CYBER Systems Peripheral Diagnostic

Reference Manual

This product is intended for use only as described in this document. Control Data cannot be responsible for the proper functioning of undescribed features and parameters.

Publication Number 60000144

Manual History

Revision	Reason for Change	Date
A	Manual released to support CYBER 930 Beta.	July 1987
B	Manual revised to support CV009 Level 700	April 1988
C	Manual revised to support CV009 Level 700.	April 1988

Revision C of this manual incorporates LEEP and UESM commands.

Contents

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About This Manual

This manual describes the common maintenance software used for CDC peripheral products.

- Section 1 contains a matrix listing the maintenance software tests to be used for any combination of hardware, with either 12-bit or 16-bit protocol.
- Section 2 contains a description of the generic IPO common disk driver program.
- Sections 3 through 9 contain the PP compass maintenance software test descriptions.
- Appendix A presents Error Code 1 definitions. Appendix B lists NOS HYDRA fault codes.

Related Publications	Publication Number
Concurrent Maintenance Library (CML) Reference Manual	60455980
Maintenance Software Library (MSL) 15X Offline Reference Manual	60456530
CYBER Initialization Package (CIP) Reference Manual	60457180
Hardware Performance Analyzer (HPA) User Reference Manual	60459460
CDCNET Troubleshooting Guide	60462630
Concurrent Maintenance Library/Virtual Environment (CML/VE) Reference Manual	60000019
MALET/VE Reference Manual	60461940
Hardware Performance Analyzer/Virtual Environment (HPA/VE) Reference Manual	60461930
ISMT Subsystem Reference Manual	60461090

Equipment to Diagnostic Matrix 1

Equipment to Diagnostic Matrix 1

Introduction

This section contains a matrix for cross referencing the maintenance software tests available for each peripheral equipment. The matrix is designed on the PP type, IOU type, bits per channel, and operating system to which the peripheral equipment is connected. From this the CE should be able to easily determine the proper diagnostic test to be used.

The documentation for maintenance software tests that are MALET (DEMOT) based are located within the diagnostic test code. Refer to the CML Reference Manual, publication number 60455980, or CML/VE Reference Manual, publication number 60000019, for information on how to access the test documentation.

NOTE

The maintenance software diagnostics pertaining to CDCNET may be found in the CDCNET Troubleshooting Guide, publication number 60462630.

Maintenance Software
Equipment to Diagnostic Reference Chart

		IOU Type	I1/I2	I1/I2	I4	I4	I4	I4	I4	I0	I0
		PP Type	---	---	NIO	NIO	CIO	CIO	CIO	---	---
		Chan Type	ICI/C170	ICI/C170	ICI/C170	ICI/C170	ISI	IPI	ICI/C170	ICI/C170	IPI
		Bits/Chan	12	16	12	16	16	16	12	16	16
885 Disk (FMD)	MALET 3.2 under NOS		FHC DL8 FMC D88 FMD FMU FLD		FMC FHC D88 FMD FMU FLD DL8						
	MALET/VE under NOS/VE		FMC FHC DL8 FMU FLD		FMC FHC FLD FMU DL8						
	CMSE	DEMOT	FHC DL8 FMC D88 FMD FMU FLD		FMC FHC D88 FMD FMU FLD DL8						
		PP Compass									
887 Disk (Hydra)	MALET 3.2 under NOS										
	MALET/VE under NOS/VE										
	CMSE	DEMOT									
		PP Compass					HYDR UHYD				
895 Disk (33800)	MALET 3.2 under NOS		DM8 DTI DFU		DM8 DTI DFU				DM8 DTI DFU		
	MALET/VE under NOS/VE		DM8 DTI DFU		DM8 DTI DFU				DM8 DTI DFU		
	CMSE	DEMOT	DM8 DTI DFU		DM8 DTI DFU				DM8 DTI DFU		
		PP Compass									

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Maintenance Software
Equipment to Diagnostic Reference Chart

			IOU Type	I1/I2	I1/I2	I4	I4	I4	I4	I4	I0	I0
			PP Type	---	---	NIO	NIO	CIO	CIO	CIO	---	---
			Chan Type	ICI/C170	ICI/C170	ICI/C170	ICI/C170	ISI	IPI	ICI/C170	ICI/C170	IPI
			Bits/Chan	12	16	12	16	16	16	12	16	16
834 Disk (ISD I)	MALET 3.2 under NOS			FSD DFU DTI	DTI							
	MALET/VE under NOS/VE			FSD DFU DTI	DTI							
	CMSE	DEMOT		FSD DTI DFU	DTI							
		PP Compass			DPDS							
836 Disk (ISD II)	MALET 3.2 under NOS			FSD DTI	DTI							
	MALET/VE under NOS/VE			FSD DTI	DTI							
	CMSE	DEMOT		FSD DTI DFU	DTI							
		PP Compass			DPDS							
9836 Disk (CM3/FSD2)	MALET 3.2 under NOS											
	MALET/VE under NOS/VE											IDT
	CMSE	DEMOT										
		PP Compass										DPDI
	930 Console											CM3D

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Maintenance Software
Equipment to Diagnostic Reference Chart

			IOU Type	I1/I2	I1/I2	I4	I4	I4	I4	I4	I0	I0
			PP Type	---	---	NIO	NIO	CIO	CIO	CIO	---	---
			Chan Type	ICI/C170	ICI/C170	ICI/C170	ICI/C170	ISI	IPI	ICI/C170	ICI/C170	IPI
			Bits/Chan	12	16	12	16	16	16	12	16	16
67X Tape (ATS)	MALET 3.2 under NOS			ATC T7X		ATC T7X						
	MALET/VE under NOS/VE			ATC T7X		ATC T7X						
	CMSE	DEMOT		ATC T7X		ATC T7X						
		PP Compass										
698 Tape (CMTS)	MALET 3.2 under NOS			T7X		T7X						
	MALET/VE under NOS/VE			T7X		T7X						
	CMSE	DEMOT		T7X		T7X						
		PP Compass										

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Maintenance Software
Equipment to Diagnostic Reference Chart

		IOU Type	I1/I2	I1/I2	I4	I4	I4	I4	I4	I0	I0
		PP Type	---	---	NIO	NIO	CIO	CIO	CIO	---	---
		Chan Type	ICI/C170	ICI/C170	ICI/C170	ICI/C170	ISI	IPI	ICI/C170	ICI/C170	IPI
		Bits/Chan	12	16	12	16	16	16	12	16	16
CCC CYBER Channel Coupler	MALET 3.2 under NOS		CCM CLM		CCM CLM				CCM CLM		
	MALET/VE under NOS/VE		CCM CLM		CCM CLM				CCM CLM		
	CMSE	DEMOT	CCM CLM		CCM CLM				CCM CLM		
		PP Compass									
9639 Tape QSE ISMT	MALET 3.2 under NOS										
	MALET/VE under NOS/VE									ITW ISW	
	CMSE	DEMOT									
		PP Compass		ISTU						ISTU	
	930 Console									ISTQ	
639 Tape (ISMT)	MALET 3.2 under NOS		ITU IST								
	MALET/VE under NOS/VE			ITW ISW							
	CMSE	DEMOT	ITU IST								
		PP Compass									

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Maintenance Software
Equipment to Diagnostic Reference Chart

			IOU Type	I1/I2	I1/I2	I4	I4	I4	I4	I4	I0	I0	I0
			PP Type	---	---	NIO	NIO	CIO	CIO	CIO	---	---	---
			Chan Type	ICI/C170	ICI/C170	ICI/C170	ICI/C170	ISI	IPI	ICI/C170	ICI/C170	IPI	ICI/C170
			Bits/Chan	12	16	12	16	16	16	12	16	16	12
9853 Disk (CM3/XMD3)	MALET 3.2 under NOS												
	MALET/VE under NOS/VE								IDT			IDT	
	CMSE	DEMOT											
		PP Compass							DPDI4 LEEP			DPDI0 LEEP	
	930 Console											FST	
9380 (STORNET) -or- ESM II w/STORNET Option	MALET 3.2 under NOS		MSD MSM		MSD MSM					MSD MSM			
	MALET/VE under NOS/VE		MSD MSM		MSD MSM					MSD MSM			SSD SSM
	CMSE	DEMOT	MSD LSP MSM		MSD LSP MSM					MSD LSP MSM			
		PP Compass	UESM		UESM					UESM			
	MALET 3.2 under NOS												
	MALET/VE under NOS/VE												
	CMSE	DEMOT											
		PP Compass											
	930 Console												

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IPD I/O Channel Operation 2

IPD I/O Channel Operation 2

Introduction

This section describes the operations and communications of the IPI Common Disk Driver (IPD), a common program developed for maintenance software programs which execute on the Intelligent Peripheral Interface (IPI) channels of a CYBER mainframe. IPD is incorporated into all maintenance software programs which communicate with disk devices attached to an IPI channel. These include:

- CTI (Common Test and Initialization)
- CMSE (Common Maintenance Software Executive)
- MALET/VE (Maintenance Language for Equipment Testing in the Virtual Environment)
- All IPI disk diagnostics

NOTE

IPD is a common deck which is assembled into the maintenance software programs. The user (CE) of this program has no control over its operation. IPD establishes communications with the peripheral device and provides error and status information to the user.

IPD Overview

IPD consists of 18 different tasks the calling program uses. IPD passes parameters to IPD from the calling program via the Driver Control Block (DCB). When each task is complete, IPD provides:

- A word of general status
- Low-level error codes
- IPI sequence status
- A word of IPI Adapter Error status for the calling program

NOTE

For all the tasks except Select Controller and Deselect Controller, IPD provides a variable-length block of detailed controller/drive status in the status buffer (SB). This status block is called a response packet.

IPD examines a response packet for proper ending status for all of the command/response type tasks. When the Request Task Complete task is called, it makes one pass of the IPI channel to see if any response packet is present. If a response packet is present, IPD reads it into the status buffer and makes a success check. If a response packet is not present, IPD sets the Task Busy bit in the General Status word. This status, however, will not be present if the General Status word has the Fatal Error bit set and the Status Error bit not set. This indicates a hardware error has prevented IPD from inputting the control module's response packet.

Figure 2-1 lists the DCB entries required as input to IPD in order to execute the tasks, as well as the last 10 words of output error/status information provided by IPD after performing each task.

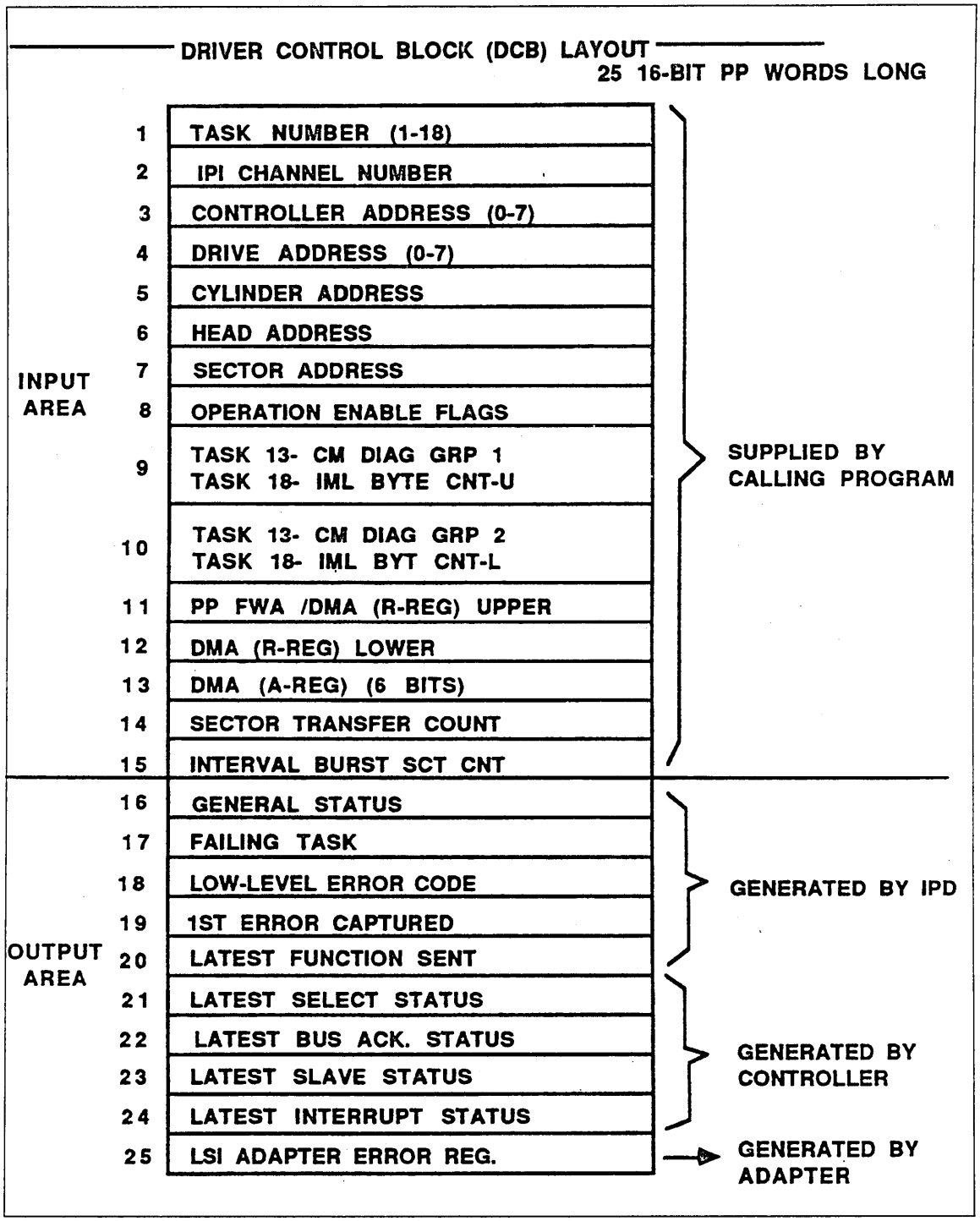

Figure 2-1. DCB and Response Packet

Example of IPD Calling Program

The flow chart shown in figure 2-2 is a general design example for an IPD calling program.

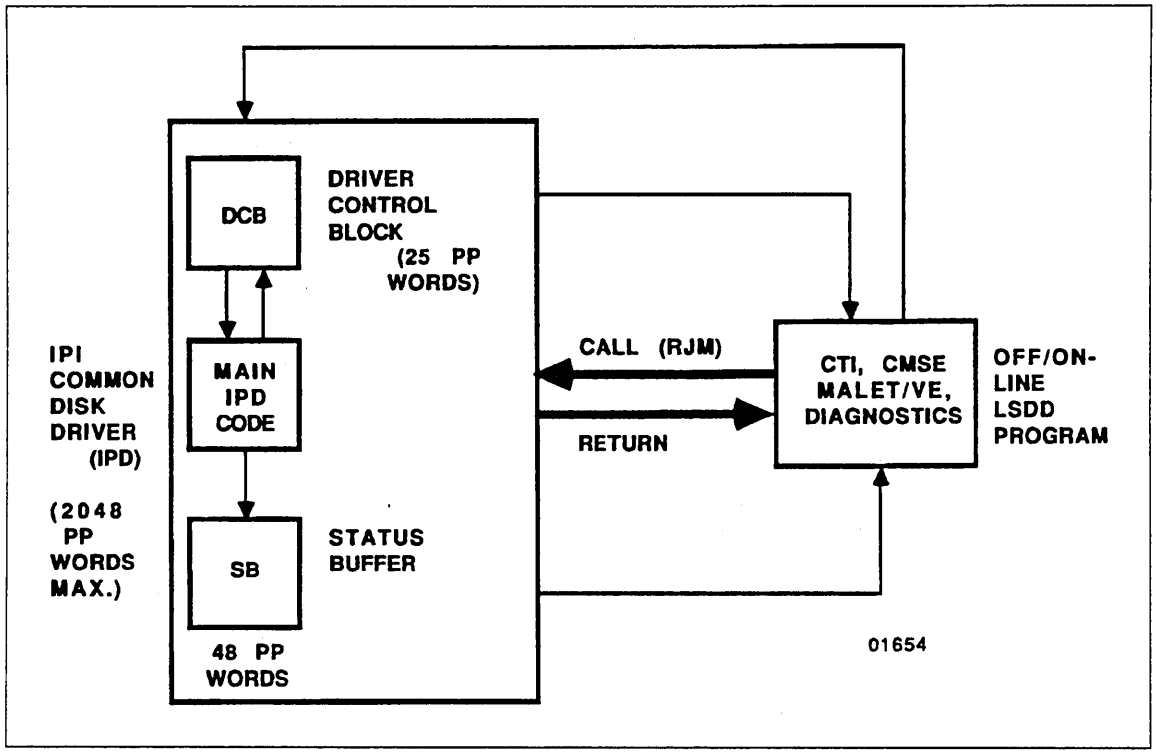

Figure 2-2. IPD General Flow Diagram

Interrupts

A controller can present three different classes interrupts to the host.

CLASS 1 A Class 1 interrupt is either a Command Complete type or an Asynchronous type.

Command Complete means that a command-type task has now successfully or unsuccessfully completed.

The Asynchronous packet can contain host-related information about an unexpected event, or it can indicate that a Selective Reset has successfully or unsuccessfully completed.

CLASS 2 A Class 2 interrupt is called a Transfer Notification and indicates that a data transfer may now proceed. The calling program should never see this condition.

CLASS 3 A Class 3 interrupt indicates and contains some critical error information that was gathered by the control module.

IPD Interface Specifications

This subsection describes all DCB entries used for commanding IPD to perform a controller or drive subsystem task, together with the 10 completion status words.

Table 2-1. DCB Inputs

Word	Entry	Required for Tasks	Valid Range
1	Task Number	all	1-18
2	IPI Channel Number	all	----
3	Controller (CTLR) Address	all	0-7
4	Drive Address	4-15,17	0-7
5	Cylinder Address	6-8,11,12	0-max. cyl.
6	Head Address	6-8,11,12	0-max. head
7	Sector Address	6-8,11,12	0-max. sector
8	Operation Enable Flags	(optional)	----
9	Tsk 13- CTLR Diag Grp 1 Tsk 18- IML Byte Cnt-U	13 18	0 - FFFF 0 - FFFF
10	Tsk 13- CTLR Diag Grp 2 Tsk 18- IML Byte Cnt-L	13 18	any upper 10 1 - FFFF
11	I0 : PP or DMA R-u FWA I4 : PP or upper RMA	 7-12,18	 ----
12	I0 : DMA address R-lw I4 : lower RMA FWA	(w/CM) 7-12,18	 ----
13	I0 : DMA address A-rg I4 : not used	(w/CM) 7-12,18	 ----
14	Sector Transfer Count	7,8,11,12,18	----
15	Interval Burst Sector Count	(optional) 7,8,11,12,18	 ----

Table 2-2 lists IPD tasks.

Table 2-2. IPD Tasks by Number and Tag Name

Task	Tag Name	Title
1	RSET	Master/Selective Reset
2	SEL	Select Controller
3	DESEL	Deselect Controller
4	RESDR	Reserve Drive
5	RELDR	Release Drive
6	SEEK	Seek
7	SEKRD	Seek-Read Data
8	SEKWR	Seek-Write Data
9	BUFRD	Read from Controller Buffer
10	BUFWR	Write to Controller Buffer
11	SSRDD	Select/Seek-Read/Deselect
12	SSWRD	Select/Seek-Write/Deselect
13	CMDG	Perform CM3 Diagnostics
14	DRDG	Perform Drive Diagnostics
15	RQDT	Request Drive Type
16	RQTC	Request Task Complete
17	IFMT	Initial Format
18	LCIML	Load Controller IML

Controller Diagnostic Subtest Parameter Words

The following diagram shows which diagnostic group bits control which controller tests when using Task 13, the Perform Controller Diagnostics command. All of the selectable controller diagnostic tests are shown.

PARAMETER 1 (WORD 9)

48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p

a MPU Diagnostic Port test.
b MAGIC Errors test.
c MAGIC Registers test.
d Data Buffer Addressing test.
e Data Buffer Patterns test.
f PDI Sequencer - Group 0 test.
g PDI Sequencer - Group 1 test.
h PDI Sequencer - Group 2 test.
i PDI Sequencer - Group 3 test.
j PDI Control Chip test.
k ECC/PDI Functional test.
l Issuing Port Sequencer - Group 0.
m Issuing Port Sequencer - Group 1.
n Issuing Port Sequencer - Group 2.
o Issuing Port Sequencer - Group 3.
p Issuing Port Errors test.

PARAMETER 2 (WORD 10)

48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
q	r	s	t	u	v	w	x	y	z	0	0	0	0	0	0

q Issuing Port Logic test.
r Issuing Port Functional test.
s Alternate Port Sequencer-Grp 0.
t Alternate Port Sequencer-Grp 1.
u Alternate Port Sequencer-Grp 2.
v Alternate Port Sequencer-Grp 3.
w Alternate Port Errors test.
x Alternate Port Logic test.
y Alternate Port Functional test.
z COS Checksum test.
0 Not Used.
0 Not Used.
0 Not Used.
0 Not Used.
0 Not Used.
0 Not Used.

NOTE

Set all bits (a-z) to run all tests, or particular bits for separate tests.

Operation Enable Flags (Word 8)

Figure 2-3 shows the titles and bit positions for all the Operation Enable Flags defined in the eighth DCB word. Table 2-3 explains DCB outputs.

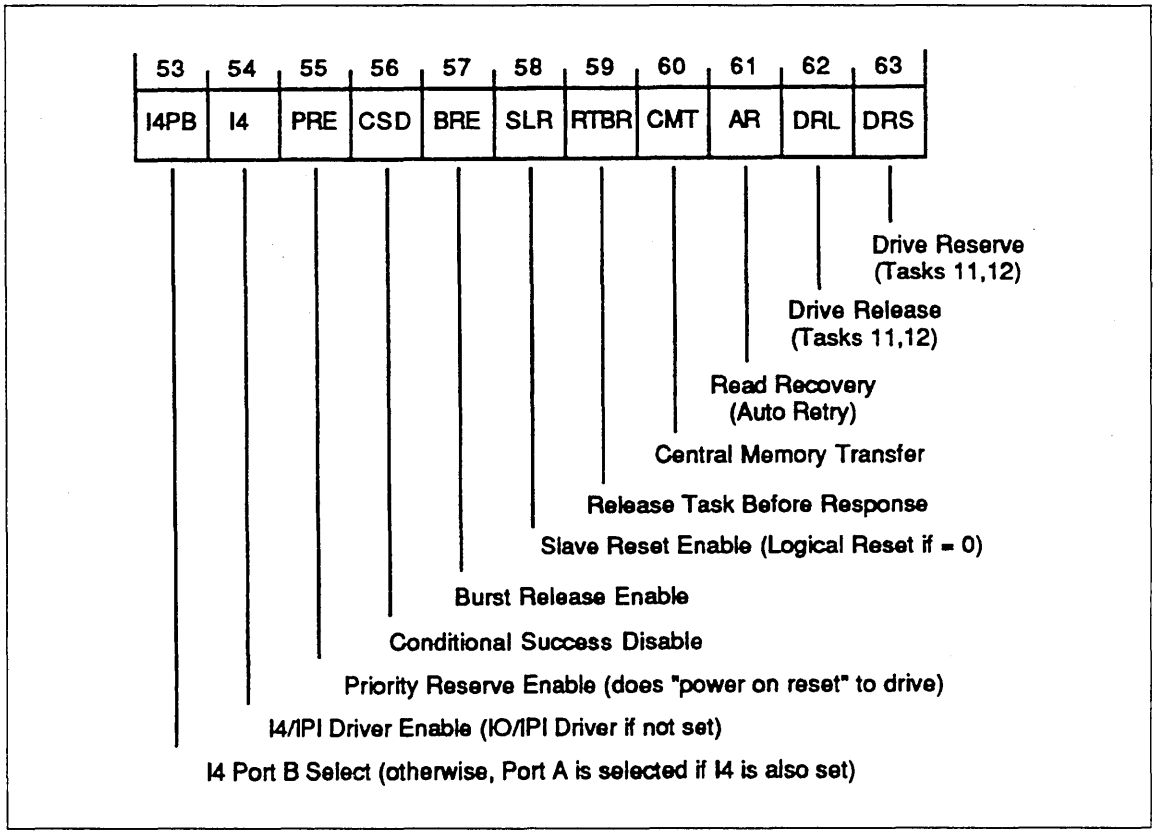

Figure 2-3. Operation Enable Flags

Table 2-3. DCB Outputs

Word	DCB Entry	Provided for Tasks	Valid Range
16	General Status	all	----
17	Failing Task	all-if error	1-18
18	Low-Level Error	all-if error	01-FF
19	First Error Captured	all-if error (optional)	----
20	Latest Function Sent	all	----
21	Latest Select Status	all	----
22	Latest Bus Acknowledge Status	all	----
23	Latest Slave Status	all	----
24	Latest Interrupt Status	all	----
25	LSI/IPI Error Register	any	----

IPD Task Descriptions and Usage Chart

Table 2-4 describes the function of each task. It indicates whether the controller (CTLR) is to be selected or deselected before calling the task, and the state of the controller after the task is finished. The type of task, sequence, or command will also be specified.

Table 2-4. IPD Task Descriptions and Usage Chart

Task	Title	Description	CTLR on Entry	CTLR on Good Exit	Task Type
1	MASTER/SEL RESET	Performs a Master and Selective (Logical or Slave) Reset; via OEF bit SLR	S or D	D	Q
2	SELECT CONTROLLER	Selects the desired IPI disk controller	D	S	Q
3	DESELECT CONTROLLER	Deselects the desired IPI disk controller	S	D	Q
4	RESERVE DRIVE	Reserves the desired controller-to-drive path	S	S	C
5	RELEASE DRIVE	Releases the desired controller-to-drive path	S	S	C
6	SEEK	Moves the heads of the desired drive to the desired disk cylinder	S	S	C
7	SEEK-READ DATA	Performs an implied seek, reads the given number of sectors from the desired drive, and stores them into the desired PP or central memory buffer	S	S	C
8	SEEK-WRITE DATA	Same as task 7, except that it writes data to the disk drive from the desired PP or central memory buffer	S	S	C
9	READ FROM CONTROLLER BUFFER	Reads a sector's worth of bytes from the controller's data buffer and stores them into the desired PP or central memory buffer	S	S	C

KEY S= Selected, D= Deselected, Q= seQuence, C= Command, CTLR= Control Module

(Continued)

Table 2-4. IPD Task Descriptions and Usage Chart *(Continued)*

Task	Title	Description	CTLR on Entry	CTLR on Good Exit	Task Type
10	WRITE TO CM BUFFER	Same as task 9, except that it writes data to the controller's data buffer	S	S	C
11	SELECT/ SEEK-READ/ DESELECT	Performs a Select Controller task, a Seek-Read task, and a Deselect Controller task	D	D	QCQ
12	SELECT/ SK-WRITE/ DESELECT	Performs a Select Controller task, a Seek-Write task, and a Deselect Controller task	D	D	QCQ
13	PERFORM CTLR DIAG	Runs the selected controller's specified internal diagnostics.	S	S	C
14	PERFORM DRIVE DIAG	Runs the desired drive's internal diagnostics	S	S	C
15	REQUEST DRIVE TYPE	Inputs the drive type status of the desired disk drive into the SB, under parameter IDs 50 and 54	S	S	C
16	REQUEST TASK COMPLETE	Polls the desired controller once to see if there are any outstanding interrupts. If an interrupt is present, inputs the response packet; otherwise, sets the Task Busy bit in the General Status word	D	D	Q
17	INITIAL FORMAT	Causes the CTLR to format the entire HDA with 2048-byte sectors	S	S	C
18	LOAD CTLR IML	Reads x sectors from central memory and streams it to the CTLR as IML data; or can burst-release x sectors of IML data at a time from PP or central memory	S	S	C

KEY S= Selected, D= Deselected, Q= seQuence, C= Command, CTLR= Control Module

NOTE

If any of these tasks fail with the Status Error bit set in General Status, the controller will usually be left in a selected state. But if a task fails with the Fatal Error bit set, the IPI channel is in an unknown state, and a Master/Logical(or Slave) Reset will have to be issued before any of the other tasks can be run. Since the calling program cannot rely on any assumptions, it should perform a Logical Reset after it reads any needed error information from the DCB and SB when the Status Error and/or Fatal Error bits are present in the General Status word following a task.

Status Word and Error Descriptions

The General Status word (word 16) bit descriptions, major controller/drive status bit definitions, and low-level error code descriptions are shown and described in figure 2-4.

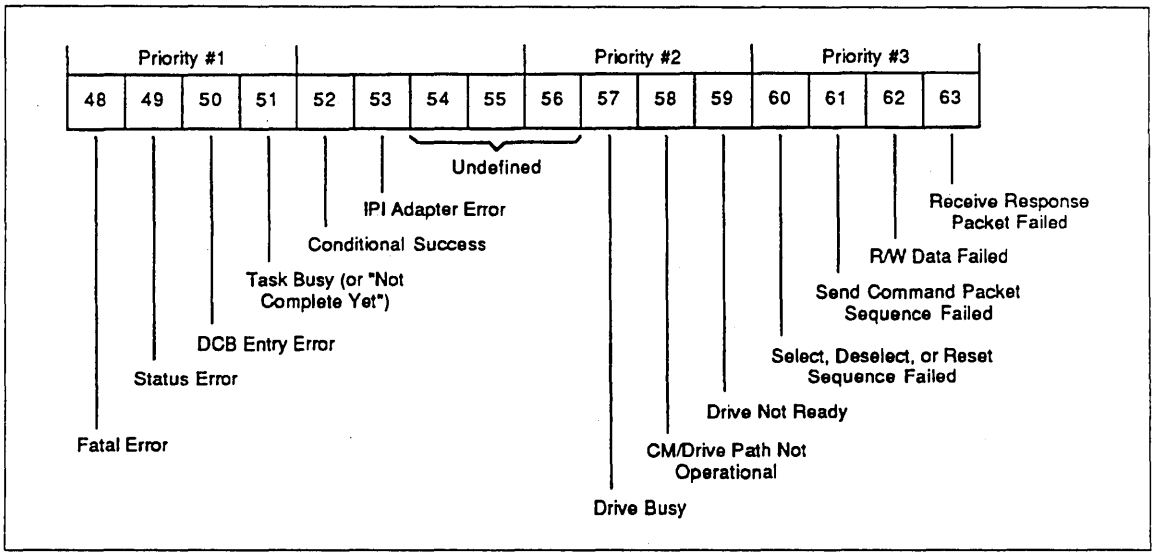

Figure 2-4. General Status Word Description

Bit	Meaning
48	A hardware related error detected by IPD or the controller has occurred which prevented the SB from receiving any status, or a critical Class 3 response packet was received from the controller if the Status Error bit is also set. (Also see bits 60-63.)
49	The SB contains a response packet revealing some CM3 or drive related error. (Also see bits 57-63.)
50	The calling program has placed an illegal value in the DCB.
51	A previously issued task has not completed yet. (Used in conjunction with the Request Task Complete task to indicate that a response packet is not ready at this time. This is also used with the Burst Release Enable option when throttling multi-sector data transfers. Task Busy means that another call to IPD needs to be made in order to continue the data transfer.)

Bit	Meaning
52	The latest task involving a controller command has failed on its first attempt, but was successful upon retry by the subsystem. First failure data is contained within the response packet in the SB.
53	An error is present in the LSI Adapter's IPI Error Register.
54-56	Undefined.
57	The desired drive is busy, that is, reserved to another port.
58	The controller/drive is unable to send or receive commands.
59	The desired drive is not spun up and ready.
60	An error occurred during the Select, Deselect, or Reset sequence.
61	An error occurred during the Send Command Packet sequence.
62	An error occurred during the Read or Write Data sequence.
63	An error occurred during the Receive Response Packet sequence.

Low-Level Error Code Descriptions (Word 18)

The low-level error code passed to the Entry/Exit module of IPD is stored in the DCB's low-level error code location (DCB+LLE). Sometimes two low-level error codes are sent; the first being stored in DCB+PLLE and the second being stored in DCB+LLE. Figure 2-5 shows the meaning of the digits in the low-level error codes. Table 2-5 lists the current low-level error codes for the LSI version of the IPI Adapter and IPD. (All error codes are in hexadecimal.)

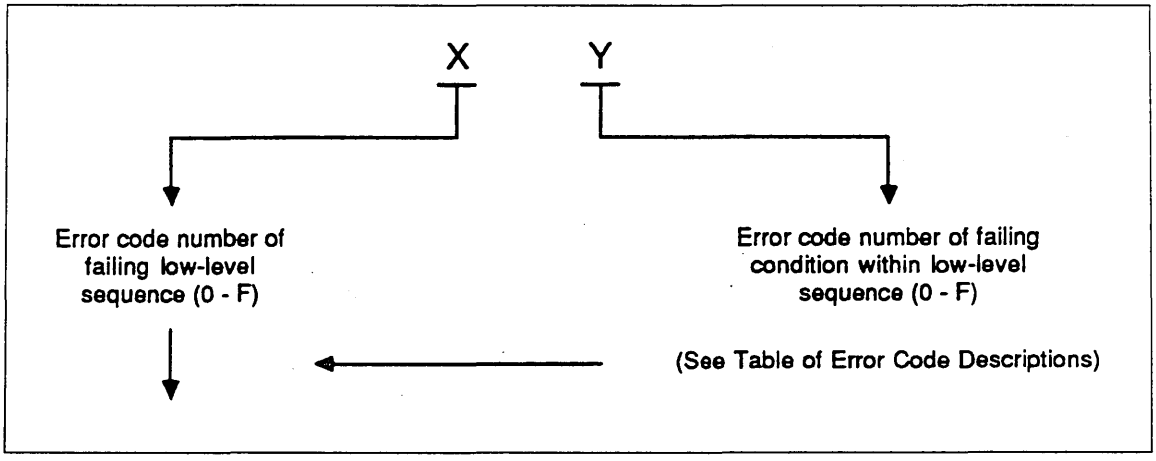

Figure 2-5. Low-Level Error Code Sequence

Low-Level Sequence Code Number	IPI Sequence Title or Error
0	IPI Adapter Function or DMA/I4 Error
1	Master/Selective Reset (MSR)
2	Select (SEL)
3	Bus Control (BSC)
4	Information Transfer Out (ITO)
5	Ending Status (EDS)
6	Response Handler (RSPHDL)
7	Information Transfer In (ITI)
8	Deselect (DSL)
9	Request Transfer Settings (RQTS)
E	Status-related error (Response Packet in SB)
F	DCB input error

Table 2-5. Low-Level Error Code Messages

Error Code	Description
0B	CHANNEL IS FULL AFTER T-REGS WERE LOADED
0C	DMA/I4 TRANSFER IN PROGRESS TIME-OUT ERROR
0D	DMA/I4 ERROR STATUS PRESENT
0E	CH ACTIVE BEFORE A FUNCTION OUTPUT
0F	CH ACTIVE 1 USEC AFTER A FUNCTION OUTPUT
11	ASYN RESP NOT FND DURING SELECTIVE RESET
21	SLAVE-IN RISE TIME-OUT ERROR
22	UNKNOWN CONTROLLER ADDRESS RECEIVED
23	CH ERROR AFTER SELECT STATUS BYTE REC'D
31	SYNC-IN RISE TIME-OUT ERROR
32	WRONG BUS ACKNOWLEDGE BYTE RECEIVED
33	CH ERROR FLAG IS UP AFTER INPUT OF BUS ACK BYTE
34	SYNC-IN FALL TIME-OUT ERROR
40	BASE FOR I4 ADAPTER DMA ERROR
41	WORD COUNT RESIDUE AFTER INFO TRANSFER OUT
42	CH EMPTY WHEN ADAPTER INPUT WORD EXPECTED
51	SLAVE-IN RISE TIME-OUT ERROR
52	CH ERROR FLAG AFTER ENDING SLAVE STATUS REC'D
53	INFORMATION TRANSFER NOT SUCCESSFUL
61	SLAVE INTERRUPT BYTE NOT PRESENT
62	CH ERROR AFTER SLAVE INTERRUPT RECEIVED
63	NO CONTROLLER INTERRUPT WITHIN ALLOTTED TIME
70	BASE FOR I4 ADAPTER DMA ERROR
71	WORD CNT RESIDUE EXISTS AFTER INFO XSFER IN
72	CH EMPTY WHEN ADAPTER INPUT WORD EXPECTED
81	SLAVE-IN FALL TIME-OUT ERROR

(Continued)

Table 2-5. Low-Level Error Code Messages *(Continued)*

Error Code	Description
91	SLAVE-IN RISE TIME-OUT ERROR
92	CH ERROR AFTER XSFER SETTINGS BYTE REC'D
93	SLAVE-IN FALL TIME-OUT ERROR
E0	OPERATION NOT SUCCESSFUL
E1	TASK IS BUSY -- NO RESPONSE PACKET YET
E2	DATA TRANSFER/SLAVE-IN TIME-OUT ERROR
E3	AN UNEXPECTED CLASS 2 INTERR WAS RECEIVED
E4	AN UNEXPECTED CLASS 1 INTERR WAS RECEIVED
E5	AN UNKNOWN RESPONSE TYPE WAS RECEIVED
E6	AN UNEXPECTED ASYNCHRONOUS RESPONSE WAS RECEIVED
E7	COMMAND HAD CONDITIONAL SUCCESS
E8	CRITICAL ERROR DURING ENDING STATUS SEQUENCE
E9	UNSUCCESSFUL DATA BURST TRANSFER
EA	DRIVE NOT OPERATIONAL AND READY
EB	CONTROLLER NOT OPERATIONAL AND READY
EC	UNRECOVERABLE DATA TRANSFER ERROR
F0	INVALID TASK SPECIFIED
F1	INVALID CONTROLLER ADDRESS SPECIFIED
F2	INVALID DRIVE ADDRESS SPECIFIED
F3	NO DATA TRANSFER LENGTH SPECIFIED (IN DCB+STC OR DCB+IBSC)

Status Buffer Description

If IPD reports a status error in the general status word, the status buffer will contain a response packet sent by the controller. Response packet status is not only used by the controller to relay error information, but also host-specified information (like drive type status when Task 15 has been run successfully). This subsection describes the general form of a response packet. The first five words of all response packets have the same meaning. The length of Word 1, however, does not include its own length, nor the length any unused lower byte of the last word. The first five words are defined in figure 2-6.

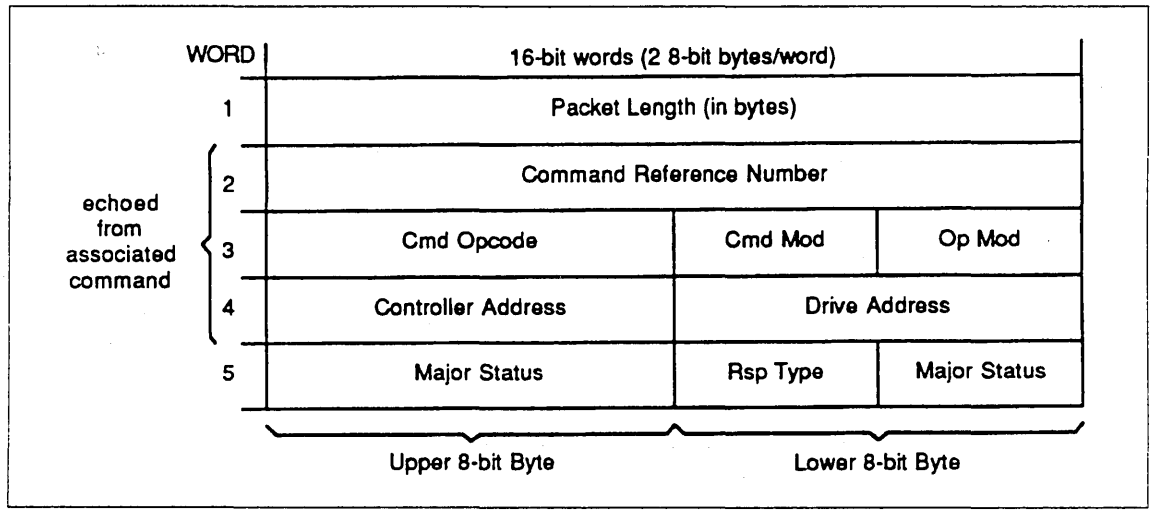

Figure 2-6. Response Packet Control Words

The status buffer's major status word (5) bits are defined in figure 2-7.

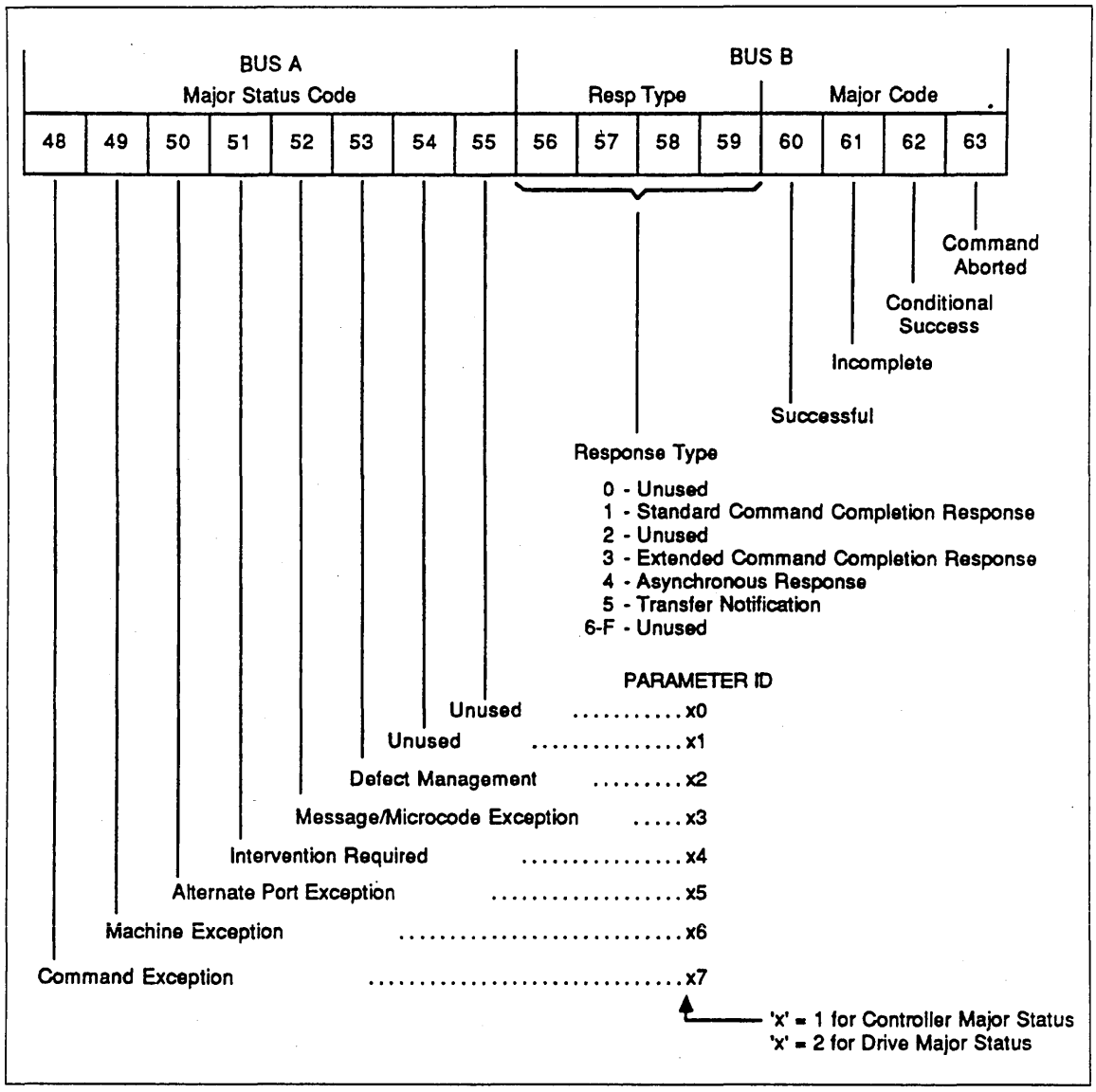

Figure 2-7. Major Status Word Bits

The Command Opcode identifies which controller command the response packet belongs to. IPD always waits for a command's response packet before issuing another command. Following the response packet control words, the next amount of words is variable. They are dependent on the type and severity of the error or status being sought. These words are parameters. There is always at least one variable-length parameter. Just as word 1 of the response packet contains the length of the entire response packet in bytes (not including the length word itself), the upper 8 bits of the first word of a parameter contains the length of that parameter in bytes (not including the length byte itself, or any unused lower 8-bit byte in the last word of the parameter). An example of two parameters within a response packet is shown in figure 2-8.

