9000-RAD

Run-time Alarm Detection and Recording Card

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1.1 BOARD FEATURES

Xycom's industrial computers can be configured with the optional 9000-RAD Run-time Alarm Detection And Recording (RADAR) Card, which provides additional preventive measures for extra protection. This PC/AT I/O board monitors internal temperature, hard disk life, and battery life. It can even notify operators of scheduled maintenance or imminent failures. All RADAR functions are user-selectable.

Features of the 9000-RAD board include the following:

- Two optically isolated and buffered serial ports (each port can be configured as RS-232C or RS-485)
- Fault relay output
- Temperature sensor
- On-board battery
- External battery input connector
- Extended BIOS/data logging static RAM (SRAM)
- Watchdog Timer
- Solid State Disk (SSD) eight memory sockets
- Off-line diagnostics

1.2 OPERATIONAL DESCRIPTION

A block diagram of the 9000-RAD board is depicted in Figure 1-1, on the following page.

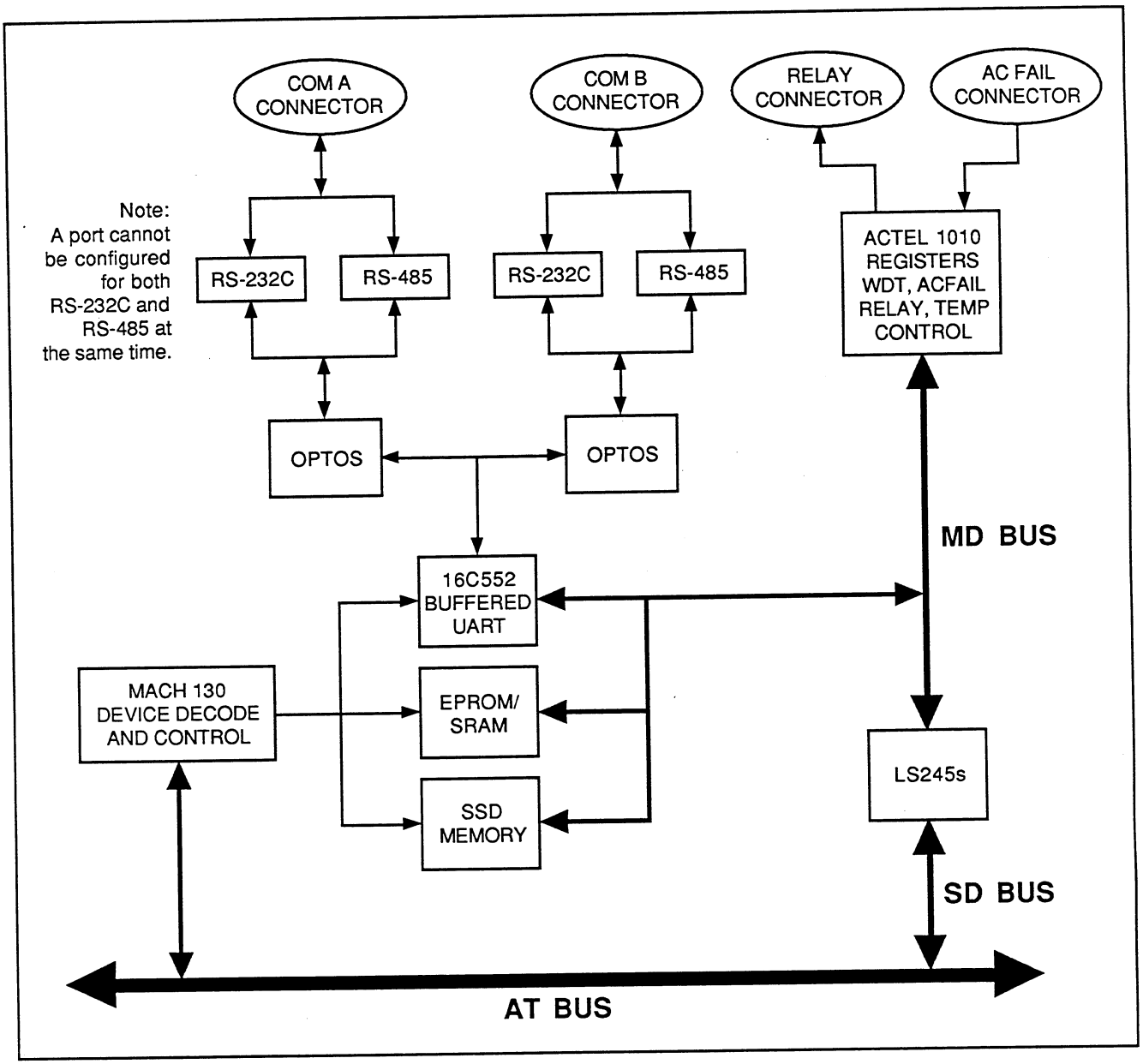

Figure 1-1. 9000-RAD Block Diagram

1.2.1 SSD Memory Interface

The board contains eight sockets consisting of two banks of four chips each. There are two constraints when using the SSD memory:

1. A bank must have the same device type and size.

2. A bank containing devices must be filled.

1.2.2 Extended BIOS Base Address

A 128, 256, or 512 Kbyte EPROM is provided to store all extended BIOS code. The EPROM is broken into sixteen 32 Kbyte pages. Each page can be mapped into the memory space by writing the page number into I/O register 232. The location of the extended BIOS is switch selectable, as described in Table 1-1.

Table 1-1. Extended BIOS Switch Positions

SW2-1	SW2-2	Location
Closed✓	Closed✓	0C8000h-0CFFFFh
Open	Closed	0D0000h-0D7FFFh
Closed	Open	0D8000h-0DFFFFh
Open	Open	Disabled

✓=Factory setting

1.2.3 Battery

An on-board battery is available to battery back the data SRAM and SSD memory. An external battery connector is also provided. The battery test circuit tests the on-board battery if there is no external battery installed. Otherwise, the external battery is tested.

1.2.4 Temperature Sensor

The temperature sensor, which is read from status register 232h, is capable of readings from 0° to 70°C.

> **NOTE**
> When enabling the temperature sensor, do not write back the upper four bits of register 232h that were read. Because the bit definitions for writes to the upper bits are different than the read definitions, writing back what was read could change the EPROM page that is selected.

The following sequence takes place to get a temperature reading:

1. Assert chip select of the temperature A/D by setting bit 1 of register 232h.
2. Drive A/D clock high by setting bit 0 of register 232h.
3. Drive A/D clock low by clearing bit 0 of register 232h.
4. Repeat steps 2 and 3.
5. Read temperature data from bit 7 of register 232h.
6. Repeat steps 4 and 5 seven more times to get a byte of data. The first bit read is the Most Significant Byte (MSB).
7. Negate chip select by clearing bit 1 of register 232h.

The actual temperature (in Centigrade) is determined as follows:

1. Calculate the adjusted voltage:

   adj_voltage = ((ambient-OFFSET_ERROR)/COUNTS)*V_RANGE

   Where:

ambient	=	byte read from temperature A/D
OFFSET_ERROR	=	1
COUNTS	=	256
V_RANGE	=	2.47

2. Calculate degrees Celsius:

   c_degrees = (adj_voltage - V_OFFSET)/V_PER_C

   Where:

V_OFFSET	=	1.235
V_PER_C	=	.01

The set-up time from the falling edge of chip select to the rising edge of the first clock is a minimum of 250 ns. The maximum clock frequency is 400 KHz.

1.2.5 Watchdog Timer

The time-out period of the watchdog timer (WDT) circuit is 1.71±0.14 seconds. The WDT is enabled and disabled by setting and clearing bit 6 of register 632h. The WDT is strobed by taking bit 7 of register 632h high and then low. When the WDT expires, an IOCHCK* error occurs and the relay relaxes (when SW2-6 is open), if it is energized. Since the WDT and AC Fail are ANDed together and tied to IOCHCK*, the source of the IOCHCK* error will need to be determined. If bit 5 of register 232h is 0, then an acf* error has occurred. If bit 7 of register 632h is 0, then a WDT* error has occurred.

1.2.6 Relay

The relay is software enabled and disabled by setting and clearing bit 1 of register 632h. It can also be optionally relaxed through the use of a switch when the watchdog timer expires. The relay contacts are isolated to 500V.

1.2.7 Optically Isolated Serial Ports

There are two serial ports, configurable as COM1, COM2, COM3, COM4, or disabled. The interrupts are IRQ4 or IRQ10 for serial port 0 (jumper selectable as COM1 or COM3) and IRQ3 or IRQ11 for serial port 1 (jumper selectable as COM2 or COM4). The base port addresses are as follows:

COM1	3F8h
COM2	2F8h
COM3	3E8h
COM4	2E8h

Each port has the capability of being either RS-232C or RS-485. Both serial ports are individually isolated to 500V. This isolation is maintained through the use of a 5V-9V DC-DC converter and a 5V regulator for each port. All signal lines between the UART and the serial connectors are optically isolated.

1.3 I/O MAP

The table below describes the I/O Map for the 9000-RAD board.

