MB comm	OFF	Body TR flt	OFF
0	Mon A comm	OFF	Spec TR flt	OFF
0	Mon B comm	OFF	Body Coil 1	OFF
0	PS fault	OFF	Dyn Dis flt	OFF
0	Top cover	OFF	Body Coil 2	OFF
0	MC disable	ON	MC1 fault	OFF
0	TR disable	ON	MC2 fault	OFF
0	DD disable	ON	MC3 fault	OFF
0	DD open ckt	OFF	MC4 fault	OFF

Press 'esc' to return to main menu

SAMPLE OF CURRENT FRONT PANEL INFORMATION OF CPD.EXE
ILLUSTRATION 1-5

1-2 CPD.EXE (continued)



SAMPLE PIN DRIVER SCREEN OF CPD.EXE
ILLUSTRATION 1-6

1-2-1 CPD.EXE Special Operation Screens

```
A) View the EEPROM variables
B) Run Selftest
C) Set DD open circuit tolerance
D) Change RF Amp AFT status
E) Change RF Amp tube serial number
F) Change Multi-coil configuration
G) Change Power Monitor type (1.0T, 1.5T)
H) Change PAC Power Supply Voltage (8V, 9V)
I) Adjust Multi-coil and T/R Circuits
J) Create a test unblank signal
K) Remove test unblank signal
L) Return to Main Menu (or press 'esc')

   Choice:
```

SPECIAL OPERATION MENU OF CPD.EXE
ILLUSTRATION 1-7

Pressing the **<Esc>** key at any screen exits to the previous menu.

Selection A) "View the EEPROM variables" does not work. Error: can not locate EEPROM.TXT file will be displayed.

Selection B) "Run Selftest" displays the following screen (see Illustration 1-8).

```
Faulting Monitor A ...  Please wait
Asking Amp if it is faulted ...  Please wait

Faulting Monitor B ...  Please wait
Asking Amp if it is faulted ...  Please wait
                                                    FAIL
Checking Amp mode change capability ...  Please wait  FAIL
                                                    PASS
                self test flag = 0003               PASS
                                                    PASS
Ability of Monitor A to fault the amp:              PASS
Ability of Monitor A to clear the fault to the amp: PASS
Ability of Monitor B to fault the amp:
Ability of Monitor B to clear the fault to the amp:
Read of amplifier current mode:
Write of amplifier to different mode:
Write of amplifier to current mode:


                    Press any key to return
```

B) RUN SELFTEST
ILLUSTRATION 1-8

1-2-1 CPD.EXE Special Operation Screens (continued)

Selection C) Set DD open circuit tolerance displays the following screen (see Illustration 1-9).

```
Current Status:
    DAC1 = 009Dh    3.08  V
    DAC2 = 009Dh    3.08  V
    DAC3 = 007Bh    2.41  V
    DAC4 = 0080h    2.51  V
    DAC  Offset = 0054h    1.65  V
    Target comparison = 0001h    0.02  V


Do you wish to update the DAC values 'Y' or 'N'
```

C) SET DD OPEN CIRCUIT TOLERANCE
ILLUSTRATION 1-9

Selection D) Change RF Amp AFT Status displays the following screen (see Illustration 1-10).

```
Current RF Amplifier AFT status is AFT DISABLED

Do you wish to change it 'Y' or 'N'
```

D) CHANGE RF AMP AFT STATUS
ILLUSTRATION 1-10

Selection E) Change RF Amp tube serial number displays the following screen (see Illustration 1-11).

```
3CPX800A7  Serial Number:
YC156  Serial Number:

Are these correct? (Y)es or (N)o
```

E) CHANGE RF AMP TUBE SERIAL NUMBER
ILLUSTRATION 1-11

Note

Selection E) Change RF Amp tube serial number is not applicable to 1.0T systems installed with the RF/PDU cabinet.

1-2-1 CPD.EXE Special Operation Screens (continued)

Selection F) Change Multi-coil configuration displays the following screen (Illustration 1-12).

```
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 1-12

Selection G) Change Power Monitor type (1.0T, 1.5T) displays the following screen (Illustration 1-13).