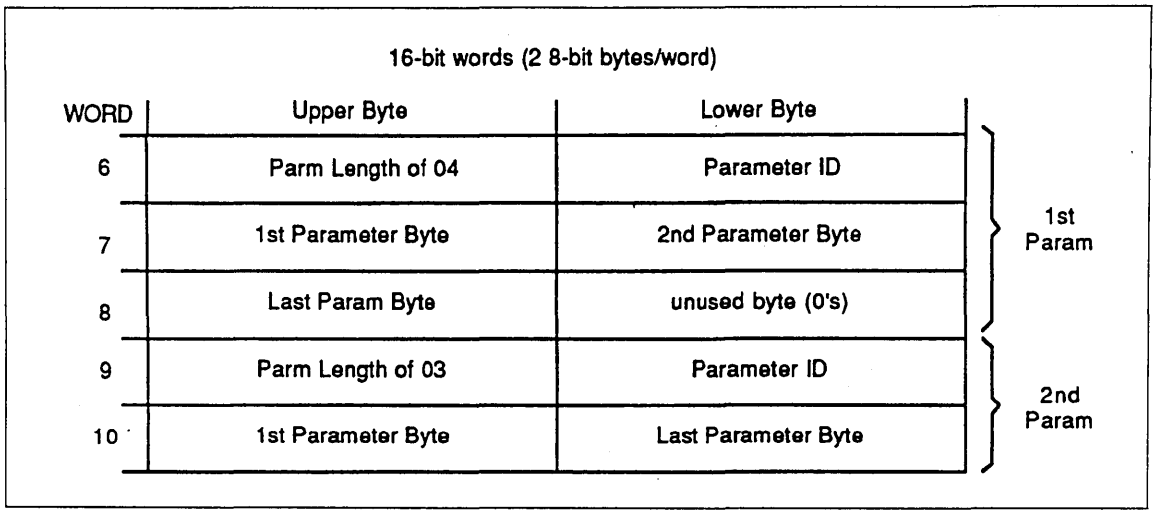

Figure 2-8. Response Packet Parameter Example

NOTE

The Parameter ID byte will always be in the lower byte of a parameter's first word. This ID identifies the general catagory of the parameter bytes that follow it.

DPDI 3

DPDI 3

Introduction

DPDI0 and DPDI4 are offline data path integrity tests for the 9836 and 9853 disk subsystems. DPDI0 executes in a CYBER 930 Computer System. DPDI4 executes on all other CYBER Computer Systems. For convenience, this manual refers to DPDI for either use; you should substitute DPDI0 or DPDI4 depending on your computer system.

DPDI tests the data path between the IOU, central memory, and the 9836 disk subsystem. It also executes the CM3 control module and disk drive inline diagnostics as well as formatting the drive.

Assumptions

DPDI assumes that the Command Operating System for the control module is loaded and running prior to execution.

Restrictions

DPDI is not intended to test the integrity of the disk surface.

DPDI does not support the repeat iteration or end iteration parameters.

Test Description

DPDI is PP based and runs under CMSE. It tests the non-DMA path between the IOU and the disk drive and the DMA path between the central memory and the disk drive. DPDI is divided into ten sections. Sections 0 through 7 are executed by default. Sections 8 and 9 execute only if they are selected through the parameter words.

Table 3-1 describes the DPDI tests.

Table 3-1. DPDI Tests

Section	Description
0	CM3 inline diagnostics
1	Disk drive inline diagnostics
2	CM3 data buffer echo test
3	Ones and zeroes test
4	Alternating one and zeroes test
5	Sliding zeroes test
6	Sliding ones test
7	Random data pattern test
8	User specified pattern and disk address
9	Format pack utility

The first section executes the inline diagnostics for the control module. The second section executes the inline diagnostics for the disk drive. The third section writes random data to the buffer in the controller and reads it back.

In sections 4 through 8, one of sixteen different data patterns is written to a preallocated sector on the disk via the IPI channel, read back, and compared with the data written. The data buffers are compared three times for each iteration. The first compare checks the non-DMA path between the IOU and CM3. The second compare checks the DMA write path between central memory and CM3. The third compare checks the read DMA path.

Section 8 executes only if selected by the user. It allows the user to specify both the disk address and the pattern to be written. Enter the disk address carefully to avoid inadvertently destroying data on the disk.

Section 9 is a format utility for formatting the pack and executes only if selected through the parameter words.

Loading Procedures

Load DPDI to a PP by using one of the following procedures.

1. At the system console, enter:

   ```
   LT,x,DPDI0 (cr) or LT,x,DPDI4 (cr)
   ```

   where x is the PP number.

2. To load DPDI from the system console, execute the command buffer:

   ```
   GO,DPDI0 (cr) or GO,PDDI4 (cr)
   ```

   An example and explanation of that command buffer is:

0000	DPDI0 or DPDI4	Command buffer title.
0001	DP,pp	Deadstart the PP pp.
0002	CP,pp,DPDI0 or DPDI4	Load the test.
0003	EP,pp,00123,100004	Set bypass parameter stop in PARAM1.
0004	EP,pp,00125,ccuu	Where cc is the channel and uu is the unit.
0005	BP,pp	Assign pp to B-display.

Running Procedures

Running procedures for the DPDI are:

S (cr)	Stops test execution. This command is interpreted as a stop command. DPDI goes into an idle loop whereby communication is maintained with CMSE but no test activity takes place.
Spacebar	Starts or resumes test execution.
R (cr)	Restarts the test from the beginning.
Cxx or Sxx	Clear/set xx bit of PARAM0/1, where xx is the bit mnemonic such as SS, ST.
EP,num,adrs,data	Enter parameter data into PP num at location adrs. See Parameters for definitions and locations of test parameters.

Parameters

The parameter words are located at location 00122(8) in PP memory. Bit 2**0 is defined as the least significant bit of a word. The following figures describe the bit locations and definitions for DPDI parameters.

PARAM0 - Test Control (Location 00122(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
*	**	DE	DR	NU	NU	RC	RB	RS	RT	LE	SE	SC	SB	SS	ST

ST	Stop at end of test.	SE	Stop on error.
SS	Stop at end of section.	LE[1]	Log errors in dayfile.
SB	Stop at end of subsection.	RT	Repeat test.
SC	Stop at end of condition.	RS	Repeat section.
RB	Repeat subsection.	DR	Bypass all messages.
RC	Repeat condition.	DE	Display only error messages.
**	Reserved for CMSE 180 use.	*	Enable CMSE to alter PARAM0 bits via the Cxx/Sxx commands (EP command must be used to alter this parameter.)
NU	Not Used.		

Default selection is 100021(8)/8011(16). This corresponds to setting ST,SE and enabling CMSE to alter PARAM0 bits.

PARAM1 - Test Control (Location 00123(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
**	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	*	NU	NU	NU

*	2**2	Bypass parameter stop.
**	2**15	Enable CMSE to alter PARAM1 bits.

Default selection is 100000(8)/8000(16). This corresponds to enabling CMSE to alter PARAM1 bits. Use the EP command to set or clear these parameters.

PARAM2 - Repeat Test Count (Location 00124(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

The test will repeat the number of times (-1) contained in this location. The test will then unconditionally exit if the Repeat Test parameter bit is not set (PARAM0 Bit 6).

1. LE is not supported on CYBER 930 Systems.

PARAM3 - Unit Select (Location 00125(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	CH	CH	CH	CH	CH	CH	CM	CM	CM	UN	UN	UN

UN Disk unit number.
CM Control module number.
CH IPI channel number.

Default is 1100(8).

PARAM4 - IPI Port Selection (Location 00126(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	PP

PP0 Port A.
PP1 Port B.

Default is zero.

PARAM5 - Section Select (Location 00127(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	x	x	x	x	x	x	x	x	x	x

Bit 00 Section 0.
Bit 01 Section 1.
Bit 02 Section 2.
Bit 03 Section 3.
Bit 04 Section 4.
Bit 05 Section 5.
Bit 06 Section 6.
Bit 07 Section 7.
Bit 08 Section 8.
Bit 09 Section 9.

The default condition is section 0 through 7 as selected.

PARAM6 - Not Used (Location 00130(8))

PARAM7 - Not Used (Location 00131(8))

PARAM8 - Not Used (Location 00132(8))

PARAM9 - Disk Type (Location 00133(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	x

Bit 00 Disk unit.
Bit 01 XMD3.
Bits 02...15 Not Used.

Default is zero.

PARAM10 - Disk Cylinder (Location 00134(8)

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	CY	CY	CY	CY	CY	CY	CY	CY	CY	CY	CY	CY

Bits 00...11 Disk cylinder to use for reads and writes.
Cylinder 1274(8) for FSD2, 2601(8) for XMD3.
Bits 02...15 Not Used.

Default selection is 1274(8). This is the default test cylinder for an FSD2. This parameter word is only used by section 8.

PARAM11 - Disk Track (Location 00135(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	TK	TK	TK	TK	TK	TK

Bits 00...05 Disk track to use for reads and writes.
Maximum track: 27(8) for FSD2, 22(8) for XMD3.
Bits 06...15 Not Used.

Default selection is zero. This parameter word is only used by section 8.

PARAM12 - Disk Sector (Location 00136(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	SE	SE	SE	SE	SE	SE

Bits 00...05 Disk sector to use for reads and writes.
Maximum sector: 13(8) for FSD2, 24(8) for SMD3
Bits 06...15 Not Used.

Default selection is zero. This parameter word is only used by section 8.

PARAM13 - Test Pattern (Location 00137(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX

Bits 00...15 Data test pattern.

Default selection is zero. This parameter word is only used by section 8.

PARAM14 - Inline Diagnostic Subtest Select (Location 00140(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Bit 00 MPU diagnostic port test.
Bit 01 MAGIC errors test.
Bit 02 MAGIC registers test.
Bit 03 Data buffer addressing test.
Bit 04 Data buffer patterns test.
Bit 05 PDI sequencer - Group 0 test.
Bit 06 PDI sequencer - Group 1 test.
Bit 07 PDI sequencer - Group 2 test.
Bit 08 PDI sequencer - Group 3 test.
Bit 09 PDI control chip test.
Bit 10 ECC/PDI functional test.
Bit 11 Issuing port sequencer - Group 0.
Bit 12 Issuing port sequencer - Group 1.
Bit 13 Issuing port sequencer - Group 2.
Bit 14 Issuing port sequencer - Group 3.
Bit 15 Issuing port sequencer - Group 0.

Default selection is 177777(8).

PARAM15 - Inline Diagnostic Subtest Select (Location 00141(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	x	x	x	x	x	x	x	x	x	x

Bit 00 Issuing port logic test.
Bit 01 Issuing port functional test.
Bit 02 Alternate port sequencer - Group 0.
Bit 03 Alternate port sequencer - Group 1.
Bit 04 Alternate port sequencer - Group 2.
Bit 05 Alternate port sequencer - Group 3.
Bit 06 Alt. port errors test.
Bit 07 Alt. port logic test.
Bit 08 Alt. port functional test.
Bit 09 COS errors test.
Bit 10...15 Not Used.

Default selection is 3FF(16).

PARAM16 - Not Used (Location 00142(8))

PARAM17 - Not Used (Location 00143(8))

PARAM18 - Repeat Subsection Count (Location 00144(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU

Bits 00...15 Repeat subsection count.
The test will automatically repeat each subsection in the selected sections the number of times (-1) contained in this location. Repeat Subsection PARAM0 bit 2**8 must be set.

Default selection is zero.

Control Words

Use control words to identify a program and supply information to the user. The control words start at location 00102(8) in the PP memory.

Tag Name	Location	Meaning
CW0	00102(8)	Test name, upper two characters
CW1	00103(8)	Test name, lower two characters
CW2	00104(8)	Program type
CW3	00105(8)	Iteration count
CW4	00106(8)	Error code 1
CW5	00107(8)	Error code 2
CW6	00110(8)	Test pass count
CW7	00111(8)	Current section number
CW8	00112(8)	Current subsection number
CW9	00113(8)	Current condition number
CW10	00114(8)	Error count

Messages

Since all test messages are displayed on the B display, before they are displayed the B display must be assigned to the PP in which the test is executing. Dropping the test display by assigning the B display to a different PP, or central memory, causes the present displayed test message to be lost. Assigning the B display back to the test PP results in a blank display until the test displays a new message. The general format for all normal and error messages appears as:

```
DPDIO ZZ PCxxxx SOOss SBOObb COOcc CHhh UNmu
EC1=0000 EC2=yyee TE=tttt RN=nnnn
AAA-------------------------------------AAA
```

where:

ZZ	=	Message type (one of the following): RU = Running. SC = Stopped at end of condition. SB = Stopped at end of subsection. SS = Stopped at end of section. ST = Stopped at end of test. SE = Stopped on error. RC = Repeating condition. RB = Repeating subsection. RS = Repeating section. HT = Halted (operator stop).
xxxx	=	Pass count (decimal).
ss	=	Current section number (decimal).
bb	=	Current subsection number (decimal).
cc	=	Current condition number (decimal).
hh	=	IPI channel number (octal).
mu	=	CM and disk unit.
0000	=	Error code 1 (hex) (see appendix A).
ee	=	Error code 2.
yy	=	00 for parameter, 10 for channel reserve, 20 for channel fault, 40 for disk, 50 for data compare.
tttt	=	Total error count (decimal).
nnnn	=	Random or base number used for generating data (hex).
AAA	=	Verbal error description (1 or more lines).

Normal Messages

The system displays the following message at the beginning of the test to allow the user to set test parameters. This display is bypassed when the Bypass Parameter Stop bit is set, PARAM1 bit 2.

```
DPDIO SET PARAMS PA=0122B YY/ MM /DD
```

where:

PA	=	FWA of parameter area in PP memory.
YY/MM/DD	=	Year/Month/Day (test's version assembly date).

To warn the user that formatting the drive will result in loss of data on this drive, the system displays:

```
CM-3 DATA PATH INTEGRITY TEST
FORMAT PACK

WARNING EXECUTION OF THIS COMMAND WILL
RESULT IN LOSS OF DATA
```

The system displays the following message to tell the user that the task is still being executed. This is normally displayed when formatting a drive, executing CM inline diagnostics, or drive diagnostics.

```
CM-3 DATA PATH INTEGRITY TEST
ST------------------------------ST

TASK BUSY
```

Error Messages

For the Data Compare Errors error message, the system displays:

```
DPDIO  SE  PCxxxx S000y  SB000z C0000 CHhh UNmu
EC1=9010 EC2=500c  TE=000t RN=nnnn

CM-3 DATA PATH INTEGRITY TEST
ST------------------------------ST

DATA COMPARE ERROR

SECTOR WORD wwwwH
IB  iiii  iiii  iiii  iiii  iiii  iiii  iiii  iiii
OB  oooo  oooo  oooo  oooo  oooo  oooo  oooo  oooo
```

where:

c	=	Transfer type that caused miscompare.
iiii	=	Input data word.
oooo	=	Output data word.
wwww	=	Sector word address where data compare failed.

The data read in does not match the data written out at word (wwww) in the sector. Eight data words are displayed starting with the first miscompare.

EC2 values and brief descriptions of the errors are:

5001 COMPARE ERROR ON NON-DMA DATA TRANSFER.
This error occurred on a data transfer between the IOU and the CM3 disk subsystem.

5005 COMPARE ERROR AFTER A DMA WRITE.
This error occurred on a data transfer from central memory to the CM3 disk subsystem.

5004 COMPARE ERROR AFTER A DMA READ.
This error occurred on a data transfer to central memory from the CM3 disk subsystem.

For the Disk Address Parameter Error error message, the system displays:

```
DPDIO  SE  PCxxxx S000y  SB000z C0000 CHcc UNmu
EC1=F200  EC2=000e  TE=000t RN=nnnn

CM-3 DATA PATH INTEGRITY TEST
ST------------------------------ST

DISK ADDRESS PARAMETER ERROR

CHANNEL ccO
CYLINDER  yyyyO  TRACK ttttO  SECTOR ssssO
```

where:

cc	=	IPI channel.
yyyy	=	Cylinder.
tttt	=	Track.
ssss	=	Sector.

A disk parameter entered by the user has exceeded the range specified for CM3 disk subsystem or the channel specified is out of range.

For the Channel Reserved Error error message, the system displays:

```
DPDIO  SE  PCxxxx S000y  SB000z C0000 CHcc UNmu
EC1=F200  EC2=1000  TE=000t RN=nnnn

CM-3 DATA PATH INTEGRITY TEST
ST------------------------------ST

UNABLE TO RESERVE CHANNEL xxO
```

This error message appears if the channel specified in PARAM3 is reserved to some other PP.

For the Central Memory Not Available error message, the system displays:

```
DPDI0  SE  PCxxxx S000y  SB000z C0000 CHcc UNmu
EC1=F200  EC2= 000  TE=000t RN=nnnn

CM-3 DATA PATH INTEGRITY TEST
ST------------------------------ST

CENTRAL MEMORY BUFFER NOT AVAILABLE
```

This error message appears if central memory space was not available for the DMA data buffers.

For the Disk Subsystem Error error message, the system displays:

```
DPDI0  SE  PCxxxx S000y  SB000z C0000 CHhh UNmu
EC1=9000  EC2=4mof  TE=000t RN=nnnn

CM-3 DATA PATH INTEGRITY TEST
ST------------------------------ST

DISK SUBSYSTEM ERROR

DRIVER STATUS ggggH LOW LEVEL ERROR llllH

MAJOR STATUS rrrrH  ADAPTER STATUS aaaaH

  STATUS BUFFER (HEX)

01D  dddd  dddd  dddd  dddd  dddd  dddd  dddd  dddd
09D  dddd  dddd  dddd  dddd  dddd  dddd  dddd  dddd
17D  dddd  dddd  dddd  dddd  dddd  dddd  dddd  dddd
24D  dddd  dddd  dddd  dddd  dddd  dddd  dddd  dddd
```

where:

m	=	Drive status priority 1 or 2 error.
f	=	Drive status priority 3 error (failing sequence).
gggg	=	Driver status.
llll	=	Low-level error code.
rrrr	=	Major status.
dddd	=	Status buffer word in hex.
aaaa	=	Adapter status word.

This is the basic format for all disk subsystem messages. Driver status and low-level error code are software status information provided by the IPI driver. Hardware major status and status buffer words are provided when available.

EC2 values and brief descriptions of the errors are:

400F CONDITIONAL SUCCESS.
This error indicates that the disk operation completed sucessfully, but only after retry. First failure data is contained in the status buffer.

410F DRIVE BUSY.
This error occurs if the drive is reserved from an other access.

420F DRIVE NOT READY.
This error indicates that the drive is present, but not ready and does not have a fault. This can occur if the drive is not spun up.

430F CM/DRIVE PATH NOT OPERATIONAL.
This error indicates that the controller drive is unable to send or recieve commands.

440F CLASS 3 RESPONSE PACKET WAS RECEIVED.
This error indicates that critical class 3 response packet was recieved from the controller. Error information is available in the status buffer.

450F SUBSYSTEM ERROR.
This error occurs as the result of some subsystem failure and no status is available from the controller.

460F ADAPTER ERROR.
This error code indicates a problem with the IPI adapter.

Section Descriptions

Section 00 Execute CM3 Inline Diagnostics.
This section invokes the inline diagnostics for testing the CM3. Subtests are selectable through parameter words 14 and 15. All subtests are selected by default.

Section 01 Execute Disk Drive Inline Diagnostics.
This section invokes the inline diagnostics for testing the drive. There are no selectable subtests associated with this section.

Section 02 Control Module Buffer Echo Test.
This section tests the ability of the IPI data path to transfer data to and from the control module buffer.

Section 03 Ones and Zeroes Test.
This section tests the IPI data path from the PP to the disk by writing, reading, and comparing one sector using a pattern of either all zeroes or all ones.

Subsection 00 Zeroes test
A pattern of all zeroes is used.

Subsection 01 Ones test
A pattern of all ones is used.

Section 04 Alternating Ones Test.
This section tests the IPI data path from the PP to the disk by writing, reading, and comparing one sector of a pattern consisting of alternating ones and zeroes ten times for each pattern.

Subsection 00 Pattern 5555(16)
The pattern 5555(16) is used.

Subsection 01 Pattern aaaa(16)
The pattern aaaa(16) is used.

Section 05 Sliding Zeroes Test.
This section tests the IPI data path from the PP to the disk by writing, reading, and comparing one sector of a sliding zeroes pattern ten times for each pattern.

Subsection 00 Pattern ef6e(16)
The pattern ef6e(16) is used.

Subsection 01 Pattern df7d(16)
The pattern df7d(16) is used.

Subsection 02 Pattern 6ef6(16)
The pattern 6ef6(16) is used.

Subsection 03 Pattern 7df7(16)
The pattern 7df7(16) is used.

Subsection 04 Pattern f6ef(16)
The pattern f6ef(16) is used.

Subsection 05 Pattern f7df(16)
The pattern f7df(16) is used.

Section 06 Sliding Ones Test.
This section tests the IPI data path from the PP to the disk by writing, reading, and comparing one sector using a sliding ones pattern ten times for each pattern.

Subsection 00 Pattern 1041(16)
The pattern 1041(16) is used.

Subsection 01 Pattern 2082(16)
The pattern 2082(16) is used.

Subsection 02 Pattern 4104(16)
The pattern 4104(16) is used.

Subsection 03 Pattern 8208(16)
The pattern 8208(16) is used.

Subsection 04 Pattern 410(16)
The pattern 410(16) is used.

Subsection 05 Pattern 820(16)
The pattern 820(16) is used.

Section 07 Random Data Test.
This section tests the IPI data path from the PP to the disk by writing and reading one sector of random data ten times. Each iteration uses a different random seed based on the last word generated from the last data set.

Section 08 User Specified Pattern and Disk Address.
This section tests the IPI data path from the PP to the disk by writing and reading one sector of the data pattern in PARAM13 ten times. The cylinder, track, and sector used are in PARAM10 through PARAM12. The user should check the parameters carefully before executing this test.

Section 09 Format Pack Utility.
This utility formats the entire data and CE partitions of the HDA with header fields and data fields. The command issued to the controller is the Full Volume Format (initial). Certification of the pack is not performed. A user warning is displayed to prevent the user from inadvertently destroying data on the pack before proceeding with the format.

DPDS 4

DPDS 4

Introduction

DPDS is an offline 16-bit data path integrity test for the 834/836 disk subsystem. It tests the data path between the IOU and the disk subsystem.

Assumptions

The inline diagnostics have executed without error.

Restrictions

DPDS requires that the controlware for the adapter and the Command Operating System for the control module be loaded and running prior to execution.

DPDS is not intended to test the integrity of the disk surface.

DPDS does not support the repeat iteration or end iteration parameters.

Test Description

DPDS tests the data path between the IOU and the FSD I or FSD II drive via a 16-bit ICI channel. The test is PP based and runs under CMSE. Table 4-1 describes the eight sections of DPDS.

Table 4-1. DPDS Tests

Section	Description
0	ICI adapter buffer echo test
1	ICI control module buffer echo test
2	ICI ISD I/II ones and zeroes test
3	ISD I/II alternating one and zeroes test
4	ISD I/II sliding zeroes test
5	ISD I/II sliding ones test
6	ISD I/II random data pattern test
7	ISD I/II user specified pattern and disk address (section 7 is deselected by default)

Each section generates a data buffer from a given pattern, writes it out on the ICI channel, and reads it back to compare it for accuracy. Sections 1 and 2 write random data to the buffers in the adapter and control module and read it back. Sections 3 through 6 write one of sixteen different data patterns to a preallocated sector on the disk and read it back. Section 7 is executed only if selected by the user. It allows the user to specify both the disk address and the pattern to be written. Use care when entering the disk address to avoid inadvertently destroying data on the disk. Each pattern is written and read ten times in all sections.

Loading Procedures

Load DPDS to a PP by using one of the following procedures.

1. At the system console, enter:

   ```
   LT,x,DPDS (cr)
   ```

   where x is the PP number.

2. To load DPDS from the system console, execute the command buffer:

   ```
   GO,DPDS (cr)
   ```

   An example and explanation of that command buffer is:

0000	DPDS	Command buffer title.
0001	DP,pp	Deadstart the PP pp.
0002	CP,pp,DPDS	Load the test.
0003	EP,pp,00123,100004	Set bypass parameter stop in PARAM1.
0004	EP,pp,00133,ccuu	Where cc is the channel and uu is the unit.
0005	BP,pp	Assign pp to B-display.
0006	RU,pp,100	Start execution of DPDS.
0007	TB	Terminate command buffer.

Running Procedures

Running procedures for the DPDS are:

`S (cr)`	Stops test execution. This command is interpreted as a stop. DPDS goes into an idle loop whereby communication is maintained with CMSE but no test activity takes place.
Spacebar	Starts or resumes test execution.
`R (cr)`	Restarts the test from the beginning.
`Cxx` or `Sxx`	Clear/set xx bit of PARAM0/1, where xx is the bit mnemonic such as SS, ST.
`EP,num,adrs,data`	Enter parameter data into PP num at location adrs. See Paramenters for definitions and locations of test parameters.

Parameters

The parameter words are located at location 00122(8) in PP memory. Bit 2**0 is defined as the least significant bit of a word. The following figures describe the bit locations and definitions for DPDS parameters.

PARAM0 - Test Control (Location 00122(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
*	**	DE	DR	NU	NU	RC	RB	RS	RT	LE	SE	SC	SB	SS	ST

ST	Stop at end of test.	SE	Stop on error.
SS	Stop at end of section.	LE	Log errors in dayfile.
SB	Stop at end of subsection.	RT	Repeat test.
SC	Stop at end of condition.	RS	Repeat section.
RB	Repeat subsection.	DR	Bypass all messages.
RC	Repeat condition.	DE	Display only error messages.
**	Reserved for CMSE 180 use.	*	Enable CMSE to alter PARAM0 bits via the Cxx/Sxx commands (EP command must be used to alter this parameter.)

NU Not Used.

Default selection is 100021(8)/8011(16). This corresponds to setting ST,SE and enabling CMSE to alter PARAM0 bits.

PARAM1 - Test Control (Location 00123(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
**	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	*	NU	NU	NU

*	2**2	Bypass parameter stop.
**	2**15	Enable CMSE to alter PARAM1 bits.

Default selection is 100000(8)/8000(16). This corresponds to enabling CMSE to alter PARAM1 bits. Use the EP command to set or clear these parameters.

PARAM2 - Repeat Test Count (Location 00124(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

The test will repeat the number of times (-1) contained in this location. The test will then unconditionally exit if the Repeat Test parameter bit is not set (PARAM0 Bit 6).

PARAM3 - Not Used (Location 00125(8))

PARAM4 - Not Used (Location 00126(8))

PARAM5 - Section Select (Location 00127(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	x	x	x	x	x	x	x	x

Bit 00 Section 0.
Bit 01 Section 1.
Bit 02 Section 2.
Bit 03 Section 3.
Bit 04 Section 4.
Bit 05 Section 5.
Bit 06 Section 6.
Bit 07 Section 7.

The default conditions is sections 0 through 6 selected. Section 7 is not selected.

PARAM6 - Not Used (Location 00130(8))

PARAM7 - Not Used (Location 00131(8))

PARAM8 - Not Used (Location 00132(8))

PARAM9 - ICI Channel and Disk Unit Number (Location 00133(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	C	C	C	C	C	C	U	U	U	U	U	U

Bits 00...05 FSD disk unit number.
Bits 06..11 NIO channel number.

Default selection is zero.

PARAM10 - Disk Cylinder (Location 00134(8)

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	CY	CY	CY	CY	CY	CY	CY	CY	CY	CY	CY	CY

Bits 00...11 Disk cylinder to use for reads and writes.

Default selection is 1457(8). This is the default test cylinder for an 834/FSD-I. The default test cylinder for an 836/FSD-II is 1273(8). This parameter word is only used by section 7.

PARAM11 - Disk Track (Location 00135(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	TK	TK	TK	TK	TK	TK

Bits 00...05 Disk track to use for reads and writes.

Default selection is zero. This parameter word is only used by section 7.

PARAM12 - Disk Sector (Location 00136(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	SE	SE	SE	SE	SE	SE

Bits 00...05 Disk sector to use for reads and writes.

Default selection is zero. This parameter word is only used by section 7.

PARAM13 - Test Pattern (Location 00137(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX

Bits 00...15 Data test pattern.

Default selection is zero. This parameter word is only used by section 7.

PARAM14 - Not Used (Location 00140(8))

PARAM15 - Not Used (Location 00141(8))

PARAM16 - Not Used (Location 00142(8))

PARAM17 - Not Used (Location 00143(8))

PARAM18 - Repeat Subsection Count (Location 00144(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU

Bits 00...15 Repeat subsection count.

The test automatically repeats each subsection in the selected sections the number of times (-1) contained in this location. Repeat Subsection PARAM0 bit 2**8 must be set.

Default selection is zero.

Control Words

Use control words to identify a program and supply information to the user. The control words start at location 00102(8) in the PP memory.

Tag Name	Location	Meaning
CW0	00102(8)	Test name, upper two characters
CW1	00103(8)	Test name, lower two characters
CW2	00104(8)	Program type
CW3	00105(8)	Iteration count
CW4	00106(8)	Error code 1
CW5	00107(8)	Error code 2
CW6	00110(8)	Test pass count
CW7	00111(8)	Current section number
CW8	00112(8)	Current subsection number
CW9	00113(8)	Current condition number
CW10	00114(8)	Error count

Messages

Since all test messages are displayed on the B display, before they are displayed the B display must be assigned to the PP in which the test is executing. Dropping the test display by assigning the B display to a different PP, or central memory, causes the present displayed test message to be lost. Assigning the B display back to the test PP results in a blank display until the test displays a new message. The general format for all normal and error messages appears as:

```
DPDS ZZ PCxxxx SOOss SBOObb COOcc CHhh UNmu
EC1=0000 EC2=yyee TE=tttt RN=nnnn
AAA-----------------------------------AAA
```

where:

ZZ	=	Message type (one of the following): RU = Running. SC = Stopped at end of condition. SB = Stopped at end of subsection. SS = Stopped at end of section. ST = Stopped at end of test. SE = Stopped on error. RC = Repeating condition. RB = Repeating subsection. RS = Repeating section. HT = Halted (operator stop).
xxxx	=	Pass count (decimal).
ss	=	Current section number (decimal).
bb	=	Current subsection number (decimal).
cc	=	Current condition number (decimal).
hh	=	ICI channel number (octal).
mu	=	CM and disk unit.
0000	=	Error code 1 (hex) (see appendix A).
ee	=	Error code 2.
yy	=	00 for parameter, 10 for channel reserve, 20 for channel fault, 40 for disk, 50 for data compare.
tttt	=	Total error count (decimal).
nnnn	=	Random or base number used for generating data (hex).
AAA	=	Verbal error description (1 or more lines).

Normal Messages

The system displays the following message at the beginning of the test to allow the user to set test parameters. This display is bypassed when the Bypass Parameter Stop bit is set, PARAM1 bit 2.

```
DPDS SET PARAMS PA=0122B YY/ MM /DD
```

where:

PA	=	FWA of parameter area in PP memory.
YY/MM/DD	=	Year/Month/Day (test's version assembly date).

Error Messages

For the Data Compare Error error message, the system displays:

```
DPDS  SE  PCxxxx S000y  SB000z C0000 CHhh UNmu
EC1=9010  EC2=5000  TE=000t RN=nnnn

16 BIT ISD DATA PATH INTEGRITY TEST
ST------------------------------ST

DATA COMPARE ERROR

SECTOR WORD wwwwH
IB  iiii  iiii  iiii  iiii  iiii  iiii  iiii  iiii
OB  oooo  oooo  oooo  oooo  oooo  oooo  oooo  oooo
```

where:

iiii	=	Input data word.
oooo	=	Output data word.
wwww	=	Sector word address where data compare failed.

The data read in does not match the data written out at word (wwww) in the sector. Eight data words are displayed starting with the first miscompare.

For the Parameter Error error message, the system displays:

```
DPDS  SE  PCxxxx S000y  SB000z C0000 CHcc UNmu
EC1=F200  EC2=000e  TE=000t RN=nnnn

16 BIT ISD DATA PATH INTEGRITY TEST
ST------------------------------ST

DISK ADDRESS PARAMETER ERROR

CHANNEL ccO
CYLINDER  yyyyO  TRACK ttttO  SECTOR ssssO
```

where:

cc	=	ICI channel.
yyyy	=	Cylinder.
tttt	=	Track.
ssss	=	Sector.

A disk parameter entered by the user has exceeded the range specified for 834/836 disk subsystem or the channel specified is out of range.

For the Wrong Subsystem error message, the system displays:

```
DPDS  SE  PCxxxx S000y  SB000z C0000 CHcc UNmu
EC1=F200  EC2=3000  TE=000t RN=nnnn

16 BIT ISD DATA PATH INTEGRITY TEST
ST------------------------------ST

NOT AN ISD SUBSYSTEM
```

This error message appears if the test has detected that it is not connected to an 834/836 disk subsystem.

For the Channel Reserved Error error message, the system displays:

```
DPDS  SE  PCxxxx S000y  SB000z C0000 CHcc UNmu
EC1=F200  EC2=1000  TE=000t RN=nnnn

16 BIT ISD DATA PATH INTEGRITY TEST
ST------------------------------ST

UNABLE TO RESERVE CHANNEL xxO
```

This error message appears if the channel specified in PARAM9 is reserved to some other PP.

For the Disk Subsystem Fault error message, the system displays:

```
DPDS  SE  PCxxxx S000y  SB000z C0000 CHhh UNmu
EC1=9000  EC2=400e  TE=000t RN=nnnn

16 BIT ISD DATA PATH INTEGRITY TEST
ST------------------------------ST

DISK I/O ERROR

GENERAL STATUS ggggH

DETAILED STATUS (OCTAL)

01D  dddd  dddd  dddd dddd
05D  dddd  dddd  dddd dddd
09D  dddd  dddd  dddd dddd
13D  dddd  dddd  dddd dddd
17D  dddd  dddd  dddd dddd
```

where:

e = Error code 2.
gggg = General status.
dddd = Detailed status word in octal.

This is the basic format for all disk subsystem messages. General status and detailed status provide the information needed to determine the problem.

EC2 values and brief descriptions of the errors are:

4004 DRIVE NOT READY.
This error indicates that the drive is present, but not ready and does not have a fault. This can occur if the drive is not spun up.

4005 ADAPTER ERROR.
This message indicates that an adapter or ICI parity problem exists.

4006 CORRECTABLE ECC DATA ERROR.
This message occurs if a data field ECC error has occurred the error may be correctable.

4007 CM ERROR.
This message informs the user that there is no unit (u) on the selected control module (m). This error message may also indicate a failure in the drive or control module.

4008 UNCORRECTABLE ECC DATA ERROR.
This error message occurs if an uncorrectable ECC error has occurred.

4010 SUBSYSTEM ERROR.
This error occurs as the result of some subsystem failure.

For the Channel Fault error message, the system displays:

```
DPDS  SE  PCxxxx SOOOy  SBOOOz COOOO CHhh UNmu
EC1=9000  EC2=20ee  TE=OOOt RN=nnnn

16 BIT ISD DATA PATH INTEGRITY TEST
ST------------------------------ST
```

This is the basic format for all channel fault messages. Channel fault messages may be generated if the wrong channel is selected in the test.

EC2 values and brief descriptions of the errors are:

2001 CHANNEL INACTIVE AND EMPTY ON INPUT.
Channel timed out inactive and empty while waiting for input.

2002 CHANNEL INACTIVE BEFORE STATUS.
Channel became inactive while waiting for status.

2003 CHANNEL FULL BEFORE OUTPUT.
Channel was found to be full before doing an output.

2004 CHANNEL ACTIVE BEFORE CONNECT.
Channel was active before a Connect function was sent.

2005 CHANNEL FULL AFTER OUTPUT.
Channel did not go empty after an output.

2006 CHANNEL ACTIVE BEFORE FUNCTION SENT.
Channel was found to be active before sending a function.

2007 CHANNEL INACTIVE AFTER ACTIVATE.
Channel did not become active after an activate instruction was sent.

2008 CHANNEL ACTIVE AFTER DISCONNECT.
Channel was found active after a DCN instruction was issued.

200A CHANNEL PARITY ERROR.
A channel parity error was detected.

200B INPUT TRANSFER INCOMPLETE.

200C OUTPUT TRANSFER INCOMPLETE.

200D FUNCTION REJECT.
Function was rejected.

Section Descriptions

Section 00 Adapter Buffer Echo Test.
This section tests the ability of the ICI data path to transfer 16-bit data to and from the adapter.

Section 01 Control Module Buffer Echo Test.
This section tests the ability of the ICI data path to transfer 12-bit data to and from the control module buffer.

Section 02 Ones and Zeroes Test.
This section tests the ICI data path from the PP to the disk by writing, reading, and comparing one sector ten times for each pattern. The default cylinder, track, and sector is used.

Subsection 00 Zeroes test
A pattern of all zeroes is used.

Subsection 01 Ones test
A pattern of all ones is used.

Section 03 Alternating Ones Test.
This section tests the ICI data path from the PP to the disk by writing, reading, and comparing one sector ten times for each pattern. The default cylinder, track, and sector is used.

Subsection 00 Pattern 052525(8)
The pattern 052525(8) is used.

Subsection 01 Pattern 125252(8)
The pattern 125252(8) is used.

Section 04 Sliding Zeroes Test.
This section tests the ICI data path from the PP to the disk by writing, reading, and comparing one sector ten times for each pattern. The default cylinder, track, and sector is used.

Subsection 00 Pattern 167676(8)
The pattern 167676(8) is used.

Subsection 01 Pattern 157575(8)
The pattern 157575(8) is used.

Subsection 02 Pattern 137373(8)
The pattern 137373(8) is used.

Subsection 03 Pattern 076767(8) The pattern 076767(8) is used.

Subsection 04 Pattern 175757(8)
The pattern 175757(8) is used.

Subsection 05 Pattern 173737(8)
The pattern 173737(8) is used.

Section 05 Sliding Ones Test.
This section tests the ICI data path from the PP to the disk by writing, reading, and comparing one sector ten times for each pattern. The default cylinder, track, and sector is used.

Subsection 00	Pattern 010101(8) The pattern 010101(8) is used.
Subsection 01	Pattern 020202(8) The pattern 020202(8) is used.
Subsection 02	Pattern 040404(8) The pattern 040404(8) is used.
Subsection 03	Pattern 101010(8) The pattern 101010(8) is used.
Subsection 04	Pattern 002020(8) The pattern 002020(8) is used.
Subsection 05	Pattern 004040(8) The pattern 004040(8) is used.

Section 06 Random Data Test.
This section tests the ICI data path from the PP to the disk by writing and reading one sector of random data ten times. Each iteration uses a different random seed based on the last word generated from the last data set.

Section 07 User Specified Pattern and Disk Address.
This section tests the ICI data path from the PP to the disk by writing and reading one sector of the data pattern in PARAM13 ten times. The cylinder, track, and sector used are in PARAM10 through PARAM12. The user should check the parameters carefully before executing this test.

ISTQ 5

ISTQ 5

Introduction

ISTQ is a basic operational test of the 9639 intelligent tape subsystem connected to an 16-bit ICI channel on a CYBER 930 Computer System. This test does not execute on any other CYBER mainframe.

Assumptions

ISTQ assumes that the CYBER 930 intelligent console will be monitoring the PP P register.

The adapter microcode has been written onto the tape. The tape is mounted and ready on the unit being addressed.

Restrictions

The intelligent console must supply ISTQ with channel, equipment, and unit numbers at load time. This information will be located in PP memory locations 37400(8), 37401(8), and 37402(8), respectively.

ISTQ cannot use PP memory locations 37400 to 37777(8), as these locations will be occupied by the bootstrap loader.

ISTQ has a LJM (Long Jump) to start of test in PP memory locations 01 and 02 respectively.

Test Description

ISTQ tests the 9639 intelligent tape subsystem when connected to an CYBER 930 IOU via the ICI channel. Internally, ISTQ is divided into sections. However, there is no external control over their execution. ISTQ's purpose is to detect errors in the 9639 subsystem when the loading of either CMSE or the operating system is not possible.

Use this test to provide hardware error detection of 9639 subsystem failures. The test is divided into two sections: section 0 invokes the inline tests, section 1 executes the data echo test.

Loading Procedure

ISTQ resides on the intelligent console and loading is performed via the intelligent console.

The following procedure loads and executes ISTQ from the intelligent console.

1. From the Console Main Menu, select MAINTENANCE.
2. From the Maintenance Main Menu, select ENGINEERING MAINTENANCE.
3. From the Engineering Maintenance Menu, select TECHNICAL SUPPORT FUNCTIONS.

   NOTE

   When a warning message is displayed, enter a RETURN to continue.

4. From the Technical Support Functions Menu, select DIAGNOSTICS.
5. From the Diagnostics Menu, select SUBSYSTEM TESTS.
6. From the Subsystem Tests Menu, select TAPE TEST (ICI).
7. From the Tape Test Diagnostics Options, select RUN DIAGNOSTICS.

ISTQ begins execution. The system displays the P and A registers on the console screen.

Running Procedure

The test begins execution immediately after loading when control is given to the PP at location 000001.

Parameters

ISTQ requires channel, equipment, and unit information in PP locations 37400B, 37401B, and 37402B, respectively, after being loaded.

Messages

All test messages are displayed on the intelligent console. The system interprets the contents of the PP's A register to determine if an error has occured when the PP halts. The P register will be set to 00004, 00005, or 00006, depending upon where the test was executing when the error occurred.

Normal Messages

During normal test execution, a RUNNING message is displayed in the lower left corner of the display and the contents of the P and A registers are displayed.

Error Messages

The A register contains either channel error codes or testing error codes. Channel errors are the result of a failure at a very low level. Test errors come from three basic operations; failures of the inline diagnostics, incorrect status following any operation, or data compare failures during echo testing. The P register indicates either inline diagnostic testing (00005) or echo testing (00004) when the test halts.

The ISTQ Channel Error Codes and their descriptions are:

0001 CH ACTIVE AFTER DEACTIVATE.
After performing a DCN on the channel, the channel was found active.

0002 CH INACTIVE AFTER ACTIVATE.
After performing an ACN on the the channel, the channel was found to be inactive.

0003 NO INACTIVE ON EQUIPMENT FUNCTION.
After sending function Fffff using a FAN instruction, the channel was found active.