Table 1-2. I/O Map

Address	Description
230	SSD Data Port
232	Control/status register 1
2F8-2FF	COM2 serial port (relocatable to 2E8-2EF as COM4)
3F8-3FF	COM1 serial port (relocatable to 3E8-3EF as COM3)
630	SSD Address Select Register
632	Control/status register 2
A30	SSD Dipswitch/board select register
A32	Control/status register 3
E30	SSD Control/status register

1.4 JUMPER AND SWITCH SETTINGS

This section describes the 9000-RAD jumper and switch settings. Figure 1-2 illustrates jumper and switch locations on the board.

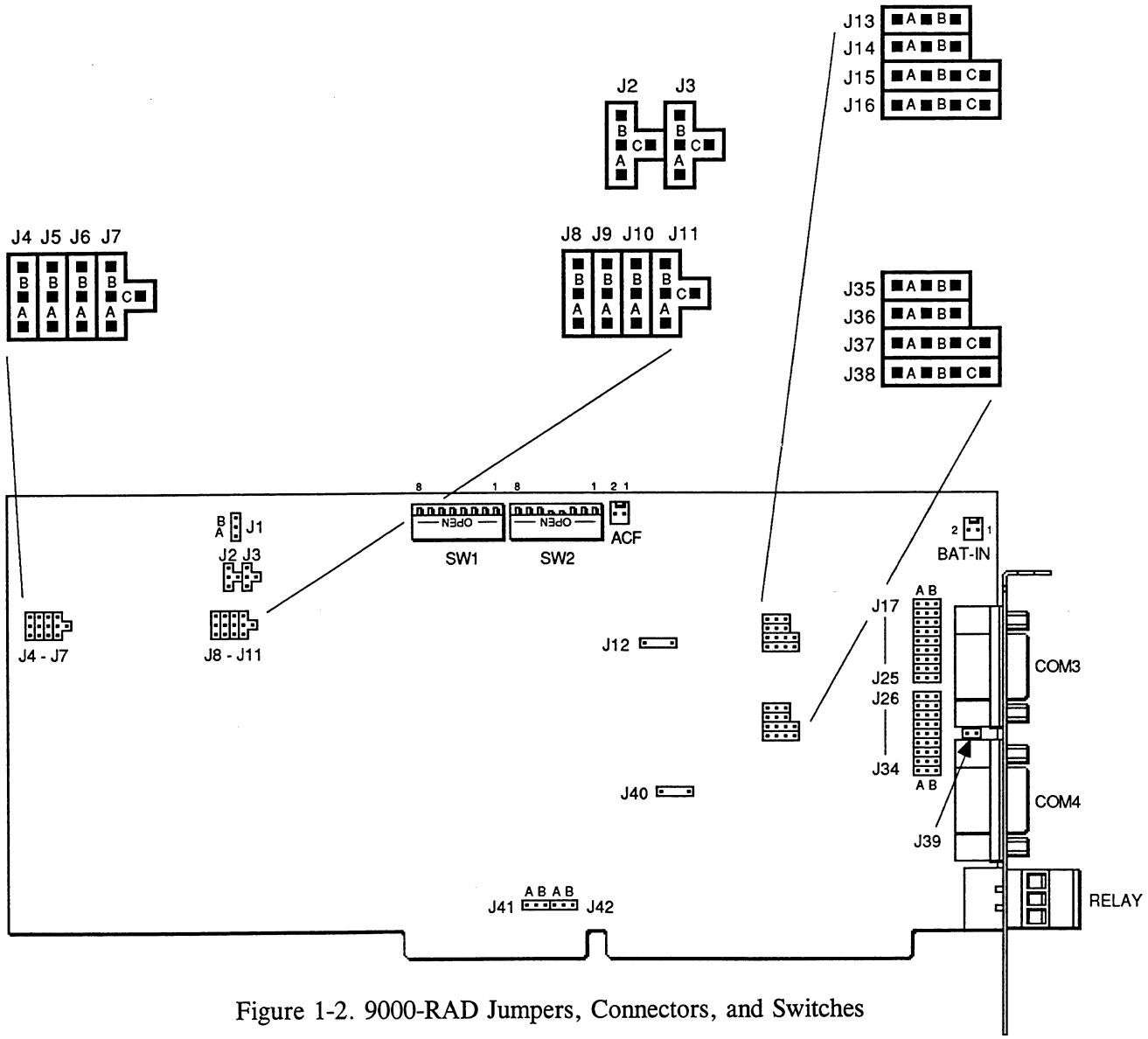

Figure 1-2. 9000-RAD Jumpers, Connectors, and Switches

1.4.1 Jumper Settings

Table 1-3, on the following page, lists the 9000-RAD jumpers, their default positions, and their functions.

Table 1-3. 9000-RAD Jumper Settings

Jumper	Position	Function
J1	A B✓	On-board battery disconnected On-board battery connected
J2	A✓ B C	128Kx8, 256Kx8, or 512Kx8 EPROM 128Kx8, 256Kx8, or 12V 512Kx8 FLASH EPROM 5V 512Kx8 FLASH EPROM
J3	A✓ B C	128Kx8 or 256Kx8 EPROM 512Kx8 EPROM or 12V 512Kx8 FLASH EPROM 128Kx8, 256Kx8, or 5V 512Kx8 FLASH EPROM
J12	IN OUT✓	Connects isolated GND to digital GND on serial port 0 Isolates isolated GND and digital GND on serial port 0
J13-J14	A✓ B	No serial port 0 RS-485 termination RXD termination on serial port 0
J15-J16	A✓ B C	No RS-485 termination on serial port 0 CTS termination on serial port 0 TXD termination on serial port 0
J17-J25	A✓ B	Serial port 0 = RS-232C Serial port 0 = RS-485
J26-J34	A✓ B	Serial port 1 = RS-232C Serial port 1 = RS-485
J35, J36	A✓ B	No RS-485 termination on serial port 1 RXD termination on serial port 1

Table continued on the following page.

Table 1-3. 9000-RAD Jumper Settings (*continued*)

Jumper	Position	Function
J37, J38	A✓ B C	No RS-485 termination on serial port 1 CTS termination on serial port 1 TXD termination on serial port 1
J39	IN OUT✓	Connects chassis GND to digital GND Isolates chassis GND and digital GND
J40	IN OUT✓	Connects isolated GND to digital GND on serial port 1 Isolates isolated GND and digital GND on serial port 1
J41	A B✓ OUT	Serial port 1 drives IRQ3 Serial port 1 drives IRQ11 Serial port 1 cannot drive IRQ3/IRQ11
J42	A B✓ OUT	Serial port 0 drives IRQ4 Serial port 0 drives IRQ10 Serial port 0 cannot drive IRQ4/IRQ10

✓=Factory setting

1.4.2 Switch Settings

Table 1-4 lists the default switch settings on the 9000-RAD.

Table 1-4. 9000-RAD Switch Settings

Switch	Position	Function
SW1-1 through SW1-8	Open Closed✓	SSD device type register
SW2-1	Open Closed✓	Extended BIOS location (refer to Table 1-2)
SW2-2	Open Closed✓	Extended BIOS location (refer to Table 1-2)
SW2-3	Open Closed✓	Serial ports disabled Serial ports enabled
SW2-4	Open✓ Closed	Serial port 0 set to COM3 Serial port 0 set to COM1
SW2-5	Open✓ Closed	Serial port 1 set to COM4 Serial port 1 set to COM2
SW2-6	Open Closed✓	WDT time-out will relax relay WDT time-out will not relax relay
SW2-7	Open Closed✓	SSD memory read only SSD memory read/write
SW2-8	Open Closed✓	Not used

✓=Factory setting

1.5 REGISTERS

This section describes the registers used by the 9000-RAD board.

> **NOTE**
> You must disable the RADAR BIOS (open switches SW2-1 and SW2-2) before writing to any registers.

1.5.1 Control/Status Registers

Control/Status Register 1 is located at address 232h.

Table 1-5. Control/Status Register 1

Bit	R/W	Description
7	W R	EPROM page select bit 3 (see Table 1-6) 1= Serial data bit from temperature A/D is 1 0 = Serial data bit from temperature A/D is 0
6	W R	EPROM page select bit 2 (see Table 1-6) Not used (read back as 0)
5	W R	EPROM page select bit 1 (see Table 1-6) 1 = ACFAIL* has not been asserted since being cleared 0 = ACFAIL* interrupt has been asserted and has not been cleared
4	W R	EPROM page select bit 0 (see Table 1-6) 1 = ACFAIL* input is negated 0 = ACFAIL* input is asserted
3	R/W	1 = ACFAIL* interrupt enabled 0 = Disable and clear ACFAIL* interrupt
2	R/W	1 = Enable FLASH BIOS write enable (if installed) 0 = Disable FLASH write enable
1	R/W	1 = Chip select is asserted to temperature A/D 0 = Chip select is negated by temperature A/D
0	R/W	Clock data bit out of A/D by writing this bit high then low

NOTE
Writing to bits 4-7 of register 232h also writes to bits 4-7 of register A32h, where these values can be read back.

