RA90 ITS Reference Guide

Order Number EY-5804E-TG-0001
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FOR INTERNAL USE ONLY
June, 1988

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<th>DEC</th>
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<th>UNIBUS</th>
</tr>
</thead>
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<tr>
<td>DEC/CMS</td>
<td>EduSystem</td>
<td>VAX</td>
</tr>
<tr>
<td>DEC/MMS</td>
<td>IAS</td>
<td>VAXcluster</td>
</tr>
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<td>DECnet</td>
<td>MASSBUS</td>
<td>VMS</td>
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<td>DECSYSTEM-10</td>
<td>PDP</td>
<td>VT</td>
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<td>DECSYSTEM-20</td>
<td>PDT</td>
<td></td>
</tr>
<tr>
<td>DECUS</td>
<td>RSTS</td>
<td></td>
</tr>
<tr>
<td>DECwriter</td>
<td>RSX</td>
<td></td>
</tr>
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</table>

[Digital Logo]
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About This Manual

NOTE
DKUTIL is on page viii.
OCP Exercise Checklist is on page ix.

Instructions
Welcome to the RA90 Interactive Troubleshooting Simulator. The simulator will present you with RA90 problems that you may find in the field. Your task is to solve these problems.

This simulator is not a test and it does not keep score. It is a tool which provides you troubleshooting practice for the RA90. Your goal is to solve a problem within a prescribed time. The prescribed times are calculated based on performing specific troubleshooting steps which includes evaluating system error logs and drive internal error logs, running diagnostics, removal and replacement, etc.

This simulator keeps track of real time and includes the actual times it takes an ACTION such as RUN ILDISK or replace an FRU. We didn’t simulate the diagnostic run times as real time so you could concentrate on troubleshooting instead of waiting. After you have solved a problem, you will be given your troubleshooting time and the maximum troubleshooting time determined by CSSE.

There are 11 problems in this exercise. Try as many as you wish, and use your documentation to help you solve the problems. No score is kept, so enjoy sharpening your troubleshooting skills.

The simulator also includes a list of ACTIONS and OBJECTS which you will use to solve these problems. To display either list, press the PF2 key or the Help key, or type HELP at the ITS WORDS prompt. Then use the right and left arrow keys to select either ACTIONS or OBJECTS from the Help Strip and the list.

To use these ACTIONS and OBJECTS to solve the problems, type an ACTION, or an ACTION/OBJECT combination, at the ITS WORDS prompt.

<table>
<thead>
<tr>
<th>Prompt</th>
<th>Action</th>
<th>Object</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITS WORDS &gt;</td>
<td>exit</td>
<td></td>
</tr>
<tr>
<td>ITS WORDS &gt;</td>
<td>run</td>
<td>ildisk</td>
</tr>
</tbody>
</table>

The ACTIONS are listed below.

CHECK
HELP
REPLACE

DONE
INSTALL
RESTORE

EXIT
POWER ON
REVIEW

Give Up
Power OFF
RUN

Notice that some of letters of the ACTION words are capitalized and underlined. You may type only these letters or the whole word.
There are four words on the ACTION list - EXIT, GIVE UP, REVIEW, and HELP - which provide you with help when you need it. These four action words are described below.

EXIT - exits you from the problem.

GIVE UP - tells you the solution and exits you from the problem.

REVIEW - restates the problem, and lists the actions you have taken so far.

HELP - brings up a Help Strip containing three selections - CONTINUE, ACTION, and OBJECT. Use the right and left arrow keys or enter the first letter of each word to make your selections. Pressing the Help key or the PF2 key also displays the Help Strip. The three functions for the Help Strip are:

CONTINUE - allows you to continue with the problem.
ACTION - displays the ACTION list.
OBJECT - displays the OBJECT list.

The OBJECTS are listed below.

<table>
<thead>
<tr>
<th>Cartridge</th>
<th>File</th>
<th>FRU</th>
<th>LOOPback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dkutil</td>
<td>IlDisk</td>
<td>Lexer</td>
<td>Verify</td>
</tr>
<tr>
<td>System Error Log</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As with the ACTION words, you may type in only the letters which are capitalized and underlined, or the whole word. This simulator has some limitations. The drive internal diagnostics, the in-line diagnostics, and the utilities are NOT simulated 100 percent because of programming restrictions. Most of the limitations are with parameter selections. You should also keep in mind that the real run times for the SIMULATED diagnostic and utilities run much faster than the actual diagnostics and utilities.

The Operator Control Panel (OCP) on the RA90 is also simulated. The following KEYPAD keys simulate the RA90 Operator Control Panel (OCP) and the power switch.

KEYPAD Key | FUNCTION
---|---
Pf3 | Turn off RA90 power.
Pf4 | Turn on RA90 power.
1 | Run button
2 | Fault button
3 | Write Protect button
4 | Port A button
5 | Port B button
6 | Test button

The following is a list of functions for the ACTION words and their associated OBJECT words.

FOR INTERNAL USE ONLY
<table>
<thead>
<tr>
<th>ACTION</th>
<th>OBJECT</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHECK</td>
<td>FRU</td>
<td>Check an FRU for a physical condition.</td>
</tr>
<tr>
<td>CHECK</td>
<td>CARTRIDGE</td>
<td>Check to see if an update cartridge is installed.</td>
</tr>
<tr>
<td>CHECK</td>
<td>LOOP BACKS</td>
<td>Check to see if the SDI loopback connectors are installed.</td>
</tr>
<tr>
<td>CHECK</td>
<td>SYSTEM ERROR LOG</td>
<td>Check the system error logger for MSCP error log messages.</td>
</tr>
<tr>
<td>DONE</td>
<td></td>
<td>Tells the program that you fixed the problem and you are done. problem. If the problem is not fixed, you will be informed. If the problem is fixed, you will be given a comparison of your repair time and the prescribed repair time.</td>
</tr>
<tr>
<td>EXIT</td>
<td></td>
<td>Exits the problem without stating the solution.</td>
</tr>
<tr>
<td>GIVE UP</td>
<td></td>
<td>Exits the problem and gives the solution.</td>
</tr>
<tr>
<td>HELP</td>
<td></td>
<td>Display the ACTION and OBJECT words.</td>
</tr>
<tr>
<td>INSTALL</td>
<td>CARTRIDGE</td>
<td>Installs a Firmware Update Cartridge</td>
</tr>
<tr>
<td>INSTALL</td>
<td>LOOPBACKS</td>
<td>Install the loopback test connectors in both ports.</td>
</tr>
<tr>
<td>POWER ON</td>
<td></td>
<td>Reconnects the power cord and turns on the drive power switch.</td>
</tr>
<tr>
<td>POWER OFF</td>
<td></td>
<td>Turns off the drive power switch and disconnects the power cord.</td>
</tr>
<tr>
<td>REPLACE</td>
<td>FRU</td>
<td>Replaces an FRU.</td>
</tr>
<tr>
<td>RESTORE</td>
<td>FILE</td>
<td>Restores files from backup</td>
</tr>
<tr>
<td>REVIEW</td>
<td></td>
<td>Restates the problem scenario and lists the actions you have taken for the current problem.</td>
</tr>
<tr>
<td>RUN</td>
<td>DKUTIL</td>
<td>Runs the HSC Disk Utility.</td>
</tr>
<tr>
<td>RUN</td>
<td>ILDISK</td>
<td>Runs the HSC Disk diagnostic.</td>
</tr>
<tr>
<td>RUN</td>
<td>ILEXER</td>
<td>Runs the HSC Exerciser.</td>
</tr>
<tr>
<td>RUN</td>
<td>VERIFY</td>
<td>Runs the HSC Verify Utility</td>
</tr>
</tbody>
</table>

If you choose to REPLACE FRUS, a menu will display. At the menu, use the up and down arrow keys, or type the FRU name to make your selection. This is the FRU menu.

**FRUs**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Blower Motor</td>
<td>OCP Panel</td>
</tr>
<tr>
<td>Brake Assembly</td>
<td>PCM Module</td>
</tr>
<tr>
<td>ECM Module</td>
<td>Power Supply</td>
</tr>
<tr>
<td>Ground Brush Assembly</td>
<td>Read/Write Cable</td>
</tr>
<tr>
<td>HDA Assembly</td>
<td>SI Cable</td>
</tr>
<tr>
<td>IEC Cable</td>
<td>Controller SDI Module (.ksdi)</td>
</tr>
</tbody>
</table>

When you think you have performed the necessary procedures, and have solved the problem, type the word DONE. You will receive feedback indicating whether or not you have solved the problem.

If you have solved the problem, the feedback will include the amount of time you took to solve it, as if you had performed the procedures in the field.
DKUTIL

DKUTIL>
DKUTIL>
DKUTIL>
DKUTIL> DISPLAY ERROR

*---------------------------------------------------------------*
| Disk Drive Internal Error Log Display                        |
| This command will display the internal error log of disk drives |
| that support internal error logging.                          |
| For the RA80, RA81 and RA82 only 16 bytes of error log data will |
| be displayed. For the RA60, no error log is implemented. For later |
| drives, the internal error log data will be displayed.          |

*---------------------------------------------------------------*
| Error Log Entries                                             |
| Error log entries are written sequentially FORWARD starting from|
| the first memory location to the last. When the last location is|
| written, a wrap occurs back to the first memory location such that|
| subsequent error entries write-over previous entries again from |
| the first memory location to the last. The Entry Count for each |
| memory location is incremented when a new entry is written.     |
| Thus, an entry count of 2 for any location not only indicates two|
| writes for that location but also indicates that at least one wrap|
| of the Error Log has occurred. Error Log entries remain unchanged|
| until over-written with a new error entry.                      |
| Error log entries are displayed in REVERSE chronological order.|
| That is, the newest entry first, continuing with the next newest|
| entry etc....until the entire error log or selected portion has    |
| been displayed including "NULL" entries. The newest entry location|
| is displayed as the DEFAULT to the "Select starting entry location"|
| prompt, where a different location can be entered to start the   |
| utility display. The selectable option to pause and prompt after |
| every 10 error log entries provides a means to stop the error log |
| display. This option also provides a method of continuously       |
| dumping the error log without further operator intervention.    |

*---------------------------------------------------------------*
OCP Exercise Checklist

Please complete the following check list. Remember to use your service guide (Chapter 3) to aid you through these exercises.

1. ________ Set the unit address to 2345 and store the address
2. ________ Set the unit address to 0021 and store the address
3. ________ Set the unit address to 0011 say no to the change, then set the unit address to 0059 and store the unit address
4. ________ Run DKUTIL
5. ________ Run Test 00 with drive spun down
6. ________ Run Test 00 with drive spun down
7. ________ Run Test 10
8. ________ Run Test 41
9. ________ Run Test 45
10. ________ Run Test 47
11. ________ Run Test 66

Take this opportunity to refer to Chapter 4 in your service manual and practice running other diagnostic and utility.
1.1 Problem Statement

The customer reports that a user error message occurs every time a user attempts to run file $8:[SYS0.SYSEXEMARK]CONTLLAB.EXE;1 and the error count from the RA90 increments. The drive unit number is 8. Also, an error message is given whenever a backup is done on the same file.

This customer operates in a cluster environment with twenty 20 RA type disk drives. An SA600 is dual ported between two HSC50's. The customer demonstrates the problem to you on site with a user terminal that is logged into a VAX 8800 CPU.

Refer to Section 1.2 in your ITS Reference Guide to examine the Customer Console Trail.
1.2 Customer Error Log

VA X / VMS SYSTEM ERROR REPORT  COMPILED 17-APR-1988 09:53
ERROR SEQUENCE 2626.
ERL$LOGMESSAGE ENTRY  10-APR-1988 01:00:42.04
KA87  REV# 125. RIGHT CPU
I/O SUB-SYSTEM, UNIT _GREASY$DUA3:

MESSAGE TYPE  0001 DISK MSCP MESSAGE
MSLG$W_CMD_REF  00000000 UNIT #3.
MSLG$W_UNIT  0003 SEQUENCE #1.
MSLG$W_SEQ_NUM  0001 SDI ERROR
MSLG$B_FORMAT  03 SEQUENCE NUMBER RESET
MSLG$B_FLAGS  41 OPERATION CONTINUING
MSLG$W_EVENT  00EB DRIVE ERROR
    DRIVE DETECTED ERROR
MSLG$Q_CNT_ID  0000FA05 UNIQUE IDENTIFIER, 00000000FA05(X)
    01200000 MASS STORAGE CONTROLLER
MSLG$B_CNT_SVR  00 HSC70
MSLG$B_CNT_HVR  00 CONTROLLER SOFTWARE VERSION #0.
MSLG$W_MULT_UNIT  0072 CONTROLLER HARDWARE REVISION #0.
    02130000
MSLG$Q_UNIT_ID  0000022D UNIQUE IDENTIFIER, 0000000022D(X)
    02130000 DISK CLASS DEVICE (166)
    RA90
MSLG$B_UNIT_SVR  0E UNIT SOFTWARE VERSION #14.
MSLG$B_UNIT_HVR  00 UNIT HARDWARE REVISION #0.
MSLG$L_VOL_SER  0000022D VOLUME SERIAL #557.
MSLG$L_HDR_CODE  00000000 LOGICAL BLOCK #0.
MSLG$Z_SDI REQUEST  1F GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
LOG INFORMATION IN EXTENDED AREA
SPINDLE READY
PORT B RECEIVERS ENABLED

FOR INTERNAL USE ONLY
MODE 00
ERROR 40
CONTROLLER 00
RETRY 00

512-BYTE SECTOR FORMAT
SDI RECEIVE ERROR
NORMAL DRIVE OPERATION
0. RETRIES

CONTROLLER OR DEVICE DEPENDENT INFORMATION
LED CODE 07
PANEL CODE 0E
LAST OPCODE 88
RESERVED 03
CUR CYLNDR 0000
CUR GROUP 00
REQUESTOR 07
DRIVE PORT 02

GET SUB-UNIT CHARACTERISTICS
CURRENT CYLINDER, #0.
CURRENT GROUP, #0.
REQUESTOR #7.
DRIVE PORT #2.

***********************************************************************
1. INTERVENING RECORD(S) WILL BE PRINTED AT INPUT FILE "<EOF>"

FOR INTERNAL USE ONLY
**ERROR SEQUENCE 3416.**

ERL$LOGMESSAGE ENTRY 17-APR-1988 05:31:20.00
KA87 REV# 125. RIGHT CPU

I/O SUB-SYSTEM, UNIT _WHEEZY$DUA130:

<table>
<thead>
<tr>
<th>MESSAGE TYPE</th>
<th>0001</th>
<th>DISK MSCP MESSAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSLG$L_CMD_REF</td>
<td>00000000</td>
<td>UNIT #130.</td>
</tr>
<tr>
<td>MSLG$W_UNIT</td>
<td>0082</td>
<td>SEQUENCE #9.</td>
</tr>
<tr>
<td>MSLG$W_SEQ_NUM</td>
<td>0009</td>
<td>SDI ERROR</td>
</tr>
<tr>
<td>MSLG$B_FORMAT</td>
<td>03</td>
<td>OPERATION CONTINUING</td>
</tr>
<tr>
<td>MSLG$B_FLAGS</td>
<td>40</td>
<td>DRIVE ERROR</td>
</tr>
<tr>
<td>MSLG$W_EVENT</td>
<td>002B</td>
<td>DRIVE COMMAND TIMEOUT</td>
</tr>
<tr>
<td>MSLG$Q_CNT_ID</td>
<td>7087FC03 01010000</td>
<td>UNIQUE IDENTIFIER, 00007087FC03(X) MASS STORAGE CONTROLLER HSC50</td>
</tr>
</tbody>
</table>

| MSLG$B_CNT_SVR | 02 | CONTROLLER SOFTWARE VERSION #2. |
| MSLG$B_CNT_HVR | 00 | CONTROLLER HARDWARE REVISION #0. |
| MSLG$W_MULT_UNIT | 0040 | |
| MSLG$Q_UNIT_ID | 00042D9E 02050000 | UNIQUE IDENTIFIER, 000000042D9E(X) DISK CLASS DEVICE (166) RAB1 |
| MSLG$B_UNIT_SVR | 07 | UNIT SOFTWARE VERSION #7. |
| MSLG$B_UNIT_HVR | 06 | UNIT HARDWARE REVISION #6. |
| MSLG$L_VOL_SER | 00000000 | VOLUME SERIAL #0. |
| MSLG$L_HDR_CODE | 00000000 | LOGICAL BLOCK #0. GOOD LOGICAL SECTOR |

| MSLG$Z_SDI_REQUEST | 13 | RUN/STOP SWITCH IN PORT SWITCH IN SPINDLE READY |
| MODE | 00 | 512-BYTE SECTOR FORMAT |
| ERROR | 00 | NORMAL DRIVE OPERATION |
| CONTROLLER | 00 | 0. RETRIES |
| RETRY | 00 | |

FOR INTERNAL USE ONLY
DEVICE DEPENDENT INFORMATION

LONGWORD 1.  04E30088  /.../  
LONGWORD 2.  04000003  /..../  
LONGWORD 3.  00000000  /..../  
LONGWORD 4.  00000000  /..../  

BEGINNING OF INTERVENING ENTRIES
ERROR SEQUENCE 3388.
ERL$LOGMESSAGE ENTRY 16-APR-1988 08:39:44.23
KA87 REV# 125. RIGHT CPU

I/O SUB-SYSTEM, UNIT _GREASYDUAL:

MESSAGE TYPE 0001
MSLGS$CMD_REF C9290000
MSLGS$UNIT 0001
MSLGS$SEQ_NUM 0080
MSLGS$FORMAT 02
MSLGS$FLAGS 81
MSLGS$EVENT 006B
MSLGS$Q_CNT_ID 0000FA05 01200000

MSLGS$CNT_SVR 00
MSLGS$CNT_HVR 00
MSLGS$MULT_UNT 0032
MSLGS$UNIT_ID 00001000 02050000

MSLGS$UNIT_SVR 06
MSLGS$UNIT_HVR 00
MSLGS$LEVEL 00
MSLGS$RETRY 00
MSLGS$VOL_SER 4BCE4E13
MSLGS$HDR_CODE 0000BF0A

CONTROLLER DEPENDENT INFORMATION

ORIG ERR 1800

ERR RECOV FLGS 0002
LV1 A RETRY 06
LV1 B RETRY 00

SRC REQ # 03
DET REQ # 03

3. ************************ LOGGED ON SID 067D0140

DISK MSCP MESSAGE
UNIT #1.
SEQUENCE #128.
DISK TRANSFER ERROR
SEQUENCE NUMBER RESET
OPERATION SUCCESSFUL

DRIVE ERROR
POSITIONER ERROR (MIS-SEEK)

UNIQUE IDENTIFIER, 00000000FA05(X)
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #0.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 000000001000(X)
DISK CLASS DEVICE (166)
RA81

UNIT SOFTWARE VERSION #6.
UNIT HARDWARE REVISION #0.

VOLUME SERIAL #1271811603.
LOGICAL BLOCK #36618.
GOOD LOGICAL SECTOR

HEADER COMPARE ERROR
HEADER SYNC TIMEOUT
SUSPECTED LOW HEADER MISMATCH

ERR LOGGED TO CONSOLE AND HOST

BUF DAT MEM ADR CEE3

FOR INTERNAL USE ONLY
<table>
<thead>
<tr>
<th>DEVICE</th>
<th>ERROR BITS</th>
<th>QIO TIMEOUT</th>
<th>ERRORS THIS SESSION</th>
<th>QIOS THIS SESSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>_GREASY$DUA1:</td>
<td>0.</td>
<td>1.</td>
<td>0.</td>
<td>0.</td>
</tr>
<tr>
<td>_GREASY$DUA3:</td>
<td>0.</td>
<td>1.</td>
<td>0.</td>
<td>0.</td>
</tr>
<tr>
<td>_WHEEZY$DUA130:</td>
<td>0.</td>
<td>1.</td>
<td>0.</td>
<td>0.</td>
</tr>
</tbody>
</table>

**SUMMARY OF ALL ENTRIES LOGGED BY SID 067D0140**

ERL$LOGMESSAGE 3.

**DATE OF Earliest Entry** 10-APR-1988 01:00:42.04
**DATE OF LATEST ENTRY** 17-APR-1988 05:31:20.00

**PROCESSED ENTRIES HOUR-OF-DAY HISTOGRAM LOGGED BY SID 067D0140**

<table>
<thead>
<tr>
<th>Hour</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>00:00</td>
<td>0.</td>
</tr>
<tr>
<td>01:00</td>
<td>1.</td>
</tr>
<tr>
<td>02:00</td>
<td>0.</td>
</tr>
<tr>
<td>03:00</td>
<td>0.</td>
</tr>
<tr>
<td>04:00</td>
<td>0.</td>
</tr>
<tr>
<td>05:00</td>
<td>1. *</td>
</tr>
<tr>
<td>06:00</td>
<td>0.</td>
</tr>
<tr>
<td>07:00</td>
<td>0.</td>
</tr>
<tr>
<td>08:00</td>
<td>1. *</td>
</tr>
<tr>
<td>09:00</td>
<td>0.</td>
</tr>
<tr>
<td>10:00</td>
<td>0.</td>
</tr>
<tr>
<td>11:00</td>
<td>0.</td>
</tr>
<tr>
<td>12:00</td>
<td>0.</td>
</tr>
<tr>
<td>13:00</td>
<td>0.</td>
</tr>
<tr>
<td>14:00</td>
<td>0.</td>
</tr>
<tr>
<td>15:00</td>
<td>0.</td>
</tr>
<tr>
<td>16:00</td>
<td>0.</td>
</tr>
<tr>
<td>17:00</td>
<td>0.</td>
</tr>
<tr>
<td>18:00</td>
<td>0.</td>
</tr>
<tr>
<td>19:00</td>
<td>0.</td>
</tr>
<tr>
<td>20:00</td>
<td>0.</td>
</tr>
<tr>
<td>21:00</td>
<td>0.</td>
</tr>
<tr>
<td>22:00</td>
<td>0.</td>
</tr>
<tr>
<td>23:00</td>
<td>0.</td>
</tr>
</tbody>
</table>
1.3 Troubleshooting the Forced Error

PROBLEM FLOW

Discussion with customer should have revealed that the problem was isolated to a single user/application failure.

Examination of host error log would have revealed NO errors against the unit in question.

The error log also indicates that the subsystem is processing MSCP/disk errors in a normal fashion, so the reporting mechanism is working.

Discussions with customer would have revealed that all other applications appear to work.

With this information, it is best to pursue the application/users use of the disk/subsystem, and not attempt to affect a repair on the drive itself.

Examination of the drive internal error log is ALWAYS an appropriate action on any disk call provided that there is no significant "availability hit" to the customer. With an HSC50/70, this is easily accomplished and will only take 2-3 minutes for an RA70/RA90 disk drive! It would only take seconds for an RA8x drive. The dumping of the internal error log on a '2-board' controller would have resulted in an unnecessary hit to system availability. The host system would have to be brought down and the appropriate DM-coded utility executed.

When did the file get the forced error? The ONLY way of telling is to find the error log that recorded the replacement or the console trail of the system/user program that read the block in error. There is no other mechanism of telling. The forced error occurred because at SOME historic time past the file (block) was read, had an uncorrectable ECC error, and then as a result of trying to recover the data, the data was 'flagged" with the forced error. It could have happened at ANY time previous, but at whichever time it happened, the user application or system utility was notified at that time as to the unsuccessful read without error.

DSA DISK AND FORCED ERROR MESSAGES ON VMS

DSA Disks - Dynamic Bad Block Replacement

The new DIGITAL Storage Architecture (DSA) disks greatly increase data reliability by dynamically handling media errors.

On older non-DSA disks, data could become corrupted while the disk was in use and it would be difficult to determine that the error was the result of a bad block. The VMS "BAD" utility handled bad blocks on the older disks but could not be used on the DSA disks. The new disks are designed to protect data from media errors that occur while the disk is in use. The UDA/KDA/KDB/HSC and DSA disks not only correct more data errors, but also informs the operating system when their error correcting capability is exceeded via the "Forced Error" message.

DSA Dynamic Bad Block Mechanism

Before the DSA disks leave the factory, they are tested for bad blocks; the information is stored in the Format Control Table (FCT) and again in the Replacement Control Table (RCT). In the field, DSA disks are designed to handle media errors as they occur. Each sector (logical block (LBN)) of a DSA series disk has a 170-bit error correction code (ECC) and an error detection (EDC) character after the data field. This 170-bit ECC field can correct-up to eight symbol errors where a symbol is 10 bits long. There are three classes of ECC errors; only the class that sets up "FORCED ERROR" messages can affect the user.
When the system identifies an LBN as bad, the data is moved to a revectored block number (RBN). The LBN is marked so that future references to it will cause the hardware to access the RBN holding the data. The RCT contains an entry for the RBN used to store the data from a bad LBN. When there are more than eight symbol errors, the data moved to the RBN is "SUSPECT AS CORRUPT". The hardware now has to notify the software that it was unable to correct the symbol errors. The "forced Error" message lets the file user know that some preventative action should be taken.

Question: What Is A Forced Error And How Does It Occur?

Answer: A forced error (FE) is a way of identifying a block of data that contained an uncorrectable ECC error at SOME TIME in the past.

A forced Error (FE) is manufactured by the BBR code when the sector being replaced contains an uncorrectable ECC error. The FE is applied to the data by an MSCP WRITE COMMAND with the FE modifier set. At this time only the BBR code writes FEs.

DETECTING FORCED ERRORS

The forced error message occurs when an attempt is made to read, dump or backup (incremental, stand-along, or HSC) the file with the "FORCED ERROR FLAG" set. System utilities such as VMS's ANALYZE tells which file has the forced error flag set. Look for:

```
%VERIFY -I-READFILE, file (553,1,1) JBCSYSQUE.EXE;1 error reading VBN 11
-SYSTEM-F-FORCEDERROR, forced error flagged in last sector read
```

VMS ANALYZE/DISK will cause VMS to read and check the structures of all existing files on the selected disk and report any discrepancies on the user terminal.

VMS ANALYZE/DISK/READ will cause VMS to read all blocks that are ALLOCATED and report any errors such as blocks with "forced error" flag set. It WILL NOT report the existences of forced errors on blocks that are NOT currently allocated to a file.

Note that in the ANALYZE printout in the example above the reported block in error is listed as a "virtual block number" or VBN. VBN 0 is the first block of the file. The LBN starting block number of the file is recorded in the ODS-2 file directory information. With considerable effort and a knowledge of the ODS-2 file structure, it is possible to compute the LBN location of a VBN.

HSC - VERIFY

The HSC VERIFY will read all blocks on a disk and report the presence of any/all "forced errors". HSC VERIFY will verify that the integrity of the DSA structure on the disk is correct. It WILL NOT provide any 'file system information' as the HSC does not understand file structures such as the ODS-2 file format of a VMS disk.

When using backup, the message looks like:

```
%BACKUP_F_READBLOCK
   error reading block 11 of DUA0:[SYS0.SYSEX]JBCSYSQUE.EXE;15
   -SYSTEM-F-FORCEDERROR, forced error flagged in last sector read
```

The drive error that caused the LBN to be replaced also generates an entry in the error log. Usually this error shows up under an event type as "Data Error - Uncorrectable "ECC Error". Finding this entry in the error log file suggests that ANALYZE should be run to identify the file.

Just because the forced error flag is set DOES NOT MEAN that the data in the block is corrupt; it indicates that it MOST probably is. ASCII files can easily be checked, but, for other files, corruption is only apparent when the piece of code on the flagged block is used. The user should ALWAYS assume that the data is CORRUPT and return to a valid copy of the file.

FOR INTERNAL USE ONLY
HSC VERIFY

A ‘complete’ HSC - VERIFY run on an RA90 will take at best approximately 40 minutes. This type of “scan” of the disk will identify all blocks that are in error. Various options to select in running of Verify can be utilized. Consult the available HSC documentation.

The utility will display the blocks in error only as LBN’s, RBN’s, or DBN’s and WILL NOT associate any block with any file. Verify DOES NOT understand file structures. In order to convert an LBN number to a filename will take considerable effort and understanding.

DEALING WITH FORCED ERROR MESSAGES IN THE VMS ENVIRONMENT

The only way to clear the ‘forced error flag’ is to actually write to the block containing the data with the “Forced Error” flag set. This is NOT a simple straightforward operation. The LBN must be identified and a program written that writes to that LBN. To verify that the write completed successfully, use the IO$M-DATACHECK modifier on IO$ _ Writelblk.

The simplest method of dealing with “Forced Errors” is really to restore the file from a GOOD backup. VMS since V4.0 has the capability of zeroing the disk blocks allocated to a file when the file is deleted. This feature allows dealing with “Forced Errors” very quickly.

COPYING A FILE—The VMS “COPY” utility will always fail when it attempts to copy a file containing a block written with forced error.

BACKUP TO TAPE - IMAGE—When a file with a “forced Error” is backed up to tape, the user is notified by a backup message. THERE IS NO MECHANISM OF

RETAINING THE “FORCED ERROR” FLAG WITH THE DATA ON TAPE. If the potentially corrupt file is restored from this tape, no notification that the file originally contained a “forced Error” will be given. The sector specific information is not stored on the tape, so this information has to manually be recorded on the tape label as reported on the terminal console from which the backup is running. If backup is initiated via a batch process, it is a GOOD practice to log the batch process results into a log file and examine that log file for such error messages.

BACKUP TO TAPE - FILE FORMAT—A “file” orientated backup will give you the added information of knowing which exact file had the block with forced error! This is useful in identifying specifically which file should be restored from a good source.

BACKUP TO DSA DISK (including SHADOW COPYING)—Backing up DSA to DSA type disks via the backup or restore utilities will RETAIN the “forced error” flag indicator with the data that is suspect. This will be true for file, image or HSC based disk to disk operations.

DEALING WITH ‘FORCED ERRORS’ WITH NON-VMS OPERATING SYSTEMS.

The simplest method of dealing with “Forced Errors” is really a workaround that avoids dealing directly with the problem. Simply rename the current file and leave it unused on the disk, then restore the file from a good backup. Now the block with the forced error flag is never read. Renaming only works well if the file is not taking up crucial disk space. Be sure to set the protection so no one can accidentally delete the file and free up the flagged block.

Deleting the file and leaving the block open for reuse may cause the problem to recur.

FOR INTERNAL USE ONLY
The BBR algorithm is defined in the Digital specification "Digital Storage Architecture Disk Format". Version 1.5 of that specification made modification to that algorithm to place the requirement on the IMPLEMENTER of BBR action to utilize the customer data as one of the test patterns when testing a potential bad block for replacement. This method significantly improves the ability to determine and revector 'marginal' blocks.

This spec is adhered to by VMS systems since Version 4.2, and by HSC software since V200. Current DEC supported versions of ULTRIX32, RSX, RSTS and RT11 operating systems have implemented to this specification.

If the cluster size for the disk is 16 and the block with the forced error is the 14th of 16, the next file using this cluster might not write exactly over that block. For instance, the next file that uses that disk cluster might only write to the first seven blocks. The forced error message is still seen when this new file is read because a read QIO reads all the blocks in a cluster. Here the "forced Error" message is misleading, but the user does not know and must still implement a workaround.
Bug 2

2.1 Problem Statement

The customer reports that RA90 unit number 59 has logged approximately 250 errors since yesterday morning. All the other RA90's are running with no problems. This customer has eight RA90s that are part of a large disk farm running in a cluster and dual ported between 2 HSC50's.

The cluster includes 11/780, 11/750 and various 8000 series CPU's.
### 2.2 Customer Errorlog Rollup

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*FOR INTERNAL USE ONLY*
2.3 Troubleshooting ECC Errors Without 'Wire' Errors - 1 Surface

Troubleshooting ECC Errors WITHOUT Pulse/State Parity Errors - That Correlate To Single Head/Surface

You were presented with information in error log that would allow you to make a firm accurate decision concerning replacement of this HDA. The number one goal of your service effort should be to make the correct diagnosis of a problem on the first call, replacing the correct part so that you MINIMAL IMPACT customer availability of his disk and data.

CORRECTIVE ACTION STEPS WOULD HAVE INCLUDED:

1. Determine drive.
2. Examination of host error log reveals ECC errors and NO indication of "wire" related errors.
3. Examination of drive internal error log would reveal no significant drive errors of consequence or relating to the customer reported problems.
4. Conversion of LBN's affected indicates that errors isolate to a single head/surface.
5. Replacement of HDA takes place after consideration about customer data is made.
6. Verification of FRU replacement is made with internal drive diagnostics.

NOTE
It is not necessary to run a 'formatter' against the new HDA. This is an unnecessary 'hit' to customer availability and to the MTTR of the product. Upon HDA replacement, a few minutes of HSC ILEXER should be the most that is considered. Other utilities/testing should not be contemplated.

RA8x Drives: Some people recommend that upon replacement of an RA8x HDA, that HSC-ILEXER (if on HSC) be ran in the customer data area with BBR 'turned on'. HSC Version 370 microcode now implements the option of selecting BBR while running over the customer data area. This will tend to "clean" the disk, however utilizing it in such a fashion will SIGNIFICANTLY add to the MTTR of the call and for the RA90 will add no value. This procedure may have some incremental benefit for RA8x products. Due to differences in technologies of heads/media for the RA90 (from past RA8x products) this practice DOES NOT have ANY demonstrated value. For the RA90 it IS NOT a recommended practice to 'format' an HDA upon installation/replacement.

7. Return the disk drive to the customer.

You were presented with information in error log that depicted a R/W data problem. It is IMPORTANT to note in the host error log that no SDI communication problems were logged such as:

   Controller detected pulse or state parity error

This allows you to draw a conclusion that the "SDI wire" level communications is probably not contributing to the occurrence of the bad ECC, but that the problem resides elsewhere.
Read/write transfer problems manifest themselves in a variety of symptoms as logged in a host error log. Some of these include:

- Data errors
- ECC errors
- Uncorrectable ECC errors
- Header Not Fond errors
- Invalid Header errors
- Header Compare errors
- Format errors
- Data sync timeout errors

Basically these type errors involve what is often referred to as the R/W data path hardware or defective media. For the SDI disk subsystem, the R/W data path includes SDI controller R/W data path circuits, SDI cables and bulkhead connectors, disk drive R/W data path hardware, and the specific disk storage media.

In determining which FRU’s to suspect as causing particular R/W transfer errors the following analysis process will lead you to an effective analysis of the given symptoms.

1. Isolate the specific LBN’s (logical block numbers) that were associated with the logged transfer errors in the host error log. If there are 'hundreds', then randomly select a few (10-20). If there are not 'hundreds', then take the available ones, and utilizing the appropriate formula, decode the 'targeted' or suspect LBN numbers to the logical cylinder, group and head.

2. Decode the specific LBN’s in question to specific RA90 physical cylinders, tracks, and groups (physical R/W heads).

By taking a random selection of the available error log LBN information as provided in the ITS problem scenario, you would have easily converted and made the correlation that only one head was defective.

The following was the list of 'bad' LBN’s indicated in the provided error log and what the LBN conversion would have resulted in.

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Examination of the 'host error log' should have shown a frequency of error rate < 10/hour, which on an active system user disk means that attempts to 'duplicate or replicate' the errors in the 'diagnostic' environment is not effective to/for the customer or for service.
Failures that consistently occur due to 1 or two R/W heads are 'usually' related to an HDA failure. Recall the RA90 block diagram, within the HDA assembly. The final head selection is made of heads 0-3, 4-7, 8-11, or head 12, by the logic (CHIP ENABLE 1-4 L) selecting one of the 4 R/W multiplexing chips that is located WITHIN the HDA FRU itself.

CONTROLLERS

If the hardware configuration included the use of multiple controllers and/or 'dual-porting', then examination of error logs from other hosts/controllers would have indicated that same "head correlation" problem.

BBR ACTIVITY WITH KDA/KDB/UDA CONTROLLERS

A lot of various MSCP error packets can be reported during BBR (testing and replacement sequences) with the '2-board' controllers and often it is difficult to understand which events are meaningful, and which are not. This problem came about when the 'enhanced' version of the BBR algorithm was added to the DSDF specification and implemented by the various operating systems. (Remember: For '2-board' controllers, the BBR is actually performed by the "host" operating system). The enhanced algorithm caused more error log events to be generated during testing of the bad block to determine if it was really bad. The change to the algorithm specifies that testing is to be done with correction and recovery disabled. By disabling correction and recovery, the controller generates an uncorrectable ECC error if the bad block has any ECC symbol errors.

