

## BMC Log Service Translation Guide

# IBM x346

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# 1 Introduction

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## 1.1 Purpose

This document is intended for IBM Service and Support for the following IBM products:

- x346 all models

Since the BMC code base is common for all of these products, a single document applies. This document specifically deals with situations in which it is required that the BMC IPMI log is the only available source of machine log information. Since this log is designed to the industry standard IPMI specification, it is not formatted in a way that yields explicit service information. This document provides limited translation capabilities for trained service personnel.

When to use BMC logs:

- When a Service Processor is not present in the system, or the Service Processor has failed.
- When internal Lightpath LEDs are not readily accessible
- More Lightpath information may be needed; for example in the following cases:
  - NMI LED lit
  - PLANAR BRD LED lit
- The system is hung.
- The first part replaced did not fix the problem.

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## 1.2 Viewing BMC logs

There are currently three different methods for BMC System Event Log (SEL) retrieval; BIOS SETUP/CONFIGURATION, DSA and SMBridge. This is important because each of these retrieval methods displays the SEL in a different format. Another very important point is that the majority of data in the SEL is of an informational nature and not useful for problem determination. Once an error entry is identified, this document will provide a look up for a suggested service action plan. This table lookup will be similar to looking up a POST error code in the Hardware Maintenance Manual (HMM) or Problem Determination Guide.

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## 1.3 BIOS SETUP/CONFIGURATION VIEW

Let's look at a single SEL entry using the BIOS SETUP/CONFIGURATION view as shown below. This view can be accessed under SETUP/ ADVANCED SETUP / BMC SETTINGS / BMC SYSTEM EVENT LOG.

Three key fields are: **Entry Number**, **Entry Details** and **Sensor Number**.

Noting that there can be up to 512 entries in the SEL, the **Entry Number** shows where we are in the log and helps from a navigation perspective. SEL entries also occur in chronological order, which is helpful to know when the BMC displays an uncalibrated timestamp due to its lack of a real time clock. The timestamp below is uncalibrated because the year is 1970.

The second field of interest is the **Entry Details**. The Entry Details field is important because in the majority of cases, it will help classify the log entry is an informational or a critical error. The following key words in the Entry Details field can be used to quickly identify an informational entry:

- Deasserted
- Presence
- Inserted/ Present
- Removed / Absent
- On / Off
- Reset

Notice that in the example below, that none of these key words are shown. At this point we cannot conclude this is an informational message. We must now move to the final step in our classification algorithm, i.e. looking at the Sensor Number.

```

+-----+
|                                     |
|                               BMC System Event Log                       |
|-----+-----+
|  Get Next Entry                                                           |
|  Get Previous Entry                                                      |
|  Clear BMC SEL                                                           |
|  |                                                                       |
|  Entry Number= 00001 / 00232                                           |
|  Record ID= 0001                                                         |
|  Record Type= 02                                                         |
|  Timestamp= 1970/01/14 17:44:40                                         |
|  Entry Details: Generator ID= 0020                                   |
|  |                                                                       |
|  |                               Sensor Type= 09                         |
|  |                               Assertion Event                          |
|  |                               Power Unit                               |
|  |                               OEM Specific Type                       |
|  |                                                                       |
|  |                               Sensor Number= A8                       |
|  |                               Event Direction/Type= 71                |
|  |                                                                       |
|  |                               Event Data= A1 20 00                    |
|-----+-----+

```

Figure 1-1, SEL entry for BIOS SETUP/CONFIGURATON

In this case we see that the sensor number is A8. When using the BIOS CONFIGURATION/SETUP view, all sensor numbers are shown in hexadecimal format so A8 is more correctly written as A8h. We will now check to see if the sensor number A8h lies within the following error ranges of hexadecimal values:

- 11h - 15h
- 17h - 1Ch
- 20h - 25h
- 40h - 4Bh
- 50h - 5Bh
- 60h - 65h
- 70h - 74h

80h - 8Ch  
90h - 99h  
B8h - BBh  
C0h - C9h

In comparing the ranges, we see that A8h is not listed in the range of errors, so we can classify this entry as informational. Had this been an error entry we could have looked up the suggested service action by using the Sensor Number A8h as the error code.

## 1.4 SMBridge View

So far our classification algorithm for each entry has been:

- 1) Look at the Entry Details field and go to the final step, (step 2) if no keyword is found.
- 2) Compare the Sensor Number with known Sensor Number error ranges.

This same algorithm will now be applied to the SMBridge view. In looking at Figure 2-2, we see that the SMBridge view has very similar information to the BIOS SETUT/CONFIGURATION view. Our key fields, Entry Number, Entry Details, and Sensor Number are still shown but this time the information in a more tabular form. Since the key fields are the same, the only real difference has to do with the sensor number which is displayed as an integer value preceded by a # sign. Therefore to make our classification algorithm work, we need only to look up the error sensor number in integer range table.

The integer sensor number error ranges are as shown:

17 - 21  
23 - 29  
32 - 37  
64 - 76  
80 - 92  
96 - 101  
112 - 116  
128 - 141  
144 - 153  
200 - 204  
208 - 217

| Entry Number | Timestamp            | Sensor Number | Entry Details | Entry Details (continued)                           |
|--------------|----------------------|---------------|---------------|---|
| 1=           | 2005/02/02 16:46:42, | #182          | OEM Reserved, | Upper Non-critical - going high (deassertion event) |
| 2=           | 2005/02/02 16:46:42, | #182          | OEM Reserved, | Upper Critical - going high (deassertion event)     |
| 3=           | 2005/02/02 16:47:40, | #168          | Power Unit,   | OEM   |
| 4=           | 1970/01/01 00:00:04, | #38           | Power Supply, | Presence detected                                   |
| 5=           | 1970/01/01 00:00:04, | #39           | Power Supply, | Presence detected                                   |
| 6=           | 1970/01/01 00:00:04, | #144          | Processor,    | Processor Presence detected                         |
| 10=          | 1970/01/01 00:00:08, | #80           | Fan,          | Device Inserted/Device Present                      |
| 11=          | 1970/01/01 00:00:08, | #82           | Fan,          | Device Inserted/Device Present                      |
| 12=          | 1970/01/01 00:00:08, | #84           | Fan,          | Device Inserted/Device Present                      |
| 13=          | 1970/01/01 00:00:08, | #86           | Fan,          | Device Inserted/Device Present                      |
| 14=          | 1970/01/01 00:00:09, | #131          | Cable,        | Device Inserted/Device Present                      |
| 15=          | 1970/01/01 00:00:09, | #134          | Cable,        | Device Inserted/Device Present                      |
| 19=          | 1970/01/01 00:00:10, | #169          | Power Unit,   | OEM   |

|     |                      |      |               |                                |
|-----|----------------------|------|---------------|--------------------------------|
| 20= | 1970/01/01 00:00:10, | #173 | Cable,        | Device Inserted/Device Present |
| 21= | 1970/01/01 00:00:10, | #205 | Cable,        | State Deasserted               |
| 22= | 1970/01/01 00:00:11, | #112 | Power Supply, | Presence detected              |
| 23= | 1970/01/01 00:00:12, | #81  | Fan,          | Device Inserted/Device Present |
| 24= | 1970/01/01 00:00:12, | #83  | Fan,          | Device Inserted/Device Present |
| 25= | 1970/01/01 00:00:12, | #85  | Fan,          | Device Inserted/Device Present |
| 26= | 1970/01/01 00:00:12, | #87  | Fan,          | Device Inserted/Device Present |
| 27= | 1970/01/01 00:00:13, | #140 | Add-in Card,  | Device Removed/Device Absent   |
| 28= | 1970/01/01 00:00:13, | #132 | Cable,        | Device Inserted/Device Present |
| 29= | 1970/01/01 00:00:13, | #133 | Cable,        | Device Inserted/Device Present |
| 30= | 1970/01/01 00:00:14, | #160 | Add-in Card,  | Device Inserted/Device Present |
| 31= | 1970/01/01 00:00:14, | #162 | Add-in Card,  | Device Removed/Device Absent   |
| 32= | 1970/01/01 00:00:14, | #168 | Power Unit,   | OEM                            |
| 33= | 1970/01/01 00:00:15, | #169 | Power Unit,   | OEM                            |
| 34= | 1970/01/01 00:00:15, | #174 | Cable,        | Device Inserted/Device Present |

**Figure 1-2, SEL, SMBridge View**

## 1.5 DSA View

From figure 2-3, you will notice that the DSA view is slightly different. In an effort to make the log more readable, the Sensor Number has actually been looked up and translated into Sensor Information. If the Sensor Type and Message column look familiar, it's because these columns contain the same information as the Entry Details field. So from our classification algorithm perspective, the Step 1 keyword search will remain unchanged. If no keyword is found, use the Sensor Information to look up the classification and suggested service action.


