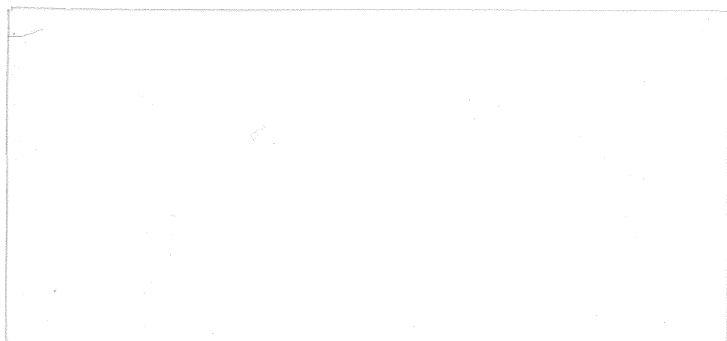


digital

RA90 ITS Reference Guide

Order Number EY-5804E-TG-0001



RA90 ITS Reference Guide

Order Number EY-5804E-TG-0001

FOR INTERNAL USE ONLY

**digital equipment corporation
maynard, massachusetts**

June, 1988

The information in this document is subject to change without notice and should not be construed as a commitment by Digital Equipment Corporation. Digital Equipment Corporation assumes no responsibility for any errors that may appear in this document.

The software described in this document is furnished under a license and may be used or copied only in accordance with the terms of such license.

No responsibility is assumed for the use or reliability of software on equipment that is not supplied by Digital Equipment Corporation or its affiliated companies.

Copyright ©June, 1988 by Digital Equipment Corporation

All Rights Reserved.
Printed in U.S.A.

The following are trademarks of Digital Equipment Corporation:

DEC	DIBOL	UNIBUS
DEC/CMS	EduSystem	VAX
DEC/MMS	IAS	VAXcluster
DECnet	MASSBUS	VMS
DECsystem-10	PDP	VT
DECSYSTEM-20	PDT	
DECUS	RSTS	
DECwriter	RSX	

digital TM

Contents

About This Manual	v
1 Bug 1	
1.1 Problem Statement	1
1.2 Customer Error Log	2
1.3 Troubleshooting the Forced Error	8
2 Bug 2	
2.1 Problem Statement	12
2.2 Customer Errorlog Rollup	13
2.3 Troubleshooting ECC Errors Without 'Wire' Errors - 1 Surface	14
3 Bug 3	
3.1 Problem Statement	19
3.2 Customer Error Log	20
3.3 Random ECC Errors Without 'Wire Errors'	72
4 Bug 4	
4.1 Problem Statement	78
4.2 Customer Error Log	79
4.3 Troubleshooting Random ECC Errors With 'Wire Errors'	80
5 Bug 5	
5.1 Problem Statement	82
5.2 Customer Error Log	83
5.3 Troubleshooting the SDI Protocol Error	103

6 Bug 6

6.1	Problem Statement	105
6.2	Customer Errorlog Rollup	106
6.3	Controller Detected SERDES Overrun	107

7 Bug 7

7.1	Problem Statement	109
7.2	Customer Error Log	110
7.3	Formatting the RA90 "READ-ONLY" Cylinder	115

8 Bug 8

8.1	Problem Statement	117
8.2	Customer Error Log	118
8.3	Troubleshooting Servo Related Failures	169

9 Bug 9

9.1	Problem Statement	172
9.2	Customer Error Log	173
9.3	Troubleshooting the Controller Detected 'EDC' Error	182

10 Bug 10

10.1	Problem Statement	185
10.2	Customer Error Log Rollup	186
10.3	Troubleshooting SERVO Data Failures	187

11 Bug 11

11.1	Problem Statement	189
11.2	Customer Console Printout	190
11.3	Troubleshooting the VMS "Mount Verification" Problem	205

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.

Prompt	Action	Object
ITS WORDS >	exit	
ITS WORDS >	run	ildisk

The ACTIONS are listed below.

CHeck	DOne	EXit	GIve Up
HELP	INStall	POwer ON	POwer OFF
REPlace	REStore	REVIew	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.

CARtridge	FILE	FRU	LOOPback
DKUTIL	ILDISK	ILEXER	VERIFY
SYSTEM ERROR LOG			

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.

ACTION	OBJECT	FUNCTION
CHECK	FRU	Check an FRU for a physical condition.
CHECK	CARTRIDGE	Check to see if an update cartridge is installed.
CHECK	LOOP BACKS	Check to see if the SDI loopback connectors are installed.
CHECK	SYSTEM ERROR LOG	Check the system error logger for MSCP error log messages.
DONE		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.
EXIT		Exits the problem without stating the solution.
GIVE UP		Exits the problem and gives the solution.
HELP		Display the ACTION and OBJECT words.
INSTALL	CARTRIDGE	Installs a Firmware Update Cartridge
INSTALL	LOOPBACKS	Install the loopback test connectors in both ports.
POWER ON		Reconnects the power cord and turns on the drive power switch.
POWER OFF		Turns off the drive power switch and disconnects the power cord.
REPLACE	FRU	Replaces an FRU.
RESTORE	FILE	Restores files from backup
REVIEW		Restates the problem scenario and lists the actions you have taken for the current problem.
RUN	DKUTIL	Runs the HSC Disk Utility.
RUN	ILDISK	Runs the HSC Disk diagnostic.
RUN	ILEXER	Runs the HSC Exerciser.
RUN	VERIFY	Runs the HSC Verify Utility

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

Blower Motor	OCP Panel
Brake Assembly	PCM Module
ECM Module	Power Supply
Ground Brush Assembly	Read/Write Cable
HDA Assembly	SI Cable
IEC Cable	Controller SDI Module (.ksdi)

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.SYSEX.E.MARK]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

V A X / V M S SYSTEM ERROR REPORT COMPILED 17-APR-1988 09:53
 ***** ENTRY 1. *****
 ERROR SEQUENCE 2626. LOGGED ON SID 067D0140

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\$L_CMD_REF 00000000

MSLG\$W_UNIT 0003

UNIT #3.

MSLG\$W_SEQ_NUM 0001

SEQUENCE #1.

MSLG\$B_FORMAT 03

SDI ERROR

MSLG\$B_FLAGS 41

SEQUENCE NUMBER RESET
 OPERATION CONTINUING

MSLG\$W_EVENT 00EB

DRIVE ERROR

DRIVE DETECTED ERROR

MSLG\$Q_CNT_ID 0000FA05
 01200000

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

MSLG\$B_CNT_SVR 00

CONTROLLER SOFTWARE VERSION #0.

MSLG\$B_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$W_MULT_UNT 0072

MSLG\$Q_UNIT_ID 0000022D
 02130000

UNIQUE IDENTIFIER, 00000000022D(X)
 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.
 GOOD LOGICAL SECTOR

MSLG\$Z_SDI
 REQUEST 1F

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

MODE	00	512-BYTE SECTOR FORMAT
ERROR	40	SDI RECEIVE ERROR
CONTROLLER	00	NORMAL DRIVE OPERATION
RETRY	00	0. RETRIES
CONTROLLER OR DEVICE DEPENDENT INFORMATION		
LED CODE	07	
PANEL CODE	0E	
LAST OPCODE	88	GET SUB-UNIT CHARACTERISTICS
RESERVED	03	
CUR CYLNR	0000	CURRENT CYLINDER, #0.
CUR GROUP	00	CURRENT GROUP, #0.
REQUESTOR	07	REQUESTOR #7.
DRIVE PORT	02	DRIVE PORT #2.

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

***** ENTRY

2. *****

ERROR SEQUENCE 3416.

LOGGED ON SID 067D0140

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

I/O SUB-SYSTEM, UNIT _WHEEZY\$DUAL130:

MESSAGE TYPE	0001	DISK MSCP MESSAGE
MSLG\$\$_CMD_REF	00000000	
MSLG\$\$_UNIT	0082	UNIT #130.
MSLG\$\$_SEQ_NUM	0009	SEQUENCE #9.
MSLG\$\$_FORMAT	03	SDI ERROR
MSLG\$\$_FLAGS	40	OPERATION CONTINUING
MSLG\$\$_EVENT	002B	DRIVE ERROR
		DRIVE COMMAND TIMEOUT
MSLG\$\$_CNT_ID	7087FC03 01010000	UNIQUE IDENTIFIER, 00007087FC03(X) MASS STORAGE CONTROLLER HSC50
MSLG\$\$_CNT_SVR	02	CONTROLLER SOFTWARE VERSION #2.
MSLG\$\$_CNT_HVR	00	CONTROLLER HARDWARE REVISION #0.
MSLG\$\$_MULT_UNT	0040	
MSLG\$\$_UNIT_ID	00042D9E 02050000	UNIQUE IDENTIFIER, 000000042D9E(X) DISK CLASS DEVICE (166) RA81
MSLG\$\$_UNIT_SVR	07	UNIT SOFTWARE VERSION #7.
MSLG\$\$_UNIT_HVR	06	UNIT HARDWARE REVISION #6.
MSLG\$\$_VOL_SER	00000000	VOLUME SERIAL #0.
MSLG\$\$_HDR_CODE	00000000	LOGICAL BLOCK #0. GOOD LOGICAL SECTOR
MSLG\$\$_SDI REQUEST	13	RUN/STOP SWITCH IN PORT SWITCH IN SPINDLE READY
MODE	00	
ERROR CONTROLLER	00 00	512-BYTE SECTOR FORMAT
RETRY	00	NORMAL DRIVE OPERATION
		0. RETRIES

DEVICE DEPENDENT INFORMATION

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

BEGINNING OF INTERVENING ENTRIES

***** ENTRY 3. *****
 ERROR SEQUENCE 3388. LOGGED ON SID 067D0140
 ERL\$LOGMESSAGE ENTRY 16-APR-1988 08:39:44.23
 KA87 REV# 125. RIGHT CPU

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

MESSAGE TYPE	0001	DISK MSCP MESSAGE
MSLG\$SL_CMD_REF	C9290000	
MSLG\$W_UNIT	0001	UNIT #1.
MSLG\$W_SEQ_NUM	0080	SEQUENCE #128.
MSLG\$B_FORMAT	02	DISK TRANSFER ERROR
MSLG\$B_FLAGS	81	SEQUENCE NUMBER RESET
		OPERATION SUCCESSFUL
MSLG\$W_EVENT	006B	DRIVE ERROR
		POSITIONER ERROR (MIS-SEEK)
MSLG\$Q_CNT_ID	0000FA05 01200000	UNIQUE IDENTIFIER, 00000000FA05(X) MASS STORAGE CONTROLLER HSC70
MSLG\$B_CNT_SVR	00	CONTROLLER SOFTWARE VERSION #0.
MSLG\$B_CNT_HVR	00	CONTROLLER HARDWARE REVISION #0.
MSLG\$W_MULT_UNT	0032	
MSLG\$Q_UNIT_ID	00001000 02050000	UNIQUE IDENTIFIER, 000000001000(X) DISK CLASS DEVICE (166) RA81
MSLG\$B_UNIT_SVR	06	UNIT SOFTWARE VERSION #6.
MSLG\$B_UNIT_HVR	00	UNIT HARDWARE REVISION #0.
MSLG\$B_LEVEL	00	
MSLG\$B_RETRY	00	
MSLG\$SL_VOL_SER	4BCE4E13	VOLUME SERIAL #1271811603.
MSLG\$SL_HDR_CODE	00008F0A	LOGICAL BLOCK #36618. GOOD LOGICAL SECTOR
CONTROLLER DEPENDENT INFORMATION		
ORIG ERR	1800	HEADER COMPARE ERROR HEADER SYNC TIMEOUT SUSPECTED LOW HEADER MISMATCH
ERR RECOV FLGS	0002	ERR LOGGED TO CONSOLE AND HOST
LV1 A RETRY	06	
LV1 B RETRY	00	
SRC REQ #	03	BUF DAT MEM ADR CEE3
DET REQ #	03	

DEVICE ROLLUP LOGGED BY SID 067D0140

DEVICE	ERROR BITS SET		QIO TIMEOUT		ERRORS THIS SESSION	QIOS THIS SESSION
	[HARD]	[SOFT]	[HARD]	[SOFT]		
_GREASY\$DUA1:	0.	1.	0.	0.	0.	0.
_GREASY\$DUA3:	0.	1.	0.	0.	0.	0.
_WHEEZY\$DUA130:	0.	1.	0.	0.	0.	0.

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

00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00

0.
1. *
0.
0.
0.
1. *
0.
0.
1. *
0.
0.
0.
0.
0.
0.
0.
0.
0.
0.
0.
0.
0.
0.
0.

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-DISA 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 cannot 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 revector 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 SOMETIME 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-alone, 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_E_READBLOCK
error reading block 11 of DUA0:[SYS0.SYSEXEX]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.

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.

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.

2

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

<-- Drive -->			MSCP	Block	< Logical >			Phy	
Name#	Typ	Led	Event	#	Cyl	Gp	S	S	yy-mm-dd hh:mm:ss:cc
DUA59	90		#01E8	630644	703	0	53	53	87/02/24 10:32:22.13
DUA59	90		0034	630652	703	0	61	61	87/02/24 10:32:29.37
DUA59	90		#00E8	630645	703	0	54	54	87/02/24 10:32:29.49
DUA59	90		0034	630645	703	0	54	54	87/02/24 10:32:34.23
DUA59	90		#01E8	632440	705	0	55	55	87/02/24 10:33:23.65
DUA59	90		0034	632440	705	0	55	55	87/02/24 10:33:28.54
DUA59	90		0034	528360	589	0	27	27	87/02/24 10:51:31.28
DUA59	90		#00E8	1905279	2124	0	51	51	87/02/24 10:55:26.97
DUA59	90		0014	1905279	2124	0	51	51	87/02/24 10:55:28.81
DUA59	90		#00E8	631548	704	0	60	60	87/02/24 10:55:28.89
DUA59	90		0034	631555	704	0	67	67	87/02/24 10:55:34.22
DUA59	90		#00E8	535570	597	0	61	61	87/02/24 10:54:25.51
DUA59	90		0034	535570	597	0	61	61	87/02/24 10:54:29.26
DUA59	90		#00E8	548122	611	0	55	55	87/02/24 10:55:51.00
DUA59	90		0034	548122	611	0	55	55	87/02/24 10:55:54.58
DUA59	90		#00E8	551702	615	0	47	47	87/02/24 10:56:14.43
DUA59	90		0034	551702	615	0	47	47	87/02/24 10:56:17.94
DUA59	90		#00E8	552591	616	0	39	39	87/02/24 10:56:22.56
DUA59	90		0034	552591	616	0	39	39	87/02/24 10:56:26.10
DUA59	90		#00E8	1637978	1826	0	56	56	87/02/24 10:56:49.71
DUA59	90		0034	1637978	1826	0	56	56	87/02/24 10:56:53.30
DUA59	90		#00E8	1637979	1826	0	57	57	87/02/24 10:56:53.46
DUA59	90		0014	1637979	1826	0	57	57	87/02/24 10:56:55.28
DUA59	90		#00E8	584903	652	0	59	59	87/02/24 10:57:17.43
DUA59	90		0014	584903	652	0	59	59	87/02/24 10:57:19.15
DUA59	90		#00E8	1800323	2007	0	44	44	87/02/24 10:57:41.60
DUA59	90		0014	1800323	2007	0	44	44	87/02/24 10:57:43.41
DUA59	90		#00E8	590264	658	0	38	38	87/02/24 10:57:47.55
DUA59	90		0014	590264	658	0	38	38	87/02/24 10:57:49.27
DUA59	90		#00E8	591126	659	0	3	3	87/02/24 10:57:55.61
DUA59	90		0014	591126	659	0	3	3	87/02/24 10:57:57.29

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 Found 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.

Block Number	< Logical > Cyl Gp S		
-----	----	--	--
630644	703	0	53
630652	703	0	61
630645	703	0	54
632440	705	0	55
528360	589	0	27
631539	704	0	51
631548	704	0	60
631555	704	0	67
535570	597	0	61
548122	611	0	55
551702	615	0	47
552591	616	0	39
579518	646	0	56
579519	646	0	57
584903	652	0	59
589373	657	0	44
590264	658	0	38
591126	659	0	3

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:[JOUT2.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

			Sector		Volume	
	Phys.	From	Soft	Hard	Serial	
Head	Cyl.	Index	Count	Count	Number	Error Type
0	597	61	1	0	472	ECC Error
0	611	55	1	0	472	ECC Error
0	615	47	1	0	472	ECC Error
0	616	39	1	0	472	ECC Error
0	646	56	1	0	472	ECC Error
0	646	57	1	0	472	ECC Error
0	652	59	1	0	472	ECC Error
0	657	44	1	0	472	ECC Error
0	658	38	1	0	472	ECC Error
0	659	3	1	0	472	ECC Error
0	703	53	1	0	472	ECC Error
0	703	54	1	0	472	ECC Error
0	704	51	1	0	472	ECC Error
0	704	60	1	0	472	ECC Error
0	705	55	1	0	472	ECC Error

Time: 24-FEB 10:32:22 TO 24-FEB 10:57:55 Span: 0:26:33

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

Bug 3

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

```

V A X / V M S      SYSTEM ERROR REPORT      COMPILED 24-MAR-1988 22:40
                                           PAGE 1.
***** ENTRY 1. *****
ERROR SEQUENCE 2834.                      LOGGED ON SID 0404F098
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:32:22.13
                                   KA86 REV# 4. SERIAL# 152. MFG PLANT 15.
I/O SUB-SYSTEM, UNIT _VADER$DUA59:

      MESSAGE TYPE      0001
      MSLG$SL_CMD_REF 316E0015
      MSLG$W_UNIT      003B
      MSLG$W_SEQ_NUM    000E
      MSLG$B_FORMAT     02
      MSLG$B_FLAGS      E0
      MSLG$W_EVENT      01E8
      MSLG$Q_CNT_ID     000000DD
                        01200000
      MSLG$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$B_RETRY      01
      MSLG$SL_VOL_SER   000001D8
      MSLG$SL_HDR_CODE  00099F74

      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

      DISK MSCP MESSAGE
      UNIT #59.
      SEQUENCE #14.
      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 #630644.
      GOOD LOGICAL SECTOR
      EDC ERROR
      ECC ERROR
      LBN REPLACEMENT INDICATED
      ERR LOGGED TO CONSOLE AND HOST

```

```

***** ENTRY 2. *****
ERROR SEQUENCE 2837. LOGGED ON SID 0404F098
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:32:29.49
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _VADER$DUA59:
MESSAGE TYPE 0001 DISK MSCP MESSAGE

MSLG$SL_CMD_REF 316E0015
MSLG$W_UNIT 003B UNIT #59.

MSLG$W_SEQ_NUM 0012 SEQUENCE #18.

MSLG$B_FORMAT 02 DISK TRANSFER ERROR

MSLG$B_FLAGS E0 BAD BLK REPLACEMENT REQUEST
OPERATION CONTINUING
OPERATION SUCCESSFUL

MSLG$W_EVENT 00E8 DATA ERROR
UNCORRECTABLE ECC ERROR

MSLG$Q_CNT_ID 000000DD
01200000 UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

MSLG$B_CNT_SVR 02 CONTROLLER SOFTWARE VERSION #2.

MSLG$B_CNT_HVR 00 CONTROLLER HARDWARE REVISION #0.

MSLG$W_MULT_UNT 0072
MSLG$Q_UNIT_ID 000FFFFF
02130000 UNIQUE IDENTIFIER, 0000000FFFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG$B_UNIT_SVR 00 UNIT SOFTWARE VERSION #0.

MSLG$B_UNIT_HVR 0F UNIT HARDWARE REVISION #15.

MSLG$B_LEVEL 00
MSLG$B_RETRY 01
MSLG$L_VOL_SER 000001D8 VOLUME SERIAL #472.

MSLG$L_HDR_CODE 00099F75 LOGICAL BLOCK #630645.
GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION
ORIG ERR 8010 EDC ERROR
ECC ERROR

ERR RECOV FLGS 0003 LBN REPLACEMENT INDICATED
ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 00
LV1 B RETRY 00
BUF DAT MEM ADR C146
SRC REQ # 07
DET REQ # 07

```

```

***** ENTRY 3. *****
ERROR SEQUENCE 2838. LOGGED ON SID 0404F098
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:32:29.49
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _VADER$DUA59:
MESSAGE TYPE 0001 DISK MSCP MESSAGE

MSLG$L_CMD_REF 316E0015
MSLG$W_UNIT 003B UNIT #59.

MSLG$W_SEQ_NUM 0012 SEQUENCE #18.

MSLG$B_FORMAT 02 DISK TRANSFER ERROR

MSLG$B_FLAGS E0 BAD BLK REPLACEMENT REQUEST
OPERATION CONTINUING
OPERATION SUCCESSFUL

MSLG$W_EVENT 00E8 DATA ERROR
UNCORRECTABLE ECC ERROR

MSLG$Q_CNT_ID 00000EAD
01200000 UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

MSLG$B_CNT_SVR 02 CONTROLLER SOFTWARE VERSION #2.

MSLG$B_CNT_HVR 00 CONTROLLER HARDWARE REVISION #0.

MSLG$W_MULT_UNIT 0072
MSLG$Q_UNIT_ID 000FFFFF
02130000 UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG$B_UNIT_SVR 00 UNIT SOFTWARE VERSION #0.

MSLG$B_UNIT_HVR 0F UNIT HARDWARE REVISION #15.

MSLG$B_LEVEL 00
MSLG$B_RETRY 01
MSLG$L_VOL_SER 000001D8 VOLUME SERIAL #472.

MSLG$L_HDR_CODE 00099F75 LOGICAL BLOCK #630645.
GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION
ORIG ERR 8010 EDC ERROR
ECC ERROR

ERR RECOV FLGS 0003 LBN REPLACEMENT INDICATED
ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 00
LV1 B RETRY 00
BUF DAT MEM ADR C146
SRC REQ # 07
DET REQ # 07

```

***** ENTRY 4. *****
 ERROR SEQUENCE 2839. LOGGED ON SID 0404F098
 ERL\$LOGMESSAGE ENTRY 24-MAR-1988 10:32:34.23
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MESSAGE TYPE	0001	DISK MSCP MESSAGE
MSLG\$\$_CMD_REF	316E0015	
MSLG\$\$_UNIT	003B	UNIT #59.
MSLG\$\$_SEQ_NUM	0013	SEQUENCE #19.
MSLG\$\$_FORMAT	09	BAD BLOCK REPLACEMENT
MSLG\$\$_FLAGS	80	OPERATION SUCCESSFUL
MSLG\$\$_EVENT	0034	BAD BLOCK REPLACEMENT
		BLOCK VERIFIED GOOD
MSLG\$\$_CNT_ID	00000EAD 01200000	UNIQUE IDENTIFIER, 0000000000DD(X) MASS STORAGE CONTROLLER HSC70
MSLG\$\$_CNT_SVR	02	CONTROLLER SOFTWARE VERSION #2.
MSLG\$\$_CNT_HVR	00	CONTROLLER HARDWARE REVISION #0.
MSLG\$\$_MULT_UNT	0072	
MSLG\$\$_UNIT_ID	000FFFFFF 02130000	UNIQUE IDENTIFIER, 0000000FFFFFF(X) DISK CLASS DEVICE (166) RA90
MSLG\$\$_UNIT_SVR	00	UNIT SOFTWARE VERSION #0.
MSLG\$\$_UNIT_HVR	0F	UNIT HARDWARE REVISION #15.
MSLG\$\$_RPL_FLGS	0000	REPLACEMENT ATTEMPTED, BLOCK _ VERIFIED GOOD
MSLG\$\$_VOL_SER	000001D8	VOLUME SERIAL #472.
MSLG\$\$_BAD_LBN	00099F75	BAD LOGICAL BLOCK _ NUMBER = 630645.
MSLG\$\$_OLD_RBN	00000000	
MSLG\$\$_NEW_RBN	000023B4	
MSLG\$\$_CAUSE	00E8	DATA ERROR UNCORRECTABLE ECC ERROR

***** ENTRY

5. *****

ERROR SEQUENCE 2840.