There are only 2 error log events that are meaningful when BBR is attempted. They are the error log packet which indicates that an ECC error above the threshold occurred and the BBR event error log packet. The error log packets after the packet which indicates ECC above the threshold AND before the BBR error log packet have no meaning at all except to the BBR algorithm. To match the ECC over threshold event log packet with the BBR log packet do the following:

Match the Command Reference Number field of the error log packets.

Match the unit number field of the error log packets.

Match the LBN field of the error log packets.

When fields of the error log packets match and the BBR packet is found, will have the information about the BBR that is necessary to understand what happened.

BACKUP OF CUSTOMER DATA

Disk to disk backups of the customer data is a much preferred method of saving and restoring the customer data. A 'shadow copy' or HSC disk to disk copy will take roughly less than 30 minutes to complete. If a backup to tape is necessary, the HSC backup utility offers a fairly quick method of backup as well. An HSC disk to tape backup will take considerably less time, depending somewhat on HSC activity. All HSC based backups are of an image format style of backup. Though they are fast, all logical blocks of the disk are transferred regardless if they are used (allocated) or not.

If an 'operating system backup (OS)' (i.e. VMS BACKUP) is necessary, it will take a while, particularly if the disk is full. However the added advantage of an "OS" type of backup is that only the allocated files are backed up, and in the restore process, file fragmentation is eliminated.
CUSTOMER DATA CORRUPTION

During the 'backup' process, be very mindful of looking for evidence of any blocks/files that contained a 'forced error'. The attributes of a forced error are lost as the file is backed up and restored to/from tape. Should a file be found in the backup process that has a 'forced error' indicator flag set, it will be necessary to restore that "file" from a known good backup, OR the customer will have to investigate that specific block(s) of a file(s) that have a forced error and attempt to recover the data manually.

SAMPLE OF VAXsimPLUS analysis and evidence information for this type of error. Reported to: DISK_$USER_DISK:[SYSMAINT.ERRLOG]OUT2.RPT Evidence in: NL:[J]OUT2.PAK

NOTE

This report contains messages about system errors which should be investigated either because of the nature of the error or because of the error-rate. Whether or not a repair should be made depends on the results of that investigation.

PACKET 1.

Attn: Field Service
Device: C3P0$_DUA59 (RA90 S/N:FFFFF) C3P0$_DUA59 VADER$_DUA59
Error: Read/Write Data Errors
Theory: [X.XX.XX]
Suspect: HDA
Read/Write Head number 0

Evidence (All results are in decimal except LED Code): Total errors on drive: 15

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<th>Phys. From</th>
<th>Soft Count</th>
<th>Hard Count</th>
<th>Volume Serial Number</th>
<th>Error Type</th>
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<td>597</td>
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<td>1</td>
<td>0</td>
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<td>1</td>
<td>0</td>
<td>472 ECC Error</td>
</tr>
</tbody>
</table>


FOR INTERNAL USE ONLY
This is a "SAMPLE" worksheet that can be used to capture essential error log information from available host error log.

<-- Drive --> MSCP  Block  <-- Logical--> Name#  Tap  Led  Event
#  Cyl  Gp  Tk  S  yy-mm-dd hh:mm:ss:cc
----------  ----  ----------  ----  --  --  ----------------------
3.1 Problem Statement

The customer reports that RA90 unit number 59 has been logging errors for the last few days but no data has been lost. This customer has a large disk farm normally dual ported between 2 HSC70's. Drive unit number 59 is dual ported to a VAX 11/785 and a VAX8650. Service and error log activities must be done from the VAX 8650.
3.2 Customer Error Log

PAGE 1

SYSTEM ERROR REPORT

COMPILERED 24-MAR-1988 22:40

LOGGED ON SID 0404F098

ERROR SEQUENCE 2834.
KAB6 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT VADERSDUA59:

MESSAGE TYPE 0001
MSLG$W_CMD_REF 316E0015
MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 000E
MSLG$B_FORMAT 02
MSLG$B_FLAGS E0

MSLG$W_EVENT 01E8

MSLG$Q_CNT_ID 0000000DD
01200000

MSLG$B_CNT_SVR 02
MSLG$B_HVR 00

MSLG$W_MULT_UNIT 0072
MSLG$Q_UNIT_ID 0000FFFF
02130000

MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 0F
MSLG$B_LEVEL 00
MSLG$B_RETRY 01
MSLG$L_VOL_SER 000001DB
MSLG$L_HDR_CODE 0099F74

CONTROLLER DEPENDENT INFORMATION

ORIG ERR 8010

ERR RECOV FLGS 0003

LV1 A RETRY 00
LV1 B RETRY 00
BUF DAT MEM ADR C3C6
SRC REQ # 07
DET REQ # 07

FOR INTERNAL USE ONLY
**ERROR SEQUENCE** 2837.
**ERL$LOGMESSAGE ENTRY** 24-MAR-1988 10:32:29.49
**KA86 REV# 4. SERIAL# 152. MFG PLANT 15.**

I/O SUB-SYSTEM, UNIT _VADER$DUAU59:
MESSAGE TYPE 0001
MSLG$CMD_REF 316E0015
MSLG$UNIT 003B
MSLG$SEQ_NUM 0012
MSLG$FORMAT 02
MSLG$FLAGS E0

MSLG$EVENT 00E8
MSLG$Q_CNT_ID 000000DD 01200000

MSLG$C_CNT_SVR 02
MSLG$C_CNT_HVR 00
MSLG$MULT_UNIT 0072
MSLG$UNIT_ID 000FFFFFF 02130000

MSLG$UNIT_SVR 00
MSLG$UNIT_HVR 0F
MSLG$LEVEL 00
MSLG$RETRY 01
MSLG$VOL_SER 000001D8

MSLG$HDR_CODE 00099F75

CONTROLLER DEPENDENT INFORMATION
ORIG ERR 8010

ERR RECOV FLGS 0003
LV1 A RETRY 00
LV1 B RETRY 00
BUF DAT MEM ADR C146
SRC REQ # 07
DET REQ # 07

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #18.
DISK TRANSFER ERROR
BAD BLK REPLACEMENT REQUEST
OPERATION CONTINUING
OPERATION SUCCESSFUL
DATA ERROR
UNCORRECTABLE ECC ERROR

UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000000FFFFFF(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.

VOLUME SERIAL #472.

LOGICAL BLOCK #630645.
GOOD LOGICAL SECTOR

EDC ERROR
ECC ERROR

LCRN REPLACEMENT INDICATED
ERR LOGGED TO CONSOLE AND HOST

FOR INTERNAL USE ONLY
**Error Sequence 2838.**

**ERL$LOGMESSAGE ENTRY** 24-MAR-1988 10:32:29.49

**KAS6 REVT# 4. SERIAL# 152. MFG PLANT 15.**

**I/O SUB-SYSTEM, UNIT_VADER$DUAS059:**

- **MESSAGE TYPE:** 0001
- **MSLG$S_CMD_REF:** 316E0015
- **MSLG$SUNIT:** 003B
- **MSLG$S_SEQ_NUM:** 0012
- **MSLG$S_FORMAT:** 02
- **MSLG$S_FLAGS:** E0
- **MSLG$S_EVENT:** 00E8
- **MSLG$S_CNT_ID:** 00000EAD 01200000
- **MSLG$S_CNT_SVR:** 02
- **MSLG$S_CNT_HVR:** 00
- **MSLG$S_MULT_UNITS:** 0072
- **MSLG$S_UNIT_ID:** 000FFFF 02130000
- **MSLG$S_UNIT_SVR:** 00
- **MSLG$S_UNIT_HVR:** 0F
- **MSLG$S_LEVEL:** 00
- **MSLG$S_RETRY:** 01
- **MSLG$S_VOL_SER:** 00001D8
- **MSLG$S_HDR_CODE:** 00099F75
- **Controller Dependent Information:**
  - **ORIG ERR:** B010
  - **ERR RECOV FLGS:** 0003
  - **LV1 A RETRY:** 00
  - **LV1 B RETRY:** 00
  - **BUF DAT MEM ADR:** C146
  - **SRC REQ #:** 07
  - **DET REQ #:** 07

**Disk MSCP Message**

- **UNIT #59.**
- **SEQUENCE #18.**
- **DISK TRANSFER ERROR**
- **BAD BLK REPLACEMENT REQUEST**
- **OPERATION CONTINUING**
- **OPERATION SUCCESSFUL**
- **DATA ERROR**
- **UNCORRECTABLE ECC ERROR**
- **Unique Identifier, 0000000000DD(X)**
- **Mass Storage Controller**
- **HSC70**
- **Controller Software Version #2.**
- **Controller Hardware Revision #0.**
- **Unique Identifier, 00000000000000DD(X)**
- **Disk Class Device (166)**
- **RA90**
- **Unit Software Version #0.**
- **Unit Hardware Revision #15.**
- **Volume Serial #472.**
- **Logical Block #630645.**
- **Good Logical Sector**
- **EDC Error**
- **ECC Error**
- **LBN Replacement Indicated**
- **Err Logged to Console and Host**

*For internal use only*
<table>
<thead>
<tr>
<th>Message Type</th>
<th>Value</th>
<th>Description</th>
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<td>MSLG$W_EVENT</td>
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<td>MSLG$Q_CNT_ID</td>
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<td>MSLG$B_CNT_HVR</td>
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Disk MSCP Message

UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.

CONTROLLER HARDWARE REVISION #9.

UNIQUE IDENTIFIER, 000000000000(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #0.

UNIT HARDWARE REVISION #15.

REPLACEMENT ATTEMPTED, BLOCK - VERIFIED GOOD

VOLUME SERIAL #472.

BAD LOGICAL BLOCK
- NUMBER = 630645.

DATA ERROR
UNCORRECTABLE ECC ERROR
ERROR SEQUENCE 2840.
ERL$LOGSTATUS ENTRY 24-MAR-1988 10:32:34.57
K866 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _VADER$DUA59:

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OWNER UIC [030,031]

DIRECTORY STRUCTURED
FILE ORIENTED
SHARABLE
AVAILABLE
MOUNTED
ERROR LOGGING
CAPABLE OF INPUT
CAPABLE OF OUTPUT
RANDOM ACCESS

6850. QIO'S THIS UNIT
51. ERRORS THIS UNIT

ONLINE
SOFTWARE VALID
UNLOAD AT DISMOUNT

STARTING LBN #630644.
WRITE PHYSICAL BLOCK
IOSM_DATACHECK
TRANSFER SIZE 32768. BYTE(S)
488. BYTE PAGE OFFSET
REQUESTOR "PID"
IOSB, 0. BYTE(S) TRANSFERRED

FOR INTERNAL USE ONLY
**ERROR SEQUENCE 2845.
ERL$LOGMESSAGE ENTRY**

24-MAR-1988 10:33:23.65
KAB6 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _VADERSDUA59:
MESSAGE TYPE 0001

MSLG$L_CMD_REF B3C20040
MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 0018
MSLG$W_FORMAT 02
MSLG$W_FLAGS E0

MSLG$W_EVENT 01E8

MSLG$Q_CNT_ID 000000EAD
01200000

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULT_UNIT 0072
MSLG$Q_UNIT_ID 000FFFFF
02130000

MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 0F
MSLG$B_LEVEL 00
MSLG$B_RETRY 01
MSLG$L_VOL_SER 000001D8
MSLG$L_HDR_CODE 00009A678

CONTROLLER DEPENDENT INFORMATION
ORIG ERR 8010

ERR RECOV FLGS 0003

LV1 A RETRY 00
LV1 B RETRY 00
BUF DAT MEM ADR C4B2
SRC REQ # 07
DET REQ # 07

**DISK MSCP MESSAGE**

UNIT #59.
SEQUENCE #24.
DISK TRANSFER ERROR
BAD BLK REPLACEMENT REQUEST
OPERATION CONTINUING
OPERATION SUCCESSFUL
DATA ERROR
8. SYMBOL ECC ERROR

UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 0000000FFFFF(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.

VOLUME SERIAL #472.
LOGICAL BLOCK #632440.
GOOD LOGICAL SECTOR

EDC ERROR
ECC ERROR

LBN REPLACEMENT INDICATED
ERR LOGGED TO CONSOLE AND HOST

FOR INTERNAL USE ONLY
ERROR SEQUENCE 2846.  LOGGED ON SID 0404F098
ERLSLOGMESSAGE ENTRY  24-MAR-1988 10:33:28.54
KA86  REV# 4.  SERIAL# 152.  MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _VADER$DUAS59:

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<th>MSLG$W_MULT_UNT</th>
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<td>003B</td>
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<td>0034</td>
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DSK MSCP MESSAGE
UNIT #59.
SEQUENCE #25.
BAD BLOCK REPLACEMENT
OPERATION SUCCESSFUL
BAD BLOCK REPLACEMENT
BLOCK VERIFIED GOOD

UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 000000000000(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.

REPLACEMENT ATTEMPTED, BLOCK VERIFIED GOOD
VOLUME SERIAL #472.
BAD LOGICAL BLOCK
NUMBER = 632440.

DATA ERROR
8. SYMBOL ECC ERROR.
**ERROR SEQUENCE 3234.**

**ENTRY**

**ERLSLOGMESSAGE ENTRY** 24-MAR-1988 10:51:31.28

**KA86 REV# 4. SERIAL# 152. MFG PLANT 15.**

**I/O SUB-SYSTEM, UNIT _VADER$DUA59:**

**MESSAGE TYPE** 001

**MSLGS$CMD REF** F8C00019

**MSLGS$UNIT** 003B

**MSLGS$SEQ NUM** 03B2

**MSLGS$FORMAT** 09

**MSLGS$FLAGS** 80

**MSLGS$EVENT** 0034

**MSLGS$CNT ID** 00000000EAD 01200000

**MSLGS$CNT SVR** 02

**MSLGS$CNT_HVR** 00

**MSLGS$MULT UNIT** 0072

**MSLGS$UNIT ID** 00000000FE000020000000

**DISK MSCP MESSAGE**

**UNIT #59.**

**SEQUENCE #946.**

**BAD BLOCK REPLACEMENT**

**OPERATION SUCCESSFUL**

**BAD BLOCK REPLACEMENT BLOCK VERIFIED GOOD**

**UNIQUE IDENTIFIER, 0000000000DD(X) MASS STORAGE CONTROLLER**

**HSC70**

**CONTROLLER SOFTWARE VERSION #2.**

**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 00000000FFFF(X) DISK CLASS DEVICE (166)**

**RA90**

**UNIT SOFTWARE VERSION #0.**

**UNIT HARDWARE REVISION #15.**

**REPLACEMENT ATTEMPTED, BLOCK - VERIFIED GOOD**

**VOLUME SERIAL #472.**

**BAD LOGICAL BLOCK - NUMBER = 528360.**

**DATA ERROR**

**8. SYMBOL ECC ERROR**

FOR INTERNAL USE ONLY
ERROR SEQUENCE 3250.
ERL$LOGSTATUS ENTRY 24-MAR-1988 10:51:38.80
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _VADER$DUAG59:

OWNER UIC [030,031]
DIRECTORY STRUCTURED
FILE ORIENTED
SHARABLE
AVAILABLE
MOUNTED
ERROR LOGGING
CAPABLE OF INPUT
CAPABLE OF OUTPUT
RANDOM ACCESS

13535. QIO'S THIS UNIT
58. ERRORS THIS UNIT

ONLINE
SOFTWARE VALID
UNLOAD AT DISMOUNT

STARTING LBN #528332.
WRITE PHYSICAL BLOCK
IOMS_DATACHECK
TRANSFER SIZE 32768. BYTE(S)
488. BYTE PAGE OFFSET
REQUESTOR "PID"
IOSB, 0. BYTE(S) TRANSFERRED
**ERROR SEQUENCE 3622.**
**KA86 REV# 4. SERIAL# 152. MFG PLANT 15.**

I/O SUB-SYSTEM, UNIT _C3P0$DUA59:

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<tr>
<td>MSLG$B_CNT_SVR</td>
<td>02</td>
<td></td>
</tr>
<tr>
<td>MSLG$B_CNT_HVR</td>
<td>00</td>
<td></td>
</tr>
<tr>
<td>MSLG$W_MULTI_UNT</td>
<td>0040</td>
<td></td>
</tr>
<tr>
<td>MSLG$Q_UNIT_ID</td>
<td>0000FFFF</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>02130000</td>
</tr>
<tr>
<td>MSLG$B_UNIT_SVR</td>
<td>00</td>
<td></td>
</tr>
<tr>
<td>MSLG$B_UNIT_HVR</td>
<td>0F</td>
<td></td>
</tr>
<tr>
<td>MSLG$W_RPL_FLGS</td>
<td>8000</td>
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<tr>
<td>MSLG$L_VOL_SER</td>
<td>000001D8</td>
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</tr>
<tr>
<td>MSLG$L_BAD_LBN</td>
<td>00038654</td>
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<tr>
<td>MSLG$L_OLD_RBN</td>
<td>00000000</td>
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<td>MSLG$L_NEW_RBN</td>
<td>000000D26</td>
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<tr>
<td>MSLG$W_CAUSE</td>
<td>01E8</td>
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</table>

**DISK MSCP MESSAGE**

**UNIT #59.**

**SEQUENCE #4.**

**BAD BLOCK REPLACEMENT**

**OPERATION SUCCESSFUL**

**BAD BLOCK REPLACEMENT**

**BAD BLOCK REPLACED**

**UNIQUE IDENTIFIER, 000000000DD(X)**

**MASS STORAGE CONTROLLER**

**HSC70**

**CONTROLLER SOFTWARE VERSION #2.**

**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 0000000FFFFF(X)**

**DISK CLASS DEVICE (166)**

**RA90**

**UNIT SOFTWARE VERSION #0.**

**UNIT HARDWARE REVISION #15.**

**REPLACEMENT ATTEMPTED, BLOCK _ VERIFIED BAD**

**VOLUME SERIAL #472.**

**BAD LOGICAL BLOCK**

- NUMBER = 230996.

**FORMER REPLACEMENT BLOCK**

- NUMBER = 0.

**NEW REPLACEMENT BLOCK**

- NUMBER = 3366.

**DATA ERROR**

8. **SYMBOL ECC ERROR**

---

FOR INTERNAL USE ONLY
ERROR SEQUENCE 3623.
KAB6 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3P0$DUA59:

MSLG$L_CMD_REF 3C230031
ORBS$L_OWNER 00180019
UCBS$L_CHAR 1C4D4108

UCBS$L_OPCNT 000037EA
UCBS$W_ERRCNT 0040
UCBS$W_STS 1810

CDRP$L_MEDIA 00036842
CDRP$W_FUNC 000C
CDRP$L_BCNT 00002000
CDRP$W_BOFF 0000
CDRP$L_PID 000A0022
CDRP$Q_IOSB 00000000 010E000F

OWNER UIC [030,031]
DIRECTORY STRUCTURED
FILE ORIENTED
SHARABLE
AVAILABLE
MOUNTED
ERROR LOGGING
CAPABLE OF INPUT
CAPABLE OF OUTPUT
RANDOM ACCESS

14314. QIO'S THIS UNIT
64. ERRORS THIS UNIT
ONLINE
SOFTWARE VALID
UNLOAD AT DISMOUNT

STARTING LBN #230978.
READ PHYSICAL BLOCK
TRANSFER SIZE 8192. BYTE(S)
TRANSFER PAGE ALIGNED
REQUESTOR "PID"
IOSB, 0. BYTE(S) TRANSFERRED

FOR INTERNAL USE ONLY
I/O SUB-SYSTEM, UNIT _C3PS$DUAS59:
MESSAGE TYPE 0001
MSLGS$CMD_REF 48C10027
MSLGS$UNIT 003B
MSLGS$SEQ_NUM 0005
MSLGS$FORMAT 02
MSLGS$FLAGS E0
MSLGS$EVENT 008E
MSLGS$Q_CNT_ID 0000000D
01200000
MSLGS$B_CNT_SVR 02
MSLGS$B_CNT_HVR 00
MSLGS$W_MULT_UNT 0040
MSLGS$Q_UNIT_ID 000FFFFF
02130000
MSLGS$B_UNIT_SVR 00
MSLGS$B_UNIT_HVR 0F
MSLGS$B_LEVEL 00
MSLGS$B_RETRY 01
MSLGS$VOLUME 000001D8
MSLGS$HDR_CODE 00134266

CONTROLLER DEPENDENT INFORMATION
ORIG ERR 8010
ERR RECOV FLGS 0003
LV1 A RETRY 00
LV1 B RETRY 00
BUF DAT MEM ADR D9F5
SRC REQ # 04
DET REQ # 04

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #5.
DISK TRANSFER ERROR
BAD BLK REPLACEMENT REQUEST
OPERATION CONTINUING
OPERATION SUCCESSFUL
DATA ERROR
UNCORRECTABLE ECC ERROR
UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70
CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.
UNIQUE IDENTIFIER, 000000000000DD(X)
DISK CLASS DEVICE (166)
RA90
UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
VOLUME SERIAL #472.
LOGICAL BLOCK #1262182.
GOOD LOGICAL SECTOR
EDC ERROR
ECC ERROR
LBN REPLACEMENT INDICATED
ERR LOGGED TO CONSOLE AND HOST

FOR INTERNAL USE ONLY
ERROR SEQUENCE 3628.
ERL$LOGSTATUS ENTRY 24-MAR-1988 10:55:34.23
KAB6 REV# 4 SERIAL# 152 MFG PLANT 15.
I/O SUB-SYSTEM, UNIT C3POS5UA59:

MSLG$SL_CMD_REF 4BC10027
ORB$SL_OWNER 00180019
UCB$SL_CHAR 1C4D4108

UCB$SL_OPCODE 000037EB
UCBW$W_ERRCNT 0045
UCBW$W_STS 1810

CDP$SL_MEDIA 001342CB
CDP$W_FUNC 000C
CDP$SL_BCNT 00002000
CDP$W_BOFF 0000
CDP$SL_PID 000A0022
CDP$Q_IOSB 00000000 010E000F

OWNER UIC [030,031]
DIRECTORY STRUCTURED
FILE ORIENTED
SHARABLE
AVAILABLE
MOUNTED
ERROR LOGGING
CAPABLE OF INPUT
CAPABLE OF OUTPUT
RANDOM ACCESS

14315 QIO'S THIS UNIT
69 ERRORS THIS UNIT
ONLINE
SOFTWARE VALID
UNLOAD AT DISMOUNT

STARTING LBN #1262280.
READ PHYSICAL BLOCK
TRANSFER SIZE 8192 BYTE(S)
TRANSFER PAGE ALIGNED
REQUESTOR "PID"
IOSB 0 BYTE(S) TRANSFERRED

FOR INTERNAL USE ONLY
I/O SUB-SYSTEM, UNIT C3PO5DUA59:  
MESSAGES TYPE 0001  
MSLGS$CMD_REF 2D440014  
MSLGS$UNIT 003B  
MSLGS$SEQ_NUM 0001  
MSLGS$FORMAT 02  
MSLGS$FLAGS E1  
MSLGS$EVENT 00EB  
MSLGS$CNT_ID 000000DD  
01200000  
MSLGS$COUNTER 02  
MSLGS$UNIT_COUNTER 00  
MSLGS$MULT_UNIT 0040  
MSLGS$UNIT_ID 000FF0FF  
02130000  
MSLGS$UNIT_COUNTER 00  
MSLGS$UNIT_HVR 00  
MSLGS$LEVEL 00  
MSLGS$RETRY 01  
MSLGS$VOL_SER 000001D8  
MSLGS$HDR_CODE 00082D0C  
CONTROLLER DEPENDENT INFORMATION  
ORIG ERR 0010  
ERR RECOV FLGS 0003  
LV1 A RETRY 00  
LV1 B RETRY 00  
BUF DAT MEM ADR C6AD  
SRC REQ # 04  
DET REQ # 04  

DISK MSCP MESSAGE  
UNIT #59.  
SEQUENCE #1.  
DISK TRANSFER ERROR  
SEQUENCE NUMBER RESET  
BAD BLK REPLACEMENT REQUEST  
OPERATION CONTINUING  
OPERATION SUCCESSFUL  
DATA ERROR  
UNCORRECTABLE ECC ERROR  
UNIQUE IDENTIFIER, 00000000000DD(X)  
MASS STORAGE CONTROLLER  
HSC70  
CONTROLLER SOFTWARE VERSION #2.  
CONTROLLER HARDWARE REVISION #0.  
UNIQUE IDENTIFIER, 00000000000000(X)  
DISK CLASS DEVICE (166)  
RA90  
UNIT SOFTWARE VERSION #0.  
UNIT HARDWARE REVISION #15.  
VOLUME SERIAL #472.  
LOGICAL BLOCK #535820.  
GOOD LOGICAL SECTOR  
EDC ERROR  
ECC ERROR  
LBN REPLACEMENT INDICATED  
ERR LOGGED TO CONSOLE AND HOST  

FOR INTERNAL USE ONLY
ERROR SEQUENCE 3618.
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:54:29.26
KAB86 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3P0$DUA59:

MESSAGE TYPE 0001
MSLG$L_CMD_REF 2D440014
MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 0002
MSLG$B_FORMAT 09
MSLG$B_FLAGS 80
MSLG$W_EVENT 0034

MSLG$Q_CNT_ID 000000DD
01200000

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULT_UNIT 0040
MSLG$Q_UNIT_ID 000FFFFF
02130000

MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 0F
MSLG$W_RPL_FLGS 0000

MSLG$L_VOL_SER 000001DB
MSLG$L_BAD_LBN 00082DOC

MSLG$L_OLD_RBN 00000000
MSLG$L_NEW_RBN 00001E55
MSLG$W_CAUSE 00E8

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #2.
BAD BLOCK REPLACEMENT
OPERATION SUCCESSFUL
BAD BLOCK REPLACEMENT
BLOCK VERIFIED GOOD

UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 0000000FFFFF(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
REPLACEMENT ATTEMPTED, BLOCK VERIFIED GOOD

VOLUME SERIAL #472.
BAD LOGICAL BLOCK
NUMBER = 535820.

DATA ERROR
UNCORRECTABLE ECC ERROR
ERROR SEQUENCE 3619.
ERLSLOGSTATUS ENTRY 24-MAR-1988 10:54:29.37
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3P0$DUA59:

MSLG$L_CMD_REF 2D440014
ORBS$L_OWNER 001B0019
UCBS$L_CHAR 1C4D4108

OWNER UIC [030,031]
DIRECTORY STRUCTURED
FILE ORIENTED
SHARABLE
AVAILABLE
MOUNTED
ERROR LOGGING
CAPABLE OF INPUT
CAPABLE OF OUTPUT
RANDOM ACCESS

UCBS$L_OPCNT 0000364C
UCBS$W_ERRCNT 003D
UCBS$W_STS 1810

13900. QIO'S THIS UNIT
61. ERRORS THIS UNIT
ONLINE
SOFTWARE VALID
UNLOAD AT DISMOUNT

CDRP$L_MEDIA 00082D07
CDRP$W_FUNC 400B

STARTING LBN #5358150.
WRITE PHYSICAL BLOCK
IOSM_DATACHECK

CDRP$L_BCNT 00008000
CDRP$W_BOFF 01EB
CDRP$L_PID 000A0020
CDRP$Q_IOSB 00000000
010E000F

TRANSFER SIZE 32768. BYTE(S)
488. BYTE PAGE OFFSET
REQUESTOR "PID"
IOSB, 0. BYTE(S) TRANSFERRED

FOR INTERNAL USE ONLY
**ERROR SEQUENCE 3630.**
**ERL$LOGMESSAGE ENTRY** 24-MAR-1988 10:55:54.58
**KA85** REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3P0$DUA59:

**MESSAGE TYPE** 0001
**MSLG$CMD_REF** 3C250022
**MSLG$UNIT** 003B
**MSLG$SEQ_NUM** 000A
**MSLG$FORMAT** 09
**MSLG$FLAGS** 80
**MSLG$EVENT** 0034

**MSLGSQ_CNT_ID** 000000DD
01200000

**MSLGSQ_CNT_SVR** 02
**MSLGSQ_CNT_HVR** 00
**MSLGSQ_MULT_UNT** 0040
**MSLGSQ_UNIT_ID** 000FFFFF
02130000

**MSLGSB_UNT_SVR** 00
**MSLGSB_UNT_HVR** 0F
**MSLGSW_RPL_FLGS** 0000

**MSLG$VOL_SER** 000001D8
**MSLG$BAD_LBN** 000D623A
**MSLG$OLD_RBN** 00000000
**MSLG$NEW_RBN** 000032D0
**MSLG$CAUSE** 01E8

**DISK MSCP MESSAGE**

**UNIT #59.**

**SEQUENCE #10.**

**BAD BLOCK REPLACEMENT**

**OPERATION SUCCESSFUL**

**BAD BLOCK REPLACEMENT BLOCK VERIFIED GOOD**

**UNIQUE IDENTIFIER, 000000000DD(X)**
**MASS STORAGE CONTROLLER HSC70**

**CONTROLLER SOFTWARE VERSION #2.**

**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 0000000FFFF(X)**
**DISK CLASS DEVICE (166)**
**RA90**

**UNIT SOFTWARE VERSION #0.**

**UNIT HARDWARE REVISION #15.**

**REPLACEMENT ATTEMPTED, BLOCK VERIFIED GOOD**

**VOLUME SERIAL #472.**

**BAD LOGICAL BLOCK NUMBER = 877114.**

**DATA ERROR**

8. SYMBOL ECC ERROR

FOR INTERNAL USE ONLY
**ERROR SEQUENCE 3631.**
LOGGED ON SID 0404F098

**ERL$LOGSTATUS ENTRY** 24-MAR-1988 10:55:54.69
KAB6 REV# 4. SERIAL# 152. MFG PLANT 15.

**I/O SUB-SYSTEM, UNIT _C3PO$DUA59:**

MSLG$L_CMD_REF 3C250022
ORBS$L_OWNER 00180019

OWNER UIC [030,031]

DIRECTORY STRUCTURED
FILE ORIENTED
SHARABLE
AVAILABLE
MOUNTED
ERROR LOGGING
CAPABLE OF INPUT
CAPABLE OF OUTPUT
RANDOM ACCESS

UCBS$L_OFCNT 0000387B
UCBS$W_ERRCNT 004B
UCBS$W_STS 1810

14459. QIO'S THIS UNIT
72. ERRORS THIS UNIT

ONLINE
SOFTWARE VALID
UNLOAD AT DISMOUNT

CDRP$L_MEDIA 000D622C
CDRP$W_FUNC 400B

STARTING LBN #8771000.
WRITE PHYSICAL BLOCK
I0$M_DATACHECK

CDRP$L_BCNT 00008000
CDRP$W_BOFF 01E8
CDRP$L_PID 000A0020
CDRP$Q_IOSB 00000000
010E000F

TRANSFER SIZE 32768. BYTE(S)
488. BYTE PAGE OFFSET
REQUESTOR "PID"

IOSB, 0. BYTE(S) TRANSFERRED

FOR INTERNAL USE ONLY
ERROR SEQUENCE 3633.
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:56:17.94
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3P0$DUA59:

MESSAGE TYPE 0001
MSLG$L_CMD_REF CE6A001C
MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 000C
MSLG$B_FORMAT 09
MSLG$B_FLAGS 80
MSLG$W_EVENT 0034
MSLG$Q_CNT_ID 000000DD
MSLG$W_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULT_UNT 0040
MSLG$Q_UNIT_ID 0000FFFF
MSLG$W_UNIT_SVR 00
MSLG$B_UNIT_HVR 0F
MSLG$W_RPL_FLGS 0000
MSLG$L_VOL_SER 000001DB
MSLG$L_BAD_LBN 000D623F
MSLG$L_OLD_RBN 00000000
MSLG$L_NEW_RBN 000032D0
MSLG$W_CAUSE 01EB

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #12.
BAD BLOCK REPLACEMENT
OPERATION SUCCESSFUL
BAD BLOCK REPLACEMENT
BLOCK VERIFIED GOOD

UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
REPLACEMENT ATTEMPTED, BLOCK _ VERIFIED GOOD

VOLUME SERIAL #472.
BAD LOGICAL BLOCK _ NUMBER = 877119.

DATA ERROR
8. SYMBOL ECC ERROR
**ERROR SEQUENCE 3634. LO**
**ERL$LOGSTATUS ENTRY** 24-MAR-1988 10:56:18.04
**KASA 4. SERIAL# 152. MFG PLANT 15.**

I/O SUB-SYSTEM, UNIT _C3P0$DUA59:

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<tr>
<th>Field</th>
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<td>MSLG$L_CMD_REF</td>
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<tr>
<td>ORB$L_OWNER</td>
<td>00180019</td>
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<tr>
<td>UCB$L_CHAR</td>
<td>1C4D4108</td>
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<td>UCB$L_OPCNT</td>
<td>0000391A</td>
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<td>UCB$W_ERRCNT</td>
<td>004B</td>
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<td>UCB$W_STS</td>
<td>1810</td>
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<td>CDRPSL_MEDIA</td>
<td>000DACDC</td>
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<td>CDRPSW_FUNC</td>
<td>400B</td>
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<td>CDRPSL_BCNT</td>
<td>00008000</td>
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<td>CDRPSW_BOFF</td>
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<td>CDRPSL_PID</td>
<td>000A0020</td>
</tr>
<tr>
<td>CDRPSQ_IOSB</td>
<td>00000000</td>
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</table>

**OWNER UIC [030,031]**

DIRECTORY STRUCTURED
FILE ORIENTED
SHARABLE
AVAILABLE
MOUNTED
ERROR LOGGING
CAPABLE OF INPUT
CAPABLE OF OUTPUT
RANDOM ACCESS

14618. QIO'S THIS UNIT
75. ERRORS THIS UNIT

ONLINE
SOFTWARE VALID
UNLOAD AT DISMOUNT

STARTING LBN #8962200.

WRITE PHYSICAL BLOCK
IOSM_DATAMEX

TRANSFER SIZE 32768. BYTE(S)

488. BYTE PAGE OFFSET
REQUESTOR "PID"

IOSB, 0. BYTE(S) TRANSFERRED

FOR INTERNAL USE ONLY
ERROR SEQUENCE 3635.
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:56:22.56
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3P0$DU59:

MESSAGE TYPE 0001
MSLG$W_CMD_REF CE78001C
MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 000D
MSLG$B_FORMAT 02
MSLG$B_FLAGS E0

MSLG$W_EVENT 00EB

MSLG$Q_CNT_ID 000000DD
01200000

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULTI_UNIT 0040
MSLG$Q_UNIT_ID 000FFFFF
02130000

MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 0F
MSLG$B_LEVEL 00
MSLG$B_RETRY 01
MSLG$L_VOL_SER 000001D8
MSLG$L_HDR_CODE 00093372

CONTROLLER DEPENDENT INFORMATION
ORIG ERR 8010

ERR RECOV FLGS 0003

LV1 A RETRY 00
LV1 B RETRY 00
BUF DAT MEM ADDR 0548
SRC REQ # 04
DET REQ # 04

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #13.
DISK TRANSFER ERROR
BAD BLK REPLACEMENT REQUEST
OPERATION CONTINUING
OPERATION SUCCESSFUL
DATA ERROR
UNCORRECTABLE ECC ERROR

UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.

VOLUME SERIAL #472.
LOGICAL BLOCK #602994.
GOOD LOGICAL SECTOR

EDC ERROR
ECC ERROR

LBN REPLACEMENT INDICATED
ERR LOGGED TO CONSOLE AND HOST

FOR INTERNAL USE ONLY
**ERROR SEQUENCE 3637.**
**ERLOGMESSAGE ENTRY** 24-MAR-1988 10:56:26.10
**KA86** REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3P0$DUA59:

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<td>CE78001C</td>
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<td>MSLG$W_SEQ_NUM</td>
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<td>MSLG$B_FORMAT</td>
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<tr>
<td>MSLG$B_FLAGS</td>
<td>80</td>
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<tr>
<td>MSLG$W_EVENT</td>
<td>0034</td>
</tr>
<tr>
<td>MSLG$Q_CNT_ID</td>
<td>000000DD 01200000</td>
</tr>
<tr>
<td>MSLG$B_CNT_SVR</td>
<td>02</td>
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<tr>
<td>MSLG$B_CNT_HVR</td>
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<tr>
<td>MSLG$W_MULT_UNIT</td>
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<td>0F</td>
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<td>MSLG$W_RPL_FLGS</td>
<td>0000</td>
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<td>MSLG$W_VOL_SER</td>
<td>000001D8</td>
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<tr>
<td>MSLG$W_BAD_LBN</td>
<td>00093372</td>
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<td>MSLG$W_OLD_RBN</td>
<td>00000000</td>
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<td>MSLG$W_NEW_RBN</td>
<td>00002223</td>
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<tr>
<td>MSLG$W_CAUSE</td>
<td>00EB</td>
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DISK MSCP MESSAGE  
UNIT #59.  
SEQUENCE #14.  
BAD BLOCK REPLACEMENT  
OPERATION SUCCESSFUL  
BAD BLOCK REPLACEMENT  
BLOCK VERIFIED GOOD  

UNIQUE IDENTIFIER, 0000000000DD(X)  
MASS STORAGE CONTROLLER  
HSC70  
CONTROLLER SOFTWARE VERSION #2.  
CONTROLLER HARDWARE REVISION #0.  