0004 CH INACTIVE ON STATUS.
The channel went inactive before any status (channel full) was received.

0005 CH ACTIVE AND EMPTY ON INPUT.
The channel was functioned to perform an input, and activated. A delay of 262ms expired without the channel becoming full.

0006 NO EMPTY ON LAST BYTE OUTPUT.
The channel was functioned to perform an output, and activated. A delay of 262ms expired and the channel was found to be still full.

0007 LAST OUTPUT NOT ACCEPTED.
The channel did not become empty on the last byte of data output.

The general format of the ISTQ Testing Error Code is:

```
TXXX
```

where:

XXX = Processor interrupt code or in-line diagnostic error code or incorrect status.

T = Operation code.
- 1 = Read.
- 2 = Write.
- 5 = Adaptor inlines.

The ISTQ Testing Error Codes and their descriptions are:

5XXX Adapter inline diagnostic failures.
The adapter was functioned with an 06UU to execute its inline diagnostics. XXX indicates the error code received. The range of error codes is 000 to 377. These error codes are listed in appendix E of the ISMT Subsystem Reference manual, publication number 60461090.

7001 Echo test data error.
A data error was detected after executing an echo test. The expected data will be in memory location 000010, the incorrect bits in 000011, and the index to the buffer in 000012. The input buffer is at 001000(8) and the output at 001510(8).

Section Descriptions

Section 1 This section invokes the inline diagnostics in the adapter and monitors their progress.

Section 2 This section tests the ability of the 9639 tape subsystem to write a record of data to the adapter memory (0067 function) and read it back correctly (0066 function). If an error occurs when attempting to do any of the functions, the A register will be entered with 00 (no response), or an error code, and the program will halt with P=00004.

ISTU 6

ISTU 6

Introduction

ISTU is an offline data path integrity and inline diagnostic monitor program for the 639 and 9639 Intelligent Small Magnetic Tape (ISMT) subsystem. This diagnostic tests the data path in the adapter, tests the data path between the adapter and STU, and executes the diagnostics in the adapter controlware and STU control storage.

NOTE

If executing on a CYBER 930 Computer System, the binary name of this program is ISTU0. On all other CYBER systems, the binary name is ISTU.

Assumptions

The subsystem controlware is loaded and running.

Restrictions

ISTU does not support the following.

SB Stop at end of subsection.
SC Stop at end of condition.
SI Stop at end of iteration.
RB Repeat subsection.
RC Repeat condition.
RI Repeat iteration.
SM Scope mode.
AB Abort on error.

After the detection of any channel or diagnostic error, the current test section will be aborted unless RS is set.

This test does not contain any polynomial, deadman timer, track, backspace, erase, or file mark testing.

STU Assembly/Disassembly code is set to 16-bit mode.

No random data is generated.

The sections selected message will not be reported by this test.

PP or controller memory should not be viewed while this diagnostic is running. This creates CMSE channel reserve errors in ISTU.

Test Description

ISTU is an offline data path integrity and inline diagnostic monitor program for the 639 and 9639 ISMT subsystem. It is PP based and consists of ten sections as described in table 6-1.

Table 6-1. ISTU Tests

Section	Description
00	Adapter path test
01	Adapter diagnostic test
02	Write/read memory test
03	Read data test
04	Write data test
05	Write/read data path test
06	Loop write/read test
07	Maintenance write
08	Maintenance read
09	STU diagnostic test

Loading Procedures

Load ISTU into a PP by using any of the following procedures.

1. At the system console, enter:

   ```
   LT,x,ISTU (cr) or
   LT,x,ISTU0 (cr) for the CYBER 930
   ```

   ISTU is loaded into PPx at location 0, the test display is assigned to PPx, and the PP is started at location 100(8).

2. To load ISTU at the system console, execute the command buffer:

   ```
   GO,ISTU (cr)
   ```

   An example and explanation of that command buffer is:

0000	DPx	Deadstart PPx.
0001	CPx,ISTU	Load ISTU into PPx.
0002	*	Setting other test parameters may be made here.
0003	BP,x	Assign the B display to PPx.
0004	RUx,100	Run PPx at address 100(8).
0005	TB	Terminate buffer.

Running Procedure

The running procedures for the ISTU are:

S (cr)	Stops test execution. This command is interpreted as a stop command. DPDS will go into an idle loop whereby communication is maintained with CMSE but no test activity will take place.
Spacebar	Starts or resumes test execution.
R (cr)	Restarts the test from the beginning.
Cxx or Sxx	Clear/set xx bit of PARAM0/1, where xx is the bit mnemonic such as SS, ST.
EP,num,adrs,data	Enter parameter data into PP num at location adrs.

Parameters

The parameter words are located at location 00122(8) in PP memory. Bit 2**0 is defined as the least significant bit of a word.

PARAM0 - Test Control (Location 00122(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
*	**	DE	DR	NU	NU	NU	NU	RS	RT	LE	SE	NU	NU	SS	ST

ST	Stop at end of test.	SE	Stop on error.
SS	Stop at end of section.	LE[1]	Log errors in dayfile.
RT	Repeat test.	RS	Repeat section.
DR	Bypass all messages.	DE	Display only error messages.
**	Reserved for CMSE 180 use.	*	Enable CMSE to alter PARAM0 bits via the Cxx/Sxx commands (EP command must be used to alter this parameter.)

NU Not Used.

Default selection is 100061(8)/8031(16).

PARAM1 - Test Control (Location 00123(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
**	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	*	NU	NU	NU

*	2**2	Bypass parameter stop.
**	2**15	Enable CMSE to alter PARAM1 bits.

Default selection is 100000(8)/8000(16). This corresponds to enabling CMSE to alter PARAM1 bits. Use the EP command to set or clear these parameters.

PARAM2 - Repeat Test Count (Location 00124(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

The test will repeat the number of times (-1) contained in this location. The test will then unconditionally exit if the Repeat Test parameter bit is not set (PARAM0 Bit 6).

1. LE is not supported on CYBER 930 Computer Systems.

PARAM3 - Channel and Equipment Select (Location 00125(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	CH	CH	CH	CH	CH	CH	EQ	EQ	EQ	EQ	EQ	EQ

EQ Bits 0...5 639 Equipment number.
CH Bits 6...11 639 Channel number.
NU Bits 12...15 Not Used.

PARAM4 - Unit Select (Location 00126(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	UN	UN	UN	UN	UN	UN

UN Bits 0...5 639 Unit number.
NU Bits 6...15 Not Used.

PARAM5 - Section Select (Location 00127(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	x	x	x	x	x	x	x	x	x	x

Bit 0 Section 0.
Bit 1 Section 1.
Bit 2 Section 2.
Bit 3 Section 3.
Bit 4 Section 4.
Bit 5 Section 5.
Bit 6 Section 6.
Bit 7 Section 7.
Bit 8 Section 8.
Bit 9 Section 9.

The default conditions is sections 0 through 9 selected.

PARAM6 - Not Used (Location 00130(8))

PARAM7 - Not Used (Location 00131(8))

PARAM8 - Enable GCR Error Correction (Location 00132(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	xx

Bits 0 Clear - Disable error correction.
Set - Enable error correction.

Bits 1...15 Not Used. Must be zero or parameter error will result.

Default selection is Enable Error Correction (Bit 0 Set).

PARAM9 - Density Select (Location 00133(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	X

Bit 0 Clear - 1600 CPI 9-track unit.
Set - 6250 CPI 9-track high density unit.

Bits 1...15 Not Used. Must be zero or parameter error will result.

Default selection is zero.

PARAM10 - Read and Post Status (Location 00134(8)

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	X

Bit 0 Clear - Do not read and post 639 status.
Set - Read and post 639 status.

Bits 1...15 Not Used. Must be zero or parameter error will result.

Default selection is Bit 0 Set.

PARAM11 - Data Pattern Select (Location 00135(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Bits 0...15 Data test pattern.

Default selection is zero.

PARAM12 - Number of Words Per Record (Location 00136(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	x	x	x	x	x	x	x	x	x

Bits 0...8 Number of words per record. Valid entries are 1...502(8).

Default selection is 00502(8)/0142(16).

PARAM13 - Number of Records to Write/Read (Location 00137(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX

Bits 0...15 Number of records to write or read. If set to all zeroes, writing or reading will occur to End of Tape.

Default selection is 00100(8)/0040(16).

PARAM14 - STU Diagnostic Test Number (Location 00140(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	XX	XX	XX	XX	XX	XX	XX	XX

Bits 0...7 STU diagnostic test number in hexidecimal.
Bits 8...15 Not Used.

Default selection is 00126(8)/0056(16).

Refer to ISMT Subsystem Reference manual, publication number 60461090, for a description of the STU Diagnostics.

PARAM15 - STU Diagnostic Test Option (Location 00141(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	XX

Bits 0...1 STU diagnostic option number.
Bits 2...15 Not Used.

Default selection is zero.

Refer to ISMT Subsystem Reference Manual, publication number 60461090, for a description of the STU Diagnostics.

PARAM16 - Not Used (Location 00142(8))

PARAM17 - Not Used (Location 00143(8))

PARAM18 - Not Used (Location 00144(8))

Control Words

Use control words to identify a program and supply information to the user. The control words start at location 00102(8) in the PP memory.

Tag Name	Location	Meaning
CW0	00102(8)	Test name, upper two characters
CW1	00103(8)	Test name, lower two characters
CW2	00104(8)	Test defined program type
CW3	00105(8)	Not used by test
CW4	00106(8)	Error code 1
CW5	00107(8)	Error code 2
CW6	00110(8)	Test Pass count
CW7	00111(8)	Current section number
CW8	00112(8)	Not used by test
CW9	00113(8)	Not used by test
CW10	00114(8)	Error count

Messages

Since all test messages are displayed on the B display, before they are displayed the B display must be assigned to the PP in which the test is executing. Dropping the test display by assigning the B display to a different PP, or central memory, causes the present displayed test message to be lost. Assigning the B display back to the test PP results in a blank display until the test displays a new message. The general format for all normal and error messages appears as:

```
ST  SE  LE
ISTU  ZZ  PCxxxx SOOss  SB0000 C0000  VER=yy/ mm /dd
EC1=9180  EC2=eeee TE=tttt RN=rrrr LF=ffff LA=aaaa
F1=uuuu F2=vvvv F3=wwww WC=cccc WT=dddd
AAA-----------------------------------AAA
```

where:

ST SE LE	=	The mnemonics for bits in PARAM0.
ZZ	=	Message type (one of the following): RU = Running. SS = Stopped at end of section. ST = Stopped at end of test. SE = Stopped on error. RS = Repeating section. HT = Halted (operator stop).
xxxx	=	Pass count (decimal).
ss	=	Current section number (decimal).
SB0000	=	Subsection number (always zero).
C0000	=	Condition number (always zero).
yy/mm/dd	=	The date of assembly.
9180	=	Error code 1 (see appendix A).
eeee	=	Error code 2 (hex) (program or driver defined).
tttt	=	Total error count (decimal).
rrrr	=	Random or base number used for generating data (hex). Not used by test. The number used fo generating data is in PARAM11.
ffff	=	Last function issued (octal). If LF=7777, channel was active before any function was sent. During test initialization, if the channel is active, a deactivate is performed.
aaaa	=	The PP address after the diagnostic routine that called the driver, or a diagnostic check routine (octal).
uuuu	=	The first parameter word used with the format unit function.
vvvv	=	The second parameter word used with the format unit function.
wwww	=	The third parameter word used with the format unit function.
cccc	=	The I/O block length from the last I/O operation. If WC=7777, no I/O has occured yet (octal).
dddd	=	The words transmitted by the last I/O operation. If WT=7777, no I/O has occured yet (octal).
AAA	=	Error type, channel, or diagnostic.

Normal Messages

The system displays the following message at the beginning of the test to allow the user to set test parameters. This display is bypassed when the Bypass Parameter Stop parameter bit is set, PARAM1 bit 2**2.

```
ST  SE  LE
ISTU  SET PARAMS PA=0122B yy/ mm /dd
```

where:

ST SE LE	=	The mnemonics for bits in PARAM0/1.
PA	=	FWA of parameter area in PP memory.
YY/MM/DD	=	Test version date (Year/Month/Day).

The system displays the following message to indicate that the test is running. If RS is set the CH, EQ, UN and PC portion of the message will not be displayed.

```
ST  SE  LE
ISTU  RU  PCxxxx SOOss  SB0000 C0000  VER=yy/ mm /dd
CHcc  EQee  UNuu          PC p
```

where:

cc	=	ISTU channel number. Entered in PARAM6.
ee	=	ISTU equipment number. Entered in PARAM6.
uu	=	ISTU unit number. Entered in PARAM7.
p	=	Section pass count. An incrementing or decrementing digit displayed to inform the user that the section is still running. The digit will remain zero for sections with run times of one second or less (octal).

The system displays the following message while tape is rewinding, or STU diagnostics are running.

```
ST  SE  LE
ISTU  RU  PCxxxx SOOss  SB0000 C0000  VER=yy/ mm /dd
CHcc  EQee  UNuu  WAIT x  PC p
```

where:

x	=	A one digit decrementing count (octal).

If RS is set the CH, EQ, UN, WAIT and PC portion of the message will not be displayed.

Error Messages

For a channel reserve or release error message, the system displays:

```
ST  SE  LE
ISTU  SE  PCxxxx SOOss  SB0000 C0000  VER=yy/ mm /dd
EC1=9180  EC2=7777 TE=tttt RN=rrrr

CHcc  EQee  UNuu          PC p
EXT FLT
```

This message informs the user that CMSE cannot reserve/release the channel specified to run ISTU. LF and LA may or may not be displayed depending on the last error condition. If they are displayed at this time, they are meaningless. The test may be restarted at this point. (R) If the space bar is depressed, the next selected section is run.

For a parameter error or connect problem error message, the system displays:

```
ST  SE  LE
ISTU  SE  PCxxxx SOOss  SB0000 C0000  VER=yy/ mm /dd
EC1=9180  EC2=070X TE=tttt RN=rrrr

CHcc  EQee  UNuu          PC p
```

This message informs the user that the diagnostic has a possible parameter error or connect problem. LF and LA may or may not be displayed depending on the last error condition. If they are displayed at this time, they are meaningless. The test may be restarted at this point. (R) If the space bar is depressed, the next selected section is run.

EC2 values and meaning for error conditions are:

0700 CHANNEL PARAMETER ERROR.
Illegal channel specified.

0701 EQUIPMENT PARAMETER ERROR.
Illegal equipment specified.

0702 UNIT PARAMETER ERROR.
Unit specified greater then 7.

0703 UNIT CONNECT ERROR.
The unit specified cannot be connected.

0704 OTHER PARAMETER ERROR.
Parameters 8, 9, 10, 12, 14, or 15 were found to be in error.

For the channel fault error message, the system displays:

```
ST  SE  LE
ISTU  ZZ  PCxxxx SOOss  SB0000 C0000  VER=yy/ mm /dd
EC1=9180  EC2=40ee TE=tttt RN=rrrr LF=ffff LA=aaaa
CHcc  EQee  UNuu          PC p
F1=uuuu F2=vvvv F3=wwww WC=cccc WT=dddd
CHN FAULT. SPACE TO CONT.
```

This is the basic format for all channel fault messages. No more messages will be posted after SPACE, unless the parameter bit to read and post 639 status is set.

If the parameter bit to read and post 639 status is set, the status displayed is:

```
SB(1-4)  =gggg  gggg  gggg  gggg
SB(5-8)  =gggg  gggg  gggg  gggg
SB(9-12) =gggg  gggg  gggg  gggg
SB(13-16)=gggg  gggg  gggg  gggg
```

where:

gggg = Status word value (octal).

EC2 values and meaning for channel faults are:

4004 WORDS TRANSMITTED ERROR.
After sending function LF=ffff, activating the channel, and transferring a block of data, the channel was found empty, and the complete block of data had not been transferred. WC should equal WT.

4015 CH EMPTY BEFORE INPUT.
After sending function LF=ffff and activating the channel but before transfering a block of data the channel was found empty. ISTU deactivates the channel before displaying this message.

4020 CHANNEL ACTIVE ON ENTRY.
Before sending another function, the channel was found active. LF=ffff is the last function issued. If LF=7777, channel was active before any function was sent. During test initialization, if the channel is active. ISTU deactivates the channel before displaying this message.

4021 CHANNEL INACTIVE AFTER ACN.
The channel was found to be inactive after an ACN command.

4022 CHANNEL ACTIVE AFTER DCN.
The channel was found to be active after a DCN command. ISTU attempts to deactivate the channel before displaying this message.

4024 NO INACTIVE TO LAST FUNCTION.
After sending function LF=ffff using a FAN instruction, the channel was found active. ISTU deactivates the channel before displaying this message.

4026 NO EMPTY ON LAST BYTE OUTPUT.
After sending function LF=ffff, activating the channel, and transfering a block of data, the channel was found full. ISTU deactivates the channel before displaying this message.

4027 UNIT HUNG BUSY.
After initiating a rewind, the unit was still busy after three minutes.

4030 CHANNEL ACTIVE AFTER INPUT.
After sending function LF=ffff, activating the channel, and transfering a block of data, the channel was found full. ISTU deactivates the channel before displaying this message.

For a diagnostic error message, the system displays:

```
ST  SE  LE
ISTU  ZZ  PCxxxx S00ss  SB0000 C0000  VER=yy/ mm /dd
EC1=9180  EC2=eeee TE=tttt RN=rrrr LF=ffff LA=aaaa
CHcc  EQee  UNuu          PC p
F1=uuuu F2=vvvv F3=wwww WC=cccc WT=dddd
DIAG ERR. SPACE TO CONTINUE.
```

This is the basic format for all diagnostic detected errors. Depress the space bar for more error information.

If the parameter bit to read and post 639 status is set, the status displayed is:

```
SB(1-4)  =gggg  gggg  gggg  gggg
SB(5-8)  =gggg  gggg  gggg  gggg
SB(9-12) =gggg  gggg  gggg  gggg
SB(13-16)=gggg  gggg  gggg  gggg
```

where:

gggg = Status word value (octal).

EC2 values and related diagnostic error formats are:

0100 ADAPTOR DIAGNOSTIC ERROR.
After issuing a 70(8) function to run adaptor diagnostics, status was taken and the alert bit was found to be active. The adaptor diagnostics have failed to run. General status word 3 error code is 70(8), and general status word 10(10) contains the adaptor error code of the failing test. Refer to the 639 Subsystem Reference manual, publication number 60461090.

0101 ADAPTOR DIAGNOSTIC TIME OUT ERROR.
After issuing a 70(8) function to run adaptor diagnostics, the channel was found active after four one-second delays, with a status function after each delay. ISTU deactivates the channel before displaying this message.

0102 DIAGNOSTIC MEMORY WRITE/READ STATUS ERROR.
After issuing a 64(8) function to diagnostic memory read, status was taken and the alert bit was found to be active.

0103 READ DATA PATH STATUS ERROR.
After issuing a 66(8) function to diagnostic data path read, status was taken and the alert bit was found to be active.

0104 WRITE DATA PATH STATUS ERROR.
After issuing a 64(8) function to diagnostic data path read, status was taken and the alert bit was found to be active.

0105 WR/RD DATA PATH STATUS ERROR.
After issuing a 67(8) function to diagnostic data path write, and a 66(8) function to diagnostic data path read, status was taken and the alert bit was found to be active.

0107 LOOP WRITE TO READ STATUS ERROR.
After issuing a 175(8) function to loop write to read, and a 50(8) function to write, status was taken and the alert bit was found to be active.

0110 STU DIAGNOSTIC DETECTED ERROR.
After issuing a 63(8) function to run an STU diagnostic, status was taken and the alert bit was found to be active.

If the space bar is depressed, the system displays:

```
FAULT SYMPTOM = xx  FAULT SUBCODE = yy
```

where:

xx	=	The diagnostic fault code (16).
yy	=	The diagnostic fault subcode (16).

0111 WAIT EOP TIMEOUT ERROR.
After issuing a 64(8) function to diagnostic memory read, the channel was found active after two 1-second delays, with a status function after each delay. ISTU deactivates the channel before displaying this message.

0112 STU NOT READY STATUS ERROR.
After connecting to the specified unit, status indicated not ready, and or no write enable, and or not at BOT.

0200 MEMORY WRITE/READ DATA ERROR.
A data compare error was detected in the data read during an adaptor memory write/adaptor memory read routine.

If the space bar is depressed, only one data error will be displayed in the following format.

```
WD= wwww EXP= ffff ACT= ssss DIF= dddd
```

where:

wwww	=	Location of failing word in the 502(8) buffer.
ffff	=	Expected data. PARAM11 or the complement (16).
ssss	=	Data from location xxxx of the read buffer (16).
dddd	=	Logical difference between the two data words (16).

0201 READ DATA PATH DATA ERROR.
A data compare error was detected in the data read during a diagnostic data path read.

If the space bar is depressed, only one data error will be displayed in the following format.

```
WD= wwww EXP= ffff ACT= ssss DIF= dddd
```

where:

wwww	=	Location of failing word in the 502(8) buffer.
ffff	=	Expected data. PARAM11 or the complement (16).
ssss	=	Data from location xxxx of the read buffer (16).
dddd	=	Logical difference between the two data words (16).

0202 WRITE DATA PATH DATA ERROR.
A data compare error was detected in the data written by a diagnostic data path write.

If the space bar is depressed, only one data error will be displayed in the following format.

```
WD= wwww EXP= ffff ACT= ssss DIF= dddd
```

where:

wwww	=	Location of failing word in the 502(8) buffer.
ffff	=	Expected data. PARAM11 or the complement (16).
ssss	=	Data from location xxxx of the read buffer (16).
dddd	=	Logical difference between the two data words (16).

0203 WR/RD DATA PATH DATA ERROR.
A data compare error was detected in the data written/read by a diagnostic data path write/read function.

If the space bar is depressed, only one data error will be displayed in the following format.

```
WD= wwww EXP= ffff ACT= ssss DIF= dddd
```

where:

wwww	=	Location of failing word in the 502(8) buffer.
ffff	=	Expected data. PARAM11 or the complement (16).
ssss	=	Data from location xxxx of the read buffer (16).
dddd	=	Logical difference between the two data words (16).

0204 DATA COMPARE ERROR.
A data compare error was detected in the data read during maintenance read routine.

If the space bar is depressed, only one data error will be displayed in the following format.

```
WD= wwww EXP= ffff ACT= ssss DIF= dddd
```

where:

wwww	=	Location of failing word in the buffer (8).
ffff	=	Expected data. PARAM11 (16).
ssss	=	Data from location xxxx of the read buffer (16).
dddd	=	Logical difference between the two data words (16).

0277 WRITE/READ STATUS ERROR.
After issuing a 50(8) or 40(8) function to write or read, status was taken and the alert bit was found to be active.

101x READ RAM DATA ERROR.
Read ram x (1-4) was copied, compared and a data error was found.

If the space bar is depressed, only one data error will be displayed in the following format.

```
WD= wwww  1ST RD= ffff  2ND RD= ssss  DIFF= dddd
```

where:

wwww	=	Location of failing word in the 200(8) buffer.
ffff	=	Data from location xxxx of the first read (16).
ssss	=	Data from location xxxx of the second read (16).
dddd	=	Logical difference between the two data words (16).

102x WRITE RAM DATA ERROR.
Write ram x (1-4) was copied, compared and a data error was found.

If the space bar is depressed, only one data error will be displayed in the following format.

```
WD= wwww  1ST RD= ffff  2ND RD= ssss  DIFF= dddd
```

where:

wwww	=	Location of failing word in the 128(10) buffer (8).
ffff	=	Data from location xxxx of the first read (16).
ssss	=	Data from location xxxx of the second read (16).
dddd	=	Logical difference between the two data words (16).

Section Descriptions

Section 00 Adapter Path Test.
This section verifies that the adapter path is stable. The data that is contained in each of the adapter conversion rams is read, saved, read again, and compared to the first read. This technique cannot detect solid bit failures.

Section 01 Adapter Diagnostic Test.
This section invokes the adaptor diagnostics executed during a controlware autoload, except for the memory test. The diagnostics tests the hardware in the adaptor and reports any errors the diagnostics detect. Successful execution of the diagnostics indicate that the hardware in the 639 adapter is fault free.

Section 02 Write/Read Memory Test.
This section tests the data path from the PP to the adaptor 16K memory and the data path from the adaptor 16K memory back to the PP.

The data path from the PP to the adaptor 16K memory is the same data path used for functions sent to the adaptor.

The data path from the adaptor 16K memory back to the PP is the same data path used to send status back to the PP.

Section 03 Read Data Test.
This section tests the data path from the adaptor 16K memory to the PP. This data path is used during a read from a 9-track tape.

Data is written into the adaptor 16K memory using the diagnostic memory write function. The data is then read back using the diagnostic data path read function. Data is then compared and any data errors reported.

Section 04 Write Data Test.
This section tests the data path to the adaptor 16K memory from the PP. This data path is used during a write to a 9-track tape.

Data is written into the adaptor 16K memory using the diagnostic data path write function. The data is then read back using the diagnostic memory read function. Data is then compared, and any data errors reported.

Section 05 Write/Read Data Path Test.
This section tests the data path to and from the adaptor 16K memory. This data path is used during a a write/read to a 9-track tape.

Data is written into the adaptor 16K memory using the diagnostic data path write function. The data is then read back using the diagnostic data path read function. Data is then compared and any data errors reported.

Section 06 Loop Write/Read Test.
This section tests the write and read data path in the adaptor, the cable to the streaming tape unit, (STU), and the STU interface.

The data is looped from the adaptor hardware through the STU hardware and backed to the adaptor where it is checked.

Section 07 Maintenance Write.
This section writes records on tape at the density and with the pattern specified by parameters.

The tape can then be read by section 08. All parameter entries have to be the same for both sections.

Record length and maximum records are parameter specified. If maximum record parameter is zero, records will be written to EOT.

Maximum length and records are defaulted respectively to 502B and 100B to force the unit to 75 ips.

Section 08 Maintenance Read.
This section reads the records written on the tape by section 07. All parameter entries have to be the same for both sections.

Record length and maximum records are parameter specified. If maximum record parameter is zero, writting will continue to EOT.

Maximum length and records are defaulted respectively to 502B and 100B to force the unit to 75 ips.

Section 09 STU Diagnostic Test.
This section runs the diagnostics which are resident in the control storage in the STU.

The diagnostics that will be run in the STU pertain to the STU interface, formatter, and the drive hardware elements.

The length of time required to execute any of the STU diagnostics is dependent on the test selected and length of the tape if one is required. This can be milliseconds to minutes.

The default test selection is 56(16).

HYDR 7

HYDR 7

Introduction

HYDR is the data path integrity test for the path between the CYBER 180 IOU4 (I4) and the 887 disk subsystem via the DMA enhanced ISI data channel. It is designed to be a detect only test and makes no attempt to isolate hardware failures. The only isolation information derived from running HYDR may be deduced by having run ISI4 and the 887 disk subsystem inline diagnostics error free before running HYDR. In that case and only that case, a HYDR failure depending on the type of failure may be isolated by deduction to a failure in the data path (assuming the following restrictions have not been violated). In this document, data path is defined as:

- The receiver/transmitters in the IOU4.
- The connecters and wiring from the IOU4 to the 887 disk subsystem ISI interface board.
- The portion of the 887 disk subsystem ISI interface board that cannot be isolated by the 887 disk subsystem inline diagnostics.

Assumptions

The following assumptions apply to this test.

- The following IOU tests have been run without error.
  - ISI4
  - PMT4
  - PMU4
  - MRT4
  - CHD4
  - CMA4
  - A PPU based central memory test, CMT3 or CMT5
- The CM buffer as defined in the parameter words is not being accessed by another system element.
- The 887 disk subsystem is powered on and the disk has been spun up.
- The 887 disk subsystem inline diagnostics have been run without error.
- The switches in the 887 subsystem have been set in the "same host ID" mode during dual channel testing (that is, running two copies of HYDR on the same physical 887 spindle over different 887 ports). When the 887 subsystem is in the "different host ID" mode, HYDR will exhibit erroneous error messages.

CAUTION

HYDR also assumes that the selection of the optional sections (that is, sections 09 through 15) means that the user intends to destroy the customer's data. The whole disk should be dumped before attempting to use the optional sections.

Restrictions

When running multiple copies of HYDR or running other IOU/CPU based tests with HYDR, the following testing environments are prohibited.

- More than one system element (CPU or IOU based test) using the same area in the control module.
- CPU or IOU based tests forcing error conditions via the MAC.

The CIO PPs and the DMA enhanced ISI channel adapters are grouped in clusters. A cluster comprises five CIO PPs and five DMA enhanced ISI channel adapters. A PP in one cluster cannot access a DMA enhanced ISI channel adapter in the other cluster.

HYDR is organized by section, subsection, and condition events. Because subsequent events rely on the successful completion of previous events, the sequential order of section execution should be maintained.

Test Description

HYDR tests the DMA enhanced ISI channel adapter to 887 disk subsystem data path. The test is CIO-PP based and is divided into sections, subsections, and conditions. HYDR consists of sixteen sections as shown in table 7-1 and 7-2. The sections marked OPTIONAL are not part of the test that is run using the default parameters and are not intended for general use by field service personnel because those sections will destroy customer data.

Table 7-1. HYDR Sections

Section	Description
0	ISI Device Function Test
1	IHD Buffer Echo Test (Interlocked)
2	IHD Buffer Echo Test (Noninterlocked)
3	Write Maintenance Cylinder Test (Interlocked)
4	Write Maintenance Cylinder Test (Noninterlocked)
5	Read Maintenance Cylinder (Interlocked)
6	Read Maintenance Cylinder (Noninterlocked)
7	Write/Read/ Maintenance Cylinder Test (Interlocked)
8	Write/Read/ Maintenance Cylinder Test (Noninterlocked)

The following sections are OPTIONAL and not intended for field use because they will destroy customer data.

Table 7-2. Optional HYDR Sections

Section	Description
9	Write/Read/Compare All Cylinders Test (Specified)
10	Write/Read/Compare Per Parameter Test (Specified)
11	Read Cylinder(s) Parameterized Test (Specified)
12	Read Headers Test (Specified)
13	Write/Read/Compare All Cylinders Test (Open-Ended)
14	Write/Read/Compare Per Parameter Test (Open-Ended)
15	Read Cylinder(s) Parameterized Test (Open-Ended)

Loading Procedure

Load HYDR to a CIO PP by using any one of the following procedures.

1. At the system console, enter:

   `LT,Cpp,HYDR` (cr) or `TL,Cpp,HYDR` (cr)

   NOTE

   HYDR will be loaded into CIO PP number pp.

2. To load HYDR from the system console, execute the command buffer:

   `GO,HYDR` (cr)

   NOTE

   HYDR will be loaded into CIO PP(s).

   An example and explanation of the command buffer is:

```
0000  HYDR        Command buffer title.
0001  CP,C,HYDR   Load HYDR into first available CIO PP.

0002  RU,/,100    Run HYDR to parameter stop.
0003  BP,/        Assign PP to B-display.
0004  TB          Terminate command buffer.
```

   Other parameter changes may be made between 0001 and 0002. (See Parameters)

By default, the command buffer HYDR tests a channel whose number is equal to the number of the CIO-PP in which it resides, and stops at parameter stop initially.

Running Procedure

Running procedures for the HYDR are:

`S` (cr)	Stops test execution. This command is interpreted as a stop command. HYDR goes into an idle loop whereby communication is maintained with CMSE but no test activity takes place.
Spacebar	Starts or resumes test execution.
`R` (cr)	Restarts the test from the beginning.
`Cxx` or `Sxx`	Clear/set xx bit of PARAM0/1, where xx is the bit mnemonic such as SS, ST.
`EP,num,adrs,data`	Enter parameter data into PP num at location adrs.

Parameters

The parameter words are located at location 00123(8) in PP memory. Bit 2**0 is defined as the least significant bit of a word.

PARAM0 - Test Control (Location 00123(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
*	**	DE	DR	NU	NU	RC	RB	RS	RT	LE	SE	SC	SB	SS	ST

ST	Stop at end of test.	SE	Stop on error.
SS	Stop at end of section.	LE	Log errors in dayfile.
SB	Stop at end of subsection.	RT	Repeat test.
SC	Stop at end of condition.	RS	Repeat section.
RB	Repeat subsection.	DR	Bypass all messages.
RC	Repeat condition.	DE	Display only error messages.
**	Reserved for CMSE 180 use.	*	Enable CMSE to alter PARAM0 bits via the Cxx/Sxx commands (EP command must be used to alter this parameter.)

NU Not Used. (NU)

Default selection is 100021(8)/8011(16). This corresponds to setting ST,SE and enabling CMSE to alter PARAM0 bits.

NOTE

Since the hardware design of the CIO PPs does not allow the NIO PPs to set and clear CIO channel flags, it is not possible to respond to the UP,Cpp command in order to drop out of Scope Mode. Therefore, although the SSM command places HYDR in Scope Mode, it is not possible to get out of Scope Mode, except by deadstarting the mainframe.

PARAM1 - Test Control (Location 00124(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
**	AB	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	***	*	NU	NU

*	2**2	Bypass parameter stop.
**	2**15	Enable CMSE to alter PARAM1 bits.
AB		Abort On Error.
***	2**3	Attention detection mode (0=Channel Flag, 1=Bus Idle Status)

Default selection is 100010(8)/8008(16). This corresponds to enabling CMSE to alter PARAM1 bits. Use the EP command to set or clear these parameters.

PARAM2 - Repeat Test Count (Location 00125(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

The test will repeat the number of times (-1) contained in this location. The test will then unconditionally exit if the Repeat Test parameter bit is not set (PARAM0 Bit 6).

PARAM3 - Subsection/Condition Select (Location 00126(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	SS	SS	SS	SS

Bits 0...3 Subsection. (SS)
Bits 4...15 Condition. (CN)

This parameter allows the user to obtain a failing subsection and condition without stepping through the section selected.

A nonzero value in PARAM3 is required to activate this process. The result of running with this parameter selected will be a stop with SC as the message type code.

Default selection is zero.

PARAM4 - Maintenance Channel Connect Code (Location 00127(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
RS	RS	RS	RS	MC	MC	MC	MC	RS	RS	RS	RS	RS	RS	RS	RS

Bits 0...7 Reserved (must be zero). (RS)
Bits 8...11 The maintenance channel connect code for the IOU Maintenance Register. (MC)
Bits 12...15 Reserved (must be zero). (RS)

Default selection is zero.

PARAM5 - Section Select (Location 00130(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Bit 0	Section 0.	Bit 4	Section 4.
Bit 1	Section 1.	Bit 5	Section 5.
Bit 2	Section 2.	Bit 6	Section 6.
Bit 3	Section 3.	Bit 7	Section 7.

CAUTION

Enabling sections 9,10,13, or 14 will cause the destruction of customer data.

Bit 8	Section 8.	Bit 12	Section 12.
Bit 9	Section 9.	Bit 13	Section 13.
Bit 10	Section 10.	Bit 14	Section 14.
Bit 11	Section 11.	Bit 15	Section 15.

Default selection is 000525(8)/0155(16), that is, sections 00, 02, 04, 06, and 08 enabled.

PARAM6 - Not Used (Location 00131(8))

PARAM7 - Not Used (Location 00132(8))

PARAM8 - Not Used (Location 00133(8))

PARAM9 - Channel Number, Bus Slave Address Port Select Bit (Location 00134(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	PS	NU	NU	DN	DN	DN	DN	BS	BS	BS	CH	CH	CH	CH	CH

Bits 0...4	CIO ISI/DMA channel number. (CH)
Bits 5...7	IHD address or bus slave address (the bus slave address must be 2 when executing with the ISI emulator). (BS)
Bits 8...11	Device number (0 for 887). (DN)
Bits 12...13	Not Used. (NU)
Bits 14	Port Select Bit-0 for Port A; 1 for Port B. (PS)
Bits 15	Not Used. (NU)

Default selection is 100000(8)/8000(16). If not changed, bus slave address zero, port A, and channel number equal to CIO-PP number is used.

PARAM10 - CM Buffer Lower Boundary Upper Four Hex Digits (Location 00135(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	CM	CM	CM	CM	CM	CM	CM	CM	CM	CM	CM	CM

Bits 0...11 Lower boundary (word address) of the central memory buffer used for DMA transfers. (CM)

Default selection is the number of the CIO-PP in which HYDR resides, times three. If PARAM10 is not altered by the command buffer, it will contain 100000(8)/8000(16) at parameter stop time.

PARAM11 - CM Buffer Lower Boundary Lower Four Hex Digits (Location 00136(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
CM	CM	CM	CM	CM	CM	CM	CM	CM	CM	CM	CM	CM	CM	CM	CM

Bits 0...15 Lower boundary (word address) of the central memory buffer used for DMA transfer. (CM)

Default selection is zero.

NOTE

PARAM10 and PARAM11 define the FWA of a 1.5 megabyte read/write buffer in central memory. The user is expected to ensure that this area of central memory does not overlap an area that is being used by another test or diagnostic.

PARAM12 - Not Used (Location 00137(8))

PARAM13 - Not Used (Location 00140(8))

PARAM14 - Patterns (Location 00141(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	IH	NU	NU	NU	xx	xx	xx	xx	xx	xx	xx	xx

Bits 0...7 Initial 8-bit pattern used by the I4 test mode data generator.
Bits 8...10 Not Used (must be zero). (NU)
Bits 11 Inhibit test mode increment bit. This bit must be set when executing with the ISI emulator. (IH)
Bits 12...15 Not Used (must be zero). (NU)

Default selection is zero.

PARAM15 - Cylinder Address (Location 00142(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
CY	CY	CY	CY	CY	CY	CY	CY	CY	CY	CY	CY	CY	CY	CY	CY

Bits 0...15 Cylinder address (used in sections 10,11,12,14, and 15 only). (CY)

Default selection is 100000(8)/8000(16). If not changed, sections 10 and 14 will use the preallocated area (cylinder 372(16)/882(10)/1562(8)) and sections 11, 12, and 15 will use cylinder zero.

PARAM16 - Head and Sector Address (Location 00143(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
HD	HD	HD	HD	HD	HD	HD	HD	SA	SA	SA	SA	SA	SA	SA	SA

Bits 0...7 Sector address (used in sections 10, 11, 12, 14, and 15 only). (SA)
Bits 8...15 Head address (used in sections 10, 11, 12, 14, and 15 only). (HD)

Default selection is 100000(8)/8000(16). If not changed, sector and head address zero will be used.

PARAM17 - Not Used (Location 00144(8))

PARAM18 - Repeat Subsection Count (Location 00145(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU

Bits 0...15 Repeat subsection count.

The test will automatically repeat each subsection in the selected sections the number of times (-1) contained in this location. Repeat Subsection PARAM0 bit 2**8 must be set.

Default selection is zero.

Messages

Since all test messages are displayed on the B display, before they are displayed the B display must be assigned to the PP in which the test is executing. Assigning the B display to the test's PP while running (that is, not stopped) results in a blank or memory display until the test displays a new message. The general format for all normal and error messages appears as:

```
ST SE LE RT
HYDR  ZZ  PCxxxx SOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=yyee TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =zzzzee
AAA-----------------------------------AAA
```

where:

ST SE LE RT	=	The mnemonics for bits in PARAM0 and PARAM1. Note that no mnemonic is displayed for PARAM0 bits 2**14, and 2**15. This portion of the display is provided by CMSE.
ZZ	=	Message type (one of the following): RU = Running. SC = Stopped at end of condition. SB = Stopped at end of subsection. SS = Stopped at end of section. ST = Stopped at end of test. SE = Stopped on error. RC = Repeating condition. RB = Repeating subsection. RS = Repeating section. HT = Halted (operator stop). MC = Maintenance channel request/release reject. CH = I/O channel request/release reject.
xxxx	=	Pass count (decimal).
ss	=	Current section number (decimal, hex for FSC1).
bb	=	Current subsection number (decimal, hex for FSC1).
cc	=	Current condition number (decimal, hex for FSC1).
hh	=	DMA enhanced adapter channel number in CIO subsystem (octal).
p	=	DMA enhanced adapter port number in CIO subsystem (A or B).
u	=	Bus Slave Address or unit number (octal).
ffff	=	Last function issued (hex).
rrrr	=	PP address from which the error routine was called (hex).
9000	=	Error code 1 (hex) (see appendix A for definition).
ee	=	Error code 2 (hex) (error type code).
yy	=	00 for DMA, 50 for channel, 60 for CMSE/MCH, 70 for BASICTC.
tttt	=	Total error count (decimal).
nnnn	=	Initial pattern parameter (see PARAM14 description).
zzzz	=	Error code 2 (yyee) (hex) or IHD general status (gs) and delay/intervention code (di) (gsdi) (hex).
AAA	=	Verbal error description (1 or more lines).

Normal Messages

The system displays the following message at the beginning of the test or after a restart (R-key) to allow the user to set test parameters. This display is bypassed when the Bypass Parameter Stop parameter bit is set, PARAM1 bit 2**2.

```
ST SE LE RT
HYDR  SET PARAMS PA=000123B YY/MM/DD. hh.mm.ss.
I4/ISI/887 DATA PATH INTEGRITY TEST
SECTIONS =
00  02  04  06  08
```

where:

ST SE LE RT	=	The mnemonics for bits in PARAM0 and PARAM1. Note that no mnemonic is displayed for PARAM0 bits 2**14 and 2**15.
PA	=	FWA of parameter area in PP memory.
YY/MM/DD	=	Year/Month/Day (Test's version assembly date).
hh.mm.ss	=	Hour/Minute/Second (Test's version assembly time).
SECTIONS	=	Sections selected. Only one display line is reserved for this portion of the display. Should the number of sections selected exceed the line capacity, a substitute message, "SEE PARAM5 THRU PARAM8" is displayed instead.

NOTE

SECTIONS will indicate the set conditions of the bits in PARAM5, 6, 7, and 8, regardless of whether such sections actually exist. Only those sections that exist will be executed when their select bit is set.

```
ST SE LE RT
BUS SLAVE BUSY IN IDLE STATUS
MSK mmmm
ACT aaaa
```

The system displays the following message if idle status was requested before attempting to select the bus slave. The Bus Slave Busy bit mmmm of the device to be selected by the test was actually aaaa, present. In dual access devices, this may mean that the other access has the IHD selected.

Error Messages

This section describes the various error messages that HYDR displays. Error codes (EC2) 01 through 05 are generated at initialization time and require operator intervention. For error codes (EC2) 08 through 1C(16) and 500x, HYDR clears Select Hold and Command Sequence before displaying the error message.

