CERTANCE

LTO-2

Ultrium Tape Drive

SCSI Interface Manual

Part Number: 50001368
December 2003

Important Information About This Manual

Contents

1 INTRODUCTION:

The Certance LTO drives are designed for computer environments requiring high performance, ultra-high capacity data storage. The drives are available in 5.25-inch internal configurations or as an external subsystem.

Certance LTO drives contain an embedded Small Computer Systems Interface (SCSI) controller. Parallel SCSI drives provide synchronous or asynchronous SCSI and a high speed burst synchronous data transfer rate of 80 megabytes/second. The internal drives are tailored for easy installation in today's computers and the full-featured embedded controller facilitates easy integration into a variety of systems.

1.1 About This Manual:

The information in this manual applies to the CL 400 drive. For drive-specific installation and operational information, including connector information, refer to the Installation Guide or Product Description Manual for the specific model of your drive.

2 INTERFACE OVERVIEW:

The Certance LTO drives are designed to operate with the Small Computer System Interface (SCSI) bus. This chapter discusses interface operation as it pertains to drive functions.

2.1.1 ANSI Standards:

In addition to the information presented in this manual, we recommend that you review the applicable SCSI-3 standards before writing host software drivers. Also, see the conformance statements, which are given in the Product Description Manual for each model of LTO drive.

SCSI is a set of standard interfaces established to support peripheral equipment such as printers, tape drives, magnetic disks, optical disks for microcomputers and other computer systems. The Parallel SCSI bus can support up to sixteen devices consisting of any multiple of host adapters and peripheral devices.

The Certance LTO drives comply with SCSI-2 and SCSI-3 specifications. In a few cases, vendor unique features are available. These features are compatible with the SCSI standards.

LTO drives support LUN 0 in stand-alone mode and can support LUN 1 when installed in a media changer (tape autoloader or library).

2.1.2 Cabling and Connectors:

The cabling requirements and pin assignments for the SCSI connector for the internal drive models are given in the respective installation guide and Product Description Manual for each model of LTO drive.

2.1.3 General features:

The CL 400 supports the following:

- Operation in both single and multi-initiator systems
- Fixed and variable block transfer lengths
- Space blocks, filemarks, and EOD
- Log Sense and Log Select for managing soft error reporting
- Multiple LUN support for command forwarding of LUN 1 command to libraries

- Multiple Initiator support

2.2 Parallel SCSI Interface:

2.2.1 General features:

The CL 400 supports the following:

- Integrated Single-Ended & Low Voltage Differential SCSI transceivers
- ST data transfers with parity protection running a max rate of 80Mbytes/sec
- DT data transfers with CRC protection running a max rate of 160Mbytes/sec
- 16 bit SCSI arbitration.
- Disconnect/reconnect
- Hard reset
- Integrated SCSI bus analyzer function.

2.2.2 Disconnect/Reconnect Function:

When the drive is performing a task not requiring communication with the Initiator or when the tape drive determines that a relatively long time has passed with no bus activity, it disconnects from the SCSI bus. Examples are:

- When rewinding the tape.
- When writing to the tape and the buffer is full.
- When reading from the tape and the buffer is empty.
- When spacing, locating, or generally performing any tape motion when data cannot be transferred on the SCSI bus.

During the time the Target is disconnected for one of these functions, the bus is free for use by other devices. Both disconnect and reconnect are initiated by the Target.

If the tape drive is selected while disconnected, it only allows the following actions:

- If the command is from a different initiator or is from the same initiator but to a different LUN, the tape drive accepts the command and immediately disconnects if the command is a media-access command. If the new command is a Request Sense, Inquiry or Test Unit Ready, then the new command is executed immediately.
- Immediately following the selection, the Initiator may send the Identify, No Op, Abort, or Bus Device Reset messages to the drive.
- If the command is from the same initiator to the same LUN, the current command terminates with a Check Condition and an Abort Sense Key.

2.2.3 SCSI Messages:

The SCSI message codes, descriptions, and directions are given in the following table. Each of these SCSI messages are supported by the Certance LTO drive.

Code	Description	Direction
00h	Command Complete	In
01h	Extended Message*	In/Out
02h	Save Data Pointer	In
03h	Restore Pointers	In

Code	Description	Direction
04h	Disconnect	In
05h	Initiator Detected Error	Out
06h	Abort	Out
07h	Message Reject	In/Out
08h	No Operation	Out
09h	Message Parity Error	Out
0Ch	Bus Device Reset	Out
23h	Ignore Wide Residue	In
80h+	Identify	In/Out

Notes: In = Drive to host; Out = Host to drive

* Only three extended messages are supported: Parallel Protocol Request, Synchronous Data Transfer Request and Wide Data Transfer Request.

2.2.4 Inbound messages:

The following table lists drive to host SCSI messages and their definitions.

Message	Hex Code	Definition
Command Complete	00h	This message is sent by the drive at the end of the status phase to indicate that a command is complete. Once the message is sent, the drive releases the bus and goes to Bus Free
Disconnect	04h	This message is sent by the drive to indicate that it is about to disconnect from the bus and go to Bus Free. During a Data phase, it is always preceded by a Save Data Pointers message. If a Message Reject message is received in response to this message, then the disconnect is prevented.
Extended Message	01h	See page 11 for a description of extended message support
Identify	80h+	An Identify in message is sent to the initiator during reconnect to indicate which Logical Unit is reconnecting. The Disconnect Privilege and LUN-TAR flags will both be clear
Ignore Wide Residue	23h	This message is sent by the drive to the initiator to indicate that a byte on a wide bus is not valid. This will be supported whenever a wide transfer is active.
Message Reject	07h	This message is sent to the initiator when the message received by the drive is unsupported or inappropriate.
Restore Pointers	03h	This message causes the initiator to reset its data transfer pointers to the values they held when the last Save Data Pointers message was sent. It will be sent when a parity error is detected on the bus or when an Initiator Detected Error message is received in order to retry the data phase.
Save Data Pointer	02h	This message instructs the initiator to save its current data transfer pointer for use with a subsequent Restore pointers message. This message will always be sent before a Disconnect message during data phases.

2.2.5 Outbound messages:

The following table lists host to drive SCSI messages and their definitions.

Message	Hex Code	Definition
Abort	06h	An abort condition is generated. See Message exception handling on page 13.
Bus Device Reset	0Ch	A reset condition is generated. . See Message exception handling on page 13.
Extended Message	01h	See Extended messages on the following page for a description of extended message support

Message	Hex Code	Definition
Identify	80h+	The Identify Out message is sent by the initiator to identify the Logical Unit to be accessed and to set Disconnect Privilege. The LUNTAR flag must be zero. The Identify Out message must be sent as the first thing after selection. If it is sent at any other time, the drive will respond with a message reject message and go to Bus Free.
Initiator Detected Error	05h	The initiator has detected an error in the data being sent in a Message Command, Data or Status phase. The drive will retry the data burst or message. If the message is received immediately after an Identify message or after the Command Complete message has been sent, the drive will go Bus Free.
Message Parity Error	09h	The initiator has detected a parity error in a message. The drive will retry the message. If the message is received during a Command, Data or Status phase, immediately after an Identify message or after the Command Complete message has been sent, the drive will go Bus Free.
Message Reject	07h	This message is sent when the initiator does not support a message sent by the drive or considers the message inappropriate. If the message being rejected is Disconnect, Synchronous Data Transfer Request or Wide Data Transfer Request, the operation continues without those features. For all other messages except Restore Pointers, the message is treated as an Abort message. If the message is received during a Command, Data or Status phase, immediately after an Identify message or after the command complete message has been sent, the drive will go Bus Free.
No Operation	08h	This message has no effect and is ignored.

2.2.6 Extended messages

The following table lists extended SCSI messages and their definitions.

Message	Hex Code	Definition
Synchronous Data Transfer Request	01h	This message negotiates an agreement between the initiator and the drive on which is the best data period and offset. If the message is received after selection and before command phase, it will then go to Message In phase and respond with a valid response to complete the negotiation. If the message is received at any other time, a Message Reject is sent in response.
Wide Data Transfer Request	03h	This message negotiates an agreement between the initiator and the drive on which is the best data width – 8-bit narrow or 16-bit wide. If the message is received after selection and before Command phase, it will then go to Message In phase and respond with a valid response to complete the negotiation. If the message is received at any other time, a Message Reject is sent in response.
Parallel Protocol Request	04h	This message negotiates an agreement between the intiator and the drive on which is the best data transfer period, offset, width and type. This is the message to request DT (Ultra160) synchronous transfers. If the message is received after selection and before Command phase, it will then go to Message In phase and respond with a valid response to complete the negotiation. If the message is received at any other time, a Message Reject is sent in response.

2.2.7 Parity errors:

The following table describes the operation for each of the possible cases of parity error.

State or Phase	Description
Bus Free State	The drive does not detect nor react to parity errors on the SCSI bus while the drive is in a bus free state.
Arbitration Phase	The drive does not detect nor react to parity errors on the SCSI bus while arbitration is being performed.
Selection Phase	The drive does not detect nor react to parity errors on the SCSI bus while the drive is being selected.
Selection, Message Out Phase (Identify Message)	If the drive detects a parity error while the host is sending an Identify message, the drive retries forever.
Reselection, Message In Phase (Identify Message)	If the drive is attempting to reconnect to the host and the host asserts ATN because it detected an error, the drive: ♦ Switches the host to the Message Out Phase. ♦ Waits for the host to send a 09 (Parity Error Message) ♦ The drive then performs the retry option by: ♦ Switching the host to the Message In Phase. ♦ Resending the Identify Message
Command Phase	If the drive detects a parity error while the host is transferring a CDB, the drive: ♦ Switches the host to Message In phase ♦ Sends Restore Data Pointers (03h) message ♦ Switches the host to Command phase to retry the command. ♦ If a parity error occurs on the retry the host: ♦ Terminates the transfer. ♦ Switches the host to the Status Phase and sends a Check Condition. ♦ Switches the host to the Message In Phase and sends a Command Complete. ♦ Sets the Sense Key = B and ASC/ASCQ = 47-00 (SCSI-2 only).
Data In Phase	If the host detects a parity error while data is being transferred from the drive and asserts ATN, the drive: ♦ Terminates the transfer of data. ♦ Switches the host to the Message Out Phase. ♦ Waits for the host to send a 05 (Host Detected Error). ♦ Switches the host to the Status Phase and sends a Check Condition. ♦ Switches the host to the Message In Phase and sends a Command Complete. ♦ Sets the Sense Key = B and ASC/ASCQ = 48-00 (SCSI-2 only).
Data Out Phase	If the drive detects a parity error while the host is transferring data, the drive: ♦ Terminates the transfer of data. ♦ Switches the host to the Status Phase and sends a Check Condition. ♦ Switches the host to the Message In Phase and sends Command Complete. ♦ Sets the Sense Key = B and ASC/ASCQ = 47-00 (SCSI-2 only).
Status Phase	If the host is in the Status phase and detects an error in the status byte and asserts ATN, the drive: ♦ Switches the host to the Message Out Phase and waits for the host to send 05 (Initiator Detected Error). ♦ Switches the host to the Status Phase and sends a Check Condition. ♦ Target sends restore pointers and resends Status.
Message In Phase	If the host is in the Message In Phase and detects an error on a message bytes an asserts ATN, the drive: ♦ Switches the host to the Message Out Phase. ♦ Waits for the host to send 09 (Parity Error Message). ♦ Switches the host to the Message In Phase and resends the message.
Message Out Phase	♦ If the host is in the Message Out Phase and sends a message bytes and the drive detects a parity error, the drive retries forever.

An Initiator that accommodates disconnect/reconnect can indicate this capability to the tape drive during the Selection phase by asserting both its own Initiator SCSI ID bit as well as the tape drive's SCSI ID bit (allows the tape drive to know with which Initiator to reconnect). The Initiator must also assert ATN before exiting the Selection phase (prior to releasing SEL)

and send an Identify message out of C0h to the tape drive. This sequence causes the drive to enter the Message-Out phase when the Selection phase completes.

The first message sent by the host after the Selection phase is an Identify message. Under normal conditions, the first message sent by the tape drive after a Reselection phase is also Identify. Under certain exceptional conditions, the host may send the Abort message or the Bus Device Reset message instead of Identify as the first message.

2.2.8 Message exception handling:

Message exceptions are handled as described in the following tables. The numbers in the tables identify the actions that the drive takes when an exception under the identified conditions occurs. The action are described following the tables.

Message	IN Phase during which ATN is raised						
	Selection	**Identify**	**Command**	**Data in**	**Data out**	**Status**	**Negotiate**
Abort (06h)	2	2	2	2	2	2	2
BDR (0Ch)	11	11	11	11	11	11	11
Identify (80h/C0h)	12	7	7	7	7	7	7
IDE (05h)	5	2	If Retry, 8, else 5	If Retry, 8, else 5	If Retry, 8, else 5	If Retry, 8, if Status, 2, if No Status, 5	If Retry, 4, else 5
Reject (07h)	5	2	2	2	2	2	1
Parity (09h)	5	2	11	11	11	11	If Retry, 4, else 5
NOP (08h)	5	9	9	9	9	9	If EOM, 9, else 4
Negotiate	5	10	7	7	7	7	10
Unrecognized or illegal	5	6	6	6	6	6	If EOM, 6, else 4

Message	IN Phase during which ATN is raised						
	Save Data Pointers (02h)	**Restore Pointers (03h)**	**Disconnect (04h)**	**Reject Message (07h)**	**Identify (80h)**	**Command Complete (00h)**	**Ignore Wide Residue (23h)**
Abort (06h)	2	2	2	2	2	2	2
BDR (0Ch)	11	11	11	11	11	11	11
Identify (80h/C0h)	7	7	7	7	7	2	7
IDE (05h)	If Retry, 4 else 5	If Status, 2, if No Status, 5	If Retry, 4, else 5	If Retry, 4, else 13	If retry, 4, else 5	2	If retry, 4, else 5
Reject (07h)	2	If Status, 2, if No Status, 5	1	2	2	2	2
Parity (09h)	If Retry, 4 else 5	If Status, 2, if No Status, 5	If Retry, 4, else 5	If Retry, 4, else 13	If Retry, 4, else 5	2	If Retry, 4, else 5
NOP (08h)	9	9	9	9	9	2	If EOM, 9, else 4
Negotiate	7	7	7	7	7	2	7
Unrecognized or illegal	6	6	6	6	6	2	If EOM, 6, else 4

Retry	Retry has not been exhausted	Status	Status has been reported
EOM	End of the message	No Status	Status has not been reported
Negotiate	PPR, SDTR or WDTR message negotiation		

2.2.8.1 Action codes used in previous tables:

1. Disconnect message case - the drive will not disconnect for the rest of the command.

   PPR message case - both the initiator and the drive go to asynchronous mode and 8-bit narrow.

   SDTR message case - both the initiator and the drive go to asynchronous mode.

   WDTR message case - both the initiator and the drive go to asynchronous mode and 8-bit narrow.

   Default case - The Message Out Reject disables the feature and continues.
2. The drive goes Bus Free without setting up sense data.
3. RESERVED
4. The drive resends the message.
5. The drive issues Check Condition status and sets up sense data indicating an Aborted command.
6. The drive rejects the message by issuing Message Reject message and continues its operation.
7. The drive rejects the message by issuing Message Reject message. The drive goes Bus Free without setting up sense data.
8. The drive issues Restore Pointers message and retries unless retry count exhausted.
9. The drive ignores the message and continues.
10. Negotiations per SPI-3 spec.
11. The drive goes Bus Free and sets up sense data.
12. The drive accepts the Identify message, observes the disconnect-privilege bit in the Identify message and then continues.
13. If the drive is continuing an operation after sending a Message in Reject, then the drive issues Check Condition status and sets up sense data indicating an Aborted command (Action 5), if not, then the drive goes Bus Free without setting up sense data (Action 2).

2.3 Standards Conformance:

The Small Computer System Interface is described in standards including several versions and a number of individual documents. The original Small Computer System Interface Standard, X3.131-1986, is referred to herein as SCSI-1. SCSI-1 was revised resulting in the Small Computer System Interface – 2 (X3.131-1994), referred to herein as SCSI-2. The set of SCSI-3 standards are collectively referred to as SCSI-3. The applicable ANSI standards are as follows:

SCSI-3 Architecture Model (SAM) X3.270:1996

SCSI Architecture Model – 2 (SAM-2) INCITS.366:2003

SCSI Architecture Model – 3 (SAM-3) in development

SCSI Parallel Interface – 3 (SPI-3) NCITS.336:2000

SCSI-3 Primary Commands (SPC) Status: X3.301:1997

SCSI Primary Commands – 2 (SPC-2) NCITS 351-2001:2001

SCSI Primary Commands – 3 (SPC-3) in development

SCSI-3 Medium Changer Commands (SMC) NCITS.314:1998

SCSI Medium Changer Commands – 2 (SMC-2) in development

SCSI-3 Stream Commands (SSC) NCITS 335:2000

SCSI Stream Commands – 2 (SSC-2) in development

NOTE: The term SCSI is used wherever it is not necessary to distinguish between the versions of SCSI.

2.4 LTO Conformance:

Certance LTO drives conform to the requirements of the *Generation 1 SCSI Common Command Set Advisory Document* (AU1-SCSI) for Ultrium format devices.

2.5 General Behaviors:

2.5.1 Reset Condition:

When a reset is issued to the tape drive, the drive clears all uncompleted commands, releases all SCSI device reservations, sets the tape drive to default modes. The Parallel SCSI drive returns to the Bus Free phase.

2.5.2 Unit Attention Condition:

The Unit Attention condition in the tape drive typically results from the following conditions:

- A Reset was previously issued to the drive.
- The drive has just been powered on.
- A cartridge has been inserted.
- A log exception condition occurred.
- The mode pages have been changed.
- The cartridge has been loaded or unloaded to the Hold position, and the Medium Auxiliary Memory (MAM) is accessible.

The Unit Attention Condition persists for each Initiator until that Initiator issues a command other than Inquiry for which the tape drive returns with a Check Condition Status. If the next command from that Initiator following the Check Condition Status is Request Sense, then the unit attention sense key is returned.

If the Inquiry Command is received from an Initiator with a pending Unit Attention Condition before the tape drive reports Check Condition Status, the tape drive performs the Inquiry Command and does not clear the Unit Attention Condition.

If the Request Sense Command is received from an Initiator with a pending Unit Attention Condition before the tape drive reports Check Condition Status, the tape drive reports unit attention sense key and clears the Unit Attention Condition for that Initiator.

2.5.3 Contingent Allegiance Condition:

The Contingent Allegiance condition shall exist following the return of Check Condition and may exist following an unexpected disconnect. The contingent allegiance condition shall be preserved for the I T x nexus until it is cleared. The contingent allegiance condition shall be cleared upon the generation of a hard reset condition or by an Abort message, a Bus Device Reset message, or any subsequent command for the I T x nexus. While the contingent allegiance condition exists the drive shall preserve the sense data for the initiator.

While the contingent allegiance condition exists, the drive shall respond to any other requests for access to the logical unit from another initiator with a Busy status. Execution of queued commands shall be suspended until the Contingent Allegiance condition is cleared.

2.5.4 Buffered Mode:

Buffered Mode allows the most efficient operation of a tape drive. The drive defaults to Buffered mode. In this mode, the drive signals Command Complete when all requested data for a Write command has been transferred from the host to the tape drive buffer. This mode provides data to maintain operation while the host readies a new Write Command.

If an error occurs in writing data to the tape after the tape drive signals Command Complete, an error status is sent on the next Command issued.

2.5.5 Immediate Commands:

For Initiators that do not support the disconnect feature, the Immediate bit in certain commands provides a means of returning status while the drive is busy completing a function such as repositioning the tape. For the Parallel SCSI interface, this allows the bus to be released. If a command is sent by the Initiator after a previous immediate command was accepted, the drive continues the immediate command it is currently performing and may disconnect, execute, or reject the new command depending on the new command.

An immediate bit of zero means that the status is returned to the Initiator when the operation is completed. (For example, the status is returned when the tape has been repositioned.) An Immediate bit of one means that the status is returned to the Initiator as soon as the function is started.

2.5.6 Residual Length Function:

When performing a Write command, the drive returns a Good Status and Command Completion Message when the last byte requested by the command is placed in the Data Buffer, rather than when it is written onto tape. If an error occurs while data is being written onto tape, the drive calculates the Residual Length and places this value in the information bytes of the Sense Data Block. Also, the Residual Length functions for other commands, such as Read.

Residual Length is calculated by: $RL = TL - AL$

Where:

AL (Actual Length) = Blocks transferred from the host to the tape drive.

TL (Transfer Length) = The Transfer Length from bytes 2-4 of the Write command (Request Transfer Length).

RL (Residual Length) = The amount of blocks or bytes not written to tape.

2.5.7 Early Warning Function:

Early Warning on the CL 400 drive is a logical warning given when 64 megabytes of storage space remain on the tape. The position is calculated by the drive. When this physical position is reached on a tape, the following occurs.

1. The command completes with a Check Condition and a 40h Sense data meaning EOM and no Sense Key.
2. Subsequent WRITE commands write data and complete with check condition with EOM Status and No Sense Key until the physical tape end is encountered.

2.5.8 Error Reporting:

Soft errors are generally tape-quality related and occur more frequently during write operations than during read operations. Soft errors indicate repeated attempts by the drive to read or write data on the tape. Some soft errors are normal, but an increase in the usual count can indicate deteriorating tape quality. If the soft error count remains higher than normal, use a cleaning cartridge to clean the read/write heads. If this procedure does not clear the problem, change to a new tape cartridge.

If a hard error (unrecoverable error) occurs during operation, the drive terminates operation immediately and returns a Check Condition. The Initiator should cease any further read or write functions and issue a Request Sense Command to determine the type of error.

When the drive detects a write error, it attempts to rewrite the data up to 128 times.

After the 128th attempt, the error is considered unrecoverable and the operation terminates. When a hard error is encountered, replace the tape with a new cartridge and repeat the function or clean the heads with a cleaning cartridge.

2.5.9 Variable and Fixed Mode Recording:

The CL400 drive can write either fixed or variable block sizes. The recording mode is determined by the Fixed bit in the SCSI Write and Read commands.

If the Fixed bit is set, the Mode Select command sets the size of the next block or multiple blocks to be written with the next Write command. When a Write command is issued with the Fixed bit set, the current block size is implemented. The transfer length specifies the number of blocks to be written with this size. If a Write command is issued with the Fixed bit set and the current block size set to 0, the CL400 drive returns a Check Condition with Illegal Request Sense Key. When writing with the Fixed bit set, each Write command specifies the number of contiguous blocks to be written of a fixed size, resulting in fixed-mode blocks. If the Fixed bit is reset, then only one block can be written on the tape per SCSI Write command CDB. In that case, the Write command CDB transfer length specifies the size of the block to be written in bytes. With the Fixed bit reset, the current block size specified with the last Mode Select command is ignored.

Setting the block size to 0 in the Mode Select page descriptor is not required. Therefore, with the Fixed bit reset, each SCSI Write command may specify a different byte count, resulting in variable-mode blocks.

The host may switch between fixed and variable mode recording. By issuing the Mode Select command to specify different block sizes, blocks can be written to the tape with different block sizes in the fixed mode. Also, the host may change the block size after BOM, allowing on-the-fly block-size changes.

The Read command Fixed bit also specifies fixed or variable mode. When reading in variable mode, the host must know the size of the block to be read from the tape in advance in order to avoid causing the CL400 drive to return a Check Condition with Incorrect Length indicated in the Sense data (ILI). Also, the data transfer may be truncated (cut off) when the recorded block does not match the transfer length in variable mode or the current block size in fixed mode.

The Read command includes a SILI bit to Suppress ILI Check conditions.

When the SILI bit is set, the host usually specifies the maximum block size before reading so that the data blocks are not truncated, and no Check Conditions are generated.

The SCSI Read Block Limits command returns the minimum and maximum block sizes that the CL400 drive can support. The Block Limits data is not modified to reflect the current mode of writing—fixed or variable. The Block Limits returned data is not modified to reflect the current block size for the next fixed-mode Write. The Mode Sense command is used for that purpose.

2.5.10 Library Features:

2.5.10.1 Auto Unload Mode:

The CL400 drive has an Auto Unload Mode that may be accessed via a Mode command to Mode Page 21h. The purpose of the Auto Unload mode is to allow the drive to be configured to work in Library systems or as a Stand Alone drive. The Auto Unload mode allows the drive to control how the tape is unloaded in “automatic” type situations. There are four Auto Unload modes that are possible.

- Do Nothing – Stay threaded at BOT (mode 0).
- Unthread Only (mode 1).
- Unthread and unload (mode 2).
- Unthread and unload non data cartridges, data cartridges go to BOT (mode 3). Basically data cartridges behave as for mode 0 and non data cartridges behave according to mode 2.

Here are the possible “automatic” situations where the ejection process will be controlled using the Auto Unload mode. As shown in the list below, this covers not only power on situations, but also how cleaning tapes, incompatible tapes and firmware tapes are handled.

- Powering on or power cycling while the tape is inside the drive.
- Cleaning tape has finished the cleaning cycle.
- Unsupported data tape has been loaded.
- Unsupported cleaning tape has been loaded.
- Microcode download from a firmware tape.
- Microcode download via the SCSI Write Buffer command while a tape is loaded.

2.5.10.2 Host Unload Override:

The CL400 drive has a Host Unload Override mode that may be accessed via a Mode command to Mode Page 21h. The purpose of the Host Unload Override mode is to allow the Library system to set the drive into a mode where the drive will not eject the cartridge should the host issue a SCSI Unload command. A SCSI Unload command from the host will cause the tape to be unthreaded but the cartridge will remain in the drive. The Library Unload command will cause the cartridge to be ejected.

2.5.10.3 ID Modification:

Tape libraries require the ability to change the SCSI ID of installed tape drives without opening the library and changing address jumpers. To change the SCSI ID (Parallel SCSI Interface) of the CL400 drive, issue a Mode Select command to Mode Page 22h to change the Next Selection ID field to the desired ID. Then reset or power cycle the drive, and it will begin responding to the new ID. This new ID will persist through additional resets and power cycles.

If the address jumpers are changed and the drive's power is cycled, the drive will respond to the new address on the jumpers. The value in the Next Selection ID field will be that on the jumpers, even though the field may have been changed immediately before the power cycle.

2.5.10.4 LUN 1 Command Forwarding:

A tape library or autoloader containing a CL400 can receive its SCSI commands via the CL400 drive. This function is called "Command Forwarding" and is enabled via the "CmdFwd" field in the Interface Control mode page (22h). When enabled, commands received via the SCSI bus and addressed to LUN 1 are immediately transmitted to the library via the RS-422 interface. CL400 acts as a bridge, passing commands, data, and status between the initiator and the library, as specified in the Library Interface Encapsulated SCSI Protocol Manual.

In SCSI Medium Changer terminology, the library or autoloader appears as an "independent medium changer," because the tape drive and medium changer are at different LUNs. Medium changer commands addressed to LUN 0 are rejected with Check Condition and sense data of Illegal Request / Invalid Command Operation Code (05/20/00).

In the Parallel SCSI drive, because of the relatively slow communication on the RS-422 interface, CL400 will disconnect from the SCSI bus after receiving a command, after receiving data-out, and after sending status. Data-in and status are sent to the initiator without disconnecting between them.

If the link fails between the CL400 and the library, the failed command will receive a status of Check Condition and sense data of Aborted Command / Logical Unit Communication Failure (0B/08/00).

If a SCSI bus reset (Parallel SCSI Interface) or a Target Reset task management request is received, then either a Target Reset or Logical Unit Reset task management request is transmitted to the library. The library must be capable of processing either request.

When command forwarding is disabled in mode page 22h, commands addressed to LUN 1 will receive a status of Check Condition and sense data of Illegal Request / Logical Unit Not Supported (05/25/00).

After Command Forwarding is enabled or disabled, the drive will respond to the next command with a Check Condition and sense data of Unit Attention / Reported LUNs Data Has Changed (06/3F/0E).

3 SCSI COMMANDS:

This chapter describes the SCSI commands for the LTO tape drive.

3.1 Command Set:

The following table shows the SCSI commands for sequential access devices implemented by the drive.

Group	Code	Command	Page
0	00h	Test Unit Ready	**Error! Bookmark not defined.**
0	01h	Rewind	99
0	03h	Request Sense	87
0	05h	Read Block Limits	73
0	06h	Park Unpark	66
0	08h	Read	68
0	0Ah	Write	107
0	10h	Write Filemarks	110
0	11h	Space	102
0	12h	Inquiry	23
0	13h	Verify	105
0	15h	Mode Select(6)	40
2	55h	Mode Select(10)	40
0	16h	Reserve Unit	97
0	17h	Release Unit	81
0	19h	Erase	22
0	1Ah	Mode Sense(6)	61
2	5Ah	Mode Sense(10)	61
0	1Bh	Load Unload	33
0	1Ch	Receive Diagnostic Results	80
0	1Dh	Send Diagnostic	100
0	1Eh	Prevent/Allow Medium Removal	66
0	0Bh	Set Capacity	101
1	2Bh	Locate	35
1	34h	Read Position	77
1	3Bh	Write Buffer	108
1	3Ch	Read Buffer	74
2	44h	Report Density Support	83
2	4Ch	Log Select	36
2	4Dh	Log Sense	40
2	56h	Reserve Unit	97
2	57h	Release Unit	81
2	5Eh	Persistent Reserve In	67
2	5Fh	Persistent Reserve Out	67
3	A0h	Report LUNS	86

3.1.1 Conventions:

The commands in this chapter are listed in alphabetical order. Each command is described, its Command Descriptor Block (CDB) illustrated, and the Completion Status is given. Bits and fields defined in the ANSI SCSI documents that are not used by the drive are not described in this document. Bits and fields that are supported by the drive are described.

3.2 Command Descriptor Blocks:

A host makes request of the tape drive by sending a Command Descriptor Block (CDB). Some commands also require a parameter list. If the CDB or the parameter list contains an invalid parameter, the drive terminates the command, returning a Sense Key of Illegal Request, without altering the medium.

3.2.1 Command Descriptor Block Formats:

SCSI six-byte Command Descriptor Blocks are arranged in the format shown in the following table.

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code							
1	Ignored LUN			Command Dependent				
2	Command Dependent							
3	Command Dependent							
4	Command Dependent							
5	Control							

SCSI ten-byte Command Descriptor Blocks are arranged in the format shown in the following table.

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code							
1	Ignored LUN			Command Dependent				
2	Command Dependent							
3	Command Dependent							
4	Command Dependent							
5	Command Dependent							
6	Command Dependent							
7	Command Dependent							
8	Command Dependent							
9	Control							

Field names that are centered represent fields that are at least one byte long. Field names that are left-aligned with a bit number are one or more bits long. The length is indicated by the beginning of the following field name, and by the Bits column in the Field Descriptions table on the following page.

3.2.1.1 Field Descriptions:

Field	Byte	Bits	Description
Operation Code	0		The Operation Code is made up of the Group Code and the Command Code. See Operation Code Format, below.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Command Dependent	1 2-4 2-8	0-4	See the specific command.
Reserved			All reserved bits must be 0.
Control	Last		The Control byte is made up of the Vendor Unique, Flag and Link bits. See Control Format, below.

Fields that are one byte or longer have no entry in the Bits column.

3.2.2 Operation Code Format:

Byte	Bits 7	6	5	4	3	2	1	0
0	Group Code		Command Code					

3.2.2.1 Field Descriptions:

Field	Byte	Bits	Description
Group Code	0	5-7	The SCSI command group.
Command Code *	0	0-4	The SCSI command code.

NOTE: The Group Code and Command Code together make the Operation Code.

3.2.3 Control Byte Format:

Byte	Bits 7	6	5	4	3	2	1	0
Last	Vendor Unique		Reserved			NACA	Flag	Link

3.2.3.1 Field Descriptions:

Field	Byte	Bits	Description
Vendor Unique	Last	6-7	Not used, always 0.
Reserved	Last	3-5	All reserved bits must be 0.
NACA	Last	2	Parallel SCSI Interface: Not supported; reserved.
Flag and Link bits	Last	0-1	These bits are not supported by the CL400 drive.

3.3 Command Status:

When the tape drive competes a command it responds with a status byte. The format of the status byte is shown below.

3.3.1 Status Byte Format:

Byte	Bits 7	6	5	4	3	2	1	0
0	Reserved		Status Code					

3.3.1.1 Field Descriptions:

Field	Byte	Bits	Description
Reserved	0	6-7	Always 0
Status Code	0	0-5	The command status, as shown below.

3.3.2 Status Codes:

Status codes for the CL400 drives are shown in the following table.

Description	Value	When returned
Good Status	00h	The command completed without problems

Description	Value	When returned
Check Condition	02h	A problem occurred during command execution. The sense data should be examined to determine the nature of the problem.
Busy	08h	The drive is unable to accept the command at this time. This is only returned during the power on sequence or if there are commands from too many initiator ports outstanding.
Reservation Conflict	18h	This is returned if the drive is reserved for an initiator port other than the one sending the command

3.4 ERASE:

The Erase command marks the tape, from the current position to the end of tape, as erased.

3.4.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (19h)							
1	Ignored LUN			Reserved			Immed	Long
2	Reserved							
3	Reserved							
4	Reserved							
5	Control							

3.4.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation Code for Erase is 19h.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Immed	1	1	0 = Status is not returned until the tape is erased. 1 = Status is returned as soon as the operation is initiated.
Long	1	0	0 = Short Erase is performed and EOD is recorded at the current tape position. 1 = Long data-security Erase is performed, and EOD is recorded from the current tape position to the end of the tape.
Reserved			All reserved bits must be 0.
Control			See Control Byte Format on page 21.

If the Immediate (Immed) flag is set to 1, then the drive validates the command and waits for any previous command from any host to complete including any immediate commands currently being processed and for any buffered data to be flushed to tape. It will then report a deferred error for any preceding command or buffered data if appropriate. If there is no deferred error, the drive reports good status and initiates the command. If the Immediate (Immed) flag is set to 0, status is not returned until after the command has completed.

If the Long bit is set, EOD is written at the current position. Data Set Separators are then written from EOD to the end of the medium to overwrite any data currently on the tape. If the Long bit is clear, then an EOD is written at the current position marking it as end of data.

3.4.2 Completion Status:

Code	Message	Description
00h	Good Status	• The drive remains in any previously set modes. • The drive is ready to perform any appropriate command. Note: If Immed is 1, then Good Status only indicates that the command is valid.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are:

Code	Message	Description
02h	Not Ready	No cartridge is in the drive.
03h	Media Error	Unrecoverable data error encountered.
04h	Hardware Error	Parity error on the SCSI bus or drive hardware failure detected.
05h	Illegal Request	Both the Immed bit and the Link bits are 1, or the Command Descriptor Block is invalid.
06h	Unit Attention	The cartridge was changed or the drive was reset prior to this command.
07h	Write Protect	The cartridge is write protected.

3.5 INQUIRY:

The Inquiry command requests that the drive return information about itself. If an Inquiry command is received from an Initiator with a pending Unit Attention Condition (before the drive reports Check Condition status), the drive performs the Inquiry command and does not clear the Unit Attention Condition.

3.5.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (12h)							
1	Ignored			Reserved				EVPD
2	Page Code							
3	Reserved							
4	Allocation Length							
5	Control							

3.5.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation Code for Inquiry is 12h.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
EVPD	1	0	0 = Requests Standard Inquiry Data. 1 = Requests data page specified by the Page Code.

Field	Bytes	Bits	Description
Page Code	2		00h = Requests Supported Vital Product Data Page 80h = Requests Unit Serial Number Page 83h = Requests Device Identification Page C0h = Requests SCSI Firmware Revision Page C1h = Requests Servo Firmware Revision Page C2h = Requests Head Assembly Serial Number Page C3h = Requests Reel Motor 1 Serial Number Page C4h = Requests Reel Motor 2 Serial Number Page C5h = Requests Board Serial Number Page C6h = Requests Base Mechanical Serial Number Page DFh = Requests Drive Status Page (Parallel SCSI drives only)
Allocation Length	4		Specifies the amount of data to be returned, in bytes. A value of 0 is a valid entry and returns no data. The drive transfers the number of bytes specified up to a maximum of 38h for Standard Inquiry.
Reserved			All reserved bits must be 0.
Control	5		See Control Byte Format on page 21.

If the Enable Vital Product Data (EVPD) flag is clear and the Page Code is zero, Standard Inquiry Data is returned. If the Enable Vital Product Data (EVPD) flag is set and the Page Code is zero, the Supported Vital Product Data Pages page is returned.

If the Enable Vital Product Data (EVPD) flag is set and the Page Code is not zero and there is a vendor defined Inquiry data page corresponding to that page code, then that page is returned. Otherwise, Check Condition status is returned. The Sense Key is set to Invalid Request (5) and the additional Sense to Invalid Field in CDB (2400).

3.5.2 Standard Inquiry Data Page:

Byte	Bits 7	6	5	4	3	2	1	0
0	Peripheral Qualifier			Peripheral Device Type				
1	RMB	Reserved						
2	Version							
3	AERC	Obsolete	NACA	HiSup	Response Data Format			
4	Additional Length							
5	Reserved							
6	BQue	EncServ	VS	MuiltiP	MChgr	Obsolete	Obsolete	Addr16
7	RelAdr	Obsolete	WBus 16	Sync	Linked	TransDis	CmdQ	VS
8 – 15	Vendor Identification							
16 – 31	Product Identification							
32 – 35	Product Revision Level							
36 – 55	Vendor Specific							

3.5.2.1 Field Descriptions:

Field	Bytes	Bits	Description
Peripheral Qualifier	0	5-7	Always 000b.

Field	Bytes	Bits	Description
Peripheral Device Type	0	0-4	Normally 01h to indicate a sequential access device. 7Fh indicates that a logical unit is not present. This value is returned when an invalid LUN was in the last Identify message.
RMB	1	7	Always 1, indicating Removable Media.
Version	2		Always 3
AERC	3	7	Always 0, indicating Asynchronous Event Reporting Capability is not supported.
NACA	3	5	0 = Normal ACA (NACA) is not supported (Parallel SCSI drives)
HiSup	3	4	Always 0, indicating Hierarchical Support is not supported.
Response Data Format	3	0-3	Always 2, indicating support of the standard that the version indicates.
Additional Length	4		Always 45h, indicating that 69 bytes of additional Inquiry command parameters follow, beginning in Byte 5. This value does not change if the Allocation Length in the CDB is too small or too large to accommodate the entire response.
BQue	6	7	0 = Basic Queuing is not supported (Parallel SCSI drives)
EncServ	6	6	Always 0, indicating Enclosure Services is not supported.
VS	6	5	Always 0, indicating this feature is not supported.
MuiltiP	6	4	0 = Multiple Interface Ports not available (Parallel SCSI drives)
MChgr	6	3	Always 0, indicating Medium Changer is not supported.
Addr16	6	0	1 = 16 Bit Address supported (Parallel SCSI drives)
RelAdr	7	7	Always 0 because Relative Addressing is not supported.
WBus16	7	5	1 = Wide Bus16 supported (Parallel SCSI drives)
Sync	7	4	1 = Synchronous Transfer is supported (Parallel SCSI drives)
Linked	7	3	Always 0, indicating Linked Command is not supported.
CmdQue	7	1	0 = Command queuing is not supported 1 = Command queuing is supported
VS	7	0	Always 0, indicating this feature is not supported.
Vendor Identification	8-15		8 bytes of ASCII data: “CERTANCE”.
Product Identification	16-31		16 bytes of ASCII data: “ULTRIUM 2“ followed by 7 spaces.
Product Revision Level	32-35		4 bytes of ASCII data indicating the SCSI firmware version.
Vendor Specific	36-73		This field may contain additional vendor specific information.
Obsolete			Always 0
Reserved			Always 0

The Standard Inquiry Data is based on the SCSI 3 standard for Standard Inquiry Data. This allows for setting certain bits in byte 6 to indicate features that were non-standard in SCSI 2. The only supported SCSI 3 field is Multi Port (MultiP).

The Multi-Port (MultiP) flag is set if the device has multiple interface ports. Parallel SCSI devices do not have multiple interface ports and have this flag clear.

The 16 Bit Address (Addr16) and Wide Bus 16 (WBus16) flags are set depending on whether the hardware supports these bus features. These flags are only valid for Parallel SCSI and are clear for all other interfaces.

3.5.3 Supported Vital Product Data (VPD) Page (00h):

The Supported Vital Product Data Page lists the following eleven VPD pages including itself.

3.5.3.1 Supported Vital Product Data Inquiry Page:

Byte	Bits 7	6	5	4	3	2	1	0
0	Peripheral Qualifier			Peripheral Device Type				
1	Page Code							
2	Reserved							
3	Page Length							
4	Supported Vital Product Data Page Code							
5	Unit Serial Number Page Code							
6	Device Identification Page Code							
7	SCSI Firmware Revision Page Code							
8	Servo Firmware Revision Page Code							
9	Head Assembly Serial Number Page Code							
10	Reel Motor 1 Serial Number Page Code							
11	Reel Motor 2 Serial Number Page Code							
12	Board Serial Number Page Code							
13	Base Mechanical Serial Number Page Code							
14	Drive Status Page Code							

3.5.3.2 Field Descriptions:

Field	Bytes	Bits	Description
Peripheral Qualifier	0	5-7	Always 000b.
Peripheral Device Type	0	0-4	Normally 01h to indicate a sequential access device. 7Fh indicates that a logical unit is not present. This value is returned when an invalid LUN was in the last Identify message, or the LUN field of the Identify CDB.
Page Code	1		Always 0, indicating the Supported Vital Product Data Inquiry Page
Reserved	2		Always 0
Page Length	3		Always 0Bh to indicate 11 listed pages.
Supported Vital Product Data Page Code	4		Always 00h, the page code of the Supported Vital Product Data Inquiry Page
Unit Serial Number Page Code	5		Always 80h, the page code of the Unit Serial Number Page
Device Identification Page Code	6		Always 83h, the page code of the Device Identification Page
SCSI Firmware Revision Page Code	7		Always C0h, the page code of the SCSI Firmware Revision Page
Servo Firmware Revision Page Code	8		Always C1h, the page code of the Servo Firmware Revision Page
Head Assembly Serial Number Page	9		Always C2h, the page code of the Head Assembly Serial Number Page.
Reel Motor 1 Serial Number Page	10		Always C3h, the page code of the Reel Motor 1 Serial Number Page.
Reel Motor 2 Serial Number Page	11		Always C4h, the page code of the Reel Motor 2 Serial Number Page.
Board Serial Number Page	12		Always C5h, the page code of the Board Serial Number Page.
Base Mechanical Serial Number Page	13		Always C6h, the page code of the Base Mechanical Serial Number Page.
Drive Status Page	14		Always DFh, the page code of the current drive and cartridge state.

3.5.4 Unit Serial Number Page (80h):

The Unit Serial Number Page contains a single value, which is a 12 byte ASCII string. The string, with the Vendor Identification and Product Identification fields in the standard Inquiry data, uniquely identifies the drive.

Byte	Bits 7	6	5	4	3	2	1	0
0	Peripheral Qualifier			Peripheral Device Type				
1	Page Code							
2	Reserved							
3	Page Length							
4-15	Drive Serial Number							

3.5.4.1 Field Descriptions:

Field	Bytes	Bits	Description
Peripheral Qualifier	0	5-7	Always 000b.
Peripheral Device Type	0	0-4	Normally 01h to indicate a sequential access device. 7Fh in byte 0 indicates that a logical unit is not present. This value is returned when an invalid LUN is specified.
Page Code	1		Always 80h, indicating the Unit Serial Number Page
Reserved	2		Always 0
Page Length	3		Always 0Ch to indicate 12 additional bytes of data.
Drive Serial Number	4-15		12 bytes of ASCII data giving the unit serial number.

3.5.5 Device Identification Page (83h):

The Device Identification Page contains one or more device identification descriptors that uniquely identify the particular device. CL400 FC returns four identifiers: Vendor, Node Name, Relative Port, and Port Name.

Byte	Bits 7	6	5	4	3	2	1	0
0	Peripheral Qualifier			Peripheral Device Type				
1	Page code							
2	Reserved							
3	Page Length							
4-…	Identification Descriptor							
…-…	…							
…-…	Identification Descriptor							

3.5.5.1 Field Descriptions:

Field	Bytes	Bits	Description
Peripheral Qualifier	0	5-7	Always 000b.
Peripheral Device Type	0	0-4	Normally 01h to indicate a sequential access device. 7Fh indicates that a logical unit is not present. This value is returned when an invalid LUN is specified.
Page Code	1		Always 83h, indicating the Device Identification Page

Field	Bytes	Bits	Description
Reserved	2		Always 0
Page Length	3		*n*-3, indicating the total length of all Identification Descriptors following.
Identification Descriptor	4-n		One or more Identification Descriptor. See the Identification Descriptor data format below.

3.5.5.2 Identification Descriptor Data Format:

Byte	Bits 7	6	5	4	3	2	1	0
0	Reserved				Code Set			
1	Reserved		Association		Identifier Type			
2	Reserved							
3	Identifier Length							
4-n	Identification Descriptor							

3.5.5.3 Field Descriptions:

Field	Bytes	Bits	Description
Code Set	0	0-3	1 = Identification Descriptor contains binary data. 2 = Identification Descriptor contains ASCII data.
Identifier Type	1	0-3	1 = Identification Descriptor is Vendor ID and Product ID from Standard Inquiry Data Page, followed by Serial Number from the Unit Serial Number Page. 2 = Identification Descriptor is an IEEE Extended Unique Identifier.
Association	1	4-5	0 = Identifier field is associated with the addressed physical or logical device. 1 = Identifier field is associated with the port that received the request.
Identifier Length	3		*n*-3, indicating the length of this Identification Descriptor.
Identification Descriptor	4-n		Binary or ASCII data (depending on Code Set).
Reserved			Always 0

3.5.6 Drive Component Revision Levels Pages (C0h, C1h):

The Drive Component Revision Levels Pages contain details of the revisions of each of the components of the drive. For any given product, if these pages are the same then the drive has been built with the same components and with the same manufacturing process.

Byte	Bits 7	6	5	4	3	2	1	0
0	Peripheral Qualifier				Peripheral Device Type			
1	Page Code							
2	Reserved							
3	Page Length							
4–29	Component							
30–48	Version							
49–72	Date							
73–95	Variant							

3.5.6.1 Field Descriptions:

Field	Bytes	Bits	Description
Peripheral Qualifier	0	5-7	Always 000b.
Peripheral Device Type	0	0-4	01h, indicating a sequential access device.
Page Code	1		C0h = SCSI Firmware Revision Page C1h = Servo Firmware Revision Page
Reserved	2		Always 0
Page Length	3		Always 5Ch
Component	4-29		26 bytes of ASCII data, identifying the component. “SCSI FIRMWARE“ = SCSI Firmware Revision Page “SERVO FIRMWARE“ = Servo Firmware Revision Page
Version	30-48		19 bytes of ASCII data, “VNNNN-MMM”
Date	49–72		24 bytes of ASCII data, “YYYY/MM/DD” YYYY = 4 digits of year MM = 2 digits of month DD = 2 digits of day
Variant	73–95		23 bytes of ASCII data

3.5.7 Drive Component Serial Number Page (C2,C3,C4,C5,C6h):

The Drive Component Serial Number Page contains a single value, which is a 12 byte ASCII string. The string, with the drive component fields in the standard Inquiry data, uniquely identifies the component.

	Bits							
Byte	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
0	Peripheral Qualifier			Peripheral Device Type				
1	Page code							
2	Reserved							
3	Page Length							
4-15	Component Serial Number							

3.5.7.1 Field Descriptions:

Field	Bytes	Bits	Description
Peripheral Qualifier	0	5-7	Always 000b.
Peripheral Device Type	0	0-4	Normally 01h to indicate a sequential access device.
Page Code	1		C2h, indicating the Head Assembly Serial Number Page C3h, indicating the Reel Motor 1 Serial Number Page C4h, indicating the Reel Motor 2 Serial Number Page C5h, Board Serial Number Page C6h, Base Mechanical Serial Number Page
Reserved	2		Always 0
Page Length	3		Always 0C to indicate 12 additional bytes of data.
Drive Serial Number	4-15		12 bytes of ASCII data giving the unit serial number.

3.5.8 Drive Status Page (DFh) (Parallel SCSI drives only):

The Drive Status Page provides a snapshot of the current state of the drive and cartridge. It provides an extract of selected mode and log pages. The page code is DFh.

Byte	Bits 7	6	5	4	3	2	1	0
0	Peripheral Qualifier			Peripheral Device Type				
1	Page Code							
2	Reserved							
3	Page Length							
4	Drive State							
5	CmdFwd		Alerts	Rsvd	NoRemov	Unit Rsvd	Rsvd	Clean
6	Reserved			Thread-ed	Lun1-Cmd	Autoload Mode		
7	Reserved							
8	Cartridge Type							
9	Cartridge Format (0)							
10	Cartridge Capacity, MSB							
11	Cartridge Capacity, LSB							
12	Port A Transport Type							
13	Reserved							
14	Reserved							
15	Port A Selection ID							
16	Reserved							
17	Reserved							
18	Reserved							
19	Reserved							
20	Operating Hours Since Manufacture, MSB							
21	Operating Hours Since Manufacture							
22	Operating Hours Since Manufacture							
23	Operating Hours Since Manufacture, LSB							
24-31	Initiator ID							
32-63	Cartridge Serial Number							

3.5.8.1 Field Descriptions:

Field	Bytes	Bits	Description
Peripheral Qualifier	0	5-7	Always 000b.
Peripheral Device Type	0	0-4	01h, indicating a sequential access device.
Page Code	1		Always DFh, indicating the Drive Status Page
Page Length	3		Always 3Ch
Drive State	4		Contains one of the values shown in the Drive State Field Values table below.
Cmd Fwd	5	6-7	0 = Command Forwarding is disabled. 1 = Command Forwarding is enabled. Command Forwarding is controlled by the Interface Control Mode Page

Field	Bytes	Bits	Description
Alerts	5	5	0 = Alerts are disabled. 1 = Alerts are enabled. (Alerts are not implemented, so this field never has a value of 1.) Alerts would be controlled by the Interface Control Mode Page
NoRemov	5	3	0 = Removal of the cartridge is enabled 1 = Removal of the cartridge has been disabled with the Prevent/Allow Medium Removal command.
Unit Rsvd	5	2	0 = The unit is not reserved. The Initiator Selection Address field is invalid. 1 = An initiator has reserved the device. The Initiator Selection Address field contains the Selection Address of the initiator.
Clean	5	0	0 = Cleaning is not needed. 1 = Cleaning is needed.
Threaded	6	4	0 = Tape is not threaded. 1 = Tape is threaded. (It may still be wrapping and not yet ready.)
Lun1Cmd	6	3	Lun1Cmd indicates that the drive has received a command over the primary interface which is addressed to LUN 1. This field will contain a value of one until the Forwarded Command packet has been transmitted to the library and the packet acknowledgement byte received. If multiple commands have been received – such as untagged commands from multiple initiators – the field will remain one until all Forwarded Command packets have been transmitted. If CmdFwd is zero, then Lun1Cmd will always be zero, as commands to LUN 1 are rejected by the drive. 0 = No unforwarded command exists for LUN 1. 1 = One or more LUN 1 commands are awaiting forwarding via RS-422.
Autoload Mode	6	2-0	0 = Load and thread when cartridge is inserted 1 = Load and do not thread when cartridge is inserted 2 = Do not load when cartridge is inserted Autoload Mode is controlled by the Control Mode Page
Cartridge Type	8		Contains one of the values shown in the Cartridge Type Field Values table below.
Cartridge Format	9		Always 0, indicating an LTO tape cartridge.
Cartridge Capacity	10-11		Uncompressed capacity of the cartridge, in multiples of 10^9 bytes.
Port A Transport Type	12		0 = Port A link is down. 3 = Parallel SCSI Ultra-160 interface
Port A Selection ID	15		The SCSI ID to which the drive responds.
Operating Hours Since Manufacture	20-23		Total number of hours of head-tape contact time.
Initiator ID	24-31		Identification of the initiator holding a reservation on the drive, when the Unit Rsvd field is one. If the interface is Parallel SCSI, then the least-significant byte contains the initiator's SCSI ID. If Unit Rsvd is zero, then this field is zero.
Cartridge Serial Number	32-63		32 bytes of ASCII data, right-filled with blanks. This is the cartridge serial number as defined by attribute number 0201h of the SPC-2 Read Attribute command. [The SPC-2 Read Attribute command has not been implemented.]
Reserved			Always 0

As there is only one LTO format defined at this time, the Cartridge Format value is always zero. During insertion, the type of a data cartridge is unknown between the time the cartridge is seated and the drive completes winding to BOT; the length calculation takes place during winding.

3.5.8.2 Drive State Field Values:

The Medium Auxiliary Memory (MAM) can be accessed only in the states indicated.

Value	State	Description	MAM Accessible
0	DRIVE NOT READY	No commands may be issued and cartridge may not be inserted.	N
1	DRIVE EMPTY READY	No cartridge in drive. Commands will be accepted and a cartridge may be inserted.	N
2	DRIVE MEDIA LOADABLE	Cartridge is in carrier and loading may be initiated by issuing a SCSI Load or a library LOAD CARTRIDGE command.	N
3	DRIVE LOADING	Drive is loading and threading the cartridge.	N
4	DRIVE LOADED HOLD	Drive is loaded to Hold point.	Y
5	DRIVE LOADED READY	Drive can accept non-status commands.	Y
6	DRIVE WRITING	Drive can accept only status and Unload commands.	Y
7	DRIVE READING	Drive can accept only status and Unload commands.	Y
8	DRIVE BUSY	Drive can accept only status and Unload commands.	Y
9	DRIVE UNLOADING	Tape is being unthreaded and ejected.	Y
10	DRIVE MEDIA REMOVABLE	Cartridge has been ejected and is ready for extraction by the library.	N
11	DRIVE LOAD FAILED EJECTED	Loading failed and the cartridge was returned to the loadable/removable position.	N
12	DRIVE LOAD FAILED	Loading failed.	N
13	DRIVE LOAD FAILED HOLD	Loading failed and the cartridge is in the drive at the Hold position.	Y
14	DRIVE EJECT FAILED	Ejection failed.	N
15	DRIVE EJECT FAILED HOLD	Ejection failed and the cartridge is in the drive at the Hold position.	Y
16	DRIVE STATE UNKNOWN.		N
17	DRIVE CLEANING FAILED	Cleaning cartridge expired or cleaning failed for another reason. Tape may be threaded.	Y

3.5.8.3 Cartridge Type Field Values:

Value	Meaning
0	Empty – no cartridge is present
1	Cleaning cartridge
2	Unknown data cartridge
3	Firmware cartridge
4	Ultrium 1 Type A data cartridge
5	Ultrium 1 Type B data cartridge
6	Ultrium 1 Type C data cartridge
7	Ultrium 1 Type D data cartridge
8	Ultrium 2 Type A data cartridge

3.5.9 Completion Status:

Code	Message	Description
00h	Good Status	♦ The tape is not moved; the current position is maintained. ♦ The drive remains in any previously set modes. ♦ The drive is ready to perform any appropriate command.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are: **Code** **Message** **Description** 04h Hardware Error Parity error on the SCSI bus or drive hardware failure. 05h Illegal Request The Command Descriptor Block is invalid.

3.6 LOAD UNLOAD:

The Load Unload command may be used to load or unload a cartridge. This command may also be used to request that the retension function be performed.