| Dynamic System Analysis |                    |  |                                   |
|-------------------------|--------------------|---|-----------------------------------|
| IPMI Event              |                    |   |                                   |
| Time Stamp              | SensorType         | SensorInformation   | Message                           |
| 02/13/2005 16:06:31     | Power Unit         | On/Off Cause  |                                   |
| 02/13/2005 16:06:33     | Power Unit         | Sys pwr monitor   | Power Off / Power Down.           |
| 02/13/2005 16:06:33     | Power Unit         | On/Off Cause  |                                   |
| 02/13/2005 16:06:34     | Power Unit         | Sys pwr monitor   | Power Off / Power Down.           |
| 02/13/2005 16:09:36     | Power Unit         | Sys pwr monitor   | Power Off / Power Down.           |
| 02/13/2005 16:09:37     | Power Unit         | On/Off Cause  |                                   |
| 02/13/2005 16:15:55     | Power Unit         | Sys pwr monitor   | Power Off / Power Down.           |
| 02/13/2005 16:15:56     | Power Unit         | On/Off Cause  |                                   |
| 02/13/2005 16:16:57     | Power Unit         | Sys pwr monitor   | Power Off / Power Down.           |
| 02/13/2005 16:16:58     | Power Unit         | On/Off Cause  |                                   |
| 02/13/2005 16:28:14     | Power Unit         | Reset Cause   |                                   |
| 02/14/2005 08:14:24     | Power Unit         | Sys pwr monitor   | Power Off / Power Down.           |
| 02/14/2005 08:14:25     | Power Unit         | On/Off Cause  |                                   |
| 02/14/2005 08:14:32     | Power Unit         | Sys pwr monitor   | Power Off / Power Down.           |
| 02/14/2005 08:14:33     | Power Unit         | On/Off Cause  |                                   |
| 02/14/2005 08:21:28     | Power Unit         | Reset Cause   |                                   |
| 01/01/1970 00:00:04     | Power Supply       | VRM 3 Status  | Presence detected.                |
| 01/01/1970 00:00:04     | Power Supply       | VRM 4 Status  | Presence detected.                |
| 01/01/1970 00:00:04     | Processor          | CPU 1 Status  | Processor Presence detected.      |
| 01/01/1970 00:00:04     | Power Supply       | VRM 3 Status  | Presence detected.                |
| 01/01/1970 00:00:04     | Power Supply       | VRM 4 Status  | Presence detected.                |
| 01/01/1970 00:00:04     | Processor          | CPU 1 Status  | Processor Presence detected.      |
| 01/01/1970 00:00:08     | Fan                | Fan 1 Presence  | Device Inserted / Device Present. |
| 01/01/1970 00:00:08     | Fan                | Fan 3 Presence  | Device Inserted / Device Present. |
| 01/01/1970 00:00:08     | Fan                | Fan 5 Presence  | Device Inserted / Device Present. |
| 01/01/1970 00:00:08     | Fan                | Fan 7 Presence  | Device Inserted / Device Present. |
| 01/01/1970 00:00:09     | Cable/Interconnect | FP Cable Detect   | Device Inserted / Device Present. |
| 01/01/1970 00:00:09     | Cable/Interconnect | HP Switch Detect  | Device Inserted / Device Present. |
| 01/01/1970 00:00:09     | Add-in Card        | Mem2 Detect   | Device Removed / Device Absent.   |
| 01/01/1970 00:00:10     | Add-in Card        | Mem4 Detect   | Device Removed / Device Absent.   |

Figure 1-3 SEL, DSA View

## 1.6 LED Control x346

Error! Reference source not found.describes the LED population on the x346.

| Bit | LED Set 1    | x346 |
|-----|--------------|------|
| 0   | Fault        | ✓    |
| 1   | Info         | ✓    |
| 2   | CPU          | ✓    |
| 3   | VRM          | ✓    |
| 4   | Power Supply |      |
| 5   | DASD         | ✓    |
| 6   | Fan          | ✓    |
| 7   | DIMM         | ✓    |

| Bit | LED Set 2         | x346 |
|-----|-------------------|------|
| 0   | Log               |      |
| 1   | NMI               | ✓    |
| 2   | Non Redundant     |      |
| 3   | Over Spec         | ✓    |
| 4   | Over Temp         | ✓    |
| 5   | Diagnostic Card   |      |
| 6   | Service Processor | ✓    |
| 7   | Post OK           |      |

| Bit | LED Set 3      | X346 |
|-----|----------------|------|
| 0   | Identification | ✓    |
| 1   | CPU Mismatch   | ✓    |
| 2   | Any PCI        |      |
| 3   | Activity       |      |
| 4   | Non Optimal    |      |
| 5   | Select KVM     |      |
| 6   | Select CD      |      |
| 7   |                |      |

| Bit | LED Set 4 | X346 |
|-----|-----------|------|
| 0   | CPU 1     | ✓    |
| 1   | CPU 2     | ✓    |
| 2   | CPU 3     |      |
| 3   | CPU 4     |      |
| 4   | CPU 5     |      |
| 5   | CPU 6     |      |
| 6   | CPU 7     |      |
| 7   | CPU 8     |      |

| Bit | LED Set 5 | x346 |
|-----|-----------|------|
| 0   | VRM 1     | ✓    |
| 1   | VRM 2     | ✓    |
| 2   | VRM 3     |      |
| 3   | VRM 4     |      |
| 4   | VRM 5     |      |
| 5   | VRM 6     |      |
| 6   | VRM 7     |      |
| 7   | VRM 8     |      |

| Bit | LED Set 6      | X346 |
|-----|----------------|------|
| 0   | Power Supply 1 | ✓    |
| 1   | Power Supply 2 | ✓    |
| 2   | Power Supply 3 |      |
| 3   | Power Supply 4 |      |
| 4   | DASD 1         |      |
| 5   | DASD2          |      |
| 6   |                |      |
| 7   |                |      |

| Bit | LED Set 7 | x346 |
|-----|-----------|------|
| 0   | Fan 1     | ✓    |
| 1   | Fan 2     | ✓    |
| 2   | Fan 3     | ✓    |
| 3   | Fan 4     | ✓    |
| 4   | Fan 5     | ✓    |
| 5   | Fan 6     | ✓    |
| 6   | Fan 7     | ✓    |
| 7   | Fan 8     | ✓    |

| Bit | LED Set 8 | x346 |
|-----|-----------|------|
| 0   | Fan 9     | ✓    |
| 1   | Fan 10    | ✓    |
| 2   | Fan 11    | ✓    |
| 3   | Fan 12    | ✓    |
| 4   | Fan 13    |      |
| 5   | Fan 14    |      |
| 6   | Fan 15    |      |
| 7   | Fan 16    |      |

| Bit | LED Set 9 | x346 |
|-----|-----------|------|
| 0   | DIMM 1    | ✓    |
| 1   | DIMM 2    | ✓    |
| 2   | DIMM 3    | ✓    |
| 3   | DIMM 4    | ✓    |
| 4   | DIMM 5    | ✓    |
| 5   | DIMM 6    | ✓    |
| 6   | DIMM 7    | ✓    |
| 7   | DIMM 8    | ✓    |

| Bit | LED Set 10 | x346 |
|-----|------------|------|
| 0   | DIMM 9     |      |
| 1   | DIMM 10    |      |
| 2   | DIMM 11    |      |
| 3   | DIMM 12    |      |
| 4   | DIMM 13    |      |
| 5   | DIMM 14    |      |
| 6   | DIMM 15    |      |
| 7   | DIMM 16    |      |

| Bit | LED Set 11 | X346 |
|-----|------------|------|
| 0   | PCI 1      |      |
| 1   | PCI 2      |      |
| 2   | PCI 3      |      |
| 3   | PCI 4      |      |



**X346 BMC\_Log\_Spec**

Owner: R. Lin  
Dept: xSeries Development  
Last Revision: 09/15/05 2:47 PM

|   |       |  |
|---|-------|--|
| 4 | PCI 5 |  |
| 5 |       |  |
| 6 |       |  |
| 7 |       |  |

## 2 Core Sensor Table

Core sensors from BMC are shown below.

Table 2-1: BMC Core Sensors

| Sensor Name       | No. | Sensor Type | Reading Type | Logged Assertions   | Logged De-Assertions | Event or Error | Repair Actions |
|-------------------|-----|-------------|--------------|---|----------------------|----------------|----------------|
| Power Unit Status | 01h | 09h         | 6Fh          | 0x00 – Power Off<br>0x04 – AC Lost  | 0x00 – Power Off     | info           |                |
| BMC Watchdog      | 03h | 23h         | 6Fh          | 0x00 – Timer Expired, status only<br>0x01 – Hard Reset<br>0x02 – Power Down<br>0x03 – Power Cycle |                      | info           |                |
| SEL Full          |     | B6h         | 01h          | 0x07 – over 75% full<br>0x09 – over 90% full<br>0x0B – 100% full                                  |                      | info           |                |

## 3 Main Sensor Table

Thresholds for threshold based sensors are noted as shown below. Note that only a few of the assertions are actual errors. The repair actions recommendations are only for use when the sensor logs an error condition.

|                             |
|-----------------------------|
| UNC = Upper Non-Critical    |
| UC = Upper Critical         |
| UNR = Upper Non-Recoverable |
| LNC = Lower Non-Critical    |
| LC = Lower Critical         |
| LNR = Lower Non-Recoverable |