UNIQUE IDENTIFIER, 00000000FFFF(X)  
DISK CLASS DEVICE (166)  
RA90  
UNIT SOFTWARE VERSION #0.  
UNIT HARDWARE REVISION #15.  
REPLACEMENT ATTEMPTED, BLOCK _ VERIFIED GOOD  
VOLUME SERIAL #472.  
BAD LOGICAL BLOCK  
NUMBER = 602994.  

DATA ERROR  
UNCORRECTABLE ECC ERROR
**** ENTRY 23. ************

ERROR SEQUENCE 3638.
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3P0$DU A59:

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<tr>
<th>Field</th>
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<tr>
<td>ORBSL_OWNER</td>
<td>00180019</td>
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<td>UCB$L_CHAR</td>
<td>1C4D4108</td>
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<td>UCB$L_OPCNT</td>
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<td>UCB$W_ERRCNT</td>
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<td>CDRPSL_MEDIA</td>
<td>0009336E</td>
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<td>CDRPSW_FUNC</td>
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<td>CDRPSW_BOFF</td>
<td>01E8</td>
</tr>
<tr>
<td>CDRPSL_PID</td>
<td>000A0020</td>
</tr>
<tr>
<td>CDRPSQ_IOSB</td>
<td>00000000</td>
</tr>
<tr>
<td></td>
<td>010E000F</td>
</tr>
</tbody>
</table>

OWNER UIC [030,031]

DIRECTORY STRUCTURED
FILE ORIENTED
SHARABLE
AVAILABLE
MOUNTED
ERROR LOGGING
CAPABLE OF INPUT
CAPABLE OF OUTPUT
RANDOM ACCESS

14660. QIO'S THIS UNIT
78. ERRORS THIS UNIT

ONLINE
SOFTWARE VALID
UNLOAD AT DISMOUNT

STARTING LBN #6029900.
WRITE PHYSICAL BLOCK
IO$M_DATACHECK
TRANSFER SIZE 32768. BYTE(S)
488. BYTE PAGE OFFSET
REQUESTOR "PID"
IOSB, 0. BYTE(S) TRANSFERRED
**ERROR SEQUENCE 3639.**

**ERL$LOGMESSAGE ENTRY**
24-MAR-1988 10:56:49.71
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT_C3POSDUA59:

MESSAGE TYPE 0001
MSLG$L_CMD_REF CED5001C
MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 000F
MSLG$B_FORMAT 02
MSLG$B_FLAGS E0

MSLG$W_EVENT 00E8

MSLG$Q_CNT_ID 000000DD
01200000

MSLG$B_CNT_SRV 02
MSLG$B_CNT_HVR 00
MSLG$W_MULTI_UNT 0040
MSLG$Q_UNIT_ID 00FF00
02130000

MSLG$B_UNIT_SRV 00
MSLG$B_UNIT_HVR 0F
MSLG$B_LEVEL 00
MSLG$B_RETRY 01
MSLG$L_VOL_SER 000001D8
MSLG$L_HDR_CODE 0009351E

**CONTROLLER DEPENDENT INFORMATION**

ORIG ERR 8010

ERR RECOV FLGS 0003

LV1 A RETRY 00
LV1 B RETRY 00
BUF DAT MEM ADR DA09
SRC REQ # 04
DET REQ # 04

**DISK MSCP MESSAGE**

UNIT #59.

SEQUENCE #15.

DISK TRANSFER ERROR

BAD BLK REPLACEMENT REQUEST
OPERATION CONTINUING
OPERATION SUCCESSFUL

DATA ERROR
UNCORRECTABLE ECC ERROR

UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.

CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #0.

UNIT HARDWARE REVISION #15.

VOLUME SERIAL #472.

LOGICAL BLOCK #603422.
GOOD LOGICAL SECTOR

EDC ERROR
ECC ERROR

LBN REPLACEMENT INDICATED
ERR LOGGED TO CONSOLE AND HOST

FOR INTERNAL USE ONLY.
ERROR SEQUENCE 3640.
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:56:51.30
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3P0$DUA59:

MESSAGE TYPE 0001
MSLG$CMD_REF CED5001C
MSLG$UNIT 003B
MSLG$SEQ_NUM 0010
MSLG$FORMAT 09
MSLG$FLAGS 80
MSLG$EVENT 0034

MSLG$CNT_ID 000000DD
01200000

MSLG$CNT_SVR 02
MSLG$CNT_HVR 00
MSLG$MULT_UNT 0040
MSLG$UNIT_ID 0000FFFF
02130000

MSLG$UNIT_SVR 00
MSLG$UNIT_HVR 0F
MSLG$RPL_FLAGS 0000

MSLG$VOL_SER 000001D8
MSLG$BAD_LBN 0009351E

MSLG$OLD_RBN 00000000
MSLG$NEW_RBN 00002229
MSLG$CAUSE 00EB

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #16.
BAD BLOCK REPLACEMENT
OPERATION SUCCESSFUL
BAD BLOCK REPLACEMENT
BLOCK VERIFIED GOOD

UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 0000000FFFFF(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
REPLACEMENT ATTEMPTED, BLOCK
VERIFIED GOOD
VOLUME SERIAL #472.
BAD LOGICAL BLOCK
NUMBER = 603422.

DATA ERROR
UNCORRECTABLE ECC ERROR
ERROR SEQUENCE 3641.
ERLOGMESSAGE ENTRY 24-MAR-1988 10:56:53.46
KAS86 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3P0$DUA59:
MESSAGE TYPE 0001

MSLGSW_CMD_REF CED5001C
MSLGSW_UNIT 003B
MSLGSW_SEQ_NUM 0011
MSLGSB_FORMAT 02
MSLGSB_FLAGS E0
MSLGSW_EVENT 00E8

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #17.
DISK TRANSFER ERROR
BAD BLK REPLACEMENT REQUEST
OPERATION CONTINUING
OPERATION SUCCESSFUL
DATA ERROR
UNCORRECTABLE ECC ERROR

MSLGSQ_CNT_ID 00000000 01200000
MSLGSB_CNTL_SVR 02
MSLGSB_CNTL_HVR 00
MSLGSW_MULT_UNIT 0040
MSLGSQ_UNIT_ID 000FFFFF 02130000

UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
MSC70
CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

MSLGSB_UNIT_SVR 00
MSLGSB_UNIT_HVR 0F
MSLGSB_LEVEL 00
MSLGSB_RETRY 03
MSLGSB_VOL_SER 000001D8
MSLGSB_HDR_CODE 00199A60

VOLUME SERIAL #472.

RA90
UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.

LOGICAL BLOCK #1677920.
GOOD LOGICAL SECTOR

EDC ERROR
ECC ERROR

LBN REPLACEMENT INDICATED
ERR LOGGED TO CONSOLE AND HOST

CONTROL DEPENDENT INFORMATION
ORIG ERR 8010

ERR RECOV FLGS 0003

LVI A RETRY 00
LVI B RETRY 00
BUF DAT MEM ADR C492
SRC REQ # 04
DET REQ # 04
**ERROR SEQUENCE 3642.**  
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:56:55.28  
RA86 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3P0S5UA59:

- **MESSAGE TYPE**: 0001  
  - DISK MSCP MESSAGE
- **MSLG$L_CMD_REF**: CED5001C
- **MSLG$W_UNIT**: 003B
- **MSLG$W_SEQ_NUM**: 0012
- **MSLG$B_FORMAT**: 09
- **MSLG$B_FLAGS**: 80
- **MSLG$W_EVENT**: 0014
  - BAD BLOCK REPLACEMENT
  - Operation Successful
  - BAD BLOCK REPLACEMENT
  - BAD BLOCK REPLACED
- **MSLG$Q_CNT_ID**: 000000DD  
  - 01200000
  - UNIQUE IDENTIFIER, 000000000DD(X)
  - MASS STORAGE CONTROLLER
  - HSC70
  - CONTROLLER SOFTWARE VERSION #2.
  - CONTROLLER HARDWARE REVISION #0.
- **MSLG$B_CNT_SVR**: 02
- **MSLG$B_CNT_HVR**: 00
- **MSLG$W_MULTI_UNT**: 0040
- **MSLG$Q_UNIT_ID**: 000FFFFF  
  - 02130000
  - UNIQUE IDENTIFIER, 0000000FFFF(X)
  - DISK CLASS DEVICE (166)
  - RA90
- **MSLG$B_UNIT_SVR**: 00
- **MSLG$B_UNIT_HVR**: 0F
- **MSLG$W_RPL_FLGS**: A000
  - BLK RE-VECTORED, NON-PRIMARY RBN RECLAMATION ATTEMPTED, BLOCK _ VERIFIED BAD
  - VOLUME SERIAL #472.
- **MSLG$L_VOL_SER**: 000001DB
- **MSLG$L_BAD_LBN**: 00199A60
  - BAD LOGICAL BLOCK
  - NUMBER = 1677920.
  - FORMER REPLACEMENT BLOCK
  - NUMBER = 0.
- **MSLG$L_OLD_RBN**: 00000000
  - NEW REPLACEMENT BLOCK
  - NUMBER = 24318.
  - DATA ERROR
  - Uncorrectable ECC ERROR
- **MSLG$W_CAUSE**: 00E8

FOR INTERNAL USE ONLY
**ERROR SEQUENCE 3643.**

**ERL$LOGSTATUS** ENTRY 24-MAR-1988 10:56:55.39

**KA86 REV# 4. SERIA# 152. MFG PLANT 15.**

**I/O SUB-SYSTEM, UNIT _C3POSUDA59:**

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>MSLG$L_CMD_REF</td>
<td>CED5001C</td>
</tr>
<tr>
<td>ORB$L_OWNER</td>
<td>00180019</td>
</tr>
<tr>
<td>UCB$L_CHAR</td>
<td>1C4D4108</td>
</tr>
<tr>
<td>UCB$L_OPCNT</td>
<td>000039FC</td>
</tr>
<tr>
<td>UCBSW_ERRCNT</td>
<td>0053</td>
</tr>
<tr>
<td>UCBSW_STS</td>
<td>1810</td>
</tr>
<tr>
<td>CDRPS$L_MEDIA</td>
<td>00199A5A</td>
</tr>
<tr>
<td>CDRPS$W_FUNC</td>
<td>400B</td>
</tr>
<tr>
<td>CDRPS$L_BCNT</td>
<td>00008000</td>
</tr>
<tr>
<td>CDRPSW_BOFF</td>
<td>01EB</td>
</tr>
<tr>
<td>CDRPSL_PID</td>
<td>000A0021</td>
</tr>
<tr>
<td>CDRPSQ_IOSB</td>
<td>00000000</td>
</tr>
<tr>
<td></td>
<td>010E000F</td>
</tr>
</tbody>
</table>

**OWNER UIC [030,031]**

- DIRECTORY STRUCTURED
- FILE ORIENTED
- SHARABLE
- AVAILABLE
- MOUNTED
- ERROR LOGGING
- CAPABLE OF INPUT
- CAPABLE OF OUTPUT
- RANDOM ACCESS

- 14844. QIO'S THIS UNIT
- 83. ERRORS THIS UNIT

**ONLINE**

**SOFTWARE VALID**

**UNLOAD AT DISMOUNT**

**STARTING LBN #1677914.**

- WRITE PHYSICAL BLOCK IOSM_DATACHECK
- TRANSFER SIZE 32768. BYTE(S)
- 488. BYTE PAGE OFFSET
- REQUESTOR "PID"
- IOSB, 0. BYTE(S) TRANSFERRED
**ERROR SEQUENCE 3644.**

**ERL$LOGMESSAGE ENTRY** 24-MAR-1988 10:57:17.43

**I/O SUB-SYSTEM, UNIT _C3POS8DUA59:**

- **MESSAGE TYPE:** 0001
  - MSLG$S_CMD_REF 4A670027
  - MSLG$S_UNIT 003B
  - MSLG$S_SEQ_NUM 0013
  - MSLG$B_FORMAT 02
  - MSLG$B_FLAGS E0

- **MSLG$W_EVENT:** 00E8

- **MSLG$Q_CNT_ID:** 000000DD 01200000

- **MSLG$B_CNT_SVR:** 02
  - MSLG$B_CNT_HVR 00
  - MSLG$W_MULTI_UNT 0040
  - MSLG$Q_UNIT_ID 000FFFFF 02130000

- **MSLG$B_UNIT_SVR:** 00
  - MSLG$B_UNIT_HVR 0F

- **MSLG$B_LEVEL:** 00
  - MSLG$B_RETRY 01
  - MSLG$V_VOL_SER 000001D8

- **MSLG$S_HDR_CODE:** 00199D30

---

**CONTROLLER DEPENDENT INFORMATION**

- **ERR RECOV FLGS:** 0003
  - LV1 A RETRY 00
  - LV1 B RETRY 00
  - BUF DAT MEM ADR CE92
  - SRC REQ # 04
  - DET REQ # 04

---

**FOR INTERNAL USE ONLY**
**ERROR SEQUENCE 3645.**

**ERL$LOGMESSAGE ENTRY** 24-MAR-1988 10:57:19.15

**KA86** REV# 4. SERIAL# 152. MFG PLANT 15.

**I/O SUB-SYSTEM, UNIT C3P0$DUA59:**

**MESSAGE TYPE** 0001

**MSLG$L_CMD_REF** 4A670027
**MSLG$W_UNIT** 003B
**MSLG$W_SEQ_NUM** 0014
**MSLG$B_FORMAT** 09
**MSLG$B_FLAGS** 80
**MSLG$W_EVENT** 0014

**MSLG$Q_CNT_ID** 0000000DD
01200000

**MSLG$B_CNT_SVR** 02
**MSLG$B_CNT_HVR** 00
**MSLG$W_MULT_UNT** 0040
**MSLG$Q_UNIT_ID** 0000FFFF
02130000

**MSLG$B_UNIT_SVR** 00
**MSLG$B_UNIT_HVR** 0F
**MSLG$W_RPL_FLGS** A000

**MSLG$L_VOL_SER** 000001D8
**MSLG$L_BAD_LBN** 00199D30
**MSLG$L_OLD_RBN** 00000000
**MSLG$L_NEW_RBN** 00005F09
**MSLG$W_CAUSE** 00E8

**DISK MSCP MESSAGE**

**UNIT #59.**

**SEQUENCE #20.**

**BAD BLOCK REPLACEMENT**

**OPERATION SUCCESSFUL**

**BAD BLOCK REPLACEMENT**

**BAD BLOCK REPLACED**

**UNIQUE IDENTIFIER, 000000000DD(X)**

**MASS STORAGE CONTROLLER**

**HSC70**

**CONTROLLER SOFTWARE VERSION #2.**

**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 0000000FFFFF(X)**

**DISK CLASS DEVICE (166)**

**RA90**

**UNIT SOFTWARE VERSION #0.**

**UNIT HARDWARE REVISION #15.**

**BLK RE-VECTORED, NON-PRIMARY RBN REPLACEMENT ATTEMPTED, BLOCK VERIFIED BAD**

**VOLUME SERIAL #472.**

**BAD LOGICAL BLOCK**

**NUMBER = 1578640.**

**FORMER REPLACEMENT BLOCK**

**NUMBER = 0.**

**NEW REPLACEMENT BLOCK**

**NUMBER = 24329.**

**DATA ERROR**

**UNCORRECTABLE ECC ERROR**

---

**FOR INTERNAL USE ONLY**
********** ENTRY 31. **********
ERROR SEQUENCE 3646.
ERLSLOGSTATUS ENTRY 24-MAR-1988 10:57:19.25
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.
I/O SUB-SYSTEM, UNIT _C3P0$DUA59:

MSLG$L_CMD_REF 4A670027
ORB$L_OWNER 00180019
UCB$L_CHAR 1C4D4108

OWNER UIC [030,031]
DIRECTORY STRUCTURED
FILE ORIENTED
SHARABLE
AVAILABLE
MOUNTED
ERROR LOGGING
CAPABLE OF INPUT
CAPABLE OF OUTPUT
RANDOM ACCESS

UCB$L_OFCNT 00003AED
UCB$W_ERRCNT 0056
UCB$W_STS 1810

15085. QIO'S THIS UNIT
86. ERRORS THIS UNIT
ONLINE
SOFTWARE VALID
UNLOAD AT DISMOUNT

CDRP$L_MEDIA 00199D30
CDRP$W_FUNC 400B

STARTING LBN #1678640.
WRITE PHYSICAL BLOCK
I0$M_DATACHECK
TRANSFER SIZE 32768. BYTE(S)
488. BYTE PAGE OFFSET
REQUESTOR "PID"

CDRP$L_BCNT 00008000
CDRP$W_BOFF 01E8
CDRP$L_PID 000A0021
CDRP$Q_IOSB 00000000
010E000F

488. BYTE PAGE OFFSET
REQUESTOR "PID"

FOR INTERNAL USE ONLY
**ERROR SEQUENCE 3660.**
**ERL$LOGMESSAGE ENTRY**
**I/O SUB-SYSTEM, UNIT _C3P0$DUA59:**
**MESSAGE TYPE** 0001
**MSLG$L_CMD_REF** 5A3C002F
**MSLG$W_UNIT** 003B
**MSLG$W_SEQ_NUM** 0015
**MSLG$B_FORMAT** 02
**MSLG$B_FLAGS** E0
**MSLG$W_EVENT** 00E8
**MSLG$Q_CNT_ID** 00000000 01200000
**MSLG$B_CNT_SVR** 02
**MSLG$B_CNT_HVR** 00
**MSLG$W_MULT_UNIT** 0040
**MSLG$Q_UNIT_ID** 0000FFFF 02130000
**MSLG$B_UNIT_SVR** 00
**MSLG$B_UNIT_HVR** 0F
**MSLG$B_LEVEL** 00
**MSLG$B_RETRY** 01
**MSLG$L_VOL_SER** 000001DB
**MSLG$L_HDR_CODE** 0000814D

**CONTROLLER DEPENDENT INFORMATION**
**ORIG ERR** 8010
**ERR RECOV FLGS** 0003
**LV1 A RETRY** 00
**LV1 B RETRY** 00
**BUF DAT MEM ADR** C6C
**SRC REQ #** 04
**DET REQ #** 04

**DISK MSCP MESSAGE**
**UNIT #59.**
**SEQUENCE #21.**
**DISK TRANSFER ERROR**
**BAD BLK REPLACEMENT REQUEST**
**OPERATION CONTINUING**
**OPERATION SUCCESSFUL**
**DATA ERROR**
**UNCORRECTABLE ECC ERROR**

**UNIQUE IDENTIFIER, 0000000000DD(X)**
**MASS STORAGE CONTROLLER**
**HSC70**
**CONTROLLER SOFTWARE VERSION #2.**
**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 00000000FFFF(X)**
**DISK CLASS DEVICE (166)**
**RA90**
**UNIT SOFTWARE VERSION #0.**
**UNIT HARDWARE REVISION #15.**

**VOLUME SERIAL #472.**
**LOGICAL BLOCK #33101.**
**GOOD LOGICAL SECTOR**

**EDC ERROR**
**ECC ERROR**

**LBN REPLACEMENT INDICATED**
**ERR LOGGED TO CONSOLE AND HOST**

FOR INTERNAL USE ONLY
*************** ENTRY 33. ***********************
ERROR SEQUENCE 3661.
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:57:43.41
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.
I/O SUB-SYSTEM, UNIT _C3P0$DU59:

MESSAGE TYPE 0001
MSLG$L_CMD_REF 5A3C002F
MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 0016
MSLG$B_FORMAT 09
MSLG$B_FLAGS 80
MSLG$W_EVENT 0014

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #22.
BAD BLOCK REPLACEMENT
OPERATION SUCCESSFUL
BAD BLOCK REPLACEMENT
BAD BLOCK REPLACED

UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70
CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90
UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
BLK RE-VECTORED, NON-PRIMARY RBN
REPLACEMENT ATTEMPTED, BLOCK
- VERIFIED BAD
VOLUME SERIAL #472.
BAD LOGICAL BLOCK
- NUMBER = 33101.
FORMER REPLACEMENT BLOCK
- NUMBER = 0.
NEW REPLACEMENT BLOCK
- NUMBER = 480.
DATA ERROR
UNCORRECTABLE ECC ERROR

FOR INTERNAL USE ONLY
ERROR SEQUENCE 3662.
ERL$LOGSTATUS ENTRY  24-MAR-1988 10:57:43.56
KAB6  REV# 4.  SERIAL# 152.  MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3P0$DUA59:
MSLG$L_CMD_REF  5A3C002F
ORBS$L_OWNER  00180019
UCBS$L_CHAR  1C4D4108

OWNER UIC [030,031]
DIRECTORY STRUCTURED
FILE ORIENTED
SHARABLE
AVAILABLE
MOUNTED
ERROR LOGGING
CAPABLE OF INPUT
CAPABLE OF OUTPUT
RANDOM ACCESS

UCBS$L_OPCODE  00003BB2
UCBS$W_ERRCNT  0059
UCBS$W_STS  1810

15282. QIO'S THIS UNIT
89. ERRORS THIS UNIT
ONLINE
SOFTWARE VALID
UNLOAD AT DISMOUNT

CDRPS$L_MEDIA  00008142
CDRPS$W_FUNC  400B

STARTING LBN #3309040.
WRITE PHYSICAL BLOCK
I0S$M_DATACHECK

CDRPS$L_BCNT  00008000
CDRPS$W_BOFF  01E8

TRANSFER SIZE 32768. BYTE(S)
488. BYTE PAGE OFFSET
REQUESTOR "PID"

CDRPS$Q_IOSB  00000021
CDRPS$Q_IOSB  010E0000

:IOSB, 0. BYTE(S) TRANSFERRED

FOR INTERNAL USE ONLY
************* ENTRY
ERROR SEQUENCE 3663.
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:57:47.55
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3P0$DUAS59:
MESSAGE TYPE 0001
MSLG$1_CMD_REF 923E0042
MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 0017
MSLG$B_FORMAT 02
MSLG$B_FLAGS E0

MSLG$W_EVENT 00E8
MSLG$Q_CNT_ID 000000DD
01200000

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULTI_U NT 0040
MSLG$Q_UNIT_ID 000FFFFF
02130000

MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 0F
MSLG$B_LEVEL 00
MSLG$B_RETRY 01
MSLG$L_VOL_SER 000001D8
MSLG$L_HDR_CODE 00090B5C

CONTROLLER DEPENDENT INFORMATION
ORIG ERR 8010
ERR RECOV FLGS 0003

LV1 A RETRY 00
LV1 B RETRY 00
BUF DAT MEM ADR C575
SRC REQ # 04
DET REQ # 04

35. *************
LOGGED ON S ID 0404F098

DISK MSCP MESSAGE

UNIT #59.

SEQUENCE #23.

DISK TRANSFER ERROR

BAD BLK REPLACEMENT REQUEST
OPERATION CONTINUING
OPERATION SUCCESSFUL

DATA ERROR
UNCORRECTABLE ECC ERROR

UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.

CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #0.

UNIT HARDWARE REVISION #15.

VOLUME SERIAL #472.

LOGICAL BLOCK #591964.
GOOD LOGICAL SECTOR

EDC ERROR
ECC ERROR

LAN REPLACEMENT INDICATED
ERR LOGGED TO CONSOLE AND HOST

FOR INTERNAL USE ONLY
ERROR SEQUENCE 3666.
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:57:49.27
KAB6 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3F0$DUA59:

MESSAGE TYPE 0001
MSLG$L_CMD_REF 923E0042
MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 0018
MSLG$B_FORMAT 09
MSLG$B_FLAGS 80
MSLG$W_EVENT 0014
MSLG$Q_CNT_ID 000000DD
01200000
MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULT_UNIT 0040
MSLG$Q_UNIT_ID 0000FFFF
02130000
MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 0F
MSLG$W_RPL_FLGS 8000
MSLG$L_VOL_SMR 000001DB
MSLG$L_BAD_LBN 0009085C
MSLG$L_OLD_RBN 00000000
MSLG$L_NEW_RBN 00002183
MSLG$W_CAUSE 00E8

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #24.
BAD BLOCK REPLACEMENT
OPERATION SUCCESSFUL
BAD BLOCK REPLACEMENT
BAD BLOCK REPLACED

UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
MSC70
CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90
UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
REPLACEMENT ATTEMPTED, BLOCK
VERIFIED BAD
VOLUME SERIAL #472.
BAD LOGICAL BLOCK
NUMBER = 591964.
FORMER REPLACEMENT BLOCK
NUMBER = 0.
NEW REPLACEMENT BLOCK
NUMBER = 8579.
DATA ERROR
UNCORRECTABLE ECC ERROR

FOR INTERNAL USE ONLY
ERROR SEQUENCE 3667.
ERL$LOGSTATUS ENTRY 24-MAR-1988 10:57:49.38
KAB6 REV$ 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3F0$DUAS59:

MSG$CMD_REF 923E0042
ORB$OWNER 001B0019
UCB$CHAR 1C4D4108

OWNER UIC [030,031]
DIRECTORY STRUCTURED
FILE ORIENTED
SHARABLE
AVAILABLE
MOUNTED
ERROR LOGGING
CAPABLE OF INPUT
CAPABLE OF OUTPUT
RANDOM ACCESS

UCB$OPCNT 00003BE1
UCBSW_ERRCNT 005C
UCBSW_STS 1810

15329. QIO'S THIS UNIT
92. ERRORS THIS UNIT

ONLINE
SOFTWARE VALID
UNLOAD AT DISMOUNT

CDRP$MEDIA 000090858
CDRP$FUNC 400B
CDRP$BCNT 00008000
CDRP$BOFF 01E8
CDRP$PID 000A0021
CDRP$QIOSB 00000000
010E000F

STARTING LBN #5919600.
WRITE PHYSICAL BLOCK
IOM$DATACHECK
TRANSFER SIZE 32768. BYTE(S)
488. BYTE PAGE OFFSET
REQUESTOR "PID"
IOSB, 0. BYTE(S) TRANSFERRED
**ERROR SEQUENCE 3669.**

**ERLSLOGMESSAGE ENTRY**

**MESSAGE TYPE** 0001

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<tr>
<th>MSGS$CMD_REF</th>
<th>824B0042</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSGS$UNIT</td>
<td>003B</td>
</tr>
<tr>
<td>MSGS$SEQ_NUM</td>
<td>0019</td>
</tr>
<tr>
<td>MSGS$FORMAT</td>
<td>02</td>
</tr>
<tr>
<td>MSGS$FLAGS</td>
<td>E0</td>
</tr>
</tbody>
</table>

**MSGS$EVENT** 00E8

**MSGS$CNT_ID** 000000DD

**01200000**

**MSGS$CNT_SVR** 02

**MSGS$CNT_HVR** 00

**MSGS$MULT_UNT** 0040

**MSGS$UNIT_ID** 000FFFFF

**02130000**

**MSGS$UNIT_SVR** 00

**MSGS$UNIT_HVR** 0F

**MSGS$LEVEL** 00

**MSGS$RETRY** 01

**MSGS$VOL_SER** 000001D8

**MSGS$HDR_CODE** 00090516

**CONTROLLER DEPENDENT INFORMATION**

**ORIG ERR** 8010

**ERR RECOV FLGS** 0003

**LV1 A RETRY** 00

**LV1 B RETRY** 00

**BUF DAT MEM ADR** D348

**SRC REQ #** 04

**DET REQ #** 04

---

**DISK MSCP MESSAGE**

**UNIT #59.**

**SEQUENCE #25.**

**DISK TRANSFER ERROR**

**BAD BLK REPLACEMENT REQUEST**

**OPERATION CONTINUING**

**OPERATION SUCCESSFUL**

**DATA ERROR**

**UNCORRECTABLE ECC ERROR**

**UNIQUE IDENTIFIER, 000000000DD(X) MASS STORAGE CONTROLLER HSC70**

**CONTROLLER SOFTWARE VERSION #2.**

**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 000000FFFFFA(D) DISK CLASS DEVICE (166) RA90**

**UNIT SOFTWARE VERSION #0.**

**UNIT HARDWARE REVISION #15.**

**VOLUME SERIAL #472.**

**LOGICAL BLOCK #591126.**

**GOOD LOGICAL SECTOR**

**EDC ERROR**

**ECC ERROR**

**LBN REPLACEMENT INDICATED**

**ERR LOGGED TO CONSOLE AND HOST**

---

**FOR INTERNAL USE ONLY**
ERROR SEQUENCE 3671.
ERLSLOGMESSAGE ENTRY 24-MAR-1988 10:57:57.29
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3P0$DUA59:

MESSAGE TYPE 0001
MSLG$L_CMD_REF 924B0042
MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 001A
MSLG$B_FORMAT 09
MSLG$B_FLAGS 80
MSLG$W_EVENT 0014
MSLG$Q_CNT_ID 00000000
01200000
MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULT_UNIT 0040
MSLG$Q_UNIT_ID 00000000
02130000
MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 0F
MSLGW_RPL_FLGS A000
MSLG$L_VOL_SER 000001D8
MSLG$L_BAD_LBN 00090516
MSLG$L_OLD_RBN 00000000
MSLG$L_NEW_RBN 00002176
MSLG$W_CAUSE 00E8

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #26.
BAD BLOCK REPLACEMENT
OPERATION SUCCESSFUL
BAD BLOCK REPLACEMENT
BAD BLOCK REPLACED

UNIQUE IDENTIFIER, 00000000000DD(X)
MASS STORAGE CONTROLLER
HSC70
CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 0000000000000000
DISK CLASS DEVICE (166)
RA90
UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
BLK RE-VECTORED, NON-PRIMARY RBN
REPLACEMENT ATTEMPTED, BLOCK
- VERIFIED BAD
VOLUME SERIAL #472.
BAD LOGICAL BLOCK
- NUMBER = 591126.
FORMER REPLACEMENT BLOCK
- NUMBER = 0.
NEW REPLACEMENT BLOCK
- NUMBER = 8566.
DATA ERROR
UNCORRECTABLE ECC ERROR
**ERROR SEQUENCE 3672.**

**ERLSLOGSTATUS ENTRY** 24-MAR-1988 10:57:57.30

**KA86 REV# 4. SERIAL# 152. MFG PLANT 15.**

**I/O SUB-SYSTEM, UNIT _C3PO$DUAS59:**

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<th>Value</th>
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<tbody>
<tr>
<td>MSLSL_CMD_REF</td>
<td>924B0042</td>
</tr>
<tr>
<td>ORBSL_OWNER</td>
<td>00180019</td>
</tr>
<tr>
<td>UCB$L_CHAR</td>
<td>1C4D4108</td>
</tr>
<tr>
<td>UCB$L_OPCODE</td>
<td>00003C0D</td>
</tr>
<tr>
<td>UCB$W_ERRCNT</td>
<td>005F</td>
</tr>
<tr>
<td>UCB$W_STS</td>
<td>1810</td>
</tr>
<tr>
<td>CDRPSL_MEDIA</td>
<td>000904F4</td>
</tr>
<tr>
<td>CDRPSW_FUNC</td>
<td>400B</td>
</tr>
<tr>
<td>CDRPSL_BCNT</td>
<td>000008000</td>
</tr>
<tr>
<td>CDRPSW_BOFF</td>
<td>01E8</td>
</tr>
<tr>
<td>CDRPSL_PID</td>
<td>000A0021</td>
</tr>
<tr>
<td>CDRPSQ_IOSB</td>
<td>000000000</td>
</tr>
<tr>
<td></td>
<td>010E0000F</td>
</tr>
</tbody>
</table>

**OWNER UIC (030,031)**

**DIRECTORY STRUCTURED**

**FILE ORIENTED**

**SHARABLE**

**AVAILABLE**

**MOUNTED**

**ERROR LOGGING**

**CAPABLE OF INPUT**

**CAPABLE OF OUTPUT**

**RANDOM ACCESS**

**15373. QIO'S THIS UNIT**

**95. ERRORS THIS UNIT**

**ONLINE**

**SOFTWARE VALID**

**UNLOAD AT DISMOUNT**

**STARTING LBN #5910920.**

**WRITE PHYSICAL BLOCK**

**IOSM_DATACHECK**

**TRANSFER SIZE 32768. BYTE(S)**

**488. BYTE PAGE OFFSET**

**REQUESTOR "PID"**

**IOSB, 0. BYTE(S) TRANSFERRED**

---

**FOR INTERNAL USE ONLY**
### Error Sequence 3688

**ERROR SEQUENCE 3688.**
**ERLOGMESSAGE ENTRY** 24-MAR-1988 10:59:20.79
**KA86  REV# 4.  SERIAL# 152.  MFG PLANT 15.**

**I/O SUB-SYSTEM, UNIT _C3P0$DUA59:**
- **MESSAGE TYPE** 0001
- **MSLG$R_CMD_REF** 31050014
- **MSLG$W_UNIT** 003B
- **MSLG$W_SEQ_NUM** 001B
- **MSLG$B_FORMAT** 02
- **MSLG$B_FLAGS** 00
- **MSLG$W_EVENT** 01A8

**MSLG$Q_CNT_ID**

- 000000DD
- 01200000

**MSLG$B_CNT_SVR**

- 02

**MSLG$B_CNT_HVR**

- 00

**MSLG$W_MULTIUNT**

- 0040

**MSLG$Q_UNIT_ID**

- 00000000
- 02130000

**MSLG$B_UNIT_SVR**

- 00

**MSLG$B_UNIT_HVR**

- 0F

**MSLG$B_LEVEL**

- 00

**MSLG$B_RETRY**

- 00

**MSLG$L_VOL_SER**

- 0000001D8

**MSLG$L_HDR_CODE**

- 0009085E

**CONTROLLER DEPENDENT INFORMATION**

- **ORIG ERR** 8010

**ERR RECOV FLGS** 0003

- **LVI A RETRY** 00
- **LVI B RETRY** 00
- **BUF DAT MEM ADDR** D91B
- **SRC REQ #** 04
- **DET REQ #** 04

**DISK MSCP MESSAGE**

- **UNIT #59.**
- **SEQUENCE #27.**

**DISK TRANSFER ERROR**

- BAD BLK REPLACEMENT REQUEST
- OPERATION CONTINUING
- OPERATION SUCCESSFUL

**DATA ERROR**

- 6. SYMBOL ECC ERROR

**UNIQUE IDENTIFIER, 0000000000DD(X)**

- MASS STORAGE CONTROLLER
- HSC70
- CONTROLLER SOFTWARE VERSION #2.
- CONTROLLER HARDWARE REVISION #0.

**UNIQUE IDENTIFIER, 0000000000FF(X)**

- DISK CLASS DEVICE (166)
- RA90
- UNIT SOFTWARE VERSION #0.
- UNIT HARDWARE REVISION #15.

