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StorageWorks

RAID Array 3000 Controller

Job Aids for Servicing

EK–R3KJA–UG. A01

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Regulatory Information

WARNING!

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

ACHTUNG!

Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Attention!

Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.

JAPAN

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1

RAID Array 3000 Job Aids for Servicing Event Log - Setup and Interpretation Information

This Job Aid provides supplemental information that summarizes how to setup the HSZ22 controller to access and interpret the event log. It also contains references to the event log data fields and SCSI Sense Data information.

This Job Aid describes how to setup the HSZ22 controller to perform service-related activities and:

- Setup hyperterminal session to view HSZ22 status/error/event information
- View the PowerUp Self Test diagnostic screens using hyperterminal
- Enable HSZ22 event/error log viewing if system “hangs” or is“ locked up”
- Save and Restore Procedures
- Navigate to the Event Viewer/Error Log and view the logged events
- Interpret detailed information regarding the data fields found in the Event Logging event sequences
- Interpret ASC and ASCQ code assignments and descriptions. These codes are part of the Sense Data information that is transmitted in response to a Request Sense command.

NOTE

The instructions given here are intended as a guide to accessing the HSZ22 diagnostic/service information and should be performed in the sequence presented. For detailed instructions, refer to the procedures listed in the HSZ22 Getting Started manual, the HSZ22 Hardware User manual, or the StorageWorks Command Console manual.

1.1 Connecting the PC Serial Interface Cable

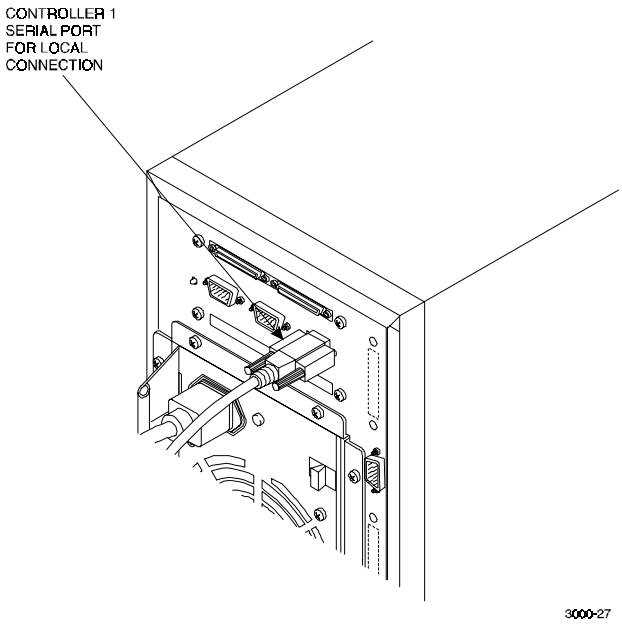
NOTE

This procedure assumes that you are starting with an HSZ22 controller that is powered down and lacks a physical connection for using hyperterminal. If your HSZ22 is already physically connected for hyperterminal, proceed to the section 2.1.

You must make a serial connection to the RAID controller to create your first virtual disk. This disk is required to communicate to your RAID Array 3000 over a network or SCSI bus. The serial cable is 5 meters (16.4 feet) long and is labeled 1704730-01. Perform the following steps to connect the PC to the controller:

1. Locate the connecting cable that came with the RAID subsystem. It has 9-pin female, serial connectors on each end.
2. Plug one end into the 9-pin serial port on a PC.
3. Plug the other end of the cable into the Controller 1 port on the RAID Array 3000 (Figure 1–1). The control ports are labeled CTR TOP (configuration port for the controller installed in the top controller slot) and CTR BOTTOM (configuration port for the second controller slot).
4. Note which PC serial port you use (COM1 or COM2 for example); you will need that information to establish a serial connection between your PC and the RAID Array 3000 controller.

Figure 1–1 Connecting the Serial Interface



2.1 Setting the Hyperterminal Parameters

Set the hyperterminal parameters as follows:

1. Click on the Start Button.
2. Point to Programs.
3. Point to Accessories.
4. Click on HyperTerminal.
5. Double-click the Hypertrm icon.
6. At the phone connection configuration screen, for phone number/connection, choose one of the direct connections to COM port options, for example, com1.
7. For the other properties screen, choose 9600 baud, 8 bits no parity, 1 stop bit, Xon/Xoff flow control, and, if applicable, VT100 display emulation.
8. To obtain information from event logging, start with hyper terminal configured and running, with the RAID 3000 turned off.

NOTE

your display may look different from the examples given here. For example, the font type that you choose when setting hyperterminal parameters can make the displayed screens look somewhat different. (For instance, the screens may have letters instead of lines for borders.) Therefore, use this document as an "overview" to navigating through the Event Logging feature.

3.1 Powering Up the RAID 3000

This section contains instructions for systems that are already running and for systems that need to be powered up. If your system is already running, go to Section 3.1. If your system has not been powered up, go to Section 3.2.

3.1.1 Systems Already Running

If the system is already running and has previously been connected via SWCC, the controller is in RTS mode. The controller cannot communicate with the hyperterminal when in RTS mode. If you use the arrow keys, you get a response similar to the following:

?01?01

To clear this condition, enter the following keyboard character sequence: **Escape**, followed by both the **Shift** and the **numeral 7** keys at the same time.

CAUTION

If you wish to see the contents of the event log, **do not** restart the controller. Doing so clears out the contents of the event log.

Press **Enter** to access the Monitor Utility choices.

Go to Section 4.

3.1.2 Systems Not Powered Up

1. Power up the RAID 3000. The hyperterminal display appears, briefly displaying the following:

   `Flash boot utility CRD Version xxx`

> **NOTE**
>
> The previous message is displayed **only** during power up. It is not be visible on a system already running.

The HSZ22 begins to execute its Power On Self Test routine, and displays self-test messages on the hyperterminal screen. However, if the HSZ22 previously had been running StorageWorks Command Console, the controller only displays two or three message lines, and then appears to “hang.” While in this “hang” state, wait until the controller’s green reset (heartbeat) LED begins to flash at its normal 1 Hz rate.

2. Once the green (heartbeat) LED begins flashing, press the **Enter** key. If the characters ?01 appear, you are still in a “hang” condition.
3. To clear the “hang” condition, enter the following keyboard character sequence: **Escape**, followed by both the **Shift** and the **numeral 7** keys at the same time. (You may need to repeat this sequence (**Escape** then **Shift** and **7**) a few times.) The hyperterminal screen should then display the Monitor Utility screen.

```
ÚÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ¿
             DEC                    ³
HSZ22    (C) DEC Monitor Utility ³
         Version xxx          ³
ÀÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÙ

Press Any Key To Activate Menu
```

> **CAUTION**
>
> If you wish to see the contents of the event log, **do not** restart the controller. Doing so clears out the contents of the event log.

4. You may either press **Enter** to access the Monitor Utility choices, or you may restart the controller and observe the Power On Self Test message sequences.

> **NOTE**
>
> For dual controllers, you may have to perform the above procedures for each controller.

5. Go to Section 4.1.

4.1 Saving and Restoring RAID 3000 Configuration Information

Once the RAID 3000 has been powered up, the configuration information should be saved so that it can be restored if it becomes necessary to replace a controller. Refer to section 4.1.1 for save procedures. Refer to Section 4.1.2 for restore procedures.

4.1.1 Saving RAID 3000 Configuration Information

1. From the SWCC directory, bring up the SWCC Client.
2. With the mouse, point to Storage.
3. Point to controller.
4. Point to configuration.
5. Double-click on save. A Save Configuration box appears.
6. You can save the configuration information in a file on your hard drive or on a floppy drive. If saving to the hard drive, we suggest that you place the file in the RAID3000 directory and give it a name that you so you can easily identify it. In the space provided type in the path and file name. For example:

   ```
   C:\RAID3000\RA3000.cfg
   ```

   If saving to a floppy drive clearly label the floppy so and keep it in a place that it can easily be found. In the space provided, type in the path and file name. For example:

   ```
   A:\RA3000.cfg
   ```

7. Once you have decided where to store the information, click on OK. You will see a message warning you that any file with the same name shall be overwritten. When satisfied that you wish to continue click OK to save the configuration information.

4.1.2 Restoring RAID 3000 Configuration Information

1. From the SWCC directory, bring up the SWCC Client.
2. With the mouse, point to Storage.
3. Point to controller.
4. Point to configuration.
5. Double-click on Restore. A Restore Configuration box appears.
6. If restoring from the hard drive, type the path and file name in the space provided. For example:

   ```
   C:\RAID3000\RA3000.cfg
   ```

   If restoring from a floppy, insert the floppy and type the path and file name in the space provided. For example:

   ```
   A:\RA3000.cfg
   ```

7. Click on OK. You will see a message warning you that any file with the same name shall be overwritten. When satisfied that you wish to continue click OK to restore the configuration information.

5.1 Accessing the Event Log

> **NOTE**
>
> This Section assumes that you have completed the setup instructions contained in Sections 1 through 4, in sequence.

1. Press any key to invoke the following DEC Monitor Utility menu screen:

```
HSZ22    (C) DEC Monitor Utility              01-08-98

                                      MAIN MENU

08:37:41


                                 ÚÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ¿
                                 ³ RAID Set Information  ³
                                 ³ Setup Parameters      ³
                                 ³ System Information    ³
                                 ³ RAID Set Functions    ³
                                 ³ System Functions      ³
                                 ³ Disk Utilities        ³
                                 ³ Rebuild/Create Status ³
                                 ³ Event Log             ³
                                 ÀÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÙ


 UP ARROW: CURSOR UP ³ DOWN ARROW: CURSOR DOWN ³ ENTER: SELECT ³ CTRL-Z: EXIT
```

> **NOTE**
>
> Only the Event Log can be invoked. Therefore, some or all of the other choices may not be displayed on your screen.

2. After this screen appears, use the **down arrow** to move the highlighted block to **Event Log**. (Note that the other choices are not available for use, although they may appear on the menu.)

3. After highlighting the choice, **Event Log**, press **Enter.** The Event Log function appears. It shows the first of the series of event log screens that the program has logged (or captured). The following example, (event log Sequence 0), shows the first in a series of events that were logged by the RAID controller.

```
HSZ22    (C) DEC Monitor Utility             01-08-98

                                    EVENT LOG
08:43:27


ÚÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÂÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÂÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÂÄÄÄÄÄÄÄÄ
ÄÄÄÄÄÄÄ¿
³ Sequence Number ³ 0                     ³ Date             ³ 01-08-98
³
³ Recorded Event  ³ System Power-Up       ³ Time             ³ 08:42:55
³
ÃÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÅÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÅÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÅÄÄÄÄÄÄÄÄ
ÄÄÄÄÄÄÄ´
³ RAID Set        ³ NA                    ³ RAID Level       ³ NA
³
³ RAID Set Status ³ NA                    ³ Redundancy Group ³ NA
³
³ Logical Member  ³ NA                    ³ Partitions       ³ NA
³
ÃÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÅÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÁÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÁÄÄÄÄÄÄÄÄ
ÄÄÄÄÄÄÄ´
³ Date            ³ 01-08-98
³
³ Time            ³ 08:42:55
³
³                 ³
³
³                 ³
³
³                 ³
³
³                 ³
³
ÀÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÁÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÁÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÁÄÄÄÄÄÄÄÄ
ÄÄÄÄÄÄÄÙ


UP ARROW: NEXT EVL ³ DOWN ARROW: PREV EVL ³ F: FLTR ³ C: CLR LOG ³
CTRL-Z: EXIT
```

4. Press the "**F**" key, as indicated at the bottom of the screen, to select "filter" (**FLTR**) mode. Doing so brings up the following screen with menu choices for the "filter" option:

You are able to specify the criteria to use when displaying the logged events. That is, you can have the controller "filter" or select which logged events are displayed.

```
HSZ22    (C) DEC Monitor Utility            01-08-98

                                   EVENT LOG
12:09:36


                        ÚÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ¿
                        ³ Select Event Log Filter                ³
                        ÃÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ´
                        ³ All Recorded Events                    ³
                        ³ Starting Sequence Number               ³
                        ³ Starting Date and Time                 ³
                        ³ Event Type                             ³
                        ³ RAID Set Number                        ³
                        ³ Disk I/O Channel                       ³
                        ³ Disk I/O Channel and SCSI ID           ³
                        ÀÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÙ


 ENTER: SELECT ³ CTRL-Z: EXIT ³
```

5. Choose the event you wish to see. Select a specific category by first using the up or down arrow to move the highlight box to that choice, and then by pressing **Enter**. Refer to *Appendix A, Error Log*, for more information regarding these choices.
6. You are prompted to choose any one of some twenty (approx.) different criteria, such as SCSI events, power up events, etc. See *Appendix A* for additional information. From the category choices given, you are able to "fine tune" the criteria by which that category is displayed. In the following example, if you select the choice **Event Type**, only data pertinent to that choice is displayed. All other categories are filtered out.

```
ÚÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÂÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÂÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÂÄÄÄÄ¿
³ Event Type ³                                                                  ³
ÃÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÅÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÅÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÅÄÄÄÄ
```

7. You can go backwards through your menu screen choices by pressing **Control Z** (Control and Z at the same time), as indicated at the bottom of the example screen).

For example, to view logged errors ranging from sequence number 3 through 5, press **Control Z** (a couple times should be sufficient) to move “backward” through the screen windows until you get back to the following menu window:

```
HSZ22    (C) DEC Monitor Utility            01-08-98

                                    EVENT LOG
12:44:51


                          ÚÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ¿
                          ³ Select Event Log Filter      ³
                          ÃÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ´
                          ³ All Recorded Events          ³
                          ³ Starting Sequence Number     ³
                          ³ Starting Date and Time       ³
                          ³ Event Type                   ³
                          ³ RAID Set Number              ³
                          ³ Disk I/O Channel             ³
                          ³ Disk I/O Channel and SCSI ID ³
                          ÀÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÙ



ENTER: SELECT ³ CTRL-Z: EXIT ³
```

8. For this example, select **Starting Sequence Number** (use up or down arrow key to select the choice, then press **Enter**). You are then prompted to enter the sequence number from which you wish to start. Sequence Number 0 is the first logged event.

For a slight variation of this example, press **Control Z**, then **Enter**, to return to the main **Filter Selection Menu** screen, shown above. For our example select the choice, **All Recorded Events**.

The screen displays the logged event, sequence 0:

```
ÚÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÂÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÂÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÂÄÄÄÄÄÄÄÄÄÄ
ÄÄÄÄÄÄÄ¿
³ Sequence Number ³ 0                    ³ Date             ³ 01-08-98
³
³ Recorded Event  ³ System Power-Up      ³ Time             ³ 11:57:52
³
ÃÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÅÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÅÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÅÄÄÄÄÄÄÄÄÄÄ
ÄÄÄÄÄÄÄ´
³ RAID Set        ³ NA                   ³ RAID Level       ³ NA
³
³ RAID Set Status ³ NA                   ³ Redundancy Group ³ NA
³
³ Logical Member  ³ NA                   ³ Partitions       ³ NA
³
ÃÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÅÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÁÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÁÄÄÄÄÄÄÄÄÄÄ
ÄÄÄÄÄÄÄ´
³ Date            ³ 01-08-98
³
³ Time            ³ 11:57:52
³
³                 ³
³
³                 ³
³
³                 ³
³
³                 ³
³
³                 ³
³
ÀÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÁÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÁÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÁÄÄÄÄÄÄÄÄÄÄ
ÄÄÄÄÄÄÄÙ


UP ARROW: NEXT EVL ³ DOWN ARROW: PREV EVL ³ F: FLTR ³ C: CLR LOG ³
CTRL-Z: EXIT
```

The previous is the first of the sequence of logged events to be displayed. Sequence 1 is the next event listed, and is accessed by pressing the up arrow, as is indicated at the bottom of the screen.

If you press the down arrow, you see the previous sequence number. If you were looking at sequence 5, pressing the down arrow would show sequence 4. However, assume you had 10 sequences in the example. If you were to press the down arrow, you would be shown sequence 9, because it would show you the previous sequence in the "revolving queue of events." (See *Appendix A* for additional information.)

Appendix A in lists detailed information regarding the data fields contained in the event viewer sequences. *Appendix B* contains SCSI information relative to Sense Data information.

6.0 Accessing and Decoding SCSI Event Data

1. The previous sample screen also shows where to access SCSI-related logged activities. For example, to interpret various SCSI-related logged activities, access the menu shown in *Step 7, Select Event Log Filter*. From the choices listed, choose **Event Type**.
2. At the **Event Type** choice, scroll through the event types listed until you see **SCSI Event**.
3. Choose **SCSI Event**. The logged SCSI Event sequences can be displayed. After selecting a specific SCSI Event sequence number, look in the display and read the line, *SCSI Sense Data.* The numbers displayed in the *SCSI Sense Data* field may be interpreted using the information contained in the Appendices for this job aid.

A

Errorlog Event Packets

This Appendix contains detailed information regarding the Event Log Data Fields.

The HSZ22 event log is a queue of event messages containing information about the significant events that have taken place. Various events ranging from recording information about a drive error to changes in the subsystem environment are recorded during system operation. This section shows all the events that will be logged into a host operating systems binary error log by the SWCC agent. The format is Event Information Response With Data messages. The types of events that are recorded are shown in Figure A-1.

Figure A-1 Event Types

Event Type	Event Name
0	Unknown Event
1	SCSI Event
2	Port Event
3	DMA Parity Error Event
4	Create Started Event
5	Rebuild Started Event
6	Create Completed Event
7	Rebuild Completed Event
8	Drop Drive Event
9	Temperature Changed Event
13	Validation Conflict Event
14	SCSI Host Event
15	Reassign Block Event
16	Internal Environmental System Event
21	Forced Error Written Event
22	Unexpected PORT Interrupt Event
23	Add Spare Started Event
24	Add Spare Completed Event
25	System Power-Up Event
26	System Shutdown Event
27	Redundant Controller Transmit Message Event
28	Redundant Controller Receive Message Event
29	Redundant Controller Status Change Event
30	Redundant Controller Parity Error Event
31	Redundant controller Parity Error Action Event
34	Drive Validation Event
35	SWAP_L Event
36	Validation Degraded Event

255	Reserved Event

A.1 Event Log Header

As described above the header of all events recorded in the event log are the same. The common event header is shown in Figure A-2.

Figure A-2 Common Event Header Information

Byte	Message Field	Valid Values
0	Event Log Version	0 – 255
1	Event Type	0 – 255
2 – 3	Sequence Number	0 – 65535
4	Time Stamp: Month	1 – 12
5	Time Stamp: Date	1 – 31
6	Time Stamp: Year	0 – 99
7	Time Stamp: Hours	0 – 23
8	Time Stamp: Minutes	0 – 56
9	Time Stamp: Seconds	0 – 59

A.1.1 Event Header Information

Event Log Version: This is the version of the event log when the event was recorded. The version number allows an application to know how to interpret an event which may have change from one version to another.

- Event Type: The event type that is being logged.
- Sequence Number: A unique number assigned to the event when it was entered into the event log which allows events in the event log to be uniquely identified. Sequence numbers are assigned in consecutive ascending order.
- Time Stamp: These fields contain the month, date, year, hour, minute and second when the event was recorded.

A.2 Event Log Data Packets

As described above the header of all events recorded in the event log is the same.The following descriptions of event log data packet begin at an offset of byte 10 from the event log header.

