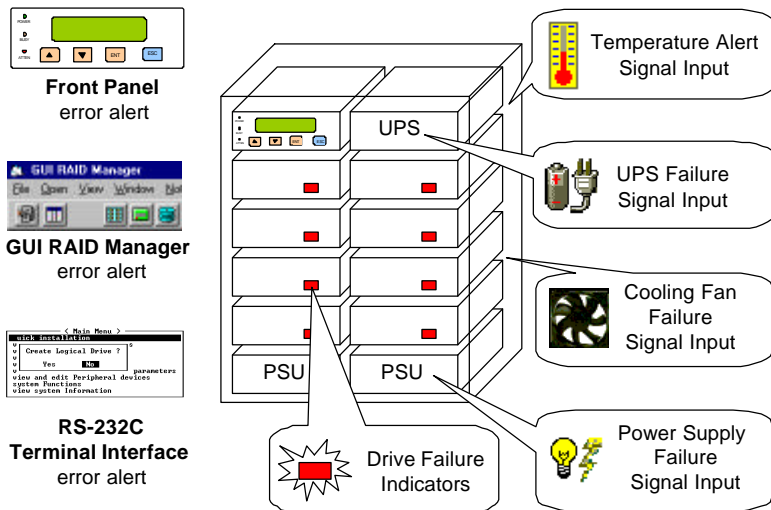


## Chapter 12 Fault-Bus

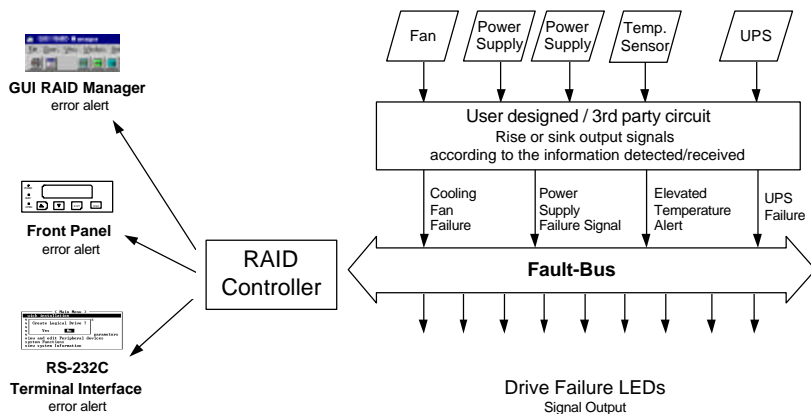
### 12.1 What is Fault-Bus? Why the Need for Fault-Bus?

Fault-bus is a proprietary enclosure management interface. It gathers the failure signals from the cooling fans, redundant power supply, enclosure temperature sensor and UPS device. It reports these failure information to the user through the front panel, RS-232C terminal interface and GUI RAID Manager. The LED of the drive that failed will light showing the location of the drive that needs to be replaced. It warns the user of a dangerous situation happening to the RAID subsystem.



Fault-bus is actually a signal bus which contains a group of input and output signals. The Fault-bus design is fully open for easy integration. Simply install, configure and integrate the RAID controller with the enclosure, the RAID controller will be able to provide corresponding alert to the user for an immediate dispose to protect the data stored in the RAID system.

## 12.2 How Does the Fault-Bus Work?



### Error Signals Input

Fault-bus only collects the signals, it does not detect the temperature, fan rotation, power supply failure or the UPS power failure. A user designed or a 3rd party circuit is necessary for Fault bus.

The user designed / 3rd party circuit must do the following:

- Detect the fan rotation, and rise up or sink down the “fan” signal of the Fault-bus (pin 26 in the Fault-bus connector) according to the detected information. When the fan fails to rotate, activate the signal. When the fan rotates properly, keep the signal inactive. If more than one fan is supported in this enclosure, detect the fan rotation of each fan and simply combine them into one signal.
- Detect the power supply status, and rise up or sink down the “power” signal of the Fault-bus (pin 23 in the Fault-bus connector) according to the detected information. When a power supply failed, activate the signal. When the power supply is working properly, keep the signal inactive. If the enclosure supports the redundant power supply feature (with more than one power supply), detect the status of each power supply and combine them into one signal.