```
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 1-13

Selection H) Change PAC Power Supply Voltage (8V, 9V) displays the following screen (Illustration 1-14).

```
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 1-14

Note

The laptop software does not work properly. It will not allow you to change the PAC Voltage but can be used to verify current PAC voltage setting. Use the front switches to change the PAC voltage setting and selection H to verify.

1-2-1 CPD.EXE Special Operation Screens (continued)

Selection I) Adjust Multi-coil and T/R Circuits displays the following screen (Illustration 1-15).

```
Disable unblank from getting to the cabinet
Press the 'D' key when you have done so or press 'esc' to exit
```

I) ADJUST MULTI-COIL AND T/R CIRCUITS
ILLUSTRATION 1-15

Selection J) Create a test unblank signal displays the following screen (Illustration 1-16).

```
Current Unblank Time = 1000.00
Current Blank Time = 15000.00

Enter the amount of Unblank time (in uS):  XXXX.XX
Enter the amount of Blank time (in uS):  XXXXX.XX

Attempting to write new values ...  Please wait
New unblank values written.  Press any key to return.
```

J) CREATE A TEST UNBLANK SIGNAL
ILLUSTRATION 1-16

Selection K) Remove test unblank signal does not display a screen. Selection L) returns to the Main menu (Illustration 1-4).

1-3 MONS.EXE

This program is useful for debugging possible power monitor problems. It can be used to determine what the power monitor sees as power out of the RF amplifier or the MNSpectroscopy amplifier.

This program can be used to check the power monitor faulting capability. See the procedure for *Power Monitor Functional Checks*.

This program also allows you to view the values that are downloaded from Signa, which is useful in situations where it is unclear if Signa is behaving properly. It is possible to download trip values manually for testing purposes as well.

Several command line options can be invoked to make the program more useful as a debugging tool. They are as follows:

SYNTAX: MONS {/? /(D,A) /(1-4) /(R,U,S)}

Where:

/? = syntax help
/D = debug communications on
/A = auxiliary port communications
/(1-4) = laptop serial communications port (COM1-COM4)
/R = disable RF amplifier refresh
/U = establish a minimum pulse width for display on screen
/S = establish a minimum power threshold for display on screen

The default mode is: MONS /A /1 (i.e., typing **MONS <Enter>** invokes the default).

The /R, /U, and /S options are strictly for screen formatting purposes only. In normal operation, these are constantly updated and thus the value zero (0) is intermixed with the real power and can cause confusion. The same is true for RF pulse width. If the RF amplifier refresh is disabled, it is possible to see only the real power during the RF pulse rather than the zero power during the refresh pulse.

The /D option is useful only if there is no cabinet present. It shows what is available via the program. This is useful for training purposes, but does not provide any real data.

It is possible to use any combination of /R, /U, and /S; however, only the last option listed for /A, /D, and /1,/2,/3,/4 will be accepted.