LOGGED ON SID 0404F098

ERL\$LOGSTATUS ENTRY 24-MAR-1988 10:32:34.57

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

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

MSLG\$L_CMD_REF 316E0015

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 00001AC2

6850. QIO'S THIS UNIT

UCB\$W_ERRCNT 0033

51. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE

SOFTWARE VALID

UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 00099F74

STARTING LBN #630644.

CDRP\$W_FUNC 400B

WRITE PHYSICAL BLOCK

IO\$M_DATACHECK

CDRP\$L_BCNT 00008000

TRANSFER SIZE 32768. BYTE(S)

CDRP\$W_BOFF 01E8

488. BYTE PAGE OFFSET

CDRP\$L_PID 000A0022

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000
010E000F

IOSB, 0. BYTE(S) TRANSFERRED

***** ENTRY

6. *****

ERROR SEQUENCE 2845.

LOGGED ON SID 0404F098

ERL\$LOGMESSAGE ENTRY 24-MAR-1988 10:33:23.65

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

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$\$_CMD_REF 83C20040

MSLG\$\$_UNIT 003B

UNIT #59.

MSLG\$\$_SEQ_NUM 0018

SEQUENCE #24.

MSLG\$\$_FORMAT 02

DISK TRANSFER ERROR

MSLG\$\$_FLAGS E0

BAD BLK REPLACEMENT REQUEST
OPERATION CONTINUING
OPERATION SUCCESSFUL

MSLG\$\$_EVENT 01E8

DATA ERROR

MSLG\$\$_CNT_ID 00000EAD
01200000

8. SYMBOL ECC ERROR

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

MSLG\$\$_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$\$_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$\$_MULT_UNIT 0072

MSLG\$\$_UNIT_ID 000FFFFF
02130000UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG\$\$_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$\$_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$\$_LEVEL 00

MSLG\$\$_RETRY 01

MSLG\$\$_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$\$_HDR_CODE 0009A678

LOGICAL BLOCK #632440.
GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION

ORIG ERR 8010

EDC ERROR

ECC ERROR

ERR RECOV FLGS 0003

LBN REPLACEMENT INDICATED
ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 00

LV1 B RETRY 00

BUF DAT MEM ADR C4B2

SRC REQ # 07

DET REQ # 07

***** ENTRY 7. *****
 ERROR SEQUENCE 2846. LOGGED ON SID 0404F098
 ERL\$LOGMESSAGE ENTRY 24-MAR-1988 10:33:28.54
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 83C20040

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 0019

SEQUENCE #25.

MSLG\$B_FORMAT 09

BAD BLOCK REPLACEMENT

MSLG\$B_FLAGS 80

OPERATION SUCCESSFUL

MSLG\$W_EVENT 0034

BAD BLOCK REPLACEMENT
 BLOCK VERIFIED GOOD

MSLG\$Q_CNT_ID 00000EAD
 01200000

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

MSLG\$B_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$B_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$W_MULT_UNT 0072

MSLG\$Q_UNIT_ID 000FFFFF
 02130000

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

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$W_RPL_FLGS 0000

REPLACEMENT ATTEMPTED, BLOCK
 _ VERIFIED GOOD

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_BAD_LBN 0009A678

BAD LOGICAL BLOCK
 _ NUMBER = 632440.

MSLG\$L_OLD_RBN 00000000

MSLG\$L_NEW_RBN 000023CD

MSLG\$W_CAUSE 01E8

DATA ERROR
 8. SYMBOL ECC ERROR.

***** ENTRY 8. *****
 ERROR SEQUENCE 3234. LOGGED ON SID 0404F098
 ERL\$LOGMESSAGE 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	0001	DISK MSCP MESSAGE
MSLG\$L_CMD_REF	F8C00019	
MSLG\$W_UNIT	003B	UNIT #59.
MSLG\$W_SEQ_NUM	03B2	SEQUENCE #946.
MSLG\$B_FORMAT	09	BAD BLOCK REPLACEMENT
MSLG\$B_FLAGS	80	OPERATION SUCCESSFUL
MSLG\$W_EVENT	0034	BAD BLOCK REPLACEMENT
		BLOCK VERIFIED GOOD
MSLG\$Q_CNT_ID	00000EAD 01200000	UNIQUE IDENTIFIER, 0000000000DD(X) MASS STORAGE CONTROLLER HSC70
MSLG\$B_CNT_SVR	02	CONTROLLER SOFTWARE VERSION #2.
MSLG\$B_CNT_HVR	00	CONTROLLER HARDWARE REVISION #0.
MSLG\$W_MULT_UNIT	0072	
MSLG\$Q_UNIT_ID	000FFFFF 02130000	UNIQUE IDENTIFIER, 0000000FFFFF(X) DISK CLASS DEVICE (166) RA90
MSLG\$B_UNIT_SVR	00	UNIT SOFTWARE VERSION #0.
MSLG\$B_UNIT_HVR	0F	UNIT HARDWARE REVISION #15.
MSLG\$W_RPL_FLGS	0000	REPLACEMENT ATTEMPTED, BLOCK _ VERIFIED GOOD
MSLG\$L_VOL_SER	000001D8	VOLUME SERIAL #472.
MSLG\$L_BAD_LBN	00080FE8	BAD LOGICAL BLOCK _ NUMBER = 528360.
MSLG\$L_OLD_RBN	00000000	
MSLG\$L_NEW_RBN	00001DE9	
MSLG\$W_CAUSE	01E8	DATA ERROR
		8. SYMBOL ECC ERROR

***** ENTRY 9. *****
 ERROR SEQUENCE 3250. LOGGED ON SID 0404F098
 ERL\$LOGSTATUS ENTRY 24-MAR-1988 10:51:38.80
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MSLG\$L_CMD_REF F8C00019
 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 000034DF

13535. QIO'S THIS UNIT

UCB\$W_ERRCNT 003A

58. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE
 SOFTWARE VALID
 UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 00080FCC

STARTING LBN #528332.

CDRP\$W_FUNC 400B

WRITE PHYSICAL BLOCK
 IO\$M_DATACHECK

CDRP\$L_BCNT 00008000

TRANSFER SIZE 32768. BYTE(S)

CDRP\$W_BOFF 01E8

488. BYTE PAGE OFFSET

CDRP\$L_PID 000A0020

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000
 010E000F

IOSB, .0. BYTE(S) TRANSFERRED

***** ENTRY

10. *****

ERROR SEQUENCE 3622.

LOGGED ON SID 0404F098

ERL\$LOGMESSAGE ENTRY 24-MAR-1988 10:55:28.81

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

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 3C230031

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 0004

SEQUENCE #4.

MSLG\$B_FORMAT 09

BAD BLOCK REPLACEMENT

MSLG\$B_FLAGS 80

OPERATION SUCCESSFUL

MSLG\$W_EVENT 0014

BAD BLOCK REPLACEMENT

BAD BLOCK REPLACED

MSLG\$Q_CNT_ID 000000DD

01200000

UNIQUE IDENTIFIER, 0000000000DD(X)

MASS STORAGE CONTROLLER

HSC70

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 000FFFFFF

02130000

UNIQUE IDENTIFIER, 0000000FFFFFF(X)

DISK CLASS DEVICE (166)

RA90

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$W_RPL_FLGS 8000

REPLACEMENT ATTEMPTED, BLOCK

_ VERIFIED BAD

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_BAD_LBN 00038654

BAD LOGICAL BLOCK

_ NUMBER = 230996.

MSLG\$L_OLD_RBN 00000000

FORMER REPLACEMENT BLOCK

_ NUMBER = 0.

MSLG\$L_NEW_RBN 00000D26

NEW REPLACEMENT BLOCK

_ NUMBER = 3366.

MSLG\$W_CAUSE 01E8

DATA ERROR

8. SYMBOL ECC ERROR

***** ENTRY

11. *****

ERROR SEQUENCE 3623.

LOGGED ON SID 0404F098

ERL\$LOGSTATUS ENTRY 24-MAR-1988 10:55:28.82

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

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

MSLG\$L_CMD_REF 3C230031

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 000037EA

14314. QIO'S THIS UNIT

UCB\$W_ERRCNT 0040

64. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE

SOFTWARE VALID

UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 00038642

STARTING LBN #230978.

CDRP\$W_FUNC 000C

READ PHYSICAL BLOCK

CDRP\$L_BCNT 00002000

TRANSFER SIZE 8192. BYTE(S)

CDRP\$W_BOFF 0000

TRANSFER PAGE ALIGNED

CDRP\$L_PID 000A0022

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000

IOSB, 0. BYTE(S) TRANSFERRED

010E000F

***** ENTRY 12. *****
 ERROR SEQUENCE 3624. LOGGED ON SID 0404F098
 ERL\$LOGMESSAGE ENTRY 24-MAR-1988 10:55:28.89
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$\$_CMD_REF 48C10027

MSLG\$\$_UNIT 003B

UNIT #59.

MSLG\$\$_SEQ_NUM 0005

SEQUENCE #5.

MSLG\$\$_FORMAT 02

DISK TRANSFER ERROR

MSLG\$\$_FLAGS E0

BAD BLK REPLACEMENT REQUEST
 OPERATION CONTINUING
 OPERATION SUCCESSFUL

MSLG\$\$_EVENT 00E8

DATA ERROR
 UNCORRECTABLE ECC ERROR

MSLG\$\$_CNT_ID 000000DD
 01200000

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

MSLG\$\$_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$\$_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$\$_MULT_UNIT 0040

MSLG\$\$_UNIT_ID 000FFFFF
 02130000

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

MSLG\$\$_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$\$_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$\$_LEVEL 00

MSLG\$\$_RETRY 01

MSLG\$\$_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$\$_HDR_CODE 00134266

LOGICAL BLOCK #1262182.
 GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION

ORIG ERR 8010

EDC ERROR
 ECC ERROR

ERR RECOV FLGS 0003

LBN REPLACEMENT INDICATED
 ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 00

LV1 B RETRY 00

BUF DAT MEM ADR D9F5

SRC REQ # 04

DET REQ # 04

***** ENTRY

13. *****

ERROR SEQUENCE 3628.

LOGGED ON SID 0404F098

ERL\$LOGSTATUS ENTRY 24-MAR-1988 10:55:34.23

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

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

MSLG\$L_CMD_REF 48C10027

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 000037EB

14315. QIO'S THIS UNIT

UCB\$W_ERRCNT 0045

69. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE

SOFTWARE VALID

UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 001342C8

STARTING LBN #1262280.

CDRP\$W_FUNC 000C

READ PHYSICAL BLOCK

CDRP\$L_BCNT 00002000

TRANSFER SIZE 8192. BYTE(S)

CDRP\$W_BOFF 0000

TRANSFER PAGE ALIGNED

CDRP\$L_PID 000A0022

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000

IOSB, 0. BYTE(S) TRANSFERRED

010E000F

***** ENTRY

14. *****

ERROR SEQUENCE 3628.

LOGGED ON SID 0404F098

ERL\$LOGMESSAGE ENTRY 24-MAR-1988 10:54:25.51

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

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$\$_CMD_REF 2D440014

MSLG\$\$_UNIT 003B

UNIT #59.

MSLG\$\$_SEQ_NUM 0001

SEQUENCE #1.

MSLG\$\$_FORMAT 02

DISK TRANSFER ERROR

MSLG\$\$_FLAGS E1

SEQUENCE NUMBER RESET
BAD BLK REPLACEMENT REQUEST
OPERATION CONTINUING
OPERATION SUCCESSFUL

MSLG\$\$_EVENT 00E8

DATA ERROR
UNCORRECTABLE ECC ERRORMSLG\$\$_CNT_ID 000000DD
01200000UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

MSLG\$\$_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$\$_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$\$_MULT_UNIT 0040

MSLG\$\$_UNIT_ID 000FFFFF
02130000UNIQUE IDENTIFIER, 0000000FFFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG\$\$_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$\$_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$\$_LEVEL 00

MSLG\$\$_RETRY 01

MSLG\$\$_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$\$_HDR_CODE 00082D0C

LOGICAL BLOCK #535820.
GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION

ORIG ERR 8010

EDC ERROR
ECC ERROR

ERR RECOV FLGS 0003

LBN REPLACEMENT INDICATED
ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 00

LV1 B RETRY 00

BUF DAT MEM ADR C6AD

SRC REQ # 04

DET REQ # 04

FOR INTERNAL USE ONLY

```

***** ENTRY 15. *****
ERROR SEQUENCE 3618.          LOGGED ON SID 0404F098
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:54:29.26
                          KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

      MESSAGE TYPE          0001          DISK MSCP MESSAGE

      MSLG$B_CMD_REF        2D440014
      MSLG$B_UNIT           003B          UNIT #59.

      MSLG$B_SEQ_NUM         0002          SEQUENCE #2.

      MSLG$B_FORMAT          09          BAD BLOCK REPLACEMENT

      MSLG$B_FLAGS           80          OPERATION SUCCESSFUL

      MSLG$B_EVENT           0034          BAD BLOCK REPLACEMENT
                                          BLOCK VERIFIED GOOD

      MSLG$Q_CNT_ID          000000DD
                                          UNIQUE IDENTIFIER, 0000000000DD(X)
                                          MASS STORAGE CONTROLLER
                                          HSC70
                                          01200000

      MSLG$B_CNT_SVR         02          CONTROLLER SOFTWARE VERSION #2.

      MSLG$B_CNT_HVR         00          CONTROLLER HARDWARE REVISION #0.

      MSLG$B_MULT_UNIT       0040
      MSLG$Q_UNIT_ID         000FFFFF
                                          UNIQUE IDENTIFIER, 00000000FFFF(X)
                                          DISK CLASS DEVICE (166)
                                          RA90
                                          02130000

      MSLG$B_UNIT_SVR        00          UNIT SOFTWARE VERSION #0.

      MSLG$B_UNIT_HVR        0F          UNIT HARDWARE REVISION #15.

      MSLG$B_RPL_FLGS        0000          REPLACEMENT ATTEMPTED, BLOCK
                                          _ VERIFIED GOOD

      MSLG$L_VOL_SER         000001D8          VOLUME SERIAL #472.

      MSLG$L_BAD_LBN         00082D0C          BAD LOGICAL BLOCK
                                          _ NUMBER = 535820.

      MSLG$L_OLD_RBN         00000000
      MSLG$L_NEW_RBN         00001E55
      MSLG$W_CAUSE           00E8          DATA ERROR
                                          UNCORRECTABLE ECC ERROR

```


***** ENTRY 16.*****
 ERROR SEQUENCE 3619. LOGGED ON SID 0404F098
 ERL\$LOGSTATUS 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
 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 0000364C

13900. QIO'S THIS UNIT

UCB\$W_ERRCNT 003D

61. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE
 SOFTWARE VALID
 UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 00082D07

STARTING LBN #5358150.

CDRP\$W_FUNC 400B

WRITE PHYSICAL BLOCK
 IO\$M_DATACHECK

CDRP\$L_BCNT 00008000

TRANSFER SIZE 32768. BYTE(S)

CDRP\$W_BOFF 01E8

488. BYTE PAGE OFFSET

CDRP\$L_PID 000A0020

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000
 010E000F

IOSB, 0. BYTE(S) TRANSFERRED

***** ENTRY

17. *****

ERROR SEQUENCE 3630.

LOGGED ON SID 0404F098

ERL\$LOGMESSAGE ENTRY 24-MAR-1988 10:55:54.58

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

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 3C250022

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 000A

SEQUENCE #10.

MSLG\$B_FORMAT 09

BAD BLOCK REPLACEMENT

MSLG\$B_FLAGS 80

OPERATION SUCCESSFUL

MSLG\$W_EVENT 0034

BAD BLOCK REPLACEMENT
BLOCK VERIFIED GOODMSLG\$Q_CNT_ID 000000DD
01200000UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

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 000FFFFFFF
02130000UNIQUE IDENTIFIER, 0000000FFFFFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$W_RPL_FLGS 0000

REPLACEMENT ATTEMPTED, BLOCK
_ VERIFIED GOOD

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_BAD_LBN 000D623A

BAD LOGICAL BLOCK
_ NUMBER = 877114.

MSLG\$L_OLD_RBN 00000000

MSLG\$L_NEW_RBN 000032D0

MSLG\$W_CAUSE 01E8

DATA ERROR
8. SYMBOL ECC ERROR

***** ENTRY 18. *****
 ERROR SEQUENCE 3631. LOGGED ON SID 0404F098
 ERL\$LOGSTATUS ENTRY 24-MAR-1988 10:55:54.69
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MSLG\$L_CMD_REF 3C250022
 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 0000387B

14459. QIO'S THIS UNIT

UCB\$W_ERRCNT 0048

72. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE
 SOFTWARE VALID
 UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 000D622C

STARTING LBN #8771000.

CDRP\$W_FUNC 400B

WRITE PHYSICAL BLOCK
 IOSM_DATACHECK

CDRP\$L_BCNT 00008000

TRANSFER SIZE 32768. BYTE(S)

CDRP\$W_BOFF 01E8

488. BYTE PAGE OFFSET

CDRP\$L_PID 000A0020

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000
 010E000F

IOSB, 0. BYTE(S) TRANSFERRED

***** ENTRY 19. *****
 ERROR SEQUENCE 3633. LOGGED ON SID 0404F098
 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

DISK MSCP MESSAGE

MSLG\$\$_CMD_REF CE6A001C
 MSLG\$\$_UNIT 003B

UNIT #59.

MSLG\$\$_SEQ_NUM 000C

SEQUENCE #12.

MSLG\$\$_FORMAT 09

BAD BLOCK REPLACEMENT

MSLG\$\$_FLAGS 80

OPERATION SUCCESSFUL

MSLG\$\$_EVENT 0034

BAD BLOCK REPLACEMENT
 BLOCK VERIFIED GOOD

MSLG\$\$_CNT_ID 000000DD
 01200000

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

MSLG\$\$_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$\$_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$\$_MULT_UNT 0040
 MSLG\$\$_UNIT_ID 000FFFFF
 02130000

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

MSLG\$\$_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$\$_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$\$_RPL_FLGS 0000

REPLACEMENT ATTEMPTED, BLOCK
 _ VERIFIED GOOD

MSLG\$\$_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$\$_BAD_LBN 000D623F

BAD LOGICAL BLOCK
 _ NUMBER = 877119.

MSLG\$\$_OLD_RBN 00000000
 MSLG\$\$_NEW_RBN 000032D0
 MSLG\$\$_CAUSE 01E8

DATA ERROR
 8. SYMBOL ECC ERROR

***** ENTRY 20. *****
 ERROR SEQUENCE 3634. LO LOGGED ON SID 0404F098
 ERL\$LOGSTATUS ENTRY 24-MAR-1988 10:56:18.04
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MSLG\$L_CMD_REF CE6A001C
 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 0000391A

14618. QIO'S THIS UNIT

UCB\$W_ERRCNT 004B

75. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE
 SOFTWARE VALID
 UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 000DACDC

STARTING LBN #8962200.

CDRP\$W_FUNC 400B

WRITE PHYSICAL BLOCK
 IO\$M_DATACHECK

CDRP\$L_BCNT 00008000

TRANSFER SIZE 32768. BYTE(S)

CDRP\$W_BOFF 01E8

488. BYTE PAGE OFFSET

CDRP\$L_PID 000A0020

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000
 010E000F

IOSB, 0. BYTE(S) TRANSFERRED

***** ENTRY 21. *****
 ERROR SEQUENCE 3635. LOGGED ON SID 0404F098
 ERL\$LOGMESSAGE ENTRY 24-MAR-1988 10:56:22.56
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MESSAGE TYPE	0001	DISK MSCP MESSAGE
MSLG\$L_CMD_REF	CE78001C	
MSLG\$W_UNIT	003B	UNIT #59.
MSLG\$W_SEQ_NUM	000D	SEQUENCE #13.
MSLG\$B_FORMAT	02	DISK TRANSFER ERROR
MSLG\$B_FLAGS	E0	BAD BLK REPLACEMENT REQUEST OPERATION CONTINUING OPERATION SUCCESSFUL
MSLG\$W_EVENT	00E8	DATA ERROR UNCORRECTABLE ECC ERROR
MSLG\$Q_CNT_ID	000000DD 01200000	UNIQUE IDENTIFIER, 0000000000DD(X) MASS STORAGE CONTROLLER HSC70
MSLG\$B_CNT_SVR	02	CONTROLLER SOFTWARE VERSION #2.
MSLG\$B_CNT_HVR	00	CONTROLLER HARDWARE REVISION #0.
MSLG\$W_MULT_UNT	0040	
MSLG\$Q_UNIT_ID	000FFFFF 02130000	UNIQUE IDENTIFIER, 0000000FFFFF(X) DISK CLASS DEVICE (166) RA90
MSLG\$B_UNIT_SVR	00	UNIT SOFTWARE VERSION #0.
MSLG\$B_UNIT_HVR	0F	UNIT HARDWARE REVISION #15.
MSLG\$B_LEVEL	00	
MSLG\$B_RETRY	01	
MSLG\$L_VOL_SER	000001D8	VOLUME SERIAL #472.
MSLG\$L_HDR_CODE	00093372	LOGICAL BLOCK #602994. GOOD LOGICAL SECTOR
CONTROLLER DEPENDENT INFORMATION		
ORIG ERR	8010	EDC ERROR ECC ERROR
ERR RECOV FLGS	0003	LBN REPLACEMENT INDICATED ERR LOGGED TO CONSOLE AND HOST
LV1 A RETRY	00	
LV1 B RETRY	00	
BUF DAT MEM ADR	D548	
SRC REQ #	04	
DET REQ #	04	

***** ENTRY 22 *****
 ERROR SEQUENCE 3637. LOGGED ON SID 0404F098
 ERL\$LOGMESSAGE ENTRY 24-MAR-1988 10:56:26.10
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MESSAGE TYPE	0001	DISK MSCP MESSAGE
MSLG\$L_CMD_REF	CE78001C	
MSLG\$W_UNIT	003B	UNIT #59.
MSLG\$W_SEQ_NUM	000E	SEQUENCE #14.
MSLG\$B_FORMAT	09	BAD BLOCK REPLACEMENT
MSLG\$B_FLAGS	80	OPERATION SUCCESSFUL
MSLG\$W_EVENT	0034	BAD BLOCK REPLACEMENT
		BLOCK VERIFIED GOOD
MSLG\$Q_CNT_ID	000000DD 01200000	UNIQUE IDENTIFIER, 0000000000DD(X) MASS STORAGE CONTROLLER HSC70
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	000FFFFF 02130000	UNIQUE IDENTIFIER, 0000000FFFFF(X) DISK CLASS DEVICE (166) RA90
MSLG\$B_UNIT_SVR	00	UNIT SOFTWARE VERSION #0.
MSLG\$B_UNIT_HVR	0F	UNIT HARDWARE REVISION #15.
MSLG\$W_RPL_FLGS	0000	REPLACEMENT ATTEMPTED, BLOCK _ VERIFIED GOOD
MSLG\$L_VOL_SER	000001D8	VOLUME SERIAL #472.
MSLG\$L_BAD_LBN	00093372	BAD LOGICAL BLOCK _ NUMBER = 602994.
MSLG\$L_OLD_RBN	00000000	
MSLG\$L_NEW_RBN	00002223	
MSLG\$W_CAUSE	00E8	DATA ERROR UNCORRECTABLE ECC ERROR

***** ENTRY 23. *****
 ERROR SEQUENCE 3638. LOGGED ON SID 0404F098
 ERL\$LOGSTATUS ENTRY 24-MAR-1988 10:56:26.22
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MSLG\$L_CMD_REF CE78001C
 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 00003944

14660. QIO'S THIS UNIT

UCB\$W_ERRCNT 004E

78. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE
 SOFTWARE VALID
 UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 0009336E

STARTING LBN #6029900.