Table 1-6. EPROM Page Select Bits

EPROM Page Select Bits				
3	2	1	0	**Page Description**
1	1	1	1	32 Kbyte EPROM page 15
1	1	1	0	32 Kbyte EPROM page 14
1	1	0	1	32 Kbyte EPROM page 13
1	1	0	0	32 Kbyte EPROM page 12
1	0	1	1	32 Kbyte EPROM page 11
1	0	1	0	32 Kbyte EPROM page 10
1	0	0	1	32 Kbyte EPROM page 9
1	0	0	0	32 Kbyte EPROM page 8
0	1	1	1	32 Kbyte EPROM page 7
0	1	1	0	32 Kbyte EPROM page 6
0	1	0	1	32 Kbyte EPROM page 5
0	1	0	0	32 Kbyte EPROM page 4
0	0	1	1	32 Kbyte EPROM page 3
0	0	1	0	32 Kbyte EPROM page 2
0	0	0	1	32 Kbyte EPROM page 1
0	0	0	0	32 Kbyte EPROM page 0

Control/Status Register 2 is located at address 632h.

Table 1-7. Control/Status Register 2

Bit	R/W	Description
7	W R	Strobe WDT by writing bit high then low 1 = WDT interrupt not currently asserted 0 = WDT interrupt is currently assert
6	R/W	1 = Enable WDT 0 = Disable WDT
5	R/W	General purpose read/write
4	R/W	Not used (read back as 0)
3	R/W	Not used (read back as 0)
2	R/W	Not used (read back as 0)
1	R/W	1 = Relay is energized; switch in normally open (NO) position 0 = Relay is relaxed; switch in normally closed (NC) position
0	R/W	Not used (read back as 0)

Control/Status Register 3 is located at address A32h.

Table 1-8. Control/Status Register 3

Bit	R/W	Description
7	R/W	EPROM page select bit 3 (see Table 1-6)
6	R/W	EPROM page select bit 2 (see Table 1-6)
5	R/W	EPROM page select bit 1 (see Table 1-6)
4	R/W	EPROM page select bit 0 (see Table 1-6)
3	R/W	1 = SRAM appears in lower 16 Kbytes of Extended BIOS block 0 = EPROM appears in entire 32 Kbytes of Extended BIOS block
2	R/W	SRAM page select bit 2 (see Table 1-9)
1	R/W	SRAM page select bit 1 (see Table 1-9)
0	R/W	SRAM page select bit 0 (see Table 1-9)

Table 1-9. SRAM Page Select Bits

SRAM Page Select bits			Page Description
2	1	0	
1	1	1	16 Kbyte SRAM page 7
1	1	0	16 Kbyte SRAM page 6
1	0	1	16 Kbyte SRAM page 5
1	0	0	16 Kbyte SRAM page 4
0	1	1	16 Kbyte SRAM page 3
0	1	0	16 Kbyte SRAM page 2
0	0	1	16 Kbyte SRAM page 1
0	0	0	16 Kbyte SRAM page 0

1.5.2 SSD Registers

Table 1-10 describes the SSD registers.

Table 1-10. SSD Registers

Register	Read	Write
230	Data port	Data port
630	Address select	Address select
A30	Dipswitch	Board select
E30	Status/address counter	Control

1.5.3 **Control/Status Register** (E30h)

All output bits, 0-5, are read/write and are reset to zero upon power-up.

Table 1-11. Address E30h

Bit	**Description**
0	Enables the auto-increment feature. When set, the address counter auto-increments to the next address on the data port reads and writes.
1	Not used.
2-5	General purpose read/write bits
6	Read only. Indicates the state of the write-protect switch. If set, it indicates the switch is open and SSD memory is read only. If reset, it indicates the switch is closed and SSD memory is read/write.
7	Read only. Checks the battery. If the battery is okay, this bit is a 1. If the battery is low, this bit is a 0.

1.5.4 **Dipswitch/Board Select Register** (A30h)

When read, this register gives the status of switch bank SW1. Bits 0-3 and 4-7 indicate the type of devices installed in SSD memory banks 0 and 1, respectively. When written to, bits 0-3 of this register select which SSD board is active.

> **NOTE**
> Xycom's CPU boards have an LED port that is accessed at address 231h. And, when 16-bit writes are performed to register A30h, the contents of 231h are changed. Therefore, always access this register as 8 bits.

> **NOTE**
> The 9000-RAD board is hardware defined as board 0, so bits 0-3 must be reset to access the 9000-RAD's SSD registers. Bits 4-7 are read only.

1.5.5 **Address Select Register** (630h)

This read/write register has a default power-on value of 0000h. The lower 14 bits (bits 14 and 15 are tied to ground) form the memory address bits 9-22 along with the 8-bit address counter being bits 1-8. The 8-bit address counter is cleared to zero when there is a write to the address select register. The 14 bits of the address select register can be further defined as follows:

Bit	Definition
0-11	Select which 256-word block is selected within the active socket.
12	Selects which two sockets in the bank are active.
13	Selects which bank is active.

1.5.6 **Data Port** (230h)

The data read from and written to the 16-bit Data Port will be read from and written to the address specified by the address select register and the address counter. After the read/write, if the auto-increment bit (bit 0) in the SSD control register is set, the address counter will increment to the next address. When the address counter reaches FFh it rolls over to 00h and does not increment the address select register. This register must be incremented by software.

1.6 MEMORY DEVICE SELECTION

Table 1-12 lists the jumper and switch settings necessary to select SRAM.

Table 1-12. Memory Device Selection

Device	**Bank 0: Bank 1:**	**J4 J8**	**J5 J9**	**J6 J10**	**J7 J11**	**SW1- 4 8**	**3 7**	**2 6**	**1 5**
No devices	Don't Care					C	C	C	C
SRAM 128Kx8 512Kx8		* *	A A	B A	A A	C C	C C	C O	O C

*A = SRAM not battery backed; B = SRAM battery backed

This chapter contains information on accessing the RADAR Setup Menus for systems that incorporate 9000-RAD boards. All pertinent menu instructions are included.

RADAR features are intended to decrease system down time by providing indicators when various system components require maintenance or when a fault occurs. Each feature monitors a single component and can be enabled or disabled, allowing users to control which features are operational. When a feature is enabled, it can turn on the Fault or Maintenance LED. In addition, the Fault Relay Control feature can energize or relax the relay based upon the state of the Fault LED. This allows users to attach critical features to the Fault LED, which, in turn, can be attached via the Fault Relay to an alarm or other external signal.

2.1 SOFTWARE COMPATIBILITY

The RADAR Setup Menus use the LED Register (231h) found on Xycom's CPU boards. If register 231h is used for another purpose, there will be conflict with the RADAR firmware. If register 231h is not present, the status of the RADAR will not be visible.

2.2 ACCESSING THE RADAR SETUP MENUS

To access the RADAR Setup Menu, press <Ctrl><Alt>R at any time after the ROM scan.

RADAR Setup Menu - Copyright 1992-94, Xycom Inc.		
Diagnostics Hard Disk Life Meter Fan Filter Cleaning Reminder Battery Life Meter Temperature Monitor Fault Relay Control Watchdog Timer Solid State Disk		
↑↓ Move	Enter Select	Esc Exit

Figure 2-1. RADAR Setup Menu

If any of the RADAR features turn on the Fault or Maintenance LEDs, a flashing "Fault Occurred," "Data Corrupted," or "Maintenance Required" message will appear to the right of the feature responsible. For example, if the Filter Cleaning Interval (see Fan Filter Reminder Menu) had elapsed since the last cleaning, the flashing Maintenance Required message would appear to the right of the Fan Filter Reminder option on the RADAR Setup Menu, as shown below.

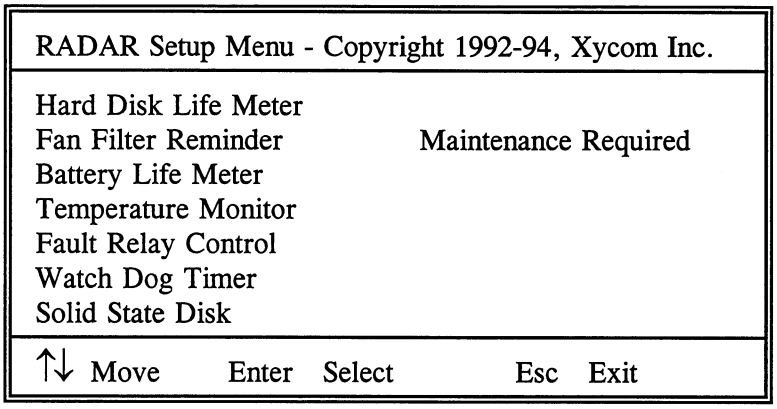

Figure 2-2. RADAR Setup Menu (Maintenance Required)

The RADAR Setup Menu follows Quadtel System BIOS Main Menu conventions:

(↑↓)	Moves the cursor to an item to select.
<Enter>	Selects the item.
<Esc>	Exits the menu. Press <Esc> in the RADAR Setup Menu to reboot the system.

The individual menus selected from the RADAR Setup Menu follow the conventions of the Quadtel Setup menus. Arrow keys and <Enter> are used to move the cursor to the item to modify. Some fields can be modified by typing in a new value. White space is used in the menus to separate the items the user can change from those that are used to report the collected statistics.

<F5>	Selects the previous or smaller value.
<F6>	Selects the next or higher value.
<F2>, <F3>	Reset values in selected menus.
<F10>	Saves the new configuration.
<Esc>	Exits the menu. Users will be given a chance to save changes if <Esc> is pressed before <F10>.

