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F3 Serial Port Diagnostics

This document uses the following conventions:

- Items highlighted in red indicate a command or feature that is not fully functional. Issuing these commands or selecting these features may produce unexpected results.

Serial Port Diagnostic Modes

The Serial Port interface for platform drives operates in the following three modes:

(1) ESLIP Mode

Power-on default, This mode is enabled by Control-T.

In this mode, the drive will respond only to ESLIP encoded packets received over the serial port interface. The ASCII diagnostic commands described in this document are not available in this mode. In this mode, the native interface (SATA, SCSI, SAS, FC) is alive. This is the default power on mode for the serial port interface.

- Entering a Control-T character from YASPP (or any similar host serial port program) while the drive serial port is in ASCII Online mode or ASCII Diagnostic mode will switch the serial port to ESLIP mode.

- Entering a Control-R character while the drive serial port is in ESLIP mode will switch the serial port to ASCII Online mode.

- Entering a Control-Z character while the drive serial port is in ESLIP mode will switch the serial port to ASCII Diagnostic mode.

(2) ASCII Online Mode

This mode is enabled by Control-R.

In this mode, the drive will respond only to the ASCII Online commands described in this document. It will not respond to ESLIP encoded packets received over the serial port interface. In this mode, the native interface (SATA, SCSI, SAS, FC) is alive.

- Entering a Control-R character from YASPP (or any similar host serial port program) while the drive serial port is in ESLIP mode or ASCII Diagnostic mode will switch the serial port to ASCII Online mode.

- Entering a Control-Z character while the drive serial port is in ASCII Online mode will switch the serial port to ASCII Diagnostic mode.

- Entering a Control-T character while the drive serial port is in ASCII Online mode will switch the serial port to ESLIP mode.

(3) ASCII Diagnostic Mode

This mode is enabled by Control-Z.

In this mode, the drive will respond to all ASCII commands described in this document. It will not respond to ESLIP encoded packets received over the serial port interface.

In this mode, the native interface (SATA, SCSI, SAS, FC) is not alive.

- Entering a Control-Z character from YASPP (or any similar host serial port program) while the drive serial port is in ESLIP mode or ASCII Online mode will switch the serial port to ASCII Diagnostic mode.
- Entering a Control-R character while the drive serial port is in ASCII Diagnostic mode will switch the serial port to ASCII Online mode.
- Entering a Control-T character while the drive serial port is in ASCII Diagnostic mode will switch the serial port to ESLIP mode.

Serial Port Diagnostic Command Levels

All Level Commands

Carriage Return Command: Abort

'/' Command: Change Diagnostic Command Level

'+' Command: Peek Memory Byte

'-' Command: Peek Memory Word

'=' Command: Poke Memory Byte

'@' Command: Batch File Label

'|' Command: Batch File Terminator

'*' Command: Special Batch File Function

'A' Command: Set Test Space

'L' Command: Enable Looping

Level 1 Commands

'B' Command: Buffer Display

'D' Command: Memory Block Display

'G' Command: Generic Read/Write Request

'I' Command: Buffer DLL Tune

'N' Command: SMART Control

'S' Command: Edit Processor Memory Byte

'U' Command: Edit Buffer Memory Byte

'c' Command: Buffer Compare

'e' Command: Spin Down and Reset Drive

'm' Command: Edit Processor Memory Word

Level 2 Commands

'B' Command: Buffer Display

'C' Command: Buffer Copy

'E' Command: Display / Edit Log

'F' Command: Modify Track Defect List

'H' Command: Select Logical Head

'I' Command: Display / Modify Adaptive Parameter

'I,0' Command: Display / Modify CAP

'I,1' Command: Display / Modify RAP revision 02

'I,1' Command: Display / Modify RAP revision 10

'I,1' Command: Display / Modify RAP revision 11

'I,1' Command: Display / Modify RAP revision 14

'I,2' Command: Display / Modify SAP

'I,3' Command: Display / Modify RW Working Parameters

'J' Command: Particle Sweep

'K' Command: Set Tracking Offset

'M' Command: Set Diag Idle Mode

'N' Command: Set Direct Write Mode

'O' Command: Seek Repeatedly Between Physical Cylinders

'P' Command: Set Buffer Pattern

'Q' Command: Write, Read, Read CHS

'R' Command: Read CHS

'S' Command: Seek to Logical Cylinder and Head

'T' Command: Measure Throughput

'U' Command: Spin Up Drive

'V' Command: Read Verify CHS

'W' Command: Write CHS

'X' Command: Display Track Information

'Y' Command: Set Retries - Non-DERP

'Y' Command: Set Retries - DERP

'Z' Command: Spin Down Drive

'c' Command: Buffer Compare

'h' Command: Translate Physical Sector

'i' Command: Display Defects On Current Track

'j' Command: Read Wedge

'l' Command: Translate Logical Sector

'o' Command: Corrupt LBA

'r' Command: Read Long CHS or Read System CHS

's' Command: Seek to Physical Cylinder and Head

't' Command: Translate Wedge

'u' Command: Enable/Disable Channel/Preamp Register Display

'v' Command: Convert Data Track Percentage To Servo Offset Count

'w' Command: Write Long CHS or Write System CHS

'x' Command: Display Zone Information

'y' Command: Set DERP Retry State

'z' Command: Write Wedge

'7' Command: Write Verify CHS

Level 3 Commands

'D' Command: Measure Seek Access Time

'E' Command: Display / Edit Log

'H' Command: Select Logical Head

'O' Command: Seek Repeatedly Between Physical Cylinders

'Q' Command: Write, Read, Write, Read CHS

'R' Command: Read Current Servo Destination

'S' Command: Seek to Logical Cylinder and Head

'U' Command: Spin Up Drive

'V' Command: Read or Write Power ASIC Register

'Z' Command: Spin Down Drive

'b' Command: Load/Unload Heads

'c' Command: Measure Latch Force

'f' Command: Real Time Servo Trace

'p' Command: Translate Physical Sector

'q' Command: Translate Logical Sector

's' Command: Seek to Physical Cylinder and Head

Level 4 Commands

'B' Command: Enable / Disable RVFF

'D' Command: Measure Seek Access Time

'E' Command: Display / Edit Log

'H' Command: Select Logical Head

'K' Command: Set Tracking Offset

'O' Command: Display Micro Jog for Logical Cylinder and Head

'S' Command: Seek to Logical Cylinder and Head

'U' Command: Servo Batch Test sub commands

'e' Command: Enable / Disable PES Output

'l' Command: Scan Track for Servo Defects and ZAP

't' Command: Display / Modify ZAP Table

'u' Command: Set Seek Speed

'v' Command: Butterfly Seek Test

Level 5 Commands

'B' Command: Servo Bode Plot

'C' Command: Generic Servo Command

'D' Command: Read / Unlock DDR Buffer

'E' Command: Measure Disc Eccentricity

'F' Command: Drive Free Fall Protection

'G' Command: Select Servo Controller

'R' Command: Read Servo RAM at Address

'S' Command: Enter Servo Matlab Shell

'U' Command: Enable / Disable Servo Updates

'W' Command: Write Servo RAM at Address

'Z' Command: Read Zap from Disc to Table

'd' Command: Disable / Enable Servo ZAP coefficients and ZAP read

'i' Command: Read Servo Symbol Table at Index

'r' Command: Read Servo RAM at Index

'w' Command: Write Servo RAM at Index

Level 6 Commands

'B' Command: Run Batch File

'D' Command: Display Batch File

'E' Command: Enter Batch File

Level 7 Commands

'B' Command: Buffer Display

'C' Command: Buffer Copy

'D' Command: Display Temperature

'E' Command: Display / Edit Log

'H' Command: Select Logical Head

'I' Command: Display / Modify Adaptive Parameter

'I,0' Command: Display / Modify CAP

'I,1' Command: Display / Modify RAP revision 02

'I,1' Command: Display / Modify RAP revision 10

'I,1' Command: Display / Modify RAP revision 11

'I,1' Command: Display / Modify RAP revision 14

'I,2' Command: Display / Modify SAP

'I,3' Command: Display / Modify RW Working Parameters

'K' Command: Set Track Format

'P' Command: Set Buffer Pattern

'Q' Command: Write, Read, Read CHS

'R' Command: Read CHS

'S' Command: Seek to Logical Cylinder and Head

'U' Command: Channel Temperature Adjustment

'W' Command: Write CHS

'X' Command: Display Preamp Head Resistance

'Y' Command: Set Retries - Non-DERP

'Y' Command: Set Retries - DERP

'Z' Command: Spin Down Drive

'b' Command: Erase Track

'c' Command: Off Track Capability

'h' Command: Mark Media Flaw

'i' Command: Generic Read/Write Request

'm' Command: Display Directed Offline Scan Information

'r' Command: Read Non-Volatile Adaptive Parameters

's' Command: Write Peripheral Register - channel or preamp

't' Command: Read Peripheral Register - channel or preamp

'u' Command: Enable / Disable Write Fault

'w' Command: Save Adaptives To Flash

'x' Command: Display Zone Information

'y' Command: Set DERP Retry State

Level 8 Commands

'C' Command: Servo Diagnostic Sub Commands

'R' Command: Read Current Servo Destination

'S' Command: Seek to Logical Cylinder and Head

'U' Command: Spin Up Drive

'Z' Command: Spin Down Drive

'd' Command: Head Smash Test

Level A Commands

'C' Command: Translate PBA

'D' Command: Translate Symbols From Index

Level C Commands

Level E Commands

Level F Commands

'C' Command: Buffer Copy

'D' Command: Memory Block Display

'P' Command: Set Buffer Pattern

'U' Command: Spin Up Drive

'V' Command: Buffer Compare

'Y' Command: Set Retries - Non-DERP

'Y' Command: Set Retries - DERP

'Z' Command: Spin Down Drive

'b' Command: Set Baud Rate

'r' Command: Read System CHS

's' Command: Seek to Physical Cylinder and Head

't' Command: Write Peripheral Register - channel or preamp

'y' Command: Set DERP Retry State

'z' Command: SATA Debug Athos Shanghai 390

'z' Command: SATA Debug Athos MiPhy 365

'z' Command: SATA Debug SPI SSIP

Level G Commands

'B' Command: Fill Correction Buffer

'C' Command: Copy Correction Buffer

'D' Command: Display Correction Buffer

'F' Command: Fill Super Parity RAM

'G' Command: Display Super Parity RAM

Level H Commands

'B' Command: Buffer Display

'P' Command: Set Buffer Pattern

'S' Command: Seek to Logical Cylinder and Head

'b' Command: Contact Detect

Level L Commands

'C' Command: Copy Log File

'D' Command: Display Log File

'E' Command: Enable / Disable Logging

'I' Command: Display Log File Information

'c' Command: Create Log File

'd' Command: Delete Log File

'i' Command: Initialize Log File

Level T Commands

'B' Command: Set Baud Rate

'E' Command: Display / Edit Log

'F' Command: Set Congen Parameter

'O' Command: Select Data Output Mode

'P' Command: Download Generic File

'R' Command: Read Non-Volatile Adaptive Parameters

'T' Command: Odd Even Encroachment Test

'V' Command: Display Defect Lists

'W' Command: Save Adaptives To Flash

'Z' Command: Erase Seacos Data and Code

'i' Command: Initialize Defect List

'm' Command: Format Partition

'[' Command: ASCII Log Control

Online Commands

Carriage Return Command: Abort

ESCAPE Command: Abort Looping Command or Batch File

Space Command: Pause Output

'!' Command: Display Current Read Channel Settings

'$' Command: Display Read/Write Statistics By Zone

’.’ Command: Display Active Status

’`’ Command: Display Read/Write Statistics

’<’ Command: Decrement Read/Write Scope Sync

’>’ Command: Increment Read/Write Scope Sync

’?’ Command: Display Diagnostic Buffer Information

’{’ Command: Toggle EIB-Specific R/W Tracing

’~’ Command: Display Native Interface Command State

Control A Command: Display Firmware Revision

Control B Command: Get Thermistor Temperature

Control C Command: Firmware Reset

Control D Command: Toggle R/W Tracing

Control E Command: Display Native Interface Configuration

Control F Command: Display Native Interface Read Cache Information

Control I Command: Display Controller Registers

Control K Command: Display DST Status

Control L Command: Display Sign On Message

Control N Command: Toggle R/W Tracing

Control P Command: Toggle Diag Idle Mode

Control Q Command: Resume Interface Task

Control R Command: Enable ASCII Online Serial Port Mode

Control S Command: Pause Interface Task

Control T Command: Enable ESLIP Serial Port Mode

Control U Command: Display Congen

Control V Command: Toggle Interface Command Echo

Control W Command: Enable and Init RW Statistics

Control X Command: Display Native Interface and Read/Write Command History

Control Y Command: Display DST Status

Control Z Command: Enable ASCII Diagnostic Serial Port Mode

Control \ Command: Toggle Debug Display Enable

Serial Port Diagnostic Commands

Abort (All Levels and Online Carriage Return)

Description:
This command terminates any diagnostic command that is in progress and disables looping.

Quick Help:

"Abort";

Input Parameters:
None

Output Data:
None

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Abort Looping Command or Batch File (Online ESCAPE)

Description:
This command aborts the looping of a diagnostic command or the execution of a Batch File.