If the /? option is invoked at any location in the command line, it will take precedence over all other options and will exit to the DOS prompt after displaying the syntax options.

1-3 MONS.EXE (continued)

Illustration 1-17 shows a sample of what the main screen of the program looks like, the limits and measures may vary depending on the system configuration.

MONS.EXE Rev 1.3

	MONITOR A LIMIT	MONITOR A MEASURE	MONITOR B LIMIT	MONITOR B MEASURE
spec pwr:	2071 W	1 W	2071 W	4 W
head pwr:	687 W	80 W	687 W	80 W
body pwr:	2197 W	6 W	2197 W	15 W
spec pulse width:	11.60 ms	0.00 ms	11.60 ms	0.00 ms
head pulse width:	29.18 ms	0.90 ms	29.18 ms	0.90 ms
body pulse width:	2.71 ms	0.00 ms	2.71 ms	0.00 ms
spec duty cycle:	16.87 %	0.00 %	16.87 %	0.00 %
head duty cycle:	25.21 %	0.00 %	25.21 %	0.00 %
body duty cycle:	25.41 %	0.00 %	25.41 %	0.00 %
spec cable det:		OPEN		OPEN
head cable det:		NORMAL		NORMAL
body cable det:		NORMAL		NORMAL
+15V supply:		15.04 V		15.10 V
–15V supply:		–15.04 V		–15.04 V
operational status:	NORM		NORM	

Press ‘esc’ to exit, ‘C’ to change limits, ‘N’ for next screen, ‘?’ for help

MAIN SCREEN OF MONS.EXE
ILLUSTRATION 1-17

1-3 MONS.EXE (continued)

The program allows the user to change any of the following power monitor limits for head, body, or MNSpectro modes: power trip, RF pulse width, and duty cycle. This option is invoked by pressing the **<C>** key while the main screen is showing or, in Windows95, click **[Start]**, **[Shut Down...]**, Restart the computer in MS-DOS mode?, **[Yes].** At the C:\Windows> prompt, type **cd..<ENTER>,** type **cd Cclass<ENTER>,** at the C:\CCLASS> prompt, type **cd erbtec<ENTER>,** type **mons <ENTER>**. You are prompted to choose the limit that you wish to change from a list of menu options (Illustration 1-18). Then you are asked which power monitor to change. The final prompt asks you to enter a value (i.e., watts, milliseconds, or percent). Illustration 1-19 shows this.

A. Spectro Power Trip Limit
B. Head Power Trip Limit
C. Body Power Trip Limit
D. Spectro RF Pulse Width Limit
E. Head RF Pulse Width Limit
F. Body RF Pulse Width Limit
G. Spectro Duty Cycle Limit
H. Head Duty Cycle Limit
I. Body Duty Cycle Limit
J. Return to Main Menu (or press 'esc')

Choice:

CHANGE LIMIT SCREEN OF MONS.EXE
ILLUSTRATION 1-18

A. Spectro Power Trip Limit
B. Head Power Trip Limit
C. Body Power Trip Limit
D. Spectro RF Pulse Width Limit
E. Head RF Pulse Width Limit
F. Body RF Pulse Width Limit
G. Spectro Duty Cycle Limit
H. Head Duty Cycle Limit
I. Body Duty Cycle Limit
J. Return to Main Menu (or press 'esc')

Choice: a

Which Power Monitor would you like to write to? (A or B): a

Power is in Watts, RF Pulse is in ms, Duty cycle is in percent
What value (in decimal) do you wish to write?

CHANGE LIMITS SCREEN AFTER MAKING A CHOICE
ILLUSTRATION 1-19

Note

The 0.7T system does not offer the Multi-Nuclear Spectroscopy option.

1-3 MONS.EXE (continued)

Another feature is the second screen, invoked by pressing the **<N>** key while the main screen is showing (Illustration 1-20). This screen shows status type information about each power monitor. It also shows the last fault detected and the value of the fault. The faults are not cleared until a reset of the power monitor occurs. It is possible in this screen to invoke a power monitor test condition by pressing the **<T>** key. This function is described in the procedure for Power Monitor Functional Checks.