2.3 DIAGNOSTICS MENU

The Advanced Diagnostics Software System is a collection of utility programs that provide advanced tests for PC/AT compatible systems. This section contains information on using the Advanced Diagnostics Software System. The Diagnostics Menu offers the following choices:

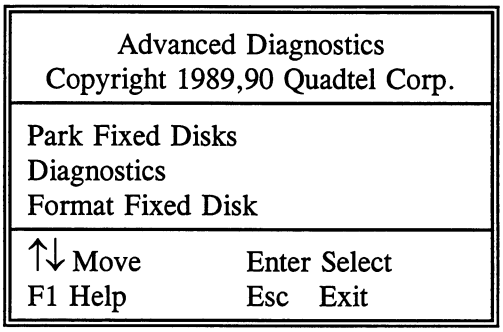

Figure 2-3. Advanced Diagnostics Menu

Each of the options from the menu is explained in the sections below. <Esc> exits the Diagnostics and reboots the system.

2.3.1 Park Fixed Disks

This menu selection parks the fixed disk drive(s) by placing the fixed heads over the diagnostic cylinder so that vibration will not damage the usable media.

2.3.2 **Diagnostics**

When Diagnostics is selected from the Advanced Diagnostics Menu, the following warning message is displayed:

Warning!
You have selected the Diagnostics. The diagnostics should be run on a system with no device drivers or TSRs loaded. Many of the diagnostic functions directly operate on the system hardware and memory. This can cause problems with installed software such as hard disk caches or RAM drives. The system should be rebooted after the diagnostics have been run. Floppy disks must be formatted by DOS after exiting the diagnostics to be usable. Insert scratch diskettes in all drives.
Continue Y/[N]

Figure 2-4. Diagnostics Warning Message

After reading the warning and inserting the disks, press N to abort the operation or Y to continue.

Select Y and the Main Diagnostics Menu appears (shown in Figure 2-5 on the following page).

CAUTION
The diagnostics should be run on a system with no device drivers or TSRs loaded.

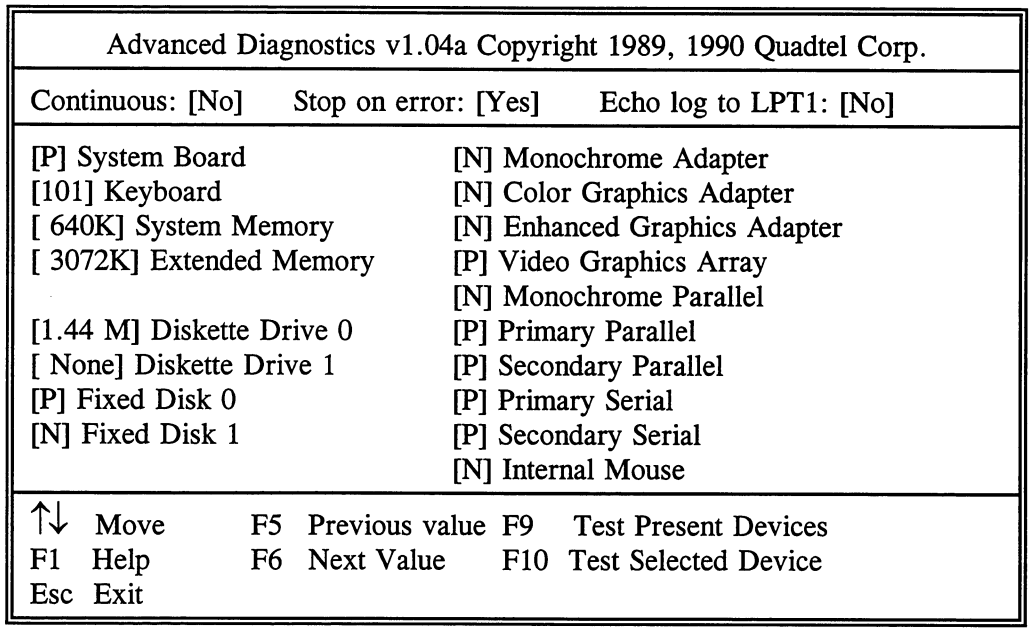

Figure 2-5. Main Diagnostics Menu

Items that appear in brackets indicate fields that can be changed. Default settings initially appear on the screen.

Each of the selections on the menu indicate the hardware item to test and the configuration of that item. Some items are present (P) or not present (N), while others specify a hardware type. For example, Keyboard can be an 84-key keyboard, a 101-key keyboard, or not present.

The initial hardware selections shown in the menu are determined by the system configuration that is detected by the diagnostics software. To override the initial selections or exclude certain tests from being performed, use the arrow keys (←↑↓→), <Tab>, or <Enter> to move the cursor to the item(s), and use <F5> or <F6> to change the selection.

<Esc>	Exits the menu.
<F5>	Selects the previous or smaller value.
<F6>	Selects the next or higher value.
<F9>	Tests all currently available items. If there are specific tests that you do not want to perform, set these selections to not present (N, None, or 0).
<F10>	Selects a single test on which the cursor is placed. This selection cannot be set to (N, None, or 0).

The fields at the top of the screen are options that control how the tests are performed. These options must be set before a test or tests are initiated.

The Continuous option can be set to Yes or No. When set to Yes, the test performs continuously until you press <Esc> to stop it. After pressing <Esc>, press the space bar to continue the test or press <Esc> again to abort the test(s). Continuous test works with either a single test (selected by <F10>) or several tests (selected by <F9>).

The Stop on Error option can be set to Yes or No. When set to Yes, the diagnostic system stops after detecting an error. After the system reports the error, press the space bar to continue or <Esc> to end testing.

The Echo to LPT1 option can be set to Yes or No. If set to Yes, the test result data is written to a printer attached to LPT1. This feature is useful if you set Continuous Test to Yes, Stop Error to No, and are running the test(s) unattended.

> **NOTE**
> Some of the submenu tests require you to respond to prompts. These are identified as interactive. If you are performing continuous unattended tests, do not select any interactive tests.

Each of the tests available on the Diagnostics Menu is described on the following pages.

When a test is initiated, a menu like that shown in Figure 2-6, on the next page, is displayed. The actual information shown depends on the type of test selected.

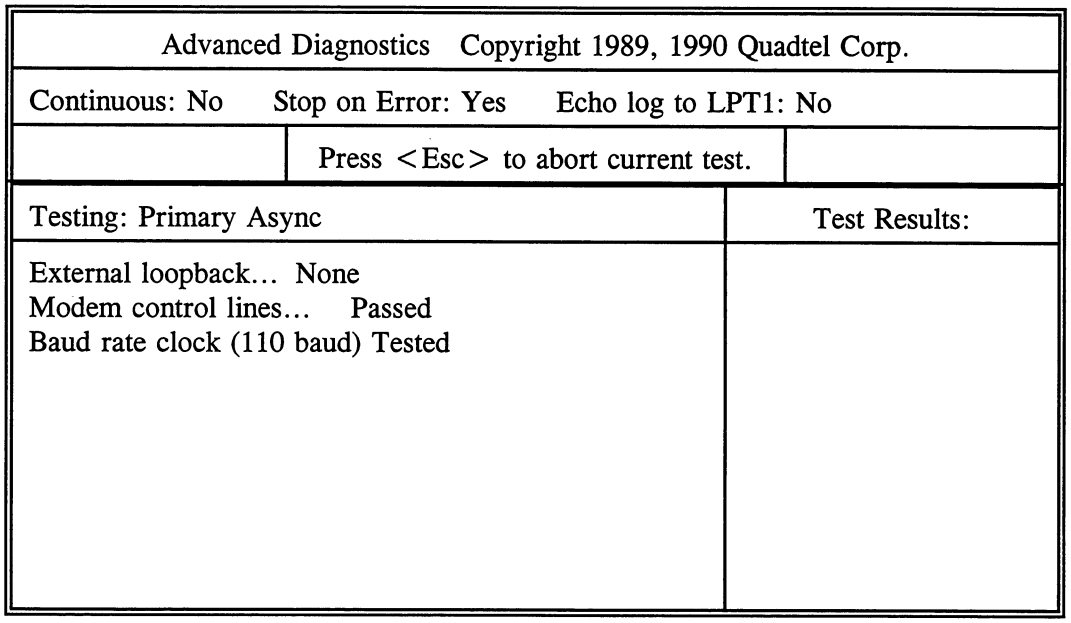

Figure 2-6. Sample Advanced Diagnostics Test Menu

The left side of the screen shows information relating to the test(s) being performed, while the right side of the screen shows results of completed tests.

CAUTION
Tests that are labeled destructive could destroy information.

2.3.2.1 **Test Control Option Menu**

Many of the hardware items shown in the Advanced Diagnostics Menu have an associated Test Control Option Menu. One or more of these menus will appear depending on how many tests have been started. Each of these menus allow you to enable or disable parts of each test. Below is a description of the keys used in these menus:

<↑↓>, <Tab>, <Enter>	Move the cursor to another option.
<Esc>	Returns to the Diagnostics menu.
<F5>	Enables the selected test option if it is currently disabled or disables the selected test option if it is currently enabled.
<F7>	Enables all test options.
<F8>	Disables all test options.
<F10>	Moves to the next test option menu if there are any that must be examined and set, or starts the test(s).

2.3.2.2 **System Board**

This selection tests the processor, DMA registers, CMOS RAM, real-time clock, timers, and interrupt controller. After the test is completed, press <Esc> to return to the Main Diagnostics Menu or the space bar to run the test again.