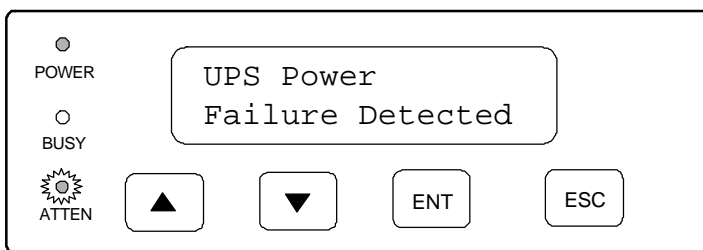
- Detect the temperature in the enclosure, and rise up or sink down the “temperature” signal of the Fault-bus (pin 24 in the Fault-bus connector) according to the detected information. When the temperature goes too high, activate the signal. When the temperature goes back to normal, keep the signal inactive. If more than one temperature sensor is supported in this enclosure, collect the temperature information from each sensor and combine them into one signal.
- Receive the UPS status from the UPS, and rise up or sink down the “UPS” signal of the Fault-bus (pin 25 in the Fault-bus connector) according to the received information. When UPS reports a power failure, activate the signal. When UPS reports that power failure has recovered, keep the signal inactive.

## Drive Failure Signal Outputs

Each SCSI drive can assign a slot number. There are 14 slot signal outputs in the Fault-bus connector. When the RAID controller has detected that a SCSI drive has failed, the corresponding slot number signal will be activated for the failed drive indicated.

The controller will report the Fault-bus error signals to the user through the front panel, RS-232C terminal interface and the GUI RAID Manager.

### 12.2.1 Fault-Bus Error Alert



When the Fault-bus function is enabled and a failure signal is detected, an alert message will be shown on the LCD. The ATTN LED will also light at the same time.

**IMPORTANT:**

*The Fault-Bus signals are collected from the enclosure. The controller itself does not detect the temperature, fan rotation or the power supply voltage.*

UPS Power Failure  
Detected

The input signal from the UPS has been triggered.

Power Supply  
Failure Detected

The input signal from the power supply has been triggered.

Cooling Fan Failure  
Detected

The input signal from the cooling fan has been triggered.

Elevated  
Temperature Alert

The input signal from the temperature sensor in the enclosure has changed.

## **12.3 How to Setup the Fault-bus?**

### **12.3.1 Hardware**

1. Connect all error signal inputs to the 3rd party circuit, then connect the error signals to the Fault-bus. Make sure each signal is active high or active low according to the 3rd party circuit.
2. Connect the LED of the failed drive, located in front of the drive canister, to the Fault-bus. Record the slot number connected to each canister.
3. If there is a "Drive failed" LED in front of the enclosure which presumably indicate a drive member failed, connect the "Drive failed" LED in front of the enclosure to pin 27 of the left Fault-bus connector.
4. Make sure the drive failure LED signal required is according to the drive failure LED circuit, active high or active low.

## 12.3.2 Configuring the Controller through the Front Panel

### Assign Each SCSI Drive or Canister a Slot Number

Press **ENT** for two seconds to enter the Main Menu. Press ▼ or ▲ to select “View and Edit SCSI Drives”, then press **ENT**.

```
View and Edit  
SCSI Drives ↓
```

### Assign a Slot Number to an Existing SCSI Drive

The SCSI drive information will be displayed on the LCD. Press ▼ or ▲ to select the desired SCSI drive, then press **ENT**.

```
C=1 I=0    1010MB  
LG=0  LN SEAGATE
```

Press ▼ or ▲ to choose “Slot Number Assignments”, then press **ENT**.

```
Slot Number  
Assignments  ..
```