	MONITOR A	MONITOR B
CRC:	A000	A000
Mon Type:	1.0T	1.0T
Status:	8F10	8F10
Unblank is	ENABLED	ENABLED
Faults are	ENABLED	ENABLED
A Fault is	NOT DETECTED	NOT DETECTED
RF Sense	NO RF	NO RF
Safety Shutdown	NOT ACTIVATED	NOT ACTIVATED
Fault:	0000	0000
RF During 'Blank'	NOT DETECTED	NOT DETECTED
+15 V Power Supply	NORMAL	NORMAL
Body Pwr	NORMAL	NORMAL
Head Pwr	NORMAL	NORMAL
Spec Pwr	NORMAL	NORMAL
Duty Cycle Fault	NORMAL	NORMAL
Pulse Width Fault	NORMAL	NORMAL
–15V Power Supply	NORMAL	NORMAL

Press 'esc' to return to main screen, 'T' for test mode screen

POWER MONITOR STATUS ON MONS.EXE
ILLUSTRATION 1-20

	MONITOR A	MONITOR B
A Fault is	NOT DETECTED	NOT DETECTED

Press 'esc' to return to previous screen, 'C' to Continue after Fault

'T' TEST MODE SCREEN (NO FAULT)

or

	MONITOR A	MONITOR B
A Fault is	DETECTED	DETECTED

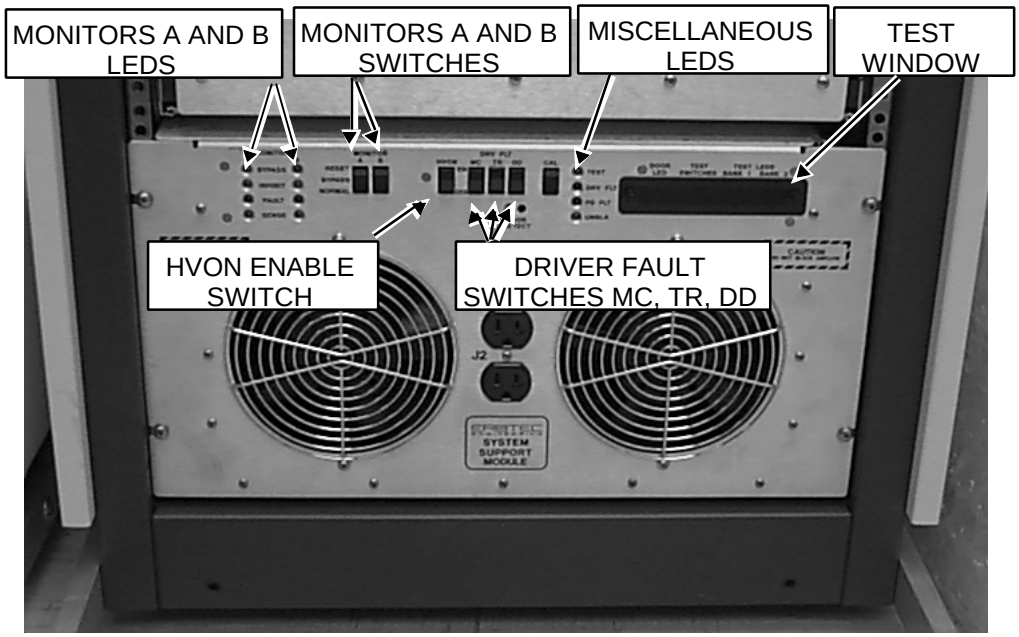
Press 'esc' to return to previous screen, 'C' to Continue after Fault

'T' TEST MODE SCREEN (WITH FAULT)
ILLUSTRATION 1-21

Pressing the **<Esc>** key at any time exits to the previous menu.

2- FRONT PANEL DIAGNOSTICS

When problems are suspected with the cabinet, the first step should be to remove the front door and examine the LEDs and switches on the front of the system support module (SSM) as shown in Illustration 2-1.



SSM FRONT PANEL LEDS AND SWITCHES
ILLUSTRATION 2-1

A complete description of each LED follows.

2-1 Monitor A and B LEDs

Bypass

This LED is lit whenever the monitor is in bypass mode. While in this mode, any faults that are detected are latched but the RF amplifier is not shut down. The monitor can be switched between bypass and normal modes by one of two methods:

a) Two three-position switches located on the front panel are dedicated to the monitors. The switch on the left corresponds to monitor A; the other corresponds to monitor B.

   The rockers in the down position are the Normal position. This is the position that enables fault monitoring. The center position of the rockers is the Bypass position. While in this position, faults are latched, but no action is taken. The up position (reset) of the rockers clears the fault latch.

   These switches are overridden whenever the door detect reflection sensor indicates that the door is present. (This sensor is described later in this section.)

b) Jumper JP2 on the Analog Power Monitor (APM) circiut board forces monitor A into bypass. Jumper JP1 on the APM forces monitor B into bypass.

2-1- Monitor A and B LEDs (continued)

Inhibit

This LED is lit whenever one of the three RF cable interlocks is either open or shorted. If the monitor is in normal mode, a signal is sent to the CPD, which inhibits the unblank signal to the APM and front panel display.

Fault

This LED is lit whenever a power fault is detected. If the monitor is in normal mode, a signal is sent to the amplifier, causing it to shut down.

Sense

This LED is lit whenever one of the three RF sample inputs (body, head, or MNSpectro) has power that exceeds a predefined threshold.