Figure A-3 . Event Log Header Offset Information

Byte Offset	Field Descriptor
0	SWCC HSZ22
.	Controller ID
.	Header
n	
0	Event Log Header See section A.1 Event Log Header
.	
.	
.	
9	
0	Event Log Data See Below
m	

A.2.1 Debugging Addresses and Information

Some data packets list addresses of data structures. This information is for debugging purposes only and requires support from CMD to be of any use to the customer or field engineer.

A.2.2 RAID Set Information

Many of the events in the event log contain information about a RAID set. For these events, a common structure is used. This information in this structure ranges from the RAID set number to the logical position a drive occupies in a RAID set. Not all of the fields in the structure apply to every event that uses the structure. In many of those cases, a value of 255 is entered into the necessary field. If byte 0 is set to 255, bytes 1 - 7 are filled with padded data and should be ignored in which case they should not be decoded.

Figure A-4 Raid Set Information

Byte	Message Field	Valid Values
0	RAID Set	0 - 31, 255
1	RAID Level	0 - 1, 4 – 7
2	RAID Set Status	0 – 4
3	Redundancy Group	0 - 31, 255
4	Member	0 - 55, 255
5	Number Of Members	0 - 55, 255
6	RAID Set Partitions	1 - 16, 255
7	Number of Redundancy Groups	1 - 16, 255

A.2.2.1 RAID Set Information Fields

- RAID Set: The RAID Set number of the RAID set associated with the event. If there is no RAID set associated with the event, a value of 255 is recorded in this field.
- RAID Level: The RAID level of the RAID set (this field is only valid when the RAID Set field is not set to 255).
  - 0 = RAID level 0
  - 1 = RAID level 1
  - 4 = RAID level 4
  - 5 = RAID level 5
  - 6 = RAID level 0+1
  - 7 = JBOD (just a bunch of drives)
- RAID Set Status: The status of the RAID set (this field is only valid when the RAID Set field is not set to 255).
  - 0 = Unused
  - 1 = Non-Degraded
  - 2 = Degraded
  - 3 = Offline
  - 4 = Creating
- Redundancy Group: The redundancy group number of the RAID set. If there is no redundancy group associated with this event, a value of 255 will be placed in this field.
- Member: The logical member number of the drive associated with the event. If there is no logical member associated with this event, a value of 255 will be placed in this field.
- Number Of Members: The total number of members in the RAID Set. If there is no valid RAID set associated with this event, a value of 255 will be placed in this field.
- RAID Set Partitions: The number of partitions in the RAID set. If a RAID Set is not partitioned, this field is set to 1. This field is only valid when the RAID Set field is not set to 255.
- Number of Redundancy Groups: The number of redundancy groups in the RAID set. If an event has no valid information for this field, a 255 will be placed in this field.

A.2.3 Unknown Event (0)

An Unknown Event is recorded when the controller attempts to log an event with an invalid event type. The format of the Unknown Event is shown in Figure A-5.

Figure A-5 Unknown Event Format

Byte	Message Field	Valid Values
0	Unknown Event Value	See Below
1 - 3	Pad	0

A.2.3.1 Unknown Event Fields

- Event Header: For this event, the Event Type is Unknown (0).
- Unknown Event Value: The value of the event unknown to the event log manager.
- Pad: A pad to insure long word alignment in the internal data structure.

A.2.4 SCSI Event (1)

A SCSI Event is recorded when a disk drive returns a status of check condition in response to a command sent by the controller. The format of the SCSI Event is shown in Figure A-6.

Figure A-6 SCSI Event Format

Byte	Message Field	Valid Values
0 – 7	RAID Set Information	See Below
8	Channel	1 - 9
9	SCSI ID	0 - 15
10 – 11	Pad	0
12 – 15	SCDRP	See Below
16 – 19	CDRP	See Below
20 - 31	SCSI Command	See Below
32 – 47	Phase History	See Below
48 – 65	Request Sense Data	See Below
66	Retry Count	0 - 2
67	Pad	0
68 - 95	SWCC Disk ID	See Below

A.2.4.1 SCSI Event Fields

- Event Header: For this event, the Event Type is SCSI (1).
- RAID Set Information: RAID Set Status and configuration information.
- Channel: The Channel of the disk drive involved in the SCSI event.
- SCSI ID: The SCSI ID of the disk drive involved in the SCSI event.
- Pad: A pad to insure long word alignment in the internal data structure.
- SCDRP: The Address of a structure used for debugging purposes.

- CDRP: The Address of a structure used for debugging purposes.
- The actual SCSI Command Block Descriptor of the command that was being attempted.
- SCSI Phase History: The history of the SCSI bus phases that the controller detected during the SCSI command's execution. The history buffer is a 16 byte circular buffer which is initially zeroed. An end marker (255) is placed in the buffer after the last phase. When the buffer has been filled, the data in the buffer wraps around to the start of the buffer and the end marker must be used to determine the oldest and newest phase recorded. Below is a list of the phases detected by the controller. The actual status byte is recorded after the status phase indicator and the actual message bytes are recorded after the message phase indicators. An example is provided in section A.2.3.2 *SCSI Phase History Example*.

  0 = Data Out

  1 = Data In

  2 = Command

  3 = Status

  6 = Message Out

  7 = Message In

  255 = End Marker

- Request Sense Data: The SCSI request sense data. Note these are the standard 18 sense bytes. In the case
- of vendor specific sense bytes the vendor identification of the disk must be known.
- Retry Count: The number of times the command has been retried at this point.
- Pad: A pad to insure long word alignment in the internal data structure.

A.2.4.2 SCSI Phase History Example

An example of a PORT Event of the SCSI BUS Time Out where the SCSI command hung during a Data in Phase.

B = Byte

B0	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15
02	07	04	01	07	02	07	04	01	255	00	00	00	00	00	00

B0 = 02 = Command Phase
B1 = 07 = Message In phase
B2 = 04 =Disconnect Message
B3 = 01 =Data In Phase
B4 = 07 = Message In Phase
B5 = 02 = Save Data Pointers Message
B6 = 07 = Message In Phase
B7 = 04 = Disconnect Message
B8 = 01 = Data In Phase
B9 = 255 = End Of Phase History

A.2.4.3 SCSI Phase History Example 2

The data after the Message Phase indicator is of variable length depending on how long the message phase is. Most messages are one byte, some are two, and some are more. The length is usually determined by the first message byte but the only way to tell how many message bytes there are is to reference the SCSI specification and reference the section on message phases. The data following the status byte is always one byte and shows how the SCSI operation completed. The values for the status byte data are also described in the SCSI–2 specification The command and data in/out phases do not have any additional data following them. The only way to distinguish phase indicators from data is to start at the beginning, detect phases that have data following them, parse the data (all messages and status lengths are calculable as shown in the SCSI spec).

As an example, reference the following SCSI transfer

```
SELECTION
MESSAGE OUT PHASE (for Identify)
COMMAND (read)
DATA IN (512 bytes transferred)
STATUS (SUCCESS)
MESSAGE IN (COMMAND COMPLETE)
```

The phase history would look like

```
06   (message out for Identify Command)
C0   (byte is identifiable as Identify message which is a one
     byte message)
02   (command phase. CDB will be stored in CDB field)
01   (data in)
03   (status)
00   (status data = SUCCESS)
07   (message in)
00   (message in data = command complete)
255  (end of phase history)
```

A.3 SCSI Request Sense Data Format

The controller is capable of sending 18 bytes of extended sense data, and sends 18 bytes if the allocation length of the request sense command is equal or greater than 18 bytes (otherwise, the number of bytes specified by the allocation length will be sent). The extended sense data format is summarized in the following figure.

Figure A-7 Sense Data Format

Extended Sense Data								
Byte\Bit	7	6	5	4	3	2	1	0
0	Valid Bit	1	1 Error Class	1	0			
1	0 Segment Number							
2	0 Filemark	0 EOM	0 ILI	0	Sense Key			
3	Information Byte (MSB)							
4	Information Byte							
5	Information Byte							
6	Information Byte (LSB)							
7	Additional Sense Length							
8	0							
9	0							
10	0							
11	0							
12	Additional Sense Code (ASC)							
13	Additional Sense Code Qualifier (ASCQ)							
14	FRU Code							
15	FPV	C/D	0		BPV	Bit Pointer		
16	Field Pointer (MSB)							
17	Field Pointer (LSB)							
18-n	Product Unique Sense Data							

A.3.1 Sense Data Explanations

Valid Bit: This bit will be one if the information bytes (bytes 3-6) are valid and zero if they are not valid.

Error Class: Ones in these three bits indicate that extended sense is in use.

Segment Number: All bits contain zeros.

Filemark: This bit is always set to zero for the controller.

EOM: This is the “end of medium” indicator and is always set to zero for the controller.

ILI: The “incorrect length” indicator is always set to zero for the controller.

Sense Key: Indicates the controller's general error categories, which are listed in the next figure. The additional sense code in byte 12 gives additional information about errors.

Information Bytes: When the valid bit is one, the information bytes will contain the the sense key's unsigned logical block address associated. The information bytes will contain the address of the current logical block unless otherwise specified.

Additional Sense Length: The length in bytes of additional sense data to follow. The allocation length in the command descriptor block must be sufficient to accommodate the additional sense data to avoid truncation.

Additional Sense Code/Additional Sense Code Qualifier: When the sense key is valid, gives additional information about errors.

FRU Code: The field replaceable unit code is for the use of field service personnel only.

FPV: When the field pointer valid bit is set to one, the C/D bit and bytes 16 and 17 are valid. These fields will be ignored when the FPV bit is zero.

C/D Bit: When the command/data bit is set to one, the value in the field pointer bytes identifies the byte number in the CDB that prompted an illegal request sense key. When the C/D bit is zero, the value reported in the field pointer bytes identifies the byte number in the data phase that prompted an illegal request sense key.

Field Pointer (MSB & LSB): When an illegal request sense key is issued due to an illegal parameter, this field gives the parameter's location in the command descriptor block or the data block. The next figure provides detailed information about this field.

BPV: When the bit pointer valid bit is one, the next field—the bit pointer field—is valid.

Bit Pointer Field: This field pinpoints the bit that caused the illegal request sense key. A value of seven means the leftmost bit caused the error, and a zero means the rightmost bit caused the error. The byte in which the bit lies is identified by the field pointer field.

A.3.1.1 Sense Keys

The sense keys are summarized in the following figure.

Figure A-8 Sense Keys

Sense	Name	Explanation
0	NO SENSE	No particular sense key is present.
1	RECOVERED ERROR	The last executed command completed successfully with some recovery operation performed by the controller. When two or more errors occur and are recovered during processing of a command, the last is reported.
2	NOT READY	The disk drive is not accessible.
3	MEDIUM ERROR	An unrecoverable error was detected due to a defect in the medium or an error in the recorded data.
4	HARDWARE ERROR	The controller detected the hardware error to which the recovery process cannot be applied during command execution or self-diagnostic test.
5	ILLEGAL REQUEST	An illegal value was detected in the CDB, in the parameter transferred, or the LUN is incorrect. When the controller detects an illegal parameter in the CDB, the controller terminates the command without rewriting the disk.
6	UNIT ATTENTION	The UNIT ATTENTION condition occurred.
B	ABORTED COMMAND	The controller abnormally terminated the command being executed. Normally, the initiator can try recovery by reissuing the command.
E	MISCOMPARE	Source data did not match the data read from medium.

A.3.1.2 Sense and Subsense Codes

The sense and subsense codes are summarized in the following Figure.

Figure A-9. Sense and Subsense Codes

ASC	ASCQ	Name	Explanation	Sense Key
00	00	No additional sense information	No particular sense code is present	0
			An attempt was made to read the read prohibited area.	7
00	06	I/O process terminated	The I/O process has been terminated by a “Terminate I/O Process” message.	0
04	00	Logical unit not ready, cause not reporfigure	The disk drive is not accessible.	2
04	04	Logical unit not ready, format in progress	The drive is not accessible because it is being formatted.	2
08	01	Logical unit timeout error	A timeout occurred on a drive's internal interface.	2
08	02	Logical unit communication parity error	A parity error occurred on a drive's internal interface.	2
0C	01	Write error recovered with auto reallocation	The error at write operation was recovered by the automatic alternate block allocation.	1
0C	02	Write error, auto reallocation failed	The automatic alternate block allocation process failed during the write operation.	3, 4
10	00	ID CRC or ECC error	A CRC error was detected in the ID field.	1, 3
11	00	Unrecovered read error	An unrecoverable error was detected when data was read.	3
11	04	Unrecovered read error, auto reallocation failed.	The automatic alternate block allocation process failed during the read operation.	3
1A	00	Parameter list length error	The initiator sent a parameter of incorrect length	5
20	00	Invalid command operation code	CDB byte 0 (operation code) is invalid	5
21	00	Logical block address out of range	A logical block address exceeding the maximum value of the drive was specified.	5
24	00	Invalid field in CDB	Setting in the CDB is incorrect.	5
25	00	Logical unit not supported	Invalid LUN was specified.	5
26	00	Invalid field on parameter list	Setting of the parameter list transferred from the initiator during command execution is invalid.	2
27	00	Write protected	An attempt was made to write in the write-prohibited area.	7
29	00	Power-on, RESET, or BUS DEVICE RESET occurred	State immediately after power-on, state after RESET condition, or BUS DEVICE RESET message.	6
2A	00	MODE parameters changed	Another initiator changed the MODE SELECT parameter value.	6
2A	02	Log parameters changed	Log parameters have changed by another initiator.	6

Figure A-9. Sense and Subsense Codes Continued

37	00	Rounded parameter	The MODE SELECT parameter specified by the command was rounded.	1
3D	00	Invalid bits in IDENTIFY message	1 was specified for the reserve bit of the IDENTIFY message.	5
40	nn	Diagnostic failure on component “nn”	An error was detected in self-diagnostic test.	4
43	00	Message error	The message sent from the controller was rejected.	B
44	00	Internal target failure	A hardware error was detected in the controller.	4
45	00	Select/reselect failure	Response waiting timeout for the initiator was detected in RESELECTION phase.	1, B
47	00	SCSI parity error	A parity error was detected in the SCSI parity data bus.	1, B
48	00	INITIATOR DETECTED ERROR message received	The INITIATOR DETECTED ERROR message was received from the initiator.	1, B
49	00	Invalid message error	Unsupported or illegal message was received.	B
4E	00	Overlapped commands attempted	A new command was issued from the same initiator to the same logical unit before execution of a command was completed with tagged queuing disabled.	B

A.3.2 Port Event (2)

A Port Event is recorded when a SCSI port process encounters an error while processing a command. The format of the Port Event is shown in the following figure.

Figure A-10 Event Format

Byte	Message Field	Valid Values
0 – 7	RAID Set Information	See Below
8	Channel	1 - 9
9	SCSI ID	0 - 15
10	Retry Count	0 - 2
11	PORT Status	0 - 255
12 – 15	SCDRP	See Below
16 – 19	CDRP	See Below
20 – 31	SCSI Command	See Below
32 - 47	Phase History	See Below

A.3.2.1 Port Event Fields

- Event Header: For this event, the Event Type is Port (2).
- RAID Set Information: RAID Set Status and configuration information.
- Channel: The Channel of the disk drive involved in the port event.
- SCSI ID: The SCSI ID of the disk drive involved in the port event.
- Retry Count: The number of times the command has been retried at this point.
- Port Status: The status of the SCSI Port Driver for this command. See port status field figure below.
- SCDRP: The Address of a structure used for debugging purposes.
- CDRP: The Address of a structure used for debugging purposes.
- SCSI Command: The actual SCSI Command Block Descriptor of the command that was being attempted.
- SCSI Phase History: The history of the SCSI bus phases that the controller detected during the SCSI command's execution. The history buffer is a 16 byte circular buffer which is initially zeroed. An end marker (255) is placed in the buffer after the last phase. When the buffer has been filled, the data in the buffer wraps around to the start of the buffer and the end marker must be used to determine the oldest and newest phase recorded. Below is a list of the phases detected by the controller. The actual status byte is recorded after the status phase indicator and the actual message bytes are recorded after the message phase indicators.
  0 = Data Out
  1 = Data In
  2 = Command
  3 = Status
  6 = Message Out
  7 = Message In
  255 = End Marker

A.3.3 Port Event (Byte 26 Port Status Field Values

- Port Status: The status of the SCSI Port Driver.
  0 = Good
  1 = Reselection Tag Error - Invalid Tagged Queue Command Reselection
  2 = Check Condition while performing Request Sense
  3 = Received Illegal SCSI Status
  4 = Received Unsupported Message-In Byte
  5 = Selection Time-out
  6 = Illegal Disconnect
  7 = Target did not disconnect when expected
  8 = Detected SCSI Bus Reset
  9 = Disconnect Time-out
  10 = Illegal Reselection
  11 = Target rejected a non-rejecfigure Message-Out byte
  12 = SCSI Bus Time-out #1- Timed out a Phase Change on the SCSI Bus
  13 = SCSI Bus Time-out #2 - The Target has been connected to the SCSI Bus for 30 seconds
  14 = SCSI Chip detected an Internal Gross Error
  15 = SCSI Chip detected a Parity Error on the SCSI Bus

16 = SCSI Chip received an Illegal Command
17 = Target has been taken Offline
18 = Invalid Ignore Wide Residue Message was received
19 = Target always busy
20 = Odd byte in FIFO (wide only)
21 = Bad Opcode
22 = Bad Message-Out
23 = Failed Read Long
24 = ECC Size Too Large
25 = Invalid Read Long Sense Data
26 = Failed Device Reset
27 = Failed Synchronous Negation
28 = Port Failed Setup
29 = Expected Simple Tag
30 = Expected Message-In After Simple Tag
31 = Reselection With Invalid Tag Number
32 = Invalid Reselection ID
33 = Target Failed To Abort The Reselection
34 = Target Failed To Go To Message-Out After Unit Attention Asserted
35 = Request Sense command Received BUSY Status
36 = Request Sense Command Received Unsupported Status
37 = Unexpected Disconnect After Message Out
38 = Unexpected Disconnect During a Data Phase
39 = Internally Generated Request Sense had a Disconnect Timeout
40 = Internally Generated Request Sense Detected SCSI Bus Reset
41 = REQ Overflow Detected During a Data Phase
42 = Data Out Phase Detected When Data In Phase Expected
43 = Data In Phase Detected When Data Out Phase Expected
44 = Block Type Command Disconnected on Non-block Boundary
45 = Not Enough Data Transferred During a Data Phase
255 = No Port Status

A.3.4 Parity Error Event (3)

A Parity Error Event is recorded when a parity error is detected by the controller. The format of the Parity Error Event is shown in the following figure.

Figure A-11 Parity Error Format

Byte	Message Field	Valid Values
0 - 3	Memory Address	See Below

A.3.4.1 Parity Error Event Fields

- Event Header: For this event, the Event Type is Parity Error (3).
- Memory Address: The 32-bit address of the memory location that caused the parity error.

A.3.5 Create Started Event (4)

A Create Started Event is recorded whenever a RAID set begins the create process. The format of the Create Started Event is shown in the following figure.