For the Initialization Failure error message, the system may display one of the following messages.

```
ST SE LE RT
HYDR  SE  PCxxxx S0000  SB0000 C0000 ChhPpUu Fffff Prrrr
EC1=F270  EC2=0001 TE=tttt RN=nnnn
FSC1 =000000  FSC2 =000101
WONT RUN IN NIO-PP
RELOAD IN CORRECT CIO PP
```

This error occurs during HYDR initialization if the test is loaded into a PP in the NIO subsystem. The user is reminded that the CIO PPs and ISI adapters are grouped into clusters of five in the CIO subsystem. Since HYDR loops endlessly on this message, the test must be reloaded into a CIO PP in the cluster of the ISI adapter channel assigned in PARAM9.

```
ST SE LE RT
HYDR  SE  PCxxxx S0000  SB0000 C0000 ChhPpUu Fffff Prrrr
EC1=F270  EC2=0002 TE=tttt RN=nnnn
FSC1 =000000  FSC2 =000202
PP/CH NUMBER MISMATCH
RELOAD IN CORRECT CIO PP,
OR ALTER CH PARAMETER AND RESTART
```

This message informs the user that the ISI adapter, on the channel number in PARAM9, cannot be accessed from the PP the test is running in. The user is reminded that the CIO PPs and ISI adapters are grouped into clusters of five in the CIO subsystem. Either, the test must be reloaded into a CIO PP in the ISI adapter channel's cluster or the ISI adapter channel number parameter (PARAM9) must be changed to a channel in the CIO PP's cluster. After this message, HYDR returns to the parameter message to allow parameter entry.

```
ST SE LE RT
HYDR  SE  PCxxxx S0000  SB0000 C0000 ChhPpUu Fffff Prrrr
EC1=F270  EC2=0003 TE=tttt RN=nnnn
FSC1 =000000  FSC2 =000303
CHANNEL TYPE CODE ERROR
WONT RUN ON THIS CHANNEL.
ALTER CH PARAMETER AND RESTART.
EXP 30
ACT cc
```

This error occurs during HYDR initialization if PARAM9 is set to a channel that does not have a DMA enhanced ISI channel adapter. The type code for the DMA enhanced ISI channel adapter is 30. The type code cc indicates the type code read from the register for the channel given in PARAM9. Since HYDR loops endlessly on this message, the test must be restarted with PARAM9 set to an appropriate DMA enhanced ISI adapter channel or some other test loaded that will execute properly on the type of channel described by the type code cc.

```
ST SE LE RT
HYDR  SE  PCxxxx S0000  SB0000 C0000 ChhPpUu Fffff Prrrr
EC1=F270  EC2=0004 TE=tttt RN=nnnn
FSC1 =000000  FSC2 =000404
ELEMENT ID ERROR
WONT RUN ON THIS MODEL
RUNS ON I4
```

This message informs the user that the IOU element ID in IOU maintenance register indicated that the machine was not an I4. Since this is a fatal error, the program will loop forever on this error message. To run HYDR, load it into an I4. If the IOU has less than 8K of memory, CMSE will post a different error message before this diagnostic has completed loading.

```
ST SE LE RT
HYDR  SE  PCxxxx S0000  SB0000 C0000 ChhPpUu Fffff Prrrr
EC1=F270  EC2=0005 TE=tttt RN=nnnn
FSC1 =000000  FSC2 =000505
CM BUFFER LWA .GT. LWA UNUSED CM
DECREASE CM LOWER BOUNDS PARAMETERS
AND RESTART
```

This message informs the user that the lower control module buffer boundary, as defined in PARAM10 and PARAM11, causes the control module buffer to exceed the last word address of unused central memory. The user must change the lower control module buffer boundary. After this message, HYDR returns to the parameter message to allow parameter entry.

```
ST SE LE RT
HYDR  AQ  PCxxxx S00ss  SB00bb C00cc ChhPpUu Fffff Prrrr
```

where:

Q is one of the following:

0 = Overlay load timeout (from D.OVL).
1 = Overlay address clobbers DEX (from D.INIT, not used).
2 = Zero length data generation (from D.GEN, not used).
3 = Buffer clobbers DEX or CMSE Idler (from D.GEN, not used).
4 = Zero length compare (from D.COMP, not used).
5 = Test idled via a "D" entry (not used).
6 = Entered DEX with illegal function (GT.75B, not used)..
7 = CMSE did not accept a call (from D.MC, not used).

This message is provided by DEX and is reporting an unrecoverable condition. The test must be reloaded and rerun after the fault condition has been corrected.

For the Internal Faults error message, the system displays one of the following messages.

```
ST SE LE RT
HYDR  SE  PCxxxx S00ss  SB00bb C00cc ChhPpUu Fffff Prrrr
EC1=F170  EC2=700x TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =700x0x
INTERNAL FAULT
BAD BASICTC CALL
```

This message indicates the test used improper call parameters when calling a BASICTC subroutine. This is an unrecoverable fault. In normal operation of this program, this error should never occur. While this error is primarily intended to indicate a software fault, it may be caused by an IOU hardware failure.

EC2 values and the meaning to internal faults are:

7001 Improper call of BASICTC subroutine CMCH.
7002 Improper call of BASICTC subroutine CMRW.
7003 Improper call of BASICTC subroutine CCSB.
7004 Test subsection has more than allowable 16 conditions.
7005 Microcode version date incompatible with test version date.

```
ST SE LE RT
HYDR  SE  PCxxxx SOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=0670  EC2=60xx TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =60xxxx
EXTERNAL FAULT
COULD BE MCH/CMSE/ETC.
```

This message indicates the test requested a function on an external device (that is, the maintenance channel, CMSE, and so on) and the function was not performed or was performed incorrectly. This is an unrecoverable fault.

EC2 values and the meaning to internal faults are:

6001 MCH active when it should not be. CMFN subroutine.
6002 MCH channel error on function. CMFN subroutine.
6003 MCH active when it should not be. CMBT subroutine.
6004 MCH not empty when it should be. CMBT subroutine.
6005 MCH channel error on control bytes. CMBT subroutine.
6006 MCH active when it should not be. CMRD subroutine.
6007 MCH channel error on input. CMRD subroutine.
6010 MCH active when it should not be. CMWT subroutine.
6011 MCH not empty when it should be. CMWT subroutine.
6012 MCH channel error on output. CMWT subroutine.
6013 MCH inactive when it should be active. CMBT subroutine.
6014 MCH inactive when it should be active. CMWT subroutine.
6015 MCH inactive when it should be active. CMRD subroutine.
6050 CMSE-180 call rejected. CALL subroutine.
6052 CMSE-180 program load could not find program on library. CALL subroutine.
6053 An error occurred on a CMSE-180 program load. CALL subroutine.
6054 PP not available on auto assignment.
6057 CM is in use by CMSE (P3 tests will not run).
6060 Test could not initialize properly. Probably due to a hardware problem which must be detected by a test which is to run before this test.
6070 Error in parameter entry. One or more of the test parameters is not consistent with allowable values.

For the Channel Faults error message, the system displays:

```
ST SE LE RT
HYDR  SE  PCxxxx SOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=500e TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =500e0e
CHANNEL FAULT
   .                    .
   .  text of error message .
   .                    .
```

This is the basic format for all channel fault messages. The text of the error message provides additional information about the error. Except for EC2=500B, this type of error may be isolated by running ISI4. Assuming that ISI4 and the inlines have been run error-free first, Error Code 500B indicates a data path failure.

EC2 values, error message text, and meaning for channel faults are:

5001 CH ACTIVE AFTER FUNCTION.
After sending function Fffff using a FNC instruction, the channel was found active. HYDR deactivates the channel before displaying this message. If ffff is 0A00, HYDR waits for 1.2 seconds for the channel to deactivate before issuing this message.

5002 ACTIVE BEFORE FUNCTION.
Before sending function Fffff, the channel was found active. HYDR deactivates the channel before displaying this message. The initialization routine also deactivates the channel to avoid this error due to other programs leaving the channel active.

5003 CH EMPTY BEFORE INPUT.
After sending function Fffff and activating the channel but before transferring a block of data, the channel was found empty for 1.2 seconds. HYDR deactivates the channel before displaying this message and no data is transferred.

5004 CH EMPTY BEFORE INPUT.
After sending function Fffff and activating the channel but before transferring one data word the channel was found empty. HYDR deactivates the channel before displaying this message and no data is transferred.

5005 CH FULL BEFORE OUTPUT.
After sending function Fffff and activating the channel but before transferring a block of data, the channel was found full. HYDR deactivates the channel before displaying this message and no data is transferred.

5006 CH FULL AFTER OUTPUT.
After sending function Fffff, activating the channel, and transferring a block of data, the channel was found full for 1.2 seconds. HYDR deactivates the channel before displaying this message.

5007 CH FULL BEFORE OUTPUT.
After sending function Fffff and activating the channel but before transferring one data word, the channel was found full. HYDR deactivates the channel before displaying this message and no data is transferred.

5008 CH FULL AFTER OUTPUT.
After sending function Fffff, activating the channel, and transferring one data word, the channel was found full. HYDR deactivates the channel before displaying this message.

5009 CH INACT AFTER INPUT.
After sending function Fffff, activating the channel, and transferring a block of data the channel was found inactive. HYDR attempts to deactivate the channel before displaying this message.

500A CH INACT AFTER OUTPUT.
After sending function Fffff, activating the channel, and transferring a block of data, the channel was found inactive. HYDR attempts to deactivate the channel before displaying this message.

500B ISI CH FUNCTION TIMEOUT.
After sending function Fffff, activating the channel, and transferring an ISI function word, the channel was found full after 1.2 seconds. HYDR deactivates the channel before displaying this message.

For the Testing Faults error messages, the system displays one of the following messages.

```
ST SE LE RT
HYDR  SE  PCxxxx SOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=0008 TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =000808
BIT SIGNIFICANT RESPONSE ERROR
CYLINDER xxxH HEAD x SECTOR xxH <optional, sections 9 through 15 only>
EXP eeee
ACT aaaa
```

During the ISI select sequence, the bus slave selected in PARAM9 failed to respond with its bit in the bit significant response.

```
ST SE LE RT
HYDR  SE  PCxxxx SOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=0009 TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =000909
ERROR STATUS MISCOMPARE
<verbal description of failure>
EXP 0000
ACT aaaa
OSR=ssss
```

The expected and actual contents of the error status register did not compare. Upon continuing, the channel flag is cleared. The operational status ssss is also displayed. This error may be used to isolate a bad data path component if, and only if, ISI4 has run error free. The verbal description of the failure portion of the message will be absent for more complex error status register values.

The following is a list of messages that may be displayed in the verbal description portion of the message:

UNCORRECTED CM ERROR {aaaa=2000(16)}

This message indicates that the CMC received an uncorrected error response from central memory on a write or read request.

CENTRAL MEMORY REJECT {aaaa=1000(16)}

This message indicates that a reject response was received from central memory.

INVALID CM RESPONSE CODE {aaaa=0800(16)}

This message indicates that the response code received from central memory decoded into an illegal value.

CMI RESPONSE CODE PARITY ERROR {aaaa=0400(16)}

This message indicates that a parity error was detected on the CM central memory response code. The error was detected in the CMI logic of the IOU4.

JX RESPONSE CODE PARITY ERROR {aaaa=0401(16)}

This message indicates that a parity error was detected on the central memory response code. The error was detected in the JX board of the IOU4.

CMI READ DATA PARITY ERROR {aaaa=0200(16)}

This message indicates that the IOU4 CMI logic has detected a read data parity error on a DMA transfer from this channel's DMA enhanced ISI channel adapter.

TEST MODE COMPARE ERROR {aaaa=0100(16)}

This message indicates that the data read into central memory did not compare with the data generated by the test mode data generator.

OVERFLOW ERROR (JZ BOARD) {aaaa=0084(16)}

This message indicates that a parity error was received after the input buffer in the IOU4 was full. The error was detected on the JZ board.

ISI INPUT DATA PARITY ERR (JZ) {aaaa=0044(16)}

This message indicates that a parity error was received on the input data. The error was detected on the JZ board.

ISI TIMEOUT {aaaa=0020(16)}

This message indicates that a channel timeout has occurred on the ISI channel in the IOU4 hardware. This happens when the DMA enhanced ISI channel adapter has sent a sync out and not received a sync in, within 1 second.

JY DATA PARITY ERROR {aaaa=0012(16)}

This message indicates that the JY board has detected a data parity error.

BARREL + SLOT PARITY ERROR (JX) {aaaa=0009(16)}

This message indicates that the JX board has detected a parity error on the data received from the barrel and slot (PP) in the IOU4.

JZ ERROR (I/O BUFFER DATA ERR) {aaaa=0004(16)}

This message indicates that the JZ board has detected an error. The error is either an input or output buffer data error in the IOU4.

JY ERROR (BCPE/RMAPE/CONCMREQ) {aaaa=0002(16)}

This message indicates that the JY board has detected an error. The error is either a byte count parity error (BCPE), real memory address parity error (RMAPE), or a constant central memory request error (CONCMREQ).

JX ERROR (CR/MR/FNC/CH PARITY) {aaaa=0001(16)}

This message indicates that the JX board has detected an error. The error is either control register (CR), mask register (MR), function decoder (FNC), or channel data register (CH) parity error.

```
ST SE LE RT
HYDR  SE  PCxxxx SOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=000A TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =000A0A
OPERATIONAL STATUS MISCOMPARE
<optional portion of message>
EXP eeee
MSK mmmm
ACT aaaa
```

The data read from the operational status register, aaaa did not compare with the value expected, eeee.

If the select active line is inactive during a bus slave select or reselect sequence, one of the following optional portions of the message will appear.

```
SELECT NOT ACTIVE
DURING A SELECT SEQUENCE
INCORRECT PARAMETERS OR
DEVICE NOT CABLED TO THIS CHANNEL
OR DEVICE PORT NOT ENABLED.

SELECT NOT ACTIVE
DURING A RESELECT SEQUENCE
```

Testing Faults error messages could also include the following messages.

```
ST SE LE RT
HYDR  SE  PCxxxx SOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=000B TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =000B0B
UNEXPECTED CHANNEL ERROR FLAG
```

The channel error flag expected to be clear but was found to be set. Furthermore, no error status register bits were set. Thus, the condition causing the channel error flag is unknown. Upon continuing, the channel error flag is cleared.

```
ST SE LE RT
HYDR  SE  PCxxxx SOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=000D TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =000D0D
UNRECOGNIZED DEVICE RECORD SIZE
EXP 1000 OR 4000
ACT aaaa
WARNING - 1000 WILL BE USED
```

Before exchanging data with the IHD, the F0(16) register in the IHD's function buffer is read. If the value read, aaaa, is neither 1000(16) for 4K sectors nor 4000(16) for 8K sectors, the test will use 1000(16) for the device record size when execution is resumed. This error condition is not repeatable for scoping purposes since it represents an IHD firmware error.

```
ST SE LE RT
HYDR  SE  PCxxxx SOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=000E TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =gsdi0E
SUBSYSTEM STATUS MISCOMPARE
CYLINDER xxxH HEAD x SECTOR xxH <optional, sections 9 through 15 only>
WORD 80  EXP eeee  MSK mmmm  ACT aaaa
< execution status message >
< intervention status, delay status, zero to three lines >
< IHD and device status or error register image, see below >

Error register image line format:
xx  rrrr  rrrr  rrrr  rrrr  rrrr  rrrr  rrrr  rrrr

IHD (iiii) and device (dddd) status line format:
80  iiii  iiii  iiii  iiii  iiii  iiii  iiii  iiii
90  dddd  dddd  dddd  dddd  dddd  dddd  dddd  dddd
```

After an ISI command sequence, the general command status word, aaaa, whose function code is 80(16), did not match the value expected, eeee. The mask, mmmm, indicates which bits are to be compared and which are to be ignored.

Below the actual status, one to four lines of verbal information interpret the IHD (iiii) status words (80 through 83) displayed below that. The first line is the execution status (see Extended Description below in this chapter) which is interpreted from the general command status word (IHD function code 80). If delay status valid is set, the second line will contain one of the delay status messages. The third line will contain NONRECOVERABLE if check end is set or RECOVERABLE if check end is clear.

If either manual or system intervention are valid, the appropriate manual or system intervention status message will be displayed on the second or fourth line. If the manual intervention code is 27(16), 41(16), 63(16), 64(16), 65(16), 66(16), 67(16), or 6F(16), the error register image will be displayed below the second or fourth line. Otherwise, the IHD and device status is displayed. The error register image is displayed in hexadecimal as shown above, where xx is the error register image address of the left most 16-bits of error register rrrr, displayed on that line. The upper 8 bits of the general command status (word 80), gs, are displayed in FSC2 which also displays the delay/system intervention/manual intervention status, di.

Extended Description

The execution status messages are:

BUS SLAVE IDLE.

Bus slave idle (code=0) – There is no command block in execution and no unexecuted command blocks.

DATA AVAILABLE.

Read data available (code=1) – There is valid data ready to be transferred to the host from the IHD's data buffer.

SPACE AVAILABLE.

Buffer space available (code=2) – The bus slave is ready to accept data to written to the IHD's data buffer.

INTERFACE STATUS.

Interface control status (code=3) – The bus master is requesting or temporarily relinquishing the use of the ISI interface.

CMD BLK INDEPEND.

Command block independent (code=4) – The host has initiated a condition not related to the execution of a command block. For example, a parity error on a bus slave select sequence or a response to a Broadcast Master Reset or Selective Reset operation.

UNUSED STATUS.

Unused status (code=5) – This message should never appear.

UNSOLICITED ATTN.

Unsolicited attention (code=6) – This indicates that the attention is a result of an action other than those resulting from host functions. It may be caused by manual use of the maintenance panel on the IHD.

COMMAND COMPLETE.

Command complete (code=7) – This indicates that the bus slave has finished the execution of a command block.

The manual intervention (MI) status messages are:

Message	Code	Description
CMD BLOCK OVRWRT	(MI21)	Command Block Overwrite
ILLEGAL CMD BYTE	(MI22)	Illegal Command Byte
ILL 2ND SEK ADRS	(MI23)	Illegal Secondary Seek Address
ILL 1ST SEK ADRS	(MI24)	Illegal Primary Seek Address
ILL CMD PARAM	(MI25)	Illegal Command Parameter
ILL WRITE ERROR	(MI27)	I/O Illegal Write Error
END OF DISK	(MI28)	End of Disk Reached
ILL DEVICE NO.	(MI29)	Illegal Device Number
ILL CONTRL FIELD	(MI2A)	Illegal Control Field
ILL TERMINATION	(MI2B)	Illegal Termination (format)
ILL DISCONNECT	(MI41)	I/O Illegal Disconnect Error
ISI I/O PAR. ERR	(MI63)	ISI I/O Parity Error
R/W SEQ RAM P E	(MI64)	R/W Sequencer RAM Parity Error
MPU PARITY ERROR	(MI65)	MPU Parity Error
ECC FAULT	(MI66)	ECC Fault
VOLTAGE FAULT	(MI67)	Voltage Fault
XFER COUNT ERROR	(MI68)	Transfer Count Error
DIAG FAULT LVL 2	(MI6A)	Diagnostic Fault Detected (level 2)
OVER-TEMPERATURE	(MI6B)	Over-Temperature Fault
NO R/W SEQ RESP.	(MI6C)	No Read/Write Sequencer Response
INV R/W SEQ RESP	(MI6D)	Invalid Read/Write Sequencer Response
SEQ STS OVERWRIT	(MI6E)	Read/Write Sequencer Status Overwrite
IHD HARD. FAULT	(MI6F)	IDSM Hardware Fault (Check 2 Error)

Message	Code	Description
R/W SEQ FAULT	(MI70)	Read/Write Sequencer Fault
ZEROFILL TIMEOUT	(MI71)	Zero Fill Time Out
FUNCTION BFR P E	(MI72)	Function Buffer Parity Error
DISK FAULT	(MI81)	Disk Fault
NO SECTOR PULSE	(MI90)	No Sector Pulse
NO INDEX PULSE	(MI91)	No Index Pulse
ADRS WRAP ERROR	(MI92)	Cylinder/Head/Sector Address Wrap Error
ILLEGAL SEQUENCE	(MIC1)	Illegal Sequence (Not Ready)
FORMAT PROTECT	(MIC2)	Format Protect Error
NO DISK RESPONSE	(MIC3)	No Disk Response
NO MAN IV STATUS	(MI00)	No Manual Intervention Status. This message will also be displayed for any manual intervention status code (which is given in the di portion of FSC2) that the test is unable to interpret.

The system intervention (SI) status messages are:

Message	Code	Description
SEEK ERROR	(SI21)	Seek Error
UNABLE RD HEADER	(SI41)	Unable To Read Header
HEADR MISCOMPARE	(SI42)	Header Miscompare
UNABLE READ DATA	(SI43)	Unable to Read Data
NO SPARE SECTORS	(SI64)	No Spare Sectors Available
UNABLE WRITE HDR	(SI67)	Unable To Write Header
XFER COUNT ERROR	(SI68)	Transfer Count Error
DISK NOT FORMATD	(SI82)	Disk Not Formatted
DIAG FAULT LVL 1	(SIA6)	Diagnostic Fault Detected (Level 1)
CMD BLK NEGATED	(SIC1)	Command Block Negated
NO SYS IV STATUS	(SI00)	No System Intervention Status. This message will also be displayed for any system intervention status code (which is given in the di portion of FSC2) that the test is unable to interpret.

The delay status (DS) messages are:

Message	Code	Description
DATA CORR APPLYD	(DS21)	Data Correction Applied
SEEK RETRY APLYD	(DS22)	Seek Retry Applied
DATA COR/SEK RET	(DS23)	Data Correction Applied and Seek Retry Applied
DATA RETRY APLYD	(DS24)	Data Retry Applied
DATA RETRY/CORR.	(DS25)	Data Retry Applied and Data Correction Applied
DATA/SEEK RETRY	(DS26)	Data Retry Applied and Seek Retry Applied
DATA/SEK RET/COR	(DS27)	Data Correction Applied, Seek Retry Applied, and Data Retry Applied
HEADER RETRY	(DS42)	Header Retry Applied
POWER-UP COMPLET	(DS81)	Power-up Initialization Complete
HOST RST COMPLET	(DS83)	Host Generated Reset Complete
PRIORITY OVERIDE	(DS84)	Priority Override Complete
BUS SLAVE ONLINE	(DS85)	Bus Slave On Line
NO DELAY STATUS	(DS00)	No Delay Status. This message will also be displayed for any delay status code (which is given in the 'di' portion of FSC2) that the test is unable to interpret.

For other Testing Faults error messages, the system displays one of the following messages.

```
ST SE LE RT
HYDR  SE  PCxxxx SOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=0010 TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =001010
NO ATTENTION FOR xx.x SEC.
CYLINDER xxxH HEAD x SECTOR xxH <optional, sections 9 through 15 only>
OSR=ssss
```

After issuing a command block to write or read the buffer or disk with the bus slaves attention bit set in the flag mask register, the channel flag failed to set within xx.x seconds as a result of the presence of the attention bit in idle status. The DMA enhanced ISI channel adapter operational status register, ssss, is also displayed.

```
ST SE LE RT
HYDR  SE  PCxxxx SOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=0011 TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =001111
OP STATUS BIT(S) ACTIVE .GT. 600 MSEC.
<optional portion of message>
MSK mmmm
ACT aaaa
```

The bits given in the mask mmmm (usually transfer-in-progress) were active for more than 600 msec. If transfer-in-progress is still active during a bus slave select sequence, one of the following optional portions of the message will appear.

```
TRANSFER STILL IN PROGRESS
DURING A SELECT SEQUENCE
INCORRECT PARAMETERS OR
DEVICE NOT CABLED TO THIS CHANNEL
OR DEVICE PORT NOT ENABLED.

CYLINDER xxxH HEAD x SECTOR xxH
(Sections 9 through 15 only)
```

Testing Faults error messages could also include the following messages.

```
ST SE LE RT
HYDR  SE  PCxxxx SOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=0012 TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =001212
NO T-REGISTER EMPTY FOR 1.2 SEC.
CYLINDER xxxH HEAD x SECTOR xxH <optional, sections 9 through 15 only>
```

During a DMA transfer with the T-register empty bit set in the flag mask register, the channel flag did not set for 1.2 seconds.

```
ST SE LE RT
HYDR  SE  PCxxxx SOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=0013 TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =001313
NO TRANSFER COMPLETE FOR 1.2 SEC.
CYLINDER xxxH HEAD x SECTOR xxH <optional, sections 9 through 15 only>
```

During a DMA transfer with the transfer complete bit set in the flag mask register, the channel flag did not set for 1.2 seconds.

```
ST SE LE RT
HYDR  SE  PCxxxx SOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=0014 TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =001414
IHD DATA BUFFER MISCOMPARE
ERROR STATUS  EXP 0000  ACT aaaa
      CM ADDRESS CM DATA
WRITE bbbb bbbb  dddd dddd dddd dddd
READ  bbbb bbbb  dddd dddd dddd dddd
```

After a DMA read of the IHD data buffer, an DMA enhanced ISI adapter test mode compare of DMA reads central memory buffer resulted in a test mode compare error (aaaa=1000). Sensing that the DMA hardware has detected an error, the test searches central memory for the error and displays the address bbbb and data dddd for the data written to and the data read from the IHD data buffer. All addresses, data, and status are in hexadecimal. The central memory addresses are both byte addresses.

```
ST SE LE RT
HYDR  SE  PCxxxx SOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=0015 TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =001515
MEDIA DATA MISCOMPARE
CYLINDER xxxH HEAD x SECTOR xxH <optional, sections 9 through 15 only>
ERROR STATUS  EXP 0000  ACT aaaa
      CM ADDRESS CM DATA
WRITE bbbb bbbb  dddd dddd dddd dddd
READ  bbbb bbbb  dddd dddd dddd dddd
```

After a DMA read of the disk media, an DMA enhanced ISI adapter test mode compare of DMA reads central memory buffer resulted in a test mode compare error (aaaa=1000). Sensing that the DMA hardware has detected an error, the test searches central memory for the error and displays the address bbbb and data dddd for the data written to and the data read from the IHD data buffer. All addresses, data, and status are in hexadecimal. The central memory addresses are both byte addresses.

NOTE

Sections 05 and 06 assume that either section 03 or 04 has written the appropriate data to the media. If this failure is seen in either section 05 or 06, it may mean that neither section 03 nor 04 was executed first.

```
ST SE LE RT
HYDR  SE  PCxxxx SOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=0016 TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =001616
NO SELECT ACTIVE
IHD DETECTED ERROR PROBABLE
CYLINDER xxxH HEAD x SECTOR xxH <optional, sections 9 through 15 only>
```

During a command sequence while waiting for either transfer-in-progress to clear or T-register empty to set, select active has dropped. This condition usually indicates that the 887 has detected and error. Since HYDR will abort to the end of condition when this error occurs, the only known way to witness the 887's status is to use the 887 monitor/utility, UHYD.

```
ST SE LE RT
HYDR  SE  PCxxxx SOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=0017 TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =001717
TEST MODE COMPARE ERROR
CYLINDER xxxH HEAD x SECTOR xxH <optional, sections 9 through 15 only>
ERROR STATUS REGISTER
EXP 0000
ACT aaaa
```

After reading data from the 887 subsystem, HYDR uses the DMA enhanced ISI channel adapter's test mode compare feature to check the data. This message indicates the test mode compare error bit was set in the error status register (aaaa = X1XX) during the compare (eeee is always 0000). When this bit sets, HYDR performs a compare of the data found in central memory in order to be able to display the failing data on the IHD DATA BUFFER MISCOMPARE and MEDIA DATA MISCOMPARE error messages. If this compare fails to find a miscompare, this message is displayed. Therefore, it may be assumed that the failure is in the channel adapter.

```
ST SE LE RT
HYDR  SE  PCxxxx SOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=0018 TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =001818
DISK NOT READY
CHECK SPINDLE POWER.
POSSIBLE DISK FAULT.
```

After the select sequence in sections 03 through 15, word 05 of IHD status is examined to determine whether or not the disk is ready. This message is displayed if the disk is not ready.

```
ST SE LE RT
HYDR  SE  PCxxxx XOOss  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=0019 TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =001919
INCORRECT MODEL AND TYPE NO.
EXP 6100
ACT aaaa
```

After the select sequence, word 03 of the IHD status is examined to determine whether or not the device attached to the ISI channel is an 887 (HYDRA) drive. If it is not, this message is displayed and further running of HYDR will produce erroneous error messages.

```
ST SE LE RT
HYDR  SE  PCxxxx SOOOO  SBOObb COOcc ChhPpUu Fffff Prrrr
EC1=9000  EC2=001A TE=tttt RN=nnnn
FSC1 =ssbbcc  FSC2 =001A1A
BUS IDLE MODE STATUS ERROR
EXP eeee
ACT aaaa
```

After waiting for attention to set the channel flag (eeee = 00xx) or after reading bus slave status (eeee = 0000), the actual bus idle mode status (aaaa) did not match the expected bus idle mode status (eeee).

```
ST SE LE RT
HYDR  SE  PCXXXX S0012  SB0000 C00CC CHHPPUU FFFF PRRRR
EC1=9000  EC2=001B TE=TTTT RN=nnnn
FSC1 =SSBBCC  FSC2 =001B1B
SPECIFIED HEADER DISPLAY
READ CYLINDER XXXXH HEAD X SECTOR XXH
FLAGS=XXXX
PRIMARY ADRS=CYLINDER XXXXH  HEAD XX SECTOR XXH
ALTERNATE ADRS=CYLINDER XXXXH  HEAD XX SECTOR XXH
SKIP CTRL 1=XXXX
SKIP CTRL 2=XXXX
THIS IS NOT AN ERROR MESSAGE
```

After reading the header specified in PARAM15 and PARAM16, section 12 stops on error to display the contents of that header. As noted in the body of the message, this is not an error message.

```
ST SE LE RT
HYDR  SE  PCxxxx S0000  SB00bb C00cc ChhPpUu Fffff Prrrr
EC1=9000  EC2=001C TE=tttt Rn=nnnn
FSC1 =ssbbcc  FSC2 =001C1C
TRANSIENT ATTENTION DETECTED
```

While waiting for an attention, the channel flag (PARAM1 bit 3 clear) or bus idle status attention bit (PARAM1 bit 3 set) set to indicate that an attention was present, but the attention bit was clear during a subsequent read of bus idle status.

Section Description

All sections, except most of section 00, follow the same general scheme. Each subsection within a section contains three basic parts: an initialization, a test condition (which is repeatable, see Parameters), and an abort sequence (which is used to return the 887 subsystem to a known state after an error).

The initialization sequence reads the device record size (used to determine whether the device has 4K or 16K sector size), generates transfer blocks (the T-register values to be used during the DMA transfer), and uses ISI adapter TESTMODE to generate the data in the central memory write buffer.

The test condition always begins by clearing the ISI Channel Adapter (but not the CIO maintenance register). It then utilizes macro calls to generate an I/O driver for the various types and numbers of transfers required by the condition. At the end of the macro calls, repeat condition is tested to determine whether it has been selected. Some subsections follow the repeat conditon check with code to increment the cylinder number and repeat the condition for all cylinders. In those subsections, the condition number in the running message will indicate the cylinder-in-use in decimal.

Each macro call I/O driver follows a similar sequence. First, the 887 drive is selected. The select sequence waits if the drive is busy. When the drive becomes nonbusy, the sequence request drive reservation on the select function word. If Select Active is not returned by the drive, the select sequence is repeated until the drive is selected. If the drive is not selected an error message results the indicates the drive may not be present. Once selected, the drive model and type numbers are read to insure that the device accessed is an 887. The device ready status is also tested. Secondly, the bus slave is functioned for the transfer desired. Then, the I/O driver waits for the initial attention and checks that the appropriate status accompanies the attention. Next, the data transfer is executed. Finally, the I/O driver waits for the ending attention and checks that the appropriate status accompanies the attention. The I/O driver sequence concludes by deselecting and releasing the reservation of the 887 drive and its channel. If an error is detected at any point in the above sequence, the abort sequence is entered when execution resumes after the error message has been displayed.

The abort sequence returns the 887 drive to a known state thereby avoiding 887 hang conditions (that is, previous command block still busy and/or "in-process" light on) that would cause subsequent error messages. Thus, two ISI channel terminate function words are issued to end the current operation in the 887. If, after the second terminate message, the select active has dropped, the 887 is reselected, status is read, an error message is displayed, and a third terminate message is issued. Finally, the 887 drive is deselected (dropping its reservation) and test control is passed to the repeat condition check. If an error occurs during the abort sequence, test control is passed to the repeat condition check.

Section 00 ISI Device Function Test.
This section tests the basic ISI channel control signals (select active, select hold, sync out, sync in, command sequence, and pause). It also tests the ability of the ISI device to transfer data across the ISI channel in both directions. This section does not use the ISI device's media (that is, disk). Its philosophical design is to have each subsection's operations build on that of previous subsections to the point that a complete ISI data transfer command sequence can be executed.

Subsection 00 ISI Idle Mode Channel State Test.
This subsection selects the port given in PARAM9. It expects the control lines (select active, sync in, sync out, command sequence, and select hold) to be clear.

< optional error data > none.

Subsection 01 Bus Slave Select/Deselect Sequence Test.
This section executes the select and deselect sequences and checks the state of the ISI control signals at each step in the process. The port and bus slave address given in PARAM9 are used.

< optional error data > none.

Subsection 02 Bit Significant Response Test.
After selecting the port and bus slave given in PARAM9, a force sync out function is issued and the bit significant response (BSR) is read. The word read is compared with what would be expected according to the bus slave address given in PARAM9. The state of the ISI channel control signals is checked for each step of the sequence that has not previously been executed.

Subsection 03 ISI Function Word Transfer Sequence Without Information Exchange.
After executing the select sequence for the device given in PARAM9 (including a BSR check), a command sequence is issued with a "do-nothing" function word (only the clear attention bit is set). The state of the ISI channel control signals is checked for each step of the sequence that has not previously been executed.

< optional error data > none.

Subsection 04 ISI Function Word Transfer Sequence With Information Exchange (Read Status).
After executing the select sequence for the device given in PARAM9 (including a BSR check), a command sequence is issued with a read bus slave status function word followed by a block input. The data read is ignored, but the state of the ISI channel control signals is checked for each step of the sequence that has not previously been executed. Bus idle mode status is also read and the selected units attention bit is expected to be clear.

< optional error data > none.

Subsection 05 ISI Function Word Transfer Sequence With Selective Reset.
After executing the select sequence for the device given in PARAM9 (including a BSR check) and checking the model and type numbers, a command sequence is issued with a selective reset function word. Then, command sequence and select hold are dropped and the ISI channel adapter is master cleared. Next, the program waits for 5.0 seconds for an attention to occur at which time it checks that attention is set in bus idle mode status, reselects the IHD, and reads the device status block (expecting command block independent and delay status valid to be set and clearing attention), then deselects. The state of the ISI channel control signals is checked for each step of the sequence that has not previously been executed. Bus idle mode status is also read and the selected units attention bit is expected to be clear.

< optional error data > none.

Subsection 06 ISI Function Word Transfer Sequence With Information Exchange (Write Command Block).
After executing the select sequence for the device given in PARAM9 (including a BSR check), a command sequence is issued with a write function buffer word followed by a block output. The command block written has clear fault status (4D) set for its command byte. Next, the program waits for 1.2 seconds for an attention to occur, at which time it checks that attention is set in bus idle mode status and reads the device status block (expecting normal end to be set and clearing attention), then deselects. The state of the ISI channel control signals is checked for each step of the sequence that has not previously been executed. Bus idle mode status is also read and the selected units attention bit is expected to be clear.

< optional error data > none.

Section 01 IHD Buffer Echo Test (Interlocked).
This section tests the ability of the ISI data path to transfer data to and from the IHD's buffer in interlocked and noninterlocked mode.

Subsection 00 IHD Buffer Echo in Interlocked Mode.
The DMA enhanced ISI channel adapter is placed in test mode to write a central memory buffer. The bus slave (IHD) is selected and functioned for a write to its buffer. After the data has been transmitted to the IHD's buffer, it is read back into central memory and checked by placing the DMA enhanced ISI channel adapter in test mode in order to read the data.

< optional error data > none.

Section 02 IHD Buffer Echo Test (Noninterlocked).
This section tests the ability of the ISI data path to transfer data to and from the IHD's buffer in noninterlocked mode.

Subsection 00 IHD Buffer Echo in Noninterlocked Mode.
The DMA enhanced ISI channel adapter is placed in test mode to write a central memory buffer. The bus slave (IHD) is selected and functioned for a write to its buffer. After the data has been transmitted to the IHD's buffer, it is read back into central memory and checked by placing the DMA enhanced ISI channel adapter in test mode in order to read the data.

< optional error data > none.

Section 03 Write Maintenance Cylinder Test (Interlocked).
This section tests the ability of the ISI data path to write data to the disk media on the maintenance cylinder 882(10) or 372(16) in interlocked mode.

Subsection 00 Write in Interlocked Mode.
The DMA enhanced ISI channel adapter is placed in test mode to write a central memory buffer. The bus slave (IHD) is selected and functioned for a write to its disk. After the data has been transmitted to the disk, the bus slave status is checked for normal end.

< optional error data > none.

Section 04 Write Maintenance Cylinder Test (Noninterlocked).
This section tests the ability of the ISI data path to write data to the disk media on the maintenance cylinder, 882(10) or 372(16) in noninterlocked mode.

Subsection 00 Write in Noninterlocked Mode.
The DMA enhanced ISI channel adapter is placed in test mode to write a central memory buffer. The bus slave (IHD) is selected and functioned for a write to its disk. After the data has been transmitted to the disk, the bus slave status is checked for normal end.

< optional error data > none.

Section 05 Read Maintenance Cylinder Test (Interlocked).
This section tests the ability of the ISI data path to read data from the disk media (maintenance cylinder 882(10) or 372(16)) in interlocked mode. It assumes that the Write Maintenance Cylinder Test has been previously executed to provide the data pattern to be read.

Subsection 00 Read in Interlocked Mode.
The bus slave (IHD) is selected and functioned for a read from its disk. After the data has been transmitted from the disk to central memory, the DMA enhanced ISI channel adapter is placed in test mode to read and compare the central memory buffer's data. The bus slave status is checked for normal end.

< optional error data > none.

Section 06 Read Maintenance Cylinder Test (Noninterlocked).
This section tests the ability of the ISI data path to read data from the disk media (maintenance cylinder 882(10) or 372(16) in noninterlocked mode. It assumes that the Write Maintenance Cylinder Test has been previously executed to provide the data pattern to be read.

Subsection 00 Read in Noninterlocked Mode.
The bus slave (IHD) is selected and functioned for a read from its disk. After the data has been transmitted from the disk to central memory, the DMA enhanced ISI channel adapter is placed in test mode to read and compare the central memory buffer's data. The bus slave status is checked for normal end.

< optional error data > none.

Section 07 Write/Read Maintenance Cylinder Test (Interlocked).
This section tests the ability of the ISI data path to transfer data to and from the disk media (maintenance cylinder 882(10) or 372(16)) in interlocked mode.

Subsection 00 Write/Read in Interlocked Mode.
The DMA enhanced ISI channel adapter is placed in test mode to write a central memory buffer. The bus slave (IHD) is selected and functioned for a write to its disk. After the data has been transmitted to the disk, the bus slave status is checked for normal end. Next, the bus slave (IHD) is selected and functioned for a read from its disk. After the data has been transmitted from the disk to central memory, the DMA enhanced ISI channel adapter is placed in test mode to read and compare the central memory buffer's data. The bus slave status is checked for normal end.

< optional error data > none.

Section 08 Write/Read Maintenance Cylinder Test (Noninterlocked).
This section tests the ability of the ISI data path to transfer data to and from the disk media (maintenance cylinder 882(10) or 372(16)) in noninterlocked mode.

Subsection 00 Write/Read in Noninterlocked Mode.
The DMA enhanced ISI channel adapter is placed in test mode to write a central memory buffer. The bus slave (IHD) is selected and functioned for a write to its disk. After the data has been transmitted to the disk, the bus slave status is checked for normal end. Next, the bus slave (IHD) is selected and functioned for a read from its disk. After the data has been transmitted from the disk to central memory, the DMA enhanced ISI channel adapter is placed in test mode to read and compare the central memory buffer's data. The bus slave status is checked for normal end.

< optional error data > none.

Section 09 Write/Read/Compare All Cylinders Test (Specified Mode).
This section tests the ability of the whole surface of the 887 disk to retain data. All data transfers are one cylinder in length in noninterlocked mode. This section is optional because it will destroy customer data.

Subsection 00 Write/Read/Compare in Noninterlocked Mode.
The DMA enhanced ISI channel adapter is placed in test mode to write a central memory buffer. The bus slave (IHD) is selected and functioned for a write to its disk. After the data has been transmitted to the disk, the bus slave status is checked for normal end. Next, the bus slave (IHD) is selected and functioned for a read from its disk. After the data has been transmitted from the disk to central memory, the DMA enhanced ISI channel adapter is placed in test mode to read and compare the central memory buffer's data. The bus slave status is checked for normal end. This process is repeated for each cylinder until all cylinders have been checked.

< optional error data > none.

Section 10 Write/Read/Compare Sector Per Parameters (Specified Mode).
This section tests the ability of one sector of the 887 to retain data. It uses PARAM15 and PARAM16 for the cylinder, head, and sector address. This section is optional because it will destroy customer data.

Subsection 00 Write/Read/Compare in Noninterlocked Mode.
The DMA enhanced ISI channel adapter is placed in test mode to write a central memory buffer. The bus slave (IHD) is selected and functioned for a write to its disk. After the data has been transmitted to the disk, the bus slave status is checked for normal end. Next, the bus slave (IHD) is selected and functioned for a read from its disk. After the data has been transmitted from the disk to central memory, the DMA enhanced ISI channel adapter is placed in test mode to read and compare the central memory buffer's data. The bus slave status is checked for normal end.

< optional error data > none.

Section 11 Read Cylinder(s) Test Per Parameters (Specified Mode).
This section tests the ability of the 887 to retain data. If PARAM15 and PARAM16 have been entered, it uses them for the cylinder, head, and sector address but confines its reads to the cylinder beginning at that address. If the parameters have not been entered, it will start at cylinder, head, and sector address zero, and incrementally scan all cylinders. Data is not written by this section. Furthermore, since the data read is not checked, this section may be used to read any type of data that resides on the disk.

Subsection 00 Read Cylinders(s) in Noninterlocked Mode.
The bus slave (IHD) is selected and functioned for a read from its disk. After the data has been transmitted from the disk to central memory, the bus slave (IHD) status is checked for normal end.

< optional error data > none.

Section 12 Read a Specified Header.
This section tests the ability of the 887 to read a specified header. If both PARAM15 and PARAM16 have been entered, it uses them for the beginning cylinder, head, and sector address. If the parameters have not been entered, it will begin at cylinder, head, and sector address zero. Data is not written by this section. The header data is read into IOU4 memory and not checked, but rather displayed in an error stop message.

NOTE

This message is not to be considered an error.

Subsection 00 Read a Specified Header Into IOU Memory.
The bus slave (IHD) is selected and functioned for reading headers. After the data has been transmitted from the disk to the IHD buffer memory, the data is read into IOU memory and displayed via an error stop message.

< optional error data > none.

Section 13 Write/Read/Compare All Cylinder Test (Open-Ended Mode).
This section tests the ability of the whole surface of the 887 disk to retain data. All data transfers are one cylinder in length in noninterlocked mode. This section is optional because it will destroy customer data.

Subsection 00 Write/Read/Compare in Noninterlocked Mode.
The DMA enhanced ISI channel adapter is placed in test mode to write a central memory buffer. Then, the bus slave (IHD) is selected and functioned for a write to its disk. After the data has been transmitted to the disk, the bus slave status is checked for normal end. Next, the bus slave (IHD) is selected and functioned for a read from its disk. After the data has been transmitted from the disk to central memory, the DMA enhanced ISI channel adapter is placed in test mode to read and compare the central memory buffers data. The the bus slave status is checked for normal end. This process is repeated for each cylinder until all cylinders have been checked.

< optional error data > none.

Section 14 Write/Read/Compare Sector Per Parameters (Open-Ended Mode).
This section tests the ability of one sector of the 887 to retain data. It used PARAM15 and PARAM16 for the cylinder, head, and sector address. This section is optional because it will destroy customer data.

Subsection 00 Write/Read/Compare in Noninterlocked Mode.
The DMA enhanced ISI channel adapter is placed in test mode to write a central memory buffer. Then, the bus slave (IHD) is selected and functioned for a write to its disk. After the data has been transmitted to the disk, the bus slave status is checked for normal end. Next, the bus slave (IHD) is selected and functioned for a read from its disk. After the data has been transmittted from the disk to central memory, the DMA enhanced ISI channel adapter is placed in test mode to read and compare the central memory buffers data. Then, the bus slave status is checked for normal end.