3.6.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (1Bh)							
1	Ignored LUN			Reserved				Immed
2	Reserved							
3	Reserved							
4	Reserved				Hold	EOT	Reten	Load
5	Control							

3.6.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation Code for the Load Unload command is 1Bh.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Immed	1	0	0 = Status is not returned until the operation has completed. 1 = Status is returned as soon as buffered data and filemarks are written to the medium and the CDB has been validated.
Hold	4	3	1 = Requests that the medium be positioned to the Medium Auxiliary Memory Accessible position where the medium is seated into the drive but the tape is not threaded to BOT.
EOT	4	2	Not supported. Must be set to 0.
Reten	4	1	1 = Requests that the retension function be performed on medium.
Load	4	0	0 = requests that the medium be unloaded. 1 = requests that the medium be loaded.
Reserved			All reserved bits must be 0.
Control	5		See Control Byte Format on page 21.

The drive has three possible states where the medium may be positioned. The locations are:

- The Medium Loadable Position where the medium is inserted into the drive but has not been seated into the drive and the tape has not been threaded to BOT.

- The Medium Auxiliary Memory Accessible position where the medium has been seated into the drive but the tape has not been threaded to BOT.
- The Medium Loaded And Ready position where the medium has been seated into the drive and the tape has been threaded to BOT. The medium is ready to use.

3.6.1.2 Medium Loadable Position:

Hold	Reten	Load	Description
0	0	0	No action taken, Good Status is returned.
0	0	1	Load the medium to the Loaded position. The medium will be ready at BOT.
0	1	0	Check condition, sense data 02/3A/03.
0	1	1	Load the medium to the Loaded position and perform the retension operation. The medium will be ready at BOT.
1	0	0	Load the medium to the Medium Auxiliary Memory Accessible position.
1	0	1	Load the medium to the Medium Auxiliary Memory Accessible position.
1	1	0	Check condition, sense data 02/3A/03.
1	1	1	Check condition, sense data 02/3A/03.

3.6.1.3 Medium Auxiliary Memory Accessible Position:

Hold	Reten	Load	Description
0	0	0	Unload the medium to the Loadable position.
0	0	1	Load the medium to the Loaded position. The medium will be ready at BOT.
0	1	0	Check condition, sense data 02/3A/04.
0	1	1	Load the medium to the Loaded position and perform the retension operation. The medium will be ready at BOT.
1	0	0	No action taken, Good Status is returned.
1	0	1	No action taken, Good Status is returned.
1	1	0	Check condition, sense data 02/3A/04.
1	1	1	Check condition, sense data 02/3A/04.

3.6.1.4 Medium Loaded And Ready Position:

Hold	Reten	Load	Description
0	0	0	Unload the medium to the Loadable position.
0	0	1	Rewind the medium to the Loaded position. The medium will be ready at BOT.
0	1	0	Perform the retension operation and unload the medium to the Loadable position.
0	1	1	Perform the retension operation. The medium will remain at the Loaded position ready at BOT.
1	0	0	Unload the medium to the Medium Auxiliary Memory Accessible position.
1	0	1	Unload the medium to the Medium Auxiliary Memory Accessible position.
1	1	0	Perform the retension operation and unload the medium to the Medium Auxiliary Memory Accessible position.
1	1	1	Perform the retension operation and unload the medium to the Medium Auxiliary Memory Accessible position.

If the Prevent Medium Removal state has been set using the Prevent Allow Medium Removal command and a Load Unload command is issued that requests the medium be unloaded to the Medium Loadable position, then a check condition status will be returned. The sense key will be set to Illegal Request(05) and the additional sense data will be set to Medium Removal Prevented (5302).

If the Immediate (Immed) flag is 1, then the drive validates the command and waits for any previous command from any host to complete, including any immediate commands currently being processed, and for any buffered data to be flushed to tape. It will then report a deferred error for any preceding command or buffered data if appropriate. If there is no deferred error, the drive reports good status and initiates the command. If the Immediate flag is 0, status is not returned until after the command has completed.

3.6.2 Completion Status:

<table>
<tr><th>Code</th><th>Message</th><th>Description</th></tr>
<tr><td>00h</td><td>Good Status</td><td>♦ The tape is positioned as requested.
♦ The drive remains in any previously set modes.
♦ The drive is ready to perform any appropriate command.
Note: If IMMED is one, then Good status only indicated that the command is valid.</td></tr>
<tr><td>02h</td><td>Check Condition</td><td>Use the Request Sense command to retrieve status information. Possible Sense Keys are:
<table>
<tr><th>Code</th><th>Message</th><th>Description</th></tr>
<tr><td>02h</td><td>Not Ready</td><td>No cartridge is in the drive, cartridge is in the Loadable position or the cartridge is in the Medium Auxiliary Memory Accessible Position</td></tr>
<tr><td>04h</td><td>Hardware Error</td><td>Parity error on then SCSI bus, or drive hardware failure detected.</td></tr>
<tr><td>05h</td><td>Illegal Request</td><td>Medium Removal Prevention has been set, or the command Descriptor Block is invalid.</td></tr>
<tr><td>06h</td><td>Unit Attention</td><td>The cartridge was loaded or unloaded to the Medium Loadable, Medium Auxiliary Memory Accessible Or Medium Loaded at BOT positions.</td></tr>
</table></td></tr>
</table>

3.7 LOCATE:

The Locate command moves to a specified position on the tape.

Before the locate operation is performed, all buffered data and filemarks are transferred to tape. On completion, the logical position is before the specified location.

3.7.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (2Bh)							
1	Ignored LUN			Reserved				Immed
2	Reserved							
3	Block Address, MSB							
4	Block Address							
5	Block Address							
6	Block Address, LSB							
7	Reserved							
8	Reserved							
9	Control							

3.7.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The operation code for Locate is 2Bh
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Immed	1	0	0 = Status is not returned until the tape is positioned. 1 = Status is returned as soon as the operation is initiated.
Block Address	3-6		The logical block address of the block to which the tape is to be positioned. Block 0 is the first block on tape. The value indicates the total number of records and marks between BOT and the desired logical position.
Reserved			All reserved bits must be 0.
Control	9		See Control Byte Format on page 21.

The Locate command causes the logical position on tape to be set to the value indicated by the Block Address field. The value indicates the total number of records and marks between BOT and the desired logical position. A value of 0 will cause the tape to be positioned at BOT.

If the Immediate (Immed) flag is set to 1, then the drive validates the command and waits for any previous command from any host to complete including any immediate commands currently being processed and for any buffered data to be flushed to tape. It will then report a deferred error for any preceding command or buffered data if appropriate. If there is no deferred error, the drive reports good status and initiates the command. If the Immediate (Immed) flag is set to 0, status is not returned until after the command has completed.

3.7.2 Completion Status:

Code	Message	Description
00h	Good Status	♦ The tape is positioned to the logical block address specified. ♦ The drive remains in any previously set mode. ♦ The drive is ready to perform any appropriate command. Note: If Immed is 1, then Good Status only indicates that the command is valid.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are:

Code	Message	Description
02h	Not Ready	No cartridge is in the drive.
03h	Media Error	Unrecoverable data error encountered.
04h	Hardware Error	Parity error on SCSI bus or drive hardware failure detected.
05h	Illegal Request	The Command Descriptor Block is invalid.
06h	Unit Attention	The cartridge was changed, or the drive was reset prior to this command.
08h	Blank Check	The drive encountered EOD.

3.8 LOG SELECT:

The Log Select and Log Sense commands work in conjunction to allow the host to control and obtain statistical information about cartridge usage and error rates. This information consists of counters of particular events.

The Log Select command is used to reset the log counters to their default values. A SCSI Bus Reset, Bus Device Reset, or cartridge loading is also used to reset these counters (of pages 02h, 03h, 0Ch, and 32h.) Multiple pages are reset by a single Log Select command. Log Select affects pages 02h, 03h, 2Eh, and 32h only. See Log Sense for information about log pages and their format.

3.8.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (4Ch)							
1	Ignored LUN			Reserved			PCR	Rsvd
2	PC			Reserved				
3	Reserved							
4	Reserved							
5	Reserved							
6	Reserved							
7	Parameter List Length, MSB							
8	Parameter List Length, LSB							
9	Control							

3.8.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation Code for Log Select is 4Ch
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Parameter Code Reset (PCR)	1	1	0 = Reset values as specified by PC. Do not clear the DU (Disable Update, see **Log Parameter**) bits of the parameters of log pages 02h, 03h, 2Eh, and 32h. With page 2Eh log parameters are set to 0 only when PC = 11b. 1 = Reset log parameters on pages 02h, 03h, 2Eh, and 32h. All accumulated values are set to 0; all threshold values are set to maximums except page 2Eh. DU bits of the parameters of these log pages are also cleared.
Page Control (PC)	2	6-7	00b = Check Condition if Parameter List Length > 0. 01b = Check Condition if Parameter List Length > 0. 10b = All thresholds are set to maximums. Check Condition if Parameter List Length > 0. 11b = All accumulated values are set to 0. Check Condition if Parameter List Length > 0. This field is ignored if PCR is not 0.
Parameter List Length	7-8		Always 0. Specifies the length (in bytes) of the parameter list to be transferred during the Data Out phase. A 0 length indicates that no parameter data is to be transferred.
Reserved			All reserved bits must be 0.
Control	9		See Control Byte Format on page 21.

NOTE: Pages 00h, 0Ch, 30h, and 31h cannot be reset by Log Select.

The drive does not maintain a separate set of log parameters for each initiator. Therefore, a Log Select command affects all initiators.

NOTE: The subsequent section discusses the Log Sense command. The log page codes and the log parameter codes are described in that section.

3.8.2 Log Pages:

A log page is made up of a four-byte page header and one or more log parameters. A log parameter is made up of a four-byte parameter header and one or more associated parameter data bytes.

The following table shows the log page header format.

Byte	Bits 7	6	5	4	3	2	1	0
0	Reserved		Page Code					
1	Reserved							
2	Page Length, MSB							
3	Page Length, LSB							

3.8.2.1 Field Descriptions:

Field	Bytes	Bits	Description
Page Code	0	0-5	Identifies the page.
Page Length	2-3		Indicates the length of log parameters (in bytes) which follow the page header.
Reserved			All reserved bits must be 0.

3.8.2.2 Log Parameter:

The following table shows a typical log parameter format.

Byte	Bits 7	6	5	4	3	2	1	0
0	Parameter Code, MSB							
1	Parameter Code, LSB							
2	DU	DS	Reserved					
3	Parameter Length (n-3)							
4	Parameter Value							
n	Parameter Value							

3.8.2.3 Field Descriptions:

Field	Bytes	Bits	Description
Parameter Code	0-1		Identifies the log parameter. Log Parameters are always in ascending order.
Disable Update (DU)	2	7	0 = Enables update of accumulated value when the corresponding event occurs. 1 = Disables update of all accumulated values within a log page when the corresponding event occurs. The drive sets this bit to indicate that the accumulated value of the parameter has reached its maximum value so that the drive can no longer increment any Parameter Values.
Disable Save (DS)	2	6	Always 1, indicating that the drive does not support Save Page in Log Sense and Log Select.
Parameter Length	3		n – 3, indicating the length of the Parameter Value.
Parameter Value	4 - n		Actual data.
Reserved			Always 0.

The parameter header contains a two-byte parameter code to identify the parameter, a Parameter Control byte, and a parameter length byte.

All of the bits in byte 2 of the Log Parameter are collectively referred to as the Parameter Control byte. The Parameter Control byte specifies counter controls.

The Parameter Control byte specifies:

- Whether or not a counter or a log page is enabled.
- Whether or not a Check Condition is generated when a counter is incremented, and if so, how the Check Condition is generated.

Each Log Parameter contains only one control byte. This control byte is shared between the threshold and accumulated parameters. The Log Sense data reflects the current setting of the control byte for the parameter.

There are several logs of different formats that allow you to retrieve different drive parameters. The following logs are supported:

Log	See Page
Supported Log Pages Log Page (00h)	43
Write Error Counters Log Page (02h)	43
Read Error Counters Log Page (03h)	44
Sequential Access Device Log Page (0Ch)	45
Tape Alert Log Page (2Eh)	45
Tape Usage Log Page (30h)	46
Tape Capacity Log Page (31h)	46
Data Compression Log Page (32h)	47

3.8.2.4 Maximum Counts:

The maximum value of each counter depends on the size of the counter in bytes. When the maximum count is reached, the DU bit in the Parameter Control byte for the counter is set to 1 for the Log Sense data indicating that the parameter is no longer to be updated by the drive because the maximum count has been reached and if RLEC (Report Log Exception Condition) bit in Mode Page 0Ah (Control Mode page) is set to 1, Recovered Error/Log Counter at Maximum (01/5B/02) is returned to host to inform of the log exception. Bytes 15-17 of the Request Sense data specify the page, MSB and LSB of the Parameter Code respectively, which caused the Log Exception.

When a counter reaches the maximum, the counter is no longer incremented. If a maximum value for the parameter size is reached, the count does NOT roll over and continue counting. When any counter of a page reaches maximum, all counters of that page are no longer incremented. A Log Select command can be issued for pages 02h, 03h, and 32h with the PCR bit set to reset the accumulated values and to allow counters to continue as normal. The DU bit of the affected parameter is also reset to zero. The same effect can be achieved by a SCSI Bus Reset, Bus Device Reset, or cartridge loading.

3.8.3 Completion Status:

<table>
<tr><th>Code</th><th>Message</th><th>Description</th></tr>
<tr><td>00h</td><td>Good Status</td><td>• The drive is ready to perform any appropriate command.
• The affected log parameters are reset.
• The tape position is not changed.</td></tr>
<tr><td>02h</td><td>Check Condition</td><td>Use the Request Sense command to retrieve status information. Possible Sense Keys are:
<table>
<tr><th>Code</th><th>Message</th><th>Description</th></tr>
<tr><td>04h</td><td>Hardware Error</td><td>Parity error on the SCSI bus or drive hardware failure.</td></tr>
<tr><td>05h</td><td>Illegal Request</td><td>The Reserved bits are set or the Parameter List Length is not 0 in the Command Descriptor Block.</td></tr>
<tr><td>06h</td><td>Unit Attention</td><td>The cartridge was changed, or the drive was reset prior to this command.</td></tr>
</table></td></tr>
</table>

3.9 LOG SENSE:

The Log Select and Log Sense commands work in conjunction to allow the host to control and obtain statistical information about cartridge usage and error rates. This information consists of counters of particular events.

Log Sense data is obtained by specifying a log page in the Page Code field of the Log Sense CDB. The host can request only one page of data with each Log Sense command. The available pages are found by reading the Supported Log Pages Log (00h).

3.9.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (4Dh)							
1	Ignored LUN				Reserved			
2	PC			Page Code				
3	Reserved							
4	Reserved							
5	Parameter Pointer, MSB							
6	Parameter Pointer, LSB							
7	Allocation Length, MSB							
8	Allocation Length, LSB							
9	Control							

3.9.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation Code for Log Sense is 4Dh.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Page Control (PC)	2	6-7	00b = Requests Threshold values (always returns maximum possible values). 01b = Requests Accumulated values 10b = Requests Default threshold values (always returns maximum possible values). 11b = Requests Default accumulated values (always returns 0s).
Page Code	2	0-5	00h = Requests Supported Log Pages Log 02h = Requests Write Error Counters Log 03h = Requests Read Error Counters Log 0Ch = Requests Sequential Access Device Log 2Eh = Requests Tape Alert Log 30h = Requests Tape Usage Log 31h = Requests Tape Capacity Log 32h = Requests Data Compression Log
Parameter Pointer	5-6	7-0	Specifies the beginning parameter code to be returned to the initiator. All remaining parameter codes are returned in ascending order. This field is ignored for page code 00h.
Allocation Length	7-8	7-0	The Allocation Length field specifies the maximum amount of memory space (in bytes), which the initiator has reserved for Log Sense data. The drive returns the number of bytes contained in the requested page, or the requested Allocation Length, whichever is less. If the Allocation Length is less than the actual page length, the transfer is truncated.

Field	Bytes	Bits	Description
Reserved			All reserved bits must be 0.
Control	9		See Control Byte Format on page 21.

The Page Control (PC) field specifies the type of counters that the initiator is requesting. The value 01b is the most common page control setting. This requests the accumulated counts for the page to be returned. These counts reflect the current count of events since the last power-on cycle, SCSI bus Reset, Bus Device Reset, Target or Logical Unit Reset, Reset LIP, cartridge loading, or the last Log Select command that cleared the parameter values.

Accumulated values are incremented by the drive as an event occurs. For pages 02h, 03h, and 32h, these values can be cleared with all the above methods. For page 0Ch these values can be cleared with all the above methods except with Log Select. Because the drive maintains the accumulated values in volatile memory, the values may be lost if a power cycle occurs.

The PC field is ignored for pages 00h, 0Ch, 2Eh, 30h, and 31h and the accumulated values are always returned except page 00h which has no accumulated values.

3.9.2 The Parameter Pointer Field:

The Parameter Pointer field specifies the starting page that is to be transferred. For example, if the page uses parameter codes 2 through 6 and the parameter pointer field is set to 3, then the drive returns parameters 3 through 6. Likewise, if the parameter pointer is set to 1, parameters 2 through 6 are returned.

If the Parameter Pointer field is set to 0, all parameters for that particular page are returned up to the maximum number of bytes specified in the allocation length.

Regardless of the starting parameter code specified in the Parameter Pointer field, the page header is always returned.

3.9.3 Log Pages:

There are several logs of different formats that allow you to retrieve different drive parameters. The following logs are supported:

Log	See Page
Supported Log Pages Log Page (00h)	43
Write Error Counters Log Page (02h)	43
Read Error Counters Log Page (03h)	44
Sequential Access Device Log Page (0Ch)	45
Tape Alert Log Page (2Eh)	45
Tape Usage Log Page (30h)	46
Tape Capacity Log Page (31h)	46
Data Compression Log Page (32h)	47

Only one log page is transferred to the host with each Log Sense command. The Page Code field (Byte 2) of the CDB specifies the page to be transferred.

A four-byte page header precedes the parameter data for each page. The page header specifies the page code returned and the length of that page in bytes.

Following the page header are the log parameters. Each log parameter is a data structure that contains several description bytes followed by the parameter value itself.

Log Page Header
First Log Parameter

Log Page Header is always returned.

…
Last Log Parameter

Multiple Log Parameters are returned in each log page. The log parameters are returned in ascending order.

3.9.3.1 Log Page Header:

Byte	Bits 7	6	5	4	3	2	1	0
0	Reserved			Page Code				
1	Reserved							
2	Page Length, MSB							
3	Page Length, LSB							

3.9.3.2 Field Descriptions:

Field	Bytes	Bits	Description
Page Code	0	0-5	Identifies the page being returned.
Page Length	2-3		Indicates the length of the page in bytes that follow the page header. If the allocation length specified in the CDB is too small to transfer the entire requested page, this value is not adjusted to reflect the truncation. However, if the Parameter Pointer field specifies a starting parameter code other than zero, the page length is adjusted to indicate the number of bytes that follow the page header.
Reserved			All reserved bits must be 0.

3.9.3.3 Log Parameter:

Byte	Bits 7	6	5	4	3	2	1	0
0	Parameter Code, MSB							
1	Parameter Code, LSB							
2	DU	DS	TSD	ETC	TMC		LBIN	LP
3	Parameter Length							
4 – n	Parameter Value							

3.9.3.4 Field Descriptions:

Field	Bytes	Bits	Description
Parameter Code	0-1		Identifies the log parameter returned. Log Parameters are always returned in ascending order.
Disable Update (DU)	2	7	0 = Enables update of accumulated value when the corresponding event occurs. 1 = Disables update of all accumulated values within a log page when the corresponding event occurs. The drive sets this bit to indicate that the accumulated value of the parameter has reached its maximum value so that the drive can no longer increment any Parameter Values.
Disable Save (DS)	2	6	Always 1, indicating that the drive does not support Save Page in Log Sense and Log Select.
TSD	2	5	Always 0, indicating that Target Save Disable (TSD) is not supported.
ETC	2	4	Always 0, indicating that Enable Threshold Comparison (ETC) is not supported.

TMC	2	2-3	Always 0, indicating that Threshold Met Criteria (TMC) is not supported.
List Binary (LBIN)	2	1	Always 0, indicating that all log parameters are data counters.
List Parameter (LP)	2	0	Always 0, indicating that all log parameters are data counters.
Parameter Length	3		n – 3, indicating the length of the Parameter Value.
Parameter Value	4 – n		The Parameter Value is the actual data requested.
Reserved			Always 0.

3.9.4 Supported Log Pages Log Page (00h):

Page 00h indicates the log pages used by the drive. To determine the size of each page and of each parameter in the page, the individual page must be requested. Page 00h is unique in that the log parameters returned do not contain log parameter headers. All other pages return a log parameter header for each log parameter. Page 00h is valid only for the Log Sense command. When page 00h is requested, the four-byte page header is returned followed by the list of log pages—one byte for each log page. The list of log pages is returned in ascending order.

Byte	Bits 7	6	5	4	3	2	1	0
0	Reserved				Page Code (00h)			
1	Reserved							
2	Page Length, MSB							
3	Page Length, LSB (0Ah)							
4	Supported Log Pages Log Page (00h)							
5	Write Error Counters Log Page (02h)							
6	Read Error Counters Log Page (03h)							
7	Sequential Access Device Log Page (0Ch)							
8	Tape Alert Log Page (2Eh)							
9	Tape Usage Log Page (30h)							
10	Tape Capacity Log Page (31h)							
11	Data Compression Log Page (32h)							

3.9.4.1 Field Descriptions:

Field	Bytes	Bits	Description
Page Code	0	0-5	
Page Length	2-3		Always 0Ah, indicating the page length.
Supported Log Pages Log	4		Always 00h, the page code of the Supported Log Pages Log Page
Write Error Counters Log	5		Always 02h, the page code of the Write Error Counters Log Page
Read Error Counters Log	6		Always 03h, the page code of the Read Error Counters Log Page
Sequential Access Device Log	7		Always 0Ch, the page code of the Sequential Access Device Log Page

Field	Bytes	Bits	Description
Tape Alert Log	8		Always 2Eh, the page code of the Tape Alert Log Page
Tape Usage Log	9		Always 30h, the page code of the Tape Usage Log Page
Tape Capacity Log	10		Always 31h, the page code of the Tape Capacity Log Page
Data Compression Log	11		Always 32h, the page code of the Data Compression Log Page
Reserved			Always 0.

3.9.5 Write Error Counters Log Page (02h):

The Write Error Counters Log Page records write errors. The parameters on this page can be reset to 0 with the Log Select command.

Page Code	Page Length
02h	38h

Parameter	Description	Length
0	Errors corrected without substantial delay	4
1	Errors corrected with possible delay.	4
2	Total rewrites. (sum of Parameter 0003 and Parameter 0006)	4
3	Total errors corrected. This is total write retries less total unrecoverable write errors. (Parameter 0004 minus Parameter 0006, this is also the sum of Parameter 0000 and Parameter 0001)	4
4	Total times error correction processed. This is the total number of write retries.	4
5	Total bytes processed. The is the total data sets written.	4
6	Total uncorrected errors. This is the total unrecoverable write errors.	4

3.9.6 Read Error Counters Log Page (03h):

The Read Error Counters Log Page records read errors. The parameters on this page can be reset to 0 with the Log Select command.

Page Code	Page Length
03h	38h

Parameter	Description	Length
0	Errors corrected without substantial delay	4
1	Errors corrected with possible delay.	4
2	Total rereads. (sum of Parameter 0003 and Parameter 0006)	4
3	Total errors corrected. This is total read retries less total unrecoverable errors. (Parameter 0004 minus Parameter 0006, this is also the sum of Parameter 0000 and Parameter 0001)	4
4	Total times error correction processed. This is the total number of read retries.	4
5	Total bytes processed. The is the total data sets read.	4
6	Total uncorrected errors. This is the total unrecoverable read errors.	4

3.9.7 Sequential Access Device Log Page (0Ch):

The Sequential Access Device Log Page tracks the flow of data to and from the drive. It also signals when drive cleaning is necessary.

Page Code	Page Length
0Ch	3Ch

Parameter	Description	Length
0000h	Number of data bytes received from application clients during Write Command operations. This is the number of bytes transferred over the SCSI interface before compression.	8
0001h	Number of data bytes written to the media as a result of Write Command operations, not counting ECC and formatting overhead. This is the number of data bytes transferred to media after compression.	8
0002h	Number of data bytes read from the media during Read command Operations, not counting ECC and formatting overhead. This is the number of data bytes transferred from media with compression.	8
0003h	Number of data bytes transferred to the initiator(s) during Read Command operations. This is the number of bytes transferred over the SCSI interface, after decompression.	8
0100h	Cleaning required. A non-zero value of the cleaning required parameter indicates that a condition requiring cleaning has been detected and a subsequent cleaning cycle has not been completed. The cleaning required parameter is persistent across hard resets and power cycles.	8

3.9.8 Tape Alert Log Page (2Eh):

The Tape Alert Log Page provides information about errors and the status of the drive and media.

Page Code	Page Length
2Eh	140h

All parameters are one byte long. Each parameter is either zero to indicate the corresponding condition has not occurred or one to indicate that the corresponding condition has occurred. The log page is used in conjunction with Information Exceptions Mode Page (1Ch) that controls the action taken by the drive when a flag is set and sets various other control mechanisms of the Tape Alert system. A flag is set whenever the condition for setting the flag exists. There are three types of flags, Informational, Warning, and Critical. The type of flag depends upon the severity of the condition that sets the flag. Flags are cleared on the following conditions:

- At drive power on
- When the TapeAlert Log page is read
- When specified corrective action has been taken (such as using a cleaning cartridge)
- On a SCSI bus reset or bus device reset message (Parallel SCSI interface) or Target Reset or Logical Unit Reset task management request
- On Log Select reset (note that the recommended action on receiving Log Select for the TapeAlert Log Page is to reject the command with an error).

Additional information regarding the Tape Alert system is found in the SCSI-3 Stream Commands (SSC) Standard and Tape Alert specification. The following is the list of flags (parameters) supported by the drive.

Parameter	Description	Type	Length
3	Hard Error	Warning	1
9	Write Protect	Critical	1
11	Cleaning media in drive	Informational	1

Parameter	Description	Type	Length
12	Unsupported Format	Informational	1
14	Unrecoverable snapped tape	Critical	1
15	Memory in Cartridge Failure	Warning	1
16	Forced Eject	Critical	1
17	Read Only Format	Warning	1
18	Tape Directory Corrupted on Load	Warning	1
20	Clean now	Critical	1
22	Expired cleaning media	Critical	1
23	Invalid cleaning tape	Critical	1
30	Hardware A	Critical	1
31	Hardware B	Critical	1
32	Interface	Warning	1
34	Download Fault	Warning	1
51	Tape Directory Invalid at Unload	Warning	1

3.9.9 Tape Usage Log Page (30h):

The Tape Usage Log Page returns information about the current tape cartridge. These values are all read directly from the tape log. The Page Control, PC, field is ignored and accumulated values are always returned.

Page Code	Page Length
30h	5Ah

Parameter	Description	Length
1	Thread Count	4
2	Total Data Sets Written	8
3	Total Write Retries	4
4	Total Unrecovered Write Errors	2
5	Total Suspended Writes	2
6	Total Fatal Suspended Writes	2
7	Total Data Sets Read	8
8	Total Read Retries	4
9	Total Unrecovered Read Errors	2
10	Reserved	2
11	Reserved	2
12	Total Suspended Append Writes	2

3.9.10 Tape Capacity Log Page (31h):

The Tape Capacity Log Page returns information about the tape capacity. All values are in millions of bytes (10^6) and assume no data compression. The Page Control, PC, field is ignored and accumulated values are always returned.

Page Code	Page Length
31h	20h

Parameter	Description	Length
1	Main partition remaining capacity	4
2	Always 0	4

Parameter	Description	Length
3	Main partition maximum capacity	4
4	Always 0	4

3.9.11 Data Compression Log Page (32h):

The Data Compression Log Page records compression information. The parameters on this page can be reset to 0 with the Log Select command

Page Code	Page Length
32h	4Ch

Parameter	Description	Length
0	Read compression ratio in percent	2
1	Write compression ratio in percent	2
2	Millions of total bytes transferred to host	4
3	Remaining bytes of total bytes transferred to host	4
4	Millions of total bytes read from tape	4
5	Remaining bytes of total bytes read from tape	4
6	Millions of total bytes transferred from host	4
7	Remaining bytes of total bytes transferred from host	4
8	Millions of total bytes written to tape	4
9	Remaining bytes of total bytes written to tape	4

Parameters 2 through 9 occur as pairs each of which represents a total number of bytes (i.e., total number of bytes transferred to host as with Parameter 2 and 3 pair.) The first four-byte parameter of a pair represents millions of bytes (10^6.) The second four-byte parameter of a pair represents the difference between the millions of bytes and the total number of bytes as a positive number in the range of 0 to 999,999. Thus the total number of bytes is the first four-byte parameter in bytes plus the second four-byte parameter. Parameters 0 and 1are in percent, i.e. 200 represents 200% compression. Compression ratios will be most accurate after 10^8 bytes have been read or written.

3.9.13 Completion Status:

<table>
<tr><th>Code</th><th>Message</th><th>Description</th></tr>
<tr><td>00h</td><td>Good Status</td><td>• The drive is ready to perform any appropriate command.
• The requested log page is returned.
• The tape position is not changed.</td></tr>
<tr><td>02h</td><td>Check Condition</td><td>Use the Request Sense command to retrieve status information. Possible Sense Keys are:
Code Message Description
04h Hardware Error Parity error on the SCSI bus or drive hardware failure.
05h Illegal Request The Command Descriptor Block is invalid.
06h Unit Attention The cartridge was changed, or the drive was reset prior to this command.</td></tr>
</table>

3.10 MODE SELECT:

The Mode Select command allows the host to assign device parameters to the drive.

After a power-on or SCSI reset condition, the drive sets its device parameters to the default values. By issuing a Mode Select command, the host can change the device parameters. The parameters are transferred to the drive as data formatted in a parameter list.

Parameters assigned by the Mode Select command remain in effect until the drive receives a subsequent Mode Select command or a reset. The Mode Select parameters are not unique to the initiator that assigned the parameters.

In multiple-initiator systems, all initiators that access the drive use the assigned parameters. However, when a Mode Select command changes parameters that apply to other initiators, the drive generates a Unit Attention condition for all initiators except the one that issued the Mode Select command. The Additional Sense Code and Additional Sense Code Qualifier are set to Mode Parameters Changed.

The Mode Select command immediately checks for invalid parameters or invalid combinations of parameters before executing. If an exception is found, the drive returns a Check Condition, and the request sense data is set to Illegal Request.

All Mode Select parameters may be rounded up or down, as appropriate. A Mode Sense command may be issued after a Mode Select command to determine which parameters have been rounded.

3.10.1 Command Descriptor Block:

3.10.1.1 6-Byte Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (15h)							
1	Ignored LUN			PF	Reserved			
2	Reserved							
3	Reserved							
4	Parameter List Length							
5	Control							

3.10.1.2 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	1		The Operation Code for Mode Select is 15h.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
PF	1	4	Always 1, indicating SCSI-2 format.
Parameter List Length	4		Specifies the number of bytes in the Mode Select parameter list to be transferred from the host to the drive. A value of 0 is a valid entry and indicates no data.
Reserved			All reserved bits must be 0.
Control	5		See Control Byte Format on page 21.

A value in the Parameter List Length field that truncates a parameter list causes the drive to return a Check Condition, and the request sense data is set to Illegal Request.

3.10.1.3 10-Byte Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (55h)							

Byte	Bits 7	6	5	4	3	2	1	0
1	Ignored LUN			PF	Reserved			
2	Reserved							
3	Reserved							
4	Reserved							
5	Reserved							
6	Reserved							
7	Parameter List Length, MSB							
8	Parameter List Length, LSB							
9	Control							

3.10.1.4 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	1		The Operation Code for Mode Select is 55h.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
PF	1	4	Always 1, indicating SCSI-2 format.
Parameter List Length	7-8		Specifies the number of bytes in the Mode Select parameter list to be transferred from the host to the drive. A value of 0 is a valid entry and indicates no data.
Reserved			All reserved bits must be 0.
Control	9		See Control Byte Format on page 21.

A value in the Parameter List Length field that truncates a parameter list causes the drive to return a Check Condition, and the request sense data is set to Illegal Request.

3.10.2 Mode Select Parameters:

The Mode Select parameter list, for both the 6-byte CDB and 10-byte CDB versions is in the following general format:

Mode Parameter Header	The Mode Parameter Header is required.
Block Descriptor	The Block Descriptor is optional.
Mode Parameter Pages	Zero or more Mode Parameter Pages may be included.

3.10.3 Mode Parameter Header:

3.10.3.1 6-Byte CDB Mode Parameter Header:

Byte	Bits 7	6	5	4	3	2	1	0
0	Mode Data Length							
1	Reserved							
2	WP	Buffered Mode			Speed			
3	Block Descriptor Length							

3.10.3.2 Field Descriptions:

Field	Bytes	Bits	Description
Mode Data Length	0		Mode Select: Always 0. Mode Sense: The number of bytes of data available.
WP	2	7	Mode Select: Ignored. Mode Sense: 0 = The cartridge is not write protected. 1 = the cartridge is write protected.
Buffered Mode	2	4-6	0 = Unbuffered mode. 1 = Buffered mode (default).
Speed	2	0-3	This field indicates the tape speed. 0 = variable speed (default) 2 = 2.077 m/sec (meter/second) 3 = 2.576 m/sec 4 = 3.097 m/sec 5 = 4.153 m/sec 6 = 5.000 m/sec 7 = 5.916 m/sec
Block Descriptor Length	3		0 = No Block Descriptor follows. 8 = 8-byte Block Descriptor follows.
Reserved			All reserved bits must be 0.

When Buffered Mode is 1, a Write command is terminated when the data is transferred to the internal buffer of the drive. When Buffered Mode is 0 a Write command is not terminated until all data has been transferred to tape.

3.10.3.3 10-Byte CDB Mode Parameter Header:

Byte	Bits 7	6	5	4	3	2	1	0
0	Mode Data Length, MSB							
1	Mode Data Length, LSB							
2	Reserved							
3	WP	Buffered Mode			Speed			
4	Reserved							
5	Reserved							
6	Block Descriptor Length, MSB							
7	Block Descriptor Length, LSB							

3.10.3.4 Field Descriptions:

Field	Bytes	Bits	Description
Mode Data Length	0-1		Mode Select: Always 0. Mode Sense: The number of bytes of data available.
WP	3	7	Mode Select: Ignored. Mode Sense: 0 = The cartridge is not write protected. 1 = the cartridge is write protected.
Buffered Mode	3	4-6	0 = Unbuffered mode. 1 = Buffered mode (default).

Field	Bytes	Bits	Description
Speed	3	0-3	This field indicates the tape speed. 0 = variable speed (default) 2 = 2.077 m/sec (meter/second) 3 = 2.576 m/sec 4 = 3.097 m/sec 5 = 3.643 m/sec 6 = 4.153 m/sec 7 = 5.916 m/sec
Block Descriptor Length	6-7		0 = No Block Descriptor follows. 8 = 8-byte Block Descriptor follows.
Reserved			All reserved bits must be 0.

When Buffered Mode is 1, a Write command is terminated when the data is transferred to the internal buffer of the drive. When Buffered Mode is 0 a Write command is not terminated until all data has been transferred to tape.

3.10.4 Block Descriptor:

The following table presents the Parameter List block descriptor.

Byte	Bits 7	6	5	4	3	2	1	0
0	Density Code							
1	Reserved							
2	Reserved							
3	Reserved							
4	Reserved							
5	Block Length, MSB							
6	Block Length							
7	Block Length, LSB							

3.10.4.1 Field Descriptions:

Field	Bytes	Bits	Description
Density Code	0		Identifies the format of the tape currently in the drive. Mode Select: 00h = Default 40h = Ultrium 1 41h = Ultrium 2 7Fh = No-op Mode Sense: 00h = Default
Block Length	5-7		0 = Variable length block mode. The Fixed bit in Read and Write commands must be 0. 1 to FFFFFFh = The length of the fixed-length block to be read or written when the Fixed bit is set in a Read or Write command.
Reserved			All reserved bits must be 0.

3.10.5 Mode Parameter Pages:

There are several mode parameter pages of different formats that allow you to set different drive parameters. The following mode parameter pages are supported:

Mode Parameter Page	See Page
Disconnect/Reconnect Mode Page (02h)	52
Control Mode Page (0Ah)	53
Data Compression Control Mode Page (0Fh)	54
Sequential Access Device Configuration Mode Page (10h)	55
Information Exceptions Mode Page (1Ch)	55
Drive Capabilities Control Mode Page (21h)	58
Interface Control Mode Page (22h) (Parallel SCSI drives only)	58

The following table shows the general format of a Mode Parameter Page.

Byte	Bits 7	6	5	4	3	2	1	0
0	Reserved				Page Code			
1	Additional Page Length							
2 - n	Mode Parameters							

3.10.5.1 Field Descriptions:

Field	Bytes	Bits	Description
Page Code	0	0-5	02h = Disconnect/Reconnect Mode Page 0Ah = Control Mode Page 0Fh = Data Compression Control Mode Page 10h = Device Configuration Mode Page 1Ch = Information Exceptions Mode Page 21h = Drive Capabilities Control Mode Page 22h = Interface Control Mode Page
Additional Page Length	1		Specifies the length (in bytes) of the Mode Parameters.
Mode Parameters	2-n		The mode parameters are specific to each mode parameter page and are described in the following sections.
Reserved			All reserved bits must be o.

If the initiator does not set the Additional Page Length field of the Mode Page to the value indicated in the Mode Page definition (for example, 10h for the Device Configuration Page), the drive terminates the Mode Select command and returns Check Condition status bytes with an Illegal Request sense key. The Additional Sense Code and Additional Sense Code Qualifier are set to Invalid Field in Parameter List.

3.10.6 Disconnect/Reconnect Mode Page (02h):

The Disconnect/Reconnect mode page allows the host to set the maximum burst size for data transfer.

Byte	Bits 7	6	5	4	3	2	1	0
0	Reserved				Page Code (02h)			
1	Additional Page Length (0Eh)							
2	Reserved							
3	Reserved							
4	Reserved							
5	Reserved							
6	Reserved							
7	Reserved							

8	Reserved
9	Reserved
10	Maximum Burst Size, MSB
11	Maximum Burst Size, LSB
12	Reserved
13	Reserved
14	Reserved
15	Reserved

3.10.6.1 Field Descriptions:

Field	Bytes	Bits	Description
Page Code	0	0-5	Always 02h, indicating the Disconnect/Reconnect Page
Additional Page Length	1		Always 0Eh, indicating that 14 parameter bytes follow the Page Length byte.
Maximum Burst Size	10-11		0 = No limit exists on the amount of data transferred per connection (default). The drive does not have to disconnect until all requested data is transferred. 1 to FFFFh = The maximum amount of data that the drive can transfer, in 512-byte increments, before disconnecting, if the initiator granted the disconnect capability.
Reserved			All reserved bits must be 0.

On read operations, the drive disconnects when the drive buffer is empty, even if the Allocation Length has not been satisfied. On write operations, the drive disconnects when the drive buffer is full, even if the Transfer Length has not been exhausted.

3.10.7 Control Mode Page (0Ah):

The Control mode page specifies whether the drive generates a Check Condition when any log parameter reaches maximum. (Refer to the Log Select command and the Log Sense command.) It also specifies whether tagged queuing is used and the behavior of the drive autoload sequence.

Note that Autoload Mode persists across power cycles. Its new definition takes effect at the next cartridge insertion after Mode Select.

Byte	Bits 7	6	5	4	3	2	1	0
0	Reserved		Page Code (0Ah)					
1	Additional Page Length (0Ah)							
2	TST			Reserved		D_SNS	GLTSD	RLEC
3	Queue Algorithm Modifier				Rsvd	QErr		DQUE
4	TAS	RAC	UA_INTLCK_CTRL		SWP	Obsolete		
5	Reserved					Autoload Mode		
6	Obsolete							
7	Obsolete							
8	Busy Timeout Period, MSB							
9	Busy Timeout Period, LSB							
10	Extended Self-Test Completion Time, MSB							
11	Extended Self-Test Completion Time, LSB							

3.10.7.1 Field Descriptions:

Field	Bytes	Bits	Description
Page Code	0	0-5	Always 0Ah, indicating the Control Mode Page.
Additional Page Length	1		Always 0Ah indicating that 10 parameter bytes follow the Page Length byte.
TST	2	5-7	Always 0, indicating that Task Set Type is per logical unit for all initiators.
D_SNS	2	2	Always 0, indicating support of the fixed format sense data.
GLTSD	2	1	Always 0, indicating that Global Logging Target Saving is enabled.
RLEC	2	0	0 = Drive does not Report Log Exception Conditions (RLEC) (default). 1 = Drive Reports Log Exception Conditions (RLEC).
Queue Algorithm Modifier	3	4-7	Always 0, indicating that drive reorders the processing of incoming Simple-attribute tasks in such a way that the data integrity is maintained for the issuing initiator.
QErr	3	1-2	Always 0, together with TST = 0 indicating that Queue Error management should block all tasks in the task set when error occurs.
DQUE	3	0	Always 1 for Parallel SCSI, indicating that Tagged Queuing (DQUE) is disabled
TAS	4	7	Always 0, indicating that Task Abort Status should not be returned to the initiator when another initiator aborts the task.
RAC	4	6	Always 0, indicating that drive may return long busy condition in place of Report A Check condition.
SWP	4	3	Always 0, indicating unsupported Software Write Protect.
Auto Load Mode	5	0-2	000b = Load inserted medium for full access. 001b = Load inserted medium for medium auxiliary memory access only. 010b = Do not load inserted medium.
Busy Timeout Period	8-9		Always 0, indicating unsupported feature.
Extended Selftest Completion Time	10-11		Always 0, indicating unsupported feature.
Reserved			All reserved bits must be 0.

3.10.8 Data Compression Control Mode Page (0Fh):

The Data Compression Control mode page specifies whether or not data is compressed during Write commands and whether or not data is decompressed during Read commands.

Byte	Bits 7	6	5	4	3	2	1	0
0	Reserved				Page Code (0Fh)			
1	Additional Page Length (0Eh)							
2	DCE	DCC			Reserved			
3	DDE	RED			Reserved			
4	Compression Algorithm, MSB							
5	Compression Algorithm							
6	Compression Algorithm							
7	Compression Algorithm, LSB							
8	Decompression Algorithm, MSB							
9	Decompression Algorithm							
10	Decompression Algorithm							

Byte	Bits 7	6	5	4	3	2	1	0
11	Decompression Algorithm, LSB							
12	Reserved							
13	Reserved							
14	Reserved							
15	Reserved							

3.10.8.1 Field Descriptions:

Field	Bytes	Bits	Description
Page Code	0	0-5	Always 0Fh, indicating the Data Compression Control Page.
Additional Page Length	1		Always 0Eh, indicating that 14 parameter bytes follow the Page Length byte.
DCE	2	7	0 = Data compression is disabled. 1 = Data Compression is Enabled (DCE) (default). The drive compresses data before writing to tape.
DCC	2	6	Always 1, indicating that the drive is Data Compression Capable (DCC).
DDE	3	7	0 = Data decompression is disabled. Compressed data is not decompressed before it is transferred to the host. 1 = Data Decompression is Enabled (DDE) (default). The drive decompresses compressed data before sending it to the host.
RED	3	5-6	Always 0, indicating that when DDE is 1 and drive is unable to decompress compressed data from tape, it should return Check Condition.
Compression Algorithm	4-7		0 = Data is not compressed before it is written to tape (even if DCE is 1). 1 = Default compression algorithm (default).
Decompression Algorithm	8-11		0 = No algorithm is selected. 1 = Default decompression algorithm is used (default).
Reserved			All reserved bits must be 0.

3.10.9 Sequential Access Device Configuration Mode Page (10h):

The Device Configuration mode page specifies the appropriate sequential access device configuration. The following table illustrates this page.

Byte	Bits 7	6	5	4	3	2	1	0
0	Reserved		Page Code (10h)					
1	Additional Page Length (0Eh)							
2	Rsvd	CAP	CAF	Active Format				
3	Active Partition							
4	Write Buffer Full Ratio							
5	Read Buffer Empty Ratio							
6	Write Delay Time, MSB							
7	Write Delay Time, LSB							
8	DBR	BIS	RSMK	AVC	SOCF		RBO	REW
9	Gap Size							
10	EOD Defined			EEG	SEW	SWP	Reserved	
11	Buffer Size at Early Warning, MSB							
12	Buffer Size at Early Warning							
13	Buffer Size at Early Warning, LSB							

Byte	Bits 7	6	5	4	3	2	1	0
14	Select Data Compression Algorithm							
15	Reserved					ASOC WP	PERS WP	PRM WP

3.10.9.1 Field Descriptions:

Field	Bytes	Bits	Description
Page Code	0	0-5	10h, indicating the Sequential Access Device Configuration Page.
Additional Page Length	1		Always 0Eh, indicating that 14 parameter bytes follow the Page Length byte.
CAP	2	6	Always 0, indicating that multiple partitions are not supported
CAF	2	5	Always 0, indicating that changing formats is not supported
Active Format	2	0-4	Always 0, indicating that changing formats is not supported
Active Partition	3		Always 0, indicating that multiple partitions are not supported
Write Buffer Full Ratio	4		Always 0, indicating that buffer management is handled by the drive.
Read Buffer Empty Ratio	5		Always 0, indicating that buffer management is handled by the drive.
Write Delay time	6-7		For a WRITE command, the Write Delay Time field indicates to the drive how long in 100 millisecond increments, to delay writing buffered data to tape after the last WRITE command.
DBR	8	7	Always 0, indicating that Data Buffer Recovery is not supported.
BIS	8	6	Always 1, indicating that Block Identifiers are Supported
RSMK	8	5	Always 0, indicating that Report Set Marks is not supported.
AVC	8	4	Always 0, indicating that Automatic Velocity Control is managed by the drive.
SOCF	8	2-3	Always 0, indicating that Stop On Consecutive Filemarks is not supported.
RBO	8	1	Always 0, indicating that Recover Buffer Order is not supported.
REW	8	0	Always 0, indicating that Report Early Warning for Read type commands is not supported.
Gap Size	9		Always 0, indicating that there is no concept of inter-block gaps in the LTO format.
EOD Defined	10	5-7	Always 0, indicating the logical unit's default EOD definition.
EEG	10	4	Always 1, indicating that EOD generation is always enabled.
SEW	10	3	Always 0, The Buffered Mode set in the Mode Select Parameter Header controls drive buffering.
SWP	10	2	Always 0, indicating unsupported Soft Write Protect.
Buffer Size at Early Warning	11-13		Always 0, indicating that this cannot be set.
Select Data Compression Algorithm	14		0 = Use pass through mode; do not compress data (not recommended). 1 = Use default auto-compression scheme (recommended default)
ASOCWP	15	2	Always 0, indicating unsupported Associated Write Protect.
PERSWP	15	1	Always 0, indicating unsupported Persistent Write Protect.
PRMWP	15	0	Always 0, indicating unsupported Permanent Write Protect.
Reserved			All reserved bits must be 0.

3.10.10Informational Exceptions Mode Page (1Ch):

The Informational Exceptions Mode Page controls exception reporting via the TapeAlert log page.

Byte	Bits 7	6	5	4	3	2	1	0
0	Rsvd	Page Code (1Ch)						
1	Page Length (0Ah)							
2	Perf	Rsvd	EBF	EWasc	DExcept	Test	Rsvd	LogErr
3	Reserved				MRIE			
4	Interval Timer, MSB							
5	Interval Timer							
6	Interval Timer							
7	Interval Timer, LSB							
8	Test Flag Number, MSB							
9	Test Flag Number							
10	Test Flag Number							
11	Test Flag Number, LSB							

3.10.10.1 Field Descriptions:

Field	Bytes	Bits	Description
Page Code	0	0-5	1Ch, indicating the Information Exceptions Mode Page.
Additional Page Length	1		Always 0Ah, indicating that 10 parameter bytes follow the Page Length byte.
Perf	2	7	Always 0, indicating that this feature is not supported.
EBF	2	5	Parallel SCSI Interface: Always 0.
EWasc	2	4	Always 1, indicating that Tape Alert warning flags are reported.
DExcept	2	3	0 = Exception reporting is enabled. 1 = Exception reporting is disabled (default).
Test	2	2	0 = Normal operation (default). 1 = Fail next command (see below) with: 01/5D/FF if Test Flag Numbert is 0. 01/5D/00 if Test Flag Number indicates a valid value (see below). This will be reported only one time between resets. Test bit and Test Flag Number are cleared right away after the Mode Select and are displayed as 0s in Mode Sense.
LogErr	2	0	Always 0, indicating that this feature is not supported.
MRIE	3	0-3	Always 3, so if an exception occurs, the next command (except Inquiry and Request Sense) will get check condition status and the Sense Key will be set to Recovered Error (01) and the Additional Sense will be set to Failure Prediction Threshold Exceeded (5D00).
Interval Timer	4-7		Always 0, indicating that this feature is not supported.
Test Flag Number	8-11		This field is in 2's complement. 0 = No flag number. If Test = 1, then Test bit will be cleared only in Mode Sense when 01/5D/FF is returned. If Test = 0 and Test Flag Number is not 0, return Check Condition. If Test = 1 and Test Flag Number is one of the following: 1 to 64 = Set the indicated tape alert flag in log page 2Eh if it is supported. Otherwise, return Check Condition. -1 to -64 = Clear the indicated tape alert flag (from 1 to 64) if it is supported. Otherwise, return Check Condition. 32767 = Set all supported tape alert flags.
Reserved			All reserved bits must be 0.

3.10.11Drive Capabilities Control Mode Page (21h):

The Drive Capabilities Control mode page controls the capabilities of the CL400 drive. A single copy of this page is maintained for all initiators. New Inquiry String Control, Firmware Test Control, and Data Compression Control will be in effect immediately after Mode Select. New Operating Systems Support, Extended POST Mode, and Auto Unload Mode will be in effect the next power cycle, after Mode Select. This page persists across power cycles.

Byte	Bits 7	6	5	4	3	2	1	0
0	Reserved				Page Code (21h)			
1	Page Length (07h)							
2	Operating Systems Support							
3	Firmware Test Control-2							
4	Extended POST Mode							
5	Inquiry String Control							
6	Firmware Test Control							
7	Data Compression Control							
8	Host Unload Override	Auto Unload Mode						

3.10.11.1 Field Descriptions:

Field	Bytes	Bits	Description
Page Code	0	0-5	21h, indicating the Drive Capabilities Control Mode Page.
Additional Page Length	1		07h, indicating that seven parameter bytes follow the Page Length byte.
Operating Systems Support	2		0 = Standard LTO (default AU1-SCSI and ISV)
Firmware Test Control-2	3		0 = disable Factory test mode code (default) 1 = enable Factory test code 1 2 = enable Factory test code 2
POST Mode	4		0 = Enable POST (default) 1 = Disable POST
Inquiry String Control	5		0 = Standard Certance CL400 Inquiry string (default) 1 = Factory test only Inquiry string 1 2 = Factory test only Inquiry string 2 3 = Factory test only Inquiry string 3
Firmware Test Control	6		0 = disable Factory test mode code (default) 1 = enable Factory test code 1 2 = enable Factory test code 2
Data Compression Control	7		0 = Full Mode Page 0Fh & 10h Control of Compression (default) 1 = Auto compression with No SCSI Mode control 2 = Compression Disabled with No SCSI Mode control
Host Unload Override	8	7	The Host Unload Override when set will place the drive into a mode where SCSI Unload commands from the host will not eject the cartridge. Library systems that do not want the host to eject the cartridge should set this bit.

Field	Bytes	Bits	Description
Auto Unload Mode	8	0-6	The Auto Unload Mode allows the drive to control how the tape is unloaded when (a) a power cycle occurs with a tape inside, (b) an incompatible tape is inserted, (c) a firmware download occurs with a tape inside, and (d) the cleaning tape has finished the cleaning process. Refer to section on Library Features – Auto Unload Mode for additional details. 0 = Data cartridge stays threaded at BOT; do not unthread and do not unload. (default) 1 = Unthread. 2 = Unthread and unload. 3 = Unthread and unload non data cartridges, data cartridges are threaded to BOT. (Basically data cartridges behave as for mode 0 and non data cartridges behave according to mode 2.
Reserved			All reserved bits must be 0.

3.10.12Interface Control Mode Page (22h) (Parallel SCSI drives only):

The Interface Control mode page is implemented only for parallel SCSI drives. It controls the operation of the Parallel SCSI port as well as parameters of the Library serial interface. A single copy of this page is maintained for all initiators. New CmdFwd and Alerts will be in effect immediately after Mode Select. New Baud Rate, 2StopBits, Next Selection ID, Target Initiated Bus Control will be in effect the next reset or power cycle after Mode Select. This page persists across power cycles.

Alerts are not implemented, so this field has a value of 0 and is not changeable.

Byte	Bits 7	6	5	4	3	2	1	0
0	Reserved			Page Code (22h)				
1	Page Length (0Eh)							
2	Baud Rate							
3	Reserved				CmdFwd		2StopBits	Alerts
4	Port A Transport Type							
5	Reserved							
6	Reserved							
7	Port A Present Selection ID							
8	Reserved							
9	Reserved							
10	Reserved							
11	Reserved							
12	Next Selection ID							
13	Jumpered Selection ID							
14	Target Initiated Bus Control							
15	Reserved			Port A Enabled	Rsvd	Port A Power On Enabled	Reserved	

3.10.12.1 Field Descriptions:

Field	Bytes	Bits	Description
Page Code	0	0-5	22h, indicating the Interface Control Mode Page.
Additional Page Length	1		Always 0Eh, indicating that fourteen parameter bytes follow the Page Length byte.

Field	Bytes	Bits	Description
Baud Rate	2		The baud rate at which the Library interface will operate after the next reset. 0 = 9600 baud 1 = 9600 baud (was 4800 baud in LTO1 200 drives) 2 = 9600 baud 3 = 19200 baud 4 = 38400 baud 5 = 57600 baud 6 = 115200 baud
Alerts	3	0	0 = Disable unsolicited alert messages to the tape library via the serial interface. 1 = Enable unsolicited alert messages to the tape library via the serial interface. This field is fixed at 0 and is not changeable, because Alerts are not implemented.
2StopBits	3	1	0 = Library interface transmits 1 stop bit per byte. 1 = Library interface transmits 2 stop bits per byte.
Cmd Fwd	3	2-3	0 = Command forwarding disabled. 1 = Command forwarding enabled. Note: Not all drives support command forwarding. If the value in this field is zero and it is not changeable, then command forwarding is not supported.
Port A Transport Type	4		0 = Port A link is down. 3 = Parallel SCSI Ultra-160 Interface The drive will not check and will not change this field by Mode Select. This field is unchangeable to hosts and is changed only by some other means that is beyond the scope of Mode Select.
Port A Present Selection ID	7		The SCSI ID to which the drive responds. This field is unchangeable by hosts and is changed only by some other means that is beyond the scope of Mode Select.
Next Selection ID	12		The SCSI ID that the drive will respond to after the Port A Enabled bit is changed from 0 to 1 by a Mode Select command. If the port is already enabled, then the new ID takes effect immediately. Next Selection ID is provided to obviate the need for changing address jumpers.
Jumpered Selection ID	13		The Selection ID that is set by external jumpers. If both the jumpers and Next Selection ID are changed and then the drive is reset or power cycled, the jumper address will be used, and Next Selection ID will be set to this value.
Target Initiated Bus Control	14		0 = Not supported
Port A Power On Disabled	15	2	0 = SCSI Port will be enabled at next power up 1 = SCSI Port will be disabled at next power up
Port A Enabled	15	4	0 = SCSI Port is disabled 1 = SCSI Port is enabled
Features in bytes 14 and 15 are enabled by special request; otherwise the fields are 0.			
Reserved			All reserved bits must be 0.