Figure A-12. Create Started Event Format

Byte	Message Field	Valid Values
0 – 7	RAID Set Information	See Below
8	(First) Member Descriptor: Channel	1 - 9
9	(First) Member Descriptor: SCSI ID	0 - 15
	:	
6+(2*n)	(Last) Member Descriptor: Channel	1 - 9
7+(2*n)	(Last) Member Descriptor: SCSI ID	0 - 15

where n = number of members *

A.3.5.1 Create Started Event Fields

- Message Size for the data packet only ranges from 10 to 120 (in increments of two) based on the number of members in the RAID set (which is indicated in the *Number of Members* field in the RAID Set Information structure) Reference byte 5 of section A.2.2. Note a value of 255 indicates the field is not valid.

  For example if there is one member then *n* = 1 and the last bytes are (6 + 2*1 = 8) and (7 + 2*1 = 9) respectively. If there are two members, the last bytes are (6+ 2*2 = 10) and (7 + 2*2 = 11) respectively.

  The are offsets from the beginning of the data packet. The offsets for the SWCC header and Event header have to be added to 6 and 7 respectively to calculate the true offset.
- Event Header: For this event, the Event Type is Create Started (4).
- RAID Set Information: RAID Set Status and configuration information.
- Member Descriptor: The parameters used to identify a disk drive. There will be a member descriptor for each member in the RAID set. The descriptor will be given in order from the first logical member to the last. The number of members in the RAID set is indicated in the Number of Members field in the RAID Set Information structure.

  1. Channel: The channel that the disk drive is connected to.
  2. SCSI ID: The SCSI ID of the disk drive.

  Note: *n* is the number of members in the list. If there is one member then *n* = 1 and the last bytes are (21 + 2*1 = 23) and (22 + 2*1 = 24) respectively. If there are two members, the last bytes are (21+ 2*2 = 25) and (22 + 2*2 = 26) respectively.

A.3.6 Rebuild Started Event (5)

The Rebuild Started Event is recorded when a disk drive has started to rebuild in order to replace a failed drive in a RAID set. The format of the Rebuild Started Event is shown in the following figure.

Figure A-13 Rebuild Started Event Format

Byte	Message Field	Valid Values
0 – 7	RAID Set Information	See Below
8	Channel	1 - 9
9	SCSI ID	0 - 15
10 – 11	Pad	0

A.3.6.1 Rebuild Started Event Fields

- Event Header: For this event, the Event Type is Rebuild Started (5).
- RAID Set Information: RAID Set Status and configuration information.
- Channel: The Channel number of the drive that is being rebuilt.
- SCSI ID: The SCSI ID of the drive that is being rebuilt.
- Pad: A pad to insure long word alignment in the internal data structure.

A.3.7 Create Completed Event (6)

A Create Completed Event is recorded whenever a RAID Set has finished being created or when a create process fails due to an error. The format of the Create Completed Event is shown in the following figure.

Figure A-14 Create Complete Event Fields

Byte	Message Field	Valid Values
0 – 7	RAID Set Information	See Below
8	Channel	0 - 9
9	SCSI ID	0 - 15
10	Status	0 - 1
11	Pad	0

A.3.7.1 Create Completed Event Fields

- Event Header: For this event, the Event Type is the Create Completed (6).
- RAID Set Information: RAID Set Status and configuration information.
- Channel: If the create did not complete successfully, this field will indicate the channel of the drive that caused failure. If the create completed successfully, this field is not meaningful (and will be zero).
- SCSI ID: If the create did not complete successfully, this field will indicate the SCSI ID of the drive that caused failure. If the create completed successfully, this field is not meaningful (and will be zero).
- Status: The status of the create.

  0 = Success
  1 = Failure
- Pad: A pad to insure long word alignment in the internal data structure.

A.3.8 Rebuild Completed Event (7)

A Rebuild Completed Event is recorded whenever a drive has finished being rebuilt or when the rebuild process has failed due to an error. The format of the Rebuild Completed Event is shown in the following figure.

Figure A-15 Rebuild Completed Event Format

Byte	Message Field	Valid Values
0 – 7	RAID Set Information	See Below
8	Channel	0 – 9
9	SCSI ID	0 – 15
10	Status	0 – 1
11	Pad	0

A.3.8.1 Rebuild Completed Event Fields

- Event Header: For this event, the Event Type is the Rebuild Completed (7).
- RAID Set Information: RAID Set Status and configuration information.
- Channel: The channel of the drive that was being rebuilt.
- SCSI ID: The SCSI ID of the disk drive that was being rebuilt.
- Status: The status of the rebuild.

  0 = Success
  1 = Failure
- Pad: A pad to insure long word alignment in the internal data structure.

A.3.9 Dropped Drive Event (8)

A Dropped Drive Event is recorded when an online member is removed from a RAID set. The format of the Dropped Drive Event is shown in the following figure.

Figure A-16 Dropped Drive Event Format

Byte	Message Field	Valid Values
0 – 7	RAID Set Information	See Below
8	Channel	0 - 9
9	SCSI ID	0 - 15
10	Reason	0 - 1
11	Pad	0

A.3.9.1 Dropped Drive Event Fields

- Event Header: For this event, the Event Type is Drop Drive (8).
- RAID Set Information: RAID Set Status and configuration information.
- Channel: The channel of the disk drive that is being dropped.
- SCSI ID: The SCSI ID of the disk drive that is being dropped.
- Reason: The reason for dropping the drive.
  0 = Drive Failure
  1 = User Initiated
- Pad: A pad to insure long word alignment in the internal data structure.

A.3.10 Temperature Changed Event (9)

A Temperature Changed Event is recorded when a change in temperature has occurred in the remote node's enclosure. The format of the Temperature Event is shown in the following figure.

Figure A-17 Temperature Event Format

Byte	Message Field	Valid Values
0	Temperature	See Below
1 - 3	Pad	0

A.3.10.1 Temperature Event Fields

Message Header: For this message, the Message Size is 19 bytes.

Event Header: For this event, the Event Type is Temperature (9).

Temperature: The temperature in the subsystem enclosure when the event was sent.

Pad: A pad to insure long word alignment in the internal data structure.

A.3.11 Validation Conflict Event (13)

A RAID Set Validation Conflict Event is recorded when, during the validation of a RAID set, the controller encounters a RAID set using the same RAID set number or redundancy group number of a previously validated RAID set. The format of the RAID Set Validation Conflict Event is shown in the following figure.

Figure A-18 Validation Conflict Event Format

Byte	Message Field	Valid Values
0 – 7	RAID Set Information	See Below
8 - (7 + n)	Redun. Groups in RAID Set	0 - 31
8 + n	Logical Member 0 I/O Channel	1 - 9
8 + n + 1	Logical Member 0 SCSI ID	0 - 15
6 + n + m	Logical Member 55 I/O Channel	1 - 9
6 + n + m	Logical Member 55 SCSI ID	0 - 15

*where n = number of redundancy groups and m = number of members * 2*
Add the value of n and m to get the real offsets.
Note these values must be added to the SWCC and Event headers offset values as well.

A.3.11.1 Validation Conflict Event Fields

- Message Size ranges from 11 to 136 based on the number of redundancy groups and members in the RAID set (which is indicated in the Number of Redundancy Groups field and Number of Members field in the RAID Set Information structure). Note the SWCC and event header offsets must be added to these values.

- Event Header: For this event, the Event Type is Validation Conflict (13).
- RAID Set Information: RAID Set Status and configuration information.
- Redun. Groups in the RAID Set: All the redundancy groups that are apart of the RAID set. This field is as large as the number of redundancy groups in the RAID set. For example, if there is only one redundancy group, the field is only one byte. If the there are 16 redundancy groups, the field is 16 bytes.

  Each RAID Set can contain multiple Redundancy Groups (separate Logical Unit Numbers (LUN's)) as defined in the CMD Theory of Operation document. These bytes are a list of all redundancy groups that comprise this RAID Set. If the number of Raid set redundancy groups were 16 (per byte 7 of the Raid set information) then there will be 16 bytes starting at Byte 8, each contain a number between 0-31.
- Logical Member X: The Channel and SCSI ID of member X in the RAID Set. The logical members will be given in order from the first logical member to the last. If a member has becomes off-line, it will have a channel and SCSI ID of 255. This field is as large as the number of members in the RAID set multiplied by two (one for channel and one for SCSI ID).

  1. Channel: The channel of logical member X.
  2. SCSI ID: The SCSI ID of logical member X.

A.3.12 SCSI Host Event (14)

A SCSI Host Event is recorded anytime the HSZ22 encounters an error when processing a SCSI command from a host. The format of the SCSI Host Event is shown in the following figure.

Figure A-19. SCSI Host Event Format

Byte	Message Field	Valid Values
0 – 3	Host Event Type	0
4 – 7	CDRP	See Below
8	Target ID	0 - 3
9	LUN	0 - 15
10	Initiator ID	0 - 7
11	HTCB Flags	See Below
12 – 13	CDRP Host Flags	See Below
14 – 15	CDRP Flags	See Below
16	Error Type	0 - 14
17	Tag Type	0, 0x20 - 0x22
18	Tag Number	0 - 255
19	SCSI Chip Status Register	See Below
20	SCSI Chip Interrupt Register	See Below
21	SCSI Status	See Below
22 – 37	SCSI Command	See Below
38 - 55	Request Sense	See Below

A.3.12.1 SCSI Host Event Fields

- Event Header: For this event, the Event Type is SCSI Host (14).
- Event Type: Type of Host Event.
  0 = SCSI Host Event
  1-255 = Reserved
- CDRP: The Address of a structure used for debugging purposes.
- Target ID: The SCSI ID of the HSZ22.
- LUN: The LUN associated with the error.
- Initiator ID: The SCSI ID of the initiator.
- HTCB Flags: A copy of the Host Transfer Control Block Flags used internally for debugging purposes.
- CDRP Host Flags: A copy of the CDRP host flags used internally for debugging purposes.
- CDRP Flags: A copy of the CDRP flags used internally for debugging purposes.
- Error Type: The type of error detected.
  0 = No error
  1 = Received Clear Queue Message
  2 = Received Abort Message
  3 = Received Abort Tag Message
  4 = Reselection Timeout
  5 = Aborted Initiator/LUN Tasks
  6 = Aborted Task
  7 = Busy
  8 = Reserved
  9 = Queue Full
  10 = Busy/Overlapped Command
  11 = Device Reset
  12 = Reselected By Another SCSI Device
  13 = Connection Timed Out By Host Port
  14 = Delay Mode
  Tag Type: The SCSI tag type that was sent by the initiator.
  0x00 = No Tag
  0x20 = Simple Tag
  0x21 = Head Tag
  0x22 = Ordered Tag
- Tag Number: The SCSI tag number of the command (if tag queuing is used).
- SCSI Chip Status Register: The status of the SCSI chip's status register the last time it was read.
- SCSI Chip Interrupt Register: The status of the SCSI chip's interrupt register the last time it was read
- SCSI Status: The SCSI status that was sent to the initiator.
- SCSI Command: The actual SCSI Command that was sent by the initiator.

Request Sense: The first 18 bytes of the SCSI request sense data. This should give the user a fair amount of detail relating to the error.

A.3.13 Reassign Block Event (15)

A Reassign Block Event is recorded after a SCSI reassign block command has been completed by a disk drive. The format of the Reassign Block Event is shown in the following figure.

Figure A-20 Reassign Block Event Format

Byte	Message Field	Valid Values
0 – 7	RAID Set Information	See Below
8	Channel	0 - 9
9	SCSI ID	0 - 15
10	Status	0 - 1
11	Pad	0
12 – 15	SCDRP	See Below
16 – 19	CDRP	See Below
20 – 23	Reassigned VBN	See Below
24 - 27	Reassigned PBN	See Below

A.3.13.1 Reassign Block Event Fields

- Event Header: For this event, the Event Type is Reassign Block (15).
- RAID Set Information: RAID Set Status and configuration information.
- Channel: The Channel of the drive that had a block reassigned.
- SCSI ID: The SCSI ID of the disk drive that had a block reassigned.
- Status: The completion status of the reassign block command.
  0 = Success
  1 = Failure
- Pad: A pad to insure long word alignment in the internal data structure.
- SCDRP: The Address of a structure used for debugging purposes.
- CDRP: The Address of a structure used for debugging purposes.
- Reassigned VBN: The Virtual Block Number that was reassigned. If the reassigned block was on a drive that contains parity data, this field would contain 0xFFFFFFFF.
- Reassigned PBN: The Physical Block Number that was reassigned.

A.3.14 Internal Environmental System Event (16)

An Internal Environmental System (IES) Event is recorded whenever the HSZ22 detects a significant change in the voltage or temperature of the controller. The format of the Internal Environmental System Event is shown in the following figure.

Figure A-21. Internal Environmental System Event Format

Byte	Message Field	Valid Values
0	Device Type	0 - 2
1	Device	0 - 8
2	Status	0 - 8
3	Pad	0
4 – 5	Temperature/Voltage	See Below
6 - 7	Pad	0

A.3.14.1 Internal Environmental System Event Fields

Event Header: For this event, the Event Type is Internal Environmental System (16).

Device Type: The type of device the event is for.

0 = Temperature
1 = Voltage
2 = UPS

Device: The device the event is for.

0 = External Temperature
1 = HSZ22 Board Temperature
2 = Termination Power
3 = Cache DRAM2 Power
4 = System 5V Power
5 = Cache DRAM1 Power
6 = System 12V Power
7 = Battery
8 = UPS

Status: The status of the device.

0 = Not Installed
1 = Normal
2 = Below Normal
3 = Above Normal
4 = Too Low
5 = Too High
6 = Back to Normal
7 = AC Power Lost
8 = 2 Minute Warning

Pad: A pad to insure long word alignment in the internal data structure.

Temperature/Voltage: The measured temperature, in Fahrenheit, or voltage, in milivolts, that corresponds to the device the event is for.

Pad: A pad to insure long word alignment in the internal data structure.

A.3.15 Forced Error Written Event (21)

A Forced Error Written Event is generated whenever the HSZ22's firmware has determined that a block needs to be written with CMD's unique data and ECC pattern. This is done whenever a block has an unrecoverable medium error and the data is not available to write to the reassigned block. The format of the Forced Error Written Event is shown in the following figure.

Figure A-22 Forced Error Written Event Format

Byte	Message Field	Valid Values
0 – 7	RAID Set Information	See Below
8	Channel	1 - 9
9	SCSI ID	0 - 15
10	Status	0 - 1
11	Pad	0
12 – 15	SCDRP	See Below
16 – 19	CDRP	See Below
20 – 23	Forced Error VBN	See Below
24 - 27	Forced Error PBN	See Below

A.3.15.1 Forced Error Written Event Fields

- Event Header: For this event, the Event Type is Forced Error Written (21).
- RAID Set Information: RAID Set Status and configuration information.
- Channel: The Channel of the drive that had a block reassigned.
- SCSI ID: The SCSI ID of the disk drive that had a block reassigned.
- Status: The completion status of the forced error write command.

  0 = Success

  1 = Failure
- Pad: A pad to insure long word alignment in the internal data structure.
- SCDRP: The Address of a structure used for debugging purposes.
- CDRP: The Address of a structure used for debugging purposes.
- Forced Error VBN: The Virtual Block Number that was written with the forced error data pattern. If the reassigned block was on a drive that contains parity data, this field would contain 0xFFFFFFFF.
- Reassigned PBN: The Physical Block Number that was written with the forced error data pattern.

A.3.16 Unexpected Port Interrupt Event (22)

An Unexpected Port Interrupt Event is recorded whenever the port process services a SCSI chip interrupt and discovers it has no work to do related to the interrupt. This will usually take place when the SCSI bus glitches in such a way as to cause a SCSI phase change interrupt when there is no activity on the SCSI Bus. The format of the Unexpected Port Interrupt Event is shown in the following figure.

Figure A-23 Unexpected Port Interrupt Event Format

Byte	Message Field	Valid Values
0	Channel	1 - 9
1	SCSI ID	0
2	SCSI Chip Status Register	See Below
3	SCSI Chip Interrupt Register	See Below
4 – 7	SCPDT	See Below
8	Last SCSI Bus Phase	0 - 7
9	Current SCSI Bus Phase	0 - 7
10 – 11	Pad	0
12 – 13	Port Flags	See Below
14 – 15	Port Status	0 - 255
16 – 27	Message Out Data Buffer	See Below
28 - 39	Message In Data Buffer	See Below

A.3.16.1 Unexpected Port Interrupt Event Fields

- Event Header: For this event, the Event Type is Unexpected Port Interrupt (22).
- Channel: The Channel that had the unexpected port interrupt.
- SCSI ID: Since this event is not specifically related to a drive, this field is not applicable.(Do not translate)
- SCSI Chip Status Register: The contents of the port driver's SCSI chip status register when the interrupt occurred
- SCSI Chip Interrupt Register: The contents of the port driver's SCSI chip interrupt register when the interrupt occurred.
- SCPDT Address: The address of the SCSI port process structure that had the unexpected interrupt.
- Last SCSI Bus Phase: The last SCSI bus phase that the controller detected during the SCSI command's execution. Reference A.2.4.2 SCSI Phase History Example
  0 = Data Out
  1 = Data In
  2 = Command
  3 = Status
  6 = Message Out
  7 = Message In
- Current SCSI Bus Phase: The SCSI bus phase that was present when the unexpected interrupt occurred.
- 0 = Data Out
- 1 = Data In
- 2 = Command

- 3 = Status
- 6 = Message Out
- 7 = Message In
- Reference section A.2.4 SCSI Event (1) for an example of Phase History.
- Pad: A pad to insure long word alignment in the internal data structure.
- Port Flags: Current contents of the port process flags used for debugging purposes.
- Port Status: The status of the SCSI Port Driver for this command. Reference Port Status fields A.3.4.
- Message Out Data Buffer: The contents of the port process's SCSI message out data buffer.
- Message In Data Buffer: The contents of the port process's SCSI message in data buffer.

A.3.17 Add Spare Started Event (23)

An Add Spare Started Event is recorded when a disk drive has begun to be made into a spare. The format of the Add Spare Started Event is shown in the following figure.

Figure A-24 Add Spare Started Event Format

Byte	Message Field	Valid Values
0	Channel	1 - 9
1	SCSI ID	0 - 15
2	Type	12 - 13, 15
3	Pad	0

A.3.18 Add Spare Started Event Fields

- Event Header: For this event, the Event Type is Add Spare Started (23).
- Channel: The Channel number of the drive that is being made into a spare.
- SCSI ID: The SCSI ID of the drive that is being made into a spare.
- Type: The type of spare that is being added.
  12 = Hot Spare
  13 = Warm Spare
  15 = No Spare (Unknown)
- Pad: A pad to insure long word alignment in the internal data structure.

A.3.19 Add Spare Completed Event (24)

An Add Spare Completed Event is recorded whenever a drive has finished being added as a spare or when the add spare process has failed due to an error. The format of the Add Spare Completed Event is shown in the following figure.

Figure A-25 Add Spare Completed Event Format

Byte	Message Field	Valid Values
0 – 7	RAID Set Information	See Below
8	Channel	0 - 9
9	SCSI ID	0 - 15
10	Status	0 - 1
11	Pad	0

A.3.19.1 Add Spare Completed Event Fields

- Event Header: For this event, the Event Type is the Add Spare Completed (24).
- RAID Set Information: RAID Set Status and configuration information.
- Channel: The channel of the drive that was being added as a spare.
- SCSI ID: The SCSI ID of the disk drive that was being added as a spare.
- Status: The status of the operation.
  0 = Success
  1 = Failure
- Pad: A pad to insure long word alignment in the internal data structure.