CDRP\$W_FUNC 400B

WRITE PHYSICAL BLOCK
 IO\$M_DATACHECK

CDRP\$L_BCNT 00008000

TRANSFER SIZE 32768. BYTE(S)

CDRP\$W_BOFF 01E8

488. BYTE PAGE OFFSET

CDRP\$L_PID 000A0020

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000
 010E000F

IOSB, 0. BYTE(S) TRANSFERRED

***** ENTRY 24. *****
 ERROR SEQUENCE 3639. LOGGED ON SID 0404F098
 ERL\$LOGMESSAGE ENTRY 24-MAR-1988 10:56:49.71
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$SL_CMD_REF CED5001C

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 000F

SEQUENCE #15.

MSLG\$B_FORMAT 02

DISK TRANSFER ERROR

MSLG\$B_FLAGS E0

BAD BLK REPLACEMENT REQUEST
 OPERATION CONTINUING
 OPERATION SUCCESSFUL

MSLG\$W_EVENT 00E8

DATA ERROR

UNCORRECTABLE ECC ERROR

MSLG\$Q_CNT_ID 000000DD
 01200000

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

MSLG\$B_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$B_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$W_MULT_UNT 0040

MSLG\$Q_UNIT_ID 000FFFFFFF
 02130000

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

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$B_LEVEL 00

MSLG\$B_RETRY 01

MSLG\$SL_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$SL_HDR_CODE 0009351E

LOGICAL BLOCK #603422.
 GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION
 ORIG ERR 8010

EDC ERROR
 ECC ERROR

ERR RECOV FLGS 0003

LBN REPLACEMENT INDICATED
 ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 00

LV1 B RETRY 00

BUF DAT MEM ADR DA09

SRC REQ # 04

DET REQ # 04

FOR INTERNAL USE ONLY

***** ENTRY 25. *****
 ERROR SEQUENCE 3640. LOGGED ON SID 0404F098
 ERL\$LOGMESSAGE ENTRY 24-MAR-1988 10:56:53.30
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MESSAGE TYPE 0001
 MSLG\$L_CMD_REF CED5001C
 MSLG\$W_UNIT 003B
 MSLG\$W_SEQ_NUM 0010
 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_UNT 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 000001D8
 MSLG\$L_BAD_LBN 0009351E
 MSLG\$L_OLD_RBN 00000000
 MSLG\$L_NEW_RBN 00002229
 MSLG\$W_CAUSE 00E8

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

***** ENTRY 26. *****
 ERROR SEQUENCE 3641. LOGGED ON SID 0404F098
 ERL\$LOGMESSAGE ENTRY 24-MAR-1988 10:56:53.46
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF CED5001C

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 0011

SEQUENCE #17.

MSLG\$B_FORMAT 02

DISK TRANSFER ERROR

MSLG\$B_FLAGS E0

BAD BLK REPLACEMENT REQUEST
 OPERATION CONTINUING
 OPERATION SUCCESSFUL

MSLG\$W_EVENT 00E8

DATA ERROR

UNCORRECTABLE ECC ERROR

MSLG\$Q_CNT_ID 000000DD
 01200000

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

MSLG\$B_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$B_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$W_MULT_UNT 0040

MSLG\$Q_UNIT_ID 000FFFFF
 02130000

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

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$B_LEVEL 00

MSLG\$B_RETRY 03

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_HDR_CODE 00199A60

LOGICAL BLOCK #1677920.
 GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION

ORIG ERR 8010

EDC ERROR
 ECC ERROR

ERR RECOV FLGS 0003

LBN REPLACEMENT INDICATED
 ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 00

LV1 B RETRY 00

BUF DAT MEM ADR C492

SRC REQ # 04

DET REQ # 04

FOR INTERNAL USE ONLY

```

***** ENTRY 27.*****
ERROR SEQUENCE 3642.          LOGGED ON SID 0404F098
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:56:55.28
                           KA86 REV# 4.  SERIAL# 152.  MFG PLANT 15.

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

      MESSAGE TYPE          0001          DISK MSCP MESSAGE

      MSLG$L_CMD_REF        CED5001C
      MSLG$W_UNIT           003B          UNIT #59.

      MSLG$W_SEQ_NUM        0012          SEQUENCE #18.

      MSLG$B_FORMAT         09          BAD BLOCK REPLACEMENT

      MSLG$B_FLAGS          80          OPERATION SUCCESSFUL

      MSLG$W_EVENT          0014          BAD BLOCK REPLACEMENT
                                         BAD BLOCK REPLACED

      MSLG$Q_CNT_ID         000000DD
                           01200000          UNIQUE IDENTIFIER, 0000000000DD(X)
                                         MASS STORAGE CONTROLLER
                                         HSC70

      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         000FFFFF
                           02130000          UNIQUE IDENTIFIER, 0000000FFFFF(X)
                                         DISK CLASS DEVICE (166)
                                         RA90

      MSLG$B_UNIT_SVR        00          UNIT SOFTWARE VERSION #0.

      MSLG$B_UNIT_HVR        0F          UNIT HARDWARE REVISION #15.

      MSLG$W_RPL_FLGS       A000          BLK RE-VECTORED, NON-PRIMARY RBN
                                         REPLACEMENT ATTEMPTED, BLOCK
                                         _ VERIFIED BAD

      MSLG$L_VOL_SER         000001D8          VOLUME SERIAL #472.

      MSLG$L_BAD_LBN         00199A60          BAD LOGICAL BLOCK
                                         _ NUMBER = 1677920.

      MSLG$L_OLD_RBN         00000000          FORMER REPLACEMENT BLOCK
                                         _ NUMBER = 0.

      MSLG$L_NEW_RBN         00005EFE          NEW REPLACEMENT BLOCK
                                         _ NUMBER = 24318.

      MSLG$W_CAUSE           00E8          DATA ERROR
                                         UNCORRECTABLE ECC ERROR

```

***** ENTRY 28. *****
 ERROR SEQUENCE 3643. LOGGED ON SID 0404F098
 ERL\$LOGSTATUS ENTRY 24-MAR-1988 10:56:55.39
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MSLG\$L_CMD_REF CED5001C
 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 000039FC

14844. QIO'S THIS UNIT

UCB\$W_ERRCNT 0053

83. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE
 SOFTWARE VALID
 UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 00199A5A

STARTING LBN #1677914.

CDRP\$W_FUNC 400B

WRITE PHYSICAL BLOCK
 IO\$M_DATACHECK

CDRP\$L_BCNT 00008000

TRANSFER SIZE 32768. BYTE(S)

CDRP\$W_BOFF 01E8

488. BYTE PAGE OFFSET

CDRP\$L_PID 000A0021

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000

IOSB; 0. BYTE(S) TRANSFERRED

010E000F

***** ENTRY

29. *****

ERROR SEQUENCE 3644.

LOGGED ON SID 0404F098

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

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

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$SL_CMD_REF 4A670027

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 0013

SEQUENCE #19.

MSLG\$B_FORMAT 02

DISK TRANSFER ERROR

MSLG\$B_FLAGS E0

BAD BLK REPLACEMENT REQUEST
OPERATION CONTINUING
OPERATION SUCCESSFUL

MSLG\$W_EVENT 00E8

DATA ERROR

UNCORRECTABLE ECC ERROR

MSLG\$Q_CNT_ID 000000DD
01200000UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

MSLG\$B_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$B_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$W_MULT_UNT 0040

MSLG\$Q_UNIT_ID 000FFFFF
02130000UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$B_LEVEL 00

MSLG\$B_RETRY 01

MSLG\$SL_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$SL_HDR_CODE 00199D30

LOGICAL BLOCK #1678640.
GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION

ORIG ERR 8010

EDC ERROR

ECC ERROR

ERR RECOV FLGS 0003

LBN REPLACEMENT INDICATED
ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 00

LV1 B RETRY 00

BUF DAT MEM ADR CE92

SRC REQ # 04

DET REQ # 04

***** ENTRY 30. *****
 ERROR SEQUENCE 3645. LOGGED ON SID 0404F098
 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

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 4A670027

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 0014

SEQUENCE #20.

MSLG\$B_FORMAT 09

BAD BLOCK REPLACEMENT

MSLG\$B_FLAGS 80

OPERATION SUCCESSFUL

MSLG\$W_EVENT 0014

BAD BLOCK REPLACEMENT

BAD BLOCK REPLACED

MSLG\$Q_CNT_ID 000000DD
01200000

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

MSLG\$B_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$B_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$W_MULT_UNT 0040

MSLG\$Q_UNIT_ID 000FFFFF
02130000

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

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$W_RPL_FLGS A000

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

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_BAD_LBN 00199D30

BAD LOGICAL BLOCK
 _ NUMBER = 1678640.

MSLG\$L_OLD_RBN 00000000

FORMER REPLACEMENT BLOCK
 _ NUMBER = 0.

MSLG\$L_NEW_RBN 00005F09

NEW REPLACEMENT BLOCK
 _ NUMBER = 24329.

MSLG\$W_CAUSE 00E8

DATA ERROR
 UNCORRECTABLE ECC ERROR

***** ENTRY 31. *****
 ERROR SEQUENCE 3646. LOGGED ON SID 0404F098
 ERL\$LOGSTATUS 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_OPCNT 00003AED

15085. QIO'S THIS UNIT

UCB\$W_ERRCNT 0056

86. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE
 SOFTWARE VALID
 UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 00199D30

STARTING LBN #1678640.

CDRP\$W_FUNC 400B

WRITE PHYSICAL BLOCK
 IOSM_DATACHECK

CDRP\$L_BCNT 00008000

TRANSFER SIZE 32768. BYTE(S)

CDRP\$W_BOFF 01E8

488. BYTE PAGE OFFSET

CDRP\$L_PID 000A0021

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000
 010E000F

IOSB, 0. BYTE(S) TRANSFERRED


```

***** ENTRY 32. *****
ERROR SEQUENCE 3660. LOGGED ON SID 0404F098
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:57:41.60
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MSLG$SL_CMD_REF 5A3C002F
MSLG$W_UNIT 003B UNIT #59.

MSLG$W_SEQ_NUM 0015 SEQUENCE #21.

MSLG$B_FORMAT 02 DISK TRANSFER ERROR

MSLG$B_FLAGS E0 BAD BLK REPLACEMENT REQUEST
OPERATION CONTINUING
OPERATION SUCCESSFUL

MSLG$W_EVENT 00E8 DATA ERROR
UNCORRECTABLE ECC ERROR

MSLG$Q_CNT_ID 000000DD
01200000 UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

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 000FFFFF
02130000 UNIQUE IDENTIFIER, 0000000FFFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG$B_UNIT_SVR 00 UNIT SOFTWARE VERSION #0.

MSLG$B_UNIT_HVR 0F UNIT HARDWARE REVISION #15.

MSLG$B_LEVEL 00
MSLG$B_RETRY 01
MSLG$SL_VOL_SER 000001D8 VOLUME SERIAL #472.

MSLG$SL_HDR_CODE 0000814D LOGICAL BLOCK #33101.
GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION
ORIG ERR 8010 EDC ERROR
ECC ERROR

ERR RECOV FLGS 0003 LBN REPLACEMENT INDICATED
ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 00
LV1 B RETRY 00
BUF DAT MEM ADR CE6C
SRC REQ # 04
DET REQ # 04

```

```

***** ENTRY 33. *****
ERROR SEQUENCE 3661. LOGGED ON SID 0404F098
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:57:43.41
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MESSAGE TYPE 0001 DISK MSCP MESSAGE

MSLG$$_CMD_REF 5A3C002F
MSLG$_UNIT 003B UNIT #59.

MSLG$_SEQ_NUM 0016 SEQUENCE #22.

MSLG$_FORMAT 09 BAD BLOCK REPLACEMENT

MSLG$_FLAGS 80 OPERATION SUCCESSFUL

MSLG$_EVENT 0014 BAD BLOCK REPLACEMENT
BAD BLOCK REPLACED

MSLG$_CNT_ID 000000DD
01200000 UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

MSLG$_CNT_SVR 02 CONTROLLER SOFTWARE VERSION #2.

MSLG$_CNT_HVR 00 CONTROLLER HARDWARE REVISION #0.

MSLG$_MULT_UNT 0040
MSLG$_UNIT_ID 000FFFFF
02130000 UNIQUE IDENTIFIER, 0000000FFFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG$_UNIT_SVR 00 UNIT SOFTWARE VERSION #0.

MSLG$_UNIT_HVR 0F UNIT HARDWARE REVISION #15.

MSLG$_RPL_FLGS A000 BLK RE-VECTORED, NON-PRIMARY RBN
REPLACEMENT ATTEMPTED, BLOCK
_ VERIFIED BAD

MSLG$_VOL_SER 000001D8 VOLUME SERIAL #472.

MSLG$_BAD_LBN 0000814D BAD LOGICAL BLOCK
_ NUMBER = 33101.

MSLG$_OLD_RBN 00000000 FORMER REPLACEMENT BLOCK
_ NUMBER = 0.

MSLG$_NEW_RBN 000001E0 NEW REPLACEMENT BLOCK
_ NUMBER = 480.

MSLG$_CAUSE 00E8 DATA ERROR
UNCORRECTABLE ECC ERROR

```

***** ENTRY 34. *****
 ERROR SEQUENCE 3662. LOGGED ON SID 0404F098
 ERL\$LOGSTATUS ENTRY 24-MAR-1988 10:57:43.56
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MSLG\$L_CMD_REF 5A3C002F
 ORB\$L_OWNER 00180019

OWNER UIC [030,031]

UCB\$L_CHAR 1C4D4108

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

UCB\$L_OPCNT 00003BB2

15282. QIO'S THIS UNIT

UCB\$W_ERRCNT 0059

89. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE
 SOFTWARE VALID
 UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 00008142

STARTING LBN #3309040.

CDRP\$W_FUNC 400B

WRITE PHYSICAL BLOCK
 IOSM_DATACHECK

CDRP\$L_BCNT 00008000

TRANSFER SIZE 32768. BYTE(S)

CDRP\$W_BOFF 01E8

488. BYTE PAGE OFFSET

CDRP\$L_PID 000A0021

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000

IOSB, 0. BYTE(S) TRANSFERRED

010E000F

***** ENTRY

35. *****

ERROR SEQUENCE 3663.

LOGGED ON SID 0404F098

ERL\$LOGMESSAGE ENTRY 24-MAR-1988 10:57:47.55

KAB6 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 923E0042

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 0017

SEQUENCE #23.

MSLG\$B_FORMAT 02

DISK TRANSFER ERROR

MSLG\$B_FLAGS E0

BAD BLK REPLACEMENT REQUEST
OPERATION CONTINUING
OPERATION SUCCESSFUL

MSLG\$W_EVENT 00E8

DATA ERROR
UNCORRECTABLE ECC ERRORMSLG\$Q_CNT_ID 000000DD
01200000UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

MSLG\$B_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$B_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$W_MULT_UNT 0040

MSLG\$Q_UNIT_ID 000FFFFF
02130000UNIQUE IDENTIFIER, 0000000FFFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$B_LEVEL 00

MSLG\$B_RETRY 01

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_HDR_CODE 0009085C

LOGICAL BLOCK #591964.
GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION

ORIG ERR 8010

EDC ERROR
ECC ERROR

ERR RECOV FLGS 0003

LBN REPLACEMENT INDICATED
ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 00

LV1 B RETRY 00

BUF DAT MEM ADR C575

SRC REQ # 04

DET REQ # 04

***** ENTRY

36. *****

ERROR SEQUENCE 3666.

LOGGED ON SID 0404F098

ERL\$LOGMESSAGE ENTRY 24-MAR-1988 10:57:49.27

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

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 923E0042

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 0018

SEQUENCE #24.

MSLG\$B_FORMAT 09

BAD BLOCK REPLACEMENT

MSLG\$B_FLAGS 80

OPERATION SUCCESSFUL

MSLG\$W_EVENT 0014

BAD BLOCK REPLACEMENT

BAD BLOCK REPLACED

MSLG\$Q_CNT_ID 000000DD
01200000UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

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 000FFFFF
02130000UNIQUE IDENTIFIER, 0000000FFFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$W_RPL_FLGS 8000

REPLACEMENT ATTEMPTED, BLOCK
_ VERIFIED BAD

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_BAD_LBN 0009085C

BAD LOGICAL BLOCK
_ NUMBER = 591964.

MSLG\$L_OLD_RBN 00000000

FORMER REPLACEMENT BLOCK
_ NUMBER = 0.

MSLG\$L_NEW_RBN 00002183

NEW REPLACEMENT BLOCK
_ NUMBER = 8579.

MSLG\$W_CAUSE 00E8

DATA ERROR
UNCORRECTABLE ECC ERROR

FOR INTERNAL USE ONLY

***** ENTRY

37. *****

ERROR SEQUENCE 3667.

LOGGED ON SID 0404F098

ERL\$LOGSTATUS ENTRY 24-MAR-1988 10:57:49.38

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

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

MSLG\$L_CMD_REF 923E0042

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 00003BE1

15329. QIO'S THIS UNIT

UCB\$W_ERRCNT 005C

92. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE

SOFTWARE VALID

UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 00090858

STARTING LBN #5919600.

CDRP\$W_FUNC 400B

WRITE PHYSICAL BLOCK

IO\$M_DATACHECK

CDRP\$L_BCNT 00008000

TRANSFER SIZE 32768. BYTE(S)

CDRP\$W_BOFF 01E8

488. BYTE PAGE OFFSET

CDRP\$L_PID 000A0021

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000

IOSB, 0. BYTE(S) TRANSFERRED

010E000F

```

***** ENTRY 38. *****
ERROR SEQUENCE 3669. LOGGED ON SID 0404F098
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:57:55.61
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3P0$DUA59:
  MESSAGE TYPE 0001
    MSLG$SL_CMD_REF 924B0042
    MSLG$W_UNIT 003B
    MSLG$W_SEQ_NUM 0019
    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$W_MULT_UNT 0040
    MSLG$Q_UNIT_ID 000FFFFF
    02130000
    MSLG$B_UNIT_SVR 00
    MSLG$B_UNIT_HVR 0F
    MSLG$B_LEVEL 00
    MSLG$B_RETRY 01
    MSLG$SL_VOL_SER 000001D8
    MSLG$SL_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, 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 #591126.
GOOD LOGICAL SECTOR
EDC ERROR
ECC ERROR
LBN REPLACEMENT INDICATED
ERR LOGGED TO CONSOLE AND HOST

```

***** ENTRY 39. *****
 ERROR SEQUENCE 3671. LOGGED ON SID 0404F098
 ERL\$LOGMESSAGE 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

DISK MSCP MESSAGE

MSLG\$SL_CMD_REF 924B0042
 MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 001A

SEQUENCE #26.

MSLG\$B_FORMAT 09

BAD BLOCK REPLACEMENT

MSLG\$B_FLAGS 80

OPERATION SUCCESSFUL

MSLG\$W_EVENT 0014

BAD BLOCK REPLACEMENT
 BAD BLOCK REPLACED

MSLG\$Q_CNT_ID 000000DD
 01200000

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

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 000FFFFF
 02130000

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

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$W_RPL_FLGS A000

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

MSLG\$SL_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$SL_BAD_LBN 00090516

BAD LOGICAL BLOCK
 _ NUMBER = 591126.

MSLG\$SL_OLD_RBN 00000000

FORMER REPLACEMENT BLOCK
 _ NUMBER = 0.

MSLG\$SL_NEW_RBN 00002176

NEW REPLACEMENT BLOCK
 _ NUMBER = 8566.

MSLG\$W_CAUSE 00E8

DATA ERROR
 UNCORRECTABLE ECC ERROR

***** ENTRY 40. *****
 ERROR SEQUENCE 3672. LOGGED ON SID 0404F098
 ERL\$LOGSTATUS ENTRY 24-MAR-1988 10:57:57.30
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MSLG\$L_CMD_REF 924B0042
 ORB\$L_OWNER 00180019

OWNER UIC [030,031]

UCB\$L_CHAR 1C4D4108

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

UCB\$L_OPCNT 00003C0D

15373. QIO'S THIS UNIT

UCB\$W_ERRCNT 005F

95. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE
 SOFTWARE VALID
 UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 000904F4

STARTING LBN #5910920.

CDRP\$W_FUNC 400B

WRITE PHYSICAL BLOCK
 IOSM_DATACHECK

CDRP\$L_BCNT 00008000

TRANSFER SIZE 32768. BYTE(S)

CDRP\$W_BOFF 01E8

488. BYTE PAGE OFFSET

CDRP\$L_PID 000A0021

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000
 010E000F

IOSB, 0. BYTE(S) TRANSFERRED

***** ENTRY

41. *****

ERROR SEQUENCE 3688.

LOGGED ON SID 0404F098

ERL\$LOGMESSAGE 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

DISK MSCP MESSAGE

MSLG\$\$_CMD_REF 31050014

MSLG\$\$_UNIT 003B

UNIT #59.

MSLG\$\$_SEQ_NUM 001B

SEQUENCE #27.

MSLG\$\$_FORMAT 02

DISK TRANSFER ERROR

MSLG\$\$_FLAGS E0

BAD BLK REPLACEMENT REQUEST
OPERATION CONTINUING
OPERATION SUCCESSFUL

MSLG\$\$_EVENT 01A8

DATA ERROR

MSLG\$\$_CNT_ID 000000DD
01200000

6. SYMBOL ECC ERROR

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

MSLG\$\$_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$\$_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$\$_MULT_UNIT 0040

MSLG\$\$_UNIT_ID 000FFFFF
02130000UNIQUE IDENTIFIER, 0000000FFFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG\$\$_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$\$_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$\$_LEVEL 00

MSLG\$\$_RETRY 00

MSLG\$\$_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$\$_HDR_CODE 0009085E

LOGICAL BLOCK #591966.
GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION

ORIG ERR 8010

EDC ERROR

ECC ERROR

ERR RECOV FLGS 0003

LBN REPLACEMENT INDICATED
ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 00

LV1 B RETRY 00

BUF DAT MEM ADR D91B

SRC REQ # 04

DET REQ # 04

***** ENTRY 42. *****
 ERROR SEQUENCE 3689. LOGGED ON SID 0404F098
 ERL\$LOGMESSAGE ENTRY 24-MAR-1988 10:59:24.66
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 31050014

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 001C

SEQUENCE #28.

MSLG\$B_FORMAT 09

BAD BLOCK REPLACEMENT

MSLG\$B_FLAGS 80

OPERATION SUCCESSFUL

MSLG\$W_EVENT 0034

BAD BLOCK REPLACEMENT

BLOCK VERIFIED GOOD

MSLG\$Q_CNT_ID 000000DD
01200000

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

MSLG\$B_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$B_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$W_MULT_UNT 0040

MSLG\$Q_UNIT_ID 000FFFFF
02130000

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

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$W_RPL_FLGS A000

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

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_BAD_LBN 0009085E

BAD LOGICAL BLOCK
 _ NUMBER = 591966.

MSLG\$L_OLD_RBN 00000000

FORMER REPLACEMENT BLOCK
 _ NUMBER = 0.

MSLG\$L_NEW_RBN 00002184

NEW REPLACEMENT BLOCK
 _ NUMBER = 8580.

MSLG\$W_CAUSE 01A8

DATA ERROR
 6. SYMBOL ECC ERROR

***** ENTRY 43. *****
 ERROR SEQUENCE 3690. LOGGED ON SID 0404F098
 ERL\$LOGSTATUS ENTRY 24-MAR-1988 10:59:24.66
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MSLG\$L_CMD_REF 31050014
 ORB\$L_OWNER 00180019

OWNER UIC [030,031]

UCB\$L_CHAR 1C4D4108

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

UCB\$L_OPCNT 00003F26

16166. QIO'S THIS UNIT

UCB\$W_ERRCNT 0062

98. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE
 SOFTWARE VALID
 UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 00090858

STARTING LBN #5919600.