Quick Help:

"AbortLoopOrBatchFile";

Input Parameters:
None

Output Data:
None

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

ASCII Log Control (Level T '[')

Description:
This command performs various functions associated with the ASCII Log. THe ASCII Log is used to capture ASCII data transfered to the host over the Serial Port Interface.

Quick Help:

"AsciiLogControl, [[LogFunction],[Log]";

Input Parameters:

0 - Select ASCII Log Function.

This parameter selects the following ASCII log functions.

0x09 - Append data to end of ASCII Log.

If Parameter 0 is equal to 9, ASCII data entered from the serial port will be appended to the end of the ASCII log. Entering a carriage return terminates the ASCII data to be appended.

0x0A - Enable ASCII Logging.

If Parameter 0 is equal to 0xA, ASCII Logging will be enabled. When enabled, ASCII Logging will capture all data transfered to the host over the serial port interface to the ASCII Log.

0x0B - Disable ASCII Logging.

If Parameter 0 is equal to 0xB, ASCII Logging will be disabled.

0x0C - Save ASCII Log.

If Parameter 0 is equal to 0xC, the ASCII Log will be copied to the log specified by Parameter 1.

0x0D - Display ASCII Log.

If Parameter 0 is equal to 0xD, the ASCII Log will be displayed.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

1 - Log Number.

If Parameter 0 is equal to 0xC, this parameter specifies the number of the log to which the ASCII Log is to be copied. If Parameter 0 is not equal to 0xC, this parameter will not be used.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred and the contents of an ASCII Log are being displayed, "Log c Entries d"

(Followed by the ASCII data contained in log)

where

c is the log number

d is the number of valid ASCII characters contained in the log

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Batch File Label (All Levels '@')

Description:
This command places a label in a Batch File that can be the destination for Batch File branch instructions. See the Special Batch File Function command (All Levels '*') for a description of the available branch instructions.

Quick Help:

"BatchFileLabel, @[LabelNum]";

Input Parameters:
0 - Label Number.

This parameter specifies the Label Number. The Batch File branch instructions specify this value as the branch destination.

Type: Unsigned 32-bit value

Range: 0 to 0xF

Default: None

Output Data:
None

Revision History:

0001.0000 Initial revision.

Batch File Terminator (All Levels '|')

Description:
This command terminates the entry and execution of a Batch File.

Quick Help:

"BatchFileTerminator, |";

Input Parameters:
None

Output Data:
None

Revision History:

0001.0000 Initial revision.

Buffer Compare (Level 1, 2 'c', Level F 'V')

Description:
The Buffer Compare command compares the contents of the specified source buffer block(s) to the specified reference buffer block(s) and returns an error if a miscompare is detected.

Quick Help:

```
   Level 1 and 2
"BufferCompare, c[SrcBlk],[RefBlk],[NumBlks],[ContOnErr]";
   Level F
"BufferCompare, V[SrcBlk],[RefBlk],[NumBlks],[ContOnErr]";
```

Input Parameters:

0 - First Source Buffer Block Number.

If this parameter is entered, it specifies the number of the first buffer block that contains the source data to be compared.

Type: Unsigned 16-bit value

Range: 0 to Buffer Size (in blocks) minus 1

Default: If this parameter is not entered, the first block of the Diagnostic Read Buffer will be the first source block.

1 - First Reference Buffer Block Number.

If this parameter is entered, it specifies the number of the first buffer block to which the source data is to be compared.

Type: Unsigned 16-bit value

Range: 0 to Buffer Size (in blocks) minus 1

Default: If this parameter is not entered, the first block of the Diagnostic Write Buffer will be the first reference block.

2 - Number of Buffer Blocks to Compare.

This parameter specifies the number of consecutive buffer blocks to be compared.

Type: Unsigned 16-bit value

Range: 1 to maximum number of buffer blocks

Default: If Parameters 0, 1 and 2 are not entered, the entire Diagnostic Read Buffer will be compared to the Diagnostic Write Buffer. If Parameter 2 is not entered and either Parameter 0 or 1 is entered, a single buffer block will be compared.

3 - Continue on Error option.

If this parameter is entered, the compare operation will compare all of the specified bytes and display an error for each miscompare that is detected. If this parameter is not entered, the compare operation will stop when the first miscompare is detected.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If the error is a buffer miscompare, the following additional information will be displayed.

"at SrcBlk = cccc Addr = dddddddd Data = ee, RefBlk = ffff Addr = gggggggg Data = hh"

where

cccc is the number of the Source Buffer Block in which the miscompare occurred.

dddddddd is the address of the Source Buffer byte that miscompared.

ee is the value of the Source Buffer byte that miscompared.

ffff is the number of the Reference Buffer Block in which the miscompare occurred.

gggggggg is the address of the Reference Buffer byte that miscompared.

hh is the value of the Reference Buffer byte that miscompared.

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Buffer Copy (Level 2, 7, F 'C')

Description:

The Buffer Copy command copies the contents of the specified source buffer block(s) to the specified destination buffer block(s).

Quick Help:

"BufferCopy, C[SrcBlk],[DestBlk],[NumBlks]";

Input Parameters:

0 - First Source Buffer Block Number.

If this parameter is entered, it specifies the number of the first buffer block that contains the source data to be copied.

Type: Unsigned 16-bit value

Range: 0 to Buffer Size (in blocks) minus 1

Default: If this parameter is not entered, the first block of the Diagnostic Read Buffer will be the first source block.

1 - First Destination Buffer Block Number.

If this parameter is entered, it specifies the number of the first buffer block to which the source data is to be copied.

Type: Unsigned 16-bit value

Range: 0 to Buffer Size (in blocks) minus 1

Default: If this parameter is not entered, the first block of the Diagnostic Write Buffer will be the first destination block.

2 - Number of Buffer Blocks to Copy.

This parameter specifies the number of consecutive buffer blocks to be copied.

Type: Unsigned 16-bit value

Range: 1 to maximum number of buffer blocks

Default: If Parameters 0, 1 and 2 are not entered, the entire Diagnostic Read Buffer will be copied to the Diagnostic Write Buffer. If Parameter 2 is not entered and either Parameter 0 or 1 is entered, a single buffer block will be copied.

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Buffer Display (Levels 1, 2, 7, F, H 'B')

Description:

The Buffer Display command reads and displays the contents of the specified buffer blocks. Optionally, the buffer data being displayed can be compared to a specified compare buffer blocks, with miscomparing bytes displayed as highlighted text.

Quick Help:

"BufferDisplay, B[DisplayBlk],[RefBlk],[NumBlks],[Opts],[SymBits]";

Input Parameters:

0 - Display Buffer Block.

This parameter specifies the number of the first buffer block to be displayed.

Type: Unsigned 16-bit value

Range: 0 to last buffer block number

Default: If this parameter is not entered, the First block of Diagnostic Read Buffer will be displayed.

1 - Reference Buffer Block.

This parameter specifies the number of the first buffer block that will be compared to the blocks being displayed. Bytes that miscompare will be displayed as highlighted text.

Type: Unsigned 16-bit value

Range: 0 to last buffer block number

Default: If this parameter is not entered and the Display Buffer Block is located in the Diagnostic Read Buffer, the corresponding block in the Diagnostic Write Buffer will be used as the Reference Buffer Block.

2 - Number of Blocks.

This parameter specifies the number of consecutive buffer blocks to be display.

Type: Unsigned 16-bit value

Range: 1 to the number of buffer blocks

Default: 1

3 - Options.

This parameter is a bit-significant value that selects the following options.

Bits 31-1: not used

Bit 0: Disable pause after each block displayed.

If this bit is cleared, the display will pause after each block and wait for the user to enter a character.

If this bit is set, all of the requested blocks will be displayed without pausing.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0 (Enable pause after each block displayed)

4 - Symbol Size.

If this parameter specifies the size, in bits, of the symbols to be displayed.

Type: Unsigned 8-bit value

Range: 1 to 32

Default: 8

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following header will be displayed.

"Buffer Block cccc (eee Bytes/Block)" or
"Buffer Block cccc compared to Buffer Block dddd (eee Bytes/Block)"

where

cccc is the number of the Buffer Block being displayed.

dddd if the number of the Buffer Block to which the displayed block is being compared.

eee is the number of bytes per block.

If the memory data is being displayed as bytes, the following information will be displayed following the header.

```
"  Addr    0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F"
"ffffffff  gg gg gg gg gg gg gg gg gg gg gg gg gg gg gg gg"  (repeated)
```

where

ffffffff is the buffer address of the first byte in the row.

gg is the buffer data byte.

If the memory data is being displayed as non-8-bit symbols, the following information will be displayed following the header.

```
"Symbol Size = hh bits"
"Sym  0  1  2  ... "
"iii  jj jj jj ... "             (repeated)
```

where

hh is the size, in bits, of the symbols being displayed.

iii is the number of the first symbol in the row.

jj is the buffer symbol. The number of characters displayed for each symbol will vary depending on the symbol size.

If the displayed data is being compared to a reference buffer block, the bytes or symbols that are not equal to the reference will be displayed as highlighted text.

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Buffer DLL Tune (Level 1 'I')

Description:
This command exercises the DRAM read clock DLL tuning routines.

Quick Help:

"BufferDllTune, I[action][DLL]";

Input Parameters:

0 - Action Value.

This parameter specifies what action to take.

0: Display value currently in bypass register
1: not used
2: Enable periodic compensation.
3: Disable periodic compensation.
4: Enable display of compensation.
5: Disable display of compensation.
9: Set new bypass value to specified value.

Type: unsigned 32 bit value

Range: 0, 2, 3, 4, 5, 9

Default: 0 (display current bypass register value)

1 - New Value.

This parameter specifies the new DLL value to load.

Type: unsigned 32 bit value

Range: 0 to 0x1FF

Default: none

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, then the output of this command will be displayed as follows:

Current reg = 92

Examples:

Example #1:
To display current DLL values:
F3 1>I

Example #2:
To turn on display of DLL values:
F3 1>I4

Example #3:
To turn off periodic DLL updates:
F3 1>I3

Revision History:

0001.0000 Initial revision.

Butterfly Seek Test (Level 4 'v')

Description:

The Butterfly Seek Test commmand performs the following seeks on the specified head:

1) Seek to specified 1st cylinder (minimum cyl addr , OD) , then to specified 2nd cylinder (maximum cyl addr , ID) .
2) Increment 1st cyl, decrement 2nd cyl , seek to 1st , then 2nd .
3) Repeat 2) until seek has again reached original OD and ID cylinders, but in opposite order of original seek.
4) Decrement 1st cyl, increment 2nd cyl , seek to 1st , then 2nd .
5) Repeat 4) until seek has again reached original OD and ID cylinders.
6) Repeat Steps 2) through 5) until test duration or desired number seeks is complete.

Quick Help:

"ButterflySeekTest, v[StartPhyCyl0],[StartPhyCyl1],[NumSkPairs],[NumSeconds],[Hd]";

Input Parameters:

0 - Starting first Physical cylinder of seek

Expected to be OD-most bound, but code functions correctly with either OD or ID .

Type: Signed 32-bit value

Range: 0 to 0xFFFFFFFF

Default: Minimum (OD) physical cylinder for current head

1 - Starting Second Physical cylinder of seek
Expected to be ID-most bound, but code functions correctly with either OD or ID .

Type: Signed 32-bit value

Range: 0 to 0xFFFFFFFF

Default: Maximum (ID) physical cylinder for current head

2 - Number of seek pairs (a seek to "second" cylinder, then to "first") to do for this test if Parameter 3 not entered,
ELSE time in seconds to run seek test
ELSE if == 0 , continue test for large arbitrary time .

Type: Unigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 5 (Seconds)

3 - Select test duration to be time or number of seek pairs. If not entered , perform Parameter 2 seek pairs . If entered, run seeks for Parameter 2 seconds, for "forever", or for number of seconds specified by parameter 2 .

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Perform counted seeks, not timed)

4 - Head on which to perform seek test

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Change Diagnostic Command Level (All Levels '/')

Description:
This command selects the specified Diagnostic Level.

Quick Help:

"ChangeDiagLevel, /[Level]";

Input Parameters:
0 - New Diagnostic Level.

This parameter specifies the new Diagnostic Command Level to be selected. The following Diagnostic Command Levels are currently supported:

1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, I, L and T

Optionally, the new level can be followed by a Diagnostic Command for the specified level. In this case, the new level will be selected and the specified command will be executed. Parameters 1, 2, 3, etc. will specify Parameters 0, 1, 2, etc. of the Diagnostic Command. For example, entering "/2S200,0" at the diagnostic prompt "F3 1>"

```
F3 1>/2S200,0
F3 2>
```

will change the diagnostic level from 1 to 2, seek to cylinder 200 head 0 and leave the diagnostic level set to 2.

Type: ASCII character

Range: A single ASCII character

Default: Level T

Output Data:
The Diagnostic Level is displayed followed by the command prompt.

Revision History:

0001.0000 Initial revision.

Channel Temperature Adjustment (Level 7 'U')

Description:
This command tweaks the write power and fly height values based on the specified temperature value.

Quick Help:

"ChannelTemperatureAdj, U[TweakTemperature],[Partition],[Hd],[Zone],[Opts]";

Input Parameters:

0 - Tweak Temperature in degrees Celsius.