3.10.13Completion Status:

Code	Message	Description
00h	Good Status	• The drive is ready to perform any appropriate command. • The defined mode is set and remains set until another MODE SELECT or RESET command is issued. • The tape position is not changed.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are: **Code** **Message** **Description** 01h Recovered Error One or more parameters was rounded to complete the command. 04h Hardware Error Parity error on the SCSI bus or drive hardware failure. 05h Illegal Request The Page Length field is incorrect, or the Command Descriptor Block is invalid. 06h Unit Attention The cartridge was changed, or the drive was reset prior to this command.

3.11 MODE SENSE:

The MODE SENSE command allows the host to determine various drive parameters. These parameters are sent from the drive to the host as data formatted in a parameter list. This command is complementary to the Mode Select command that sets device parameters.

The drive terminates execution of the Mode Sense command:

When the number of bytes specified in the Allocation Length field have been sent to the host, or

When all available Mode Sense data has been sent to the host.

If a Mode Select command has not been performed since power-on or SCSI Reset, the default mode parameters are in effect.

All Mode Select parameters may be rounded up or down, as appropriate. A Mode Sense command may be issued after a Mode Select command to determine which parameters have been rounded.

Block and page descriptions for this command are shown on subsequent pages.

3.11.1 Command Descriptor Block:

3.11.1.1 6-Byte Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (1Ah)							
1	Ignored LUN			Rsvd	DBD	Reserved		
2	PC			Page Code				
3	Reserved							
4	Allocation Length							
5	Control							

3.11.1.2 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation Code for the 6-byte version of Mode Sense is 1Ah.

Field	Bytes	Bits	Description
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
DBD	1	3	0 = Return the block descriptor in the Mode Sense data. 1 = Disable Block Descriptors (DBD). NOTE: When the DBD is 1, the Block Descriptor Length in the parameter header is 0.
PC	2	6-7	Page Control specifies the type of values to be returned. 00b = Report current values. 01b = Report changeable values. Any bit that can be changed by Mode Select is set to 1; otherwise, the bits are set to 0. 10b = Report default values. Returns the power-up, or reset, values. 11b = Report saved values. Returns the power-up, or reset, values.
Page Code	2	0-5	The Page Code selects the page or pages to be returned by the drive. 00h = Return only the Parameter List Header/Block Descriptor 02h = Return the Disconnect/Reconnect Page 0Ah = Return the Control Mode Page 0Fh = Return the Data Compression Control Page 10h = Return the Device Configuration Page 1Ch = Return the Information Exceptions Page 21h = Return the Drive Capabilities Page 22h = Return the Interface Control Page (Parallel SCSI drives only) 3Fh = Return all available pages in ascending order starting from page 02h
Allocation Length	4		Specifies the number of bytes the host has allocated for returned Mode Sense data. The drive will not return more than this amount of data. A value of 0 is a valid entry and indicates no data.
Reserved			All reserved bits must be 0.
Control	5		See Control Byte Format on page 21.

3.11.1.3 10-Byte Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (5Ah)							
1	Ignored LUN			Rsvd	DBD	Reserved		
2	PC		Page Code					
3	Reserved							
4	Reserved							
5	Reserved							
6	Reserved							
7	Allocation Length, MSB							
8	Allocation Length, LSB							
9	Control							

3.11.1.4 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation Code for the 6-byte version of Mode Sense is 1Ah.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.

Field	Bytes	Bits	Description
DBD	1	3	0 = Return the block descriptor in the Mode Sense data. 1 = Disable Block Descriptors (DBD). NOTE: When the DBD is 1, the Block Descriptor Length in the parameter header is 0.
PC	2	6-7	Page Control specifies the type of values to be returned. 00b = Report current values. 01b = Report changeable values. Any bit that can be changed by Mode Select is set to 1; otherwise, the bits are set to 0. 10b = Report default values. Returns the power-up, or reset, values. 11b = Report saved values. Returns the power-up, or reset, values. 76b = Unit
Page Code	2	0-5	The Page Code selects the page or pages to be returned by the drive. 00h = Return only the Parameter List Header/Block Descriptor 02h = Return the Disconnect/Reconnect Page 0Ah = Return the Control Mode Page 0Fh = Return the Data Compression Control Page 10h = Return the Device Configuration Page 1Ch = Return the Information Exceptions Page 21h = Return the Drive Capabilities Page 22h = Return the Interface Control Page (Parallel SCSI drives only) 3Fh = Return all available pages in ascending order starting from page 02h
Allocation Length	7-8		Specifies the number of bytes the host has allocated for returned Mode Sense data. The drive will not return more than this amount of data. A value of 0 is a valid entry and indicates no data.
Reserved			All reserved bits must be 0.
Control			See Control Byte Format on page 21.

3.11.2 Mode Sense Data:

The Mode Sense data list, for both the 6-byte CDB and 10-byte CDB versions is in the following general format:

Mode Parameter Header	The Mode Parameter Header is always returned.
Block Descriptor	The Block Descriptor is returned if DBD is 0 in the Mode Sense CDB.
Mode Parameter Pages	One or all Mode Parameter Pages may be returned depending on the value of Page Code in the Mode Sense CDB.

3.11.3 Mode Parameter Header:

3.11.3.1 6-Byte CDB Mode Parameter Header:

Byte	Bits 7	6	5	4	3	2	1	0
0	Mode Data Length							
1	Medium Type							
2	WP	Buffered Mode			Speed			
3	Block Descriptor Length							

3.11.3.2 Field Descriptions:

Field	Bytes	Bits	Description
Mode Data Length	0		Mode Select: Always 0. Mode Sense: The number of bytes of data available.
Medium Type	1		Identifies the type of media currently in the drive. 0 = Data Cartridge 1 = Cleaning Cartridge
WP	2	7	Mode Select: Ignored. Mode Sense: 0 = The cartridge is not write protected. 1 = the cartridge is write protected.
Buffered Mode	2	4-6	0 = Unbuffered mode. 1 = Buffered mode (default).
Speed	2	0-3	This field indicates the tape speed. 0 = variable speed (default) 2 = 2.077 m/sec (meter/second) 3 = 2.576 m/sec 4 = 3.097 m/sec 5 = 3.643 m/sec 6 = 4.153 m/sec 7 = 5.916 m/sec
Block Descriptor Length	3		0 = No Block Descriptor follows. 8 = 8-byte Block Descriptor follows.
Reserved			All reserved bits must be 0.

When Buffered Mode is 1, a Write command is terminated when the data is transferred to the internal buffer of the drive. When Buffered Mode is 0 a Write command is not terminated until all data has been transferred to tape.

3.11.3.3 10-Byte CDB Mode Parameter Header:

	Bits							
Byte	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
0	Mode Data Length, MSB							
1	Mode Data Length, LSB							
2	Medium Type							
3	WP	Buffered Mode			Speed			
4	Reserved							
5	Reserved							
6	Block Descriptor Length, MSB							
7	Block Descriptor Length, LSB							

3.11.3.4 Field Descriptions

Field	Bytes	Bits	Description
Mode Data Length	0-1		Mode Select: Always 0. Mode Sense: The number of bytes of data available.
Medium Type	1		Identifies the type of media currently in the drive. 0 = Data Cartridge 1 = Cleaning Cartridge
WP	3	7	Mode Select: Ignored. Mode Sense: 0 = The cartridge is not write protected. 1 = the cartridge is write protected.

Field	Bytes	Bits	Description
Buffered Mode	3	4-6	0 = Unbuffered mode. 1 = Buffered mode (default).
Speed	3	0-3	This field indicates the tape speed. 0 = variable speed (default0 2 = 2.077 m/sec (meter/second) 3 = 2.576 m/sec 4 = 3.097 m/sec 5 = 3.643 m/sec 6 = 4.153 m/sec 7 = 5.916 m/sec
Block Descriptor Length	6-7		0 = No Block Descriptor follows. 8 = 8-byte Block Descriptor follows.
Reserved			All reserved bits must be 0.

When Buffered Mode is 1, a Write command is terminated when the data is transferred to the internal buffer of the drive. When Buffered Mode is 0 a Write command is not terminated until all data has been transferred to tape.

3.11.4 Block Descriptor:

Byte	Bits 7	6	5	4	3	2	1	0
0	Density Code							
1	Reserved							
2	Reserved							
3	Reserved							
4	Reserved							
5	Block Length, MSB							
6	Block Length							
7	Block Length, LSB							

3.11.4.1 Field Descriptions:

Field	Bytes	Bits	Description
Density Code	0		Identifies the format of the tape currently in the drive. Mode Select: 00h = Default 40h = Ultrium 1 41h = Ultrium 2 7Fh = No-op Mode Sense: 00h = Default
Block Length	5-7		0 = Variable length block mode. The Fixed bit in Read and Write commands must be 0. 1 to FFFFFFh = The length of the fixed-length block to be read or written when the Fixed bit is set in a Read or Write command.
Reserved			All reserved bits must be 0.

3.11.5 Mode Parameter Pages:

There are several mode parameter pages that allow you to retrieve different drive parameters. The format of these pages is described in the Mode Select command, starting on page 40. The following mode parameter pages are supported:

Mode Parameter Page	See Page
Disconnect/Reconnect Mode Page (02h)	52
Control Mode Page (0Ah)	53
Data Compression Control Mode Page (0Fh)	54
Sequential Access Device Configuration Mode Page (10h)	55
Information Exceptions Mode Page (1Ch)	55
Drive Capabilities Control Mode Page (21h)	58
Interface Control Mode Page (22h) (Parallel SCSI drives only)	58

3.11.6 Completion Status:

Code	Message	Description
00h	Good Status	• The drive is ready to perform any appropriate command. • The drive remains in any previously set mode. MODE SENSE does not set or change any modes. • The tape position is not changed. It remains at the previous position.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are: **Code** **Message** **Description** 04h Hardware Error Parity error on the SCSI bus or drive hardware failure. 05h Illegal Request The Command Descriptor Block is invalid. 06h Unit Attention The cartridge was changed, or the drive was reset prior to this command.

3.12 PARK UNPARK:

The Park Unpark command with the park bit set requests that the drive park the load arm in preparation for transport.

The Park Unpark command with the park bit not set requests that the drive load arm be unparked. This is not usually necessary as the drive automatically unparks on power up.

In either case, attempting to issue this command while the medium is present will result in a vendor specific check condition of MEDIUM_IS_PRESENT (09/80/80).

The Park Unpark command is a vendor unique command.

3.12.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (06h)							
1	Ignored LUN			Reserved				
2	Reserved							
3	Reserved							
4	Reserved							Park
5	Control							

3.12.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation Code for Park Unpark is 06h.

Field	Bytes	Bits	Description
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Park	4	0	0b = Requests the drive to be unparked. 1b = Requests the drive to be parked.
Reserved			All reserved bits must be 0.
Control	5		See Control Byte Format on page 21.

3.12.2 Completion Status:

Code	Message	Description
00h	Good Status	• The drive is ready to perform any appropriate command. • The drive remains in any previously set mode. • The tape position is not changed.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are: **Code** **Message** **Description** 04h Hardware Error Drive hardware failure. 05h Illegal Request The Command Descriptor Block is invalid. 06h Unit Attention The cartridge was changed, or the drive was reset prior to this command. 09h Medium Present Cannot park drive with medium present.

3.13 PREVENT ALLOW MEDIUM REMOVAL:

The Prevent Allow Medium Removal command requests that the target enable or disable the removal of the medium from the drive. The drive will not allow medium removal if any initiator currently has medium removal prevented.

If medium removal is prevented and the medium is in the loaded position, then:

- Pressing the eject button on the front panel will be ignored.
- The Load Unload command with the LOAD bit set to zero will result in a Check Condition status. The sense code is set to Illegal Request and the Additional Sense to Medium Removal Prevented (5302).

All initiators that have prevented medium removal must enable it before the medium can be removed from the drive.

A Bus Reset, Bus Device Reset message (Parallel SCSI interface), Target Reset or Logical Unit Reset task management request, or power cycle will clear any previous medium removal prevented setting and allow medium removal.

3.13.1 Command Descriptor Block:

	Bits							
Byte	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
0	Operation Code (1Eh)							
1	Ignored LUN			Reserved				
2	Reserved							
3	Reserved							
4	Reserved							Prevent
5	Control							

3.13.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation Code for Prevent/Allow Medium Removal is 1Eh.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Prevent	4	0-1	00b = Medium removal allowed. 01b = Medium removal prevented. 10b = Not supported, no medium changer. 11b = Not supported, no medium changer.
Reserved			All reserved bits must be 0.
Control	5		See Control Byte Format on page 21.

3.13.2 Completion Status:

Code	Message	Description
00h	Good Status	• The drive is ready to perform any appropriate command. • The drive remains in any previously set mode. • The tape position is not changed.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are: **Code** **Message** **Description** 04h Hardware Error Parity error on the SCSI bus or drive hardware failure. 05h Illegal Request The Command Descriptor Block is invalid. 06h Unit Attention The cartridge was changed, or the drive was reset prior to this command.

3.14 READ:

The READ command transfers one or more bytes or blocks from the drive to the Initiator beginning with the next block on tape.

If the Fixed flag is clear and Transfer Length is not zero, then a single block of the length in Transfer Length is transferred. If the next block on tape is of this length or shorter then it is transferred to the initiator. If the next block is longer than this length, then only the length requested is returned and the logical position is set to after the record. If the length of the block was the same as the Transfer Length field, then good status is returned. If the length of the block was not the same as in Transfer Length and the Suppress Illegal Length Indicator (SILI) flag was clear, then Check Condition Status is returned. If the length of the block was not the same as in Transfer Length and the Suppress Illegal Length Indicator (SILI) flag was set, then Good status is returned.

If the fixed flag is set and the Transfer Length field is not zero and the Suppress Illegal Length Indicator (SILI) flag is clear, then a sequence of blocks of the currently configured block length is to be returned, the number of blocks being indicated in the Transfer Length field. If there is a sequence of blocks of this length on the tape, they are returned to the initiator with good status. If a block that is longer than the configured length is encountered before the sequence is complete, the blocks up to that block are returned followed by the configured length from the record that was too long and Check Condition status. If a block that is shorter than the configured length is encountered before the sequence is complete, the blocks up to that block are returned followed by all of that block and Check Condition status. The current position is set after the last block that was returned or partially returned.

If the Transfer Length field is zero and the Suppress Illegal Length Indicator and the Fixed bit are not both set, then no action is taken.

If Suppress Illegal Length Indicator (SILI) flag is set and the Fixed bit is set, then Check Condition status is returned. The sense key is set to Illegal Request and the Additional Sense to Invalid Field in CDB (2400).

3.14.1 Command Descriptor Block:

The following table shows the layout of the CDB.

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (08h)							
1	Ignored LUN			Reserved			SILI	Fixed
2	Transfer Length, MSB							
3	Transfer Length							
4	Transfer Length, LSB							
5	Control							

3.14.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation Code for Read is 08h.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
SILI	1	1	0 = Return Check Status when an incorrect block length is detected. 1 = Suppresses incorrect length error reporting when reading variable-length blocks
Fixed	1	0	0 = Variable block length. Transfer Length contains the number of bytes to return. 1 = Fixed block length, as specified by the Mode Select Block Descriptor. Transfer Length contains the number of blocks to return
Transfer Length	2-4		This field specifies the number of bytes (Fixed = 0) or blocks (Fixed = 1) to be read. A transfer length of 0 is valid and no data is transferred.
Reserved			All reserved bits must be 0.
Control	5		See Control Byte Format on page 21.

If the SILI bit is 1 and the Fixed bit is 1, the drive returns a Check Condition with Illegal Request sense key with an additional sense code of Invalid Field in CDB.

When the SILI bit is 1 and Fixed bit is 0 and the only error encountered by the drive is that the actual block length differs from the requested transfer length, then the drive:

- Returns a Check Condition if the actual block length is larger than the requested transfer length and the Block Length field in the Mode Parameter block descriptor is nonzero.
- Does not return a Check Condition if the actual block length is smaller than the requested transfer length or if the actual block is larger than the requested block and the block length in the Mode Parameter block descriptor is 0.

If the Fixed flag is clear and Transfer Length is not zero, then a single block of the length in Transfer Length is transferred. If the next block on tape is of this length or shorter then it is transferred to the initiator. If the next block is longer than this length, then only the length requested is returned and the logical position is set to after the record. If the length of the block was the same as the Transfer Length field, then good status is returned. If the length of the block was not the same as in Transfer Length and the Suppress Illegal Length Indicator (SILI) flag was clear, then Check Condition Status is returned. If the length of the block was not the same as in Transfer Length and the Suppress Illegal Length Indicator (SILI) flag was set, then Good status is returned.

If the fixed flag is set and the Transfer Length field is not zero and the Suppress Illegal Length Indicator (SILI) flag is clear, then a sequence of blocks of the currently configured block length is returned, the number of blocks being indicated in the Transfer Length field. If there is a sequence of blocks of this length on the tape, they are returned to the initiator with good status. If a block that is longer than the configured length is encountered before the sequence is complete, the blocks up to that block are returned followed by the configured length from the record that was too long and Check Condition status. If a block that is shorter than the configured length is encountered before the sequence is complete, the blocks up to that block are returned followed by all of that block and Check Condition status. The current position is set after the last block that was returned or partially returned.

If the Transfer Length field is zero and the Suppress Illegal Length Indicator and the Fixed bit are not both set, then no action is taken.

If Suppress Illegal Length Indicator (SILI) flag is set and the Fixed bit is set, then Check Condition status is returned. The sense key is set to Illegal Request and the Additional Sense to Invalid Field in CDB (2400).

3.14.2 Read Command Operation:

The Read command is complete when one of the following conditions is met. These conditions are described in the following paragraphs.

- End-of-Data (EOD) is reached.
- A filemark (FM) is read.
- Transfer length is satisfied
- End-of-Tape (EOT) or end-of-partition (EOP) is reached.
- Unrecoverable data error occurs.
- Detection of incorrect block length.

3.14.2.1 End-of-Data:

If EOD is encountered, the command terminates with a Check Condition status and a Sense Key of 08h. If the Valid bit (byte 0, bit 7) is set indicating a residual count, the Residual length field is determined as follows:

- If the Fixed bit is 1, it equals the difference between the CDB transfer length and the number of actual blocks read.
- If the Fixed bit is 0, it equals the CDB transfer length.

The tape is then positioned to allow an Append Data operation.

3.14.2.2 Filemark:

If a filemark is encountered, the command terminates with a Check Condition, and the filemark bit (byte 2, bit 7) of the sense data is set to 1. If the Valid bit (byte 0, bit 7) is set indicating a residual count, the Residual length field is determined as follows:

- If the Fixed bit is 1, it equals the difference between the CDB transfer length and the number of actual blocks read.
- If the Fixed bit is 0, it equals the CDB transfer length.

On termination, the tape is positioned after the filemark on the EOT side of tape.

3.14.2.3 Transfer Length Satisfied:

If the CDB Transfer Length is satisfied, the command completes successfully with a Good Status, and the tape is positioned on the EOT side of the last block read.

3.14.2.4 End of Tape (EOT) or End-of-Partition (EOP):

When the end-of-tape or end-of-partition position is encountered, the command terminates with a Check Condition and Medium Error (03h) sense key. The Valid bit (byte 0, bit 7) and the EOM bit (byte 2, bit 6) are set.

The Residual Length field is then set as follows:

- If the Fixed bit is 1, it equals the difference between the CDB transfer length and the number of actual blocks read.
- If the Fixed bit is 0, it equals the CDB transfer length.

The logical position after encountering an end-of-tape or end-of-partition error is undetermined.

3.14.2.5 Recoverable Data Error:

If an error is encountered while reading the drive applies its retry algorithm. If the algorithm process cannot recover the error is reported as an unrecoverable read error.

3.14.2.6 Unrecoverable Data Error:

If an Unrecoverable Data Error is encountered, the READ command terminates with Check Condition and a Medium Error (03h) sense key.

If the Valid bit (byte 0, bit 7) is set, Residual Length field equals the difference between the requested Transfer Length and the actual number of blocks or bytes transferred. On termination, the tape is positioned after the error block on the EOT side of tape.

3.14.2.7 Incorrect Length:

Writing fixed- and variable-length blocks varies according to the setting of the Fixed bit.

When the Fixed bit is set (1), one or more tape blocks can be read. The CDB Transfer Length field specifies the block count to read. The block size is the current block size of the drive, which is set to 512 after a Bus Reset, Bus Device Reset message (Parallel SCSI interface), Target Reset or Logical Unit Reset task management request, or power cycle.

The host can change the current block size by issuing a MODE SELECT command with a new block descriptor parameter that specifies a new block size. If the current block size differs from the actual block size of the block being read, the drive reports an Incorrect Length error.

When the Fixed bit is reset (0), the CDB Transfer Length field indicates the number of bytes to be read. When the actual block size found on tape differs from the CDB Transfer Length, an Incorrect Length error is reported.

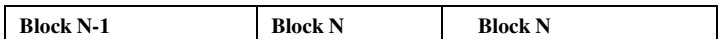
The drive reports the Incorrect Length error based on the Suppress Incorrect Length Indicator (SILI) bit as follows:

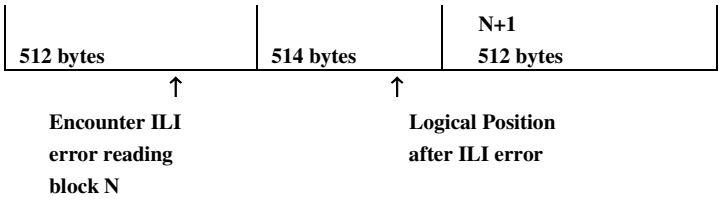
- If the actual block length exceeds the CDB Transfer Length, the Incorrect Length error is reported.
- If the actual block length is smaller than the CDB Transfer Length and the SILI bit is 1, the drive ignores (that is, suppresses) the Incorrect Length error.
- If the actual block length is different than the CDB Transfer Length and the SILI bit is 0, the drive reports the Incorrect Length error.

The drive reports the Incorrect Length error by returning a Check Condition. The Incorrect Length Indicator bit (byte 2, bit 5) of the Request Sense data is set (1) indicating the Incorrect Length error. The Valid bit (byte 0, bit 7) of the Request Sense data is also set (1) indicating that the residual data (bytes 3 through 6) is valid. The meaning of the residual data depends on the setting of the Fixed bit.

For reading both fixed- and variable-length blocks, the logical position after encountering an Incorrect Length error in block N is always at the end of block N. The following figure illustrates this position.

Current Block Size = 512 bytes/block





3.14.2.8 Fixed Mode Residual Data:

When the Fixed bit is set (1), the residual data is set to the CDB Transfer Length *minus* the actual number of blocks *correctly* read without encountering an ILI error.

For example, assume the following:

- The current block size is 512 bytes/block.
- The drive is currently positioned before block N.
- Block N contains 514 bytes.

If the host issues a READ command with a CDB Transfer Length of one, indicating one 512-byte block is to be read, the drive transfers the first 512 bytes of block N; then skips the last two bytes (513 and 514) and reports a Check Condition (caused by an Incorrect Length error). The residual is set to one. This residual is determined as follows:

CDB Transfer Length = Number of blocks correctly read without encountering an ILI error (1 - 0 = 1).

The logical position after the error is after byte 514 of block N.

3.14.2.9 Variable Mode Residual Data:

When the Fixed bit is reset (0), the residual data is always set to the CDB Transfer Length.

For example, assume the following:

- The drive is currently positioned before block N.
- Block N + 1 contains 512 bytes.

The host issues a READ command with a CDB Transfer Length of 514, indicating 514 bytes of data to be read. The drive transfers the first 512 bytes of block N; then stops because of an Incorrect Length error. The logical position after the error is after byte 512 of block N.

If the SILI bit is set (1), the drive does not report a Check Condition (caused by Incorrect Length error).

If the SILI bit is reset (0), the drive reports a Check Condition, and the residual is set to 2 (CDB Transfer Length = 514).

In the above example, if the block size of block N is 514 bytes and a READ command specifies a Transfer Length of 512 bytes, the drive transfers the first 512 bytes of block N; then skips the last two bytes to position itself at the end of byte 514 of block N. The residual is set to -2. Because the actual block length exceeds the CDB Transfer Length, the drive unconditionally reports Check Condition. In this case, the residual is set to -2.

3.14.3 Completion Status:

Code	Message	Description
00h	Good Status	• The drive is ready to perform any appropriate command. • The drive remains in any previously set mode. • The tape is positioned on the EOT side of the last block read.

Code	Message	Description		
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are:		
		Code	**Message**	**Description**
		02h	Not Ready	No cartridge is in the drive.
		03h	Media Error	Unrecoverable data error encountered.
		04h	Hardware Error	Parity error on the SCSI bus or drive hardware failure.
		05h	Illegal Request	The Command Descriptor Block is invalid.
		06h	Unit Attention	The cartridge was changed, or the drive was reset prior to this command.
		08h	Blank Check	The drive encountered EOD.

3.15 READ BLOCK LIMITS:

The Read Block Limits command requests that the drive return the maximum and minimum block sizes that it supports. The minimum block length is always reported as 1 byte, the maximum as 224-1 bytes.

3.15.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (05h)							
1	Ignored LUN			Reserved				
2	Reserved							
3	Reserved							
4	Reserved							
5	Control							

3.15.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation Code for Read Block Limits is 05h
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Reserved			All reserved bits must be 0.
Control	5		See Control Byte Format on page 21.

The host specifies the actual block size in fixed mode with the Mode Select command and in variable mode with the transfer/allocation length of Read and Write commands. The use of the Mode Sense command determines the current block size. The Read Block Limits command indicates the minimum and maximum block size that the drive can support.

3.15.2 Block Limit Data:

The Read Block Limits command returns data in the following format.

Byte	Bits 7	6	5	4	3	2	1	0
0	Reserved							
1	Maximum Block Length, MSB							
2	Maximum Block Length							
3	Maximum Block Length, LSB							

Byte	Bits 7	6	5	4	3	2	1	0
4	Minimum Block Length, MSB							
5	Minimum Block Length, LSB							

3.15.2.1 Field Descriptions:

Field	Bytes	Bits	Description
Reserved			All reserved bits must be 0.
Maximum Block Length	1-3		Always FFFFFFh, indicating a maximum block length of 2^{24}-1 bytes.
Minimum Block Length	4-5		Always 0001h, indicating a minimum block length of 1.

3.15.3 Completion Status:

Code	Message	Description
00h	Good Status	• The drive is ready to perform any appropriate command. • The drive remains in any previously set mode. • The tape position is not changed.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are: **Code** **Message** **Description** 04h Hardware Error Parity error on the SCSI bus or drive hardware failure. 05h Illegal Request The Command Descriptor Block is invalid. 06h Unit Attention The cartridge was changed, or the drive was reset prior to this command.

3.16 READ BUFFER:

The Read Buffer command reads data from the memory on the drive and sends it to the initiator. This command is used in conjunction with the Write Buffer command as a diagnostic function for testing the drive buffer memory and confirming the SCSI bus integrity. The tape is not accessed during execution of this command.

3.16.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (3Ch)							
1	Ignored LUN			Rsvd	Mode			
2	Buffer ID							
3	Buffer Offset (MSB)							
4	Buffer Offset							
5	Buffer Offset (LSB)							
6	Allocation Length (MSB)							
7	Allocation Length							
8	Allocation Length (LSB)							
9	Control							

3.16.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The operation code for Read Buffer is 3Ch.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Mode	1	0-3	0000b = Return descriptor and data. 0001b = Return Medium Auxiliary Memory(MAM), EEPROM or FLASH data. 0010b = Return data only. 0011b = Return descriptor only. 0100b = Return Trace Buffer data.
Buffer ID	2		00h = normal access (default) 54h = specifies access to MAM
Buffer Offset	3-5		For Mode not equal 0001b: The offset from the beginning of the specified buffer in bytes. For Mode equal 0001b: Set to the MAM page code as described in the tables or FFFFFFh to specify the entire 4KB MAM.
Allocation length	6-8		Specifies the amount of data bytes to be returned. A value of 0 is a valid entry and returns no data. The drive stops sending data when the number of bytes specified has been transferred or when all available data has been sent.
Reserved			All reserved bits must be 0.
Control	9		See Control Byte Format on page 21.

A Mode of 0000b requests that the data returned consist of a 4-byte descriptor header followed by the data from the buffer. The 4-byte header is included in the number of bytes specified by the Allocation Length. The Buffer ID and Buffer Offset fields are reserved.

A Mode of 0001b requests that data from the Medium Auxiliary Memory is returned.

A Mode of 0010b requests that only the data from the buffer is returned.

A Mode of 0011b requests that only the 4-byte descriptor header is returned. A Buffer ID value for which there is no buffer associated will result in an all zero header. The Buffer Offset field is reserved.

The Buffer ID field indicates which buffer is to be read. All drives support buffer 0. Other buffers may be available in the drive.

The Buffer Offset field may be used to specify the offset within the specified buffer from which the data will be transferred.

The Allocation Length is used to specify the number of bytes that the initiator has allocated for the returned data.

3.16.2 Read Buffer Descriptor:

If the Mode field is set to 0000b or 0011b, then the data returned includes a 4 byte Read Buffer Descriptor. The following table shows the fields in the Read Buffer Descriptor.

Byte	Bits 7	6	5	4	3	2	1	0
0	Reserved (0)							
1	Buffer capacity, MSB							
2	Buffer capacity							
3	Buffer capacity, LSB							

3.16.2.1 Field Descriptions:

Field	Bytes	Bits	Description
Reserved	0		All bits are 0.
Buffer Capacity	1-3		The capacity of the drive's data buffer.

3.16.3 MAM, Flash, and EEPROM Page Definitions:

The following sections details the pages available in the MAM. Refer to the Ultrium Generation I or Ultrium Generation II for the latest 8-Channel Format Specification Documents for the latest up-to-date MAM data.

3.16.3.1 MAM Pages:

The table below shows the Page ID used to identify each page within the MAM. Note that a Page ID of 0xFFFFFF is used when reading the entire MAM.

An optional page will not exist unless the drive has preformed an operation that requires information be stored to that optional page. A Read Buffer command to an optional page that has not been created will result in a check condition LUN NOT READY AUXILIARY MEMORY NOT ACCESSIBLE.

Page ID	Access	Description
FFFFFFh	RO	All pages.
000001h	RO	Cartridge Manufacturer's Information
000002h	RO	Media Manufacturer's Information (optional)
0000F0h-0000FFh	RO	Drive Manufacturer Support (cleaning tape only)
0000FFh	RO	Universal Drive Support (Universal Cleaning Cartridge only)
000101h	RO	Initialization Data
000102h	RO	Tape Write Pass
000103h	RO	Tape Directory
000104h	RO	EOD Information
000105h	RO	Cartridge Status and Tape Alert Flags
000106h	RO	Mechanism Related (optional)
000107h	RO	Suspended Append Writes
000108h-00010Bh	RO	Usage Information (optional)
0001FCh-0001FFh	RO	Cleaning Usage Information (optional, cleaning tape only)
000200h	RW	Application Specific (optional)

3.16.4 Completion Status:

Code	Message	Description
00h	Good Status	• The drive is ready to perform any appropriate command. • The drive remains in any previously set mode. • The tape position is not changed.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are: **Code** **Message** **Description** 04h Hardware Error Drive hardware failure detected. 05h Illegal Request The Command Descriptor Block is invalid. 06h Unit Attention The cartridge was changed or the drive was reset prior to this command.

3.17 READ POSITION:

The Read Position command reports the block address of the current data block. The current data block is the first data block that would be read from the current tape partition if a Read command were issued.

3.17.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (34h)							
1	Ignored LUN			Reserved		TCLP	Long	Rsvd
2	Reserved							
3	Reserved							
4	Reserved							
5	Reserved							
6	Reserved							
7	Reserved							
8	Reserved							
9	Control							

3.17.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation Code for Read Position is 34h.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
TCLP	1	2	1 = The drive returns data specifying the partition, file and set number with the current logical position. 0 = The drive returns data specifying the first and last block location. The Long bit and the TCLP bit must be equal, otherwise, the command shall be terminated with Check Condition status. The sense key shall be set to Illegal Request, and the additional sense code and an additional sense code qualifier set to Invalid Field in CDB.
Long	1	1	1 = The drive shall return 32 bytes of data. 0 = The drive shall return 20 bytes of data. The Long bit and the TCLP bit must be equal, otherwise, the command shall be terminated with Check Condition status. The sense key shall be set to Illegal Request, and the additional sense code and an additional sense code qualifier set to Invalid Field in CDB.
Reserved	2-8		All reserved bits must be 0.
Control	9		See Control Byte Format on page 21.

3.17.2 Read Position Data:

The Read Position command returns a block of Read Position Data.

The following table shows the fields in the Read Position Data when the Long and TCLP bits are set to 0.

Byte	Bits 7	6	5	4	3	2	1	0
0	BOP	EOP	Reserved			BPU	Reserved	

Byte	Bits 7	6	5	4	3	2	1	0
1	Partition Number (0)							
2	Reserved							
3	Reserved							
4	First Block Location, MSB							
5	First Block Location							
6	First Block Location							
7	First Block Location, LSB							
8	Last Block Location, MSB							
9	Last Block Location							
10	Last Block Location							
11	Last Block Location, LSB							
12	Reserved							
13	Number of blocks in buffer, MSB							
14	Number of blocks in buffer							
15	Number of blocks in buffer, LSB							
16	Number of bytes in buffer, MSB							
17	Number of bytes in buffer							
18	Number of bytes in buffer							
19	Number of bytes in buffer, LSB							

3.17.2.1 Field Descriptions:

Field	Bytes	Bits	Description
BOP	0	7	0 = The current logical position is not at BOT. 1 = The current logical position is at Beginning-of-Partition (BOT).
EOP	0	6	0 = The current logical position is not between early-warning and end-of-tape. 1 = The current logical position is between early-warning and end-of-tape.
BPU	0	2	0 = First Block Location and Last Block Location fields are valid. 1 = First Block Location and Last Block Location fields are invalid.
Partition Number	1		This field is always 0.
First Block Location	4-7		The block address of the current logical position.
Last Block Location	8-11		The block address of the current logical position. Always the same as First Block Location.
Number of blocks in buffer	13-15		This field is not supported and is always 0.
Number of bytes in buffer	16-19		This field is not supported and is always 0.
Reserved			All bits are 0.

The First Block Location and the Last Block Location are both set to the number of blocks and file marks between BOT and current logical position. If the tape is at BOT, 0 is returned in these fields. The Beginning of Partition (BOP) flag is set if the Block Location fields are zero.

The following table shows the fields in the Read Position Data when Long and TCLP bits are set to 1.

Byte	Bits 7	6	5	4	3	2	1	0
0	BOP	EOP	Reserved		MPU	BPU	Reserved	
1	Reserved							
2	Reserved							
3	Reserved							
4	Partition Number, MSB (0)							
5	Partition Number (0)							
6	Partition Number (0)							
7	Partition Number, LSB (0)							
8	Block Number, MSB							
9	Block Number							
10	Block Number							
11	Block Number							
12	Block Number							
13	Block Number							
14	Block Number							
15	Block Number, LSB							
16	File Number, MSB							
17	File Number							
18	File Number							
19	File Number							
20	File Number							
21	File Number							
22	File Number							
23	File Number, LSB							
24	Set Number, MSB (0)							
25	Set Number (0)							
26	Set Number (0)							
27	Set Number (0)							
28	Set Number (0)							
29	Set Number (0)							
30	Set Number (0)							
31	Set Number, LSB (0)							

3.17.2.2 Field Descriptions:

Field	Bytes	Bits	Description
BOP	0	7	0 = The current logical position is not at BOT. 1 = The current logical position is at Beginning-of-Partition (BOT).
EOP	0	6	0 = The current logical position is not between early-warning and end-of-tape. 1 = The current logical position is between early-warning and end-of-tape.
MPU	0	3	0 = File Number field is valid. 1 = File Number field is invalid.
BPU	0	2	0 = Block Number field is valid. 1 = Block Number field is invalid.
Partition Number	4-7		This field is always 0.
Block Number	8-15		This field indicates the number of logical blocks including filemarks between beginning-of-medium and the current logical position.

Field	Bytes	Bits	Description
File Number	16-23		This field indicates the number of filemarks between beginning-of-medium and the current logical position.
Set Number	24-31		This field is always 0.
Reserved			All bits are 0.

3.17.3 Completion Status:

Code	Message	Description
00h	Good Status	• The drive is ready to perform any appropriate command. • The drive remains in any previously set mode. • The tape is not moved.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are: **Code** / **Message** / **Description** 02h / Not Ready / No cartridge is in the drive. 04h / Hardware Error / Drive hardware failure detected. 05h / Illegal Request / The CDB contains an invalid bit. 06h / Unit Attention / The cartridge was changed, or the drive was reset prior to this command.

3.18 RECEIVE DIAGNOSTIC RESULTS:

The Receive Diagnostic Results command requests that the results of a previously executed Send Diagnostics command be sent to the initiator.

3.18.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (1C)							
1	Ignored LUN			Reserved				PCV
2	Page Code							
3	Allocation Length (MSB)							
4	Allocation Length (LSB)							
5	Control							

3.18.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation Code for Receive Diagnostic Results is 1Ch.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Reserved	1	1-4	All reserved bits must be 0.
PCV	1	0	Page Code Valid bit. Not supported, should be set to 0.
Page Code	2		Valid only when PCV bit is set.
Allocation length	3-4		Specifies the amount of data to be returned. An ALLOCATION LENGTH of 0 is valid and shall not be considered an error.
Control	5		See Control Byte Format on page 21.

3.18.2 Returned Data:

The Receive Diagnostic Results command returns a diagnostic page that reports the results of the previous Send Diagnostics command.

3.18.2.1 Returned Data Format:

Byte	Bits 7	6	5	4	3	2	1	0
0	Page Code							
1	Reserved							
2	Page Length (MSB)							
3	Page Length (LSB)							
4	Diagnostic Parameter (MSB)							
5	Diagnostic Parameter							
6	Diagnostic Parameter							
7	Diagnostic Parameter (LSB)							

3.18.2.2 Field Descriptions

Field	Bytes	Description
Page Code	0	Identifies the type of diagnostic page being returned.
Reserved	1	All reserved bits must be 0.
Page Length	2-3	Indicates the number of bytes of data to be returned after this block.
Diagnostic Parameter	4-7	The results of the Send Diagnostics command test. A code of zero indicates that the drive passed the test. A non zero code indicates that the drive has failed the test. The value returned corresponds to the Message Code described in Appendix A.

3.18.3 Completion Status:

Status	Message	Description
00h	Good Status	♦ The drive is ready to perform any appropriate command. ♦ The drive remains in any previously set mode. ♦ The tape position is not changed.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are: **Code** **Message** **Description** 04h Hardware Error Drive hardware failure detected. 05h Illegal Request The CDB contains an invalid bit. 06h Unit Attention The cartridge was changed, or the drive was reset prior to this command.

3.19 RELEASE UNIT:

The Release Unit command releases a current drive reservation, if the command is received from the Initiator that established the reservation.

Any Release Unit command that arrives from other than the originating requester is ignored and Good Status is returned in response to the command.

Third Party reservations are not supported.

It is not an error to attempt to release an ID that is not currently reserved to the requesting Initiator. A reservation cannot be released if the reservation was made by another Initiator. Other events and conditions that can cause a reservation to be released are discussed under the Reserve Unit command.

3.19.1 Command Descriptor Blocks:

3.19.1.1 6-Byte Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (17h)							
1	Ignored LUN			Reserved				
2	Reserved							
3	Reserved							
4	Reserved							
5	Control							

3.19.1.2 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation code for the 6-byte version of Release Unit is 17h.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Reserved			All reserved bits must be 0.
Control	5		See Control Byte Format on page 21.

3.19.1.3 10-byte Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (57h)							
1	Ignored LUN			Reserved				
2	Reserved							
3	Ignored Third Party Device ID							
4	Reserved							
5	Reserved							
6	Reserved							
7	Reserved							
8	Reserved							
9	Control							

3.19.1.4 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation code for the 10-byte version of Release Unit is 57h.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Ignored Third Party Device ID	3		This field is ignored by the drive.

Field	Bytes	Bits	Description
Reserved			All reserved bits must be 0.
Control	5		See Control Byte Format on page 21.

3.19.2 Completion Status:

Code	Message	Description
00h	Good Status	• The drive is ready to perform any appropriate command. • The drive remains in any previously set mode. • The drive accepts commands from any Initiator. • The tape position is not changed.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are: **Code** **Message** **Description** 04h Hardware Error Parity error on the SCSI bus or drive hardware failure. 05h Illegal Request The Command Descriptor Block is invalid. 06h Unit Attention The cartridge was changed, or the drive was reset prior to this command.

3.20 REPORT DENSITY SUPPORT:

The Report Density Support command returns details about the tape formats supported by the drive. The data is returned as a header and a series of descriptor blocks. If the Media flag is set, then one descriptor block is returned with the data for the currently loaded tape. If the Media bit is clear, then one descriptor block is returned for each format supported by the drive.

3.20.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (44h)							
1	Ignored LUN			Reserved				Media
2	Reserved							
3	Reserved							
4	Reserved							
5	Reserved							
6	Reserved							
7	Allocation Length, MSB							
8	Allocation Length, LSB							
9	Control							

3.20.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation code for Report Density is 44h.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Media	1	0	0 = Report all densities supported by drive. 1 = Report current media density.

Field	Bytes	Bits	Description
Allocation Length	7-8		Specifies the amount of data to be returned, in bytes.
Reserved			All reserved bits must be 0.
Control	9		See Control Byte Format on page 21.

3.20.2 Report Density Support Data:

The Report Density Support returns a header followed by one or more pages of data.

3.20.2.1 Report Density Support Header:

Byte	Bits 7	6	5	4	3	2	1	0
0	Available Density Descriptor Length, MSB							
1	Available Density Descriptor Length, LSB							
2	Reserved							
3	Reserved							

3.20.2.2 Field Descriptions:

Field	Bytes	Bits	Description
Available Density Descriptor Length	0-1		The total amount of data that is available to be returned excluding this field.
Reserved	2-3		All reserved bits are 0.

One or more Report Density Support pages in the format shown below follow the header.

3.20.2.3 Report Density Support Data Block Descriptor:

Byte	Bits 7	6	5	4	3	2	1	0
0	Primary Density Code							
1	Secondary Density Code							
2	WRTOK	DUP	DEFLT	Reserved				
3	Reserved							
4	Reserved							
5	Bits per mm, MSB							
6	Bits per mm							
7	Bits per mm, LSB							
8	Media Width, MSB							
9	Media Width, LSB							
10	Tracks, MSB							
11	Tracks, LSB							
12	Capacity, MSB							
13	Capacity							
14	Capacity							
15	Capacity, LSB							
16-23	Assigning Organization							
24-31	Density Name							

Byte	Bits 7	6	5	4	3	2	1	0
32-51	Description							

3.20.2.4 Field Descriptions:

Field	Bytes	Bits	Description
Primary Density Code	0		40h indicating Ultrium 1 41h indicating Ultrium 2
Secondary Density Code	1		40h, indicating Ultrium 1 41h indicating Ultrium 2
WRTOK	2	7	0 = Writing to a medium with this density is not supported. 1 = Writing to a medium with this density is supported.
DUP	2	6	0 = The primary density code occurs in exactly one density support data block descriptor. 1 = The primary density code occurs in more than one density support data block descriptor.
DEFLT	2	5	0 = Not the default density of the drive. 1 = The default density of the drive.
Bits per mm	5-7		4880 for Ultrium 1 and 7398 for Ultrium 2
Media Width	8-9		127
Tracks	10-11		384 for Ultrium 1 and 512 for Ultrium 2
Capacity	12-15		Can be one of the following nominal values: For Ultrium 2: 200,000 MB For Ultrium 1: 100,000 MB 50,000 MB 30,000 MB 10,000 MB
Assigning Organization	16-23		8 bytes of ASCII data, “LTO-CVE ”
Density Name	24-31		8 bytes of ASCII data. Can be one of the following: For Ultrium 2: “U-28-200” For Ultrium 1: “U-18-100” “U-18-50 “ “U-18-30 “ “U-18-10 “
Description	32-51		20 bytes of ASCII data. Can be one of the following: For Ultrium 2: “Ultrium 2/8T 200GB ” For Ultrium 1: “Ultrium 1/8T 100GB ” “Ultrium 1/8T 50GB ” “Ultrium 1/8T 30GB ” “Ultrium 1/8T 10GB ”
Reserved			All reserved bits are 0.

3.20.3 Completion Status:

Code	Message	Description
00h	Good Status	• The drive is ready to perform any appropriate command. • The drive remains in any previously set mode. • The drive accepts commands from any Initiator. • The tape position is not changed.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are: **Code** **Message** **Description** 04h Hardware Error Parity error on the SCSI bus or drive hardware failure. 05h Illegal Request The Command Descriptor Block is invalid. 06h Unit Attention The cartridge was changed, or the drive was reset prior to this command.

3.21 REPORT LUNS:

The host uses this command to retrieve information about which Logical Units the drive supports. The allocation length shall be at least 16 bytes. If this is not the case, drive will return Check Condition status and provide a sense key of Illegal Request and additional sense of INVALID FIELD IN CDB.

3.21.1 Command Descriptor Block:

The following table shows the layout of the CDB.

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (A0h)							
1	Ignored LUN			Reserved				
2	Reserved							
3	Reserved							
4	Reserved							
5	Reserved							
6	Allocation Length, MSB							
7	Allocation Length							
8	Allocation Length							
9	Allocation Length, LSB							
10	Reserved							
11	Control							

3.21.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation code for Report LUNS is A0h.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Allocation Length	6-9		Specifies the amount of data to be returned, in bytes. Must be at least 16 bytes or the drive will return Check Condition.
Reserved			All reserved bits must be 0.
Control	11		See Control Byte Format on page 21.

3.21.2 Report LUNS Data:

The following header is returned by the Report LUNS command.

Byte	Bits 7	6	5	4	3	2	1	0
0	LUN List Length, MSB							
1	LUN List Length							
2	LUN List Length							
3	LUN List Length, LSB							
4	Reserved							
5	Reserved							
6	Reserved							
7	Reserved							
8-15	LUN 0							

3.21.2.1 Field Descriptions:

Field	Bytes	Bits	Description
LUN List Length	0-3		Always 8, indicating the length of the LUN list, starting in byte 8.
Reserved	4-7		All reserved bits must be 0.
LUN 0	8-15		Always 0, indicating LUN 0.

Future drives may supports multiple Logical Unit Numbers. This would increase the LUN List Length and add additional LUNs to the LUN List after byte 15.

3.21.3 Completion Status:

Code	Message	Description
00h	Good Status	• The drive is ready to perform any appropriate command. • The drive remains in any previously set mode. • The drive accepts commands from any Initiator. • The tape position is not changed.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are: **Code** **Message** **Description** 04h Hardware Error Parity error on the SCSI bus or drive hardware failure. 05h Illegal Request The Command Descriptor Block is invalid. 06h Unit Attention The cartridge was changed, or the drive was reset prior to this command.

3.22 REQUEST SENSE:

The Request Sense command returns the status of the last command.

Sense Data is updated with each command; therefore, the sense data only reports the status of the immediately previous command. If a Check Condition status results, a Request Sense command should be issued to recover the information form the Sense Data.

The Request Sense command returns Check Condition status only if a fatal error occurs during execution of the Request Sense command. If nonfatal errors occur during the Request Sense execution, Good Status is returned. Sense Data may be invalid following a fatal error on a Request Sense command.

3.22.1 Sense Data Management:

The drive maintains three types of sense data.

- Current Sense is sense data associated with the last command received from the initiator.
- Deferred Sense is sense data from a command that has been reported as good, but has generated sense data after being reported. This may be a command with the Immediate flag set or may be a buffered write. A command with the Immediate flag set will generate sense for the host that sent the command. A buffered write will generate sense for all hosts.
- Unit Attention Sense is sense data generated by a Unit Attention condition. This is generated for all hosts.

Any command other than a Request Sense command or an Inquiry command will generate Check Condition status if there is Deferred Sense data or Unit Attention data available. All commands will generate Check Condition status if the command itself generates sense data. If the next command after the Check Condition status is not a Request Sense command, then all the sense data for that initiator is cleared.

When a Request Sense command is received, the Current Sense is returned. If there is no Current Sense, the Deferred Sense is returned. If there is no Deferred Sense, the Unit Attention Sense is returned. If there is no Unit Attention Sense, default sense data is returned. Once a particular set of sense data has been returned, that sense data is cleared. Any other sense data that is still pending may still cause Check Condition status for subsequent commands.

3.22.2 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (03h)							
1	Ignored LUN			Reserved				
2	Reserved							
3	Reserved							
4	Allocation Length							
5	Control							

3.22.2.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation code for Request Sense is 03h.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Allocation Length	4		Specifies the amount of data to be returned, in bytes.
Reserved			All reserved bits must be 0.
Control	5		See Control Byte Format on page 21.

3.22.3 Sense Data Format:

The Request Sense command returns sense data in the following format.

Byte	Bits 7	6	5	4	3	2	1	0
0	Valid	Error Code						
1	Segment Number							
2	FM	EOM	ILI	Rsvd	Sense Key			

Byte	Bits 7	6	5	4	3	2	1	0
3	Information, MSB							
4	Information							
5	Information							
6	Information, LSB							
7	Additional Sense Length							
8	Command-specific Information, MSB							
9	Command-specific Information							
10	Command-specific Information							
11	Command-specific Information, LSB							
12	Additional Sense Code							
13	Additional Sense Code Qualifier							
14	Field-Replaceable Unit Code							
15	SKSV	C/D	Reserved		BPV	Bit Pointer		
16	Field Pointer, MSB							
17	Field Pointer, LSB							
18	Reserved							
19	Reserved							
20	Reserved							
21	Reserved				CLN	Reserved		
22-29	Vendor Unique1 (Reserved)							
30-33	Vendor Unique2 (Reserved)							
34-37	Vendor Unique3 (Reserved)							

3.22.3.1 Field Descriptions:

Field	Bytes	Bits	Description
Valid	0	7	0 = The Information field does not contain valid information 1 = The Information field contains valid information This is always 0 for deferred errors.
Error Code	0	0-6	70h = A current error, associated with the most recent command. 71h = A deferred error, not associated with the current command.
Segment Number	1		Always 0, because the Copy, Compare, and Copy and Verify commands are not supported.
FM bit	2	7	1 = A Space, Read, or Verify command did not complete because a file mark was read.
EOM bit	2	6	1 = A Write or Write File Marks command completed in the early warning area. If no other error occurred, the Sense Code will be set to No Sense and the Additional Sense will be set to EOT (0002). If another error occurred, then the Sense Code and Additional Sense will reflect that error.
Incorrect Length Indicator (ILI)	2	5	1 = A Read or Verify ended because a block was read from tape that did not have the block length requested in the command.
Sense Key	2	0-3	This field indicates the status of the last command and provides a generic error category. See Sense Key Values.

Field	Bytes	Bits	Description
Information	3-6		♦ For a Read, Verify or Write with the Fixed flag clear, this field contains the number of bytes in the command less the number of bytes actually processed. ♦ For a Read, Verify, or Write with the fixed flag set, or a Space with the Code set to zero, this field contains the number of blocks in the command less the number of blocks processed. Any block partially transferred in a Read or Write command or partially verified in a Verify command is considered processed but is not included in the calculation. For a Write File Marks or Space command, this field contains the difference between the number of file marks in the command and the number of file marks processed.
Additional Sense Length	7		n-7, indicating the length of the Sense Data.
Command Specific	8-11		Always 0, because no commands use this field.
Additional Sense Code	12		This field provides further detail for the current Sense Key. See Sense Key Values.
Additional Sense Code Qualifier	13		This field provides further detail for the current Additional Sense Code. See Sense Key Values.
Field Replaceable Unit Codes	14		0 = No part of the drive is suspected of failing 1 to *n* = Identifies a part of the drive that is suspected of causing the failure.
SKSV	15	7	0 = Bytes 16-17 contain a message code as defined in Message Codes, below. 1 = Sense Key Specific data in bytes 15-17 is valid and can be used to determine the first parameter that caused an Illegal Request sense key (as defined below).
C/D	15	6	0 = The first error was encountered in the Data-Out Phase. 1 = The first error was encountered in the Command Descriptor Block.
BPV	15	3	1 = The Bit Pointer field indicates the bit field in error.
Bit Pointer	15	0-2	♦ If BPV is set, this field points to the most significant bit of the field in error. ♦ When a Log Exception is generated, this field indicates the affected page that caused the Log Exception.
Field Pointer	16-17		♦ If BPV is set, this field points to the most significant byte of the field in error. ♦ When a Log Exception is generated, bytes 16 and 17 indicate the MSB and LSB of the Log Parameter code that caused the Log Exception. Byte 15 indicates the affected page that caused the Log Exception. ♦ For all other errors, this field contains message codes as defined in Message Codes, Appendix A.
CLN	21	3	0 = The drive does not need cleaning. 1 = The drive needs cleaning.
Reserved			All reserved bits are 0.

3.22.3.2 Sense Key Values:

The following table shows the meaning of the Sense Key values. For expanded information, see Additional Sense Codes and Code Qualifiers, below.

Key	Message	Definition
00h	No Sense	The Check Condition occurred in conjunction with detection of FM, EOT, or ILI, or status was not available.

Key	Message	Definition
01h	Recovered Error	The Log Sense counter reached its maximum value and the RLEC bit is set.
02h	Not Ready	The drive is not ready to accept tape access commands. Operator intervention may be required to correct this condition, or the drive may be coming ready.
03h	Medium Error	The command terminated with a nonrecoverable error that was probably caused by a flaw in the medium or an error in the recorded data.
04h	Hardware Error	The drive detected a nonrecoverable hardware failure (parity, etc.) while performing the command. Until the cartridge is ejected or a reset is received, the drive continues to return this sense key to any tape motion command.
05h	Illegal Request	The CDB or command parameters contained an illegal parameter.
06h	Unit Attention	One of the following actions occurred: the cartridge was changed; the drive was reset; the operational mode was changed; a Log Exception occurred; or the firmware was changed.
07h	Data Protect	The cartridge is write-protected; the operation was not performed.
08h	Blank Check	A no-data condition was encountered on the tape, or the wrong data format was encountered on tape.
09h	Vendor Specific	Vendor specific conditions.
0Bh	Aborted Command	The drive aborted the command. This key is returned if a bus parity error is detected. The Initiator may be able to recover by trying the command again.
ODh	Volume Overflow	The drive reached the physical EOT, and write data remains in the buffer.
0Eh	Miscompare	The source data did not match the tape data during a VERIFY command.

3.22.3.3 Additional Sense Codes and Code Qualifiers:

Additional Sense Codes and Additional Sense Codes Qualifiers are returned in the Request Sense data in bytes 12 and 13. These codes are loaded whenever a Check Condition is returned for a SCSI command. The purpose of the codes is to provide more specific error information.