CDRP\$W_FUNC 000C

READ PHYSICAL BLOCK

CDRP\$L_BCNT 00002000

TRANSFER SIZE 8192. BYTE(S)

CDRP\$W_BOFF 0000

TRANSFER PAGE ALIGNED

CDRP\$L_PID 000A0020

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000
 010E000F

IOSB, 0. BYTE(S) TRANSFERRED

***** ENTRY 44. *****
 ERROR SEQUENCE 3695. LOGGED ON SID 0404F098
 ERL\$LOGMESSAGE ENTRY 24-MAR-1988 10:59:38.18
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF D071001C

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 001D

SEQUENCE #29.

MSLG\$B_FORMAT 02

DISK TRANSFER ERROR

MSLG\$B_FLAGS E0

BAD BLK REPLACEMENT REQUEST
 OPERATION CONTINUING
 OPERATION SUCCESSFUL

MSLG\$W_EVENT 00E8

DATA ERROR

UNCORRECTABLE ECC ERROR

MSLG\$Q_CNT_ID 000000DD
 01200000

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

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 000FFFFF
 02130000

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

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$B_LEVEL 00

MSLG\$B_RETRY 01

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_HDR_CODE 0009364A

LOGICAL BLOCK #603722.
 GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION

ORIG ERR 8010

EDC ERROR

ECC ERROR

ERR RECOV FLGS 0003

LBN REPLACEMENT INDICATED
 ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 00

LV1 B RETRY 00

BUF DAT MEM ADR CEEC

SRC REQ # 04

DET REQ # 04

***** ENTRY 45. *****
 ERROR SEQUENCE 3696. LOGGED ON SID 0404F098
 ERL\$LOGMESSAGE ENTRY 24-MAR-1988 10:59:39.85
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF D071001C

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 001E

SEQUENCE #30.

MSLG\$B_FORMAT 09

BAD BLOCK REPLACEMENT

MSLG\$B_FLAGS 80

OPERATION SUCCESSFUL

MSLG\$W_EVENT 0014

BAD BLOCK REPLACEMENT

BAD BLOCK REPLACED

MSLG\$Q_CNT_ID 000000DD
01200000

UNIQUE IDENTIFIER, 0000000000DD(X)

MASS STORAGE CONTROLLER

HSC70

MSLG\$B_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$B_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$W_MULT_UNT 0040

MSLG\$Q_UNIT_ID 000FFFFFF
02130000

UNIQUE IDENTIFIER, 0000000FFFFFF(X)

DISK CLASS DEVICE (166)

RA90

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$W_RPL_FLGS 8000

REPLACEMENT ATTEMPTED, BLOCK
_ VERIFIED BAD

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_BAD_LBN 0009364A

BAD LOGICAL BLOCK
_ NUMBER = 603722.

MSLG\$L_OLD_RBN 00000000

FORMER REPLACEMENT BLOCK
_ NUMBER = 0.

MSLG\$L_NEW_RBN 0000222D

NEW REPLACEMENT BLOCK
_ NUMBER = 8749.

MSLG\$W_CAUSE 00E8

DATA ERROR
UNCORRECTABLE ECC ERROR

***** ENTRY 46. *****
 ERROR SEQUENCE 3697. LOGGED ON SID 0404F098
 ERL\$LOGSTATUS ENTRY 24-MAR-1988 10:59:39.98
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MSLG\$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

16354. QIO'S THIS UNIT

UCB\$W_ERRCNT 0065

101. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE
 SOFTWARE VALID
 UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 00093634

STARTING LBN #6037000.

CDRP\$W_FUNC 400B

WRITE PHYSICAL BLOCK
 IO\$M_DATACHECK

CDRP\$L_BCNT 00008000

TRANSFER SIZE 32768. BYTE(S)

CDRP\$W_BOFF 01E8

488. BYTE PAGE OFFSET

CDRP\$L_PID 000A0022

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000

IOSB, 0. BYTE(S) TRANSFERRED

010E000F

```

***** ENTRY 47. *****
ERROR SEQUENCE 3701. LOGGED ON SID 0404F098
ERL$LOGMESSAGE ENTRY 24-MAR-1988 10:59:55.10
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _C3P0$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 E0

MSLG$W_EVENT 01C8

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 00
MSLG$L_VOL_SER 000001D8

MSLG$L_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 DBAD
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, 00000000FFFFF(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

```


***** ENTRY

48. *****

ERROR SEQUENCE 3704.

LOGGED ON SID 0404F098

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

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 5B2A002F

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 0020

SEQUENCE.#32.

MSLG\$B_FORMAT 09

BAD BLOCK REPLACEMENT

MSLG\$B_FLAGS 80

OPERATION SUCCESSFUL

MSLG\$W_EVENT 0014

BAD BLOCK REPLACEMENT

BAD BLOCK REPLACED

MSLG\$Q_CNT_ID 000000DD
01200000UNIQUE IDENTIFIER, 0000000000DD(X)
MASS STORAGE CONTROLLER
HSC70

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 000FFFFF
02130000UNIQUE IDENTIFIER, 0000000FFFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$W_RPL_FLGS A000

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

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_BAD_LBN 0009085F

BAD LOGICAL BLOCK
_ NUMBER = 591967.

MSLG\$L_OLD_RBN 00000000

FORMER REPLACEMENT BLOCK
_ NUMBER = 0.

MSLG\$L_NEW_RBN 00002182

NEW REPLACEMENT BLOCK
_ NUMBER = 8578.

MSLG\$W_CAUSE 01C8

DATA ERROR
7. SYMBOL ECC ERROR

***** ENTRY 49. *****
 ERROR SEQUENCE 3705. LOGGED ON SID 0404F098
 ERL\$LOGSTATUS ENTRY 24-MAR-1988 10:59:57.04
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MSLG\$L_CMD_REF 5B2A002F
 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 000040BF

16575. QIO'S THIS UNIT

UCB\$W_ERRCNT 0068

104. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE
 SOFTWARE VALID
 UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 00090858

STARTING LBN #5919600.

CDRP\$W_FUNC 000C

READ PHYSICAL BLOCK

CDRP\$L_BCNT 00002000

TRANSFER SIZE 8192. BYTE(S)

CDRP\$W_BOFF 0000

TRANSFER PAGE ALIGNED

CDRP\$L_PID 000A0020

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000
 010E000F

IOSB, 0. BYTE(S) TRANSFERRED

```

***** ENTRY          50. *****
ERROR SEQUENCE 3713.          LOGGED ON SID 0404F098
ERL$LOGMESSAGE 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          DISK MSCP MESSAGE

  MSLG$SL_CMD_REF      02A70030
  MSLG$W_UNIT          003B          UNIT #59.

  MSLG$W_SEQ_NUM       0022          SEQUENCE #34.

  MSLG$B_FORMAT        02          DISK TRANSFER ERROR

  MSLG$B_FLAGS         E0          BAD BLK REPLACEMENT REQUEST
                                   OPERATION CONTINUING
                                   OPERATION SUCCESSFUL

  MSLG$W_EVENT         01E8          DATA ERROR
                                   8. SYMBOL ECC ERROR

  MSLG$Q_CNT_ID        000000DD
                        01200000          UNIQUE IDENTIFIER, 0000000000DD(X)
                                   MASS STORAGE CONTROLLER
                                   HSC70

  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       000FFFFF
                        02130000          UNIQUE IDENTIFIER, 0000000FFFFF(X)
                                   DISK CLASS DEVICE (166)
                                   RA90

  MSLG$B_UNIT_SVR      00          UNIT SOFTWARE VERSION #0.

  MSLG$B_UNIT_HVR      0F          UNIT HARDWARE REVISION #15.

  MSLG$B_LEVEL         00
  MSLG$B_RETRY         01
  MSLG$L_VOL_SER       000001D8          VOLUME SERIAL #472.

  MSLG$L_HDR_CODE      00095932          LOGICAL BLOCK #612658.
                                   GOOD LOGICAL SECTOR

  MSLG$B_UNIT_SVR      00          EDC ERROR
                                   ECC ERROR

  MSLG$B_UNIT_HVR      0F          LBN REPLACEMENT INDICATED
                                   ERR LOGGED TO CONSOLE AND HOST

  MSLG$B_LEVEL         00
  MSLG$B_RETRY         01
  MSLG$L_VOL_SER       000001D8
  MSLG$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

```

```

***** ENTRY          51. *****
ERROR SEQUENCE 3714.          LOGGED ON SID 0404F098
ERL$LOGMESSAGE ENTRY 24-MAR-1988 11:00:52.73
                        KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

      MESSAGE TYPE          0001
      MSLG$L_CMD_REF 02A70030
      MSLG$W_UNIT          003B
      MSLG$W_SEQ_NUM       0023
      MSLG$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_UNT      0040
      MSLG$Q_UNIT_ID 000FFFFF
                        02130000
      MSLG$B_UNIT_SVR      00
      MSLG$B_UNIT_HVR      0F
      MSLG$W_RPL_FLGS      0000
      MSLG$L_VOL_SER 000001D8
      MSLG$L_BAD_LBN 00095932
      MSLG$L_OLD_RBN 00000000
      MSLG$L_NEW_RBN 000022AF
      MSLG$W_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

```

***** ENTRY 52. *****
 ERROR SEQUENCE 3715. LOGGED ON SID 0404F098
 ERL\$LOGSTATUS ENTRY 24-MAR-1988 11:00:52.75
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MSLG\$L_CMD_REF 02A70030
 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 000043A1

17313. QIO'S THIS UNIT

UCB\$W_ERRCNT 006B

107. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE
 SOFTWARE VALID
 UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 000958F4

STARTING LBN #6125960.

CDRP\$W_FUNC 400B

WRITE PHYSICAL BLOCK
 IO\$M_DATACHECK

CDRP\$L_BCNT 00008000

TRANSFER SIZE 32768. BYTE(S)

CDRP\$W_BOFF 01E8

488. BYTE PAGE OFFSET

CDRP\$L_PID 000A0022

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000

IOSB, 0. BYTE(S) TRANSFERRED

010E000F

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.

Block Number	< Logical > Cyl Gp S		
-----	----	--	---
630644	703	0	53
630645	703	0	54
632440	705	0	55
528360	589	0	27
230996	257	6	53
1262182	1407	1	34
535820	597	4	35
877114	977	10	55
877119	977	10	60
602994	672	3	3
603422	672	9	17
1677920	1870	7	47
1678640	1871	5	8
33101	36	11	50
591964	659	12	13
591126	659	0	3
591966	659	12	15
603722	673	0	41
591967	659	12	16
612658	683	0	7

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. 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/INTERCONNECTS
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. CABLING (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 revectorred, 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 bl*****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,ZUDLxx, 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

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:

CONTROLLER DEPENDENT INFORMATION
ORIG ERR 8010

EDC ERROR
ECC ERROR

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".

REPLACEMENT FLAGS FIELD

FLAG FIELD (H)	DESCRIPTION
8000	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.
4000	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.
2000	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.
1000	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.
0800	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.
0400	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.

VAXsimPLUS would give to the Support Centers concerning this problem:

Reported to: DISK_\$USER_DISK:[SYSMAINT.ERRLOG]ERRORLOG.RPT
Evidence in: NL:[]OUT3.PAC

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: C3P0_\$DUA59 (RA90 S/N:FFFFF)
 C3P0_\$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

		Sector			Volume	
	Phys. From	Soft	Hard		Serial	
Head	Cyl.	Index	Count	Count	Number	Error Type
0	659	3	1	0	472	ECC Error
0	673	41	1	0	472	ECC Error
0	683	7	1	0	472	ECC Error
0	703	53	1	0	472	ECC Error
0	703	54	1	0	472	ECC Error
0	705	55	1	0	472	ECC Error
1	1407	48	1	0	472	ECC Error
3	672	45	1	0	472	ECC Error
4	597	21	1	0	472	ECC Error
5	1871	8	1	0	472	ECC Error
6	257	67	1	0	472	ECC Error
7	1870	5	1	0	472	ECC Error
9	672	3	1	0	472	ECC Error
10	977	55	1	0	472	ECC Error
11	36	64	1	0	472	ECC Error
12	659	41	1	0	472	ECC Error
12	659	43	1	0	472	ECC Error
12	659	44	1	0	472	ECC Error

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

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.

<-- Drive -->			MSCP	Block	< Logical >			Phy		
Name#	Typ	Led	Event	Type / #	Cyl	Gp	S	S	yy-mm-dd	hh:mm:ss:cc
DUA59	90		#01E8	630644	703	0	53	53	87/02/24	10:32:22.13
DUA59	90		010B	0	0	0	0	0	87/02/24	10:32:23.13
DUA59	90		010B	0	0	0	0	0	87/02/24	10:32:23.47
DUA59	90	21	00EB	0	0	0	0	0	87/02/24	10:32:29.02
DUA59	90		#00E8	630645	703	0	54	54	87/02/24	10:32:29.49
DUA59	90		0034	630645	703	0	54	54	87/02/24	10:32:34.23
DUA59	90		010B	0	0	0	0	0	87/02/24	10:32:41.21
DUA59	90		010B	0	0	0	0	0	87/02/24	10:32:44.21
DUA59	90		01AB	0	0	0	0	0	87/02/24	10:32:48.44
DUA59	90		#01E8	632440	705	0	55	55	87/02/24	10:33:23.65
DUA59	90		0034	632440	705	0	55	55	87/02/24	10:33:28.54
DUA59	90		0034	528360	589	0	27	27	87/02/24	10:51:31.28
DUA59	90		0014	230996	257	6	53	67	87/02/24	10:55:28.81
DUA59	90		#00E8	1262182	1407	1	34	48	87/02/24	10:55:28.89
DUA59	90	21	00EB	0	0	0	0	0	87/02/24	10:54:25.01
DUA59	90		010B	0	0	0	0	0	87/02/24	10:54:25.47
DUA59	90		#00E8	535820	597	4	35	21	87/02/24	10:54:25.51
DUA59	90		0034	535820	597	4	35	21	87/02/24	10:54:29.26
DUA59	90		010B	0	0	0	0	0	87/02/24	10:55:54.58
DUA59	90		010B	0	0	0	0	0	87/02/24	10:54:54.69
DUA59	90		#00E8	602994	672	3	3	45	87/02/24	10:56:22.56
DUA59	90		0034	602994	672	3	3	45	87/02/24	10:56:26.10
DUA59	90		#00E8	603422	672	9	17	3	87/02/24	10:56:49.71
DUA59	90		0034	603422	672	9	17	3	87/02/24	10:56:53.30
DUA59	90		#00E8	1677920	1870	7	47	5	87/02/24	10:56:53.46
DUA59	90		0014	1677920	1870	7	47	5	87/02/24	10:56:55.28
DUA59	90		#00E8	1678640	1871	5	8	8	87/02/24	10:57:17.43
DUA59	90		0014	1678640	1871	5	8	8	87/02/24	10:57:19.15
DUA59	90		#00E8	33101	36	11	50	64	87/02/24	10:57:41.60
DUA59	90		0014	33101	36	11	50	64	87/02/24	10:57:43.41

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: C3P0_\$DUA59 (RA90 S/N:FFFFF)
 VADER_\$DUA59

Error: SDI Communication Errors
 Theory: [1.xx.yy]

Suspect: Drive SI Logic

Evidence: 8 SDI Communication Errors

Count	Event- Status	Translation
7.	(10B)	Controller Detected Pulse or State Parity Errors

1. (1AB) Receiver Ready Collision Errors

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

Evidence:

Count	Error Code (HEX)	Mfg. Code (HEX)	Translation of Error Code
2.	(21)	2	SDI Pulse State or Parity Error

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

```

V A X / V M S      SYSTEM ERROR REPORT      COMPILED 18-APR-1988 07:11
                                           PAGE 1.
***** ENTRY 1. *****
ERROR SEQUENCE 89.                                LOGGED ON SID 04006273

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:

MESSAGE TYPE      0001      DISK MSCP MESSAGE

MSLG$L_CMD_REF    00000000
MSLG$W_UNIT       003B      UNIT #59.

MSLG$W_SEQ_NUM    004A      SEQUENCE #74.

MSLG$B_FORMAT     03        "SDI" ERROR

MSLG$B_FLAGS      40        OPERATION CONTINUING

MSLG$W_EVENT      002B      DRIVE ERROR
                           DRIVE COMMAND TIMEOUT

MSLG$Q_CNT_ID     0000FA05
                   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$W_MULT_UNT   0043
MSLG$Q_UNIT_ID    000001FF
                   02130000      UNIQUE IDENTIFIER, 0000000001FF
                           DISK CLASS DEVICE
                           RA90

MSLG$B_UNIT_SVR   00        UNIT SOFTWARE VERSION #0.

MSLG$B_UNIT_HVR   00        UNIT HARDWARE REVISION #0.

MSLG$L_VOL_SER    00000419      VOLUME SERIAL #1049.

MSLG$L_HEADER     00000000      LBN #0.
                           GOOD LOGICAL SECTOR

MSLG$Z_SDI
REQUEST          17          RUN/STOP SWITCH IN
                           PORT SWITCH IN
                           SPINDLE READY
                           PORT B RECEIVERS ENABLED

MODE             00          512-BYTE SECTOR FORMAT

ERROR            00
CONTROLLER       00          NORMAL DRIVE OPERATION

RETRY            00          0. RETRIES

```

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	05650090	/..e./
LONGWORD 2.	04000007	/..../
LONGWORD 3.	00000003	/..../
LONGWORD 4.	00000000	/..../

```

***** ENTRY                2. *****
ERROR SEQUENCE 90.          LOGGED ON SID 04006273
ERL$LOGMESSAGE ENTRY 17-APR-1988 16:27:55.96
                           KA86 REV# 0. SERIAL# 627. MFG PLANT 6.

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

  MESSAGE TYPE              0001          DISK MSCP MESSAGE

  MSLG$SL_CMD_REF 00000000
  MSLG$W_UNIT      003B          UNIT #59.

  MSLG$W_SEQ_NUM    004B          SEQUENCE #75.

  MSLG$B_FORMAT     03          "SDI" ERROR

  MSLG$B_FLAGS      40          OPERATION CONTINUING

  MSLG$W_EVENT      00EB          DRIVE ERROR
                                   DRIVE DETECTED ERROR

  MSLG$Q_CNT_ID     0000FA05
                           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$W_MULT_UNIT  0043
  MSLG$Q_UNIT_ID    000001FF
                           02130000          UNIQUE IDENTIFIER, 0000000001FF
                                           DISK CLASS DEVICE
                                           RA90

  MSLG$B_UNIT_SVR   00          UNIT SOFTWARE VERSION #0.

  MSLG$B_UNIT_HVR   00          UNIT HARDWARE REVISION #0.

  MSLG$SL_VOL_SER   00000419          VOLUME SERIAL #1049.

  MSLG$SL_HEADER    00000000          LBN #0.
                                           GOOD LOGICAL SECTOR

  MSLG$Z_SDI
  REQUEST              1F          RUN/STOP SWITCH IN
                                   PORT SWITCH IN
                                   LOG INFORMATION IN EXTENDED AREA
                                   SPINDLE READY
                                   PORT B RECEIVERS ENABLED

  MODE               00          512-BYTE SECTOR FORMAT

  ERROR              80          DRIVE ERROR

  CONTROLLER         00          NORMAL DRIVE OPERATION

  RETRY              00          0. RETRIES

```

CONTROLLER OR DEVICE DEPENDENT INFORMATION

LED CODE	0E	
PANEL CODE	11	
LAST OPCODE	0A	
		INITIATE SEEK
RESERVED	00	
CUR CYLNR	00AB	CURRENT CYLINDER, #171.
CUR GROUP	01	CURRENT GROUP, #1.

***** ENTRY 3. *****
 ERROR SEQUENCE 291. LOGGED ON SID 04006273
 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	DISK MSCP MESSAGE
MSLG\$L_CMD_REF	00000000	
MSLG\$W_UNIT	003B	UNIT #59.
MSLG\$W_SEQ_NUM	0060	SEQUENCE #96.
MSLG\$B_FORMAT	03	"SDI" ERROR
MSLG\$B_FLAGS	40	OPERATION CONTINUING
MSLG\$W_EVENT	002B	DRIVE ERROR
		DRIVE COMMAND TIMEOUT
MSLG\$Q_CNT_ID	0000FA05 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_MULT_UNT	0043	
MSLG\$Q_UNIT_ID	000001FF 02130000	UNIQUE IDENTIFIER, 0000000001FF DISK CLASS DEVICE RA90
MSLG\$B_UNIT_SVR	00	UNIT SOFTWARE VERSION #0.
MSLG\$B_UNIT_HVR	00	UNIT HARDWARE REVISION #0.
MSLG\$L_VOL_SER	00000419	VOLUME SERIAL #1049.
MSLG\$L_HEADER	00000000	LBN #0. GOOD LOGICAL SECTOR
MSLG\$Z_SDI REQUEST	17	RUN/STOP SWITCH IN PORT SWITCH IN SPINDLE READY PORT B RECEIVERS ENABLED
MODE	00	512-BYTE SECTOR FORMAT
ERROR	00	
CONTROLLER	00	NORMAL DRIVE OPERATION
RETRY	00	0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	021B0090	/..../
LONGWORD 2.	0400000C	/..../
LONGWORD 3.	00000003	/..../
LONGWORD 4.	00000000	/..../

```

***** ENTRY 4. *****
ERROR SEQUENCE 292. LOGGED ON SID 04006273
ERL$LOGMESSAGE ENTRY 18-APR-1987 23:58:50.80
                     KA86 REV# 0. SERIAL# 627. MFG PLANT 6.

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

MESSAGE TYPE 0001 DISK MSCP MESSAGE

MSLG$L_CMD_REF 00000000
MSLG$W_UNIT 003B UNIT #59.

MSLG$W_SEQ_NUM 0061 SEQUENCE #97.

MSLG$B_FORMAT 03 "SDI" ERROR

MSLG$B_FLAGS 40 OPERATION CONTINUING

MSLG$W_EVENT 00EB DRIVE ERROR
DRIVE DETECTED ERROR

MSLG$Q_CNT_ID 0000FA05
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$W_MULT_UNIT 0043
MSLG$Q_UNIT_ID 000001FF
02130000 UNIQUE IDENTIFIER, 0000000001FF
DISK CLASS DEVICE
RA90

MSLG$B_UNIT_SVR 00 UNIT SOFTWARE VERSION #0.

MSLG$B_UNIT_HVR 00 UNIT HARDWARE REVISION #0.

MSLG$L_VOL_SER 00000419 VOLUME SERIAL #1049.

MSLG$L_HEADER 00000000 LBN #0.
GOOD LOGICAL SECTOR

MSLG$Z_SDI
REQUEST 1F RUN/STOP SWITCH IN
PORT SWITCH IN
LOG INFORMATION IN EXTENDED AREA
SPINDLE READY
PORT B RECEIVERS ENABLED

MODE 00 512-BYTE SECTOR FORMAT

ERROR 80 DRIVE ERROR

CONTROLLER 00 NORMAL DRIVE OPERATION

RETRY 00 0. RETRIES

```

CONTROLLER OR DEVICE DEPENDENT INFORMATION

LED CODE	0C
PANEL CODE	11
LAST OPCODE	0A

INITIATE SEEK

RESERVED	00
CUR CYLNR	009C

CURRENT CYLINDER, #156.

CUR GROUP	00
-----------	----

CURRENT GROUP, #0.

***** ENTRY 5. *****
 ERROR SEQUENCE 373. LOGGED ON SID 04006273
 ERL\$LOGMESSAGE ENTRY 19-APR-1987 12:41:17.19
 KA86 REV# 0. SERIAL# 627. MFG PLANT 6.