A.3.20 System Power-Up Event (25)

A System Power-Up Event is recorded when the controller is first powered up (after self test has been completed). The format of the System Power-Up Event is shown in the following figure.

Figure A-26 System Power-Up Event Format

Byte	Message Field	Valid Values
0	Time Stamp: Month	1- 12
1	Time Stamp: Day	1 - 31
2	Time Stamp: Year	0 - 99
3	Time Stamp: Hours	0 - 23
4	Time Stamp: Minutes	0 - 59
5	Time Stamp: Seconds	0 - 59
6 - 7	Pad	0

A.3.20.1 System Power-Up Event Fields

Event Header: For this event, the Event Type is System Power-Up (25).

Time Stamp: This is contains the month, date, year, hour, minutes and seconds when the event occurred.

Pad: A pad to insure long word alignment in the internal data structure.

A.3.21 System Shutdown Event (26)

A System Shutdown Event is recorded when a user initiates a controlled shutdown. The format of the System Shutdown Event is shown in the following figure.

Figure A-27 System Shutdown Event Format

Byte	Message Field	Valid Values
0	Reason	1 - 3
1 - 3	Pad	0

A.3.21.1 System Shutdown Event Fields

Event Header: For this event, the Event Type is System Shutdown (26).

Reason For Shutdown: The reason why the shutdown occurred.

1 = System Shutdown

2 = Restart System

3 = Restart due to firmware Download

Pad: A pad to insure long word alignment in the internal data structure.

A.3.22 Redundant Controller Transmit/Receive Event (27) (28)

Event Type: 27 (Transmit)
28 (Receive)

Event Log Data Length: 164

The Redundant Controller Transmit/Receive Event is recorded after a message has been transmitted to or received from a redundant controller. The format of the Redundant Controller Transmit/Receive Event is shown in the following figure.

Figure A-28 Redundant Controller Transmit/Receive Event Format

Offset	Message Field	Valid Values
0	Byte Count	See Below
1	Tag	0 - 255
2	Message Type	See Below
3	Reason/Flags/Pad	0 - 255
4 - 159	Body of Message	See Below
160	Channel	1 - 2
161 - 163	Pad	0

A.3.22.1 Redundant Controller Transmit/Receive Event Fields

Event Header: For this event, the Event Type is either the Redundant Controller Transmit Message (27) or Redundant Controller Receive Message Event (28). Byte count does not include pad data and hence is of a variable length.

Byte Count: This byte contains the size of the actual transmit or receive message including the size of the Byte Count field, Tag field, Message Type field, Reason or Pad field, and the Body of Message.

Tag: This byte contains the tag number of this message which is used internally to keep track of what messages are going back and forth.

Message Type: This byte contains the actual message types which are listed below. There are fifteen different message types. Some of these messages contain additional information about the message in the body of the message. The message types that do not contain any additional information in the body of the message are QUERY, BIND DONE, REDUNDANT CONTROLLER SET BROKEN, ACK, and NACK. There are no message posted for heartbeat message types since they occur so frequently.

2	Query	(no message body) SWCC will not log
4	Unit Configuration	
5	System Configuration	
6	Host Configuration	
7	Redundancy Group Information	
8	Bind Failed	
9	Bind Done	(no message body)
10	Redundant Controller Set Broken	(no message body)
11	Switchover	
12	Raid Set Change	
13	Raid Set Error	
14	Drive Request	
15	Drive Request Rejected	
16	Write Cache Enable Status Update	
17	Acknowledge W/ Status	
18	Session Request	
19	Update System Parameter	
20	Rebind Config	
21	Download Cache	
22	Download Done	
23	Download Config	
24	Lock Subsystem	
25	Quiesce	
26	Update Firmware Status	
27	Install Firmware	
28	Fault Bus	
29	Map Host LUN	
30	Unmap Host LUN	(SWCC will not log)
31	Alarm Off	
128	Ack	(no message body) SWCC will not log
129	Nack	(no message body) SWCC will not log

Reason/Flags/Pad: Message Dependent. See Below. Some message types can be further broken down into subtypes and this subtype is defined by this reason field.

Message Body: Message Dependent. Unused bytes are padded. See Below.

Bind Failed Reasons:

0 = Timeout
1 = Cache Mismatch
2 = Firmware Version Mismatch
3 = Hardware Mismatch
4 = Hardware Error
5 = Parity Error
6 = Raid Set Error
7 = Hostmap Error
8 = Unexpected Reason

9 = Bad Response (no message body)
10 = Query Received (no message body)
11 = Cache not mirrored (no message body)

Redundant Controller Set Broken Reasons:
0 = Incorrect Heartbeat (no message body)
1 = System Restart Command Received (no message body)
2 = System Shutdown Command Received (no message body)
3 = Raid Set Error
4 = Query Message Received During Bind (no message body)
5 = Communication Problems (no message body)
255 = Unknown Reason (no message body)

Switchover:
0 = Bugcheck
1 = I/O Hang (no message body)
2 = Missing Heartbeat (no message body)
3 = Other Controller Failed to Bind After Power Loss (no message body)
4 = Power Was Lost After Other Controller Failed (no message body)

Body of Message: This contains additional information about some message types that are described below in further detail. The part of the message body that does not contain any valid information about the message contains all zeros.

Channel: The redundant controller communication channel on which the timeout occurred.

Pad: A pad to insure long word alignment in the internal data structure.

A.3.23 Unit Configuration

Figure A-29 Unit Configuration Event Format

Byte	Message Field	Valid Values
4	Flags	See Below
5 -14	Unit Name	See Below
15	Host 0 Status	1 - 3
18	Host 3 Status	1 - 3
19	Host 0 Lun Map - Lun 0	0 - 31, 255
50	Host 0 Lun Map - Lun 31	0 - 31, 255
51	Host 1 Lun Map - Lun 0	0 - 31, 255
82	Host 1 Lun Map - Lun 31	0 - 31, 255
113	Host 3 Lun Map - Lun 0	0 - 31, 255
144	Host 3 Lun Map - Lun 31	0 - 31, 255

A.3.23.1 Unit Configuration Event Fields

The body of the message begins at byte 4 of the Redundant Controller Transmit/Receive Event.

Flags: The unit configuration flags.

Bit 4: This controller came up first before the redundant controller set was formed.

Bit 5: This controller is at SCSI ID 7.

Unit Name: A null terminated string containing the name of the unit for which the configuration information is given.

Host Status: These are the statuses for all hosts.
1 = Passive
2 = Active
3 = Error

Host Lun Map: These fields indicate the mapping of redundancy groups to the host channel LUNs by the redundancy group number. If a host LUN is not mapped to any redundancy group, this field has a value of 255.

A.3.24 System Configuration

Figure A-30 System Configuration Event Format

Byte	Message Field	Valid Values
4 - 7	Cache Size	0 - 4G
8 - 11	Firmware Version	See Below
12 - 19	Vendor	See Below
20 - 35	Model	See Below
36	Module 0 Status	0 - 255
45	Module 9 Status	0 - 255

A.3.24.1 System Configuration Event Fields

The body of the message begins at byte 4 of the Redundant Controller Transmit/Receive Event.

- Cache Size: The cache size in bytes.
- Firmware Version: An alphanumeric string that indicates the version of the firmware currently being used.
- Vendor: An ASCII string, not null-terminated, containing the name of the vendor.
- Model: An ASCII string, not null-terminated, containing the model name of the HSZ22.
- Module N Status: Indicates the type of module installed in channel N (where N = 0 - 9).
  - Bit 0: 0 = Slot available
    1 = Slot not available (there is no slot on the motherboard for the module)
  - Bit 1: 0 = Empty
    1 = Populated
  - Bit 2: 0 = Passed Self test
    1 = Failed Self test
  - Bit 3: 0 = 8-Bit (Narrow)
    1 = 16-Bit (Wide)

Bit 4: 0 = Single-Ended
1 = Differential
Bit 5: 0 = Non-PCI Module
1 = PCI Module
Bit 6: 0 = Configured as a Host Module
1 = Configured as a Disk Module
Bit 7 0 = Non-Fast 20
1 = Fast 20

A.3.25 Host Configuration

Figure A-31 Host Configuration Event Format

Byte	Message Field	Valid Values
4	Port ID	0 - 3
5	SCSI ID	0 - 15
6	Flags	See Below
7	Bus Width	0 - 2
8	Sync Rate	5 - 40
9 - 156	Mode Parameters	See Below

A.3.25.1 Host Configuration Event Fields

- Port ID: The channel number of the host module whose parameters are being read. Since three of the HSZ22's SCSI modules can be selected as either a host or a disk module, the parameters for channels 1, 2 and 3 only have meaning if the modules are selected as host modules.
- SCSI ID: The SCSI ID of the HSZ22 as seen by the host computer on the selected channel.
- Flags: These are the host configuration flags.

  Bit 0: 0 = Tag Queuing Off

  1 = Tag Queuing On

  Bit 1: 0 = Asynchronous mode of communication.

  1 = Synchronous mode of communication.
- Bus Width: The bus width being used by the host module.

  0 = 8-bit (narrow)

  1 = 16-bit (wide)

  2 = 32-bit (fast SCSI)
- Sync. Rate: The rate at which the data is set to be transferred when synchronous communication is selected. The rate is expressed in MB per second.
- Mode Parameters: The following figures describe the mode parameter pages (Refer to SCSI 2 specification as noted for additional information)

Figure A-32 Mode Page Codes

Page Code	Description	Length	SCSI-2 Section
1h	Read-Write Error Recovery Page	12	9.3.3.6
02h	Disconnect-Reconnect Page	16	8.3.3.2
03h	Format Device Page	24	9.3.3.3
04h	Rigid Disk Geometry Page	24	9.3.3.7
07h	Verify Error Recovery Page	12	9.3.3.8
08h	Caching Page	12	9.3.3.1
09h	Peripheral Device Page	8	8.3.3.3
0Ah	Control Mode Page	8	8.3.3.1
0Bh	Medium Types Supported Page	8	9.3.3.4
0Ch	Notch and Partition Page	24	9.3.3.5

A.3.26 Read-write error recovery page

The read-write error recovery page specifies the error recovery parameters the target shall use during any command that performs a read or write operation to the medium (e.g. READ(6), READ(10), WRITE(6), WRITE(10), COPY, COMPARE, WRITE & VERIFY, etc.).

Figure A-33 Read-write error recovery page

	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
byte 9	PS	R	Page code (01h)					
byte 10	Page length (0Ah)							
byte 11	AWRE	ARRE	TB	RC	ERR	PER	DTE	DCR
byte 12	Read Retry Count							
byte 13	Correction span							
byte 14	Head offset count							
byte 15	Data Strobe offset count							
byte 16	Reserved							
byte 17	Write retry count							
byte 18	Reserved							
byte 19	(MSB) Recovery time limit							
byte 20	(LSB)							

Figure A-34 Error recovery bit definitions

ERR	PER	DTE	DCR	Description
1	-	-	-	An enable early recovery (EER) bit of one indicates that the target shall use of the most expedient form of error recovery first. This bit only applies to data error recovery and it does not affect positioning retries and the message system error recovery procedures.
0	-	-	-	An EER bit of zero indicates that the target shall use an error recovery procedure that minimizes the risk of mis-detection or mis-correction.
-	1	-	-	A post error (PER) bit of one indicates that the target shall report recovered errors.
-	0	-	-	A PER bit of zero indicates that the target shall not report recovered errors. Error recovery procedures shall be performed within the limits established by the error recovery parameters.
-	-	1	-	A disable transfer on error (DTE) bit of one indicates that the target shall terminate the data phase upon detection of a recovered error.
-	-	0	-	A DTE bit of zero indicates that the target shall not terminate the data phase upon detection of a recovered error.
-	-	-	1	A disable correction (DCR) bit of one indicates that error correction codes shall not be used for data error recovery.
-	-	-	0	A DCR bit of zero allows the use of error correction codes for data error recovery.

A.3.27 Disconnect-Reconnect Page

Figure A-35. Disconnect-Reconnect Page

	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
byte 21	PS	R	Page code (02h)					
byte 22	Page length (0Eh)							
byte 23	Buffer full ratio							
byte 24	Buffer empty ratio							
byte 25	(MSB) Bus inactivity Limit							
byte 26	(LSB)							
byte 27	Disconnect time limit							
byte 28								
byte 29	Connect time limit							
byte 30								
byte 31	Maximum burst size							
byte 32								
byte 33	Reserved							
byte 34	Reserved							DTDC
byte 35	Reserved							
byte 36	Reserved							

A.3.28 Format device page

The format device page contains parameters which specify the medium format.

Figure A-36 Format device page

	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
byte 37	PS	R	Page code (03h)					
byte 38	Page length (16h)							
byte 39	(MSB Tracks per zone							
byte 40								(LSB)
byte 41	Alternate sectors per zone							
byte 42								
byte 43	Alternate tracks per Zone							
byte 44								
byte 45	Alternate tracks per logical unit							
byte 46								
byte 47	Sectors per track							
byte 48								
byte 49	Data Bytes per physical sector							
byte 50								
byte 51	Interleave							
byte 52								
byte 53	Track skew factor							
byte 54								
byte 55	Cylinder skew factor							
byte 56								
byte 57	SSEC	HSEC	RMB	SURF	Reserved			
byte 58	Reserved							
byte 59	Reserved							
Byte 60	Reserved							

A.3.29 Rigid Disk Drive Geometry Page

The rigid disk drive geometry page (see figure 37) specifies parameters for direct-access devices employing a rigid disk drive.

Figure A-37 Rigid Disk Drive Geometry Page

	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
byte 61	PS	R	Page code (04h)					
byte 62	Page length (16h)							
byte 63	(MSB) Number of Cylinders							
byte 64								
byte 65	(LSB)							
byte 66	Number of Heads							
byte 67	Starting cylinder-write pre-compensation							
byte 68								
byte 69								
byte 70	Starting cylinder-reduced write current							
byte 71								
byte 72								
byte 73	Drive step rate							
byte 74								
byte 75	Landing zone cylinder							
byte 76								
byte 77								
byte 78	Reserved							
byte 79	Rotational offset							
byte 80	Reserved							
byte 81	Medium rotation rate							
byte 82								
byte 83	Reserved							
byte 84	Reserved							

A.3.30 Verify error recovery page

The verify error recovery page (see figure 38) specifies the error recovery parameters the target shall use during the VERIFY command, the verify operation of the WRITE AND VERIFY command and the verify operation of the COPY AND VERIFY command.

Figure A-38 Verify error recovery page

	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
byte 85	PS	R	Page code (07h)					
byte 86	Page length (0Ah)							
byte 87	Reserved				ERR	PER	DTE	DCR
byte 88	Verify retry count							
byte 89	Verify correction span							
byte 90	Reserved							
byte 91	Reserved							
byte 92	Reserved							
byte 93	Reserved							
byte 94	Reserved							
byte 95	Verify recovery time limit							
byte 96								

A.3.31 Caching page

The caching parameters page (see figure 39) defines the parameters that affect the use of the cache.

Figure A-39 Caching page

	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
byte 97	PS	R	Page code (08h)					
byte 98	Page length (0Ah)							
byte 99	Reserved					WCE	MF	RCD
byte 100	Demand read retention priority				Write retention priority			
byte 101	Disable Pre-fetch transfer length							
byte 102								
byte 103	Minium pre-fetch							
byte 104								
byte 105	Maximum pre-fetch							
byte 106								
byte 107	Maximum pre-fetch ceiling							
byte 108								

A.3.32 Peripheral Device Page

The peripheral device page is used to pass vendor-specific information between an initiator and the peripheral interface below the target (i.e between the target and the peripheral device). The standard does not define the format of this data, except to provide a standard header.

Figure A-40 Peripheral Device Page

	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
byte 109	PS	R	Page code (09h)					
byte 110	Page length (8)							
byte 111	Interface identifier							
byte 112								
byte 113	Reserved							
byte 114	Reserved							
byte 115	Reserved							
byte 116	Reserved							

A.3.33 Control Mode Page

The Control mode page provides controls over several SCSI-2 features which are applicable to all device types such as tagged queuing, extended contingent allegiance, asynchronous event notification, and error logging.

Figure A-41 Control Mode Page

	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
byte 117	PS	R	Page code (0Ah)					
byte 118	Page length (06h)							
byte 119	Reserved							RLEC
byte 120	Queue algorithm modifier				Reserved		QErr	DQue
byte 121	EECA	Reserved				RAENP	UAAENP	EAENP
byte 122	Reserved							
byte 123	(MSB)							
byte 124	Ready AEN holdoff period							(LSB)

A.3.34 Medium Types Supported Page

The medium types supported page contains a list of the medium types implemented by the target for logical units.

The code values for each medium type supported by the target (up to four maximum), as defined in the MODE SELECT command, are reported in ascending order. If only the default medium type is supported zero is reported. If less than four medium types are supported the unused entries shall be returned as zero.

Figure A-42 Medium Types Supported Page

	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
byte 125	PS	R	Page code (0Bh)					
byte 126	Page length (06h)							
byte 127	Reserved							
byte 128	Reserved							
byte 129	Medium type 1 Supported							
byte 130	Medium type 2 Supported							
byte 131	Medium type 3 Supported							
byte 132	Medium type 4 Supported							

A.3.35 Notch and partition page

The notch page contains parameters for direct-access devices which implement a variable number of blocks per cylinder and support this page. Each clause of the logical unit with a different number of blocks per cylinder is referred to as a notch.

Figure A-43 Notch Page

	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
byte 133	PS	R	Page code (0Ch)					
byte 134	Page length (16h)							
byte 135	ND	LPN	Reserved					
byte 136	Reserved							
byte 137	Maximum number of notches							
byte 138								
byte 139	Active notch							
byte 140								
byte 141	Starting boundary							
byte 142								
byte 143								
byte 144								
byte 145	Ending boundary							
byte 146								
byte 147								
byte 148								
byte 149	Pages notched							
byte 150								
byte 151								
byte 152								
byte 153								
byte 154								
byte 155								
byte 156								

A.3.36 Redundancy Group Information

Figure A-44 Redundancy Group Information Event Format

Byte	Message Field	Valid Values
4	Redundancy Group Number	0 - 31
5	Raid Set Status	0 - 4
6	Member Descriptor: SCSI ID	0 - 15
7	Member Descriptor: Channel	0 - 9
8	Member Descriptor: Status	0, 5, 10 - 16
	:	
147	Member Descriptor: SCSI ID	0 - 15
148	Member Descriptor: Channel	0 - 9
149	Member Descriptor: Status	0, 5, 10 - 16

A.3.36.1 Redundancy Group Information Event Fields

- Redundancy Group Number: The number of the redundancy group that this information pertains to.
- Raid Set Status: RAID set status for the redundancy group. The statuses that are currently defined are the following:
  0 = Unused
  1 = Nondegraded
  2 = Degraded
  3 = Offline
  4 = Creating
- Member Descriptor: The parameters used to identify a disk drive. There will be a member descriptor for each member in the redundancy group. The descriptor will be given in order from the first logical member to the last. The number of members can be calculated by (byte count of message – 4)/3.
  1. Channel: The channel that the disk drive is connected to.
  2. SCSI ID: The SCSI ID of the disk drive.
  3. Status: Member statuses that are currently defined are the following:
     0 = Empty
     5 = Creating
     10 = Online
     11 = Rebuilding
     12 = Hot Spare
     13 = Warm Spare
     14 = Adding Spare
     15 = Unknown
     16 = Formatting

A.3.37 Bind Failed

There are currently twelve different reasons for a bind to fail but only the first nine contain additional information. This information is provided to allow the user to know specifically why the bind was not successful.