Sense Key Byte 2	ASC Byte 12	ASCQ Byte 13	Message	Explanation
00h No Sense				
00h	00h	00h	No additional sense information	The flags in the sense data indicate the reason for command failure
00h	00h	01h	Filemark detected	A Read or a Space command has terminated early because a file mark has been encountered. The File Mark flag will be set.
00h	00h	02h	EOM detected	A Write or a Write File Marks command ended in the early warning area. The EOM flag will be set.
00h	00h	04h	BOM detected	
00h	00h	17h	Cleaning requested	
00h	5Dh	00h	Failure prediction threshold exceeded	
00h	5Dh	FFh	Failure prediction threshold exceeded false	
00h	70h	00h	Decompression exception short algorithm id of nn	
01h Recovered Error				
01h	00h	17h	Cleaning requested	

Sense Key Byte 2	ASC Byte 12	ASCQ Byte 13	Message	Explanation
01h	18h	01h	Recovered data with error correction and retries	
01h	37h	00h	Rounded parameter	A Mode Select command parameter has been rounded because the drive cannot store it with the accuracy of the command
01h	3Fh	00h	Target operation conditions have changed.	CM inquiry failure detected
01h	5Bh	01h	Threshold condition met	
01h	5Bh	02h	Log counter at maximum	
01h	5Dh	00h	Failure prediction threshold exceeded	Failure Prediction thresholds have been exceeded indicating that a failure may occur soon.
01h	5Dh	FFh	Failure prediction threshold exceeded false	
01h	70h	00h	Decompression exception short algorithm id of nn	
02h Not Ready				
02h	04h	00h	LUN not ready CNR	Cause Not Reportable - A tape is present in the drive, but it is in the process of being unloaded.
02h	04h	01h	LUN not ready POBR	Process of Becoming Ready - A medium access command has been received during a front panel initiated load or an immediate reported load command
02h	04h	02h	LUN not ready ICR	Initializing Command Required - A tape is present in the drive, but it is not logically loaded. A Load command is required.
02h	04h	03h	LUN not ready MIR	Manual Intervention Required
02h	04h	10h	LUN not ready AMNA	Auxiliary Memory Not Accessible
02h	30h	00h	Incompatible medium installed	
02h	30h	03h	Cleaning cartridge installed	An operation could not be carried out because the tape in the drive is a cleaning cartridge.
02h	30h	04h	Cannot write medium unknown format	
02h	30h	07h	Cleaning failure	A cleaning operation was attempted, but could not be completed for some reason
02h	3Ah	00h	Medium not present	A media access command has been received when there is no tape loaded
02h	3Ah	03h	Medium not present, but loadable	A media access command has been received when the is tape is loadable.
02h	3Ah	04h	Medium not present, Medium Auxiliary Memory Accessible	A media access command has been received when the tape seated but not loaded. The MAM is accessible.
02h	3Eh	00h	Logical unit has not self configured yet	The drive has just powered on and has not completed its self-test sequence and cannot process commands.
02h	3Eh	02h	Timeout on logical unit	

Sense Key Byte 2	ASC Byte 12	ASCQ Byte 13	Message	Explanation
02h	4Ch	00h	LUN failed self configuration	
02h	53h	00h	Media load or eject failed	
02h	5Ah	01h	Operator medium removal request	
03h Medium Error				
03h	00h	02h	EOM detected	A Read or a Space command terminated early because End of Tape was encountered. The EOM flag will be set.
03h	00h	04h	BOM detected	A Space command terminated early because beginning of tape was encountered. The EOM flag will be set
03h	03h	02h	Excessive write errors	
03h	09h	00h	Track following error	
03h	0Ch	00h	Write error	A Write operation has failed. This is probably due to bad media, but may be hardware related.
03h	0Ch	0Bh	Auxiliary memory write error	
03h	11h	00h	Unrecovered read error	A Read operation failed. This is probably due to bad media, but may be hardware related.
03h	11h	01h	Read retries exhausted	
03h	11h	02h	Error too long to correct	
03h	11h	12h	Auxiliary memory read error	
03h	14h	00h	Recorded entity not found	A Space or Locate failed because a format violation prevented the target of the operation from being found.
03h	14h	01h	Record not found	
03h	30h	00h	Incompatible medium installed	
03h	30h	02h	Cannot read medium incompatible format	An operation could not be completed because the Logical Format is not correct.
03h	30h	07h	Cleaning failure	
03h	30h	80h	Firmware tape fail	
03h	31h	00h	Medium format corrupted	Data could not be read because the format on tape is not valid, but is a known format
03h	3Bh	00h	Sequential positioning error	A command has failed and left the logical position at an unexpected location
03h	3Bh	01h	Tape position error at BOM	
03h	3Bh	02h	Tape position error at EOM	
03h	3Bh	08h	Reposition error	
03h	50h	00h	Write append error	A Write type command failed because the point at which to append data was unreadable.
03h	50h	01h	Write append position error	
03h	51h	00h	Erase failure	

Sense Key Byte 2	ASC Byte 12	ASCQ Byte 13	Message	Explanation
03h	52h	00h	Cartridge fault	A command could not be completed due to a fault in the tape cartridge
03h	52h	01h	Media end of life	
03h	53h	00h	Media load or eject failed	An attempt to load or eject the tape failed due to a problem with the tape
03h	53h	01h	Unload tape failure	
03h	70h	00h	Decompression exception short algorithm id of nn	
04h Hardware Error				
04h	15h	01h	Mechanical positioning error	
04h	40h	BDh	HE diagnostic task timeout	
04h	44h	00h	HE internal target failure	
04h	44h	D0h	AIC interrupt DMA FIFO overrun or underrun	
04h	44h	D1h	AIC interrupt DMA offset error	
04h	44h	D2h	AIC interrupt DMA parity error	
04h	44h	D3h	AIC interrupt read parity error	
04h	44h	D4h	Diagnostic cache test failed	
04h	51h	00h	Erase failure	An Erase command failed to erase the required area on the medium.
04h	52h	00h	Cartridge fault	The tape is snapped
04h	53h	00h	Media load or eject failed	An attempt to load or eject the tape failed due to a problem with the drive
05h Illegal Request				
05h	1Ah	00h	Parameter list length error	The amount of data sent in a Mode Select or Log Select command is incorrect
05h	20h	00h	Invalid command operation code	The Operation Code in the command was not a valid Operation Code
05h	21h	01h	Invalid element address	
05h	24h	00h	Invalid field in CDB	An invalid field has been detected in a Command Descriptor Block.
05h	25h	00h	LUN not supported	The command was addressed to a non-existent logical unit number.
05h	26h	00h	Invalid field in parameter list	An invalid field has been detected in the data sent during the data phase
05h	26h	02h	Parameter value invalid	Firmware download flash failure.
05h	26h	04h	Invalid release of persistent reservation	
05h	26h	098h	Invalid field parameter checksum	Microcode image invalid, bad checksum or CRC.
05h	3Bh	0Ch	Position past beginning of medium	
05h	53h	02h	Medium removal prevented	An Unload command has failed to eject the tape because medium removal has been prevented.
05h	55h	04h	Insufficient registration resource	

Sense Key Byte 2	ASC Byte 12	ASCQ Byte 13	Message	Explanation
06h Unit Attention				
06h	04h	10h	Auxiliary Memory not accessible	An access attempt was made to the Medium Auxiliary Memory or the EEPROM that was not successful.
06h	28h	00h	Not ready to ready transition	A tape has been loaded successfully into the drive and is now ready to be accessed.
06h	29h	00h	Power on reset or bus device reset occurred	The drive has powered on, received a reset signal or a bus device reset message since the initiator last accessed it
06h	2Ah	01h	Mode parameters changed	An initiator other than the one issuing the command has changed the Mode parameters for the drive.
06h	2Ah	02h	Log parameters changed	
06h	2Ah	04h	Reservations released	
06h	2Ah	05h	Registration preempted	
06h	3Fh	01h	Microcode has been changed	The firmware in the drive has just been changed by a Write Buffer command or firmware tape.
06h	3Fh	0Eh	Reported LUNs Data Has Changed	Command Forwarding has been changed from disabled to enabled or vice-versa.
06h	3Fh	10h	Media Loadable	Medium has transistioned to a loadable state.
06h	3Fh	11h	Auxiliary Cartridge Memory accessible.	Medium has transistioned to MAM accessible state from a MAM inaccessible state.
06h	5Bh	01h	Threshold condition met	
06h	5Dh	00h	Failure prediction threshold exceeded	
06h	5Dh	FFh	Failure prediction threshold exceeded false	A Mode Select command has been used to test for Failure Prediction system.
06h	67h	00h	Power on reset or bus device soft reset occurred	
07h Data Protect				
07h	27h	00h	Write protected	A Write type operation has been requested on a tape that has been write protected.
07h	30h	00h	Incompatible medium installed	A Write type operation could not be executed because it is not supported on the tape type that is loaded
08h Blank Check				
08h	00h	05h	EOD detected	A Read or a Space command terminated early because End of Data was encountered.
08h	14h	03h	EOD not found	A Read type operation failed because a format violation related to a missing EOD data set
08h	30h	01h	Cannot read medium unknown format	
08h	30h	02h	Cannot read medium incompatible format	

Sense Key Byte 2	ASC Byte 12	ASCQ Byte 13	Message	Explanation
09h Vendor Unique				
09h	00	05	VS EOD detected	Raw reader
09h	80	80	VS Medium is present	Park Unpark command
0Bh Aborted Command				
0Bh	08h	01h	LUN communication time out	
0Bh	1Bh	00h	Synchronous data transfer error	
0Bh	3Dh	00h	Invalid bits in identify message	An illegal Identify message has been received by the drive at the start of a command.
0Bh	43h	00h	Message error	A message could not be sent or received due to excessive transmission errors.
0Bh	45h	00h	Select or reselect failure	An attempt to reselect an initiator in order to complete the command has failed.
0Bh	47h	00h	SCSI parity error	
0Bh	48h	00h	Initiator detected error message received	A command failed because an Initiator Detected Error message was received.
0Bh	49h	00h	Invalid message error	The command failed because an invalid message was received by the drive.
0Bh	4Ah	00h	Command phase error	A command could not be executed because too many parity errors occurred in the Command phase
0Bh	4Bh	00h	Data phase error	A command could not be completed because too many errors occurred during the Data phase.
0Bh	4Dh	NNh	Tagged overlapped commands (NN = Queue Tag value)	An initiator sent the drive a new command even though it already had a command with the same Task ID outstanding in the drive.
0Bh	4Eh	00h	Overlapped commands attempted	An initiator selected the drive even though it already had a command outstanding in the drive.
0Bh	5Ah	01h	Operator medium removal request	The command was aborted because the eject button was pressed.
0Dh Volume Overflow				
0Dh	00h	02h	EOM detected	A Write or Write File Marks command failed because the physical end of tape was encountered. The EOM flag will be set.

3.22.3.4 Message Codes:

The table in Appendix A: Message Codes, beginning on page 111, lists the vendor unique message codes that are returned in the Field Pointer field (bytes 16-17) when the SKSV bit is 0.

3.22.4 Completion Status:

Code	Message	Description
00h	Good Status	• The drive is ready to perform any appropriate command. • The drive remains in any previously set mode. • The tape position is not changed.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are: **Code** **Message** **Description** 05h Illegal Request The Command Descriptor Block is invalid.

3.23 RESERVE UNIT:

The Reserve Unit command reserves the drive for exclusive use of the requesting Initiator.

The drive reservation once established, remains in effect until one of the following occurs:

- Another Reserve Unit command arrives from the same Initiator that requested the current reservation. The new reservation supersedes the current one and may be the same as the current one. Redundant use of the command is not considered an error.
- A Release Unit command arrives from the same Initiator that requested the current reservation. The drive returns to unreserved mode.
- A Bus Device Reset message (Parallel SCSI interface) or Target Reset or Logical Unit Reset task management request arrives from any Initiator.
- A Reset condition occurs.
- Firmware is updated.

When the drive is reserved, it returns Reservation Conflict Status in response to most commands received from excluded Initiators. Inquiry, Request Sense, Prevent Medium Removal (with a prevent bit of zero), and Release Unit commands are accepted from any initiator.

3.23.1 Command Descriptor Block:

3.23.1.1 6-Byte Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (16h)							
1	Ignored LUN			Reserved				
2	Reserved							
3	Reserved							
4	Reserved							
5	Control							

3.23.1.2 Field Descriptions for 6-Byte Command:

Field	Bytes	Bits	Description
Operation Code	0		The Operation code for the 6-byte version of Reserve Unit is 16h.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.

Field	Bytes	Bits	Description
Reserved			All reserved bits must be 0.
Control	5		See Control Byte Format on page 21.

3.23.1.3 10-byte Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (56h)							
1	Ignored LUN			Reserved				
2	Reserved							
3	Ignored Third Party Device ID							
4	Reserved							
5	Reserved							
6	Reserved							
7	Reserved							
8	Reserved							
9	Control							

3.23.1.4 Field Descriptions for 10-Byte Command:

Field	Bytes	Bits	Description
Operation Code	0		The Operation code for the 10-byte version of Reserve Unit is 57h.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Ignored Third Party Device ID	3		This field is ignored by the drive.
Reserved			All reserved bits must be 0.
Control	9		See Control Byte Format on page 21.

3.23.2 Completion Status:

Code	Message	Description
00h	Good Status	• The drive is ready to perform any appropriate command. • The drive remains in any previously set mode. • The drive is reserved for the use of the specified ID. • The tape position is not changed.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are: **Code** **Message** **Description** 02h Not Ready — No cartridge is in the drive. 03h Media Error — Unrecoverable data error encountered. 04h Hardware Error — Parity error on the SCSI bus or drive hardware failure. 05h Illegal Request — The Command Descriptor Block is invalid. 06h Unit Attention — The cartridge was changed, or the drive was reset prior to this command.

3.24 REWIND:

The Rewind command requests that the medium be positioned to the Beginning Of Tape (BOT). Prior to performing the Rewind operation, the buffered data and filemarks are written to the tape, and an EOD marker is recorded. The Rewind operation is done at high speed.

3.24.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (01h)							
1	Ignored LUN			Reserved				Immed
2	Reserved							
3	Reserved							
4	Reserved							
5	Control							

3.24.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation code for Rewind is 01h.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Immed	1	0	Immediate bit: 0 = Status is not returned the rewind operation has completed. 1 = Status is returned as soon as all buffered data and filemarks have been written to the medium and the Rewind CDB has been validated.
Reserved			All reserved bits must be 0.
Control	5		See Control Byte Format on page 21.

If Check Condition status is returned from Rewind command with the Immed bit set to 1, then the rewind operation is not performed.

3.24.2 Completion Status:

Code	Message	Description
00h	Good Status	• The drive is ready to perform any appropriate command. • The drive remains in any previously set mode. • The tape position is BOT (if not an Immediate command). Note: If IMMED is one, then Good Status only indicates that all buffered data and filemarks have been written to the medium and that the Rewind CDB is valid.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are: **Code** **Message** **Description** 02h Not Ready No cartridge is in the drive. 03h Media Error Unrecoverable data error encountered. 04h Hardware Error Parity error on the SCSI bus or drive hardware failure. 05h Illegal Request The Command Descriptor Block is invalid.

3.25 SEND DIAGNOSTIC:

The Send Diagnostic command requests the drive to perform diagnostic operations on itself. The diagnostic tests are part of the drive's resident firmware.

The Receive Diagnostic Results command may be used to retrieve the result of the diagnostic operations.

A Self Test bit of one requests the drive to perform its self test diagnostic.

3.25.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (1Dh)							
1	Self-Test Code			PF	Rsvd	Selftest	Devoffl	UnitOffl
2	Reserved							
3	Parameter List Length (MSB)							
4	Parameter List Length (LSB)							
5	Control							

3.25.1.1 Field Descriptions:

Field	Bytes	Bits	Description	
Operation code	0		The Operation Code for Send Diagnostic is 1Dh.	
Self-test code	1	5-7	This bit field is not supported and must be set to 0.	
Pf	1	4	This bit is not supported and must be set to 0.	
Selftest	1	2	Self test diagnostics.	Mode 0: supported Mode 4: Perform self test diagnostics; Mode 5: Write with incrementing pattern; Mode 6: Verify with incrementing pattern; Mode 7: Write and verify with incrementing pattern
Devoffl	1	1	Device off-line.	
UnitOffl	1	0	Unit off-line.	
			Mode 0: Selftest = 0 Devoffl = 0 UnitOffl = 0	
			Mode 4: Selftest = 1 Devoffl = 0 UnitOffl = 0	
			Mode 5: Selftest = 1 Devoffl = 0 UnitOffl = 1	
			Mode 6: Selftest = 1 Devoffl = 1 UnitOffl = 0	
			Mode 7: Selftest = 1 Devoffl = 1 UnitOffl = 1	
Parameter list length	3-4		This field is not supported and must be to 0.	
Reserved			All reserved bits must be 0.	
Control	5		The control field must be 0.	

3.25.2 Completion Status:

Code	Message	Description
00h	Good Status	• The drive is ready to perform any appropriate command. • The drive remains in any previously set mode. • The tape position is not changed.

Code	Message	Description
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are: **Code** **Message** **Description** 02h Not Ready — No cartridge is inserted in the drive. 04h Hardware Error — Drive hardware failure detected. 05h Illegal Request — The CDB contains an invalid bit. 06h Unit Attention — The cartridge was changed, or the drive was reset prior to this command.

3.26 SET CAPACITY:

The Set Capacity command sets the available medium for a volume to a proportion of the total capacity of that volume. Any excess space is unavailable on the volume after successful completion of this command until reset by a new Set Capacity command.

The Set Capacity command is valid only when the medium is at beginning-of-medium. If the medium is logically at any other position, the command is rejected with Check Condition status. The sense key is Illegal Request with the additional sense code and an additional sense code qualifier set to position past beginning of medium.

If the medium is write protected, the command is rejected with Check Condition status. The sense key is Data Protect with the additional sense code and an additional sense code qualifier set to Write Protected.

With respect to a 200 gigabyte cartridge, if the Set Capacity command specifies the portion of the total volume capacity to be made available for use less than 20 gigabytes, the device will round up the capacity to 20 gigabytes. The command is terminated with Check Condition status. The sense key is Recovered Error with the additional sense code and an additional sense code qualifier set to Rounded Parameter.

A valid Set Capacity command causes all data on the tape to be lost.

3.26.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (0Bh)							
1	Ignored LUN			Reserved				Immed
2	Reserved							
3	Capacity Proportion Value, MSB							
4	Capacity Proportion Value, LSB							
5	Control							

3.26.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation Code for Set Capacity is 0Bh.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Immed	1	0	0 = Status is not returned until the operation is complete 1 = Status is returned as soon as the operation is initiated.
Capacity Proportion Value	3-4		This field specifies the portion of the total tape capacity to be made available for use. The Capacity Proportion Value is the numerator of a fraction with a denominator of 65535. The resulting available tape capacity is equal to the total tape capacity multiplied by this fraction. The drive rounds up the capacity to the next higher supported value.

Field	Bytes	Bits	Description
Reserved			All reserved bits must be 0.
Control	5		See Control Byte Format on page 21.

The Set Capacity command sets the available tape capacity to:
Tape Capacity = Total Tape Capacity × Capacity Proportion Value / 65535

3.26.2 Completion Status:

Code	Message	Description
00h	Good Status	♦ The drive is ready to perform any appropriate command. ♦ The drive remains in any previously set mode. ♦ The tape position is at BOT. ♦ Data on tape is logically inaccessible. Note: If Immed is 1, then Good Status only indicates that the command is valid.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are:

Code	Message	Description
01h	Recovered Error	Tape capacity is rounded up to 10% of total capacity.
02h	Not Ready	No cartridge is in the drive.
04h	Hardware Error	Drive hardware failure detected.
05h	Illegal Request	The tape is not at BOT or the Command Descriptor Block is not valid.
06h	Unit Attention	The cartridge was changed or the drive was reset prior to this command.
07h	Write Protected	The cartridge is write-protected.

3.27 SPACE:

The Space command uses three methods to move the tape. This command moves the position:

- Forward or backward a specified number of blocks.
- Forward or backward a specified number of filemarks.
- Forward to the end of recorded data (EOD).

If the target block or filemark is in the buffer of the drive, no tape motion results, otherwise, spacing is done at high search speed.

3.27.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (11h)							
1	Ignored LUN			Reserved		Code		
2	Count, MSB							
3	Count							
4	Count, LSB							
5	Control							

3.27.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation Code for Space is 11h.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Code	1	0-2	000b = Move Count blocks 001b = Move Count filemarks 011 = Move to end of recorded data (EOD)
Count	2-4		This field specifies the number of blocks or filemarks to space over. A positive Count moves the tape forward. A negative (2's complement) Count moves the tape backward. A zero Count causes no media movement and is not an error. For Space to EOD operation, this field is ignored.
Reserved			All reserved bits must be 0.
Control	5		See Control Byte Format on page 21.

The Space command instructs the drive to set a new logical position relative to the current logical position. How this is done is dependent on the value of the Code field and the Count field. The Count field is a signed value indicating the distance to move, negative indicating movement towards BOT and positive indicating movement towards EOT.

If the Code field is 000b, then the logical position is moved the number of blocks indicated by the Count field. If a file mark is detected between the current logical position and the requested logical position, the new logical position is set to immediately after the file mark in the direction of the space operation. If BOT or EOD is detected before the requested logical position, then the logical position is set to that position.

If the Code field is 001b, then the logical position is moved the number of file marks indicated by the Count field. If BOT or EOD is detected before the requested logical position, then the logical position is set to that position.

If the Code field is 011b, then the logical position is set to after the last valid block on tape. In this case the count field is ignored.

Any other value of the Code field will cause Check Condition status to be returned. Spacing to sequential file marks is not supported. Set marks are not supported. The Sense Key is set to Illegal Request and the Additional Sense is set to Invalid field in CDB (2400).

3.27.2 Space-by-Count Functions:

The Count field indicates both direction and number of blocks or filemarks to space over from the current logical position. A positive value N in the Count field moves the tape forward over N blocks or filemarks. A negative value -N (2's complement) in the Count field moves the tape backward over N blocks or filemarks. Zero in the count field causes no tape movement and is not considered an error.

When there are no exception conditions during space functions, forward tape motion ends on the EOT side of the last block or filemark and reverse motion ends on the BOT side of the last block or filemark.

- If a filemark is encountered while spacing over blocks, a Check Condition Status is returned. The Sense FM bit is set and the Sense Valid bit is set, indicating Residual Length is non-zero.

  The Residual Length equals the difference in the requested count and the actual number of blocks spaced over not including the filemark. The tape is positioned on the logical EOT side of the filemark if movement was forward or on the logical BOT side of the filemark if movement was reverse.

- If EOD is encountered while spacing forward, Check Condition is returned with 08h Sense Key. Extended Sense Valid bit is set, indicating Residual Length is nonzero.

- If BOT is encountered while spacing in reverse, Check Condition is returned with 40h Sense Key. Extended sense Valid bit is set, indicating a nonzero Residual Length.

- If EOT is encountered while spacing forward, Check Condition is returned with 40h or 43h Sense Key. Extended Sense Valid bit is set, indicating a nonzero Residual Length.
- If an unrecoverable data error is encountered, Check Condition is returned, Extended Sense Key is set to Medium Error, and Extended Sense Valid bit is set, indicating Residual Length is nonzero.

3.27.3 Space to EOD:

The Count field is ignored in the space-to-EOD function.

In the space-to-EOD function, the tape is positioned such that a subsequent WRITE command appends data to the last recorded information on the tape. This positioning is done at high search speed.

The space-to-EOD function is useful in support of user-defined directories located at the end of recorded data.

- If physical EOT is encountered while spacing to end of data, Check Condition Status is returned and Extended Sense is set to Medium Error.
- If unrecoverable data error is encountered, Check Condition Status is returned, Extended Sense Key is set to Medium Error, and Extended Sense Valid bit is set, indicating Residual Length is non-zero.

3.27.4 Completion Status:

<table>
<tr><th>Code</th><th>Message</th><th>Description</th></tr>
<tr><td>00h</td><td>Good Status</td><td>• The drive is ready to perform any appropriate command.
• The drive remains in any previously set mode.
• The tape is positioned on the EOT side if space forward and on the BOT side if space reverse.</td></tr>
<tr><td>02h</td><td>Check Condition</td><td>Use the Request Sense command to retrieve status information. Possible Sense Keys are:
<table>
<tr><th>Code</th><th>Message</th><th>Description</th></tr>
<tr><td>02h</td><td>Not Ready</td><td>No cartridge is inserted in the drive.</td></tr>
<tr><td>03h</td><td>Media Error</td><td>Unrecoverable data error encountered while performing a Space command.</td></tr>
<tr><td>04h</td><td>Hardware Error</td><td>Drive hardware failure detected.</td></tr>
<tr><td>05h</td><td>Illegal Request</td><td>The Command Descriptor Block is invalid.</td></tr>
<tr><td>06h</td><td>Unit Attention</td><td>The cartridge was changed or the drive was reset prior to this command.</td></tr>
<tr><td>08h</td><td>Blank Check</td><td>EOD was encountered while executing a Space forward.</td></tr>
</table></td></tr>
</table>

3.28 TEST UNIT READY:

The Test Unit Ready command provides a means to check that the drive is ready.

If the drive is able to accept a medium-access command without returning a Check Condition status, then the Test Unit Ready command will result in Good status.

If the drive is unable to become operational or is in a state that requires action from the host to make the drive ready, then the Test Unit Ready command will result in a Check Condition status with a sense key of Not Ready.

This command does not access the medium or initiate a diagnostic routine.

3.28.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (00h)							
1	Ignored LUN			Reserved				

Byte	Bits 7	6	5	4	3	2	1	0
2	Reserved							
3	Reserved							
4	Reserved							
5	Control							

3.28.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation Code for Test Unit Ready is 00h.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Reserved			All reserved bits must be 0.
Control	5		The control field must be 0.

3.28.2 Completion Status:

Code	Message	Description
00h	Good Status	• The drive is ready to perform any appropriate medium access command. • The drive remains in any previously set mode. • The tape is not moved.
02h	Check Condition	Use the Request Sense command to retrieve the sense data.

Code	Message	Description
02h	Not Ready	No cartridge is present; an immediate command is in progress; or the eject button has been pressed.
04h	Hardware Error	Parity error on the SCSI bus or drive hardware failure.
05h	Illegal Request	The Command Descriptor Block is invalid.
06h	Unit Attention	The cartridge was changed or the drive was reset.

3.29 VERIFY:

The Verify command verifies one or more blocks of data beginning with the next block from the tape unit.

The command terminates after the specified number of bytes or blocks are verified or when the drive encounters a filemark, the EOD, the EOT, or an unrecoverable error. On completion the medium is positioned after the last block verified, after the end-of-data, after a filemark or after an unrecoverable block.

If a Verify with a zero verification length is issued, no data is verified, and the current position on the tape does not change. This condition is not considered an error.

The Verify command causes data to be read from the tape and passed through the drive's error detection and correction hardware to determine whether it can be recovered from the tape. The amount of data to be read is indicated by the Verification Length field and the Fixed flag in the same manner as is used in a Read command.

3.29.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (13h)							
1	Ignored LUN			Reserved				Fixed
2	Verification Length, MSB							

Byte	Bits 7	6	5	4	3	2	1	0
3	Verification Length							
4	Verification Length, LSB							
5	Control							

3.29.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation Code for Verify is 00h.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Fixed	1	0	0 = Variable block length. Verify Length contains the number of bytes to return. 1 = Fixed block length, as specified by the MODE SELECT Block Descriptor. Verify Length contains the number of blocks to return
Verify Length	2-4		This field specifies the number of bytes (Fixed = 0) or blocks (Fixed = 1) to be verified. A transfer length of 0 is valid and no data is verified.
Reserved			All reserved bits must be 0.
Control	5		The control field must be 0.

3.29.2 Verify Command Operation:

When the Fixed bit is set, the Verify Length specifies the number of contiguous blocks to be verified on the tape. When the Fixed bit is cleared, the Verify Length specifies the number of bytes in the block to verify.

The byte compare starts on a block boundary starting at the current tape block position.

3.29.3 Completion Status:

Code	Message	Description
00h	Good Status	• The drive is ready to perform any appropriate command. • The drive remains in any previously set mode. • The tape is positioned on the EOT side of the last block verified.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are: **Code** **Message** **Description** 02h Not Ready — No cartridge is in the drive. 03h Media Error — Unrecoverable data error encountered. 04h Hardware Error — Parity error on the SCSI bus or drive hardware failure. 05h Illegal Request — The Command Descriptor Block is invalid. 06h Unit Attention — The cartridge was changed, or the drive was reset prior to this command. 08h Blank Check — EOD was encountered..

3.30 WRITE:

The Write command transfers one or more data blocks from the Initiator to the drive. If the Transfer Length is zero, no data is transferred, and the current position of the tape is not changed. This condition is not considered an error.

3.30.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (0Ah)							
1	Ignored LUN			Reserved				Fixed
2	Transfer Length, MSB							
3	Transfer Length							
4	Transfer Length, LSB							
5	Control							

3.30.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The Operation Code for Write is 0Ah.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Fixed	1	0	0 = Variable block length. Transfer Length contains the number of bytes to write. 1 = Fixed block length, as specified by the MODE SELECT Block Descriptor. Transfer Length contains the number of blocks to write.
Transfer Length	2-4		This field specifies the number of bytes (Fixed = 0) or blocks (Fixed = 1) to be written. A transfer length of 0 is valid and no data is written.
Reserved			All reserved bits must be 0.
Control	5		The control field must be 0.

If the Fixed flag is clear, the initiator will transfer a single block of the length indicated in Transfer Length.

If the Fixed flag is set, the initiator will transfer a sequence of blocks. The Transfer Length field gives the number of blocks. The current fixed block length gives the length of the blocks.

At Early Warning, the drive completes the current block transfer and terminates the command with a Check Condition, EOM bit set, and Sense Key equal to 0.

Subsequent Write commands complete with a Check Condition and the EOM bit set.

If writing the buffer to tape is unsuccessful because of EOT, a Volume Overflow is reported. The Residual count field in the Request Sense data reports the amount of data not transferred. Writing can continue in the Early Warning region until EOT is encountered. Any Write command issued within Early Warning and successfully completed, finishes with a Check Condition and the EOM bit set.

3.30.2 Completion Status:

Code	Message	Description
00h	Good Status	• The SCSI data has been transferred to the data buffer. • The drive remains in any previously set mode.

Code	Message	Description		
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are:		
		Code	**Message**	**Description**
		02h	Not Ready	No cartridge is in the drive.
		03h	Media Error	Unrecoverable data error encountered.
		04h	Hardware Error	Parity error on the SCSI bus or drive hardware failure.
		05h	Illegal Request	The Command Descriptor Block is invalid.
		06h	Unit Attention	The cartridge was changed, or the drive was reset prior to this command.
		07h	Write Protect	The tape is write-protected; check the cartridge before continuing.
		0Dh	Volume Overflow	The Write command completed with data in the buffer because the end-of-partition was encountered.

3.31 WRITE BUFFER:

The Write Buffer command is used in conjunction with the Read Buffer command as a diagnostic function for testing the data buffer memory of the drive and confirming the SCSI bus integrity. The medium is not accessed during the execution of this command.

The Write Buffer command is also used to download microcode to the drive.

3.31.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (3B)							
1	Ignored LUN			Rsvd	Mode			
2	Buffer ID							
3	Buffer Offset, MSB							
4	Buffer Offset							
5	Buffer Offset, LSB							
6	Parameter List Length, MSB							
7	Parameter List Length							
8	Parameter List Length, LSB							
9	Control							

3.31.1.1 Field Descriptions:

Field	Bytes	Bits	Description
Operation Code	0		The operation code for Write Buffer is 3Bh.
Ignored Logical Unit	1	5-7	The LUN field is vestigial from the SCSI-1 standard and is ignored.
Reserved	1	4	All Reserved bits must be 0.
MODE	1	0-3	0000b = Write header and data. 0001b = Write Medium Auxiliary Memory(MAM). 0010b = Write data only. 0100b = Microcode download. Do not write to flash memory. 0101b = Microcode download. Write to flash memory. 0110b = Microcode download. Do not write to flash memory. 0111b = Microcode download. Write to flash memory.

Field	Bytes	Bits	Description
Buffer ID			00h = normal access (default) 54h = specifies access to Medium Auxiliary Memory
BUFFER OFFSET	3-5		For Mode not equal to 0001b: The offset from the beginning of the specified buffer in bytes. For Mode equal 0001b: Set to the Medium Auxiliary Memory as described in the tables.
PARAMETER LIST LENGTH	6-8		Specifies the amount of data to be sent. A value of 0 is a valid entry and shall not be considered an error. This value must be smaller than the difference between the Buffer Offset and the size of the buffer.
CONTROL	9		See Control Byte Format on page 21.

A Mode field of 0000b indicates that the data to be written will be preceded with a four-byte header. This Write Buffer Data Header is reserved and must be set to all zeros. The header will not be placed into buffer memory.

A Mode field of 0001b indicates that data to be written to the Medium Auxiliary Memory will be sent. If the optional Application Specific page does not exist in the MAM then a Write Buffer command to this page will create it prior to writing data.

A Mode field of 0010b indicates that only data to be written to the buffer will be sent.

A Mode field of 0100b or 0110b indicates download microcode.

A Mode field of 0101b or 0111b indicates download microcode and save.

The Buffer ID field indicates which buffer is to be written. All drives support buffer 0. Other buffers may be available in the drive.

The Buffer Offset is used to specify the byte location within the specified buffer where data is to be written.

The Parameter List Length field indicated the amount of data to be transferred. Care needs to be taken so that the Buffer Offset plus the Parameter List Length does not exceed the buffer capacity. If the buffer capacity is exceeded, no data is written and Check Condition status is generated.

3.31.1.2 Soft Microcode Download:

A soft microcode download will load the microcode image and reboot the drive without flashing the image into memory.

Use Mode field of 0100b or 0110b to download the microcode image into memory without saving (flashing). Buffer Offsets may be used in either of these Modes.

After the downloaded microcode image is in memory, it may be booted (without flashing) by issuing a Write Buffer command with Mode 0100b or 0110b and a Parameter List Length of zero. The downloaded code will then run on the drive until the drive is power cycled. Upon power cycling the drive, the original firmware revision will be restored.

3.31.1.3 Hard Microcode Download:

A hard microcode download will load the microcode image, flash it into memory and reboot the drive.

Use Mode field of 0100b or 0110b to download the microcode image into memory without saving (flashing). Buffer Offsets may be used in either of these Modes.

After the downloaded microcode image is in memory, it may be flashed and booted by issuing a Write Buffer command with Mode 0101b or 0111b and a Parameter List Length of zero. The downloaded code will then run on the drive and remain in memory until a subsequent hard microcode download is done.

3.31.2 Write Buffer Data Header:

If the Mode field is set to 0000b, then the data sent must be preceded by a 4 byte Write Buffer Data Header. The following table shows the fields in the Write Buffer Data Header.

Byte	Bits 7	6	5	4	3	2	1	0
0	Reserved							
1	Reserved							
2	Reserved							
3	Reserved							

3.31.2.1 Field Descriptions:

Field	Bytes	Bits	Description
Reserved	0-3		All bits are 0.

3.31.3 Completion Status:

Code	Message	Description
00h	Good Status	• The drive is ready to perform any appropriate command. • The drive remains in any previously set mode. • The tape position is not changed.
02h	Check Condition	Use the Request Sense command to retrieve status information. Possible Sense Keys are: **Code** **Message** **Description** 04h Hardware Error Drive hardware failure detected. 05h Illegal Request The Command Descriptor is invalid, the transfer length exceeds the maximum, or the microcode file is invalid. 06h Unit The cartridge was changed, or the drive was reset prior to this command. Microcode image has been changed.

3.32 WRITE FILE MARKS:

The Write Filemarks command causes the specified number of filemarks to be written to tape.

This command can be used to force all remaining buffered data blocks to be written to tape without appending filemarks by specifying zero filemarks. When zero filemarks are specified, the command does not return Good Status to the Initiator until all buffered data blocks and filemarks are written correctly on the tape. Otherwise, status is returned immediately.

3.32.1 Command Descriptor Block:

Byte	Bits 7	6	5	4	3	2	1	0
0	Operation Code (10h)							
1	Reserved							Immed
2	Count, MSB							
3	Count							
4	Count, LSB							
5	Control							

3.32.1.1 Field Descriptions:

Field Name	Bytes	Bits	Description
Operation Code	0		The Operation Code for Write Filemarks is 10h.
Immed	1	0	0 = Status is not returned until the tape is positioned. 1 = Status is returned as soon as the operation is initiated.
Count	2-4		The number of filemarks to record.
Reserved			All Reserved bits must be 0.
Control	5		See Control Byte Format on page 21.

The Write File Marks command causes a sequence of file marks to be written at the current logical position. The number of file marks to be written is indicated in the Count field.

If the Immed flag is set, status is returned immediately, before the file marks are written to tape. If the Immed flag is clear, the file marks and any buffered data is written to tape before status is returned. If the Immed flag is clear and the Count field is 0, then all buffered data is flushed to tape before the command is reported.

3.32.2 Completion Status:

<table>
<tr><th>Code</th><th>Message</th><th>Description</th></tr>
<tr><td>00h</td><td>Good Status</td><td>• The filemarks have been sent to the buffer.
• The drive remains in any previously set mode.
Note: If Immed is 1, then Good Status only indicates that the command is valid.</td></tr>
<tr><td>02h</td><td>Check Condition</td><td>Use the Request Sense command to retrieve status information. Possible Sense Keys are:
<table>
<tr><th>Code</th><th>Message</th><th>Description</th></tr>
<tr><td>02h</td><td>Not Ready</td><td>No cartridge is in the drive.</td></tr>
<tr><td>03h</td><td>Media Error</td><td>Unrecoverable data error encountered.</td></tr>
<tr><td>04h</td><td>Hardware Error</td><td>Parity error on the SCSI bus or drive hardware failure.</td></tr>
<tr><td>05h</td><td>Illegal Request</td><td>The Command Descriptor Block is invalid.</td></tr>
<tr><td>06h</td><td>Unit Attention</td><td>The cartridge was changed, or the drive was reset prior to this command.</td></tr>
<tr><td>07h</td><td>Write Protect</td><td>The tape is write-protected; check the cartridge before continuing.</td></tr>
<tr><td>0Dh</td><td>Volume</td><td>The command completed with Overflow data in the buffer because EOT was encountered.</td></tr>
</table></td></tr>
</table>

4 APPENDIX A: MESSAGE CODES:

This table lists the vendor unique message codes that are returned by the Request Sense command in the Field Pointer field (bytes 16-17) when the SKSV bit is 0.

GOOD_STATUS	00h	General	All Seems Well
BUSY_STATUS	01h	General	Busy
ILLEGAL_COMMAND_STATUS	02h	General	Illegal command
COMMAND_ABORTED_STATUS	03h	General	Command aborted
BAD_STATUS	04h	General	
FAILED_STATUS	05h	General	
ILLEGAL_MESSAGE	06h	General	Illegal message
LOGICAL_EW_STATUS	07h	General	
BOP_STATUS	08h	General	
REWRITE_RECOVERED_STATUS	09h	General	
SCSI_BOR_ERR	0Ah	SCSI	Additional Vendor Specific ASCQ BOR error

SCSI_CRC_ERR	0Bh	SCSI	CRC error
SCSI_INDETERMINATE_IRQ	0Ch	SCSI	Unknown IRQ
SCSI_CHIP_INITIALIZE_TIMED_OUT	0Dh	SCSI	SAPI initialization timed out.
SCSI_KERNEL_MSG_FAILED	0Eh	SCSI	Receiving kernel message failed
SCSI_UNKNOWN_BE_STATE_00	0Fh	SCSI	Unknown BE state
SCSI_UNKNOWN_FE_STATE_00	10h	SCSI	Unknown FE state
SCSI_UNKNOWN_SCSI_INT	11h	SCSI	Kernel Message: Unknown SCSI interrupt (unknown SCSI kernel message type)
SCSI_UNKNOWN_KERNEL_MSG_TYPE	12h	SCSI	Kernel Message: Unknown kernel message type
SCSI_UNKNOWN_SENDER	13h	SCSI	Kernel Message: Unknown kernel message sender
SCSI_UNKNOWN_SCSI_MSG	14h	SCSI	Kernel Message: Unknown SCSI message
SCSI_UNKNOWN_SVA_MSG	15h	SCSI	Kernel Message: Unknown SERVO ALERT message
SCSI_UNKNOWN_DMA_MSG	16h	SCSI	Kernel Message: Unknown DMA message
SCSI_TIMER_FAILED	17h	SCSI	Timer failed
SCSI_ZERO_TRANSFER	18h	SCSI	SAPI transfer with zero length
SCSI_UNEXP_CCSTARTED_00	19h	SCSI	Unexpected COMMAND COMPLETE started
SCSI_UNEXP_CCNOTSTARTED	1Ah	SCSI	Unexpected COMMAND COMPLETE not started
SCSI_FE_STATE_NOT_MATCHED_00	1Bh	SCSI	Unexpected FE state
SCSI_UNEXP_SELFTEST_MODE	1Ch	SCSI	Unexpected Self Test mode
SCSI_ABORT_BIT_SET	1Dh	SCSI	Unexpected ABORT bit set
SCSI_NON_DSM_PRIMITIVE	1Eh	SCSI	Unexpected DSM primitive
SCSI_CMD_REFS_EXHAUSTED_00	1Fh	SCSI	Exhausted all command references.
SCSI_UNKNOWN_INQ_PAGE	20h	SCSI	Unknown Inquiry page
SCSI_UNKNOWN_IID	21h	SCSI	Unknown initiator id
SCSI_UNKNOWN_SENSE_TYPE	22h	SCSI	Unknown sense type
SCSI_DMA_FIFO_ERR	23h	SCSI	DMA OVERRUN/UNDERRUN
SCSI_DMA_OFFSET_ERR	24h	SCSI	DMA offset error
SCSI_DMA_PARITY_ERR	25h	SCSI	DMA parity error
SCSI_READ_PARITY_ERR	26h	SCSI	Read parity error
SCSI_OFFSET_ERR	27h	SCSI	SCSI offset error
SCSI_UNKNOWN_MODE_PAGE	28h	SCSI	Unknown Mode page
SCSI_EJECT_FAILED	29h	SCSI	EJECT failed
SCSI_ILLEGAL_MSG_SEQ	2Ah	SCSI	Illegal SCSI bus message sequence
SCSI_ILLEGAL_DSM_CMD	2Bh	SCSI	Illegal command returned from DSM
SCSI_BUSY_STATUS_FAILED	2Ch	SCSI	Command should have return busy status
SCSI_UNEXP_CMD_REF	2Dh	SCSI	Unexpected Command reference found
SCSI_ILLEGAL_MON_CMD	2Eh	SCSI	Illegal command returned from MON Task
SCSI_DSM_TIMEOUT	2Fh	SCSI	DSM timeout
SCSI_KERNEL_MSG_TIMEOUT	30h	SCSI	Receiving kernel message timeout
SCSI_FW_DOWNLOAD_FAILED	31h	SCSI	Microcode download failure
SCSI_UNKN_CMD_REF_TYPE	32h	SCSI	Unknown Command Reference Type
SCSI_RB_NO_ROOM	33h	SCSI	Ring Buffer should have enough room
SCSI_MAIN_NOT_FOUND	34h	SCSI	pMainRoutine not found
SCSI_XFERDONE_NOT_FOUND	35h	SCSI	pXferDoneRoutine not found
SCSI_COMPDONE_NOT_FOUND	36h	SCSI	pCompDoneRoutine not found
SCSI_PDETECT_NOT_FOUND	37h	SCSI	pDetect routine not found
SCSI_PCMD_LOSTINFEHEAD_00	38h	SCSI	pCmd lost in the FE head
SCSI_PCMD_LOSTINBEHEAD_00	39h	SCSI	pCmd lost in the BE head
SCSI_PACTIVE_CMD_LOST	3Ah	SCSI	pActive_Cmd lost
SCSI_CR_POOL_UNINIT	3Bh	SCSI	Command Reference Pool sc_Command uninitialized
SCSI_QE_POOL_UNINIT	3Ch	SCSI	Queue Element Pool sc_Queue_Element uninitialized
SCSI_FAIL_TO_GET_FREE_ELEMENT	3Dh	SCSI	Fail to get free element from queue
SCSI_FAIL_TO_FREE_ELEMENT	3Eh	SCSI	Fail to free element during dequeue
SCSI_RB_BUSY	3Fh	SCSI	SCSI RB busy

SCSI_INVALID_CDB_LENGTH	40h	SCSI	(CDB Length != 6) and (CDB_Length != 10)
SCSI_UA_POWER_ON_OCCURRED	41h	SCSI	SCSI UA power on occurred
SCSI_UA_SCSI_BUS_RESET_OCCURRED	42h	SCSI	
SCSI_UA_BUS_DEVICE_RESET_FUNCTION_OCCURRED	43h	SCSI	
SCSI_UA_INTERNAL_FW_REBOOT	44h	SCSI	
SCSI_UA_TRANSCEIVERS_CHANGED_TO_SE	45h	SCSI	
SCSI_UA_TRANSCEIVERS_CHANGED_TO_LVD	46h	SCSI	
SCSI_UA_COMMANDS_CLEARED_BY_ANOTHER_INITIATOR	47h	SCSI	
SCSI_FE_DISPATCH_NULL_POINTER	48h	SCSI	
SCSI_BE_DISPATCH_NULL_POINTER	49h	SCSI	
DSM_ILLEGAL_CMD	4Ah	Data set manager	
DSM_APPEND_LOCATE_FAILED	4Bh	Data set manager	
DSM_MIC_COMMAND_FAILED	4Ch	Data set manager	
DSM_WR_FMK_TIMEOUT	4Dh	Data set manager	
DSM_COMMAND_MISMATCH	4Eh	Data set manager	
DSM_STATUS_85	4Fh	Data set manager	
DSM_CMPR_READ_DP_ERROR	50h	Data set manager	
DSM_CMPR_READ_INVALID_INTERRUPT	51h	Data set manager	
DSM_CMPR_UNRECOGNIZED_ALERT	52h	Data set manager	
DSM_CMPR_READ_C1_ERROR	53h	Data set manager	
DSM_BUSY	54h	Data set manager	
DSM_PORT_B_ADDR_RANGE	55h	Data set manager	
DSM_EOD_DETECTED	56h	Data set manager	
DSM_WR_ILLEGAL_RB_DESC	57h	Data set manager	
DSM_COMMAND_FAILED_MIC_CERR	58h	Data set manager	
DSM_COMMAND_FAILED_MIC_HERR	59h	Data set manager	
DSM_BUSY_GOT_REWIND	5Ah	Data set manager	
DSM_READ_STOP_NEEDS_READ	5Bh	Data set manager	
DSM_DRIVE_NOT_READY	5Ch	Data set manager	
DSM_UNKNOWN_COMMAND	5Dh	Data set manager	
DSM_CMPR_INTERRUPT_NO_DS	5Eh	Data set manager	
DSM_FORMAT_ERROR_DSN	5Fh	Data set manager	
DSM_FORMAT_ERROR_RECORD_COUNT	60h	Data set manager	
DSM_FORMAT_ERROR_FMK_COUNT	61h	Data set	

		manager	
DSM_FORMAT_ERROR_TOTAL_RECORDS	62h	Data set manager	
DSM_FORMAT_ERROR_TOTAL_FMKS	63h	Data set manager	
DSM_FORMAT_ERROR_THREAD_COUNT	64h	Data set manager	
DSM_FORMAT_ERROR_THREAD_WRITE_PASS	65h	Data set manager	
DSM_FORMAT_ERROR_TAPE_WRITE_PASS	66h	Data set manager	
DSM_FORMAT_ERROR_EXPECTED_FID	67h	Data set manager	
DSM_FORMAT_ERROR_UNKNOWN_DS_TYPE	68h	Data set manager	
DSM_MISSING_DS_READ_STOP	69h	Data set manager	
DSM_MISSING_DS_REWIND	6Ah	Data set manager	
DSM_MISSING_DS_DS_FLUSH	6Bh	Data set manager	
DSM_FREEPOOL_NEG_COUNT_IN_FEED_ELDC	6Ch	Data set manager	
DSM_FREEPOOL_SENT_NULL_DS_IN_FEED_ELDC	6Dh	Data set manager	
DSM_FREEPOOL_SENT_NULL_DS_IN_FEED_ELDC2	6Eh	Data set manager	
DSM_CMPR_NEEDS_DS_RANGE_ERR	6Fh	Data set manager	
DSM_CMPR_SKIP_IN_DS_FAILED	70h	Data set manager	
DSM_MISSING_DS_LOCATE_READ_STOP	71h	Data set manager	
DSM_CMPR_READ_RETRY_LIMIT_EXCEEDED	72h	Data set manager	
DSM_NO_SKIP_DS	73h	Data set manager	
DSM_FORMAT_ERROR_AT_EOD	74h	Data set manager	
DSM_FILEMARK_ENCOUNTERED	75h	Data set manager	
DSM_READ_PAUSE_NEEDS_READ	76h	Data set manager	
DSM_SPACE_REV_BLKS_BOT_ENCOUNTERED	77h	Data set manager	
DSM_NO_WRITE_APPEND_DS	78h	Data set manager	
DSM_CMPR_WR_NO_ACCESS_PT_IN_APPEND_DS	79h	Data set manager	
DSM_WRITE_FLUSH_ERROR	7Ah	Data set manager	
DSM_WRITE_ERROR	7Bh	Data set manager	
DSM_NULL_DS_DETECTED_DURING_FLUSH	7Ch	Data set manager	
DSM_CANT_FLUSH_COMPRESSOR_NOT_HALTED	7Dh	Data set manager	
DSM_NOT_IN_WRITE_MODE_CANT_FLUSH	7Eh	Data set manager	
DSM_BE_PENDED_FLUSH_CMD_LOST	7Fh	Data set manager	

DSM_ELDC_SET_NDSPTR_NULL	80h	Data set manager	
DSM_LOCATE_NEEDS_IDLE	81h	Data set manager	
DSM_GENERAL_COMPRESSION_ERROR	82h	Data set manager	
DSM_POSITION_MISMATCH_AFTER_FLUSH	83h	Data set manager	
DSM_MISSING_DS_RETURN_TO_FREEPOOL	84h	Data set manager	
DSM_ELDC_DS_COUNT_MISMATCH	85h	Data set manager	
DSM_ELDC_DS_COUNT_IS_NEGATIVE	86h	Data set manager	
DSM_MISSING_DS_FLUSH_DONE	87h	Data set manager	
DSM_SPACE_REV_FMKS_BOT_ENCOUNTERED	88h	Data set manager	
DSM_CMPR_SET_MAXSIZE_BUSY	89h	Data set manager	
TAPE_ILLEGAL_CMD	8Ah	Tape	
TAPE_SRV_ILLEGAL_CMD	8Bh	Tape	Illegal cmd opt code
TAPE_SRV_CMD_TIMEOUT	8Ch	Tape	WP idle but not pick up cmd until time-out
TAPE_SRV_OVERLAPPED_CMD	8Dh	Tape	Low level is currently busy with another cmd
TAPE_SRV_WP_BUSY	8Eh	Tape	unable deposit cmd since WP busy until time-out
TAPE_RECYCLE	8Fh	Tape	Data Set status: recycle Data Set.
TAPE_DS_NOT_WRITTEN	90h	Tape	Data Set status: not written Data Set.
TAPE_NOT_READY	91h	Tape	Whirlpool_status Ready bit is not set.
TAPE_WRITE_PROTECT	92h	Tape	Write: Write protect tape.
TAPE_ILLEGAL_MODE	93h	Tape	Command received in illegal mode.
TAPE_EOT_STATUS	94h	Tape	Write: End of tape detected.
TAPE_WRITE_HARD_ERR	95h	Tape	Write: Hard write error detected.
TAPE_INVALID_STATE	96h	Tape	Invalid state.
TAPE_WRITE_UNEXP_MSG	97h	Tape	Write: unexpected message received.
TAPE_WRITE_DS_MISMATCH	98h	Tape	Write: data set ptr not match
TAPE_SERVO_REC_FAIL	99h	Tape	Write: fail to recover from servo demark.
TAPE_APPEND_FAIL	9Ah	Tape	Write: fail to append because can not
TAPE_C1_ERR	9Bh	Tape	Write: C1 ECC error detected by formatter.
TAPE_WRITE_UNKNOWN_ERR	9Ch	Tape	Write: Unknown error.
TAPE_HARD_READ_ERROR	9Dh	Tape	Read: Hard Read Error.
TAPE_READ_EOT	9Eh	Tape	Read: End of Tape
TAPE_READ_AT_EOD	9Fh	Tape	Read: EOD encounter
TAPE_READ_FIFO_OVRRUN	A0h	Tape	Read: FIFO Overrrun (HW error)
TAPE_TARGET_NOT_FOUND	A1h	Tape	Seek: target not found error
TAPE_ILLEGAL_SRV_ALERT	A2h	Tape	Task: illegal SERVO_ALERT message received.
TAPE_ILLEGAL_MSG_TYPE	A3h	Tape	Task: illegal message type received.
TAPE_BUSY_STATUS	A4h	Tape	Task: Busy.
TAPE_ILLEGAL_ABORT_CMD	A5h	Tape	Task: illegal ABORT_COMMMAND received.
TAPE_DS_IN_OUT_SEQUENCE	A6h	Tape	Write: Data Set in out of sequence.
TAPE_DS_DN_OUT_SEQUENCE	A7h	Tape	Write: Data Set done out of sequence.
TAPE_READ_BLANK_TAPE	A8h	Tape	Read: Blank Tape
TAPE_ILLEGAL_SPEED	A9h	Tape	tp_set_vco(): illegal speed.
TAPE_VCO_LOCK_ERR	AAh	Tape	tp_set_vco(): VCO_LOCK error.
TAPE_VCO_PHASE_ERR	ABh	Tape	tp_set_vco(): VCO is not running in correct phase.
TAPE_RECYCLING_DATA_SETS	ACh	Tape	
TAPE_CHAN_ILLEGAL_EQ_REG	ADh	Tape	Not a valid equalizer register (>20 during read)
TAPE_CHAN_ILLEGAL_PA_REG	AEh	Tape	Not a valid preamp register (> 53)

TAPE_DS_NOT_AVAILABLE	AFh	Tape	Data Set not available
TAPE_UNEXP_SERVO_ALERT	B0h	Tape	Write/Read: Unexpected SERVO_ALERT Message is received.
TAPE_CHAN_SET_CALIB_ID_ERROR	B1h	Tape	
TAPE_CHAN_SET_CALIB_MODE_ERROR	B2h	Tape	
TAPE_CHAN_ILLEGAL_MODE	B3h	Tape	
TAPE_SERVO_ERROR	B4h	Tape	Seek: Unrecoverable Hard Servo Error
TAPE_CHAN_READ_CALIB_ID_ERROR	B5h	Tape	
TAPE_CHAN_READ_CALIB_MODE_ERROR	B6h	Tape	
TAPE_AUTO_LOAD_FAILED	B7h	Tape	auto_load sequence failure
TAPE_READ_END_OF_WRAP	B8h	Tape	Read: RAW read end-of-wrap
TAPE_RAW_READ_UNDERRUN	B9h	Tape	Read: RAW underrun error
TAPE_CHAN_EQ1_COMM_ERROR	BAh	Tape	
TAPE_CHAN_EQ2_COMM_ERROR	BBh	Tape	
TAPE_CHAN_EQ1_AND_EQ2_COMM_ERROR	BCh	Tape	
TAPE_BAD_MIC_PAGE	BDh	Tape	Task: Bad MIC page error
TAPE_UNEXP_MSG_REC	BEh	Tape	Task: Unexpected Message Received
TAPE_SRV_RAMP_UP_TO_LP1	BFh	Tape	Write: Append ramp up
TAPE_SRV_RAMP_UP_TO_LP6	C0h	Tape	Write: Append ramp up
TAPE_WRITE_LOOP_BACK_FAIL	C1h	Tape	Write: WRITE_LOOP_BACK error detected.
TAPE_WRITE_ISB_SVO_FAIL	C2h	Tape	Write: LOOP_BACK
TAPE_WRITE_DSS_SERVO_FAULT	C3h	Tape	Write: LOOP_BACK
TAPE_FIRST_DS_SERVO_REC_FAIL	C4h	Tape	Write: Fail to handle the Servo demark
TAPE_UNEXP_SVA_LP1_UNDERRUN	C5h	Tape	Write: unexpected lp1 received.
TAPE_UNEXP_SVA_LP6_OVERRUN	C6h	Tape	Write: unexpected lp6 received.
TAPE_AUTO_LOAD_CM_FAILED	C7h	Tape	CM failure during auto_load sequence
TAPE_READ_ILLEGAL_OLD_DATA	C8h	Tape	Read: Reader detects old data which has higher WPC than new data WPC
TAPE_FIRST_DS_APPEND_FAIL	C9h	Tape	Write: Fail to detect the last
SRV_PARPORT_SCRAMBLER_NOT_READY_IN_PASS_THRU	CAh	Servo	Scrambler not ready to accept command for passthru mode
SRV_MOVETAPE_REVERSE_PHYSICAL_LIMIT_UNDERRUN_DURING_CRUISE_CONTROL	CBh	Servo	Physical limit exceeded in reverse direction
SRV_CMDPROC_SET_TAPE_SPEED_REJ_INVALID_STATE	CCh	Servo	Reject set tape speed command same
SRV_CMDPROC_SET_TAPE_SPEED_REJ_NOT_INCREASING	CDh	Servo	Reject set tape speed command
SRV_MOVETAPE_FORWARD_PHYSICAL_LIMIT_OVERRUN_DURING_RAMP_UP	CEh	Servo	Physical limit in forward direction exceeded in ramp up state
SRV_REJ_INV_STATE	CFh	Servo	Invalid State For This Command
SRV_REJ_CMD	D0h	Servo	Unrecognized Command
SRV_REJ_PARM	D1h	Servo	Invalid Parameter Received
SRV_REJ_FORMAT	D2h	Servo	Invalid Message Format
SRV_REJ_NO_LP1	D3h	Servo	LP1 Not Set
SRV_REJ_NO_CARTRIDGE	D4h	Servo	No cartridge present
SRV_REJ_NOT_THREADED	D5h	Servo	Cartridge not threaded yet
SRV_REJ_AT_BOT	D6h	Servo	Cmd rejected
SRV_REJ_REWINDING	D7h	Servo	Cmd rejected
SRV_REJ_CLEANING	D8h	Servo	Cleaning tape inserted
SRV_LPOS_TABLE_FULL	D9h	Servo	LPOS table is full.
SRV_UNKNOWN_REASON	DAh	Servo	Unknown reason code in cmd response memory.
SRV_DIVIDER_ERROR	DBh	Servo	Hardware divider detected a division error
SRV_DIVIDER_TIMEOUT	DCh	Servo	FW timed out waiting for hardware divider
SRV_SERVO_TIMEOUT	DDh	Servo	Servo firmware time out
SRV_FIND_INDEX_FAILED	DEh	Servo	Find drive motor index failed
SRV_CAL_SLOT_FAILED	DFh	Servo	Calibrate slot command failed
SRV_GOTO_POINT_INVALID	E0h	Servo	target point to close to ramp to or already past
SRV_SERVO_POWEROFF_FAILED	E1h	Servo	servo did not acknowledge power off
SRV_REWIND_NOT_NECESSARY	E2h	Servo	current tape position is at or before wrap point.