**VOLUME SERIAL #472.**

- LOGICAL BLOCK #591966.
- GOOD LOGICAL SECTOR

**EDC ERROR**

- ECC ERROR

**LBN REPLACEMENT INDICATED**

- ERR LOGGED TO CONSOLE AND HOST

---

*FOR INTERNAL USE ONLY*
42. **************************** ENTRY
LOGGED ON SID 0404F098

ERROR SEQUENCE 3689.
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:59:24.66
KAB6 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT_C3P0$DUASA59:

MESSAGE TYPE 0001
MSLG$C_CMD_REF 31050014
MSLG$C_UNIT 003B
MSLG$C_SEQ_NUM 001C
MSLG$C_FORMAT 09
MSLG$C_FLAGS 80
MSLG$C_EVENT 0034
MSLG$Q_CNT_ID 000000DD
01200000
MSLG$B_CNT_SRV 02
MSLG$B_CNT_HVR 00
MSLG$W_MULTIUNT 0040
MSLG$Q_UNIT_ID 0000000F
02130000
MSLG$B_UNIT_SRV 00
MSLG$B_UNIT_HVR 0F
MSLG$W_RPL_FLAGS A000
MSLG$V_VOL_SER 000001D8
MSLG$V_BAD_LBN 0009085E
MSLG$V_OLD_RBN 00000000
MSLG$V_NEW_RBN 00002184
MSLG$W_CAUSE 01A8

DISK MSCP MESSAGE

UNIT #59.
SEQUENCE #28.
BAD BLOCK REPLACEMENT
OPERATION SUCCESSFUL
BAD BLOCK REPLACEMENT
BLOCK VERIFIED GOOD

UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000000FFFD(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
BLK RE-VECTORED, NON-PRIMARY RBN
REPLACEMENT ATTEMPTED, BLOCK
VERIFIED BAD

VOLUME SERIAL #472.
BAD LOGICAL BLOCK
NUMBER = 591966.
FORMER REPLACEMENT BLOCK
NUMBER = 0.
NEW REPLACEMENT BLOCK
NUMBER = 8580.
DATA ERROR
6. SYMBOL ECC ERROR

FOR INTERNAL USE ONLY
**ERROR SEQUENCE 3690.**

**ERL$LOGSTATUS ENTRY** 24-MAR-1988 10:59:24.66

**KA66 REV# 4. SERIAL# 152. MFG PLANT 15.**

I/O SUB-SYSTEM, UNIT _C3P0$DUA59:

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>MSLG$L_CMD_REF</td>
<td>31050014</td>
</tr>
<tr>
<td>ORB$L.Owner</td>
<td>00180019</td>
</tr>
<tr>
<td>UCB$L_CHAR</td>
<td>1C4D4108</td>
</tr>
</tbody>
</table>

**OWNER UIC** [030,031]

DIRECTORY STRUCTURED  
FILE ORIENTED  
SHARABLE  
AVAILABLE  
MOUNTED  
ERROR LOGGING  
CAPABLE OF INPUT  
CAPABLE OF OUTPUT  
RANDOM ACCESS

**UCB$L_OP_CNT** 000003F26  
**UCB$W_ERRC NT** 0062  
**UCB$W_STS** 1810  

16166. QIO'S THIS UNIT  
98. ERRORS THIS UNIT  
ONLINE  
SOFTWARE VALID  
UNLOAD AT DISMOUNT

**CDRP$L_MEDIA** 00090858  
**CDRP$W_FUNC** 00C  
**CDRP$L_BCNT** 00002000  
**CDRP$W_BOFF** 0000  
**CDRP$L_PID** 000A0020  
**CDRP$Q_IOSB** 00000000 010E000F

STARTING LBN #5919600.  
READ PHYSICAL BLOCK  
TRANSFER SIZE 8192. BYTE(S)  
TRANSFER PAGE AlIGNED  
REQUESTOR "PID"  
IOSB, 0. BYTE(S) TRANSFERRED

---

FOR INTERNAL USE ONLY
**ERROR SEQUENCE 3695.**

**ERLSLOGMESSAGE ENTRY**

**I/O SUB-SYSTEM, UNIT _C3P0$DUA59:**

**MESSAGE TYPE** 0001

**MSLGS$CMD_REF** D071001C

**MSLGS$UNIT** 003B

**MSLGS$SEQ_NUM** 001D

**MSLGS$FORMAT** 02

**MSLGS$FLAGS** E0

**MSLGS$EVENT** 00E8

**MSLGS$CNT_ID** 000000DD

**MSLGS$UNIT_ID** 01200000

**MSLGS$CNT_SVR** 02

**MSLGS$CNT_HVR** 00

**MSLGS$MULT_UNIT** 0040

**MSLGS$UNIT_ID** 0000FFFF

**MSLGS$UNIT_SVR** 00

**MSLGS$UNIT_HVR** 0F

**MSLGS$LEVEL** 00

**MSLGS$RETRY** 01

**MSLGS$VOL_SERIAL** 000001D8

**MSLGS$HDR_CODE** 0009364A

**CONTROLLER DEPENDENT INFORMATION**

**ORIG_ERR** 8010

**ERR RECOV FLGS** 0003

**LVI A RETRY** 00

**LVI B RETRY** 00

**BUF DAT MEM ADR** CEEC

**SRC REQ #** 04

**DET REQ #** 04

---

**DISK MSCP MESSAGE**

**UNIT #59.**

**SEQUENCE #29.**

**DISK TRANSFER ERROR**

BAD BLK REPLACEMENT REQUEST
OPERATION CONTINUING
OPERATION SUCCESSFUL

DATA ERROR
UNCORRECTABLE ECC ERROR

**UNIQUE IDENTIFIER, 0000000000DD(X)**
MASS STORAGE CONTROLLER
HSC70

**CONTROLLER SOFTWARE VERSION #2.**

**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 00000000FFFF(X)**
DISK CLASS DEVICE (166)
RA90

**UNIT SOFTWARE VERSION #0.**

**UNIT HARDWARE REVISION #15.**

**VOLUME SERIAL #472.**

LOGICAL BLOCK #603722.
GOOD LOGICAL SECTOR

EDC ERROR
ECC ERROR

LBH REPLACEMENT INDICATED
ERR LOGGED TO CONSOLE AND HOST

---

FOR INTERNAL USE ONLY
**ERROR SEQUENCE 3696.**
**ERLSLOGMESSAGE ENTRY** 24-MAR-1988 10:59:39.05
**KAB6 REV# 4. SERIAL# 152. MFG PLANT 15.**

**I/O SUB-SYSTEM, UNIT C3P0$DUA59:**

- **MESSAGE TYPE** 0001
- **MSLGS$L_CMD_REF** D071001C
- **MSLGS$W_UNIT** 003B
- **MSLGS$W_SEQ_NUM** 001E
- **MSLGS$B_FORMAT** 09
- **MSLGS$B_FLAGS** 80
- **MSLGS$W_EVENT** 0014

**DISK MSCP MESSAGE**

- **UNIT #59.**
- **SEQUENCE #30.**
- **BAD BLOCK REPLACEMENT**
- **OPERATION SUCCESSFUL**
- **BAD BLOCK REPLACEMENT**
- **BAD BLOCK REPLACED**

**UNIQUE IDENTIFIER, 0000000000DD(X)**
**MASS STORAGE CONTROLLER**
**HSC70**

**CONTROLLER SOFTWARE VERSION #2.**
**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 00000000FFFF(X)**
**DISK CLASS DEVICE (166)**
**RA90**

**UNIT SOFTWARE VERSION #0.**
**UNIT HARDWARE REVISION #15.**

**REPLACEMENT ATTEMPTED, BLOCK VERIFIED BAD**
**VOLUME SERIAL #472.**
**BAD LOGICAL BLOCK**
- **NUMBER = 603722.**
**FORMER REPLACEMENT BLOCK**
- **NUMBER = 0.**
**NEW REPLACEMENT BLOCK**
- **NUMBER = 8749.**
**DATA ERROR**
**UNCORRECTABLE ECC ERROR**

FOR INTERNAL USE ONLY
**ERROR SEQUENCE 3697.**

**LOGGED ON SID 0404F098**


**KA86 REV# 4. SERIAL# 152. MFG PLANT 15.**

I/O SUB-SYSTEM, UNIT _C3P0$DUA59:

**MSL$L_CMD_REF** D071001C
**ORB$L_OWNER** 00180019
**UCB$L_CHAR** 1C4D4108

OWNER UIC [030,031]

DIRECTORY STRUCTURED
FILE ORIENTED
SHARABLE
AVAILABLE
MOUNTED
ERROR LOGGING
CAPABLE OF INPUT
CAPABLE OF OUTPUT
RANDOM ACCESS

**UCB$L_OPCNT** 00003FE2
**UCB$W_ERRCNT** 0065
**UCB$W_STS** 1810

16354. QIO'S THIS UNIT
101. ERRORS THIS UNIT

ONLINE
SOFTWARE VALID
UNLOAD AT DISMOUNT

**CDRP$L_MEDIA** 00093634
**CDRP$W_FUNC** 400B

STARTING LBN #6037000.

WRITE PHYSICAL BLOCK
IOM$DATACHECK

**CDRP$L_BCNT** 00008000
**CDRP$W_BOFF** 01E8
**CDRP$L_PID** 000A0022
**CDRP$Q_IOSB** 00000000

TRANSFER SIZE 32768. BYTE(S)
488. BYTE PAGE OFFSET
REQUESTOR "PID"

IOSB, 0. BYTE(S) TRANSFERRED

FOR INTERNAL USE ONLY
47. ************************ ENTRY
ERROR SEQUENCE 3701.
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:59:55.10
KAB6 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3F0$DUA59:
MESSAGE TYPE 0001
MSLG$L_CMD_REF 5B2A002F
MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 001F
MSLG$B_FORMAT 02
MSLG$B_FLAGS 00

MSLG$W_EVENT 01CB
MSLG$Q_CNT_ID 000000DD
01200000

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULT_UNIT 0040
MSLG$Q_UNIT_ID 0000FFFF
02130000

MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 0F
MSLG$B_LEVEL 00
MSLG$B_RETRY 00
MSLG$V_VOL_SER 000001D8
MSLG$V_HDR_CODE 0009085F

CONTROLLER DEPENDENT INFORMATION
ORIG_ERR 8010

ERR RECOV FLGS 0003
LV1 A RETRY 00
LV1 B RETRY 00
BUF DAT MEM ADR DBBAD
SRC REQ # 04
DET REQ # 04

DISK MSCP MESSAGE
UNIT #59.
 SEQUENCE #31.
 DISK TRANSFER ERROR
BAD BLK REPLACEMENT REQUEST
OPERATION CONTINUING
OPERATION SUCCESSFUL
DATA ERROR
7. SYMBOL ECC ERROR

UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.

VOLUME SERIAL #472.
LOGICAL BLOCK #591967.
GOOD LOGICAL SECTOR

EDC ERROR
ECC ERROR

LBN REPLACEMENT INDICATED
ERR LOGGED TO CONSOLE AND HOST

FOR INTERNAL USE ONLY
**** ENTRY 48. ****

**ERROR SEQUENCE 3704.**
**ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:59:57.03**
**KA86 REV# 4. SERIAL# 152. MFG PLANT 15.**

**I/O SUB-SYSTEM, UNIT _C3P0$DUA59:**

**MESSAGE TYPE** 0001

MSLGSJ$CMD_REF 5B2A002F
MSLGSJ$UNIT 003B
MSLGSJ$SEQ_NUM 0020
MSLGSJ$FORMAT 09
MSLGSJ$_FLAGS 80
MSLGSJ$EVENT 0014

MSLGSJ$CNT_ID 000000DD
01200000

MSLGSJ$_CNT_SVR 02
MSLGSJ$_CNT_HVR 00
MSLGSJ$MULT_UNT 0040
MSLGSJ$UNIT_ID 000FFFFF
02130000

MSLGSJ$UNIT_SVR 00
MSLGSJ$UNIT_HVR 0F
MSLGSJ$RPL_FLGS A000

MSLGSJ$VOL_SER 000001DB
MSLGSJ$BAD_LBN 0009085F
MSLGSJ$OLD_RBN 00000000
MSLGSJ$NEW_RBN 00002182
MSLGSJ$CAUSE 01C8

**DISK MSCP MESSAGE**

**UNIT #59.**

**SEQUENCE #32.**

**BAD BLOCK REPLACEMENT**

**OPERATION SUCCESSFUL**

**BAD BLOCK REPLACEMENT**

**BAD BLOCK REPLACED**

**UNIQUE IDENTIFIER, 0000000000DD(X)**

**MASS STORAGE CONTROLLER**

**HSC70**

**CONTROLLER SOFTWARE VERSION #2.**

**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 00000000FFFF(X)**

**DISK CLASS DEVICE (166)**

**RA90**

**UNIT SOFTWARE VERSION #0.**

**UNIT HARDWARE REVISION #15.**

**BLK RE-VECTORED, NON-PRIMARY RBN REPLACEMENT ATTEMPTED, BLOCK VERIFIED BAD**

**VOLUME SERIAL #472.**

**BAD LOGICAL BLOCK**

- **NUMBER = 591967.**

**FORMER REPLACEMENT BLOCK**

- **NUMBER = 0.**

**NEW REPLACEMENT BLOCK**

- **NUMBER = 8578.**

**DATA ERROR**

7. **SYMBOL ECC ERROR**

---

**FOR INTERNAL USE ONLY**
ERROR SEQUENCE 3705.
ERL$LOGSTATUS ENTRY 24-MAR-1988 10:59:57.04
KAX6 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3F0$DUA59:

MSLG$L_CMD_REF 5B2A002F
ORBS$L_OWNER 00180019
UCBS$L_CHAR 1C4D4108

OWNER UIC [030,031]
DIRECTORY STRUCTURED
FILE ORIENTED
SHARABLE
AVAILABLE
MOUNTED
ERROR LOGGING
CAPABLE OF INPUT
CAPABLE OF OUTPUT
RANDOM ACCESS

UCBS$L_OPCNT 000040BF
UCBS$W_ERRCNT 0068
UCBS$W_STS 1810

16575. QIO'S THIS UNIT
104. ERRORS THIS UNIT
ONLINE
SOFTWARE VALID
UNLOAD AT DISMOUNT

CDRP$S_MEDIA 00090858
CDRP$W_FUNC 000C
CDRP$S_BCNT 00020000
CDRP$W_BOFF 0000
CDRP$S_PID 000A0020
CDRP$Q_IOSB 00000000 0100000F

STARTING LBN #5919600.
READ PHYSICAL BLOCK
TRANSFER SIZE 8192. BYTE(S)
TRANSFER PAGE AlIGNED
REQUESTOR "PID"
IOSB, 0. BYTE(S) TRANSFERRED
**ERROR SEQUENCE 3713.**
**ERLSLOGMESSAGE** ENTRY 24-MAR-1988 11:00:49.12
**KA86 REV# 4. SERIAL# 152. MFG PLANT 15.**

**I/O SUB-SYSTEM, UNIT _C3P0$DUA59:**
**MESSAGE TYPE** 0001
**MSLG$C_CMD_REF** 02A70030
**MSLG$W_UNIT** 003B
**MSLG$W_SEQ_NUM** 0022
**MSLG$B_FORMAT** 02
**MSLG$B_FLAGS** E0

**MSLG$W_EVENT** 01EB
**MSLG$Q_CNT_ID** 000000DD
01200000

**MSLG$B_CNT_SVR** 02
**MSLG$B_CNT_HVR** 00
**MSLG$W_MULT_UNT** 0040
**MSLG$Q_UNIT_ID** 000FFFFF
02130000

**MSLG$B_UNIT_SVR** 00
**MSLG$B_UNIT_HVR** 0F
**MSLG$B_LEVEL** 00
**MSLG$B_RETRY** 01
**MSLG$L_VOL_SER** 000001DB
**MSLG$L_HDR_CODE** 00095932

**CONTROLLER DEPENDENT INFORMATION**
**ORIG ERR** 8010
**ERR RECOV FLGS** 0003
**LV1 A RETRY** 00
**LV1 B RETRY** 00
**BUF DAT MEM ADR** C112
**SRC REQ #** 04
**DET REQ #** 04

**DISK MSCP MESSAGE**
**UNIT #59.**
**SEQUENCE #34.**
**DISK TRANSFER ERROR**
**BAD BLK REPLACEMENT REQUEST**
**OPERATION CONTINUING**
**OPERATION SUCCESSFUL**

**DATA ERROR**
**8. SYMBOL ECC ERROR**

**UNIQUE IDENTIFIER, 0000000000DD(X)**
**MASS STORAGE CONTROLLER**
**HSC70**

**CONTROLLER SOFTWARE VERSION #2.**
**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 00000000FFFF(X)**
**DISK CLASS DEVICE (166)**
**RA90**

**UNIT SOFTWARE VERSION #0.**
**UNIT HARDWARE REVISION #15.**

**VOLUME SERIAL #472.**
**LOGICAL BLOCK #612658.**
**GOOD LOGICAL SECTOR**

**EDC ERROR**
**ECC ERROR**

**LBN REPLACEMENT INDICATED**
**ERR LOGGED TO CONSOLE AND HOST**

---

FOR INTERNAL USE ONLY
ERROR SEQUENCE 3714.
ERL$LOGMESSAGE ENTRY 24-MAR-1988 11:00:52.73
KAS6 REV# 4. SERIAL#: 152. MFG PLANT 15.
I/O SUB-SYSTEM, UNIT _C3P0$DUA59:
MESSAGE TYPE 0001
MSLG$CMD_REF 02A70030
MSLG$UNIT 003B
MSLG$SEQ_NUM 0023
MSLG$FORMAT 09
MSLG$FLAGS 00
MSLG$EVENT 0034
MSLG$CNT_ID 00000000D
01200000
MSLG$CNT_SRV 02
MSLG$CNT_HVR 00
MSLG$MULT_UNT 0040
MSLG$UNIT_ID 00000000F
02130000
MSLG$UNIT_SRV 00
MSLG$UNIT_HVR 0F
MSLG$RPL_FLGS 0000
MSLG$VOL_SER 0000001DB
MSLG$BAD_LBN 000095932
MSLG$OLD_RBN 00000000
MSLG$NEW_RBN 00000022AF
MSLG$CAUSE 01E8

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #35.
BAD BLOCK REPLACEMENT
OPERATION SUCCESSFUL
BAD BLOCK REPLACEMENT
BLOCK VERIFIED GOOD
UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70
CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.
UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90
UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
REPLACEMENT ATTEMPTED, BLOCK
VERIFIED GOOD
VOLUME SERIAL #472.
BAD LOGICAL BLOCK
NUMBER = 612658.
DATA ERROR
8. SYMBOL ECC ERROR

FOR INTERNAL USE ONLY
ERROR SEQUENCE 3715.
ERLOGSTATUS ENTRY 24-MAR-1988 11:00:52.75
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3P0$DUA59:

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSGS$L_CMD_REF</td>
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</tr>
<tr>
<td>ORBS$L_OWNER</td>
<td>00180019</td>
</tr>
<tr>
<td>UCB$S_L_CHAR</td>
<td>1C4D4108</td>
</tr>
<tr>
<td>UCB$S_L_OPCNT</td>
<td>000043A1</td>
</tr>
<tr>
<td>UCB$W_ERRCNT</td>
<td>006B</td>
</tr>
<tr>
<td>UCB$W_STS</td>
<td>1810</td>
</tr>
<tr>
<td>CDRPS$L_MEDIA</td>
<td>00095BF4</td>
</tr>
<tr>
<td>CDRPS$W_FUNC</td>
<td>400B</td>
</tr>
<tr>
<td>CDRPS$L_BCNT</td>
<td>00008000</td>
</tr>
<tr>
<td>CDRPS$W_BOFF</td>
<td>01E8</td>
</tr>
<tr>
<td>CDRPS$L_PID</td>
<td>000A0022</td>
</tr>
<tr>
<td>CDRPS$Q_IOSB</td>
<td>00000000</td>
</tr>
<tr>
<td></td>
<td>010E000F</td>
</tr>
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</table>

OWNER UIC [030,031]

DIRECTORY STRUCTURED
FILE ORIENTED
SHARABLE
AVAILABLE
MOUNTED
ERROR LOGGING
CAPABLE OF INPUT
CAPABLE OF OUTPUT
RANDOM ACCESS

17313. QIO'S THIS UNIT
107. ERRORS THIS UNIT
ONLINE
SOFTWARE VALID
UNLOAD AT DISMOUNT

STARTING LBN #6125960.
WRITE PHYSICAL BLOCK
IO$M_DATACHECK
TRANSFER SIZE 32768. BYTE(S)
488. BYTE PAGE OFFSET
REQUESTOR "PID"
IOSB, 0. BYTE(S) TRANSFERRED
3.3 Random ECC Errors Without "Wire Errors"

Troubleshooting Random ECC Errors WITHOUT Pulse Or State Parity Errors

You were presented with information in error log that depicted a general R/W data path problem. It is IMPORTANT to note in the host error log that no SDI communication problems were logged such as:

Controller detected pulse or state parity error
Drive Detected 'LED error code 21' errors

Wire Errors

A wire error is a basic communications error such as "Pulse or State Parity Errors". This is similar to an analogy of talking on the telephone when there is excessive noise on the line. You have trouble hearing the message because of the basic communications problems.

This allows you to draw a conclusion that the "SDI wire" level communications is probably NOT contributing to the occurrence of the bad ECC, but that the problem resides elsewhere.

The number one goal of your service effort should be to make the correct diagnosis of a problem on the first call, replacing the correct part so that you MINIMALLY IMPACT customer availability to HIS system, HIS disk and HIS data.

By taking a random selection of the available error log LBN information as provided in the ITS problem scenario, you would have noted that the errors were 'random' to group, to cylinder and to head.

The following was the list of 'bad' LBN's provided in the ITS problem scenario and what the LBN conversion would have resulted in.

<table>
<thead>
<tr>
<th>Block Number</th>
<th>Logical Cyl</th>
<th>Group</th>
<th>Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>630644</td>
<td>703</td>
<td>0</td>
<td>53</td>
</tr>
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<tr>
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<td>705</td>
<td>0</td>
<td>55</td>
</tr>
<tr>
<td>528360</td>
<td>589</td>
<td>0</td>
<td>27</td>
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<tr>
<td>230996</td>
<td>257</td>
<td>6</td>
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<td>1407</td>
<td>1</td>
<td>34</td>
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<td>597</td>
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<tr>
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<td>977</td>
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</tr>
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<td>877119</td>
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<td>60</td>
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<td>672</td>
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<tr>
<td>612358</td>
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<td>0</td>
<td>7</td>
</tr>
</tbody>
</table>

CORRECTIVE ACTION STEPS WOULD HAVE INCLUDED:

1. Determine drive.

FOR INTERNAL USE ONLY
2. Examination of host error log reveals ECC errors and NO indication of "wire" related errors.
3. Conversion of LBN's affected indicates that errors are "random".
4. Noting that many heads are involved and that the errors are related to 'data' type problems, the conclusion could be drawn that the problem is probably between the PCM and the controller, selection of PCM or ECM is made.
5. Replacement of FRU takes place
6. Verification of FRU replacement is made with internal drive diagnostics.
7. Return the disk drive to the customer.

If in your efforts you ran controller based diagnostics ILDISK or ILEXER in order to find this problem, you were given 'error free runs'. We wanted to emphasize the point that trying to 'reproduce' errors through the use of these diagnostics for this type of problem is very COUNTERPRODUCTIVE to the service goal of maximizing system availability, particularly if the errors occur at low rates (very few per hour). The 'default' runs of HSC based verification tools such as ILEXER test the drive in the "Diagnostic Block Number (DBN)" space only and therefore the 'customer data' area IS NOT touched. Obviously running over the customer area has a serious impact to the customer (he loses his data or has to backup/restore). You the service engineer ALSO LOSE, because it takes you much longer to complete the call, and customer satisfaction is lost.

We encourage you to SERVICE SMARTLY by utilizing the available host error log. You will fix problems quicker, with fewer repeat calls, and maximize customer satisfaction in the process.

MULTIPLE CONTROLLERS REPORT SAME ERRORS

Do you have evidence that multiple controllers report the same random R/W errors? Sites with multiple controllers may give you this evidence.

If multiple controllers report the same type errors, and only one drive port (after cable swap) reports the error, then it is an ECM problem.

If multiple controllers report the same type errors, and both drive ports report the same error, the emphasis should be placed on the following order:

1. PCM
2. ECM
3. SDI CABLING/INTERCONNETCS
4. Drive Power Supply
5. Spindle Ground
6. HDA

ONLY SINGLE CONTROLLER PORT AFFECTED

If errors only occur to a single controller, and both drive ports to the same controller port have been tested, then the problem is in the controller or "cable" depending on how the cables were swapped.
NOT A DEFINED DRIVE PORT / CONTROLLER PORT

This is a very typical decision point to be at for the ‘first time’ call effort with random R/W errors.

For the RA90, the following order should be pursued:
1. PCM
2. ECM
3. POWER SUPPLY
4. CABLE (Reconfigure?)
5. SPINDLE GROUND BRUSH
6. HDA

NOTICE
EXCESSIVE NUMBER OF BLOCKS REPLACED BECAUSE OF R/W PATH PROBLEM

A bad R/W path problem may cause the replacement of a high number of blocks which were in fact not bad. This may lead to a very fragmented logical structure on the disk. If this has happened, you will find that the number of blocks in the RCT that have been recorded as vectored, will differ substantially with the FCT information.

ALL disks over time will slowly add detected bad blocks into the RCT as media ages, wears, or touchdowns occurs. Over time the differences between FCT and RCT could approach 500-1000 entries in 3-5 years.

A bad R/W path problem on a heavily used disk could however add several hundred block per hour until disk usage is stopped. When this abnormal occurrence occurs, to recover these GOOD blocks, you must backup the customer data and reformat the media.

To tell if there have been a significant amount of replacements, you have to rely on host error log to display the BBR completion activity. HSC-VERIFY will also display the number of RCT/FCT recorded replacements. Utilizing the ‘BBR’ utility (EVRLK,ZUDELx, future NAKDAX) will provide a ‘hit to availability’ but can be utilized to show the same thing. Remember that the contents of RCT only show what blocks are replaced. There is NO information about when the blocks were ‘retired’ and recorded in the RCT. Only host error log or HSC console trail will give the time occurrence of the replacements.

DSA DISK FORMATTER

Should a disk subsystem electronics problem result in a ‘large’ number of block retirements thru either primary or non-primary (tertiary) replacements, then the only recovery recourse that the field has is to utilize a DSA disk formatter utility such as:

ZUDKxx—Formatter Utility
EVRLB—Formatter Utility
MDM—RA Disk Utility Menu Option
HSC—FORMAT DSA Disk Formatter

FOR INTERNAL USE ONLY
LBN’s THAT CORRELATE TO ZONE WRITE BOUNDARIES

Failures that show no consistency as to group/head, may show consistency by ‘zones’ of write current per the implementation in the respective drive. RA90 divides the media into four (4) different write current amplitude zones.

NOTE
It takes a fairly substantial number of errors in order to verify this correlation (>50), and a knowledge of how much of the user disk space may actually be being accessed.

A customer that is using >50% of the available disk space probably is over time accessing all zones of the disk. A disk that is using <25% of the user area could in fact be accessing only a single zone of the disk. Also knowledge of how the operating system utilizes the disk, and where it puts the directory and how it allocates the free blocks space is necessary.

Zone related problems encountered with the RA70 will generally be resolved with replacement of the ECM.

Zone related problems encountered with the RA90 will generally be resolved with replacement of the PCM, ECM and HDA in that order.

SPECIFIC NOTE ABOUT VMS ERROR LOG

One of the pieces of information that is broken out in an VMS error log for a data transfer type error is certain “controller dependent information” such as:

<table>
<thead>
<tr>
<th>CONTROLLER DEPENDENT INFORMATION</th>
<th>EDC ERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORIG   ERR</td>
<td>8010</td>
</tr>
<tr>
<td>ECC ERROR</td>
<td></td>
</tr>
</tbody>
</table>

The ASCII text indicates that there is both an EDC and ECC error. For most ‘ECC’ type errors this information will indicate both EDC/ECC error conditions. These ‘status bits’ mean that when the block was read with error, as a result of the read, both the ECC flag and EDC flag was set. If bits were dropped/picked in the sector data field or the sector EDC bytes, both of these bits will be set. If the bits were dropped/picked only in the ECC field, then only the ECC flag bit would be set. DO NOT use this controller information field to interpret the ‘goodness’ of the data!

The ‘goodness’ of the data is revealed in the “Replacement Flags Field” of the host error logs “BAD BLOCK REPLACEMENT Error Log Entry”.

FOR INTERNAL USE ONLY
REPLACEMENT FLAGS FIELD

<table>
<thead>
<tr>
<th>FLAG FIELD (H)</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>8000</td>
<td>REPLACEMENT ATTEMPTED. This bit is set if the suspect bad block indeed tested bad during the initial stages of the replacement process. If NOT SET, then the suspect block did not check bad and no replacement was completed if set—no problem.</td>
</tr>
<tr>
<td>4000</td>
<td>FORCED ERROR WRITTEN. The data from the suspect bad block could not be corrected or obtained without error. The Forced Error Indicator will be written to the replacement block along with the bad data from the block that was replaced. The users data from the bad block will be read with a forced error when accessed.</td>
</tr>
<tr>
<td>2000</td>
<td>NON-PRIMARY REPLACEMENT. This bit will be set if the replacement process was accomplished and was required to put the bad blocks data into a replacement block (RBN) that was not the bad blocks primary RBN.</td>
</tr>
<tr>
<td>1000</td>
<td>REPLACE COMMAND FAILURE. This bit will be set during the replacement process, if the “status” coming back from the execution of the MSCP “REPLACE” command is not successful. THIS IS VERY SERIOUS. If this occurs, the drive should NOT be used until it can be reformatted.</td>
</tr>
<tr>
<td>0800</td>
<td>REPLACEMENT CONTROL TABLE INCONSISTENT. This bit will set if it is found that the RCT tables are not usable. Again a serious problem. The drive should not be used until it can be reformatted.</td>
</tr>
<tr>
<td>0400</td>
<td>BAD REPLACEMENT BLOCK. This bit will set if the bad block reported is a replacement block. This is not a problem. Replacement blocks can be replaced just like any other LBN.</td>
</tr>
</tbody>
</table>

VAXsimPLUS would give to the Support Centers concerning this problem:

Reported to: DISK_USER_DISK:[SYSMINT.ERRLOG][ERRORLOG.RPT]
Evidence in: NL:[]OUT2.JAC

NOTE
This report contains messages about system errors which should be investigated either because of the nature of the error or because of the error-rate. Whether or not a repair should be made depends on the results of that investigation.
4

Bug 4

4.1 Problem Statement

The customer reports a number of logged errors on RA90 unit 59 and sometimes the drive will run for days without logging any errors. This customer operates a cluster with a medium size disk farm of four RA90's with a variety of other RA type disks all dual ported between two HSC50's.
**PACKET 1.**

**Attn:** Field Service  
**Device:** C3PO_$DUA59 (RA90 S/N:FFFFF)  
C3PO_$DUA59  
VADER_$DUA59  

**Error:** Read/Write Data Errors  
**Theory:** [X.XX.XXX]  
**Suspect:** Manual Analysis Required (may be Read Path(drive, SDI, controller)) or Spindle Ground Brush  
ECM  
Spindle Ground Brush  

**Evidence (All results are in decimal except LED Code):**  
Total errors on drive: 18  

<table>
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<tr>
<th>Sector</th>
<th>Phys. From Cyl.</th>
<th>Head</th>
<th>Soft Index</th>
<th>Hard Count</th>
<th>Serial Number</th>
<th>Error Type</th>
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<td>0</td>
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<tr>
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</tbody>
</table>

**Time:** 24-FEB 10:32:22 TO 24-FEB 11:00:49  
**Span:** 0:28:26

---

FOR INTERNAL USE ONLY
4.2 Customer Error Log

This is the summary of the customer error log data: This information is being displayed in a format that could be duplicated for other problems you face.

<table>
<thead>
<tr>
<th>Drive Name</th>
<th>Typ</th>
<th>Led</th>
<th>MSCP Event</th>
<th>Block Type / #</th>
<th>&lt; Logical Cyl&gt; Gp S</th>
<th>Phy S</th>
<th>yy-mm-dd hh:mm:ss:cc</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUA59 90</td>
<td>#01EB</td>
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<td>0034</td>
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<tr>
<td>DUA59 90</td>
<td>#00EB</td>
<td>#00EB</td>
<td>603422</td>
<td>672</td>
<td>9</td>
<td>17</td>
<td>3</td>
</tr>
<tr>
<td>DUA59 90</td>
<td>0034</td>
<td>0034</td>
<td>603422</td>
<td>672</td>
<td>9</td>
<td>17</td>
<td>3</td>
</tr>
<tr>
<td>DUA59 90</td>
<td>#00EB</td>
<td>#00EB</td>
<td>1677920</td>
<td>1870</td>
<td>7</td>
<td>47</td>
<td>5</td>
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<tr>
<td>DUA59 90</td>
<td>0014</td>
<td>0014</td>
<td>1677920</td>
<td>1870</td>
<td>7</td>
<td>47</td>
<td>5</td>
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<tr>
<td>DUA59 90</td>
<td>#00EB</td>
<td>#00EB</td>
<td>1678640</td>
<td>1871</td>
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<tr>
<td>DUA59 90</td>
<td>0014</td>
<td>0014</td>
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<td>33101</td>
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<tr>
<td>DUA59 90</td>
<td>0014</td>
<td>0014</td>
<td>33101</td>
<td>36</td>
<td>11</td>
<td>50</td>
<td>64</td>
</tr>
</tbody>
</table>

FOR INTERNAL USE ONLY
4.3 Troubleshooting Random ECC Errors With 'Wire Errors' 

CONTROLLER OR DRIVE DETECTED COMMUNICATION ERRORS

The occurrence of transient drive detected communication "wire" errors will generally cause an occasional protocol error, which is just a further manifestation of the "wire" problem.

These errors include:

- Drive Error 20 - SDI RTCS parity error.
- Drive Error 21 - SDI Pulse (transfer) error

WIRE ERRORS

Wire errors are basic communications errors such as "Pulse or State Parity Errors". This is similar to an analogy of talking on the telephone when there is excessive noise on the line. You have trouble hearing the message because of the basic communications problems.

The occurrence of transient controller detected communication errors will generally also result in ECC errors that [depending on the severity/frequency of the error occurrence] will result in a successful retry.

It can be beneficial to know if this basic communications problem is only occurring on the transmit lines from controller to drive, or if in fact the controller is seeing 'transmission' type errors from the drive as well.

If the drive is only seeing this type of error, then the drive ECM receive circuitry, SDI port transmit circuitry or SDI cabling is suspect. Reconfiguration might further isolate the problem (using different drive/controller port and cable combinations).

The handling of controller detected communications errors is very similar to the handling of drive detected communications errors.

If the controller is seeing 'transmission' type errors (will show up as ECC errors as well) and the drive is also seeing the transmission type errors, then the entire path "drive to controller" is suspect.

It is important to make a distinction between the occurrence of communications errors AND of ECC errors. If an SDI subsystem is having "wire" error occurrences, one of the manifestations (not cause) will be ECC errors. So the ********* is to "fix transmission" problems before concentrating on ECC errors.

NOTE

All SDI cables should be securely fastened to the bulkhead connectors at all interconnecting points in order to provide proper electrical and mechanical connection.

Please note that the drive has recorded a few basic wire communication' errors 21's. The controller has detected pulse errors (10B), and ECC errors. The ECC's are random, again a clue to the 'overall R/W path' from media to controller. When the wire communications between drive and controller however is not good, the ECC's will very often be the result of the wire communications problem. Can any of the following considerations help in isolation of the problem?

1. Are other drives exhibiting the same problem?
2. Are other drives on the same controller port module showing these type of errors?
3. Are other controllers attached to the same drive showing the same errors?
4. Have the SDI cables been 'securely' fastened to all bulkhead connectors with the appropriate screws?

5. Are there others types of electrical cables that could be injecting noise into our SDI cable system?

These considerations may be helpful in determining the real problem.

VAXsimPLUS Analysis

The attached report would be the format/text of a VAXsimPLUS message sent to the Field Service Account upon a match of the internal algorithm to the events in error log for this type of problem. It is IMPORTANT to note that this print out DOES NOT reflect the actual error event thresholds.

NOTE
This report contains messages about system errors which should be investigated either because of the nature the error or because of the error-rate. Whether or not a repair should be made depends on the results of that investigation.

PACKET 1.

Attn: Field Service
Device: C3PO_SDUAS9 (RA90 S/N:FFFFF)
       VADER_SDUAS9
Error: SDI Communication Errors
Theory: [1.xx.yy]
Suspect: Drive SI Logic
Evidence: 8 SDI Communication Errors

<table>
<thead>
<tr>
<th>Event-Count</th>
<th>Status</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.</td>
<td>(10B)</td>
<td>Controller Detected Pulse or State Parity Errors</td>
</tr>
<tr>
<td>1.</td>
<td>(1AB)</td>
<td>Receiver Ready Collision Errors</td>
</tr>
</tbody>
</table>

The following 2 drive detected errors may be related to the above SDI errors:

Evidence:

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Mfg. Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>Translation of Error Code</td>
</tr>
<tr>
<td>(HEX)</td>
<td>(HEX)</td>
</tr>
<tr>
<td>2.</td>
<td>(21)</td>
</tr>
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</table>
5
Bug 5

5.1 Problem Statement
The customer reports that RA90 unit number 59 has an intermittent problem. The system has to retry the command several times before it gets a good response. The RA90 is part of a large disk farm dual ported between two HSC70's operating in a cluster.
## 5.2 Customer Error Log

**SYSTEM ERROR REPORT**

**ERROR SEQUENCE 89.**

ERL$LOGMESSAGE ENTRY 17-APR-1988 16:27:55.94

KA86 REV# 0. SERIAL# 627. MFG PLANT 6.