2.3.2.3 **Keyboard**

If selected, this menu will appear before the Keyboard test is executed.

Select tests for Keyboard:		
Keyboard test (interactive)		[No]
Controller test (non-interactive)		[Yes]
↑↓ Move	F5 Toggle	F7 All
Esc Abort	F8 None	F10 Accept

Figure 2-7. Keyboard Test Menu

If the interactive Keyboard test is executed, a picture of the keyboard defined in the Main Diagnostics Menu (84- or 101-key) is displayed. The first time you press and release a key, the equivalent key on the screen should highlight. Subsequent press/release cycles should cause the highlight on that key to blink. Pressing and holding a key should cause the equivalent key on the screen to blink, and the key on the screen should be highlighted when the key is released.

The Caps Lock, Num Lock, and Scroll Lock LEDs will match those on the screen unless you press and hold one of these keys long enough to make them blink on the screen.

After testing all of the keys, press <Ctrl>Y if the keyboard is functioning correctly, otherwise press <Ctrl>N.

2.3.2.4 **System Memory**

This diagnostic tests the system memory.

2.3.2.5 **Extended Memory**

This diagnostic tests the extended memory. Separate read/write and address line tests are performed.

2.3.2.6 **Diskette Drives 0 and 1**

Before the Diskette Drive 0 or Diskette Drive 1 test is executed, a test control option menu like the following will be displayed. <F7> selects all the tests. <F8> sets all the tests to No.

Select tests for diskette drive A:		
Seek tracks		[Yes]
Verify tracks		[Yes]
Disk change (interactive)		[Yes]
Read/Write	(destructive)	[No]
Format	(destructive)	[No]
↑↓ Move	F5 Toggle	F7 All
Esc Abort	F8 None	F10 Accept

Figure 2-8. Diskette Drive 0 Menu

The Disk change, Read/Write, and Format tests require a diskette that fits the selected drive. The Read/Write and Format tests will destroy any data on the diskette.

2.3.2.7 **Fixed Disk 0 and 1**

The Fixed Disk 0 or Fixed Disk 1 test control option menu will be displayed before either test is executed.

Select tests for fixed disk: 0		
Controller test		[Yes]
Head select test		[Yes]
Seek test		[Yes]
↑↓ Move	F5 Toggle	F7 All
Esc Abort	F8 None	F10 Accept

Figure 2-9. Fixed Disk 0 Menu

The Controller, Head Select, and Seek tests are non-destructive.

2.3.2.8 **Monitor Type**

Set your monitor type to [P] and the other monitor types to [N]. All of the monitor tests are interactive except the Memory test. The monitor selections and their test control option menus are:

- Monochrome Adapter

Select tests for Monochrome adaptor:		
Attribute test		[No]
Character test		[No]
Text test		[No]
Memory test		[Yes]
↑↓ Move	F5 Toggle	F7 All
Esc Abort	F8 None	F10 Accept

Figure 2-10. Monochrome Adapter Menu

- Color Graphics Adapter (CGA)

Select tests for CGA adaptor:		
Attribute test		[No]
Character test		[No]
Text test		[No]
Page test		[Yes]
Graphics test		[No]
Background test		[No]
Memory test		[No]
↑↓ Move	F5 Toggle	F7 All
Esc Abort	F8 None	F10 Accept

Figure 2-11. Color Graphics Adapter Menu

- Enhanced Graphics Adapter (EGA)

Select tests for EGA adaptor:	
Attribute test	[No]
Character test	[No]
Text test	[No]
Page test	[No]
Graphics test	[No]
Background test	[No]
Memory test	[Yes]

↑↓ Move	F5 Toggle	F7 All
Esc Abort	F8 None	F10 Accept

Figure 2-12. Enhanced Graphics Adapter Menu

- Video Graphics Array (VGA)

Select tests for VGA adaptor:	
Attribute test	[No]
Character test	[No]
Text test	[No]
Page test	[No]
Graphics test	[No]
Background test	[No]
Memory test	[No]

↑↓ Move	F5 Toggle	F7 All
Esc Abort	F8 None	F10 Accept

Figure 2-13. Video Graphics Array Menu

2.3.2.9 **Parallel Port**

Set the primary, secondary, and monochrome parallel ports to [P] if present in your system or [N] if not present. When a parallel port test is selected, a menu similar to the one below appears:

Select Tests for Parallel	
Internal Loopback	[Yes]
Printed Pattern (requires connected printer)	[No]
External Loopback (requires loopback connector)	[No]
↑↓ Move	F5 Toggle F7 All
Esc Abort	F8 None F10 Accept

Figure 2-14. Parallel Port Test Menu

The port(s) selected can be tested for external loopback, internal loopback, and printer pattern.

If performing an external loopback test, there must be a loopback connector on the selected output ports. The pinouts for this connector are shown in Figure 2-15 below:

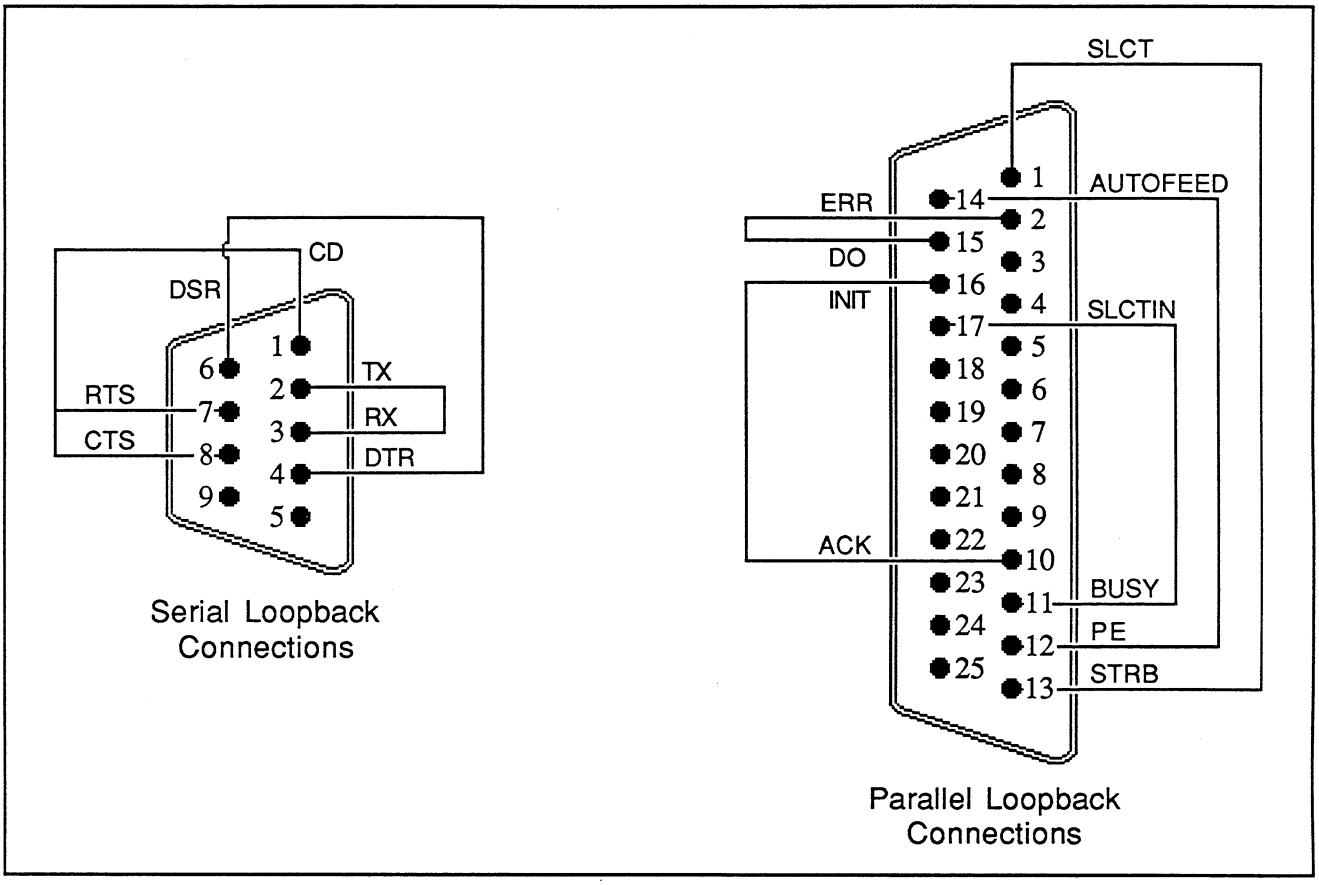

Figure 2-15. Serial and Parallel Loopback Connections

2.3.2.10 **Serial Ports**

Set the primary and secondary serial ports to [P] if present or [N] if not present in your system. A menu appears when you select the port(s) to test. You can test baud rate clock, internal transmit and receive data lines, and modem control data lines. The external loopback test requires a loopback connector.