Bind Fail Reasons:

0 = Timeout	
1 = Cache Mismatch	
2 = Firmware Version Mismatch	
3 = Hardware Mismatch	
4 = Hardware Error	
5 = Parity Error	
6 = Raid Set Error	
7 = Hostmap Error	
8 = Unexpected Message	
9 = Bad Response	(no additional data)
10 = Query Received	(no addition data)
11 = Cache Not Mirrored	(no additional data)

Figure A-45 Bind Aborted Due To Timeout Format

Byte	Message Field	Valid Values
4	Type	1 - 3
5	Channel	1 - 2

A.3.37.1 Bind Aborted Due To Timeout Fields

- Type: The type of timeout which occurred.
  1 = Transmit Timer Expired
  2 = Response Timer Expired
  3 = Configuration Read Register Timer Expired

Channel: The redundant controller communication channel on which the timeout occurred.

Figure A-46 Due To Cache Mismatch Format

Byte	Message Field	Valid Values
4 – 7	Other Controller's Cache Size	See Below
8 - 11	This Controller's Cache Size	See Below

A.3.37.2 Bind Aborted Due To Cache Mismatch Fields

- Other Controller's Cache Size: Cache size in bytes of the other controller with which this controller is attempting to bind
- This Controller's Cache Size: Cache size in bytes of this controller.

Figure A-47 Bind Aborted Due To Firmware Version Mismatch Format

Byte	Message Field	Valid Values
4 – 7	Other Controller's FW Version	See Below
8 - 11	This Controller's FW Version	See Below

A.3.37.3 Bind Aborted Due To Firmware Version Mismatch Fields

- Other Controller's Firmware Version: An alphanumeric string containing the firmware version of the other controller with which this controller is attempting to bind
- This Controller's Firmware Version: An alphanumeric string containing the firmware version of this controller.
- Strings are not null terminated.

Figure A-48 Bind Aborted Due To Hardware Mismatch Format

Byte	Message Field	Valid Values
4	Other Controller's Slot 0 Status	See Below
13	Other Controller's Slot 9 Status	See Below
14	This Controller's Slot 0 Status	See Below
23	This Controller's Slot 9 Status	See Below

A.3.37.4 Bind Aborted Due To Hardware Mismatch Fields

- Other Controller's Slot N Status: Indicates the status of module installed in channel N for the other controller (where N = 0 - 9).
  - Bit 0: 0 = Slot available
    1 = Slot not available (there is no slot on the motherboard for the module)
  - Bit 1: 0 = Empty
    1 = Populated
  - Bit 2: 0 = Passed Selftest
    1 = Failed Selftest
  - Bit 3: 0 = 8-Bit (Narrow)
    1 = 16-Bit (Wide)
  - Bit 4: 0 = Single-Ended
    1 = Differential
  - Bit 5: 0 = Non-PCI Module
    1 = PCI Module
  - Bit 6: 0 = Configured as a Host Module
    1 = Configured as a Disk Module
  - Bit 7: 0 = Non-Fast 20
    1 = Fast 20
- This Controller's Slot N Status: Indicates the status of module installed in channel N for this controller (where N = 0 - 9).
  - Bit 0: 0 = Slot available
    1 = Slot not available (there is no slot on the motherboard for the module)
  - Bit 1: 0 = Empty
    1 = Populated
  - Bit 2: 0 = Passed Selftest
    1 = Failed Selftest
  - Bit 3: 0 = 8-Bit (Narrow)
    1 = 16-Bit (Wide)
  - Bit 4: 0 = Single-Ended
    1 = Differential
  - Bit 5: 0 = Non-PCI Module
    1 = PCI Module
  - Bit 6: 0 = Configured as a Host Module
    1 = Configured as a Disk Module
  - Bit 7: 0 = Non-Fast 20
    1 = Fast 20

Figure A-49 Bind Aborted Due To Hardware Error Format

Byte	Message Field	Valid Values
4	Channel	1 - 2

A.3.37.5 Bind Aborted Due To Hardware Error Fields

- Channel: Redundant controller communication channel which the hardware error was detected on.

Figure A-50 Bind Aborted Due To Parity Error Format

Byte	Message Field	Valid Values
4	Channel	1 - 2

A.3.37.6 Bind Aborted Due To Parity Error Fields

- Channel: Redundant controller communication channel which the parity error was detected on.

Figure A-51 Bind Aborted Due To Raid Set Error Format

Byte	Message Field	Valid Values
4	Redundancy Group Number	0 - 31

A.3.37.7 Bind Aborted Due To Raid Set Error Fields

- Redundancy Group Number: The redundancy group of the raid set on which the error occurred.

Figure A-52 Bind Aborted Due To Host Map Error Format

Byte	Message Field	Valid Values
4 -7	Raid Set Bitmap	See Below
8 – 11	Redundancy Group Bitmap	See Below

A.3.37.8 Bind Aborted Due To Host Map Error Fields

- Raid Set Bitmap: A 32-bit field where each bit in the field represents a RAID set that is associated with the host. The bit position numbers of the bits indicate the RAID set number. A bit with the value of 1 indicates that a RAID set belongs to this host. A bit with the value of 0 indicates that the RAID set does not belong to this host.
- Redundancy Group Bitmap: A 32-bit field where each bit in the field represents a redundancy that is associated with the host. The bit position numbers of the bits indicate the redundancy group number. A bit with the value of 1 indicates that a redundancy group belongs to this host. A bit with the value of 0 indicates that the redundancy group does not belong to this host.

Figure A-53 Bind Aborted Due To Unexpected Error Format

Byte	Message Field	Valid Values
4	Unexpected Opcode	See Below

A.3.37.9 Bind Aborted Due To Unexpected Error Fields

- Unexpected Opcode: The opcode of the unexpected message received.

A.3.38 Switchover

There are five different reasons for a switchover to occur (as described in the reason field) but only one of them contains additional information in the body of the message. The reason that contains further explanation, Switchover due to Bugcheck, is described below.

Figure A-54 Switchover Due To Bugcheck Format

Byte	Message Field	Valid Values
4 – 7	Error Code	See Below
8 – 11	Line Number	See Below
12 – 15	Address of PCB of Current Process	See Below
16 - 24	Module Name	See Below

A.3.38.1 Switchover Due to Bugcheck Fields

- Error Code: Error code for the bugcheck.
- Line Number: The line number in the module at which the error occurred.
- Address of PCB of Current Process: Address of the process control block of the process in which the bugcheck occurred.
- Module Name: The name of the module in which the error occurred.
- Strings are null terminated ASCII strings

A.3.39 RAID Set Change

Figure A-55 RAID Set Change

Byte	Message Field	Valid Values
4	RAID Set Number	0 - 55
5	Type of Change	0 - 4
6 - 103	RAID Set Change Information	**See Below**

A.3.39.1 RAID Set Change Fields

- RAID Set Number: The number of the RAID set in which the change occurred.
- Type of Change: There are five types of changes that can take place in a RAID Set.

  0 = A new RAID set has been created

  1 = A rebuild is taking place on this RAID set.

  2 = One or more drives have failed in this RAID set.

  3 = RAID set has gone offline.

  4 = A spare has been added to this RAID set.
- **RAID Set Change Information: Based on the type of change, these bytes contain more detailed information about the change in the RAID set.**

A.3.39.1.1 New Set

Figure A-56 New Set Event Format

Byte	Message Field	Valid Values
6	Member Status	0, 5, 10 - 16
7	Member Count	0 - 55
8	(First) Member Descriptor: SCSI ID	0 - 15
9	(First) Member Descriptor: Channel	0 - 9
	:	
102	(Last) Member Descriptor: SCSI ID	0 - 15
103	(Last) Member Descriptor: Channel	0 - 9

A.3.39.1.2 New Set Event Fields

- Member Status: Member statuses that are currently defined are the following:

  0 = Empty
  5 = Creating
  10 = Online
  11 = Rebuilding
  12 = Hot Spare
  13 = Warm Spare
  14 = Adding Spare
  15 = Status Unknown
  16 = Formatting

- Member Count: The total number of members in the RAID Set.
- Member Descriptor: The parameters used to identify a disk drive. There will be a member descriptor for each member in the RAID set. The descriptor will be given in order from the first logical member to the last. The number of members in the RAID set is indicated in the Member Count field.

  1. Channel: The channel that the disk drive is connected to.
  2. SCSI ID: The SCSI ID of the disk drive.

A.3.39.1.3 Rebuild

Figure A-57 Rebuild Event Format

Byte	Message Field	Valid Values
6	Member	0 - 55
7	SCSI ID	0 - 15
8	Channel	0 - 9
9	Status	0, 5, 10 - 16
10	LUN	0 - 31

A.3.39.1.4 Rebuild Event Fields

- Member: The logical member number in the RAID set of the member that is undergoing rebuild.
- SCSI ID: The SCSI ID of the disk drive that is undergoing rebuild.
- Channel: The channel number of the disk drive that is being rebuilt.
- Status: Member statuses that are currently defined are the following:
  0 = Empty
  5 = Creating
  10 = Online
  11 = Rebuilding
  12 = Hot Spare
  13 = Warm Spare
  14 = Adding Spare
  15 = Status Unknown
  16 = Formatting
- LUN: The LUN number of the drive that is rebuilding.

A.3.39.1.5 Drive Fail

Figure A-58 Drive Fail Event Format

Byte	Message Field	Valid Values
6	Member	0 - 55
7	SCSI ID	0 - 15
8	Channel	0 - 9

A.3.39.1.6 Drive Fail Event Fields

- Member: The logical member number in the RAID set for the member that failed.
- SCSI ID: The SCSI ID of the disk drive that has failed.
- Channel: The channel number of the disk drive that failed.

A.3.39.1.7 RAID Set Offline

Figure A-59 RAID Set Offline

Byte	Message Field	Valid Values
6	Member	0 - 55
7	SCSI ID	0 - 15
8	Channel	0 - 9

A.3.40.1.8 RAID Set Offline Fields

- Member: The logical member number in the RAID set of the member that failed.
- SCSI ID: The SCSI ID of the disk drive that failed..
- Channel: The channel number of the disk drive that failed.

RAID Set Offline Message

The full message length will always be returned. The unused bytes may or may not be null filled and should be ignored.

A.3.39.1.9 Add Spare

Figure A-60 Add Spare Event Format

Byte	Message Field	Valid Values
6	Status	0, 5, 10 - 16
7	SCSI ID	0 - 15
8	Channel	0 - 9

A.3.39.1.10 Add Spare Event Fields

- Status: Member statuses that are currently defined are the following:
  0 = Empty
  5 = Creating
  10 = Online
  11 = Rebuilding
  12 = Hot Spare
  13 = Warm Spare
  14 = Adding Spare
  15 = Status Unknown
  16 = Formatting
- SCSI ID: The SCSI ID of the disk drive that is being added as a spare.
- Channel: The channel number of the disk drive that is being added as a spare.
- Type of Change: There are five types of changes that can take place in a RAID Set.
  0 = A new RAID set has been created
  1 = A rebuild is taking place on this RAID set.
  2 = One or more drives have failed in this RAID set.
  3 = RAID set has gone offline.
  4 = A spare has been added to this RAID set.

A.3.40 Raid Set Error

Figure A-61 RAID Set Error Format

Byte	Message Field	Valid Values
4	RAID Set Number	0 - 55

A.3.40.1 RAID Set Error Event Fields

RAID Set Number: The number of the RAID set on which an error has occurred

A.3.41 Drive Request

Figure A-62 Drive Request Event Format

Byte	Message Field	Valid Values
4 – 7	Drive Map Channel 0	See Below
8 – 11	Drive Map Channel 1	See Below
	:	
36 – 39	Drive Map Channel 8	See Below
40	New Drive Status	0, 5, 10 - 16
41	RAID Set Number	0 - 55

A.3.41.1 Drive Request Event Fields

- Drive Map Channel X: A 32-bit field representing a different channel where each bit in the field represents a SCSI ID. The bit position numbers of the bits indicate the SCSI ID's. A bit with the value of 1 indicates that a drive at that SCSI ID is being requested. A bit with the value of 0 indicates that there is no drive with that SCSI ID that is being requested.

*There are nine 32-bit entries. Each bit represents a SCSI ID where "1" indicates an ID being requested and a "0" indicates an ID NOT being requested. * The algorithm for converting from "mapped-bit" to SCSI ID is as follows:*

First byte is least significant byte. Bit 0 is least significant bit.

Bit 0 = SCSI ID 0
Bit 1 = SCSI ID 1
Bit 2 = SCSI ID 2
Bit 3 = SCSI ID 3
Bit 4 = SCSI ID 4
Bit 5 = SCSI ID 5
Bit 6 = SCSI ID 6
Bit 7 = SCSI ID 7
Bit 8 = SCSI ID 8
Bit 9 = SCSI ID 9
Bit 10 = SCSI ID 10
Bit 11 = SCSI ID 11
Bit 12 = SCSI ID 12
Bit 13 = SCSI ID 13
Bit 14 = SCSI ID 14
Bit 15 = SCSI ID 15
Bit 16 = SCSI ID 16
Bit 17 = SCSI ID 17
Bit 18 = SCSI ID 18
Bit 19 = SCSI ID 19
Bit 20 = SCSI ID 20
Bit 21 = SCSI ID 21
Bit 22 = SCSI ID 22

Bit 23 = SCSI ID 23
Bit 24 = SCSI ID 24
Bit 25 = SCSI ID 25
Bit 26 = SCSI ID 26
Bit 27 = SCSI ID 27
Bit 28 = SCSI ID 28
Bit 29 = SCSI ID 29
Bit 30 = SCSI ID 30
Bit 31 = SCSI ID 31

* *It is possible to have more than one bit set per entry.*

Status: Member statuses that are currently defined are the following:
0 = Empty
5 = Creating
10 = Online
11 = Rebuilding
12 = Hot Spare
13 = Warm Spare
14 = Adding Spare
15 = Status Unknown
16 = Formatting

RAID Set Number: The RAID Set that will be associated with the drives that are being requested.

A.3.41.1.1 Drive Request Rejected

Figure A-63 Drive Request Rejected Message Body Data Format

Byte	Message Field	Valid Values
4	Drive Channel	2 - 3
5	Drive ID	0 - 15
6 - 159	Pad	

Drive Channel/ID Address of drive being requested that was rejected.

A.3.41.1.2 Write Cache Enable Status Update

Figure A-64 Write Cache Enable Status Message Body Data Format

Byte	Message Field	Valid Values
4 - 7	Channel 0 WCE Status	See Below
8 - 11	Channel 1 WCE Status	See Below
12 - 15	Channel 2 WCE Status	Not Used
16 - 19	Channel 3 WCE Status	Not Used
20 - 159	Pad	

Channel WCE Status: Each status is a 32 bit mask indicating whether write caching is enabled for that particular host channel / LUN. For example, if the values in bytes 4 - 7 are 0002, then LUN 1 of host channel 0 has write caching enabled.

A.3.41.1.3 Acknowledge With Status

Figure A-65 Acknowledge With Status Body Data Format

Byte	Message Field	Valid Values
4 - 159	Pad	

Reason: Completion status of command. This response is used after one controller has issued a command to the other. The actual value of the status depends on the message that was previously sent.

A.3.41.1.4 Session Request

Figure A-66 Session Request Body Data Format

Byte	Message Field	Valid Values
4 - 135	Debug Data	0 - 255
136 - 159	Pad	

A.3.41.1.5 Update System Parameter

Figure A-67 Update System Parameter Body Data Format

Byte	Message Field	Valid Values
4	Debug Data	0 - 255
5 - 159	Pad	

A.3.41.1.6 Rebind Configuration

Figure A-68 Rebind Config Body Data Format

Byte	Message Field	Valid Values
4 - 48	Debug Data	0 - 255
49 - 159	Pad	

A.3.41.1.7 Download Cache

Figure A-69 Download Cache Body Data Format

Byte	Message Field	Valid Values
4	Channel	0, 1
5 - 159	Pad	

Channel: Hardware channel used when downloading the cache.

A.3.41.1.8 Download Done

Figure A-70 Download Cache Body Data Format

Byte	Message Field	Valid Values
4	Status	0, 1, 2
5 - 159	Pad	

Status: Completion status of the download

0 SUCCESS
1 TIMEOUT
2 PARITY ERROR

A.3.41.1.9 Download Config

Figure A-71 Download Config Body Data Format

Byte	Message Field	Valid Values
4 - 32	Debug Data	0 - 255
33 - 159	Pad	

A.3.41.1.10 Lock Subsystem

Figure A-72 Lock Subsystem Body Data Format

Byte	Message Field	Valid Values
4	Operation	0, 1
5	Key	0
6 - 13	Debug Data	0 - 255
14 - 159	Pad	

Operation: 0 Unlock
1 Lock

Key: 0 Lock for Firmware Download

A.3.41.1.11 Quiesce Subsystem

Figure A-73 Quiesce Subsystem Body Data Format

Byte	Message Field	Valid Values
4	Operation	0, 1
5 - 13	Debug Data	0 - 255
14 - 159	Pad	

Operation: 1 Begin Quiesce
2 Check Quiesce Status
3 Halt Quiesce

A.3.41.1.12 Update Firmware Status

Figure A-74 Update Firmware Status Body Data Format

Byte	Message Field	Valid Values
4	Status	0x80- 0x85
5 - 13	Debug Data	0 - 255
14 - 159	Pad	

Status: 0x80 Normal
0x81 Initiating
0x82 Quiescing
0x83 Downloading
0x84 Installing
0x85 Activating

A.3.41.1.13 Install Firmware

Figure A-75 Install Firmware Body Data Format

Byte	Message Field	Valid Values
4 - 138	Debug Data	0 - 255
139 - 159	Pad	

A.3.41.1.14 Faultbus Message

Figure A-76 Faultbus Body Data Format

Byte	Message Field	Valid Values
4	Opcode	1 - 4
5 - 20	Debug Data	0 - 255
21 - 159	Pad	

Opcode: 1 LED Message
2 Serial Number
3 Drive Failed Message
4 Update Failed Drive Status

A.3.41.1.15 Host LUN Map Message

Figure A-77 Host LUN Map Message

Byte	Message Field	Valid Values
4	Host Channel	0, 1
5	LUN	0 - 31
6	Redundancy Group	0 - 31
21 - 159	Pad	

Host Channel: Host channel of LUN to be mapped
LUN: LUN being mapped
Redundancy Group: Redundancy Group being mapped to LUN
Host Channel: Host channel of LUN to be unmapped
LUN: LUN being unmapped
Redundancy Group: Redundancy Group being unmapped

A.3.41.1.16 Alarm Off Message

Figure A-78 Alarm Off Message

Byte	Message Field	Valid Values
4 - 159	Pad	

A.3.42 Redundant Controller Status Change Event (29)

The Redundant Controller Status Change Event is recorded after a status change takes place in the redundant controller set. The format of the Redundant Controller Status Change Event is shown in the following figure.