**I/O SUB-SYSTEM, UNIT _GREASY$DUA59:**

<table>
<thead>
<tr>
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<tbody>
<tr>
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<td>0000000000</td>
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<tr>
<td>MSLG$W_UNIT</td>
<td>003B</td>
</tr>
<tr>
<td>MSLG$W_SEQ_NUM</td>
<td>004A</td>
</tr>
<tr>
<td>MSLG$B_FORMAT</td>
<td>03</td>
</tr>
<tr>
<td>MSLG$B_FLAGS</td>
<td>40</td>
</tr>
<tr>
<td>MSLG$W_EVENT</td>
<td>002B</td>
</tr>
<tr>
<td>MSLG$Q_CNT_ID</td>
<td>0000FA05 01200000</td>
</tr>
</tbody>
</table>

**DISK MSCP MESSAGE**

**UNIT #59.**

**SEQUENCE #74.**

**"SDI" ERROR**

**OPERATION CONTINUING**

**DRIVE ERROR**

**DRIVE COMMAND TIMEOUT**

**UNIQUE IDENTIFIER, 00000000FA05**

**MASS STORAGE CONTROLLER**

**HSC70**

**CONTROLLER SOFTWARE VERSION #2.**

**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 000000001FF**

**DISK CLASS DEVICE**

**RA90**

**UNIT SOFTWARE VERSION #0.**

**UNIT HARDWARE REVISION #0.**

**VOLUME SERIAL #1049.**

**LBN #0.**

**GOOD LOGICAL SECTOR**

**MSLG$Z_SDI REQUEST**

**17**

**MODE**

**00**

**ERROR CONTROLLER**

**00**

**RETRY**

**00**

**RUN/STOP SWITCH IN**

**PORT SWITCH IN**

**SPINDLE READY**

**PORT B RECEIVERS ENABLED**

**512-BYTE SECTOR FORMAT**

**NORMAL DRIVE OPERATION**

**0. RETRIES**

FOR INTERNAL USE ONLY
<table>
<thead>
<tr>
<th>DEVICE DEPENDENT INFORMATION</th>
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<tbody>
<tr>
<td>LONGWORD 1. 05650090</td>
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<tr>
<td>LONGWORD 2. 04000007</td>
</tr>
<tr>
<td>LONGWORD 3. 00000003</td>
</tr>
<tr>
<td>LONGWORD 4. 00000000</td>
</tr>
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</table>

FOR INTERNAL USE ONLY
I/O SUB-SYSTEM, UNIT _GREASY$DUA59:

MESSAGE TYPE 0001
MSLG$U_CMD_REF 00000000
MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 004B
MSLG$B_FORMAT 03
MSLG$B_FLAGS 40
MSLG$W_EVENT 00EB

MSLG$Q_CNT_ID 0000FA05
01200000

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULT_Unit 0043
MSLG$Q_UNIT_ID 000001FF
02130000

MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 00
MSLG$L_VOL_SER 00000419
MSLG$L_HEADER 00000000

MSLG$Z_SDl_REQUEST 1F

MODE 00
ERROR 80
CONTROLLER 00
RETRY 00

DISK MSCF MESSAGE
UNIT #59.
SEQUENCE #75.
"SDI" ERROR
OPERATION CONTINUING
DRIVE ERROR
DRIVE DETECTED ERROR

UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 000000001FF
DISK CLASS DEVICE
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #0.
VOLUME SERIAL #1049.
LBN #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
LOG INFORMATION IN EXTENDED AREA
SPINDLE READY
PORT B RECEIVERS ENABLED

512-BYTE SECTOR FORMAT
DRIVE ERROR
NORMAL DRIVE OPERATION
0. RETRIES

FOR INTERNAL USE ONLY
<table>
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<td><strong>INITIATE SEEK</strong></td>
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<tr>
<td><strong>CURRENT CYLINDER, #171.</strong></td>
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</tr>
<tr>
<td><strong>CURRENT GROUP, #1.</strong></td>
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ERROR SEQUENCE 291.
ERL$LOGMESSAGE ENTRY 18-APR-1987 23:58:50.78
KA86 REV# 0. SERIAL# 627. MFG PLANT 6.

I/O SUB-SYSTEM, UNIT _GREASY$DUA59:

MESSAGE TYPE 0001
MSLG$CMD_REF 00000000
MSLG$UNIT 003B
MSLG$SEQ_NUM 0060
MSLG$FORMAT 03
MSLG$FLAGS 40
MSLG$EVENT 002B
MSLG$Q_CNT_ID 0000FA05
01200000
MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$MULT_UNT 0043
MSLG$Q_UNIT_ID 000001FF
02130000
MSLG$UNIT_SVR 00
MSLG$UNIT_HVR 00
MSLG$VOL_SER 00000419
MSLG$HEADER 00000000
MSLG$Z_SDI REQUEST 17

MODE 00
ERROR 00
CONTROLLER 00
RETRY 00

FOR INTERNAL USE ONLY
DEVICE DEPENDENT INFORMATION

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<th>LONGWORD</th>
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<tr>
<td>2.</td>
<td>0400000C</td>
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<td>3.</td>
<td>00000003</td>
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<td>4.</td>
<td>00000000</td>
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ERROR SEQUENCE 292.

I/O SUB-SYSTEM, UNIT _GREASY$DUAX59:

MESSAGE TYPE 0001
MSLGSL_CMD_REF 00000000
MSLGW_UNIT 003B
MSLGW_SEQ_NUM 0061
MSLG$B_FORMAT 03
MSLG$B_FLAGS 40
MSLGW:event 00EB

MSLG$Q_CNT_ID 0000FA05
01200000

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULT_UNT 0043
MSLG$QUNIT_ID 000001FF
02130000

MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 00
MSLG$V_VOL_SER 00000419
MSLG$0 HEADER 00000000

MSLG$Z_SDI REQUEST 1F

MODE 00
ERROR 80
CONTROLLER 00
RETRY 00

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #97.
"SDI" ERROR
OPERATION CONTINUING
DRIVE ERROR
DRIVE DETECTED ERROR
UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
HSC70
CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.
UNIQUE IDENTIFIER, 000000001FF
DISK CLASS DEVICE
RA90
UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #0.
VOLUME SERIAL #1049.
LBN #0.
GOOD LOGICAL SECTOR
RUN/STOP SWITCH IN
PORT SWITCH IN
LOG INFORMATION IN EXTENDED AREA
SPINDLE READY
PORT B RECEIVERS ENABLED
512-BYTE SECTOR FORMAT
DRIVE ERROR
NORMAL DRIVE OPERATION
0. RETRIES

FOR INTERNAL USE ONLY
### CONTROLLER OR DEVICE DEPENDENT INFORMATION

| LED CODE   | 0C |
| PANEL CODE | 11 |
| LAST_OPCODE| 0A |
| RESERVED   | 00 |
| CUR_CYLNDR | 009C |
| CUR_GROUP  | 00 |

INITIATE SEEK

CURRENT CYLINDER, #156.

CURRENT GROUP, #0.
**ERROR SEQUENCE 373.**

**ENTRY 19-APR-1987 12:41:17.19**

**KA86 REV# 0. SERIAL# 627. MFG PLANT 6.**

**I/O SUB-SYSTEM, UNIT _GREASY$DUA59:**

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<tr>
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<tr>
<td>MSLG$B_FORMAT</td>
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<td>MSLG$B_FLAGS</td>
<td>40</td>
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<tr>
<td>MSLG$W_EVENT</td>
<td>002B</td>
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<table>
<thead>
<tr>
<th>MSLG$Q_CNT_ID</th>
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<tbody>
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<td>01200000</td>
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| MSLG$B_CNT_SVR | 02 |
| MSLG$B_CNT_HVR | 00 |
| MSLG$W_MULTI_UNIT | 0043 |
| MSLG$Q_UNIT_ID | 000001FF |
|               | 02130000 |

| MSLG$B_UNIT_SVR | 00 |
| MSLG$B_UNIT_HVR | 00 |
| MSLG$L_VOL_SER | 00000419 |
| MSLG$L_HEADER | 00000000 |
| MSLG$Z_SDI_REQUEST | 17 |

| MODE | 00 |
| ERROR | 00 |
| CONTROLLER | 00 |
| RETRY | 00 |

**DISK MSCP MESSAGE**

**UNIT #59.**

**SEQUENCE #107.**

**"SDI" ERROR**

**OPERATION CONTINUING**

**DRIVE ERROR**

**DRIVE COMMAND TIMEOUT**

**UNIQUE IDENTIFIER, 00000000FA05**

**MASS STORAGE CONTROLLER**

**HSC70**

**CONTROLLER SOFTWARE VERSION #2.**

**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 000000001FF**

**DISK CLASS DEVICE**

**RA90**

**UNIT SOFTWARE VERSION #0.**

**UNIT HARDWARE REVISION #0.**

**VOLUME SERIAL #1049.**

**LBN #0.**

**GOOD LOGICAL SECTOR**

**RUN/STOP SWITCH IN**

**PORT SWITCH IN**

**SPINDLE READY**

**PORT B RECEIVERS ENABLED**

**512-BYTE SECTOR FORMAT**

**NORMAL DRIVE OPERATION**

**0. RETRIES**

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**FOR INTERNAL USE ONLY**
<table>
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<tr>
<th>LONGWORD 1.</th>
<th>052C0090</th>
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<td>LONGWORD 3.</td>
<td>00000003</td>
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<td>LONGWORD 4.</td>
<td>00000000</td>
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I/O SUB-SYSTEM, UNIT _GREASY$DUA59:

MESSAGE TYPE 0001

MSLG$V_CM D_REF 00000000
MSLG$W_UNIT 003B

MSLG$W_SEQ_NUM 006C
MSLG$B_FORMAT 03
MSLG$B_FLAGS 40
MSLG$W_EVENT 00EB

MSLG$Q_CNT_ID 0000FA05
01200000

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00

MSLG$W_MULT_UNIT 0043
MSLG$Q_UNIT_ID 000001FF
02130000

MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 00

MSLG$L_VOL_SER 00000419
MSLG$L_HEADER 00000000

MSLG$Z_SDI_REQUEST 1F

MODE 00
ERROR 80
CONTROLLER 00
RETRY 00

DISK MSCP MESSAGE

UNIT #59

SEQUENCE #108

"SDI" ERROR

OPERATION CONTINUING

DRIVE ERROR
DRIVE DETECTED ERROR

UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.

CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 000000001FF
DISK CLASS DEVICE
RA90

UNIT SOFTWARE VERSION #0.

UNIT HARDWARE REVISION #0.

VOLUME SERIAL #1049.

LBN #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
LOG INFORMATION IN EXTENDED AREA
SPINDLE READY
PORT B RECEIVERS ENABLED

512-BYTE SECTOR FORMAT

DRIVE ERROR
NORMAL DRIVE OPERATION

0. RETRIES

FOR INTERNAL USE ONLY
CONTROLLER OR DEVICE DEPENDENT INFORMATION

<table>
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<tr>
<th>LED CODE</th>
<th>PANEL CODE</th>
<th>LAST OPCODE</th>
<th>RESERVED</th>
<th>CUR CYLNDR</th>
<th>CUR GROUP</th>
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<tbody>
<tr>
<td>0E</td>
<td>11</td>
<td>0A</td>
<td>00</td>
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<td>0C</td>
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- **INITIATE SEEK**
- **CURRENT CYLINDER, #161.**
- **CURRENT GROUP, #12.**
ERROR SEQUENCE 603.
ERL$LOGMESSAGE ENTRY 20-APR-1987 11:59:52.44
KA86 REV# 0. SERIAL# 627. MFG PLANT 6.

I/O SUB-SYSTEM, UNIT _GREASY$DUAS59:
MESSAGE TYPE 0001
MSLG$C_CMD_REF 00000000
MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 0082
MSLG$B_FORMAT 03
MSLG$B_FLAGS 40
MSLG$W_EVENT 00EB
MSLG$Q_CNT_ID 0000FA05 01200000
MSLG$B_CNT_SRV 02
MSLG$B_CNT_HVR 00
MSLG$W_MULTI_UNT 0043
MSLG$Q_UNIT_ID 000001FF 02130000
MSLG$B_UNIT_SRV 00
MSLG$B_UNIT_HVR 00
MSLG$L_VOL_SER 00000419
MSLG$L_HEADER 00000000
MSLG$Z_SDI_REQUEST 1F

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #130.
"SDI" ERROR
OPERATION CONTINUING
DRIVE ERROR
DRIVE DETECTED ERROR

UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 0000000001FF
DISK CLASS DEVICE
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #0.
VOLUME SERIAL #1049.
LBN #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
LOG INFORMATION IN EXTENDED AREA
SPINDLE READY
PORT B RECEIVERS ENABLED

512-BYTE SECTOR FORMAT
NORMAL DRIVE OPERATION
0. RETRIES

FOR INTERNAL USE ONLY
CONTROLLER OR DEVICE DEPENDENT INFORMATION

| LED CODE  | 07 |
| PANEL CODE | 00 |
| LAST OPCODE | 88 |
| RESERVED | 00 |
| CUR CYLNDR | 0000 |
| CUR GROUP | 11 |

GET SUB-UNIT CHARACTERISTICS

CURRENT CYLINDER, #0.

CURRENT GROUP, #1.

FOR INTERNAL USE ONLY
I/O SUB-SYSTEM, UNIT_GREASYSDUA59:

MESSAGE TYPE 0001
MSLG$L_CMD_REF 00000000
MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 0086
MSLG$B_FORMAT 03
MSLG$B_FLAGS 40
MSLG$W_EVENT 00EB

MSLG$Q_CNT_ID 0000FA05
01200000

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULTIUNT 0043
MSLG$Q_UNIT_ID 000001FF
02130000

MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 00
MSLG$L_VOL_SER 00000419
MSLG$L_HEADER 00000000

MSLG$Z_SDI REQUEST 1F

MODE 00
ERROR 00
CONTROLLER 00
RETRY 00

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #134.
"SDI" ERROR
OPERATION CONTINUING
DRIVE ERROR
DRIVE DETECTED ERROR

UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
HSC70
CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 0000000001FF
DISK CLASS DEVICE
RA90
UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #0.
VOLUME SERIAL #1049.
LBN #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
LOG INFORMATION IN EXTENDED AREA
SPINDLE READY
PORT B RECEIVERS ENABLED

512-BYTE SECTOR FORMAT
NORMAL DRIVE OPERATION
0. RETRIES

FOR INTERNAL USE ONLY
### CONTROLLER OR DEVICE DEPENDENT INFORMATION

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- GET SUB-UNIT CHARACTERISTICS
- CURRENT CYLINDER, #2651.
- CURRENT GROUP, #0.
**ERROR SEQUENCE 639.**
**ERL$LOGMESSAGE ENTRY**
20-APR-1987 16:25:37.47
**KABA** REV# 0. SERIAL# 627. MFG PLANT 6.

**I/O SUB-SYSTEM, UNIT GREASY$DU59:**

**MESSAGE TYPE** 0001
**MSLG$1_CMD_REF** 00000000
**MSLG$W_UNIT** 003B
**MSLG$W_SEQ_NUM** 0087
**MSLG$B_FORMAT** 03
**MSLG$B_FLAGS** 40
**MSLG$W_EVENT** 00EB
**MSLG$Q_CNT_ID** 0000FA05 01200000
**MSLG$B_CNT_SVR** 02
**MSLG$B_CNT_HVR** 00
**MSLG$W_MULTI_UNT** 0043
**MSLG$Q_UNIT_ID** 000001FF 02130000
**MSLG$B_UNIT_SVR** 00
**MSLG$B_UNIT_HVR** 00
**MSLG$L_VOL_SER** 00000419
**MSLG$L_HEADER** 00000000
**MSLG$2 SDI REQUEST** 1F

**MODE** 00
**ERROR CONTROLLER** 00
**RETRY** 00

**DISK MSCP MESSAGE**
**UNIT #59.**
**SEQUENCE #135.**
"SDI" ERROR
OPERATION CONTINUING
DRIVE ERROR
DRIVE DETECTED ERROR

UNIQUE IDENTIFIER, 0000000001FF
MASS STORAGE CONTROLLER
HSC70
CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 0000000001FF
DISK CLASS DEVICE
RA90
UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #0.
VOLUME SERIAL #1049.
LEN #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
LOG INFORMATION IN EXTENDED AREA
SPINDLE READY
PORT B RECEIVERS ENABLED
512-BYTE SECTOR FORMAT
NORMAL DRIVE OPERATION
0. RETRIES

FOR INTERNAL USE ONLY
CONTROLLER OR DEVICE DEPENDENT INFORMATION

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED CODE</td>
<td>09</td>
</tr>
<tr>
<td>PANEL CODE</td>
<td>0E</td>
</tr>
<tr>
<td>LAST OPCODE</td>
<td>88</td>
</tr>
<tr>
<td>RESERVED</td>
<td>00</td>
</tr>
<tr>
<td>CUR CYLINDR</td>
<td>0A5B</td>
</tr>
<tr>
<td>CUR GROUP</td>
<td>00</td>
</tr>
</tbody>
</table>

GET SUB-UNIT CHARACTERISTICS

CURRENT CYLINDER, #2651.

CURRENT GROUP, #0.
I/O SUB-SYSTEM, UNIT _GREASY$DUAS59:

MESSAGE TYPE 0001
MSLG$CMD_REF 00000000
MSLG$UNIT 003B
MSLG$SEQ_NUM 0088
MSLG$FORMAT 03
MSLG FLAGS 40
MSLG$EVENT 00EB

MSLG$Q_CNT_ID 0000FA05
01200000

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$MULT_UNT 0043
MSLG$Q_UNT_ID 000001FF
02130000

MSLG$UNIT_SVR 00
MSLG$UNIT_HVR 00
MSLG$VOL_SER 00000419
MSLG$HEADER 00000000

MSLG$Z_SDI REQUEST 1F

MODE 00
ERROR 00
CONTROLLER 00
RETRY 00

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #136.
"SDI" ERROR
OPERATION CONTINUING
DRIVE ERROR
DRIVE DETECTED ERROR

UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 000000001FF
DISK CLASS DEVICE
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #0.
VOLUME SERIAL #1049.
LBN #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
LOG INFORMATION IN EXTENDED AREA
SPINDLE READY
PORT B RECEIVERS ENABLED

512-BYTE SECTOR FORMAT
NORMAL DRIVE OPERATION
0. RETRIES

FOR INTERNAL USE ONLY
| LED CODE | 09 |
| PANEL CODE | 0E |
| LAST OPCODE | 88 |

| RESERVED | 00 |
| CUR CYLNDR | 0A5B |
| CUR GROUP | 00 |

GET SUB-UNIT CHARACTERISTICS
CURRENT CYLINDER, #2651.
CURRENT GROUP, #0.
5.3 Troubleshooting the SDI Protocol Error

This problem presents a case where the 'wire communications' are free of pulse/state parity errors, and no ECC errors are being detected. The drive however is receiving his command messages and did not 'understand' them or finds the message frames to be out of sequence. The drive microcode verifies that the 'parameters' passed to him by any controller is indeed correct for the drive. Some of the errors presented in the ITS error log reflect this as well.

An analogy to this problem is talking on the telephone to a person who in place of using only the language you understand, would occasionally speak a word or words in a language foreign to you. There is no noise or distortion on the phone line.

Should a drive be 'interpreting' the communications wrong (without wire errors), it is likely it would do so from any controller/port connection.

Should a controller port be sending 'bad command packets, it would likely do so to other like drives from the same port.

For HSC controllers, the problem would likely be isolated to the SDI port module, though in some circumstances it might be other areas of the controller. However typically in the HSC environment, only one of the SDI port modules will be involved.

For UDA/KDA/KDB the problem could conceivably be either controller board. For UDA/KDA/KDB the problem would probably be occurring on other drives attached to any of the other ports on the controller in question. Corrective action steps would have included:

1. Determine drive.
2. Examination of host error log reveals few/no ECC errors and NO indication of "wire" related errors.
3. Drive is reporting the errors, not the controller.
4. Drive reported errors all related to drive detecting bad parameters being passed to it, or improperly sequenced messages from the controller.
5. Replacement of controller "SDI" interface board is called for. If there are 2 HSC's in the configuration, and complete dual-porting of all DSA disk drives, then removal of a single HSC will have 'minimal' impact to the customer. If NOT, then removal of the HSC for replacement of the K.SDI will have significant ramifications to the customer.
6. Verification of FRU replacement will be in accordance with appropriate service procedures outlined for the respective controller.
7. Return the subsystem to the customer.

VAXsimPLUS Analysis

The attached VAXsimPLUS report is of the type of analysis that would be made for this type of error.

NOTE

This report contains messages about system errors which should be investigated either because of the nature of the error or because of the error-rate. Whether or not a repair should be made depends on the results of that investigation.
PACKET 1.

Attn: Field Service
Device: GREASY_$DUA59 (RA90 S/N:1FF)
Error: Drive detected error with valid extended error logging.
Theory: [X.XX.XX.XX.XX]
Suspect: Controller (HSC, UDA, etc.)
Electronic Control Module SDI

Since there were several error code errors, and no one represents a majority, this list is the shortest FRU suspect list from all possible errors.

Evidence:

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Translation of Error Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. 07</td>
<td>SDI Frame Sequence Failure</td>
</tr>
<tr>
<td>20. 09</td>
<td>SDI Framing Error</td>
</tr>
<tr>
<td>10. 0C</td>
<td>SDI Command Length Error Level 1</td>
</tr>
<tr>
<td>20. 0E</td>
<td>SDI Invalid Group Select Level 1</td>
</tr>
<tr>
<td>10. 44</td>
<td>Format Command and Not Enabled</td>
</tr>
</tbody>
</table>

The drive detected errors may have been responsible for the following 30 SI events:

Evidence: 30 SDI Communication Transfer Errors

<table>
<thead>
<tr>
<th>Event Count</th>
<th>Status</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>30. (2B)</td>
<td></td>
<td>SDI Drive Command Timeout Errors</td>
</tr>
</tbody>
</table>


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6
Bug 6

6.1 Problem Statement

A Field Service Engineer has completed what appears to be a successful RA90 installation. The engineer ran the RA90 drive internal tests from the OCP and connected the drive to the controller. The RA90's were installed to replace RA81's. Just before leaving site, the customer reports that one newly installed RA90, unit 59, started logging errors almost immediately. The customer said this problem did not occur with RA81's. This customer operates a cluster with a disk farm that is being upgraded from RA81's to RA90's to provide more storage. All the RA disks are dual ported between two HSC50's.
### 6.2 Customer Errorlog Rollup

The errorlog has been rolled up in the following fashion in order to reduce your 'evaluation' time for this problem.

<table>
<thead>
<tr>
<th>Drive</th>
<th>MSCP</th>
<th>Block #</th>
<th>&lt;Logical&gt;</th>
<th>Phy</th>
<th>Cyl</th>
<th>Gp</th>
<th>S</th>
<th>S</th>
<th>yy-mm-dd</th>
<th>hh:mm:ss:cc</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUA59</td>
<td>90</td>
<td>002A</td>
<td>1188082</td>
<td>1324</td>
<td>6</td>
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<td>60</td>
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<td>23:27:51.14</td>
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</tr>
</tbody>
</table>

FOR INTERNAL USE ONLY
6.3 Controller Detected SERDES Overrun

The RA90 disk drive is the ‘fastest’ SDI disk product developed to date (Q4-FY88) and as such will in ISOLATED cases find SDI controller ports that show ‘speed sensitivity’. Even drive ports that have successfully ran RA81/RA82 disk products, may fail to run with the RA90 disk product because of its speed. There IS NOT A UNIVERSAL problem with any of the DEC SDI controller port boards. The design of all controller port boards was made to support speeds higher than the RA90 currently runs at.

The appropriate checkout of an RA90 for installation when in a cluster environment would include for an FSE to connect the new drive to the HSC controller, and accessing the drive for a short run of ILDISK doing reads and writes, or at least while there, observe the customer in his first attempt to utilize/access the drive.

The ‘SERDES overrun’ problem may manifest itself from only the ‘transient’ occurrence of the error to a solid SERDES problem where it is not possible to communicate with the drive. The ‘SERDES overrun’ error signifies either:

1. The controller processor(s) is unable to remove data from the port interface module as quickly as necessary (problem elsewhere in controller), OR.
2. The drive device is sending data 'too fast' for the port interface module. OR.
3. The SERDES chip is 'broke' on the controller port module. Usually if the chip is broke you will get ECC and EDC errors as well.

CORRECTIVE ACTION STEPS FOR THIS PROBLEM SHOULD HAVE INCLUDED:

1. Determine drive.
2. Examination of host error log and HSC control trail reveals occurrence of SERDES overrun errors, associated with single “requester” of the HSC.
3. Controller is reporting the errors predominately, and drive is not.
4. Replacement of controller “SDI” interface board is called for. If there are 2 HSC's in the configuration, and complete dual-porting of all DSA disk drives, then removal of a single HSC will have 'minimal' impact to the customer. If NOT, then removal of the HSC for replacement of the K.SDI will have significant ramifications to the customer.
5. Verification of FRU replacement will be in accordance with appropriate service procedures outlined for the respective controller.
6. Return the subsystem to the customer.

VAXsimPLUS Analysis

The following is an analysis that VAXsimPLUS could make of a similar "SERDES OVERRUN" ERROR problem. You will note that in this case, he does no indict a FRU, but calls attention to the necessity of manual analysis.

Reported to: DISK$USER_DISK:[SYSMAINT.ERRLOG]VAXSIM.RPT
Evidence in: DISK$USER_DISK:[SYSMAINT.ERRLOG]TEMP.PACK

NOTE

This report contains messages about system errors which should be investigated either because of the nature of the error or because of the error-rate. Whether or not a repair should be made depends on the results of that investigation.

- All OK -
Based on built-in thresholds to filter out transient errors, SPEAR found no serious problems during the selected time period.
7.1 Problem Statement

The customer has been successfully utilizing his disk drive without complaint or significant problem. During routine maintenance, the Field Service Engineer finds a problem with RA90 unit number 10.
### 7.2 Customer Error Log

**VAUX/VMS**

**SYSTEM ERROR REPORT**

**COMPILED 17-MAR-1988 08:52**

**PAGE 1.**

*************** ENTRY 1. ***************

**ERROR SEQUENCE 2737.**

**ERL$LOGMESSAGE** ENTRY 14-MAR-1988 13:48:38.02

**KABB REV# 127. RIGHT CPU**

**I/O SUB-SYSTEM, UNIT _GREASY$DU3A:**

**MESSAGE TYPE** 0001

<table>
<thead>
<tr>
<th>Message Field</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>00000000</td>
<td>DISK MSCP MESSAGE</td>
</tr>
<tr>
<td>MSG$TUNIT</td>
<td>0003</td>
<td>UNIT #3.</td>
</tr>
<tr>
<td>MSG$TSEQ_NUM</td>
<td>0001</td>
<td>SEQUENCE #1.</td>
</tr>
<tr>
<td>MSG$T_FORMAT</td>
<td>03</td>
<td>SDI ERROR</td>
</tr>
<tr>
<td>MSG$T_FLAGS</td>
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<td>SEQUENCE NUMBER RESET  OPERATION CONTINUING</td>
</tr>
<tr>
<td>MSG$T_EVENT</td>
<td>00EB</td>
<td>DRIVE ERROR</td>
</tr>
<tr>
<td>MSG$Q_CNT_ID</td>
<td>0000FA05</td>
<td>DRIVE DETECTED ERROR</td>
</tr>
<tr>
<td></td>
<td>01200000</td>
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<td>MSG$B_CNT_SVR</td>
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<td>MASS STORAGE CONTROLLER HSC70</td>
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<td>0072</td>
<td>CONTROLLER HARDWARE REVISION #0.</td>
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<td>DISK CLASS DEVICE (166) RA90</td>
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<tr>
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<td>VOLUME SERIAL #557.</td>
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<tr>
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<td>LOGICAL BLOCK #0.</td>
</tr>
<tr>
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<td>1F</td>
<td>GOOD LOGICAL SECTOR</td>
</tr>
<tr>
<td>MSG$UNIT_SVR</td>
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<td>RUN/STOP SWITCH IN</td>
</tr>
<tr>
<td>MSG$UNIT_HVR</td>
<td>00</td>
<td>PORT SWITCH IN</td>
</tr>
<tr>
<td>MSG$VOLSER</td>
<td>00000022D</td>
<td>LOG INFORMATION IN EXTENDED AREA SPINDLE READY</td>
</tr>
<tr>
<td>MSG$HDR_CODE</td>
<td>00000000</td>
<td>PORT B RECEIVERS ENABLED</td>
</tr>
<tr>
<td>MSG$UNIT_SVR</td>
<td>00</td>
<td>512-BYTE SECTOR FORMAT</td>
</tr>
<tr>
<td>MSG$UNIT_HVR</td>
<td>00</td>
<td>SDI RECEIVE ERROR</td>
</tr>
<tr>
<td>MSG$VOLSER</td>
<td>00000022D</td>
<td>NORMAL DRIVE OPERATION</td>
</tr>
<tr>
<td>MSG$HDR_CODE</td>
<td>00000000</td>
<td>0. RETRIES</td>
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</table>

**FOR INTERNAL USE ONLY**
<table>
<thead>
<tr>
<th>CONTROLLED OR DEVICE DEPENDENT INFORMATION</th>
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</thead>
<tbody>
<tr>
<td>LED CODE</td>
</tr>
<tr>
<td>PANEL CODE</td>
</tr>
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<td>LAST OPCODE</td>
</tr>
<tr>
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<tr>
<td>CUR GROUP</td>
</tr>
<tr>
<td>REQUESTOR</td>
</tr>
<tr>
<td>DRIVE PORT</td>
</tr>
</tbody>
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**GET SUB-UNIT CHARACTERISTICS**

CURRENT CYLINDER, #0.
CURRENT GROUP, #0.
REQUESTOR #7.
DRIVE PORT #2.

FOR INTERNAL USE ONLY
****** ENTRY ERROR SEQUENCE 32.******
ERL$LOGMESSAGE ENTRY 16-MAR-1988 15:31:20.07
KABB REV# 127. RIGHT CPU

I/O SUB-SYSTEM, UNIT _WHEEZYSDUA130:
MESSAGE TYPE 0001
MSLG$L_CMD_REF 00000000
MSLG$W_UNIT 0082
MSLG$W_SEQ_NUM 0009
MSLG$B_FORMAT 03
MSLG$B_FLAGS 40
MSLG$W_EVENT 002B
MSLG$Q_CNT_ID 7087FC03
01010000

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULT_UNT 0040
MSLG$Q_UNIT_ID 00042D9E
02950000

MSLG$B_UNIT_SVR 07
MSLG$B_UNIT_HVR 06
MSLG$L_VOL_SER 00000000
MSLG$L_HDR_CODE 00000000
MSLG$S_SDI_REQUEST 13

MODE 00
ERROR 00
CONTROLLER 00
RETRY 00

DEVICE DEPENDENT INFORMATION
LONGWORD 1. 04E30088 /..... /
LONGWORD 2. 04000003 /..... /
LONGWORD 3. 00000000 /..... /
LONGWORD 4. 00000000 /..... /

FOR INTERNAL USE ONLY
ERR SEQUENCE 3388.
ERL$LOGMESSAGE ENTRY 16-MAR-1988 08:39:44.23
KA88 REV# 127. RIGHT CPU

I/O SUB-SYSTEM, UNIT _GREASY$DUAL:

MESSAGE TYPE 0001
MSLG$L_CMD_REF C9290000
MSLG$W_UNIT 0001
MSLG$W_SEQ_NUM 0080
MSLG$B_FORMAT 02
MSLG$B_FLAGS 81
MSLG$W_EVENT 006B

MSLG$Q_CNT_ID 0000FA05
01200000

MSLG$B_CNT_SVR 00
MSLG$B_CNT_HVR 00
MSLG$W_MULT_UNIT 0032
MSLG$Q_UNIT_ID 00001000
02050000

MSLG$B_UNIT_SVR 06
MSLG$B_UNIT_HVR 00
MSLG$B_LEVEL 00
MSLG$B_RETRY 00
MSLG$L_VOL_SER 4BCE4E13
MSLG$L_HDR_CODE 0000B0A

CONTROLLER DEPENDENT INFORMATION
ORIG ERR 1800

ERR RECOV FLGS 0002
LV1 A RETRY 06
LV1 B RETRY 00
BUF DAT MEM ADR CEE3
SRC REQ # 03
DET REQ # 03

DISK MSCP MESSAGE
UNIT #1.
SEQUENCE #128.
DISK TRANSFER ERROR
SEQUENCE NUMBER RESET
OPERATION SUCCESSFUL
DRIVE ERROR
POSITIONER ERROR (MIS-SEEK)

UNIQUE IDENTIFIER, 00000000FA05(X)
MASS STORAGE CONTROLLER
HSC70
CONTROLLER SOFTWARE VERSION #0.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000001000(X)
DISK CLASS DEVICE (166)
RA81
UNIT SOFTWARE VERSION #6.
UNIT HARDWARE REVISION #0.

VOLUME SERIAL #1271811603.
LOGICAL BLOCK #36618.
GOOD LOGICAL SECTOR

HEADER COMPARE ERROR
HEADER SYNC TIMEOUT
SUSPECTED LOW HEADER MISMATCH

ERR LOGGED TO CONSOLE AND HOST

FOR INTERNAL USE ONLY
<table>
<thead>
<tr>
<th>DEVICE</th>
<th>ERROR BITS SET</th>
<th>QIO TIMEOUT</th>
<th>ERRORS THIS SESSION</th>
<th>QIOS THIS SESSION</th>
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SUMMARY OF ALL ENTRIES LOGGED BY SID 067F0070

ERL$LOGMESSAGE

3.

DATE OF EARLIEST ENTRY 14-MAR-1988 13:48:38.02
DATE OF LATEST ENTRY 16-MAR-1988 15:31:20.07

PROCESSED ENTRIES

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</table>
7.3 Formatting the RA90 "READ-ONLY" Cylinder

Lack of error log entry information available for the drive fairly well eliminates the drive as having a problem that the customer can see. The only ***** you had was a failure to properly execute drive internal diagnostic test 14. This test will fail whether invoked separately or as a part of diagnostic chain test 00. How the read only track became corrupted can be of concern and should be duly noted in the site management guide. However, if the drive is NOT BROKE, DON'T FIX IT by making parts replacements. Running drive test 17 (READ ONLY TRACK FORMATTER) and implementing the "software jumper"

Corrective action steps would have included:

1. Examination of host error log reveals no errors against unit that are significant.
2. Controller is not reporting errors during drives operational use.
3. Drive internal error log shows the detected internal diagnostic failure pointing to inability to successfully read the "read only cylinder".
4. Access of drive from HSC with utilities such as ILEXER does not reveal a read problem.
5. Corruption of "READ ONLY" cylinder is a possibility.
6. Because the customer has NOT experienced any read/write problems, it is likely that the drive is working correctly, and it is a problem that is isolated only to the read only cylinder.
7. Verification of Fix is made by executing successfully the drive internal diagnostics.
8. Return the disk to the customer.

CRITERIA FOR SUCCESSFUL PASSING OF DRIVE INTERNAL READ/WRITE TESTS

For the RA90 drive every protection is afforded in how the drive is tested by drive internal diagnostics. Before the drive will allow the execution of any "write" test, the drive must successfully pass the READ-ONLY test (T14). The drive "chain sequence" tests do 'affirm' that the read only test is executed before a write/read test is executed. During the execution of the READ-ONLY test, a flag is written in 'volatile' RAM memory that indicates since the last power-up, the drive has SUCCESSFULLY executed the "read-only test". When the "WRITE/READ TEST" (T15) is executed, the 'flag' in RAM is tested to verify that the test 14 has been successfully executed. If the flag is not set, a drive fault occurs with an error code of "67" logged.

There are some potential drive problems that if a write test is executed could result in the corruption of either the customer data or a logical structure within the drive. To prevent this from happening this checking for successful execution of reads is made before writes are attempted by the drive internal diagnostics.

READ-ONLY TEST - T14

This test does a read of a pre-recorded pattern on a dedicated read-only cylinder (2659). This pattern is different for each head. The data read by each head is compared with its pattern.

If, the comparison fails, an error is generated. This drive fault error code is "62".

If, 5 off-track read errors are detected while reading with any 1 head, an error will be generated.
After testing all the heads, the test will analyze the error data as follows.

A sector is considered BAD if, the same sector fails to read the correct data 3 out of 5 times.

A head is considered BAD if the same head contains 9 BAD sectors.