< optionsl error data > none.

Section 15 Read Cylinder(s) Test Per Parameters (Open-Ended Mode).
This section tests the ability of the 887 to retain data. If PARAM15 and PARAM16 have been entered, it used them for the cylinder, head, and sector address but confines its reads to the cylinder beginning at that address. If the parameters have not been entered, it will start at cylinder, head, and sector address zero and incrementally scan all cylinders. Data is not written by this section. Furthermore, since the data read is not checked, this section may be used to read any type of data that resides on the disk.

Subsection 00 Read Cylinders(s) in Noninterlocked Mode.
The bus slave (IHD) is selected and functioned for a read from its disk. After the data has been transmitted from the disk to central memory, the bus slave (IHD) status is checked for normal end.

< optional error data > none.

Applications

This section describes the unique application procedures for this test.

Limited Fault Isolation

In the event that this test fails, the user is advised that running ISI4 and the 887 in-line (built-in) diagnostics will help isolate the failure. Then and only then, if HYDR is the only test to fail, it may be assumed that the data path from the DMA enhanced ISI channel adapter to the 887 disk subsystem is at fault.

Daisy Chain Testing

HYDR allows the testing of multiple 887s connected to the same ISI channel bus. This is achieved by loading multiple copies of HYDR into the same CIO-PP cluster and assigning each copy (via PARAM9) to a different bus slave address on the same channel.

NOTE

The maximum number that may be tested simultaneously is five due to CIO-PP clustering.

Arbitration of channel usage is handled by CMSE's channel reservation scheme. HYDR requests the channel from CMSE prior to executing an operation and releases the channel upon operation completion. Thus, if another CIO-PP is operating on the channel (assuming it has requested the channel from CMSE), HYDR will loop while waiting for CMSE to accept the channel request (CH will be displayed in the message type when this occurs). In the event of an error, HYDR releases the channel before displaying the error message. This allows other programs using the same channel to continue operation while the user views the error message.

Dual Channel Device Testing

HYDR has been designed to allow the testing of two channels connected to the same 887 subsystem. This is achieved by loading HYDR into the CIO-PPs whose clusters contain the two channels attached to the 887 drive (which has been set for "Same Host ID") and assigning each copy (via PARAM9) its appropriate bus slave address and channel number. Arbitration of 887 subsystem usage is handled by HYDR's use of the 887's reservation feature. HYDR reserves the 887 prior to executing an operation and releases the subsystem upon operation completion. Thus, if another CIO-PP is operating on the subsystem, HYDR will loop waiting for the subsystem to go not busy and select active to be returned. In the event of an error, HYDR does not release the subsystem before displaying the error message. This prevents the other copy of HYDR using the subsystem from receiving an error due to the condition that caused the original error. Upon continuing after displaying the error message, HYDR will go through its abort sequence which should reset the drive to a known state prior to releasing the reservation to allow the other copy its turn to use the subsystem.

Central Memory Write/Read Buffer Viewing

The lower portions of central memory have been arbitrarily allocated by HYDR to allow all available CIO-PPs to have an area equal to two cylinders worth of data for a write/read buffer without interfering with other programs run from other CIO-PPs in the system. In order to view these buffers in central memory, the user must take the lower bound parameters, PARAM10 and PARAM11, multiply them by 8(10), and enter the hexadecimal result in the CMSE ABxxxxxx (for the left screen) or BBxxxxxx (for the right screen) command. This will cause the write buffer to be displayed. For sections 01, 02, and 05 through 08, the read buffer may be displayed by adding 10000(16) to the aforementioned value used in the ABxxxxxx or BBxxxxxx command.

For sections 09 and 13, the read buffer may be displayed by adding 98000(16) for a 4K sector size or B000(16) for a 16K sector size to the aforementioned value in the ABxxxxxx or BBxxxxxx command.

For sections 10 and 14, the read buffer may be displayed by adding 1000(16) for a 4K sector size or 4000(16) for a 16K sector size to the aforementioned value used in the ABxxxxxx or BBxxxxxx command. For sections 11, 12, and 15, the read buffer address is the same as the write buffer address (these are read only sections). If HYDR resides in the secondary IOU of a dual IOU4 system, the addresses given above are biased by 1000000(16).

UHYD 8

UHYD 8

Introduction

UHYD is the offline monitor of the 887 disk subsystem inline diagnostics. It is also a utility routine used to issue commands to the 887 disk subsystem and monitor the resulting activity. While some diagnostic features are available in UHYD, it is not a diagnostic or test and should not be used as such. (For example, some of the parameters are similar to those of diagnostics, but other parameters are not available. Refer to the section on Parameters.)

Assumptions

The following assumptions apply to this test.

UHYD assumes that HYDR, ISI4, PMT4, PMU4, MRT4, CHD4 and CMA4 have been run without error. Furthermore, a PPU based central memory test, CMT3 or CMT5, must have been run without error.

UHYD assumes that the device whose address is given in PARAM9 is a 887 disk subsystem.

UHYD assumes that the 887 disk subsystem is powered on and that the disk has been spun up.

Restrictions

When running multiple copies of UHYD or running other IOU/CPU based tests with UHYD, the following testing environments are prohibited.

- CPU or IOU based tests forcing error conditions via the MAC.
- More than one program using the same CIO channel.

The CIO PPs and the DMA enhanced ISI channel adapters are grouped in clusters. A cluster comprises five CIO PPs and five DMA enhanced ISI channel adapters. A PP in one cluster cannot access a DMA enhanced ISI channel adapter in the other cluster.

The 887 disk subsystem inline diagnostics are organized in a hierarchical manner (that is, each test builds on a hardware base that was verified in a previous test). Because subsequent sections utilize the hardware tested in previous sections, the order of execution should be maintained. Otherwise, the detection/isolation capabilities of the inline diagnostics will be affected. Use of command code 70(16) maintains the correct order of execution. It may be executed by using the DIAG or T70 command.

Test Description

UHYD is designed to monitor the activity of up to sixteen 887 disk drives attached to the two ports of the IOU4's DMA enhanced ISI channel adapter. The activity is controlled by keyboard commands entered manually by the user/operator. Various displays and error messages are provided to assist the user/operator's monitoring task, but no effort is made to specifically test any hardware features, isolate hardware failures (it is assumed that all IOU4 diagnostics have been run error free), or analyze the results of tasks issued to the 887 disk subsystems.

The normal use of this utility is to initiate execution of 887 disk subsystem inline diagnostics and other subsystem commands. UHYD is basically a monitor program that accepts keyboard commands in order to begin execution of user selectable utilities. The monitor loop in the program controls the data that is displayed, updates the display clocks, checks bus idle status for bus slave busy, selects each bus slave in turn (if there is no bus slave at the address currently being issued, ABSENT is displayed), checks the bit significant response, checks for attention from the currently selected bus slave (if attention is present, bus slave status is read and displayed), and executes the task (utility) assigned to the bus slave by the user.

Loading Procedures

Load UHYD to a CIO PP by using any one of the following procedures.

1. At the system console, enter:

   `LT,Cpp,UHYD` (cr) or `TL,Cpp,UHYD` (cr)

   NOTE

   UHYD will be loaded into CIO PP number pp.

2. To load UHYD at the system console, execute the command buffer:

   `GO,UHYD` (cr)

   NOTE

   UHYD will be loaded into CIO PP(s).

   An example and explanation of that command buffer is:

```
0000  UHYD         Command buffer title.
0001  CP,C,UHYD    Load UHYD in first available CIO-PP.
0002  RU,/,100     Run UHYD to parameter stop.
0003  BP,/         Assign current CIO-PP to B-display.
0004  TB           Terminate command buffer.
```

   Parameter changes may be made between 0001 and 0002 (see Parameters).

   If parameter PARAM9 is not entered at or before parameter stop, UHYD uses a channel number equal to the PP number in which it resides.

Running Procedures

This section contains a list of the commands that the monitor/utility UHYD accepts. All other commands not accepted by it or CMSE will cause an appropriate message to be displayed on the ILLEGAL COMMAND-WXYZ line (see Keyboard Command Error Messages).

Monitor Control Commands

The following keyboard commands may be used to control the action of this utility monitor with respect to CMSE and its displays.

Command	Description
< cr >	Changes the currently displayed message to one of the other help messages or the IHD monitor message. Its action is circular (that is, several entries of the carriage return returns the original message to the display).
D	Returns control of the CIO PP to CMSE.
H or Hn	Changes the display to a different or the same message. Values of 0 through 3 are accepted for n. • H or H0 causes the IHD monitor message to be displayed. • H1 causes the keyboard command help message to be displayed. • H2 brings the FRU identification message to the display. • H3 causes the last error register image read to be displayed. • H4 displays the last command block (function buffer 00(16) through 7F(16)) read from the IHDs function buffer. • H5 displays the last status block (function buffer 80(16) through FF(16)) read from the IHDs function buffer. • H6 causes the last error log read to be displayed. • H7 causes the last defect log read to be displayed.
R	Restarts the UHYD monitor from the beginning by re-executing the initialization routines.
hh.mm.ss	Changes the utility clock, where hh is the hour in the range of 00 to 23(10) inclusive, and mm and ss are the minute and second, respectively, in the range of 00 to 59(10) inclusive.

Bus Slave Utility Commands

The following commands may be used to initiate bus slave utilities.

CMND — Causes the monitor to read the command blocks (function buffer addresses 00(16) through 7F(16) from the currently selected bus slave and to display it on the H4 display.

DIAG — Causes the monitor to run the comprehensive diagnostic test (level 2), command code 70(16), on the currently selected bus slave.

DLOG — Causes the monitor to run the generate defect log command, command code 46(16), on the currently selected bus slave and to display the first 16(10) entries and the number of entries in the log on the H7 display. This command requires slightly more than one minute to execute.

ELOG — Causes the monitor to run the read error log command, command code 01(16), on the currently selected bus slave and to display the error log on the H6 display.

FORM — Causes the monitor to run the format and certify device, command code 51(16), command on the currently selected bus slave.

CAUTION

This command destroys customer data.

This command allows the user to return the flaw status of each sector to its factory condition, or discover and flaw new media faults occurring after installation on a customer's site. Since this command erases the entire HDA, the whole drive should be dumped to tape when customer data is present before executing this command and reloaded after executing this command. After this keyboard command is entered, the message, DESTROY DATA, Y or N, is displayed and this utility task halts until a N or Y keyboard command is entered, giving the user one last chance to abort this utility task or validate that the destruction of customer data is permissible. This format and certify operation requires approximately 15 minutes.

IMAG — Causes the monitor to read the error register image from the currently selected bus slave and display it on the H3 display.

RHDR,cccc,h,ss — Causes the monitor to run the read specified headers, command code 39(16), command on the currently selected bus slave and display the primary and alternate addresses of one sectors header at the bus slave's control point in the IHD monitor message (H/H0 display) in hexadecimal format. The parameters (cccc, h, and ss) are required in hexadecimal format, where cccc is the cylinder number (range = 0000(16), through 0373(16), 4000(16) , 4001(16), 8000(16), and 8001(16); h is the head group number (range = 0 through 3), and ss is the sector number (range = 00(16) through 25(16) for the 4K sector size and 00(16) through 0A(16) for the 16K sector size). Parameters entered that are not within the ranges specified will cause the RANGE ERROR message or ILLEGL 1ST SEEK ADRS message.

SRST — Causes the monitor to issue a selective reset to the currently selected bus slave. This command executes in under 5 seconds and ends with the bus slave error message HOST RESET COMPLETE.

STAT — Causes the monitor to read the status blocks (function buffer addresses 80(16) through FF(16)) from the currently selected bus slave and display it on the H5 display.

TERM — Causes the monitor to issue a terminate function to the currently selected bus slave. This is useful for terminating the execution of one of the other utility commands.

Tyy,zzzz — This command causes the utility to issue a command block to the currently selected bus slave where yy is the command byte code and zzzz is the command parameter. It may be used for any command that does not require a data transfer or other parameters.

TEST — Causes the monitor to execute the integrity test (level 1), command code 7A(16), on the currently selected bus slave.

The following keyboard commands may be used to control the action of the bus slaves.

A0 through A7 and B0 through B7 — Select bus slave on a port, A or B, whose bus slave address is in the range of 0 through 7. This command causes the first line of the normal message to change its bus slave address to the one given which then becomes the currently selected bus slave. As a result of this, subsequent parameters and commands may be issued to that bus slave only. This command loads the given bus slave's previous parameters into PARAM0 through PARAM18.

Cxx or Sxx — Clear/Set xx bit of PARAM0/PARAM1, where xx is the bit mnemonic SE, LE, or DE. See PARAM0/PARAM1 under Parameters for bit mnemonic definitions. These commands change the PARAM0 parameters of the currently selected bus slave only.

EP,num,adrs,data — Enter parameter data into CIO PP num at location adrs. See the Parameters section of this document for definitions and locations of parameters.

N	This command is only legal when the currently selected bus slave is requesting a yes or no response. Entering this command causes the currently selected bus slave to terminate execution of a previously selected task such as FORM.
S	Stops execution of the currently selected bus slave. This command is interpreted as a stop command. UHYD continues to monitor other bus slaves but the currently selected bus slave will be halted with HT in its message type.
Spacebar	Starts or resumes execution of the currently selected bus slave. This is useful when the bus slave is stopped on error (that is, SE is displayed for the bus slaves message type).
Y	This command is only legal when the currently selected bus slave is requesting a yes or no response. Entering this command causes the currently selected bus slave to continue to execute a previously selected task such as FORM.

Parameters

The parameter words are located at location 000123(8) in the PP memory. Bit 2**0 is defined as the least significant bit of a word. Altering PARAM0, alters only the parameters of the currently selected bus slave.

PARAM0 - Test Control (Location 00123(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
*	**	DE	NU	NU	NU	NU	NU	NU	NU	LE	SE	NU	NU	NU	NU

SE Stop on error.
LE Log errors in dayfile.
DE Display status error messages in an alphanumeric verbal interpretation format. When this bit is clear, status errors are displayed in hexadecimal.
** Reserved for CMSE 180 use.
NU Not Used.

* Enable CMSE to alter PARAM0 bits via the Cxx/Sxx commands (EP command must be used to alter this parameter).

Default selection is 100020(8)/8010(16).

PARAM1 - Test Control (Location 00124(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
**	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	*	NU	NU

* 2**2 Bypass parameter stop.
** 2**15 Enable CMSE to alter PARAM1 bits.

Default selection is 100000(8)/8000(16). This corresponds to enabling CMSE to alter PARAM1 bits. Use the EP command to set or clear these parameters.

PARAM2 - Not Used (Location 00125(8))

PARAM3 - Not Used (Location 00126(8))

PARAM4 - Maintenance Channel Connect Code (Location 00127(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	CC	CC	CC	CC	NU	NU	NU	NU	NU	NU	NU	NU

Bits 0...7 Not Used (must be zero). (NU)
Bits 8...11 Maintenance channel connect code for the IOU maintenance register (that is 0). (CC)
Bits 12...15 Not Used (must be zero). (NU)

PARAM5 - Not Used (Location 00130(8))

PARAM6 - Not Used (Location 00131(8))

PARAM7 - Not Used (Location 00132(8))

PARAM8 - Not Used (Location 00133(8))

PARAM9 - Channel Number (Location 00134(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	CH	CH	CH	CH	CH

Bits 00...04 CIO ISI DMA enhanced channel number. (CH)
Bits 05...15 Not Used. (NU)

Default selection is 100000(8) / 8000(16). If this parameter is not entered at or before parameter stop, UHYD will use a channel number equal to the PP number in which it resides.

PARAM10 - Not Used (Location 00135(8))

PARAM11 - Not Used (Location 00136(8))

PARAM12 - Not Used (Location 00137(8))

PARAM13 - Not Used (Location 00140(8))

PARAM14 - Not Used (Location 00141(8))

PARAM15 - Not Used (Location 00142(8))

PARAM16 - Not Used (Location 00143(8))

PARAM17 - Not Used (Location 00144(8))

PARAM18 - Not Used (Location 00145(8))

Messages

Since all messages are displayed on the B display, before they are displayed the B display must be assigned to the PP in which the UHYD is executing. Assigning the B display to the utility's PP while running (that is, not stopped) results in a blank or memory display until UHYD displays the next message.

Normal Messages

There are three types of normal messages: the parameter stop message, the IHD monitor message, and the HELP information display messages. While the parameter message is only displayed at initial parameter stop, the IHD monitor message and HELP information display messages may be accessed while UHYD is monitoring subsystem activity.

All normal messages except the parameter stop message have the following format.

```
SE LE DE
UHYD  ZZ   CCHcc  PORT p SLAVE s LAFaaaa LSFssss Prrrr
UTILITY CLOCK=*hh.mm.ss.
.                                                    .
.  text of message, see individual descriptions      .
.                                                    .
H/H0=MONITOR, H1=COMMANDS, H2=FRU ID, H3=ERR REG
ILLEGAL COMMAND-WXYZ (optional message line, see Keyboard Command Error Messages)
```

where:

SE LE DE	=	The mnemonics for bits in PARAM0 and PARAM1.
ZZ	=	Message type (one of the following) RU = Running. SE = Stopped on Error. HT = Halted (operator stop). MC = Maintenance channel request/release reject. CH = I/O channel request/release reject.
cc	=	DMA enhanced adapter channel number in CIO subsystem (octal).
p	=	Port currently selected for keyboard input (A or B).
s	=	Bus Slave Address of slave currently selected for keyboard input (octal).
aaaa	=	Last ISI adapter function issued (hexadecimal).
ssss	=	Last bus slave function word issued (hexadecimal).
rrrr	=	PP address from which the last subroutine was called (hex).

NOTE

No mnemonic is displayed for PARAM0 bits 2**14 and 2**15. This portion of the display is provided by CMSE and represents the state of those parameters for the currently selected bus slave.

hh.mm.ss. = utility clock where hh is hours, mm is minutes, and ss is seconds.

Parameter Messages

The system displays the following message at the beginning of execution of UHYD or after a restart (R-key) to allow the user to set parameters. This display is bypassed when the Bypass Parameter Stop parameter bit is set, PARAM1 bit 2**2.

```
SE LE DE
UHYD SET PARAMS PA=000123B YY/MM/DD. hh.mm.ss.

887 MONITOR UTILITY

PRESS SPACE BAR TO START MONITOR
```

where:

SE LE DE	=	The mnemonics for bits in PARAM0 and PARAM1. Note that no mnemonic is displayed for PARAM0 bits 2**14 and 2**15.
PA	=	FWA of parameter area in PP memory.
YY/MM/DD	=	Year/Month/Day (UHYD's version assembly date).
hh.mm.ss	=	Hour/Minute/Second (UHYD's version assembly time).

For the IHD Monitor message (H or H0 Display), the system displays:

```
SE LE DE
UHYD  ZZ   CCHcc  PORT p SLAVE s LAFaaaa LSFssss Prrrr
UTILITY CLOCK=*hh.mm.ss.
PS       RUN TIME   STATUS
A0  ZZ   00.00.00.  BUSY
A1  ZZ   00.00.00.  ATTENTION
A2  ZZ   00.00.00.  ABSENT
A3  ZZ   00.00.00.  IDLE
A4  ZZ   00.00.00.  DIAGNOSTIC
A5  ZZ   00.00.00.  REFORMAT
A6  ZZ   00.00.00.  7A00 DE00 AF6A 0000 (level 2 error)
A7  ZZ   00.00.00.  7C00 DEA6 AF00 0000 (level 1 error)
B0  ZZ   00.00.00.  TESTING
B1  ZZ   00.00.00.  DESTROY DATA, Y OR N
B2  ZZ   00.00.00.  SELECTIVE RESET
B3  ZZ   00.00.00.  IMAGE NOT AVAILABLE
B4  ZZ   00.00.00.  TERMINATE
B5  ZZ   00.00.00.  WAITING FOR ATTENT-N
B6  ZZ   00.00.00.  TESTING XX
B7  ZZ   00.00.00.  ABSENT
H/H0=MONITOR, H1=COMMANDS, H2=FRU ID, H3=ERR REG
ILLEGAL COMMAND-WXYZ (optional message line, see Keyboard Command Error Messages)
```

This message is displayed after the parameter stop. If one of the help messages is being displayed, it may be displayed by typing H(cr) or H0(cr) or by pressing (cr) until it is displayed. The normal monitor display for UHYD gives the status for all sixteen possible IHDs connected (that is, daisy chained) to the channel cc. The port p and slave s represent the bus slave currently selected for keyboard input. The parameters displayed at the top and in PARAM0 represent the current state of those parameters for the selected bus slave.

The utility clock is updated continuously from the time the monitor is placed in execution (that is, after parameter stop) and is reset by use of the R-key (that is, the initialization routine). It may also be set by use of a keyboard command (see Monitor Control Commands). The run time clock for each bus slave is only incremented when a bus slave task is active and is reset at the beginning of a new bus slave task. This allows the user/operator to determine when a bus slave task has executed too long, since UHYD does not limit through error messages the bus slave task run times.

The message type ZZ reflects the current state of the monitor with respect to a given bus slave (see Normal Messages for the message type definitions). The status display shown here gives an overview of the various possible messages that may be displayed (see Bus Slave Error Messages and Bus Slave Normal Messages for a more complete description).

For the Keyboard Command Help message (H1 Display), the system displays:

```
SE LE DE
UHYD  ZZ   CCHcc  PORT p SLAVE s LAFaaaa LSFssss Prrrr
UTILITY CLOCK=*hh.mm.ss.
A0-A7+B0-B7 - SELECT BUS SLAVE (0-7) ON PORT A/B
CMND  - READ COMMAND BLOCK (H4)
CXX   - CLEAR PARAMETER BIT XX
DIAG  - RUN COMPREHENSIVE DIAGNOSTIC (LEVEL 2)
DLOG  - READ DEFECT LOG (H7)
ELOG  - READ ERROR LOG (H6)
FORM  - FORMAT AND CERTIFY DEVICE
IMAG  - READ ERROR REGISTER IMAGE (H3)
RHDR,CCC,H,SS-READ SPECIFIED HEADER C,H,S
SPACE - RESUME SELECTED BUS SLAVE TASK
SRST  - SELECTIVE RESET
STAT  - READ STATUS BLOCK (H5)
SXX   - SET PARAMETER BIT XX
TERM  - TERMINATE ACTIVE 887 COMMAND
TEST  - RUN INTEGRITY TEST (LEVEL 1)
TYY,ZZZZ - EXECUTE 887 COMMAND YY, PARAMETER ZZZZ
Y OR N- YES OR NO (A RESPONSE TO A QUERY)
H/H0=MONITOR, H1=COMMANDS, H2=FRU ID, H3=ERR REG
ILLEGAL COMMAND-WXYZ(optional, see KEYBOARD COMMAND ERROR MESSAGES)
```

This message provides the user with a brief summary of all the commands that UHYD will accept. All other commands are either accepted by CMSE or are illegal (see Running Procedures for a more complete description of these commands). Illegal commands cause the ILLEGAL COMMAND-WXYZ line to appear with an appropriate error message, where WXYZ is the illegal command entered (see Keyboard Command Error Messages). This message may be displayed by typing H1(cr) or by pressing (cr) until it is displayed.

For the FRU Identification Help message (H2 Display), the system displays:

```
SE LE DE
UHYD  ZZ   CCHcc  PORT p SLAVE s LAFaaaa LSFssss Prrrr
UTILITY CLOCK=*hh.mm.ss.
FRU NO. FRU IDENTIFICATION
   0    NO FRU INDICATED
   1    PCA POSITION 1-READ/WRITE CHANNELS 0 AND 1
   2    PCA POSITION 2-READ/WRITE CHANNELS 2 AND 3
   3    PCA POSITION 3-SERVO/DEVICE CONTROL
   4    PCA POSITION 4-ASYNCHRONOUS INTERFACE
   5    PCA POSITION 5-READ/WRITE SEQUENCER/ECC
   6    PCA POSITION 6-IDSM MPU
   7    PCA POSITION 7-ISI/BUFFER MEMORY
   8    SERVO DRIVER PCA
   9    BULKHEAD PCA
   A    MOTOR/BRAKE ASSEMBLY
   B    HEAD/DISK ASSEMBLY
   C    FAN/BLOWER ASSEMBLY
   D    OPERATOR PANEL
   E    NOT ASSIGNED
   F    POWER SUPPLY
H/H0=MONITOR, H1=COMMANDS, H2=FRU ID, H3=ERR REG
ILLEGAL COMMAND-WXYZ   (optional message line)
```

This message provides the user with a list of FRU codes and their interpretation. It may be displayed by typing H2(cr) or by pressing (cr) until it is displayed.

For the Error Register Image Help message (H3 Display), the system displays:

```
SE LE DE
UHYD  ZZ   CCHcc  PORT p SLAVE s LAFaaaa LSFssss Prrrr
UTILITY CLOCK=*hh.mm.ss.
ERROR REGISTER IMAGE
WD  DATA
00  0000  0000  0000  0000  0000  0000  0000  0000
08  0000  0000  0000  0000  0000  0000  0000  0000
10  0000  0000  0000  0000  0000  0000  0000  0000
18  0000  0000  0000  0000  0000  0000  0000  0000
20  0000  0000  0000  0000  0000  0000  0000  0000
28  0000  0000  0000  0000  0000  0000  0000  0000

H/H0=MONITOR, H1=COMMANDS, H2=FRU ID, H3=ERR REG
ILLEGAL COMMAND-WXYZ   (optional message line)
```

This message provides the user with a display of the error register image previously read from slave s on port p. If the error register has not been read using the IMAG command or the bus slave's error register is clear, this display will contain all zeroes as shown. It may be displayed by typing H3(cr) or by pressing (cr) until it is displayed. All numeric values are displayed in hexadecimal format.

For the Bus Slave Command Block Help message (H4 Display), the system displays:

```
SE LE DE
UHYD  ZZ   CCHcc  PORT p SLAVE s LAFaaaa LSFssss Prrrr
UTILITY CLOCK=*hh.mm.ss.
WD  DATA      COMMAND BLOCKS
00  0000  0000  0000  0000  0000  0000  0000  0000
08  0000  0000  0000  0000  0000  0000  0000  0000
10  0000  0000  0000  0000  0000  0000  0000  0000
18  0000  0000  0000  0000  0000  0000  0000  0000
20  0000  0000  0000  0000  0000  0000  0000  0000
28  0000  0000  0000  0000  0000  0000  0000  0000
30  0000  0000  0000  0000  0000  0000  0000  0000
38  0000  0000  0000  0000  0000  0000  0000  0000
40  0000  0000  0000  0000  0000  0000  0000  0000
48  0000  0000  0000  0000  0000  0000  0000  0000
50  0000  0000  0000  0000  0000  0000  0000  0000
58  0000  0000  0000  0000  0000  0000  0000  0000
60  0000  0000  0000  0000  0000  0000  0000  0000
68  0000  0000  0000  0000  0000  0000  0000  0000
70  0000  0000  0000  0000  0000  0000  0000  0000
78  0000  0000  0000  0000  0000  0000  0000  0000
H/H0=MONITOR, H1=COMMANDS, H2=FRU ID, H3=ERR REG
ILLEGAL COMMAND-WXYZ(optional, see KEYBOARD COMMAND ERROR MESSAGES)
```

This message provides the user with a display of the bus slave's command block area that was previously read from slave s, on port p. If the bus slave's command block area has not been read using the CMND command, this display will contain all zeroes as shown above. It may be displayed by typing H4(cr) or by pressing (cr) until it is displayed. All numeric values are displayed in hexadecimal format.

For the Bus Slave STATUS Block Help message (H5 Display), the system displays:

```
SE LE DE
UHYD  ZZ   CCHcc  PORT p SLAVE s LAFaaaa LSFssss Prrrr
UTILITY CLOCK=*hh.mm.ss.
WD  DATA      STATUS BLOCK
80  0000  0000  0000  0000  0000  0000  0000  0000
88  0000  0000  0000  0000  0000  0000  0000  0000
90  0000  0000  0000  0000  0000  0000  0000  0000
98  0000  0000  0000  0000  0000  0000  0000  0000
A0  0000  0000  0000  0000  0000  0000  0000  0000
A8  0000  0000  0000  0000  0000  0000  0000  0000
B0  0000  0000  0000  0000  0000  0000  0000  0000
B8  0000  0000  0000  0000  0000  0000  0000  0000
C0  0000  0000  0000  0000  0000  0000  0000  0000
C8  0000  0000  0000  0000  0000  0000  0000  0000
D0  0000  0000  0000  0000  0000  0000  0000  0000
D8  0000  0000  0000  0000  0000  0000  0000  0000
F0  0000  0000  0000  0000  0000  0000  0000  0000
F8  0000  0000  0000  0000  0000  0000  0000  0000
H/H0=MONITOR, H1=COMMANDS, H2=FRU ID, H3=ERR REG
ILLEGAL COMMAND-WXYZ(optional, see KEYBOARD COMMAND ERROR MESSAGES)
```

This message provides the user with a display of the bus slave's command block area that was previously read from slave s, on port p. If the bus slave's status block area has not been read using the STAT command, this display will contain all zeroes as shown above. It may be displayed by typing H5(cr) or by pressing (cr) until it is displayed. All numeric values are displayed in hexadecimal format.

For the Error Log Help message (H6 Display), the system displays:

```
SE LE DE
UHYD  ZZ   CCHcc  PORT p SLAVE s LAFaaaa LSFssss Prrrr
UTILITY CLOCK=*hh.mm.ss.
ERROR LOG
WD  DATA
00  0000  0000  0000  0000  0000  0000  0000  0000
08  0000  0000  0000  0000  0000  0000  0000  0000
10  0000  0000  0000  0000  0000  0000  0000  0000
18  0000  0000  0000  0000  0000  0000  0000  0000
20  0000  0000  0000  0000  0000  0000  0000  0000
28  0000  0000  0000  0000  0000  0000  0000  0000
H/H0=MONITOR, H1=COMMANDS, H2=FRU ID, H3=ERR REG
ILLEGAL COMMAND-WXYZ(optional, see KEYBOARD COMMAND ERROR MESSAGES)
```

This message provides the user with a display of the error log that was previously read from slave s, on port p. If the error log has not been read using the ELOG command or the bus slave's error log is clear, this display will contain all zeroes as shown above. It may be displayed by typing H6(cr) or by pressing (cr) until it is displayed. All numeric values are displayed in hexadecimal format.

For the Defect Log Help message (H7 Display) the system displays:

```
SE LE DE
UHYD  ZZ   CCHcc  PORT p SLAVE s LAFaaaa LSFssss Prrrr
UTILITY CLOCK=*hh.mm.ss.DEFECT LOG ENTRIES =0000 0000
ENTRY FLAG      PCYL HDSC ACYL HDSC SKIP CTRL
0000  0000 0000 0000 0000 0000 0000 0000 0000
0001  0000 0000 0000 0000 0000 0000 0000 0000
0002  0000 0000 0000 0000 0000 0000 0000 0000
0003  0000 0000 0000 0000 0000 0000 0000 0000
0004  0000 0000 0000 0000 0000 0000 0000 0000
0005  0000 0000 0000 0000 0000 0000 0000 0000
0006  0000 0000 0000 0000 0000 0000 0000 0000
0007  0000 0000 0000 0000 0000 0000 0000 0000
0008  0000 0000 0000 0000 0000 0000 0000 0000
0009  0000 0000 0000 0000 0000 0000 0000 0000
000A  0000 0000 0000 0000 0000 0000 0000 0000
000B  0000 0000 0000 0000 0000 0000 0000 0000
000C  0000 0000 0000 0000 0000 0000 0000 0000
000D  0000 0000 0000 0000 0000 0000 0000 0000
000E  0000 0000 0000 0000 0000 0000 0000 0000
000F  0000 0000 0000 0000 0000 0000 0000 0000
H/H0=MONITOR, H1=COMMANDS, H2=FRU ID, H3=ERR REG
ILLEGAL COMMAND-WXYZ(optional, see KEYBOARD COMMAND ERROR MESSAGES)
```

This message provides the user with a display of the bus slave's defect log that was previously read from slave s, on port p. If the bus slave's defect log has not been read using the DLOG command this display will contain all zeroes as shown above. It may be displayed by typing H7(cr) or by pressing (cr) until it is displayed all numeric values are displayed in hexadecimal format.

Each line of the display gives the log entry for a different defect. The column headers indicate the position of the various parts of each defect log entry. These parts are the header flags (FLAG), primary address (PCYL HDSC), alternate address (ACYL HDSC), and skip control (SKIP CTRL). In each address, the left column contains the cylinder number while the right column contains the head and sector numbers. The number of entries in the defect log is given at the top of this display. All numeric values are displayed in hexadecimal format.

Bus Slave Normal Messages

The bus slave normal messages are displayed in the IHD monitor message under the column heading STATUS. In addition to the bus slave error messages, the messages show the user/operator the current state of the bus slave upon whose display line they appear.

ABSENT

This message indicates that the bus slave whose address is given in column PS of the display failed to return a select active when a select sequence was attempted. The bus slave might not be cabled to this channel or its port enable switch might be off.

ATTENTION

This message indicates that the bus slave has asserted its attention line as determined by reading bus idle mode status. It also indicates that the monitor/utility has not serviced the attention by reading status and clearing attention.

BUSY

This message indicates that the bus slave has been reserved by its other port as determined by reading bus idle mode status. As a result, the monitor/utility will be unable to continue normal operations on that bus slave until busy is cleared.

DESTROY DATA, Y OR N

This message indicates that the monitor is waiting for the operator/user to enter a Y for yes or N for no before reformatting the IHD. If Y is entered, the reformatting will occur. If N is entered, the monitor will exit the reformat sequence and the bus slave status will probably be IDLE. This message occurs as the result of the FORM keyboard command.

DIAGNOSTIC

This message indicates that the bus slave is currently executing the comprehensive diagnostic command, command code 70(16), that was initiated by the DIAG keyboard command.

IDLE

This message indicates that the bus slave is selectable and not busy. Furthermore, it indicates that the bus slave is available to execute any command issued to it.

READING DEFECT LOG

This message indicates that the monitor is currently reading the selected bus slave's defect log. The message should occur as the result of a DLOG keyboard command and may stay on the screen slightly more than a minute.

READING ERROR IMAGE

This message indicates that the monitor is currently reading the selected bus slave's error image register. The message occurs as the result of the IMAG keyboard command.

READING ERROR LOG

This message indicates that the monitor is currently reading the selected bus slave's error log. The message occurs as the result of an ELOG keyboard command.

READING FUNCT BUFFER

This message indicates that the monitor is currently reading the selected bus slave's function buffer. The message occurs as the result of a CMND or STAT keyboard command.

REFORMAT

This message indicates that the bus slave is currently executing the format and certify device command, command code 51(16), that was initiated by the FORM keyboard command.

SELECTIVE RESET

This message indicates that the bus slave is currently executing a selective reset that was initiated by the SRST keyboard command.

TERMINATE

This message indicates that the monitor has issued a terminate function to the currently selected bus slave. This action was initiated by the TERM keyboard command.

TESTING

This message indicates that the bus slave is currently executing the inline tests, command code 7A(16). This message should occur as the result of a TEST keyboard command.

TESTING xx

This message indicates that the bus slave is currently executing the command code xx(16). This message should occur as the result of a Tyy,zzzz keyboard command.

Error Messages

The general format for all error messages except the bus slave error messages is:

```
SE LE DE
UHYD  ZZ   CCHcc  PORT p SLAVE s LAFaaaa LSFssss Prrrr
EC1=pqrs  EC2=yyee TE=tttt RN=nnnn
AAA-----------------------------------AAA
```

where:

SE LE DE	=	The mnemonics for bits in PARAM0 and PARAM1.
ZZ	=	Message type (one of the following): RU = Running. SE = Stopped on error. HT = Halted (operator stop). MC = Maintenance channel request/release reject. CH = I/O Channel request/release reject.
cc	=	DMA enhanced adapter channel number in CIO subsystem (octal).
p	=	Port currently selected (A or B).
s	=	Bus Slave Address of slave currently selected (octal).
aaaa	=	Last ISI adapter function issued (hex).
ssss	=	Last bus slave function word issued (hex).
rrrr	=	PP address from which the error routine was called (hex).
pqrs	=	Error code 1 (hex)(See appendix A, for definition).
ee	=	Error code 2 (hex) (Error type code).
yy	=	00 for DMA, 50 for channel, 60 for CMSE/MCH, 70 for BASICTC.
tttt	=	Total error count (decimal).
nnnn	=	Initial pattern parameter (see PARAM14 description).
AAA	=	Verbal error description (1 or more lines).

NOTE

No mnemonic is displayed for PARAM0 bits 2**14, and 2**15. This portion of the display is provided by CMSE.

Initialization Error Messages

The error messages described in this section occur after parameter stop but before UHYD enters its main monitor loop. They are typically caused by incorrect parameters or incorrect system configuration. The following are examples of initialization error messages.

```
SE LE DE
UHYD  ZZ   CCHcc  PORT p SLAVE s LAFaaaa LSFssss Prrrr
EC1=F270  EC2=0001 TE=tttt RN=nnnn
WONT RUN IN NIO-PP
RELOAD IN CORRECT CIO-PP
```

This error occurs during initialization if UHYD is loaded into a PP in the NIO subsystem. The user is reminded that the CIO PPs and ISI adapters are grouped into clusters of five in the CIO subsystem. Since UHYD loops endlessly on this message, it must be reloaded into a CIO PP in the cluster of the ISI adapter channel assigned in PARAM9.

```
SE LE DE
UHYD  ZZ   CCHcc  PORT p SLAVE s LAFaaaa LSFssss Prrrr
EC1=F270  EC2=0002 TE=tttt RN=nnnn
PP/CH NUMBER MISMATCH
RELOAD IN CORRECT CIO-PP,
OR ALTER CH PARAMETER AND RESTART
```

This message informs the user that the ISI adapter, on the channel number in PARAM9, cannot be accessed from the PP in which UHYD is running. The user is reminded that the CIO PPs and ISI adapters are grouped into clusters of five in the CIO subsystem. Either UHYD must be reloaded into a CIO PP in the ISI adapter channel's cluster or the ISI adapter channel number parameter (PARAM9) must be changed to a channel in the CIO PP's cluster. After this message, UHYD returns to the parameter message to allow parameter entry.

```
SE LE DE
UHYD  ZZ   CCHcc  PORT p SLAVE s LAFaaaa LSFssss Prrrr
EC1=F270  EC2=0003 TE=tttt RN=nnnn
CHANNEL TYPE CODE ERROR
WONT RUN ON THIS CHANNEL.
ALTER CH PARAMETER AND RESTART.
EXP 30
ACT xx
```

This error occurs during UHYD initialization if PARAM9 is set to a channel that does not have a DMA enhanced ISI channel adapter. The type code for the DMA enhanced ISI channel adapter is 30. The type code xx indicates the type code read from the register for the channel given in PARAM9. Since UHYD loops endlessly on this message, it must be restarted with PARAM9 set to an appropriate DMA enhanced ISI adapter channel or some other program loaded that will execute properly on the type of channel described by the type code xx.

```
SE LE DE
UHYD  ZZ   CCHcc  PORT p SLAVE s LAFaaaa LSFssss Prrrr
EC1=F270  EC2=0004 TE=tttt RN=nnnn
ELEMENT ID ERROR
WONT RUN ON THIS MODEL
RUNS ON I4
```

This message informs the user that the IOU element ID in the IOU maintenance register indicated that the machine was not an I4. Since this is a fatal error, the program loops endlessly on this error message. To run UHYD, load it into an I4. If the IOU has less than 8K of memory, CMSE will post a different error message before this diagnostic has completed loading.

DEX Error Messages

The following error message is generated by DEX. During normal operation, it should never occur. This message is provided by DEX and is reporting an unrecoverable condition. UHYD must be reloaded and rerun after the fault condition has been corrected.

```
SE LE DE
UHYD  AQ   CCHcc  PORT p SLAVE s LAFaaaa LSFssss Prrrr
```

where:

Q is one of the following:

0 = Overlay load timeout (from D.OVL).
1 = Overlay address clobbers DEX (from D.INIT, not used).
2 = Zero length data generation (from D.GEN, not used).
3 = Buffer clobbers DEX or CMSE Idler. (from D.GEN, not used).
4 = Zero length compare (from D.COMP, not used).
5 = Test idled via a "D" entry (not used).
6 = Entered DEX with illegal function (.GT.75B, not used).
7 = CMSE did not accept a call (from D.MC, not used).

BASICTC Error Messages

The following error messages are generated by BASICTC. During normal operation, they should never occur. When they do occur, they may indicate a software fault or IOU hardware failure.

```
SE LE DE
UHYD  SE   CCHcc  PORT p SLAVE s LAFaaaa LSFssss Prrrr
EC1=F170  EC2=700x TE=tttt RN=nnnn
INTERNAL FAULT
BAD BASICTC CALL
```

UHYD used improper call parameters when calling a BASICTC subroutine. This is an unrecoverable fault. In normal operation of this program, this error should never occur. While this error is primarily intended to indicate a software fault, it may be caused by an IOU hardware failure.

The EC2 values and meaning to internal faults are:

7001 = Improper call of BASICTC subroutine CMCH.
7002 = Improper call of BASICTC subroutine CMRW.
7003 = Improper call of BASICTC subroutine CCSB.
7004 = Test subsection has more than allowable 16 conditions.
7005 = Microcode version date incompatible with test version date.

```
SE LE DE
UHYD  SE   CCHcc  PORT p SLAVE s LAFaaaa LSFssss Prrrr
EC1=0670  EC2=60xx TE=tttt RN=nnnn
EXTERNAL FAULT
COULD BE MCH/CMSE/ETC.
```

UHYD requested a function on an external device (that is, the maintenance channel, CMSE, and so on) and the function was not performed or was performed incorrectly. This is an unrecoverable fault.

The EC2 values and meaning to internal faults are:

6001 = MCH active when it should not be. CMFN subroutine.
6002 = MCH channel error on function. CMFN subroutine.
6003 = MCH active when it should not be. CMBT subroutine.
6004 = MCH not empty when it should be. CMBT subroutine.
6005 = MCH channel error on control bytes. CMBT subroutine.
6006 = MCH active when it should not be. CMRD subroutine.
6007 = MCH channel error on input. CMRD subroutine.
6010 = MCH active when it should not be. CMWT subroutine.
6011 = MCH not empty when it should be. CMWT subroutine.
6012 = MCH channel error on output. CMWT subroutine.
6013 = MCH inactive when it should be active. CMBT subroutine.
6014 = MCH inactive when it should be active. CMWT subroutine.
6015 = MCH inactive when it should be active. CMRD subroutine.
6050 = CMSE-180 Call rejected. CALL subroutine.
6052 = CMSE-180 Program load could not find program on library. CALL subroutine.
6053 = An error occurred on a CMSE 180 program load. CALL subroutine.
6054 = PP not available on auto assignment
6057 = CM is in use by CMSE (P3 tests will not run)
6060 = Test could not initialize properly. Probably due to a hardware problem which must be detected by a test which is to run before UHYD.
6070 = Error in parameter entry. One or more of the parameters is not consistent with allowable values.

CYBER 180 Channel Error Messages

The error messages described in this section are caused by the CYBER 180 channel being in the wrong state and represent IOU hardware failures. The following message is the basic format for all channel fault messages. The "text of error message" provides additional information about the error.

```
SE LE DE
UHYD  SE   CCHcc  PORT p SLAVE s LAFaaaa LSFssss Prrrr
EC1=9000  EC2=500e TE=tttt RN=nnnn
CHANNEL FAULT
.                          .
.  text of error message   .
.                          .
```

The EC2 values, error message text, and meaning for channel faults are:

5001 CH ACTIVE AFTER FUNCTION.
After sending function Fffff using a FNC instruction, the channel was found active. UHYD deactivates the channel before displaying this message. If ffff is 0A00, UHYD waits for 1.2 seconds for the channel to deactivate before issuing this message.