This parameter specifies the temperature (in degrees Celsius) with which the write power and fly height are to be tweaked.

Type: Signed 8 bit value

Range: 0 to 0xFF

Default: None. If this parameter is not entered, the current thermistor temperature will be used.

1 - Partition

This parameter specifies the media partition on which the write power and fly height will be tweaked with the temperature.

0x00 = User Partition
0x01 = System Partition
0x10 = User Partition
0x20 = System Partition

Type: Unsigned 8-bit value

Range: 0, 1, 10 hex or 20 hex

Default: 0

2 - Head

This parameter specifies the head or heads to tweak the write power and fly height. If parameter 2 is 0xFF, the write current and fly heigth will be tweaked on all heads in the zone or zones specified by parameter 3. If parameter 2 is not entered, the write current and fly height values will be tweaked on the current head in the zone or zones specified by parameter 3.

Type: Unsigned 8-bit value

Range: Defined by RAP.

Default: None

3 - Zone

This parameter specifies the zone or zones to tweak the write power and fly height. If parameter 3 is 0xFF, the write current and fly height will be tweaked in all zones on the head or heads specified by parameter 2. If parameter 3 is not entered, the write current and fly height values will be tweaked in the current zone on the head or heads specified by parameter 2.

Type: Unsigned 8-bit value

Range: Defined by RAP.

Default: None

4 - Channel Temperature Adjustment Option.

This parameter is a bit significant value that specifies how the channel temperature adjustment are to be applied. The bits are defined as follows:

Bits 15-2: not used

Bit 1: Disable Heater Value Tweak.

If this bit is equal to 1, the read heat, write heat and preheat will not be tweaked with the temperature. However the heat values in the working memory will be updated with the value from the RAP in the memory. If this bit is equal to 0, the heat values will be tweaked with the tmeperature.

Bit 0: Disable Write Power Tweak.

If this bit is equal to 1, the write current, write current damping and write current damping duration will not be tweaked with the temperature. However the write power in the working memory will be updated with the value from the RAP in the memory. If this bit is equal to 0, the write power will be tweaked with the tmeperature.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Enable Write Power Tweak)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following will be displayed

"Write Current = a"
"Write Damping = b"
"Write Damping Duration = c"

where

a is a hex value of write current

b is a hex value of write damping

c is a hex value of write damping duation

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following will be displayed

"WL = a.bbbbbbsEscc"
"dCT = d.ffffffsEsgg"
"Read Fly Height = h.iiiiiisEsjj"
"Write Fly Height = k.llllllsEsmm"
"Preheat = hh, Write heat = hh, Read heat = hh"

where

a.bbbbbbsEscc is a floating point value for write loss

d.ffffffsEsgg is a floating point value for delta clearance due to temperature

h.iiiiiisEsjj is a floating point value for read fly height

k.llllllsEsmm is a floating point value for write fly height

hh are heater DAC values for preheat, write heat, and read heat

Revision History:

0001.0000	Initial revision.
0001.0001	Added option bit 1 to directly use heat values from RAP without any tweaking.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Contact Detect (Level H 'b')

Description:

This commmand exercises a simple method of Delta PES contact detection. The methodology is heavily leveraged from Self Test FW Test 35.

Quick Help:

"ContactDetect, b[Flags],[Revs],[BaselineRevs],[StartWedge],[A],[B],[C],[D],[E],[StartHt],[Ht
"[FixedPESThresh],[FilterDelta]";

Input Parameters:

0 - Flags

Bit 0 Search Mode
0 = Heater Only
1 = Write+Heat

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0 indicates Heater only search

1 - Number of iterations

If entered, this parameter contains the number of Fast IO iterations (almost analogous to revolutions) to measure for contact detect measurement point.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: 50

2 - Baseline iterations

If entered, this parameter contains the number of Fast IO iterations (almost analogous to revolutions) to measure for contact detect baseline measurement.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: 50

3 - Starting wedge

This number is the starting wedge from Index.

Type: Unsigned 16-bit value

Range: 0x0000 to 0xFFFF

Default: 0

4 - Fast IO "A" wedges

This parameter specifies the "A" pre write/read number of wedges for Fast IO.

Type: Unsigned 16-bit value

Range: 0x0000 to 0xFFFE
Note there is a memory limitation on this value, this # wedges directly impacts memory set aside for Fast IO.

Default: Scales with number of Servo wedges/track.

5 - Fast IO "B" wedges

This parameter specifies the "B" write/read number of wedges for Fast IO.

Type: Unsigned 16-bit value

Range: 0x0000 to 0xFFFE
Note there is a memory limitation on this value, this # wedges directly impacts memory set aside for Fast IO.

Default: Scales with number of Servo wedges/track.

6 - Fast IO "C" wedges

This parameter specifies the "C" post write/read number of wedges for Fast IO.

Type: Unsigned 16-bit value

Range: 0x0000 to 0xFFFE
Note there is a memory limitation on this value, this # wedges directly impacts memory set aside for Fast IO.

Default: Scales with number of Servo wedges/track.

7 - Fast IO "D" wedges

This parameter specifies the "D" secondary write/read number of wedges for Fast IO.

Type: Unsigned 16-bit value

Range: 0x0000 to 0xFFFE
Note there is a memory limitation on this value, this # wedges directly impacts memory set aside for Fast IO.

Default: 0

8 - Fast IO "E" wedges

This parameter specifies the "E" post secondary write/read number of wedges for Fast IO.

Type: Unsigned 16-bit value

Range: 0x0000 to 0xFFFE
Note there is a memory limitation on this value, this # wedges directly impacts memory set aside for Fast IO.

Default: 0

9 - Starting heater DAC

This number is the starting heater DAC.

Type: Unsigned 8-bit value

Range: 0x00 to 0xFF

Default: 0

10 - Heater DAC coarse increment

This number is the coarse heater DAC increment.

Type: Unsigned 8-bit value

Range: 0x00 to 0xFF

Default: 1

11 - Fixed PES Threshold

This number is the fixed PES threshold.

Type: Decimal float

Range: 14 character entry

Default: 0.05

12 - Filter Delta

This number is the filter delta.

Type: Unsigned 8-bit value

Range: 0x00 to 0xFF

Default: 70

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

dddddddd is the error code returned by the R/W subsystem

If the Verbose Formatted ASCII Data Output Mode is selected:

Bit 0: Displays a legthy list of parameter initialization.
Bits 31-1: NA

Standard display:

Parameter setup

```
Heater Only Search
Revs aa
BaselineRevs bb
APreWrNumSvoWedges cccc
BWrNumSvoWedges dddd
CPostWrNumSvoWedges eeee
DRdNumSvoWedges ffff
EPostRdNumSvoWedges gggg
HeaterStart hh
HeaterIncr ii
PesThreshold +j.jjjjjE+j
FilterDelta kk
```

where

aa, bb number of iterations of Fast IO measurements.

cccc Fast IO "A" parameter.

dddd Fast IO "B" parameter.

eeee Fast IO "C" parameter.

ffff Fast IO "D" parameter.

gggg Fast IO "E" parameter.

hh Heater Start.

ii Heater Increment.

+j.jjjjjE+j Fixed PES Threshold.

kk Filter Delta window.

Contact Detect loop

```
State DAC dPESSigma
a,    bb,  c
a,    bb,  c
```

```
    a,    bb, c
    a,    bb, c
    a,    bb, c
    a,    bb, c
    a,    bb, c
```

where

a Contact Detect loop state, defined as:
S searching
DC contact detected
DV contact verified

bb Current heater DAC.

c dPES variance, displayed as Scientific Notation floating point value.

Test Summary ffff

```
    L,
    Zone aa
    Cyl bbbbbbbb
    Hd cc
    Freq dddd
    IW ee
    Ovs ee
    Dur ee
    ContactVar f
    ContactThresh g
    Clearance h
    Temp ii

    M,
    IW ee
    OVS ee
    OSD ee
    Read Heat jj
    Preheat jj
    Write Heat jj
```

where

aa Target zone.

bbbbbbbb Target cylinder.

cc Target head.

dddd Frequency in MHz.

ee Write powers.

f Variance at contact.

g Threshold of contact.

h Calculated clearance at contact DAC.

ii Current drive temperature.

jj Heater values.

Revision History:

```
0001.0000   Initial revision.
0001.0001   Added new parameters:
               Starting Heat
               Coarse Heater Increment
               Fixed PES Threshold
               Filter Delta
0002.0000   Added new parameter Baseline Iterations.
            This addition lines up naturally with the Iterations parameter, hence all
            other parameters shifted down.
0011.0000   Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External
            Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes
            (DiagError).
```

Convert Data Track Percentage To Servo Offset Count (Level 2 'v')

Description:

This command converts the specified data track percentage to a servo offset count for the current target track.

Quick Help:

"ConvertTrackPercentageToOffsetCount, v[Percentage]";

Input Parameters:

0 - Data Track Percentage.

This parameter specifies the data track percentage for which the servo offset count is to be displayed. It is in units of 0.1% of the data track width. If this parameter is not entered, the offset count between track centers will be displayed. For drives that implement V2BAR, this number will vary with radial position.

Type: Signed 16-bit value

Range: 0x8000 to 0x7FFF

Default: 0x3e8 (1000 decimal or 100% offtrack)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following information will be displayed.

"Phy Cyl cccccccc Log Hd d Data Track Percentage eeee Servo Offset Count ffff Data

where

cccccccc is the physical cylinder address d is the logical head address

eeee is the data track percentage

ffff is the servo offset count that will move the head offtrack by the specified percentage on the specified track.

wwww is the width of a data track, in units of servo position. Q14 scaling, so 0x4000 is the width of a data track at nominal TPI (before VTPI and warping)

Revision History:

0001.0000	Initial revision.
0002.0000	Changed to use Q14 servo count, instead of old servo offset count. Output also changed to include data track width in Q14 servo counts.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Copy Correction Buffer (Level G 'C')

Description:

This command copies the specified segment of the Correction Buffer to another place in the same buffer.

Quick Help:

"CopyCorrectionBuffer, C[SrcAddr],[DestAddr],[NumSyms]";

Input Parameters:

0 - Source Address Offset of Correction Buffer.

This parameter specifies the source address offset of the correction buffer.

Type: Unsigned 16-bit value

Range: 0 to 0xffff,

Default: 0

1 - Destination Address Offset of Correction Buffer.

This parameter specifies the destination address offset of the correction buffer.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: 0

2 - Symbol Count of Correction Buffer Units To Be Copied.

This parameter specifies the count of the symbols in the correction buffer to be copied.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Copy Log File (Level L 'c')

Description:

This command copies the specified source log file to the specified destination log file.

Quick Help:

"CopyLogFile, C[SrcLog],[DestLog],[AppendOpt]";

Input Parameters:

0 - Source Log Number.

This parameter specifies the number of the log that is the source of the data to be copied.

The following are the default or special log files supported by the diagnostics:
0x0000: ACTIVE_ERROR_LOG_ID - Indicates the currently active error log.
0x0001: ACTIVE_ASCII_LOG_ID - Indicates the currently active ASCII log.
0x0002: ACTIVE_RW_STATISTICS_LOG_ID - Indicates the currently active R/W statistics log.
0xFFFC: DEFAULT_ERROR_LOG_ID - Indicates the default error log.
0xFFFD: DEFAULT_RW_STATISTICS_LOG_ID - Indicates the default R/W statistics log.
0xFFFE: TEMPORARY_LOG_ID - This log is used internally for copy operations.
0xFFFF: INVALID_LOG_ID - Indicates an invalid log.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

1 - Destination Log Number.

This parameter specifies the number of the log that is the destination of the data to be copied.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

2 - Append Source Log to Destination Log.

If any value is entered for this parameter, the specified source log will be appended to the end of the specified destination log.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Corrupt LBA (Level 2 'o')

Description:

This command corrupts blocks in User Area starting at the specified LBA (Logical Block Address) for the specified number of blocks. Each block will be corrupted by the specified number of bytes to corrupt. The location within the blocks where the corruption should occur is determined by the specified offset and option flag. This Diagnostic command basically does Read Long operation, corrupt the Diag Read buffer then does Write Long operation with the corrupted Diag Read buffer.

Quick Help:

"CorruptLba, o[Lba],[NumBlocks],[NumBytes],[ByteOffset],[Flags]";

Input Parameters:

0 - LBA (Logical Block Address) Number.

This parameter specifies the address of the first User Area LBA to corrupt.

Type: Unsigned 32-bit value

Range: 0 to maximum User Area LBA

Default: None

1 - Number of Blocks To Corrupt

This parameter specifies the number of consecutive blocks to corrupt.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 1

2 - Number of Bytes To Corrupt.

This parameter specifies the number of bytes to be corrupted for each block.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: None

3 - Starting Byte Offset for Consecutive Corruption

This parameter specifies the starting byte offset for consecutive corruption. This parameter is valid only when lower 4 bits of the parameter 4 are all 0. Consecutive bytes starting from the byte offset specified by this parameter for the number of bytes specified by the parameter 2 will be corrupted.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: 0

4 - Options

This parameter is a bit-significant value that specifies the following options

Bits 15-5: not used.

Bit 4: Enable ECC Correction for the Read Long operation part of the Corrupt LBA diag command.