If NO ERRORS are detected in this test, a compare error is induced to test the ability of the IID chip to detect a compare error.

WRITE/READ TEST - T15

This test does a write and read on a different dedicated write/read cylinder (2660). It will do a write and a read of all heads. There are 2 patterns that are used during this test.

First, all the heads are written with an all 0's + SYNCH BIT pattern and read to verify that the data compares. If there are no errors, a 'no sync' detect test is run to verify that the IID sync detect circuitry is working correctly and that it can detect a 'no sync' error.

Secondly, this test does a write and read of all the heads with an 1's + SYNCH BIT pattern and verifies that the data compares.

WRITING THE READ-ONLY CYLINDER

The "Read-Only Track Formatter Utility - T17" must be executed to write the read-only cylinder (2659) with a pattern during manufacturing. To avoid any unintentional writing of this cylinder, a jumper must be used to execute this test.

NOTE

Because of the physical configuration of this disk drive, it is very inconvenient to use a HARDWARE jumper for this test. Therefore, a SOFTWARE jumper is implemented. This jumper is the 'hitting' of the "RUN switch" within 1 second of the start of execution of test 17!

This test writes an all 0's + SYNCH BIT pattern on each head and then reading back the pattern to verify the data. Then, a different pattern is written on each head and read back to make a comparison for correct data. An error is generated if the comparison fails.
8.1 Problem Statement

The customer reports problems accessing various files during normal operation and Backup on RA90 unit 59. An increasing number of logged errors has the customer very concerned. Although Backup still works, the customer is concerned about loosing information because the problem is getting worse. RA90 unit number 59 operates in a cluster and it is dual ported between two HSC70’s.
8.2 Customer Error Log

SYSTEM ERROR REPORT  COMPILED 24-MAR-
1988 20:39

PAGE 1

ERROR SEQUENCE 971.
ERL$LOGMESSAGE ENTRY  23-MAR-1988 12:05:46.43
KA86 REV 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _VADER$DUA59:

MESSAGE TYPE 0001
MSLG$L_CMDREF 316E0015
MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 0077
MSLG$B_FORMAT 03
MSLG$B_FLAGS 40
MSLG$W_EVENT 008B
MSLG$Q_CNT_ID 0000FA05 01200000
MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULT_UNIT 0072
MSLG$Q_UNIT_ID 0000FFFF 02130000
MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 0F
MSGL$L_VOL_SER 000001DB
MSGL$L_HDR_CODE 00000000
MSLG$Z_SDI REQUEST 17

MODE 00
ERROR 00
CONTROLLER 00
RETRY 00

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #119.
SDI ERROR
OPERATION CONTINUING
DRIVE ERROR
LOST R/W READY, (TRANSFER)

UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER HSC70
CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000000FFFF(X) DISK CLASS DEVICE (166) RA90
UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
VOLUME SERIAL #472.
LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED

512-BYTE SECTOR FORMAT
NORMAL DRIVE OPERATION
0. RETRIES

FOR INTERNAL USE ONLY
<table>
<thead>
<tr>
<th>DEVICE DEPENDENT INFORMATION</th>
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<td>LONGWORD 4.</td>
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FOR INTERNAL USE ONLY
ERROR SEQUENCE 972.
ENTRY 23-MAR-1988 12:05:46.43
ERL$LOGMESSAGE ENTRY KA86 REV# 4. SERIAL# 152. MFG PLANT 15.
I/O SUB-SYSTEM, UNIT _VADER$DUAX59:

MESSAGE TYPE 0001
MSLG$B_CMD_REF 316E0015
MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 0078
MSLG$B_FORMAT 03
MSLG$B_FLAGS 40
MSLG$W_EVENT 00EB
MSLG$W_CNT_ID 0000FA05 01200000
MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULT_UNIT 0072
MSLG$Q_UNIT_ID 0000FFFF 02130000
MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 0F
MSLG$L_VOL_SER 000001D8
MSLG$L_HDR_CODE 00000000
MSLG$Z_SDI REQUEST 1F

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #120.
SDI ERROR
OPERATION CONTINUING
DRIVE ERROR
DRIVE DETECTED ERROR
UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
HSC70
CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.
UNIQUE IDENTIFIER, 0000000FFFFFF(X)
DISK CLASS DEVICE (166)
RA90
UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
VOLUME SERIAL #472.
LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR
RUN/STOP SWITCH IN
PORT SWITCH IN
LOG INFORMATION IN EXTENDED AREA
SPINDLE READY
PORT B RECEIVERS ENABLED
512-BYTE SECTOR FORMAT
DRIVE ERROR
NORMAL DRIVE OPERATION
0. RETRIES

FOR INTERNAL USE ONLY
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**INITIATE SEEK**

CURRENT CYLINDER, #269.

CURRENT GROUP, #4
**ENTRY**

**ERROR SEQUENCE 973.**
**ERL$LOGMESSAGE ENTRY** 23-MAR-1988 12:05:53.15
**KA86 REV# 4. SERIAL# 152. MFG PLANT 15.**

**I/O SUB-SYSTEM, UNIT _VADERSDUA59:**

**MESSAGE TYPE** 0001
**MSLG$S_$CMD_REF** 316E0040
**MSLG$W_UNIT** 003B
**MSLG$W_SEQ_NUM** 0079
**MSLG$B_FORMAT** 03
**MSLG$B_FLAGS** 40
**MSLG$W_EVENT** 00EB

**MSLG$Q_CNT_ID** 0000FA05
**01200000**

**MSLG$B_CNT_SVR** 02
**MSLG$B_CNT_HVR** 00

**MSLG$W_MULTI_UNIT** 0072
**MSLG$Q_UNIT_ID** 0000FFFF
**02130000**

**MSLG$B_UNIT_SVR** 00
**MSLG$B_UNIT_HVR** 0F
**MSLG$D_VOL_SER** 000001DB
**MSLG$D_HDR_CODE** 00000000

**MSLG$Z_SDIX REQUEST** 17

**MODE** 00
**ERROR** 00
**CONTROLLER** 00
**RETRY** 00

**DISK MSCF MESSAGE**
**UNIT #59.**
**SEQUENCE #121.**
**SDI ERROR**
**OPERATION CONTINUING**
**DRIVE ERROR**
**DRIVE DETECTED ERROR**

**UNIQUE IDENTIFIER, 000000000FA05**
**MASS STORAGE CONTROLLER**
**HSC70**

**CONTROLLER SOFTWARE VERSION #2.**
**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 000000000AFFF(X)**
**DISK CLASS DEVICE (166)**
**RA90**

**UNIT SOFTWARE VERSION #0.**
**UNIT HARDWARE REVISION #15.**
**VOLUME SERIAL #472.**
**LOGICAL BLOCK #0.**
**GOOD LOGICAL SECTOR**

**RUN/STOP SWITCH IN**
**PORT SWITCH IN**
**SPINDLE READY**
**PORT B RECEIVERS ENABLED**

**512-BYTE SECTOR FORMAT**

**NORMAL DRIVE OPERATION**
**0. RETRIES**
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I/O SUB-SYSTEM, UNIT _VADER$DOA59:

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MSLGS$W_UNIT 003B
MSLGS$W_SEQ_NUM 0002
MSLGS$B_FORMAT 03
MSLGS$B_FLAGS 40
MSLGS$W_EVENT 008B
MSLGS$Q_CNT_ID 0000FA05 01200000

MSLGS$B_CNT_SVR 02
MSLGS$B_CNT_HVR 00
MSLGS$W_MULT_UNT 0072
MSLGS$Q_UNIT_ID 000FFFFF 02130000

MSLGS$B_UNIT_SVR 00
MSLGS$B_UNIT_HVR 0F
MSLGS$L_VOL_SER 0000010B
MSLGS$L_HDR_CODE 00000000
MSLGS$2_SDI
REQUEST 17

MODE 00
ERROR 00
CONTROLLER 00
RETRY 00

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #2.
SDI ERROR
OPERATION CONTINUING
DRIVE ERROR
LOST R/W READY, (TRANSFER)

UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 0000000FFFFFF(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
VOLUME SERIAL #472.
LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED

512-BYTE SECTOR FORMAT
NORMAL DRIVE OPERATION
0. RETRIES
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I/O SUB-SYSTEM, UNIT VADERS$DUAS9:

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MSLG$ Cmd_Ref  83c20040
MSLG$W UNIT   003B
MSLG$W_SEQ_NUM 0003
MSLG$B_FORMAT  03
MSLG$B_FLAGS   40
MSLG$W_EVENT   00EB
MSLG$Q_CNT_ID  0000FA05 01200000
MSLG$B_CNT_SRV 02
MSLG$B_CNT_HVR 00
MSLG$W_MULTI_UNT 0072
MSLG$Q_UNIT_ID 00000000 02130000
MSLG$B_UNIT_SRV 00
MSLG$B_UNIT_HVR 0F
MSLG$L_VOL_SER 000001DB
MSLG$L_HDR_CODE 00000000
MSLG$Z_SDI_REQUEST 1F

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #3:
SDI ERROR
OPERATION CONTINUING
DRIVE ERROR
DRIVE DETECTED ERROR

UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RAs90
UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
VOLUME SERIAL #472.
LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
LOG INFORMATION IN EXTENDED AREA
SPINDLE READY
PORT B RECEIVERS ENABLED

512-BYTE SECTOR FORMAT
DRIVE ERROR
NORMAL DRIVE OPERATION
0. RETRIES

FOR INTERNAL USE ONLY
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**INITIATE SEEK**

CURRENT CYLINDER, #267.

CURRENT GROUP, #4.
**ERROR SEQUENCE 1507.**  
ERL$LOGMESSAGE ENTRY 23-MAR-1988 12:07:32.74  
RA86 REV# 4. SERIAL# 152. MFG PLANT 15.  

I/O SUB-SYSTEM, UNIT _VADERS$DUA59:

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**DISK MSCP MESSAGE**  
UNIT #59.  
SEQUENCE #4.  
SDI ERROR  
OPERATION CONTINUING  
DRIVE ERROR  
DRIVE DETECTED ERROR  

**UNIQUE IDENTIFIER, 00000000FA05**  
MASS STORAGE CONTROLLER  
HSC70  
CONTROLLER SOFTWARE VERSION #2.  
CONTROLLER HARDWARE REVISION #0.  

**UNIQUE IDENTIFIER, 00000000FFFFFF(X)**  
DISK CLASS DEVICE (166)  
RA90  
UNIT SOFTWARE VERSION #0.  
UNIT HARDWARE REVISION #15.  
VOLUME SERIAL #472.  
LOGICAL BLOCK #0.  
GOOD LOGICAL SECTOR  
RUN/STOP SWITCH IN  
PORT SWITCH IN  
SPINDLE READY  
PORT B RECEIVERS ENABLED  
512-BYTE SECTOR FORMAT  
NORMAL DRIVE OPERATION  
0. RETRIES
<table>
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<td>LONGWORD 4.</td>
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I/O SUB-SYSTEM, UNIT _VADER$DUA59:

MESSAGE TYPE 0001

MSLGS$CMD_REF 3C230031
MSLGS$UNIT 003B
MSLGS$SEQ_NUM 0077
MSLGS$FORMAT 03
MSLGS$FLAGS 40
MSLGS$EVENT 0088

MSLGS$CNT_ID 0000FA05 01200000

MSLGS$CNT_SRV 02
MSLGS$CNT_HVR 00
MSLGS$MULT_UNIT 0072
MSLGS$UNIT_ID 00FFFF 02130000

MSLGS$UNIT_SRV 00
MSLGS$UNIT_HVR 0F
MSLGS$L_VOL_SER 0000018B
MSLGS$L_HDR_CODE 00000000

MSLGS$Z_SDI REQUEST 17

MODE 00
ERROR 00
CONTROLLER 00
RETRY 00

DISK MSCP MESSAGE

UNIT #59.
SEQUENCE #119.
SDI ERROR
OPERATION CONTINUING

DRIVE ERROR
LOST R/W READY, (TRANSFER)

UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.

VOLUME SERIAL #472.
LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED

512-BYTE SECTOR FORMAT

NORMAL DRIVE OPERATION
0. RETRIES
<table>
<thead>
<tr>
<th>DEVICE DEPENDENT INFORMATION</th>
<th>LONGWORD 1.</th>
<th>052C0284</th>
<th>/...,/</th>
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<tbody>
<tr>
<td>LONGWORD 2.</td>
<td>07H000009</td>
<td>/....,/</td>
<td></td>
</tr>
<tr>
<td>LONGWORD 3.</td>
<td>00H000002</td>
<td>/....,/</td>
<td></td>
</tr>
<tr>
<td>LONGWORD 4.</td>
<td>00H000000</td>
<td>/....,/</td>
<td></td>
</tr>
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</table>
**CONTROLLER OR DEVICE DEPENDENT INFORMATION**

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED CODE</td>
<td>39</td>
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<tr>
<td>PANEL CODE</td>
<td>1D</td>
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<tr>
<td>LAST OPCODE</td>
<td>0A</td>
</tr>
<tr>
<td>RESERVED</td>
<td>02</td>
</tr>
<tr>
<td>CUR CYLNDR</td>
<td>010D</td>
</tr>
<tr>
<td>CUR GROUP</td>
<td>04</td>
</tr>
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</table>

INITIATE SEEK

CURRENT CYLINDER, #269.

CURRENT GROUP, #4.
**ERROR SEQUENCE 1520.**
**ERL$LOGMESSAGE ENTRY** 23-MAR-1988 12:08:37.62
**KA86 REV# 4. SERIAL# 152. MFG PLANT 15.**

**I/O SUB-SYSTEM, UNIT _VADERS$DU59:**

**MESSAGE TYPE** 0001
**MSLGS$ CMD REF** 48C10027
**MSLGS$ UNIT** 003B
**MSLGS$ SEQ_NUM** 0079
**MSLGS$ FORMAT** 03
**MSLGS$ FLAGS** 40
**MSLGS$ EVENT** 00EB

**DISK MSCP MESSAGE**
**UNIT #59.**
**SEQUENCE #121.**
**SDI ERROR**
**OPERATION CONTINUING**
**DRIVE ERROR**
**DRIVE DETECTED ERROR**

**MSLGS$ CNT_ID** 0000FA05 01200000

**CONTROLLER SOFTWARE VERSION #2.**
**CONTROLLER HARDWARE REVISION #0.**

**MSLGS$ CNT_SRV** 02
**MSLGS$ CNT_HVR** 00
**MSLGS$ MULT_UNIT** 0072
**MSLGS$ UNIT_ID** 0000FFFF 02130000

**DISK CLASS DEVICE (166) RA90**
**UNIT SOFTWARE VERSION #0.**
**UNIT HARDWARE REVISION #15.**
**VOLUME SERIAL #472.**
**LOGICAL BLOCK #0.**
**GOOD LOGICAL SECTOR**

**MSLGS$ UNIT_SRV** 00
**MSLGS$ UNIT_HVR** 0F
**MSLGS$ VOL_SER** 000001D8
**MSLGS$ HDR_CODE** 00000000

**RUN/STOP SWITCH IN**
**PORT SWITCH IN**
**SPINDLE READY**
**PORT B RECEIVERS ENABLED**

**MODE** 00
**ERROR** 00
**CONTROLLER** 00
**RETRY** 00

**512-BYTE SECTOR FORMAT**
**NORMAL DRIVE OPERATION**
**0. RETRIES**
| LONGWORD 1. | 010D0205 | /.../ |
| LONGWORD 2. | 07112400 | /.$../ |
| LONGWORD 3. | 00000002 | /.../ |
| LONGWORD 4. | 00000000 | /.../ |
I/O SUB-SYSTEM, UNIT_VADER$DUA59:

**MESSAGE TYPE** 0001
**MSLG$CMD_REF** 2D440014
**MSLG$UNIT** 003B
**MSLG$SEQ_NUM** 0002
**MSLG$FORMAT** 03
**MSLG$FLAGS** 40
**MSLG$EVENT** 008B

**MSLG$Q.CNT_ID** 0000FA05 01200000
**MSLG$S.CNT_SVR** 02
**MSLG$S.CNT_HVR** 00
**MSLG$W_MULT_UNIT** 0072
**MSLG$W_UNIT_ID** 0000FFFF 02130000

**MSLG$S_UNIT_SVR** 00
**MSLG$S_UNIT_HVR** 0F
**MSLG$S_VOL_SER** 000001D0
**MSLG$S_HDR_CODE** 00000000

**MSLG$Z.SDI REQUEST** 17

**MODE** 00
**ERROR** 00
**CONTROLLER** 00
**RETRY** 00

---

**DISK MSCP MESSAGE**

**UNIT #59.**
**SEQUENCE #2.**
**SDI ERROR**
**OPERATION CONTINUING**

**DRIVE ERROR**
**LOST R/W READY, (TRANSFER)**

**UNIQUE IDENTIFIER, 00000000FA05**
**MASS STORAGE CONTROLLER**
**HSC70**

**CONTROLLER SOFTWARE VERSION #2.**
**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 00000000FFFF(X)**
**DISK CLASS DEVICE (166)**
**RA90**

**UNIT SOFTWARE VERSION #0.**
**UNIT HARDWARE REVISION #15.**
**VOLUME SERIAL #472.**
**LOGICAL BLOCK #0.**
**GOOD LOGICAL SECTOR**

**RUN/STOP SWITCH IN**
**PORT SWITCH IN**
**SPINDLE READY**
**PORT B RECEIVERS ENABLED**

**512-BYTE SECTOR FORMAT**

**NORMAL DRIVE OPERATION**
**0. RETRIES**
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<tr>
<th>Longword</th>
<th>Value</th>
<th>Format</th>
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<tr>
<td>1</td>
<td>00150288</td>
<td>.......</td>
</tr>
<tr>
<td>2</td>
<td>07000001</td>
<td>.......</td>
</tr>
<tr>
<td>3</td>
<td>00000002</td>
<td>.......</td>
</tr>
<tr>
<td>4</td>
<td>00000000</td>
<td>.......</td>
</tr>
</tbody>
</table>
ERROR SEQUENCE 1620.
KAS6 REV# 4. SERIAL# 152. MFG PLANT 15.

1. I/O SUB-SYSTEM, UNIT VADER 5:DU59:
MESSAGE TYPE 0001
MSLGSL_CMD_REF 2D440014
MSLGSL_UNIT 003B
MSLGSL_SEQ_NUM 003
MSLGSL_FORMAT 03
MSLGSL_FLAGS 40
MSLGSL_EVENT 00EB

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #3.
SDI ERROR
OPERATION CONTINUING
DRIVE ERROR
DRIVE DETECTED ERROR

MSLGSL_CNT_ID 00000A05
01200000

MSLGSL_CNT_SVR 02
MSLGSL_CNT_HVR 00
MSLGSL_MULT_UNIT 0072
MSLGSL_UNIT_ID 00000000
02130000

HSC70
CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

MSLGSL_UNIT_SVR 00
MSLGSL_UNIT_HVR 0F
MSLGSL_VOL_SER 000001D8
MSLGSL_HDR_CODE 00000000

RA80
UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
VOLUME SERIAL #472.
LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR

MSLGSL_SD1 REQUEST 1F

RUN/STOP SWITCH IN
PORT SWITCH IN
LOG INFORMATION IN EXTENDED AREA
SPINDLE READY
PORT B RECEIVERS ENABLED

MODE 00
ERROR 80
CONTROLLER 00
RETRY 00

512-BYTE SECTOR FORMAT
DRIVE ERROR
NORMAL DRIVE OPERATION
0. RETRIES
**CONTROLLER OR DEVICE DEPENDENT INFORMATION**

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>LED Code</td>
<td>24</td>
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<td>Panel Code</td>
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<tr>
<td>Last Opcode</td>
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<tr>
<td>Reserved</td>
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<tr>
<td>Cur Cylindr</td>
<td>010D</td>
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<td>Cur Group</td>
<td>04</td>
</tr>
</tbody>
</table>

INITIATE SEEK

CURRENT CYLINDER, #269.

CURRENT GROUP, #4.
I/O SUB-SYSTEM, UNIT VADER$DUA59:

MESSAGE TYPE 0001
MSLG$T_CMD_REF 3C250022
MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 0077
MSLG$B_FORMAT 03
MSLG$B_FLAGS 40
MSLG$W_EVENT 00BB

MSLG$Q_CNT_ID 0000FA05
01200000

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00

MSLG$W_MULT_UNT 0072
MSLG$Q_UNIT_ID 0000FFFF
02100000

MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 0F
MSLGL_VOL_SER 000001DB
MSLGL_HDR_CODE 00000000

MSLGS2_SDI REQUEST 17

MODE 00
ERROR 00
CONTROLLER 00
RETRY 00

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #119.
SDI ERROR
OPERATION CONTINUING
DRIVE ERROR
LOST R/W READY, (TRANSFER)

UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
MSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
VOLUME SERIAL #472.
LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED
512-BYTE SECTOR FORMAT
NORMAL DRIVE OPERATION
0. RETRIES
<table>
<thead>
<tr>
<th>DEVICE DEPENDENT INFORMATION</th>
<th>LONGWORD 1.</th>
<th>052C0284</th>
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<tbody>
<tr>
<td>LONGWORD 2.</td>
<td>07000009</td>
<td>/..../</td>
</tr>
<tr>
<td>LONGWORD 3.</td>
<td>00000002</td>
<td>/..../</td>
</tr>
<tr>
<td>LONGWORD 4.</td>
<td>00000000</td>
<td>/..../</td>
</tr>
</tbody>
</table>

FOR INTERNAL USE ONLY
I/O SUB-SYSTEM, UNIT _VADER$DUAS59:

**MESSAGE TYPE** 0001

**MLGSL_CMD_REF** CE6A001C
**MLGSW_UNIT** 003B
**MLGSW_SEQ_NUM** 0079
**MLGSB_FORMAT** 03
**MLGSB_FLAGS** 40
**MLGSW_EVENT** 00EB

**MLGSQ_CNT_ID** 0000FA05 01200000
**MLGSB_CNT_SRV** 02
**MLGSB_CNT_HVR** 00
**MLGSW_MULT_UNIT** 0072
**MLGSQ_UNIT_ID** 000FFFFF 02130000

**MLGSB_UNIT_SRV** 00
**MLGSB_UNIT_HVR** 0F
**MLGSB_VOL_SER** 000001DB
**MLGSB_HDR_CODE** 00000000

**MLGS2_SDI**
**REQUEST** 17

**MODE** 00
**ERROR** 00
**CONTROLLER** 00
**RETRY** 00

---

**DISK MSCP MESSAGE**

**UNIT #59.**
**SEQUENCE #121.**
**SDI ERROR**
**OPERATION CONTINUING**
**DRIVE ERROR**
**DRIVE DETECTED ERROR**

**UNIQUE IDENTIFIER, 00000000FA05**
**MASS STORAGE CONTROLLER**
**HSC70**

**CONTROLLER SOFTWARE VERSION #2.**
**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 00000000FFFF(X)**
**DISK CLASS DEVICE (165)**
**RA90**

**UNIT SOFTWARE VERSION #0.**
**UNIT HARDWARE REVISION #15.**
**VOLUME SERIAL #472.**
**LOGICAL BLOCK #0.**
**GOOD LOGICAL SECTOR**

**RUN/STOP SWITCH IN**
**PORT SWITCH IN**
**SPINDLE READY**
**PORT B RECEIVERS ENABLED**

**512-BYTE SECTOR FORMAT**

**NORMAL DRIVE OPERATION**

0. RETRIES

---

FOR INTERNAL USE ONLY
<table>
<thead>
<tr>
<th>LONGWORD</th>
<th>Value</th>
<th>Code/Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>01000205</td>
<td>/..../</td>
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<tr>
<td>2</td>
<td>07112400</td>
<td>/.$../</td>
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<tr>
<td>3</td>
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<td>/..../</td>
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<tr>
<td>4</td>
<td>00000000</td>
<td>/..../</td>
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</tbody>
</table>
ERROR SEQUENCE 1875.
ERL$LOGMESSAGE ENTRY 23-MAR-1988 14:14:41.03
KAB20 REV# D PATCH REV# 21. UCODE REV# 20.
I/O SUB-SYSTEM, UNIT _VADER$DU_A59:

MESSAGE TYPE 0001                   DISK MSCP MESSAGE
MSLG$L_CMD_REF CF66002B              UNIT #59.
MSLG$W_UNIT 003B                     SEQUENCE #121.
MSLG$W_SEQ_NUM 0079                  SDI ERROR
MSLG$B_FORMAT 03                      OPERATION CONTINUING
MSLG$B_FLAGS 40                       DRIVE ERROR
MSLG$W_EVENT 00EB                    DRIVE DETECTED ERROR
MSLG$Q_CNT_ID 0000FA05 012000000     UNIQUE IDENTIFIER, 00000000FA05
                                          MASS STORAGE CONTROLLER
                                          HSC70
MSLG$B_CNT_SRV 02                     CONTROLLER SOFTWARE VERSION #2.
MSLG$B_CNT_HVR 00                     CONTROLLER HARDWARE REVISION #0.
MSLG$W_MULTI_UNT 0072                UNIQUE IDENTIFIER, 00000000FFFF(X)
MSLG$Q_UNIT_ID 0000FFFF 021300000    DISK CLASS DEVICE (166)
                                          RA90
MSLG$B_UNIT_SRV 00                     UNIT SOFTWARE VERSION #0.
MSLG$B_UNIT_HVR 0F                    UNIT HARDWARE REVISION #15.
MSLG$L_VOL_SER 0000001D8              VOLUME SERIAL #472.
MSLG$L_HDR_CODE 000000000            LOGICAL BLOCK #0.
                                          GOOD LOGICAL SECTOR
MSLG$Z_SDI_REQUEST 17

MODE 00                              RUN/STOP SWITCH IN
ERROR 00                             PORT SWITCH IN
CONTROLLER 00                         SPINDLE READY
RETRY 00                             PORT B RECEIVERS ENABLED
                                          512-BYTE SECTOR FORMAT
                                          NORMAL DRIVE OPERATION
                                          0. RETRIES
<table>
<thead>
<tr>
<th>DEVICE DEPENDENT INFORMATION</th>
<th>LONGWORD 1.</th>
<th>010D0205</th>
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</thead>
<tbody>
<tr>
<td>LONGWORD 2.</td>
<td>07112400</td>
<td>/..../</td>
</tr>
<tr>
<td>LONGWORD 3.</td>
<td>00000002</td>
<td>/..$/</td>
</tr>
<tr>
<td>LONGWORD 4.</td>
<td>00000000</td>
<td>/..../</td>
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</tbody>
</table>
ERROR SEQUENCE 1076.
ERL$LOGMESSAGE ENTRY 23-MAR-1988 14:15:19.29
KA820 REV# D PATCH REV# 21. UCODE REV# 20.

I/O SUB-SYSTEM, UNIT _VADERSDUA59:

MESSAGE TYPE  0001
MSLG$M_CMD_REF CE78001C
MSLG$M_UNIT 003B
MSLG$M_SEQ_NUM 0002
MSLG$M_FORMAT 03
MSLG$M_FLAGS 40
MSLG$M_EVENT 008B
MSLG$Q_CNT_ID 0000FA05 01200000
MSLG$B_CNT_SRV 02
MSLG$B_CNT_HVR 00
MSLG$W_MULT_UNIT 0072
MSLG$W_UNIT_ID 000FFFFF 02130000
MSLG$B_UNIT_SRV 00
MSLG$B_UNIT_HVR 0F
MSLG$L_VOL_SER 000001DB
MSLG$L_HDR_CODE 00000000
MSLG$Z_SDREQUEST 17

MODE 00
ERROR 00
CONTROLLER 00
RETRY 00

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #2.
SDI ERROR
OPERATION CONTINUING
DRIVE ERROR
LOST R/W READY, (TRANSFER)
UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
HSC70
CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.
UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90
UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
VOLUME SERIAL #472.
LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED
512-BYTE SECTOR FORMAT
NORMAL DRIVE OPERATION
0. RETRIES

FOR INTERNAL USE ONLY
<table>
<thead>
<tr>
<th>DEVICE DEPENDENT INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>LONGWORD 1. 00150288</td>
</tr>
<tr>
<td>LONGWORD 2. 07000001</td>
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<tr>
<td>LONGWORD 3. 00000002</td>
</tr>
<tr>
<td>LONGWORD 4. 00000000</td>
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</table>
ERROR SEQUENCE 1877.
ERL$LOGMESSAGE ENTRY 23-MAR-1988 14:15:19.29
KAB20 REV D PATCH REV# 21. UCODE REV# 20.

I/O SUB-SYSTEM, UNIT _VADERS$DUA59:

MESSAGE TYPE 0001
MSLGS$L_CMD_REF CE78001C
MSLGS$W_UNIT 003B
MSLGS$W_SEQ_NUM 0003
MSLGS$B_FORMAT 03
MSLGS$B_FLAGS 40
MSLGS$W_EVENT 00EB

MSLGS$Q_CNT_ID 000000FA05 01200000

MSLGS$B_CNT_SVR 02
MSLGS$B_CNT_HVR 00
MSLGS$W_MULT_UNI 0072
MSLGS$Q_UNIT_ID 0000FFFF 02130000

MSLGS$B_UNIT_SVR 00
MSLGS$B_UNIT_HVR 0F
MSLGS$L_VOL_SER 0000001D8
MSLGS$L_HDR_CODE 00000000

MSLGS$Z_SDl REQUEST 1F

MODE 00
ERROR 80
CONTROLLER 00
RETRY 00

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #3.
SDI ERROR
OPERATION CONTINUING
DRIVE ERROR
DRIVE DETECTED ERROR

UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
HSC70
CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90
UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
VOLUME SERIAL #472.
LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
LOG INFORMATION IN EXTENDED AREA
SPINDLE READY
PORT B RECEIVERS ENABLED
512-BYTE SECTOR FORMAT
DRIVE ERROR
NORMAL DRIVE OPERATION
0. RETRIES

FOR INTERNAL USE ONLY
### CONTROLLER OR DEVICE DEPENDENT INFORMATION

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED CODE</td>
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<td>PANEL CODE</td>
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<tr>
<td>LAST OPCODE</td>
<td>0A</td>
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<tr>
<td>RESERVED</td>
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<tr>
<td>CUR CYLNDR</td>
<td>010D</td>
</tr>
<tr>
<td>CUR GROUP</td>
<td>04</td>
</tr>
</tbody>
</table>

**INITIATE SEEK**

- CURRENT CYLINDER, #269.
- CURRENT GROUP, #4.
ERROR SEQUENCE 1878.
ERL$LOGMESSAGE ENTRY 23-MAR-1988 14:15:20.89
KA82O REV# D PATCH REV# 21. UCODE REV# 20.

I/O SUB-SYSTEM, UNIT _VADER$DUA59:

MESSAGE TYPE 0001
MSLG$C_CMD_REF CEF2002A
MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 0004
MSLG$B_FORMAT 03
MSLG$B_FLAGS 40
MSLG$W_EVENT 00EB

MSLG$Q_CNT_ID 0000FA05
01200000

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULT_UNT 0072
MSLG$Q_UNIT_ID 000FFFFF
02130000

MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 0F
MSLG$L_VOL_SER 000001D8
MSLG$L_HDR_CODE 00000000

MSLG$2_SDI REQUEST 17

MODE 00
ERROR 00
CONTROLLER 00
RETRY 00

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #4.
SDI ERROR
OPERATION CONTINUING
DRIVE ERROR
DRIVE DETECTED ERROR

UNIQUE IDENTIFIER, 0000000000FA05
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 0000000000000000(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
VOLUME SERIAL #472.

LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED

512-BYTE SECTOR FORMAT
NORMAL DRIVE OPERATION
0. RETRIES
<table>
<thead>
<tr>
<th>LONGWORD</th>
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<th>Comment</th>
</tr>
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<tr>
<td>1</td>
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<td>00000002</td>
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### ERROR SEQUENCE 1879.

#### ERL$LOGMESSAGE ENTRY

- **Date**: 23-MAR-1988
- **Time**: 14:17:27.58
- **Login**
- **Revision**: D
- **Patch**
- **UCODE**: REV 21

#### I/O SUB-SYSTEM, UNIT _VADERS$DU24A59:

- **MESSAGE TYPE**: 0001
- **MSLGS$CMD_REF**: CED500C
- **MSLGS$UNIT**: 003B
- **MSLGS$SEQ_NUM**: 0079
- **MSLGS$FORMAT**: 03
- **MSLGS$FLAGS**: 40
- **MSLGS$EVENT**: 00EB
- **MSLGS$CNT_ID**: 0000FA05
- **MSLGS$CNT_SVR**: 02
- **MSLGS$CNT_HVR**: 00
- **MSLGS$MULT_UNT**: 0072
- **MSLGS$UNIT_ID**: 00FFFF
- **MSLGS$REQUEST**: 17

#### DISK MSCP MESSAGE

- **UNIT #59.**
- **SEQUENCE #121.**
- **SDI ERROR**
- **OPERATION CONTINUING**
- **DRIVE ERROR**
- **DRIVE DETECTED ERROR**

**UNIQUE IDENTIFIER, 00000000FA05**
**MASS STORAGE CONTROLLER**
**HSC70**

**CONTROLLER SOFTWARE VERSION #2.**
**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 00000000FFFF(X)**
**DISK CLASS DEVICE (166)**
**RA90**

**UNIT SOFTWARE VERSION #0.**
**UNIT HARDWARE REVISION #15.**
**VOLUME SERIAL #472.**
**LOGICAL BLOCK #0.**
**GOOD LOGICAL SECTOR**

**RUN/STOP SWITCH IN**
**PORT SWITCH IN**
**SPINDLE READY**
**PORT B RECEIVERS ENABLED**

**512-BYTE SECTOR FORMAT**

**NORMAL DRIVE OPERATION**

0. RETRIES
| LONGWORD 1. | 0100205 | /..../ |
| LONGWORD 2. | 07113600 | /..6../ |
| LONGWORD 3. | 00000002 | /..../ |
| LONGWORD 4. | 00000000 | /..../ |
**FILE SYSTEM 1881.**
**ERLGLOGMESSAGE ENTRY** 23-MAR-1988 14:24:34.66
**KAB20 REV D PATCH REV# 21. UCODE REV# 20.**

I/O SUB-SYSTEM, UNIT _VADERSDUA59:

- **MESSAGE TYPE**: 0001
- **MSLG$L_CMD_REF**: CEFF0023
- **MSLG$W_UNIT**: 003B
- **MSLG$W_SEQ_NUM**: 0079
- **MSLG$B_FORMAT**: 03
- **MSLG$B_FLAGS**: 40
- **MSLG$W_EVENT**: 00EB
- **MSLG$Q_CNT_ID**: 0000FA05 01200000
- **MSLG$B_CNT_SVR**: 02
- **MSLG$B_CNT_HVR**: 00
- **MSLG$W_MULT_UNIT**: 0072
- **MSLG$Q_UNIT_ID**: 000FFFFF 02130000

**DISK MSCP MESSAGE**

- **UNIT #59.**
- **SEQUENCE #121.**
- **SDI ERROR**
- **OPERATION CONTINUING**
- **DRIVE ERROR**
- **DRIVE DETECTED ERROR**

**UNIQUE IDENTIFIER, 00000000FA05**
**MASS STORAGE CONTROLLER**
**HSC70**

- **CONTROLLER SOFTWARE VERSION #2.**
- **CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 00000000FFFF(X)**
**DISK CLASS DEVICE (166)**
**RA90**

- **UNIT SOFTWARE VERSION #0.**
- **UNIT HARDWARE REVISION #15.**
- **VOLUME SERIAL #472.**
- **LOGICAL BLOCK #0.**
- **GOOD LOGICAL SECTOR**

**RUN/STOP SWITCH IN**
**PORT SWITCH IN**
**SPINDLE READY**
**PORT B RECEIVERS ENABLED**

**512-BYTE SECTOR FORMAT**

**NORMAL DRIVE OPERATION**
**0. RETRIES**
DEVICE DEPENDENT INFORMATION

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LONGWORD 3.  00000002
LONGWORD 4.  00000000
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ERL$LOGMESSAGE ENTRY 23-MAR-1988 14:24:36.66
KA820 REV# D PATCH REV# 21. UCODE REV# 20.