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

MESSAGE TYPE	0001	DISK MSCP MESSAGE
MSLG\$L_CMD_REF	00000000	
MSLG\$W_UNIT	003B	UNIT #59.
MSLG\$W_SEQ_NUM	006B	SEQUENCE #107.
MSLG\$B_FORMAT	03	"SDI" ERROR
MSLG\$B_FLAGS	40	OPERATION CONTINUING
MSLG\$W_EVENT	002B	DRIVE ERROR
		DRIVE COMMAND TIMEOUT
MSLG\$Q_CNT_ID	0000FA05 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_MULT_UNIT	0043	
MSLG\$Q_UNIT_ID	000001FF 02130000	UNIQUE IDENTIFIER, 0000000001FF DISK CLASS DEVICE RA90
MSLG\$B_UNIT_SVR	00	UNIT SOFTWARE VERSION #0.
MSLG\$B_UNIT_HVR	00	UNIT HARDWARE REVISION #0.
MSLG\$L_VOL_SER	00000419	VOLUME SERIAL #1049.
MSLG\$L_HEADER	00000000	LBN #0. GOOD LOGICAL SECTOR
MSLG\$Z_SDI REQUEST	17	RUN/STOP SWITCH IN PORT SWITCH IN SPINDLE READY PORT B RECEIVERS ENABLED
MODE	00	512-BYTE SECTOR FORMAT
ERROR	00	
CONTROLLER	00	NORMAL DRIVE OPERATION
RETRY	00	0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	052C0090	/.../
LONGWORD 2.	04000009	/.../
LONGWORD 3.	00000003	/.../
LONGWORD 4.	00000000	/.../

***** ENTRY 6. *****
 ERROR SEQUENCE 374. LOGGED ON SID 04006273
 ERL\$LOGMESSAGE ENTRY 19-APR-1987 12:41:17.22
 KA86 REV# 0. SERIAL# 627. MFG PLANT 6.

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

MESSAGE TYPE	0001	DISK MSCP MESSAGE
MSLG\$L_CMD_REF	00000000	
MSLG\$W_UNIT	003B	UNIT #59.
MSLG\$W_SEQ_NUM	006C	SEQUENCE #108.
MSLG\$B_FORMAT	03	"SDI" ERROR
MSLG\$B_FLAGS	40	OPERATION CONTINUING
MSLG\$W_EVENT	00EB	DRIVE ERROR
		DRIVE DETECTED ERROR
MSLG\$Q_CNT_ID	0000FA05 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_MULT_UNIT	0043	
MSLG\$Q_UNIT_ID	000001FF 02130000	UNIQUE IDENTIFIER, 0000000001FF DISK CLASS DEVICE RA90
MSLG\$B_UNIT_SVR	00	UNIT SOFTWARE VERSION #0.
MSLG\$B_UNIT_HVR	00	UNIT HARDWARE REVISION #0.
MSLG\$L_VOL_SER	00000419	VOLUME SERIAL #1049.
MSLG\$L_HEADER	00000000	LBN #0. GOOD LOGICAL SECTOR
MSLG\$Z_SDI REQUEST	1F	RUN/STOP SWITCH IN PORT SWITCH IN LOG INFORMATION IN EXTENDED AREA SPINDLE READY PORT B RECEIVERS ENABLED
MODE	00	512-BYTE SECTOR FORMAT
ERROR	80	DRIVE ERROR
CONTROLLER	00	NORMAL DRIVE OPERATION
RETRY	00	0. RETRIES

CONTROLLER OR DEVICE DEPENDENT INFORMATION

LED CODE 0E
 PANEL CODE 11
 LAST OPCODE 0A

INITIATE SEEK

RESERVED 00
 CUR CYLNR 00A1

CURRENT CYLINDER, #161.

CUR GROUP 0C

CURRENT GROUP, #12.

***** ENTRY 7. *****
 ERROR SEQUENCE 603. LOGGED ON SID 04006273
 ERL\$LOGMESSAGE ENTRY 20-APR-1987 11:59:52.44
 KA86 REV# 0. SERIAL# 627. MFG PLANT 6.

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

MESSAGE TYPE	0001	DISK MSCP MESSAGE
MSLG\$SL_CMD_REF	00000000	
MSLG\$W_UNIT	003B	UNIT #59.
MSLG\$W_SEQ_NUM	0082	SEQUENCE #130.
MSLG\$B_FORMAT	03	"SDI" ERROR
MSLG\$B_FLAGS	40	OPERATION CONTINUING
MSLG\$W_EVENT	00EB	DRIVE ERROR
		DRIVE DETECTED ERROR
MSLG\$Q_CNT_ID	0000FA05 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_MULT_UNT	0043	
MSLG\$Q_UNIT_ID	000001FF 02130000	UNIQUE IDENTIFIER, 0000000001FF DISK CLASS DEVICE RA90
MSLG\$B_UNIT_SVR	00	UNIT SOFTWARE VERSION #0.
MSLG\$B_UNIT_HVR	00	UNIT HARDWARE REVISION #0.
MSLG\$SL_VOL_SER	00000419	VOLUME SERIAL #1049.
MSLG\$SL_HEADER	00000000	LBN #0. GOOD LOGICAL SECTOR
MSLG\$Z_SDI REQUEST	1F	RUN/STOP SWITCH IN PORT SWITCH IN LOG INFORMATION IN EXTENDED AREA SPINDLE READY PORT B RECEIVERS ENABLED
MODE	00	512-BYTE SECTOR FORMAT
ERROR CONTROLLER	00 00	NORMAL DRIVE OPERATION
RETRY	00	0. RETRIES

FOR INTERNAL USE ONLY

CONTROLLER OR DEVICE DEPENDENT INFORMATION

LED CODE	07
PANEL CODE	00
LAST OPCODE	88

GET SUB-UNIT CHARACTERISTICS

RESERVED	00
CUR CYLNR	0000

CURRENT CYLINDER, #0.

CUR GROUP	11
-----------	----

CURRENT GROUP, #1.

***** ENTRY 8. *****
 ERROR SEQUENCE 638. LOGGED ON SID 04006273
 ERL\$LOGMESSAGE ENTRY 20-APR-1987 16:25:35.26
 KA86 REV# 0. SERIAL# 627. MFG PLANT 6.

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

MESSAGE TYPE	0001	DISK MSCP MESSAGE
MSLG\$L_CMD_REF	00000000	
MSLG\$W_UNIT	003B	UNIT #59.
MSLG\$W_SEQ_NUM	0086	SEQUENCE #134.
MSLG\$B_FORMAT	03	"SDI" ERROR
MSLG\$B_FLAGS	40	OPERATION CONTINUING
MSLG\$W_EVENT	00EB	DRIVE ERROR
		DRIVE DETECTED ERROR
MSLG\$Q_CNT_ID	0000FA05 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_MULT_UNIT	0043	
MSLG\$Q_UNIT_ID	000001FF 02130000	UNIQUE IDENTIFIER, 0000000001FF DISK CLASS DEVICE RA90
MSLG\$B_UNIT_SVR	00	UNIT SOFTWARE VERSION #0.
MSLG\$B_UNIT_HVR	00	UNIT HARDWARE REVISION #0.
MSLG\$L_VOL_SER	00000419	VOLUME SERIAL #1049.
MSLG\$L_HEADER	00000000	LBN #0. GOOD LOGICAL SECTOR
MSLG\$Z_SDI REQUEST	1F	RUN/STOP SWITCH IN PORT SWITCH IN LOG INFORMATION IN EXTENDED AREA SPINDLE READY PORT B RECEIVERS ENABLED
MODE	00	512-BYTE SECTOR FORMAT
ERROR CONTROLLER	00 00	NORMAL DRIVE OPERATION
RETRY	00	0. RETRIES

CONTROLLER OR DEVICE DEPENDENT INFORMATION

LED CODE	44
PANEL CODE	0E
LAST OPCODE	88
RESERVED	00
CUR CYLNR	0A5B
CUR GROUP	00

GET SUB-UNIT CHARACTERISTICS

CURRENT CYLINDER, #2651.

CURRENT GROUP, #0.

***** ENTRY

9. *****

ERROR SEQUENCE 639.

LOGGED ON SID 04006273

ERL\$LOGMESSAGE ENTRY 20-APR-1987 16:25:37.47

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

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

MESSAGE TYPE	0001	DISK MSCP MESSAGE
MSLG\$L_CMD_REF	00000000	
MSLG\$W_UNIT	003B	UNIT #59.
MSLG\$W_SEQ_NUM	0087	SEQUENCE #135.
MSLG\$B_FORMAT	03	"SDI" ERROR
MSLG\$B_FLAGS	40	OPERATION CONTINUING
MSLG\$W_EVENT	00EB	DRIVE ERROR
		DRIVE DETECTED ERROR
MSLG\$Q_CNT_ID	0000FA05 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_MULT_UNIT	0043	
MSLG\$Q_UNIT_ID	000001FF 02130000	UNIQUE IDENTIFIER, 0000000001FF DISK CLASS DEVICE RA90
MSLG\$B_UNIT_SVR	00	UNIT SOFTWARE VERSION #0.
MSLG\$B_UNIT_HVR	00	UNIT HARDWARE REVISION #0.
MSLG\$L_VOL_SER	00000419	VOLUME SERIAL #1049.
MSLG\$L_HEADER	00000000	LBN #0. GOOD LOGICAL SECTOR
MSLG\$Z_SDI REQUEST	1F	RUN/STOP SWITCH IN PORT SWITCH IN LOG INFORMATION IN EXTENDED AREA SPINDLE READY PORT B RECEIVERS ENABLED
MODE	00	512-BYTE SECTOR FORMAT
ERROR CONTROLLER	00 00	NORMAL DRIVE OPERATION
RETRY	00	0. RETRIES

FOR INTERNAL USE ONLY

CONTROLLER OR DEVICE DEPENDENT INFORMATION

LED CODE	09
PANEL CODE	0E
LAST OPCODE	88

RESERVED	00
CUR CYLNR	0A5B

CUR GROUP	00
-----------	----

GET SUB-UNIT CHARACTERISTICS

CURRENT CYLINDER, #2651.

CURRENT GROUP, #0.

***** ENTRY 10. *****
 ERROR SEQUENCE 640. LOGGED ON SID 04006273
 ERL\$LOGMESSAGE ENTRY 20-APR-1987 16:25:50.82
 KA86 REV# 0. SERIAL# 627. MFG PLANT 6.

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

MESSAGE TYPE	0001	DISK MSCP MESSAGE
MSLG\$SL_CMD_REF	00000000	
MSLG\$W_UNIT	003B	UNIT #59.
MSLG\$W_SEQ_NUM	0088	SEQUENCE #136.
MSLG\$B_FORMAT	03	"SDI" ERROR
MSLG\$B_FLAGS	40	OPERATION CONTINUING
MSLG\$W_EVENT	00EB	DRIVE ERROR
		DRIVE DETECTED ERROR
MSLG\$Q_CNT_ID	0000FA05 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_MULT_UNT	0043	
MSLG\$Q_UNIT_ID	000001FF 02130000	UNIQUE IDENTIFIER, 0000000001FF DISK CLASS DEVICE RA90
MSLG\$B_UNIT_SVR	00	UNIT SOFTWARE VERSION #0.
MSLG\$B_UNIT_HVR	00	UNIT HARDWARE REVISION #0.
MSLG\$SL_VOL_SER	00000419	VOLUME SERIAL #1049.
MSLG\$SL_HEADER	00000000	LBN #0. GOOD LOGICAL SECTOR
MSLG\$Z_SDI REQUEST	1F	RUN/STOP SWITCH IN PORT SWITCH IN LOG INFORMATION IN EXTENDED AREA SPINDLE READY PORT B RECEIVERS ENABLED
MODE	00	512-BYTE SECTOR FORMAT
ERROR CONTROLLER	00 00	NORMAL DRIVE OPERATION
RETRY	00	0. RETRIES

CONTROLLER OR DEVICE DEPENDENT INFORMATION

LED CODE 09
 PANEL CODE 0E
 LAST OPCODE 88

GET SUB-UNIT CHARACTERISTICS

RESERVED 00
 CUR CYLNR 0A5B

CURRENT CYLINDER, #2651.

CUR GROUP 00

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.X.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:

Count	Error Code (HEX)	Translation of Error Code
10.	07	SDI Frame Sequence Failure
20.	09	SDI Framing Error
10.	0C	SDI Command Length Error Level 1
20.	0E	SDI Invalid Group Select Level 1
10.	44	Format Command and Not Enabled

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

Evidence : 30 SDI Communication Transfer Errors

Count	Event- Status	Translation
30.	(2B)	SDI Drive Command Timeout Errors

Time: 17-APR 16:27:55 TO 20-APR 16:25:50

Time: 17-APR 16:27:55 TO 20-APR 16:25:50 Span: 71:58:54

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.

<-- Drive -->			MSCP	Block	< Logical>				Phy		
Name#	Typ	Led	Event	#	Cyl	Gp	S	S	yy-mm-dd	hh:mm:ss:cc	
DUA59	90		002A	1188082	1324	6	40	54	87/09/03	23:27:07.08	
DUA59	90		002A	1188088	1324	6	46	60	87/09/03	23:27:07.64	
DUA59	90		002A	1188095	1324	6	53	67	87/09/03	23:27:08.16	
DUA59	90		002A	1188098	1324	6	56	0	87/09/03	23:27:08.30	
DUA59	90		002A	1188103	1324	6	61	5	87/09/03	23:27:08.51	
DUA59	90		002A	1188114	1324	7	3	31	87/09/03	23:27:09.09	
DUA59	90		002A	1188136	1324	7	25	53	87/09/03	23:27:10.06	
DUA59	90		002A	1188144	1324	7	33	61	87/09/03	23:27:10.41	
DUA59	90		002A	1188087	1324	6	45	59	87/09/03	23:27:44.24	
DUA59	90		002A	1188095	1324	6	53	67	87/09/03	23:27:44.87	
DUA59	90		002A	1188098	1324	6	56	0	87/09/03	23:27:45.47	
DUA59	90		002A	1188110	1324	6	68	12	87/09/03	23:27:46.36	
DUA59	90		002A	1188114	1324	7	3	31	87/09/03	23:27:46.86	
DUA59	90		002A	1188124	1324	7	13	41	87/09/03	23:27:47.43	
DUA59	90		002A	1188139	1324	7	28	56	87/09/03	23:27:48.10	
DUA59	90		002A	1188150	1324	7	39	67	87/09/03	23:27:48.57	
DUA59	90		002A	1188151	1324	7	40	68	87/09/03	23:27:48.64	
DUA59	90		002A	1188163	1324	7	52	10	87/09/03	23:27:50.42	
DUA59	90		002A	1188171	1324	7	60	18	87/09/03	23:27:51.14	

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

Bug 7

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

V A X / V M S SYSTEM ERROR REPORT COMPILED 17-MAR-1988 08:52
PAGE 1.

```
***** ENTRY 1. *****
ERROR SEQUENCE 2737. LOGGED ON SID 067F0070
ERL$LOGMESSAGE ENTRY 14-MAR-1988 13:48:38.02
KA88 REV# 127. RIGHT CPU
```

I/O SUB-SYSTEM, UNIT _GREASY\$DUA3:
MESSAGE TYPE 0001

```
MSLG$L_CMD_REF 00000000
MSLG$W_UNIT    0003
```

MSLG\$W_SEQ_NUM 0001

MSLG\$B_FORMAT 03

MSLG\$B FLAGS 41

MSLG\$W EVENT 00EB

```
MSLG$Q_CNT_ID      0000FA05
                   01200000
```

MSLG\$B CNT SVR 00

MSLG\$B CNT HVR 00

```
MSLG$W_MULT_UNT      0072
MSLG$Q_UNIT_ID      0000022D
                   02130000
```

MSLG\$B UNIT SVR 0E

MSLG\$B UNIT HVR 00

MSLG\$L VOL SER 0000022D

MSLG\$L HDR CODE 00000000

MSLG\$Z SDI
REQUEST 1F

MODE 00

ERROR 40

CONTROLLER 00

RETRY 00

DISK MSCP MESSAGE

UNIT #3.

SEQUENCE #1.

SDI ERROR

SEQUENCE NUMBER RESET
OPERATION CONTINUING

DRIVE ERROR
DRIVE DETECTED ERROR

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

CONTROLLER SOFTWARE VERSION #0.

CONTROLLER HARDWARE REVISION #0.

UNIQUE IDENTIFIER, 00000000022D(X)
DISK CLASS DEVICE (166)
RA90

UNIT SOFTWARE VERSION #14.

UNIT HARDWARE REVISION #0.

VOLUME SERIAL #557.

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

SDI RECEIVE ERROR

NORMAL DRIVE OPERATION

0. RETRIES

CONTROLLER OR DEVICE DEPENDENT INFORMATION

LED CODE	07
PANEL CODE	0E
LAST OPCODE	88

GET SUB-UNIT CHARACTERISTICS

RESERVED	03
CUR CYLNR	0000

CURRENT CYLINDER, #0.

CUR GROUP	00
-----------	----

CURRENT GROUP, #0.

REQUESTOR	07
-----------	----

REQUESTOR #7.

DRIVE PORT	02
------------	----

DRIVE PORT #2.

***** ENTRY

2. *****

ERROR SEQUENCE 32.

LOGGED ON SID 067F0070

ERL\$LOGMESSAGE ENTRY 16-MAR-1988 15:31:20.07
 KA88 REV# 127. RIGHT CPU

I/O SUB-SYSTEM, UNIT _WHEEZY\$DUAL130:

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 00000000

MSLG\$W_UNIT 0082

UNIT #130.

MSLG\$W_SEQ_NUM 0009

SEQUENCE #9.

MSLG\$B_FORMAT 03

SDI ERROR

MSLG\$B_FLAGS 40

OPERATION CONTINUING

MSLG\$W_EVENT 002B

DRIVE ERROR

DRIVE COMMAND TIMEOUT

MSLG\$Q_CNT_ID 7087FC03
 01010000

UNIQUE IDENTIFIER, 00007087FC03(X)
 MASS STORAGE CONTROLLER
 HSC50

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)
 RA81

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

CONTROLLER 00

NORMAL DRIVE OPERATION

RETRY 00

0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1. 04E30088

/..../

LONGWORD 2. 04000003

/..../

LONGWORD 3. 00000000

/..../

LONGWORD 4. 00000000

/..../

***** ENTRY

3. *****

ERROR SEQUENCE 3388.

LOGGED ON SID 067F0070

ERL\$LOGMESSAGE ENTRY 16-MAR-1988 08:39:44.23

KA88 REV# 127. RIGHT CPU

I/O SUB-SYSTEM, UNIT _GREASY\$DUAL1:

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF C9290000

MSLG\$W_UNIT 0001

UNIT #1.

MSLG\$W_SEQ_NUM 0080

SEQUENCE #128.

MSLG\$B_FORMAT 02

DISK TRANSFER ERROR

MSLG\$B_FLAGS 81

SEQUENCE NUMBER RESET
OPERATION SUCCESSFUL

MSLG\$W_EVENT 006B

DRIVE ERROR

POSITIONER ERROR (MIS-SEEK)

MSLG\$Q_CNT_ID 0000FA05
01200000UNIQUE IDENTIFIER, 00000000FA05(X)
MASS STORAGE CONTROLLER
HSC70

MSLG\$B_CNT_SVR 00

CONTROLLER SOFTWARE VERSION #0.

MSLG\$B_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$W_MULT_UNIT 0032

MSLG\$Q_UNIT_ID 00001000
02050000UNIQUE IDENTIFIER, 000000001000(X)
DISK CLASS DEVICE (166)
RA81

MSLG\$B_UNIT_SVR 06

UNIT SOFTWARE VERSION #6.

MSLG\$B_UNIT_HVR 00

UNIT HARDWARE REVISION #0.

MSLG\$B_LEVEL 00

MSLG\$B_RETRY 00

MSLG\$L_VOL_SER 4BCE4E13

VOLUME SERIAL #1271811603.

MSLG\$L_HDR_CODE 00008F0A

LOGICAL BLOCK #36618.
GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION

ORIG ERR 1800

HEADER COMPARE ERROR
HEADER SYNC TIMEOUT
SUSPECTED LOW HEADER MISMATCH

ERR RECOV FLGS 0002

ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 06

LV1 B RETRY 00

BUF DAT MEM ADR CEE3

SRC REQ # 03

DET REQ # 03

DEVICE ROLLUP LOGGED BY SID 067F0070

DEVICE	ERROR BITS		QIO TIMEOUT		ERRORS THIS SESSION	QIOS THIS SESSION		
	SET							
	[HARD]	[SOFT]	[HARD]	[SOFT]				
_GREASY\$DUA1:	0.	1.	0.	0.	0.	0.		
_GREASY\$DUA3:	0.	1.	0.	0.	0.	0.		
_WHEEZY\$DUA130:	0.	1.	0.	0.	0.	0.		

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 HOUR-OF-DAY HISTOGRAM LOGGED BY SID 067F0070

00:00	0.
01:00	0.
02:00	0.
03:00	0.
04:00	0.
05:00	0.
06:00	0.
07:00	0.
08:00	1. *
09:00	0.
10:00	0.
11:00	0.
12:00	0.
13:00	1. *
14:00	0.
15:00	1. *
16:00	0.
17:00	0.
18:00	0.
19:00	0.
20:00	0.
21:00	0.
22:00	0.
23:00	0.

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 + SYNC 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 + SYNC 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 + SYNC 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

Bug 8

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 losing 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

V A X / V M S SYSTEM ERROR REPORT COMPILED 24-MAR-
1988 20:39

PAGE 1.

***** ENTRY 1. *****
ERROR SEQUENCE 971. LOGGED ON SID 0404F098
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	DISK MSCP MESSAGE
MSLG\$SL_CMD_REF	316E0015	
MSLG\$W_UNIT	003B	UNIT #59.
MSLG\$W_SEQ_NUM	0077	SEQUENCE #119.
MSLG\$B_FORMAT	03	SDI ERROR
MSLG\$B_FLAGS	40	OPERATION CONTINUING
MSLG\$W_EVENT	008B	DRIVE ERROR
		LOST R/W READY, (TRANSFER)
MSLG\$Q_CNT_ID	0000FA05 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_MULT_UNT	0072	
MSLG\$Q_UNIT_ID	000FFFFFF 02130000	UNIQUE IDENTIFIER, 00000000FFFFFF(X) DISK CLASS DEVICE (166) RA90
MSLG\$B_UNIT_SVR	00	UNIT SOFTWARE VERSION #0.
MSLG\$B_UNIT_HVR	0F	UNIT HARDWARE REVISION #15.
MSLG\$L_VOL_SER	000001D8	VOLUME SERIAL #472.
MSLG\$L_HDR_CODE	00000000	LOGICAL BLOCK #0. GOOD LOGICAL SECTOR
MSLG\$Z_SDI REQUEST	17	RUN/STOP SWITCH IN PORT SWITCH IN SPINDLE READY PORT B RECEIVERS ENABLED
MODE	00	512-BYTE SECTOR FORMAT
ERROR	00	
CONTROLLER	00	NORMAL DRIVE OPERATION
RETRY	00	0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	052C0284	/.../
LONGWORD 2.	07000009	/.../
LONGWORD 3.	00000002	/.../
LONGWORD 4.	00000000	/.../

***** ENTRY

2. *****

ERROR SEQUENCE 972.

LOGGED ON SID 0404F098

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

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 316E0015

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 0078

SEQUENCE #120.

MSLG\$B_FORMAT 03

SDI ERROR

MSLG\$B_FLAGS 40

OPERATION CONTINUING

MSLG\$W_EVENT 00EB

DRIVE ERROR

DRIVE DETECTED ERROR

MSLG\$Q_CNT_ID 0000FA05
01200000UNIQUE 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_MULT_UNT 0072

MSLG\$Q_UNIT_ID 000FFFFF
02130000UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_HDR_CODE 00000000

LOGICAL BLOCK #0.
GOOD LOGICAL SECTORMSLG\$Z_SDI
REQUEST 1FRUN/STOP SWITCH IN
PORT SWITCH IN
LOG INFORMATION IN EXTENDED AREA
SPINDLE READY
PORT B RECEIVERS ENABLED

MODE 00

512-BYTE SECTOR FORMAT

ERROR 80

DRIVE ERROR

CONTROLLER 00

NORMAL DRIVE OPERATION

RETRY 00

0. RETRIES

CONTROLLER OR DEVICE DEPENDENT INFORMATION

LED CODE	24
PANEL CODE	11
LAST OPCODE	0A

INITIATE SEEK

RESERVED	02
CUR CYLNR	010D

CURRENT CYLINDER, #269.