SRV_NOT_USED_8	E3h	Servo	
SRV_DIVIDER_OVERFLOW	E4h	Servo	division overflow when using hardware divider.
SRV_MULTIPLY_ERROR	E5h	Servo	overflow error in scaled int multiply routine.
SRV_WRONG_REEL_SELECT	E6h	Servo	Wrong reel selected in rotate reel or stop reel command.
SRV_CMDPROC_UNDEFINED_SCRAMBLER_COMMAND	E7h	Servo	Command sent from scrambler is not defined.
SRV_INVALID_MONITOR_MSG	E8h	Servo	internal RTOS message unknown.
SRV_SELF_MONITOR_BUF_OVERFLOW	E9h	Servo	fiq monitor to irq buffer overflow.
SRV_SELF_EVENT_BUF_OVERFLOW	EAh	Servo	fiq event to irq buffer overflow.
SRV_RTOS_UNKNOWN	EBh	Servo	unknown rtos error.
SRV_SEQ_TABLE_LOOKUP	ECh	Servo	sequencer table look up error.
SRV_SEQ_NULL_FUNCTION_CALLED	EDh	Servo	sequencer table function is null.
SRV_SEQ_UNEXPECTED_MESSAGE_RESPONSE	EEh	Servo	response not expected for command.
SRV_SELF_ERROR_BUF_OVERFLOW	EFh	Servo	fiq error buf to irq buffer overflow.
SRV_SEQ_NON_MECHANICAL_SCRAMBLER_COMMAND	F0h	Servo	non mechanical command received by sequencer.
SRV_SEQ_OUT_OF_RANGE_SCRAMBLER_COMMAND	F1h	Servo	out of range command received by sequencer.
SRV_SELF_RTOS_BUF_OVERFLOW	F2h	Servo	fiq rtos buffer to irq buffer overflow.
SRV_CMDPROC_UNDEFINED_TASK_FOR_COMMAND_IN_BYPASS_MODE	F3h	Servo	undefined task specified.
SRV_CMDTYPE_TABLE_INTEGRITY	F4h	Servo	table integrity for command type or parameter table look
SRV_REEL_NO_TASK_SPECIFIED	F5h	Servo	reel task received a message without a valid sender specified.
SRV_STACK_OVERFLOW	F6h	Servo	stack overflow.
SRV_NO_SINECAL_DATA	F7h	Servo	Sine calibration failed to find 0-xings.
SRV_BAD_SINECAL_DATA	F8h	Servo	Sine calibration found invalid 0-xings.
SRV_NO_SINECAL_INDEX	F9h	Servo	Sine calibration couldn't find index.
SRV_NO_LOADRCA_INDEX	FAh	Servo	Sine RCA/RCB load couldn't find index.
SRV_PARAM_TABLE_INTEGRITY	FBh	Servo	Table lookup not consistent with COMMAND_ENUM definitions.
SRV_PARPORT_SCRAMBLER_NOT_READY_IN_SEND_RESPONSE	FCh	Servo	Scrambler not ready to accept command.
SRV_PARPORT_UNDEFINED_CONDENSED_FORMAT	FDh	Servo	Undefined scrambler condensed format.
SRV_CMDPROC_NO_TAPE_TO_EJECT	FEh	Servo	Eject attempt rejected because there was no tape.
SRV_CMDPROC_REJECT_EJECT_INVALID_STATE	FFh	Servo	Reject eject button due to invalid mechanical state.
SRV_STATUS_100	100h	Servo	
SRV_CMD_REJECT	101h	Servo	Command rejected
SRV_CMD_ERROR	102h	Servo	Command error
SRV_CMD_ABORTED	103h	Servo	Command aborted
SRV_ALERT	104h	Servo	Servo Alert
SRV_MOVETAPE_ERROR_EOT_OVERRUN_DURING_CRUISE_CONTROL	105h	Servo	Tape has gone past eot during cruise control state
SRV_MOVETAPE_ERROR_BOT_UNDERRUN_DURING_CRUISE_CONTROL	106h	Servo	Tape has gone past bot during cruise control state
SRV_MOVETAPE_ERROR_EOT_OVERRUN_DURING_RAMP_UP	107h	Servo	Tape has gone past eot during ramp up state
SRV_MOVETAPE_ERROR_BOT_UNDERRUN_DURING_RAMP_UP	108h	Servo	Tape has gone past bot during ramp up state
SRV_INVALID_MARK_SELECT	109h	Servo	Invalid mode select in mark.c.
ECC_C2_ERROR	10Ah	ECC	
MIC_NO_STATUS	10Bh	Medium Auxiliary Memory	Fill Info.Word with this if there is no status to send.

MIC_PAGE_ID_BAD	10Ch	Medium Auxiliary Memory	the PAGE ID value received is out of RANGE.
MIC_PAGE_DOES_NOT_EXIST	10Dh	Medium Auxiliary Memory	the PAGE ID requested does not exist in the PAGE descriptor table.
MIC_PAGE_CRC_BAD	10Eh	Medium Auxiliary Memory	the CRC calculated on the PAGE is not valid.
MIC_PAGE_LOCKED_60SEC	10Fh	Medium Auxiliary Memory	a lock is on the PAGE for more than 60 seconds.
MIC_RELOCKING_PAGE_ERR	110h	Medium Auxiliary Memory	a Task is trying to lock a PAGE that it has already locked.
MIC_BAD_STATUS_REQUEST	111h	Medium Auxiliary Memory	the status word requested was out of RANGE.
MIC_UNLOCKING_TWICE	112h	Medium Auxiliary Memory	a Task is trying to unlock a PAGE that is not locked.
MIC_TAPE_DIR_RANGE	113h	Medium Auxiliary Memory	the Tape Directory index value given is out of range or too big.
MIC_INVALID_MSG_TYPE	114h	Medium Auxiliary Memory	an illegal message type was sent to the MIC Task.
MIC_INVALID_TASK_VALUE	115h	Medium Auxiliary Memory	the Task number in the message received was out of range.
MIC_RESET_MSG_BAD	116h	Medium Auxiliary Memory	there was an error in the RESET message sent to the MIC Task.
MIC_PAGE_WR_PROT	117h	Medium Auxiliary Memory	the PAGE is write protected and a read modify lock is requested.
MIC_CART_NOT_SEATED	118h	Medium Auxiliary Memory	the Cartridge was not seated when a request for a lock was received.
MIC_FLUSHING_RAM	119h	Medium Auxiliary Memory	the RAM is being flushed to EEPROM and read modify locks are not allowed.
MIC_WRITE_PASS_INVALID	11Ah	Medium Auxiliary Memory	the write pass value stored in the EEPROM is not correctly stored.
MIC_DELAYED_Q_FULL	11Bh	Medium Auxiliary Memory	there is no more room on the delayed Q when a message needs to be delayed.
MIC_CREATE_TWICE	11Ch	Medium Auxiliary Memory	create_lock message received on a Page that is already created.
MIC_SPI_FAILED	11Dh	Medium Auxiliary Memory	Serial Port Interface failed
MIC_READ_FAILED	11Eh	Medium Auxiliary Memory	Read CM/EEPROM failed
MIC_WRITE_FAILED	11Fh	Medium Auxiliary Memory	Write CM/EEPROM failed
MIC_VERIFY_FAILED	120h	Medium	Read after Write failed

		Auxiliary Memory	
MIC_BAD_PG_TBL	121h	Medium Auxiliary Memory	Page table corrupted
MIC_BAD_PG_ID	122h	Medium Auxiliary Memory	Page ID incorrect
MIC_BAD_PG_LEN	123h	Medium Auxiliary Memory	Page length incorrect
MIC_INVALID_COPIES	124h	Medium Auxiliary Memory	Too many/little copies of a page
MIC_MALT_INIT_FAILED	125h	Medium Auxiliary Memory	Cannot init MALT reader chip
MIC_CM_NOT_DETECTED	126h	Medium Auxiliary Memory	Cannot find Cartridge Memory chip
MIC_BAD_CM_INFO	127h	Medium Auxiliary Memory	CM Manufacturer Info is blank/invalid
MIC_NO_CART_INFO	128h	Medium Auxiliary Memory	Cart Manufacturer Info does not exist
MIC_BAD_CART_INFO	129h	Medium Auxiliary Memory	Cart Manufacturer Info is blank/invalid
MIC_NO_MEDIA_INFO	12Ah	Medium Auxiliary Memory	Media Manufacturer Info does not exist
MIC_BAD_MEDIA_INFO	12Bh	Medium Auxiliary Memory	Media Manufacturer Info is blank/invalid
MIC_NO_INIT_DATA	12Ch	Medium Auxiliary Memory	Initialisation Data does not exist
MIC_PARTIAL_INIT	12Dh	Medium Auxiliary Memory	data CM is partially init or corrupted
MIC_CLEAN_CART_BAD	12Eh	Medium Auxiliary Memory	clean CM is partially init or corrupted
MIC_CLEAN_CART_NEW	12Fh	Medium Auxiliary Memory	clean cart is uninit but support Seagate
MIC_CLEAN_CART_OTHER	130h	Medium Auxiliary Memory	clean cart was init by other drive
MIC_CLEAN_CART_SEAGATE	131h	Medium Auxiliary Memory	clean cart was init by Seagate drive
MIC_CLEAN_CART_INCOMPAT	132h	Medium Auxiliary Memory	clean cart does not support Seagate
MIC_CART_TYPE_INVALID	133h	Medium Auxiliary Memory	cart type is not data or cleaning
MIC_WRITE_PASS_INVLD2	134h	Medium Auxiliary	2nd type of invalid write pass

		Memory	
MIC_CLEAN_CART_NEW_UCC	135h	Medium Auxiliary Memory	clean cart is uninit universal clean cart Tape shall send CM_INIT_PG & init some
MIC_CLEAN_CART_UCC	136h	Medium Auxiliary Memory	universal clean cart was initialized Tape shall clean head
CALIB_BUSY_STATUS	137h	Calibration	
MON_CMD_OVERLAPPED	138h	Monitor	Cmd overlapped
MON_CMD_INVALID_CHECK_SUM	139h	Monitor	Check sum failed
MON_CMD_INVALID_OPT_CODE	13Ah	Monitor	Invalid Opt code
MON_CMD_ILLEGAL_ABORTED	13Bh	Monitor	Illegal abort
MON_CMD_ILLEGAL_IMM_BIT	13Ch	Monitor	IMM bit not allowed
MON_CMD_IN_PROG	13Dh	Monitor	Cmd is not finished yet
MON_BTO_INT_TEST_FAILED	13Eh	Monitor	Bus time-out INT test failed
MON_C1CMPL_INT_TEST_FAILED	13Fh	Monitor	C1 INT test failed
MON_WCQ_INT_TEST_FAILED	140h	Monitor	WCQ INT test failed
MON_SCSI_EXT_INT_TEST_FAILED	141h	Monitor	SCSI EXT INT test failed
MON_HOST_DMA_INT_TEST_FAILED	142h	Monitor	Host DMA INT test failed
MON_DSS_INT_TEST_FAILED	143h	Monitor	DSS INT test failed
MON_RBT_INT_TEST_FAILED	144h	Monitor	RB threshold INT test failed
MON_DP_INT_TEST_FAILED	145h	Monitor	ELDC INT test failed
MON_TMR1_INT_TEST_FAILED	146h	Monitor	Timer 1 INT test failed
MON_SRVO_INT_TEST_FAILED	147h	Monitor	Servo INT test failed
MON_DS_INT_TEST_FAILED	148h	Monitor	DS INT test failed
MON_ECC_INT_TEST_FAILED	149h	Monitor	ECC INT test failed
MON_TMR2_INT_TEST_FAILED	14Ah	Monitor	Timer 2 INT test failed
MON_INT_TEST_FAILED	14Bh	Monitor	INT test failed (general)
MON_TIMER_TEST_FAILED	14Ch	Monitor	timer test failed
MON_TIMER_PRESCALE_TEST_FAILED	14Dh	Monitor	timer prescale test failed
MON_PATTERNIZE_DATA_FAILED	14Eh	Monitor	patternize data patterns failed
MON_PASSTHRU_INT_FAILED	14Fh	Monitor	Pass-thru INT failed
MON_PASSTHRU_FAILED	150h	Monitor	Pass-thru Operation failed
MON_PASSTHRU_MISCOMPARE	151h	Monitor	Pass-thru Miscompare failed
MON_DC_FAILED	152h	Monitor	DC Operation failed
MON_DC_MISCOMPARE	153h	Monitor	DC data miscompare
MON_ADAPTEC_SCSI_CONTROLLER_FAILED	154h	Monitor	SCSI controller selftest failed
MON_INTERNAL_SRAM_SCSI_CONTROLLER_ FAILED	155h	Monitor	SCSI controller internal
MON_TEST_MEM_FAILED	156h	Monitor	SRAM selftest failed
MON_CHECK_SUM_TEST_FAILED	157h	Monitor	
MON_NO_DS_AVAILABLE	158h	Monitor	No Data Set is available at time of request
MON_CMD_ILLEGAL_PARAMETER	159h	Monitor	Illegal parameter
MON_RX1_INT_TEST_FAILED	15Ah	Monitor	Serial port 1 rcv interrupt test failed
MON_TX1_INT_TEST_FAILED	15Bh	Monitor	Serial transmit intr test failed
MON_RX2_INT_TEST_FAILED	15Ch	Monitor	Timer 1 intr test failed
MON_TIMER1_INT_TEST_FAILED	15Dh	Monitor	Serial port 2 rcv intr test failed
MON_TX2_INT_TEST_FAILED	15Eh	Monitor	Serial port 2 transmit intr test failed
MON_RTC_INT_TEST_FAILED	15Fh	Monitor	Real time clock intr test failed
MON_SC_EXTERNAL_SRAM_TEST_FAILED	160h	Monitor	Scrambler External SRAM test failed
MON_SC_INTERNAL_SRAM_TEST_FAILED	161h	Monitor	Scrambler Internal SRAM test failed
MON_SC_SDRAM_TEST_FAILED	162h	Monitor	Scrambler Data Set SDRAM test failed
MON_WP_INTERNAL_SRAM_TEST_FAILED	163h	Monitor	Servo Internal RAM test failed
MON_WP_EXTERNAL_SRAM_TEST_FAILED	164h	Monitor	Servo External RAM test failed
MON_DS_INTERNAL_SRAM_TEST_FAILED	165h	Monitor	Data Set Internal SRAM test failed
MON_NEXT_STEP_READY	166h	Monitor	Command ready for next step
MON_COMPRESSION_SCHEME_1_FAILED	167h	Monitor	Compression Scheme 1 failure
MON_COMPRESSION_SCHEME_2_FAILED	168h	Monitor	Compression Scheme 2 failure
MON_COMPRESSION_AUTO_SCHEME_FAILE	169h	Monitor	Auto Scheme Compression failure

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MON_DECOMPRESSION_SCHEME_1_FAILED	16Ah	Monitor	Decompression Scheme 1 failure
MON_DECOMPRESSION_SCHEME_2_FAILED	16Bh	Monitor	Decompression Scheme 2 failure
MON_DECOMPRESSION_AUTO_SCHEME_FAILED	16Ch	Monitor	Auto Scheme Decompression failure
MON_DESC_ERRORS	16Dh	Monitor	Despcriptor Errors detected
MON_CRC_ERROR	16Eh	Monitor	CRC checking error
MON_INVALID_PARAMETERS	16Fh	Monitor	Invalid parameters field in cmd packet
MON_NO_CARTRIDGE_INSERTED	170h	Monitor	No Cartridge inserted
MON_SERVO_MARGIN_DATA_IS_NOT_AVAILABLE	171h	Monitor	Servo Margin Data in not available
MON_ISR_UART_RCV_UNDERRUN_ERROR	172h	Monitor	
MON_ISR_UART_RCV_HEADER_ERROR	173h	Monitor	
MON_ISR_UART_RCV_TERMINATOR_ERROR	174h	Monitor	
MON_ISR_UART_RCV_PORT_ERROR	175h	Monitor	
MON_FLASH_OUT_OF_RANGE	176h	Monitor	Data size to flash is out of allocated range
MON_FLASH_IMAGE_CHECKSUM_BAD	177h	Monitor	Firmware image file fails checksum
SRV_LPOS_NOTIFICATION_NOT_FOUND	178h	Servo	Delete lpos failed because it was not in the notify table.
SRV_LPOS_UNRECOGNIZED_LPOS_DELETE_MODE	179h	Servo	Delete mode not recognized as a valid enum.
SRV_LPOS_READ_DIR_INVALID	17Ah	Servo	Invalid direction in lpos notification check
SRV_MOVETAPE_REVERSE_PHYSICAL_LIMIT_UNDERRUN_DURING_RAMP_UP	17Bh	Servo	Physical limit in reverse direction exceeded in ramp up state.
SRV_MOVETAPE_RAMP_DOWN_FAILED_AT_LPOS_NOTIFICATION	17Ch	Servo	A ramp down attempt was rejected by the fiq servo code during
SRV_MOVETAPE_RAMP_DOWN_FAILED_WHEN_REVERSING_DIR	17Dh	Servo	A ramp down attempt was rejected by the fiq servo code during
SRV_MOVETAPE_RAMP_DOWN_FAILED_WHEN_SPEED_CHANGE_REQUIRED	17Eh	Servo	A ramp down attempt was rejected by the fiq servo code during
SRV_MOVETAPE_TAPE_ACTIVE_CMD_NOT_VALID_FOR_THIS_STATE	17Fh	Servo	In tape state machine
SRV_MOVETAPE_TAPE_RAMP_UP_FAILED_FROM_IDLE_STATE	180h	Servo	Ramp up failed in srv_skip_to_lpos_in_idle transition function.
SRV_MOVETAPE_UNEXPECTED_MESSAGE_RESPONSE_IN_CRUISE_CONTROL	181h	Servo	An unexpected message was received in the cruise control.
SRV_LPOS_REJECT_LPOS_SET_LPOS_NOTIFICATION_BECAUSE_TABLE_IN_USE	182h	Servo	Notification table being updated by other task
SRV_MOVETAPE_RAMPDOWN_FAILED_DURING_LPOS_UNDERRUN_IN_CRUISE_CONTROL	183h	Servo	Tape lpos underrun error during cruise control state.
SRV_MOVETAPE_RAMPDOWN_FAILED_DURING_LPOS_OVERRUN_IN_CRUISE_CONTROL	184h	Servo	Tape lpos overrun error during cruise control state.
SRV_MOVETAPE_FORWARD_PHYSICAL_LIMIT_OVERRUN_DURING_CRUISE_CONTROL	185h	Servo	Physical limit exceeded in forward direction.
SRV_SEQ_TABLE_LOOKUP_ERROR	186h	Servo	Sequencer table incorrectly defined at compile time.
SRV_SEQ_MAXIMUM_STATE_EXCEEDED	187h	Servo	Sequencer index exceeded maximum number of functions in table.
SRV_REEL_MAXIMUM_STATE_EXCEEDED	188h	Servo	Reel task state variable exceeded number of defined states.
SRV_CMDPROC_NOT_ENOUGH_TAPE_TO_RAMP	189h	Servo	Not enough tape is available to ramp up before a PBOT or
SRV_SEQ_PAST_LP1_REJ_INV_STATE	18Ah	Servo	Command rejected since we are already past lp1.
SRV_SEQ_PAST_LP6_REJ_INV_STATE	18Bh	Servo	Command rejected since we are already past lp6.
SRV_SEQ_REJ_NO_LP1	18Ch	Servo	Command rejected since tape parameters were not set.
SRV_CMDPROC_REJ_PARM	18Dh	Servo	Command rejected in command processor because

SRV_CMDPROC_REJ_INV_DIR	18Eh	Servo	Command rejected
SRV_CMDPROC_REJ_CMD_NOT_ENOUGH_TAPE_TO_RAMP	18Fh	Servo	Command rejected
SRV_CMDPROC_REJ_CMD_TAPE_PAST_TARGET_LPOS	190h	Servo	Command rejected
SRV_CMDPROC_TAPE_NOT_STOPPED	191h	Servo	Command rejected
SRV_REEL_UNKNOWN_TAPE_MOVE_COMMAND	192h	Servo	Reel task received a command not recognized
SRV_MOVETAPE_RAMPDOWNTAPE_API_BUSY_REJECT	193h	Servo	Servo API function RampDownTape() returned busy status.
SRV_MOVETAPE_MOVETAPETRACK_API_BUSY_REJECT	194h	Servo	Servo API function MoveTapeTrack() returned busy status.
SRV_MOVETAPE_MOVETAPE_API_BUSY_REJECT	195h	Servo	Servo API function MoveTape() returned busy status.
SRV_REEL_INVALID_MESSAGE_RECEIVED	196h	Servo	An invalid message was received by the reel task.
SRV_REEL_DRIVEMOTOR_ON_API_BUSY_REJECT	197h	Servo	API call DriverMotor failed.
SRV_REEL_DRIVEMOTOR_OFF_API_BUSY_REJECT	198h	Servo	API call DriverMotor failed.
SRV_REEL_MOTORPOWEROFF_API_BUSY_REJECT	199h	Servo	API call MotorPowerOff failed.
SRV_REEL_TIMEOUT_USER_ABORT_STATE	19Ah	Servo	Timeout message received in USER_ABORT_STATE.
SRV_REEL_TIMEOUT_USER_ABORT_TAPE_STATE	19Bh	Servo	Timeout message received in USER_ABORT_TAPE_STATE.
SRV_MOVETAPE_TIMEOUT_RAMP_UP_STATE	19Ch	Servo	Timeout message received in RAMP_UP_STATE.
SRV_MOVETAPE_TIMEOUT_RAMP_DOWN_STATE	19Dh	Servo	Timeout message received in RAMP_DOWN_STATE.
SRV_MOVETAPE_TIMEOUT_RAMP_DOWN_RESTART_STATE	19Eh	Servo	Timeout message received in RAMP_DOWN_RESTART_STATE.
SRV_ROTATE_RAMPUPDRIVEMOTOR_API_DRIVE_REEL_REJECT_BUSY	19Fh	Servo	API call RampUpDriveMotor failed.
SRV_ROTATE_RAMPUPDRIVEMOTOR_API_CART_REEL_REJECT_BUSY	1A0h	Servo	API call RampUpDriveMotor failed
SRV_ROTATE_INVALID_REEL_SELECT_RAMP_UP	1A1h	Servo	Invalid reel select parameter.
SRV_ROTATE_RAMPDOWNDRIVEMOTOR_DRIVE_SEL_API_REJECT_BUSY	1A2h	Servo	API call RampDownDriveMotor failed.
SRV_ROTATE_RAMPDOWNDRIVEMOTOR_CART_SEL_API_REJECT_BUSY	1A3h	Servo	API call RampDownDriveMotor failed.
SRV_ROTATE_INVALID_REEL_SELECT_RAMP_DOWN	1A4h	Servo	Invalid reel select parameter.
SRV_ROTATE_INVALID_REEL_SELECT_RAMP_UP_REEL_STATE	1A5h	Servo	Invalid reel select parameter in ramp up reel select.
SRV_ROTATE_TIMEOUT_RAMP_UP_REEL_STATE	1A6h	Servo	Timeout message occurred during ramp up reel state.
SRV_ROTATE_INVALID_REEL_SELECT_ROTATING_REEL_STATE	1A7h	Servo	Invalid reel select parameter in rotating reel state.
SRV_ROTATE_TIMEOUT_RAMP_DOWN_REEL_STATE	1A8h	Servo	Timeout message received in ramp down reel in rotate.
SRV_POSREEL_POSITIONDRIVE_API_REJECT_BUSY_IN_MOVE_HOME	1A9h	Servo	API call PositionDrive failed.
SRV_POSREEL_POSITIONDRIVE_API_REJECT_BUSY_IN_POSITION_MOVE	1AAh	Servo	API call PositionDrive failed.
SRV_POSREEL_HOMEDRIVEREEL_API_REJECT_BUSY	1ABh	Servo	API call HomeDriveReel failed.
SRV_POSREEL_TIMEOUT_IN_MOVE_TO_POSITION_STATE	1ACh	Servo	Timeout message received in move to position state.
SRV_GOTO_LC_POSITIONTAPE_API_BUSY_R	1ADh	Servo	API call PositionTape failed.

EJECT			
SRV_GOTO_LC_TIMEOUT_IN_RAMP_UP_STATE	1AEh	Servo	Timeout message received in RAMP_UP_STATE.
SRV_GOTO_LC_TIMEOUT_IN_WAIT_MARK_STATE	1AFh	Servo	Timeout message received in WAIT_MARK_STATE.
SRV_GOTO_LC_TIMEOUT_IN_MARK_FOUND_STATE	1B0h	Servo	Timeout message received in MARK_FOUND_STATE.
SRV_GOTO_LC_TIMEOUT_IN_POSITION_STATE	1B1h	Servo	Timeout message received in POSITION_REEL_STATE.
SRV_CMDPROC_REJ_PARM_LPOS_NOT_WITHIN_LP2_OR_LP6_IN_SKIP_TO_LPOS_VALID	1B2h	Servo	Command rejected in skip to lpos.
SRV_CMDPROC_REJ_PARM_LP1_OR_LP6_OUT_OF_RANGE	1B3h	Servo	SET_TAPE command rejected because LP1 or LP6 out of range.
SRV_CMDPROC_REJ_CMD_TAPE_IN_MOTION_IN_SETTAPE_CMD	1B4h	Servo	SET TAPE command rejected because tape was in motion.
SRV_CMDPROC_WRITELINEARCOUNTER_API_REJECT_BUSY	1B5h	Servo	API call WriteLinearCounter failed.
SRV_CMDPROC_SETRADIUSCOUNTER_API_REJ_CMD_REJECT_BUSY	1B6h	Servo	API call SetRadiusCounter failed.
SRV_CMDPROC_SETTENSION_API_REJECT_BUSY_IN_SET_PARAMETER	1B7h	Servo	API call SetTension failed.
SCSI_STATUS_DIAG_INIT_FAILED	1B8h	SCSI	
SCSI_STATUS_DIAG_SBIST_FAILED	1B9h	SCSI	
SCSI_STATUS_DIAG_BBIST_FAILED	1BAh	SCSI	
SCSI_STATUS_DIAG_DBIST_FAILED	1BBh	SCSI	
SCSI_STATUS_DIAG_DMA_SETUP_FAILED	1BCh	SCSI	
SCSI_STATUS_DIAG_HI_RAM_FAILED	1BDh	SCSI	
SCSI_STATUS_DIAG_AIC_RAM_FAILED	1BEh	SCSI	
SCSI_STATUS_DIAG_DMA_WRITE_INTERRUPT_FAILED	1BFh	SCSI	
SCSI_STATUS_DIAG_DMA_WRITE_DFIFOERR	1C0h	SCSI	
SCSI_STATUS_DIAG_DMA_WRITE_OFSERR	1C1h	SCSI	
SCSI_STATUS_DIAG_DMA_WRITE_DMAPERR	1C2h	SCSI	
SCSI_STATUS_DIAG_DMA_WRITE_RDPARERR	1C3h	SCSI	
SCSI_STATUS_DIAG_DMA_WRITE_MPACCERR	1C4h	SCSI	
SCSI_STATUS_DIAG_DMA_WRITE_COUNTER_ERROR	1C5h	SCSI	
SCSI_STATUS_DIAG_DMA_WRITE_DATA_COMPARE_ERROR	1C6h	SCSI	
SCSI_STATUS_DIAG_DMA_READ_INTERRUPT_FAILED	1C7h	SCSI	
SCSI_STATUS_DIAG_DMA_READ_DFIFOERR	1C8h	SCSI	
SCSI_STATUS_DIAG_DMA_READ_OFSERR	1C9h	SCSI	
SCSI_STATUS_DIAG_DMA_READ_DMAPERR	1CAh	SCSI	
SCSI_STATUS_DIAG_DMA_READ_RDPARERR	1CBh	SCSI	
SCSI_STATUS_DIAG_DMA_READ_MPACCERR	1CCh	SCSI	
SCSI_STATUS_DIAG_DMA_READ_COUNTER_ERROR	1CDh	SCSI	
SCSI_STATUS_DIAG_DMA_READ_DATA_COMPARE_ERROR	1CEh	SCSI	
SCSI_STATUS_DIAG_TASK_STATUS_UNKNOWN	1CFh	SCSI	
SCSI_STATUS_DIAG_CABLE_PROBLEMS	1D0h	SCSI	
SCSI_STATUS_DIAG_EXCESSIVE_RESET_CONDITIONS	1D1h	SCSI	
SCSI_CUR_DESC_NULL_POINTER_00	1D2h	SCSI	
SCSI_MPACCESS_NEVER_CLEARED	1D3h	SCSI	
SCSI_AIC_IN_RESET_MODE	1D4h	SCSI	

SCSI_FW_IMAGE_FIRST_WORD_ZERO	1D5h	SCSI	
SCSI_FW_IMAGE_CHECKSUM_BAD	1D6h	SCSI	
SCSI_WB_PARAM_DATA_MISMATCH_CDB_PAGE_ID	1D7h	SCSI	
SCSI_WB_PARAM_DATA_MISMATCH_CDB_PLL_PAGE_SIZE	1D8h	SCSI	
SCSI_WB_PARAM_DATA_MISMATCH_MIC_PAGE_ID	1D9h	SCSI	
SCSI_WB_PARAM_DATA_MISMATCH_MIC_PAGE_SIZE	1DAh	SCSI	
SCSI_MEDIUM_PRESENT	1DBh	SCSI	
SCSI_NULL_THREAD_TABLE_PTR_00	1DCh	SCSI	
SCSI_UNKNOWN_AUTOLOAD_MODE	1DDh	SCSI	
SCSI_UNKNOWN_DIAGNOSTIC_TYPE	1DEh	SCSI	
SCSI_NULL_TRACE_BUFFER_NEXT_PTR	1DFh	SCSI	
SCSI_EJECT_BIT_SET_BUT_ABORT_BIT_NOT_SET	1E0h	SCSI	
SCSI_NUM_IID_REGISTERED_NOT_GREATER_THAN_ZERO	1E1h	SCSI	
SCSI_REG_MASK_NOT_EQU_RES_MASK_BITWISE_OR_REG_MASK	1E2h	SCSI	
SCSI_NUM_IID_REGISTERED_NOT_EQU_BITS_SET_IN_REG_MASK	1E3h	SCSI	
SCSI_ILLEGAL_CDB_REQ_WHEN_INSERTED	1E4h	SCSI	
SCSI_ILLEGAL_CDB_REQ_WHEN_SEATED	1E5h	SCSI	
SCSI_UNKNOWN_MEDIUM_POSITION_STATE	1E6h	SCSI	
SCSI_STATUS_INVALID_MIC_STATE	1E7h	SCSI	
SCSI_LIB_KERNEL_MSG_TIMEOUT	1E8h	SCSI	
SCSI_UNEXPECTED_NUMBER_OF_TRACE_BUFFERS	1E9h	SCSI	
SCSI_UNEXPECTED_CASE_IN_SWITCH	1EAh	SCSI	
SCSI_FW_IMAGE_OEMCODE_MISMATCH	1EBh	SCSI	
SCSI_FW_IMAGE_INTERFACE_TYPE_MISMATCH	1ECh	SCSI	
SCSI_FIRMWARE_MEDIUM_PRESENT	1EDh	SCSI	
SCSI_UNEXPECTED_TAPE_ALERT_MRIE	1EEh	SCSI	(MRIE <> 0x01) and/or (MRIE <> 0x03)
SCSI_RESELECTION_BUT_MISSING_PCMD_IN_FE	1EFh	SCSI	
SCSI_HTEST_ERR	1F0h	SCSI	
SCSI_INVALID_MEDIUM_FOR_SET_CAPACITY	1F1h	SCSI	
SCSI_PCMD_LOST_IN_LIB_XFER_DONE	1F2h	SCSI	
SCSI_PCMD_LOST_IN_LIB_COMMAND_COMPLETE_DELIVERED	1F3h	SCSI	
SCSI_PCMD_LOST_IN_LIB_START_XFER	1F4h	SCSI	
SCSI_PCMD_LOST_IN_LIB_SEND_COMMAND_COMPLETE	1F5h	SCSI	
SCSI_PCMD_LOST_IN_LIB_SEND_DATA_IN_AND_GOOD_STATUS	1F6h	SCSI	
SCSI_WRONG_SIGNAL_NODE	1F7h	SCSI	
SCSI_UNABLE_ALLOC_DTD	1F8h	SCSI	
SCSI_UNKNOWN_FC_MSG	1F9h	SCSI	
SCSI_XFERSTOP_NOT_FOUND	1FAh	SCSI	
SCSI_INFO_STRUCTS_EXHAUSTED	1FBh	SCSI	
SCSI_CANNOT_ADD_IID_IN_FREE_Q	1FCh	SCSI	
SCSI_IID_LOST_IN_FREE_Q	1FDh	SCSI	
SCSI_INITIATOR_ADDED_LOST	1FEh	SCSI	
SCSI_REMOVE_AN_UNKNOWN_INITIATOR	1FFh	SCSI	
SCSI_LRU_LOGOUT_FAILED_LRU_REMOVE_IID	200h	SCSI	

SCSI_LRU_LOGOUT_FAILED_FREE_IID_Q_ADD_IID	201h	SCSI	
SCSI_LRU_LOGOUT_FAILED_IID_RESERVED	202h	SCSI	
SCSI_LRU_UPDATE_FAILED_LRU_REMOVE_IID	203h	SCSI	
SCSI_LRU_UPDATE_FAILED_LRU_ADD_IID	204h	SCSI	
SCSI_IID_RUN_OUT_OF_RESOURCES	205h	SCSI	
SCSI_IID_NEEDS_TO_LOGOUT	206h	SCSI	
SCSI_ADD_NULL_PTR_NEXUS_DB	207h	SCSI	
SCSI_EXISTING_NEXUS_HAS_DIFFERENT_PCMD	208h	SCSI	
SCSI_CA_ACA_FLAGS_BOTH_SET	209h	SCSI	
SCSI_HAPI_UNEXPECTED_RECORD_TYPE	20Ah	SCSI	
SCSI_UNKNOWN_SIGNAL_NODE	20Bh	SCSI	
SCSI_INVALID_COMMAND_DONE_SIGNAL_NODE	20Ch	SCSI	
SCSI_UNKNOWN_TASK_MANAGEMENT_SIGNAL_NODE	20Dh	SCSI	
SCSI_UNKNOWN_THRESHOLD_INTERRUPT	20Eh	SCSI	
SCSI_NULL_PSCSIINFO_FROM_DMA	20Fh	SCSI	
SCSI_STREAMOP_BUT_VALID_PACTIVE_CMD	210h	SCSI	
SCSI_FCP_INVALID_PORT_NUMBER_GET_WWN	211h	SCSI	
SCSI_FCP_INVALID_PORT_NUMBER_ID_CHANGE	212h	SCSI	
SCSI_FCP_PORT_DB_ENTRY_NOT_FOUND	213h	SCSI	
SCSI_FCP_INVALID_PORT_NUMBER_ATTACH_CHANGE	214h	SCSI	
SCSI_STDF_RESTART_DUE_TO_FAILURE	215h	SCSI	
SCSI_STDF_UNKNOWN_FAILURE	216h	SCSI	
SCSI_STDF_ASSERTION_FAILURE	217h	SCSI	
SCSI_STDF_COMPONENT_VERSION_MISMATCH	218h	SCSI	
SCSI_STDF_STARTUP_FAILURE	219h	SCSI	
SCSI_STDF_DYNAMIC_CONFIGURATION_FAILURE	21Ah	SCSI	
SCSI_STDF_UNEXPECTED_OS_BEHAVIOR	21Bh	SCSI	
SCSI_STDF_INTERNAL_GENERAL_FAILURE	21Ch	SCSI	
SCSI_STDF_INTERNAL_INIT_FAILURE	21Dh	SCSI	
SCSI_STDF_LOGICAL_UNIT_INIT_FAILURE	21Eh	SCSI	
SCSI_STDF_SD_CONTROLLER_HARDWARE_FAILURE	21Fh	SCSI	
SCSI_STDF_TRANSPORT_PROTOCOL_FAILURE	220h	SCSI	
SCSI_STDF_CONFIGURATION_PARAMETER_ERROR	221h	SCSI	
SCSI_STDF_INTERRUPT_NESTING_OVERFLOW	222h	SCSI	
SCSI_STDF_INSUFFICIENT_DYNAMIC_MEMORY	223h	SCSI	
SCSI_STDF_MEMORY_POOL_MISMANAGEMENT	224h	SCSI	
SCSI_STDF_DYNAMIC_MEMORY_CORRUPTION	225h	SCSI	
SCSI_STDF_BAD_DATA_STRUCTURE_FORMAT	226h	SCSI	
SCSI_SET_THRESHOLD_NOT_SIZE_ERR	227h	SCSI	
SCSI_SAPI_GET_CMD_REF_NULL_00	228h	SCSI	
SCSI_INVALID_MICROCODE_UPDATE_TYPE	229h	SCSI	

SCSI_CREATE_SENSE_FAILED	22Ah	SCSI	
SCSI_INITALIZE_SENSE_FAILED	22Bh	SCSI	
SCSI_UNKNOWN_CM_EEPROM_STATE	22Ch	SCSI	
SCSI_INVALID_LOG_PARAMETER	22Dh	SCSI	
SCSI_INVALID_LOG_PAGE	22Eh	SCSI	
SCSI_INVALID_LOG_PAGE_CONTROL	22Fh	SCSI	
SCSI_PAGE_OUT_OF_RANGE	230h	SCSI	Log page out of range
SCSI_UNKNOWN_LOG_INFO_RESPONSE	231h	SCSI	
SCSI_UNKNOWN_LOG_INFO_RESPONSE_DATA_POINTER	232h	SCSI	
SRV_CMDPROC_CMD_REJECT_ABORT_IN_PROGRESS	233h	Servo	Abort command rejected since already aborting.
SRV_CMDPROC_CMD_REJECT_SEQUENCER_BUSY	234h	Servo	Mechanical command rejected
SRV_CMDPROC_PARAMETER_OUT_OF_RANGE	235h	Servo	Parameter out of range for command.
SRV_CMDPROC_SETTAPETHICK_API_REJECT_BUSY	236h	Servo	API SetTapeThick failed
SRV_CMDPROC_SETTENSION_API_REJECT_BUSY_IN_STATUS_REQUEST	237h	Servo	API SetTension failed
SRV_CMDPROC_SETRADIUSCOUNTER_API_REJECT_BUSY	238h	Servo	API SetRadiusCounter failed
SRV_CMDPROC_INVALID_COMMAND_IN_SET_PARAMETER	239h	Servo	Invalid parameter in set parameter function.
SRV_REEL_AT_SPEED_MESSAGE_RECEIVED_IN_IDLE_STATE	23Ah	Servo	AT_SPEED message received in idle state.
SRV_REEL_TRACKING_MESSAGE_RECEIVED_IN_IDLE_STATE	23Bh	Servo	TRACKING message received in idle state.
SRV_REEL_AT_SPEED_MESSAGE_RECEIVED_IN_HOLD_STATE	23Ch	Servo	AT_SPEED message received in hold state.
SRV_REEL_TRACKING_MESSAGE_RECEIVED_IN_HOLD_STATE	23Dh	Servo	TRACKING message received in hold state.
SRV_MOVETAPE_FORWARD_PHYSICAL_LIMIT_OVERRUN_DURING_RAMP_DOWN	23Eh	Servo	Forward Physical limit exceeded in ramp down state.
SRV_MOVETAPE_REVERSE_PHYSICAL_LIMIT_UNDERRUN_DURING_RAMP_DOWN	23Fh	Servo	Reverse physical limit exceeded in ramp down state.
SRV_MOVETAPE_FORWARD_PHYSICAL_LIMIT_OVERRUN_DURING_RAMP_DOWN_RESTART	240h	Servo	Forward physical limit exceeded in ramp down restart state.
SRV_MOVETAPE_REVERSE_PHYSICAL_LIMIT_UNDERRUN_DURING_RAMP_DOWN_RESTART	241h	Servo	Reverse physical limit exceeded in ramp down restart state.
SRV_SEQ_SUBCOMMAND_TIMED_OUT	242h	Servo	Subcommand timeout in sequencer.
SRV_STEP_PWR_RECOVERY_THREAD_TAPE_ERROR1	243h	Servo	The Load Arm was unable to find the Cart Bicell target zone during Thread Power
SRV_STEP_PWR_RECOVERY_THREAD_TAPE_ERROR2	244h	Servo	expecting SNS13 low
SRV_STEP_PWR_RECOVERY_THREAD_TAPE_ERROR3	245h	Servo	expecting steps done
SRV_STEP_PWR_RECOVERY_THREAD_TAPE_ERROR4	246h	Servo	failed to remove slack
SRV_STEP_PWR_RECOVERY_THREAD_TAPE_ERROR5	247h	Servo	failed to release pin
SRV_STEP_PWR_RECOVERY_THREAD_TAPE_ERROR6	248h	Servo	The Load Arm failed while moving to home position (in front of the guides) durin
SRV_STEP_PWR_RECOVERY_THREAD_TAPE_ERROR7	249h	Servo	expecting steps done
SRV_STEP_PWR_RECOVERY_THREAD_TAPE_ERROR8	24Ah	Servo	exceded retrys
SRV_STEP_PWR_RECOVERY_THREAD_TAPE_	24Bh	Servo	motor stall waiting for SNS13 high

ERROR9			
SRV_MOVETAPE_RAMP_DOWN_FAILED_IN_RAMP_DOWN_AT_LPOS_FROM_CRUISE_CONTROL_FORWARD	24Ch	Servo	Ramp down failed in ramp_down_at_lpos_from_cruise_control in forward direction.
SRV_MOVETAPE_RAMP_DOWN_FAILED_IN_RAMP_DOWN_AT_LPOS_FROM_CRUISE_CONTROL_REVERSE	24Dh	Servo	Ramp down failed in ramp_down_at_lpos_from_cruise_control in reverse direction.
SRV_MOVETAPE_INVALID_DIRECTION_IN_RAMP_DOWN_AT_LPOS_FROM_CRUISE_CONTROL	24Eh	Servo	Tape not moving
SRV_MOVETAPE_LPOS_RECEIVED_BEFORE_TRACKING_IN_RAMP_UP_STATE	24Fh	Servo	LPOS notification received before ramp up completed.
SRV_CMDPROC_TAPE_NOT_MOVING_FOR_REPOSITION_CMD	250h	Servo	Reposition cmd rejected
SRV_MOVETAPE_REPOSITION_FAILED_ALREADY_PAST_LPOS	251h	Servo	LPOS already exceeded in reposition_from_idle
SRV_CMD_INVALID_HEADPOSITION_SELECTED_LOOKUP_TRACKING_RATIO	252h	Servo	Invalid head position selected in looking up tracking ratio
SRV_MOVETAPE_INVALID_TAPE_DIRECTION_IN_ENABLE_HEAD_BIAS_FOR_READ_TRACKING	253h	Servo	Invalid tape direction was selected in enable head bias function
SRV_MOVETAPE_INVALID_TAPE_DIRECTION_IN_ENABLE_HEAD_BIAS_FOR_WRITE_TRACKING	254h	Servo	Invalid tape direction selected in enable head bias function
SRV_MOVETAPE_INVALID_TRACKING_MODE_IN_ENABLE_HEAD_BIAS	255h	Servo	Invalid tracking mode selected in enable bias function
SRV_GOTO_LC_FORWARD_PHYSICAL_LIMIT_OVERRUN_DURING_RAMP_UP	256h	Servo	Physical limit exceded during goto_lc_ramp_up state.
SRV_GOTO_LC_REVERSE_PHYSICAL_LIMIT_UNDERRUN_DURING_RAMP_UP	257h	Servo	Physical limit exceded during goto_lc_ramp_up state.
SRV_GOTO_LC_FORWARD_PHYSICAL_LIMIT_OVERRUN_DURING_WAIT_MARK	258h	Servo	Physical limit exceded during goto_lc_wait_mark state.
SRV_GOTO_LC_REVERSE_PHYSICAL_LIMIT_UNDERRUN_DURING_WAIT_MARK	259h	Servo	Physical limit exceded during goto_lc_wait_mark_state.
SRV_GOTO_LC_FORWARD_PHYSICAL_LIMIT_OVERRUN_DURING_MARK_FOUND	25Ah	Servo	Physical limit exceded during goto_lc_mark_found state.
SRV_GOTO_LC_REVERSE_PHYSICAL_LIMIT_UNDERRUN_DURING_MARK_FOUND	25Bh	Servo	Physical limit exceded during goto_lc_mark_found state.
SRV_GOTO_LC_FORWARD_PHYSICAL_LIMIT_OVERRUN_DURING_POSITION_TAPE	25Ch	Servo	Physical limit exceded during position tape state.
SRV_GOTO_LC_REVERSE_PHYSICAL_LIMIT_UNDERRUN_DURING_POSITION_TAPE	25Dh	Servo	Physical limit exceded during position tape state.
SRV_GOTO_LC_INITREELS_API_BUSY_REJECT	25Eh	Servo	Init reels api call failed with a busy status.
SRV_STEPPER_MOTOR_TASK_INVALID_OPERATION	25Fh	Servo	32c
SRV_STEP_LOAD_CART_ERROR1	260h	Servo	Another event occurred before the cartridge in switch (SNS1) tripped
SRV_STEP_LOAD_CART_ERROR2	261h	Servo	The cartridge load motor stalled before it reach it final position
SRV_STEP_LOAD_CART_ERROR3	262h	Servo	Expecting to see the cartridge in sensor change
SRV_STEP_LOAD_CART_ERROR4	263h	Servo	Expecting good completion status from cartridge load motor task
SRV_STEP_LOAD_CART_DEFAULT	264h	Servo	invalid state in process_load_cart function
SRV_STEP_UNLOAD_CART_ERROR1	265h	Servo	The firmware failed to hit SNS2 (switch on side of load mech)
SRV_STEP_UNLOAD_CART_ERROR2	266h	Servo	Error occurred while moving the loading tray past SNS2 (switch on side of load m
SRV_STEP_UNLOAD_CART_DEFAULT	267h	Servo	An unexpected state occurred in the cartridge unload task.
SRV_STEP_THREAD_TAPE_ERROR1	268h	Servo	fRemoving tape slack from the cartridge failed

			while Threading
SRV_STEP_PWR_RECOVERY_LOAD_CART_ERROR1	269h	Servo	expecting SNS1 high
SRV_STEP_PWR_RECOVERY_LOAD_CART_ERROR2	26Ah	Servo	expecting steps done
SRV_STEP_PWR_RECOVERY_LOAD_CART_ERROR3	26Bh	Servo	expecting serial eeprom done
SRV_STEP_PWR_RECOVERY_LOAD_CART_ERROR4	26Ch	Servo	expecting SNS1 low
SRV_STEP_THREAD_TAPE_ERROR6	26Dh	Servo	Load arm motor stalled while going to the cartridge.
SRV_STEP_THREAD_TAPE_ERROR7	26Eh	Servo	expecting steps done
SRV_STEP_THREAD_TAPE_ERROR8	26Fh	Servo	expecting MECH_DELAY1_DONE
SRV_STEP_THREAD_TAPE_ERROR9	270h	Servo	motor stall waiting for SNS13 high
SRV_STEP_THREAD_TAPE_ERROR10	271h	Servo	SNS13 Did not change to expected value
SRV_STEP_THREAD_TAPE_ERROR11	272h	Servo	motor stall waiting for ENGAGED_LEADER
SRV_STEP_THREAD_TAPE_ERROR12	273h	Servo	expecting steps done
SRV_STEP_THREAD_TAPE_ERROR13	274h	Servo	timer failure
SRV_STEP_THREAD_TAPE_ERROR14	275h	Servo	expecting MECH_DELAY2_DONE
SRV_STEP_THREAD_TAPE_ERROR15	276h	Servo	Load arm stalled pulling pin from cartridge
SRV_STEP_THREAD_TAPE_ERROR16	277h	Servo	While removing the hysteresis from the load arm (hooking the pin) the bi-cell va
SRV_STEP_THREAD_TAPE_ERROR17	278h	Servo	The load arm failed to grab the pin to thread the tape and all of the retries we
SRV_STEP_THREAD_TAPE_ERROR18	279h	Servo	All retries for pulling tape from the cartridge were used up
SRV_STEP_THREAD_TAPE_ERROR19	27Ah	Servo	expecting SNS7
SRV_STEP_PWR_RECOVERY_LOAD_CART_ERROR5	27Bh	Servo	expecting steps done
SRV_STEP_PWR_RECOVERY_LOAD_CART_EXPECTED_TRAY_OUT	27Ch	Servo	expecting SNS2 low
SRV_STEP_THREAD_TAPE_ERROR22	27Dh	Servo	Load arm motor stalled while finishing a thread operation
SRV_STEP_THREAD_TAPE_ERROR23	27Eh	Servo	Cartridge reel motor did not move as much as expected.
SRV_STEP_THREAD_TAPE_DEFAULT	27Fh	Servo	An unexpected state occurred in the tape thread task.
SRV_STEP_PWR_RECOVERY_LOAD_CART_ERROR7	280h	Servo	expecting steps done
SRV_STEP_UNTHREAD_TAPE_ERROR2	281h	Servo	motor stall
SRV_STEP_PWR_RECOVERY_LOAD_CART_ERROR8	282h	Servo	expecting eerpom done
SRV_STEP_PWR_RECOVERY_LOAD_CART_DEFAULT	283h	Servo	invalid state in srv_dcl_loadCartridgePoweronRecovery function
SRV_STEP_UNTHREAD_TAPE_ERROR6	284h	Servo	Load arm stalled while leaving the hub
SRV_STEP_UNTHREAD_TAPE_ERROR7	285h	Servo	expecting steps done
SRV_STEP_LOAD_CART_ERROR5	286h	Servo	expecting serial eeprom done
SRV_STEP_PWR_RECOVERY_THREAD_TAPE_ERROR10	287h	Servo	expecting SNS13 high
SRV_STEP_UNTHREAD_TAPE_ERROR10	288h	Servo	35motor stall waiting
SRV_STEP_UNTHREAD_TAPE_ERROR11	289h	Servo	expecting steps done
SRV_STEP_UNTHREAD_TAPE_ERROR12	28Ah	Servo	SNS13 Did not change to expected value
SRV_STEP_UNTHREAD_TAPE_ERROR13	28Bh	Servo	expecting steps done
SRV_STEP_UNTHREAD_TAPE_ERROR14	28Ch	Servo	Removing tape slack from the cartridge failed during Unthread
SRV_STEP_UNTHREAD_TAPE_ERROR15	28Dh	Servo	failed to release pin
SRV_STEP_UNTHREAD_TAPE_ERROR16	28Eh	Servo	motor stall waiting for HALT4
SRV_STEP_UNTHREAD_TAPE_ERROR17	28Fh	Servo	Unexpected id
SRV_STEP_UNTHREAD_TAPE_DEFAULT	290h	Servo	An unexpected state occurred in the tape

			unthread task.
SRV_STEP_MOTOR_ERROR1	291h	Servo	expecting steps done
SRV_STEP_STEP_MOTOR_DEFAULT	292h	Servo	An in unexpected state occurred in the move motor task.
SRV_STEP_HEAD_INVALID_WRAP	293h	Servo	invalid wrap value
SRV_STEP_HEAD_EXPECTING_STOP_AFTER_MOVING_TO_POSITION	294h	Servo	expecting HALT1
SRV_STEP_HEAD_EXPECTING_STOP_AFTER_ADDED_HYSTERESIS	295h	Servo	expecting steps done
SRV_STEP_HEAD_EXPECTING_TOP_SENSOR_HIGH	296h	Servo	expecting SNS9 high
SRV_STEP_HEAD_EXPECTING_STOP_AFTER_TOP_SENSOR_HIGH	297h	Servo	expecting HALT2
SRV_STEP_HEAD_EXPECTING_TOP_SENSOR_LOW	298h	Servo	expecting SNS9 low
SRV_STEP_HEAD_EXPECTING_STOP_AFTER_TOP_SENSOR_LOW	299h	Servo	expecting HALT3
SRV_STEP_HEAD_STEP_DEFAULT	29Ah	Servo	An unexpected state occurred in the head step task.
SRV_STEP_STEP_DEFAULT	29Bh	Servo	An unexpected state occurred in the step motor task.
SRV_STEP_SETUP_MOTOR_CONTROL_DEFAULT	29Ch	Servo	An unexpected state occurred in the cartridge load task
SRV_STEP_RETRY_THREAD_TAPE_ERROR1	29Dh	Servo	expecting HALT1
SRV_STEP_RETRY_THREAD_TAPE_ERROR2	29Eh	Servo	expecting SNS13 low
SRV_STEP_RETRY_THREAD_TAPE_ERROR3	29Fh	Servo	expecting steps done
SRV_STEP_RETRY_THREAD_TAPE_DEFAULT	2A0h	Servo	An unexpected state occurred in the cartridge load task.
SRV_STEP_PWR_RECOVERY_THREAD_TAPE_ERROR11	2A1h	Servo	motor stall waiting for ENGAGED_LEADER
SRV_STEP_PWR_RECOVERY_THREAD_TAPE_ERROR12	2A2h	Servo	expecting steps done
SRV_STEP_PWR_RECOVERY_THREAD_TAPE_DEFAULT	2A3h	Servo	An unexpected state occurred in the power on recovery task.
SRV_STEP_GOFROM_HUB_TOPARK_ERROR1	2A4h	Servo	expecting steps done
SRV_STEP_GOFROM_HUB_TOPARK_DEFAULT	2A5h	Servo	An unexpected state occurred in the cartridge load task.
SRV_STEP_THREAD_TAPE_ERROR26	2A6h	Servo	expected serial eeprom done
SRV_STEP_UNTHREAD_TAPE_ERROR3	2A7h	Servo	expecting steps done
SRV_STEP_NO_ACTIVE_PWR_RECOVERY_THREAD_RETRY_ISR	2A8h	Servo	An unexpected state occurred in the cartridge load task.
SRV_STEP_FIND_PARK_ERROR1	2A9h	Servo	expecting SNS7 or SNS8
SRV_STEP_FIND_PARK_ERROR2	2AAh	Servo	motor stall while waiting for SNS7
SRV_STEP_FIND_PARK_ERROR3	2ABh	Servo	expecting SNS7 high
SRV_STEP_FIND_PARK_ERROR4	2ACh	Servo	motor stalled
SRV_STEP_FIND_PARK_ERROR5	2ADh	Servo	oCould not detect one or both of the Bi-cell sensors.
SRV_STEPPER_MOTOR_TASK_EEPROM_INVALID_OPERATION	2AEh	Servo	state machince did not expect sate returned from EEPROM_TSK
SRV_STEP_RETRY6_ERROR1	2AFh	Servo	Unable to thread into hub bicell.
SRV_STEP_FIND_PARK_DEFAULT	2B0h	Servo	An unexpected state occurred in the cartridge load task.
SRV_STEP_RETRY6_ERROR2	2B1h	Servo	motor stall waiting for steps done
SRV_STEP_GOTO_HUB_ERROR2	2B2h	Servo	expecting steps done
SRV_STEP_GOTO_HUB_DEFAULT	2B3h	Servo	An unexpected state in the occurred cartridge load task.
SRV_STEP_RETRY6_ERROR3	2B4h	Servo	expected STEPS_DONE
SRV_STEP_RETRY6_DEFAULT	2B5h	Servo	An unexpected state in the occurred cartridge load task.
SRV_STEP_INTO_CART_ERROR3	2B6h	Servo	expecting steps done