If this bit is set ECC Correction will be enabled for the read long operation, else ECC Correction will be disabled.

Bit 0-3: Region Selector for Corruption

If this is 0 then consecutive bytes specified by parameter 2 and 3 will be corrupted.

If this field is either 0xA, 0xD or 0xE then bytes at random byte offsets will be corrupted by the number of bytes specified by the parameter 2.

If this is 0xA then user data region and ECC region will be corrupted.
If this is 0xD only data region will be corrupted.
If this is 0xE only ECC region will be corrupted.

Type: Unsigned 8-bit value

Range: 0 to 0xFFFF

Default: 0 (ECC Correction disabled, consecutive corruption selected)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Next User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

or

"Next System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is the Disk Logical Block Address of the sector in error

ffffff is the Logical Cylinder Address of the sector in error

g is the Logical Head Address of the sector in error

hhhh is the Logical Sector Address of the sector in error

iiiiii is the Physical Cylinder Address of the sector in error

j is the Logical Head Address of the sector in error

kkkk is the Physical Sector Address of the sector in error

llllllll is the number of sectors remaining to be read or written

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: Enable the Next Address to be displayed
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed
Bit 4: Enables the Recovery Status to be displayed
Bit 5: Enables the Fault Status to be displayed
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 1 is set, the Next Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed as follows.

"Target User LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

or

"Target System LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

where

pppppppp is the starting Disk Logical Block Address

qqqqqq is the starting Logical Cylinder Address

r is the starting Logical Head Address

ssss is the starting Logical Sector Address

tttttt is the starting Physical Cylinder Address

u is the starting Logical Head Address

vvvv is the starting Physical Sector Address

wwwwwwww is the starting Transfer Length

If Bit 4 is set, the Recovery Status will be displayed as follows.

"Recovered User LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

or

"Recovered System LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

where

AAAAAAAA is the Disk Logical Block Address of the last recovered sector

BBBBBB is the Logical Cylinder Address of the last recovered sector

C is the Logical Head Address of the last recovered sector

DDDD is the Logical Sector Address of the last recovered sector

EEEEEE is the Physical Cylinder Address of the last recovered sector

F is the Logical Head Address of the last recovered sector

GGGG is the Physical Sector Address of the last recovered sector

HHHH are the Recovery Flags reported by the Read/Write code

II is the Recovery Count reported by the Read/Write code

If Bit 5 is set, the Fault Status will be displayed as follows.

"Drive Fault Status JJJJ Preamp Fault Status KKKK"

where

JJJJ is the Drive Fault Status reported by the Read/Write code

KKKK is the Preamp Fault Status reported by the Read/Write code

If Bit 6 is set, the Elapsed Time for the read/write operation will be displayed.

```
"Elapsed Time a mins b secs"  or
"Elapsed Time b.c secs"       or
"Elapsed Time c.d msecs"
```

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

Examples:

Example #1:
To corrupt a single LBA at byte offsets from 0 to 0xF
(in this case LBA at 0x51237)

```
F3 2>o51237,,10
or
F3 2>o51237,1,10,0,0
```

Example #2:
To corrupt multiple LBAs at byte offsets from 0x100 to 0x11F for each block
(in this case LBAs from 0x51237 to 0x51247)

```
F3 2>o51237,11,20,100
or
F3 2>o51237,11,20,100,0
```

Example #3:
To corrupt a single LBA at 16 random byte offsets within data and ECC region
(in this case LBA at 0x51237)

```
F3 2>o51237,,10,,A
or
```

```
F3 2>o51237,1,10,,A
```

Example #4:
To corrupt a single LBA at 32 random byte offsets within data region only
(in this case LBA at 0x51237)

```
F3 2>o51237,,20,,D
or
F3 2>o51237,1,20,,D
```

Example #5:
To corrupt a single LBA at 48 random byte offsets within ECC region only
(in this case LBA at 0x51237)

```
F3 2>o51237,,30,,E
or
F3 2>o51237,1,30,,E
```

To enable ECC correction for the Read Long operation before corrupting the buffer
add 0x10 to the parameter 4.

Example #6:
To corrupt a single LBA at byte offsets from 0x30 to 00x37 with ECC correction enabled
(in this case LBA at 0x51237)

```
F3 2>o51237,,8,30,10
or
F3 2>o51237,1,8,30,10
```

Example #7:
To corrupt a single LBA at 32 random byte offsets within data region only
with ECC correction enabled
(in this case LBA at 0x51237)

```
F3 2>o51237,,20,,1D
or
F3 2>o51237,1,20,,1D
```

Revision History:

0001.0000 Initial revision.

Create Log File (Level L 'c')

Description:
This command creates the specified log file.

Quick Help:

"CreateLogFile, c[Log],[LogType],[BufferOrDiskOpt],[NumBytes]";

Input Parameters:

0 - Log Number.

This parameter specifies the number that will be associated with the log that
is to be created.

The following are the default or special log files supported by the diagnostics:

0x0000: ACTIVE_ERROR_LOG_ID - Indicates the currently active error log.
0x0001: ACTIVE_ASCII_LOG_ID - Indicates the currently active ASCII log.
0x0002: ACTIVE_RW_STATISTICS_LOG_ID - Indicates the currently active R/W statistics log.
0xFFFC: DEFAULT_ERROR_LOG_ID - Indicates the default error log.
0xFFFD: DEFAULT_RW_STATISTICS_LOG_ID - Indicates the default R/W statistics log.
0xFFFE: TEMPORARY_LOG_ID - This log is used internally for copy operations.
0xFFFF: INVALID_LOG_ID - Indicates an invalid log.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

1 - Log Type.

This parameter specifies the type of log file to be created.

0 = Error Log
1 = ASCII Log
2 = Read/Write Statistics Log

Type: Unsigned 8-bit value

Range: 0 to 2

Default: None

2 - Buffer or Disc Log.

This parameter specifies whether the log file is to be stored in the data buffer or on the disc.

0 = Buffer Log
1 = Disc Log

Type: Unsigned 8-bit value

Range: 0 to 1

Default: None

3 - Log Size in bytes.

This parameter specifies the size, in bytes, of the log file to be created.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000   Initial revision.
0011.0000   Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Decrement Read/Write Scope Sync (Online '<')

Description:
This command decrements the number of the Servo Wedge for which the Scope Sync Pulse will be generated.

Quick Help:

"DecRwScopeSync";

Input Parameters:
None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following information will be displayed.

"   Burst cccc"

where

cccc is the current Scope Sync Wedge number

Revision History:

0001.0000   Initial revision.
0011.0000   Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Delete Log File (Level L 'd')

Description:
This command deletes the specified log file.

Quick Help:

"DeleteLogFile, d[Log]";

Input Parameters:

0 - Log Number.

This parameter specifies the number of the log to be deleted.

The following are the default or special log files supported by the diagnostics:
0x0000: ACTIVE_ERROR_LOG_ID - Indicates the currently active error log.
0x0001: ACTIVE_ASCII_LOG_ID - Indicates the currently active ASCII log.
0x0002: ACTIVE_RW_STATISTICS_LOG_ID - Indicates the currently active R/W statistics log.
0xFFFC: DEFAULT_ERROR_LOG_ID - Indicates the default error log.
0xFFFD: DEFAULT_RW_STATISTICS_LOG_ID - Indicates the default R/W statistics log.
0xFFFE: TEMPORARY_LOG_ID - This log is used internally for copy operations.
0xFFFF: INVALID_LOG_ID - Indicates an invalid log.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Disable / Enable Servo ZAP coefficients and ZAP read (Level 5 'd')

Description:
This command disables / enables the servo from using the coefficients in the ZAP table.

Quick Help:

"DisableEnableServoZap, d[ZapControlMode]";

Input Parameters:

0 - ZAP Control Mode.

If this parameter is not entered, the command will display the current ZAP control mode only without changing it.

If this parameter is entered, the ZAP control mode will be set to this value with the meaning as the following:
0: Disable ZAP coefficients
1: Enable Write ZAP coefficients only with ZAP data from disk

2: Enable both Read and Write ZAP coefficients with ZAP data from ZAP table
3: Reserved for future use
4: Enable Read ZAP coefficients only with ZAP data from disk
5: Enable both Read and Write ZAP coefficients with ZAP data from disk

Type: Unsigned 8-bit value

Range: 0 to 5

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, one of the follwing information will be displayed to indicate the current ZAP control mode

ZAP control: No
ZAP control: Write ZAP from disc
ZAP control: Read/Write ZAP from table
ZAP control: Reserved
ZAP control: Read ZAP from disc
ZAP control: Read/Write ZAP from disc

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display Active Status (Online '.')

Description:
The Display Active Status command displays the drives's active status information.

Quick Help:

"DisplayActiveStatus";

Input Parameters:
None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred and the current Read/Write Sector Address is in the User Area, the following information will be displayed.

"Current User LBA cccccccc LLL CHS dddddd.e.ffff PLP CHS gggggg.h.iiii"
"R/W Status j R/W Error kkkkkkkk lll...l"

If no error occurred and the current Read/Write Sector Address is in the User Area, the following information will be displayed.

"Current System LBA cccccccc LLL CHS dddddd.e.ffff PLP CHS gggggg.h.iiii"
"R/W Status j R/W Error kkkkkkkk lll...l"

where

cccccccc is the current Read/Write Disk Logical Block Address

dddddd is the current Read/Write Logical Cylinder Address

e is the current Read/Write Logical Head Address

ffff is the current Read/Write Logical Sector Address

gggggg is the current Read/Write Physical Cylinder Address

h is the current Read/Write Logical Head Address

iiii is the current Physical Sector Address

j is the sense status returned by the R/W subsystem for the last operation

kkkkkkkk is the error code returned by the R/W subsystem for the last operation

lll...l is a string that indicates whether or not the drive is currently ready

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display ASCII Command Information (Level C 'Q')

Description:
This command displays the revision of the specified ASCII serial port diagnostic command.

Quick Help:

"DisplayAsciiCmdInfo, Q[CmdLevel],[Cmd]";

Input Parameters:
0 - Diagnostic Command Level.

This parameter specifies the Diagnostic Command Level of the ASCII Serial Port

Diagnostic Command for which the revision is to be displayed. Entering a value of '0' selects the All Level commands. Entering a value of '^' selects the Online commands.

Type: ASCII character

Range: Any printable ASCII character

Default: None. If this parameter is not entered, the revision of all supported ASCII commands in all supported command levels will be displayed.

1 - Diagnostic Command.

This parameter specifies the ASCII Diagnostic Command for which the revision is to be displayed.

If the Online commands are selected by entering a '^' for Parameter 0 and an upper or lower case alphabetic character is entered for this parameter, it will be interpreted as a control character. For example, if '^' is entered for Parameter 0 and 'C' is entered for Parameter 1, the revision of the online Control-C command will be displayed.

Type: ASCII character

Range: Any printable ASCII character

Default: None. If this command is not entered, the revision of all supported ASCII commands in the level specified by Parameter 0 will be displayed.

Output Data:

For each command specified, the following is displayed:

```
Level LL 'CC': Rev XXXX.YYYY, RRRRRR, SSSSSS
   or
All Levels LL 'CC': Rev XXXX.YYYY, RRRRRR, SSSSSS
   or
Online LL 'CC': Rev XXXX.YYYY, RRRRRR, SSSSSS
```

Where:

```
LL     = Command Level
CC     = Command Character
XXXX   = Major Revision Number
YYYY   = Minor Revision Number
RRRRRR = "Overlay" or "Flash"
SSSSSS = Command help string
```

Revision History:

0001.0000 Initial revision.

Display Batch File (Level 6 'D')

Description:

This command displays the contents of the specified Diagnostic Batch File. A Batch File is sequence of ASCII Diagnostic Commands entered by the user via the serial port interface.

Quick Help:

"DisplayBatchFile, D[BatchFileNum]";

Input Parameters:

0 - Batch File Number.

This parameter specifies the number of the Batch File to be displayed.

Type: Unsigned 8-bit value

Range: 0 t0 0xFF

Default: 0

Output Data:

Displays the ASCII Serial Port Command sequence contained in the Batch File.

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display Congen (Online Control U)

Description:

This command displays the Congen information.