Figure A-79 Redundant Controller Status Change Event Format

Byte	Message Field	Valid Values
0	Status	0 - 255
1	Reason	0 - 255
2 – 23	Body of Message	See Below
24 - 27	Pad	0

A.3.42.1 Redundant Controller Status Change Event Fields

Event Header: For this event, the Event Type is Redundant Controller Status Change (29).

Status: This is the status of the redundant controllers. These statuses include the following:

0 = Unbound (no message body)
1 = Attempting Bind (no message body)
2 = Bind Aborted
3 = Bind Successfully Completed (no message body)
4 = Redundant Controller Set Broken
5 = Controller Failed (no message body)
6 = Switchover in Progress (no message body)
7 = Switchover Failed
8 = Switchover Completed Successfully

Reason: Some statuses can be further explained by listing the reasons which are described in this field. For statuses that do not require this field, it is used as a pad byte to keep structure alignment in the internal data structure. Only reasons for statuses that do not have “no message body” listed, contain additional information in the message body. Statuses that are further broken down into subtypes are listed here.

Bind Aborted Reasons (status = 2):

0	= Timeout	
1	= Cache Mismatch	
2	= Firmware Version Mismatch	
3	= Hardware Mismatch	
4	= Hardware Error	
5	= Parity Error	
6	= Raid Set Error	
7	= Hostmap Error	
8	= Unexpected Reason	
9	= Bad Response	(no message body)
10	= Query Received	(no message body)
11	= Cache not mirrored	(no message body)

Redundant Controller Set Broken Reasons (status = 4):

0	= Incorrect Heartbeat	(no message body)
1	= System Restart Command Received	(no message body)
2	= System Shutdown Command Received	(no message body)
3	= Raid Set Error	
4	= Query Message Received During Bind	(no message body)
5	= Communication Problems	(no message body)

Switchover Failed or Switchover Completed Successfully (status = 7 or 8):

0	= Bugcheck	
1	= I/O Hang	(no message body)
2	= Missing Heartbeat	(no message body)
3	= Other Controller Failed to Bind After Power Loss	(no message body)
4	= Power Was Lost After Other Controller Failed	(no message body)

Body of Message: This contains additional information about some statuses which have a reason listed in the Reason field. Some of the reasons for the status change are described here in further detail.

Pad: A pad to insure long word alignment in the internal data structure.

A.3.42.1.1 Bind Aborted

There are currently twelve different reasons for a bind to be aborted but only the first nine contain additional information. This information is provided to allow the user to know specifically why the bind was not successful.

- Bind Abort Reasons:

0	= Timeout	
1	= Cache Mismatch	
2	= Firmware Version Mismatch	
3	= Hardware Mismatch	
4	= Hardware Error	
5	= Parity Error	
6	= Raid Set Error	
7	= Hostmap Error	
8	= Unexpected Message	
9	= Bad Response	(no additional data)
10	= Query Received	(no addition data)
11	= Cache Not Mirrored	(no additional data)

Figure A-80 Bind Aborted Due To Timeout Format

Byte	Message Field	Valid Values
2	Type	1 - 3
3	Channel	1 - 2

A.3.42.1.2 Bind Aborted Due To Timeout Fields

Type: The type of timeout which occurred.
1 = Transmit Timer Expired
2 = Response Timer Expired
3 = Configuration Read Register Timer Expired

Channel: The redundant controller communication channel on which the timeout occurred.

Figure A-81 Bind Aborted Due To Cache Mismatch

Byte	Message Field	Valid Values
2 – 5	Other Controller's Cache Size	See Below
6 - 9	This Controller's Cache Size	See Below

A.3.41.1.3 Bind Aborted Due To Cache Mismatch Fields.

- Other Controller's Cache Size: Cache size in bytes of the other controller with which this controller is attempting to bind
- This Controller's Cache Size: Cache size in bytes of this controller.

Figure A-82 Bind Aborted Due To Firmware Version Mismatch Message Format

Byte	Message Field	Valid Values
2 – 5	Other Controller's FW Version	See Below
6 - 9	This Controller's FW Version	See Below

A.3.42.1.4 Bind Aborted Due To Firmware Version Mismatch Fields

- Other Controller's Firmware Version: An alphanumeric string containing the firmware version of the other controller with which this controller is attempting to bind
- This Controller's Firmware Version: An alphanumeric string containing the firmware version of this controller.

Figure A-83 Bind Aborted Due To Hardware Mismatch Format

Byte	Message Field	Valid Values
2	Other Controller's Slot 0 Status	See Below
	:	
11	Other Controller's Slot 9 Status	See Below
12	This Controller's Slot 0 Status	See Below
	:	
21	This Controller's Slot 9 Status	See Below

A.3.42.1.5 Bind Aborted Due To Hardware Mismatch Fields

- Other Controller's Slot N Status: Indicates the status of module installed in channel N for the other controller (where N = 0 - 9).
  - Bit 0: 0 = Slot available
    1 = Slot not available (there is no slot on the motherboard for the module)
  - Bit 1: 0 = Empty
    1 = Populated
  - Bit 2: 0 = Passed Selftest
    1 = Failed Selftest
  - Bit 3: 0 = 8-Bit (Narrow)
    1 = 16-Bit (Wide)
  - Bit 4: 0 = Single-Ended
    1 = Differential
  - Bit 5: 0 = Non-PCI Module
    1 = PCI Module
  - Bit 6: 0 = Configured as a Host Module
    1 = Configured as a Disk Module
  - Bit 7: 0 = Non-Fast 20
    1 = Fast 20
- This Controller's Slot N Status: Indicates the status of module installed in channel N for this controller (where N = 0 - 9).
  - Bit 0: 0 = Slot available
    1 = Slot not available (there is no slot on the motherboard for the module)
  - Bit 1: 0 = Empty
    1 = Populated
  - Bit 2: 0 = Passed Selftest
    1 = Failed Selftest
  - Bit 3: 0 = 8-Bit (Narrow)
    1 = 16-Bit (Wide)
  - Bit 4: 0 = Single-Ended
    1 = Differential
  - Bit 5: 0 = Non-PCI Module
    1 = PCI Module
  - Bit 6: 0 = Configured as a Host Module
    1 = Configured as a Disk Module
  - Bit 7: 0 = Non-Fast 20
    1 = Fast 20

Figure A-84 Redundant Controller Parity Error Action Event (30)

Byte	Message Field	Valid Values
2	Channel	1 - 2

A.3.42.1.6 Bind Aborted Due To Hardware Error Fields

- Channel: Redundant controller communication channel which the hardware error was detected on.

Figure A-85 Bind Aborted Due To Parity Error Format

Byte	Message Field	Valid Values
2	Channel	1 - 2

A.3.42.1.7 Bind Aborted Due To Parity Error Fields

- Channel: Redundant controller communication channel on which the parity error was detected.

Figure A-86 Bind Aborted Due To Raid Set Error Format

Byte	Message Field	Valid Values
2	Redundancy Group Number	0 - 31

A.3.42.1.8 Bind Aborted Due To Raid Set Error Fields

- Redundancy Group Number: The redundancy group of the raid set on which the error occurred.

Figure A-87 Bind Aborted Due To Host Map Error Format

Byte	Message Field	Valid Values
2 – 5	Raid Set Bitmap	See Below
6 - 9	Redundancy Group Bitmap	See Below

A.3.42.1.9 Bind Aborted Due To Host Map Error Fields

- Raid Set Bitmap: A 32-bit field where each bit in the field represents a RAID set that is associated with the host. The bit position numbers of the bits indicate the RAID set number. A bit with the value of 1 indicates that a RAID set belongs to this host. A bit with the value of 0 indicates that the RAID set does not belong to this host.
- Redundancy Group Bitmap: A 32-bit field where each bit in the field represents a redundancy that is associated with the host. The bit position numbers of the bits indicate the redundancy group number. A bit with the value of 1 indicates that a redundancy group belongs to this host. A bit with the value of 0 indicates that the redundancy group does not belong to this host.

Figure A-88 Bind Aborted Due To Unexpected Error Format

Byte	Message Field	Valid Values
2	Unexpected Opcode	See Below

A.3.42.1.10 Bind Aborted Due To Unexpected Message Fields

- Unexpected Opcode: The opcode of the unexpected message received.

A.3.42.1.11 Switchover Failed or Switchover Completed Successfully

There are five different reasons for a switchover to occur (as described in the reason field) but only one of them contains additional information in the body of the message. The reason that contains further explanation is switchover due to bugcheck is described below.

Figure A-89 Switchover Due To Bugcheck Format

Byte	Message Field	Valid Values
2 – 5	Error Code	See Below
6 – 9	Line Number	See Below
10 – 13	Address of PCB of Current Process	See Below
14 - 23	Module Name	See Below

A.3.42.1.12 Switchover Due to Bugcheck Fields

- Error Code: Error code for the bugcheck.
- Line Number: The line number in the module at which the error occurred.
- Address of PCB of Current Process: Address of the process control block of the process in which the bugcheck occurred.
- Module Name: The name of the module in which the error occurred.

A.3.42.1.13 Redundant Controller Set Broken

There are five different reasons for a redundant controller set to break (as described in the reason field) but only one of them contains additional information in the body of the message. The reason that contains further explanation, Redundant Controller Set Broken due to RAID Set Error, is described below.

Figure A-90 Redundant Controller Set Broken Due To RAID Set Error Format

Byte	Message Field	Valid Values
2	RAID Set Number	0 - 55

A.3.42.1.14 Redundant Controller Set Broken Due To RAID Set Error Fields

- RAID Set Number: The number of the RAID set on which an error has occurred

A.3.43 Redundant Controller Parity Error Event

The Redundant Controller Parity Error Event is recorded whenever a parity error is encountered in a redundant controller configuration. The format of the Redundant Controller Parity Error Event is shown in the following figure.

Figure A-91 Redundant Controller Parity Error Event Format

Byte	Message Field	Valid Values
0 - 3	Address	See Below

A.3.43.1 Redundant Controller Parity Error Event Fields

- Event Header: For this event, the Event Type is Redundant Controller Parity Error (30).
- Address: The address at which the error occurred.

A.3.44 Redundant Controller Parity Error Action Event (31)

The Redundant Controller Parity Error Action Event is recorded whenever any action is taken to deal with a parity error in a redundant controller configuration.

Figure A-92 Redundant Controller Parity Error Action Event Format

Byte	Message Field	Valid Values
0 – 3	Type	See Below
4 – 7	Where	See Below
8 – 11	Address	See Below
12 – 15	Action	See Below
16 – 19	Value	See Below

A.3.44.1 Redundant Controller Parity Error Action Event Fields

- Event Header: For this event, the Event Type is Redundant Controller Parity Error Action (31).
- Type: Type of error.
  0 = Parity Error
  1 = Invalid Structure Address
- Where: A value associated with the name of an internal data structure used for debugging purposes.
- Address: The address at which the error occurred.
- Action: Action that was taken and the value that is associated with it (as given in the next field).

0 = Offline all redundancy groups	(None)
1 = Offline Lun	(Redundancy Group)
2 = Write forced error to data and parity	(Redundancy Group)
3 = Write forced error to data	(Redundancy Group)
4 = Write forced error to parity	(Redundancy Group)
5 = Report unit attention reset	(Host ID)
6 = Abort create or rebuild	(None)
7 = Abort create	(None)
8 = Abort rebuild	(None)
9 = Abort command	(Host ID and LUN)

- Value: A long word value associated with some of the actions listed above. This value represents a long word redundancy group for actions 1 through 4, a long word host ID for action 5, and two different byte values with each representing a host ID and LUN for action 9. For all other actions this value remains 0.

A.3.45 Drive Validation Event (34)

The Drive Validation Event is recorded when a disk drive returns a unit attention condition and an attempt is made to read information off of that drive to determine if it has been swapped.

Figure A-93 Drive Validation Event Format

Byte	Message Field	Valid Values
0 – 8	RAID Set Information	See Below
9	Channel	1 - 9
10	SCSI ID	0 - 15
11	Drive Status	0, 5, 10-16
12	Validation Status	0 - 3

A.3.46 Drive Validation Event Fields

- Event Header: For this event, the Event Type is Drive Validation (34).
- RAID Set Information: RAID Set Status and configuration information.
- Channel: The Channel of the disk drive that is to be validated.
- SCSI ID: The SCSI ID of the disk drive that is to be validated.
- Drive Status: Drive statuses that are currently defined are the following:
  0 = Empty
  5 = Creating
  10 = Online
  11 = Rebuilding
  12 = Hot Spare
  13 = Warm Spare
  14 = Adding Spare
  15 = Status Unknown
  16 = Formatting
- Validation Status: Drive Validation statuses that are currently defined are the following:
  0 = Success
  1 = Failure - Drive Changed
  2 = Failure - Drive Error
  3 = Failure - Drive Not Validafigure

A.4 SWAP_L Event (35)

Event Type: 35

Event Log Data Length: 4

Figure A-94 SWAP_L Event Log Format

Offset	Message Field	Valid Values
0	SCSI Channel	2 - 3
1 - 3	Pad	*n/a*

A.4.1 SWAP_L Event Log Fields

- SCSI Channel: The SCSI Channel the SWAP_L event was detected on.

A.5 Validation Degraded Event (36)

Event Type: 36

Event Log Data Length: 120

Figure A-95 Validate Degraded Event Log format

Offset	Message Field	Valid Values
0 - 7	Raid Set Information	
8	Member #0 SCSI Channel	2 - 3, 0xFF
9	Member #0 SCSI ID	0 - 15, 0xFF
...	...	...
118	Member #55 SCSI Channel	2 - 3, 0xFF
119	Member #55 SCSI ID	0 - 15, 0xFF

A.5.1 Validate Degraded Event Log Fields

RAID Set Information: See Section A.2.2.

Member Information: Describes the disk members that make up the RAID Set. Each descriptor consists of a SCSI channel in the first byte and SCSI ID in the second. Unused members are filled with values of 0xFF.

B

SCSI Sense Data

This Appendix contains information relative to SCSI Sense Data, extracted from SCSI specifications.

The following SCSI Sense Data information is extracted from the SCSI Specification.

Sense Data may be returned in response to a REQUEST SENSE Command. The Sense Data information listed here, as well as additional SCSI reference information is available at the following DIGITAL internal web site.

http://hit.shr.dec.com/ssag/Standardsdocs.htm#SCSI

The following Error Codes may be returned in response to a REQUEST SENSE Command;

70h – Indicates current errors that targets shall implement

71h – Deferred errors are optional

72h to 7Eh – Reserved

7Fh – Vendor-specific sense data format

00h to 6Fh – Not defined by the SCSI standard and their use is not recommended.

The Sense Data format for Error Code 70h or 71h is the following:

Response Codes 70h and 71h Sense Data Format

Byte 0:
- Bit 7: Valid
- Bits 6 – 0: Response code (70h or 71h)

Byte 1
- Bits 7 – 0: Segment Number

Byte 2
- Bit 7: Filemark
- Bit 6: EOM
- Bit 5: ILI
- Bit 4: Reserved
- Bit 3 – 0 Sense Key

Bytes 3 – 6
- Information

Byte 3, Bit 7: MSB

Byte 6, Bit 0: LSB

Byte 7
- Bits 7 – 0: Additional Sense Length (n-7)

Bytes 8 – 11
- Command-Specific Information
- Byte 8, Bit 7: MSB
- Byte 11, Bit 0: LSB

Byte 12:
Bits 7 – 0: Additional Sense Code

Byte 13:
Bits 7 – 0: Additional Sense Code Qualifier

Byte 14:
Bits 7 – 0: Field Replaceable Unit Code

Bytes 15 – 17:
Sense-Key Specific
Byte 15, Bit 7: SKSV

Bytes 18 – n
Additional Sense Bytes

A valid bit of zero indicates that the information field is not as defined in this standard. A valid bit of one indicates the information field contains valid information as defined in this standard. Device servers shall implement the valid bit.

Response code values 70h (current errors) is described in *Section B.2, Current Errors*. Device servers shall implement Response code 70h.

Response code value 71h (deferred errors) is described in *Section B.3, Deferred Errors*. Implementation of Response code 71h is optional.

Response code 7Fh is for a vendor-specific sense data formats. Response code values of 72h to 7Eh and 00h to 6Fh are reserved.

The segment number field contains the number of the current segment descriptor if the REQUEST SENSE command is in response to a COPY, COMPARE, or COPY AND VERIFY command. Up to 256 segments are supported, beginning with segment zero.

The Filemark bit is mandatory for sequential-access devices, and this bit is reserved for all other device types. A Filemark bit of one indicates that the current command has read a filemark or setmark. The additional sense code field may be used to indicate whether a filemark or setmark was read. Reporting of setmarks is optional and indicated by the Rsmk bit for sequential-access devices in the configuration parameters page.

The end-of-medium (EOM) bit is mandatory for sequential-access and printer devices, and this bit is reserved for all other device types. An EOM bit of one indicates that an end-of-medium condition (end-of-partition, beginning-of-partition, out-of-paper, etc.) exists. For sequential-access devices, this bit indicates that the unit is at or past the early-warning if the direction was forward, or that the command was not completed because beginning-of-partition was encountered if the direction was reverse.

An incorrect length indicator (ILI) bit of one usually indicates that the requested logical block length did not match the logical block length of the data on the medium.

The sense key, additional sense code and additional sense code qualifier provide a hierarchy of information. The intention of the hierarchy is to provide a top-down approach for an application client to determine information relating to the error and exception conditions. The sense key provides generic categories in which error and exception conditions may be reported.

Application clients typically use sense keys for high level error recovery procedures. Additional sense codes provide further detail describing the sense key. Additional sense code qualifiers add further detail to the additional sense code. The additional sense code and additional sense code qualifier may be used by application clients where sophisticated error recovery procedures require detailed information describing the error and exception conditions.

The sense key field is mandatory and indicates generic information describing an error or exception condition. The sense keys are defined in *Section B.3, Deferred Errors*.

The contents of the information field is device-type or command specific and is defined within the appropriate standard for the device type or command of interest. Device servers shall implement the information field. Unless specified otherwise, this field contains:

a) the unsigned logical block address associated with the sense key, for direct-access devices (device type 0), write-once devices (device type 4), CD-ROM devices (device type 5), and optical memory devices (device type 7);

b) the difference (residue) of the requested length minus the actual length in either bytes or blocks, as determined by the command, for sequential-access devices (device type 1), printer devices (device type 2), processor devices (device type 3) and some direct access device commands, except as defined for d) below. (Negative values are indicated by two's complement notation.);

c) the difference (residue) of the requested number of blocks minus the actual number of blocks copied or compared for the current segment descriptor of a COPY, COMPARE, or COPY AND VERIFY command; or

d) For sequential-access devices operating in buffered modes 1h or 2h that detect an unrecoverable write error when unwritten data blocks, filemarks, or setmarks remain in the buffer, the value of the information field for all commands shall be:

   1) the total number of data blocks, filemarks, and setmarks in the buffer if the device is in fixed block mode (block length field of the MODE SENSE block descriptor is non-zero and the fixed bit of the WRITE command is one);

      or

   2) the number of bytes in the buffer, including filemarks and setmarks, if the device is in variable mode (the fixed bit of the WRITE command is zero).

The additional sense length field indicates the number of additional sense bytes to follow. If the allocation length of the command descriptor block is too small to transfer all of the additional sense bytes, the additional sense length is not adjusted to reflect the truncation.