Table 3-1: Sensors

| Sensor Name  | No. | Sensor Type | Reading Type | Logged Assertions | Logged De-Assertions | Event or Error | Repair Actions   |
|--------------|-----|-------------|--------------|-------------------|----------------------|----------------|--|
| Planar 1.25V | 11h | 02h         | 01h          | LC, UC            | LC, UC               | Error          | <p>1.25Volts powers the ServeRAID 7K.<br/>Procedure:<br/>If ServeRAID 7K Installed, Remove ServeRAID 7K adapter, Retest system for same 1.25V Failure.</p> <p>Was a 1.25V Failure Logged after the retest? ? If "No" go to Step 1. If "Yes" go to Step 2.</p> <p>Step 1: Replace Defective ServeRAID 7K<br/>Step 2: Check this log for a 12V A Failure Entry. Was a 12V A Failure Logged? If "No" go to step 3, if "Yes" GO to 12V A action plan.<br/>Step 3: Replace System Board</p> |
| Planar 1.3V  | 12h | 02h         | 01h          | LC, UC            | LC, UC               | Error          | <p>Was a 2.5V Failure logged?<br/>No: Replace System Board<br/>Yes: GO to 2.5V action plan</p>   |
| Planar 1.5V  | 13h | 02h         | 01h          | LC, UC            | LC, UC               | Error          | <p>Was a 12V B Failure logged?<br/>No: Replace System Board<br/>Yes: GO to 12V B action plan</p>   |
| Planar 1.8V  | 14h | 02h         | 01h          | LC, UC            | LC, UC               | Error          | <p><i>1.8 Volts powers the DDR2 Memory and the System Board</i><br/>Procedure:<br/>Remove all memory DIMMs.<br/>Retest System for same 1.8v failure.</p>   |

| Sensor Name | No. | Sensor Type | Reading Type | Logged Assertions | Logged De-Assertions | Event or Error | Repair Actions   |
|-------------|-----|-------------|--------------|-------------------|----------------------|----------------|--|
| Planar 2.5V | 15h | 02h         | 01h          | LC, UC            | LC, UC               | Error          | <p>1.8V Failure Logged ? If "No" go to Step 1. If "Yes" go to Step 2.</p> <p><i>Step 1:</i> Defective Memory DIMM</p> <p>Install one DIMM at a time. Repeat test to isolate defective DIMM.</p> <p><i>Step 2:</i> With Memory DIMMs removed:</p> <p>Check the log for a 12V A failure entry. ? If "No" go to Step 3. If "Yes" go to 12V A Action plan.</p> <p><i>Step 3.</i> Replace System Board.</p> <p>2.5Volts powers the ServeRAID 7K and System Board.</p> <p>Procedure:</p> <p>If ServeRAID 7K installed, Remove ServeRAID 7K adapter, Retest system for same 2.5V Failure.</p> <p>Was a 2.5V Failure Logged after the retest? ? If "No" go to Step 1. If "Yes" go to Step 2.</p> <p>Step 1: Replace Defective ServeRAID 7K.</p> <p>Step 2: Check this log for a 12V A Failure Entry. Was a 12V A Failure Logged? If "No" go to step 3. If "YES" GO to 12V A action plan.</p> <p>Step3: Replace System Board.</p> |
| Planar 5V   | 17h | 02h         | 01h          | LC, UC            | LC, UC               | Error          | <p><i>5 Volts is generated from Power Backplane. 5 Volts powers the PCI, PCI-X, PCI-E Slots, USB, IDE CDROM, Tape, and DASD Backplane.</i></p> <p>Procedure:</p> <p>Remove all I/O devices powered by 5 Volts to isolate the failure to a FRU. Retest system for same 5V failure.</p>  |

| Sensor Name  | No. | Sensor Type | Reading Type | Logged Assertions | Logged De-Assertions | Event or Error | Repair Actions  |
|--------------|-----|-------------|--------------|-------------------|----------------------|----------------|---|
|              |     |             |              |                   |                      |                | <p>Was a 5V failure logged after the retest ? If "No" go to Step 1. If "Yes" go to Step 2.</p> <p><i>Step 1:</i> Defective I/O device. Install one device at a time. Repeat test to isolate defective device.</p> <p><i>Step 2:</i> Replace power backplane.</p> <p>Retest , on error, replace system board.</p>  |
| Planar 12V A | 18h | 02h         | 01h          | LC, UC            | LC, UC               | Error          | <p><i>12Volt_A powers powers the System Board and Fans 1,2,7 &amp; 8 Is Overspec Diagnostic LED illuminated on the Info Panel?</i></p> <p>If "yes" A 12V_A fault to ground has occurred. Go to step Y1. If "No" , go to step N1.</p> <p><i>Step Y1:</i> Removed Fan 1, 2,7 &amp; 8. Power unit on repeat test. If failure still occurs Replace planar</p> <p><i>If "No" failure, do step Y2</i></p> <p><i>Step Y2:</i> Re-Install Fan one at a time, Repeat test to isolate defective Fan. Replace defective fan.</p> <p><i>Step N1:</i> Replace Power Supply</p> <p>Power unit on repeat test. If failure still occurs Step N2</p> <p><i>Step N2:</i> Replace Power Backplane</p> <p>Power unit on repeat test. If failure still occurs Step N3</p> <p><i>Step N3:</i> Replace System Board.</p> |

| Sensor Name  | No. | Sensor Type | Reading Type | Logged Assertions | Logged De-Assertions | Event or Error | Repair Actions   |
|--------------|-----|-------------|--------------|-------------------|----------------------|----------------|--|
| Planar 12V B | 19h | 02h         | 01h          | LC, UC            | LC, UC               | Error          | <p>12Volt_B powers VRM2, CPU 2, System Board, and Fans 5,6,11 &amp;12.</p> <p>Is Overspec LED illuminated on the Diagnostic Info Panel? If yes, A 12V_B fault to Ground has occurred. go to step Y1. If "No", go to step N1.</p> <p><i>Step Y1: Remove Fans 5, 6, 11, 12, Pluggable VRM and CPU 2 to help isolate the fault. Retest, If error still occurs, replace system board. If "No" go to step Y2.</i></p> <p><i>Step Y2: Re-Install Fan one at a time, Repeat test to isolate defective Fan. Replace defective fan.</i></p> <p><i>Step Y3. Re-install VRM2 and CPU 2. Retest. If error still occurs, replace VRM2.</i></p> <p><i>Step N1: Replace Power Supply</i></p> <p>Power unit on repeat test. If failure still occurs Step N2</p> <p><i>Step N2: Replace Power Backplane</i></p> <p>Power unit on repeat test. If failure still occurs Step N3</p> <p><i>Step N3: Replace System Board</i></p> |
| Planar 12V C | 1Ah | 02h         | 01h          | LC, UC            | LC, UC               | Error          | <p>12Volt_C powers the CPU1, system board, and Fans 3, 4, 9, 10.</p> <p>Is Overspec LED illuminated on the Diagnostic Info Panel? If yes, A 12V_C fault to Ground has occurred. go to step Y1. If "No", go to step N1.</p> <p><i>Step Y1: Remove Fans 3, 4, 9, 10, CPU1 to help isolate the fault. Retest, If error still occurs, replace system board. If "No" go</i></p>   |

| Sensor Name | No. | Sensor Type | Reading Type | Logged Assertions | Logged De-Assertions | Event or Error | Repair Actions   |
|-------------|-----|-------------|--------------|-------------------|----------------------|----------------|--|
|             |     |             |              |                   |                      |                | <p>to step Y2.</p> <p><i>Step Y2: Re-Install Fan one at a time, Repeat test to isolate defective Fan. Replace defective fan. If Fans are fine and error still occurs, replace system board.</i></p> <p><i>Step Y3. Re-install CPU1. Retest. If error still occurs, replace CPU1.</i></p> <p><i>Step N1: Replace Power Supply</i></p> <p>Power unit on repeat test. If failure still occurs Step N2</p> <p><i>Step N2: Replace Power Backplane</i></p> <p>Power unit on repeat test. If failure still occurs Step N3</p> <p><i>Step N3: Replace System Board.</i></p> |
| Planar -12V | 1Bh | 02h         | 01h          | LC, UC            | LC, UC               | Error          | <p><i>The -12Volts is generated from the power backplane. Goes to PCI, PCI-x and PCI-express connectors.</i></p> <p>Procedure:</p> <p>Remove all PCI adapters. Retest system for same -12V failure.</p> <p>Was a -12 V failure logged after the retest ? If "No" go to Step 1. If "Yes" go to Step 2.</p> <p><i>Step 1: Defective PCI Adapter</i></p> <p>Install one adapter at a time. Repeat test to isolate defective adapter.</p> <p><i>Step 2: Replace power backplane.</i></p>   |

| Sensor Name     | No. | Sensor Type | Reading Type | Logged Assertions                              | Logged De-Assertions | Event or Error | Repair Actions  |
|-----------------|-----|-------------|--------------|--|----------------------|----------------|---|
|                 |     |             |              |  |                      |                | Power unit on repeat test. If failure still occurs Step 3<br><br>Step 3: Replace System Board   |
| Planar VBAT     | 1Ch | 02h         | 01h          | LC, UC   | LC, UC               | Error          | <i>Planar Battery Failure</i><br>1. <i>Replace planar Battery.</i><br>Power unit on repeat test. If failure still occurs Step 2.<br>2. <i>Replace planar</i>  |
| Power 3V Fault  | 20h | 09h         | 03h          | 00h – State Deasserted<br>01h – State Asserted |                      | Error          | <i>The 3Volts is generated from the power backplane<br/>Goes to PCI, PCI-x and PCI-express connectors and planar logic.</i><br><br>Procedure:<br><br>Remove all PCI adapters. Retest system for same 3V failure.<br><br>Was a 3V failure logged after the retest ? If “No” go to Step 1. If “Yes”go to Step 2.<br><br>Step 1: Defective PCI Adapter<br><br>Install one adapter at a time. Repeat test to isolate defective adapter.<br><br>Step 2: Replace System Board |
| Power 5V Fault  | 21h | 09h         | 03h          | 00h – State Deasserted<br>01h – State Asserted |                      | Error          | Same As 5 Volt Procedure  |
| Power 12V Fault | 22h | 09h         | 03h          | 00h – State Deasserted<br>01h – State Asserted |                      | Error          | <i>This is really power_good which comes from the Power Backplane</i><br><br>Procedure:<br><br>Step 1. Check this log for the specific voltage that has failed and follow that action plan<br><br>Step 2. Perform a system teardown to  |