Quick Help:

"DisplayCongen";

Input Parameters:

None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the Congen data will be displayed as follows:

```
F3 T>
       00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
 0000: A8 5C 00 00 00 08 53 43 68 00 00 00 01 10 01 00
 0010: 00 00 00 00 00 00 0B 00 01 00 0A 00 82 00 00 00
 0020: 03 00 16 00 8E 00 00 00 04 00 16 00 A6 00 00 00
 0030: 07 00 0A 00 BE 00 00 00 08 00 12 00 CA 00 00 00
 0040: 0A 00 0A 00 DE 00 00 00 1A 00 0A 00 EA 00 00 00
 0050: 3A 00 26 00 F6 00 00 00 00 00 16 00 1E 01 00 00
```

```
0060: DC 01 0C 00 38 01 00 00 3E 00 DC 02 48 01 00 00
0070: B4 03 00 00 01 10 00 00 00 00 00 00 06 00 01 00
0080: 81 0A C0 08 FF 00 00 00 05 00 FF FF 83 16 0D BE
0090: 00 00 00 0E 00 00 06 46 02 00 00 01 01 18 01 18
00A0: 40 00 00 00 84 16 02 44 8A 02 00 00 00 00 00 00
00B0: 00 00 00 00 00 00 00 00 1C 20 00 00 87 0A 00 08
00C0: FF 00 00 00 00 00 FF FF 88 12 14 00 FF FF 00 00
00D0: FF FF FF FF 80 20 00 00 00 00 00 00 8A 0A 02 00
00E0: 00 00 00 00 00 00 00 00 9A 0A 00 02 00 00 00 05
00F0: 00 00 00 04 BA 26 00 05 00 00 00 00 00 0A 00 00
0100: 00 00 00 00 00 00 00 00 00 00 00 02 00 00 00 00
0110: 00 00 00 00 00 00 00 00 00 00 00 00 80 16 30 32
0120: 36 46 51 30 32 34 31 00 00 00 00 00 00 00 00 00
0130: 01 37 03 40 DC 01 0C 00 01 00 00 18 00 02 00 00
0140: 00 00 00 00 BE 00 DC 02 5A 0C FF 3F 37 C8 10 00
0150: 00 00 00 00 3F 00 00 00 00 00 00 00 00 00 00 00
0160: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0170: 00 00 00 40 04 00 20 20 20 20 20 20 20 20 53 54
0180: 45 33 32 34 34 38 31 30 41 53 20 20 20 20 20 20
0190: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
01A0: 20 20 20 20 20 20 10 00 00 00 20 2F 00 40 00 02
01B0: 00 02 00 00 FF 3F 10 00 3F 00 10 FC FB 00 10 01
01C0: FF FF FF 0F 00 00 07 04 23 00 78 00 78 00 78 00
01D0: 78 00 00 00 00 00 00 00 00 00 00 00 00 00 1F 00
01E0: 26 21 00 00 20 20 20 20 7E 20 1B 00 6B 34 01 7F
01F0: 03 40 28 34 01 3C 03 40 7F 00 00 00 00 00 FE FE
0200: FE FF 00 00 00 FE 00 00 00 00 00 00 00 00 00 00
0210: 99 A9 6B 1C 00 00 00 00 00 00 00 00 00 00 00 00
0220: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0230: 00 00 00 00 00 00 24 20 22 20 00 00 00 00 00 00
0240: 00 00 00 00 00 00 00 00 21 00 00 00 00 00 00 00
0250: 00 00 00 00 02 00 00 00 00 00 00 00 00 00 00 00
0260: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0270: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0280: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0290: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
02A0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
02B0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
02C0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
02D0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
02E0: 00 00 00 00 08 10 20 20 00 00 00 00 00 00 00 00
02F0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0300: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0310: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0320: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0330: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0340: 00 00 00 00 00 00 00 00 0F 00 06 00 03 00 00 00
0350: 32 00 14 00 33 00 24 00 0F 00 1E 00 32 00 00 00
0360: 13 00 61 00 32 00 14 00 32 00 00 00 3A 00 00 00
0370: 22 00 2D 00 32 00 00 00 32 00 00 00 32 00 00 00
0380: 22 00 00 00 1A 00 00 00 12 00 00 00 10 00 00 00
0390: 3E 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
03A0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
03B0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
03C0: 00 00 40 4B 00 00 00 00 00 00 00 00 00 00 00 00
03D0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
03E0: 40 04 00 15 20 00 2C 01 00 00 00 00 99 A9 6B 1C
03F0: 99 A9 6B 1C 00 A0 08 00 00 00 00 00 00 00 00 00
0400: 00 00 00 00 00 00 00 00 00 00 00 00 D0 07 E8 03
0410: 54 15 3C 00 00 26 00 00 00 00 08 00 00 00 00 00
0420: 00 00 00 00 00 00 00
```

DriveNativeInfo Mode Page

```
            DriveNativeInfo Group
Byte:011E:        PartNumber = 30 32 36 46 51 30 32 34 31
                  '026FQ0241'
Byte:0127:        PartNumberWhitespacePad = 00 00 00 00 00 00 00 00
                  ''
Byte:012F:        PartNumberPad = 00
Byte:0130:        ProcessControlVersion = 01 37
Byte:0132:        CongenConfigurationState = 03
Byte:0133:        WrittenCount = 40

Bytes Returned = 0.

F3 T>
```

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display Controller Registers (Online Control I)

Description:
This command displays the controller registers to the serial port.

Quick Help:

"DisplayControllerRegs";

Input Parameters:
None

Output Data:
The controller registers will be output as 16-bit values. There are eight columns per block of registers. For example:

```
    SATA Vis Mux Registers
  400a0600: 0000 0000 0000 0000 0000 0000 0000 0000
  400a0610: 0000 0000 0000 0000 0000 0000 0000 0000
```

Currently, the register blocks output are as follows:
- SATA Core Registers
- SATA Vis Mux Registers
- SATA Test Mux Registers
- SATA SSIP / Phy Registers
- AT Registers
- Traverser Regs
- Host Data Manager Regs
- Disc Data Manager Registers
- PBM Memory Controller Registers

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display Correction Buffer (Level G 'D')

Description:

This command displays the specified segment of Correction Buffer with the expected data pattern.

Quick Help:

"DisplayCorrectionBuffer, D[StartAddr],[EndAddr],[CompareData]";

Input Parameters:

0 - Start Address Offset of Correction Buffer.

This parameter specifies the start address offset of the correction buffer.

Type: Unsigned 16-bit value

Range: 0 to 0xffff,

Default: 0

1 - End Address Offset of Correction Buffer.

This parameter specifies the end address offset of the correction buffer.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: 0

2 - Expected Data Pattern.

This parameter specifies the expected pattern. The specified pattern is assumed to be right justified. If the value of the patten is greater than 0x03FF, the command will take the lower 10 bits of the address as its pattern to compare with the data read from the Correction Buffer.

Type: Unsigned 16-bit value

Range: 0 to 0x03ff

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000 Initial revision.

0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display Current Read Channel Settings (Online '!')

Description:

This command displays the current value of the Read Channel, Preamp and Power ASIC registers.

Quick Help:

"DisplayRdChannelRegs";

Input Parameters:

None

Output Data:

If a single Read Channel register was read, the following information will be displayed.

```
"Read Channel Reg cccc = dddd"
```

where

cccc is the address of the register that was read

dddd is the value that was read from the register

If multiple Read Channel registers were read, the following information will be displayed.

```
"Read Channel"
"      0    1    2    3    4    5    6    7    8    A    B    C    D    E    F"
"cccc: dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd"
```

where

cccc is the address of the first register in the row

dddd is the value that was read from the register

If a single Preamp register was read, the following information will be displayed.

```
"Preamp Reg cc = dd"
```

where

cc is the address of the register that was read

dd is the value that was read from the register

If multiple Preamp registers were read, the following information will be displayed.

```
"Preamp"
"    0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F"
"cc: dd dd dd dd dd dd dd dd dd dd dd dd dd dd dd dd"
```

where

cc is the address of the first register in the row

dd is the value that was read from the register

If a single Power ASIC register was read, the following information will be displayed.

"Power ASIC Reg cc = dddd"

where

cc is the address of the register that was read

dddd is the value that was read from the register

If multiple Power ASIC registers were read, the following information will be displayed.

```
"Power ASIC"
"    0    1    2    3    4    5    6    7    8    9    A    B    C    D    E    F"
"cc: dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd"
```

where

cc is the address of the first register in the row

dddd is the value that was read from the register

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display Defect Lists (Level T 'V')

Description:

This command displays any combination of the user slip list, the system slip list, the servo flaws list, and the reassigned sectors table.

Quick Help:

"DisplayDefectLists, V[DefectListSelect],[Hd],[StartCyl],[NumCyls],[DisplaySummaryOpt]";

Input Parameters:

0 – Bit Select.

This input specifies the bit select for the display:

If bit 0 is set, the user track slip list will be displayed. If bit 15 is also set, the entries will be displayed by index instead of cylinder/head.

If bit 1 is set, the reserved track slip list will be displayed. If bit 15 is also set, the entries will be displayed by index instead of cylinder/head.

If bit 2 is set (4), the alt list will be displayed.

If bit 3 is set (8), the servo flaws list will be displayed.

If bit 4 is set (10), the primary defect list (PLIST) will be displayed. This list holds raw defect position information obtain during drive processing.

If bit 5 is set (20), the primary servo flaws list will be displayed.

If bit 6 is set (40), the nonresident G List will be displayed. This PBA based list combines the previous nonresident G List with the resident G List at the time of the last format.

If bit 7 is set (80), the resident G List will be displayed. This PBA based list holds bad spares and defects found since the last format. This list includes all bad PBAs found since format. It will have more than one entry for a reallocated reallocation, for example.

If bit 8 is set (100), the primary DST list will be displayed. This list holds the defect position information from the PLIST (above) expressed as sector positions instead of SFI.

If bit 15 is set, the user track slip list and the system track slip list will be displayed by entry index and entry count instead of cylinder range.

Note: bits may be combined to display more than one list.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0001

1 - Chosen Head.

If this input is entered then defects will display only for the specified head.
If this input is not entered then defects for all heads will be displayed.
If bit 15 is set in parameter zero (Bit Select), this parameter is ignored.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: None (display all heads)

2 - Start Element

For the user track slip list and reserve track slip list,
If bit 15 of parameter 0 (above) is set, Start Element is the index of the first element to be displayed.

If bit 15 of parameter 0 (above) is clear, Start Element is the first cylinder of entries to be displayed.

For the servo flaws list and primary servo flaws list, Start Element is the first cylinder of entries to be displayed.

For the P List, Start Element is the first cylinder of entries to be displayed.

For the G List Resident and GList Nonresident, Start Element is the lowest PBA of entries to be displayed.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF This value is not range checked and the user must use discretion selecting input values.

Default: 0

3 - Element Count

For the user track slip list and reserve track slip list,
If bit 15 of parameter 0 (above) is set, Element Count is the number of list entries to display.

If bit 15 of parameter 0 (above) is clear, Element Count is the number of list elements to display.

For the servo flaws list and primary servo flaws list, Element Count is the number of cylinders of entries to be displayed.

For the P List, Element Count is the number of cylinders of entries to be displayed.

For the G List Resident and GList Nonresident, Element Count is the number of PBAs of entries to be displayed.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

4 - Display Summary

If set to 99, this input causes a parser - friendly list summary to be displayed after all other output. Works with V4 only.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Slips Output Fields:

LBA - LBA of first good sector AFTER slipped section

Span - Length in sectors of slip

Cumm - Cummulative length of all slips up to and including this slip

Log cyl, hd, sctr, zn, phys cyl, phys sctr - These indicate the location of the first sector after slip. This address matches the LBA listed in the first column. Note that physical head will equal the logical head.

SFI - Symbols from index of the first sector after the slip. The SFI corresponds to the LBA listed in the first column

Slips Sample:

```
F3 T>V8001,,10,6
  90EB43      2     11   881  1    D2   0     881    D4     5A52   90EB54
  90FB09      1     12   882  1   7FA   0     882   7FB     590E   90FB1B
  910230      1     13   883  1   682   0     883   683     59C6   910243
  910956      1     14   884  1   509   0     884   50A     5882   91096A
  91107D      1     15   885  1   391   0     885   392     5956   911092
  9117A4      1     16   886  1   219   0     886   21A     5A0E   9117BA

Head 0: entries    22E        slips     1BBE
Head 1: entries    187        slips      3B5
  Total Entries    3B5  Total Slips     1F73

F3 T>V1,,881,6
 User Slip Defect List
                         log log   log      phys   phys
    LBA     span    cumm   cyl  hd   sctr zn   cyl    sctr      SFI       PBA
  90EB43      2     11   881  1    D2   0     881    D4     5A52   90EB54
  90FB09      1     12   882  1   7FA   0     882   7FB     590E   90FB1B
  910230      1     13   883  1   682   0     883   683     59C6   910243
  910956      1     14   884  1   509   0     884   50A     5882   91096A
  91107D      1     15   885  1   391   0     885   392     5956   911092
  9117A4      1     16   886  1   219   0     886   21A     5A0E   9117BA

Head 0: entries    22E        slips     1BBE
Head 1: entries    187        slips      3B5
  Total Entries    3B5  Total Slips     1F73
```

Note that no header is displayed.

```
F3 T>V2,0
 System Slip Defect List
                       log log   log       phys   phys
    LBA     span    cumm   cyl  hd   sctr zn   cyl    sctr      SFI
      0       0       0      0  0      0   0  24884      0 FFFFFFFF
   16688    268     268     96  0      0   1  2491A      0 FFFFFFFF

Head 0: entries      2        slips      268
  Total Entries      2  Total Slips      268
```