The command-specific information field contains information that depends on the command that was executed. Further meaning for this field is defined within the command description. The command-specific information field is mandatory if the device server supports any of the following commands: COPY, COMPARE, COPY AND VERIFY, and REASSIGN BLOCKS.

The additional sense code (ASC) field indicates further information related to the error or exception condition reported in the sense key field. Device servers shall support the additional sense code field. Support of the additional sense codes not explicitly required by this standard is optional. A list of additional sense codes is in *Section B.3, Deferred Errors*. If the device server does not have further information related to the error or exception condition, the additional sense code is set to NO ADDITIONAL SENSE INFORMATION.

The additional sense code qualifier (ASCQ) indicates detailed information related to the additional sense code. The additional sense code qualifier is optional. If the error or exception condition is reportable by the device, the value returned shall be 76 as specified in *Section B.3, Deferred Errors*. If the device server does not have detailed information related to the error or exception condition, the additional sense code qualifier is set to zero.

Non-zero values in the field replaceable unit code field are used to define a device-specific mechanism or unit that has failed. A value of zero in this field shall indicate that no specific mechanism or unit has been identified to have failed or that the data is not available. The field replaceable unit code field is optional. The format of this information is not specified by this standard. Additional information about the field replaceable unit may be available in the ASCII information page if supported by the device server.

The sense-key specific bytes are described in *Section B.1, Sense-Key Specific*, below.

The additional sense bytes field may contain command specific data, peripheral device specific data, or vendor-specific data that further defines the nature of the CHECK CONDITION status.

B.1 Sense-Key Specific

The sense-key specific field as defined by this standard when the value of the sense-key specific valid (SKSV) bit is one. The sense-key specific valid bit and sense-key specific field are optional. The definition of this field is determined by the value of the sense key field. This field is reserved for sense keys not described below. An SKSV value of zero indicates that this field is not as defined by this standard.

If the sense key field is set to ILLEGAL REQUEST and the SKSV bit is set to one, the sense-key specific field shall be as defined as shown below. The field pointer field indicates which illegal parameters in the command descriptor block or the data parameters are in error.

Field Pointer Bytes:

Byte 15:

Bit 7: SKSV

Bit 6: C/D

Bit 5: Reserved

Bit 4: Reserved

Bit 3: BPV

Bits 2, 1, 0: Bit Pointer

Byte 16 & 17 Field Pointer

Byte 16, Bit 7: MSB

Byte 17, Bit 0: LSB

A command data (C/D) bit of one indicates that the illegal parameter is in the command descriptor block. A C/D bit of zero indicates that the illegal parameter is in the data parameters sent by the application client in the Data-Out Buffer.

A bit pointer valid (BPV) bit of zero indicates that the value in the bit pointer field is not valid. A BPV bit of one indicates that the bit pointer field specifies which bit of the byte designated by the field pointer field is in error. When a multiple-bit field is in error, the bit pointer field shall point to the most-significant (left-most) bit of the field.

The field pointer field indicates which byte of the command descriptor block or of the parameter data was in error. Bytes are numbered starting from zero, as shown in the tables describing the commands and parameters. When a multiple-byte field is in error, the pointer shall point to the most- significant (left-most) byte of the field.

NOTE: Bytes identified as being in error are not necessarily the place that has to be changed to correct the problem.

If the sense key is RECOVERED ERROR, HARDWARE ERROR or MEDIUM ERROR and if the SKSV bit is one, the sense-key specific field shall be as shown below:

Actual Retry Count Bytes

Byte 15:

Bit 7: SKSV

Bits 6 – 0 Reserved

Byte 16 & 17 Actual Retry Count

Byte 16, Bit 7: MSB

Byte 17, Bit 0: LSB

The actual retry count field returns vendor-specific information on the actual number of retries of the recovery algorithm used in attempting to recover an error or exception condition.

NOTE: This field should computed in the same way as the retry count fields within the error recovery page of the MODE SELECT command.

If the sense key is NOT READY or NO SENSE and the SKSV bit is one, the sense-key specific field shall be as shown below:

Progress Indication Bytes

Byte 15:

Bit 7: SKSV

Bits 6 – 0 Reserved

Byte 16 & 17 Progress Indication

Byte 16, Bit 7: MSB

Byte 17, Bit 0: LSB

The progress indication field is a percent complete indication in which the returned value is the numerator that has 65536 (10000h) as its denominator. The progress indication shall be based upon the total operation.

NOTE: It is intended that the progress indication be time related. However, since for example format time varies with the number of defects encountered, etc., it is reasonable for the device server to assign values to various steps within the process. The granularity of these steps should be small enough to provide reasonable assurances to the application client that progress is being made.

B.2 Current Errors

Response code 70h (current error) indicates that the CHECK CONDITION or COMMAND TERMINATED status returned is the result of an error or exception condition on the task that returned the CHECK CONDITION or COMMAND TERMINATED status or a protocol-specific failure condition. This includes errors generated during execution of the command. It also includes errors not related to any command that are first observed during execution of a command (e.g., disk servo-mechanism failure, off-track errors, and power-up test errors).

B. 3 Deferred Errors

Response code 71h (deferred error) indicates that the CHECK CONDITION status returned is the result of an error or exception condition that occurred during execution of a previous command for which GOOD status has already been returned. Such commands are associated with use of the immediate bit and with some forms of caching. Device servers that implement these features shall implement deferred error reporting.

The deferred error indication may be sent at a time selected by the device server through use of the asynchronous event reporting mechanism (see SAM), if AER is supported by both the application client and device server.

If AER is not supported, the deferred error may be indicated by returning CHECK CONDITION status to an application client on the appropriate initiator as described below. The subsequent execution of a REQUEST SENSE command shall return the deferred error sense information.

If the task terminates with CHECK CONDITION status and the subsequent sense data returns a deferred error that task shall not have been executed. After the device server detects a deferred error condition, it shall return a deferred error according to the rules described below:

a) If no external system intervention is necessary to recover a deferred error, a deferred error indication shall not be posted unless required by the error handling parameters of a MODE SELECT command. The occurrence of the error may be logged if statistical or error logging is supported;

b) If it is possible to associate a deferred error with a causing initiator and with a particular function or a particular subset of data, and the error is either unrecovered or required to be reported by the mode parameters, a deferred error indication is returned to an application client on the causing initiator. If an application client on an initiator other than the causing initiator attempts access to the particular function or subset of data associated with the deferred error, a BUSY status is returned to that application client in response to the command attempting the access;

c) If a deferred error cannot be associated with a causing initiator or with a particular subset of data, the device server shall return a deferred error indication to an application client on each initiator. If multiple deferred errors have accumulated for some initiators, only the last error shall be returned;

d) If a deferred error cannot be associated with a particular logical unit, the device server shall return a deferred error indication to an application client associated with any logical unit on the appropriate initiator; or

e) If a task has never entered the enabled task state, and a deferred error occurs, the task shall be terminated with CHECK CONDITION status and deferred error information posted in the sense data. If a deferred error occurs after a task has entered the enabled task state and the task is affected by the error, the task shall be terminated by CHECK CONDITION status and the current error information shall be returned in the sense data. In this case, if the current error information does not adequately define the deferred error condition, a deferred error may be returned after the current error information has been recovered. If a deferred error occurs after a task has entered the enabled task state and the task completes successfully, the device server may choose to return the deferred error information after the completion of the current command in conjunction with a subsequent command that has not started execution.

NOTE: Deferred errors may indicate that an operation was unsuccessful long after the command performing the data transfer returned GOOD status. If data that cannot be replicated or recovered from other sources is being stored using buffered write operations, synchronization commands should be performed before the critical data is destroyed in the host. This is necessary to be sure that recovery actions may be taken if deferred errors do occur in the storing of the data. If AER is not implemented, the synchronizing process should provide the necessary commands to allow returning CHECK CONDITION status and subsequent returning of deferred error sense information after all buffered operations are guaranteed to be complete.

B.4 Sense Key and Sense Code Definitions

The sense keys are defined below.

Table B–1 Sense Key Descriptions

Sense Key	Description
0h	NO SENSE. Indicates that there is no specific sense key information to be reported. This may occur for a successful command or for a command that receives CHECK CONDITION or COMMAND TERMINATED status because one of the Filemark, EOM, or ILI bits is set to one.
1h	RECOVERED ERROR. Indicates that the last command completed successfully with some recovery action performed by the device server. Details may be determinable by examining the additional sense bytes and the information field. When multiple recovered errors occur during one command, the choice of which error to report (first, last, most severe, etc.) is vendor-specific.
2h	NOT READY. Indicates that the logical unit addressed cannot be accessed. Operator intervention may be required to correct this condition
3h	MEDIUM ERROR. Indicates that the command terminated with a non-recovered error condition that was probably caused by a flaw in the medium or an error in the recorded data. This sense key may also be returned if the device server is unable to distinguish between a flaw in the medium and a specific hardware failure (sense key 4h).
4h	HARDWARE ERROR. Indicates that the device server detected a non-recoverable hardware failure (for example, controller failure, device failure, parity error, etc.) while performing the command or during a self test.
5h	ILLEGAL REQUEST. Indicates that there was an illegal parameter in the command descriptor block or in the additional parameters supplied as data for some commands (FORMAT UNIT, SEARCH DATA, etc.). If the device server detects an invalid parameter in the command descriptor block, then it shall terminate the command without altering the medium. If the device server detects an invalid parameter in the additional parameters supplied as data, then the device server may have already altered the medium.
6h	UNIT ATTENTION. Indicates that the removable medium may have been changed or the target has been reset. See SAM for more detailed information about the unit attention condition
7h	. DATA PROTECT. Indicates that a command that reads or writes the medium was attempted on a block that is protected from this operation. The read or write operation is not performed
8h	BLANK CHECK. Indicates that a write-once device or a sequential-access device encountered blank medium or format-defined end-of-data indication while reading or a write-once device encountered a non-blank medium while writing.
9h	VENDOR-SPECIFIC. This sense key is available for reporting vendor specific conditions

Table B–1 Sense Key Descriptions (cont)

Sense key	Description
Ah	COPY ABORTED. Indicates a COPY, COMPARE, or COPY AND VERIFY command was aborted due to an error condition on the source device, the destination device, or both. (See 7.3.2 for additional information about this sense key.)
Bh	ABORTED COMMAND. Indicates that the device server aborted the command. The application client may be able to recover by trying the command again.
Ch	Obsolete
Dh	VOLUME OVERFLOW. Indicates that a buffered SCSI device has reached the end-of-partition and data may remain in the buffer that has not been written to the medium. One or more RECOVER BUFFERED DATA command(s) may be issued to read the unwritten data from the buffer.
Eh	MISCOMPARE. Indicates that the source data did not match the data read from the medium
Fh	RESERVED

The additional sense codes and additional sense code qualifiers are defined in the list that follows:

NOTE: Not all codes listed here apply to the HSZ22 because some of the devices listed here are not supported by the HSZ22.

ASC and ASCQ assignments

Legend (key) for the **Device Type** field in the list below:

D - DIRECT ACCESS DEVICE (SBC)
T - SEQUENTIAL ACCESS DEVICE (SSC)
L – PRINTER DEVICE (SSC)
P – PROCESSOR DEVICE (SPC)
W - WRITE ONCE READ MULTIPLE DEVICE (SBC)
R -CDDEVICE (MMC)
S - SCANNER DEVICE (SGC)
O - OPTICAL MEMORY DEVICE (SBC)
M - MEDIA CHANGER DEVICE (SMC)
C - COMMUNICATION DEVICE (SSC)
A - STORAGE ARRAY DEVICE (SCC)
E - ENCLOSURE SERVICES DEVICE (SES)

Table B-2 ASC and ASCQ Assignments

ACS	SCQ	DEVICE TYPE FIELD	DESCRIPTION
67h	02h	A	ADD LOGICAL UNIT FAILED
13h	00h	D W O	ADDRESS MARK NOT FOUND FOR DATA FIELD
12h	00h	D W O	ADDRESS MARK NOT FOUND FOR ID FIELD
27h	03h	T	ASSOCIATED WRITE PROTECT

Table B-2 ASC and ASCQ Assignments (cont)

ACS	SCQ	DEVICE TYPE FIELD	DESCRIPTION
67h	06h	A	ATTACHMENT OF LOGICAL UNIT FAILED
00h	11h	R	AUDIO PLAY OPERATION IN PROGRESS
00h	12h	R	AUDIO PLAY OPERATION PAUSED
00h	14h	R	AUDIO PLAY OPERATION STOPPED DUE TO ERROR
00h	13h	R	AUDIO PLAY OPERATION SUCCESSFULLY COMPLETED
66h	00h	S	AUTOMATIC DOCUMENT FEEDER COVER UP
66h	01h	S	AUTOMATIC DOCUMENT FEEDER LIFT UP
00h	04h	T S	BEGINNING-OF-PARTITION/MEDIUM DETECTED
0Ch	06h	DT W O	BLOCK NOT COMPRESSIBLE
14h	04h	T	BLOCK SEQUENCE ERROR
29h	03h	DTLPWRSOMCAE	BUS DEVICE RESET FUNCTION OCCURRED
11h	0Eh	DT WR O	CANNOT DECOMPRESS USING DECLARED ALGORITHM
30h	06h	DT W O	CANNOT FORMAT MEDIUM - INCOMPATIBLE MEDIUM
30h	02h	DT WR O	CANNOT READ MEDIUM - INCOMPATIBLE FORMAT
30h	01h	DT WR O	CANNOT READ MEDIUM - UNKNOWN FORMAT
30h	08h	R	CANNOT WRITE - APPLICATION CODE MISMATCH
30h	05h	DT WR O	CANNOT WRITE MEDIUM - INCOMPATIBLE FORMAT
30h	04h	DT WR O	CANNOT WRITE MEDIUM - UNKNOWN FORMAT
52h	00h	T	CARTRIDGE FAULT
73h	00h	R	CD CONTROL ERROR
3Fh	02h	DTLPWRSOMC	CHANGED OPERATING DEFINITION
11h	06h	WR O CIRC	UNRECOVERED ERROR
30h	03h	DT	CLEANING CARTRIDGE INSTALLED
30h	07h	DTL WRSOM AE	CLEANING FAILURE
00h	17h	DTL WRSOM AE	CLEANING REQUESTED
4Ah	00h	DTLPWRSOMCAE	COMMAND PHASE ERROR
2Ch	00h	DTLPWRSOMCAE	COMMAND SEQUENCE ERROR
6Eh	00h	A	COMMAND TO LOGICAL UNIT FAILED
2Fh	00h	DTLPWRSOMCAE	COMMANDS CLEARED BY ANOTHER INITIATOR
0Ch	04h	DT W O	COMPRESSION CHECK MISCOMPARE ERROR
67h	00h	A	CONFIGURATION FAILURE
67h	01h	A	CONFIGURATION OF INCAPABLE LOGICAL UNITS FAILED
2Bh	00h	DTLPWRSO C	COPY CANNOT EXECUTE SINCE HOST CANNOT DISCONNECT
67h	07h	A	CREATION OF LOGICAL UNIT FAILED
2Ch	04h	R	CURRENT PROGRAM AREA IS EMPTY
2Ch	03h	R	CURRENT PROGRAM AREA IS NOT EMPTY

Table B-2 ASC and ASCQ Assignments (cont)

ACS	SCQ	DEVICE TYPE FIELD	DESCRIPTION
30h	09h	R	CURRENT SESSION NOT FIXATED FOR APPEND
0Ch	05h	DT W O	DATA EXPANSION OCCURRED DURING COMPRESSION
69h	00h	A	DATA LOSS ON LOGICAL UNIT
41h	00h	D	DATA PATH FAILURE (SHOULD USE 40 NN)
4Bh	00h	DTLPWRSOMCAE	DATA PHASE ERROR
11h	07h	W O	DATA RE-SYNCHRONIZATION ERROR
16h	03h	D W O	DATA SYNC ERROR - DATA AUTO-REALLOCATED
16h	01h	D W O	DATA SYNC ERROR - DATA REWRITTEN
16h	04h	D W O	DATA SYNC ERROR - RECOMMEND REASSIGNMENT
16h	02h	D W O	DATA SYNC ERROR - RECOMMEND REWRITE
16h	00h	D W O	DATA SYNCHRONIZATION MARK ERROR
11h	0Dh	DT WR O	DE-COMPRESSION CRC ERROR
71h	00h	T	DECOMPRESSION EXCEPTION LONG ALGORITHM ID
70h	NNh	T	DECOMPRESSION EXCEPTION SHORT ALGORITHM ID OF NN
19h	00h	D O	DEFECT LIST ERROR
19h	03h	D O	DEFECT LIST ERROR IN GROWN LIST
19h	02h	D O	DEFECT LIST ERROR IN PRIMARY LIST
19h	01h	D O	DEFECT LIST NOT AVAILABLE
1Ch	00h	D O	DEFECT LIST NOT FOUND
32h	01h	D W O	DEFECT LIST UPDATE FAILURE
29h	04h	DTLPWRSOMCAE	DEVICE INTERNAL RESET
40h	NNh	DTLPWRSOMCAE	DIAGNOSTIC FAILURE ON COMPONENT NN (80H-FFH)
66h	02h	S	DOCUMENT JAM IN AUTOMATIC DOCUMENT FEEDER
66h	03h	S	DOCUMENT MISS FEED AUTOMATIC IN DOCUMENT FEEDER
72h	04h	R	EMPTY OR PARTIALLY WRITTEN RESERVED TRACK
34h	00h	DTLPWRSOMCAE	ENCLOSURE FAILURE
35h	00h	DTLPWRSOMCAE	ENCLOSURE SERVICES FAILURE
35h	03h	DTLPWRSOMCAE	ENCLOSURE SERVICES TRANSFER FAILURE
35h	04h	DTLPWRSOMCAE	ENCLOSURE SERVICES TRANSFER REFUSED
35h	02h	DTLPWRSOMCAE	ENCLOSURE SERVICES UNAVAILABLE
3Bh	0Fh	R	END OF MEDIUM REACHED
63h	00h	R	END OF USER AREA ENCOUNTERED ON THIS TRACK
00h	05h	T S	END-OF-DATA DETECTED
14h	03h	T	END-OF-DATA NOT FOUND
00h	02h	T S	END-OF-PARTITION/MEDIUM DETECTED
51h	00h	T O	ERASE FAILURE
0Ah	00h	DTLPWRSOMCAE	ERROR LOG OVERFLOW

Table B-2 ASC and ASCQ Assignments (cont)