Select Tests for Primary Async	
Baud rate clock	[Yes]
Internal Tx / Rx	[Yes]
Modem control lines	[Yes]
External loopback (requires loopback connector)	[No]
↑↓ Move F5 Toggle F7 All Esc Abort F8 None F10 Accept	

Figure 2-16. Select Tests for Primary Async Menu

2.3.2.11 **Internal Mouse**

The test control option menu appears as shown below:

Select tests for Internal Mouse	
Movement test (interactive)	[No]
Controller test (non-interactive)	[Yes]
↑↓ Move F5 Toggle F7 All Esc Abort F8 None F10 Accept	

Figure 2-17. Internal Mouse Test Menu

2.3.3 Format Fixed Disk

> **CAUTION**
> Your unit has an IDE drive and should not be low-level formatted.

Select Format Fixed Disk from the Advanced Diagnostics Menu to format your fixed disk drive(s). A menu will prompt you for which fixed disk (0 or 1) you wish to format. Use the arrow keys to select the disk and press <Enter>. A warning informs you that this operation will destroy all data on the selected hard drive. You are prompted to continue. If you select Y, the Format Fixed Disk Menu appears, as shown below:

Format Fixed Disk V1.06 Copyright 1989,90 Quadtel Corporation.					
Drive: 0 Heads: 8 Cylinders: 1024					
Cyl Hd	Cyl Hd	Cyl Hd	Cyl Hd	Cyl Hd	Cyl Hd
Interleave: **[3]**		Insert: Cyl **[0]** Hd **[0]**		Total bad tracks: 0	
↑↓ Move PgDn/PgUp Esc Exit		Ins/Del Bad Track F2 Clear Table F3 Print Table F4 Set Interleave		F5 Scan Bad Tracks F6 Analyze Surface F7 Format Unformatted Drive F8 Format Preformatted Drive	

Figure 2-18. Format Fixed Disk Menu

2.3.3.1 Using the Bad Track Table

Bad tracks are areas of the fixed disk that cannot properly store data. The bad tracks are displayed in the center of the menu. Press <F5>, <F6>, or <F8> to automatically update this list.

To add a bad track manually, press <Ins> and use the arrow keys, or press <Enter> to select the cylinder and head fields. Enter the appropriate information, and press <F10> or <Enter>. You are prompted if you enter an invalid head or cylinder. Use the arrow keys to position the cursor, press <Del>, and then enter the new information.

To clear the entire bad track table, press <F2>. Press <F3> to print the table. If the drive has already been formatted, you can search for existing bad tracks by pressing <F5>.

2.3.3.2 Setting the Interleave

The interleave is the value used by the format operation to interleave the fixed disk tracks. Press <F4> to set the interleave. Consult your disk drive manual for the proper interleave value.

> **NOTE**
> The interleave set is the value that will be used to format, which is not necessarily the current value for your fixed disk.

If you do not set the interleave, a default of three is used.

2.3.3.3 Analyzing the Fixed Disk Surface

If you do not need to reformat the entire fixed disk, but want to perform a thorough media test to detect any bad or marginal areas, press <F6> to analyze the surface.

> **CAUTION**
> Analyzing the surface causes all data on the disk to be lost.

Any bad tracks found in the analysis are automatically added to the bad track table. As they are located, the bad tracks are reformatted as bad to prevent these areas from being used.

2.3.3.4 Formatting a New Fixed Disk Drive

Formatting the disk will format the bad tracks with a special attribute so that other programs (like DOS FORMAT) will not attempt to use these areas on the disk.

After installing a new fixed disk drive, enter the bad track information provided by the manufacturer into the bad track table. Next, press <F7> to begin formatting. This operation will perform two functions:

- Format each track of the fixed disk using the current interleave.
- Reformat each bad track as bad so that it cannot be used.

2.3.3.5 Formatting an Already Formatted Disk

If your fixed disk was previously formatted, press <F8> to begin formatting. The following operations will be performed:

- The drive is scanned for bad tracks, which are added to the bad track table.
- Each track is reformatted using the current interleave.
- Each bad track is reformatted as bad so it cannot be used.
- A surface analysis is performed on the media and any additional bad tracks found are reformatted as bad and added to the bad track table.

2.3.3.6 Finishing the Formatting

The Fixed Disk Format commands perform low level-format operations on the fixed disk drive(s). After the format is complete, run the DOS FDISK command followed by DOS FORMAT to prepare the media for use under DOS (or the corresponding utilities for another operating system). Refer to your DOS manual for more information.

2.3.4 Error Codes

When the diagnostics system detects an error, a two-byte hexadecimal code is displayed. The first byte of this code is the class of error and the second byte is the sub-class. The error code class generally corresponds to a specific hardware system or group of systems. For example, the first class (01) is used for the system planar board, and error 0108 indicates a system board error regarding the 8253 counters.

Table 2-1, on the following pages, describes the error codes.

Table 2-1. Error Codes

Code	Class	Failure Type
0101	System board	DMA registers
0102		DMA memory move
0103		Interrupt mask
0104		Hot interrupt line
0105		Struck NMI
0106		Process registers
0107		System timer
0108		8253 counters
0109		System timer interrupts (1)
010A		System timer interrupts (2)
010B		Processor flags
0110		CMOS memory
0111		Real time clock
0120		BIOS checksum
0701	Keyboard	Controller
0702		Keyboard map
1001	Co-processor	Registers
1002		Calculations
1701	Video	Text attributes
1702		Background colors
1703		Character set
1704		Text page registration
1705		Text pages
1706		Graphics display
1707		EGA/VGA palette
1708		Memory
1709		VGA sequencer
170A		VGA controller registers
170B		VGA attribute controller
170C		VGA DAC
1730		Cannot initialize video
2001	Serial	Baud rate clock
2002		Internal loopback data
2003		Internal loopback control
2004		External loopback data

Table is continued on the following page.

Table 2-1. Error Codes (*continued*)

Code	Class	Failure Type
2701	LPT	Registers read/write
2702		Control loopback
2703		Printed pattern
2704		Printer not ready
2705		Unknown error
2706		No paper/paper jam
2707		Printer timeout
2708		Printer busy
3001	Memory	Address lines
3002		Data patterns
3003		Walking bits
3701	Disk	Invalid parameter
3702		Address mark not found
3703		Write protect error
3704		Sector not found
3705		Reset failed
3706		Change line active
3707		Drive parameter error
3708		DMA overrun
3709		Attempt to DMA across 64 K
370A		Bad sector flag found
370B		Bad cylinder detected
370C		Media type not found
370D		Invalid format sectors count
370E		Control data mark detected
3710		CRC or ECC error detected
3711		ECC corrected error
3720		General controller failure
3740		Seek operation
3750		Change line test
3780		Drive not ready
37BB		Undefined error occurred
37CC		Write fault on selected drive
37EO		Status error
37FF		Sense operation failed

2.4 HARD DISK LIFE METER MENU

The RADAR Hard Disk Life Meter monitors hard disk usage. When enabled, the Hard Disk Life Meter keeps track of how long the computer has been on since the hard disk was last serviced and replaced. The user indicates how long the hard disk is allowed to be used without maintenance. When this period expires, the Hard Disk Life Meter will inform the user via the MAINT LED. It also logs when the user indicates that the hard disk has been serviced and/or replaced.

Select the Hard Disk Life Meter option from the RADAR Main Menu to access the Hard Disk Life Meter Menu, shown below:

```
Hard Disk Life Meter, Copyright 1992-94, Xycom Inc.

Hard Disk Life Meter: [Disabled ]

Maintenance Reminder Interval (hours): [ 60000]

Date Installed or Serviced: 01/10/1980
Hours since drive replacement or maintenance: 0
Total Hard Drive Power On Hours: 0

↑↓  Move        F5  Previous Value   F2   Drive Serviced
Esc  Exit       F6  Next Value       F3   Drive Replaced
                                     F10  Save Configuration
```

Figure 2-19. Hard Disk Life Meter Menu

Menu options are described below. Underlined items indicate the default setting for a menu option.

2.4.1 **Hard Disk Life Meter** (Disabled; Enabled/Fault LED; Enabled Maintenance LED)

This selection allows the user to enable or disable the Hard Disk Life Meter. When enabled and tied to the Maintenance LED, it indicates when maintenance is required when the Reminder Interval expires. When enabled and tied to the Fault LED, it indicates when a fault has occurred when the Reminder Interval expires.

2.4.2 **Maintenance Reminder Interval** (0-60000-999999)

When the Hard Disk Life Meter is enabled and the Hours since drive replacement or maintenance field is equal to or greater than the value in this field, the Maintenance or Fault LED turns on. The maximum value of this item is 999,999 hours. The manufacturer's reliability specifications for the mean time between failures (MTBF) for the ProDrive ELS and the LPS is 250,000 hours.

> **NOTE**
> If you do not know what to set the Maintenance Reminder Interval to, start with the MTBF of the hard drive that is in your system. As you gain experience with the reliability of hard drives in your specific application, modify this value appropriately.

2.4.3 **Date Installed or Serviced** (mm/dd/yy)

This field shows the last date at which the drive was serviced or replaced. Press <F2> or <F3> to set this field to the current date. The format of the date field is month/day/year.

2.4.4 **Hours since drive replacement or maintenance**

This field displays the number of hours since the drive was last replaced or maintained. The RADAR BIOS maintains this number when the Hard Disk Life Meter is enabled. It is set to zero when the user presses <F2> or <F3>.

2.4.5 **Total Hard Drive Power On Hours**

This field indicates the total number of hours the drive has been powered on. Press <F3> to set this field to zero. The RADAR BIOS maintains this number when the Hard Disk Life Meter is enabled.