SRV_STEP_INTO_CART_DEFAULT	2B7h	Servo	An unexpected state occurred in the cartridge load task.
SRV_STEP_PARK_LA_ERROR1	2B8h	Servo	expecting steps done
SRV_STEP_PARK_LA_DEFAULT	2B9h	Servo	An unexpected state occurred in the cartridge load task.
SRV_STEP_LWR_ENGAGE_ERROR1	2BAh	Servo	expecting SNS13 high
SRV_STEP_LWR_ENGAGE_ERROR2	2BBh	Servo	expecting steps done
SRV_STEP_LWR_ENGAGE_DEFAULT	2BCh	Servo	An unexpected state occurred in the cartridge load task.
SRV_STEP_LWR_DISENGAGE_ERROR1	2BDh	Servo	expecting SNS13 low
SRV_STEP_LWR_DISENGAGE_ERROR2	2BEh	Servo	expecting steps done
SRV_STEP_LWR_DISENGAGE_DEFAULT	2BFh	Servo	An unexpected state occurred in the cartridge load task.
SRV_STEP_RETRY4_ERROR5	2C0h	Servo	eThe tape could not be pulled around the guides on an unthread and all retries w
SRV_STEP_CART_REEL_RUNAWAY	2C1h	Servo	While pulling or pushing tape with the load arm motor the cartridge reel motor m
SRV_STEP_LOAD_ARM_MOTOR_STALLED	2C2h	Servo	the load arm motor stalled
SRV_STEP_CART_LOAD_MOTOR_STALL	2C3h	Servo	the cart load motor stalled
SRV_STEP_CART_NOT_IN	2C4h	Servo	Cartridge was removed during a load
SRV_CAL_MOT_MOVE	2C5h	Servo	reel motor moved during bias calibration
SRV_CAL_MOT_STOP	2C6h	Servo	reel motor failed to stop during bias calibration
SRV_STATEM_COMMAND_SOURCE_INVALID_IN_IDLE_MODE	2C7h	Servo	message not from cmd processor task
SRV_CMD_CALIBATE_ALL_FAILED_WRITING_TO_LINEAR_COUNTER_API_BUSY	2C8h	Servo	calibrate all failed trying to reset the linear counter
SRV_CMD_FIND_INDEX_FAILED_WRITING_TO_LINEAR_COUNTER_API_BUSY	2C9h	Servo	find index command failed writing to linear counter
SRV_EVENTS_TABLE_INTEGRITY_ERROR	2CAh	Servo	Events table integrity error. Ids donot match index.
SRV_FINDZEROWRAP_API_REJECTED_BUSY_STATE	2CBh	Servo	find_zero_wrap() API call failed
SRV_CMDPROC_EJECT_REJECTED_NO_TAPE_READY	2CCh	Servo	Eject command rejected by command processor
SRV_UNTHREAD_STALL_WHILE_PUTTING_AWAY_PIN	2CDh	Servo	motor stall waiting for SNS7 high while parking
SRV_STEP_UNTHREAD_TAPE_ERROR19	2CEh	Servo	expecting SNS7 high (park)
SRV_CMDPROC_EJECT_REJECTED_TAPE_MOVING	2CFh	Servo	Eject command rejected by command processor
SRV_REEL_UNEXPECTED_MESSAGE_IN_USER_ABORT_REEL_STATE	2D0h	Servo	Unexpected message received in user abort reel state of reel task
SRV_REEL_UNEXPECTED_MESSAGE_IN_ERROR_ABORT_REEL_STATE	2D1h	Servo	Unexpected message received in error abort reel state of reel task
SRV_REEL_UNEXPECTED_MESSAGE_IN_USER_ABORT_TAPE_STATE	2D2h	Servo	Unexpected message received in user abort tape state of reel task
SRV_STEP_RETRY2_ERROR1	2D3h	Servo	motor stall waiting for HALT3
SRV_STEP_RETRY2_ERROR2	2D4h	Servo	expecting steps done
SRV_STEP_RETRY2_ERROR3	2D5h	Servo	expecting SNS13 low
SRV_STEP_RETRY2_ERROR4	2D6h	Servo	expecting steps done
SRV_STEP_RETRY2_ERROR5	2D7h	Servo	failed to remove slack
SRV_STEP_RETRY2_ERROR6	2D8h	Servo	The Load Arm failed while moving to home position (in front of the guides) durin
SRV_STEP_RETRY2_ERROR7	2D9h	Servo	motor stall waiting for HALT4
SRV_STEP_RETRY2_ERROR8	2DAh	Servo	expecting steps done
SRV_STEP_RETRY2_ERROR9	2DBh	Servo	motor stall waiting for HALT4
SRV_STEP_RETRY2_ERROR10	2DCh	Servo	expecting steps done
SRV_STEP_RETRY2_ERROR11	2DDh	Servo	motor stall waiting for HALT4
SRV_STEP_RETRY2_ERROR12	2DEh	Servo	expecting steps done
SRV_STEP_RETRY2_DEFAULT	2DFh	Servo	An unexpected state occurred in the cartridge load task

SRV_STEP_RETRY3_ERROR1	2E0h	Servo	expecting SNS13 low
SRV_STEP_RETRY3_ERROR2	2E1h	Servo	expecting SNS13 high
SRV_STEP_RETRY3_ERROR3	2E2h	Servo	expecting steps done
SRV_STEP_RETRY3_DEFAULT	2E3h	Servo	An unexpected state occurred in the cartridge load task.
SRV_STEP_RETRY4_ERROR1	2E4h	Servo	Load arm stalled while doing the retry that leads to a 0x38d error
SRV_STEP_RETRY4_ERROR2	2E5h	Servo	expected STEPS_DONE
SRV_STEP_RETRY4_DEFAULT	2E6h	Servo	An unexpected state occurred in the cartridge load task.
SRV_STEP_RETRY4_ERROR3	2E7h	Servo	motor stall waiting for steps done
SRV_STEP_RETRY4_ERROR4	2E8h	Servo	expected STEPS_DONE
SRV_STEP_GOFROM_HUB_GRABER_ERROR1	2E9h	Servo	expecting steps done
SRV_STEP_GOFROM_HUB_GRABER_ERROR2	2EAh	Servo	motor stall
SRV_STEP_GOFROM_HUB_GRABER_ERROR3	2EBh	Servo	expecting steps done
SRV_STEP_GOFROM_HUB_GRABER_DEFAULT	2ECh	Servo	An unexpected state occurred in the cartridge load task.
SRV_STEP_LA_INTO_CART_ERROR1	2EDh	Servo	expecting SNS13 low
SRV_STEP_LA_INTO_CART_ERROR2	2EEh	Servo	expecting steps done
SRV_STEP_LA_INTO_CART_ERROR3	2EFh	Servo	Load arm motor stalled while trying to go to the park location
SRV_STEP_LA_INTO_CART_DEFAULT	2F0h	Servo	An unexpected state occurred in the cartridge load task.
SRV_STEP_LOAD_ARM_MOTOR_STALLED1	2F1h	Servo	the load arm motor stalled
SRV_STEP_MOTOR_ERROR2	2F2h	Servo	expecting steps done
SRV_STEP_PARK_LA_CMD_ERROR1	2F3h	Servo	expecting steps done
SRV_STEP_PARK_LA_CMD_DEFAULT	2F4h	Servo	An unexpected state occurred in the cartridge load task.
SRV_STEP_RETRY_FAILED1	2F5h	Servo	exceded retrys
SRV_STEP_RETRY_FAILED2	2F6h	Servo	exceded retrys
SRV_STEP_UNTHREAD_TAPE_ERROR20	2F7h	Servo	motor stall waiting for SNS13 high
SRV_STEP_UNTHREAD_TAPE_ERROR21	2F8h	Servo	expecting SNS13 high
SRV_STEP_UNTHREAD_TAPE_ERROR22	2F9h	Servo	motor stall waiting for ENGAGED_LEADER
SRV_STEP_UNTHREAD_TAPE_ERROR23	2FAh	Servo	expecting steps done
SRV_STEP_THREAD_TAPE_ERROR24	2FBh	Servo	expecting SNS13 low
SRV_STEP_THREAD_TAPE_ERROR25	2FCh	Servo	expecting steps done
SRV_STEP_PWR_RECOVERY_UNTHREAD_TAPE_ERROR1	2FDh	Servo	expecting steps done
SRV_STEP_PWR_RECOVERY_UNTHREAD_TAPE_ERROR2	2FEh	Servo	expecting SNS13 low
SRV_STEP_PWR_RECOVERY_UNTHREAD_TAPE_ERROR3	2FFh	Servo	expecting steps done
SRV_STEP_PWR_RECOVERY_UNTHREAD_TAPE_ERROR4	300h	Servo	failed to remove slack
SRV_STEP_PWR_RECOVERY_UNTHREAD_TAPE_ERROR5	301h	Servo	failed to release pin
SRV_STEP_PWR_RECOVERY_UNTHREAD_TAPE_ERROR6	302h	Servo	motor stall waiting for HALT4
SRV_STEP_PWR_RECOVERY_UNTHREAD_TAPE_ERROR7	303h	Servo	expecting steps done
SRV_STEP_NO_ACTIVE_PWR_RECOVERY_UNTHREAD_RETRY_ISR	304h	Servo	An unexpected state occurred in the cartridge load task.
SRV_STEP_PWR_RECOVERY_UNTHREAD_TAPE_ERROR8	305h	Servo	exceeded retries
SRV_STEP_PWR_RECOVERY_UNTHREAD_TAPE_ERROR9	306h	Servo	motor stall waiting for SNS13 high
SRV_STEP_PWR_RECOVERY_UNTHREAD_TAPE_ERROR10	307h	Servo	expecting SNS13 high
SRV_STEP_PWR_RECOVERY_UNTHREAD_TAPE_ERROR11	308h	Servo	motor stall waiting for ENGAGED_LEADER

SRV_STEP_PWR_RECOVERY_UNTHREAD_TAPE_ERROR12	309h	Servo	expecting steps done
SRV_STEP_PWR_RECOVERY_UNTHREAD_TAPE_DEFAULT	30Ah	Servo	An unexpected state occurred in the cartridge load task.
SRV_STEP_NO_ACTIVE_ISR	30Bh	Servo	the step isr was call without an active function
SRV_STEP_NO_ACTIVE_THREAD_RETRY_ISR	30Ch	Servo	the retry step isr was call without an active function
SRV_STEP_NO_ACTIVE_UNTHREAD_RETRY_ISR	30Dh	Servo	the retry step isr was call without an active function
SRV_STEP_RETRY5_ERROR1	30Eh	Servo	motor stall waiting for steps done
SRV_STEP_RETRY5_ERROR2	30Fh	Servo	expected STEPS_DONE
SRV_STEP_RETRY5_ERROR3	310h	Servo	motor stall waiting for steps done
SRV_STEP_RETRY5_ERROR4	311h	Servo	expected STEPS_DONE
SRV_STEP_RETRY5_DEFAULT	312h	Servo	An unexpected state occurred in the cartridge load task.
SRV_STEP_MOTOR_PWR_FAIL	313h	Servo	The reel motor loast it's power source.
SRV_STEP_CENTER_PIN_DEFAULT	314h	Servo	invalid state in srv_center_pin_in_hub function
SRV_STEP_CENTER_PIN_ERROR1	315h	Servo	motor stall waiting for HALT1
SRV_STEP_CENTER_PIN_ERROR2	316h	Servo	expecting steps done
SRV_STEP_RETRY5_ERROR5	317h	Servo	motor stall waiting for SNS13 high
SRV_STEP_RETRY5_ERROR6	318h	Servo	expecting SNS13 high
SRV_STEP_RETRY5_ERROR7	319h	Servo	motor stall waiting for ENGAGED_LEADER
SRV_STEP_RETRY5_ERROR8	31Ah	Servo	expecting steps done
SRV_STEP_RETRY5_ERROR9	31Bh	Servo	motor stall waiting for steps done
SRV_STEP_RETRY5_ERROR10	31Ch	Servo	expected STEPS_DONE
SRV_STEP_UNLOAD_CART_ERROR3	31Dh	Servo	expecting eerpom done
SRV_RECOVER_BIN_ERROR	31Eh	Servo	an unspecified error occurred while accessing the serial EEPROM
SRV_RECOVER_EEPROM_DEFAULT	31Fh	Servo	invalid state in the recover_drive_state function
SRV_TEST_SEEP_DEFAULT	320h	Servo	invalid state in the test_seep function
SRV_STEP_NO_ACTIVE_FUNCTION_FOR_EEPROM_TASK	321h	Servo	no command handler was installed to handle completion fro EEPROM_TSK
SRV_SERIAL_EEPROM_ERROR	322h	Servo	expect good status fro serial eerpom task
SRV_STEP_THREAD_TAPE_ERROR27	323h	Servo	expecting eeprom done
SRV_STEP_RETRY2_ERROR13	324h	Servo	motor stall waiting for HALT4
SRV_STEP_RETRY2_ERROR14	325h	Servo	expecting steps done
SRV_STEP_RETRY7_ERROR1	326h	Servo	motor stall waiting for steps done
SRV_STEP_RETRY7_ERROR2	327h	Servo	expected STEPS_DONE
SRV_STEP_RETRY7_DEFAULT	328h	Servo	invalid state in srv_dcl_retry_failed_park function
SRV_STEP_THREAD_TAPE_ERROR28	329h	Servo	reel motor stalled adding slack
SRV_STEP_THREAD_TAPE_ERROR29	32Ah	Servo	unexpected error adding slack
SRV_STEP_THREAD_TAPE_ERROR30	32Bh	Servo	reel motor stalled removing added slack
SRV_STEP_THREAD_TAPE_ERROR31	32Ch	Servo	unexpected error removing added slack
SRV_STEP_GOTO_HUB_ERROR1	32Dh	Servo	expecting SNS2 low
SRV_STEP_GOTO_HUB_ERROR3	32Eh	Servo	expecting steps done
SRV_STEP_REEL_TASK_RETURNED_MISCHUCKED_CARTRIDGE	32Fh	Servo	Cartridge mis-chuck detected during Thread
SRV_UNTHREAD_DELAY_ERROR_BEFORE_MOVING_TO_PARK	330h	Servo	error occurred during unthread moving from dropping off the pinreel motor task i
SRV_UNTHREAD_ERROR_MOVING_TO_PARK	331h	Servo	The Load Arm failed while moving to park during Unthread
SRV_UNTHREAD_FAILED_TO_PUT_PIN_AWAY	332h	Servo	unthread exhausted retries trying to park pin in cartridge
RTOS_STATUS_TASK_ID_ERROR	333h	RTOS	
RTOS_STATUS_NO_MEMORY_AVAILABLE	334h	RTOS	
RTOS_STATUS_MAILBOX_IN_USE	335h	RTOS	
RTOS_STATUS_ZERO_MESSAGE	336h	RTOS	
RTOS_STATUS_INVALID_SYSTEM_CALL	337h	RTOS	
RTOS_STATUS_TIMEOUT	338h	RTOS	

RTOS_STATUS_NO_MESSAGE_PRESENT	339h	RTOS	
RTOS_STATUS_QUEUE_ID_ERROR	33Ah	RTOS	
RTOS_STATUS_QUEUE_FULL	33Bh	RTOS	
RTOS_STATUS_PARTITION_ID_ERROR	33Ch	RTOS	
RTOS_STATUS_INVALID_CONFIGURATION_PARAMETER	33Dh	RTOS	
RTOS_STATUS_INVALID_INPUT_PARAMETER	33Eh	RTOS	
RTOS_STATUS_TASK_PENDING_ON_QUEUE	33Fh	RTOS	
RTOS_STATUS_EVENT_FLAG_GROUP_AND_VIRTUAL_TIMER_ID_ERROR	340h	RTOS	
RTOS_STATUS_EVENT_FLAG_ALREADY_SET	341h	RTOS	
RTOS_STATUS_UNKNOWN_ERROR	342h	RTOS	
DSM_FREEPOOL_SENT_NULL_DS_IN_FEED_UNDERRUN	343h	Data set manager	
DSM_WR_FEED_ELDC_DS_CMPL	344h	Data set manager	
DSM_WR_FEED_ELDC_DS_CMPL2	345h	Data set manager	
DSM_WR_FEED_ELDC_DS_CMPL3	346h	Data set manager	
DSM_WRONG_MODE_FOR_WRITE_CMD	347h	Data set manager	
DSM_WRONG_STATE_FOR_APPEND	348h	Data set manager	
DSM_WRONG_STATE_FOR_WRITE_CMD	349h	Data set manager	
DSM_WRITE_APPEND_DS_SHOULD_BE_EOD	34Ah	Data set manager	
DSM_MISSING_DS_WHEN_WRITE_CMD_RECV	34Bh	Data set manager	
DSM_WRONG_MODE_FOR_APPEND	34Ch	Data set manager	
DSM_WR_MAN_FLUSH_TIMEOUT	34Dh	Data set manager	
DSM_WRITE_DSLIST_HAS_TOO_MANY_DS	34Eh	Data set manager	
DSM_LOCATE_FMK_0_COUNT	34Fh	Data set manager	
DSM_LOCATE_SPACED_PAST_TARGET	350h	Data set manager	
DSM_HALT_BIT_WORKAROUND_FAILURE	351h	Data set manager	
DSM_HALT_BIT_WORKAROUND_FAILURE2	352h	Data set manager	
DSM_DCA_PUT_ERROR_FAILED	353h	Data set manager	
DSM_DCA_PUT_HERR_FAILED	354h	Data set manager	
DSM_DCA_PUT_EOD_FAILED	355h	Data set manager	
DSM_READ_UNEXPECTED_SCSI_STATE	356h	Data set manager	
DSM_READ_UNEXPECTED_BACKEND_STATE	357h	Data set manager	
DSM_READ_UNEXPECTED_MODE	358h	Data set manager	
DSM_BE_NO_HANDLE	359h	Data set manager	
DSM_CMPR_READ_NO_ACCESS_POINT_IN_D	35Ah	Data set	

S		manager	
DSM_CMPR_SKIP_NO_ACCESS_POINT_IN_DS	35Bh	Data set manager	
DSM_READ_PUT_TERMINUS_FAILED	35Ch	Data set manager	
DSM_ILLEGAL_WRITE_TERMINATED_CONDITION	35Dh	Data set manager	
DSM_CMPR_SKIP_ADD_DS_FAILED	35Eh	Data set manager	
DSM_CMPR_SKIP_DSIT_C1_ERROR	35Fh	Data set manager	
DSM_CMPR_SKIP_UNEXPECTED_UNDERRUN	360h	Data set manager	
DSM_CMPR_SKIP_FMK_ENCOUNTERED	361h	Data set manager	
DSM_CMPR_SKIP_END_MARK_ENCOUNTERED	362h	Data set manager	
DSM_CMPR_SKIP_C1_ERROR	363h	Data set manager	
DSM_CMPR_SKIP_DP_ERROR	364h	Data set manager	
DSM_CMPR_SKIP_INVALID_INTERRUPT	365h	Data set manager	
DSM_CMPR_READ_DSIT_C1_ERROR	366h	Data set manager	
DSM_CMPR_READ_UNEXPECTED_COMMAND_COMPLETE	367h	Data set manager	
DSM_CMPR_WR_FLUSH_NOT_HALTED	368h	Data set manager	
DSM_CMPR_WR_FLUSH_DS_NULL_DS	369h	Data set manager	
DSM_CMPR_WR_DP_ERROR	36Ah	Data set manager	
DSM_CMPR_WR_HALT_DETECTED	36Bh	Data set manager	
DSM_CMPR_WR_INVALID_INTERRUPT	36Ch	Data set manager	
DSM_WR_NOT_IN_LOCATED_STATE	36Dh	Data set manager	
DSM_INFO_REQUEST_CONTAINS_INVALID_LOG_PAGE	36Eh	Data set manager	
DSM_STATUS_46C	36Fh	Data set manager	
DSM_BE_WR_BAD_PTR_IN_FLUSH_EOD_MIC_DONE	370h	Data set manager	
DSM_BE_WR_BAD_PTR_IN_DS_DONE	371h	Data set manager	
DSM_BE_WR_BAD_PTR_IN_EOW_DS_RECYCLE	372h	Data set manager	
DSM_BE_WR_BAD_PTR_IN_RECYCLE_START_WHILE_FLUSHING	373h	Data set manager	
DSM_BE_WR_BAD_PTR_IN_DS_RECYCLE	374h	Data set manager	
DSM_STATUS_472	375h	Data set manager	
DSM_DCADESCPTR_OVERWRITTEN	376h	Data set manager	
DSM_MIC_TOO_MANY_QUEUED_CMDS	377h	Data set manager	
DSM_KILL_DECOMPRESSION_NEEDS_READ	378h	Data set manager	

DSM_APPEND_TYPE_WRONG	379h	Data set manager	
DSM_WRONG_APPEND_TYPE_IN_TDIR_UPDATE	37Ah	Data set manager	
DSM_WR_MIC_EOD_UPDATE_WITH_NULL_DS	37Bh	Data set manager	
DSM_WRITE_LOCATED_BUT_NO_APPEND_DS	37Ch	Data set manager	
DSM_WRITE_READ_PAUSED_BUT_NO_APPEND_DS	37Dh	Data set manager	
DSM_GOT_READ_WHEN_POSITION_UNKNOWN	37Eh	Data set manager	
DSM_SPACE_EOD_DS_NOT_EOD	37Fh	Data set manager	
DSM_MIC_READ_CART_PAGE_GOT_CRC	380h	Data set manager	
DSM_MIC_WRITE_EOD_PAGE_GOT_CRC	381h	Data set manager	
DSM_CMPR_SET_MAXSIZE_NOT_MODULO_32	382h	Data set manager	
TAPE_SERVO_NEVER_RECOVER	383h	Tape	to 4bf
TAPE_BAD_MIC_TD	384h	Tape	SEEK: Bad MIC TAPE DIRECTORY page error
TAPE_BAD_MIC_EOD	385h	Tape	SEEK: Bad MIC EOD INFORMATION page error
TAPE_FIRST_DS_APPEND_FAIL_OLD_HIGH_WPC	386h	Tape	
TAPE_APPEND_FAIL_OLD_HIGH_WPC	387h	Tape	
TAPE_WRITE_LOOP_EXT_FAIL	388h	Tape	Write: WRITE_LOOP_EXT command fail.
TAPE_READ_SERVO_CMD_REJECT	389h	Tape	Read: Servo cmd reject
TAPE_SERVO_GAIN_CALIB_FAIL	38Ah	Tape	servo gain calib failed
TAPE_READ_SEEK_TARGET_OVERSHOOT	38Bh	Tape	Read: Could not find target after seek
TAPE_READ_FOUND_TARGET_PLUS_N	38Ch	Tape	Read: Detect DSn+k
TAPE_HARD_READ_ADJACENT_TRACK_IS_OVERWRITTEN	38Dh	Tape	Read: Hard Read Error due to adjacent track is overwritten
TAPE_READ_4METERS_TIMEOUT	38Eh	Tape	Read: Has no Data Set Interrupt for more than 4 meters
TAPE_READ_TIMEOUT_NO_SERVO_RESPONSE	38Fh	Tape	Read: 20 seconds timeout wait for Servo response
TAPE_READ_BOW_DS_NOT_FOUND	390h	Tape	Read: Could not find BOW data Set
TAPE_READ_LAST_WRAP_DS_NOT_FOUND	391h	Tape	Read: Could not find the last Data Set at end-of-wrap
TAPE_READ_BAD_CM_AND_BAD_FID	392h	Tape	Read: Could not read FID
TAPE_SEEK_ISB_UNDERRUN	393h	Tape	Seek: Hardware reports isb underrun error
TAPE_SEEK_ISB_SVO_FAIL	394h	Tape	Seek: Hardware reports isb svo fail error
TAPE_SEEK_ISB_EOWRAP	395h	Tape	Seek: Hardware reports isb eowrap error
TAPE_SEEK_ISB_UNKNOWN	396h	Tape	Seek: Hardware reports isb unknown error
TAPE_READ_SERVO_OVERSHOOT	397h	Tape	Read: Servo overshoot
TAPE_BAD_CLEAN_CARTRIDGE	398h	Tape	Tape: Bad cleaning cartridge
TAPE_OUT_OF_CLEAN_TAPE	399h	Tape	Tape: Out of cleaning tape
TAPE_SEEKER_MISSING_DS	39Ah	Tape	Read: Seeker missed data set buffer
TAPE_CHAN_HOC_GAIN_CALIB_FAILED	39Bh	Tape	head offset gain calibration failed
TAPE_NULL_PTR_TP_LIST	39Ch	Tape	Read: Detect Null pointer in tp_ds_list
TAPE_INVALID_PHYS_LP6	39Dh	Tape	Tape: auto_load sequence for detecting invalid phys lp6
TAPE_ABORT_STATUS	39Eh	Tape	Tape: abort status for command that has just been aborted
TAPE_HARD_READ_ERROR_RETRY_EXHAUSTED	39Fh	Tape	Tape: could not recover data
TAPE_CHAN_BOTH_SERVO_HEADS_BAD	3A0h	Tape	Tape: per tape servo gain calib: both channels

			failed
TAPE_CHAN_UPPER_SERVO_HEAD_BAD	3A1h	Tape	Tape: per tape servo gain calib: upper channel failed
TAPE_CHAN_LOWER_SERVO_HEAD_BAD	3A2h	Tape	Tape: per tape servo gain calib: lower channel failed
TAPE_SRV_FAIL_REPORT_EW	3A3h	Tape	Write: WP fail to report early warning at end of wrap.
TAPE_RED_ZONE_ERR_RETRY_EXHAUSTED	3A4h	Tape	Tape: Red Zone Error retry exhausted.
TAPE_APPEND_ON_TRACK_FAIL	3A5h	Tape	Write: On track signal fail when try to detect the last DS for append.
TAPE_SERVO_GAIN_CALIB_RETRY_FAIL	3A6h	Tape	servo gain calib retry failed
TAPE_SERVO_GAIN_CALIB_RETRY_GOOD	3A7h	Tape	servo gain calib retry good
TAPE_ON_TRACK_NEVER_ON	3A8h	Tape	Read: On_Track signal is not ON
TAPE_WRITE_BOW_ON_TRACK_FAIL	3A9h	Tape	Write: On track signal fail when try to start to write at BOW.
TAPE_READ_SWITCH_WRONG_WRAP	3AAh	Tape	Read: DSM commands to switch to opposite direction
TAPE_HARD_READ_ERROR_CORNER_RETRY_FAILED	3ABh	Tape	Read: Failed to reread at corner
TAPE_READ_ILLEGAL_SWITCH_WRAP_IDLE_STATE	3ACh	Tape	Read: Idle state
TAPE_READ_ILLEGAL_SWITCH_WRAP_UNDERRUN_STATE	3ADh	Tape	Read: Underrrun state
TAPE_READ_SWITCH_WRAP_BAD_EOD_PAGE	3AEh	Tape	Read: EOD must be valid
TAPE_READ_ILLEGAL_SWITCH_WRAP_BACKWARD_MODE	3AFh	Tape	Read: Must be in forward mode
TAPE_CM_SUSPENDED_APPEND_WRITES_PAGE_FULL	3B0h	Tape	Write: CM Suspend Append Writes Page full.
TAPE_READ_WRT_SUSPEND_MORE_THAN_4METERS	3B1h	Tape	Read: Write problem. Write suspend more than 4 meters
TAPE_READ_OVERSHOOT_RETRY_EXHAUSTED	3B2h	Tape	Read: Read. Servo overshoot retry
TAPE_READ_SEEK_LOST_POSITION	3B3h	Tape	Read: Seek to Read lost position
TAPE_READ_NO_DATA_DETECTED	3B4h	Tape	Read: Cannot read any cwp
SRV_REEL_UNEXPECTED_MESSAGE_IN_ERROR_ABORT_TAPE_STATE	3B5h	Servo	Unexpected message received in error abort tape state
SRV_MOVETAPE_UNEXPECTED_MESSAGE_IN_RAMP_UP_STATE	3B6h	Servo	Unexpected message in ramp up state
SRV_MOVETAPE_UNEXPECTED_MESSAGE_IN_RAMP_DOWN_STATE	3B7h	Servo	Unexpected message in ramp down state
SRV_MOVETAPE_UNEXPECTED_MESSAGE_IN_RAMP_RESTART_STATE	3B8h	Servo	Unexpected message in ramp down restart state
SRV_MOVETAPE_UNEXPECTED_MESSAGE_IN_CRUISE_CONTROL_STATE	3B9h	Servo	Unexpected message received in cruise control state
SRV_ROTATE_UNEXPECTED_MESSAGE_IN_RAMP_UP_REEL_STATE	3BAh	Servo	Unexpected message received in ramp up reel state
SRV_ROTATE_UNEXPECTED_MESSAGE_IN_ROTATING_REEL_STATE	3BBh	Servo	Unexpected message received in rotating reel state
SRV_ROTATE_UNEXPECTED_MESSAGE_IN_RAMP_DOWN_REEL_STATE	3BCh	Servo	Unexpected message received in ramp down reel state
SRV_POSREEL_UNEXPECTED_MESSAGE_IN_MOVE_TO_POSITION_STATE	3BDh	Servo	Unexpected message received in position reel state
SRV_GOTO_LC_UNEXPECTED_MESSAGE_IN_RAMP_UP_STATE	3BEh	Servo	Unexpected message received in goto lc module in ramp up state
SRV_GOTO_LC_UNEXPECTED_MESSAGE_IN_WAIT_MARK_STATE	3BFh	Servo	Unexpected message received in goto lc module in wait mark state
SRV_GOTO_LC_UNEXPECTED_MESSAGE_IN_MARK_FOUND_STATE	3C0h	Servo	Unexpected message received in goto lc module in mark found state
SRV_GOTO_LC_UNEXPECTED_MESSAGE_IN_	3C1h	Servo	Unexpected message received in goto lc

POSITION_STATE			module in position tape state
SRV_REEL_UNEXPECTED_MESSAGE_IN_HOLD_STATE	3C2h	Servo	Unexpected message received in hold state.
SRV_REEL_UNEXPECTED_MESSAGE_IN_IDLE_STATE	3C3h	Servo	Unexpected message received in idle state
SRV_CMDPROC_REJ_PARM_LPOS_NOT_WITHIN_LP2_OR_LP6_IN_GOTO_TO_LPOS_VALID	3C4h	Servo	The LPOS selected for the GOTO_LPOS command is beyond the limits
SRV_CMDPROC_REJ_PARM_NOT_ENOUGH_TAPE_TO_RAMP_TO_LPOS_IN_GOTO_LPOS_PARAM_VALID	3C5h	Servo	The distance between the current position and the target LPOS is to short
SRV_CMDPROC_GOTO_LPOS_REJECTED_TAPE_NOT_STOPPED	3C6h	Servo	The tape was not stopped when this command was received
SRV_CMDPROC_GOTO_LPOS_REJECTED_LP1_LP6_NOT_SET	3C7h	Servo	The tape parameters were not set before issuing the GOTO_LPOS command.
SRV_MOVETAPE_TIMEOUT_CALCULATION_ERROR	3C8h	Servo	The calculation of a time out time in the movetape module calculated an erroneou
SRV_CALMEM_SET_TENSION_REJ_INVALID_STATE	3C9h	Servo	Set tension api call failed during startup
SRV_CALMEM_SET_TAPE_SPEED_REJ_INVALID_STATE	3CAh	Servo	Set tape speeds api call failed during startup
SRV_INDEX_MOTOR_INTERRUPT_NOT_DETECTED_AFTER_ROTATING_DRIVE_MOTOR	3CBh	Servo	Motor interrupt not detected after rotating drive motor
SRV_MOVETAPE_RAMPDOWN_API_FAILED_IN_TIMEOUT_HANDLER_IN_RAMP_UP_STATE	3CCh	Servo	An attempt to ramp down the tape failed after a timeout occured during ramp up
SRV_OFF_TRACK	3CDh	Servo	tracking servo detected off track event
SRV_NO_PES_FOUND	3CEh	Servo	no valid PES event
SRV_VCM_SHOCK_ERROR	3CFh	Servo	tracking servo detected shock vibration error
SRV_TRACKING_TARGET_OUTRANGE	3D0h	Servo	tracking servo detected unreachable track error
SRV_TRACKING_SAMPLE_ERROR	3D1h	Servo	tracking servo detected asic sample error
SRV_TRACKING_COARSE_MOVE_ERROR	3D2h	Servo	tracking servo detected coarse stepper is out of position
SRV_TRACKING_UPDATE_MEM_ERROR	3D3h	Servo	tracking servo detected PES memory failure
SRV_MOVETAPE_RAMPDOWN_API_FAILED_IN_TRACKING_CMD_FAILED_HANDLER_IN_RAMP_UP_STATE	3D4h	Servo	Rampdown api call failed/rejected when called from tracking command failed handl
SRV_MOVETAPE_TRACKING_CMD_FAILED_IN_RAMP_UP_STATE	3D5h	Servo	Tracking command failed in ramp up state
SRV_CMDPROC_ROTATE_REEL_REJECTED_BECAUSE_CART_LOADED	3D6h	Servo	Rotate reel command rejected because cartridge is loaded and command is trying
SRV_CMDPROC_ROTATE_REEL_REJECTED_BECAUSE_DRIVE_REEL_IS_OBSTRUCTED	3D7h	Servo	Rotate reel command rejected because reels are obstructed by tape or a cartridge
SRV_CMDPROC_ROTATE_REEL_REJECTED_INVALID_REEL_SELECT	3D8h	Servo	Rotate reel command rejected because an invalid reel select was given
SRV_CMDPROC_SET_DRIVE_STATE_COMMAND_REJECTED_STATE_OUT_OF_RANGE	3D9h	Servo	Set drive state command rejected because the drive state is out of range.
SRV_STATEM_RECOVERY_COMMAND_REJECTED_DRIVE_IN_UNKNOWN_STATE	3DAh	Servo	Recovery command rejected
SRV_TRKCNVT_MULTIPLY_ERROR_IN_TRACKING_CONVERT_FUNCTION	3DBh	Servo	Multiply error in tracking conversion function from ratio to dac
SRV_TRKCNVT_DIVIDE_ERROR_IN_TRACKING_CONVERT_FUNCTION	3DCh	Servo	Divide error in tracking conversion function from dac to ratio.
SRV_STATEM_AUTOLOAD_COMMAND_REJECTED_INVALID_STATE	3DDh	Servo	Command rejected since the drive state was invalid (out of range).
SRV_NOT_USED_OBSOLETE_2	3DEh	Servo	Command rejected since the drive state was invalid in eject sequence
SRV_STATEM_PRE_EJECT_COMMAND_REJECTED_INVALID_STATE	3DFh	Servo	Command rejected since the drive state was invalid in pre-eject sequence
SRV_STATEM_PRE_EJECT_COMMAND_REJECTED_DRIVE_IN_UNKNOWN_STATE	3E0h	Servo	Command rejected
SRV_STATEM_AUTOLOAD_COMMAND_REJE	3E1h	Servo	Command rejected

CTED_UNKNOWN_STATE			
SRV_TRKCNVT_DAC_OUTPUT_EXCEEDED_LIMIT	3E2h	Servo	Calculated DAC tracking target greater than maximum input
SRV_TRKCNVT_DAC_OUTPUT_BELOW_MINIMUM_LIMIT	3E3h	Servo	Calculated DAC tracking target less than minimum input
SRV_STEP_HEAD_EXPECTING_BOTTOM_SENSOR_HIGH	3E4h	Servo	expecting SNS9 high
SRV_STEP_HEAD_EXPECTING_STOP_AFTER_BOTTOM_SENSOR_HIGH	3E5h	Servo	expecting SNS9 low
SRV_STEP_HEAD_EXPECTING_BOTTOM_SENSOR_LOW	3E6h	Servo	expecting stepper to halt after SNS9 high
SRV_STEP_HEAD_EXPECTING_STOP_AFTER_BOTTOM_SENSOR_LOW	3E7h	Servo	expecting stepper to halt after SNS9 low
SRV_SZA_INTERFACE_BUSY	3E8h	Servo	interface to SZA chip busy for too long
SRV_SZA_FUNCTION_ACTIVE	3E9h	Servo	SZA read or write already in progress
SRV_SZA_REGISTER_INVALID	3EAh	Servo	request to read invalid SZA register number
SRV_SZA_READ_COUNT_TOO_LARGE	3EBh	Servo	amount of SZA read data exceeds buffer size
SRV_SZA_WRITE_COUNT_TOO_LARGE	3ECh	Servo	amount of SZA write data exceeds buffer size
SRV_SZA_WRITE_DATA_INVALID	3EDh	Servo	SZA write data contains invalid reg or chip ID
SRV_REEL_CARTDITHER_API_CALL_FAILED_INVALID_STATE	3EEh	Servo	Call to cartDither api failed
SRV_SERIAL_EEPROM_FAILED	3EFh	Servo	
SRV_SRV_RTOS_INVALID_TASK_ID_SPECIFIED	3F0h	Servo	invalid task specified in rtos wrapper function.
SRV_MOTOR_POWER_FAIL_1	3F1h	Servo	no power to reel motor circuits on startup
SRV_MOTOR_POWER_FAIL_2	3F2h	Servo	no power to reel motor circuits after POR clear
SRV_MOTOR_POWER_FAIL_3	3F3h	Servo	no power to reel motor circuits after PF clear
SRV_MOTOR_POR_STUCK_1	3F4h	Servo	can't clear reel motor POR flag on startup
SRV_MOTOR_POR_STUCK_2	3F5h	Servo	can't clear reel motor POR flag after PF clear
SRV_MOTOR_PWR_FAIL	3F6h	Servo	can't clear reel motor power fail condition on startup
SRV_STATEM_AUTOLOAD_COMMAND_REJECTED_NO_CART_IN_DRIVE	3F7h	Servo	Autoload failed
SRV_SZA_LOAD_COMPLETION_FAILURE	3F8h	Servo	SZA load function did not complete in the allotted time
SRV_TAPE_CUT	3F9h	Servo	tape cut
SRV_MOVETAPE_ERROR_LP1_UNDERRUN_DURING_RAMP_UP	3FAh	Servo	LP1 Underrun during ramp up state
SRV_MOVETAPE_ERROR_LP6_OVERRUN_DURING_RAMP_UP	3FBh	Servo	LP6 overrun during ramp up
SRV_MOVETAPE_RAMP_DOWN_API_FAILED_DURING_ERROR_HANDLING	3FCh	Servo	Ramp down api failed during error handling
SRV_MOVETAPE_LP1_UNDERRUN_IN_CRUISE_CONTROL	3FDh	Servo	LP1 underrun during cruise control state.
SRV_MOVETAPE_LP6_OVERRUN_IN_CRUISE_CONTROL	3FEh	Servo	LP6 overrun in cruise control state.
SRV_CMDPROC_NO_CARTRIDGE_IN_DRIVE	3FFh	Servo	No cartridge in drive
SRV_STEP_HEAD_TRIGGERED_SENSORS_DURING_HEAD_STEPPING	400h	Servo	Top or bottom sensors for head stepper were triggered when they shouldn't have b
SRV_STEP_HEAD_NOT_AT_BASEMENT_POSITION	401h	Servo	
SRV_STEP_HEAD_COULD_NOT_FIND_PES_DURING_HEAD_CALIBRATION	402h	Servo	
SRV_STEP_HEAD_PES_CAPTURE_IS_BAD_DURING_HEAD_CALIBRATION	403h	Servo	
SRV_STEP_HEAD_INCORRECT_OFFSET_FROM_HEAD_CALIBRATION	404h	Servo	
SRV_ROTATE_ENABLEMOTOR_API_REJECT_BUSY	405h	Servo	Enable Motor API failed at beginning of Rotate command
SRV_EXCEED_LC_LIMIT	406h	Servo	exceed LC limit

SRV_RAD_COMP_ERR	407h	Servo	radius computation off
SRV_TAPE_SLACK	408h	Servo	tape slack
SRV_HIT_EOT	409h	Servo	hit EOT
SRV_HIT_PEOT	40Ah	Servo	hit PEOT
SRV_WATCH_DOG	40Bh	Servo	Watch Dog Timer Interrupt
SRV_EXCEPT_UNDEF_INSTR	40Ch	Servo	Undefined exception
SRV_EXCEPT_PREFECT	40Dh	Servo	Prefect exception
SRV_EXCEPT_MEMORY_ABORT	40Eh	Servo	Memory abort exception
SRV_EXCEPT_SOFTWARE_INTERRUPT	40Fh	Servo	Software interrupt exception
SRV_EXCEPT_EXCEPTION_CODE_OUT_OF_RANGE	410h	Servo	Software exception identifier out of range
SRV_GLOBAL_ERROR_STATE	411h	Servo	Firmware global error state
SRV_REEL_PHYSICAL_EOT_LIMIT_OVERRUN_IN_HOLD_STATE	412h	Servo	Physical eot limit overrun occured in hold state
SRV_REEL_PHYSICAL_BOT_LIMIT_UNDERUN_IN_HOLD_STATE	413h	Servo	Physical bot limit underrun occured in hold state
SRV_REEL_LP1_LIMIT_UNDERUN_IN_HOLD_STATE	414h	Servo	LP1 limit underrun in hold state
SRV_REEL_LP6_LIMIT_OVERRUN_IN_HOLD_STATE	415h	Servo	LP6 limit overrun in hold state
SRV_SEQ_PAST_EOT_REJ_INV_STATE_BETWEEN_EOT_AND_PEOT	416h	Servo	LPOS is past EOT based on ratiometric EOT detection
SRV_REEL_INVALID_TASK_FOR_MESSAGE_RESPONSE	417h	Servo	Sender id not valid for sending a message to
SRV_STATEM_SEQUENCER_STACK_OVERFLOW	418h	Servo	Sequencer control stack overflowed.
SRV_SEQ_STACK_UNDERFLOW	419h	Servo	Sequencer control stack underflowed.
SRV_SEQ_PAST_EOT_REJ_INV_STATE_EXCEEDING_PEOT	41Ah	Servo	Tape exceeds EOT per ratiometric calculation of position
SRV_MOVETAPE_UNEXPECTED_LPOS_NOTIFICATION_IN_RAMP_UP_STATE	41Bh	Servo	An LPOS notification occured during ramp up
SRV_MOVETAPE_UNRECOGNIZED_COMMAND_IN_RAMP_UP_STATE	41Ch	Servo	Unrecognized command detected at speed in ramp up state
SRV_STEP_HEAD_COULD_NOT_FIND_ANY_PES_DURING_HEAD_CALIBRATION	41Dh	Servo	
SRV_CMDPROC_MANUFACTURER_ID_NOT_AVAILABLE	41Eh	Servo	Manufacturer id not available
SRV_CMDPROC_LP1_NOT_AVAILABLE	41Fh	Servo	LP1 value not available
SRV_CMDPROC_MFR_DATA_NOT_AVAILABLE_TAPE_NOT_READ	420h	Servo	Manufacturer id not available.
SRV_CMDPROC_MFR_DATA_NOT_AVALIABLE_TAPE_NOT_READY	421h	Servo	Manufacturer data not available
SRV_SEQ_LOOP_UNDERRUN_CONDITION_IN_TABLE	422h	Servo	Loop in sequencer table detected an invalid condition of current state
SRV_REEL_SETTENSION_API_FAILED_DURING_WRAP	423h	Servo	Settension API call failed during wrap tape operation
SRV_BAD_PES_VALUES	424h	Servo	
SRV_CMDPROC_HEAD_OFFSET_NOT_ZERO_IN_WRITE_MODE	425h	Servo	Head offset is not zero while writing.
SRV_EXCEPT_RETURN_FROM_RTOS	426h	Servo	Return from RTOS. Should never go here.
SRV_TRACKING_NEVER_CALLED	427h	Servo	
SRV_NEVER_SAW_SERVO_SIGNAL	428h	Servo	
SRV_SERVO_SIGNALS_NOT_WITHIN_ACQUIRING_WINDOW	429h	Servo	
SRV_FAILURE_DURING_TRACKING_RAMPING	42Ah	Servo	
SRV_FAILURE_DURING_TRACKING_SETTLING	42Bh	Servo	
SRV_FAILURE_DURING_TRACKING_PRE_TRACKING	42Ch	Servo	

SRV_FAILURE_DURING_READING	42Dh	Servo	
SRV_FAILURE_DURING_WRITING	42Eh	Servo	
SRV_MOVETAPE_HEAD_POS_OUT_OF_RANGE	42Fh	Servo	invalid head position from stepper task
SRV_CMDPROC_ERROR_CODE_NOT_SUPPORTED_FOR_SET_TRIGGER	430h	Servo	Error code not supported for set trigger command.
SRV_CLOSED_LOOP_STEPPER_TIMEOUT_ATTEMPTING_TO_FIND_PES	431h	Servo	closed loop stepper timeout attempting to find pes
SRV_CMDPROC_SET_TRIGGER_REJECTED_TMUXSET_API_BUSY	432h	Servo	Set trigger argument not supported
SRV_MOTOR_LP1_OVERRUN	433h	Servo	LP1 underrun alert received in sequencer during command processing
SRV_MOTOR_LP6_OVERRUN	434h	Servo	LP6 overrun alert received in sequencer during command processing
SRV_MOTOR_EOT_OVERRUN	435h	Servo	EOT overrun alert received in sequencer during command processing
SRV_MOTOR_BOT_UNDERRUN	436h	Servo	BOT underrun alert received in sequencer during command processing.
SRV_SEQUENCER_UNKNOWN_ALERT_RECEIVED	437h	Servo	Unknown error alert received in sequencer during command processing.
SRV_SZA_SIFT_COUNT_TOO_LARGE	438h	Servo	Sift values in READ SZA command exceed the number of samples
SRV_RTOS_TASK_ID_ERROR	439h	Servo	RTOS error
SRV_RTOS_NO_MEMORY_AVAILABLE	43Ah	Servo	RTOS error
SRV_RTOS_MAILBOX_IN_USE	43Bh	Servo	RTOS error
SRV_RTOS_ZERO_MESSAGE	43Ch	Servo	RTOS error
SRV_RTOS_INVALID_SYSTEM_CALL	43Dh	Servo	RTOS error
SRV_RTOS_NO_MESSAGE_PRESENT	43Eh	Servo	RTOS error
SRV_RTOS_QUEUE_ID_ERROR	43Fh	Servo	RTOS error
SRV_RTOS_QUEUE_FULL	440h	Servo	RTOS error
SRV_STATEM_COMMAND_ABORTED_BY_EMERGENCY_EJECT	441h	Servo	Command aborted by emergency eject
SRV_EMERGENCY_EJECT_ABORT	442h	Servo	Command aborted by emergency abort
SRV_STEP_THREAD_TEST18_ERROR1	443h	Servo	slack couldn't be taken up
SRV_FINDZERO_INIT_API_REJECT	444h	Servo	findzero init servo findzero api reject
SRV_FINDZERO_ROUGH_RADIUS_API_REJECT	445h	Servo	findzero: rough radius servo api reject
SRV_FINDZERO_PRECISE_RADIUS	446h	Servo	findzero: precise radius servo api rejected
SRV_FINDZERO_COARSE_MOTION_API_REJECT	447h	Servo	findzero: coarse motion servo api rejected
SRV_MOVETAPE_RAMPDOWNTAPE_API_BUSY_REJECT_DURING_FINDZERO	448h	Servo	findzero rampdown api rejected during findzero operation
SRV_FINDZERO_NULL_FUNCTION_IN_TABLE	449h	Servo	null function pointer in table lookup
SRV_FINDZERO_INVALID_MESSAGE_RECEIVED	44Ah	Servo	invalid message received by reel task during findzero operation
SRV_CMDPROC_INVALID_DRIVE_STATE_ON_UNLOAD_CMD	44Bh	Servo	invalid drive state on unload command
SRV_CMDPROC_OUT_OF_RANGE_DRIVE_STATE_ON_UNLOAD_CMD	44Ch	Servo	Drive state is out of range.
SRV_CMDPROC_INVALID_DRIVE_STATE_ON_EJECT_CMD	44Dh	Servo	Eject command rejected
SRV_CMDPROC_OUT_OF_RANGE_DRIVE_STATE_ON_EJECT_CMD	44Eh	Servo	Eject command rejected
SRV_FINDZERO_MOVETAPE_API_BUSY_REJECT	44Fh	Servo	Servo API function MoveTape() returned busy status when called from findzero
SRV_FINDZERO_POSITIONTAPE_API_FWD_BUSY_REJECT	450h	Servo	API call PositionTape forward failed when called from findzero
SRV_FINDZERO_POSITIONTAPE_API_REV_BUSY_REJECT	451h	Servo	API call PositionTape reverse failed when called from findzero
SRV_CMDPROC_CMD_REJECTED_DURING_I	452h	Servo	Mechanical command received from scrambler

NITIALIZATION			while still initializing
SRV_CMDPROC_INVALID_DRIVE_STATE_ON_PARK_CMD	453h	Servo	Park command rejected
SRV_CMDPROC_OUT_OF_RANGE_DRIVE_STATE_ON_PARK_CMD	454h	Servo	Park command rejected
SRV_CMDPROC_INVALID_DRIVE_STATE_ON_UNPARK_CMD	455h	Servo	Unpark command rejected
SRV_CMDPROC_OUT_OF_RANGE_DRIVE_STATE_ON_UNPARK_CMD	456h	Servo	Unpark command rejected
SRV_CMDPROC_TAPE_IS_NOT_STOPPED	457h	Servo	Command rejected because tape is moving.
SRV_CMDPROC_INVALID_COMMAND_CHANGE_OF_DIRECTION	458h	Servo	Command rejected because tape is moving in the opposite direction
SRV_CAL_MOT1_MOVE	459h	Servo	Motor 1 (drive motor) moved during motor bias calibration
SRV_CAL_MOT2_MOVE	45Ah	Servo	Motor 2 (cartridge motor) moved during motor bias calibration
SRV_CAL_MOT1_STOP	45Bh	Servo	Motor 1 (drive motor) failed to move during motor bias calibration
SRV_CAL_MOT2_STOP	45Ch	Servo	Motor 2 (cartridge motor) failed to move during motor bias calibration
SRV_SEQ_RAMP_DOWN_COMPLETED_BEFORE_HEAD_STEPPER_MOVE	45Dh	Servo	Ramp down completed before head stepper movement completed. Potential tape damag
SRV_MOVETAPE_LPOS_NOTICATION_PASSED	45Eh	Servo	LPOS notification exceeded at set up time.
SRV_SEQ_INVALID_TRACKING_MODE_IN_REPOSITION_TO_WRAP_COMMAND	45Fh	Servo	Invalid tracking mode parameter during reposition to wrap command
SRV_UNKNOWN_CMD	460h	Servo	Unknown command (out of range) in command processor
SRV_TESTBIT_INVALID_MODE_FOR_SET_MODE	461h	Servo	Invalid mode for test bit usage.
SRV_CLOSED_LOOP_STEPPER_FAILED_TO_FIND_PES	462h	Servo	Failed to find PES during closed loop head stepper positioning
SRV_STATEM_INVALID_STATE_AFTER_STEPPER_RECOVERY	463h	Servo	Invalid drive state after stepper recovery operation
SRV_HIT_EOT_YELLOW	464h	Servo	Servo entered yellow EOT zone in fwd direction
SRV_HIT_EOT_RED	465h	Servo	Servo entered red EOT zone in fw direction
SRV_SEQ_REGISTER_RESPONSE_OVERFLOW	466h	Servo	Too many responses were registered in the sequencer.
SRV_PES_AVG_FUNCTION_ACTIVE	467h	Servo	Read PES Average function already in progress
SRV_PES_AVG_READ_COUNT_TOO_LARGE	468h	Servo	Read count for PES Average function too large for buffer
SRV_SZA_SC_DATA_BUFFER_IN_USE	469h	Servo	SZA read command rejected because servo controller data buffer is in use.
SRV_PESAVG_SC_DATA_BUFFER_IN_USE	46Ah	Servo	PESAVG command rejected because servo controller data buffer is in use.
SRV_MOVETAPE_RAMP_UP_FAILED_REQUESTED_SPEED_NOT_ACQUIRED	46Bh	Servo	Ramp up did not get to requested speed
SRV_MOVETAPE_SPEED_OUT_OF_RANGE_IN_GET_CURRENT_SPEED	46Ch	Servo	Tape speed returned from get current speed out of range
SRV_TCNT_RUNAWAY	46Dh	Servo	ASIC TCNT register detects that the tape is running much higher than 4.15 meter/
SRV_CLOSED_LOOP_STEPPER_FAILED_TO_FIND_PES_GOING_BACKWARDS	46Eh	Servo	Closed loop stepper failed to find pes while in backwards mode
SRV_LPOS_SET_CANDIDATE_TAPE_NOT_MOVING	46Fh	Servo	An attempt to enable a candidate lpos notification entry was attempted while tap
SRV_LPOS_INVALID_TAPE_DIRECTION_WHEN_ENABLING_LIMITS	470h	Servo	When setting limits the direction of tape movement was not defined.
SRV_CMDPROC_INVALID_CALIB_DATA_FROM_FLASH	471h	Servo	Calibration data from flash has invalid values

SRV_CMDPROC_CALIB_DATA_OVERWRITTEN_BY_DEFAULTS	472h	Servo	Calibration data was overwritten by setting defaults
SRV_NEVER_SAW_SERVO_SIGNAL_DURING_BACKWARDS	473h	Servo	0x5be never saw servo signal during backwards tracking.
SRV_SERVO_SIGNALS_NOT_WITHIN_ACQUIRING_WINDOW_DURING_BACKWARDS	474h	Servo	0x5bf servo signals not within acquiring window during backwards tracking.
SRV_FAILURE_DURING_TRACKING_BAND_LOCK	475h	Servo	0x5c0 failure during tracking band lock
SRV_FAILURE_DURING_TRACKING_BAND_LOCK_DURING_BACKWARDS	476h	Servo	0x5c1 failure during tracking band lock during backwards tracking.
SRV_FAILURE_DURING_TRACKING_RAMPING_DURING_BACKWARDS	477h	Servo	0x5c2 failure during tracking ramping during backwards tracking.
SRV_FAILURE_DURING_TRACKING_SETTLING_DURING_BACKWARDS	478h	Servo	0x5c3 failure during tracking settling during backwards tracking.
SRV_FAILURE_DURING_TRACKING_PRE_TRACKING_DURING_BACKWARDS	479h	Servo	0x5c4 failure during tracking pre tracking during backwards tracking.
SRV_FAILURE_DURING_READING_DURING_BACKWARDS	47Ah	Servo	0x5c5 failure during reading during backwards tracking.
SRV_FAILURE_DURING_WRITING_DURING_BACKWARDS	47Bh	Servo	0x5c6 failure during writing during backwards tracking.
SRV_REEL_UNEXPECTED_ERROR_DETECTED_MESSAGE_RECEIVED	47Ch	Servo	An asynchronous error detected message was received in a state that would normal
SRV_REEL_NULL_FUNCTION_IN_ERROR_MSG_TABLE	47Dh	Servo	A null function in the error handling function lookup was undefined.
SRV_REEL_INVALID_MESSAGE_RECEIVED_NOT_IN_TABLE	47Eh	Servo	A message that does not have an entry in the table look up was received
SRV_REEL_INVALID_STATE_VARIABLE_OUT_OF_RANGE	47Fh	Servo	The state variable is out of range.
SRV_TRACKING_FAILED_TO_TIMEOUT	480h	Servo	Tracking code fails to respond after failure to track.
SRV_MOVETAPE_UNEXPECTED_LPOS_RECIEVED_IN_CRUISE_CONTROL	481h	Servo	An LPOS reel notification was recieved in the cruise control state that was not
SRV_CLEAN_SCRUB_LENGTH_MUST_BE_LESS_THAN_GOTO_LPOS	482h	Servo	Error because goto lpos - scrub lpos length is less than 0
SRV_MOVETAPE_TAPE_SPEED_NOT_GREATER_THAN_ZERO_AFTER_RAMP_UP	483h	Servo	After ramp up speed is not greater than zero
SRV_CMDPROC_INVALID_DRIVE_STATE_ON_CLEAN_CMD	484h	Servo	Cannot execute clean command at current drive state
SRV_CMDPROC_OUT_OF_RANGE_DRIVE_STATE_ON_CLEAN_CMD	485h	Servo	Unknown or out of range drive state for clean command
SRV_MOVETAPE_RAMP_DOWN_FAILED_AFTER_LPOS_HIT_IN_CRUISE_CONTROL	486h	Servo	After recieving LPOS notification to ramp down
SRV_CMDPROC_UNKNOWN_SOURCE_FOR_MESSAGE	487h	Servo	unknown sender of message received in command processor task
SRV_MOVETAPE_TAPE_MOVEMENT_COMMANDS_ARE_INVALID_IN_CRUISE_CONTROL	488h	Servo	A tape movement command was received while tape was moving
SRV_HALL_SENSORS_TOO_HIGH	489h	Servo	The hall sensors with reference to the head stepper unit are locate too high. Th
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_TIMEOUT_DURING_IDLE	48Ah	Servo	Timeout during head stepper offset calibration idle.
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_TIMEOUT_DURING_STARTING_SEARCH	48Bh	Servo	Timeout during head stepper offset calibration starting search.
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_TIMEOUT_DURING_SEARCHING_FOR_PES	48Ch	Servo	Timeout during head stepper offset calibration searching for pes.
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_TIMEOUT_DURING_FOUND_PES	48Dh	Servo	Timeout during head stepper offset calibration found pes.
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_TIMEOUT_DURING_STOPPING_AFTER_FOUND_PES	48Eh	Servo	Timeout during head stepper offset calibration stopping after found pes.
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_TIMEOUT_DURING_MOVING_UP_WITH_AD	48Fh	Servo	Timeout during head stepper offset calibration moving up with added hysteresis.