ACS	SCQ	DEVICE TYPE FIELD	DESCRIPTION
11h	10h	R	ERROR READING ISRC NUMBER
11h	0Fh	R	ERROR READING UPC/EAN NUMBER
11h	02h	DT W SO	ERROR TOO LONG TO CORRECT
03h	02h	T	EXCESSIVE WRITE ERRORS
67h	04h	A	EXCHANGE OF LOGICAL UNIT FAILED
3Bh	07h	L	FAILED TO SENSE BOTTOM-OF-FORM
3Bh	06h	L	FAILED TO SENSE TOP-OF-FORM
5Dh	00h	DTLPWRSOMCAE	FAILURE PREDICTION THRESHOLD EXCEEDED
5Dh	FFh	DTLPWRSOMCAE	FAILURE PREDICTION THRESHOLD EXCEEDED (FALSE)
00h	01h	T	FILEMARK DETECTED
14h	02h	T	FILEMARK OR SETMARK NOT FOUND
09h	02h	WR O	FOCUS SERVO FAILURE
31h	01h	D L R O	FORMAT COMMAND FAILED
58h	00h	O	GENERATION DOES NOT EXIST
1Ch	02h	D O	GROWN DEFECT LIST NOT FOUND
27h	01h	DT W O	HARDWARE WRITE PROTECTED
09h	04h	DT WR O	HEAD SELECT FAULT
00h	06h	DTLPWRSOMCAE	I/O PROCESS TERMINATED
10h	00h	D W O	ID CRC OR ECC ERROR
5Eh	03h	DTLPWRSO CA	IDLE CONDITION ACTIVATED BY COMMAND
5Eh	01h	DTLPWRSO CA	IDLE CONDITION ACTIVATED BY TIMER
22h	00h	D	ILLEGAL FUNCTION (USE 20 00, 24 00, OR 26 00)
64h	00h	R	ILLEGAL MODE FOR THIS TRACK
28h	01h	DT WR OM	IMPORT OR EXPORT ELEMENT ACCESSED
30h	00h	DT WR OM	INCOMPATIBLE MEDIUM INSTALLED
11h	08h	T	INCOMPLETE BLOCK READ
6Ah	00h	A	INFORMATIONAL, REFER TO LOG
48h	00h	DTLPWRSOMCAE	INITIATOR DETECTED ERROR MESSAGE RECEIVED
3Fh	03h	DTLPWRSOMCAE	INQUIRY DATA HAS CHANGED
44h	00h	DTLPWRSOMCAE	INTERNAL TARGET FAILURE
3Dh	00h	DTLPWRSOMCAE	INVALID BITS IN IDENTIFY MESSAGE
2Ch	02h	S	INVALID COMBINATION OF WINDOWS SPECIFIED
20h	00h	DTLPWRSOMCAE	INVALID COMMAND OPERATION CODE
21h	01h	DT WR OM	INVALID ELEMENT ADDRESS
24h	00h	DTLPWRSOMCAE	INVALID FIELD IN CDB
26h	00h	DTLPWRSOMCAE	INVALID FIELD IN PARAMETER LIST
49h	00h	DTLPWRSOMCAE	INVALID MESSAGE ERROR
64h	01h	R	INVALID PACKET SIZE

Table B-2 ASC and ASCQ Assignments (cont)

ACS	SCQ	DEVICE TYPE FIELD	DESCRIPTION
26h	04h	DTLPWRSOMCAE	INVALID RELEASE OF ACTIVE PERSISTENT RESERVATION
11h	05h	WR O L-EC	UNCORRECTABLE ERROR
60h	00h	S	LAMP FAILURE
5Bh	02h	DTLPWRSOM	LOG COUNTER AT MAXIMUM
5Bh	00h	DTLPWRSOM	LOG EXCEPTION
5Bh	03h	DTLPWRSOM	LOG LIST CODES EXHAUSTED
2Ah	02h	DTL WRSOMCAE	LOG PARAMETERS CHANGED
21h	00h	DT WR OM	LOGICAL BLOCK ADDRESS OUT OF RANGE
08h	03h	DT R OM	LOGICAL UNIT COMMUNICATION CRC ERROR (ULTRA-DMA/32)
08h	00h	DTL WRSOMCAE	LOGICAL UNIT COMMUNICATION FAILURE
08h	02h	DTL WRSOMCAE	LOGICAL UNIT COMMUNICATION PARITY ERROR
08h	01h	DTL WRSOMCAE	LOGICAL UNIT COMMUNICATION TIME-OUT
05h	00h	DTL WRSOMCAE	LOGICAL UNIT DOES NOT RESPOND TO SELECTION
4Ch	00h	DTLPWRSOMCAE	LOGICAL UNIT FAILED SELF-CONFIGURATION
3Eh	01h	A	LOGICAL UNIT FAILURE
3Eh	00h	DTLPWRSOMCAE	LOGICAL UNIT HAS NOT SELF-CONFIGURED YET
04h	01h	DTLPWRSOMCAE	LOGICAL UNIT IS IN PROCESS OF BECOMING READY
68h	00h	A	LOGICAL UNIT NOT CONFIGURED
04h	00h	DTLPWRSOMCAE	LOGICAL UNIT NOT READY, CAUSE NOT REPORTABLE
04h	04h	DTL O	LOGICAL UNIT NOT READY, FORMAT IN PROGRESS
04h	02h	DTLPWRSOMCAE	LOGICAL UNIT NOT READY, INITIALIZING CMD. REQUIRED
04h	08h	R	LOGICAL UNIT NOT READY, LONG WRITE IN PROGRESS
04h	03h	DTLPWRSOMCAE	LOGICAL UNIT NOT READY, MANUAL INTERVENTION REQUIRED
04h	07h	DTLPWRSOMCAE	LOGICAL UNIT NOT READY, OPERATION IN PROGRESS
04h	05h	A	LOGICAL UNIT NOT READY, REBUILD IN PROGRESS
04h	06h	A	LOGICAL UNIT NOT READY, RECALCULATION IN PROGRESS
25h	00h	DTLPWRSOMCAE	LOGICAL UNIT NOT SUPPORTED
27h	02h	DT W O	LOGICAL UNIT SOFTWARE WRITE PROTECTED
5Eh	00h	DTLPWRSO CA	LOW POWER CONDITION ON
15h	01h	DTL WRSOM	MECHANICAL POSITIONING ERROR
53h	00h	DTL WRSOM	MEDIA LOAD OR EJECT FAILED
3Bh	0Dh	DT WR OM	MEDIUM DESTINATION ELEMENT FULL
31h	00h	DT WR O	MEDIUM FORMAT CORRUPTED
3Bh	13h	DT WR OM	MEDIUM MAGAZINE INSERTED

Table B-2 ASC and ASCQ Assignments (cont)

ACS	SCQ	DEVICE TYPE FIELD	DESCRIPTION
3Bh	14h	DT WR OM	MEDIUM MAGAZINE LOCKED
3Bh	11h	DT WR OM	MEDIUM MAGAZINE NOT ACCESSIBLE
3Bh	12h	DT WR OM	MEDIUM MAGAZINE REMOVED
3Bh	15h	DT WR OM	MEDIUM MAGAZINE UNLOCKED
3Ah	00h	DTL WRSOM	MEDIUM NOT PRESENT
3Ah	01h	DT WR OM	MEDIUM NOT PRESENT - TRAY CLOSED
3Ah	02h	DT WR OM	MEDIUM NOT PRESENT - TRAY OPEN
53h	02h	DT WR OM	MEDIUM REMOVAL PREVENTED
3Bh	0Eh	DT WR OM	MEDIUM SOURCE ELEMENT EMPTY
43h	00h	DTLPWRSOMCAE	MESSAGE ERROR
3Fh	01h	DTLPWRSOMCAE	MICROCODE HAS BEEN CHANGED
1Dh	00h	D W O	MISCOMPARE DURING VERIFY OPERATION
11h	0Ah	DT O	MISCORRECTED ERROR
2Ah	01h	DTL WRSOMCAE	MODE PARAMETERS CHANGED
67h	03h	A	MODIFICATION OF LOGICAL UNIT FAILED
69h	01h	A	MULTIPLE LOGICAL UNIT FAILURES
07h	00h	DTL WRSOM	MULTIPLE PERIPHERAL DEVICES SELECTED
11h	03h	DT W SO	MULTIPLE READ ERRORS
00h	00h	DTLPWRSOMCAE	NO ADDITIONAL SENSE INFORMATION
00h	15h	R	NO CURRENT AUDIO STATUS TO RETURN
32h	00h	D W O	NO DEFECT SPARE LOCATION AVAILABLE
11h	09h	T	NO GAP FOUND
01h	00h	D W O	NO INDEX/SECTOR SIGNAL
06h	00h	D WR OM	NO REFERENCE POSITION FOUND
02h	00h	D WR OM	NO SEEK COMPLETE
03h	01h	T	NO WRITE CURRENT
28h	00h	DTLPWRSOMCAE	NOT READY TO READY CHANGE, MEDIUM MAY HAVE CHANGED
00h	16h	DTLPWRSOMCAE	OPERATION IN PROGRESS
5Ah	01h	DT WR OM	OPERATOR MEDIUM REMOVAL REQUEST
5Ah	00h	DTLPWRSOM	OPERATOR REQUEST OR STATE CHANGE INPUT
5Ah	03h	DT W O	OPERATOR SELECTED WRITE PERMIT
5Ah	02h	DT W O	OPERATOR SELECTED WRITE PROTECT
61h	02h	S	OUT OF FOCUS
4Eh	00h	DTLPWRSOMCAE	OVERLAPPED COMMANDS ATTEMPTED
2Dh	00h	T	OVERWRITE ERROR ON UPDATE IN PLACE
63h	01h	R	PACKET DOES NOT FIT IN AVAILABLE SPACE
3Bh	05h	L	PAPER JAM

Table B-2 ASC and ASCQ Assignments (cont)

ACS	SCQ	DEVICE TYPE FIELD	DESCRIPTION
1Ah	00h	DTLPWRSOMCAE	PARAMETER LIST LENGTH ERROR
26h	01h	DTLPWRSOMCAE	PARAMETER NOT SUPPORTED
26h	02h	DTLPWRSOMCAE	PARAMETER VALUE INVALID
2Ah	00h	DTL WRSOMCAE	PARAMETERS CHANGED
69h	02h	A	PARITY/DATA MISMATCH
1Fh	00h	D O	PARTIAL DEFECT LIST TRANSFER
03h	00h	DTL W SO	PERIPHERAL DEVICE WRITE FAULT
27h	05h	T	PERMANENT WRITE PROTECT
27h	04h	T	PERSISTENT WRITE PROTECT
50h	02h	T	POSITION ERROR RELATED TO TIMING
3Bh	0Ch	T S	POSITION PAST BEGINNING OF MEDIUM
3Bh	0Bh	S	POSITION PAST END OF MEDIUM
15h	02h	DT WR O	POSITIONING ERROR DETECTED BY READ OF MEDIUM
73h	01h	R	POWER CALIBRATION AREA ALMOST FULL
73h	03h	R	POWER CALIBRATION AREA ERROR
73h	02h	R	POWER CALIBRATION AREA IS FULL
29h	01h	DTLPWRSOMCAE	POWER ON OCCURRED
29h	00h	DTLPWRSOMCAE	POWER ON, RESET, OR BUS DEVICE RESET OCCURRED
42h	00h	D	POWER-ON OR SELF-TEST FAILURE (SHOULD USE 40 NN)
1Ch	01h	D O	PRIMARY DEFECT LIST NOT FOUND
73h	05h	R	PROGRAM MEMORY AREA IS FULL
73h	04h	R	PROGRAM MEMORY AREA UPDATE FAILURE
40h	00h	D	RAM FAILURE (SHOULD USE 40 NN)
15h	00h	DTL WRSOM	RANDOM POSITIONING ERROR
11h	11h	R	READ ERROR - LOSS OF STREAMING
3Bh	0Ah	S	READ PAST BEGINNING OF MEDIUM
3Bh	09h	S	READ PAST END OF MEDIUM
11h	01h	DT W SO	READ RETRIES EXHAUSTED
6Ch	00h	A	REBUILD FAILURE OCCURRED
6Dh	00h	A	RECALCULATE FAILURE OCCURRED
14h	01h	DT WR O	RECORD NOT FOUND
14h	06h	DT W O	RECORD NOT FOUND - DATA AUTO-REALLOCATED
14h	05h	DT W O	RECORD NOT FOUND - RECOMMEND REASSIGNMENT
14h	00h	DTL WRSO	RECORDED ENTITY NOT FOUND
18h	02h	D WR O	RECOVERED DATA - DATA AUTO-REALLOCATED
18h	05h	D WR O	RECOVERED DATA - RECOMMEND REASSIGNMENT
18h	06h	D WR O	RECOVERED DATA - RECOMMEND REWRITE

Table B-2 ASC and ASCQ Assignments (cont)

ACS	SCQ	DEVICE TYPE FIELD	DESCRIPTION
17h	05h	D WR O	RECOVERED DATA USING PREVIOUS SECTOR ID
18h	03h	R	RECOVERED DATA WITH CIRC
18h	07h	D W O	RECOVERED DATA WITH ECC - DATA REWRITTEN
18h	01h	D WR O	RECOVERED DATA WITH ERROR CORR. & RETRIES APPLIED
18h	00h	DT WR O	RECOVERED DATA WITH ERROR CORRECTION APPLIED
18h	04h	R	RECOVERED DATA WITH L-EC
17h	03h	DT WR O	RECOVERED DATA WITH NEGATIVE HEAD OFFSET
17h	00h	DT WRSO	RECOVERED DATA WITH NO ERROR CORRECTION APPLIED
17h	02h	DT WR O	RECOVERED DATA WITH POSITIVE HEAD OFFSET
17h	01h	DT WRSO	RECOVERED DATA WITH RETRIES
17h	04h	WR O	RECOVERED DATA WITH RETRIES AND/OR CIRC APPLIED
17h	06h	D W O	RECOVERED DATA WITHOUT ECC - DATA AUTO-REALLOCATED
17h	09h	D W O	RECOVERED DATA WITHOUT ECC - DATA REWRITTEN
17h	07h	D W O	RECOVERED DATA WITHOUT ECC - RECOMMEND REASSIGNMENT
17h	08h	D W O	RECOVERED DATA WITHOUT ECC - RECOMMEND REWRITE
1Eh	00h	D W O	RECOVERED ID WITH ECC CORRECTION
6Bh	01h	A	REDUNDANCY LEVEL GOT BETTER
6Bh	02h	A	REDUNDANCY LEVEL GOT WORSE
67h	05h	A	REMOVE OF LOGICAL UNIT FAILED
3Bh	08h	T	REPOSITION ERROR
2Ah	03h	DTLPWRSOMCAE	RESERVATIONS PREEMPTED
36h	00h	L	RIBBON, INK, OR TONER FAILURE
37h	00h	DTL WRSOMCAE	ROUNDED PARAMETER
5Ch	00h	D O RPL	STATUS CHANGE
39h	00h	DTL WRSOMCAE	SAVING PARAMETERS NOT SUPPORTED
62h	00h	S	SCAN HEAD POSITIONING ERROR
29h	02h	DTLPWRSOMCAE	SCSI BUS RESET OCCURRED
47h	00h	DTLPWRSOMCAE	SCSI PARITY ERROR
54h	00h	P	SCSI TO HOST SYSTEM INTERFACE FAILURE
45h	00h	DTLPWRSOMCAE	SELECT OR RESELECT FAILURE
3Bh	00h	TL	SEQUENTIAL POSITIONING ERROR
72h	00h	R	SESSION FIXATION ERROR

Table B-2 ASC and ASCQ Assignments (cont)

ACS	SCQ	DEVICE TYPE FIELD	DESCRIPTION
72h	03h	R	SESSION FIXATION ERROR - INCOMPLETE TRACK IN SESSION
72h	01h	R	SESSION FIXATION ERROR WRITING LEAD-IN
72h	02h	R	SESSION FIXATION ERROR WRITING LEAD-OUT
00h	03h	T	SETMARK DETECTED
3Bh	04h	L	SLEW FAILURE
09h	03h	WR O	SPINDLE SERVO FAILURE
5Ch	02h	D O	SPINDLES NOT SYNCHRONIZED
5Ch	01h	D O	SPINDLES SYNCHRONIZED
5Eh	04h	DTLPWRSO CA	STANDBY CONDITION ACTIVATED BY COMMAND
5Eh	02h	DTLPWRSO CA	STANDBY CONDITION ACTIVATED BY TIMER
6Bh	00h	A	STATE CHANGE HAS OCCURRED
1Bh	00h	DTLPWRSOMCAE	SYNCHRONOUS DATA TRANSFER ERROR
55h	01h	D O	SYSTEM BUFFER FULL
55h	00h	P	SYSTEM RESOURCE FAILURE
4Dh	NNh	DTLPWRSOMCAE	TAGGED OVERLAPPED COMMANDS (NN = QUEUE TAG)
33h	00h	T	TAPE LENGTH ERROR
3Bh	03h	L	TAPE OR ELECTRONIC VERTICAL FORMS UNIT NOT READY
3Bh	01h	T	TAPE POSITION ERROR AT BEGINNING-OF-MEDIUM
3Bh	02h	T	TAPE POSITION ERROR AT END-OF-MEDIUM
3Fh	00h	DTLPWRSOMCAE	TARGET OPERATING CONDITIONS HAVE CHANGED
5Bh	01h	DTLPWRSOM	THRESHOLD CONDITION MET
26h	03h	DTLPWRSOMCAE	THRESHOLD PARAMETERS NOT SUPPORTED
3Eh	02h	A	TIMEOUT ON LOGICAL UNIT
2Ch	01h	S	TOO MANY WINDOWS SPECIFIED
09h	00h	DT WR O	TRACK FOLLOWING ERROR
09h	01h	WR O	TRACKING SERVO FAILURE
61h	01h	S	UNABLE TO ACQUIRE VIDEO
57h	00h	R	UNABLE TO RECOVER TABLE-OF-CONTENTS
53h	01h	T	UNLOAD TAPE FAILURE
11h	00h	DT WRSO	UNRECOVERED READ ERROR
11h	04h	D W O	UNRECOVERED READ ERROR - AUTO REALLOCATE FAILED
11h	0Bh	D W O	UNRECOVERED READ ERROR - RECOMMEND REASSIGNMENT
11h	0Ch	D W O	UNRECOVERED READ ERROR - RECOMMEND REWRITE THE DATA
46h	00h	DTLPWRSOMC	UNSUCCESSFUL SOFT RESET

Table B-2 ASC and ASCQ Assignments (cont)

ACS	SCQ	DEVICE TYPE FIELD	DESCRIPTION
35h	01h	DTLPWRSOMCAE	UNSUPPORTED ENCLOSURE FUNCTION
59h	00h	O	UPDATED BLOCK READ
61h	00h	S	VIDEO ACQUISITION ERROR
65h	00h	DTLPWRSOMCAE	VOLTAGE FAULT
0Bh	00h	DTLPWRSOMCAE	WARNING
0Bh	02h	DTLPWRSOMCAE	WARNING - ENCLOSURE DEGRADED
0Bh	01h	DTLPWRSOMCAE	WARNING - SPECIFIED TEMPERATURE EXCEEDED
50h	00h	T	WRITE APPEND ERROR
50h	01h	T	WRITE APPEND POSITION ERROR
0Ch	00h	T RS	WRITE ERROR
0Ch	02h	D W O	WRITE ERROR - AUTO REALLOCATION FAILED
0Ch	09h	R	WRITE ERROR - LOSS OF STREAMING
0Ch	0Ah	R	WRITE ERROR - PADDING BLOCKS ADDED
0Ch	03h	D W O	WRITE ERROR - RECOMMEND REASSIGNMENT
0Ch	01h		WRITE ERROR - RECOVERED WITH AUTO REALLOCATION
0Ch	08h	R	WRITE ERROR - RECOVERY FAILED
0Ch	07h	R	WRITE ERROR - RECOVERY NEEDED
27h	00h	DT W O	WRITE PROTECTED
80h	xxh		
Through		Vendor-specific.	
FFh	xxh		
xxh	80h		
Through		Vendor-specific QUALIFICATION OF STANDARD ASC	
xxh	FFh		
NOTE: All codes not shown are reserved.			