5002 ACTIVE BEFORE FUNCTION.
Before sending function Fffff, the channel was found active. UHYD deactivates the channel before displaying this message.

5003 CH EMPTY BEFORE INPUT.
After sending function Fffff and activating the channel but before transferring a block of data, the channel was found empty for 1.2 seconds. UHYD deactivates the channel before displaying this message and no data is transferred.

5004 CH EMPTY BEFORE INPUT.
After sending function Fffff and activating the channel but before transferring one data word the channel was found empty. UHYD deactivates the channel before displaying this message and no data is transferred.

5005 CH FULL BEFORE OUTPUT.
After sending function Fffff and activating the channel but before transferring a block of data, the channel was found full. UHYD deactivates the channel before displaying this message and no data is transferred.

5006 CH FULL AFTER OUTPUT.
After sending function Fffff, activating the channel, and transferring a block of data, the channel was found full for 1.2 seconds. UHYD deactivates the channel before displaying this message.

5007 CH FULL BEFORE OUTPUT.
After sending function Fffff and activating the channel but before transferring one data word, the channel was found full. UHYD deactivates the channel before displaying this message and no data is transferred.

5008 CH FULL AFTER OUTPUT.
After sending function Fffff, activating the channel, and transferring one data word, the channel was found full. UHYD deactivates the channel before displaying this message.

5009 CH INACT AFTER INPUT.
After sending function Fffff, activating the channel, and transferring a block of data the channel was found inactive. UHYD attempts to deactivate the channel before displaying this message.

500A CH INACT AFTER OUTPUT.
After sending function Fffff, activating the channel, and transferring a block of data, the channel was found inactive. UHYD attempts to deactivate the channel before displaying this message.

500B ISI CH FUNCTION TIMEOUT.
After sending function Fffff, activating the channel, and transferring an ISI function word, the channel was found full after 1.2 seconds. UHYD deactivates the channel before displaying this message.

Bus Slave Error Messages

The bus slave error messages are displayed in the IHD monitor message under the column heading STATUS. In addition to the bus slave normal messages which show the current state of the bus slave upon whose display line they appear, bus slave error messages indicate status errors.

The bus slave error messages are hexadecimal displays of the first four words of the bus slave status which has been returned to UHYD by the bus slave. If the DE parameter is set, the displays are alphanumeric representations of the hexadecimal values. Interpretation of these status errors is left to the user (that is, some may not be considered errors).

The following are approximate examples of what you may see. A complete listing of all the possible messages is infinitely long and therefore not included.

7A00 DE00 AF6A 0000

This message is a level 2 diagnostic fault status (that is, it contains a Manual Intervention bit in the 7A portion and the Manual Intervention status is 6A). The DE and AF portions of the message indicate that the failing FRUs are D, E, A, and F.

7C00 DEA6 AF00 0000

This message is a level 1 diagnostic fault status (that is, it contains a System Intervention bit in the 7C portion and the System Intervention status is 6A). The DE and AF portions of the message indicates that the failing FRUs are D, E, A, and F.

These and other bus slave error messages may be interpreted with the aid of a hardware programming manual for the IHD.

BSR ERROR, BSR=00

This message indicates that the bit significant response returned by the bus slave did not match the value expected. A faulty ISI channel terminator may cause this message.

CHECK END

Check end was set, but manual or system intervention and delay status valid were not set.

NORMAL END

Normal end was set, but manual or system intervention and delay status valid were not set. This message is not an error message. It is displayed at the end of command execution to indicate successful completion and to indicate that the ending attention was received.

Other bus slave error messages are:

Message	Code	Description
SEEK ERROR	(SI21)	Seek Error
UNABLE 2 READ HEADER	(SI41)	Unable To Read Header
HEADER MISCOMPARE	(SI42)	Header Miscompare
UNABLE TO READ DATA	(SI43)	Unable to Read Data
NO SPARE SECTORS	(SI64)	No Spare Sectors Available
UNABLE WRITE HEADER	(SI67)	Unable To Write Header
TRANSFER COUNT ERROR	(SI68)	Transfer Count Error
DISK NOT FORMATTED	(SI82)	Disk Not Formatted
DIAG FRU(S)=0,0,0,0	(SIA6)	Diagnostic Fault Detected (Level 1)
COMMAND BLOK NEGATED	(SIC1)	Command Block Negated
NO SYSTEM IV STATUS	(SI00)	No System Intervention Status (also displayed for any system intervention status code that the monitor/utility is unable to interpret)
CMD BLOCK OVERWRITE	(MI21)	Command Block Overwrite
ILLEGAL COMMAND BYTE	(MI22)	Illegal Command Byte
ILLEGL 2ND SEEK ADRS	(MI23)	Illegal Secondary Seek Address
ILLEGL 1ST SEEK ADRS	(MI24)	Illegal Primary Seek Address
ILLEGL COMMAND PARAM	(MI25)	Illegal Command Parameter
ILLEGAL WRITE ERROR	(MI27)	I/O Illegal Write Error
END OF DISK REACHED	(MI28)	End of Disk Reached
ILLEGAL DEVICE NO.	(MI29)	Illegal Device Number
ILLEGL CONTROL FIELD	(MI2A)	Illegal Control Field
ILLEGAL TERMINATION	(MI2B)	Illegal Termination (format)
ILLEGAL DISCONNECT	(MI41)	I/O Illegal Disconnect Error
ISI I/O PARITY ERROR	(MI63)	ISI I/O Parity Error
R/W SEQUENCR RAM P E	(MI64)	R/W Sequencer RAM Parity Error

Message	Code	Description
MPU PARITY ERROR	(MI65)	MPU Parity Error
ECC FAULT	(MI66)	ECC Fault
VOLTAGE FAULT	(MI67)	Voltage Fault
TRANSFER COUNT ERROR	(MI68)	Transfer Count Error
DIAG FRU(S)=0,0,0,0	(MI6A)	Diagnostic Fault Detected (level 2)
OVERTEMPERATURE	(MI6B)	Overtemperature Fault
NO R/W SEQ RESPONSE	(MI6C)	No Read/Write Sequencer Response
INV R/W SEQ RESPONSE	(MI6D)	Invalid Read/Write Sequencer Response
R/W SEQ STS OVERWRIT	(MI6E)	Read/Write Sequencer Status Overwrite
IHD HARDWARE FAULT	(MI6F)	IDSM Hardware Fault (Check 2 Error)
R/W SEQUENCER FAULT	(MI70)	Read/Write Sequencer Fault
ZERO FILL TIME OUT	(MI71)	Zero Fill Time Out
FUNCTION BUFFER P E	(MI72)	Function Buffer Parity Error
DISK FAULT	(MI81)	Disk Fault
NO SECTOR PULSE	(MI90)	No Sector Pulse
NO INDEX PULSE	(MI91)	No Index Pulse
ADDRESS WRAP ERROR	(MI92)	Cylinder/Head/Sector Address Wrap Error
ILLEGAL SEQUENCE	(MIC1)	Illegal Sequence (Not Ready)
FORMAT PROTECT ERROR	(MIC2)	Format Protect Error
NO DISK RESPONSE	(MIC3)	No Disk Response
NO MANUAL IV STATUS	(MI00)	No Manual Intervention Status (also displayed for any manual intervention status code that the monitor/utility is unable to interpret)
NO DEFECT FOUND	(DS01)	No Defect Found
DEFECT FOUND,SKIPPED	(DS03)	Defect Found, Skip Added
REALLOCATED	(DS04)	Reallocated
DEFECT FOUND,REALOCD	(DS05)	Defect Found, Reallocated
REALLOCATION REMOVED	(DS08)	Reallocation Removed

Message	Code	Description
DATA CORR APPLIED	(DS21)	Data Correction Applied
SEEK RETRY APPLIED	(DS22)	Seek Retry Applied
DATA CORR/SEEK RETRY	(DS23)	Data Correction Applied and Seek Retry Applied
DATA RETRY APPLIED	(DS24)	Data Retry Applied
DATA RETRY/CORRECT-N	(DS25)	Data Retry Applied and Data Correction Applied
DATA/SEEK RETRY	(DS26)	Data Retry Applied and Seek Retry Applied
DATA/SEEK RETRY/CORR	(DS27)	Data Correction Applied, Seek Retry
HEADER RETRY	(DS42)	Header Retry Applied
POWER-UP COMPLETE	(DS81)	Power-up Initialization Complete
HOST RESET COMPLETE	(DS83)	Host Generated Reset Complete
PRIORITY OVERRIDE	(DS84)	Priority Override Complete
BUS SLAVE ON LINE	(DS85)	Bus Slave On Line
NO DELAY STATUS	(DS00)	No Delay Status (also be displayed for any delay status code that the monitor/utility is unable to interpret)

Keyboard Command Error Messages

This section lists the various error messages that may appear on the ILLEGAL COMMAND-WXYZ line when the monitor/utility receives an incorrect keyboard command from the operator/user.

FORMAT ERROR

This message indicates that the monitor/utility has received a character in its keyboard buffer that it does not recognize at the position it occupies within the command. The message typically occurs when something other than a period is used in the "hh.mm.ss" command.

SLAVE HALTED

This message indicates that the currently selected bus slave for which the command is intended is in the halted (HT) or stop on error (SE) state. The command entered may be successfully reentered when the currently selected bus slave reaches the IDLE state. Usually, a space bar entry will result in the IDLE state when the bus slave is stopped on error. If the bus slave is in halted (HT) state, a Y or N keyboard command will be required if the status message indicates a DESTROY operation is in progress. If the halted (HT) state is due to an S keyboard command, a space bar will allow the bus slave to continue to the IDLE state.

ILLEGAL COMMAND

This message indicates that the monitor/utility has received a command that exceeds four characters or that is not one of the commands it is programmed to recognize.

ILL. CHARACTER

This message indicates that the monitor/utility has received a character in its keyboard buffer that it does not recognize (that is, it is illegal).

MISSING PARAM

This message indicates that the monitor/utility has not received the character or characters that comprise the nonoptional parameter portion of the command.

NONHEX PARAM

This message indicates that the monitor/utility has received a character in its keyboard buffer that exceeds the range of zero to nine and A to F (that is, the range of hexadecimal characters).

NONOCTAL PARAM

This message indicates that the monitor/utility has received a character in its keyboard buffer that exceeds the range of zero to seven (that is, the range of octal characters).

RANGE ERROR

This message indicates that the monitor/utility has received a character in its keyboard buffer that exceeds the range of values permissible.

SLAVE ABSENT

This message indicates that the currently selected bus slave for which the command is intended is missing from the system configuration. The status for the currently selected bus slave is ABSENT which may be caused by the bus slave not being enabled or cabled to the channel on which the monitor/utility is running.

SLAVE ACTIVE

This message indicates that the currently selected bus slave for which the command is intended is currently executing a utility command. The command entered may be successfully reentered when the currently selected bus slave reaches the IDLE state.

SLAVE NOT ACTIV

This message indicates that the currently selected bus slave for which the command is intended is not currently executing a task as required by the command. Note that the Y and N commands require a slave which has a query message active.

TRAILER DATA

This message indicates that the monitor/utility has received a character in its keyboard buffer that appears after the last character of an otherwise valid command.

CM3D 9

CM3D 9

Introduction

CM3D is a PP COMPASS program used for testing a disk subsystem, consisting of an FSD2 or XMD3 disk with a CM3 control module on an IPI channel. CM3D has three basic functions.

- Invoke the CM3 inline diagnostics
- Perform echo testing
- Obtain the subsystem status of the disk subsystem

All errors are reported to the intelligent console by entering the A and P registers with error and status codes. All of the actual code required to drive the IPI channel is contained in the IPI driver (IPID). Interface to this driver is accomplished via the driver control block (DCB).

Assumptions

CM3D assumes that the intelligent console will be monitoring the PP's P register and will display an error message reflecting the code in the A and P registers.

There will be an IPI channel driver available to call and use for interfacing with the actual IPI channel.

Restrictions

The intelligent console must supply CM3D with channel, equipment, and unit numbers at load time. This information will be located in PP memory locations 37400B, 37401B, and 37402B respectively.

CM3D cannot use PP memory locations 37403B to 37777B, as these locations will be occupied by the bootstrap loader.

CM3D has a Long Jump to start-of-test in PP memory locations 01 and 02 respectively.

Loading Procedure

CM3D resides on a fixed disk within the 930 intelligent console. All loading is performed via the console. Execution of the test is selected via a console menu selection sequence of: (M)aintenance, (E)ngineering, (T)echnical, (D)iagnostic, (S)ubsystem, (D)isk, (E)nter. At this point the channel, equipment number, and unit number are requested. These correspond to an IPI channel, the CM3 module address, and the disk drive address. Normally the values are 1, 0 and 0 where each digit is entered and followed by the return key. When this is complete, depress the function key (F3) to save the parameters. Selecting the (R)un menu option initiates loading of the test into PP memory. A text message indicates that IPIDSST.BIN is loading. IPIDSST.BIN is the name by which CM3D is known to the console.

Running Procedure

While the test is executing the contents of the A and P register are displayed. The values displayed will be changing constantly. When the test successfully completes execution, the display will automatically revert to the display of the last selected menu.

If the P and A registers lock with values other than zero, it should be assumed that an error has been detected. Refer to Error Codes that follow for additional details.

Test execution time is less than two minutes; if the P and A registers have not locked within that period the PP executing the test may be hung due to some unexpected condition. No text message will be displayed for this case.

Parameters

CM3D requires channel, unit, and equipment information in PP locations 37400B, 37401B, and 37402B, respectively.

Messages

The console software interprets the P and A register values and in the event that an error is detected, a single line text message is displayed.

Error Codes

When the test detects an error, the A and P register displays on the console should stop cycling; the values displayed provide status and error codes as described in the following tables.

NOTE

Ensure that the HALT CODE displayed in the A register is either 4 or 5, that no bits in the P register are changing, and that the P value is equal to or greater than 20000(8). If these conditions are not present, the processor may be hung or some other unexpected fault may have occured. Also note that the escape key (ESC) must be pressed to regain control after the A and P register values have been recorded.

A Register Display

The description of the A register display codes is broken down by Halt Code, Task Number, and Low-Level Error Code.

Halt Code - 1st (Left) Octal

4 - Error in echo test
5 - Error in inline test

Task Number - 2nd and 3rd Octals

Octal	Decimal	Description
01	1	Master/selective reset
02	2	Select controller
03	3	Deselect controller
04	4	Reserve drive
05	5	Release drive
06	6	Seek
07	7	Seek-read data
10	8	Seek-write data
11	9	Read data from controller buffer
12	10	Write data to controller buffer
13	11	Select/seek – read/deselect
14	12	Select/seek – write/deselect
15	13	Perform controller diagnostics
16	14	Perform drive diagnostics
17	15	Request drive type
20	16	Request task complete

Low-Level Error Code - 4th to 6th Octals

The definitions for the 8-bit low-level error codes are shown in the following table in both octal and hex format. Octal values are displayed when the test is running; however, other documentation may use hex values.

Octal	Hex	Description
000	00	Cannot verify drive type (FSD/XMD)
001	01	Parameter ID for drive type not found
013	0D	Channel full after T-regs loaded
021	11	No async response on selective reset
036	1E	Channel active before function out
037	1F	Channel active 1 usec after function out
041	21	Slave-in rise-time out error
042	22	Unknown controller address received
043	23	Channel error after select status byte received
056	2E	Channel active before function out
057	2F	Channel active 1 usec after function out
061	31	Sync-in rise time-out error
062	32	Wrong bus acknowledge byte received
063	33	Channel error flag after bus acknowledge byte
064	34	Sync-in fall time-out error
076	3E	Channel active before function out
077	3F	Channel active 1 usec after function out
101	41	Word count residue after information transfer out
102	42	Channel empty when adapter input word expected
116	4E	Channel active before function out
117	4F	Channel active 1 usec after function out
121	51	Slave-in rise time-out error
122	52	Channel error flag after ending slave status recieved
123	53	Information transfer not successful
136	5E	Channel active before function out
137	5F	Channel active 1 usec after function out

Octal	Hex	Description
141	61	No slave intrupt byte present
142	62	Channel error after slave intrupt received
143	63	No controller interrupt within in allotted time
156	6E	Channel active before function out
157	6F	Channel active 1 usec after function out
161	71	Word count residue after information transfer in
162	72	Channel empty when adapter input expected
176	7E	Channel active before function out
177	7F	Channel active 1 usec after function out
201	81	Slave-in fall time-out error
216	8E	Channel active before function out
217	8F	Channel active 1 usec after function out
221	91	Slave-in rise time-out error
222	92	Channel error after transfer setting byte received
223	93	Slave-in fall time out error
236	9E	Channel active before function out
237	9F	Channel active 1 usec after function out
340	E0	Operation not successful
341	E1	Task busy (no response packet recieved yet)
342	E2	Data transfer/slave-in time-out error
343	E3	Unexpected class 2 interupt received
344	E4	Unexpected class 1 interupt received
345	E5	Unknown response type received
346	E6	Unexpected async response received
347	E7	Command had conditional success
350	E8	Critical error during ending status sequence
351	E9	Unsuccessful data burst transfer
352	EA	Drive not operational and ready
353	EB	Controller not operational and ready
354	EC	Unrecoverable data error
360	F0	Invalid task specified
361	F1	Invalid controller address specified
362	F2	Invalid drive address specified
363	F3	No data transfer length specified

The low-level error codes shown are composed of two parts. The first digit (hex) of the code defines the failing sequence, the second digit (hex) defines failing condition within the sequence. The definitions of the first digit are:

Hex Digit	Description
0	IPI adapter function
1	Master/Selective reset (MSR)
2	Select (SEL)
3	Bus control (BSC)
4	Information transfer out (ITO)
5	Ending status (EDS)
6	Request interrupts (RQI)
7	Information transfer in (ITI)
8	Deselect (DSL)
9	Request transfer settings (RQTS)
E	Status related error
F	Device control block input error

P Register Display

The description of P register display codes is done according to sequence and location.

General Status

The disk driver general status bits are treated as a P register value in order that the they may be displayed. The individual bits are identified below as bit vectors in octal format. The bits have been repacked for display and do not appear in the same bit positions as they would in PP memory.

Octal	Description
020000	Always set, not a status bit
010000	Fatal error
004000	Status error
002000	Device controller block entry error
001000	Task busy (no packet present)
000400	Conditional success
000200	IPI adapter error
000100	Drive busy
000040	CM3/drive path not operational
000020	Drive not ready
000010	Select/deselect/reset sequence failed
000004	Send command packet sequence failed
000002	Read/write data failed
000001	Receive response packet failed

Significant Error Locations

The following octal memory locations are a part of the IPI driver package, and contain the information listed whenever an error occurs.

000010 - CORRECT DATA ON A COMPARE ERROR
000011 - DIFFERANCE BITS ON A COMPARE ERROR
000023 - INDEX TO FAILING BUFFER LOCATION
005021 - GENERAL STATUS
005023 - LOW LEVEL ERROR CODE
XXXXXX - CONTROLLER IN-LINES ERROR CODE *** contained in the******
XXXXXX - DRIVE IN-LINES ERROR CODE *** response packet, *****
XXXXXX - DRIVE IN-LINES FRU *** not yet defined.******
000500 - INPUT BUFFER
002600 - OUTPUT BUFFER

The subsystem status buffer (SB) begins at location 5033. The driver control block (DCB) begins at location 5002.

Section Descriptions

The following is a brief description of the test sections.

Section 0

This section invokes the in line diagnostics in the adapter and monitors their progress. Follow this procedure.

1. Issue a 02 task to select the controller.
2. Issue a 13 task to the IPI driver. This results in the controller's internal diagnostics being executed.
3. Monitor the results of the in lines: if an error occurs, enter a code in the A register and stop with HALT CODE = 5.

If the 13 task executes correctly, the the drive internal diagnostics are invoked. Follow this procedure.

1. Issue a 14 task to the IPI driver. This results in the drive's internal diagnostics being executed.
2. Monitor the results of the drive diagnostics; if an error occurs, enter an error code in the A register, and stop with HALT CODE = 5.

Section 1

This section tests the ability of the CM3 subsystem to write a sector of data to the controller buffer (10 task) and read it back correctly (09 task). If the buffer operation is successful, a write and read (07 and 08 tasks) are performed. In each case, if an error occurs, the error code is entered into the A register and the test stops with P = 0004.

1. Perform task 15 to determine the drive type (FSD2 or XMD3) and select the maintenance cylinder accordingly.
2. Perform a 10 task (write buffer).
3. Obtain and verify the status.
4. Compare the data written and read.
5. Load the error code and stop with HALT CODE = 0004 if either a status or compare error occurred.
6. Perform a 09 task (read buffer).
7. Obtain and verify the status.
8. Compare the data written and read.
9. Load the error code and stop with HALT CODE = 0004 if either a status or compare error occurred.
10. Perform a 08 task (seek-write data).

11. Obtain and verify the status.

12. Compare the data written and read.

13. Load the error code and stop with HALT CODE = 0004 if either a status or compare error occurred.

14. Perform a 07 task (seek-read data).

15. Obtain and verify the status.

16. Compare the data written and read.

17. Load the error code and stop with HALT CODE = 0004 if either a status or compare error occurred.

On a data compare error, the correct data will be in memory location 10 and the incorrect bits in memory location 11.

LEEP 10

LEEP 10

Introduction

LEEP is an offline EEPROM loader for the CM3 disk subsystem. It is designed to load the microcode into the EEPROM from a predetermined location in central memory. The microcode must have been previously loaded into memory via the CMSE CC command.

Assumptions

LEEP assumes that the microcode (COS) for the control module is loaded into central memory prior to execution.

Restrictions

LEEP does not test any of the disk subsystem.

The microcode must be loaded into central memory before executing LEEP.

The microcode size is hardcoded into parameters 11 and 12. This value must be changed if the size of the microcode changes.

The value is 195214D {575216(8), 2FA8E(16)}.

No other programs are allowed to be executing under CMSE while LEEP is performing EEPROM loading.

Test Description

LEEP is designed to load the EEPROM microcode and verify the correct status following the operation.

LEEP performs the following steps to load and verify the CM3 EEPROM.

1. Read PARAMS 9 and 10 to obtain the starting address of the microcode in central memory.
2. Read PARAMS 11 and 12 to determine the length of the microcode.
3. Load the IPI driver call block (DCB) with the required information, and function the IPI driver to load the EEPROM using a DMA transfer.
4. Verify the correct status from the CM3.

Loading Procedures

LEEP is executed using the following command buffer.

```
GO,LEEP (CR)
```

An example and explanation of that command buffer is:

0000	LEEP	Command buffer title.
0001	CC,MH426,1000	Load the microcode into central memory.
0002	DP,CPP	Deadstart the PP pp.
0003	CP,CPP,LEEP	Load the test.
0004	EP,CPP,00125,CCUU	Where CC is the channel and UU is the unit.
0005	EP,CPP,00133,00000	Enter the upper central memory location bit.
0006	EP,CPP,00134,10000B	Enter the lower central memory location bit.
0007	BP,PP	Assign PP to B-display.
0010	RU,PP,100	Start execution of LEEP.
0011	TB	Terminate command buffer.

Running Procedures

Running procedures for LEEP are:

S (cr)	Stops test execution. This command is interpreted as a stop command. LEEP goes into an idle loop whereby communication is maintained with CMSE, but no test activity takes place.
Spacebar	Starts or resumes test execution.
R (cr)	Restarts the test from the beginning.
Cxx or Sxx	Clear/set xx bit of PARAM0/1, where xx is the bit mnemonic such as SS, ST.
EP,num,adrs,data	Enter parameter data into PP num at location adrs. See Parameters for definitions and locations of test parameters.

Parameters

The parameter words are located at location 00122(8) in PP memory. Bit 2**0 is defined as the least significant bit of a word.

PARAM0 - Test Control (Location 00122(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
*	**	DE	DR	NU	NU	RC	RB	RS	RT	LE	SE	SC	SB	SS	ST

ST	Stop at end of test.	SE	Stop on error.
SS	Stop at end of section.	LE	Log errors in dayfile.
SB	Stop at end of subsection.	RT	Repeat test.
SC	Stop at end of condition.	RS	Repeat section.
RB	Repeat subsection.	DR	Bypass all messages. (Over-rides bit 2**13.)
RC	Repeat condition.	DE	Display only error messages. Bypasses all stops and messages except error stop and error message.
**	Reserved for CMSE 180 use.	*	Enable CMSE to alter PARAM0 bits via the Cxx/Sxx commands (EP command must be used to alter this parameter.)
NU	Not Used.		

Default selection is 100021(8)/8011(16). This corresponds to setting ST,SE and enabling CMSE to alter PARAM0 bits.

PARAM1 - Test Control (Location 00123(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
**	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	*	NU	NU

*	2**2	Bypass parameter stop.
**	2**15	Enable CMSE to alter PARAM1 bits. (EP command must be used to alter this parameter.)

Default selection is 100000(8)/8000(16). This corresponds to enabling CMSE to alter PARAM1 bits.

PARAM2 - Repeat Test Count (Location 00124(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

The test will repeat the number of times (-1) contained in this location. The test will then unconditionally exit if the Repeat Test parameter bit is not set (PARAM0 Bit 6).

PARAM3 - IPI Channel, CM, and Unit (Location 00125(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	CH	CH	CH	CH	CH	CH	CM	CM	CM	UN	UN	UN

UN FSD disk unit number.
CM Control module number.
CH IPI channel number for the FSD disk path to be tested.
NU Not Used.

Default is 1100(8).

PARAM4 - IPI Port Selection (Location 00126(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	PP

PP0 Port A.
PP1 Port B.

Default is zero.

PARAM5 - Section Select (Location 00127(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	x

Bit 00 Section 0.

The default selection is 00001.

PARAM6 - Not Used (Location 00130(8))

PARAM7 - Not Used (Location 00131(8))

PARAM8 - Not Used (Location 00132(8))

PARAM9 - Upper Central Memory Address Bits (Location 00133(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM

Upper central memory (UM) address bits.

Default is zero.

PARAM10 - Lower Central Memory Address Bits (Location 00134(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM	LM

Lower central memory (LM) address bits.

Default selection is 10000(8)/001000(16).

PARAM11 - Upper 8 Bits of Microcode Length (Location 00135(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	NU	NU	NU	NU	x	x	x	x	x	x	x	x

Upper 8 bits of microcode length.

Default selection is 000057(8).

PARAM12 - Lower 12 Bits of Microcode Length (Location 00136(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
NU	NU	NU	NU	x	x	x	x	x	x	x	x	x	x	x	x

Lower 12 bits of microcode length.

Default selection is 005216(8).

PARAM13 - Not Used (Location 00137(8))

PARAM14 - Not Used (Location 00140(8))

PARAM15 - Not Used (Location 00141(8))

PARAM16 - Not Used (Location 00142(8))

PARAM17 - Not Used (Location 00143(8))

PARAM18 - Repeat Subsection Count (Location 00144(8))

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Bits 00...15 Repeat subsection count.

The test will automatically repeat each subsection in the selected sections the number of times (-1) contained in this location. If PARAM18=0002, each subsection will be repeated once, resulting in two passes through each subsection. Repeat subsection PARAM0 bit 2**8 must be set.

Default selection is zero.

Control Words

Use control words to identify a program and supply information to the user. The control words start at location 00102(8) in the PP memory.

Tag Name	Location	Meaning
CW0	00102(8)	Test name, upper two characters
CW1	00103(8)	Test name, lower two characters
CW2	00104(8)	Program type
CW3	00105(8)	Iteration count
CW4	00106(8)	Error code 1
CW5	00107(8)	Error code 2
CW6	00110(8)	Test pass count
CW7	00111(8)	Current section number
CW8	00112(8)	Current subsection number
CW9	00113(8)	Current condition number
CW10	00114(8)	Error count

Messages

Since all test messages are displayed on the B display, before they are displayed the B display must be assigned to the PP in which the test is executing. Note that dropping the test display by assigning the B display to a different PP, or central memory, will cause the presently displayed test message to be lost. Assigning the B display back to the test PP will result in a blank display until the test displays a new message. The general format for all normal and error messages appears as:

```
LEEP ZZ PCxxxx SOOss  SBOObb COOcc CHhh UNmu
EC1=0000  EC2=yyee TE=tttt RN=nnnn
AAA----------------------------------AAA
```

where:

ZZ	=	Message type (one of the following): RU = Running. SC = Stopped at end of condition. SB = Stopped at end of subsection. SS = Stopped at end of section. ST = Stopped at end of test. SE = Stopped on error. RC = Repeating condition. RB = Repeating subsection. RS = Repeating section. HT = Halted (operator stop).
xxxx	=	Pass count (decimal).
ss	=	Current section number (decimal).
bb	=	Current subsection number (decimal).
cc	=	Current condition number (decimal).
hh	=	IPI channel number (octal).
mu	=	CM and disk unit.
0000	=	Error code 1 (hexadecimal) (see appendix A for definition).
ee	=	Error code 2.
yy	=	00 for parameter, 10 for channel reserve, 20 for channel fault, 40 for disk, 50 for data compare.
tttt	=	Total error count (decimal).
nnnn	=	Random or base number used for generating data (hexadecimal).
AAA	=	Verbal error description (1 or more lines).

Normal Messages

The system displays the following message at the beginning of the test to allow the user to set test parameters. This display is bypassed when the Bypass Parameter Stop parameter bit is set, PARAM1 bit 2**2.

```
LEEP SET PARAMS PA=0122B YY/MM/DD
```

where:

PA	=	FWA of parameter area in PP memory.
YY/MM/DD	=	Year/Month/Day (Test's version assembly date).

This message appears after starting the program.

```
CM-3 EEPROM LOADER
   ---- WARNING ----
            EXECUTION OF THIS PROGRAM WILL
            LOAD NEW MICROCODE INTO THE EEPROM.
            EXECUTION TIME IS BETWEEN 1 AND 9 MINS.
            THE MICROCODE MUST BE IN CENTRAL MEMORY
            AND PARAMS 9 AND 10 SET BEFORE STARTING.

            XXXXXXXXXXXXX

            ENTER (SPACE BAR) TO CONTINUE.
                 ---- WARNING ----
```

where:

xxxxxxxxxxxxx	=	Microcode level xx is currently loaded.
-----	=	Microcode level cannot be determined.

In the first instance, the level of the microcode loaded will be displayed. In the second instance, the level could not be determined because of some problem with the CM3.

```
MICROCODE LEVEL XX SUCCESSFULLY LOADED.
PRESS ANY KEY TO END.
```

This message is displayed when the microcode has been properly loaded.

```
CM-3 EEPROM LOADER.
ST------------------------------ST
TASK BUSY
```

This message is displayed to tell the user that the task is still being executed. This will normally be displayed when EEPROM loading is underway.

Error Messages

This section describes the various error messages that LEEP displays.

```
LEEP  SE  PCxxxx S000y  SB000z C0000 CHcc UNmu
EC1=F200  EC2=1000  TE=000t RN=nnnn

CM-3 EEPROM LOADER
ST--------------------------------ST

UNABLE TO RESERVE CHANNEL XX0
```

This error message will appear if the channel specified in PARAM3 is reserved to some other PP.

```
LEEP  SE  PCxxxx S000Y  SB000z C0000 CHhh UNmu
EC1=9000  EC2=4mof  TE=000t RN=nnnn

CM-3 EEPROM LOADER
ST--------------------------------ST

DISK SUBSYSTEM ERROR

DRIVER STATUS GGGGH LOW LEVEL ERROR LLLLH

MAJOR STATUS RRRRH  ADAPTER STATUS AAAAH
  STATUS BUFFER (HEX)

01D  dddd  dddd  dddd  dddd  dddd  dddd  dddd  dddd
09D  dddd  dddd  dddd  dddd  dddd  dddd  dddd  dddd
17D  dddd  dddd  dddd  dddd  dddd  dddd  dddd  dddd
24D  dddd  dddd  dddd  dddd  dddd  dddd  dddd  dddd
```

where:

m	=	Drive status priority 1-2 error.
f	=	Drive status priority 3 error (failing sequence).
gggg	=	Driver status.
llll	=	Low level error code.
rrrr	=	Major status.
dddd	=	Status buffer word in hexadecimal.
aaaa	=	Adapter status word.

This is the basic format for all disk subsystem messages. Driver status and low level error code are software status information provided by the IPI driver. Hardware major status and status buffer words are provided when available.

EC2 values and brief descriptions of the errors are:

400F CONDITIONAL SUCCESS.
This error indicates that the disk operation completed sucessfully, but only after retry. First failure data is contained in the status buffer.

410F DRIVE BUSY.
This error occurs if the drive is reserved from an other access.

420F DRIVE NOT READY.
This error indicates that the drive is present, but not ready and does not have a fault. This can occur if the drive is not spun up.

430F CM/DRIVE PATH NOT OPERATIONAL.
This error indicates that the controller/drive is unable to send or recieve commands.

440F CLASS 3 RESPONSE PACKET WAS RECEIVED.
This error indicates that critical class 3 response packet was recieved from the controller. Error information is available in the status buffer.

450F SUBSYSTEM ERROR.
This error occurs as the result of some subsystem failure and no status is available from the controller.

460F ADAPTER ERROR.
This error code indicates a problem with the IPI adapter.

UESM 11

UESM 11

Introduction

UESM is the offline monitor for ESM/STORNET. It is also a utility routine that can be used to issue commands to the ESM/STORNET low speed, fast transfer, and side door ports. While some diagnostic features, such as error detection and error displays are available in UESM, it is not a diagnostic or test.

NOTE

This manual references models I and II as ESM I and II respectively, and models III and IV as STORNET models.

Assumptions

- UESM assumes that the following tests have been run without error: CCA4, PMT4, PMU4, MRT4, CHD4 and CMA4. Furthermore, a PP based central memory test, CMT3 or CMT5, must have been run without error. These tests must have run one pass successfully on the IOU4 and central memory in order to obtain valid results from this utility.
- UESM assumes that the device, whose address is given in I.P0, is an ESM/STORNET subsystem.

Restrictions

- When running other IOU/CPU based tests with UESM the following testing environments are prohibited:
  - CPU or IOU based tests forcing error conditions via the MAC.
  - More than one program using the same CIO channel.
- The CIO-PPs and the DMA enhanced CYBER channel adapters are grouped in clusters. A cluster comprises five CIO-PPs and five DMA enhanced CYBER channel adapters. A PP in one cluster cannot access a DMA enhanced CYBER channel adapter in the other cluster.
- UESM does not check for activity when performing a side door function command that may result in an error condition, such as writing relocation memory. The operator must take care that the command is not entered when it could affect memory operation.
- When performing utility sections on a low speed port and/or fast transfer DMA port, it uses system keyboard calls to move the test sequence to a test PP and to place it in execution. The operator must verify that he has selected a legal PP and the PP is in the system idle loop.
- The test is defaulted to bypass access to the side door port. This must be changed with an MIU,xxxx command to display the error log and function the side door port. When running the utility in a mainframe that does not have access to the side door port, the side door access must remain disabled. (See Utility Parameter Keyboard Commands for description of the MIU,xxxx command).
- When running another diagnostic concurrently which also accesses the side door port, an SRC command should be entered to release the channel after each access to allow other diagnostics to use the channel, also. When no other program is using the side door, a CRC command should be entered to speed up program execution.
- When running low speed or fast transfer DMA utilities with the stop all utilities option selected, the utilities use bit 0 of the eighteen-bit global flag register for communication of the stop condition.
- When performing reads with a low speed or fast transfer DMA port utility, the last two blocks to be read are read using the read one record (5041(8)) function, to avoid SECDED errors or address overflow due to the look ahead logic attempting to read past the maximum address, as given in the utility command parameters.
- Clock margins of nominal, +2 percent, −2 percent, +4 percent, and −4 percent are provided using the SCM,x command.

CAUTION

The + and −4 percent may be set at the operator's risk.

Utility/Monitor Description

UESM is designed to provide a means of interfacing to the ESM/STORNET memory interface unit through the side door, fast transfer, and low speed ports.

UESM is basically a monitor program that will accept keyboard commands in order to begin execution of user selectable utilities. The utilities provide the user with the capability of initiating transfers on the various ports available with options as to type of transfer, beginning and ending addresses, and length of data block to be transferred.

UESM reads and interprets the error log data and displays its contents, monitors for error conditions and displays them, provides a means of reading and writing the relocation memory, and provides a means of reading the flag registers. In addition, it provides the means to perform basic side door functions and to perform automatic refresh margin scanning.

UESM provides commands to read, write and compare data in the ESM/STORNET memory through the low speed and fast transfer DMA ports in a utility format.

Loading Procedures

The utility consists of a PP program which is loaded into a CYBER 180 IOU PP (usually an NIO-PP). The program which is loaded into that PP is identified as UESM. In addition, if a utility routine is requested, the utility will make a system library call to load UESMCP for a fast transfer DMA port, or UESMPP for a low speed port.

The following commands are entered to call the program from the system load device:

`CPxx,UESM,,P0,P1,P2,P3`	Load UESM into NIO-PP xx and enter any octal patches using system commands.
`BPxx,0`	Assign B-display to NIO-PP xx.
`AA`	Assign A-display to display active display requests.
`RUxx,100`	Start execution of UESM in PP xx (See Parameters for parameter words P0-P3).

When using the disk as the system load device, these commands may be set up in the following command buffer on the disk and executed by entering the command, GO,UESM(cr).

`0000`	`UESM`	Command buffer title.
`0001`	`CP,UESM`	Load UESM in first available NIO-PP. Parameter changes may be made here (See Parameters).
`0002`	`RU,/,100`	Run UESM to parameter stop.
`0003`	`BP,/`	Assign current NIO-PP to B-display.
`0004`	`AA`	Assign A-display to display active display requests.
`0005`	`TB`	Terminate command buffer.

Running Procedures

This section contains a list of the commands that the utility, UESM, accepts. All other commands not accepted by it or CMSE will cause UTILITY SECTION message to be displayed on the FORMAT ERROR - XXXX line (See Keyboard Command Error Messages).

Utility Control Keyboard Commands

The commands listed in this section are used to control the execution of the utility, UESM, and its displays.

Command	Description
(cr)	A carriage return entry (cr) without a job command will cause the job display presented by the utility to cycle through the normal job displays and the aid displays. Each carriage return will advance to the next display. The order of the displays is aid command display, aid parameter display, utility description display, double SECDED error log display, and single error log display.
space bar	The space bar entry will resume execution of the utility routines.
L,x	This command selects job display x. If the display number parameter, x, is not in the range of 0 through 4, the keyboard command error message, RANGE ERROR -L,x, is displayed. The displays selected by the x parameter are as follows: x=0, Parameter and test commands x=1, Side door function commands x=2, Utility commands x=3, Double SECDED error log x=4, Single SECDED error log
S	This command stops execution of the utilities and automatic margin scanning. If any utility is stopped, the message, UTILITIES STOPPED, appears in the job display. If automatic margin scanning is selected, the scanning is stopped at the current margin conditions and the message, MARGN HALT, will appear in the job display. If none are active when this command is processed, no action is taken.
D	This command terminates execution of the utility/monitor and returns control of the PP to the CMSE idler routine. Any margins are reset and any active utilities are terminated.
R	The test sequence is restarted from the beginning. All active utility operations are aborted and will have to be reentered.

Utility Parameter Keyboard Commands

The commands listed in this section are used to alter the parameters, I.P0, I.P1, I.P2, and I.P3 (See Parameters).

Command	Description
CAM	Clear the automatic margins bit in parameter word I.P1. The margins are reset to nominal in the side door port for the refresh margins. The characters, AM, are removed from the job display.
CDC	Clear the data checking bit in parameter word I.P1. Any utility read entry following this will not check data. The characters, DC, are removed from the job display.
CDE	Clear the stop scan on double error bit in parameter word I.P1. The characters, DE, are removed from the job display.
CDF	Clear the enable dayfile dump bit in parameter word I.P1. The characters, DF, are removed from the job display.
CES	Clear the stop utility on error bit in parameter word I.P1. The characters, ES, are removed from the job display.
CII	Clear the model parameter word, I.P4. The character, I, replaces the characters II on the job display.
CIV	Clear the model parameter word, I.P4. The character, I, replaces the characters IV on the job display.
CMN	Clear the model parameter word, I.P4. The character, I, replaces the characters MN on the job display.
CRC	Clear the request channel bit in parameter word I.P1. The characters, RC, are removed from the job display.
CSE	Clear the stop scan on single SECDED error bit in parameter word I.P1. The characters, SE, are removed from the job display.
CST	Clear the stop scan on status error bit in parameter word I.P1. The characters, ST, are removed from the job display.
CUE	Clear the stop all utilities on error bit in parameter word I.P1. The characters, UE, are removed from the job display.
ECS	Clear the ESM mode bit in parameter word I.P1.
ESM	Set the ESM mode bit in parameter word I.P1.
MIU,xxxx	Set the channel and equipment for the side door port access to the MIU in parameter word I.P0. If xxxx = 0077(8), the side door access is disabled. If the parameter, xxxx, is not in the range of 0000(8) through 3377(8), the keyboard command error message, RANGE ERROR -MIU,xxxx, is displayed.

Command	Description
SAM,xxxx	Set the automatic margin scanning bit in parameter word I.P1. The characters, AM, are displayed on the job display. The time between margin conditions is xxxx(8) seconds. The refresh margin is incremented by 1200(8) each time, from the minimum setting of 1200(8) through 7400(8). The sequence will then be repeated. If the parameter, xxxx, is not in the range of 0000(8) through 7777(8), the keyboard command error message, RANGE ERROR -SAM,xxxx, is displayed.
SDC	Set the data checking bit in parameter word I.P1. Any utility read entry following this will check data. The characters, DC, are displayed on the job display.
SDE	Set the stop scan on double SECDED error bit in parameter word I.P1. The characters, DE, are displayed on the job display.
SDF	Set the enable dayfile bit in parameter word I.P1 to enable dumping messages and error log to dayfile. The characters, DF, are displayed on the job display.
SES	Set the stop utility routine on error bit in parameter word I.P1. The characters, ES, are displayed on the job display.
SII	Set the model parameter word, I.P4, to 1. The characters, II, are displayed on the job display.
SIV	Set the model parameter word, I.P4, to 3. The characters, IV, are displayed on the job display.
SMN	Set the model parameter word, I.P4, to 2. The characters, MN, are displayed on the job display.
SRC	Set the request channel from CMSE bit in parameter word I.P1. The characters, RC, are displayed on the job display.
SSE	Set the stop scan on single error bit in parameter word I.P1. The characters, SE, are displayed on the job display.
SST	Set the stop scan on status error bit in parameter word I.P1. The characters, ST, are displayed on the job display.
SUE	Set the stop all utilities on error bit in parameter word I.P1. The characters, UE, are displayed on the job display.
T,xxxx	Set the pause time for delay between passes for each utility routine in parameter word I.P2. The pause time between passes of a utility routine is in seconds. If 0 delay time, the utility will terminate at the end of a pass. If a delay time of 1, no pause is made between passes. If the parameter, xxxx, is not in the range of 0000(8) through 7777(8), the keyboard command error message, RANGE ERROR -T,xxxx, is displayed.

Side Door Port Keyboard Commands

The commands listed in this section are used to access the capabilities of the side door port. If the side door port is not enabled (See Parameters), the message, NO SD ACCESS -zzzz, is displayed (See Keyboard Command Error Messages).