If currently there is a slot number assigned to this SCSI drive, the current slot number will be displayed. Press ▼ or ▲ to select the desired slot number, then press **ENT**.

```
Slot Def  # 1  
Change to #   ?
```

The slot number has two characters. The right character will be chosen first, then the left character. Press **ENT** once to switch between the left and right character. Press **ENT** for two seconds.

```
Slot Assignment  
Set to      # 0  ?
```

### Assign a Slot Number to an Empty Canister

When there is an empty drive canister which currently does not contain any drive, its SCSI channel/ID will not appear in the drive information list. Assign a slot number to this empty canister and add a drive entry in order to use it later when a drive is installed.

### Add Drive Entry

Choose “View and Edit SCSI Drives” to enter the Main Menu. The SCSI drive information will be displayed on the LCD. Press ▼ or ▲ to select a SCSI drive, then press **ENT**.

```
C=1 I=0    1010MB
LG=0  LN SEAGATE
```

Press ▼ or ▲ to select “Add Drive Entry”, then press **ENT**.

```
Add Drive Entry
..
```

Press ▼ or ▲ to select the desired SCSI channel, then press **ENT** for two seconds.

```
Add Channel=1
Drive Entry    ?
```

Press ▼ or ▲ to select the desired SCSI ID, then press **ENT** for two seconds.

```
Add Channel=1
ID= 3 Drv Entry?
```

### Delete the Slot Number

Choose “View and Edit SCSI Drives” to enter the Main Menu. The SCSI drive information will be displayed on the LCD. Press ▼ or ▲ to select the desired SCSI drive or empty drive entry, then press **ENT**.

```
C=1 I=0    1010MB
LG=0  LN SEAGATE
```

Press ▼ or ▲ to select “Slot Number Assignment”, then press **ENT**.

```
Slot Number
Assignments  ..
```

Press ▼ or ▲ to select “0” for the slot number, then press **ENT**. Press **ENT** for two seconds to set.

```
Slot Def  # 1
Change to #   ?
```

### Remove Empty Drive Entry

Before an empty drive entry can be removed, the slot number has to be deleted first. Please refer to the paragraph above on how to delete the slot number.

Choose “View and Edit SCSI Drives” to enter the Main Menu. The SCSI drive information will be displayed on the LCD. Press ▼ or ▲ to select the empty drive entry you desire to remove, then press **ENT**.

C=1 I=3 ABSENT

Press ▼ or ▲ to select “Clear Drive Status”, then press **ENT**.

Clear Drive  
Status ..

Press **ENT** for two seconds to confirm.

Clear Drive  
Status ?

### Set Each Fault-bus Error Signal Input as Active-high or Active-low

Choose “View and Edit Periph Parm” to enter the Main Menu, then press **ENT**.

View and Edit  
Periph Parm ↓

Press ▼ or ▲ to select “Define Periph. Active Signal”, then press **ENT**.

Define Periph.  
Active Signal ..

Press ▼ or ▲ to select the desired item: Power Supply, Cooling Fan, Temperature Alert, or UPS Power Fail to Drive Failure, then press **ENT** to choose.

PowerSupply Fail  
Sig. Active Low

Press ▼ or ▲ to select an alternative selection. Press **ENT** for two seconds to confirm.

Set Power Fail Sig  
Active High?

## Enable Each Fault-bus Error Signal Input

Choose “View and Edit Periph Parm” to enter the Main Menu, then press **ENT**.

```
View and Edit  
Periph Parm  ↑↓
```

Press ▼ or ▲ to select “Set Peripheral Devices Entry”, then press **ENT**.

```
Set Peripheral  
Devices Entry ..
```

Press ▼ or ▲ to select the desired item: Power Supply, Cooling Fan, Temperature Alert or UPS Power Fail, then press **ENT** to choose.

```
Power Supply  
Status Disabled
```

Press ▼ or ▲ to select an alternative selection. Press **ENT** for two seconds to confirm.

```
Enable Power  
Supply Status ?
```