DED_HYSTERESIS			
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_TIMEOUT_DURING_STOPPING_AFTER_ADDED_HYSTERESIS	490h	Servo	Timeout during head stepper offset calibration stopping after added hysteresis.
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_TIMEOUT_DURING_CAPTURING_PES_SAMPLES	491h	Servo	Timeout during head stepper offset calibration capturing pes samples.
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_TIMEOUT_DURING_STOPPING_AFTER_GOING_TO_NEW_OFFSET	492h	Servo	Timeout during head stepper offset calibration stopping after going to new offse
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_TIMEOUT_DURING_MOVING_UP_WITH_ADDED_HYSTERESIS_FOR_VERIFICATION	493h	Servo	Timeout during head stepper offset calibration moving up with added hysteresis f
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_TIMEOUT_DURING_VERIFYING_NEW_OFFSET	494h	Servo	Timeout during head stepper offset calibration verifying new offset.
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_TIMEOUT_DURING_STOPPING_AFTER_GOING_TO_OFFSET	495h	Servo	Timeout during head stepper offset calibration stopping after going to offset.
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_TIMEOUT_DURING_STOPPING_AFTER_REFERENCE_SENSOR_LOW	496h	Servo	Timeout during head stepper offset calibration stopping after reference sensor l
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_TIMEOUT_DURING_STOPPING_AFTER_REFERENCE_SENSOR_HIGH	497h	Servo	Timeout during head stepper offset calibration stopping after reference sensor h
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_TIMEOUT_DURING_STOPPING_AFTER_PES_FOUND	498h	Servo	Timeout during head stepper offset calibration stopping after pes found.
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_TIMEOUT_DURING_DEALING_WITH_HYSTERESIS	499h	Servo	Timeout during head stepper offset calibration dealing with hysteresis.
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_TIMEOUT_DURING_MOVE_UNTIL_REFERENCE_SENSOR_LOW	49Ah	Servo	Timeout during head stepper offset calibration move until reference sensor low.
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_TIMEOUT_DURING_MOVE_UNTIL_REFERENCE_SENSOR_HIGH	49Bh	Servo	Timeout during head stepper offset calibration move until reference sensor high.
SRV_LPOS_NEW_ESTIMATE_JUMPED_MORE_THAN_2_FROM_PREVIOUS_RELATIVE_LPOS	49Ch	Servo	New estimated LPOS should never jump more than 2 from previous relative_lpos.
SRV_CMDPROC_CMD_REJECT_DRIVE_MECH_STUCK	49Dh	Servo	Drive requires recovery command to 'unstuck' mechanics
SRV_CMDPROC_EMERGENCY_EJECT_IN_PROGRESS_ABORT_NOT_VALID	49Eh	Servo	Abort rejected because emergency eject was in progress
SRV_SEQ_INVALID_HIGHER_PRIORITY_COMMAND_RECEIVED	49Fh	Servo	A higher priority command was received from the command processor that was not a
SRV_INVALID_REEL_STATE_FOR_SET_RUN_TENSION_COMMAND	4A0h	Servo	Invalid reel state for set run tension command.
SRV_SEQ_NON_STANDARD_CARTRIDGE_RADIUS	4A1h	Servo	Calculated radius does not match possible radii for cartridges
SRV_TIMEOUT_DURING_HEAD_STEPPER_IDLE	4A2h	Servo	Timeout during head stepper idle.
SRV_TIMEOUT_DURING_HEAD_STEPPER_STARTING	4A3h	Servo	Timeout during head stepper starting.
SRV_TIMEOUT_DURING_HEAD_STEPPER_MOVING_TO_POSITION	4A4h	Servo	Timeout during head stepper moving to position.
SRV_TIMEOUT_DURING_HEAD_STEPPER_STOPPING_AFTER_MOVING_TO_POSITION	4A5h	Servo	Timeout during head stepper stopping after moving to position.
SRV_TIMEOUT_DURING_HEAD_STEPPER_MOVING_UP_WITH_ADDED_HYSTERESIS	4A6h	Servo	Timeout during head stepper moving up with added hysteresis.
SRV_TIMEOUT_DURING_HEAD_STEPPER_VALIDATING_PES	4A7h	Servo	Timeout during head stepper validating pes.

SRV_TIMEOUT_DURING_HEAD_STEPPER_MOVE_UNTIL_REFERENCE_SENSOR_HIGH	4A8h	Servo	Timeout during head stepper move until reference sensor high.
SRV_TIMEOUT_DURING_HEAD_STEPPER_MOVE_UNTIL_REFERENCE_SENSOR_LOW	4A9h	Servo	Timeout during head stepper move until reference sensor low.
SRV_TIMEOUT_DURING_HEAD_STEPPER_STOPPING_AFTER_REFERENCE_SENSOR_HIGH	4AAh	Servo	Timeout during head stepper stopping after reference sensor high.
SRV_TIMEOUT_DURING_HEAD_STEPPER_STOPPING_AFTER_REFERENCE_SENSOR_LOW	4ABh	Servo	Timeout during head stepper stopping after reference sensor low.
SRV_TIMEOUT_DURING_HEAD_STEPPER_SEARCHING_FOR_SERVO_BAND	4ACh	Servo	Timeout during head stepper searching for servo bundle.
SRV_TIMEOUT_DURING_HEAD_STEPPER_RETURNING_FROM_SEARCHING_FOR_SERVO_BAND	4ADh	Servo	Timeout during head stepper returning from searching for servo bundle.
SRV_TIMEOUT_DURING_HEAD_STEPPER_SEARCHING_FOR_SERVO_BAND_IN_OTHER_DIRECTION	4AEh	Servo	Timeout during head stepper searching for servo bundle in other direction.
SRV_TIMEOUT_DURING_HEAD_STEPPER_RETURNING_FROM_SEARCHING_FOR_SERVO_BAND_IN_OTHER_DIRECTION	4AFh	Servo	Timeout during head stepper returning from searching for servo bundle in other d
SRV_TIMEOUT_DURING_HEAD_STEPPER_STOPPING_AFTER_FAILING_SEARCH_FOR_SERVO_BAND	4B0h	Servo	Timeout during head stepper stopping after failing search for servo bundle.
SRV_TIMEOUT_DURING_HEAD_STEPPER_STOPPING_BEFORE_SEARCHING_FOR_SERVO_BAND_IN_OTHER_DIRECTION	4B1h	Servo	Timeout during head stepper stopping before searching for servo bundle in other
SRV_TIMEOUT_DURING_HEAD_STEPPER_HYSTERESIS_BEFORE_SEARCHING_FOR_SERVO_BAND_IN_OTHER_DIRECTION	4B2h	Servo	Timeout during head stepper hysteresis before searching for servo bundle in othe
SRV_TIMEOUT_DURING_HEAD_STEPPER_STOPPING_AFTER_FAILING_SEARCH_FOR_SERVO_BAND_IN_OTHER_DIRECTION	4B3h	Servo	Timeout during head stepper stopping after failing search for servo bundle in ot
SRV_SEQ_INCORRECT_SERVO_BAND_BEFORE_TRACKING	4B4h	Servo	Servo band not at target servo band
SRV_SELF_EXCEPTION_BUF_OVERFLOW	4B5h	Servo	Overflow in self_isr has occured.
SRV_SEQ_SERVO_BAND_VALIDATION_FAILED_AND_RECOVERED_ON_RETRY	4B6h	Servo	Exception: Servo band found does not match servo band requested on first attempt
SRV_SEQ_HEAD_POSITION_REQUESTED_OUT_OF_RANGE	4B7h	Servo	Servo head position out of range in servo band validation
SRV_SEQ_SERVO_BAND_VALIDATION_FAILED_CANNOT_COMPUTE_SERVO_BAND_NUMBER	4B8h	Servo	Servo code could not compute the servo band number
SRV_SELF_FIQ_SERVO_ERROR_DATA	4B9h	Servo	FIQ Servo code generated error with data
SRV_POWER_ON_SELF_TEST_FAILED	4BAh	Servo	Power on self test failed during power up
SRV_INVALID_ERROR_ALERT_TRANSLATION_TO_MESSAGE_STATUS_TYPE	4BBh	Servo	Alert type is invalid for translation to error code (MESSAGE_STATUS_T).
SRV_SMACHINE_RADIUS_CALCULATION_RETRIED_SUCCESSFULLY	4BCh	Servo	Radius calculation failed to validate on first attempt but succeeded on retry
SRV_SEQ_HEAD_OFFSET_CALIBRATION_REJECTED_TAPE_NOT_MOVING	4BDh	Servo	Head offset calibration is not valid if tape is not moving.
SRV_MOVETAPE_LP6_OVERRUN	4BEh	Servo	LP6 overrun detected by RTOS
SRV_MOVETAPE_LP1_UNDERRUN	4BFh	Servo	LP1 underrun detected by RTOS
SRV_MOVETAPE_EOT_OVERRUN	4C0h	Servo	EOT overrun detected by encoder interrupt
SRV_MOVETAPE_BOT_UNDERRUN	4C1h	Servo	BOT underrun detected by encoder interrupt
SRV_CMDPROC_INVALID_DRIVE_STATE_ON_RAMP_CMD	4C2h	Servo	Ramp cannot execute at current drive state
SRV_CMDPROC_OUT_OF_RANGE_DRIVE_STATE_ON_RAMP_CMD	4C3h	Servo	Ramp cannot execute at undefined drive state
SRV_ATTEMPTING_TO_FIND_PES_RETRY	4C4h	Servo	Head stepper module is going to look for pes after a delay.
SRV_SEQ_TARGET_LPOS_NOT_BEHIND_CURRENT_POSITION	4C5h	Servo	Reject reposition command

SRV_SEQ_TARGET_LPOS_EXCEEDED_IN_REPOSITION_COMMAND	4C6h	Servo	Command failed LPOS target past notification point.
SRV_CART_MEMORY_LP1_AND_WP_CALC_LP1_NOT_WITHIN_TOLERANCE	4C7h	Servo	Cartridge memory LP1 value isn't within tolerance of the Whirlpool calculated LP
SRV_CM_CALC_CART_TYPE_DOES_NOT_MATCH_RADIUS_CALC_CART_TYPE	4C8h	Servo	Cartridge type derived from mic LP1 and LP6 doesn't match cartridge type calcula
SRV_CM_LP1_AND_LP6_NOT_WITHIN_LTO_SPEC	4C9h	Servo	Cartridge memory LP1 and LP6 values don't fall within LTO specification.
SRV_SEQ_INVALID_LPOS_DISTANCE_IN_CALCULATE_OPTIMAL_BACKWARD_SPEED	4CAh	Servo	Invalid lpos distance (negative) calculated in reposition command
SRV_LPOS_BOT_UNDERRUN	4CBh	Servo	Whirlpool relative LP1 (972) underrun.
SRV_MOVETAPE_ERROR_REL_LP1_UNDERRUN_DURING_RAMP_UP	4CCh	Servo	Exceded BOT
SRV_MOTOR_REL_LP1_OVERRUN	4CDh	Servo	Relative LP1 underrun detected by RTOS
SRV_MOVETAPE_REL_LP1_UNDERRUN_IN_CRUISE_CONTROL	4CEh	Servo	
SRV_REEL_REL_LP1_LIMIT_UNDERRUN_IN_HOLD_STATE	4CFh	Servo	Relative LP1 limit underrun in hold state
SRV_CMDPROC_COMMAND_INVALID_SEQUENCE	4D0h	Servo	Recovery commands are for internal use only and should not be executed from the
SRV_SEQ_UNEXPECTED_COMMAND_RECEIVED_DURING_ACTIVE_MECHANICAL_COMMAND	4D1h	Servo	A command was received from the command processor during processing of a mechani
SRV_SEQ_COMMAND_RECEIVED_DURING_ERROR_HANDLING	4D2h	Servo	A command was received from the command processor during error recovery. This ma
SRV_POST_REGISTER_FAILED	4D3h	Servo	POST register test failed
SRV_NOT_USED	4D4h	Servo	End of this SRV series
SCSI_SAPI_REQUEST_TIMEOUT	4D5h	SCSI	
SCSI_NEXUS_IID_OUT_OF_RANGE	4D6h	SCSI	IID Parameter is out of range (Programming Error)
SCSI_NEXUS_LUN_OUT_OF_RANGE	4D7h	SCSI	LUN Parameter is out of range (Programming Error)
SCSI_NEXUS_TAG_OUT_OF_RANGE	4D8h	SCSI	TAG Parameter is out of range (Programming Error)
SCSI_FW_IMAGE_TRANSPORT_LAYER_MISMATCH	4D9h	SCSI	Interface type of resident code does not match fw image
SCSI_PCMD_LOSTINFEHEAD_01	4DAh	SCSI	
SCSI_PCMD_LOSTINFEHEAD_02	4DBh	SCSI	
SCSI_PCMD_LOSTINFEHEAD_03	4DCh	SCSI	
SCSI_PCMD_LOSTINFEHEAD_04	4DDh	SCSI	
SCSI_PCMD_LOSTINFEHEAD_05	4DEh	SCSI	
SCSI_PCMD_LOSTINFEHEAD_06	4DFh	SCSI	
SCSI_PCMD_LOSTINFEHEAD_07	4E0h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_08	4E1h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_09	4E2h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_10	4E3h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_11	4E4h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_12	4E5h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_13	4E6h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_14	4E7h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_15	4E8h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_16	4E9h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_17	4EAh	SCSI	
SCSI_PCMD_LOSTINFEHEAD_18	4EBh	SCSI	
SCSI_PCMD_LOSTINFEHEAD_19	4ECh	SCSI	
SCSI_PCMD_LOSTINFEHEAD_20	4EDh	SCSI	
SCSI_PCMD_LOSTINFEHEAD_21	4EEh	SCSI	
SCSI_PCMD_LOSTINFEHEAD_22	4EFh	SCSI	
SCSI_PCMD_LOSTINFEHEAD_23	4F0h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_24	4F1h	SCSI	

SCSI_PCMD_LOSTINFEHEAD_25	4F2h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_26	4F3h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_27	4F4h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_28	4F5h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_29	4F6h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_30	4F7h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_31	4F8h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_32	4F9h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_33	4FAh	SCSI	
SCSI_PCMD_LOSTINFEHEAD_34	4FBh	SCSI	
SCSI_PCMD_LOSTINFEHEAD_35	4FCh	SCSI	
SCSI_PCMD_LOSTINFEHEAD_36	4FDh	SCSI	
SCSI_PCMD_LOSTINFEHEAD_37	4FEh	SCSI	
SCSI_PCMD_LOSTINFEHEAD_38	4FFh	SCSI	
SCSI_PCMD_LOSTINFEHEAD_39	500h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_40	501h	SCSI	
SCSI_PCMD_LOSTINBEHEAD_01	502h	SCSI	
SCSI_PCMD_LOSTINBEHEAD_02	503h	SCSI	
SCSI_PCMD_LOSTINBEHEAD_03	504h	SCSI	
SCSI_PCMD_LOSTINBEHEAD_04	505h	SCSI	
SCSI_PCMD_LOSTINBEHEAD_05	506h	SCSI	
SCSI_PCMD_LOSTINBEHEAD_06	507h	SCSI	
SCSI_PCMD_LOSTINBEHEAD_07	508h	SCSI	
SCSI_PCMD_LOSTINBEHEAD_08	509h	SCSI	
SCSI_PCMD_LOSTINBEHEAD_09	50Ah	SCSI	
SCSI_CMD_REFS_EXHAUSTED_01	50Bh	SCSI	
SCSI_CMD_REFS_EXHAUSTED_02	50Ch	SCSI	
SCSI_CMD_REFS_EXHAUSTED_03	50Dh	SCSI	
SCSI_CMD_REFS_EXHAUSTED_04	50Eh	SCSI	
SCSI_CMD_REFS_EXHAUSTED_05	50Fh	SCSI	
SCSI_CMD_REFS_EXHAUSTED_06	510h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_07	511h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_08	512h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_09	513h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_10	514h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_11	515h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_12	516h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_13	517h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_14	518h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_15	519h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_16	51Ah	SCSI	
SCSI_CMD_REFS_EXHAUSTED_17	51Bh	SCSI	
SCSI_CMD_REFS_EXHAUSTED_18	51Ch	SCSI	
SCSI_CMD_REFS_EXHAUSTED_19	51Dh	SCSI	
SCSI_CMD_REFS_EXHAUSTED_LIB_FORWARD_ABORT	51Eh	SCSI	
SCSI_CMD_REFS_EXHAUSTED_LIB_LOP_CMD_RCVD	51Fh	SCSI	
SCSI_CMD_REFS_EXHAUSTED_22	520h	SCSI	
SCSI_ILLEGAL_DSM_CMD_01	521h	SCSI	
SCSI_ILLEGAL_DSM_CMD_02	522h	SCSI	
SCSI_ILLEGAL_DSM_CMD_03	523h	SCSI	
SCSI_ILLEGAL_DSM_CMD_04	524h	SCSI	
SCSI_ILLEGAL_DSM_CMD_05	525h	SCSI	
SCSI_ILLEGAL_DSM_CMD_06	526h	SCSI	
SCSI_ILLEGAL_DSM_CMD_07	527h	SCSI	
SCSI_ILLEGAL_DSM_CMD_08	528h	SCSI	
SCSI_ILLEGAL_DSM_CMD_09	529h	SCSI	
SCSI_ILLEGAL_DSM_CMD_10	52Ah	SCSI	

SCSI_ILLEGAL_DSM_CMD_11	52Bh	SCSI	
SCSI_UNKNOWN_BE_STATE_01	52Ch	SCSI	
SCSI_UNKNOWN_BE_STATE_02	52Dh	SCSI	
SCSI_UNKNOWN_BE_STATE_03	52Eh	SCSI	
SCSI_UNKNOWN_BE_STATE_04	52Fh	SCSI	
SCSI_UNKNOWN_BE_STATE_05	530h	SCSI	
SCSI_UNKNOWN_BE_STATE_06	531h	SCSI	
SCSI_UNKNOWN_BE_STATE_07	532h	SCSI	
SCSI_UNKNOWN_BE_STATE_08	533h	SCSI	
SCSI_UNKNOWN_BE_STATE_09	534h	SCSI	
SCSI_UNKNOWN_BE_STATE_10	535h	SCSI	
SCSI_UNKNOWN_BE_STATE_LIB_DISPATCH_SET_MODES	536h	SCSI	
SCSI_LIB_DISPATCH_UNLOAD_UNKNOWN_TAPE_STATE	537h	SCSI	
SCSI_UNKNOWN_BE_STATE_LIB_DISPATCH_UNLOAD	538h	SCSI	
SCSI_LIB_DISPATCH_LOAD_AND_HOLD_UNKNOWN_TAPE_STATE	539h	SCSI	
SCSI_UNKNOWN_BE_STATE_LIB_DISPATCH_LOAD_AND_HOLD	53Ah	SCSI	
SCSI_UNKNOWN_BE_STATE_16	53Bh	SCSI	
SCSI_UNKNOWN_BE_STATE_17	53Ch	SCSI	
SCSI_UNKNOWN_BE_STATE_18	53Dh	SCSI	
SCSI_UNKNOWN_BE_STATE_19	53Eh	SCSI	
SCSI_UNKNOWN_BE_STATE_20	53Fh	SCSI	
SCSI_UNKNOWN_BE_STATE_21	540h	SCSI	
SCSI_UNKNOWN_BE_STATE_22	541h	SCSI	
SCSI_UNKNOWN_BE_STATE_23	542h	SCSI	
SCSI_UNKNOWN_BE_STATE_24	543h	SCSI	
SCSI_UNKNOWN_BE_STATE_25	544h	SCSI	
SCSI_UNKNOWN_BE_STATE_26	545h	SCSI	
SCSI_UNKNOWN_BE_STATE_27	546h	SCSI	
SCSI_UNKNOWN_BE_STATE_28	547h	SCSI	
SCSI_UNKNOWN_BE_STATE_29	548h	SCSI	
SCSI_UNKNOWN_BE_STATE_30	549h	SCSI	
SCSI_UNKNOWN_BE_STATE_31	54Ah	SCSI	
SCSI_UNKNOWN_BE_STATE_32	54Bh	SCSI	
SCSI_UNKNOWN_BE_STATE_33	54Ch	SCSI	
SCSI_UNKNOWN_BE_STATE_34	54Dh	SCSI	
SCSI_UNKNOWN_BE_STATE_35	54Eh	SCSI	
SCSI_UNKNOWN_BE_STATE_36	54Fh	SCSI	
SCSI_UNKNOWN_BE_STATE_37	550h	SCSI	
SCSI_UNKNOWN_BE_STATE_38	551h	SCSI	
SCSI_UNKNOWN_BE_STATE_39	552h	SCSI	
SCSI_UNKNOWN_BE_STATE_40	553h	SCSI	
SCSI_UNKNOWN_BE_STATE_41	554h	SCSI	
SCSI_UNEXP_CCSTARTED_01	555h	SCSI	
SCSI_UNEXP_CCSTARTED_02	556h	SCSI	
SCSI_UNEXP_CCSTARTED_03	557h	SCSI	
SCSI_CUR_DESC_NULL_POINTER_01	558h	SCSI	
SCSI_CUR_DESC_NULL_POINTER_02	559h	SCSI	
SCSI_CUR_DESC_NULL_POINTER_03	55Ah	SCSI	
SCSI_CUR_DESC_NULL_POINTER_04	55Bh	SCSI	
SCSI_CUR_DESC_NULL_POINTER_05	55Ch	SCSI	
SCSI_FE_STATE_NOT_MATCHED_01	55Dh	SCSI	
SCSI_FE_STATE_NOT_MATCHED_02	55Eh	SCSI	
SCSI_FE_STATE_NOT_MATCHED_03	55Fh	SCSI	
SCSI_FE_STATE_NOT_MATCHED_04	560h	SCSI	

SCSI_FE_STATE_NOT_MATCHED_05	561h	SCSI	
SCSI_SAPI_GET_CMD_REF_NULL_01	562h	SCSI	
SCSI_SAPI_GET_CMD_REF_NULL_02	563h	SCSI	
SCSI_SAPI_GET_CMD_REF_NULL_03	564h	SCSI	
SCSI_SAPI_GET_CMD_REF_NULL_04	565h	SCSI	
SCSI_SAPI_GET_CMD_REF_NULL_05	566h	SCSI	
SCSI_SAPI_GET_CMD_REF_NULL_06	567h	SCSI	
SCSI_UNKNOWN_FE_STATE_01	568h	SCSI	Unknown FE state
SCSI_UNKNOWN_FE_STATE_02	569h	SCSI	Unknown FE state
SCSI_UNKNOWN_FE_STATE_03	56Ah	SCSI	Unknown FE state
SCSI_UNKNOWN_FE_STATE_04	56Bh	SCSI	Unknown FE state
SCSI_UNKNOWN_FE_STATE_05	56Ch	SCSI	Unknown FE state
SCSI_UNKNOWN_FE_STATE_06	56Dh	SCSI	Unknown FE state
SCSI_NULL_THREAD_TABLE_PTR_01	56Eh	SCSI	
SCSI_NULL_THREAD_TABLE_PTR_02	56Fh	SCSI	
SCSI_NULL_THREAD_TABLE_PTR_03	570h	SCSI	
SCSI_UNKNOWN_TASK_MANAGEMENT_FUNCTION	571h	SCSI	
CM_BAD_APP_SPEC	572h	Medium Auxiliary Memory	Application Specific
CM_BAD_CM_MANUF_INFO	573h	Medium Auxiliary Memory	CM Manufacturer's Information
CM_BAD_WRITE_PROTECT	574h	Medium Auxiliary Memory	CM Write Protect
CM_BAD_PROT_PAGE_TBL	575h	Medium Auxiliary Memory	CM Protected Page Table
CM_BAD_CART_MANUF_INFO	576h	Medium Auxiliary Memory	Cartridge Manufacturer's Information
CM_BAD_MEDIA_MANUF_INFO	577h	Medium Auxiliary Memory	Media Manufacturer's Information
CM_BAD_DRIVE_MANUF_SUPPORT	578h	Medium Auxiliary Memory	Drive Manufacturer's Support
CM_BAD_UNPROT_PAGE_TBL	579h	Medium Auxiliary Memory	CM Unprotected Page Table
CM_BAD_INITIALIZATION	57Ah	Medium Auxiliary Memory	Initialisation Data
CM_BAD_WRITE_PASS	57Bh	Medium Auxiliary Memory	Tape Write Pass
CM_BAD_TAPE_DIR	57Ch	Medium Auxiliary Memory	Tape Directory
CM_BAD_EOD_INFO	57Dh	Medium Auxiliary Memory	EOD Information
CM_BAD_CART_STATUS	57Eh	Medium Auxiliary Memory	Cartridge Status & Tape Alert Flags
CM_BAD_MECHANISM_RELATED	57Fh	Medium Auxiliary Memory	Mechanism Related
CM_BAD_SUSPEND_APPEND	580h	Medium	Suspended Append Writes

		Auxiliary Memory	
CM_BAD_USAGE_INFO_0	581h	Medium Auxiliary Memory	Usage Information 0
CM_BAD_USAGE_INFO_1	582h	Medium Auxiliary Memory	Usage Information 1
CM_BAD_USAGE_INFO_2	583h	Medium Auxiliary Memory	Usage Information 2
CM_BAD_USAGE_INFO_3	584h	Medium Auxiliary Memory	Usage Information 3
CM_BAD_CLEAN_USAGE_0	585h	Medium Auxiliary Memory	Cleaning Usage 0
CM_BAD_CLEAN_USAGE_1	586h	Medium Auxiliary Memory	Cleaning Usage 1
CM_BAD_CLEAN_USAGE_2	587h	Medium Auxiliary Memory	Cleaning Usage 2
CM_BAD_CLEAN_USAGE_3	588h	Medium Auxiliary Memory	Cleaning Usage 3
EEP_BAD_PROT_PAGE_TBL	589h	Medium Auxiliary Memory	EEPROM Protected Page Table
EEP_BAD_DRIVE_CONFIG_INFO	58Ah	Medium Auxiliary Memory	Drive ID / Configuration Info
EEP_BAD_FW_VER_0	58Bh	Medium Auxiliary Memory	Firmware Version Info 0
EEP_BAD_FW_VER_1	58Ch	Medium Auxiliary Memory	Firmware Version Info 1
EEP_BAD_FW_VER_2	58Dh	Medium Auxiliary Memory	Firmware Version Info 2
EEP_BAD_FW_VER_3	58Eh	Medium Auxiliary Memory	Firmware Version Info 3
EEP_BAD_FW_VER_4	58Fh	Medium Auxiliary Memory	Firmware Version Info 4
EEP_BAD_FW_VER_5	590h	Medium Auxiliary Memory	Firmware Version Info 5
EEP_BAD_FW_VER_6	591h	Medium Auxiliary Memory	Firmware Version Info 6
EEP_BAD_FW_VER_7	592h	Medium Auxiliary Memory	Firmware Version Info 7
EEP_BAD_UNPROT_PAGE_TBL	593h	Medium Auxiliary Memory	EEPROM Unprotected Page Table
EEP_BAD_SWITCH_SETTINGS	594h	Medium Auxiliary	Switch Settings

		Memory	
EEP_BAD_DEBUG_FLAGS	595h	Medium Auxiliary Memory	Debug Flags
EEP_BAD_CART_STAT_0	596h	Medium Auxiliary Memory	Cartridge Status & Tape Alert Flags 0
EEP_BAD_CART_STAT_1	597h	Medium Auxiliary Memory	Cartridge Status & Tape Alert Flags 1
EEP_BAD_CART_STAT_2	598h	Medium Auxiliary Memory	Cartridge Status & Tape Alert Flags 2
EEP_BAD_CART_STAT_3	599h	Medium Auxiliary Memory	Cartridge Status & Tape Alert Flags 3
EEP_BAD_CART_USAGE_0	59Ah	Medium Auxiliary Memory	Cartridge Usage Info 0
EEP_BAD_CART_USAGE_1	59Bh	Medium Auxiliary Memory	Cartridge Usage Info 1
EEP_BAD_CART_USAGE_2	59Ch	Medium Auxiliary Memory	Cartridge Usage Info 2
EEP_BAD_CART_USAGE_3	59Dh	Medium Auxiliary Memory	Cartridge Usage Info 3
EEP_BAD_DRIVE_USAGE_0	59Eh	Medium Auxiliary Memory	Drive Usage Info 0
EEP_BAD_DRIVE_USAGE_1	59Fh	Medium Auxiliary Memory	Drive Usage Info 1
EEP_BAD_DRIVE_USAGE_2	5A0h	Medium Auxiliary Memory	Drive Usage Info 2
EEP_BAD_DRIVE_USAGE_3	5A1h	Medium Auxiliary Memory	Drive Usage Info 3
EEP_BAD_ERROR_EVENT_00	5A2h	Medium Auxiliary Memory	Error Event 00
EEP_BAD_ERROR_EVENT_01	5A3h	Medium Auxiliary Memory	Error Event 01
EEP_BAD_ERROR_EVENT_02	5A4h	Medium Auxiliary Memory	Error Event 02
EEP_BAD_ERROR_EVENT_03	5A5h	Medium Auxiliary Memory	Error Event 03
EEP_BAD_ERROR_EVENT_04	5A6h	Medium Auxiliary Memory	Error Event 04
EEP_BAD_ERROR_EVENT_05	5A7h	Medium Auxiliary Memory	Error Event 05
EEP_BAD_ERROR_EVENT_06	5A8h	Medium Auxiliary Memory	Error Event 06

EEP_BAD_ERROR_EVENT_07	5A9h	Medium Auxiliary Memory	Error Event 07
EEP_BAD_ERROR_EVENT_08	5AAh	Medium Auxiliary Memory	Error Event 08
EEP_BAD_ERROR_EVENT_09	5ABh	Medium Auxiliary Memory	Error Event 09
EEP_BAD_ERROR_EVENT_10	5ACh	Medium Auxiliary Memory	Error Event 10
EEP_BAD_ERROR_EVENT_11	5ADh	Medium Auxiliary Memory	Error Event 11
EEP_BAD_ERROR_EVENT_12	5AEh	Medium Auxiliary Memory	Error Event 12
EEP_BAD_ERROR_EVENT_13	5AFh	Medium Auxiliary Memory	Error Event 13
EEP_BAD_ERROR_EVENT_14	5B0h	Medium Auxiliary Memory	Error Event 14
EEP_BAD_ERROR_EVENT_15	5B1h	Medium Auxiliary Memory	Error Event 15
EEP_BAD_EXCEPTION_EVENT_00	5B2h	Medium Auxiliary Memory	Exception Event 00
EEP_BAD_EXCEPTION_EVENT_01	5B3h	Medium Auxiliary Memory	Exception Event 01
EEP_BAD_EXCEPTION_EVENT_02	5B4h	Medium Auxiliary Memory	Exception Event 02
EEP_BAD_EXCEPTION_EVENT_03	5B5h	Medium Auxiliary Memory	Exception Event 03
EEP_BAD_EXCEPTION_EVENT_04	5B6h	Medium Auxiliary Memory	Exception Event 04
EEP_BAD_EXCEPTION_EVENT_05	5B7h	Medium Auxiliary Memory	Exception Event 05
EEP_BAD_EXCEPTION_EVENT_06	5B8h	Medium Auxiliary Memory	Exception Event 06
EEP_BAD_EXCEPTION_EVENT_07	5B9h	Medium Auxiliary Memory	Exception Event 07
EEP_BAD_EXCEPTION_EVENT_08	5BAh	Medium Auxiliary Memory	Exception Event 08
EEP_BAD_EXCEPTION_EVENT_09	5BBh	Medium Auxiliary Memory	Exception Event 09
EEP_BAD_EXCEPTION_EVENT_10	5BCh	Medium Auxiliary Memory	Exception Event 10
EEP_BAD_EXCEPTION_EVENT_11	5BDh	Medium	Exception Event 11

		Auxiliary Memory	
EEP_BAD_EXCEPTION_EVENT_12	5BEh	Medium Auxiliary Memory	Exception Event 12
EEP_BAD_EXCEPTION_EVENT_13	5BFh	Medium Auxiliary Memory	Exception Event 13
EEP_BAD_EXCEPTION_EVENT_14	5C0h	Medium Auxiliary Memory	Exception Event 14
EEP_BAD_EXCEPTION_EVENT_15	5C1h	Medium Auxiliary Memory	Exception Event 15
EEP_BAD_POR_COUNT	5C2h	Medium Auxiliary Memory	Power On Reset Count
EEP_BAD_RETRY_HISTORY	5C3h	Medium Auxiliary Memory	Retry History
EEP_BAD_APP_SPEC	5C4h	Medium Auxiliary Memory	Application Specific
SCSI_SC_TRANSFER_DONE_NO_PCMD	5C5h	SCSI	SCSI received SC_TRANSFER_DONE but pCmd is NULL
SCSI_SC_COMPLETE_DONE_NO_PCMD	5C6h	SCSI	SCSI received SC_COMPLETE_DONE but pCmd is NULL
SCSI_FE_QUEUE_TOO_MANY_PCMDS	5C7h	SCSI	SCSI FE traps excessive number of pCmds in the queue
SCSI_NULL_SDPORT_DB_CHANGED	5C8h	SCSI	Database Change - NULL SDPORT pointer
SCSI_HAPI_INVOKE_CALLBACK_FAILED	5C9h	SCSI	HAPI DMA FAILED TO INVOKE FC CALLBACK
SCSI_FAILED_TO_REMOVE_IID	5CAh	SCSI	Failed to remove/log out the initiator.
SCSI_FE_RETRY_FUNCTION_POINTER_IS_NULL	5CBh	SCSI	FE Retry dispatch has a null pointer
SCSI_WP_VERSION_NOT_AVAILABLE	5CCh	SCSI	Whirpool Version Number Not Available
SCSI_WP_DATE_NOT_AVAILABLE	5CDh	SCSI	Whirpool Build Date Not Available
SCSI_EARLY_EXIT_FAILED	5CEh	SCSI	
SCSI_EARLY_EXIT_FAILED_SIZE	5CFh	SCSI	
SCSI_EARLY_EXIT_FAILED_BOR	5D0h	SCSI	
SCSI_STS_BUSY_TRANS_ID_ALLOCATION_FAILURE	5D1h	SCSI	
SCSI_STS_BUSY_CA_ACTIVE	5D2h	SCSI	
SCSI_STS_BUSY_CA_OR_ACA_ACTIVE	5D3h	SCSI	
SCSI_STS_BUSY_NO_DISC_PRIV_AND_NEED_TO_RUN_NOW	5D4h	SCSI	
SCSI_STS_BUSY_IMMED_NEED_TO_RUN_NOW_AND_BE_BUSY	5D5h	SCSI	
SCSI_STS_BUSY_LIB_SVC_RESP_INVALID_ID	5D6h	SCSI	
SCSI_CANNOT_APPEND_LIB_IID_FREE_Q	5D7h	SCSI	
SCSI_CANNOT_REMOVE_LIB_IID_FREE_Q	5D8h	SCSI	
SCSI_CANNOT_ADD_LIB_IID_LRU_Q	5D9h	SCSI	
SCSI_CANNOT_REMOVE_LIB_IID_LRU_Q	5DAh	SCSI	
SCSI_CANNOT_UPDATE_LIB_IID_LRU_Q	5DBh	SCSI	
SCSI_STS_BUSY_IMMED_LIB_CMD_AND_BE_BSY	5DCh	SCSI	
SCSI_INVALID_TRANSPORT_COUNT	5DDh	SCSI	
SCSI_STATUS_DIAG_DMA_CONTROLLER_TIMEOUT	5DEh	SCSI	
SCSI_STATUS_DIAG_FPGA_VERSION_ERROR	5DFh	SCSI	

SCSI_STATUS_DIAG_FC_SDRAM_PARAMETER_MISMATCH	5E0h	SCSI	
SCSI_STATUS_DIAG_RB_PARAMETER_MISMATCH	5E1h	SCSI	
SCSI_STATUS_8BB	5E2h	SCSI	
SCSI_STATUS_8BC	5E3h	SCSI	
SCSI_STATUS_8BD	5E4h	SCSI	
SCSI_STATUS_8BE	5E5h	SCSI	
SCSI_STATUS_8BF	5E6h	SCSI	
DSM_READ_DSN_OUT_OF_SEQUENCE	5E7h	Data set manager	900
DSM_SCSI_COMMAND_ABORTED	5E8h	Data set manager	
DSM_BE_WR_EOWS_IN_ODD_SECTION	5E9h	Data set manager	
DSM_LOCATE_DONE_BUT_NOT_AT_TARGET	5EAh	Data set manager	
DSM_MIC_UPDATE_TAPE_DIR_BUILD_FAILED	5EBh	Data set manager	
DSM_BE_WR_OUTSTANDING_DS_COUNT_CANT_GO_NEGATIVE	5ECh	Data set manager	
DSM_BE_READ_STOP_MISSING_DS	5EDh	Data set manager	
DSM_FAILURE_OCCURRED_WITH_GOOD_STATUS	5EEh	Data set manager	
DSM_LOCATE_TERMINATED_WITH_GOOD_STATUS	5EFh	Data set manager	
DSM_DEGRADED_SPACE_LOCATE	5F0h	Data set manager	
DSM_CANT_CORRECT_INIT_PAGE_AWAY_FROM_BOT	5F1h	Data set manager	
DSM_DCA_PUT_REREAD_RECOVERED_FAILED	5F2h	Data set manager	
DSM_RECEIVED_INVALID_DS_DATA	5F3h	Data set manager	
DSM_RECEIVED_INVALID_DS_DONE	5F4h	Data set manager	
DSM_RECEIVED_INVALID_DS_EMPTY	5F5h	Data set manager	
DSM_CMD_LIST_RECVD_DONE_WHILE_PREVENTED	5F6h	Data set manager	
DSM_MIC_Q_CANT_PREVENT_LIST_NOT_EMPTY	5F7h	Data set manager	
DSM_RB_NOT_EMPTY_AFTER_FLUSH	5F8h	Data set manager	
DSM_CMPR_NO_DS_TO_FLUSH	5F9h	Data set manager	
SRV_POST_MEMORY_FAILED	5FAh	Servo	Post memory test failed
SRV_POST_DIVIDER_FAILED	5FBh	Servo	POST hardware divider test failed
SRV_POST_TIMESTAMP_FAILED	5FCh	Servo	Post timestamp incrementing test failed
SRV_SEQ_INVALID_DRIVE_STATE_AT_UNLOAD	5FDh	Servo	Sequencer received a load command when drive was parked. This should never happe
SRV_CMDPROC_INVALID_STATE_FOR_LOAD	5FEh	Servo	Command processor rejects load command because drive is in parked
SRV_TEMP1	5FFh	Servo	
SRV_MONITOR_UNKNOWN_COMMAND	600h	Servo	Servo recieved unknown command from serial port.
SRV_MONITOR_TOO_MANY_VARIABLES	601h	Servo	Command has too many variables
SRV_MONITOR_INVALID_NUMBER_OF_PARAMETERS	602h	Servo	Invalid number of parameters

SRV_MONITOR_INVALID_PARAMETER	603h	Servo	Recieved invalid parameter
SRV_MONITOR_XMIT_ERROR	604h	Servo	Transmit error
SRV_MONITOR_MESSAGE_TOO_LONG	605h	Servo	
SRV_MONITOR_LENGTH_OF_MESSAGE_ZERO	606h	Servo	
SRV_MONITOR_NO_WORD_COUNT	607h	Servo	
SRV_MONITOR_BAD_TRAILER	608h	Servo	
SRV_MONITOR_BUSY	609h	Servo	
SRV_MONITOR_BUFFER_OVERFLOW	60Ah	Servo	
SRV_MONITOR_INCORRECT_PORT_ID	60Bh	Servo	
SRV_MONITOR_INVALID_MODE_IN_TESTBIT	60Ch	Servo	
SRV_MONITOR_HARDWARE_DIVIDER_ERROR	60Dh	Servo	
SRV_CLOSED_LOOP_STEPPER_TOO_MANY_RETRIES_DUE_TO_BOTH_SERVOS_MARGINAL	60Eh	Servo	Too many retries due to both servos marginal.
SRV_CMDPROC_HEAD_POS_CLOSED_LOOP_REJECTED_TAPE_NOT_MOVING	60Fh	Servo	Tape needs to be moving for head pos closed loop.
SRV_CMDPROC_INVALID_DRIVE_STATE_ON_REWRAP_CMD	610h	Servo	Drive state has to be wrapped
SRV_CMDPROC_OUT_OF_RANGE_DRIVE_STATE_ON_REWRAP_CMD	611h	Servo	Illegal drive state
SRV_STATEM_REWRAP_COMMAND_REJECTED_INVALID_STATE	612h	Servo	Command rejected since the drive state was invalid (out of range).
SRV_CMDPROC_CMD_REJECT_SEQUENCER_BUSY_AND_BUFFER_FULL	613h	Servo	Command rejected since the sequencer was processing an error and the polled buff
SRV_CANNOT_INSERT_INTO_LPOS_NOTIFY_TABLE_UNTIL_SCR_AND_WP_FOUND_LP1	614h	Servo	LPOS values in the notification table are dependent on CM_LP1 and WP_LP1.
SRV_LPOS_ROLLOVER_DETECTED_FROM_CM_PHYS_LP1	615h	Servo	Calc phy LP7 from CM phys LP1 is greater then LTO spec
SRV_LPOS_ROLLOVER_DETECTED_FROM_WP_CALC_PHYS_LP1	616h	Servo	Calc phy LP7 from WP calc phys LP1 is greater then LTO spec
SRV_LPOS_TOP_SERVO_AND_BOTTOM_SERVO_CALC_LP1_NOT_WITHIN_TOLERANCE	617h	Servo	The LP1 value calc for top servo didn't match the LP1 value calc for the bottom
SRV_REEL_MOT_PWR_FAIL_DETECTED	618h	Servo	12 volt power reset detected
SRV_REEL_MOT_EXCESSIVE_CURRENT_DEMAND_DETECTED	619h	Servo	Excessive current detected on motor
SRV_FINDZERO_TIME_OUT	61Ah	Servo	Time out occured waiting for servo response
SRV_FINDZERO_STATE_VARIABLE_OUT_OF_RANGE	61Bh	Servo	Find zero wrap state variable out of range.
SRV_FINDZERO_COARSE_OR_APPROACHING	61Ch	Servo	Find zero wrap coarse or approaching api rejected call.
SRV_FINDZERO_INDEX_SETUP_API_REJECT	61Dh	Servo	Find zero wrap index setup api rejected call.
SRV_FINDZERO_INDEX_HOME_API_REJECT	61Eh	Servo	Find zero wrap index home api rejected call.
SRV_FINDZERO_HOME_DRIVE_REEL_API_REJECT	61Fh	Servo	Find zero wrap home drive reel api rejected call.
SRV_FINDZERO_APPROACHING_API_REJECT	620h	Servo	Find zero wrap approaching zero api rejected call.
SRV_FINDZERO_TOO_MANY_RETRIES_AFTER_COARSE_MOTION	621h	Servo	Find zero wrap coarse exceeded coarse motion retries.
SRV_FINDZERO_TOO_MANY_RETRIES_AFTER_COMPLETE	622h	Servo	Find zero wrap retries exceeded after completion.
SRV_CMDPROC_FIND_INDEX_FAILED_WRITING_TO_LINEAR_COUNTER_API_BUSY	623h	Servo	Reset linear counter to remember the aligned slot position
SRV_CMDPROC_LINEAR_COUNTER_NOT_RECORDED_PREVIOUSLY	624h	Servo	Linear counter not reset with RECORD ALIGNED SLOT command prior to this command
SRV_SEQ_POWER_ON_INIT_FAILED_WRITING_TO_LINEAR_COUNTER_API_BUSY	625h	Servo	Reset linear counter failed during power on recovery
SRV_CMDPROC_INVALID_STATE_FOR_RAMP_HEAD_COMMAND	626h	Servo	Ramp head command rejected

SRV_CMDPROC_TAPE_NOT_MOVING_FOR_RAMP_HEAD_COMMAND	627h	Servo	Ramp head command rejected
SRV_CMD_INVALID_HEAD_POSITION_SPECIFIED_IN_CHANGE_TRACKING_MODE	628h	Servo	Head position not a valid tracking head position
SRV_CMD_INVALID_HEAD_POSITION_SPECIFIED_IN_WRAP_RESTART_TRACKING	629h	Servo	Head position not a valid tracking head position for restart tracking
SRV_MOVETAPE_SET_LC_NOTIFICATION_FAILED	62Ah	Servo	Attempt to set linear counter mark failed since already past point.
SRV_CMDPROC_REJ_TAPE_NOT_READY	62Bh	Servo	Tape ready for retension
SRV_STEP_HEAD_EXPECTING_MOVING_UP_WITH_ADDED_HYSTERESIS_AFTER_REFERENCE_SENSOR_HIGH	62Ch	Servo	Expecting moving up with added hysteresis after reference sensor high.
SRV_CMD_INVALID_COMMAND_CALLED_SEQUENCE_IS_NULL	62Dh	Servo	Invalid command called or invalid message sent to sequencer
SRV_TIMEOUT_DURING_HEAD_STEPPER_STOPPING_AFTER_SEARCHING_FOR_SERVO_BAND	62Eh	Servo	Timeout during head stepper stopping after searching for servo bundle
SRV_TIMEOUT_DURING_HEAD_STEPPER_MOVING_UP_WITH_ADDED_HYSTERESIS_AFTER_REFERENCE_SENSOR_HIGH	62Fh	Servo	Timeout during head stepper moving up with added hysteresis after reference sens
SRV_STEP_HEAD_EXPECTING_SEARCHING_FOR_SERVO_BAND	630h	Servo	Expecting searching for servo bundle
SRV_STEP_HEAD_EXPECTING_HYSTERESIS_BEFORE_SEARCHING_FOR_SERVO_BAND_IN_OTHER_DIRECTION	631h	Servo	Expecting hysteresis before searching for servo bundle in other direction
SRV_STEP_HEAD_EXPECTING_SEARCHING_FOR_SERVO_BAND_IN_OTHER_DIRECTION	632h	Servo	Expecting searching for servo bundle in other direction
SRV_STEP_HEAD_EXPECTING_STOPPING_AFTER_FAILING_SEARCH_FOR_SERVO_BAND_IN_OTHER_DIRECTION	633h	Servo	Expecting stopping after failing search for servo bundle in other direction
SRV_STEP_HEAD_EXPECTING_STOPPING_AFTER_SEARCHING_FOR_SERVO_BAND	634h	Servo	Expecting stopping after searching for servo bundle
SRV_STEP_HEAD_EXPECTING_STOPPING_AFTER_FAILING_SEARCH_FOR_SERVO_BAND	635h	Servo	Expecting stopping after failing search for servo bundle
SRV_STEP_HEAD_EXPECTING_STOPPING_BEFORE_SEARCHING_FOR_SERVO_BAND_IN_OTHER_DIRECTION	636h	Servo	Expecting stopping before searching for servo bundle in other direction
SRV_HEAD_STEPPER_MOVE_HEAD_TO_HEAD_POSITION_STATE_MACHINE_DEFAULT_ENCOUNTERED	637h	Servo	Head stepper move head to head position state machine default encountered
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_EXPECTING_SEARCHING_FOR_PES	638h	Servo	Head stepper offset calibration expecting searching for pes
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_EXPECTING_STOPPING_AFTER_PES_FOUND	639h	Servo	Head stepper offset calibration expecting stopping after pes found
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_EXPECTING_DEALING_WITH_HYSTERESIS	63Ah	Servo	Head stepper offset calibration expecting dealing with hysteresis
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_EXPECTING_STOPPING_AFTER_GOING_TO_NEW_OFFSET	63Bh	Servo	Head stepper offset calibration expecting stopping after going to new offset
SRV_FAILURE_TO_FIND_PES_DURING_HEAD_STEPPER_OFFSET_CALIBRATION	63Ch	Servo	Failure to find pes during head stepper offset calibration
SRV_HEAD_STEPPER_OFFSET_CALIBRATION_STATE_MACHINE_DEFAULT_ENCOUNTERED	63Dh	Servo	Head stepper offset calibration state machine default encountered
SRV_INCORRECT_DATA_BAND_ID	63Eh	Servo	Query for data band returned incorrect band ID
SRV_CALCULATED_LP1_VALUES_NOT_CONSISTENT	63Fh	Servo	Calculated LP1 sample array values vary too much. Cannot calculate LP1 from this
SRV_HEAD_STEPPER_PROCESS_STEP_MOTOR_STATE_MACHINE_DEFAULT_ENCOUNTERED	640h	Servo	Unknown state encountered while head stepper process_step_motor function.
SRV_MOVETAPE_TIMEOUT_IN_CRUISE_CON	641h	Servo	Timeout message received in cruise control

TROL			state
SRV_NEVER_SAW_SERVO_SIGNAL_DUE_TO_MECHANICAL_ISSUES	642h	Servo	Never saw servo signal due to mechanical issues.
SRV_SERVO_SIGNALS_NOT_WITHIN_ACQUIRING_WINDOW_DUE_TO_MECHANICAL_ISSUES	643h	Servo	Servo signals not within acquiring window due to mechanical issues.
SRV_FAILURE_DURING_TRACKING_BAND_LOCK_DUE_TO_MECHANICAL_ISSUES	644h	Servo	Failure during tracking band lock due to mechanical issues.
SRV_FAILURE_DURING_TRACKING_RAMPING_DUE_TO_MECHANICAL_ISSUES	645h	Servo	Failure during tracking ramping due to mechanical issues.
SRV_FAILURE_DURING_TRACKING_SETTLING_DUE_TO_MECHANICAL_ISSUES	646h	Servo	Failure during tracking settling due to mechanical issues.
SRV_FAILURE_DURING_TRACKING_PRE_TRACKING_DUE_TO_MECHANICAL_ISSUES	647h	Servo	Failure during tracking pre tracking due to mechanical issues.
SRV_FAILURE_DURING_TRACKING_UNKNOWN_STATE_DUE_TO_MECHANICAL_ISSUES	648h	Servo	Failure during tracking unknown state due to mechanical issues .
SRV_NEVER_SAW_SERVO_SIGNAL_DURING_BACKWARDS_DUE_TO_MECHANICAL_ISSUES	649h	Servo	Never saw servo signal during backwards due to mechanical issues.
SRV_SERVO_SIGNALS_NOT_WITHIN_ACQUIRING_WINDOW_DURING_BACKWARDS_DUE_TO_MECHANICAL_ISSUES	64Ah	Servo	Servo signals not within acquiring window during backwards due to mechanical iss
SRV_FAILURE_DURING_TRACKING_BAND_LOCK_DURING_BACKWARDS_DUE_TO_MECHANICAL_ISSUES	64Bh	Servo	Failure during tracking band lock during backwards due to mechanical issues.
SRV_FAILURE_DURING_TRACKING_RAMPING_DURING_BACKWARDS_DUE_TO_MECHANICAL_ISSUES	64Ch	Servo	Failure during tracking ramping during backwards due to mechanical issues.
SRV_FAILURE_DURING_TRACKING_SETTLING_DURING_BACKWARDS_DUE_TO_MECHANICAL_ISSUES	64Dh	Servo	Failure during tracking settling during backwards due to mechanical issues.
SRV_FAILURE_DURING_TRACKING_PRE_TRACKING_DURING_BACKWARDS_DUE_TO_MECHANICAL_ISSUES	64Eh	Servo	Failure during tracking pre tracking during backwards due to mechanical issues.
SRV_FAILURE_DURING_TRACKING_UNKNOWN_STATE_DURING_BACKWARDS_DUE_TO_MECHANICAL_ISSUES	64Fh	Servo	Failure during tracking unknown state during backwards due to mechanical issues
SRV_NEVER_SAW_SERVO_SIGNAL_DUE_TO_SERVO_SIGNAL_ISSUES	650h	Servo	Never saw servo signal due to servo signal issues.
SRV_SERVO_SIGNALS_NOT_WITHIN_ACQUIRING_WINDOW_DUE_TO_SERVO_SIGNAL_ISSUES	651h	Servo	Servo signals not within acquiring window due to servo signal issues.
SRV_FAILURE_DURING_TRACKING_BAND_LOCK_DUE_TO_SERVO_SIGNAL_ISSUES	652h	Servo	Failure during tracking band lock due to servo signal issues.
SRV_FAILURE_DURING_TRACKING_RAMPING_DUE_TO_SERVO_SIGNAL_ISSUES	653h	Servo	Failure during tracking ramping due to servo signal issues.
SRV_FAILURE_DURING_TRACKING_SETTLING_DUE_TO_SERVO_SIGNAL_ISSUES	654h	Servo	Failure during tracking settling due to servo signal issues.
SRV_FAILURE_DURING_TRACKING_PRE_TRACKING_DUE_TO_SERVO_SIGNAL_ISSUES	655h	Servo	Failure during tracking pre tracking due to servo signal issues.
SRV_FAILURE_DURING_TRACKING_UNKNOWN_STATE_DUE_TO_SERVO_SIGNAL_ISSUES	656h	Servo	Failure during tracking unknown state due to servo signal issues .
SRV_NEVER_SAW_SERVO_SIGNAL_DURING_BACKWARDS_DUE_TO_SERVO_SIGNAL_ISSUES	657h	Servo	Never saw servo signal during backwards due to servo signal issues.
SRV_SERVO_SIGNALS_NOT_WITHIN_ACQUIRING_WINDOW_DURING_BACKWARDS_DUE_TO_SERVO_SIGNAL_ISSUES	658h	Servo	Servo signals not within acquiring window during backwards due to servo signal i
SRV_FAILURE_DURING_TRACKING_BAND_LOCK_DURING_BACKWARDS_DUE_TO_SERV	659h	Servo	Failure during tracking band lock during backwards due to servo signal issues.