| Sensor Name  | No. | Sensor Type | Reading Type | Logged Assertions                              | Logged De-Assertions | Event or Error | Repair Actions   |
|--------------|-----|-------------|--------------|--|----------------------|----------------|--|
|              |     |             |              |  |                      |                | minimum configuration.<br><br>Minimum Configuration:<br>Minimum power configuration consists of: Fans, the On/Off operator information panel, CPU1, Power Backplane and one power supply. All Memory DIMMs should be removed.<br><br>Step 3. Power system on with this minimum configuration.<br><br>Does system POST with memory beep errors, and remain powered On?<br><br>If Yes: Add removed components back in one at a time using BIOS POST's inability to run or provide beep codes to determine the faulty device.<br><br>If No:<br>1. Replace system Board and test<br>2. Replace Power Supply and test<br>3. Replace power backplane and test<br>4. Replace CPU1 |
| Planar Fault | 23h | 09h         | 03h          | 00h – State Deasserted<br>01h – State Asserted |                      | Error          | <i>No Power Good, DC Voltage Failure.</i><br>Procedure:<br><br>Step 1. Check this log for the specific voltage that has failed and follow that action plan<br><br>Step 2. Perform a system teardown to minimum configuration.<br><br>Minimum Configuration:  |

| Sensor Name  | No. | Sensor Type | Reading Type | Logged Assertions                                     | Logged De-Assertions                                  | Event or Error | Repair Actions  |
|--------------|-----|-------------|--------------|---|---|----------------|---|
|              |     |             |              |   |   |                | <p>Minimum power configuration consists of: Fans, the On/Off operator information panel, CPU1, Power Backplane and one power supply. Both PCI riser boards/cages should be removed. SCSI Backplane power cable and SCSI signal cable should be removed. All Memory DIMMs should be removed.</p> <p>Step 3. Power system on with this minimum configuration.</p> <p>Does system POST with memory beep errors, and remain powered On?</p> <p>If Yes: Add removed components back in one at a time using BIOS POST's inability to run or provide beep codes to determine the faulty device.</p> <p>If No:</p> <ol style="list-style-type: none"> <li>1. Replace system Board and test</li> <li>2. Replace Power Supply and test</li> <li>3. Replace power backplane and test</li> <li>4. Replace CPU1</li> </ol> |
| VRM 1 Status | 24h | 08h         | 6Fh          | 01h – Power Supply Failure                            | 01h – Power Supply Failure                            | Error          | <p><i>The VRM error signal monitors the output voltage is out of tolerance</i></p> <ol style="list-style-type: none"> <li>1. Replace system board and recheck for error.</li> <li>2. Replace CPU 1</li> </ol>   |
| VRM 2 Status | 25h | 08h         | 6Fh          | 00h – Presence Detected<br>01h – Power Supply Failure | 00h – Presence Detected<br>01h – Power Supply Failure | Error          | <p><i>The VRM error signal monitors the output voltage is out of tolerance</i></p> <p>If VRM 2 Error:</p>   |

| Sensor Name   | No. | Sensor Type | Reading Type | Logged Assertions  | Logged De-Assertions | Event or Error | Repair Actions   |
|---------------|-----|-------------|--------------|--|----------------------|----------------|--|
|               |     |             |              |  |                      |                | 1. Reseat VRM2 and recheck for error.<br>2. Replace VRM<br>3. Replace CPU 2  |
| Ambient Temp  | 32h | 01h         | 01h          |  |                      | Info           |  |
| DASD Temp     | 35h | 01h         | 01h          | UNC, UNR   | UNC, UNR             | Error          | DASD Temperature Alert<br><br>Ensure that the server is being properly cooled. Check for Fan Failures                        |
| Fan 1 Tach    | 40h | 04h         | 01h          | LC   | LC                   | Error          | <i>No Reading From Fan TACH</i><br><br>Step 1. Check connections to the fan<br>Step 2. Reseat the Fan<br>Step 3. Replace Fan |
| Fan 2 Tach    | 41h | 04h         | 01h          | LC   | LC                   | Error          | <i>Same Repair Action as above for all FAN Tachs</i>   |
| Fan 3 Tach    | 42h | 04h         | 01h          | LC   | LC                   | Error          | <i>Same Repair Action as above for all FAN Tachs</i>   |
| Fan 4 Tach    | 43h | 04h         | 01h          | LC   | LC                   | Error          | <i>Same Repair Action as above for all FAN Tachs</i>   |
| Fan 5 Tach    | 44h | 04h         | 01h          | LC   | LC                   | Error          | <i>Same Repair Action as above for all FAN Tachs</i>   |
| Fan 6 Tach    | 45h | 04h         | 01h          | LC   | LC                   | Error          | <i>Same Repair Action as above for all FAN Tachs</i>   |
| Fan 7 Tach    | 46h | 04h         | 01h          | LC   | LC                   | Error          | <i>Same Repair Action as above for all FAN Tachs</i>   |
| Fan 8 Tach    | 47h | 04h         | 01h          | LC   | LC                   | Error          | <i>Same Repair Action as above for all FAN Tachs</i>   |
| Fan 9 Tach    | 48h | 04h         | 01h          | LC   | LC                   | Error          | <i>Same Repair Action as above for all FAN Tachs</i>   |
| Fan 10 Tach   | 49h | 04h         | 01h          | LC   | LC                   | Error          | <i>Same Repair Action as above for all FAN Tachs</i>   |
| Fan 11 Tach   | 4Ah | 04h         | 01h          | LC   | LC                   | Error          | <i>Same Repair Action as above for all FAN Tachs</i>   |
| Fan 12 Tach   | 4Bh | 04h         | 01h          | LC   | LC                   | Error          | <i>Same Repair Action as above for all FAN Tachs</i>   |
| Fan 1 Present | 50h | 04h         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |                      | Info Error     | Step 1. Check connections to the fan<br>Step 2. Reseat the Fan   |

| Sensor Name    | No. | Sensor Type | Reading Type | Logged Assertions  | Logged De-Assertions                             | Event or Error | Repair Actions  |
|----------------|-----|-------------|--------------|--|--|----------------|---|
|                |     |             |              |  |  |                | Step 3. Replace Fan   |
| Fan 2 Present  | 51h | 04h         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |  | Info Error     | <i>Same Repair Action as above for all FAN Present.</i>   |
| Fan 3 Present  | 52h | 04h         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |  | Info Error     | <i>Same Repair Action as above for all FAN Present.</i>   |
| Fan 4 Present  | 53h | 04h         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |  | Info Error     | <i>Same Repair Action as above for all FAN Present.</i>   |
| Fan 5 Present  | 54h | 04h         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |  | Info Error     | <i>Same Repair Action as above for all FAN Present.</i>   |
| Fan 6 Present  | 55h | 04h         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |  | Info Error     | <i>Same Repair Action as above for all FAN Present.</i>   |
| Fan 7 Present  | 56h | 04h         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |  | Info Error     | <i>Same Repair Action as above for all FAN Present.</i>   |
| Fan 8 Present  | 57h | 04h         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |  | Info Error     | <i>Same Repair Action as above for all FAN Present.</i>   |
| Fan 9 Present  | 58h | 04h         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |  | Info Error     | <i>Same Repair Action as above for all FAN Present.</i>   |
| Fan 10 Present | 59h | 04h         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |  | Info Error     | <i>Same Repair Action as above for all FAN Present.</i>   |
| Fan 11 Present | 5Ah | 04h         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |  | Info Error     | <i>Same Repair Action as above for all FAN Present.</i>   |
| Fan 12 Present | 5Bh | 04h         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |  | Info Error     | <i>Same Repair Action as above for all FAN Present.</i>   |
| Drive 1 Status | 60h | C1h         | 6Fh          | 00h – Device/Slot Present<br>02h – Device Faulty             | 00h – Device/Slot Present<br>02h – Device Faulty | Info Error     | <i>Is Hard Disk Drive 0 Status LED is illuminated?</i><br>No :<br>Ignore any message<br>Yes:<br><i>Is ServeRAID 7K installed or failing? HDD connected to a</i> |

| Sensor Name    | No. | Sensor Type | Reading Type | Logged Assertions                                | Logged De-Assertions                             | Event or Error | Repair Actions   |
|----------------|-----|-------------|--------------|--|--|----------------|--|
|                |     |             |              |  |  |                | <p>ServerRAID adapter?<br/>                     If "yes", go to step Y1. If "No", Power down system and reseal failing HDD, If failure still occurs, go to step N1.</p> <p>Step Y1: Reboot Server and press CTL-A when prompted.<br/>                     Try to access the failing disk and run verify disk media test. If CTL-A cannot access the failing disk or media test fails replace the drive. Warning - Data loss possible.<br/>                     Pull ServerRAID logs for analysis prior any other action</p> <p>Step N1. Check that HDDs have proper air flow and cooling .<br/>                     Check log for fan fails or DASD overtemp.</p> <p>Step N2. Replace failing HDD<br/>                     Step N3. Replace DASD backplane.</p> <p><i>See also OEM Sensor List</i></p> |
| Drive 2 Status | 61h | C1h         | 6Fh          | 00h – Device/Slot Present<br>02h – Device Faulty | 00h – Device/Slot Present<br>02h – Device Faulty | Info Error     | Same As Above<br><i>See also OEM Sensor List</i>   |
| Drive 3 Status | 62h | C1h         | 6Fh          | 00h – Device/Slot Present<br>02h – Device Faulty | 00h – Device/Slot Present<br>02h – Device Faulty | Info Error     | Same As Above<br><i>See also OEM Sensor List</i>   |
| Drive 4 Status | 63h | C1h         | 6Fh          | 00h – Device/Slot Present<br>02h – Device Faulty | 00h – Device/Slot Present<br>02h – Device Faulty | Info Error     | Same As Above<br><i>See also OEM Sensor List</i>   |
| Drive 5 Status | 64h | C1h         | 6Fh          | 00h – Device/Slot Present<br>02h – Device Faulty | 00h – Device/Slot Present<br>02h – Device Faulty | Info Error     | Same As Above<br><i>See also OEM Sensor List</i>   |
| Drive 6 Status | 65h | C1h         | 6Fh          | 00h – Device/Slot Present<br>02h – Device Faulty | 00h – Device/Slot Present                        | Info Error     | Same As Above  |