## Test Drive Failure LED for Each Drive Canister

Choose “View and Edit SCSI Drives” to enter the Main Menu. The SCSI drive information will be displayed on the LCD. Press ▼ or ▲ to select the desired SCSI drive or empty drive entry, then press **ENT**.

```
C=1 I=0 1010MB  
LG=0 LN SEAGATE
```

Press ▼ or ▲ to select “Toggle Failure Signal”, then press **ENT**.

```
Toggle Failure  
Signal ..
```

Press **ENT** for two seconds to toggle the drive failure signal.

```
Toggle Failure  
Signal ?
```

The drive failure LED should light on or off, following the toggle.



## Viewing the Status of Each Fault-bus Error Signal Input

Choose “View and Edit Periph Parms” in the Main Menu, then press **ENT**.

View and Edit  
Periph Parms    ↑

Press ▼ or ▲ to select “View Peripheral Devices Status”, then press **ENT**.

View Peripheral  
Devices Status..

Press ▼ or ▲ to view the desired item:  
Power Supply, Cooling Fan,  
Temperature Alert or UPS Power Fail.

Power Supply  
Status Normal

### 12.3.3 Configuring on the Controller through the RS-232C Terminal Interface

#### Assign Each SCSI Drive or Canister a Slot Number

Cache Status: Clean

< Main Menu >

- Quick installation
- view and edit logical drives
- view and edit Host luns
- view and edit scsi drives**

view  
view  
view  
view  
view  
view  
view  
view

Slot	Chl	ID	Size(MB)	Speed	LG_DRU	Status	Vendor and Product ID
1	0	1010	40MB	0	ON-LINE	SEAGATE ST31055W	
				0	ON-LINE	SEAGATE ST31055W	
				0	ON-LINE	SEAGATE ST31055W	
				0	ON-LINE	SEAGATE ST31055W	

View drive information  
Scan scsi drive  
**set slot Number**

Slot Number : 1

Enter:Clear Slot Number !Esc:Exit !Ctrl+L:Refresh Screen

Choose “View and Edit SCSI Drives” in the Main Menu, then press **[Enter]**. A list of the connected SCSI drives will appear. The “Slot” column indicates the current slot number of each SCSI drive.

#### Assign a Slot Number to an Existing SCSI Drive

Choose the desired drive to edit the slot number, then press **[Enter]**. Choose “Set Slot Number” in the menu, then press **[Enter]**. Enter the corresponding slot number of this SCSI drive, then press **[Enter]**. The

slot number will appear in the slot column of the drive information list.

## Assign a Slot Number to an Empty Canister

Cache Status: Clean

< Main Menu >

Quick installation

view and edit Logical drives

view and edit Host luns

**view and edit scsi Drives**

view

view

view

syst

view

Slot	Chl	ID	Size(MB)	Speed	LG_DRU	Status	Vendor and Product ID
1	1	0	1010	40MB	0	ON-LINE	SEAGATE S ID 3
					0	ON-LINE	SEAGATE S ID 5
					0	ON-LINE	SEAGATE S ID 8
					0	ON-LINE	SEAGATE S ID 9
					0	ON-LINE	SEAGATE S ID 10
					0	ON-LINE	SEAGATE S ID 11
					0	ON-LINE	SEAGATE S ID 12
					0	ON-LINE	SEAGATE S ID 13
					0	ON-LINE	SEAGATE S ID 14
					0	ON-LINE	SEAGATE S ID 15

View drive information

Scan scsi drive

set slot Number

**add drive entry**

Clear drive status

Toggle failure signal

SCSI Channel 1

SCSI Channel 2

a1

Arrow Keys:Move Cursor    !Enter:Select    !Esc:Exit    !Ctrl+L:Refresh Screen

When there is an empty drive canister which currently does not contain any drive, the corresponding SCSI channel/ID will not appear in the drive information list. Assign a slot number to this empty canister and add a drive entry in order to use it later when a drive is installed.