O_SIGNAL_ISSUES			
SRV_FAILURE_DURING_TRACKING_RAMPING_DURING_BACKWARDS_DUE_TO_SERVO_SIGNAL_ISSUES	65Ah	Servo	Failure during tracking ramping during backwards due to servo signal issues.
SRV_FAILURE_DURING_TRACKING_SETTLING_DURING_BACKWARDS_DUE_TO_SERVO_SIGNAL_ISSUES	65Bh	Servo	Failure during tracking settling during backwards due to servo signal issues.
SRV_FAILURE_DURING_TRACKING_PRE_TRACKING_DURING_BACKWARDS_DUE_TO_SERVO_SIGNAL_ISSUES	65Ch	Servo	Failure during tracking pre tracking during backwards due to servo signal issues
SRV_FAILURE_DURING_TRACKING_UNKNOWN_STATE_DURING_BACKWARDS_DUE_TO_SERVO_SIGNAL_ISSUES	65Dh	Servo	Failure during tracking unknown state during backwards due to servo signal issue
SRV_FAILURE_DURING_TRACKING_UNKNOWN_STATE	65Eh	Servo	Failure during tracking unknown state.
SRV_FAILURE_DURING_TRACKING_UNKNOWN_STATE_DURING_BACKWARDS	65Fh	Servo	Failure during tracking unknown state during backwards.
SRV_STEP_THREAD_TAPE_RAMP_TENSION_FAILED	660h	Servo	Dropping tape tensionn failed after taking up slack when cartridge is initially
SRV_INSUFFICIENT_GOOD_PES_DATA_CANNOT_COMPUTE_DATA_BAND_ID	661h	Servo	Not enough good PES data to compare good top PES with corresponding good bottom
SRV_GET_DATA_BAND_TIMEOUT_CANNOT_COMPUTE_DATA_BAND_ID	662h	Servo	PES state machine didn't finish capturing PES data within expected time frame
SRV_MULTIPLE_SAMPLES_OF_MOTOR_INDEX_NOT_WITHIN_TOLERANCE	663h	Servo	Multiple sampling of motor index counts should be 4000 tach counts apart +/- 1.
SRV_COMMAND_REJECTED_WP_NEVER_FOUND_PHYSICAL_LP1_FROM_TAPE	664h	Servo	Reject command if Whirlpool never calculated physical lp1 from tape.
SRV_INVALID_PCB_VERSION	665h	Servo	Only dakota_12 and dakota_13a are valid versions. dakota_13b and dakota_13c are
SRV_INVALID_CALIBRATION_VERSION	666h	Servo	Version in calibration memory is not valid (possibly test code)
SRV_UNLOAD_CART_EXCEEDED_RETRIES	667h	Servo	Unload Cartridge process failed after retrying
SRV_UNLOAD_CART_RETRY_FAILED_LOAD	668h	Servo	Load failed during Unload Cartridge Retry
SRV_PARK_CART_DEFAULT	669h	Servo	Invalid state in Park Cart function
SRV_CMDPROC_INVALID_CARTRIDGE_IN_DRIVE_DURING_AUTO_LOAD	66Ah	Servo	Invalid cartridge in drive during autoload
SRV_REEL_FAST_REPOSITIONTAPE_API_CALL_FAILED_INVALID_STATE	66Bh	Servo	New fast repositionTape API call failed
SRV_UNABLE_TO_FIND_M1_MECH_INDEX	66Ch	Servo	Unable to locate drive motor mechanical index
SRV_UNABLE_TO_FIND_M2_MECH_INDEX	66Dh	Servo	Unable to locate cart motor mechanical index
SRV_UNLOAD_CART_RETRY	66Eh	Servo	Exception: Wasn't able to Unload the Cart Tray and will try again
SRV_THREAD_RETRY_MOVING_TO_DRIVE_HUB	66Fh	Servo	Exception: Something prevented the Load Arm from making it to the Drive Reel Hub
SRV_UNTHREAD_RETRY_RELEASING_PIN	670h	Servo	Exception: Was not able to get rid of the pin at the end of Unthread and will tr
SRV_UNTHREAD_RETRY_PUT_AWAY_PIN	671h	Servo	Exception: Something prevented putting away the pin into the cartridge during Un
SRV_UNTHREAD_RETRY_GOING_HOME	672h	Servo	Exception: Something prevented the Load Arm from going to Home Position after pu
SRV_UNTHREAD_RETRY_STUCK_ON_GUIDES	673h	Servo	Exception: Assume tape got stuck on guides during Unthread. Will try to unstick
SRV_THREAD_RETRY_RECOVER	674h	Servo	Exception: Something failed during Thread and will try to recover.
SRV_THREAD_RETRY_RECHUCKING_CARTRIDGE	675h	Servo	Exception: Wasn't able to pick pin from Cartridge. Cartridge was rechucked and
SCSI_ILLEGAL_DSM_CMD_00	676h	SCSI	SCSI_ILLEGAL_DSM_CMD_00
SCSI_FW_IMAGE_INCOMPATIBLE_WITH_MECHANICS	677h	SCSI	Microcode failed with invalid field parameter checksum
SRV_PARK_CART_FAILED_LOADING_TRAY	678h	Servo	expecting steps done

CM_BAD_707	679h	Medium Auxiliary Memory	
SCSI_INFO_STRUCTS_EXHAUSTED_00	67Ah	SCSI	Failed to allocate a SCSI INFO structure when we tried to post SC_NEW_CDB_RCVD.
SRV_RTOS_TIMEOUT	67Bh	Servo	
SRV_RTOS_INVALID_TASK_ID_FOR_QUEUE	67Ch	Servo	
SRV_PARAMETER_LOWER_THAN_MIN	67Dh	Servo	
SRV_PARAMETER_HIGHER_THAN_MAX	67Eh	Servo	
SRV_CONTROLLER_BUSY	67Fh	Servo	
SRV_INVALID_SEND_MESSAGE	680h	Servo	
SRV_INVALID_CMD	681h	Servo	
SRV_INVALID_CMD_OR_TYPE	682h	Servo	
SRV_UNABLE_TO_ALLOCATE_BLOCK	683h	Servo	
SRV_RELEASING_NULL_POINTER	684h	Servo	
SRV_RELEASING_NONE_ALOCATED_BLOCK	685h	Servo	
SRV_COMMAND_WITH_INVALID_INDEX	686h	Servo	
SRV_CMDPROC_UNKNOWN_CMD	687h	Servo	
SRV_LP1_NOT_AVAILABLE	688h	Servo	
SRV_CMDPROC_REJ_CMD_TAPE_IN_MOTION	689h	Servo	
SRV_CMDPROC_INVALID_SET_COMMAND	68Ah	Servo	
SRV_SEQ_LOG_FULL	68Bh	Servo	
SRV_SEQ_BUSY	68Ch	Servo	
SRV_SEQ_ABORT	68Dh	Servo	
SRV_SEQ_UNKNOWN_CMD	68Eh	Servo	
SRV_SEQ_INVALID_STATE_OF_DRIVE	68Fh	Servo	
SRV_SEQ_TAPE_THREADED	690h	Servo	
SRV_SEQ_THREADED_OR_LOADED	691h	Servo	
SRV_SEQ_TAPE_WRAPPED	692h	Servo	
SRV_SEQ_TAPE_AT_BOT	693h	Servo	
SRV_SEQ_REJ_CMD_TAPE_IN_MOTION	694h	Servo	
SRV_SEQ_REJ_CMD_TAPE_NOT_IN_MOTION	695h	Servo	
SRV_COMMAND_REJECTED_NO_HEAD_OFFSET_CALIBRATION	696h	Servo	
SRV_MON_INVALID_CMD	697h	Servo	
SRV_MON_INVALID_EVENT_ID	698h	Servo	
SRV_MON_INVALID_EVENT_OPTION	699h	Servo	
SRV_WATCH_DOG_TIMEOUT	69Ah	Servo	
SRV_SZA_INVALID_WRITE_DATA	69Bh	Servo	
SRV_POST_REG_SIZE_EXCEEDED	69Ch	Servo	
SRV_POST_MEM_SIZE_EXCEEDED	69Dh	Servo	
SRV_INIT_HARDWARE_INTERRUPT_FAIL	69Eh	Servo	
SRV_SEQ_INVALID_MSG_TYPE	69Fh	Servo	
SRV_REEL_INVALID_CMD	6A0h	Servo	
SRV_REEL_INVALID_MSG_TYPE	6A1h	Servo	
SCSI_STS_RC_RESERVED_BY_OTHER_ID	6A2h	SCSI	
SCSI_STS_RC_RESERVED_CANNOT_ISSUE_PERSISTENT_RESERVE	6A3h	SCSI	
SCSI_STS_RC_THIRD_PARTY_ID_CONFLICT	6A4h	SCSI	
SRV_MON_TOO_MANY_VARIABLES	6A5h	Servo	
SRV_MON_NO_WORD_COUNT	6A6h	Servo	
SRV_MON_INVALID_PARAMETER	6A7h	Servo	
SCSI_SAPI_DID_NOT_SET_SKEY_ASCQ	6A8h	SCSI	FC lowlevel code did not set Sense Key and ASC when it sent STMTMTYPE_EstabCA.
SCSI_AUTO_SENSE_FAILED	6A9h	SCSI	Failed to send a response with autosense.
TAPE_READ_COULD_NOT_START_HW_READER	6AAh	Tape	Failed to start hardware reader
TAPE_WRITE_FWD_HITS_LIMIT	6ABh	Tape	Hit fwd lpos limit during data gain calibration
TAPE_WRITE_REV_HITS_LIMIT	6ACh	Tape	Hit rev lpos limit during data chan gain calib
SRV_INVALID_MSG_TYPE	6ADh	Servo	

SCSI_FAILED_STATUS_00	6AEh	SCSI	
MIC_LTO1	6AFh	Medium Auxiliary Memory	LTO1 type cartridge
MIC_LTO2	6B0h	Medium Auxiliary Memory	LTO2 type cartridge
SCSI_FAILED_STATUS_01	6B1h	SCSI	
SCSI_FAILED_STATUS_02	6B2h	SCSI	
SCSI_FAILED_STATUS_03	6B3h	SCSI	
SCSI_FAILED_STATUS_04	6B4h	SCSI	
SCSI_FAILED_STATUS_05	6B5h	SCSI	
SCSI_FAILED_STATUS_06	6B6h	SCSI	
SCSI_FAILED_STATUS_07	6B7h	SCSI	
SCSI_FAILED_STATUS_08	6B8h	SCSI	
SCSI_FAILED_STATUS_09	6B9h	SCSI	
SCSI_FAILED_STATUS_10	6BAh	SCSI	
SCSI_FAILED_STATUS_11	6BBh	SCSI	
SCSI_FAILED_STATUS_12	6BCh	SCSI	
SCSI_FAILED_STATUS_13	6BDh	SCSI	
SCSI_FAILED_STATUS_14	6BEh	SCSI	
SCSI_FAILED_STATUS_15	6BFh	SCSI	
SCSI_FAILED_STATUS_16	6C0h	SCSI	
SCSI_FAILED_STATUS_17	6C1h	SCSI	
SCSI_FAILED_STATUS_18	6C2h	SCSI	
SCSI_FAILED_STATUS_19	6C3h	SCSI	
SCSI_FAILED_STATUS_20	6C4h	SCSI	
SCSI_FAILED_STATUS_21	6C5h	SCSI	
SCSI_FAILED_STATUS_22	6C6h	SCSI	
SCSI_FAILED_STATUS_23	6C7h	SCSI	
SCSI_FAILED_STATUS_24	6C8h	SCSI	
SCSI_FAILED_STATUS_25	6C9h	SCSI	
SCSI_FAILED_STATUS_26	6CAh	SCSI	
SCSI_FAILED_STATUS_27	6CBh	SCSI	
SCSI_FAILED_STATUS_28	6CCh	SCSI	
SCSI_FAILED_STATUS_29	6CDh	SCSI	
SCSI_FAILED_STATUS_30	6CFh	SCSI	
SCSI_FAILED_STATUS_31	6D0h	SCSI	
SCSI_FAILED_STATUS_32	6D1h	SCSI	
SCSI_FAILED_STATUS_33	6D2h	SCSI	
SCSI_FAILED_STATUS_34	6D3h	SCSI	
SCSI_FAILED_STATUS_35	6D4h	SCSI	
SCSI_FAILED_STATUS_36	6D5h	SCSI	
SCSI_FAILED_STATUS_37	6D6h	SCSI	
SCSI_FAILED_STATUS_38	6D7h	SCSI	
SCSI_FAILED_STATUS_39	6D8h	SCSI	
SCSI_FAILED_STATUS_40	6D9h	SCSI	
SRV_UNTHREAD_RETRY_PIVOT_TRACK_ENGAGE	6DAh	Servo	Exception: Not able to engage Lower Track during Unthread. Will try again.
SRV_THREAD_RETRY_PIVOT_TRACK_ENGAGE	6DBh	Servo	Exception: Not able to engage Lower Track during Thread. Will try again.
SRV_UNTHREAD_RETRY_PIVOT_TRACK_DISENGAGE	6DCh	Servo	Exception: Not able to disengage Lower Track during Unthread. Will try again.
SRV_THREAD_RETRY_PIVOT_TRACK_DISENGAGE	6DDh	Servo	Exception: Not able to disengage Lower Track during Thread. Will try again.
DSM_CMPR_READ_DP_END_MARK_IN_RECORD	6DEh	Data set manager	Decompression error - illegal end mark inside record
SRV_PARK_CART_EXPECTED_TRAY_OUT	6DFh	Servo	
SRV_PARK_CART_FAILED_EJECT	6E0h	Servo	
SRV_REEL_CART_HAS_STALLED	6E1h	Servo	

SRV_INVALID_CARTRIDGE_RADIUS	6E2h	Servo	
SRV_PIVOT_TRACK_RETRY_ENGAGE	6E3h	Servo	
SRV_PIVOT_TRACK_ENGAGE_RETRIES_EXHAUSTED	6E4h	Servo	
SRV_PIVOT_TRACK_RETRY_DISENGAGE	6E5h	Servo	
SRV_PIVOT_TRACK_DISENGAGE_RETRIES_EXHAUSTED	6E6h	Servo	
SRV_CART_REEL_OPEN_LOOP_RUNAWAY	6E7h	Servo	
SRV_CART_REEL_CLOSED_LOOP_RUNAWAY	6E8h	Servo	Cartridge run away detected during closed loop.
SRV_SZA_TZA_INTERFACE_BUSY	6E9h	Servo	
SRV_SZA_TZA_FUNCTION_ACTIVE	6EAh	Servo	
SRV_SZA_TZA_WRITE_COUNT_TOO_LARGE	6EBh	Servo	
SRV_WRITE_SZA_TZA_INVALID_CHIP_ID	6ECh	Servo	
SRV_WRITE_SZA_INVALID_ADDR	6EDh	Servo	
SRV_WRITE_TZA_INVALID_ADDR	6EEh	Servo	
SRV_TX_BUFFER_OVERFLOW	6EFh	Servo	
SRV_GOTO_LC_UNEXPECTED_MESSAGE_IN_RAMP_DOWN_STATE	6F0h	Servo	
SRV_ROTATE_UNEXPECTED_MESSAGE_IN_IDLE_STATE	6F1h	Servo	
SRV_REEL_ALIGN_SLOT_FAILED_WRITING_TO_LINEAR_COUNTER_API_BUSY	6F2h	Servo	
SRV_REEL_UNEXPECTED_MESSAGE_IN_FINDZERO_STATE	6F3h	Servo	
CALIB_GAIN_DONE_WARNING_HIGH_HEAD_OUTPUT	6F4h	Calibration	
CALIB_GAIN_FAILED_LOW_HEAD_OUPUT	6F5h	Calibration	
CALIB_GAIN_FAILED_HIGH_HEAD_OUPUT	6F6h	Calibration	
CALIB_GAIN_ERROR_IN_SAMPLE_COUNT	6F7h	Calibration	
CALIB_GAIN_INVALID_MSG	6F8h	Calibration	
CALIB_GAIN_UNEXPECTED_SVO_ALERT	6F9h	Calibration	
CALIB_GAIN_UNEXPECTED_CMD_TYPE	6FAh	Calibration	
CALIB_GAIN_UNEXPECTED_ZONE_END	6FBh	Calibration	
CALIB_WI_FILTER_ORDER_TOO_SMALL	6FCh	Calibration	
CALIB_WI_FILTER_ORDER_TOO_LARGE	6FDh	Calibration	
CALIB_WI_CURVE_FIT_MAX_TOO_SMALL	6FEh	Calibration	
CALIB_WI_CURVE_FIT_MIN_TOO_LARGE	6FFh	Calibration	
CALIB_WI_CURVE_FIT_MAX_LESS_THAN_MIN	700h	Calibration	
CALIB_WI_CURVE_FIT_MIN_POS_LESS_THAN_MAX	701h	Calibration	
CALIB_WI_CURVE_FIT_MID_NOT_FOUND	702h	Calibration	
CALIB_WI_CURVE_FLAT_FROM_AMP	703h	Calibration	
CALIB_WI_CURVE_FLAT_FROM_INDEX	704h	Calibration	
CALIB_WI_CURVE_FIT_SAFE_INDEX_NOT_FOUND	705h	Calibration	
CALIB_WI_UNEXPECTED_CMD_TYPE	706h	Calibration	
CALIB_ILLEGAL_DELILAH_REG	707h	Calibration	
CALIB_ILLEGAL_HERACLES_REG	708h	Calibration	
SRV_REEL_UNEXPECTED_MESSAGE_IN_FAST_REPOSITION_STATE	709h	Servo	
CALIB_GAIN_DONE_WARNING_LOW_HEAD_OUTPUT	70Ah	Calibration	
SRV_CANNOT_CALCULATE_SERVO_BAND_ID_BECAUSE_BOTH_SERVOS_MISSING	70Bh	Servo	
SRV_CANNOT_CALCULATE_SERVO_BAND_ID_BECAUSE_BOTTOM_SERVO_MISSING	70Ch	Servo	
SRV_CANNOT_CALCULATE_SERVO_BAND_ID_BECAUSE_TOP_SERVO_MISSING	70Dh	Servo	

SRV_CANNOT_CALCULATE_SERVO_BAND_ID_BECAUSE_SOME_SERVO_MISSING	70Eh	Servo	
SRV_POST_INTERRUPT_FAILED_TIMER2_INTERRUPT_UNEXPECTEDLY_OCCURRED	70Fh	Servo	Unexpected timer2 interrupt occured during POST
SRV_POST_INTERRUPT_FAILED_PARPORT_INTERRUPT_UNEXPECTEDLY_OCCURRED	710h	Servo	Unexpected parport interrupt occured during POST
SRV_POST_INTERRUPT_FAILED_TIMER1	711h	Servo	POST interrupt test failed at timer1
SRV_POST_INTERRUPT_FAILED_TIMER2	712h	Servo	POST interrupt test failed at timer2
SRV_POST_INTERRUPT_FAILED_WATCHDOG	713h	Servo	POST interrupt test failed at watchdog
SRV_POST_INTERRUPT_FAILED_SELF	714h	Servo	POST interrupt test failed at self irq
SRV_POST_INTERRUPT_FAILED_PARPORT	715h	Servo	POST interrupt test failed at parallel port
SRV_POST_INTERRUPT_FAILED_RTC	716h	Servo	POST interrupt test failed at rtc
SRV_POST_INTERRUPT_FAILED_UART_TRANSMIT	717h	Servo	POST interrupt test failed at uart transmit
SRV_POST_INTERRUPT_FAILED_MOTOR_AND_SERVO_FIQ	718h	Servo	POST interrupt test failed at servo fiq and servo fiq
SRV_POST_INTERRUPT_FAILED_TIMER1_INTERRUPT_UNEXPECTEDLY_OCCURRED	719h	Servo	Unexpected timer1 interrupt occured during POST
SRV_PARK_CART_EXPECTED_SNS2_LOW	71Ah	Servo	
SRV_SEQ_INVALID_STATE_AFTER_INITIALIZE	71Bh	Servo	
SRV_SEQ_UNABLE_TO_FIND_M1_MECH_INDEX	71Ch	Servo	
SRV_SEQ_UNABLE_TO_FIND_M2_MECH_INDEX	71Dh	Servo	
SRV_SEQ_LINEAR_COUNTER_NOT_RECORDED_PREVIOUSLY	71Eh	Servo	
SRV_SEQ_INDEX_NOT_FOUND	71Fh	Servo	
SRV_REEL_INVALID_CALIBRATE_OPTION	720h	Servo	
DSM_CMPR_TIMEOUT_WHEN_ATTEMPT_CLEAR_GO_BIT	721h	Data set manager	Timeout waiting for DP hardware to finish processing
SRV_THR_INITIALIZE_CART_SENSORS_INVALID	722h	Servo	Cartridge Sensors are Invalid
SCSI_CMD_REFS_EXHAUSTED_23	723h	SCSI	
SCSI_UA_INITIATOR_LOGGED_OUT	724h	SCSI	
SCSI_NEG_UNTAGGED_NEXUS_CNT_FOR_NEXUS	725h	SCSI	
SCSI_NEG_UNTAGGED_NEXUS_CNT_FOR_NEXUS_SET	726h	SCSI	
SCSI_INVALID_EXEC_MGMT_CODE	727h	SCSI	
SCSI_INVALID_TRANSPORT_COUNT_00	728h	SCSI	
SCSI_INVALID_TRANSPORT_COUNT_01	729h	SCSI	
SCSI_INVALID_TRANSPORT_COUNT_02	72Ah	SCSI	
SCSI_INVALID_TRANSPORT_COUNT_03	72Bh	SCSI	
SCSI_STS_RC_REGISTERED_CANNOT_SERVICE_RELEASE_CMD	72Ch	SCSI	
SCSI_STS_RC_REGISTERED_CANNOT_SERVICE_RELEASE_CMD_1	72Dh	SCSI	
SCSI_STS_RC_REGISTERED_CANNOT_ISSUE_RESERVE_RELEASE	72Eh	SCSI	
SCSI_STS_RC_EXCLUSIVE_ACCESS_PREVENT_THIS_IID	72Fh	SCSI	
SCSI_STS_RC_EXCLUSIVE_ACCESS_PREVENT_NON_ZERO_PREVENT_BIT	730h	SCSI	
SCSI_STS_RC_EXCLUSIVE_ACCESS_REG_PREVENT_NON_REGISTER_IID	731h	SCSI	
SCSI_STS_RC_EXCLUSIVE_ACCESS_REG_PREVENT_NON_ZERO_PREVENT_BIT	732h	SCSI	
SCSI_STS_RC_NON_ZERO_PR_KEY	733h	SCSI	
SCSI_STS_RC_PR_KEY_NO_MATCH	734h	SCSI	

SCSI_STS_RC_IID_NOT_REGISTERED_YET	735h	SCSI	
SCSI_STS_RC_TYPE_SCOPE_NO_MATCH	736h	SCSI	
SCSI_STS_RC_PR_RESERVED_EXIST	737h	SCSI	
SCSI_STS_RC_PR_NO_MATCH_SERVICE_ACTION_KEY	738h	SCSI	
SCSI_STS_RC_PREEMPTED_WITH_SERVICE_ACTION_KEY_ZERO	739h	SCSI	
SCSI_STS_PR_TYPE_SCOPE_NO_MATCH	73Ah	SCSI	
SCSI_UNKNOWN_SIGNAL_NODE_00	73Bh	SCSI	
SCSI_INFO_STRUCTS_EXHAUSTED_01	73Ch	SCSI	
SCSI_UNKNOWN_SIGNAL_NODE_01	73Dh	SCSI	
SCSI_UNEXPECTED_NULL_SIGNAL_NODE	73Eh	SCSI	
SCSI_INVALID_COMMAND_REFERENCE_NUMBER_00	73Fh	SCSI	
SCSI_INVALID_COMMAND_REFERENCE_NUMBER_01	740h	SCSI	
SCSI_INVALID_COMMAND_REFERENCE_NUMBER_02	741h	SCSI	
SCSI_FCP_INVALID_PORT_NUMBER_DISABLE_PORT	742h	SCSI	
SCSI_FCP_INVALID_PORT_NUMBER_ENABLE_PORT	743h	SCSI	
CALIB_CHKSUM_GOOD	744h	Calibration	Calibration is done
CALIB_CHKSUM_COPIED	745h	Calibration	Data file copied for another drive
CALIB_CHKSUM_MODIFIED	746h	Calibration	The calibration table have been modified.
CALIB_CHKSUM_RERUN	747h	Calibration	Many changes to the data file, needs to rerun calibration
CALIB_ILLEGAL_PALADIN_REG	748h	Calibration	Reserved for Calib
CALIB_GAIN_NO_STATUS	749h	Calibration	Indicates no status available before calibration creates the status
CALIB_FLASH_UPDATE_TERMINATED	74Ah	Calibration	Flash update terminated for some reason
CALIB_FLASH_INIT_TERMINATED	74Bh	Calibration	Flash initialization was terminated for some reason.
CALIB_WI_MAX_POS_TOO_LARGE	74Ch	Calibration	maximum amplitude was found too far down the sweep
CALIB_HIGH_ISAT_VARIATION	74Dh	Calibration	The VGA variation between adjacent points was greater than ISAT_MAX_VARIATION
CALIB_RSV_74E	74Eh	Calibration	
CALIB_RSV_74F	74Fh	Calibration	
CALIB_RSV_750	750h	Calibration	
CALIB_RSV_751	751h	Calibration	
CALIB_RSV_752	752h	Calibration	
CALIB_RSV_753	753h	Calibration	
CALIB_RSV_754	754h	Calibration	
CALIB_RSV_755	755h	Calibration	
CALIB_RSV_756	756h	Calibration	
CALIB_RSV_757	757h	Calibration	
CALIB_RSV_758	758h	Calibration	
CALIB_RSV_759	759h	Calibration	
CALIB_RSV_75A	75Ah	Calibration	
CALIB_RSV_75B	75Bh	Calibration	
CALIB_RSV_75C	75Ch	Calibration	
CALIB_RSV_75D	75Dh	Calibration	
CALIB_RSV_75E	75Eh	Calibration	
CALIB_RSV_75F	75Fh	Calibration	
CALIB_RSV_760	760h	Calibration	
CALIB_RSV_761	761h	Calibration	
CALIB_RSV_762	762h	Calibration	
CALIB_RSV_763	763h	Calibration	
CALIB_RSV_764	764h	Calibration	

CALIB_RSV_765	765h	Calibration	
CALIB_RSV_766	766h	Calibration	
CALIB_RSV_767	767h	Calibration	
CALIB_RSV_768	768h	Calibration	
CALIB_RSV_769	769h	Calibration	
CALIB_RSV_76A	76Ah	Calibration	
CALIB_RSV_76B	76Bh	Calibration	
CALIB_RSV_76C	76Ch	Calibration	
CALIB_RSV_76D	76Dh	Calibration	
CALIB_RSV_76E	76Eh	Calibration	
CALIB_RSV_76F	76Fh	Calibration	Reserved for Calib
SRV_CART_MOTOR_DEMAND_LIMIT_EXCEEDED	770h	Servo	
SRV_DRIVE_MOTOR_DEMAND_LIMIT_EXCEEDED	771h	Servo	
WRL_PAL_FIQ_IS_NOT_CLEARED	772h	General	
SCSI_PDETECT_NOT_FOUND_01	773h	SCSI	
SCSI_PDETECT_NOT_FOUND_02	774h	SCSI	
SCSI_PDETECT_NOT_FOUND_03	775h	SCSI	
SCSI_PDETECT_NOT_FOUND_04	776h	SCSI	
SCSI_PDETECT_NOT_FOUND_05	777h	SCSI	
SCSI_PDETECT_NOT_FOUND_06	778h	SCSI	
SCSI_PDETECT_NOT_FOUND_07	779h	SCSI	
SCSI_PDETECT_NOT_FOUND_08	77Ah	SCSI	
SCSI_PDETECT_NOT_FOUND_09	77Bh	SCSI	
SCSI_PDETECT_NOT_FOUND_10	77Ch	SCSI	
SCSI_PDETECT_NOT_FOUND_11	77Dh	SCSI	
SRV_SERIAL_EEPROM_TIMEOUT	77Eh	Servo	Servo Serial EEPROM timeout
SRV_SERIAL_EEPROM_BUSY	77Fh	Servo	Serial EEPROM was busy with a command when another was received
SRV_SERIAL_EEPROM_REMAP_FAILED	780h	Servo	Serial EEPROM failed to remap a bad page
SRV_SRL_RX_FIFO_OVERRUN	781h	Servo	
SRV_READ_SZA_TZA_INVALID_CHIP_SELECT	782h	Servo	
SRV_UNDEFINED_INSTR	783h	Servo	
SRV_PREFETCH_ABORT	784h	Servo	
SRV_DATA_ABORT	785h	Servo	
SRV_SOFTWARE_INTERRUPT	786h	Servo	
SRV_RETURN_FROM_MAIN	787h	Servo	
SRV_MOTOR_BIAS_VALUE_OUT_OF_RANGE	788h	Servo	
SRV_THREAD_RETRY_EXCEEDED_RECHUCK_RETRIES	789h	Servo	Unable to chuck cartridge during Thread
SRV_THREAD_RETRY_DISENGAGE_FAILED	78Ah	Servo	The Drive is unable to Thread Retry because of the Pivot Track
SRV_THREAD_RETRY_CANT_EJECT_BECAUSE_OF_LOAD_ARM	78Bh	Servo	Unable to eject the Cartridge during Thread retries
SRV_THREAD_RETRY_DISENGAGE_PIVOT_TRACK_FAILED	78Ch	Servo	Unable to Disengage Pivot Track during Thread Retries
SRV_THREAD_RETRY_LOAD_ARM_STALLED_GOING_TO_HOME	78Dh	Servo	Load Arm stalled going to home during a Thread Retry
SRV_REEL_INVALID_CALIB_DATA_FROM_FLASH	78Eh	Servo	
SCSI_ENABLE_SELECTION_FAILED	78Fh	SCSI	
SCSI_DISABLE_SELECTION_FAILED	790h	SCSI	
SCSI_ENABLE_AUTO_BUSY_FAILED	791h	SCSI	
SCSI_DISABLE_AUTO_BUSY_FAILED	792h	SCSI	
SRV_PALADIN_VERSION_DOES_NOT_MATCH_WRL_VERSION	793h	Servo	
DSM_MIC_INQUIRY_FAILED	794h	Data set manager	MIC failed the MIC_INQUIRY command

DSM_MIC_INQUIRY_RETURNED_INVALID_CARTRIDGE_GEN	795h	Data set manager	MIC firmware task returned illegal cartridge generation
SRV_REEL_ACTIVE_FUNCTION_IS_NULL	796h	Servo	
SCSI_CMD_REFS_EXHAUSTED_24	797h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_25	798h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_26	799h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_27	79Ah	SCSI	
SCSI_CMD_REFS_EXHAUSTED_28	79Bh	SCSI	
SCSI_CMD_REFS_EXHAUSTED_29	79Ch	SCSI	
SCSI_CMD_REFS_EXHAUSTED_30	79Dh	SCSI	
SCSI_CMD_REFS_EXHAUSTED_31	79Eh	SCSI	
SCSI_CMD_REFS_EXHAUSTED_32	79Fh	SCSI	
SCSI_CMD_REFS_EXHAUSTED_33	7A0h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_34	7A1h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_35	7A2h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_36	7A3h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_37	7A4h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_38	7A5h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_39	7A6h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_40	7A7h	SCSI	
SCSI_FCP_CNTL_MISSPECIFIED	7A8h	SCSI	
SRV_SZA_TZA_WRITE_COUNT_IS_ZERO	7A9h	Servo	
SRV_CMDPROC_INVALID_STATE_OF_DRIVE	7AAh	Servo	
SRV_THR_TAKE_UP_SLACK_FAILED	7ABh	Servo	Drive failed to remove tape slack in cartridge
RTOS_UNDEFINED_INSTR	7ACh	RTOS	RTOS undefined instruction exception interrutp
RTOS_PREFETCH_ABORT	7ADh	RTOS	RTOS prefetch abort exception interrupt
RTOS_DATA_ABORT	7AEh	RTOS	RTOS data abort exception interrupt
RTOS_SOFTWARE_INTERRUPT	7AFh	RTOS	RTOS Software Interrupt Exception
RTOS_RETURN_FROM_MAIN	7B0h	RTOS	RTOS return from main error
SCSI_CREATE_HANDLER	7B1h	SCSI	Iona Create Task or Create Queue exception occurred
RTOS_STACK_CHECK_HANDLER	7B2h	RTOS	RTOS Stack Check Handler Exception Interrupt
RTOS_TRAP_HANDLER	7B3h	RTOS	rt_trap exception handler interrupt
SCSI_IONA_ER_EVENT_ID	7B4h	SCSI	Iona Event Id Error - Invalid event ID.
SCSI_IONA_ER_EVENT_HANDLER	7B5h	SCSI	Event Handler Error - invalid handler associated with event
SCSI_IONA_ER_EVENT_ALREADY_SET	7B6h	SCSI	Event flag already set
SCSI_IONA_ER_EVENT_NOT_SET	7B7h	SCSI	Event flag not set when suspending
SCSI_IONA_ER_VT_ID	7B8h	SCSI	invalid virtual timer id, no associated handler
SCSI_IONA_ER_VT_NULL_HANDLER	7B9h	SCSI	Virtual timer tried to execute null handler
SCSI_IONA_ASSERT_ERROR	7BAh	SCSI	Assert occurred at location specified
SCSI_IONA_ER_MAIL_BUSY	7BBh	SCSI	Mailbox in use
SCSI_IONA_ER_00	7BCh	SCSI	Unused status
SCSI_IONA_ER_MAIL_READ_ERROR	7BDh	SCSI	IMICRO status reported a read word error
SCSI_IONA_ER_MAIL_WRITE_ERROR	7BEh	SCSI	IMICRO Status reported a write word error
SCSI_IONA_ER_TIME_OUT	7BFh	SCSI	Iona rtos timeout
SCSI_IONA_ER_NO_MESSAGE	7C0h	SCSI	Iona no message present
SCSI_IONA_ER_QUEUE_FULL	7C1h	SCSI	Iona Queue full
SCSI_IONA_ER_MBOX_FREE_QUEUE_EMPTY	7C2h	SCSI	MBox free queue empty - no available slots in free queue
SCSI_IONA_ER_UNKNOWN_INTERRUPT	7C3h	SCSI	Can't determine the cause of an interrupt
SCSI_IONA_ER_ERR	7C4h	SCSI	Scsi Iona unknown error
SRV_CMDPROC_INVALID_OPTION	7C5h	Servo	
SCSI_STS_BUSY_LOW_PCMD_THRESHOLD_REACHED	7C6h	SCSI	High number of pCmds already in use so report BUSY.
SCSI_STS_BSY_LOW_PCMD_THRESHOLD_REACHED	7C7h	SCSI	
SRV_MON_INVALID_WRITE_ADDRESS	7C8h	Servo	
SRV_THR_MOTOR_INVALID	7C9h	Servo	User requested unsupported Threader Motor

SRV_HW_DIVIDER_INVALID_SCALE	7CAh	Servo	
SRV_HW_DIVIDER_TIMEOUT	7CBh	Servo	
SRV_HW_DIVIDER_DIVIDE_BY_ZERO	7CCh	Servo	
SRV_HW_DIVIDER_OVERFLOW	7CDh	Servo	
SRV_TIMEOUT_DURING_HEAD_STEPPER_MOVING_TO_POSITION_CL_FAR	7CEh	Servo	
SRV_TIMEOUT_DURING_HEAD_STEPPER_MOVING_TO_POSITION_CL_NEAR	7CFh	Servo	
SRV_THR_LOAD_ARM_AT_OLD_SENSOR7	7D0h	Servo	Notification that Load Arm has passed the old Sensor 7 position (between heads a
SRV_TRK_ACTIVE_FUNCTION_IS_NULL	7D1h	Servo	
SRV_TRK_UNEXPECTED_MESSAGE_RECV_CMD_STATE	7D2h	Servo	
SRV_TRK_UNEXPECTED_MESSAGE_RECV_RESP_STATE	7D3h	Servo	
SRV_TRK_UNEXPECTED_MESSAGE_SEND_RESP_STATE	7D4h	Servo	
SRV_TRK_MAXIMUM_STATE_EXCEEDED	7D5h	Servo	
SRV_CMDPROC_INVALID_PDAC_MODE	7D6h	Servo	
SRV_MON_WRONG_NUMBER_OF_PARAMETERS	7D7h	Servo	
SRV_MON_INVALID_MODE	7D8h	Servo	
SRV_MON_INVALID_PDAC_NUM	7D9h	Servo	
SRV_MON_INVALID_SCALE	7DAh	Servo	
SRV_CMDPROC_INVALID_PDAC_NUM	7DBh	Servo	
SRV_SELF_INT_BAND_ID_TIMEOUT	7DCh	Servo	
SRV_TRK_BAND_ID_TIMEOUT	7DDh	Servo	
SRV_RESERVED	7DEh	Servo	Fibre Channel Port Signal Status
SRV_VAR_SPEED_ENABLE_REQUIRES_DRIVE_READING_OR_WRITING	7DFh	Servo	
SRV_HEAD_BRUSH_IS_NOT_PRESENT	7E0h	Servo	
SRV_THR_HEAD_BRUSH_SENSOR_MISSING	7E1h	Servo	Head Brush sensor not detected
SRV_STEPPER_BUSY	7E2h	Servo	Stepper Motor is already busy.
SRV_THR_PIVOT_TRACK_ENGAGE_MISSED_SENSOR	7E3h	Servo	Never saw sensor while engaging the Pivot Track
SRV_THR_PIVOT_TRACK_DISENGAGE_MISSED_SENSOR	7E4h	Servo	Never saw sensor while disengaging the Pivot Track
SRV_STEP_HEAD_BRUSH_PCC_UNKNOWN_COMMAND	7E5h	Servo	Unknown Head Brush Stepper command
SRV_STEP_PIVOT_TRACK_PCC_UNKNOWN_COMMAND	7E6h	Servo	Unknown Pivot Track stepper motor command
SRV_STEP_HEAD_POSITIONER_PCC_UNKNOWN_COMMAND	7E7h	Servo	Low level Head Positioner driver received an unknown command.
SRV_HEAD_POSITIONER_MISSED_SENSOR	7E8h	Servo	Coarse Head Positioner sensor was not detected.
SRV_THR_HEAD_BRUSH_STUCK_ON_SENSOR	7E9h	Servo	Head Brush Cleaner could not get off of the Head Brush sensor.
SCSI_IONA_ER_UNKNOWN_ASPEN_STATE	7EAh	SCSI	Aspen_State variable contains unknown value.
IONA_RTOS_UNDEFINED_INSTR	7EBh	General	Iona RTOS undefined instruction exception interrupt
SCSI_IONA_ER_INVALID_RECEIVED_MESSAGE_COUNT	7ECh	SCSI	Aspen_Process_Message got invalid message count
SCSI_IONA_ER_IMPROPER_EXIT_FROM_MESSAGE_HANDLING	7EDh	SCSI	Aspen_Process_Message() message processing loop exited prematurely
IONA_RTOS_PREFETCH_ABORT	7EEh	General	RTOS prefetch abort exception interrupt
IONA_RTOS_DATA_ABORT	7EFh	General	IONA RTOS data abort exception interrupt
IONA_RTOS_SOFTWARE_INTERRUPT	7F0h	General	RTOS Software Interrupt Exception
IONA_RTOS_RETURN_FROM_MAIN	7F1h	General	RTOS return from main error
IONA_RTOS_STACK_CHECK_HANDLER	7F2h	General	RTOS Stack Check Handler Exception Interrupt

IONA_RTOS_TRAP_HANDLER	7F3h	General	rt_trap exception handler interrupt
SCSI_PCMD_LOSTINFEHEAD_41	7F4h	SCSI	
SCSI_PCMD_LOSTINFEHEAD_42	7F5h	SCSI	
SRV_HEAD_STEPPER_NOT_WITHIN_RANGE	7F6h	Servo	
SRV_SEQ_EXCEED_WRAP_RETRY	7F7h	Servo	
SCSI_STATUS_RESERVED	7F8h	SCSI	
TAPE_CMD_RETRY	7F9h	Tape	Write: Unable to service the receiving command at this point, ask Sender to retr
SRV_NO_DATA_BAND_ID	7FAh	Servo	Not enough good top and bottom PES to extract databand id.
SRV_SEQ_DRIVE_NOT_INITIALIZED	7FBh	Servo	
SCSI_RESERVED_7FC	7FCh	SCSI	
CM_WRITE_FAILED	7FDh	Medium Auxiliary Memory	cm_buf_unlock failure
EEP_WRITE_FAILED	7FEh	Medium Auxiliary Memory	eep_buf_unlock failure
CM_SET_WRITE_PASS_FAILED	7FFh	Medium Auxiliary Memory	cm_set_write_pass failure
SRV_HEAD_OFFSET_VERY_HIGH	800h	Servo	
SRV_THR_UNEXPECTED_MESSAGE	801h	Servo	Load Thread Task received an unexpected message.
SRV_THR_SEEP_NULL_HANDLER	802h	Servo	Load Thread Task recieved an unexpected message.
SRV_SERIAL_EEPROM_CHECKSUM_ERROR	803h	Servo	Servo EEPROM checksum error.
SRV_SERIAL_EEPROM_READ_AFTER_WRITE_FAILED	804h	Servo	A page read from the Serial EEPROM did not match the same page written to it.
SRV_SERIAL_EEPROM_UNINITIALIZED	805h	Servo	Servo's Serial EEPROM was unitialized upon power up
SRV_THR_SEEPROM_VERIFY_FAILED	806h	Servo	Serial EEPROM failed diagnostic test
SCSI_IONA_ER_ERR_01	807h	SCSI	Scsi Iona unknown error in Iona_initialize_primitive()
SCSI_IONA_ER_ERR_02	808h	SCSI	Scsi Iona unknown error in Iona_thread_engine()
SCSI_IONA_ER_ERR_03	809h	SCSI	Scsi Iona unknown error in Iona_initialize_thread()
SCSI_IONA_ER_ERR_04	80Ah	SCSI	Scsi Iona unknown error in Iona_primitive_engine()
SCSI_IONA_ER_ERR_05	80Bh	SCSI	Scsi Iona unknown error 2 in Iona_primitive_engine()
SCSI_IONA_ER_ERR_06	80Ch	SCSI	Scsi Iona unknown error in Iona_prim_push_thread()
MIC_NO_INIT_DATA_LTO1	80Dh	Medium Auxiliary Memory	No initialization data for LTO1 cart
MIC_NO_INIT_DATA_LTO2	80Eh	Medium Auxiliary Memory	No initialization data for LTO2 cart
SCSI_LIB_XFERDONE_NOT_FOUND	80Fh	SCSI	pFE_XferDone null for library command
SCSI_LIB_COMPDONE_NOT_FOUND	810h	SCSI	pFE_CompDone null for library command
DSM_READ_SWITCH_WRAP_NEEDS_DSN	811h	Data set manager	Unexpected firmware condition occurred while locating or spacing.
SRV_REPOSITION_DISTANCE_TOO_LONG	812h	Servo	
SRV_THR_BICELL_CENTER_FLAG_FINAL_OUT_OF_RANGE	813h	Servo	Bicell Window Failed
SRV_UNTHREAD_RETRY_CANT_HIT_ZONE	814h	Servo	Unable to make it to the Cartridge Bicell target zone during Unthread.
SRV_INVALID_KDAMP_VALUE	815h	Servo	

SCSI_CHIP_SET_PARAMETERS_TIME_OUT	816h	SCSI	IONA_IPC_COMMAND_SET_PARAMETERS timeout.
SCSI_CHIP_PON_COMPLETE_TIME_OUT	817h	SCSI	Power On Sequence not completed.
SRV_KLOOP_IS_NOT_CALIBRATED	818h	Servo	
TAPE_NANOCODE_MISMATCH	819h	Tape	The nanocode downloaded does not match intended nanocode
MIC_NO_MEDIA_INFO_LTO1	81Ah	Medium Auxiliary Memory	
MIC_NO_MEDIA_INFO_LTO2	81Bh	Medium Auxiliary Memory	
MIC_BAD_MEDIA_INFO_LTO1	81Ch	Medium Auxiliary Memory	
MIC_BAD_MEDIA_INFO_LTO2	81Dh	Medium Auxiliary Memory	
SRV_THR_UNTHREAD_STUCK_ON_GUIDES_EXCEEDED_RETRIES	81Eh	Servo	Load Arm stuck between corner and end of guides during Unthread.
SRV_UNTHREAD_LAST_DITCH_FAILED_TO_PUT_PIN_AWAY	81Fh	Servo	Cannot Unthread
SRV_VAR_SPEED_RAMP_UP_REQUIRES_READ_OR_WRITE_TRACKING_MODE	820h	Servo	
SRV_THR_LOAD_ARM_MOVING_TO_HUB_WHEN_DRIVE_REEL_SPINNING	821h	Servo	Drive Reel spinning while Load Arm is going to drive hub
SRV_SPEED_TOLERANCE_IS_NOT_WITHIN_RANGE	822h	Servo	
SRV_INVALID_WRAP_NUM	823h	Servo	
SRV_DRIVE_REEL_INIT_TEST_FAILED	824h	Servo	
SCSI_IONA_ER_MBOX_INVALID_MSG	825h	SCSI	Iona_event_handler_paladin_mail_received was called without a valid pending mail
SCSI_IONA_ER_IMICRO_INVALID_MSG	826h	SCSI	Iona_isr_mbox_imicro_errors was called with an invalid message
SCSI_IONA_ER_EMICRO_INVALID_MSG	827h	SCSI	Iona_isr_mbox_emicro_errors was called with an invalid message
SCSI_IONA_ER_OUTGOING_MSGQ_INVALID_MSG	828h	SCSI	Iona_isr_mbox_empty was called without a valid outgoing Paladin message pending
SCSI_SAPI_FAILED_TO_GET_FREE_ELEMENT	829h	SCSI	SAPI_IPC_Cmd_Enqueue failed to obtain Free Element
SCSI_SAPI_FAILED_TO_FREE_DEQUEUED_ELEMENT	82Ah	SCSI	SAPI_IPC_Cmd_Dequeue was unable to free a dequeued element
SRV_SEQ_TAPE_IS_NOT_THREADED	82Bh	Servo	
CACHE_INVALID_REGION_SPECIFIED	82Ch	General	
CACHE_INVALID_START_ADDRESS	82Dh	General	
CACHE_ILLEGAL_SIZE_SPECIFIED	82Eh	General	
SCSI_CMD_REFS_EXHAUSTED_LOG_PAGE_33_WRITE_BUFFER	82Fh	SCSI	
SCSI_CMD_REFS_EXHAUSTED_LOG_PAGE_33_FIRMWARE_TAPE	830h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_TASK_MGT	831h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_MAX_CDB_RETRIES	832h	SCSI	
SCSI_CMD_REFS_EXHAUSTED_MAX_DATA_RETRIES	833h	SCSI	
SRV_THREAD_MOVING_TO_DRIVE_HUB_EXCEEDED_RETRIES	834h	Servo	Unable to Thread to the Drive Hub
SRV_UNTHREAD_UNABLE_TO_HOME_LOAD_ARM	835h	Servo	Load Arm Grabber unable to go to home position after Unpick
SRV_INIT_FINDZERO_FAIL	836h	Servo	

SCSI_OFFSET_ERR_ACK_TIMEOUT	837h	SCSI	SCSI offset error caused by ACK timeout
SRV_FAILURE_DURING_TRK_WAITING_FOR_ONTRACK	838h	Servo	Unable to lock on to track after ramp up.
SCSI_UNKNOWN_BE_STATE_42	839h	SCSI	Invalid BE state
SRV_TRACK_LOOP_OSCILATION_FAIL	83Ah	Servo	
SRV_WRAP_RETRY	83Bh	Servo	Rewrap because of invalid radius calculation on 1st wrap
SRV_REQUIRED_PARAMETER_HAS_NO_VALUE	83Ch	Servo	A parameter requiring a value is missing from the command
SRV_POSREEL_POSITIONCART_API_REJECT_BUSY_IN_MOVE_HOME	83Dh	Servo	
SRV_THR_UNTHREAD_ENTRY_UNKNOWN_MECH_STATE	83Eh	Servo	Unrecogized Mechanical State encountered during Unthread Entry
SRV_THR_CART_UNLOAD_EXPECTED_TRAY_OUT_SENSOR	83Fh	Servo	Tray Out sensor did not change during Unload
DSM_RECV_AUTO_LOAD_CMPL_WITH_NO_LOAD_CMD	840h	Data set manager	DSM received the servo auto load complete alert when there was no load command b
SRV_HEAD_POSITION_CLOSED_LOOP_START_STEPS_OFF	841h	Servo	
SRV_TRK_PES_QUALITY_IS_LOWER_THEN_REQUIRED	842h	Servo	
SRV_TRK_CALC_VCM_LOOP_GAIN_NOT_WITHIN_RANGE	843h	Servo	
SRV_HEAD_STEPPER_SEARCHING_FOR_SERVO_BAND	844h	Servo	
THR_DIAG_UNKNOWN_COMMAND	845h	General	Threader Task received unknown Diagnostic command
SRV_NO_OPEN_LOOP_HEAD_POSITION_PRIOR_TO_CLOSED_LOOP	846h	Servo	
THR_SEQ_BICELL_UNKNOWN_PARAMETER	847h	General	Bicell Select command had an unknown parameter
THR_SEQ_UNKNOWN_COMMAND	848h	General	Threader Task received an unknown command from the Sequencer Task
SRV_TRK_VCM_GAIN_LOOP_EXCEEDED_RETRY_LIMIT	849h	Servo	
SRV_REEL_MOTOR_OPEN_LOOP_VELOCITY_RUNAWAY	84Ah	Servo	Reel Motor detected excessive velocity during Open Loop Tension
SRV_REEL_MOTOR_OPEN_LOOP_POSITION_VELOCITY_RUNAWAY	84Bh	Servo	Reel Motor detected position exceeded limits.
DSM_COMMAND_SENDER_INVALID	84Ch	Data set manager	DSM received command from an unexpected or invalid task
SRV_SEQ_VCM_GAIN_LOOP_EXCEEDED_RETRY_LIMIT	84Dh	Servo	
SRV_HEAD_STEPPER_WITHIN_TARGET_BUT_TOO_CLOSE_TO_EDGE_OF_SERVO_BAND	84Eh	Servo	
SRV_CLOSED_LOOP_WRAP_POSITION_TOOK_LONGER_THAN_EXPECTED	84Fh	Servo	Closed loop wrap position should not take longer than 250 ms

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1650 Sunflower Avenue, Costa Mesa, California 92626, USA
Publication Number: 50001368 Printed in USA