| Sensor Name    | No. | Sensor Type | Reading Type | Logged Assertions   | Logged De-Assertions  | Event or Error | Repair Actions   |
|----------------|-----|-------------|--------------|---|---|----------------|--|
|                |     |             |              |   | 02h – Device Faulty   |                | See also OEM Sensor List   |
| PS 1 Status    | 70h | 08h         | 6Fh          | 00h – Presence Detected<br>01h – Power Supply Failure<br>03h – Power Supply AC Lost | 00h – Presence Detected<br>01h – Power Supply Failure<br>03h – Power Supply AC Lost | Info Error     | Power Supply 1, AC loss or Power Supply Failure<br><br>Step 1. Check AC Power<br>Step 2. Replace Power Supply<br>Step 3. Replace Power Supply AC Backplane   |
| PS 2 Status    | 71h | 08h         | 6Fh          | 00h – Presence Detected<br>01h – Power Supply Failure<br>03h – Power Supply AC Lost | 00h – Presence Detected<br>01h – Power Supply Failure<br>03h – Power Supply AC Lost | Info Error     | Power Supply 2, AC loss or Power Supply Failure<br><br>Step 1. Check AC Power<br>Step 2. Replace Power Supply<br>Step 3. Replace Power Supply AC Backplane   |
| PS 1 Fan Fault | 73h | 04h         | 03h          | 00h – State Deasserted<br>01h – State Asserted                                      |   | Error          | Fan Fault in Power Supply 1<br>- Replace Power Supply 1  |
| PS 2 Fan Fault | 74h | 04h         | 03h          | 00h – State Deasserted<br>01h – State Asserted                                      |   | Error          | Fan Fault in Power Supply 2<br>- Replace Power Supply 2  |
| NMI State      | 80h | 13h         | 6Fh          | 00h – Front Panel NMI<br>03h – Software NMI   |   | Error          | An NMI will likely occur as a result of a Non-correctable Memory error or PCI bus Error. Check LightPath Diagnostic Panel.<br><br>Is either MEM LED, PCI-A, PCI-B or PCI-C LED illuminated?<br><br>No:<br>NMI cause unknown, check other log entries such as OS logs, possible software OS reinstall needed or device driver causes.<br><br>Yes:<br>Step 1: For MEM LED: Follow Lighth Path LEDs inside the system to locate failing DIMM.<br><br>Step 2 : For PCI-A ==> Remove one adapter at a time in PCI slots |

| Sensor Name      | No. | Sensor Type | Reading Type | Logged Assertions  | Logged De-Assertions | Event or Error | Repair Actions   |
|------------------|-----|-------------|--------------|--|----------------------|----------------|--|
|                  |     |             |              |  |                      |                | 1 & 2, and retest for error. With both adapters removed retest, on error replace System Board.<br><br>Step 3. For PCI-B ==> Remove PCI adapter from Slot 3, and retest for error. on error replace System Board.<br><br>Step 4. For PCI-C ==> Remove PCI adapter from Slot 4, and retest for error. on error replace System Board. |
| FP Cable Detect  | 83h | 1Bh         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |                      | Info Error     | On error : The Front Operator Info Panel Cable is Disconnected.<br><br>Reseat Cable  |
| USB Cable Detect | 84h | 1Bh         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |                      | Info Error     | On Error: he Front USB Cable is Disconnected<br><br>Reseat Cable   |
| SCSI BP Detect   | 85h | 1Bh         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |                      | Info Error     | On Error: The cable between Power and DASD Backplane was disconnected.<br><br>Reseat Cable   |
| PCI Riser Detect | 89h | 15h         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |                      | Info           | The PCI Riser board for PCI slots 1 & 2 has been removed.<br><br>Install PCI riser board.  |
| PCI Riser Detect | 8Ah | 15h         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |                      | Info           | The PCI Riser board for PCI slots 3 & 4 has been removed.<br><br>Install PCI riser board.  |
| Raid DDR Detect  | 8Bh | 17h         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |                      | Info           |  |
| RSA II Detect    | 8Ch | 17h         | 08h          | 00h – Device Removed/Absent<br>01h – Device Inserted/Present |                      | Info           |  |

| Sensor Name  | No. | Sensor Type | Reading Type | Logged Assertions   | Logged De-Assertions  | Event or Error | Repair Actions  |
|--------------|-----|-------------|--------------|---|---|----------------|---|
| CPU 1 Status | 90h | 07h         | 6Fh          | 00h – IERR<br>01h – Thermal Trip<br>07h – Processor Presence detected<br>08h – Processor disabled | 00h – IERR<br>01h – Thermal Trip<br>07h – Processor Presence detected<br>08h – Processor disabled | Info Error     | <p><i>CPU 1 Status</i></p> <p>Was this a Thermal Trip ?<br/>                     Yes, go to step Y1.<br/>                     No:<br/>                     If IERROR do the following:<br/>                     Important - Most IERRORs are caused by I/O Timeouts.</p> <p>Step 1. Check Firmware, Device Drivers levels for all adapters and standard devices such as ethernet or SCSI.</p> <p>Step 2. Run diagnostics on HDD and other I/O devices.</p> <p>Step 3. Replace CPU only after steps 1 and 2.</p> <p>Step Y1: 1. Check Fans and server for proper cooling.<br/>                     2. Check Heatsink is properly installed</p> |
| CPU 2 Status | 91h | 07h         | 6Fh          | 00h – IERR<br>01h – Thermal Trip<br>07h – Processor Presence detected<br>08h – Processor disabled | 00h – IERR<br>01h – Thermal Trip<br>07h – Processor Presence detected<br>08h – Processor disabled | Info Error     | <p><i>Same Repair Action Procedure as for CPU 1 Status Error</i></p>  |
| CPU 1 Temp   | 98h | 01h         | 01h          | UNC, UNR  | UNC, UNR  | Error          | <p><i>CPU 1 Temperature Alert</i></p> <p>Step 1. Check Fans and server for proper cooling<br/>                     Step 2. Check Heatsink is properly installed<br/>                     Step 3. Replace CPU</p> <p><i>CPU 2 Temperature Alert</i></p>  |
| CPU2 Temp    | 99h | 01h         | 01h          | UNC, UNR  | UNC, UNR  | Error          | <p>Step 1. Check Fans and server for proper cooling<br/>                     Step 2. Check Heatsink is properly installed</p>   |



| Sensor Name   | No. | Sensor Type | Reading Type | Logged Assertions                              | Logged De-Assertions | Event or Error | Repair Actions  |
|---------------|-----|-------------|--------------|--|----------------------|----------------|---|
| CPU 1 VCore   | B8h | 02h         | 01h          | LC, UC   | LC, UC               | Error          | <p>Step 3. Replace CPU</p> <p><i>System Board CPU Voltage Regulator Error (Vcore)</i></p> <p>1. Replace system board<br/>                     2. Replace CPU 1</p>  |
| CPU 2 VCore   | B9h | 02h         | 01h          | LC, UC   | LC, UC               | Error          | <p><i>CPU 2 VRM Voltage Error (Vcore)</i></p> <p>1. Reseat VRM and recheck for error<br/>                     2. Replace VRM<br/>                     3. Replace CPU 2</p> <p><i>Vtt regulator is Feed by 12V_C</i></p> <p>CPU Bus, Terminator Voltage Failure. Check this log for a 12V_C Failure Entry . GO to 12V_C action plan.</p>   |
| CPU Vtt       | BBh | 02h         | 01h          | LC, UC   | LC, UC               | Error          | <p>If CPU 2 is installed, remove CPU 2 and VRM 2 . Retest system for same Terminator Voltage Failure.</p> <p>With only CPU 1 installed, Did a CPU Bus, Terminator Voltage Failure occur?<br/>                     Yes: Replace System Board, Retest for Same Error. If same error replace CPU 1.</p> <p>No: If previously installed, replace VRM and CPU2.</p> <p><i>The prochat sensors (0xC0 and 0xC1) will always generate a deassertion event when the sensor is rearmed following a power-on or cold reset of the BMC.</i></p> |
| CPU 1 Prochat | C0h | 01h         | 03h          | 00h – State Deasserted<br>01h – State Asserted |                      | Info           | <p>Warning - CPU 1 performance has been slowed due to CPU's Temperature</p> <p>Step 1. Check for Fan Errors<br/>                     Step 2. Check CPU 1 heatsink is</p>  |