## Add Drive Entry

Choose a SCSI drive, then press **[Enter]**. Choose “Add Drive Entry” in the menu, then press **[Enter]**. Choose the corresponding SCSI channel/ID for this empty canister, then press **[Enter]**. An empty drive entry “ABSENT” will appear in the drive information list.

Cache Status: Clean

< Main Menu >

Quick installation

view and edit Logical drives

view and edit Host luns

**view and edit scsi Drives**

view

view

view

syst

view

Slot	Chl	ID	Size(MB)	Speed	LG_DRU	Status	Vendor and Product ID
					0	ON-LINE	SEAGATE ST31055W
					0	ON-LINE	SEAGATE ST31055W
					GLOBAL	STAND-BY	SEAGATE ST31055W
						ABSENT	
1	3						
1	4		1010	40MB	0	ON-LINE	SEAGATE ST31055W

Scan scsi drive

set slot Number

**add drive entry**

Clear drive status

Toggle failure signal

a1

Arrow Keys:Move Cursor    !Enter:Select    !Esc:Exit    !Ctrl+L:Refresh Screen

Move the cursor bar on the empty drive entry and press **[Enter]**. Choose “Set Slot Number” in the menu, then press **[Enter]**. Enter the slot number of this empty canister so as to use it later when a drive is installed.

## Delete the Slot Number of a SCSI Drive or Empty Drive Entry

Choose the desired SCSI drive or empty drive entry to delete its slot number and press **[Enter]**. Choose “Set Slot Number” in the menu, then press **[Enter]** on the selected slot number. The slot number can also be cleared by entering “0” at the slot number.

## Remove Empty Drive Entry

Cache Status: Clean							
< Main Menu >							
Quick installation							
view and edit Logical drives							
view and edit Host luns							
view and edit scsi Drives							
view	Slot	Chl	ID	Size(MB)	Speed	LG_DRU	Status
view							Vendor and Product ID
view							
view							
syst							
view							
Scan scsi drive							
set slot Number							
Add drive entry							
Clear drive status							
Toggle failure signal							
	1	3					ABSENT
	1	4	1010	40MB		0	ON-LINE SEAGATE ST31055W
Arrow Keys:Move Cursor !Enter:Select !Esc:Exit !Ctrl+L:Refresh Screen							

Before an empty drive entry can be removed, the slot number has to be deleted first. Please refer to the above paragraph on how to delete the slot number.

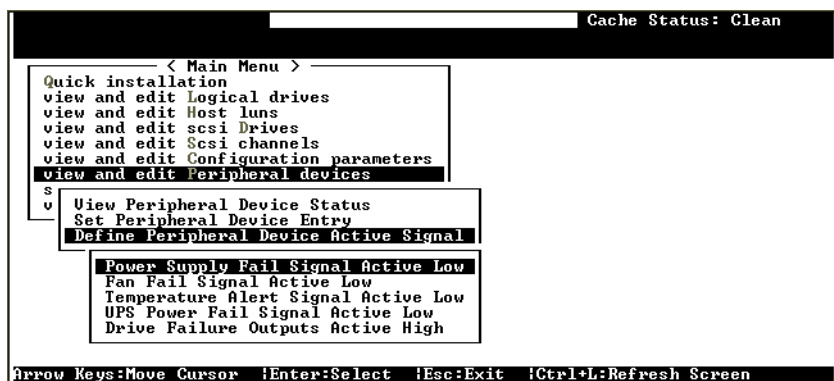
Move the cursor on the empty drive entry, then press **[Enter]**. Choose “Clear Drive Status”, then press **[Enter]**. The empty drive entry will now disappear from the drive information list.