I/O SUB-SYSTEM, UNIT _VADER$DUA59:

MESSAGE TYPE 0001
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MSLG$W_UNIT 003B
MSLG$W_SEQ_NUM 0079
MSLG$B_FORMAT 03
MSLG$B_FLAGS 40
MSLG$W_EVENT 00EB
MSLG$Q_CNT_ID 0000FA05 01200000

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULT_UNIT 0072
MSLG$Q_UNIT_ID 000FFFFF 02130000

MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 0F
MSLG$L_VOL_SER 00001D8
MSLG$L_HDR_CODE 00000000

MSLG$2_SDI REQUEST 17

MODE 00
ERROR 00
CONTROLLER 00
RETRY 00

DISK MSCP MESSAGE

UNIT #59.
SEQUENCE #121.
SDI ERROR
OPERATION CONTINUING
DRIVE ERROR
DRIVE DETECTED ERROR

UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000000FFFFF(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
VOLUME SERIAL #472.
LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED

512-BYTE SECTOR FORMAT
NORMAL DRIVE OPERATION

0. RETRIES

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**DISK MSCP MESSAGE**

**UNIT #59.**

**SEQUENCE #121.**

**SDI ERROR**

**OPERATION CONTINUING**

**DRIVE ERROR**

**DRIVE DETECTED ERROR**

**UNIQUE IDENTIFIER, 0000000000FA05**

**MASS STORAGE CONTROLLER HSC70**

**CONTROLLER SOFTWARE VERSION #2.**

**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 00000000FFFFF(X)**

**DISK CLASS DEVICE (166) RA90**

**UNIT SOFTWARE VERSION #0.**

**UNIT HARDWARE REVISION #15.**

**VOLUME SERIAL #472.**

**LOGICAL BLOCK #0.**

**GOOD LOGICAL SECTOR**

**RUN/STOP SWITCH IN**

**PORT SWITCH IN**

**SPINDLE READY**

**PORT B RECEIVERS ENABLED**

**512-BYTE SECTOR FORMAT**

**NORMAL DRIVE OPERATION**

**0. RETRIES**
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ERROR SEQUENCE 1889.
ERL$LOGMESSAGE ENTRY 23-MAR-1988 15:05:05.77
KA820 REV# D PATCH REV# 21. UCODE REV# 20.

I/O SUB-SYSTEM, UNIT _VADER$DUA59:

MESSAGE TYPE 0001
MSLG$CMD_REF 4A670027
MSLG$UNIT 003B
MSLG$SEQ_NUM 0079
MSLG$FORMAT 03
MSLG$FLAGS 40
MSLG$EVENT 00EB
MSLG$Q_CNT_ID 0000FA05
MSLG$Q_CNT 01200000
MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$MULT_UNIT 0072
MSLG$Q_UNIT_ID 0000FFFF
MSLG$Q_UNIT 02130000
MSLG$UNIT_SVR 00
MSLG$UNIT_HVR 0F
MSLG$VOL_SER 00000000
MSLG$HDR_CODE 00000000
MSLG$SDI REQUEST 17

MODE 00
ERROR CONTROLLER 00
RETRY 00

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #121.
SDI ERROR
OPERATION CONTINUING
DRIVE ERROR
DRIVE DETECTED ERROR

UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
VOLUME SERIAL #472.
LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED

512-BYTE SECTOR FORMAT
NORMAL DRIVE OPERATION
0. RETRIES
******************************************************************* ENTRY
ERROR SEQUENCE 1900.
ERL$LOGMESSAGE ENTRY 23-MAR-1988 15:11:06.02
KAB20 REV# D PATCH REV# 21. UCODE REV# 20.
I/O SUB-SYSTEM, UNIT _VADER$USA59:
MESSAGE TYPE 0001
MSLGSL.Cmd_Ref 5A3C002F
MSLGW_Unit 003B
MSLGW_Seq_Num 0079
MSLG$B_Format 03
MSLG$B_FLAGS 40
MSLG$W_Event 00EB
MSLG$Q_CNT_ID 0000FA05
01200000
MSLG$B_CNT_Svr 02
MSLG$B_CNT_Hvr 00
MSLG$W_MULT_Unt 0072
MSLG$Q_UNIT_ID 0000FFFF
02100000
MSLG$B_UNIT_Svr 00
MSLG$B_UNIT_Hvr 0F
MSLG$V_VOL_Ser 0000001D8
MSLG$H_HDR_Code 00000000
MSLG$Z_SDI REQUEST 17
MODE 00
ERROR 00
CONTROLLER 00
RETRY 00

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #121.
SDI ERROR
OPERATION CONTINUING
DRIVE ERROR
DRIVE DETECTED ERROR
UNIQUE IDENTIFIER, 0000000000FA05
MASS STORAGE CONTROLLER
HSC70
CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.
UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90
UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
VOLUME SERIAL #472.
LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR
RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED
512-BYTE SECTOR FORMAT
NORMAL DRIVE OPERATION
0. RETRIES

FOR INTERNAL USE ONLY
DEVICE DEPENDENT INFORMATION
LONGWORD 1.  010D0205
LONGWORD 2.  07112400
LONGWORD 3.  00000002
LONGWORD 4.  00000000
ERROR SEQUENCE 1968.
EURL$LOGMESSAGE ENTRY 23-MAR-1988 15:59:06.02
KA820 REV# D PATCH REV# 21. UCODE REV# 20.

I/O SUB-SYSTEM, UNIT _VADER$DUA59:

MESSAGE TYPE 0001
MSCGSL_CMD_REF 5ABCD06D
MSCGSL_UNIT 003B
MSCGSL_SEQ_NUM 0079
MSCGSLB_FORMAT 03
MSCGSLB_FLAGS 40
MSCGSL_EVENT 00EB
MSCGSLQ_CNT_ID 00000A05
01200000

MSCGSLB_CNT_SR VR 02
MSCGSLB_CNT_HVR 00
MSCGSLW_MULTI UNIT 0072
MSCGSLQ_UNIT_ID 00000000
02130000

MSCGSLB_UNIT_SR VR 00
MSCGSLB_UNIT_HVR 00
MSCGSL_UNIT_VOL_SER 0000001D8
MSCGSL_UNIT_HDR_CODE 00000000

MSCGSL2_SDI REQUEST 17

MODE 00
ERROR 00
CONTROLLER 00
RETRY 00

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #121.
SDI ERROR
OPERATION CONTINUING
DRIVE ERROR
DRIVE DETECTED ERROR
UNIQUE IDENTIFIER, 000000000FA05
MASS STORAGE CONTROLLER
HSC70
CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.
UNIQUE IDENTIFIER, 00000000FFFFFF(X)
DISK CLASS DEVICE (166)
RA90
UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #15.
VOLUME SERIAL #472.
LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR
RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED
512-BYTE SECTOR FORMAT
NORMAL DRIVE OPERATION
0. RETRIES

FOR INTERNAL USE ONLY
DEVICE DEPENDENT INFORMATION

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LONGWORD 2.  07112400  /$.../
LONGWORD 3.  00000002  /..../
LONGWORD 4.  00000000  /..../
**ERROR SEQUENCE 1969.**

**ERL$LOGMESSAGE ENTRY** 23-MAR-1988 15:59:44.37

**KA820** REV# D PATCH REV# 21. UCODE REV# 20.

**I/O SUB-SYSTEM, UNIT _VADER$DUA59:**

**MESSAGE TYPE** 0001

**DISK MSCP MESSAGE**

**MSLG$W_CMD_REF** 923E0042

**MSLG$W_UNIT** 003B

**UNIT #59.**

**MSLG$W_SEQ_NUM** 0079

**SEQUENCE #121.**

**MSLG$B_FORMAT** 03

**SDI ERROR**

**MSLG$B_FLAGS** 40

**OPERATION CONTINUING**

**MSLG$W_EVENT** 00EB

**DRIVE ERROR**

**MSLG$Q_CNT_ID** 0000FA05

**DRIVE DETECTED ERROR**

**01200000**

**UNIQUE IDENTIFIER, 00000000FA05**

**MASS STORAGE CONTROLLER**

**HSC70**

**MSLG$B_CNT_SVR** 02

**CONTROLLER SOFTWARE VERSION #2.**

**MSLG$B_CNT_HVR** 00

**CONTROLLER HARDWARE REVISION #0.**

**MSLG$W_MULTI_UNT** 0072

**UNIQUE IDENTIFIER, 00000000FFFF(X)**

**MSLG$Q_UNIT_ID** 00FFFF

**DISK CLASS DEVICE (166)**

**02130000**

**RA90**

**MSLG$B_UNIT_SVR** 00

**UNIT SOFTWARE VERSION #0.**

**MSLG$B_UNIT_HVR** 0F

**UNIT HARDWARE REVISION #15.**

**MSLG$L_VOL_SER** 000001DB

**VOLUME SERIAL #472.**

**MSLG$L_HDR_CODE** 00000000

**LOGICAL BLOCK #0.**

**MSLG$Z_SDI REQUEST** 17

**GOOD LOGICAL SECTOR**

**MODE** 00

**RUN/STOP SWITCH IN**

**ERROR** 00

**PORT SWITCH IN**

**CONTROLLER** 00

**SPINDLE READY**

**RETRY** 00

**PORT B RECEIVERS ENABLED**

**512-BYTE SECTOR FORMAT**

**NORMAL DRIVE OPERATION**

0. RETRIES
DEVICE DEPENDENT INFORMATION

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| LONGWORD 3. | 00000002
| LONGWORD 4. | 00000000

DEVICE ROLLUP LOGGED BY SID 0404F098

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DEVICE ROLLUP LOGGED BY SID 05202B14

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SUMMARY OF ALL ENTRIES LOGGED BY SID 0404F098

ERLS$LOGMESSAGE

| DATE OF EARLIEST ENTRY | 23-MAR-1988 12:05:46.43 |

SUMMARY OF ALL ENTRIES LOGGED BY SID 05202B14

ERLS$LOGMESSAGE

| DATE OF EARLIEST ENTRY | 23-MAR-1988 14:07:26.80 |
| DATE OF LATEST ENTRY   | 23-MAR-1988 15:59:44.37 |

PROCESSED ENTRIES HOUR-OF-DAY HISTOGRAM LOGGED BY SID 0404F098

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FOR INTERNAL USE ONLY
PROCESSED ENTRIES HOUR-OF-DAY HISTOGRAM LOGGED BY SID 05202B14

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8.3 Troubleshooting Servo Related Failures

Noting this failure, there are two observations that should have been made concerning the presented problem:

1. The predominant error is related to the drive detecting that it is off track during or 'near' a data transfer command. The reported host error log information also shows the controller detection of "loss of R/W ready".

2. The reported information in the host error log shows their is correlation to cylinder and to head.

When analyzing block addresses for 'patterns' of failures, it is important to consider group and cylinder information.

Failures that are primarily associated with a single head, is GENERALLY associated with the HDA only. The EXCEPTION is head/group 12.

Failures that are primarily associated with groups of heads such as heads (groups) 0 thru 3, or 4 thru 7 or 8 thru 11, are generally associated with the PCM. The EXCEPTION is head/group 12 which is handled singularly on both the PCM and inside the HDA.

Failures that are 'random to head/group' may be examined as to the 'logical cylinder involved' to see if there are only specific areas of the physical disk involved.

Failures that are ONLY associated with a single group should then be examined as to the 'logical cylinder(s) involved'. Failures over 'random' logical cylinders in all physical areas of the disk may involve a read/write problem in general caused by electronic margin/fault. Failures over a very small number of cylinders (< 180) may indicate a head touchdown problem that could have disturbed the media. Failures involving only a single cylinder or two may indicate a problem that is related to 'track following' over a very defined area of the disk.

For failures involving data transfer commands (and therefore failing LBN's) it is important to look for 'topological' correlation. If the controller is the only subsystem component that is reporting errors, then the most valid conclusion is that there is a read/write problem (versus thinking of a servoing problem). An RA90 that is exhibiting a 'servoing' problem, will GENERALLY be detecting such a problem and reporting them in a host error log (if available) and WILL be writing the errors into the drives' E2. During writes, if the drive has a servo following problem, it will notify the controller by dropping its R/W ready signal on the RTDS line to cause the controller to abort the write operation. During read (after controller Read Gate is asserted) operations however (unlike the RA8x drives) the RA90 will not drop the R/W ready signal on the RTDS, but will raise drive attention to the controller AFTER the read command has been completed. This new feature allows the controller to attempt the read of data. The ECC algorithm is there to protect the data during the read. If the error indicated that the drive is having difficulty in maintaining its fine track servo, the drive should be reporting errors along with the controller.

LOSS OF R/W READY

Another symptom of a servoing problem is the "LOSS OF R/W READY", reported by most controllers as status event code "8B". The controller detected on the RTDS line that the "READ/WRITE READY" bit was negated when the controller attempted to initiate a transfer OR at the completion of a transfer, and

READ/WRITE READY had previously been asserted (indicating completion of the preceding seek). This usually results from a drive detected transfer error in which case an additional error log message may be generated containing the "drive detected
error" subcode. If there are no other such subsequent error log entries, the loss of "FINE TRACK" was PROBABLY responsible for the "LOSS OF R/W READY".

TYPES OF SERVO SYSTEMS.

DEDICATED ONLY SERVO SYSTEMS:

The RA80 disk drive (the first in the RA family) employed a dedicated servo system. All of the positioning and "track holding" (or fine track) was done via the dedicated servo surface of the disk. The most stable surface is selected for this.

The advantage of a dedicated servo system is that the servo system never has to switch to a different "input" in order to transition from a "course" to a "fine" track position. This generally improves the seek speed and settle speed from seeking to track position.

Dedicated servo control, while offering high precision and performance, has certain inherent limitations. To understand these limitations, it is necessary to make explicit two assumptions upon which dedicated servos are based. They are:

1. The access arm assembly is perfectly rigid, and keeps heads in constant position relative to each other. Ideally, all the heads in the assembly are in perfect alignment. Even if they are not, there is no problem for fixed-media drives as long as the positional relationship of any given head to the servo head remains constant.

2. The tracks in a cylinder always remain in perfect vertical alignment with each other. Two factors, however, limit the validity of this assumption at high track densities. First, is the possible thermal expansion of the disks must be considered. Second limitation on cylinder alignment is runout, or relative eccentricity of two disks in a stack. Head misalignment, thermal expansion, runout are increasingly significant problems for multiple access arm positioners as track densities continue to rise.

The disadvantage to a dedicated only system, is that you are tracking relative to a track on the servo system and not the to read/write track. The affects of thermal offsets, vibration at the data track are not compensated for unless the same equal affect is also present at the servo track.

EMBEDDED SERVO SYSTEMS

The RA60 was the first RA disk product that employed a fully embedded servo system ONLY. The advantage of an embedded servo system is that you don’t give up an entire "surface", head and the electronics to support a dedicated channel for servo information. The RA60 utilized "embedded" servo information that was written (at factory only) between each sector of information. The disadvantage is that it is harder to attain the same seek and seek settling times because you have to deal with the rotational latency of having the servo information spread between sectors of data.

With embedded servo control, each head centers itself on its own track. Most of the factors which limit track density in a dedicated system vanish. Thermal expansion and runout are 'less' significant, since the selected head and track need not be perfectly aligned with others in the stack.

With a fully embedded servo system, the seek control logic must continuously reevaluate current positioner location from:

1. The last available track address information.
2. The elapsed time since the last track address was read.
3. The current seek velocity.
Fully embedded servo systems require track-specific information encoded into each servo burst. This information helps determine which track the head is crossing as it detects a servo burst while traversing the media surface.

**HYBRID OR "BLENDED" SERVO SYSTEMS**

Combining the merits of both a dedicated and an embedded servo system, the "blended" servo looks at both the dedicated and embedded information. The "fine track" determination is made by "blend" of both servo inputs, such that compensation for where the read/write head is relative to the embedded servo is always being fed into the basic servo position component.

Such a hybrid, or dual position control system was used in the RA81 and RA82 fixed media disks. The result is the best of both worlds—seek performance comparable to that of a dedicated servo system, and precise track centering for high track densities.

**RA90 SERVO SYSTEM**

To date, the RA90 is being designed with a dedicated servo system. This design has been selected in order to attain the "fastest" seek times possible. The thinking is that we do not wish to compromise any speed that may result from an alternate design.

The beauty of the RA90, is that to make a change from a dedicated only system to a "blended" servo system will likely only require microcode change which is easy to do through the microcode update port of the OCP.

**CORRECTIVE ACTION STEPS WOULD HAVE INCLUDED:**

1. Determine drive.
2. Examination of host error log reveals lack of ECC errors, but indications of a 'servoing problem'. Note that the errors are also being detected by the drive. There is the occurrence of Loss of R/W Ready and then the subsequent reporting of a drive detected error.
3. Conversion of LBN's affected indicates that errors correlate to a single surface/hd/group, and within a defined area of the disk. The RA90 drive internal error log reveals similar data.
4. Noting the correlation to physical location on the media, HDA replacement is called for.
5. Replacement of FRU takes place.
6. Verification of FRU replacement is made with internal drive diagnostics.

**NOTE**

It is not necessary to run a 'formatter' against the new HDA. This is an unnecessary 'hit' to customer availability and to the MTTR/MTTI of the product. Upon HDA replacement, a few minutes of HSC ILEXER should be the most that is considered. Other utilities/testing should not be contemplated.

With HSC Version 370 microcode you will have the option of running ILEXER with 'BFR' enabled or not. Enabling BFR during execution of ILEXER is appropriate.

7. Return the disk drive to the customer.
9

Bug 9

9.1 Problem Statement

The customer reports that a batch job aborts due to errors while reading a data file on DUA59 from A cluster.

The configuration includes 2 separate multinode HSC/VAX clusters. Port A of DUAM9 is connected to cluster A. Port B of DUAM9 is connected to cluster B. Occasionally cluster B will write data to DUAM9. Within the last 30 days, cluster B had port problems. Field service resolved the port problem on cluster B by replacing a K.SDI.

Your work is limited to cluster A.
9.2 Customer Error Log

VAX/VMS SYSTEM ERROR REPORT

******************************************************************************** ENTRY
ERROR SEQUENCE 2416- ERL$LOGMESSAGE ENTRY
1-MARCH-1988 10:13:09.27
KAS 80 REV# 7. SERIAL# 2639. MFG PLANT 0.

I/O SUB-SYSTEM, UNIT _GREASY$_DUA59:

MESSAGE TYPE 0001
MSLG$CMD_REF 9A5F0007
MSLG$W_UNIT 0038
MSLG$W_SEQ_NUM 006A
MSLG$B_FORMAT 02
MSLG$B_FLAGS 00
MSLG$W_EVENT 004A
MSLG$Q_CNT_ID 0000FA05
01200000

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULTI_UNIT 0072
MSLG$Q_UNIT_ID 0000001FF
02130000

MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 00
MSLG$B_LEVEL 00
MSLG$B_RETRY 05
MSLG$B_VOL_SER 00000419
MSLG$B_HEADER 00000009

CONTROLLER DEPENDENT INFORMATION
ORIG ERR 0010
ERR RECOV FLGS 0002
LVI A RETRY 00
LVI B RETRY 00
BUFFR DATA MEMADR DBB6
SRC REQ # 07
DET REQ # 07

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #106.
DISK TRANSFER ERROR

CONTROLLER ERROR
"EDC" ERROR

UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 0000000001FF
DISK CLASS DEVICE
RA90

UNIT SOFTWARE VERSION #0.
UNIT HARDWARE REVISION #0.

VOLUME SERIAL #1049.
LBN #9.
GOOD LOGICAL SECTOR

EDC ERROR
ERR LOGGED TO CONSOLE AND HOST

FOR INTERNAL USE ONLY
ERROR SEQUENCE 2417.
ERL$LOGMESSAGE ENTRY 1-MAR-1988 10:13:09.27
KA780 REV# 7. SERIAL# 2639. MFG PLANT 0.

I/O SUB-SYSTEM, UNIT _GREASY$DUA59:
MESSAGE TYPE 0001

MSLG$L_CMD_REF 9A5F0007
MSLG$W_UNIT 003B

MSLG$W_SEQ_NUM 006A
MSLG$B_FORMAT 02
MSLG$B_FLAGS 00
MSLG$W_EVENT 004A

MSLG$Q_CNT_ID 0000FA05
01200000

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00

MSLG$W_MULTI UNIT 0072
MSLG$Q_UNIT_ID 000001FF
02130000

MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 00

MSLG$B_LEVEL 00
MSLG$B_RETRY 05
MSLG$L_VOL_SER 00000419

MSLG$L_HEADER 00000009

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #106.
DISK TRANSFER ERROR

CONTROLLER ERROR
"EDC" ERROR

UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.

CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 000000001FF
DISK CLASS DEVICE
RA90

UNIT SOFTWARE VERSION #0.

UNIT HARDWARE REVISION #0.

VOLUME SERIAL #1049.

LBN #9.
GOOD LOGICAL SECTOR

EDC ERROR
ERR LOGGED TO CONSOLE AND HOST

FOR INTERNAL USE ONLY
**ENTRY**

ERROR SEQUENCE 241B.

ERL$LOGMESSAGE ENTRY 1-MAR-1988 10:13:0.9.27

KA780 REV# 7. SERIAL# 2639. MFG PLANT 0.

I/O SUB-SYSTEM, UNIT _GREASY$DUAS59:

MESSAGE TYPE 0001

MSLG$W_CMD_REF 9A5P0007

MSLG$W_UNIT 003B

MSLG$W_SEQ_NUM 006A

MSLG$B_FORMAT 02

MSLG$B_FLAGS 00

MSLG$W_EVENT 004A

MSLG$Q_CNT_ID 0000FA05

01200000

MSLG$B_CNT_SVR 02

MSLG$B_CNT_HVR 00

MSLG$W_MULT_UNT 0072

MSLG$Q_UNIT_ID 000001FF

02130000

MSLG$B_UNIT_SVR 00

MSLG$B_UNIT_HVR 00

MSLG$B_LEVEL 00

MSLG$B_RETRY .05

MSLG$L_VOL_SER 00000419

MSLG$L_HEADER 00000099

CONTROLLER DEPENDENT INFORMATION

ORIG ERR 0010

ERR RECOV FLGS 0002

LV1 A RETRY 00

LV1 B RETRY 00

BUFFR DATA MEM ADR DBB6

SRC REQ # 07

DET REQ # 07

DISK MSCP MESSAGE

UNIT #59.

SEQUENCE #106.

DISK TRANSFER ERROR

CONTROLLER ERROR

"EDC" ERROR

UNIQUE IDENTIFIER, 00000000FA05

MASS STORAGE CONTROLLER

HSC70

CONTROLLER SOFTWARE VERSION #2.

CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 000000001FF

DISK CLASS DEVICE

RA90

UNIT SOFTWARE VERSION #0.

UNIT HARDWARE REVISION #0.

VOLUME SERIAL #1049.

LBN #9.

GOOD LOGICAL SECTOR

EDC ERROR

ERR LOGGED TO CONSOLE AND HOST

FOR INTERNAL USE ONLY
** ENTRY

ERROR SEQUENCE 2419.
ERL$LOGMESSAGE ENTRY 1-MAR-1988 10:13:09.27
KA780 REV# 7. SERIAL# 2639. MFG PLANT 0.

I/O SUB-SYSTEM, UNIT _GREASY$DUA59:
MESSAGE TYPE 0001
MSLG$L_CMD_REF 9A5F0007
MSLG$W_UNIT 003B

MSLG$W_SEQ_NUM 006A
MSLG$B_FORMAT 02
MSLG$B_FLAGS 00
MSLG$W_EVENT 004A

MSLG$Q_CNT_ID 0000FA05
01200000

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULTI_UNIT 0072
MSLG$Q_UNIT_ID 000001FF
02130000

MSLG$B_UNIT_SVR 00
MSLG$B_UNIT_HVR 00
MSLG$B_LEVEL 00
MSLG$B_RETRY 05
MSLG$L_VOL_SER 00000419
MSLG$L_HEADER 00000009

CONTROLLER DEPENDENT INFORMATION
ORIG ERR 0010
ERR RECOV FLGS 0002
LV1 A RETRY 00
LV1 B RETRY 00
BUFFR DATA MEM ADR DBB6
SRC REQ # 07
DET REQ # 07

DISK MSCP MESSAGE
UNIT #59.
SEQUENCE #106.

DISK TRANSFER ERROR

CONTROLLER ERROR
"EDC" ERROR

UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
MSC70

CONTROLLER SOFTWARE VERSION #2.

CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 0000000001FF
DISK CLASS DEVICE
RA90

UNIT SOFTWARE VERSION #0.

UNIT HARDWARE REVISION #0.

VOLUME SERIAL #1049.

LBN #9.
GOOD LOGICAL SECTOR

EDC ERROR
ERR LOGGED TO CONSOLE AND HOST

FOR INTERNAL USE ONLY
**ERROR SEQUENCE 2420.**

**ERL$LOOMESSAGE ENTRY** 1-MAR-1988 10:13:09.27

**KA780 REV# 7. SERIAL# 2639. MFG PLANT 0.**

**I/O SUB-SYSTEM, UNIT _GREASYSDUA59:**

**MESSAGE TYPE** 0001

**MSLG$L_CMD_REF** 9A5F0007

**MSLG$W_UNIT** 003B

**MSLG$W_SEQ_NUM** 006A

**MSLG$B_FORMAT** 02

**MSLG$B_FLAGS** 00

**MSLG$W_EVENT** 004A

**MSLG$Q_CNT_ID** 0000FA05 01200000

**MSLG$B_CNT_SVR** 02

**MSLG$B_CNT_HVR** 00

**MSLG$W_MULT_UNIT** 0072

**MSLG$Q_UNIT_ID** 000001FF 02130000

**MSLG$B_UNIT_SVR** 00

**MSLG$B_UNIT_HVR** 00

**MSLG$B_LEVEL** 00

**MSLG$B_RETRY** 05

**MSLG$L_VOL_SER** 00000419

**MSLG$L_HEADER** 00000009

**DISK MSCP MESSAGE**

**UNIT #59.**

**SEQUENCE #106.**

**DISK TRANSFER ERROR**

**CONTROLLER ERROR**

"EDC" ERROR

**UNIQUE IDENTIFIER, 00000000FA05**

**MASS STORAGE CONTROLLER**

**HSC70**

**CONTROLLER SOFTWARE VERSION #2.**

**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 0000000001FF**

**DISK CLASS DEVICE**

**RA90**

**UNIT SOFTWARE VERSION #0.**

**UNIT HARDWARE REVISION #0.**

**VOLUME SERIAL #1049.**

**LBN #9.**

**GOOD LOGICAL SECTOR**

**EDC ERROR**

**ERR LOGGED TO CONSOLE AND HOST**

---

*FOR INTERNAL USE ONLY*
### Error Sequence 2421

**Logged On SID 01380A4F**

**I/O Sub-System, Unit ** _GREASYSDUA59:_

**Message Type** 0001

- **MSLGS$CMD_REF** 9A5F0007
- **MSLGS$UNIT** 003B
- **MSLGS$SEQ_NUM** 006A
- **MSLGS$FORMAT** 02
- **MSLGS$FLAGS** 00
- **MSLGS$EVENT** 004A

**MSLGS$CNT_ID** 0000FA0S
  - 01200000

- **MSLGS$CNT_SVR** 02
- **MSLGS$CNT_HVR** 00
- **MSLGS$MULT_UNT** 0072
- **MSLGS$UNIT_ID** 000001FF
  - 02130000

- **MSLGS$UNIT_SVR** 00
- **MSLGS$UNIT_HVR** 00
- **MSLGS$LEVEL** 00
- **MSLGS$RETRY** 05
- **MSLGS$VOL_SER** 00000419
- **MSLGS$HEADER** 00000009

**Controller Dependent Information**

- **Orig Err** 0010
- **Err Recov Flgs** 0002
- **LV1 A Retry** 00
- **LV1 B Retry** 00
- **BUFFR DATA MEM ADDR** DB86
- **SRC REQ #** 07
- **DET REQ #** 07

**Disk MSCP Message**

- **Unit #59.**
- **Sequence #106.**
- **Disk Transfer Error**

**Controller Error**

- "EDC" Error

**Unique Identifier, 00000000FA05**

- Mass Storage Controller
- HSC70

**Controller Software Version #2.**

**Controller Hardware Revision #0.**

**Unique Identifier, 000000000FF**

- Disk Class Device
- RA90

**Unit Software Version #0.**

**Unit Hardware Revision #0.**

**Volume Serial #1049.**

**LBN #9,**

**Good Logical Sector**

**EDC Error**

**Err Logged To Console And Host**

---

FOR INTERNAL USE ONLY
ERROR SEQUENCE 2415.
ERL$LOGSTATUS ENTRY 1-MAR-1988 10:13:09.27
KA780 REV# 7. SERIAL# 2639. MFG PLANT 0.
I/O SUB-SYSTEM, UNIT _GREASY$DUA59:

MSL$CMD_REF 9A5F0007
ORB$OWNER 01E80018
UCB$CHAR 1CCD4108

OWNER UIC [350,030]
DIRECTORY STRUCTURED
FILE ORIENTED
SHARABLE
AVAILABLE
MOUNTED
ERROR LOGGING
ALLOCATED
CAPABLE OF INPUT
CAPABLE OF OUTPUT
RANDOM ACCESS

UCB$OPCINT 00000668
UCBSW_ERRCNT 001B
UCBSW_STS 1C10

1640. QIO'S THIS UNIT
27. ERRORS THIS UNIT
ONLINE
DEALLOCATE AT DISMOUNT
SOFTWARE VALID
UNLOAD AT DISMOUNT

CDRP$MEDIA 00000009
CDRP$FUNC 000C
CDRP$BCNT 00002000
CDRP$BOFF 0000
CDRP$PID 00020010
CDRPSQ_IOSB 00000054
00000000

STARTING LBN #9.
READ PHYSICAL BLOCK
TRANSFER SIZE 512. BYTE(S)
TRANSFER PAGE ALIGNED
REQUESTOR "PID"
IOSB, 0. BYTE(S) TRANSFERRED

FOR INTERNAL USE ONLY
<table>
<thead>
<tr>
<th><strong>ERROR SEQUENCE 2423.</strong></th>
<th><strong>ENTRY</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>KA780 REV# 7.</td>
<td>SERIAL# 2639. MFG PLANT 0.</td>
</tr>
</tbody>
</table>

**I/O SUB-SYSTEM, UNIT GREALSY$DUAD59:**

<table>
<thead>
<tr>
<th>MESSAGE TYPE</th>
<th>DISK MSCP MESSAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSLG$CMD_REF</td>
<td>UNIT #59.</td>
</tr>
<tr>
<td>MSLG$UNIT</td>
<td>SEQUENCE #107.</td>
</tr>
<tr>
<td>MSLG$SEQ_NUM</td>
<td>DISK TRANSFER ERROR</td>
</tr>
<tr>
<td>MSLG$FORMAT</td>
<td>CONTROLLER ERROR</td>
</tr>
<tr>
<td>MSLG$FLAGS</td>
<td>&quot;EDC&quot; ERROR</td>
</tr>
<tr>
<td>MSLG$EVENT</td>
<td>UNIQUE IDENTIFIER, 00000000FA05</td>
</tr>
<tr>
<td>MSLG$CNT_ID</td>
<td>MASS STORAGE CONTROLLER</td>
</tr>
<tr>
<td>0000FA05</td>
<td>HSC70</td>
</tr>
<tr>
<td>02</td>
<td>CONTROLLER SOFTWARE VERSION #2.</td>
</tr>
<tr>
<td>MSLG$CNT_SVR</td>
<td>CONTROLLER HARDWARE REVISION #0.</td>
</tr>
<tr>
<td>02</td>
<td>UNIQUE IDENTIFIER, 0000000001FF</td>
</tr>
<tr>
<td>MSLG$CNT_HVR</td>
<td>DISK CLASS DEVICE</td>
</tr>
<tr>
<td>00</td>
<td>RA90</td>
</tr>
<tr>
<td>MSLG$MULT_UNT</td>
<td>UNIT SOFTWARE VERSION #0.</td>
</tr>
<tr>
<td>0072</td>
<td>UNIT HARDWARE REVISION #0.</td>
</tr>
<tr>
<td>MSLG$UNIT_ID</td>
<td>VOLUME SERIAL #1049.</td>
</tr>
<tr>
<td>000001FF</td>
<td>LBN #9.</td>
</tr>
<tr>
<td>02130000</td>
<td>GOOD LOGICAL SECTOR</td>
</tr>
</tbody>
</table>

**CONTROLLER DEPENDENT INFORMATION**

<table>
<thead>
<tr>
<th>ORIG ERR</th>
<th>EDC ERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0010</td>
<td>ERR LOGGED TO CONSOLE AND HOST</td>
</tr>
<tr>
<td>ERR RECOV FLGS</td>
<td>0002</td>
</tr>
<tr>
<td>LV1 A RETRY</td>
<td>00</td>
</tr>
<tr>
<td>LV1 B RETRY</td>
<td>00</td>
</tr>
<tr>
<td>BUFFR DATA MEM ADR</td>
<td>CCBO</td>
</tr>
<tr>
<td>SRC REQ #</td>
<td>07</td>
</tr>
<tr>
<td>DET REQ #</td>
<td>07</td>
</tr>
</tbody>
</table>

FOR INTERNAL USE ONLY
ERROR SEQUENCE 2422.
KA780  REV# 7.  SERIAL# 2639.  MFG PLANT 0.

I/O SUB-SYSTEM, UNIT _GREASY$DUA59:

MSLGS$CMD_REF  39A30009
MSLGS$OWNER     01E80018
UCBLS$CHAR      1CCD4108

OWNER UIC [350,030]
DIRECTORY STRUCTURED
FILE ORIENTED
SHARABLE
AVAILABLE
MOUNTED
ERROR LOGGING
ALLOCATED
CAPABLE OF INPUT
CAPABLE OF OUTPUT
RANDOM ACCESS

1641. QIO'S THIS UNIT
34. ERRORS THIS UNIT

ONLINE
DEALLOCATE AT DISMOUNT
SOFTWARE VALID
UNLOAD AT DISMOUNT

CDRP$MEDIA       00000009
CDRP$FUNC        000C
CDRP$BCNT        00000200
CDRP$BOFF        0000
CDRP$L_PID       0020010
CDRP$Q_IOSB      00000054  00000000

STARTING LBN #9.
READ PHYSICAL BLOCK
TRANSFER SIZE 512. BYTE(S)
TRANSFER PAGE ALIGNED
REQUESTOR "PID"
IOSB, 0. BYTE(S) TRANSFERRED

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9.3 Troubleshooting the Controller Detected 'EDC' Error

This problem was presented in this ITS training session in order to address a very common misunderstanding of what an EDC errors is and what its ramifications are.

The Controller Detected "EDC" Error -

****** RULE 1 ******
**** EDC errors are NOT drive errors. *****

****** RULE 2 ******

If BAD EDC is once written, ALL subsequent read operations to that block(s) will 'error', UNTIL the 'bad' blocks are rewritten.

EDC is a data protection mechanism implemented to ensure data integrity within a disk controller. In contrast, the ECC mechanism is to ensure data integrity from the controller to drive to media, from media to drive to controller. The ECC mechanism ensures data integrity of the data AND EDC mechanism together. ECC protected/corrected data by DEFAULT provides protection and correction capabilities of the EDC and the customer data.

The subsystem must first satisfy the requirements of verifying that the ECC protection of the data has been accomplished. In the problem presented, there was NO evidence of any ECC problem. The subsystem verified that the data (+EDC character) was correctly read from the media. Next priority is to verify the integrity of the data within the controller data paths thru the EDC protection mechanism. You may note that in an HSC controller based ECC error report, under the "controller dependent information" there may be both EDC and ECC error flags set. This is merely indicating that the ECC error occurred and that the EDC check failed as well. The subsystem will attempt to resolve the ECC error first, and if able, will in nearly EVERY instance resolve the EDC error as well, unless there is a controller problem now in the EDC check OR the EDC was incorrectly calculated previously during the write of the block to disk. An undetected write of bad "EDC" to disk is much more likely to happen with a 2 board controller than with an HSC.

It is important to note the differences in how the controllers implement the EDC mechanism. For the KDA/KDB/UDA family of controllers, the EDC is generated on a 'sector of data' at the buss interface as the data is initially read from host memory, and is verified on a sector basis as the data is written to host memory from the internal controller memory. Therefore with these xDA controllers, it is generated and checked at this bus interface within the controller by the microcode engine of the controller.