| Sensor Name   | No. | Sensor Type | Reading Type | Logged Assertions                              | Logged De-Assertions | Event or Error | Repair Actions   |
|---------------|-----|-------------|--------------|--|----------------------|----------------|--|
| CPU 2 Prochot | C1h | 01h         | 03h          | 00h – State Deasserted<br>01h – State Asserted |                      | Info           | <p>installed properly.</p> <p><i>The prochot sensors (0xC0 and 0xC1) will always generate a deassertion event when the sensor is rearmed following a power-on or cold reset of the BMC.</i></p> <p>Warning - CPU 2 performance has been slowed due to CPU's Temperature</p> <p>Step 1. Check for Fan Errors<br/>                     Step 2. Check CPU 2 heatsink is installed properly.</p> <p><i>CPU Machine Check</i></p> <p>Procedure:</p> <p>Check this log for a CPU Front Side Bus Error</p> <p>Was a CPU Front Side Bus Error logged?</p> <p>Yes:<br/>                     Go to CPU Front Side Bus action plan below ( BINIT).</p> <p>No:</p> <p>Step1:<br/>                     If CPU 2 is installed, remove CPU 2 and its VRM<br/>                     With only CPU 1 installed.....<br/>                     Retest system for same CPU Machine Check Failure</p> <p>Did a CPU Machine Check error occur?<br/>                     Yes: Replace CPU 1<br/>                     No: Replace CPU 2</p> <p><i>BINIT# is used to signal any bus condition that prevents reliable</i></p> |
| Machine Check | C8h | 12h         | 03h          | 00h – State Deasserted<br>01h – State Asserted |                      | Error          |  |
| BINIT         | C9h | 12h         | 03h          | 00h – State Deasserted                         |                      | Error          |  |

| Sensor Name | No. | Sensor Type | Reading Type | Logged Assertions    | Logged De-Assertions | Event or Error | Repair Actions   |
|-------------|-----|-------------|--------------|----------------------|----------------------|----------------|--|
|             |     |             |              | 01h – State Asserted |                      |                | <p><i>future operation of the bus.</i></p> <p>CPU Front Side Bus Error</p> <p>Step 1:<br/>                     If CPU 2 is installed, remove CPU 2 and its VRM.</p> <p>Retest system for same CPU FSB Failure</p> <p>Did a CPU Front Side Bus Error occur?</p> <p>No:<br/>                     Replace CPU 2</p> <p>Yes:<br/>                     Replace System Board, then retest</p> <p>Repace CPU 1 if failure continues</p> |

## 4 OEM Sensor List

In addition to the sensors supported by the core firmware, the BMC on the x346 will implement the following sensors. Thresholds for threshold based sensors are noted as shown below.

- UNC = Upper Non-Critical
- UC = Upper Critical
- UNR = Upper Non-Recoverable
- LNC = Lower Non-Critical
- LC = Lower Critical
- LNR = Lower Non-Recoverable

There are two OEM sensor types used on the x346, the first is type C1h and is a custom Drive/Slot status sensor. The reading type will be 6Fh (Sensor Specific) and the offsets are given in the table below.

**Table 4-1: OEM Drive Status Sensor Offsets**

| Sensor Type       | Sensor Type Code | Sensor-specific Offset | Event               | Repair Actions              |
|-------------------|------------------|------------------------|---------------------|-----------------------------|
| Drive/Slot Status | C1h              | 00h                    | Drive Slot Present  |                             |
|                   |                  | 01h                    | No Error            |                             |
|                   |                  | 02h                    | Device Faulty       | <i>See Main Sensor List</i> |
|                   |                  | 03h                    | Device Rebuilding   | <i>See Main Sensor List</i> |
|                   |                  | 04h                    | In Failed Array     | <i>See Main Sensor List</i> |
|                   |                  | 05h                    | In Critical Array   | <i>See Main Sensor List</i> |
|                   |                  | 06h                    | Parity Check        | <i>See Main Sensor List</i> |
|                   |                  | 07h                    | Predicted Fault     | <i>See Main Sensor List</i> |
|                   |                  | 08h                    | Un-configured Drive | <i>See Main Sensor List</i> |
|                   |                  | 09h-15h                | Reserved            |                             |

The other OEM sensor type that will be used is a LED sensor to report which LEDs are supported on each system. This sensor will be type D0h and will report a generic event/reading type code of 08h (Device Present/Absent). These records will be used solely to report LED presence, there will be no data logged in relation to these sensors.

## 5 BIOS Logged Events

System BIOS is able to communicate with the BMC and log architected events. There are two portions to BIOS logging – POST events, which occur during system power up, and SMI events, which are generally run time errors detected by hardware.

### 5.1 OEM SEL BIOS Entry Definitions

While the IPMI specification defines a wide variety of sensor types and record IDs for possible system events, IBM xSeries servers will log OEM specific messages in the BMC SEL. To provide consistency across all xSeries systems, the OEM record ID and OEM sensor type definitions will remain consistent. The table below will document each OEM record ID and sensor type used by xSeries systems as well as a text description of the event. Outside system software should use this table to provide BMC SEL NLS translations to end users.

| Sensor Type                     | Sensor Type Code | Byte Definitions/Description   |
|---------------------------------|------------------|--|
| OEM POST with Time Stamp        | 0xC0             | Byte 11 POST Error / Event Type<br>0x00 POST PCI POST Event/Error<br>0x01 POST PCI Processor Event / Error<br>0x02 POST Memory Event / Error<br>0x03 POST Scalability Event / Error (not used x346)<br>0x04 POST Bus Event / Error<br>0x05 POST Chipset Event / Error<br><br>Byte 12-15 Defined per Error / Event Type in below tables<br>Byte 16 Revision Number Format |
| OEM POST No Time Stamp          | 0xE0             | Byte 4 POST Error / Event Type<br>0x00 POST PCI POST Event/Error<br>0x01 POST PCI Processor Event<br>0x02 POST Memory Error<br>0x03 POST Scalability Event (not used x346)<br>0x04 POST Bus Event<br>0x05 POST Chipset Event<br><br>Byte 6-15 Defined per Error/Event Type in below tables<br>Byte 16 Revision Number Format   |
| OEM SMI Handler with Time Stamp | 0xC1             | Byte 11 SMI Error / Event Type<br>0x00 SMI PCI Event / Error<br>0x01 SMI Processor Event / Error<br>0x02 SMI Memory Event / Error<br>0x03 SMI Scalability Event / Error (not used x346)<br>0x04 SMI Bus Event / Error<br>0x05 SMI Chipset Event / Error<br><br>Byte 12-15 Defined per Error / Event Type in below tables<br>Byte 16 Revision Number Format               |
| OEM SMI                         | 0xE1             | Byte 4 SMI Error / Event Type  |

|                          |   |
|--------------------------|---|
| Handler No<br>Time Stamp | 0x00 SMI PCI Event / Error<br>0x01 SMI Processor Event / Error<br>0x02 SMI Memory Event / Error<br>0x03 SMI Scalability Event / Error (not used x346)<br>0x04 SMI Bus Event / Error<br>0x05 SMI Chipset Event / Error<br><br>Byte 6-15 Defined per Error/Event Type in below tables<br>Byte 16 Revision Number Format |
|--------------------------|---|

Figure 1-POST OEM SEL Definitions

## 5.2 POST OEM SEL Formats

### 5.2.1 POST OEM SEL Formats with Time Stamp

| Byte  | Contents | Description  | Repair Actions |
|-------|----------|--|----------------|
| 11    | 0x00     | POST PCI Event / Error   |                |
|       | 0x01     | POST Processor Event / Error   |                |
|       | 0x02     | POST Memory Event / Error  |                |
| 12    | 0x00     | POST Event/Error occurred. <b>Next non-timestamped OEM SEL entry will contain details of the specific event/error.</b> | ← See Next     |
| 13:15 |          | Reserved   |                |
| 16    | 0x00     | Revision Number  |                |

Figure 2- POST OEM SEL Format

### 5.2.2 POST PCI Event / Error SEL Format

| Byte | Description  | Repair Actions   |
|------|--|--|
| 4    | 0x00 POST PCI Event / Error  |  |
| 5    | Error Type<br>0x00 Device OK<br>0x01 Required ROM space not available<br>0x02 Required IO space not available<br>0x03 Required memory not available<br>0x04 Required memory below 1MB not available<br>0x05 ROM checksum failed<br>0x06 BIST failed<br>0x07 Planar device missing or disabled by user<br>0x08 PCI device has an invalid PCI configuration space header | See 1801 POST error<br>See 1801 POST error<br>See 1801 POST error<br>See 1801 POST error<br>Remove card,<br>replace<br>Remove card,<br>replace<br>Info |

|    |  |  |
|----|--|--|
|    | 0x09 Specific PCI Device added (details to follow)<br>0x0A Specific PCI Device removed (details to follow)<br>0x0B Device title for removed devices<br>0x0C Device title for added devices<br>0x0D Requested resources not available<br>0x0E Title for added devices<br>0x0F Vendor ID sub-message<br>0x10 Device ID sub-message<br>0x11 Previous slot sub-message<br>0x12 Slot sub-message<br>0x13 Planar video disabled due to add in video card<br>0x14 Partial disable value<br>0x15 Title for partial disable<br>0x16 33Mhz dev on 66Mhz bus<br>0x17 Details for 33mhz card on 66mhz bus<br>0x18-1F (not used x346) | Remove card,<br>replace<br><br>Info<br>Info<br>Info<br>Info<br>See 1801 POST error<br>Info<br>Info<br>Info<br>Info<br>Info<br>Info<br>Info<br>Info |
| 6  | Chassis Number (0xFF if not applicable)  | info   |
| 7  | Slot Number (0xFF if not applicable)   | info   |
| 8  | Bus Number (0xFF if not applicable)  | info   |
| 9  | Device ID (MSB) (0xFF if not applicable)   | info   |
| 10 | Device ID (LSB) (0xFF if not applicable)   | info   |
| 11 | Vendor ID (MSB) (0xFF if not applicable)   | info   |
| 12 | Vendor ID (LSB) (0xFF if not applicable)   | info   |
| 13 | Reserved   |  |
| 14 | Reserved   |  |
| 15 | Reserved   |  |
| 16 | Revision Number = 0x00   |  |