Command	Description
CCL	Function the side door port for a control clear.
CCM	Clear the clock margin set in the side door port (reset to 0).
CEL	Send the side door function to reset the SECDED error log and counters.
CMF	Send the side door function to clear maintenance functions in the side door port.
CRF	Clear the refresh margin in the side door port (reset to 3.2 msec).
CSL	Send the function to the side door port to clear the scanner lock.
DEL	Dump error log to dayfile. The contents of the error log are formatted and sent to the dayfile. The error log will not be reset at this time automatically.
DSD	Send the function to the side door port to disable error correction and detection during subsequent low speed port memory read operations.
	NOTE This command causes the message, ILLEGAL CMND -DSD, to be displayed when parameter I.P4 is set for models I and II, since ESM I and II do not have this function.
GBF	Send the function to the side door port to force an illegal condition in the error detection circuits for the memory GBA status and the Flag GBA status bits during subsequent low speed port memory read or low speed port flag register read operations.
	NOTE This command causes the message, ILLEGAL CMND -GBF, to be displayed when parameter I.P4 is set for models I and II, since ESM I and II do not have this function.
LCL,x	Function the side door port with a low speed port clear. x = 4 for low speed port 4 and 5 for port 5. If the parameter, x, is not in the range of 4(8) through 5(8), the keyboard command error message, RANGE ERROR -LCL,x, is displayed.
MCL	Function the side door port for a master clear of the ESM/STORNET memory system.

Command	Description
PCL	Function the side door port for a side door port master clear.
RCB	Send the function to the side door port to read check bits from memory during subsequent low speed port memory read operations. **NOTE** This command causes the message, ILLEGAL CMND -RCB, to be displayed when parameter I.P4 is set for models I and II, since ESM I and II do not have this function.
RFR,yyyyyyyy	Read 4-bit flag register memory and write to address yyyyyyyy in central memory. Contents of flag registers are grouped two words per 12-bit byte in each central memory word. If the parameter, yyyyyyyy, is not in the range of 00000000(8) through 77777777(8), the keyboard command error message, RANGE ERROR -RFR,yyyyyyyy, is displayed.
RRL,xxxxxxxx	Read contents of relocation memory and write to central memory address, xxxxxxxx. If the parameter, xxxxxxxx, is not in the range of 00000000(8) through 77777777(8), the keyboard command error message, RANGE ERROR -RRL,xxxxxxxx, is displayed. **NOTE** This command causes the message, NO RELOC MEM -RRL,xxxxxxxx, to be displayed when parameter I.P4 is set for models III and IV, since STORNET does not have a relocation memory.
RSB	Send the function to the side door port to load the error syndrome bits into byte 2 (bits 40-47) of the data word during subsequent low speed port memory read operations. **NOTE** This command causes the message, ILLEGAL CMND -RSB, to be displayed when parameter I.P4 is set for models I and II, since ESM I and II do not have this function.
RZB	Send the function to the side door port to cause the checkbits to be forced to zero during subsequent low speed port memory read operations. **NOTE** This command causes the message, ILLEGAL CMND -RZB, to be displayed when parameter I.P4 is set for models I and II, since ESM I and II do not have this function.
SCL	Function the side door port for a side door status clear.

Command	Description
SCM,x	Set the clock margin for ESM/STORNET to x in the side door port. If the parameter, x, is not in the range of 0(8) through 7(8), the keyboard command error message, RANGE ERROR -SCM,x, is displayed. The margins selected by the x parameter are as follows: x = 0, nominal setting (100 ns) x = 1, -2% (102 ns) x = 2, +4% (96 ns) x = 3, +2% (98 ns) x = 4-7, -4% (104 ns)
SEC,x,y,z,u	Set the programmable error counter in the side door port. x = address bits to be compared y = syndrome bits to be compared z = value of address bits u = value of syndrome bits
SMA,xxx	Set the maximum address for ESM/STORNET in side door port. The parameter, xxx, sets the highest addressable relocation memory entry. If the parameter, xxx, is not in the range of 000(8) through 177(8), the keyboard command error message, RANGE ERROR -SMA,xxx, is displayed.
SRF,xxxx	Set refresh time for ESM/STORNET to xxxx in the side door port. **NOTE** An attempt to set the margin below the hardware set minimum is ignored by the side door port. If xxxx=7776(8), refresh is disabled to the BSU. If xxxx=7777(8), refresh is disabled to both the MIU and BSU. If the parameter, xxxx, is not in the range of 0000(8) through 7777(8), the keyboard command error message, RANGE ERROR -SRF,xxxx, is displayed.
SSL	Send the function to the side door port to set the scanner lock.
WCB	Send the function to the side door port to write the lowest 8 bits (byte 7, bits 00-07) of data both in the 8 check bit locations and into byte 7 of memory during subsequent low speed port memory write operations. **NOTE** This command causes the message, ILLEGAL CMND -WCB, to be displayed when parameter I.P4 is set for models I and II, since ESM I and II do not have this function.

Command	Description
WRL,xxxxxxxx	Write relocation memory from buffer at address xxxxxxxx in central memory one relocation memory location per twelve bit byte. Parity is generated by the utility program for each entry. If the parameter, xxxxxxxx, is not in the range of 00000000(8) through 77777777(8), the keyboard command error message, RANGE ERROR -WRL,xxxxxxxx, is displayed. **NOTE** This command causes the message, NO RELOC MEM -WRL,xxxxxxxx, to be displayed when parameter I.P4 is set for models III and IV, since STORNET does not have a relocation memory.
WRL,IN	Write relocation memory with one to one correspondence with 512K banks. **NOTE** This command causes the message, NO RELOC MEM -WRL,IN, to be displayed when parameter I.P4 is set for models III and IV, since STORNET does not have a relocation memory.
WRL,I4	Write relocation memory with one to one correspondence with 128K banks. **NOTE** This command causes the message, NO RELOC MEM -WRL,I4, to be displayed when parameter I.P4 is set for models III and IV, since STORNET does not have a relocation memory.
WVF	Send the function to the side door port to force an illegal condition in the error detection circuit for the multiple write status bit during subsequent low speed port memory write operations. **NOTE** This command causes the message, ILLEGAL CMND -WVF, to be displayed when parameter I.P4 is set for models I and II, since ESM I and II do not have this function.

Fast Transfer and Low Speed Port Keyboard Commands

The commands listed in this section are used to control the execution of the fast transfer (DMA) and low speed port (LSP) utilities. (See Utility Section Descriptions).

Command	Description
BWR,x,y,b,p	Perform block write/read utility from a port. The port that performs the utility is decided by the last DMA or LSP command entered.
DMA,xx,yy	Select DMA enhanced (fast) transfer port for utility functions using PP xx on channel yy. CMSE keyboard commands are used to load the fast transfer port utility program, UESMCP, into PP xx and to set PP xx in execution. All ensuing utility commands are performed by the selected PP on the selected channel until another LSP or DMA command is issued. If the selected PP is already active with a utility, it is stopped. If the selected channel is already being used by another PP, a keyboard command error message, FORMAT ERROR -DMA,xx,yy, is reported. To stop an active PP, the channel need not be entered. To load the fast transfer port utility into a CIO-PP add 60(8) to the desired PP number and enter it as as the xx parameter. If the PP number (xx) entered is not in the range 60(8) through 71(8), the keyboard command error message, RANGE ERROR -DMA,xx,yy, is displayed. If the channel number (yy) entered is not in the range 00(8) through 11(8), the keyboard command error message, RANGE ERROR -DMA,xx,yy, is displayed. If the channel number (yy) entered is not in same cluster as PP xx, the keyboard command error message, RANGE ERROR -DMA,xx,yy, is displayed.
FWR,x,y,b,p	Perform full write/read utility. The port is determined by the last DMA or LSP command entered.
LSP,xx,yy	Select low speed port for utility functions using PP xx on channel yy. CMSE keyboard commands are used to load the low speed port utility program, UESMPP, into PP xx and to set PP xx in execution. All ensuing utility commands are performed by the selected PP on the selected channel until another LSP or DMA command is issued. If the selected PP is already active with a utility, it is stopped. If the selected channel is already being used by another PP, a keyboard command error message, FORMAT ERROR -LSP,xx,yy, is reported. To stop an active PP, the channel need not be entered. To load the low speed port utility into a CIO-PP, add 60(8) to the desired PP number and enter it as the xx parameter. If the PP number (xx) entered is not in the range 00(8) through 11(8), or 20(8) through 31(8), or 60(8) through 71(8), the keyboard command error message, RANGE ERROR -LSP,xx,yy, is displayed. If the PP number (xx) is in the range 60(8) through 71(8), and the channel number (yy) entered is not in same cluster as PP xx, the keyboard command error message, RANGE ERROR -LSP,xx,yy, is displayed. The same keyboard command error message occurs if the yy parameter is equal to the side door port channel.
RDD,x,y,b,p	Perform the utility read section from a port. The port that performs the utility is decided by the last DMA or LSP command entered.
WRT,x,y,b,p	Perform the utility write section from a port. The port to perform the utility is decided by the last DMA or LSP command entered.

Maintenance Tester Keyboard Commands

The commands listed in this section are used to interact with the maintenance tester.

NOTE

These commands are intended only as a debugging aid for the maintenance tester routines, and are not documented on the aid display. Furthermore, these commands will cause the message, NO MAINT TSTR-zzz, to be displayed when parameter I.P4 is set for models III and IV (See Parameters and Keyboard Command Error Messages) since STORNET does not have a maintenance tester.

Command	Description
DER,xxxxxxxx	Dump the contents of the maintenance tester error record to the Central Memory address, xxxxxxxx. If the parameter, xxxxxxxx, is not in the range of 00000000(8) through 77777777(8), the keyboard command error message, RANGE ERROR -DER,xxxxxxxx, is displayed.
DMT	Dump the formatted contents of the maintenance tester to the dayfile.
EXMT	Send a function to the side door port to start execution of the maintenance tester at the current program address.
EXMZ	Send a function to the side door port to start execution of the maintenance tester at program address zero.
HTMT	Send a function to the side door port to halt the maintenance tester.
LMT,xxxxxxxx,yy	Load a test routine into the maintenance tester. The tester routines must be in the format for the online MALET maintenance tester program and loaded in central memory at address xxxxxxxx. Routine yy is loaded. This command is intended as a debugging tool for the maintenance tester routines. Loading procedures and the routine descriptions are included in the documentation for diagnostic BSU, the MALET based maintenance tester diagnostic for the BSU. If the parameter, xxxxxxxx, is not in the range of 00000000(8) through 77777777(8), the keyboard command error message, RANGE ERROR -LMT,xxxxxxxx,yy, is displayed. If the parameter, yy, is not in the range of 00(8) through 44(8), the keyboard command error message, RANGE ERROR -LMT,xxxxxxxx,yy, is displayed.
LMZ	Enter zeros into all registers of the maintenance tester, including the instruction register.
MTCL	Send the side door function to clear the maintenance tester and error record.
SBA,xxxx	Set the maintenance tester bank address to xxxx in the side door port. The parameter, xxxx, selects a relocation memory entry. If the parameter, xxxx, is not in the range of 0000(8) through 7777(8), the keyboard command error message, RANGE ERROR -SBA,xxxx, is displayed.

Parameters

The following section describes the parameter words for the utility. These parameter words may be entered with system commands, or applicable job command (See Utility Parameter Keyboard Commands). These commands can be set up and executed in command buffers.

Address	Tag	Applicable Command	Default	Description
0005	I.P0	MIU,ccee	0077	Side door channel ccee – cc = channel ee = equipment number
				If ccee=0077(8), do not access side door port.
0006	I.P1		1003	Control flags
		C/SDC		xxx1 – Compare data in any utility read routine.
		C/SES		xxx2 – Stop on error in any utility routine.
		C/SUE		xxx4 – Stop all active utilities if any utility detects an error.
		ECS/ESM		xx1x – ECS/ESM mode,1=ESM/STORNET
				xx2x – Not Used
				xx4x – Not Used
		C/SSE		x1xx – If automatic margins selected, stop scan on current margin conditions if a single error occurs.
		C/SDE		x2xx – If automatic margins selected, stop scan on current margin conditions if a double error occurs.
		C/SST		x4xx – If automatic margins selected, stop scan on current margin conditions if a status error occurs.
		C/SDF		1xxx – Enter all errors in the dayfile, (error log will be placed in dayfile when one of the error log status bits; single error full, double error full or single error counter full; sets in word zero of the side door status.)
		C/SAM,xxxx		2xxx – Scan automatic refresh times.
		C/SRC		4xxx – Request side door channel and release after each access.

Address	Tag	Applicable Command	Default	Description
0007	I.P2	T,xxxx	0001	Pause time between passes of a utility routine in seconds, if 0 delay time, the utility will terminate at the end of a pass. If a delay time of 1 no pause is made between passes.
0010	I.P3	C/SAM,xxxx	0001	Pause time between setting new margin conditions in seconds when automatic margin scanning is selected. **NOTE** The pause times in parameters I.P2 and I.P3 are approximations due to variable display refresh times and will vary with system activity. The times should be adjusted to fit the desired delay.
0011	I.P4	CII/MN/IV	0000	xxxy - y = 0, Model I (16K) SII 1, Model II (64K) SMN 2, Model III(256K) SIV 3, Model IV (1M) **NOTE** Models I and II are ESM I and II respectively while models III and IV are STORNET models.

Messages

Normal Messages

The messages in the following sections are the various job displays that the operator may encounter during the execution of UESM. These job displays may be selected by using the L,x command (See Utility Control Keyboard Commands). It should be noted that these displays vary in format for different models. All of these displays have the following header information in common.

Line Number	Description
00	This line contains the program name, UESM, and the monitor error message.
01	This line contains the mnemonics for the control parameters that are currently selected.
02	This line contains the currently selected modes and margins.
03	This line contains the octal values of the parameter words.
04	This line contains the following information: CLK x – The current clock margin is x, as indicated by word 2, bits 7(10) through 9(10) of the side door status. RFRSH xxxx – The current refresh time is xxxx, as indicated by word 3 of the side door status. TESTER xx – The maintenance tester status bits are xx, as indicated by word 0, bits 4 through 7 of the side door status. MA zzz – The current maximum address setting is zzz, as indicated by word 2, bits 0 through 6 of the side door status.
05	This line contains the following information: ERROR STATUS – This shows the error status bits, words 0 and 1, and bits 10(10) and 11(10) of word 2 of the side door status.
42	This line contains the keyboard command error message when UESM discovers that an error has occurred in the keyboard command it has received (See Keyboard Command Error Messages).
43	This line tells the user that the carriage return (cr) may be used to cycle to the next job display. Alternatively, the L,x command may be used to select any job display desired.

Double Error Log Display (Models I and II)

This display is obtained by using the job command, L,3, when the model parameter, P4, is either zero or one (See Double SECDED Error Messages).

```
00 *UESM - monitor error message          *  TEST NAME, ERROR MSGS
01 *DC  ES  UE  DF  SE  DE  ST  RC  AM  II *  CONTROLS
02 *MODES=ESM  MIU XX  MARGN      UTILITY  *  MODES
03 *P0=0001 P1=7717 P2=0001 P3=0001 P4=0001*  PARAMETERS
04 * CLK X  RFRSH XXXX  TESTER  XX  MA ZZZ *  STATUS INDICATORS
05 *      ERROR STATUS  0000  0000  0      *  SIDE DOOR STATUS
06 *          DOUBLE ERRORS                *
07 *BSU BK SCN CS CAB MODL  CHIP ADDRESS   *  COLUMN HEADERS
10 * 0  00  1  1  A1 A1-00 XXXXXY / XXXXXZ *
11 * 0  00  1  1  A1 A1-00 XXXXXY / XXXXXZ *
12 * 0  00  1  1  A1 A1-00 XXXXXY / XXXXXZ *
13 * 0  00  1  1  A1 A1-00 XXXXXY / XXXXXZ *
14 * 0  00  1  1  A1 A1-00 XXXXXY / XXXXXZ *  DOUBLE ERROR MESSAGE
15 * 0  00  1  1  A1 A1-00 XXXXXY / XXXXXZ *
16 * 0  00  1  1  A1 A1-00 XXXXXY / XXXXXZ *
17 * 0  00  1  1  A1 A1-00 XXXXXY / XXXXXZ *
20 * 0  00  1  1  A1 A1-00 XXXXXY / XXXXXZ *
21 * 0  00  1  1  A1 A1-00 XXXXXY / XXXXXZ *
22 * 0  00  1  1  A1 A1-00 XXXXXY / XXXXXZ *
23 * 0  00  1  1  A1 A1-00 XXXXXY / XXXXXZ *
24 * 0  00  1  1  A1 A1-00 XXXXXY / XXXXXZ *
25 * 0  00  1  1  A1 A1-00 XXXXXY / XXXXXZ *
26 * 0  00  1  1  A1 A1-00 XXXXXY / XXXXXZ *
27 * 0  00  1  1  A1 A1-00 XXXXXY / XXXXXZ *
30 *                                       *
31 *                                       *
32 *                                       *
33 *                                       *
34 *                                       *
35 *                                       *
36 *                                       *
37 *                                       *
40 *                                       *
41 *                                       *
42 *FORMAT ERROR -  XXXXXXX                 *  FORMAT ERROR
43 *CR ONLY - CYCLE TO NEXT DISPLAY         *
```

Double Error Log Display (Models III and IV)

This display is obtained by using the job command, L,3, when the model parameter, P4, is either two or three (See Double SECDED Error Messages).

```
00 *UESM - monitor error message          *  TEST NAME, ERROR MSGS
01 *DC  ES  UE  DF  SE  DE  ST  RC  AM  IV *  CONTROLS
02 *MODES=ESM  MIU XX  MARGN      UTILITY  *  MODES
03 *P0=0001 P1=7717 P2=0001 P3=0001 P4=0003*  PARAMETERS
04 * CLK X  RFRSH XXXX  TESTER  XX  MA ZZZ *  STATUS INDICATORS
05 *      ERROR STATUS  0000  0000  0      *  SIDE DOOR STATUS
06 *          DOUBLE ERRORS                *
07 *  BANK SCN CS CHS SLOT  CHIP ADDRESS   *  COLUMN HEADERS
10 *    00  1  1   A   A00 XXXXXY / XXXXXZ *
11 *    00  1  1   A   A00 XXXXXY / XXXXXZ *
12 *    00  1  1   A   A00 XXXXXY / XXXXXZ *
13 *    00  1  1   A   A00 XXXXXY / XXXXXZ *
14 *    00  1  1   A   A00 XXXXXY / XXXXXZ *  DOUBLE ERROR MESSAGE
15 *    00  1  1   A   A00 XXXXXY / XXXXXZ *
16 *    00  1  1   A   A00 XXXXXY / XXXXXZ *
17 *    00  1  1   A   A00 XXXXXY / XXXXXZ *
20 *    00  1  1   A   A00 XXXXXY / XXXXXZ *
21 *    00  1  1   A   A00 XXXXXY / XXXXXZ *
22 *    00  1  1   A   A00 XXXXXY / XXXXXZ *
23 *    00  1  1   A   A00 XXXXXY / XXXXXZ *
24 *    00  1  1   A   A00 XXXXXY / XXXXXZ *
25 *    00  1  1   A   A00 XXXXXY / XXXXXZ *
26 *    00  1  1   A   A00 XXXXXY / XXXXXZ *
27 *    00  1  1   A   A00 XXXXXY / XXXXXZ *
30 *                                       *
31 *                                       *
32 *                                       *
33 *                                       *
34 *                                       *
35 *                                       *
36 *                                       *
37 *                                       *
40 *                                       *
41 *                                       *
42 *FORMAT ERROR -  XXXXXXX                 *  FORMAT ERROR
43 *CR ONLY - CYCLE TO NEXT DISPLAY         *
```

Single Error Log Display (Models I and II)

This display is obtained by using the job command, L,4, when the model parameter, P4, is either zero or one (See Single SECDED Error Messages).

```
00 *UESM - monitor error message   *  TEST NAME, ERROR MSGS
01 *DC  ES  UE  DF  SE  DE  ST  RC  AM  II *  CONTROLS
02 *MODES=ESM  MIU XX  MARGN      UTILITY  *  MODES
03 *P0=0001 P1=7717 P2=0001 P3=0001 P4=0001*  PARAMETERS
04 * CLK X  RFRSH XXXX  TESTER  XX  MA ZZZ *  STATUS INDICATORS
05 *      ERROR STATUS  0000  0000  0      *  SIDE DOOR STATUS
06 * SINGLE ERRORS              *
07 *BSU BK SCN CS CAB MODL BIT CHIP COUNT  *  COLUMN HEADERS
10 * 0  00  1  1  A1 A1-00  00  C00  11    *
11 * 0  00  1  1  A1 A1-00  00  C00  11    *
12 * 0  00  1  1  A1 A1-00  00  C00  11    *
13 * 0  00  1  1  A1 A1-00  MULTIPLE 11    *  MULTIPLE ERROR REPOR-
14 * 0  00  1  1  A1 A1-00  00  C00  11    *  TED AS SINGLE ERROR
15 * 0  00  1  1  A1 A1-00  00  C00  11    *
16 * 0  00  1  1  A1 A1-00  00  C00  11    *
17 * 0  00  1  1  A1 A1-00  00  C00  11    *
20 * 0  00  1  1  A1 A1-00  00  C00  11    *
21 * 0  00  1  1  A1 A1-00  00  C00  11    *
22 * 0  00  1  1  A1 A1-00  00  C00  11    *
23 * 0  00  1  1  A1 A1-00  00  C00  11    *
24 * 0  00  1  1  A1 A1-00  00  C00  11    *
25 * 0  00  1  1  A1 A1-00  00  C00  11    *
26 * 0  00  1  1  A1 A1-00  00  C00  11    *
27 * 0  00  1  1  A1 A1-00  00  C00  11    *
30 *                                       *
31 *                                       *
32 * SINGLE ERROR COUNTER XXXX XXXX XXXX   *  SINGLE ERROR COUNTER
33 *                                       *
34 *                                       *
35 *                                       *
36 *                                       *
37 *                                       *
40 *                                       *
41 *                                       *
42 *FORMAT ERROR -  XXXXXXX                 *  FORMAT ERROR
43 *CR ONLY - CYCLE TO NEXT DISPLAY         *
```

Single Error Log Display (Models III and IV)

This display is obtained by using the job command, L,4, when the model parameter, P4, is either two or three (See Single SECDED Error Messages).

```
00 *UESM - monitor error message   *  TEST NAME, ERROR MSGS
01 *DC  ES  UE  DF  SE  DE  ST  RC  AM  IV *  CONTROLS
02 *MODES=ESM  MIU XX  MARGN      UTILITY  *  MODES
03 *P0=0001 P1=7717 P2=0001 P3=0001 P4=0003*  PARAMETERS
04 * CLK X  RFRSH XXXX  TESTER  XX  MA ZZZ *  STATUS INDICATORS
05 *      ERROR STATUS  0000  0000  0      *  SIDE DOOR STATUS
06 *    SINGLE ERRORS        *
07 *  BANK SCN CS CHS SLOT BIT CHIP COUNT  *  COLUMN HEADERS
10 *    00  1  1   A   A00  00  C00  11    *
11 *    00  1  1   A   A00  00  C00  11    *
12 *    00  1  1   A   A00  00  C00  11    *
13 *    00  1  1   A   A00  MULTIPLE 11    *  MULTIPLE ERROR REPOR-
14 *    00  1  1   A   A00  00  C00  11    *  TED AS SINGLE ERROR
15 *    00  1  1   A   A00  00  C00  11    *
16 *    00  1  1   A   A00  00  C00  11    *
17 *    00  1  1   A   A00  00  C00  11    *
20 *    00  1  1   A   A00  00  C00  11    *
21 *    00  1  1   A   A00  00  C00  11    *
22 *    00  1  1   A   A00  00  C00  11    *
23 *    00  1  1   A   A00  00  C00  11    *
24 *    00  1  1   A   A00  00  C00  11    *
25 *    00  1  1   A   A00  00  C00  11    *
26 *    00  1  1   A   A00  00  C00  11    *
27 *    00  1  1   A   A00  00  C00  11    *
30 *                                       *
31 *                                       *
32 * SINGLE ERROR COUNTER XXXX XXXX XXXX   *  SINGLE ERROR COUNTER
33 *                                       *
34 *                                       *
35 *                                       *
36 *                                       *
37 *                                       *
40 *                                       *
41 *                                       *
42 *FORMAT ERROR -  XXXXXXX                 *  FORMAT ERROR
43 *CR ONLY - CYCLE TO NEXT DISPLAY         *
```

Aid Command Display

This display is obtained by using the job command, L,0.

```
00 *UESM - monitor error message          *  TEST NAME, ERROR MSGS
01 *DC  ES  UE  DF  SE  DE  ST  RC  AM  II *  CONTROLS
02 *MODES=ESM  MIU XX  MARGN HALT UTILITY  *  MODES
03 *P0=0001 P1=7717 P2=0001 P3=0001 P4=0001*  PARAMETERS
04 * CLK X  RFRSH XXXX  TESTER  XX  MA ZZZ *  STATUS INDICATORS
05 *      ERROR STATUS  0000  0000  0      *  SIDE DOOR STATUS
06 *PARAMETER KEYBOARD ENTRIES             *
07 *  CAM/SAM,XXXX SET AUTOMATIC MARGIN BIT*
10 *  CDC/SDC - CLEAR/SET DATA CHECK BIT   *
11 *  CDE/SDE - STOP SCAN ON DOUBLE ERR BIT*
12 *  CDF/SDF - CLR/SET DAYFILE ENABLE BIT *
13 *  CES/SES - CLEAR/SET STOP ON ERROR    *
14 *  CII/SII - CLEAR/SET ESM II MODE      *
15 *  CMN/SMN - CLEAR/SET STORNET MODE     *
16 *  CRC/SRC - CLEAR/SET REQUEST CHANNEL  *
17 *  CSE/SSE - STOP SCAN ON SINGLE ERR BIT*
20 *  CST/SST - STOP SCAN ON STATUS ERR BIT*
21 *  CUE/SUE - STOP ALL UTIL. ON ERR BIT  *
22 *  ECS/ESM - SET ECS/ESM MODE BIT       *
23 *  MIU,XX - ENTER SIDE DOOR CHANNEL     *
24 *  T,XXXX - SET UTILITY PAUSE TIME      *
25 *JOB DISPLAY KEYBOARD ENTRIES           *
26 *  L,N - SELECT JOB DISPLAY N, 0 - 4    *
27 *    N = 0 - PARAM AND TEST COMMANDS    *
30 *        1 - SIDE DOOR FUNCTION COMMANDS*
31 *        2 - UTILITY COMMANDS           *
32 *        3 - DOUBLE SECDED ERROR LOG    *
33 *        4 - SINGLE SECDED ERROR LOG    *
34 *PARAMETER WORDS                        *
35 *  P0 = SIDE DOOR CHANNEL               *
36 *  P1 = CONTROL BITS                    *
37 *  P2 = UTILITY PAUSE TIME              *
40 *  P3 = MARGIN SCAN PAUSE TIME          *
41 *  P4 = MODEL PARAMETER                 *
42 *FORMAT ERROR -  XXXXXXX                *  FORMAT ERROR
43 *CR ONLY - CYCLE TO NEXT DISPLAY        *
```

Side Door Function Command Display

This display is obtained by using the job command, L,1.

```
00 *UESM - monitor error message   *  TEST NAME, ERROR MSGS
01 *DC  ES  UE  DF  SE  DE  ST  RC  AM  II *  CONTROLS
02 *MODES=ESM  MIU XX  MARGN HALT UTILITY  *  MODES
03 *P0=0001 P1=7717 P2=0001 P3=0001 P4=0001*  PARAMETERS
04 * CLK X  RFRSH XXXX  TESTER  XX  MA ZZZ *  STATUS INDICATORS
05 *      ERROR STATUS  0000  0000  0      *  SIDE DOOR STATUS
06 *SIDE DOOR FUNCTIONS   *
07 *  CCL/MCL - CONTROL/MASTER CLEAR       *
10 *  CCM/SCM,X - CLEAR/SET CLOCK MARGIN   *
11 *    WHERE X=0 FOR NORMAL        *
12 *            1 FOR 2 PCT. SLOW         *
13 *            2 FOR 4 PCT. FAST         *
14 *            3 FOR 2 PCT. FAST         *
15 *            4 FOR 4 PCT. SLOW         *
16 *  CEL/DEL - RESET/DUMP ERROR LOG       *
17 *  CMF - CLEAR MAINTENANCE FUNCTIONS    *
20 *  CRF/SRF,XXXX - CLEAR/SET REFRESH TIME*
21 *  CSL/SSL - CLEAR/SET SCANNER LOCK     *
22 *  DSD - DISABLE SECDED        *
23 *  GBF - GBA FORCE   *
24 *  LCL,X - CLEAR LOW SPEED PORT X       *
25 *  PCL/SCL - SIDE DOOR PORT/STATUS CLR  *
26 *  RCB - READ CHECK BITS        *
27 *  RFR,XXX - READ FLAG REGISTER TO CM   *
30 *  RRL/WRL,XX - READ/WRITE RELOC. MEM.  *
31 *  RSB - READ SYNDROME BITS   *
32 *  RZB - READ ZERO CHECK BITS   *
33 *  SEC,X,Y,Z,U - SET PROG. ERROR COUNTER*
34 *  SMA,XXX - SET MAXIMUM ADDRESS        *
35 *  WCB - WRITE CHECK BITS        *
36 *  WVF - WRITE VALID ERROR FORCE        *
36 *                                       *
37 *                                       *
40 *                                       *
41 *                                       *
42 *FORMAT ERROR -  XXXXXXX               *  FORMAT ERROR
43 *CR ONLY - CYCLE TO NEXT DISPLAY       *
```

Utility Command Aid Display

This display is obtained by using the job command, L,2.

```
00 *UESM - monitor error message   *  TEST NAME, ERROR MSGS
01 *DC  ES  UE  DF  SE  DE  ST  RC  AM  II *  CONTROLS
02 *MODES=ESM  MIU XX  MARGN HALT UTILITY  *  MODES
03 *P0=0001 P1=7717 P2=0001 P3=0001 P4=0001*  PARAMETERS
04 * CLK X  RFRSH XXXX  TESTER  XX  MA ZZZ *  STATUS INDICATORS
05 *      ERROR STATUS  0000  0000  0      *  SIDE DOOR STATUS
06 *UTILITY COMMANDS   *
07 *  D - RETURN TO CMSE   *
10 *  R - RESTART, CLEAR ACTIVE UTILITIES  *
11 *  S - STOP ACTIVE UTILITIES, SCAN      *
12 *  (SP) - CONTINUE STOPPED UTIL, SCAN   *
13 *  LSP,Z,C - LOW SPEED PORT,PPZ,CH(C)   *
14 *  DMA,Z,C - FAST XFER PORT,CPPZ,CH(C)  *
15 *  BWR,X,Y,B,P - BLOCK WRITE/READ       *
16 *  FWR,X,Y,B,P - FULL WRITE/READ        *
17 *  RDD,X,Y,B,P - READ ESM        *
20 *  WRT,X,Y,B,P - WRITE ESM        *
21 *UTILITY COMMAND PARAMETERS   *
22 *    Z - PPU NO. FOR PORT UTILITY       *
23 *    C - PORT CHANNEL NUMBER   *
24 *    X - ESM BEGINNING ADDRESS, 24 BITS *
25 *    Y - ESM ENDING ADDRESS+1,  24 BITS *
26 *    B - BLOCK SIZE PER ACCESS, CM WORDS*
27 *    P - PATTERN FOR WRITE OR COMPARE   *
30 *        Z - ALL ZEROES        *
31 *        O - ALL ONES   *
32 *        F - FULL ADDRESS EACH 24 BITS  *
33 *        YYYY - CM ADDRESS OF OPERATOR  *
34 *      DEFINED BUFFER             *
35 *                                       *
36 *                                       *
37 *                                       *
40 *                                       *
41 *                                       *
42 *FORMAT ERROR -  XXXXXXX               *  FORMAT ERROR
43 *CR ONLY - CYCLE TO NEXT DISPLAY       *
```

Low Speed Port Utility Display

This display is obtained by using the CMSE command, BPzz, where zz is the NIO/CIO-PP containing the low speed utility.

```
00 *STATUS = status/error message   *  STATUS MESSAGE
01 *   UTILITY LOCATIONS   *  POINTERS TO KEY
02 *ADDRESS MEANING        *  MEMORY LOCATIONS
03 *  30     COMPARE ERRORS        *
04 *  31     READ ABORTS   *
05 *  32     WRITE ABORTS   *
06 * 33-37   FAILING BITS   *
07 *  40     PASS COUNTER   *
10 * 41-42   CURRENT BLOCK FWA   *
11 *  43     CURRENT BLOCK SIZE   *
12 * 1000    WRITE BUFFER   *
13 * 4000    READ BUFFER                    *
14 *                                        *
15 *                                        *
16 *                                        *
17 *                                        *
20 *                                        *
21 *                                        *
22 *                                        *
23 *                                        *
24 *                                        *
25 *                                        *
26 *                                        *
27 *                                        *
30 *                                        *
31 *                                        *
32 *                                        *
33 *                                        *
34 *                                        *
35 *                                        *
36 *                                        *
37 *                                        *
40 *                                        *
41 *                                        *
42 *                                        *
43 *                                        *
```

Fast Transfer DMA Port Utility Display

This display is obtained by using the CMSE command, BP,Czz, where zz is the CIO-PP containing the fast transfer DMA port utility.

```
00 *DMA STATUS = status/error message      *  STATUS MESSAGE
01 *   UTILITY LOCATIONS   *  POINTERS TO KEY
02 *ADDRESS MEANING        *  MEMORY LOCATIONS
03 *  30     COMPARE ERRORS        *
04 *  31     READ ABORTS   *
05 *  32     WRITE ABORTS   *
06 * 33-37   FAILING BITS   *
07 *  40     PASS COUNTER   *
10 * 41-42   CURRENT BLOCK FWA   *
11 *  43     CURRENT BLOCK SIZE   *
12 * 1171    ERROR STATUS UPPER   *  ADDRESS MAY VARY
13 * 1172    ERROR STATUS LOWER   *  ADDRESS MAY VARY
14 * 1173    OPERATIONAL STATUS   *  ADDRESS MAY VARY
15 * 1174    ESM STATUS   *  ADDRESS MAY VARY
16 * 0000000 CM WRITE/READ BUFFER          *  ADDRESS IS
17 *                                       *  DEPENDENT ON THE
20 *                                       *  CIO-PP NUMBER
21 *                                       *
22 *                                       *
23 *                                       *
24 *                                       *
25 *                                       *
26 *                                       *
27 *                                       *
30 *                                       *
31 *                                       *
32 *                                       *
33 *                                       *
34 *                                       *
35 *                                       *
36 *                                       *
37 *                                       *
40 *                                       *
41 *                                       *
42 *                                       *
43 *                                       *
```

Maintenance Tester Dump Display (Models I and II Only)

This display is obtained by using the UESM command, DMT. The display is only available when running from disk, and is only displayed in the dayfile. It is obtained by entering the CMSE command, AY, after entering a DMT command. This is intended only as a debugging tool for maintenance tester routines.

```
00 *MAINTENANCE TESTER DUMP                *
01 *                                       *
02 *P ADDRESS = XX                         *
03 *                                       *
04 *INSTRUCTION REGISTER =                 *
05 *                                       *
06 * 0X   1X   2X   3X   4X   5X   6X   7X *
07 *0000 0000 0000 0000 0000 0000 0000 0000*
10 *0000 0000 0000 0000 0000 0000 0000 0000*
11 *0000 0000 0000 0000 0000 0000 0000 0000*
12 *0000 0000 0000 0000 0000 0000 0000 0000*
13 *0000 0000 0000 0000 0000 0000 0000 0000*
14 *0000 0000 0000 0000 0000 0000 0000 0000*
15 *0000 0000 0000 0000 0000 0000 0000 0000*
16 *0000 0000 0000 0000 0000 0000 0000 0000*
17 *                                       *
20 *                                       *
21 *A-REGISTER = 00000                     *
22 *B-REGISTER = 00000                     *
23 *C-REGISTER = 00000                     *
24 *D-REGISTER = 00000                     *
25 *E-REGISTER = 000000000000000000000000  *
26 *F-REGISTER = 000000000000000000000000  *
30 *                                       *
31 *                                       *
32 *                                       *
33 *                                       *
34 *                                       *
35 *                                       *
36 *                                       *
37 *                                       *
40 *                                       *
41 *                                       *
42 *                                       *
43 *                                       *
```

Fast Transfer and Low Speed Port Status Messages

The following messages are the status messages displayed by the fast transfer and low speed port utilities during their execution. These messages are displayed as part of the utilities job display (displayed by using the CMSE job command, BPxx) or the CMSE active display requests display (displayed by using the CMSE command, AA or BA).

IDLE

This message is given to indicate that the utility is loaded but is not currently active on a utility routine.

STOPPED

This message indicates that the utility was active in a routine but was stopped by the operator command, S, given to UESM. The space bar command will continue execution of the routine.

END PASS

This message indicates that the utility was active in a utility routine and has completed a pass and was waiting for a continue from UESM when the selected delay time elapsed. When continued, the utility will repeat the selected routine.

ACTIVE WRT

This message indicates that the utility processor was selected to execute a WRT routine and that the routine is currently active.

ACTIVE BWR

This message indicates that the utility processor was selected to execute a BWR routine and that the routine is currently active.

ACTIVE RDD

This message indicates that the utility processor was selected to execute a RDD routine and that the routine is currently active.

ACTIVE FWR

This message indicates that the utility processor was selected to execute a FWR routine and that the routine is currently active.

Error Messages

The following messages are the various error messages that the operator may encounter during the execution of UESM.

Monitor Error Messages

The messages in this section are displayed as part of the job display (line 00) for the utility.

UTILITIES STOPPED

This stop message indicates that the operator has stopped execution of the test by giving the test an S job command. If the test is already stopped, when the S job command is received, this message will not be displayed. The space bar job command will resume execution of any utility that was active when the stop command was received.

UNABLE TO ACCESS SIDE DOOR PRT

This message informs the operator that the program was unable to access the side door port. Either the side door channel was entered incorrectly or the side door port failed to respond to a function. P0 is reset to 0077(8) to prevent further access to the channel.

SINGLE ERROR FULL

This message indicates when the status bit in the side door port sets for the single errors in the error log being full, (16(10) distinct single errors). If dayfile is enabled, the error log is dumped to the dayfile and the error log reset. If dayfile is not enabled, the operator will have to reset the error log by the CEL keyboard command.

DOUBLE ERROR FULL

This message indicates when the status bit in the side door port sets for the double errors in the error log being full, (16(10) double errors). If dayfile is enabled, the error log is dumped to the dayfile and the error log reset. If dayfile is not enabled, the operator will have to reset the error log by the CEL keyboard command.

ERROR COUNTER FULL

This message indicates when the status bit in the side door port sets for the programmable error counter in the error log being full. If dayfile is enabled, the error log is dumped to the dayfile and the error log reset. If dayfile is not enabled, the operator will have to reset the error log by the CEL keyboard command.

ENVIRONMENTAL- WARNING LEVEL

This message indicates when the status bit sets for an environmental condition that has reached the warning level.

ENVIRONMENTAL- SHUTDOWN LEVEL

This message indicates when the status bit in the side door port sets for an environmental condition that has reached the level where the memory is shutdown.

MAGNITUDE ERROR

This message indicates when the status bit in the side door port sets for a detected error on magnitude.

EVEN/ODD DATA COUNTER ERROR

This message indicates when the status bit in the side door port sets for a detected error on the even/odd data counter.

READ/WRITE DATA COUNTER ERROR

This message indicates when the status bit in the side door port sets for a detected error on the read/write data counter.

EVEN/ODD DATA SELECT ERROR

This message indicates when the status bit in the side door port sets for a detected error on the even/odd data select.

SLOT TIME ERROR

This message indicates when the status bit in the side door port sets for a detected error on the slot time.

FLAG GBA ERROR

This message indicates when the status bit in the side door port sets for a detected error on the flag GBA.

MEMORY GBA ERROR

This message indicates when the status bit in the side door port sets for a detected error on the memory GBA.

RELOCATION MEMORY PARITY ERROR

This message indicates when the status bit in the side door port sets for a parity error in the relocation memory.

MULTIPLE BSU READ VALID

This message indicates when the status bit in the side door port sets for a detected error for both BSU(S) sending a read valid in the same clock period.

MULTIPLE READ VALID, BSU 0

This message indicates when the status bit in the side door port sets for a detected error for more than one bank in BSU 0 sending a read valid in the same clock period.

MULTIPLE READ VALID, BSU 1

This message indicates when the status bit in the side door port sets for a detected error for more than one bank in BSU 1 sending a read valid in the same clock period.

MULTIPLE WRITE VALID

This message indicates when the status bit in the side door port sets for a detected error for receiving more than one write valid in the same clock period.

SIDE DOOR CHANNEL PARITY ERROR

This message indicates when the status bit in the side door port sets for a side door channel parity error.

BSU 0 ADDRESS PARITY ERROR

This message indicates when the status bit in the side door port sets for a BSU 0 address parity error.

BSU 1 ADDRESS PARITY ERROR

This message indicates when the status bit in the side door port sets for a BSU 1 address parity error.

BANK BUSY OVERFLOW

This message indicates when the status bit in the side door sets for a bank busy overflow condition in the busy logic. This is not an error condition.

REFRESH MARGIN yyyy

This message indicates that a new margin condition has has been set in the side door port, when the automatic refresh margins scanning is selected. The message appears only in the dayfile, and is used to determine the current margin conditions when an error is detected.

Double SECDED Error Messages

The messages in this section are displayed as part of the Double Error Log Display.

x yy z u av aw-cc xxxxxy / xxxxxz

When the model parameter is either zero or one, a double error has been logged in the error log. The location of the error was BSU x, bank yy, scan z, chip select u, cabinet number av, module location aw-cc, and chip address xxxxxy or xxxxxz. One to 16(10) of these messages may be displayed. A header line shows the columns for BSU, bank, scan, chip select, cabinet, module, and chip address.

yy z u A Acc xxxxxy / xxxxxz

When the model parameter is either two or three, a double error has been logged in the error log. The location of the error was bank yy, scan z, chip select u, chassis letter A, module slot location cc, and chip address xxxxxy or xxxxxz. One to 16(10) of these messages may be displayed. A header line shows the columns for bank, scan, chip select, chassis, module, and chip address.

Single SECDED Error Messages

The messages in this section are displayed as part of the Single Error Log Display.

SINGLE ERROR COUNTER xxxx xxxx xxxx

This message shows the number of single SECDED errors counted by the programmable single error counter. The total error count is indicated by xxxx xxxx xxxx.

x yy z u av aw-cc vv www bb

When the model parameter is either zero or one, a single error has been logged in the error log. The location of the error was BSU x, bank yy, scan z, chip select u, cabinet number av, module location aw-cc, bit vv, and chip location www within the module. The error has occurred bb (0 to 17(8)) times. One to 16(10) of these messages may be displayed. A header line shows the columns for BSU, bank, chip select, scan, cabinet, module, bit, chip location, and error count.

yy z u A Acc vv www bb

When the model parameter is either two or three, a single error has been logged in the error log. The location of the error was bank yy, scan z, chip select u, chassis letter A, module slot location cc, bit vv, and chip location www within the module.