CUR GROUP	04
-----------	----

CURRENT GROUP, #4

***** ENTRY 3. *****
 ERROR SEQUENCE 973. LOGGED ON SID 0404F098
 ERL\$LOGMESSAGE ENTRY 23-MAR-1988 12:05:53.15
 KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$SL_CMD_REF 316E0040
 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

DRIVE DETECTED ERROR

MSLG\$Q_CNT_ID 0000FA05
 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_MULT_UNIT 0072

MSLG\$Q_UNIT_ID 000FFFFF
 02130000

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

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$SL_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$SL_HDR_CODE 00000000

LOGICAL BLOCK #0.
 GOOD LOGICAL SECTOR

MSLG\$Z_SDI
 REQUEST 17

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

MODE 00

512-BYTE SECTOR FORMAT

ERROR 00

CONTROLLER 00

NORMAL DRIVE OPERATION

RETRY 00

0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	010D0205	/..../
LONGWORD 2.	07112400	/.\$../
LONGWORD 3.	00000002	/..../
LONGWORD 4.	00000000	/..../

***** ENTRY

4. *****

ERROR SEQUENCE 1505.

LOGGED ON SID 0404F098

ERL\$LOGMESSAGE ENTRY 23-MAR-1988 12:07:30.93

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

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 83C20040

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 0002

SEQUENCE #2.

MSLG\$B_FORMAT 03

SDI ERROR

MSLG\$B_FLAGS 40

OPERATION CONTINUING

MSLG\$W_EVENT 008B

DRIVE ERROR

LOST R/W READY, (TRANSFER)

MSLG\$Q_CNT_ID 0000FA05
01200000UNIQUE 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_MULT_UNIT 0072

MSLG\$Q_UNIT_ID 000FFFFF
02130000UNIQUE IDENTIFIER, 0000000FFFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_HDR_CODE 00000000

LOGICAL BLOCK #0.
GOOD LOGICAL SECTORMSLG\$Z_SDI
REQUEST 17RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED

MODE 00

512-BYTE SECTOR FORMAT

ERROR 00

CONTROLLER 00

NORMAL DRIVE OPERATION

RETRY 00

0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	00150288	/..../
LONGWORD 2.	07000001	/..../
LONGWORD 3.	00000002	/..../
LONGWORD 4.	00000000	/..../

***** ENTRY

5. *****

ERROR SEQUENCE 1506.

LOGGED ON SID 0404F098

ERL\$LOGMESSAGE ENTRY 23-MAR-1988 12:07:30.93

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

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 83C20040

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 0003

SEQUENCE #3:

MSLG\$B_FORMAT 03

SDI ERROR

MSLG\$B_FLAGS 40

OPERATION CONTINUING

MSLG\$W_EVENT 00EB

DRIVE ERROR

DRIVE DETECTED ERROR

MSLG\$Q_CNT_ID 0000FA05

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_MULT_UNT 0072

MSLG\$Q_UNIT_ID 000FFFFF

02130000

UNIQUE IDENTIFIER, 00000000FFFF(X)

DISK CLASS DEVICE (166)

RA90

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_HDR_CODE 00000000

LOGICAL BLOCK #0.

GOOD LOGICAL SECTOR

MSLG\$Z_SDI

REQUEST 1F

RUN/STOP SWITCH IN

PORT SWITCH IN

LOG INFORMATION IN EXTENDED AREA

SPINDLE READY

PORT B RECEIVERS ENABLED

MODE 00

512-BYTE SECTOR FORMAT

ERROR 80

DRIVE ERROR

CONTROLLER 00

NORMAL DRIVE OPERATION

RETRY 00

0. RETRIES

CONTROLLER OR DEVICE DEPENDENT INFORMATION

LED CODE	24
PANEL CODE	11
LAST OPCODE	0A

INITIATE SEEK

RESERVED	02
CUR CYLNR	010B

CURRENT CYLINDER, #267.

CUR GROUP	04
-----------	----

CURRENT GROUP, #4.

```

***** ENTRY 6. *****
ERROR SEQUENCE 1507. LOGGED ON SID 0404F098
ERL$LOGMESSAGE ENTRY 23-MAR-1988 12:07:32.74
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MESSAGE TYPE 0001 DISK MSCP MESSAGE

MSLG$S_CMD_REF F8C00019
MSLG$W_UNIT 003B UNIT #59.

MSLG$W_SEQ_NUM 0004 SEQUENCE #4.

MSLG$B_FORMAT 03 SDI ERROR

MSLG$B_FLAGS 40 OPERATION CONTINUING

MSLG$W_EVENT 00EB DRIVE ERROR
DRIVE DETECTED ERROR

MSLG$Q_CNT_ID 0000FA05
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$W_MULT_UNIT 0072
MSLG$Q_UNIT_ID 000FFFFF
02130000 UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG$B_UNIT_SVR 00 UNIT SOFTWARE VERSION #0.

MSLG$B_UNIT_HVR 0F UNIT HARDWARE REVISION #15.

MSLG$S_VOL_SER 000001D8 VOLUME SERIAL #472.

MSLG$S_HDR_CODE 00000000 LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR

MSLG$Z_SDI
REQUEST 17 RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED

MODE 00 512-BYTE SECTOR FORMAT

ERROR 00

CONTROLLER 00 NORMAL DRIVE OPERATION

RETRY 00 0. RETRIES

```

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	010B0205	/..../
LONGWORD 2.	07112401	/.\$../
LONGWORD 3.	00000002	/..../
LONGWORD 4.	00000000	/..../

***** ENTRY

7. *****

ERROR SEQUENCE 1512.

LOGGED ON SID 0404F098

ERL\$LOGMESSAGE ENTRY 23-MAR-1988 12:08:34.08

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

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 3C230031

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 0077

SEQUENCE #119.

MSLG\$B_FORMAT 03

SDI ERROR

MSLG\$B_FLAGS 40

OPERATION CONTINUING

MSLG\$W_EVENT 008B

DRIVE ERROR

LOST R/W READY, (TRANSFER)

MSLG\$Q_CNT_ID 0000FA05
01200000UNIQUE 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_MULT_UNIT 0072

MSLG\$Q_UNIT_ID 000FFFFF
02130000UNIQUE IDENTIFIER, 0000000FFFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_HDR_CODE 00000000

LOGICAL BLOCK #0.
GOOD LOGICAL SECTORMSLG\$Z_SDI
REQUEST 17RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED

MODE 00

512-BYTE SECTOR FORMAT

ERROR 00

CONTROLLER 00

NORMAL DRIVE OPERATION

RETRY 00

0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	052C0284	
LONGWORD 2.	07000009	/.../
LONGWORD 3.	00000002	/.../
LONGWORD 4.	00000000	/.../

***** ENTRY

8. *****

ERROR SEQUENCE 1513.

LOGGED ON SID 0404F098

ERL\$LOGMESSAGE ENTRY 23-MAR-1988 12:08:34.08

KAB6 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 3C230031

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 0078

SEQUENCE #120.

MSLG\$B_FORMAT 03

SDI ERROR

MSLG\$B_FLAGS 40

OPERATION CONTINUING

MSLG\$W_EVENT 00EB

DRIVE ERROR

DRIVE DETECTED ERROR

MSLG\$Q_CNT_ID 0000FA05
01200000UNIQUE 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_MULT_UNIT 0072

MSLG\$Q_UNIT_ID 000FFFFF
02130000UNIQUE IDENTIFIER, 00000000FFFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_HDR_CODE 00000000

LOGICAL BLOCK #0.
GOOD LOGICAL SECTORMSLG\$Z_SDI
REQUEST 1FRUN/STOP SWITCH IN
PORT SWITCH IN
LOG INFORMATION IN EXTENDED AREA
SPINDLE READY
PORT B RECEIVERS ENABLED

MODE 00

512-BYTE SECTOR FORMAT

ERROR 80

DRIVE ERROR

CONTROLLER 00

NORMAL DRIVE OPERATION

RETRY 00

0. RETRIES

CONTROLLER OR DEVICE DEPENDENT INFORMATION

LED CODE	39
PANEL CODE	1D
LAST OPCODE	0A

INITIATE SEEK

RESERVED	02
CUR CYLNR	010D

CURRENT CYLINDER, #269.

CUR GROUP	04
-----------	----

CURRENT GROUP, #4.

```

***** ENTRY          9. *****
ERROR SEQUENCE 1520.          LOGGED ON SID 0404F098
ERL$LOGMESSAGE ENTRY 23-MAR-1988 12:08:37.62
                          KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

  MESSAGE TYPE          0001          DISK MSCP MESSAGE

  MSLG$L_CMD_REF 48C10027
  MSLG$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
                                DRIVE DETECTED ERROR

  MSLG$Q_CNT_ID   0000FA05
                                UNIQUE IDENTIFIER, 00000000FA05
                                MASS STORAGE CONTROLLER
                                HSC70
                                01200000

  MSLG$B_CNT_SVR  02          CONTROLLER SOFTWARE VERSION #2.

  MSLG$B_CNT_HVR  00          CONTROLLER HARDWARE REVISION #0.

  MSLG$W_MULT_UNT 0072
  MSLG$Q_UNIT_ID  000FFFFF
                                UNIQUE IDENTIFIER, 00000000FFFF(X)
                                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  000001D8          VOLUME SERIAL #472.

  MSLG$L_HDR_CODE 00000000          LOGICAL BLOCK #0.
                                GOOD LOGICAL SECTOR

  MSLG$Z_SDI
  REQUEST          17          RUN/STOP SWITCH IN
                                PORT SWITCH IN
                                SPINDLE READY
                                PORT B RECEIVERS ENABLED

  MODE            00          512-BYTE SECTOR FORMAT

  ERROR           00          NORMAL DRIVE OPERATION

  CONTROLLER      00          0. RETRIES

  RETRY           00

```

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	010D0205	/..../
LONGWORD 2.	07112400	/.\$../
LONGWORD 3.	00000002	/..../
LONGWORD 4.	00000000	/..../

***** ENTRY

10. *****

ERROR SEQUENCE 1619.

LOGGED ON SID 0404F098

ERL\$LOGMESSAGE ENTRY 23-MAR-1988 13:16:18.62

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

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 2D440014
MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 0002

SEQUENCE #2.

MSLG\$B_FORMAT 03

SDI ERROR

MSLG\$B_FLAGS 40

OPERATION CONTINUING

MSLG\$W_EVENT 008B

DRIVE ERROR
LOST R/W READY, (TRANSFER)MSLG\$Q_CNT_ID 0000FA05
01200000UNIQUE 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_MULT_UNT 0072
MSLG\$Q_UNIT_ID 000FFFFF
02130000UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_HDR_CODE 00000000

LOGICAL BLOCK #0.
GOOD LOGICAL SECTORMSLG\$Z_SDI
REQUEST 17RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED

MODE 00

512-BYTE SECTOR FORMAT

ERROR 00

CONTROLLER 00

NORMAL DRIVE OPERATION

RETRY 00

0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	00150288	/..../
LONGWORD 2.	07000001	/..../
LONGWORD 3.	00000002	/..../
LONGWORD 4.	00000000	/..../

```

***** ENTRY 11. *****
ERROR SEQUENCE 1620. LOGGED ON SID 0404F098
ERL$LOGMESSAGE ENTRY 23-MAR-1988 13:16:18.62
KA86 REV# 4. SERIAL# 152. MFG PLANT 15.

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

MESSAGE TYPE 0001 DISK MSCP MESSAGE

MSLG$L_CMD_REF 2D440014
MSLG$W_UNIT 003B UNIT #59.

MSLG$W_SEQ_NUM 0003 SEQUENCE #3.

MSLG$B_FORMAT 03 SDI ERROR

MSLG$B_FLAGS 40 OPERATION CONTINUING

MSLG$W_EVENT 00EB DRIVE ERROR
DRIVE DETECTED ERROR

MSLG$Q_CNT_ID 0000FA05
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$W_MULT_UNT 0072
MSLG$Q_UNIT_ID 000FFFFF
02130000 UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG$B_UNIT_SVR 00 UNIT SOFTWARE VERSION #0.

MSLG$B_UNIT_HVR 0F UNIT HARDWARE REVISION #15.

MSLG$L_VOL_SER 000001D8 VOLUME SERIAL #472.

MSLG$L_HDR_CODE 00000000 LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR

MSLG$Z_SDI REQUEST 1F RUN/STOP SWITCH IN
PORT SWITCH IN
LOG INFORMATION IN EXTENDED AREA
SPINDLE READY
PORT B RECEIVERS ENABLED

MODE 00 512-BYTE SECTOR FORMAT

ERROR 80 DRIVE ERROR

CONTROLLER 00 NORMAL DRIVE OPERATION

RETRY 00 0. RETRIES

```


CONTROLLER OR DEVICE DEPENDENT INFORMATION

LED CODE	24
PANEL CODE	11
LAST OPCODE	0A

INITIATE SEEK

RESERVED	02
CUR CYLNR	010D

CURRENT CYLINDER, #269.

CUR GROUP	04
-----------	----

CURRENT GROUP, #4.

```

***** ENTRY 12. *****
ERROR SEQUENCE 1872. LOGGED ON SID 05202B14
ERL$LOGMESSAGE ENTRY 23-MAR-1988 14:07:26.80
KA820 REV# D PATCH REV# 21. UCODE REV# 20.

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

MESSAGE TYPE 0001 DISK MSCP MESSAGE

MSLG$SL_CMD_REF 3C250022
MSLG$W_UNIT 003B UNIT #59.

MSLG$W_SEQ_NUM 0077 SEQUENCE #119.

MSLG$B_FORMAT 03 SDI ERROR

MSLG$B_FLAGS 40 OPERATION CONTINUING

MSLG$W_EVENT 008B DRIVE ERROR
LOST R/W READY, (TRANSFER)

MSLG$Q_CNT_ID 0000FA05
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$W_MULT_UNIT 0072
MSLG$Q_UNIT_ID 000FFFFFF
02130000 UNIQUE IDENTIFIER, 00000000FFFFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG$B_UNIT_SVR 00 UNIT SOFTWARE VERSION #0.

MSLG$B_UNIT_HVR 0F UNIT HARDWARE REVISION #15.

MSLG$SL_VOL_SER 000001D8 VOLUME SERIAL #472.

MSLG$SL_HDR_CODE 00000000 LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR

MSLG$Z_SDI REQUEST 17 RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED

MODE 00 512-BYTE SECTOR FORMAT

ERROR 00

CONTROLLER 00 NORMAL DRIVE OPERATION

RETRY 00 0. RETRIES

```

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	052C0284	/.../
LONGWORD 2.	07000009	/..../
LONGWORD 3.	00000002	/..../
LONGWORD 4.	00000000	/..../

***** ENTRY

13. *****

ERROR SEQUENCE 1874.

LOGGED ON SID 05202B14

ERL\$LOGMESSAGE ENTRY 23-MAR-1988 14:14:38.40

KA820 REV# D PATCH REV# 21. UCODE REV# 20.

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF CE6A001C
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

DRIVE DETECTED ERROR

MSLG\$Q_CNT_ID 0000FA05
01200000UNIQUE 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_MULT_UNT 0072
MSLG\$Q_UNIT_ID 000FFFFF
02130000UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_HDR_CODE 00000000

LOGICAL BLOCK #0.
GOOD LOGICAL SECTORMSLG\$Z_SDI
REQUEST 17RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED

MODE 00

512-BYTE SECTOR FORMAT

ERROR 00

CONTROLLER 00

NORMAL DRIVE OPERATION

RETRY 00

0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	010D0205	/..../
LONGWORD 2.	07112400	/.\$. /
LONGWORD 3.	00000002	/..../
LONGWORD 4.	00000000	/..../

```

***** ENTRY 14. *****
ERROR SEQUENCE 1875. LOGGED ON SID 05202B14
ERL$LOGMESSAGE ENTRY 23-MAR-1988 14:14:41.03
      KA820 REV# D PATCH REV# 21. UCODE REV# 20.

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

MESSAGE TYPE 0001 DISK MSCP MESSAGE

MSLG$L_CMD_REF CF66002B
MSLG$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
DRIVE DETECTED ERROR

MSLG$Q_CNT_ID 0000FA05
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$W_MULT_UNT 0072
MSLG$Q_UNIT_ID 000FFFFF
02130000 UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG$B_UNIT_SVR 00 UNIT SOFTWARE VERSION #0.

MSLG$B_UNIT_HVR 0F UNIT HARDWARE REVISION #15.

MSLG$L_VOL_SER 000001D8 VOLUME SERIAL #472.

MSLG$L_HDR_CODE 00000000 LOGICAL BLOCK #0.
GOOD LOGICAL SECTOR

- MSLG$Z_SDI REQUEST 17 RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED

MODE 00 512-BYTE SECTOR FORMAT

ERROR 00 NORMAL DRIVE OPERATION

CONTROLLER 00 0. RETRIES

RETRY 00

```

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	010D0205	/..../
LONGWORD 2.	07112400	/.\$../
LONGWORD 3.	00000002	/..../
LONGWORD 4.	00000000	/..../

***** ENTRY 15. *****
 ERROR SEQUENCE 1876. LOGGED ON SID 05202B14
 ERL\$LOGMESSAGE ENTRY 23-MAR-1988 14:15:19.29
 KA820 REV# D PATCH REV# 21. UCODE REV# 20.

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

MESSAGE TYPE	0001	DISK MSCP MESSAGE
MSLG\$L_CMD_REF	CE78001C	
MSLG\$W_UNIT	003B	UNIT #59.
MSLG\$W_SEQ_NUM	0002	SEQUENCE #2.
MSLG\$B_FORMAT	03	SDI ERROR
MSLG\$B_FLAGS	40	OPERATION CONTINUING
MSLG\$W_EVENT	008B	DRIVE ERROR
		LOST R/W READY, (TRANSFER)
MSLG\$Q_CNT_ID	0000FA05 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_MULT_UNT	0072	
MSLG\$Q_UNIT_ID	000FFFFF 02130000	UNIQUE IDENTIFIER, 00000000FFFF(X) DISK CLASS DEVICE (166) RA90
MSLG\$B_UNIT_SVR	00	UNIT SOFTWARE VERSION #0.
MSLG\$B_UNIT_HVR	0F	UNIT HARDWARE REVISION #15.
MSLG\$L_VOL_SER	000001D8	VOLUME SERIAL #472.
MSLG\$L_HDR_CODE	00000000	LOGICAL BLOCK #0. GOOD LOGICAL SECTOR
MSLG\$Z_SDI REQUEST	17	RUN/STOP SWITCH IN PORT SWITCH IN SPINDLE READY PORT B RECEIVERS ENABLED
MODE	00	512-BYTE SECTOR FORMAT
ERROR	00	
CONTROLLER	00	NORMAL DRIVE OPERATION
RETRY	00	0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	00150288	/..../
LONGWORD 2.	07000001	/..../
LONGWORD 3.	00000002	/..../
LONGWORD 4.	00000000	/..../

***** ENTRY 16. *****
 ERROR SEQUENCE 1877. LOGGED ON SID 05202B14
 ERL\$LOGMESSAGE ENTRY 23-MAR-1988 14:15:19.29
 KA820 REV# D PATCH REV# 21. UCODE REV# 20.

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

MESSAGE TYPE	0001	DISK MSCP MESSAGE
MSLG\$L_CMD_REF	CE78001C	
MSLG\$W_UNIT	003B	UNIT #59.
MSLG\$W_SEQ_NUM	0003	SEQUENCE #3.
MSLG\$B_FORMAT	03	SDI ERROR
MSLG\$B_FLAGS	40	OPERATION CONTINUING
MSLG\$W_EVENT	00EB	DRIVE ERROR
		DRIVE DETECTED ERROR
MSLG\$Q_CNT_ID	0000FA05 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_MULT_UNT	0072	
MSLG\$Q_UNIT_ID	000FFFFF 02130000	UNIQUE IDENTIFIER, 00000000FFFF(X) DISK CLASS DEVICE (166) RA90
MSLG\$B_UNIT_SVR	00	UNIT SOFTWARE VERSION #0.
MSLG\$B_UNIT_HVR	0F	UNIT HARDWARE REVISION #15.
MSLG\$L_VOL_SER	000001D8	VOLUME SERIAL #472.
MSLG\$L_HDR_CODE	00000000	LOGICAL BLOCK #0. GOOD LOGICAL SECTOR
MSLG\$Z_SDI REQUEST	1F	RUN/STOP SWITCH IN PORT SWITCH IN LOG INFORMATION IN EXTENDED AREA SPINDLE READY PORT B RECEIVERS ENABLED
MODE	00	512-BYTE SECTOR FORMAT
ERROR	80	DRIVE ERROR
CONTROLLER	00	NORMAL DRIVE OPERATION
RETRY	00	0. RETRIES

CONTROLLER OR DEVICE DEPENDENT INFORMATION

LED CODE	24
PANEL CODE	11
LAST OPCODE	0A

INITIATE SEEK

RESERVED	02
CUR CYLNR	010D

CURRENT CYLINDER, #269.

CUR GROUP	04
-----------	----

CURRENT GROUP, #4.

***** ENTRY

17. *****

ERROR SEQUENCE 1878.

LOGGED ON SID 05202B14

ERL\$LOGMESSAGE ENTRY 23-MAR-1988 14:15:20.89

KA820 REV# D PATCH REV# 21. UCODE REV# 20.

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF CEF2002A

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 0004

SEQUENCE #4.

MSLG\$B_FORMAT 03

SDI ERROR

MSLG\$B_FLAGS 40

OPERATION CONTINUING

MSLG\$W_EVENT 00EB

DRIVE ERROR

DRIVE DETECTED ERROR

MSLG\$Q_CNT_ID 0000FA05
01200000UNIQUE 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_MULT_UNT 0072

MSLG\$Q_UNIT_ID 000FFFFF
02130000UNIQUE IDENTIFIER, 00000000FFFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_HDR_CODE 00000000

LOGICAL BLOCK #0.
GOOD LOGICAL SECTORMSLG\$Z_SDI
REQUEST 17RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED

MODE 00

512-BYTE SECTOR FORMAT

ERROR 00

CONTROLLER 00

NORMAL DRIVE OPERATION

RETRY 00

0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	010B0205	/..../
LONGWORD 2.	07112401	/.\$../
LONGWORD 3.	00000002	/..../
LONGWORD 4.	00000000	/..../

***** ENTRY

18. *****

ERROR SEQUENCE 1879.

LOGGED ON SID 05202B14

ERL\$LOGMESSAGE ENTRY 23-MAR-1988 14:17:27.58

KA820 REV# D PATCH REV# 21. UCODE REV# 20.