**Figure 3- POST PCI Event / Error SEL Format**

### 5.2.3 POST Processor Event / Error SEL Format

| Byte   | Description   | Repair Actions   |
|--------|---|--|
| 4      | 0x01 POST Processor Event / Error   |  |
| 5      | Error Type<br>0x00 Processor Failed BIST<br>0x01 Unable to Apply Microcode (Patch) Update<br>0x02 POST Does Not Support Current Stepping of Processor<br>0x03 CPU Mismatch Detected | Replace proc<br>Update BIOS<br>Update BIOS<br><br>All procs must match |
| 6      | Chassis Number (0x00 if not applicable)   | Info   |
| 7      | Processor Number (0x00 if not applicable)   | Info   |
| 8 – 15 | Reserved  |  |
| 16     | Revision Number = 0x00  |  |

**Figure 4- POST Processor Event / Error SEL Format**

## 5.2.4 Memory Event / Error SEL Format

| Byte   | Description                                  | Repair Actions |
|--------|--|----------------|
| 4      | 0x02 Memory Event / Error                    |                |
| 5      | 0x00 (not used x346)<br>0x01 (not used x346) | Info           |
| 6      | Chassis (0 if not applicable)                | Info           |
| 7      | Memory Card (1-4) (not used x346)            | Info           |
| 8      | Memory DIMM (1-4)                            | Info           |
| 9      | Failing Symbol for Correctable Error         | Info           |
| 10 -15 | Reserved                                     |                |
| 16     | Revision Number = 0x00                       |                |

**Figure 5- POST Memory Event / Error SEL Format**

| Byte   | Description  | Repair Actions   |
|--------|--|--|
| 4      | 0x02 Memory Event / Error  |  |
| 5      | Event Type<br>0x02 DIMM Status   |  |
| 6      | 0x00 DIMM Enabled<br>0x01 DIMM Disabled – Failed ECC Test<br>0x02 DIMM Disabled – Failed POST/BIOS Memory Test<br>0x03 DIMM Disabled – Non-supported memory device<br>0x04 DIMM Disabled – Non matching or missing DIMMs | 1. Check DIMM P/N.<br>2. Reseat/replace DIMM in byte 7,8,9 |
| 7      | Chassis (0 if not applicable)  |  |
| 8      | Memory Card 1-N (0 if not applicable)  |  |
| 9      | Memory DIMM 1-N (0 if not applicable)  |  |
| 10 -15 | Reserved   |  |
| 16     | Revision Number = 0x00   |  |

**Figure 6- POST Memory DIMM Event / Error SEL Format**

| Byte   | Description   | Repair Actions                      |
|--------|---|-------------------------------------|
| 4      | 0x02 Memory Event / Error                             |                                     |
| 5      | Event Type<br>0x03 Memory Card Status                 |                                     |
| 6      | 0x00 Card Enabled<br>0x01 Card Disabled – Failed BIST | Reseat/replace MEM CARD in byte 7,8 |
| 7      | Chassis (0 if not applicable)                         |                                     |
| 8      | Memory Card 1-N (0 if not applicable)                 |                                     |
| 9 – 15 | Reserved  |                                     |
| 16     | Revision Number = 0x00                                |                                     |

**Figure 7- POST Memory Card Event / Error SEL Format**



## 5.3 SMI OEM SEL Formats

### 5.3.1 SMI Event / Error SEL Format with Time Stamp

| Byte | Description   | Repair Actions                      |
|------|---|-------------------------------------|
| 11   | 0x00 SMI PCI Event / Error - See next non-time stamped entry for details.<br>0x01 SMI Processor Event / Error - See next non-time stamped entry for details.<br>0x02 SMI Memory Event / Error - See next non-time stamped entry for details.<br>0x03 SMI Scalability Event / Error - <b>see bytes 12-14 below</b><br>0x04 SMI Bus Event / Error - See next non-time stamped entry for details.<br>0x05 SMI Chipset Event / Error - See next non-time stamped entry for details. | ←<br>←<br>←<br>see SP Log<br>←<br>← |
| 12   | 0x00 Scalability Link Down<br>0x01 Scalability Link Up<br>0x02 Scalability Link Double Wide Down<br>0x03 Scalability Link Double Wide Up<br>0x80 Scalability Link PFA<br>0x81 Scalability Link Invalid Port<br>0x82 Scalability Link Invalid Node   | see SP Log                          |
| 13   | 0x01 – 0x08 Chassis Number (One based)  | Info                                |
| 14   | 0x01 – 0x03 Scalability Port Number (One based)<br>0x00 – Scalability Double Wide Link  | Info                                |
| 15   | Reserved  |                                     |
| 16   | Revision Number = 0x00  |                                     |

Figure 8-SMI Scalability Event/Error SEL Format

### 5.3.2 SMI PCI Event / Error SEL Format

| Byte | Description   | Repair Actions  |
|------|---|---|
| 4    | 0x00 SMI PCI Event / Error  |   |
| 5    | Error Type<br>0x00 Unknown SERR/PERR Detected on PCI Bus (Bytes 6-15 are 0x00 if not applicable)<br>0x01-0x0F PCI Standard Error Messages for PCI Devices & Primary Interface of PCI-to-PCI Bridge<br>0x01 SERR: Address or Special Cycle DPE<br>0x02 PERR: Master Read Parity Error<br>0x03 SERR: Received Target Abort<br>0x04 PERR: Master Write Parity Error<br>0x05 SERR: Device Signaled SERR<br>0x06 PERR: Slave Signaled Parity Error | <b>ALL ERRORS:</b><br>1. Identify PCI device from bytes 6-15 below.<br>2. Reseat/replace PCI device identified above.<br>3. Verify latest device driver for device identified above.<br>4. Replace PCIX |

|             |  |          |
|-------------|--|----------|
| 0x07        | SERR: Signaled Target Abort                                    | adapter. |
| 0x08        | PERR: Additional Correctable ECC Error                         |          |
| 0x09        | SERR: Received Master Abort                                    |          |
| 0x0A        | PERR: Additional Uncorrectable ECC Error                       |          |
| 0x0B        | SERR: Split Completion Discarded                               |          |
| 0x0C        | PERR: Correctable ECC Error                                    |          |
| 0x0D        | SERR: Unexpected Split Completion                              |          |
| 0x0E        | PERR: Uncorrectable ECC Error                                  |          |
| 0x0F        | SERR: Received Split Completion Error                          |          |
| Message     |  |          |
| 0x10        | Reserved   |          |
| 0x11-0x1F   | Same as 0x01-0x0F for Secondary Interface of PCI-to-PCI Bridge |          |
| 0x20-0x3F   | PCI Target Error Messages for PCI Host Bridge (Calgary)        |          |
| 0x20        | PERR: PCI ECC Error (Corrected)                                |          |
| 0x21        | SERR: PCI Bus Address Parity Error                             |          |
| 0x22        | PERR: PCI Bus Data Parity Error                                |          |
| 0x23        | SERR: SERR# Asserted   |          |
| 0x24        | PERR: PERR Received by Calgary on a PCIX Split Completion      |          |
| 0x25        | SERR: Invalid Address  |          |
| 0x26        | Reserved   |          |
| 0x27        | SERR: TCE Extent Error   |          |
| 0x28        | Reserved   |          |
| 0x29        | SERR: Page Fault   |          |
| 0x2A        | Reserved   |          |
| 0x2B        | SERR: Unauthorized Access                                      |          |
| 0x2C        | Reserved   |          |
| 0x2D        | SERR: Parity Error in DMA Read Data Buffer                     |          |
| 0x2E        | Reserved   |          |
| 0x2F        | SERR: PCI Bus Time Out   |          |
| 0x30        | Reserved   |          |
| 0x31        | SERR: DMA Delayed Read Timeout                                 |          |
| 0x32        | Reserved   |          |
| 0x33        | SERR: Internal Error on PCIX Split Completion                  |          |
| 0x34        | Reserved   |          |
| 0x35        | SERR: DMA Read Reply (RIO) Timeout                             |          |
| 0x36        | Reserved   |          |
| 0x37        | SERR: Internal RAM Error on DMA Write                          |          |
| 0x38        | Reserved   |          |
| 0x39        | SERR: MVE Valid Bit Off  |          |
| 0x3A        | Reserved   |          |
| 0x3B        | SERR: MVE Index Invalid  |          |
| 0x3C        | Reserved   |          |
| 0x3D        | Reserved   |          |
| 0x3E        | Reserved   |          |
| 0x3F        | Reserved   |          |
| 0x40-0x5F   | PCI Master Error Messages for PCI Host Bridge (Calgary)        |          |
| 0x40        | PERR: ECC Error (Corrected)                                    |          |
| <b>0x41</b> | <b>SERR: SERR# Detected</b>                                    |          |
| 0x42        | PERR: PCI Bus Data Parity Error                                |          |
| <b>0x43</b> | <b>SERR: No DEVSEL#</b>  |          |