The two monitors (redundant) are completely independent. Each monitor is sampling separate input signals, has separate control of the unblank, and has separate control of the amplifier.

Miscellaneous LEDs

TEST

A test is in process. Read the test window information that follows.

DRV FLT (Driver failure):

This LED is lit whenever one or more of the TR, Multi-coil, or DD drivers is faulted.

PS FLT (PS failure):

This LED is lit when one or more of the following power supplies is out of limits:

+5V lower limit = 4.7	upper limit = 5.3
–5Vlower limit = –5.3	upper limit = –4.7
+15V lower limit = 14.0	upper limit = 16.0
–15V lower limit = –16.0	upper limit = –14.0
1000V lower limit = 300V	upper limit = 1200V

UNBLK (Unblank)

This LED is the sum (OR) of BBunblk (unblk to Broadband MNSpectroscopy amplifier) and NBunblk (unblk to narrowband RF amplifier).

2-2 Front Panel Switches

A complete description of the front panel switches follows.

HVON enable switch

The 1000V (or 500V) supply is enabled while the switch is in the up (EN) position. The supply is disabled and will bleed to 0V while the switch is in the down (DIS) position.

WARNING!

POSSIBLE PERSONAL INJURY! ACCESSING INTERNAL CIRCUITRY WITH THE HVON SWITCH IN THE UP (ENABLED) POSITION MAY RESULT IN SERIOUS INJURY OR DEATH BY ELECTROCUTION. THE SUPPLY REQUIRES ABOUT 45 SECONDS TO BLEED TO A SAFE LEVEL.

Multi-coil (MC) fault enable

Multi-coil faults are enabled and disabled via this switch. The driver enable requires a different action.

DD fault enable:

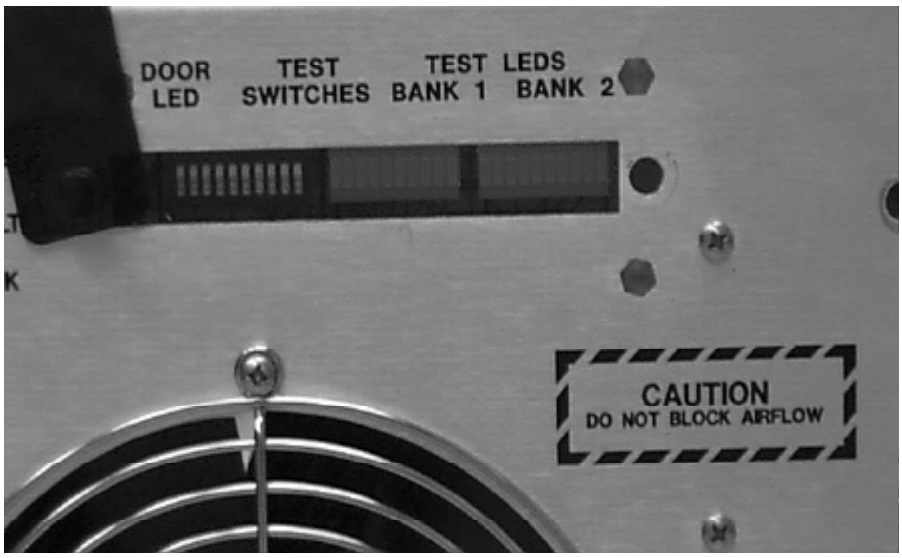
The dynamic disable (DD, Body1 and Body2) open and short circuit faults are enabled and disabled via this switch.

TR fault enable:

The head, body, and MNSpectro open and short circuit faults are enabled (for fault reporting) and disabled via this switch.

2-3 Test Window

Inside the test window are one discrete LED, ten switches, and two bars of ten LEDs each. See Illustration 2-2.



INSIDE THE TEST WINDOW
ILLUSTRATION 2-2

2-3 Test window (continued)

Door LED

This LED should be lit whenever the front door is removed. This is determined by a reflection sensor located in the center of the SSM as shown in Illustration 2-3. It should be possible to move a reflective object, such as a piece of metal, in front of the sensor and see the effect on this LED.

IR SENSOR LOCATION
ILLUSTRATION 2-3

Note
The monitors cannot be placed in bypass while the door is present.

2-3 Test window (continued)

Test switch array

This is a collection of ten dip switches. The four switches on the left specify the operating mode. (Table 2-1.) The normal position of all these switches is down. When in this state, the twenty LEDs indicate general status information. In normal operation, each LED should be off. If any of the LEDs are lit, an abnormal condition exists.

LED Bank 1

LED 1: MDS communication broken
LED 2: RF amplifier communication failure
LED 3: Monitor A communications failure
LED 4: Monitor A communications failure
LED 5: High voltage power supply failure
LED 6: Front door on
LED 7: TR faults disabled
LED 8: DD faults disabled
LED 9: Multi-coil faults disabled
LED 10: DD open circuit adjust failure

LED Bank 2

LED 1: Head TR fault