2.5 FAN FILTER CLEANING REMINDER MENU

The Fan Filter Cleaning Reminder Menu monitors how long the system has run since the fan filter was last cleaned. When enabled, it keeps track of how long the computer has been on since the fan filter has been cleaned and/or replaced. The user indicates how long the fan filter is allowed to be used between cleanings. When this period expires, the Fan Filter Cleaning Reminder informs RADAR than an error has occurred. It also logs when the user indicates that the fan filter has been cleaned or replaced.

Select the Fan Filter Cleaning Reminder option from the RADAR Main Menu to access the Fan Filter Cleaning Reminder Menu, shown below:

```
Fan Filter Cleaning Reminder, Copyright 1992-94, Xycom Inc.

Fan Filter Cleaning Reminder: [Disabled      ]

Filter Cleaning Interval (hours): [ 720]

Date Serviced: 11/15/1992
Hours since cleaning: 0

↑↓  Move          F5  Previous Value    F2   Fan Filter Cleaned
Esc Exit          F6  Next Value        F10  Save Configuration
```

Figure 2-20. Fan Filter Cleaning Reminder Menu

Menu options are described below. Underlined items indicate the default setting for a menu option.

2.5.1 **Fan Filter Cleaning Reminder** (Disabled; Enabled/Fault LED; Enabled/Maintenance LED)

This field is used to enable or disable the Fan Filter Cleaning Reminder. When enabled and tied to the Maintenance LED, it indicates when it is time to clean the fan filter. When enabled and tied to the Fault LED, it indicates when a fault has occurred.

2.5.2 **Filter Cleaning Interval** (0-720-17532)

When the Fan Filter Cleaning Reminder is enabled and the value in the Hours since cleaning field is equal to or greater than the value in this field, the Maintenance or Fault LED turns on. The maximum value of this item is 17,532 hours (two years).

2.5.3 **Date Serviced** (mm/dd/yy)

This item shows the last date that the fan filter was cleaned. Press <F2> to set this item to the current date. The format of the date field is month/day/year.

2.5.4 **Hours Since Cleaning**

This field shows the number of hours the system has been powered on since the last time the filter was cleaned. This field is updated by the RADAR BIOS when the Fan Filter Cleaning Reminder is enabled. Press <F2> to clear this value.

2.6 BATTERY LIFE METER MENU

The Battery Life Meter monitors battery usage. When enabled, it monitors how long the computer has been off since the battery was last replaced. The user indicates how long the battery is expected to live and how much of this time is allowed to pass without replacement. When this time period expires, the Battery Life Meter informs RADAR that an error has occurred. It also logs when the user indicates that the battery has been replaced.

Select the Battery Life Meter option from the RADAR Main Menu to access the Battery Life Meter Menu, shown below:

```
        Battery Life Meter, Copyright 1992-94, Xycom Inc.

Battery Life Meter: [Disabled         ]

Battery Life (hours): [41463]
Battery Replacement Interval (% ; hours): [ 90] ; 37316

Date New Battery Installed: 11/15/1992
Hours battery in use: 0
Remaining Battery Life: 41463

↑↓ Move          F5  Previous Value     F2  Battery Replaced
Esc Exit         F6  Next value         F10 Save Configuration
```

Figure 2-21. Battery Life Meter Menu

Menu options are described on the following pages. Underlined items indicate the default setting for a menu option.

2.6.1 **Battery Life Meter** (Disabled; Enabled/Fault LED; Enabled/Maintenance LED)

This option is used to enable or disable the Battery Life Meter. When enabled and tied to the Maintenance LED, it indicates when it is time to change the battery. When enabled and tied to the Fault LED, it indicates when a fault has occurred.

2.6.2 **Battery Life** (0-41463-87672)

Specify the life of the battery in hours in this field. The maximum value of this item is 87,672 hours (10 years).

2.6.3 **Battery Replacement Interval** (50-90-100%)

This field is used to specify at what percentage of battery life the battery should be replaced. After the percentage is set, the number of hours that the percentage represents is updated on the screen when the highlight bar is moved to another item in the menu. When the value of the Hours battery in use option is equal to or greater than the number of hours specified in this item and the Battery Life Meter is enabled, the Maintenance or Fault LED turns on. The minimum value of this item is 50 percent and the maximum is 100 percent.

2.6.4 **Date New Battery Installed** (mm/dd/yy)

This field displays the date the battery was last replaced. The format of the date field is month/day/year. Press <F2> to set this item to the current date.

2.6.5 **Hours Battery In Use**

This field shows how long the current battery has been in use. The RADAR BIOS maintains this number when the Battery Life Meter is enabled. Press <F2> to set this value to zero.

2.6.6 **Remaining Battery Life**

This option shows the remaining life of the battery. RADAR BIOS maintains this number when the Battery Life Meter feature is enabled. Press <F2> to set this value to the same value as Battery Life.

2.7 TEMPERATURE MONITOR MENU

When enabled, the Temperature Monitor reads in the ambient temperature from the 9000-RAD's D/A converter, updating the lowest and highest temperatures as they change. The user sets the allowable temperature range, and, if this range is violated, the Temperature Monitor will inform RADAR that an error has occurred. The event must be acknowledged to reset the error condition. The user may also reset the lowest and highest readings themselves.

> **NOTE**
> The Temperature Monitor reads the temperature around the 9000-RAD card, which is most often located in a closed unit. Therefore, the temperature selected should reflect the monitoring of the internal system temperature rather than the room temperature.

Select the Temperature Monitor option from the RADAR Main Menu to access the Temperature Monitor Menu, shown below:

```
Temperature Monitor, Copyright 1992-94, Xycom Inc.

Temperature Monitor: [Disabled          ]

High Temperature Limit (Celsius): [50]
Low Temperature Limit (Celsius): [ 0]

Temperature Fault: No
Last Temperature (Celsius): NA
Highest Temperature (Celsius): NA
Lowest Temperature (Celsius): NA

↑↓  Move          F5  Previous Value    F2   Reset Fault
Esc Exit          F6  Next Value        F3   Reset Highest/Lowest
                                        F10  Save Configuration
```

Figure 2-22. Temperature Monitor Menu

Menu options are described on the following pages. Underlined items indicate the default setting for a menu option.

2.7.1 **Temperature Monitor** (Disabled; Enabled/Fault LED; Enabled/Maintenance LED)

When this option is enabled, the Fault or Maintenance LED turns on to indicate that the temperature has gone above or below the specified limits.

2.7.2 **High Temperature Limit** (1-50°C)

This field is used to specify the highest allowable temperature. If the temperature goes out of the specified range, the Fault or Maintenance LED turns on. Temperature limits can be set as low as +1°C and as high as 50°C.

2.7.3 **Low Temperature Limit** (0-49°C)

This field is used to specify the lowest allowable temperature. If the temperature goes out of the specified range, the Fault or Maintenance LED turns on. Temperature limits can be set as low as 0°C and as high as -1°C.

2.7.4 **Temperature Fault** (Yes; No)

This field displays a Yes when a temperature fault occurs. Press <F2> to reset this field to No.

2.7.5 **Last/Highest/Lowest Temperature**

These fields show the last, highest, and lowest temperatures measured when the temperature monitor was enabled. The temperature is measured once a minute. Press <F3> to reset the Highest and Lowest Temperature fields.

2.8 FAULT RELAY CONTROL MENU

The Fault Relay Control ties the state of the Fault Relay on the 9000-RAD to the Fault LED. When enabled, the user indicates what action the Fault Relay will take when the Fault LED is turned on and off. The Fault Relay can be energized, relaxed, or ignored.

Select the Fault Relay Control option from the RADAR Main Menu to access the Fault Relay Control Menu, shown below:

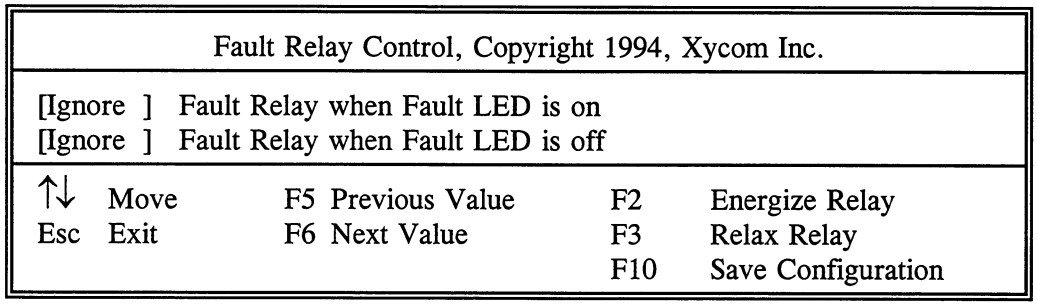

Figure 2-23. Fault Relay Control Menu

Menu options are described on the following page. Underlined items indicate the default setting for a menu option.

2.8.1 (Ignore; Energize; Relax) Fault Relay when Fault LED is on

This field indicates the state of the Fault Relay when the Fault LED is on. The user can choose to energize or relax the Fault Relay or have it remain in its current state (ignore).

2.8.2 (Ignore; Energize; Relax) Fault Relay when Fault LED is off

This field indicates the state of the Fault Relay when the Fault LED is off. The user can choose to energize or relax the Fault Relay or have it remain in its current state (ignore).