|             |  |  |
|-------------|--|--|
| 0x44        | Reserved   |  |
| <b>0x45</b> | <b>SERR: Bus Time Out</b>                                |  |
| 0x46        | Reserved   |  |
| <b>0x47</b> | <b>SERR: Retry Count Expired</b>                         |  |
| 0x48        | Reserved   |  |
| <b>0x49</b> | <b>SERR: Target-Abort</b>                                |  |
| 0x4A        | Reserved   |  |
| <b>0x4B</b> | <b>SERR: Invalid Size</b>                                |  |
| 0x4C        | Reserved   |  |
| <b>0x4D</b> | <b>SERR: Access Not Enabled</b>                          |  |
| 0x4E        | Reserved   |  |
| <b>0x4F</b> | <b>SERR: Internal RAM Error on MMIO Store</b>            |  |
| 0x50        | Reserved   |  |
| 0x51        | SERR: Split Response Received                            |  |
| 0x52        | Reserved   |  |
| 0x53        | SERR: PCIX Split Completion Error Status Received        |  |
| 0x54        | Reserved   |  |
| 0x55        | SERR: Unexpected PCIX Split Completion Received          |  |
| 0x56        | Reserved   |  |
| 0x57        | SERR: PCIX Split Completion Timeout                      |  |
| 0x58        | Reserved   |  |
| 0x59        | SERR: Recoverable Error Summary Bit                      |  |
| 0x5A        | Reserved   |  |
| 0x5B        | SERR: CSR Error Summary Bit                              |  |
| 0x5C        | Reserved   |  |
| 0x5D        | SERR: Internal RAM Error on MMIO Load                    |  |
| 0x5E        | Reserved   |  |
| 0x5F        | Reserved   |  |
| 0x60-0x7F   | PCI Machine Check Messages for PCI Host Bridge (Calgary) |  |
| 0x60        | Reserved   |  |
| 0x61        | SERR: Bad Command  |  |
| 0x62        | Reserved   |  |
| 0x63        | SERR: Length Field Invalid                               |  |
| 0x64        | Reserved   |  |
| 0x65        | SERR: Load Greater Than 8 & No Write Buffer Enabled      |  |
| 0x66        | Reserved   |  |
| 0x67        | SERR: PCIX Discontiguous Byte Enable Error               |  |
| 0x68        | Reserved   |  |
| 0x69        | SERR: 4K Address Boundary Crossing Error                 |  |
| 0x6A        | Reserved   |  |
| 0x6B        | SERR: Store Wrap State Machine Check                     |  |
| 0x6C        | Reserved   |  |
| 0x6D        | SERR: Target State Machine Check                         |  |
| 0x6E        | Reserved   |  |
| 0x6F        | SERR: Invalid Transaction PM/DW                          |  |
| 0x70        | Reserved   |  |
| 0x71        | SERR: Invalid Transaction PM/DR                          |  |
| 0x72        | Reserved   |  |
| 0x73        | SERR: Invalid Transaction PS/DW                          |  |
| 0x74        | Reserved   |  |

|    |                  |  |  |
|----|------------------|--|--|
|    | 0x75             | SERR: DMA Write Command FIFO Parity Error    |  |
|    | 0x76             | Reserved                                     |  |
|    | 0x77             | Reserved                                     |  |
|    | 0x78             | Reserved                                     |  |
|    | 0x79             | Reserved                                     |  |
|    | 0x7A             | Reserved                                     |  |
|    | 0x7B             | Reserved                                     |  |
|    | 0x7C             | Reserved                                     |  |
|    | 0x7D             | Reserved                                     |  |
|    | 0x7E             | Reserved                                     |  |
|    | 0x7F             | Reserved                                     |  |
|    | <b>0x80</b>      | <b>PCI-to-PCI Bridge Discard Timer Error</b> |  |
|    | <b>0x81-0xFF</b> | <b>Reserved</b>                              |  |
| 6  |                  | Chassis Number (0x00 if not applicable)      |  |
| 7  |                  | Slot Number                                  |  |
| 8  |                  | Bus Number                                   |  |
| 9  |                  | Device ID (LSB)                              |  |
| 10 |                  | Device ID (MSB)                              |  |
| 11 |                  | Vendor ID (LSB)                              |  |
| 12 |                  | Vendor ID (MSB)                              |  |
| 13 |                  | Status Register (LSB)                        |  |
| 14 |                  | Status Register (MSB)                        |  |
| 15 |                  | DevFun Number                                |  |
| 16 |                  | Revision Number = 0x00                       |  |

Figure 9- SMI PCI Event / Error SEL Format

### 5.3.3 SMI Processor Event / Error SEL Format

| Byte    | Description                      | Repair Actions   |
|---------|----------------------------------|--|
| 4       | 0x01 SMI Processor Event / Error | 1. Contact level 3 support for detailed analysis if possible (these errors are rare)<br>2. See SMI MCA Data D below. |
| 5       | 0x00 Data A                      |  |
| 6       | Reserved                         |  |
| 7       | Reserved                         |  |
| 8 - 9   | Bank                             |  |
| 10 - 11 | APIC ID                          |  |
| 12 - 15 | CK4                              |  |
| 16      | Revision Number = 0x00           |  |

Figure 10-SMI MCA Data A SEL Format

| Byte | Description | Repair Actions |
|------|-------------|----------------|
|------|-------------|----------------|

|        |                                  |  |
|--------|----------------------------------|--|
| 4      | 0x01 SMI Processor Event / Error | 1. Contact level 3 support for detailed analysis if possible (these errors are rare)<br>2. See SMI MCA Data D below. |
| 5      | 0x01 Data B1                     |  |
| 6      | Reserved                         |  |
| 7      | Reserved                         |  |
| 8 – 11 | Address high                     |  |
| 12-15  | Address low                      |  |
| 16     | Revision Number = 0x00           |  |

**Figure 11-SMI MCA Data B1 SEL Format**

| Byte    | Description                      | Repair Actions   |
|---------|----------------------------------|--|
| 4       | 0x01 SMI Processor Event / Error | 1. Contact level 3 support for detailed analysis if possible (these errors are rare)<br>2. See SMI MCA Data D below. |
| 5       | 0x02 Data B2                     |  |
| 6       | Reserved                         |  |
| 7       | Reserved                         |  |
| 8 – 11  | Timestamp high                   |  |
| 12 - 15 | Timestamp low                    |  |
| 16      | Revision Number = 0x00           |  |

**Figure 12-SMI MCA Data B2 SEL Format**

| Byte    | Description                      | Repair Actions   |
|---------|----------------------------------|--|
| 4       | 0x01 SMI Processor Event / Error | 1. Contact level 3 support for detailed analysis if possible (these errors are rare)<br>2. See SMI MCA Data D below. |
| 5       | 0x03 Detail C                    |  |
| 6       | Reserved                         |  |
| 7       | Reserved                         |  |
| 8 – 11  | MCA Status Register high         |  |
| 12 - 15 | MCA Status Register low          |  |
| 16      | Revision Number = 0x00           |  |

**Figure 13-SMI MCA Data C SEL Format**

| Byte   | Description  | Repair Actions   |
|--------|--|--|
| 4      | 0x01 SMI Processor Event / Error                     | 1. Contact level 3 support for detailed analysis if possible (these errors are rare) |
| 5      | 0x04 Detail D  |  |
| 6      | Chassis Number (00 if not applicable)                |  |
| 7      | Error type<br>0x00 Recoverable<br>0x01 Unrecoverable | 2. If Unrecoverable, replace CPU from byte 8.  |
| 8      | Processor ID   |  |
| 9 – 15 | Reserved   |  |
| 16     | Revision Number = 0x00                               |  |

Figure 14-SMI MCA Data D SEL Format

### 5.3.4 SMI Memory Event / Error SEL Format

| Byte   | Description   | Repair Actions |
|--------|---|----------------|
| 4      | 0x02 SMI Memory Event / Error                       | Info only      |
| 5      | 0x00 Sparing/RBS Event                              |                |
| 6      | 0x00 Sparing/RBS Start 1<br>0x02 Sparing/RBS Done 1 |                |
| 7      | Failed Row  |                |
| 8      | Spare Row   |                |
| 9 – 15 | Reserved  |                |
| 16     | Revision Number = 0x00                              |                |

Figure 15-SMI Sparing/RBS 1 SEL Format

| Byte   | Description                                 | Repair Actions |
|--------|---|----------------|
| 4      | 0x02 SMI Memory Event / Error               | Info only      |
| 5      | 0x00 Sparing Event                          |                |
| 6      | 0x01 Sparing Start 2<br>0x03 Sparing Done 2 |                |
| 7      | Failed Row 1                                |                |
| 8      | Failed Row 2                                |                |
| 9      | Spare Row 1                                 |                |
| 10     | Spare Row 2                                 |                |
| 11- 15 | Reserved                                    |                |
| 16     | Revision Number = 0x00                      |                |

Figure 16-SMI Sparing/RBS 2 SEL Format

| Byte | Description  | Repair Actions                                   |
|------|--|--|
| 4    | 0x02 SMI Memory Event / Error  |  |
| 5    | 0x01 Memory Mirroring Failover Occurred (Running from mirrored memory image) | Replace memory DIMM identified by Lightpath LEDs |
| 6-15 | Reserved   |  |
| 16   | Revision Number = 0x00   |  |

Figure 17-SMI Mirroring SEL Format

### 5.3.5 SMI FSB Bus Event / Error SEL Format

| Byte   | Description  | Repair Actions   |
|--------|--|--|
| 4      | 0x04 SMI Bus Event / Error   |  |
| 5      | Bus Type<br>0x00 FSB   |  |
| 6      | 0x00 FSB A Fatal<br>0x01 FSB A NonFatal<br>0x02 FSB B Fatal<br>0x03 FSB B NonFatal | 1. If fatal, for FSB A, test CPU1&2.<br>Replace failed device.<br>2. If fatal, for FSB B, test CPU3&4.<br>Replace failed device.<br>3. Replace CPU card. |
| 7 – 8  | FSB FERR or NERR or Zero   |  |
| 9 – 15 | Reserved   |  |
| 16     | Revision Number = 0x00   |  |

Figure 18-SMI Front Side Bus Event SEL Format

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