LED 2: Body TR fault
LED 3: Spectro TR fault
LED 4: Body coil 1 fault
LED 5: Body coil 2 fault
LED 6: DD fault
LED 7: Multi-coil 1 fault
LED 8: Multi-coil 2 fault
LED 9: Multi-coil 3 fault
LED 10: Multi-coil 4 fault

Additional tests can be constructed by configuring the first four switches in some position other than all down, Table 2-1.

TABLE 2-1
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	Monitor A comm status	Spectro T/R fault
	4	--------	in use,	Monitor B comm status	Body Coil 1 fault
	5	--------	the others	PS fault	Dyn Disable fault
	6	--------	are inactive)	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 TR open	Dyn Disable open
	2	DOWN		Head TR short	Dyn Disable short
	3	DOWN		Body TR open	Multi-coil 1 short
	4	DOWN		Body TR short	Multi-coil 1 open
	5	UP	MC1 drv enable	Spectro TR open	Multi-coil 2 short
	5	DOWN	MC1 drv disable		
	6	UP	MC2 drv enable	Spectro TR 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

2-3 Test window (continued)

TABLE 2-1 (CONTINUED)
TEST SWITCH AND TEST LED DEFINITIONS

Task	Switch Number	Position	Item Controlled	LED Bank 1	LED Bank 2
T/Rs Disabled:	8	DOWN	MC4 drv disable		
(Continued)	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			
Pulse Control of Drivers:	1	UP		Head TR open	Dyn Disable open
	2	DOWN		Head TR short	Dyn Disable short
	3	DOWN		Body TR open	Multi-coil 1 short
	4	DOWN		Body TR short	Multi-coil 1 open
	5	UP	MC1 drv enable	Spectro TR open	Multi-coil 2 short
	5	DOWN	MC1 drv disable		
	6	UP	MC2 drv enable	Spectro TR 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			
PS Override Tests	1	UP		Head TR open	Dyn Disable open
	2	DOWN		Head TR short	Dyn Disable short
	3	UP		Body TR open	Multi-coil 1 short
	4	DOWN		Body TR short	Multi-coil 1 open
	5	UP	MC1 drv enable	Spectro TR open	Multi-coil 2 short
	5	DOWN	MC1 drv disable		
	6	UP	MC2 drv enable	Spectro TR 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			
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

2-3 Test window (continued)

TABLE 2-1 (CONTINUED)
TEST SWITCH AND TEST LED DEFINITIONS

Task	Switch Number	Position	Item Controlled	LED Bank 1	LED Bank 2
PS Override Tests (continued)	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
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	--------	--------

2-3 Test window (continued)

TABLE 2-1 (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	--------	--------

Note

When switch 1 position is changed from down to up, which is necessary to conduct any of the tests, the Test LED will light.

Door detect sensor

The presence of the front door is detected by looking for the reflection of a 300Hz (approximately) IR LED. Any reasonably reflective object that is placed in front of the sensor should be recognized. If the reflection is seen, the CPU assumes the door is present and arms both power monitors. Suppose, for example, that the power monitors are in bypass mode and the bypass LEDs are lit. If a reflective object is placed in front of the sensor, the power monitors should switch to normal mode, and the door and Bypass LEDs should turn off.

REVISION HISTORY

REV	DATE	AUTHOR	PRIMARY REASONS FOR CHANGE
A	Aug. 12, 1999	Resa Lambert	Preliminary Release.
0			Initial Release.