2.9 WATCHDOG TIMER MENU

The Watchdog Timer (WDT) is an interval timer that must be strobed within a specified period or it will time out. When this feature is enabled, RADAR periodically strobes the WDT.

> **NOTE**
> While having the RADAR control the WDT provides some system integrity, having an application control the WDT provides greater integrity. That is because the RADAR is tied to the timer interrupt and it will continue to strobe the WDT even when an application has become unstable.

Select the Watchdog Timer option from the RADAR Main Menu to access the Watchdog Timer Menu, shown below:

```
Watchdog Timer, Copyright 1994, Xycom Inc.

Watchdog Timer: [Disabled       ]
Last timeout of the Watchdog Timer: 01/01/1980   00:00 (24 hour clock)

Esc Exit    F5 Previous Value   F6 Next Value   F10 Save Configuration
```

Figure 2-24. Watchdog Timer Menu

Menu options are described below. Underlined items indicate the default setting for a menu option.

2.9.1 **Watchdog Timer** (Disabled; Enabled/Fault LED)

This option is used to enable or disable the Watchdog Timer. When enabled, it is tied to the Fault LED.

2.9.2 **Last timeout of the Watchdog Timer** (mm/dd/yy; hh:mm)

The field displays the date (mm/dd/yy) and 24-hour clock time (hh:mm) at which the Watchdog Timer last timed out.

2.10 SOLID STATE DISK MENU

This Solid State Disk (SSD) feature allows the socketed chip sites on the 9000-RAD board to emulate one or two hard disks. In addition to the 9000-RAD board, up to 15 4100-SSD boards can be added to the backplane and become part of the Solid State Disk. Both the 9000-RAD and 4100-SSD boards can contain two banks of chips. (Refer to the 4100-SSD manual for more information.) If a single disk is being emulated, its size is determined by the total number of boards and the dipswitches on each individual board. If two disks are being emulated, the first disk size is specified in the setup menus (see below) as the number of banks allocated to C. The second drive starts at the following bank, and its size is determined by the number of boards remaining and the dipswitches on each remaining board.

Select the Solid State Disk option from the RADAR Main Menu to access the Solid State Disk Menu, shown in Figure 2-26. This menu is selected whenever a change to the Solid State Disk configuration is needed. An example could be when you are adding more memory to an existing 9000-RAD board or installing an additional 4100-SSD board.

NOTE

Initializing the SSD board(s) clears existing memory from your emulated drives. Be sure to back up important data before performing this initialization.

```
Solid State Disk, Copyright 1994, Xycom Inc.

Solid State Disks: [None    ]
Start of Solid State Disk C:  [ 9000-RAD]

Banks allocated to drive C:[  0   ]  (    0Sectors-      )
Banks allocated to drive D:[  0   ]  (    0Sectors-      )

↑↓  Move     F5  Previous Value    F10  Save Configuration
Esc Exit     F6  Next Value
```

Figure 2-25. Solid State Disk Menu

The user is asked whether or not to perform SSD initialization when changes to the SSD configuration indicate that initialization should occur. In some cases, you must force an initialization to occur. An example is when you are adding an additional 4100-SSD board to an existing C drive. When you add an additional board, you do not need to change any of the menu items, and when you don't change any menu items, pressing <F10> will not perform any initialization. To force initialization, change one of the fields, and press <Enter>, then change the field back to the desired value and press <F10> again.

2.10.1 Menu Options

Menu options are described below. Underlined items indicate the default setting for a menu option.

2.10.1.1 **Solid State Disks** (None; C; D; C and D)

Set this feature to emulate one hard drive (C or D), two hard drives (C and D), or None. Two is the maximum number of real and emulated hard drives in a system. Therefore, if you have an existing C drive, you cannot add C and D as SSD drives. Also, if you already have two real hard drives, you cannot add any SSD drives. The initialization will return an error message if you tell it to configure the system with more than two drives.

2.10.1.2 **Start of Solid State Disk C** (9000-RAD; 4100-SSD)

This feature specifies the board on which SSD memory starts: the 9000-RAD or the 4100-SSD. Generally, the 9000-RAD board will be the first board in the system. However, you can set this to 4100-SSD, in which case the initialization utility starts looking for the first 4100-SSD board.

> **NOTE**
> Each SSD board in the backplane must have a unique board number. The 9000-RAD board is always board zero. 4100-SSD boards have a rotary switch SW1 on them to determine their unique board number. Therefore, to add 4100-SSD boards to a backplane that contains a 9000-RAD board, the first 4100-SSD board SW1 must be set to 1. Each additional 4100-SSD board that is to be added to the system must have its switches set sequentially to 2,3,4,... etc. with SW1.

2.10.1.3 **Banks Allocated to drive C** (0-31)

This option can only be configured when the Solid State Disks option is set to C and D. You can allocate from 0 to 31 banks on drive C. The remaining number of banks are allocated to drive D. When only the C drive is set above, the system automatically allocates the number of banks.

For example, if you want the 9000-RAD (with two banks of chips) to be the C drive and an installed 4100-SSD board (SW1=1) to be the D drive, set this choice to 2.

2.10.1.4 **Banks allocated to drive D** (0-31)

This option is displayed when the Solid State Disks option is set to D, or C and D. The system automatically allocates the number of banks for D, and displays the number in this field.

2.10.2 **Partitioning and Formatting the SSD**

Once you have initialized the SSD via the RADAR Setup Menus, it needs to be partitioned and then formatted. When you exit the RADAR setup menus, the system will reboot. If you are emulating the C drive, or the C and D drive with the SSD, you need a bootable floppy drive during this phase of initialization. (DOS will try to boot from your emulated C drive which has not been partitioned or formatted yet)

2.10.2.1 **Partitioning the Disk**

To partition the disk, run the DOS utility FDISK. FDISK should recognize the presence of the mechanical hard disk (if any) and the SSD drives. (Refer to your DOS manual for more information about the FDISK program). When partitioning a drive, FDISK needs to know the drive number that you want to partition. FDISK displays the hard drives in the system by number, where C is drive 1, and D is drive 2. If the current drive number that FDISK displays does not match the drive that you want to partition, choose item #5, "Select Next Fixed Disk Drive," and then item #4, "Display Partition Data." This should read "No Partitions Available" if you have correctly chosen the SSD drive that you want to partition. If there are already partitions available, you have chosen an existing hard disk in your system. **(Do not partition this drive, as it is probably the mechanical hard disk in your system!)**

Once the correct SSD drive has been chosen, select FDISK item #1, and create a DOS partition that uses the entire disk drive. If you are emulating two drives, repeat this step by selecting the correct drive and partitioning the second SSD drive. When you are done with FDISK, exit the program which reboots the system. (Make sure you still have a bootable floppy in the A drive if you are emulating the C drive.)

2.10.2.2 **Formatting the Disk**

After the partition(s) have been created by FDISK, the SSD drive(s) need to be formatted using the DOS FORMAT program. Use the command below if you are formatting an SSD drive as C:

Format C: /S // Format C: as a bootable hard disk

If you are formatting the SSD as the D drive, use this command:

Format D: // Format D: as a non-bootable hard disk

> **NOTE**
> To avoid formatting an existing hard disk, be careful when specifying the disk drive designator. Use the DOS DIR command to check the drive contents before formatting. After FDISK, there should be no files shown when doing a DIR of an emulated SSD drive.

You should now reboot your system without the floppy drive. Your emulated hard drive(s) should now appear to the system as mechanical hard disks. To make sure that the disk data on the board(s) remain intact during power-down, enable the battery for the SRAM chips on all SSD board(s).

This section describes the pinouts for the serial port, relay, external battery, and AC Fail connectors that are found on the 9000-RAD board.

A.1 SERIAL PORTS

The serial port 0 and 1 connectors are located on the ORB. Pinouts are listed in tables A-1 and A-2.

Table A-1. Serial Port 0 Connectors

Pin	**RS-232C**	**RS-485**
1	DCD	TXD-
2	RXD	TXD+
3	TXD	RTS-
4	DTR	RTS+
5	GND	GND
6	DSR	RXD-
7	RTS	RXD+
8	CTS	CTS+
9	RI	CTS-

Table A-2. Serial Port 1 Connectors

Pin	RS-232C	RS-485
1	DCD	TXD-
2	RXD	TXD+
3	TXD	RTS-
4	DTR	RTS+
5	GND	GND
6	DSR	RXD-
7	RTS	RXD+
8	CTS	CTS+
9	RI	CTS-

A.2 RELAY

RELAY is located on the ORB. Pinouts are described in Table A-3.

Table A-3. Relay Connectors

Pin	Description
1	Normally closed
2	Common
3	Normally open

A.3 EXTERNAL BATTERY

BAT-IN is located in the upper corner of the PCB nearest the ORB. Pinouts are described in Table A-4.

Table A-4. External Battery Connectors

Pin	Description
1	Battery Negative
2	Battery Positive

A.4 AC FAIL

ACF is located near the top center of the PCB. Pinouts are described in Table A-5.

Table A-5. AC Fail Connectors

Pin	Description
1	External AC Fail Input
2	Ground

Numerical

A

B

C

D

D *(continued)*

E

F

H

J

L

M

O

P

R

S

S (*continued*)

T

W