Note that SFI is not currently supported for the system area.

```
F3 T>V4
Reassigned Sectors List
Original     New    log log   log     phy    phy
    LBA       PBA    cyl  hd   sctr zn  cyl    sctr      SFI
  7CD51F   7CD574    863  1    22C  0    863   22C     51F40      BBM
  7E89B0   7E8A05    87F  1    6E9  0    87F   6E9     14A6C      BBM
  8465B0   84662A    8E0  0    31A  0    8E0   31A     205CE      BBM
 36BA8AC  6B46255  -----  - -----  1  7343    1C5              ALT
 415B13A  6B46257  -----  - -----  1  7343    1C7              ALT
 4682DC6  4690DFC   4BD9  0    382  1  4BD9    382      950E      BBM
 980E2FA  A0911D4  -----  - -----  2  AE46    1E8              ALT
```

```
10EC8C97 1359A486  -----  - -----  7 16368   18E          ALT
14D8E9CF 1689E9C0  -----  - -----  9 1A9DF   10E          ALT
159F54DE 1689E9BF  -----  - -----  9 1A9DF   10D          ALT
16E84BE4 17E41B07  -----  - -----  A 1C9D8   139          ALT
17DEECCE 196C0D2D  -----  - -----  B 1EFD9   153          ALT
1858833F 1860FF31  1D5F2  0   20F  B 1D5F2   20F    744C8     BBM
19E066FC 19E97E01  1FC8F  1   42B  C 1FC8F   42B    2AE93     BBM

         Alt   Pending  Total    Alted  Total
       Entries Entries Entries    Alts   Alts
Head 0              3
Head 1              3
Total       8       6       E        3      B
Checksum = E964
```

The drive does not keep information about where an alt came from. Therefore LLLCHS and SFI are not available for slips, and the physical cylinder and physical sector refer to the new location in the spares.

```
 Possible flags in rightmost columns:
 ALT        sector has been reassigned
 BBM        sector is marked as untrustworthy (bad block mark)
 no write   sector is marked as should not be written
 no read    sector is makred as should not be read
 reported   (only with reallocation time stamping)
            sector has been reported to host
```

The display summary option works as follows:

```
F3 T>V4,,,,99
 Total Alt Entries:    0
 Total Alts of Alts:    0
 Total Alts:    0
 Total Pendings:   52
 Total Entries:   52

F3 T>V8
  Servo Flaws List
  log    log    phy
 head    cyl    cyl   wedge status
    2  8AA0  8AA0   C3   primary + deallocd
    2  A542  A542   C2   primary + deallocd
    2  A542  A542   C4   primary + deallocd
    2  A54A  A54A   2B   primary + deallocd
    3 15B28 15B28   34   primary + deallocd
    3 17057 17057   FD   primary + deallocd
    3 1BBED 1BBED   1C   primary + deallocd
    3 1BBED 1BBED   2F   primary + deallocd
    3 1C6CB 1C6CB   28   primary + deallocd
    3 1C6CB 1C6CB   2A   primary + deallocd
    3 25159 25159   B3   primary + deallocd
 Log head 0: entries        0
 Log head 1: entries        0
 Log head 2: entries        4
 Log head 3: entries        7
       Total Entries        B

F3 T>V10
 P List
  log   log    phy length
 head   cyl    cyl in symb  SFI  flags
   0   1A4D   1A4D   4B    8A2D1  2 TA
```

```
   1   1A4E   1A4E   49    8A2D1  1 servo
   0   1A4F   1A4F   4A    8A2D1  0
   1   1A50   1A50   4A    8A2D1  0
   1   1A51   1A51   48    8A2D1  0
   1   1A52   1A52   4B    8A2D1  0
   1   1A53   1A53   4B    8A2D1  0
Head 0 Entries:   2
Head 1 Entries:   5
  Total Entries:   7

F3 T>V20
 Primary Servo Flaws List
  log   log    phy
 head   cyl    cyl wedge
   2   8AA0   8AA0   C3
   2   A542   A542   C2
   2   A542   A542   C4
   2   A54A   A54A   2B
   3  15B28  15B28   34
   3  17057  17057   FD
   3  1BBED  1BBED   1C
   3  1BBED  1BBED   2F
   3  1C6CB  1C6CB   28
   3  1C6CB  1C6CB   2A
   3  25159  25159   B3
Head 0 Entries: 0
Head 1 Entries: 0
Head 2 Entries: 4
Head 3 Entries: 7
 Total Entries: B

F3 T>V40,0,0,20
Nonresident GList                  5 entries returned
Total entries available: 5
    PBA    Len  Flags  Phy Cyl Hd  PhySctr    SFI
       0    1      0        0   0       1      1F7
      3F    1      0        0   0      41     8164
    5290   19      0        9   0     36D   1032CD
   119C2    2      0       20   0      21    83B66
1D48B830    1      0    201FD   0     591    7B12B

Flags:
  RESERVED                1  This bit is reserved for internal use.
  POST_FORMAT_DEFECT      2  If set, this is a Post Format defect.
  DEFECTIVE_SPARE         4  If set, this is a defective spare.
  GROWN_TO_PRIMARY_LIST   8  If set, this defect came from a Glist to Plist merge.
```

Revision History:

0001.0000	Initial revision.
0002.0000	Correct headers to servo flaws list and primary servo flaws list.
0003.0000	Improve spacing of G List output.
0004.0000	Make GLists (V40, V80) and primary DST list (V100) default to displaying whole list.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display Defects On Current Track (Level 2 'i')

Description:
This command displays the defecive sector information on the current Target Track.

Quick Help:

"DisplayDefectsOnCurrentTrk, i";

Input Parameters:
None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, then the output of this command will be displayed as follows:

```
"Track Info:"
"Partition PhyCyl   LogCyl   NomCyl   Radius_mils LogHd Zn FirstLba FirstPba LogSecs PhySe
"User      cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
"System    cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
```

where

cccccccc	is the Logical Cylinder address where Logical Cylinders do not include the cylinders in other partitions.
dddddddd	is the Physical Cylinder address where Physical Cylinders include User Area Cylinders, System Area Cylinders and Spare Cylinders.
ee	is the Logical Head address where Logical Heads do not include heads that have been depopulated.
ff	is the number of the zone that contains the track.
gggggggg	is the first Logical Block Address (LBA) on the track.
hhhhhhhh	is the first Physical Block Address (PBA) on the track.
iiii	is the number of logical sectors on the track.
jjjj	is the number of physical sectors on the track.
kkkk	is the skew in wedges from index to the wedge that contains physical sector 0.
llll	is the number of physical sectors per frame.
mmmm	is the number of wedges per frame.
nnnnnnnn	is the Nominal Cylinder address where Nominal Cylinders remove the VBAR scaling factor.

o.ooooooEoo   is the Radius in milliinches as measured from the hub.

"Sector Info:"

```
"PhySec Wdg     PhySec Wdg    PhySec Wdg    PhySec Wdg"
  cccc  ddd     eeee   fff    gggg   hhh    iiii   jjj
```

As shown above, the sector information is displayed in four columns. The displayed information is defined as follows:

cccc, eeee, gggg and iiii are the Physical Sector Address.

ddd, fff, hhh and jjj are the number of the Servo Burst that preceeds the sector.

Revision History:

0011.0000   Initial revision.

Display Diagnostic Buffer Information (Online '?')

Description:

The Display Diagnostic Buffer Information command displays information about buffer memory used to process diagnostic requests.

Quick Help:

"DisplayDiagBufferInfo";

Input Parameters:

None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following information will be displayed for each Diagnostic Buffer File.

"Blks cccccc-dddddd (eeeeee), BufAddr ffffffff-gggggggg, DBA hhhhhhhh, BytesPerBlk :

where

cccccc is the number of the file's first buffer block

dddddd is the number of the file's last buffer block

eeeeee is the number of buffer blocks

ffffffff is the buffer address of the file's first byte gggggggg is the buffer address of the file's last byte

hhhhhhhh is the DBA address of the file's first byte

iii is the number of bytes per block

jjj...j is an ASCII string that is the file's name

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display DST Status (Online Control K and Online Control Y)

Description:
This command displays the status (percent complete, etc) of any current Drive Self Test (DST) activity.

Quick Help:

"DisplayDstStatus";

Input Parameters:
None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Sample output shown below:

```
Total process 8% complete
50% of current test complete    <== NOTE: This line only appears on non-AT drives.
2 out of 7 steps complete in current test
Current operation is aborted.
Current status  0
```

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display / Edit Log (Levels 2,3,4,7,A,T 'E')

Description:
This command displays or modifies the specified Log File.

Quick Help:

"DisplayEditLog, E[LogNum],[ErrCodeOrSpecialFuncKey],[SpecialFunc]";

Input Parameters:

0 - Log Number.

This parameter specifies the number of the log to be displayed. If this parameter is not entered, the Active Error Log will be displayed. If this parameter is equal to 0, the Active Error Log will be cleared. If this parameter is entered and is not equal to 0, it specifies the number of the Log to be displayed.

The following are the default or special log files supported by the diagnostics:
0x0000: ACTIVE_ERROR_LOG_ID - Indicates the currently active error log.
0x0001: ACTIVE_ASCII_LOG_ID - Indicates the currently active ASCII log.
0x0002: ACTIVE_RW_STATISTICS_LOG_ID - Indicates the currently active R/W statistics log.
0xFFFC: DEFAULT_ERROR_LOG_ID - Indicates the default error log.
0xFFFD: DEFAULT_RW_STATISTICS_LOG_ID - Indicates the default R/W statistics log.
0xFFFE: TEMPORARY_LOG_ID - This log is used internally for copy operations.
0xFFFF: INVALID_LOG_ID - Indicates an invalid log.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: Display Active Error Log

1 - Special Log Function Key or Display Error Code.

If Parameter 2 is equal to 8, 20 hex, 100 hex, 200 hex or 400 hex, this parameter must be equal to AA hex to enable the special error log operation specified by Parameter 2. If Parameter 2 is not equal to 8, 20 hex, 100 hex, 200 hex or 400 hex, only log entries with the Error Code specified by this parameter will be displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

2 - Select Special Log Function.

This parameter selects the following special log functions.

0x0004 - Display Number of Unused Log Bytes.

If Parameter 2 is equal to 4, the number of unused bytes in the log specified by Parameter 0 will be displayed.

0x0008 - Clear ASCII Log and update with entered data.

If Parameter 2 is equal to 8, the ASCII log will be cleared and ASCII data entered from the serial port will be stored in the ASCII log. When a carriage return is entered, the ASCII log will be stored to the log number specified by Parameter 0.

Note: When selecting this function, Parameter 1 must be equal to AA hex.

0x0010 - Append data to end of ASCII Log.

If Parameter 2 is equal to 10 hex, ASCII data entered from the serial port will be appended to the end of the ASCII log. Entering a carriage return terminates the ASCII data to be appended.

0x0020 - Write Active Error Log to specified Log.

If Parameter 2 is equal to 20 hex, the Active Error Log will be written to the log number specified by Parameter 0.

Note: When selecting this function, Parameter 1 must be equal to AA hex.

0x0040 - Enable Fast Log Dump.

If Parameter 2 is equal to 40 hex, the Fast Log Dump will be enabled. When Fast Log Dump is enabled, unformatted log data will be output and the delay between log dumps will be disabled.

0x0080 - Display Log Address.

If Parameter 2 is equal to 80 hex, the address of the specified log will be displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred and the contents of an Error Log are being displayed,

```
"Log c Entries d"
"Count DIAGERR  RWERR    LBA      LLL CHS         PLP CHS         Partition"
"----- -------- -------- -------- --------------- --------------- ---------"
"eeee  ffffffff hhhhhhhh iiiiiiii jjjjjjjj.k.llll mmmmmmmm.n.pppp q         "
```

where

c is the log number

d is the number of valid log entries

eeee is the number of times the error repeated

ffffffff is the Diagnostic Error Code

hhhhhhhh is the Read/Write Subsystem Error Code iiiiiiii is the LBA at which the error occurred

jjjjjjjj is the Logical Cylinder Address at which the error occurred

k is the Logical Head Address at which the error occurred

llll is the Logical Sector Address at which the error occurred

mmmmmmmm is the Physical Cylinder Address at which the error occurred

n is the Logical Head Address at which the error occurred

pppp is the Physical Sector Address at which the error occurred

q is an ASCII String that indicates the partition ("System" or " User") in which the error occurred

If no error occurred and the contents of an ASCII Log are being displayed,

"Log c Entries d"

(Followed by the ASCII data contained in log)

where

c is the log number

d is the number of valid ASCII characters contained in the log

If no error occurred and the contents of a Read/Write Statistics Log are being displayed,

TBD

If no error occurred and the number of unused log bytes is being displayed,

"Log e Number of Unused Bytes = ffffffff"

where

e is the number of the log whose starting address is being displayed

ffffffff is the number of log bytes that are currently unused

If no error occurred and the log address is being displayed,

```
"Log e Starting System Area LBA = ffffffff"      (for a Disc Log or)
"Log e Starting Buffer Addr = gggggggg"          (for a Buffer Log)
```

where

e is the number of the log whose starting address is being displayed

ffffffff is the starting System Area LBA of a disc log

gggggggg is the starting Buffer Address of a buffer log

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display Firmware Revision (Online Control A)

Description:
This command displays the Firmware Revision of the drive.

Quick Help:

"DisplayFirmwareRev";

Input Parameters:
None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following information will be displayed.

"Package Version: CCCCCC.CCCC.CCCCCC.CCCCCCCC, Package P/N: DDDDDDDDD, Package Builder ID: EE,
Package Build Date: MM-DD-YYYY, Package Build Time: HH:MM:SS, Package CFW Version: GGGG.GGGG.
Package SFW1 Version: IIII, Package SFW2 Version: JJJJ, Package SFW3 Version: KKKK, Packag

where

CCCCCC.CCCC.CCCCCC.CCCCCCCC is the Package Version Field.