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF CED5001C

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

DRIVE DETECTED ERROR

MSLG\$Q_CNT_ID 0000FA05
01200000UNIQUE 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_MULT_UNT 0072

MSLG\$Q_UNIT_ID 000FFFFF
02130000UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_HDR_CODE 00000000

LOGICAL BLOCK #0.
GOOD LOGICAL SECTORMSLG\$Z_SDI
REQUEST 17RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED

MODE 00

512-BYTE SECTOR FORMAT

ERROR 00

CONTROLLER 00

NORMAL DRIVE OPERATION

RETRY 00

0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	010D0205	/..../
LONGWORD 2.	07113600	/.6../
LONGWORD 3.	00000002	/..../
LONGWORD 4.	00000000	/..../

```

***** ENTRY          19. *****
ERROR SEQUENCE 1881.          LOGGED ON SID 05202B14
ERL$LOGMESSAGE ENTRY 23-MAR-1988 14:24:34.66
                        KA820 REV# D PATCH REV# 21. UCODE REV# 20.

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

MESSAGE TYPE          0001          DISK MSCP MESSAGE

MSLG$SL_CMD_REF      CEFF0023
MSLG$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
                                   DRIVE DETECTED ERROR

MSLG$Q_CNT_ID         0000FA05
                        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$W_MULT_UNT        0072
MSLG$Q_UNIT_ID         000FFFFF
                        02130000          UNIQUE IDENTIFIER, 00000000FFFF(X)
                                   DISK CLASS DEVICE (166)
                                   RA90

MSLG$B_UNIT_SVR         00          UNIT SOFTWARE VERSION #0.

MSLG$B_UNIT_HVR         0F          UNIT HARDWARE REVISION #15.

MSLG$L_VOL_SER         000001D8          VOLUME SERIAL #472.

MSLG$L_HDR_CODE         00000000          LOGICAL BLOCK #0.
                                   GOOD LOGICAL SECTOR

MSLG$Z_SDI
REQUEST              17          RUN/STOP SWITCH IN
                                   PORT SWITCH IN
                                   SPINDLE READY
                                   PORT B RECEIVERS ENABLED

MODE                  00          512-BYTE SECTOR FORMAT

ERROR                 00          NORMAL DRIVE OPERATION

CONTROLLER            00          0. RETRIES

RETRY                 00

```


DEVICE DEPENDENT INFORMATION

LONGWORD 1.	010D0205	/..../
LONGWORD 2.	07112400	/.\$../
LONGWORD 3.	00000002	/..../
LONGWORD 4.	00000000	/..../

***** ENTRY 20. *****
 ERROR SEQUENCE 1885. LOGGED ON SID 05202B14
 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

DISK MSCP MESSAGE

MSLG\$\$_CMD_REF CEFF0023
 MSLG\$\$_UNIT 003B

UNIT #59.

MSLG\$\$_SEQ_NUM 0079

SEQUENCE #121.

MSLG\$\$_FORMAT 03

SDI ERROR

MSLG\$\$_FLAGS 40

OPERATION CONTINUING

MSLG\$\$_EVENT 00EB

DRIVE ERROR

DRIVE DETECTED ERROR

MSLG\$\$_CNT_ID 0000FA05
 01200000

UNIQUE IDENTIFIER, 00000000FA05
 MASS STORAGE CONTROLLER
 HSC70

MSLG\$\$_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$\$_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$\$_MULT_UNIT 0072

MSLG\$\$_UNIT_ID 000FFFFF
 02130000

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

MSLG\$\$_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$\$_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$\$_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$\$_HDR_CODE 00000000

LOGICAL BLOCK #0.
 GOOD LOGICAL SECTOR

MSLG\$\$_SDI
 REQUEST 17

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

MODE 00

512-BYTE SECTOR FORMAT

ERROR 00
 CONTROLLER 00

NORMAL DRIVE OPERATION

RETRY 00

0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	010D0205	/..../
LONGWORD 2.	07112400	/.\$../
LONGWORD 3.	00000002	/..../
LONGWORD 4.	00000000	/..../

***** ENTRY 21. *****
 ERROR SEQUENCE 1886. LOGGED ON SID 05202B14
 ERL\$LOGMESSAGE ENTRY 23-MAR-1988 15:04:37.04
 KA820 REV# D PATCH REV# 21. UCODE REV# 20.

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

MESSAGE TYPE	0001	DISK MSCP MESSAGE
MSLG\$L_CMD_REF	4A670027	
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
		DRIVE DETECTED ERROR
MSLG\$Q_CNT_ID	0000FA05 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_MULT_UNT	0072	
MSLG\$Q_UNIT_ID	000FFFFFF 02130000	UNIQUE IDENTIFIER, 00000000FFFFFF(X) DISK CLASS DEVICE (166) RA90
MSLG\$B_UNIT_SVR	00	UNIT SOFTWARE VERSION #0.
MSLG\$B_UNIT_HVR	0F	UNIT HARDWARE REVISION #15.
MSLG\$L_VOL_SER	000001D8	VOLUME SERIAL #472.
MSLG\$L_HDR_CODE	00000000	LOGICAL BLOCK #0. GOOD LOGICAL SECTOR
MSLG\$Z_SDI REQUEST	17	RUN/STOP SWITCH IN PORT SWITCH IN SPINDLE READY PORT B RECEIVERS ENABLED
MODE	00	512-BYTE SECTOR FORMAT
ERROR	00	
CONTROLLER	00	NORMAL DRIVE OPERATION
RETRY	00	0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	010D0205	/..../
LONGWORD 2.	07112400	/.\$../
LONGWORD 3.	00000002	/..../
LONGWORD 4.	00000000	/..../

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	010D0205	/..../
LONGWORD 2.	07112400	/.\$./
LONGWORD 3.	00000002	/..../
LONGWORD 4.	00000000	/..../

***** ENTRY

22. *****

ERROR SEQUENCE 1889.

LOGGED ON SID 05202B14

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

DISK MSCP MESSAGE

MSLG\$SL_CMD_REF 4A670027

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

DRIVE DETECTED ERROR

MSLG\$Q_CNT_ID 0000FA05
01200000UNIQUE 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_MULT_UNIT 0072

MSLG\$Q_UNIT_ID 000FFFFFF
02130000UNIQUE IDENTIFIER, 00000000FFFFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$SL_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$SL_HDR_CODE 00000000

LOGICAL BLOCK #0.
GOOD LOGICAL SECTORMSLG\$Z_SDI
REQUEST 17RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED

MODE 00

512-BYTE SECTOR FORMAT

ERROR 00
CONTROLLER 00

NORMAL DRIVE OPERATION

RETRY 00

0. RETRIES

***** ENTRY

23. *****

ERROR SEQUENCE 1900.

LOGGED ON SID 05202B14

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\$DUA59:

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$\$_CMD_REF 5A3C002F

MSLG\$\$_UNIT 003B

UNIT #59.

MSLG\$\$_SEQ_NUM 0079

SEQUENCE #121.

MSLG\$\$_FORMAT 03

SDI ERROR

MSLG\$\$_FLAGS 40

OPERATION CONTINUING

MSLG\$\$_EVENT 00EB

DRIVE ERROR

DRIVE DETECTED ERROR

MSLG\$\$_CNT_ID 0000FA05
01200000UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
HSC70

MSLG\$\$_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$\$_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$\$_MULT_UNT 0072

MSLG\$\$_UNIT_ID 000FFFFF
02130000UNIQUE IDENTIFIER, 00000000FFFF(X)
DISK CLASS DEVICE (166)
RA90

MSLG\$\$_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$\$_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$\$_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$\$_HDR_CODE 00000000

LOGICAL BLOCK #0.
GOOD LOGICAL SECTORMSLG\$\$_SDI
REQUEST 17RUN/STOP SWITCH IN
PORT SWITCH IN
SPINDLE READY
PORT B RECEIVERS ENABLED

MODE 00

512-BYTE SECTOR FORMAT

ERROR 00

CONTROLLER 00

NORMAL DRIVE OPERATION

RETRY 00

0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	010D0205	/..../
LONGWORD 2.	07112400	/.\$../
LONGWORD 3.	00000002	/..../
LONGWORD 4.	00000000	/..../

***** ENTRY 24. *****
 ERROR SEQUENCE 1968. LOGGED ON SID 05202B14
 ERL\$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	DISK MSCP MESSAGE
MSLG\$SL_CMD_REF	5ABC006D	
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
		DRIVE DETECTED ERROR
MSLG\$Q_CNT_ID	0000FA05 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_MULT_UNIT	0072	
MSLG\$Q_UNIT_ID	000FFFFF 02130000	UNIQUE IDENTIFIER, 0000000FFFFF(X) DISK CLASS DEVICE (166) RA90
MSLG\$B_UNIT_SVR	00	UNIT SOFTWARE VERSION #0.
MSLG\$B_UNIT_HVR	0F	UNIT HARDWARE REVISION #15.
MSLG\$SL_VOL_SER	000001D8	VOLUME SERIAL #472.
MSLG\$SL_HDR_CODE	00000000	LOGICAL BLOCK #0. GOOD LOGICAL SECTOR
MSLG\$Z_SDI REQUEST	17	RUN/STOP SWITCH IN PORT SWITCH IN SPINDLE READY PORT B RECEIVERS ENABLED
MODE	00	512-BYTE SECTOR FORMAT
ERROR	00	
CONTROLLER	00	NORMAL DRIVE OPERATION
RETRY	00	0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	010D0205	/..../
LONGWORD 2.	07112400	/.\$./
LONGWORD 3.	00000002	/..../
LONGWORD 4.	00000000	/..../

***** ENTRY 25. *****
 ERROR SEQUENCE 1969. LOGGED ON SID 05202B14
 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\$L_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
 DRIVE DETECTED ERROR

MSLG\$Q_CNT_ID 0000FA05
 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_MULT_UNT 0072

MSLG\$Q_UNIT_ID 000FFFFF
 02130000

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

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 0F

UNIT HARDWARE REVISION #15.

MSLG\$L_VOL_SER 000001D8

VOLUME SERIAL #472.

MSLG\$L_HDR_CODE 00000000

LOGICAL BLOCK #0.
 GOOD LOGICAL SECTOR

MSLG\$Z_SDI
 REQUEST 17

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

MODE 00

512-BYTE SECTOR FORMAT

ERROR 00

CONTROLLER 00

NORMAL DRIVE OPERATION

RETRY 00

0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	010D0205	
		/..../
LONGWORD 2.	07112400	
		/.\$.//
LONGWORD 3.	00000002	
		/..../
LONGWORD 4.	00000000	
		/...../

DEVICE ROLLUP LOGGED BY SID 0404F098

DEVICE	ERROR BITS		QIO TIMEOUT		ERRORS THIS SESSION	QIOS THIS SESSION
	SET					
	[HARD]	[SOFT]	[HARD]	[SOFT]		
_VADER\$DUA59:	0.	11.	0.	0.	0.	0.

DEVICE ROLLUP LOGGED BY SID 05202B14

DEVICE	ERROR BITS		QIO TIMEOUT		ERRORS THIS SESSION	QIOS THIS SESSION
	SET					
	[HARD]	[SOFT]	[HARD]	[SOFT]		
_VADER\$DUA59:	0.	14.	0.	0.	0.	0.

SUMMARY OF ALL ENTRIES LOGGED BY SID 0404F098

ERL\$LOGMESSAGE	11.
DATE OF EARLIEST ENTRY	23-MAR-1988 12:05:46.43
DATE OF LATEST ENTRY	23-MAR-1988 13:16:18.62

SUMMARY OF ALL ENTRIES LOGGED BY SID 05202B14

ERL\$LOGMESSAGE	14.
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

00:00	0.
01:00	0.
02:00	0.
03:00	0.
04:00	0.
05:00	0.
06:00	0.
07:00	0.
08:00	0.
09:00	0.
10:00	0.
11:00	0.
12:00	9. *****
13:00	2. **
14:00	0.
15:00	0.
16:00	0.
17:00	0.
18:00	0.
19:00	0.
20:00	0.
21:00	0.
22:00	0.
23:00	0.

PROCESSED ENTRIES HOUR-OF-DAY HISTOGRAM LOGGED BY SID 05202B14

00:00	0.
01:00	0.
02:00	0.
03:00	0.
04:00	0.
05:00	0.
06:00	0.
07:00	0.
08:00	0.
09:00	0.
10:00	0.
11:00	0.
12:00	0.
13:00	0.
14:00	9. *****
15:00	5. *****
16:00	0.
17:00	0.
18:00	0.
19:00	0.
20:00	0.
21:00	0.
22:00	0.
23:00	0.

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 there 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 'BBR' enabled or not. Enabling BBR 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 DUA59 is connected to cluster A. Port B of DUA59 is connected to cluster B. Occasionally cluster B will write data to DUA59. 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

V A X / V M S SYSTEM ERROR REPORT

COMPILED 2-MAR-1988 07:14

PAGE 1.

***** ENTRY

1. *****

ERROR SEQUENCE 2416.

LOGGED ON SID 01380A4F

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

DISK MSCP MESSAGE

MSLG\$\$_CMD_REF 9A5F0007

MSLG\$\$_UNIT 003B

UNIT #59.

MSLG\$\$_SEQ_NUM 006A

SEQUENCE #106.

MSLG\$\$_FORMAT 02

DISK TRANSFER ERROR

MSLG\$\$_FLAGS 00

MSLG\$\$_EVENT 004A

CONTROLLER ERROR
"EDC" ERRORMSLG\$\$_CNT_ID 0000FA05
01200000UNIQUE IDENTIFIER, 00000000FA05
MASS STORAGE CONTROLLER
HSC70

MSLG\$\$_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$\$_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$\$_MULT_UNT 0072

MSLG\$\$_UNIT_ID 000001FF
02130000UNIQUE IDENTIFIER, 0000000001FF
DISK CLASS DEVICE
RA90

MSLG\$\$_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$\$_UNIT_HVR 00

UNIT HARDWARE REVISION #0.

MSLG\$\$_LEVEL 00

MSLG\$\$_RETRY 05

MSLG\$\$_VOL_SER 00000419

VOLUME SERIAL #1049.

MSLG\$\$_HEADER 00000009

LBN #9.
GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION

ORIG ERR 0010

EDC ERROR

ERR RECOV FLGS 0002

ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 00

LV1 B RETRY 00

BUFFR DATA MEM ADR DBB6

SRC REQ # 07

DET REQ # 07

FOR INTERNAL USE ONLY

```

***** ENTRY 2. *****
ERROR SEQUENCE 2417. LOGGED ON SID 01380A4F
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 DISK MSCP MESSAGE

MSLG$L_CMD_REF 9A5F0007
MSLG$W_UNIT 003B UNIT #59.

MSLG$W_SEQ_NUM 006A SEQUENCE #106.

MSLG$B_FORMAT 02 DISK TRANSFER ERROR

MSLG$B_FLAGS 00 CONTROLLER ERROR
MSLG$W_EVENT 004A "EDC" ERROR

MSLG$Q_CNT_ID 0000FA05
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$W_MULT_UNT 0072
MSLG$Q_UNIT_ID 000001FF
02130000 UNIQUE IDENTIFIER, 0000000001FF
DISK CLASS DEVICE
RA90

MSLG$B_UNIT_SVR 00 UNIT SOFTWARE VERSION #0.

MSLG$B_UNIT_HVR 00 UNIT HARDWARE REVISION #0.

MSLG$B_LEVEL 00
MSLG$B_RETRY 05
MSLG$L_VOL_SER 00000419 VOLUME SERIAL #1049.

MSLG$L_HEADER 00000009 LBN #9.
GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION
ORIG ERR 0010 EDC ERROR

ERR RECOV FLGS 0002 ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 00
LV1 B RETRY 00
BUFFR DATA MEM ADR DBB6
SRC REQ # 07
DET REQ # 07

```

***** ENTRY 3. *****
 ERROR SEQUENCE 2418. LOGGED ON SID 01380A4F
 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\$DUA59:

MESSAGE TYPE	0001	DISK MSCP MESSAGE
MSLG\$SL_CMD_REF	9A5F0007	
MSLG\$W_UNIT	003B	UNIT #59.
MSLG\$W_SEQ_NUM	006A	SEQUENCE #106.
MSLG\$B_FORMAT	02	DISK TRANSFER ERROR
MSLG\$B_FLAGS	00	CONTROLLER ERROR
MSLG\$W_EVENT	004A	"EDC" ERROR
MSLG\$Q_CNT_ID	0000FA05 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_MULT_UNT	0072	
MSLG\$Q_UNIT_ID	000001FF 02130000	UNIQUE IDENTIFIER, 0000000001FF DISK CLASS DEVICE RA90
MSLG\$B_UNIT_SVR	00	UNIT SOFTWARE VERSION #0.
MSLG\$B_UNIT_HVR	00	UNIT HARDWARE REVISION #0.
MSLG\$B_LEVEL	00	
MSLG\$B_RETRY	.05	
MSLG\$SL_VOL_SER	00000419	VOLUME SERIAL #1049.
MSLG\$SL_HEADER	00000009	LBN #9. GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION

ORIG ERR	0010	EDC ERROR
ERR RECOV FLGS	0002	ERR LOGGED TO CONSOLE AND HOST
LV1 A RETRY	00	
LV1 B RETRY	00	
BUFFR DATA MEM ADR	00000000	
SRC REQ #	07	
DET REQ #	07	

```

***** ENTRY 4. *****
ERROR SEQUENCE 2419.          LOGGED ON SID 01380A4F
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          DISK MSCP MESSAGE

  MSLG$SL_CMD_REF 9A5F0007
  MSLG$W_UNIT      003B          UNIT #59.

  MSLG$W_SEQ_NUM   006A          SEQUENCE #106.

  MSLG$B_FORMAT    02          DISK TRANSFER ERROR

  MSLG$B_FLAGS     00
  MSLG$W_EVENT     004A          CONTROLLER ERROR
                                "EDC" ERROR

  MSLG$Q_CNT_ID    0000FA05
                                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$W_MULT_UNIT 0072
  MSLG$Q_UNIT_ID   000001FF
                                02130000
                                UNIQUE IDENTIFIER, 0000000001FF
                                DISK CLASS DEVICE
                                RA90

  MSLG$B_UNIT_SVR  00          UNIT SOFTWARE VERSION #0.

  MSLG$B_UNIT_HVR  00          UNIT HARDWARE REVISION #0.

  MSLG$B_LEVEL     00
  MSLG$B_RETRY     05
  MSLG$SL_VOL_SER  00000419
                                VOLUME SERIAL #1049.

  MSLG$SL_HEADER   00000009
                                LBN #9.
                                GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION
  ORIG ERR          0010          EDC ERROR

  ERR RECOV FLGS    0002          ERR LOGGED TO CONSOLE AND HOST

  LV1 A RETRY       00
  LV1 B RETRY       00
  BUFR DATA MEM ADR DBB6
  SRC REQ #         07
  DET REQ #         07

```

```

***** ENTRY 5. *****
ERROR SEQUENCE 2420. LOGGED ON SID 01380A4F
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 DISK MSCP MESSAGE

MSLG$L_CMD_REF 9A5F0007
MSLG$W_UNIT 003B UNIT #59.

MSLG$W_SEQ_NUM 006A SEQUENCE #106.

MSLG$B_FORMAT 02 DISK TRANSFER ERROR

MSLG$B_FLAGS 00
MSLG$W_EVENT 004A CONTROLLER ERROR
"EDC" ERROR

MSLG$Q_CNT_ID 0000FA05
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$W_MULT_UNIT 0072
MSLG$Q_UNIT_ID 000001FF
02130000 UNIQUE IDENTIFIER, 0000000001FF
DISK CLASS DEVICE
RA90

MSLG$B_UNIT_SVR 00 UNIT SOFTWARE VERSION #0.

MSLG$B_UNIT_HVR 00 UNIT HARDWARE REVISION #0.

MSLG$B_LEVEL 00
MSLG$B_RETRY 05
MSLG$L_VOL_SER 00000419 VOLUME SERIAL #1049.

MSLG$L_HEADER 00000009 LBN #9.
GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION
ORIG ERR 0010 EDC ERROR

ERR RECOV FLGS 0002 ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 00
LV1 B RETRY 00
BUFFR DATA MEM ADR DBB6
SRC REQ # 07
DET REQ # 07

```

```

***** ENTRY 6. *****
ERROR SEQUENCE 2421. LOGGED ON SID 01380A4F
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 DISK MSCP MESSAGE

MSLG$L_CMD_REF 9A5F0007
MSLG$W_UNIT 003B UNIT #59.

MSLG$W_SEQ_NUM 006A SEQUENCE #106.

MSLG$B_FORMAT 02 DISK TRANSFER ERROR

MSLG$B_FLAGS 00 CONTROLLER ERROR
MSLG$W_EVENT 004A "EDC" ERROR

MSLG$Q_CNT_ID 0000FA05
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$W_MULT_UNT 0072
MSLG$Q_UNIT_ID 000001FF
02130000 UNIQUE IDENTIFIER, 0000000001FF
DISK CLASS DEVICE
RA90

MSLG$B_UNIT_SVR 00 UNIT SOFTWARE VERSION #0.

MSLG$B_UNIT_HVR 00 UNIT HARDWARE REVISION #0.

MSLG$B_LEVEL 00
MSLG$B_RETRY 05
MSLG$L_VOL_SER 00000419 VOLUME SERIAL #1049.

MSLG$L_HEADER 00000009 LBN #9.
GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION
ORIG ERR 0010 EDC ERROR

ERR RECOV FLGS 0002 ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 00
LV1 B RETRY 00
BUFFR DATA MEM ADR DBB6
SRC REQ # 07
DET REQ # 07

```


***** ENTRY

7. *****

ERROR SEQUENCE 2415.

LOGGED ON SID 01380A4F

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:

MSLG\$L_CMD_REF 9A5F0007

ORB\$L_OWNER 01E80018

UCB\$L_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\$L_OPCNT 00000668

1640. QIO'S THIS UNIT

UCB\$W_ERRCNT 001B

27. ERRORS THIS UNIT

UCB\$W_STS 1C10

ONLINE

DEALLOCATE AT DISMOUNT

SOFTWARE VALID

UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 00000009

STARTING LBN #9.

CDRP\$W_FUNC 000C

READ PHYSICAL BLOCK

CDRP\$L_BCNT 00000200

TRANSFER SIZE 512. BYTE(S)

CDRP\$W_BOFF 0000

TRANSFER PAGE ALIGNED

CDRP\$L_PID 00020010

REQUESTOR "PID"

CDRP\$Q_IOSB 00000054

00000000

IOSB, 0. BYTE(S) TRANSFERRED

***** ENTRY 8. *****
 ERROR SEQUENCE 2423. LOGGED ON SID 01380A4F
 ERL\$LOGMESSAGE ENTRY 1-MAR-1988 10:13:19.17
 KA780 REV# 7. SERIAL# 2639. MFG PLANT 0.

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

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 39A30009

MSLG\$W_UNIT 003B

UNIT #59.

MSLG\$W_SEQ_NUM 006B

SEQUENCE #107.

MSLG\$B_FORMAT 02

DISK TRANSFER ERROR

MSLG\$B_FLAGS 00

MSLG\$W_EVENT 004A

CONTROLLER ERROR

"EDC" ERROR

MSLG\$Q_CNT_ID 0000FA05

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_MULT_UNT 0072

MSLG\$Q_UNIT_ID 000001FF

02130000

UNIQUE IDENTIFIER, 0000000001FF

DISK CLASS DEVICE

RA90

MSLG\$B_UNIT_SVR 00

UNIT SOFTWARE VERSION #0.

MSLG\$B_UNIT_HVR 00

UNIT HARDWARE REVISION #0.

MSLG\$B_LEVEL 00

MSLG\$B_RETRY 05

MSLG\$L_VOL_SER 00000419

VOLUME SERIAL #1049.

MSLG\$L_HEADER 00000009

LBN #9.

GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION

ORIG ERR 0010

EDC ERROR

ERR RECOV FLGS 0002

ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 00

LV1 B RETRY 00

BUFFR DATA MEM ADR CC80

SRC REQ # 07

DET REQ # 07

***** ENTRY 9. *****
 ERROR SEQUENCE 2422. LOGGED ON SID 01380A4F
 ERL\$LOGSTATUS ENTRY 1-MAR-1988 10:13:19.17
 KA780 REV# 7. SERIAL# 2639. MFG PLANT 0.

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

MSLG\$L_CMD_REF 39A30009
 ORB\$L_OWNER 01E80018

OWNER UIC [350,030]

UCB\$L_CHAR 1CCD4108

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

UCB\$L_OPCNT 00000669

1641. QIO'S THIS UNIT

UCB\$W_ERRCNT 0022

34. ERRORS THIS UNIT

UCB\$W_STS 1C10

ONLINE
 DEALLOCATE AT DISMOUNT
 SOFTWARE VALID
 UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 00000009

STARTING LBN #9.