The error has occurred bb (0 to 17(8)) times. One to 16(10) of these messages may be displayed. A header line shows the columns for BSU, bank, chip select, scan, cabinet, module, bit, chip location, and error count.

x yy z u av aw-cc MULTIPLE bb

When the model parameter is either zero or one, a multiple error has been logged as a single error in the side door port. The location of the error was BSU x, bank yy, scan z, chip select u, cabinet number av, module location aw-cc. The error has occurred bb (0 to 17(8)) times.

yy z u A Acc MULTIPLE bb

When the model parameter is either two or three, a multiple error has been logged as a single error in the side door port. The location of the error was bank yy, scan z, chip select u, chassis letter A, module slot location cc. The error has occurred bb (0 to 17(8)) times.

Fast Transfer and Low Speed Utility Error Messages

The following messages are the error messages displayed by the fast transfer and low speed utilities during their execution. These messages are displayed as part of the utility's job display (displayed by using the CMSE job command, BPxx) or the CMSE active display requests display (displayed by using the CMSE command, AA or BA). Additional error messages are available from the fast transfer DMA port utility (See Fast Transfer DMA Utility Error Messages).

DATA ERROR

This message indicates that the utility was active in a read routine with data checking selected, and a compare error was detected while stop on error or or stop all utilities on error was selected. For further information concerning this error, a CMSE BPxx command may be used to display the utility's job display which contains the addresses of the locations containing the failing bits, error counters, ESM/STORNET block FWA, block size, and buffer addresses (See Low Speed Port Utility Display and Fast Transfer DMA Port Utility Display). The utility routine is continued when a space bar job command indicates to UESM.

READ ABORT

This message indicates that the utility was active in a read routine and an abort was detected (channel went inactive or DMA transfer halted) while stop on error or stop all utilities was selected. The utility routine will continue when a space bar job command is given to UESM.

WRITE ABORT

This message indicates that the utility was active in a write routine and an abort was detected (channel went inactive or DMA transfer halted) while stop on error or stop all utilities was selected. The utility routine will continue when a space bar job command is given to UESM.

FLAG STOP

This message indicates that the utility was active in a utility routine when a status on bit 0 of the eighteen bit global register received an abort, indicating that another utility detected an error while stop all utilities on error was selected. The utility routine will continue when a space bar job command is given to UESM or another utility routine is selected.

Fast Transfer DMA Utility Error Messages

The following messages are the various error messages displayed by the fast transfer DMA port utility during its execution. These messages are displayed as part of the utility's job display (displayed by using the CMSE job command, BPxx) or the CMSE active display requests display (displayed by using the CMSE command, AA or BA).

NO INACTIVE TO LAST FUNC

This message indicates that the DMA enhanced channel adapter or ESM/STORNET subsystem failed to respond with an inactive to the last function.

INCOMPLETE WRITE DATA FROM CM

This message indicates that the T-register stopped decrementing before it reached zero during a write of data to ESM/STORNET from central memory.

INCOMPLETE READ DATA TO CM

This message indicates that the T-register stopped decrementing before it reached zero during a read of data from ESM/STORNET to central memory.

CH FAILED TO GO EMPTY

This message indicates that the channel failed to empty after an output.

NO INACTIVE AFTER DATA XFER

This message indicates that the channel failed to go inactive after the IOU executed a deactivate instruction following its input of subsystem status.

INCOMPLETE STATUS FROM DMA

This message indicates that the CY170 DMA enhanced channel adapter failed to return status to the IOU.

CHANNEL ERROR FLAG ON STATUS

This message indicates that the CY170 DMA enhanced channel adapter set the channel error flag while the IOU was reading status.

The following error conditions are detected by checking the error status register:

INVALID CM RESPONSE CODE

This message indicates that the response code received from central memory decoded into an illegal value.

CMI RESPONSE CODE PARITY ERROR

This message indicates that a parity error was detected on the central memory response code. The error was detected in the central memory interface (CMI) logic of the IOU4.

KX RESPONSE CODE PARITY ERROR

This message indicates that a parity error was detected on the central memory response code. The error was detected in the KX board in the IOU4.

CMI READ DATA PARITY ERROR

This message indicates that the IOU4 central memory interface (CMI) logic has detected a read data parity error on a DMA transfer with this channel's DMA enhanced CY170 channel adapter.

EXTERNAL CLOCK FAULT

This message indicates that a change was detected in the external clock.

OVERFLOW ERROR

This message indicates that data was received after the input buffer was full. The first word written into the input buffer is overwritten with the last word received.

INPUT DATA PARITY ERROR

This message indicates that a parity error was received on the input data.

12/16 CONVERSION ERROR

This message indicates that a parity error was detected in the 12/16 conversion logic on the KZ board in the IOU4.

JY DATA PARITY ERROR

This message indicates that the JY board in the IOU4 has detected a data parity error.

BARREL AND SLOT PARITY ERROR

This message indicates that the KX board has detected a parity error on the data received from the barrel and slot (PP) in the IOU4. The data is either an output word or a function word.

KZ ERROR(CB/OUTPUT DATA ERROR)

This message indicates that the KZ board in the IOU4 has detected an error. The error is either an output buffer data error or a CB array error in the IOU4.

JY ERROR(BCPE/RMAPE/CONCMREQ)

This message indicates that the JY board in the IOU4 has detected an error. The error is either a byte count parity error (BCPE), real memory address parity error (RMAPE), or a constant central memory request error (CONCMREQ).

KX ERROR(CR/OR/IR/FNC PARITY)

This message indicates that the KX board in the IOU4 has detected an error. The error is either a control register (CR), adapter output register (OR), adapter input register (IR), or function decoder PROM (FNC) parity error.

ERROR STATUS REGISTER = 000000

This message indicates that the utility was unable to decode the error status into one of the above error status error messages. The 16-bit octal value, 000000, will contain the nonzero error register status causing this error in octal format.

The following error conditions are detected by checking the ESM/STORNET status register:

READ ABORTED ON DOUBLE ERROR

This message indicates that the ESM/STORNET deactivated the channel during a read because it detected a double error.

READ ABORT ON MEM ADRS PARITY

This message indicates that the ESM/STORNET deactivated the channel during a read because it detected a memory address parity error.

READ ABORT ON ADRS OUT OF RANG

This message indicates that the ESM/STORNET deactivated the channel during a read because it detected an address out of range.

READ ABORTED

This message indicates that the ESM/STORNET deactivated the channel during a read for an unknown reason. That is, only the abort bit was set in ESM/STORNET status.

CHANNEL DEACTIVATED IN READ

This message indicates that the ESM/STORNET deactivated the channel during a read for an unknown reason. That is, the abort bit was not set in ESM/STORNET status.

WRITE ABORTED ON CH PARITY ERR

This message indicates that the ESM/STORNET deactivated the channel during a write because it detected a channel parity error.

WRITE ABORT ON MEM ADRS PARITY

This message indicates that the ESM/STORNET deactivated the channel during a write because it detected a memory address parity error.

WRITE ABORT ON ADRS OUT OF RNG

This message indicates that the ESM/STORNET deactivated the channel during a write because it detected an address out of range.

WRITE ABORTED

This message indicates that the ESM/STORNET deactivated the channel during a write for an unknown reason. That is, only the abort bit was set in ESM/STORNET status.

CHANNEL DEACTIVATED IN WRITE

This message indicates that the ESM/STORNET deactivated the channel during a write for an unknown reason. That is, the abort bit was not set in ESM/STORNET status.

Keyboard Command Error Messages

This section lists the error messages that may appear on line 42(8) when the UESM receives an incorrect keyboard command from the operator/user.

FORMAT ERROR -

This message indicates that UESM cannot accept the command as entered for one of a number of reasons. They are as follows:

- The command mnemonic (that is, the first characters of the command) contains five or more alphameric characters. All commands decoded by UESM are less than five alphameric characters in length.
- An alphameric parameter in the command contains three or more characters.
- The alphameric parameter for the WRL command was not I4 or IN which are the only acceptable parameters.

- The alphameric parameter for a utility command (BWR, FWR, RDD, or WRT) was not F, O, or Z which are the only acceptable parameters.
- The CIO channel type code for the channel given in the LSP or DMA command was not for a CY170 DMA Enhanced Channel Adapter.
- The channel given by parameter in the LSP or DMA command is already in use by another utility.
- The utility (LSP or DMA) loaded into the PP given by parameter is not the utility (LSP or DMA) requested by the command.
- The channel parameter is missing on a command to load a utility (LSP or DMA).
- Too many utilities (LSP or DMA) have been loaded.

CHAN RSV ERR -

This message indicates that CMSE has rejected a call by UESM to reserve the channel given in an LSP or DMA command. This may mean that the channel is already reserved and in use by another program.

ILLEGAL CMND -

This message indicates that UESM has received a command that is not legal for the ESM/STORNET model described in the model parameter, I.P4. Typically, this error occurs when the model parameter is for an ESM I/II but the command is for a STORNET only.

MISSING PARAM-

This message indicates that UESM has not received the character or characters that comprise the nonoptional parameter portion of the command.

NO SD ACCESS -

This message indicates that the side door channel is not available. It occurs when the side door channel parameter, I.P0, is set to the NULL channel value, 0077(8), and a command requiring the side door issued.

TRAILER DATA -

This message indicates that UESM has received a character or characters in its keyboard buffer that appears after the last character of an otherwise valid command.

RANGE ERROR -

This message indicates that UESM has received a character string in its keyboard buffer that exceeds the range of values permissible.

NO RELOC MEM -

This message indicates that relocation memory is not available on the ESM/STORNET model described in the model parameter, I.P4. Typically, this error occurs when the model parameter is for a STORNET but the command (WRL or RRL) is for an ESM I/II only.

NO MAINT TSTR-

This message indicates that maintenance tester is not available on the ESM/STORNET model described in the model parameter, I.P4. Typically, this error occurs when the model parameter is for a STORNET but the command is for an ESM I/II only.

Section Descriptions

UESM contains utility routines to read, write, and write/read ESM/STORNET memory with optional data checking from fast transfer DMA or low speed ports, and to set maintenance functions in the port.

Each utility routine is designed to loop continuously until an operator or error stop, with a variable pause time between passes. Patterns are provided for zeroes, ones, full address, or an operator defined pattern buffer.

UESM is designed to handle as many fast transfer DMA and/or low speed ports as are available simultaneously.

Utility Section Descriptions

All port utilities maintain a counter for abort on read, abort on write, and if data checking is selected, each read routine maintains an error counter and a 60-bit composite error word showing all bits that have failed. The fast transfer DMA and low speed port utilities have a parameter selectable stop on error and stop all utilities on error. The stop all utilities option uses bit 0 of the 18-bit global register for communication of the stop. When an error (read abort, write abort, or compare error) is detected, the utility processor that detected the error sets the bit. All processors will status the bit before performing an ESM/STORNET access and will stop until a continue is received from UESM if the bit is set.

In each utility, if the length of the memory area is not a multiple of the block length, the block length on the last access is altered to terminate at the ending address.

A keyboard command error message (See also Keyboard Command Error Messages) is generated and the command will not be processed if:

- The selected block size exceeds the buffer size (463(8) for LSP or 7777(8) for DMA) for the current port (RANGE ERROR -).
- The beginning address is greater than or equal to the end address+1 (RANGE ERROR -).
- The block size exceeds the difference between the beginning and ending address (RANGE ERROR -).
- Any parameter is omitted (MISSING PARAM-).
- The beginning address, ending address, or pattern address is greater than 77777777(8) (RANGE ERROR -).
- The block size is zero (RANGE ERROR -).
- The pattern parameter is not Z, O, F, or 24-bit CM address (FORMAT ERROR -).
- There are extra characters after the pattern parameter (TRAILER DATA -).

Low Speed Port Utility Sections

These utility sections provide the capability to read and write memory from a low speed port. An LSP,xx,yy must be entered before selecting a utility section in order to define the low speed port channel, yy, to use and load the program UESMPP, into the PP, xx (either NIO or CIO). Then, the utility section may be selected by using the RDD, WRT, BWR, or FWR command.

Command Descriptions

Read Command

```
RDD,xxxxxxxx,yyyyyyyy,bbb,pppppppp
```

where:

xxxxxxxx = 24-bit beginning address in ESM/STORNET to read

yyyyyyyy = 24-bit ending ESM/STORNET address + 1

bbb = Block size, number of words to read each time, 1 to 463(8) 60-bit words.

pppppppp = Pattern to read if data checking.

zzzzzzzz	-	24-bit real memory address of operator defined pattern in central memory must be bbb 60-bit words long.
Z	-	zeros
O	-	ones
F	-	full address

The selected PP is set up to read from the beginning address to the ending address in blocks of bbb 60-bit words. The data is read into address 4000(8) in the PP. If selected, data is checked. If data checking is selected, the expected pattern, pppppppp, is set up at address 1000(8) in the PP.

Sequence:

1. Initialize all error counters.
2. Initialize write buffer if data checking selected and pattern is all zeroes or all ones.
3. Plug channel number into all channel instructions.
4. If stop all utilities on error selected, clear bit 0 of the 18-bit flag register.
5. Initialize beginning and ending addresses and block size (in 12-bit words) to the values specified by this command.
6. If stop all utilities on error selected, perform status on bit 0 of the 18-bit global register.
7. If abort returned, set flag stop status and call ERRSTP to wait for continue from UESM.
8. If data checking selected and pattern is full address, generate expected buffer for current address.

9. Function channel for a read (5001(8)) or read one record (5041(8)).

10. Output two word ESM/STORNET address.

11. Input the block size number of 12-bit words.

12. If channel inactive, increment read abort counter. If stop all utilities on error selected, set bit 0 of the 18-bit flag register. If stop all or stop on error set, set read abort status and call ERRSTP to wait for continue from UESM, then clear bit 0 of the 18-bit flag register.

13. If data checking selected, compare read buffer against expected buffer.

14. If any errors detected, increment compare error counter and update composite data word; if stop all utilities selected, set bit 0 of the 18-bit global register. On error if stop on error set or stop all set, set compare error status and call ERRSTP to wait for continue; clear flag register if previously set.

15. Increment address. If the remaining memory length is less than selected block size, set block size to the remaining length. If last block, change read function to read one record (5041(8)) and complete remaining area one record at a time.

16. Repeat from item 6 for all selected memory.

17. Increment pass counter and send end of pass status to UESM and wait for response.

18. Repeat from item 5 if go received from UESM.

Write Command

```
WRT,xxxxxxxx,yyyyyyyy,bbb,pppppppp
```

where:

xxxxxxxx = 24-bit beginning address in ESM/STORNET to write

yyyyyyyy = 24-bit ending ESM/STORNET address + 1

bbb = Block size, number of words to write each time, 1 to 463(8) 60-bit words.

pppppppp = Pattern to write,

zzzzzzzz	-	24-bit real memory address of operator defined pattern in central memory must be bbb 60-bit words long.
Z	-	zeros
O	-	ones
F	-	full address

The selected PP is set up to write ESM/STORNET from address xxxxxxxx to yyyyyyyy in bbb 60-bit word blocks, using the pattern, pppppppp. The data buffer is set up at and written from address 1000(8) in the PP.

Sequence:

1. Initialize all error counters.

2. Initialize write buffer if data checking selected and pattern is all zeroes or all ones.

3. Plug channel number into all channel instructions.
4. If stop all utilities on error selected, clear bit 0 of the 18-bit flag register.
5. Initialize beginning and ending addresses and block size (in 12-bit words) to the values specified by this command.
6. If stop all utilities on error selected, perform status on bit 0 of the 18-bit global register.
7. If abort returned, set flag stop status and call ERRSTP to wait for continue from UESM.
8. If pattern is full address, generate write buffer for current address.
9. Function channel for a write (5002(8)).
10. Output two word ESM/STORNET address.
11. Output the block size number of 12-bit words.
12. If channel inactive, increment write abort counter. If stop all utilities on error selected, set bit 0 of the 18-bit flag register. If stop all or stop on error set, set read abort status and call ERRSTP to wait for continue from UESM, then clear bit 0 of the 18-bit flag register.
13. Increment address. If the remaining memory length is less than selected block size, set block size to the remaining length.
14. Repeat from item 6 for all selected memory.
15. Increment pass counter and send end of pass status to UESM and wait for response.
16. Repeat from item 5 if go received from UESM.

Block Write Read

```
BWR,xxxxxxxx,yyyyyyyy,bbb,pppppppp
```

where:

xxxxxxxx = 24-bit beginning address in ESM/STORNET

yyyyyyyy = 24-bit ending ESM/STORNET address + 1

bbb = Block size, number of words to write each time, 1 to 463(8) words.

pppppppp = Pattern to write,

zzzzzzzz	-	24-bit real memory address of operator defined pattern in central memory must be bbb 60-bit words long.
Z	-	zeros
O	-	ones
F	-	full address

The selected PP is set up to write and then read each block of the selected memory area, using a block size as in the RDD and WRT commands. The data pattern, pppppppp, is set up at and written from address 1000(8) and the data is read back to address 4000(8).

Sequence:

1. Initialize all error counters.
2. Initialize write buffer if pattern is all zeroes or all ones.
3. Plug channel number into all channel instructions.
4. If stop all utilities on error selected, clear bit 0 of the 18-bit flag register.
5. Initialize beginning and ending addresses and block size (in 12-bit words) to the values specified by this command.
6. If stop all utilities on error selected, perform status on bit 0 of the 18-bit global register.
7. If abort returned, set flag stop status and call ERRSTP to wait for continue from UESM.
8. If pattern is full address, generate write buffer for current address.
9. Function channel for a write (5002(8)).
10. Output two word ESM/STORNET address.
11. Output the block size number of 12-bit words.
12. If channel inactive, increment write abort counter. If stop all utilities on error selected, set bit 0 of the 18-bit flag register. If stop all or stop on error set, set read abort status and call ERRSTP to wait for continue from UESM, then clear bit 0 of the 18-bit flag register.
13. If stop all utilities on error selected, perform status on bit 0 of the 18-bit global register.
14. If abort returned, set flag stop status and call ERRSTP to wait for continue from UESM.
15. Function channel for a read (5001(8)) or read one record (5041(8)).
16. Output two word ESM/STORNET address.
17. Input the block size number of 12-bit words.
18. If channel inactive, increment read abort counter. If stop all utilities on error selected, set bit 0 of the 18-bit flag register. If stop all or stop on error set, set read abort status and call ERRSTP to wait for continue from UESM, then clear bit 0 of the 18-bit flag register.
19. If data checking selected, compare read buffer against expected buffer.
20. If any errors detected, increment compare error counter and update composite data word; if stop all utilities selected, set bit 0 of the 18-bit global register. On error if stop on error set or stop all set, set compare error status and call ERRSTP to wait for continue; clear flag register if previously set.
21. Increment address. If the remaining memory length is less than selected block size, set block size to the remaining length. If last block, change read function to read one record (5041(8)) and complete remaining area one record at a time.

22. Repeat from item 6 for all selected memory.

23. Increment pass counter and send end of pass status to UESM and wait for response.

24. Repeat from item 5 if go received from UESM.

Full Write Read

```
FWR,xxxxxxxx,yyyyyyyy,bbb,pppppppp
```

where:

xxxxxxxx = 24-bit beginning address in ESM/STORNET

yyyyyyyy = 24-bit ending ESM/STORNET address + 1

bbb = Block size, number of words to write each time, 1 to 463(8) words.

pppppppp = Pattern to write,

zzzzzzzz	-	24-bit real memory address of operator defined pattern in central memory must be bbb 60-bit words long.
Z	-	zeros
O	-	ones
F	-	full address

The selected PP is set up to write the selected memory area and then read it, using a block size as in the RDD and WRT commands. The data pattern, pppppppp, is set up at and written from address 1000(8) and the data is read back to address 4000(8).

Sequence:

1. Initialize all error counters.
2. Initialize write buffer if pattern is all zeroes or all ones.
3. Plug channel number into all channel instructions.
4. If stop all utilities on error selected, clear bit 0 of the 18-bit flag register.
5. Initialize beginning and ending addresses and block size (in 12-bit words) to the values specified by this command.
6. If stop all utilities on error selected, perform status on bit 0 of the 18-bit global register.
7. If abort returned, set flag stop status and call ERRSTP to wait for continue from UESM.
8. If pattern is full address, generate write buffer for current address.
9. Function channel for a write (5002(8)).
10. Output two word ESM/STORNET address.
11. Output the block size number of 12-bit words.

12. If channel inactive, increment write abort counter. If stop all utilities on error selected, set bit 0 of the 18-bit flag register. If stop all or stop on error set, set read abort status and call ERRSTP to wait for continue from UESM, then clear bit 0 of the 18-bit flag register.

13. Increment address. If remaining memory is less than selected block size, set block size to remaining.

14. Repeat from item 6 for all selected memory.

15. Initialize beginning address.

16. If stop all utilities on error selected, perform status on bit 0 of the 18-bit global register.

17. If abort returned, set flag stop status and call ERRSTP to wait for continue from UESM.

18. If data checking selected and pattern is full address, generate expected buffer for current address.

19. Function channel for a read (5001(8)) or read one record (5041(8)).

20. Output two word ESM/STORNET address.

21. Input the block size number of 12-bit words.

22. If channel inactive, increment read abort counter. If stop all utilities on error selected, set bit 0 of the 18-bit flag register. If stop all or stop on error set, set read abort status and call ERRSTP to wait for continue from UESM, then clear bit 0 of the 18-bit flag register.

23. If data checking selected, compare read buffer against expected buffer.

24. If any errors detected, increment compare error counter and update composite data word; if stop all utilities selected, set bit 0 of the 18-bit global register. On error, if stop on error set or stop all set, set compare error status and call ERRSTP to wait for continue; clear flag register if previously set.

25. Increment address. If the remaining memory length is less than selected block size, set block size to the remaining length. If last block, change read function to read one record (5041(8)) and complete remaining area one record at a time.

26. Repeat from item 16 for all selected memory.

27. Increment pass counter and send end of pass status to UESM and wait for response.

28. Repeat from item 5 if go received from UESM.

Fast Transfer DMA Port Utility Sections

These utility sections provide the capability to read and write memory from a fast transfer DMA port. A DMA,xx,yy must be entered before selecting a utility to define the fast transfer DMA port channel, yy, to use and load the program UESMCP, into the CIO-PP, xx. An attempt to load an NIO-PP will cause the keyboard command error message, RANGE ERROR -DMA,xx,yy, to be displayed.

Command Descriptions

Read Command

```
RDD,xxxxxxxx,yyyyyyyy,bbb,pppppppp
```

where:

xxxxxxxx = 24-bit beginning address in ESM/STORNET to read

yyyyyyyy = 24-bit ending ESM/STORNET address + 1

bbb = Block size, number of words to read each time, 1 to 7777(8) 60-bit words.

pppppppp = Pattern to read if data checking.

zzzzzzzz	-	24-bit real memory address of operator defined pattern in central memory must be bbb 60-bit words long.
Z	-	zeros
O	-	ones
F	-	full address

The selected CIO-PP is set up to read from the beginning address to the ending address in blocks of bbb 60-bit words. The data is read into central memory. If selected, data is compared with the data pattern, pppppppp.

Sequence:

1. Initialize all error counters.
2. Initialize central memory write buffer if data checking selected and pattern is all zeroes or all ones.
3. Plug channel number into all channel instructions.
4. If stop all utilities on error selected, clear bit 0 of the 18-bit flag register.
5. Initialize beginning and ending addresses and block size (in 12-bit words) to the values specified by this command.
6. If stop all utilities on error selected, perform status on bit 0 of the 18-bit global register.
7. If abort returned, set flag stop status and call ERRSTP to wait for continue from UESM.
8. If data checking selected and pattern is full address, generate expected buffer for current address.

9. Function channel for fast mode transfer (5402(8)).

10. Set DMA adapter control register (111000(8)) for 60-bit CM words (20000(8)) and disable CYBER 170 mode error flag (400(8)).

11. Set DMA adapter T-register (117000(8)) to the block size in 8-bit bytes and first byte address in central memory.

12. Function channel for a read (5001(8)) or read one record (5041(8)).

13. Function channel for DMA fast input (102402(8)).

14. Output two word ESM/STORNET address.

15. Wait for T-register byte count (function = 116000(8)) to reach zero.

16. Read DMA adapter Operational Status register (function = 114000(8)).

17. Function DMA adapter to clear DMA mode (104000(8)).

18. Function channel to disable fast mode transfer (5602(8)).

19. If DMA Transfer Halted (000004(8)) is set in operational status, clear T-register (101000(8)), read low speed port status (5004(8)), and increment read abort counter. If stop all utilities on error selected, set bit 0 of the 18-bit flag register. If stop all or stop on error set, set read abort status and call ERRSTP to wait for continue from UESM, then clear bit 0 of the 18-bit flag register.

20. If data checking selected, compare read buffer against expected buffer.

21. If any errors detected, increment compare error counter and update composite data word; if stop all utilities selected, set bit 0 of the 18-bit global register. On error if stop on error set or stop all set, set compare error status and call ERRSTP to wait for continue; clear flag register if previously set.

22. Increment address. If the remaining memory length is less than selected block size, set block size to the remaining length. If last block, change read function to read one record (5041(8)) and complete remaining area one record at a time.

23. Repeat from item 6 for all selected memory.

24. Increment pass counter and send end of pass status to UESM and wait for response.

25. Repeat from item 5 if go received from UESM.

Write Command

```
WRT,xxxxxxxx,yyyyyyyy,bbb,pppppppp
```

where:

xxxxxxxx = 24-bit beginning address in ESM/STORNET to write

yyyyyyyy = 24-bit ending ESM/STORNET address + 1

bbb = Block size, number of words to write each time, 1 to 7777(8) 60-bit words.

pppppppp = Pattern to write,

zzzzzzzz	-	24-bit real memory address of operator defined pattern in central memory must be bbb 60-bit words long.
Z	-	zeros
O	-	ones
F	-	full address

The selected CIO-PP is set up to write ESM/STORNET from address xxxxxxxx to yyyyyyyy in bbb 60-bit word blocks, using the pattern, pppppppp. The data buffer is set up in and written from central memory.

Sequence:

1. Initialize all error counters.
2. Initialize central memory write buffer if data checking selected and pattern is all zeroes or all ones.
3. Plug channel number into all channel instructions.
4. If stop all utilities on error selected, clear bit 0 of the 18-bit flag register.
5. Initialize beginning and ending addresses and block size (in 12-bit words) to the values specified by this command.
6. If stop all utilities on error selected, perform status on bit 0 of the 18-bit global register.
7. If abort returned, set flag stop status and call ERRSTP to wait for continue from UESM.
8. If pattern is full address, generate central memory write buffer for current address.
9. Function channel for fast mode transfer (5402(8)).
10. Set DMA adapter control register (111000(8)) for 60-bit CM words (20000(8)) and disable CYBER 170 mode error flag (400(8)).
11. Set DMA adapter T-register (117000(8)) to the block size in 8-bit bytes and first byte address in central memory.
12. Function channel for a write (5002(8)).
13. Function channel for DMA fast output (103402(8)).
14. Output two word ESM/STORNET address.

15. Wait for T-register byte count (function 116000(8)) to reach zero.

16. Read DMA adapter operational status register (function 114000(8)).

17. Function DMA adapter to clear DMA mode (104000(8)).

18. Function channel to disable fast mode transfer (5602(8)).

19. If DMA transfer halted (000004(8)) is set in operational status, clear T-register (101000(8)), read low speed port status (5004(8)), and increment write abort counter. If stop all utilities on error selected, set bit 0 of the 18-bit flag register. If stop all or stop on error set, set read abort status and call ERRSTP to wait for continue from UESM, then clear bit 0 of the 18-bit flag register.

20. Increment address. If the remaining memory length is less than selected block size, set block size to the remaining length.

21. Repeat from item 6 for all selected memory.

22. Increment pass counter and send end of pass status to UESM and wait for response.

23. Repeat from item 5 if go received from UESM.

Block Write Read

```
BWR,xxxxxxxx,yyyyyyyy,bbb,pppppppp
```

where:

xxxxxxxx = 24-bit beginning address in ESM/STORNET

yyyyyyyy = 24-bit ending ESM/STORNET address + 1

bbb = Block size, number of words to write each time, 1 to 7777(8) words.

pppppppp = Pattern to write,

zzzzzzzz	-	24-bit real memory address of operator defined pattern in central memory must be bbb 60-bit words long.
Z	-	zeros
O	-	ones
F	-	full address

The selected CIO-PP is set up to write and then read each block of the selected memory area, using a block size as in the RDD and WRT commands. The data pattern, pppppppp, is set up in and written from central memory.

Sequence:

1. Initialize all error counters.

2. Initialize central memory write buffer if pattern is all zeroes or all ones.

3. Plug channel number into all channel instructions.

4. If stop all utilities on error selected, clear bit 0 of the 18-bit flag register.

5. Initialize beginning and ending addresses and block size (in 12-bit words) to the values specified by this command.

6. If stop all utilities on error selected, perform status on bit 0 of the 18-bit global register.
7. If abort returned, set flag stop status and call ERRSTP to wait for continue from UESM.
8. If pattern is full address, generate write buffer for current address.
9. Function channel for fast mode transfer (5402(8)).
10. Set DMA adapter control register (111000(8)) for 60-bit CM words (20000(8)) and disable CYBER 170 mode error flag (400(8)).
11. Set DMA adapter T-register (117000(8)) to the block size in 8-bit bytes and first byte address in central memory.
12. Function channel for a write (5002(8)).
13. Function channel for DMA fast output (103402(8)).
14. Output two word ESM/STORNET address.
15. Wait for T-register byte count (function 116000(8)) to reach zero.
16. Read DMA adapter operational status register (function 114000(8)).
17. Function DMA adapter to clear DMA mode (104000(8)).
18. Function channel to disable fast mode transfer (5602(8)).
19. If DMA transfer halted (000004(8)) is set in operational status, clear T-register (101000(8)), read low speed port status (5004(8)), and increment write abort counter. If stop all utilities on error selected, set bit 0 of the 18-bit flag register. If stop all or stop on error set, set read abort status and call ERRSTP to wait for continue from UESM, then clear bit 0 of the 18-bit flag register.
20. If stop all utilities on error selected, perform status on bit 0 of the 18-bit global register.
21. If abort returned, set flag stop status and call ERRSTP to wait for continue from UESM.
22. Function channel for fast mode transfer (5402(8)).
23. Set DMA adapter control register (111000(8)) for 60-bit CM words (20000(8)) and disable CYBER 170 mode error flag (400(8)).
24. Set DMA adapter T-register (117000(8)) to the block size in 8-bit bytes and first byte address in central memory.
25. Function channel for a read (5001(8)) or read one record (5041(8)).
26. Function channel for DMA fast input (102402(8)).
27. Output two word ESM/STORNET address.
28. Wait for T-register byte count (function 116000(8)) to reach zero.
29. Read DMA adapter Operational Status register (function 114000(8)).

30. Function DMA adapter to clear DMA mode (104000(8)).

31. Function channel to disable fast mode transfer (5602(8)).

32. If DMA transfer halted (000004(8)) is set in operational status, clear T-register (101000(8)), read low speed port status (5004(8)), and increment read abort counter. If stop all utilities on error selected, set bit 0 of the 18-bit flag register. If stop all or stop on error set, set read abort status and call ERRSTP to wait for continue from UESM, then clear bit 0 of the 18-bit flag register.

33. If data checking selected, compare read buffer against expected buffer.

34. If any errors detected, increment compare error counter and update composite data word; if stop all utilities selected, set bit 0 of the 18-bit global register. On error if stop on error set or stop all set, set compare error status and call ERRSTP to wait for continue; clear flag register if previously set.

35. Increment address. If the remaining memory length is less than selected block size, set block size to the remaining length. If last block, change read function to read one record (5041(8)) and complete remaining area one record at a time.

36. Repeat from item 6 for all selected memory.

37. Increment pass counter and send end of pass status to UESM and wait for response.

38. Repeat from item 5 if go received from UESM.

Full Write Read

```
FWR,xxxxxxxx,yyyyyyyy,bbb,pppppppp
```

where:

xxxxxxxx = 24-bit beginning address in ESM/STORNET

yyyyyyyy = 24-bit ending ESM/STORNET address + 1

bbb = Block size, number of words to write each time, 1 to 7777(8) words.

pppppppp = Pattern to write,

zzzzzzzz	–	24-bit real memory address of operator defined pattern in central memory must be bbb 60-bit words long.
Z	–	zeros
O	–	ones
F	–	full address

The selected CIO-PP is set up to write the selected memory area and then read it, using a block size as in the RDD and WRT commands. The data pattern, pppppppp, is set up in and written from central memory.

Sequence:

1. Initialize all error counters.

2. Initialize central memory write buffer if pattern is all zeroes or all ones.

3. Plug channel number into all channel instructions.

4. If stop all utilities on error selected, clear bit 0 of the 18-bit flag register.
5. Initialize beginning and ending addresses and block size (in 12-bit words) to the values specified by this command.
6. If stop all utilities on error selected, perform status on bit 0 of the 18-bit global register.
7. If abort returned, set flag stop status and call ERRSTP to wait for continue from UESM.
8. If pattern is full address, generate write buffer for current address.
9. Function channel for fast mode transfer (5402(8)).
10. Set DMA adapter control register (111000(8)) for 60-bit CM words (20000(8)) and disable CYBER 170 mode error flag (400(8)).
11. Set DMA adapter T-register (117000(8)) to the block size in 8-bit bytes and first byte address in central memory.
12. Function channel for a write (5002(8)).
13. Function channel for DMA fast output (103402(8)).
14. Output two word ESM/STORNET address.
15. Wait for T-register byte count (function 116000(8)) to reach zero.
16. Read DMA adapter operational status register (function 114000(8)).
17. Function DMA adapter to clear DMA mode (104000(8)).
18. Function channel to disable fast mode transfer (5602(8)).
19. If DMA transfer halted (000004(8)) is set in operational status, clear T-register (101000(8)), read low speed port status (5004(8)), and increment write abort counter. If stop all utilities on error selected, set bit 0 of the 18-bit flag register. If stop all or stop on error set, set read abort status and call ERRSTP to wait for continue from UESM, then clear bit 0 of the 18-bit flag register.
20. Increment address. If the remaining memory length is less than selected block size, set block size to the remaining length.
21. Repeat from item 6 for all selected memory.
22. Initialize beginning address.
23. If stop all utilities on error selected, perform status on bit 0 of the 18-bit global register.
24. If abort returned, set flag stop status and call ERRSTP to wait for continue from UESM.
25. If data checking selected and pattern is full address, generate expected buffer for current address.
26. Function channel for fast mode transfer (5402(8)).

27. Set DMA adapter control register (111000(8)) for 60-bit CM words (20000(8)) and disable CYBER 170 mode error flag (400(8)).

28. Set DMA adapter T-register (117000(8)) to the block size in 8-bit bytes and first byte address in central memory.

29. Function channel for a read (5001(8)) or read one record (5041(8)).

30. Function channel for DMA fast input (102402(8)).

31. Output two word ESM/STORNET address.

32. Wait for T-register byte count (function 116000(8)) to reach zero.

33. Read DMA adapter operational status register (function 114000(8)).

34. Function DMA adapter to clear DMA mode (104000(8)).

35. Function channel to disable fast mode transfer (5602(8)).

36. If DMA transfer halted (000004(8)) is set in operational status, clear T-register (101000(8)), read low speed port status (5004(8)), and increment read abort counter. If stop all utilities on error selected, set bit 0 of the 18-bit flag register. If stop all or stop on error set, set read abort status and call ERRSTP to wait for continue from UESM, then clear bit 0 of the 18-bit flag register.

37. If data checking selected, compare read buffer against expected buffer.

38. If any errors detected, increment compare error counter and update composite data word; if stop all utilities selected, set bit 0 of the 18-bit global register. On error, if stop on error set or stop all set, set compare error status and call ERRSTP to wait for continue; clear flag register if previously set.

39. Increment address. If the remaining memory length is less than selected block size, set block size to the remaining length. If last block, change read function to read one record (5041(8)) and complete remaining area one record at a time.

40. Repeat from item 16 for all selected memory.

41. Increment pass counter and send end of pass status to UESM and wait for response.

42. Repeat from item 5 if go received from UESM.

Appendixes

Error Code 1 (EC1) Definitions A

The following tables describe the various fields (P,Q,R,X) of the 16-bit hexadecimal error code number one (EC1). EC1 provides a general description of the type of error (R), the major hardware element (P) involved, and major functional area of that element (Q). Many of the EC1 definitions described in these tables do not apply to the program described in this document and are only included for completeness and to provide commonality with other programs developed for the hardware CYBER 180 product line.

NOTE

Error Code 1 has the format: EC1=PQRX

Type of failure (R-field)

R=0 Status error
R=1 Data error
R=2 Function error
R=3 Interrupt error
R=4 Instruction error
R=5 Address error
R=6 Error check or hardware error (hardware detected)
R=7 Undefined error
R=8 Multisymptom error
R=9-F Not used

Major hardware element of failure (P-field)

P=0 Input Output Unit (IOU, I4)
P=1 Central Processing Unit 1 (CPU0)
P=2 Central Processing Unit 2 (CPU1)
P=3-5 Not used
P=6 Central Memory (CM)
P=7 Common Memory (CMEM)
P=8 Extended Memory (XMEM)
P=9 Peripherals (I/O)
P=A,B Not used
P=C CONFIG/ENVIRON/MONITOR (CEM)
P=D Performance Monitor Facility (PMF)
P=E Not used
P=F Miscellaneous (MISC)

Major functional area of failing hardware element (Q-field)

For the Input Output Unit (P=0)

Q=0	Control logic	Q=4	Arithmetic Unit
Q=1	Memory	Q=5	Channel Logic
Q=2	R-register	Q=6	Maintenance Channel
Q=3	Central Memory access	Q=7-F	Not Used

For Central Processing Unit (P=1,2), the definitions vary with each CPU type.

For Central Memory (P=6), Common Memory (P=7), and Extended Memory (P=8)

Q=0	Port logic	Q=3	Storage Unit
Q=1	Distributor logic	Q=4	Maintenance Channel
Q=2	Bank logic	Q=5-F	Not Used

For Input/Output hardware (P=9)

Q=0	Rotating Mass Storage	Q=6	Terminal
Q=1	Magnetic Tape	Q=7	Console
Q=2	Communications Multiplexer	Q=8	Paper Tape
Q=3	Card Reader	Q=9	Optical Character Recognition
Q=4	Card Punch	Q=A	Graphics Plotter
Q=5	Line Printer	Q=B	Matrix Algorithm Processor (MAP)
		Q=C-F	Not Used

For CONFIG/ENVIRON/MONITOR (P=C) and Performance Monitor Facility (P=D)

Q=0	Control logic
Q=1	Channel logic
Q=2-F	Not Used

For Miscellaneous failing elements (P=F)

Q=0	Manual intervention failure	Q=3	Undefined failure
Q=1	Informational failure	Q=4-F	Not used
Q=2	Operator failure		

NOS HYDRA Fault Codes B

The following pages describe the HYDRA Fault Codes provided to HPA by NOS.

Fault Code	Detection Mechanism
FC = 1 Channel Parity Error	The error processor will set this fault code under the following conditions. • The IHD returned ISI Parity error (MI63). • Bit 57 of the error astatus register is set.
FC = 4 Channel Detected Error	The error processor determined that error register bits 59, 60, 62, or 63 are set or bit 61 is set and bit 57 is not set.
FC = 5 Channel Detected CM Error	The error processor determined that error status register bit 50, 51, 52, 53, or 54 is set. These bits indicate an error has been reported in the DMA channel interface to memory.
FC = 6 ISI Channel Erorr	As an initial fault code, this means the channel error flag was in a nonzero state. This indicates an error is reported in the channel error status register. The error processor will set this fault code as a final fault code if bit 56 or 58 are set in the error status register.
FC = 7 Channel Hung Full	The channel did not go empty within the allotted time while transferring data between the CPP and the channel.
FC = 10(8) Attention Timeout	The IHD did not execute ATTENTION within the Attention Timeout allotted time. The timeout value is based on what command the IHD is processing.
FC = 11(8) Channel Function Timeout	The channel did not go inactive within the allotted time after a channel function was issued.

Fault Code	Detection Mechanism
FC = 14(8) Data Parity Error	The IHD returned one of the following status: • Unable to read FC = 14(8). • Unable to read header (SI41). • Header Miscompare (SI42). • Unable to read data (SI43). • Unable to write header (SI67) and the read/write confidence tests available in the IHD do not fail.
FC = 20(8) Device Not Ready	The IHD returned a drive not ready status (MIC1)and the driver was unable to spin up the drive.
FC = 21(8) Overtemp	The IHD returned on Overtemp (MI6B) status.
FC = 24(8) Incomplete Data Transfer	The driver detected an incomplete transfer when the A register is nonzero after a transfer.
FC = 30(8) IHD Failure	The IHD has reported an error by setting system intervention or manual intervention in the IHD status block. This condition is checked whenever the IHD status block is read to determine why ATTENTION is set.
FC = 31(8) Invalid Command Block Number	The status returned to the host by the IHD was for a command block that was not in use. (Only command block zero is used by the NOS drives.)
FC = 32(8) Incorect Unit Selected	The driver will request the IHD to respond with a bit significant response whenever the IHD is selected to initiate a new I/O request. The driver reports this fault code when the invalid BSR is returned.

Fault Code	Detection Mechanism
FC = 33(8) Select Timeout	The IHD selection process will wait for the following state on the ISI channel before declaring an IHD selected. Select Hold Set Select Active Set Pause Clear Synch In Clear Synch Out Clear If this state is not achieved within the allotted time, then the driver will declare a Select Timeout.
FC = 34(8) Power Up Failure	An execution status other than Command Complete status was returned to the host after a Power Spindle Up command (Command Byte 13) has been initiated.
FC = 35(8) Power Down Failure	An execution status other than Command Complete status was returned to the host after a Power Spindle Down command (Command Byte 12) has been initiated.
FC = 36(8) Transfer Complete Timeout	The DMA transfer between the disk and UEM did not complete in the allotted time. (Bit 0 of the Operational status register did not get set to a one value.)
FC = 37(8) Unexpected Execution Status	The IHD did not respond to a selective reset with an execution status of command block independent.
FC = 40(8) Command Block Timeout	The transfer in progress flag (bit 0 of the operational status register) did not clear in the allotted time after a command block was output on the channel.
FC = 41(8) Unexpected Delay Status	The IHD did not return a Host Generated Reset Delay status (DS85) to the host after a selective reset has been initiated.
FC = 42(8) Load Operating Mode Parameters Failure	An execution status of other than Command Complete status was returned to the host after a Load Operating Mode Parameter command (Command byte 53) or a Load Attention Delay Parameters command (Command byte 54) has been initiated.

Fault Code	Detection Mechanism
FC = 43(8) Select Active Timeout	The IHD selection process will check select hold and select active before initiating a selection sequence. The selection sequence will be terminated if select hold is clear while select active is set.
FC = 44(8) T-Register Empty Timeout	The T register in the DMA channel did not go empty in the allotted time while transferring data between UEM and disk via DMA.
FC = 45(8) I/O Initiation Error	The IHD did not return an execution status of Read Data Available or Buffer Space Available after a read or write command was initiated. This error may be encountered while transferring data between UEM or the disk or while reading the error register image or the error log is being read from the IHD.
FC = 46(8) I/O Complete Failure	The IHD did not return a Command Complete status after an I/O transfer was terminated. This may be encountered while transferring data between UEM and the IHD or while the error register image or error log is being read from the IHD.
FC = 50(8) Diagnostic Fault	An execution status other than Command Complete was returned after a diagnostic command was initiated by the host or the diagnostic command returned a diagnostic failure (SIA6, MI6A) to the host.
FC = ?? Controller Reserve	The driver encountered a UNIT SELECTION TIMEOUT. If the busy bit was set for the IHD being selected, then the fault code is changed to CONTROLLER RESERVE.

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