For the HSC type controllers, the EDC is generated on a 'sector of data' at the K.PLI port processor module as the data streams in from host memory over the CI bus. The EDC then become an integral part of the customer data as the data is transferred to the HSC data memory. As this data is read out of the HSC data memory by the K.SDI modules and transmitted to the drive, the EDC of the customer data is regenerated and checked in the K.SDI and compared to the EDC characters appended to the data by the K.PLI. The EDC must check OK, or the write transfer to disk will be aborted, the HSC will re-request the data from host memory requeue the write transfer to the disk when data is again available in the HSC data memory. If the EDC checks OK at the K.SDI on a write to disk, the EDC and appended ECC code is appended to the data stream and written to disk, with the ECC mechanism ensuring data integrity of the customer data and the EDC code. For a read of disk, the data as it is read by the K.SDI (over the SDI read/response line) is checked for good ECC, and then the data + EDC characters is stored in HSC data memory. As the data is sent to host memory, the K.PLI while transferring the data to host memory, will verify that good EDC exists for the customer data block, not transferring

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the EDC characters on to host memory. Should the EDC be found to be bad, the K.PLI informs the HSC functional code to 're-request that block of data from the disk again.

So, if EDC errors are being detected, the problem is a controller problem, because the ECC is protecting the data to and from the disk and checking the integrity of the data at the SDI port module logic itself.

A GOOD controller will always read bad EDC written disks. If BAD EDC is once written, each time the block is read, the disk will still "log" EDC errors until the data is restored/rewritten onto the disk with GOOD EDC by a GOOD controller.

RAMIFICATIONS OF A FILE THAT CONTAINS INCORRECT EDC:

A file that has within it bad EDC will be treated by the host operating systems in much the same fashion that a 'Forced Error' is treated. If you try to 'access' such a file, the host operating system file retrieval code will abort and return to the user a 'fatal message'.

COPYING A FILE—The VMS "COPY" utility will always fail when it attempts to copy a file containing a BAD EDC character written to disk (with good ECC on disk).

BACKUP/IMAGE TO TAPE—When a file with a "bad EDC character" is backed up to tape, the user is notified by a backup message. THERE IS NO MECHANISM OF RETAINING THIS "EDC ERROR" FLAG WITH THE DATA ON TAPE. If the potentially corrupt file is restored from this tape, no notification that the file originally contained a "EDC error" will be given. The sector specific EDC error information is not stored on the tape, so this information has to manually be recorded on the tape label as reported on the terminal console from which the backup is running. If backup is initiated via a batch process, it is a GOOD practice to log the batch process results into a log file and examine that log file for such error messages.

BACKUP/FILE TO TAPE—A "file" orientated backup will give you the added information of knowing which exact file had the block with the bad EDC error!. This is useful in identifying specifically which file should be restored from a good source.

BACKUP TO DSA DISK (w/VMS BACKUP)—Backing up DSA to DSA type disks via the VMS backup or restore utilities will cause the block in question on the "OUTPUT" device to be flagged with "Forced Error". This will be true for file or image operations.

Back up DSA to NON-DSA type disks via file method will result in "loosing" the error flags (as tape does).

SHADOW COPYING DSA DISKS—For the output member of a shadow set copy, that is copying a block with bad EDC character written (input member block has good ECC) the block will be written with "forced error". This will be true for HSC based disk to disk backups.

HOW A CUSTOMER RECOVERS/RESTORES TO GOOD DATA:

A customer that comes across an EDC error within a file, should immediately restore that file to the disk from a KNOWN GOOD SOURCE. This means that a customer must be aware of any occurrence of a such an error if it occurs during the normal execution of his regularly scheduled backup procedures.

Because this type of error is the result of a 'broke' controller, it is essential to determine when the file and from which controller it was written. This is necessary so that the FSE can properly test/diagnose the controller. If the controller type is UDA/KDA/KDB, then the problem could be the failure of either controller board. Have other drives been affected? For instance, if only one port has shown the symptom, and other ports have been used extensively by the customer, then isolation to the port board would be most likely. If the error is a one time 'hit' then attempts to isolate the problem via diagnostics
will probably fail. If the controller is an HSC, then the K.SDI may be most suspect, as it either failed to catch the bad EDC as it retrieved the data from data memory for the write to disk, or altered the data/EDC in process of writing it to disk.

Question: What if the customer doesn't have a 'good backup' of the file?

ANSWER: With some system knowledge of the operating system, and how the file was detected bad, it is possible to determine which block(s) of the file(s) are bad. The customer could then backup/restore the file to reset the 'bad EDC'. The customer will then have the "painful" task of trying to 'correct' the suspect data. For ASCII data, this is probably not much of a problem. If the file was the bit map of the system disk, then there will be considerable pain.
10.1 Problem Statement

A VAX cluster customer reports that a high number of errors are being generated by DUA59. The disk, utilized by a number of users, appears to work for most of their users. Only a few users have reported that they have had jobs abort. Both batch jobs and some interactive programs have failed. Retrying the jobs is successful sometimes.
10.2 Customer Error Log Rollup

The VMS error log is rolled up as follows:

<table>
<thead>
<tr>
<th>Drive Name</th>
<th>Type</th>
<th>Led</th>
<th>MSCP Event</th>
<th>Block</th>
<th>Logical Cyl</th>
<th>Gp</th>
<th>S</th>
<th>yy-mm-dd hh:mm:ss:cc</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUA59</td>
<td>90</td>
<td>4B</td>
<td>00EB</td>
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10.3 Troubleshooting SERVO Data Failures

Noting this failure, there are two observations to make:

1. There is the occurrence of "C6" errors, as logged in EEPROM and host error log. This error (PLO failure) is result of the dedicated servo information read from the media is not synchronized with the VCO (voltage controlled oscillator).

2. The drive did not detect the "index pattern mark" signifying the rotational index of the disk. This index pattern is written into the dedicated servo ‘track’. Each time the drive misses the ‘index pattern’, it will log this error.

3. Examination of the actual host error log would have shown (as the drive internal error log does shows) that there is a limited number of physical cylinders that show this symptom.

Both of these observations could be made from either the actual host error log or the drive internal error log through the use of HSC-DKUTIL.

In the RA90 the PLO (phase lock loop) circuitry of the drive is driven directly from the dedicated servo continually during reads, writes and seeks. This circuitry must stay in "sync", so that the radial and rotational positioning is ALWAYS known. The failures presented in this problem indicate that there has been a probable spot on the disk that has a low "signal to noise" ration. It could have been caused by many things including:

Servo media at that position going bad.

Head 'touch down'

Degraded amplitude by a foreign object.

.others

The evidence indicates that the failure is isolated within a very narrow band of tracks (in this case only 2 cylinders). Also the failures appear to happen fairly frequently (10 per hour), while other areas of the disk (if being used) are not affected.

This problem also illustrates an occurrence (by chance) when there is no data transfer command in process. This results in the host error log indicating "block 0" as the block number in process. This could occur with a valid command reference number if the transfer had not started yet, though there was a transfer in the "SD1" controller queue waiting to be executed. Should this error occur in the middle of a transfer, then the block number would provide "cylinder information" that correlates.

LBN Correlation To A ‘Physical Cylinder’

Failures that consistently appear to be related to a specific RA90 cylinder(s), may be the result of a head crash, or problems where the servo detection information (dedicated and/or embedded) became corrupted and prevent proper head tracking on these cylinders. These problems would include HDA, ECM and PCM electronics.

Failures are 'typically' to a specific cylinder, or at most 3 cylinders. In case of head 'touchdown', the width may approach 10 cylinders.

For RA70/80/81/82/90, the logical cylinder correlates to physical cylinders. For the RA60, this logical to physical cylinder correlation DOES NOT EXIST.

Problem Resolution

Determine drive from error log information, HSC console information and/or customer.

Examination the "log" information for detail and note the type of errors.
Examination of drive internal error log information reveals a 'consistency' or correlation of logical cylinder information.

Realizing that a 'servo logic' failure probably would not be selective to a physical location on the media, you would select the HDA as being suspect.

Coordinating with the customer concerning the backing up of his data, you would replace the HDA.

You checkout of the drive subsequently would be to verify the operation of the new HDA.
11.1 Problem Statement

The customer has a "LARGE" disk farm in a cluster environment. The system consoles report "MOUNT VERIFICATION ERRORS" against RA90 unit 59. Customer applications have not "crashed" because of this. DUA59 receives data from other disks in the cluster every few hours and then a batch job is run to compile reports from this massive storage file. DUA59 is under control by various "job control programs" and is often left in the AVAILABLE state when data is not processed for it.

System configuration includes eight VAX 8800's, one HSC50, three HSC70's, eighty-eight various RA80 series units, and sixteen RA90's.

Refer to Section 11.2 in your ITS Reference Guide to examine the actual system console report printout.
11.2 Customer Console Printout

The 'actual' system console printout is:

%SYSTEM-I-MOUNTVER, _BRUTE$DUAn9: is offline. Mount
verification in progress.

$~~~~~~~~~~~~~~~~ OPCOM 27-AUG-1987 03:43:55.44 $~~~~~~~~~~~
Device _BRUTE$DUAn9: is offline.
Mount verification is in progress.

%SYSTEM-I-MOUNTVER, _BRUTE$DUAn9: has completed mount
verification.

$~~~~~~~~~~~~~~~~ OPCOM 27-AUG-1987 03:43:55.44 $~~~~~~~~~~~
CUSTOMER ERROR LOG

VAX / VMS SYSTEM ERROR REPORT COMPILED 28-MAR-1988 23:37
PAGE 1.

*************************************************************************** ENTRY 1. ***************************************************************************
ERROR SEQUENCE 478.
KAB6 REVISION 8. SERIAL# 1022. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _BRUTE$DU4:

MESSAGE TYPE 0001

MSLG$L_CMD_REF 00000000
MSLG$W_UNIT 0004

MSLG$W_SEQ_NUM 000A
MSLG$B_FORMAT 03
MSLG$B_FLAGS 40
MSLG$W_EVENT 01AB

MSLG$Q_CNT_ID 23454321
01200001

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00

MSLG$W_MULT_UNIT 0021
MSLG$Q_UNIT_ID 00000584
02050000

MSLG$B_UNIT_SVR 06
MSLG$B_UNIT_HVR 00
MSLG$L_VOL_SER 0000BA72
MSLG$L_HDR_CODE 00000000

MSLG$Z_SDI REQUEST 13

MODE 00
ERROR 00
CONTROLLER 00
RETRY 00

DISK MSCP MESSAGE
UNIT #4.
SEQUENCE #10.
SDI ERROR
OPERATION CONTINUING
DRIVE ERROR
RECEIVER READY COLLISION
UNIQUE IDENTIFIER, 000123454321(X)
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.
UNIQUE IDENTIFIER, 000000000584(X)
DISK CLASS DEVICE (166)
RA81

UNIT SOFTWARE VERSION #6.
UNIT HARDWARE REVISION #0.
VOLUME SERIAL #47730.
LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY

512-BYTE SECTOR FORMAT
NORMAL DRIVE OPERATION
0. RETRIES

FOR INTERNAL USE ONLY
### DEVICE DEPENDENT INFORMATION

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FOR INTERNAL USE ONLY
*************** ENTRY
ERROR SEQUENCE 403.
ERLSLOGMESSAGE ENTRY 27-MAR-1988 20:07:35.64
KA86 REV# 8. SERIAL# 1022. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _BRU$DUA0:
MESSAGE TYPE 0001
MSLG$C_CMD_REF 00000000
MSLG$W_UNIT 0000
MSLG$W_SEQ_NUM 000B
MSLG$B_FORMAT 03
MSLG$B_FLAGS 40
MSLG$W_EVENT 002B
MSLG$Q_CNT_ID 23454321
01200000

MSLG$B_CNT_SRV 02
MSLG$B_CNT_HVR 00
MSLG$W_MULTI_UNIT 0031
MSLG$Q_UNIT_ID 000114A4
02005000

MSLG$B_UNIT_SRV 07
MSLG$B_UNIT_HVR 06
MSLG$L_VOL_SER 00000D39
MSLG$L_HDR_CODE 00000000
MSLG$Z_SDI_REQUEST 13

MODE 00
ERROR 00
CONTROLLER 00
RETRY 00

DEVICE DEPENDENT INFORMATION
LONGWORD 1. 049F000A
LONGWORD 2. 03000001
LONGWORD 3. 00000001
LONGWORD 4. 00000000

DISK MSCP MESSAGE
UNIT #0.
SEQUENCE #11.
SDI ERROR
OPERATION CONTINUING
DRIVE ERROR
DRIVE COMMAND TIMEOUT

UNIQUE IDENTIFIER, 000123454321(X)
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 0000000114A4(X)
DISK CLASS DEVICE (165)
RA81

UNIT SOFTWARE VERSION #7.
UNIT HARDWARE REVISION #6.
VOLUME SERIAL #56633.
LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
512-BYTE SECTOR FORMAT
NORMAL DRIVE OPERATION
0. RETRIES

FOR INTERNAL USE ONLY
*** 3. **************************** ENTRY ***
ERROR SEQUENCE 752.
ERL$LOGMESSAGE ENTRY 28-MAR-1988 21:15:31.18
KAB6 REV# 8. SERIAL# 1022. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT BRUTE$DUAO:
MESSAGE TYPE 0001
MSLGS$CMD_REF 00000000
MSLGS$UNIT 0000
MSLGS$SEQ_NUM 003C
MSLGS$FORMAT 03
MSLGS$FLAGS 40
MSLGS$EVENT 01AB
MSLGS$CNT_ID 23454321
01200001

MSLGS$CNT_SRV 02
MSLGS$CNT_HVR 00
MSLGS$MULT_UNIT 0031
MSLGS$UNIT_ID 000114A4
02050000

MSLGS$UNIT_SRV 07
MSLGS$UNIT_HVR 06
MSLGS$VOL_SER 0000D39
MSLGS$HDR_CODE 00000000

MSLGSZ SDI REQUEST 13

MODE 00
ERROR 00
CONTROLLER 00
RETRY 00

DEVICE DEPENDENT INFORMATION
LONGWORD 1. 0238000A
LONGWORD 2. 03000000
LONGWORD 3. 00000001
LONGWORD 4. 00000000

DISK MSCP MESSAGE
UNIT #0.
SEQUENCE #12.
SDI ERROR
OPERATION CONTINUING
DRIVE ERROR
RECEIVER READY COLLISION

UNIQUE IDENTIFIER, 000123454321(X)
MASS STORAGE CONTROLLER
HSC70
CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 0000000114A4(X)
DISK CLASS DEVICE (166)
RA81
UNIT SOFTWARE VERSION #7.
UNIT HARDWARE REVISION #6.
VOLUME SERIAL #56633.
LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR

RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
512-BYTE SECTOR FORMAT
NORMAL DRIVE OPERATION
0. RETRIES

FOR INTERNAL USE ONLY
**ERROR SEQUENCE 260.**

**ERLSLOGMESSAGE ENTRY**

26-MAR-1988 17:35:42.69

**KA86 REV# 8. SERIAL# 1022. MFG PLANT 15.**

**I/O SUB-SYSTEM, UNIT _BRUTESDUAL:**

**MESSAGE TYPE**

0001

**MSLGS$CMD_REF**

512F000A

**MSLGS$W_UNIT**

0001

**MSLGS$W_SEQ_NUM**

0006

**MSLGS$B_FORMAT**

02

**MSLGS$B_FLAGS**

81

**MSLGS$W_EVENT**

006B

**MSLGS$Q_CNT_ID**

23454321
01200001

**MSLGS$B_CNT_SRV**

02

**MSLGS$B_CNT_HVR**

00

**MSLGS$W_MULT_UNIT**

0222

**MSLGS$Q_UNIT_ID**

00011493
02050000

**MSLGS$B_UNIT_SRV**

07

**MSLGS$B_UNIT_HVR**

06

**MSLGS$B_LEVEL**

00

**MSLGS$B_RETRY**

00

**MSLGS$L_VOL_SER**

0000DD1C

**MSLGS$L_HDR_CODE**

00034812

**CONTROLLER DEPENDENT INFORMATION**

**ORIG ERR**

1800

**ERR RECOV FLGS**

0002

**LV1 A RETRY**

01

**LV1 B RETRY**

00

**BUF DAT MEM ADR**

DD92

**SRC REQ #**

02

**DET REQ #**

02

**DISK MSCP MESSAGE**

**UNIT #1.**

**SEQUENCE #6.**

**DISK TRANSFER ERROR**

**SEQUENCE NUMBER RESET**

**OPERATION SUCCESSFUL**

**DRIVE ERROR**

**POSITIONER ERROR (MIS-SEEK)**

**UNIQUE IDENTIFIER, 000123454321(X)**

**MASS STORAGE CONTROLLER**

**HSC70**

**CONTROLLER SOFTWARE VERSION #2.**

**CONTROLLER HARDWARE REVISION #0.**

**UNIQUE IDENTIFIER, 000000011493(X)**

**DISK CLASS DEVICE (166)**

**RA81**

**UNIT SOFTWARE VERSION #7.**

**UNIT HARDWARE REVISION #6.**

**VOLUME SERIAL #56604.**

**LOGICAL BLOCK #21505B.**

**GOOD LOGICAL SECTOR**

**HEADER COMPARE ERROR**

**HEADER SYNC TIMEOUT**

**SUSPECTED LOW HEADER MISMATCH**

**ERR LOGGED TO CONSOLE AND HOST**

FOR INTERNAL USE ONLY
I/O SUB-SYSTEM, UNIT _BRUTEDUAL:

MSLG$L_CMD_REF 512F0000A
ORB$L_OWNER 00010001
UCB$L_CHAR 1C4D4108

UCB$L_OPCNT 0000532E
UCB$W_ERRCNT 0001
UCB$W_STS 1810

CDRP$L_MEDIA 00034812
CDRP$W_FUNC 000C
CDRP$L_BCNT 00000200
CDRP$W_BOFF 0000
CDRP$L_PID 0001001A
CDRP$Q_IOSB 00000000 010E0000

OWNER UIC [001,001]
DIRECTORY STRUCTURED
FILE ORIENTED
SHARABLE
AVAILABLE
MOUNTED
ERROR LOGGING
CAPABLE OF INPUT
CAPABLE OF OUTPUT
RANDOM ACCESS

21294. QIO'S THIS UNIT
1. ERRORS THIS UNIT

ONLINE
SOFTWARE VALID
UNLOAD AT DISMOUNT

STARTING LBN #215058.
READ PHYSICAL BLOCK
TRANSFER SIZE 512. BYTE(S)
TRANSFER PAGE AlIGNED
REQUESTOR "PID"
IOSB, 0. BYTE(S) TRANSFERRED
I/O SUB-SYSTEM, UNIT _BRUTESDUAL:

MESSAGE TYPE 0001
MSLG$L_CMD_REF 16AB0012
MSLG$W_UNIT 0001
MSLG$W_SEQ_NUM 0007
MSLG$B_FORMAT 02
MSLG$B_FLAGS 80
MSLG$W_EVENT 006B
MSLG$Q_CNT_ID 23454321
01200001

MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULTI_UNT 0022
MSLG$Q_UNIT_ID 00011493
02050000

MSLG$B_UNIT_SVR 07
MSLG$B_UNIT_HVR 06
MSLG$B_LEVEL 00
MSLG$B_RETRY 00
MSLG$L_VOL_SER 0000DD1C
MSLG$L_HDR_CODE 00034812

CONTROLLER DEPENDENT INFORMATION
ORIG ERR 1800

ERR RECOV FLGS 0002
LVI A RETRY 01
LVI B RETRY 00
BUF DAT MEM ADR C900
SRC REQ # 02
DET REQ # 02

DISK MSCP MESSAGE
UNIT #1.
SEQUENCE #7.
DISK TRANSFER ERROR
OPERATION SUCCESSFUL
DRIVE ERROR
POSITIONER ERROR (MIS-SEEK)

UNIQUE IDENTIFIER, 000123454321(X)
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 000000011493(X)
DISK CLASS DEVICE (166)
RA81

UNIT SOFTWARE VERSION #7.
UNIT HARDWARE REVISION #6.

VOLUME SERIAL #56604.
LOGICAL BLOCK #21505B.
GOOD LOGICAL SECTOR

HEADER COMPARE ERROR
HEADER SYNC TIMOUT
SUSPECTED LOW HEADER MISMATCH
ERR LOGGED TO CONSOLE AND HOST
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**OWNER UIC** [001,001]

**DIRECTORY STRUCTURED**

**FILE ORIENTED**

**SHARABLE**

**AVAILABLE**

**MOUNTED**

**ERROR LOGGING**

**CAPABLE OF INPUT**

**CAPABLE OF OUTPUT**

**RANDOM ACCESS**

30702. QIO'S THIS UNIT

3. ERRORS THIS UNIT

**ONLINE**

**SOFTWARE VALID**

**UNLOAD AT DISMOUNT**

STARTING LBN #215058.

**READ PHYSICAL BLOCK**

TRANSFER SIZE 512. BYTE(S)

TRANSFER PAGE ALIGNED

REQUESTOR "PID"

IOMS, 0. BYTE(S) TRANSFERRED
ERROR SEQUENCE 408.
ERL$LOGMESSAGE ENTRY 27-MAR-1988 13:19:10.08
KA86 REV# 8. SERIAL# 1022. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _BRUT$DUAL1:

MESSAGE TYPE 0001
MSL$GL_CMD_REF 82FC0008
MSL$GW_UNIT 0001
MSL$GW_SEQ_NUM 0008
MSL$GB_FORMAT 02
MSL$GB_FLAGS 80
MSL$GW_EVENT 006B

MSL$GQ_CNT_ID 23454321
01200001

MSL$GB_CNT_SVR 02
MSL$GB_CNT_HVR 00
MSL$GW_MULT_UNIT 0022
MSL$GQ_UNIT_ID 00011493
02050000

MSL$GB_UNIT_SVR 07
MSL$GB_UNIT_HVR 06
MSL$GB_LEVEL 00
MSL$GB_RETRY 00
MSL$GL_VOL_SER 0000DD1C
MSL$GL_HDR_CODE 00034812

CONTROLLER DEPENDENT INFORMATION
ORIG ERR 1800

ERR RECOV FLGS 0002
LVI A RETRY 01
LVI B RETRY 00
BUF DAT MEM ADR D76C
SRC REQ # 02
DET REQ # 02

DISK MSCP MESSAGE
UNIT #1.
SEQUENCE #8.
DISK TRANSFER ERROR
OPERATION SUCCESSFUL
DRIVE ERROR
POSITIONER ERROR (MIS-SEEK)

UNIQUE IDENTIFIER, 000123454321(X)
MASS STORAGE CONTROLLER
HSC70

CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000011493(X)
DISK CLASS DEVICE (166)
RA81

UNIT SOFTWARE VERSION #7.
UNIT HARDWARE REVISION #6.

VOLUME SERIAL #56604.
LOGICAL BLOCK #215058.
GOOD LOGICAL SECTOR

HEADER COMPARE ERROR
HEADER SYNC TIMEOUT
SUSPECTED LOW HEADER MISMATCH

ERR LOGGED TO CONSOLE AND HOST

FOR INTERNAL USE ONLY
**ERROR SEQUENCE 409.**
**ERLSLOGSTATUS ENTRY**
**27-MAR-1988 13:19:10.08**
**KA86 REV# 8. SERIAL# 1022. MFG PLANT 15.**

**I/O SUB-SYSTEM, UNIT _BRUTE$DUAL:**

<table>
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<tr>
<th>Field</th>
<th>Value</th>
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<tbody>
<tr>
<td>MSG$L_CMD_REF</td>
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<tr>
<td>ORB$L_OWNER</td>
<td>00010001</td>
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<tr>
<td>UCB$L_CHAR</td>
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<tr>
<td>UCB$L_OPCNT</td>
<td>00030F5C</td>
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<tr>
<td>UCB$W_ERRCNT</td>
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</tr>
<tr>
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<tr>
<td>CDRP$L_MEDIA</td>
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<td>CDRP$W_FUNC</td>
<td>000C</td>
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<td>CDRP$L_BCNT</td>
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<td>CDRP$W_BOFF</td>
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<td>CDRP$L_PID</td>
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<td>CDRP$Q_IOSB</td>
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**OWNER UIC [001,001]**

DIRECTORY STRUCTURED
FILE ORIENTED
SHARABLE
AVAILABLE
MOUNTED
ERROR LOGGING
CAPABLE OF INPUT
CAPABLE OF OUTPUT
RANDOM ACCESS

200540. QIO'S THIS UNIT

6. ERRORS THIS UNIT

ONLINE
SOFTWARE VALID
UNLOAD AT DISMOUNT

STARTING LBN #21505.

READ PHYSICAL BLOCK

TRANSFER SIZE 6656. BYTE(S)

TRANSFER PAGE ALIGNED

REQUESTOR "PID"

IOSB, 0. BYTE(S) TRANSFERRED
ERROR SEQUENCE 424.
ERL$LOGMESSAGE ENTRY 27-MAR-1988 14:34:54.01
KAS6 RE# 8. SERIAL# 1022. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _BRUTESDUAL:
MESSAGE TYPE 0001
MSLG$RL_CMD_REF 0F08001E
MSLG$W_UNIT 0001
MSLG$W_SEQ_NUM 0009
MSLG$B_FORMAT 02
MSLG$B_FLAGS 80
MSLG$W_EVENT 006B
MSLG$Q_CNT_ID 23454321
               01200001
MSLG$B_CNT_SVR 02
MSLG$B_CNT_HVR 00
MSLG$W_MULT_UNT 0022
MSLG$Q_UNIT_ID 00011493
               02050000
MSLG$B_UNIT_SVR 07
MSLG$B_UNIT_HVR 06
MSLG$B_LEVEL 00
MSLG$B_RETRY 00
MSLG$L_VOL_SER 0000D1C
MSLG$L_HDR_CODE 00034812

CONTROLLER DEPENDENT INFORMATION
ORIG ERR 1800

ERR RECOV FLGS 0002
LV1 A RETRY 01
LV1 B RETRY 00
BUF DAT MEM ADR DB89
SRC REQ # 02
DET REQ # 02

DISK MSCP MESSAGE
UNIT #1.
SEQUENCE #9.
DISK TRANSFER ERROR
OPERATION SUCCESSFUL
DRIVE ERROR
POSITIONER ERROR (MIS-SEEK)

UNIQUE IDENTIFIER, 000123454321(X)
MASS STORAGE CONTROLLER
HSC70
CONTROLLER SOFTWARE VERSION #2.
CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 000000011493(X)
DISK CLASS DEVICE (166)
RA81
UNIT SOFTWARE VERSION #7.
UNIT HARDWARE REVISION #6.

VOLUME SERIAL #56604.
LOGICAL BLOCK #215058.
GOOD LOGICAL SECTOR

HEADER COMPARE ERROR
HEADER SYNC TIMEOUT
SUSPECTED LOW HEADER MISMATCH
ERR LOGGED TO CONSOLE AND HOST

FOR INTERNAL USE ONLY
**ERROR SEQUENCE 423.**

**ENTRY**

**ERL$LOGSTATUS**

**ENTRY**

**27-MAR-1988 14:34:54.01**

**KA86 REV# 8. SERIAL# 1022. MFG PLANT 15.**

**I/O SUB-SYSTEM, UNIT _BRUTE$DUA1:**

**MSL$CMD_REF** 0F08001E

**ORB$OWNER** 00010001

**UCB$CHAR** 1C4D4108

**UCB$OCPNT** 000378F0

**UCB$ERRCNT** 0007

**UCB$STS** 1B10

**CDRPSL_MEDIA** 00034810

**CDRPSW_FUNC** 000C

**CDRPSL_BCNT** 00000600

**CDRPSW_BOFF** 0000

**CDRPSL_PID** 000200C3

**CDRPSQ_IOSB** 00000000

**010E000F**

**OWNER UID [001,001]**

**DIRECTORY STRUCTURED**

**FILE ORIENTED**

**SHARABLE**

**AVAILABLE**

**MOUNTED**

**ERROR LOGGING**

**CAPABLE OF INPUT**

**CAPABLE OF OUTPUT**

**RANDOM ACCESS**

**227568. QIO'S THIS UNIT**

**7. ERRORS THIS UNIT**

**ONLINE**

**SOFTWARE VALID**

**UNLOAD AT DISMOUNT**

**STARTING LBN #215056.**

**READ PHYSICAL BLOCK**

**TRANSFER SIZE 1536. BYTE(S)**

**TRANSFER PAGE ALIGNED**

**REQUESTOR "PID"**

**IOSB, 0. BYTE(S) TRANSFERRED**

**DEVICE ROLLUP LOGGED BY SID 0408F3FE**

**DEVICE**

**ERROR BITS SET**

**QIO TIMEOUT**

**ERRORS THIS SESSION**

**QIOS THIS SESSION**

<table>
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<tr>
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<th>[SOFT]</th>
<th>[HARD]</th>
<th>[SOFT]</th>
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<tr>
<td>_BRUTE$DUA4:</td>
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</table>

**SUMMARY OF ALL ENTRIES LOGGED BY SID 0408F3FE**

**ERL$LOGSTATUS** 4.

**ERL$LOGMESSAGE** 7.

**DATE OF EARLIEST ENTRY** 26-MAR-1988 17:35:42.68

**DATE OF LATEST ENTRY** 28-MAR-1988 21:15:31.18

**FOR INTERNAL USE ONLY**
PROCESSED ENTRIES HOUR-OF-DAY HISTOGRAM LOGGED BY SID 0408F3FE

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</table>
CUSTOMER CONSOLE MESSAGE

The following is the console message that the customer has concerns with:

%SYSTEM-I-MOUNTVER, _BRUTE$DUA59: is offline. Mount verification in progress.

%COM   OPCOM  27-MAR-1988 03:43:54.01 %COM
Device _BRUTE$DUA59: is offline.
Mount verification is in progress.

%SYSTEM-I-MOUNTVER, _BRUTE$DUA59: has completed mount verification.
%COM   OPCOM  27-MAR-1988 03:43:55.44 %COM
11.3 Troubleshooting the VMS "Mount Verification" Problem

A useful skill in troubleshooting is the ability to 'see the not so obvious detail' and make use of it.

The problem when initially presented in the 'drive simulation' showed that the drive was displaying that the Run, A and B port buttons as pressed BUT the RUN and READY LED were not on. Either the drive had been dismounted "unload" or the drive had previous to you just being onsite had changed state due to another event.

In addition, the problem presented also included the 'host console trail' indicating that each time the drive went into 'mount verification', it had ALWAYS exceeded. There was no evidence provided by the customer to indicate a 'failure' of application.

The only 'clue' for this problem is in the drive internal error log. This really defines the problem to be a basic overtemp condition. The drive cools down, then power comes back up, with the 'run switch' in and the appropriate ports 'selected'. When VMS has need of the drive and 'discovers' that it is not up and ready, it will issue a 'run command' to the drive and spins it up. The host will log a "mount verification error" to the system console, and if the mount is not successful in a period of time as determined by a VMS set parameter (default about 10 minutes) then the drive will be given up on. It is only coincidental that the drive has been in a 'cooled' down state and is operable.

This drive contains 3 overtemp sensors. The first, in the power supply, is provided to detect that a heat sink component temperature as measured has exceeded a safe temperature. Should the drive power supply sensor 'set', then the power supply will drop all outputs to the drive immediately (removing the drive blower fan voltage as well) and will continue to keep power to the temperature monitoring circuitry within the power supply. If the power supply sensor 'resets' as a result of "convection" cooling, then the supply will restore power to the logic within the drive.

The second and third sensors are located on the drive ECM servo heatsinks. Again these are provided to sense that proper cooling is taking place and that the thermal temperature of the servo power transistors is not exceeded. Anything that can restrict the airflow through the drive could result in any one of these sensors 'being set'.

Should a servo power heat sink sensor 'set', the drive will unload the heads, and spin down the HDA. The drive will remain in the spun down (heads unloaded and locked) state until the heat since sensor 'resets' and the drive is issued an "SDI run command". The drive will log to the controller the fact of a drive detected error is occurring. Power will remain applied to the blower assembly. If the drive is in a mount verify condition, VMS will issue to the controller an online command that the controller in turn issue a run command to the drive to bring the drive online.

The RA90 contains a variable-speed blower. The blower at about 24 degrees C will commence to increasing speed to its maximum airflow capabilities at about 35 degrees C. The variable-speed blower was needed so that the drive would meet the required 'acoustical noise standards' specified by various regulatory bodies around the world.

An obstructed airflow path (clogged prefilter), or defective motor could result in drive internal temperatures being sensed as 'too high'.
VMS-MOUNT VERIFICATION

The mount verification feature of Files-11 disk handling generally leaves users unaware that a mounted disk has gone offline and returned online or in some other way has become unreachable and then restored. Mount verification is enabled by default when a disk is mounted.

EXCEPTIONS: Disks mounted /FOREIGN and disks mounted /NOMOUNTVERIFICATION do not undergo mount verification except during cluster state transitions.

Drives dual-ported through HSCs should never be mounted /NOMOUNTVERIFICATION because this may prevent VMS from failing the drive over to the secondary HSC.

Mount verification sends messages to OPCOM. Because there are cases when mount verification messages are needed at the operators console and OPCOM might not be able to provide them, mount verification also sends special messages with the prefix %SYSTEM-I-MOUNTVER to the operator’s console only, that is, to OPA0.

VMS-PROBLEMS SURROUNDING DIAGNOSIS OF "WHY A DRIVE MOUNT-VERIFIES"

VMS Mount verifies a drive if it looses contact with it, (i.e. sent a command to it but didn’t get a successful return or did not get ANY response from the controller within a controller-specific timeout). It is a process to "verify" that the disk it (VMS) re-established contact with is the same disk it thinks it is connected to, especially after a momentary loss of context.

Sending the drive to the Mount-verify state involves:

1. Host initiating an MSCP "ONLINE" command to the drive [done with a suppress errors] modifier followed by a Get Unit Status (GUS).

2. Reading the home block and comparing the volume information (serial number, name, etc.) for the drive before VMS lost contact with it and after it re-establishes contact with the drive during mount verification.

This sequence is repeated until success or timeout. This sequence is made evident by the drive having a port light "on" and the ready light winking quite slowly as the controller accesses the FCT for the "online" and LBN block [1] for the media ID, effectively doing full-stroke seeks.

The MVTIMEOUT system parameter defines the time (in seconds) that is allowed for a pending mount verification to complete before it is automatically canceled. This dynamic parameter should always be set to a reasonable value for the typical operations at the site. The default VMS setting is 600 seconds (10 minutes) which is a good setting. Settings of less than 120 seconds is NOT appropriate.

After a mount verification times out, the pending and future I/O requests to the volume will fail. In some extreme cases, the drive failures may require the reboot of the controller, and some require the VAX to be rebooted. An attempt to do a "DISMOUNT/ABORT may allow another attempt to mount a device (if the MV timeout ever expired) to be successful.

Entry and exit to/from Mount-verify are time-stamped. VAXCluster time-stamps may vary across the CPU nodes of the cluster because of differences with the CPU 'time of year' clocks and the initial setting of the time. Slight variations in time-stamps do NOT indicate multiple drive or controller failures causing mount verification, but rather one drive or controller failure causing ALL nodes to enter mount verification at their own locally specified time.

FOR INTERNAL USE ONLY
Some reasons why a drive enters mount verification:-

- Dropped off-line, due to:
  - button glitch
  - Drive fault
  - Lost communications with controller/cable fault.
    [Drive temporarily went and came back].

Drive status changed, operator messed with drive.

Operator changed media (pack). [Causes entry but will never complete].

Someone accidentally pushed the write protect button.

By noting the time duration of the "mount verification" and other circumstances surrounding the mount verify status, you can determine some valuable troubleshooting information.

How long did it take:-

Less than "MVTIMEOUT", it succeeded eventually.

Few seconds implying a glitch/recoverable fault.

Did it appear on another controller after the mount-verification. If so then it could be a 'port' related problem.

Thirty seconds to a minute, probably means it was spun down and the "MSCP online" had to spin it back up. Was this due to a drive fault? Did it run its spin-up diagnostics error free?.

Infinite time probably means that along with the drive "disappearing it also changed its media_ID, maybe its a different drive, maybe it continually fails its spin-up diagnostics, or has a hard fault.

What did happen:-

Bear in mind VMS will not log any errors for the period of the Mount-verify, although it may log some before or after depending on how the drive broke and in what manner.

Did the drive see any fault during this period. Examination of any drive internal error log may reveal a clue?

Was there any error logs before or after or any console/HSC printout? *** it always the same drive?

Do any drives that are non-existent appear, characterizing a unit problem?

Was there a last-fail packet from the xDA shortly after, meaning the controller faulted and reinitialized as well?

Did all the drives on a port/K/controller fail?

**NON-VMS MOUNT VERIFICATION**

RSTS 9.x seems tolerant of DSA drives dropping off-line, it just seems to re-online them. Most other drives are gone-for-good under the same scenario unless the driver is patched to re-issue "online" before every command, (as RSX does) I'm not sure if either check the media_ID.