DDDDDDDDD is the Package Part Number Field.

EE is the Package Builder ID Field.

MM/DD/YYYY is the Package Build Date Field.

HH:MM:SS is the Package Build Time Field.

GGGG.GGGG.GGGGGG.GGGG is the Package CFW Component Version Field.

IIII Package SFW Component 1 Version Field.

JJJJ Package SFW Component 2 Version Field.

KKKK Package SFW Component 3 Version Field.

LLLL Package SFW Component 4 Version Field.

example output:

Package Version: MS1240.STD1.AA0502.STD10013, Package P/N: 100421943, Package Builder ID:
Package Build Date: 03/08/2007, Package Build Time: 151452, Package CFW Version: MS12.STD
Package SFW 1 Version: B413, Package SFW 2 Version: C415, Package SFW 3 Version: ----, Pa

A warning message may be printed which indicates that some of the Firmware Package informatio
has been truncated. The most likely causes of this warning would be that Package information
invalid or that this diagnostic does not support the Firmware Package format returned by the

example output:
Warning: Package Info truncation occurred.

"Controller FwRev CCCCCCCC, CustomerRel DDDDDD, Changelist EEEE, ProdType FFFF, Date GG/GG/GG

where

CCCCCCCC is the Controller Firmware Revision.

DDDD is the Customer Release number.

EEEEEEEE is the Perforce Changelist Number.

FFFF is the Product Type.

GG/GG/GGGG is the date the code was built.

HHHHHH is the time the code was built.

IIIIIII is the global ID of the person that built the code.

"Servo FwRev CCCC

where

CCCC is the Servo Firmware Revision.

"RAP FW Implementation Key: CC, RAP FormatRev DD, ContentsRev EE";

where

CC is the RAP FW Implemenation Key.

DD is the RAP Format Revision.

EE is the RAP Contents Revision.

Revision History:

0001.0000	Initial revision.
0002.0000	Added Firmware Package Information to the DSB.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).
0012.0000	Added RAP FW Implementation Key.

Display Log File (Level L 'D')

Description:

This command displays the specified log file.

Quick Help:

"DisplayLogFile, D[Log],[ErrCode]";

Input Parameters:

0 - Log Number.

This parameter specifies the number of the log to be displayed. If a Log Number is not entered, the Active Error Log will be displayed.

The following are the default or special log files supported by the diagnostics:
0x0000: ACTIVE_ERROR_LOG_ID - Indicates the currently active error log.
0x0001: ACTIVE_ASCII_LOG_ID - Indicates the currently active ASCII log.
0x0002: ACTIVE_RW_STATISTICS_LOG_ID - Indicates the currently active R/W statistics log.
0xFFFC: DEFAULT_ERROR_LOG_ID - Indicates the default error log.
0xFFFD: DEFAULT_RW_STATISTICS_LOG_ID - Indicates the default R/W statistics log.
0xFFFE: TEMPORARY_LOG_ID - This log is used internally for copy operations.
0xFFFF: INVALID_LOG_ID - Indicates an invalid log.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: Active Error Log

1 - Display Error Code.

This parameter specifies the Diagnostic Error Code to be displayed. Only log entries containing this error code will be displayed. This parameter is only valid when displaying error log files.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000   Initial revision.
0011.0000   Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes

(DiagError).

Display Log File Information (Level L 'I')

Description:
This command displays information about the specified log file.

Quick Help:

"DisplayLogFileInfo, I[Log]";

Input Parameters:

0 - Log Number.

This parameter specifies the number of the log whose information is to be displayed.
If a Log Number is not entered, the Active Error Log will be displayed.

The following are the default or special log files supported by the diagnostics:
0x0000: ACTIVE_ERROR_LOG_ID - Indicates the currently active error log.
0x0001: ACTIVE_ASCII_LOG_ID - Indicates the currently active ASCII log.
0x0002: ACTIVE_RW_STATISTICS_LOG_ID - Indicates the currently active R/W statistics log.
0xFFFC: DEFAULT_ERROR_LOG_ID - Indicates the default error log.
0xFFFD: DEFAULT_RW_STATISTICS_LOG_ID - Indicates the default R/W statistics log.
0xFFFE: TEMPORARY_LOG_ID - This log is used internally for copy operations.
0xFFFF: INVALID_LOG_ID - Indicates an invalid log.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: Active Error Log

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following information will be displayed.

"Log c d"
"e Log

"Starting System Area LBA = ffffffff" (for a Disc Log or)
"Starting Buffer Addr = gggggggg" (for a Buffer Log)

"Log Bytes = h, Log Entry Bytes = i, Max Entries = j, Valid Entries = k"

where

c is the log number

d is an ASCII string that specifies the log name e is an ASCII string that specifies the log location and type

ffffffff is the starting System Area LBA of a disc log

gggggggg is the starting Buffer Address of a buffer log

h is the total size of the log file in bytes (including unused entries)

i is the size of a log file entry, in bytes

j is the maximum number of log entries

k is the number of log entries that are currently valid

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display Micro Jog for Logical Cylinder and Head (Level 4 'O')

Description:

The Display Micro Jog Value for Logical CHS commmand seeks to the specified logical track, gets the track's micro jog value and displays it. If no address is specified, this command will seek to the next logical track in the Test Space and display its micro jog value.

Quick Help:

"DisplayMicroJogForLogChs, O[LogCyl],[Hd],[Opts],[SysAreaOpt]";

Input Parameters:

0 - Logical Cylinder Address.

If Parameter 3 is entered, Parameter 0 is the address of the System Area logical cylinder for which the micro jog value is to be displayed. If Parameter 3 is not entered, Parameter 0 is the address of the User Area logical cylinder for which the micro jog value is to be displayed. If both Parameter 0 and 1 are not entered, the micro jog value will be displayed for the next logical track in the Test Space.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: None

1 - Logical Head Address.

This parameter is the address of the Logical Head for which the micro jog value is to be displayed. If both Parameter 0 and 1 are not entered, the micro jog value will be displayed for the next logical track in the Test Space.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

2 - Display Micro Jog options.

This parameter is a bit-significant value that specifies various options for displaying the micro jog value. The bits are defined as follows:

bit 0: Disable Micro Jog Display
0 enables the micro jog value to be displayed
1 disables the micro jog value from being displayed

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Micro Jog Display enabled)

3 - System Area Flag.

If any value is entered then Parameter 0 specifies a System Area logical cylinder, else it specifies a User Area logical cylinder.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

<u>Output Data:</u>

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred and the track is in the User Area, the following information will be displayed.

"User LBA cccccccc LLL CHS dddddd.e.ffff PLP CHS gggggg.h.iiii"
"MR Offset = jjjj"

If no error occurred and the track is in the System Area, the following information will be displayed.

"System LBA cccccccc LLL CHS dddddd.e.ffff PLP CHS gggggg.h.iiii"
"MR Offset = jjjj"

where

cccccccc is the Disk Logical Block Address

dddddd is the Logical Cylinder Address

e is the Logical Head Address

ffff is the Logical Sector Address

gggggg is the Physical Cylinder Address

h is the Logical Head Address

iiii is the Physical Sector Address

jjjj is the MR Offset value for the track

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display / Modify Adaptive Parameter (Level 2, 7 'I')

Description:
This command is used to invoke the Read/Modify Adaptive Parameter subcommands.

Quick Help:

"DisplayModifyAdaptiveParm, I,[GroupId]";

Input Parameters:

0 - Not Used.

Please see the other Read/Modify Adaptive Parameters commands for details regarding the use of this parameter.

Type: N/A

Range: N/A

Default: None

1 - P1 (Adaptive Parameter Group ID).

This parameter specifies the ID of the Adaptive Parameter Group that contains the value to be displayed or modified.

00 = CAP (Controller Adaptive Parameters)
01 = RAP (Read / Write Adaptive Parameters)
02 = SAP (Servo Adaptive Parameters)
03 = RW Working Parameters (Read / Write Working Parameters)
FF = Table of Contents (All allowable Group IDs)

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

Output Data:

Please see each individual Read/Modify Adaptive Parameter subcommand for more details regarding its output data format.

Examples:

The following will present the Display/Modify Adaptives command's Table of Contents:

F3 2>I,FF

Revision History:

0001.0000	Initial revision.
0002.0000	Corrected Working Parameters display for Maintenance Heat.
0002.0001	Added separate command and diagnostic files to handle the different adaptive
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError). parameters.
0011.0001	Added support for modifying/reading SAP Flex Bias Table and SAP Bias Hysteresis Ta

Display / Modify CAP (Level 2, 7 'I,0')

Description:

This command displays the values of the specified controller adaptive parameters. (It does not currently support the modification of controller adaptive parameters.)

Quick Help:

"DisplayModifyCap, I[ParmValue],0,[ParmId]";

Input Parameters:

0 - P0 (New CAP Value).

If this parameter is entered, the adaptive value specified by command parameter 2 will be set equal to the value of this parameter.

Type: Quote-delimited string or hex value

Range: 1 to 255 character string or 0000 to FFFF (if hex value)

Default: None

1 - P1 (CAP Group ID = 0).

This parameter specifies the Group ID of the CAP, which is 0.

Type: Unsigned 32-bit value

Range: 0 is the only valid value.

Default: 0

2 - P2 (CAP Value ID).

This parameter specifies the ID of the CAP value to be displayed or modified. If Parameter 0 is not entered, entering a value of zero for this parameter will display all of the parameters in the group CAP.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

Output Data:

If no error occurred and the CAP data is being displayed, the following is an example of the CAP data that will be displayed.

```
(P1=00) CAP:

  Validation Key: FFFFFFFF
  HDA Serial Number: Invalid
  PCBA Serial Number: Invalid
  PCBA Part Number: Invalid
  Head Count: 01
  Node Name Validation Key: FF
  Node Name: FF FF FF FF FF FF FF FF
  Product Family ID: FF
  Product Family Member ID: 01
  PCBA Build Code: Invalid
  ASIC Info:
    00: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
        FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
        FF FF FF

    01: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
        FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
        FF FF FF

    02: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
        FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
        FF FF FF

    03: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
        FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
        FF FF FF

  Firmware Key: FF FF FF FF FF FF FF FF FF FF FF FF FF FF
  Firmware Key Checksum: FFFF
  Date of Manufacture: 10122002
  Destroked Buffer Size: FF
  Final Mfg Op: Invalid
  Final Mfg Erc: Undefined
  System Area Prep State: FF
  Checksum: FFFF
```

Examples:

To display the CAP:

```
F3 2>I,0
F3 2>I    <-- CAP is displayed by default for the "I" command.
```

Revision History:

0001.0000 Initial revision.

0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display / Modify RAP revision 02 (Level 2, 7 'I,1')

Description:

This command displays and optionally modifies the value of the specified read adaptive parameter.

Quick Help:

"DisplayModifyRap, I[ParmValue],1,[ParmId],[P3],[P4],[P5],[P6],[UpdateOpts]";

Input Parameters:

0 - P0 (New RAP Value).

If this parameter is entered, the adaptive value specified by command parameters 1 though 7 will be set equal to the value of this parameter. If this parameter is not entered, the RAP values specified by command parameters 1 and 2 will be displayed.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: None

1 - P1 (RAP Group ID = 1).

This parameter specifies the RAP ID (1).

Type: Unsigned 32-bit value

Range: 1 is the only valid value.

Default: NA

2 - P2 (RAP Value ID).

This parameter specifies the ID of the RAP value to be displayed or modified. If Parameter 0 is not entered, entering a value of zero for this parameter will display all of the parameters in the group RAP.

The Adaptive Parameter IDs and the values of parameters 3-6 are defined as follows:

0x00 = All RAP Parameters

Parameters 3-6 are not used

0x01 = Drive Configuration

Parameters 3-6 are not used

0x02 = Temperature Sensor Configuration

Parameters 3-6 are not used

0x03 = Zone Configuration

Parameters 3-6 are not used

0x04 = Tuned Drive parameters

Parameter 3 = Register Group
Parameter 4 = Register Index
Parameter 5 = not used
Parameter 6 = not used

0x05 = Tuned Zone parameters

Parameter 3 = Register Group
Parameter 4 = Register Index

Parameter 5 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

Parameter 6 = not used

0x06 = Tuned Head parameters

Parameter 3 = Head
Parameter 4 = Register Group
Parameter 5 = Register Index

Parameter 6 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

0x07 = Zone Format Budget parameters

Parameter 3 = Zone Format Budget Parameter Index

Parameter 4 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

Parameter 5 = not used
Parameter 6 = not used

0x08 = Head Format Budget parameters

Parameter 3 = Head

Parameter 4 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

Parameter 5 = not used
Parameter 6 = not used

0x09 = TCC Preamp Temperature Point parameters

Parameters 3-6 are not used

0x0A = TCC Preamp parameters

Parameter 3 = Head
Parameter 4 = TCC Preamp Parameter Index

Parameter 5 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

Parameter 6 = not used

0x0B = TCC Preamp Offset parameters

Parameter 3 = Set Number
Parameter 4 = Head
Parameter 5 = TCC Preamp Parameter Index

Parameter 6 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

0x0C = RAP CRC

Parameters 3-6 are not used

0x0D = AFH drive parameters
Parameter 3 = AFH drive parameter index
NOTE: Enter value in IEEE 754 float 32 bit representation!