### IMPORTANT:

*You will not be able to remove an empty drive entry if it has been assigned a slot number. Delete the slot number before removing the empty drive entry.*

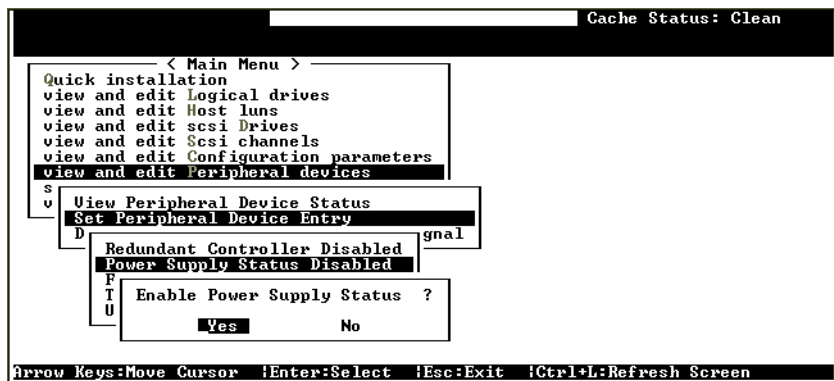
## Set Each Fault-bus Error Signal Input as Active-high or Active-low



Choose “View and Edit Peripheral Devices” in the Main Menu, then press **[Enter]**. Select “Define Peripheral Device Active Signal”, then press **[Enter]**.

Move the cursor to the item you wish to change, then press **[Enter]**. Choose “Yes” when prompted to confirm, then press **[Enter]** to set. Each error signal input can be individually set as active high or active low. The drive failure signal output can also be set as active high or active low.

## Enable Each Fault-bus Error Signal Input



Each item of the error signal input can be individually enabled or disabled. Choose “View and Edit Peripheral Devices” in the Main

Menu, then press [Enter]. Select “Set Peripheral Device Entry”, then press [Enter]. Move the cursor to the desired item to enable or disable, and press [Enter]. Choose “Yes” in the following dialog box, then press [Enter] to set.

### Test Drive Failure LED for Each Drive Canister

Cache Status: Clean

< Main Menu >

Quick i  
view an  
view an  
view an  
view an  
view  
view  
view  
syst  
view

View drive information  
Scan scsi drive  
set slot Number  
Add drive entry  
Clear drive status  
Identify scsi drive  
Toggle failure signal

G_DRU	Status	Vendor and Product ID
0	ON-LINE	SEAGATE ST31055W
2	1 1	1010 40MB 0 ON-LINE SEAGATE ST31055W
3	1 2	1010 40MB GLOBAL STAND-BY SEAGATE ST31055W
4	1 4	1010 40MB 0 ON-LINE SEAGATE ST31055W

Arrow Keys:Move Cursor    !Enter:Select    !Esc:Exit    !Ctrl+L:Refresh Screen

Choose the desired SCSI drive or empty drive entry from the drive information list, and press [Enter]. Choose “Toggle Failure Signal” in the menu, then press [Enter] to toggle the drive failure signal. The drive failure LED should light on or off followed with the toggle.

### Viewing the Status of Each Fault-bus Error Signal Input

Cache Status: Clean

< Main Menu >

Quick installation  
view and edit Logical drives  
view and edit Host luns  
view and edit scsi Drives  
view and edit Scsi channels  
view and edit Configuration parameters  
view and edit Peripheral devices

s  
v

View Peripheral Device Status  
Set Peripheral Device Entry  
Define Peripheral Device Active Signal

Arrow Keys:Move Cursor    !Enter:Select    !Esc:Exit    !Ctrl+L:Refresh Screen

Choose “View and Edit Peripheral Devices” in the Main Menu and press [Enter]. Select “View Peripheral Device Status” in the menu and press [Enter].

ITEM	STATUS	LOCATION
Redundant Controller	Disabled	
Power Supply Status	Normal	FaultBus
Fan Status	Failed	FaultBus
Temperature Status	Alert	FaultBus
UPS Status	Normal	FaultBus

The current status of each enabled Fault-bus error signal input is listed. Try to emulate the errors and view the status of each item as described above.