CDRP\$W_FUNC 000C

READ PHYSICAL BLOCK

CDRP\$L_BCNT 00000200

TRANSFER SIZE 512. BYTE(S)

CDRP\$W_BOFF 0000

TRANSFER PAGE ALIGNED

CDRP\$L_PID 00020010

REQUESTOR "PID"

CDRP\$Q_IOSB 00000054
 00000000

IOSB, 0. BYTE(S) TRANSFERRED

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 ramification 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

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.

Backing 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

Bug 10

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:

-- Drive -->			MSCP	Block	< Logical>			
Name#	Typ	Led	Event	#	Cyl	Gp	S	yy-mm-dd hh:mm:ss.cc
DUA59	90	4B	00EB	0	0	0	0	88/03/10 01:16:31.45
DUA59	90	C6	00EB	0	0	0	0	88/03/10 01:17:48.18
DUA59	90	C6	00EB	0	0	0	0	88/03/10 01:26:00.63
DUA59	90	C6	00EB	0	0	0	0	88/03/10 01:27:18.48
DUA59	90	C6	00EB	0	0	0	0	88/03/10 01:27:52.38
DUA59	90	C6	00EB	0	0	0	0	88/03/10 01:29:02.33
DUA59	90	C6	00EB	0	0	0	0	88/03/10 01:35:46.35
DUA59	90	C6	00EB	0	0	0	0	88/03/10 02:03:34.15
DUA59	90	4B	00EB	0	0	0	0	88/03/10 02:04:20.15
DUA59	90	C6	00EB	0	0	0	0	88/03/10 02:12:22.42
DUA59	90	4B	00EB	0	0	0	0	88/03/10 02:16:32.03
DUA59	90	C6	00EB	0	0	0	0	88/03/10 02:21:11.11
DUA59	90	C6	00EB	0	0	0	0	88/03/10 02:25:18.84
DUA59	90	4B	00EB	0	0	0	0	88/03/10 02:35:32.02
DUA59	90	4B	00EB	0	0	0	0	88/03/10 02:38:05.59
DUA59	90	C6	00EB	0	0	0	0	88/03/10 02:39:23.40
DUA59	90	C6	00EB	0	0	0	0	88/03/10 02:40:55.96
DUA59	90	C6	00EB	0	0	0	0	88/03/10 02:41:20.94
DUA59	90	4B	00EB	0	0	0	0	88/03/10 02:44:37.49
DUA59	90	4B	00EB	0	0	0	0	88/03/10 02:45:48.84
DUA59	90	C6	00EB	0	0	0	0	88/03/10 02:48:20.82

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 "SDI" 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$DUA59: is offline. Mount  
verification in progress.
```

```
%%%%%%%%% OPCOM 27-AUG-1987 03:34:54.01 %%%%%%%%%  
Device _BRUTE$DUA59: is offline.  
Mount verification is in progress.
```

```
%SYSTEM-I-MOUNTVER, _BRUTE$DUA59: has completed mount  
verification.
```

```
%%%%%%%%% OPCOM 27-AUG-1987 03:43:55.44 %%%%%%%%%
```

CUSTOMER ERROR LOG

V A X / V M S SYSTEM ERROR REPORT COMPILED 28-MAR-1988 23:37
 PAGE 1.
 ***** ENTRY 1. *****
 ERROR SEQUENCE 478. LOGGED ON SID 0408F3FE
 ERL\$LOGMESSAGE ENTRY 27-MAR-1988 19:37:14.38
 KA86 REV# 8. SERIAL# 1022. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _BRUTE\$DUA4:

MESSAGE TYPE	0001	DISK MSCP MESSAGE
MSLG\$L_CMD_REF	00000000	
MSLG\$W_UNIT	0004	UNIT #4.
MSLG\$W_SEQ_NUM	000A	SEQUENCE #10.
MSLG\$B_FORMAT	03	SDI ERROR
MSLG\$B_FLAGS	40	OPERATION CONTINUING
MSLG\$W_EVENT	01AB	DRIVE ERROR
		RECEIVER READY COLLISION
MSLG\$Q_CNT_ID	23454321	UNIQUE IDENTIFIER, 000123454321(X)
	01200001	MASS STORAGE CONTROLLER
		HSC70
MSLG\$B_CNT_SVR	02	CONTROLLER SOFTWARE VERSION #2.
MSLG\$B_CNT_HVR	00	CONTROLLER HARDWARE REVISION #0.
MSLG\$W_MULT_UNIT	0021	
MSLG\$Q_UNIT_ID	00000584	UNIQUE IDENTIFIER, 000000000584(X)
	02050000	DISK CLASS DEVICE (166)
		RA81
MSLG\$B_UNIT_SVR	06	UNIT SOFTWARE VERSION #6.
MSLG\$B_UNIT_HVR	00	UNIT HARDWARE REVISION #0.
MSLG\$L_VOL_SER	0000BA72	VOLUME SERIAL #47730.
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	
CONTROLLER	00	NORMAL DRIVE OPERATION
RETRY	00	0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1.	029C000A	/..../
LONGWORD 2.	02000000	/..../
LONGWORD 3.	00000001	/..../
LONGWORD 4.	00000000	/..../

***** ENTRY 2. *****
 ERROR SEQUENCE 483. LOGGED ON SID 0408F3FE
 ERL\$LOGMESSAGE ENTRY 27-MAR-1988 20:07:35.64
 KA86 REV# 8. SERIAL# 1022. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _BRUTE\$DUA0:

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$SL_CMD_REF 00000000

MSLG\$W_UNIT 0000

UNIT #0.

MSLG\$W_SEQ_NUM 000B

SEQUENCE #11.

MSLG\$B_FORMAT 03

SDI ERROR

MSLG\$B_FLAGS 40

OPERATION CONTINUING

MSLG\$W_EVENT 002B

DRIVE ERROR

DRIVE COMMAND TIMEOUT

MSLG\$Q_CNT_ID 23454321

01200001

UNIQUE IDENTIFIER, 000123454321(X)

MASS STORAGE CONTROLLER

HSC70

MSLG\$B_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$B_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$W_MULT_UNT 0031

MSLG\$Q_UNIT_ID 000114A4

02050000

UNIQUE IDENTIFIER, 0000000114A4(X)

DISK CLASS DEVICE (166)

RA81

MSLG\$B_UNIT_SVR 07

UNIT SOFTWARE VERSION #7.

MSLG\$B_UNIT_HVR 06

UNIT HARDWARE REVISION #6.

MSLG\$L_VOL_SER 0000DD39

VOLUME SERIAL #56633.

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

CONTROLLER 00

NORMAL DRIVE OPERATION

RETRY 00

0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1. 049F000A

/..../

LONGWORD 2. 03000001

/..../

LONGWORD 3. 00000001

/..../

LONGWORD 4. 00000000

/..../

FOR INTERNAL USE ONLY

***** ENTRY 3. *****
 ERROR SEQUENCE 752. LOGGED ON SID 0408F3FE
 ERL\$LOGMESSAGE ENTRY 28-MAR-1988 21:15:31.18
 KA86 REV# 8. SERIAL# 1022. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _BRUTE\$DUA0:

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 00000000
 MSLG\$W_UNIT 0000

UNIT #0.

MSLG\$W_SEQ_NUM 000C

SEQUENCE #12.

MSLG\$B_FORMAT 03

SDI ERROR

MSLG\$B_FLAGS 40

OPERATION CONTINUING

MSLG\$W_EVENT 01AB

DRIVE ERROR

RECEIVER READY COLLISION

MSLG\$Q_CNT_ID 23454321
 01200001

UNIQUE IDENTIFIER, 000123454321(X)
 MASS STORAGE CONTROLLER
 HSC70

MSLG\$B_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$B_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$W_MULT_UNIT 0031

MSLG\$Q_UNIT_ID 000114A4
 02050000

UNIQUE IDENTIFIER, 0000000114A4(X)
 DISK CLASS DEVICE (166)
 RA81

MSLG\$B_UNIT_SVR 07

UNIT SOFTWARE VERSION #7.

MSLG\$B_UNIT_HVR 06

UNIT HARDWARE REVISION #6.

MSLG\$L_VOL_SER 0000DD39

VOLUME SERIAL #56633.

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
 CONTROLLER 00

NORMAL DRIVE OPERATION

RETRY 00

0. RETRIES

DEVICE DEPENDENT INFORMATION

LONGWORD 1. 0238000A

/..8./

LONGWORD 2. 0300000D

/..../

LONGWORD 3. 00000001

/..../

LONGWORD 4. 00000000

/..../

***** ENTRY

4. *****

ERROR SEQUENCE 260.

LOGGED ON SID 0408F3FE

ERL\$LOGMESSAGE ENTRY 26-MAR-1988 17:35:42.69

KA86 REV# 8. SERIAL# 1022. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _BRUTE\$DUAL:

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 512F000A

MSLG\$W_UNIT 0001

UNIT #1.

MSLG\$W_SEQ_NUM 0006

SEQUENCE #6.

MSLG\$B_FORMAT 02

DISK TRANSFER ERROR

MSLG\$B_FLAGS 81

SEQUENCE NUMBER RESET
OPERATION SUCCESSFUL

MSLG\$W_EVENT 006B

DRIVE ERROR

MSLG\$Q_CNT_ID 23454321
01200001

POSITIONER ERROR (MIS-SEEK)

UNIQUE IDENTIFIER, 000123454321(X)
MASS STORAGE CONTROLLER
HSC70

MSLG\$B_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$B_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$W_MULT_UNIT 0022

MSLG\$Q_UNIT_ID 00011493
02050000UNIQUE IDENTIFIER, 000000011493(X)
DISK CLASS DEVICE (166)
RA81

MSLG\$B_UNIT_SVR 07

UNIT SOFTWARE VERSION #7.

MSLG\$B_UNIT_HVR 06

UNIT HARDWARE REVISION #6.

MSLG\$B_LEVEL 00

MSLG\$B_RETRY 00

MSLG\$L_VOL_SER 0000DD1C

VOLUME SERIAL #56604.

MSLG\$L_HDR_CODE 00034812

LOGICAL BLOCK #215058.
GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION

ORIG ERR 1800

HEADER COMPARE ERROR
HEADER SYNC TIMEOUT
SUSPECTED LOW HEADER MISMATCH

ERR RECOV FLGS 0002

ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 01

LV1 B RETRY 00

BUF DAT MEM ADR DD92

SRC REQ # 02

DET REQ # 02

FOR INTERNAL USE ONLY

***** ENTRY

5. *****

ERROR SEQUENCE 259.

LOGGED ON SID 0408F3FE

ERL\$LOGSTATUS ENTRY 26-MAR-1988 17:35:42.68

KA86 REV# 8. SERIAL# 1022. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _BRUTE\$DUAL:

MSLG\$L_CMD_REF 512F000A

ORB\$L_OWNER 00010001

UCB\$L_CHAR 1C4D4108

OWNER UIC [001,001]

DIRECTORY STRUCTURED

FILE ORIENTED

SHARABLE

AVAILABLE

MOUNTED

ERROR LOGGING

CAPABLE OF INPUT

CAPABLE OF OUTPUT

RANDOM ACCESS

UCB\$L_OPCNT 0000532E

21294. QIO'S THIS UNIT

UCB\$W_ERRCNT 0001

1. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE

SOFTWARE VALID

UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 00034812

STARTING LBN #215058.

CDRP\$W_FUNC 000C

READ PHYSICAL BLOCK

CDRP\$L_BCNT 00000200

TRANSFER SIZE 512. BYTE(S)

CDRP\$W_BOFF 0000

TRANSFER PAGE ALIGNED

CDRP\$L_PID 0001001A

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000

IOSB, 0. BYTE(S) TRANSFERRED

010E000F

***** ENTRY

6. *****

ERROR SEQUENCE 263.

LOGGED ON SID 0408F3FE

ERL\$LOGMESSAGE ENTRY 26-MAR-1988 17:43:42.61

KA86 REV# 8. SERIAL# 1022. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _BRUTE\$DUAL:

MESSAGE TYPE 0001

DISK MSCP MESSAGE

MSLG\$L_CMD_REF 16AB0012

MSLG\$W_UNIT 0001

UNIT #1.

MSLG\$W_SEQ_NUM 0007

SEQUENCE #7.

MSLG\$B_FORMAT 02

DISK TRANSFER ERROR

MSLG\$B_FLAGS 80

OPERATION SUCCESSFUL

MSLG\$W_EVENT 006B

DRIVE ERROR

POSITIONER ERROR (MIS-SEEK)

MSLG\$Q_CNT_ID 23454321
01200001UNIQUE IDENTIFIER, 000123454321(X)
MASS STORAGE CONTROLLER
HSC70

MSLG\$B_CNT_SVR 02

CONTROLLER SOFTWARE VERSION #2.

MSLG\$B_CNT_HVR 00

CONTROLLER HARDWARE REVISION #0.

MSLG\$W_MULT_UNIT 0022

MSLG\$Q_UNIT_ID 00011493
02050000UNIQUE IDENTIFIER, 000000011493(X)
DISK CLASS DEVICE (166)
RA81

MSLG\$B_UNIT_SVR 07

UNIT SOFTWARE VERSION #7.

MSLG\$B_UNIT_HVR 06

UNIT HARDWARE REVISION #6.

MSLG\$B_LEVEL 00

MSLG\$B_RETRY 00

MSLG\$L_VOL_SER 0000DD1C

VOLUME SERIAL #56604.

MSLG\$L_HDR_CODE 00034812

LOGICAL BLOCK #215058.
GOOD LOGICAL SECTOR

CONTROLLER DEPENDENT INFORMATION

ORIG ERR 1800

HEADER COMPARE ERROR
HEADER SYNC TIMEOUT
SUSPECTED LOW HEADER MISMATCH

ERR RECOV FLGS 0002

ERR LOGGED TO CONSOLE AND HOST

LV1 A RETRY 01

LV1 B RETRY 00

BUF DAT MEM ADR C900

SRC REQ # 02

DET REQ # 02

***** ENTRY

7. *****

ERROR SEQUENCE 262.

LOGGED ON SID 0408F3FE

ERL\$LOGSTATUS ENTRY 26-MAR-1988 17:43:42.61

KA86 REV# 8. SERIAL# 1022. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _BRUTE\$DUA1:

MSLG\$SL_CMD_REF 16AB0012

ORB\$SL_OWNER 00010001

UCB\$SL_CHAR 1C4D4108

OWNER UIC [001,001]

DIRECTORY STRUCTURED

FILE ORIENTED

SHARABLE

AVAILABLE

MOUNTED

ERROR LOGGING

CAPABLE OF INPUT

CAPABLE OF OUTPUT

RANDOM ACCESS

UCB\$SL_OPCNT 000077EE

30702. QIO'S THIS UNIT

UCB\$W_ERRCNT 0003

3. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE

SOFTWARE VALID

UNLOAD AT DISMOUNT

CDRP\$SL_MEDIA 00034812

STARTING LBN #215058.

CDRP\$W_FUNC 000C

READ PHYSICAL BLOCK

CDRP\$SL_BCNT 00000200

TRANSFER SIZE 512. BYTE(S)

CDRP\$W_BOFF 0000

TRANSFER PAGE ALIGNED

CDRP\$SL_PID 0001001A

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000

IOSB, 0. BYTE(S) TRANSFERRED

010E000F

***** ENTRY 8. *****
 ERROR SEQUENCE 408. LOGGED ON SID 0408F3FE
 ERL\$LOGMESSAGE ENTRY 27-MAR-1988 13:19:10.08
 KA86 REV# 8. SERIAL# 1022. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _BRUTE\$DUAL:

MESSAGE TYPE	0001	DISK MSCP MESSAGE
MSLG\$L_CMD_REF	82FC0008	
MSLG\$W_UNIT	0001	UNIT #1.
MSLG\$W_SEQ_NUM	0008	SEQUENCE #8.
MSLG\$B_FORMAT	02	DISK TRANSFER ERROR
MSLG\$B_FLAGS	80	OPERATION SUCCESSFUL
MSLG\$W_EVENT	006B	DRIVE ERROR
		POSITIONER ERROR (MIS-SEEK)
MSLG\$Q_CNT_ID	23454321 01200001	UNIQUE IDENTIFIER, 000123454321(X) MASS STORAGE CONTROLLER HSC70
MSLG\$B_CNT_SVR	02	CONTROLLER SOFTWARE VERSION #2.
MSLG\$B_CNT_HVR	00	CONTROLLER HARDWARE REVISION #0.
MSLG\$W_MULT_UNT	0022	
MSLG\$Q_UNIT_ID	00011493 02050000	UNIQUE IDENTIFIER, 000000011493(X) DISK CLASS DEVICE (166) RA81
MSLG\$B_UNIT_SVR	07	UNIT SOFTWARE VERSION #7.
MSLG\$B_UNIT_HVR	06	UNIT HARDWARE REVISION #6.
MSLG\$B_LEVEL	00	
MSLG\$B_RETRY	00	
MSLG\$L_VOL_SER	0000DDIC	VOLUME SERIAL #56604.
MSLG\$L_HDR_CODE	00034812	LOGICAL BLOCK #215058. GOOD LOGICAL SECTOR
CONTROLLER DEPENDENT INFORMATION		
ORIG ERR	1800	HEADER COMPARE ERROR HEADER SYNC TIMEOUT SUSPECTED LOW HEADER MISMATCH
ERR RECOV FLGS	0002	ERR LOGGED TO CONSOLE AND HOST
LV1 A RETRY	01	
LV1 B RETRY	00	
BUF DAT MEM ADR	D76C	
SRC REQ #	02	
DET REQ #	02	

FOR INTERNAL USE ONLY

***** ENTRY

9. *****

ERROR SEQUENCE 409.

LOGGED ON SID 0408F3FE

ERL\$LOGSTATUS ENTRY 27-MAR-1988 13:19:10.08

KA86 REV# 8. SERIAL# 1022. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _BRUTE\$DUAL:

MSLG\$L_CMD_REF 82FC0008

ORB\$L_OWNER 00010001

OWNER UIC [001,001]

UCB\$L_CHAR 1C4D4108

DIRECTORY STRUCTURED

FILE ORIENTED

SHARABLE

AVAILABLE

MOUNTED

ERROR LOGGING

CAPABLE OF INPUT

CAPABLE OF OUTPUT

RANDOM ACCESS

UCB\$L_OPCNT 00030F5C

200540. QIO'S THIS UNIT

UCB\$W_ERRCNT 0006

6. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE

SOFTWARE VALID

UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 0003480F

STARTING LBN #21505.

CDRP\$W_FUNC 000C

READ PHYSICAL BLOCK

CDRP\$L_BCNT 00001A00

TRANSFER SIZE 6656. BYTE(S)

CDRP\$W_BOFF 0000

TRANSFER PAGE ALIGNED

CDRP\$L_PID 00040035

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000

IOSB, 0. BYTE(S) TRANSFERRED

010E000F

***** ENTRY 10. *****
 ERROR SEQUENCE 424. LOGGED ON SID 0408F3FE
 ERL\$LOGMESSAGE ENTRY 27-MAR-1988 14:34:54.01
 KA86 REV# 8. SERIAL# 1022. MFG PLANT 15.

I/O SUB-SYSTEM, UNIT _BRUTE\$DUAL:

MESSAGE TYPE	0001	DISK MSCP MESSAGE
MSLG\$L_CMD_REF	0F08001E	
MSLG\$W_UNIT	0001	UNIT #1.
MSLG\$W_SEQ_NUM	0009	SEQUENCE #9.
MSLG\$B_FORMAT	02	DISK TRANSFER ERROR
MSLG\$B_FLAGS	80	OPERATION SUCCESSFUL
MSLG\$W_EVENT	006B	DRIVE ERROR
		POSITIONER ERROR (MIS-SEEK)
MSLG\$Q_CNT_ID	23454321 01200001	UNIQUE IDENTIFIER, 000123454321(X) MASS STORAGE CONTROLLER HSC70
MSLG\$B_CNT_SVR	02	CONTROLLER SOFTWARE VERSION #2.
MSLG\$B_CNT_HVR	00	CONTROLLER HARDWARE REVISION #0.
MSLG\$W_MULT_UNIT	0022	
MSLG\$Q_UNIT_ID	00011493 02050000	UNIQUE IDENTIFIER, 0000000011493(X) DISK CLASS DEVICE (166) RA81
MSLG\$B_UNIT_SVR	07	UNIT SOFTWARE VERSION #7.
MSLG\$B_UNIT_HVR	06	UNIT HARDWARE REVISION #6.
MSLG\$B_LEVEL	00	
MSLG\$B_RETRY	00	
MSLG\$L_VOL_SER	0000DD1C	VOLUME SERIAL #56604.
MSLG\$L_HDR_CODE	00034812	LOGICAL BLOCK #215058. GOOD LOGICAL SECTOR
CONTROLLER DEPENDENT INFORMATION		
ORIG ERR	1800	HEADER COMPARE ERROR HEADER SYNC TIMEOUT SUSPECTED LOW HEADER MISMATCH
ERR RECOV FLGS	0002	ERR LOGGED TO CONSOLE AND HOST
LV1 A RETRY	01	
LV1 B RETRY	00	
BUF DAT MEM ADR	DB89	
SRC REQ #	02	
DET REQ #	02	

***** ENTRY 11. *****
 ERROR SEQUENCE 423. LOGGED ON SID 0408F3FE
 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:

MSLG\$L_CMD_REF 0F08001E
 ORB\$L_OWNER 00010001

OWNER UIC [001,001]

UCB\$L_CHAR 1C4D4108

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

UCB\$L_OPCNT 000378F0

227568. QIO'S THIS UNIT

UCB\$W_ERRCNT 0007

7. ERRORS THIS UNIT

UCB\$W_STS 1810

ONLINE
 SOFTWARE VALID
 UNLOAD AT DISMOUNT

CDRP\$L_MEDIA 00034810

STARTING LBN #215056.

CDRP\$W_FUNC 000C

READ PHYSICAL BLOCK

CDRP\$L_BCNT 00000600

TRANSFER SIZE 1536. BYTE(S)

CDRP\$W_BOFF 0000

TRANSFER PAGE ALIGNED

CDRP\$L_PID 000200C3

REQUESTOR "PID"

CDRP\$Q_IOSB 00000000
 010E000F

IOSB, 0. BYTE(S) TRANSFERRED

DEVICE ROLLUP LOGGED BY SID 0408F3FE

DEVICE	ERROR BITS		QIO TIMEOUT		ERRORS THIS SESSION	QIOS THIS SESSION		
	SET							
	[HARD]	[SOFT]	[HARD]	[SOFT]				
_BRUTE\$DUA0:	0.	2.	0.	0.	0.	0.		
_BRUTE\$DUA1:	0.	4.	0.	0.	7.	227568.		
_BRUTE\$DUA4:	0.	1.	0.	0.	0.	0.		

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

PROCESSED ENTRIES HOUR-OF-DAY HISTOGRAM LOGGED BY SID 0408F3FE

00:00	0.
01:00	0.
02:00	0.
03:00	0.
04:00	0.
05:00	0.
06:00	0.
07:00	0.
08:00	0.
09:00	0.
10:00	0.
11:00	0.
12:00	0.
13:00	2. **
14:00	2. **
15:00	0.
16:00	0.
17:00	4. ****
18:00	0.
19:00	1. *
20:00	1. *
21:00	1. *
22:00	0.
23:00	0.

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.
```

```
%%%%%%%%% OPCOM 27-MAR-1988 03:34:54.01 %%%%%%%%%%  
Device _BRUTE$DUA59: is offline.  
Mount verification is in progress.
```

```
%SYSTEM-I-MOUNTVER, _BRUTE$DUA59: has completed mount verification.  
%%%%%%%%% OPCOM 27-MAR-1988 03:43:55.44 %%%%%%%%%%
```

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 sink 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 loses 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 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.

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.

digital™

Made in U.S.A.