Parameters 4-6 are not used

0x0E = AFH head parameters

Parameter 3 = Head
Parameter 4 = AFH head parameter index
NOTE: Enter value in IEEE 754 float 32 bit representation!

```
          Parameter 5-6 = not used

 0x0F = AFH head/zone parameters

          Parameter 3 = Head
          Parameter 4 = AFH head/zone parameter index
          Parameter 5 = Zone Number

              0x00 = User Zone 0
              0x01 = User Zone 1
                      .
                      .
                      .
              0x80 = System Zone

          Parameter 6 = not used

 0x10 = Shared registers

          Parameter 3 = Set
          Parameter 4 = Head
          Parameter 5 = Parameter index
          Parameter 6 = Zone Number

              0x00 = User Zone 0
              0x01 = User Zone 1
                      .
                      .
                      .
              0x80 = System Zone

 0x11 = VBAR Configuration

          Parameters 3-6 are not used

 0x12 = Channel Parameters Information Table

          Parameter 0 = Index
          Parameter 3 = Table
          Parameter 4 = Table offset

 0xFF = RAP Table of Contents

          Parameters 3-6 are not used

Type:    Unsigned 32-bit value

Range:   0 to 0xFFFFFFFF

Default: 0
```

3 - P3 (select value to be modified).

If Parameter 0 is entered, this parameter is used to select the value to be modified. The definition of this parameter depends on the value entered for Parameter 2. See the Parameter 2 description for more information.

If Parameter 0 is not entered and Parameter 1 is set to display RAP, this parameter will specifies the heads to display their adaptive value based on the display mode that is set by Level T O comamnd. With Verbose Formatted ASCII Output Mode, the adaptive value on all heads will be displayed. With Formatted ASCII Output Mode, if Parameter3 is not entered only the adaptive value on the existing heads will be displayed; if Parameter3 is entered only the adaptive value on the requested head will be displayed. Otherwise this parameter is not used.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

4 - P4 (select value to be modified).

If Parameter 0 is entered, this parameter is used to select the value to be modified. The definition of this parameter depends on the value entered for Parameter 2. See the Parameter 2 description for more information.

If Parameter 0 is not entered, this parameter is not used.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

5 - P5 (select value to be modified).

If Parameter 0 is entered, this parameter is used to select the value to be modified. The definition of this parameter depends on the value entered for Parameter 2. See the Parameter 2 description for more information.

If Parameter 0 is not entered, this parameter is not used.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

6 - P6 (select value to be modified).

If Parameter 0 is entered, this parameter is used to select the value to be modified. The definition of this parameter depends on the value entered for Parameter 2. See the Parameter 2 description for more information.

If Parameter 0 is not entered, this parameter is not used.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

7 - RAP Update Option.

This parameter is a bit significant value that specifies how the modified RAP values are to be applied. The bits are defined as follows:

Bits 31-2: not used

Bit 1: Enable Track Format update.

If this bit is equal to 1, the Track Format will be updated based on the RAP values that were modified. If this bit is equal to 0, the

Track Format will not be modified.

Bit 0: Enable Channel Parameter Reload.

If this bit is equal to 1, the Channel Registers will be updated based on the RAP values that were modified. If this bit is equal to 0, the Channel Registers will not be modified.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0 (Disable Track Format Update and Channel Parameter Reload)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred and the RAP data is being displayed ...

The following is an example of the RAP Drive Configuration information that will be displayed.

```
(P1=01) RAP:

   (P2=01) RAP Drive Config:

      Format Rev: 0010
      Contents Rev: 0D00
      Drive Serial Number: Invalid
```

The following is an example of the RAP Temperature Sensor Configuration information that will be displayed.

```
(P1=01) RAP:

  (P2=02) RAP Temp Sensor Config:

    Thermistor Temp Sensor Offset: 00
    Thermistor Temp Sensor Scale: 64
    Thermistor Temp Table Elements: 1E

    Thermistor Temp Lookup Table:
                      0    1    2    3    4    5    6    7
      Temperature:  FFD0 FFDA FFE3 FFEC FFFE 000F 001F 002F
      A to D Value: FF91 FF8D FF89 FF86 FF7E FF76 FF6E FF67

                      8    9    A    B    C    D    E    F
      Temperature:  003E 004D 005B 0076 0090 00A9 00D9 0107
      A to D Value: FF5F FF57 FF50 FF40 FF31 FF21 FF02 FEE3

                     10   11   12   13   14   15   16   17
      Temperature:  0138 016D 01A9 01CA 01EE 0214 023E 0254
```

```
        A to D Value: FEC5 FEA6 FE87 FE77 FE68 FE58 FE49 FE41

                        18   19   1A   1B   1C   1D
        Temperature:  026B 0283 029C 02B6 02D2 02EE
        A to D Value: FE3A FE32 FE2A FE22 FE1B FE13
```

The following is an example of the RAP Zone Configuration information that will be displayed.

```
   (P1=01) RAP:

     (P2=03) RAP Zone Config:

       Min Alt Tracks Per Zone: 00

                       StartCyl   NumCyls  SpareCyls
       User Zone   00: 00000000   002BD1   000011
       User Zone   01: 00002BD1   002940   000010
       User Zone   02: 00005511   0026E4   00000F
       System Zone 00: 00007BF5   00012C   00000E
```

The following is an example of the RAP Tuned Drive Parameters information that will be displayed.

```
   (P1=01) RAP:

     (P2=04) Tuned Drive Parms:

       (P3=00) Reg Group 00:

              P4=    0    1    2    3    4    5    6    7    8    9    A    B    C    D
         Reg Addr: 0000 0001 0055 0084 0085 0086 008C 008E 0090 0092 0095 0099 009B 009C 0(
         Reg Data: 0390 000B 01C7 8078 11D2 0092 4100 8A00 0073 0003 0021 01E9 0000 000F 0(

              P4=   10   11   12   13   14   15   16   17   18   19   1A   1B   1C   1D
         Reg Addr: 009F 00A0 00A1 00A3 00A4 00A5 00A6 00A7 00B7 00B8 00BC 00BD 00BE 00BF 0(
         Reg Data: 0000 2000 0000 0000 38DA 14D1 0048 7880 FA00 1986 0000 1525 00F0 7F00 0(

              P4=   20   21   22   23   24   25   26   27   28   29   2A   2B   2C   2D
         Reg Addr: 00DA 00DC 00DD 00DE 00E0 00E2 00E5 00E9 00EB 00EC 00ED 00EE 00EF 00F0 0(
         Reg Data: 2100 00D4 0000 0000 6817 0000 0000 0000 0000 0000 0000 0000 0000 001C 0(

              P4=   30   31   32   33   34   35   36   37   38   39   3A
         Reg Addr: 00F3 00F5 00F6 00F7 00F8 00F9 00FA 00FB 00FC 00FD 00FE
         Reg Data: 0000 0088 0020 0020 0000 0FFF 0000 0000 0000 0040 0000

       (P3=01) Reg Group 01:

              P4=    0    1    2    3    4    5    6    7    8    9    A    B    C    D
         Reg Addr: 0061 0062 0063 0064 0075 0076 00E4 00E5 00E6 00EA 00EB 00EC 00ED 00EE 0(
         Reg Data: 204F 0044 2630 0000 0520 0000 F20B 0000 0000 0000 0000 0D07 0000 4020 0(

              P4=   10   11   12   13   14   15   16   17   18   19
         Reg Addr: 00F4 00F5 00F6 00F7 00F8 00F9 00FB 00FD 00FE 00FF
         Reg Data: 0004 0002 0024 0000 0000 0000 015A 1847 0000 0400
```

The following is an example of the RAP Tuned Zone Parameters information that will be displayed.

```
   (P1=01) RAP:
```

```
    (P2=05) RAP Tuned Zone Parms:

      (P3=00) Reg Group 00:

                             P4=    0
                       Reg Addr: 0086
        (P5=00) User Zone 00:   006A
        (P5=01) User Zone 01:   0067
        (P5=02) User Zone 02:   0065
        (P5=80) System Zone 00: 0062

      (P3=01) Reg Group 01:

                             P4=    0    1    2
                       Reg Addr: 0060 0061 0063
        (P5=00) User Zone 00:   E1D3 204F 2630
        (P5=01) User Zone 01:   E1D3 204F 262B
        (P5=02) User Zone 02:   E1D3 204F 2633
        (P5=80) System Zone 00: E1D3 204F 262F
```

The following is an example of the RAP Tuned Head Parameters information that will be displayed.

```
   (P1=01) RAP:

    (P2=06) RAP Tuned Head Parms:

      (P3=00) Head 00:

        (P4=00) Reg Group 00:

                                        P5=    0    1    2    3    4    5    6    7    8
                                  Reg Addr: 0089 008A 008B 0093 0094 0096 0098 0097 0098 00
          (P6=00) User Zone 00 Reg Data:   3DF4 3DF4 A1EF 0804 0CB8 0004 0500 C900 0100 98
          (P6=01) User Zone 01 Reg Data:   3DF4 3DF4 A1EF 0804 0C60 0004 0500 C900 0100 AA
          (P6=02) User Zone 02 Reg Data:   3DF4 3DF4 A1EF 0804 0C20 0004 0500 C900 0100 A3
          (P6=80) System Zone 00 Reg Data: 3DF4 3DF4 A1EF 0804 0BC0 0004 0500 C900 0100 A4

                                        P5=   10   11   12   13   14   15   16   17   18
                                  Reg Addr: 00B9 00BB 00C0 00C1 00C2 00C3 00C4 00C5 00C6 00
          (P6=00) User Zone 00 Reg Data:   4026 0800 0000 0000 0000 0000 2828 2828 2828 28
          (P6=01) User Zone 01 Reg Data:   4026 0800 0000 0000 0000 0000 2828 2828 2828 28
          (P6=02) User Zone 02 Reg Data:   4026 0800 0000 0000 0000 0000 2828 2828 2828 28
          (P6=80) System Zone 00 Reg Data: 4026 0800 0000 0000 0000 0000 2828 2828 2828 28

                                        P5=   20   21   22   23   24   25   26
                                  Reg Addr: 00CE 00CF 00D0 00D1 00D2 00D3 00D4
          (P6=00) User Zone 00 Reg Data:   7C7C 7C00 0000 0000 0000 0000 0000
          (P6=01) User Zone 01 Reg Data:   7C7C 7C00 0000 0000 0000 0000 0000
          (P6=02) User Zone 02 Reg Data:   7C7C 7C00 0000 0000 0000 0000 0000
          (P6=80) System Zone 00 Reg Data: 7C7C 7C00 0000 0000 0000 0000 0000
```

The following is an example of the RAP Zone Format Budget Parameters information that will be displayed.

```
   (P1=01) RAP:

    (P2=07) RAP Zone Format Budget Parms:

      Format Budget Rev: 01
```

	InitialPlo (P3=0)	Plo (P3=1)	Isg (P3=2)	PreSrvGap (P3=3)	PostSrvGap (P3=4)	SeqPlo1 (P3=5)	SeqPl (P3=6)
(P4=00) User Zone 00:	1C	26	0D	20	04	14	1E
(P4=01) User Zone 01:	1B	25	0C	20	05	13	1D
(P4=02) User Zone 02:	1C	26	0B	20	05	13	1D
(P4=03) User Zone 03:	1D	26	0B	20	05	14	1D
(P4=04) User Zone 04:	1C	26	0B	21	05	13	1D
(P4=05) User Zone 05:	1D	25	0B	21	05	14	1C
(P4=06) User Zone 06:	1C	24	0C	21	05	14	1C
(P4=07) User Zone 07:	1B	24	0C	21	05	13	1C
(P4=08) User Zone 08:	1C	25	0A	21	04	13	1C
(P4=09) User Zone 09:	1D	24	0A	20	04	14	1B
(P4=0A) User Zone 0A:	1C	23	0A	20	04	13	1A
(P4=0B) User Zone 0B:	1C	23	0A	20	05	13	1A
(P4=0C) User Zone 0C:	1C	23	0A	1F	04	13	1A
(P4=0D) User Zone 0D:	1B	22	0A	1F	04	13	1A
(P4=0E) User Zone 0E:	1B	21	09	1F	04	12	18
(P4=0F) User Zone 0F:	1B	20	09	1D	04	12	17
(P4=80) System Zone 00:	1A	20	09	1D	04	11	17

	SeqPad (P3=7)	SeqIsgWr (P3=8)	SeqIsgRd (P3=9)	SeqSgToRg (P3=A)	SeqSkipRdDelay (P3=B)	SeqSyncTo (P3=C)
(P4=00) User Zone 00:	02	13	19	08	34	34
(P4=01) User Zone 01:	02	12	18	08	33	34
(P4=02) User Zone 02:	02	12	18	09	34	34
(P4=03) User Zone 03:	02	12	18	09	34	34
(P4=04) User Zone 04:	02	12	18	09	34	34
(P4=05) User Zone 05:	02	12	17	09	35	32
(P4=06) User Zone 06:	02	12	17	09	35	32
(P4=07) User Zone 07:	02	12	17	08	33	32
(P4=08) User Zone 08:	02	11	16	08	33	32
(P4=09) User Zone 09:	02	11	16	08	34	32
(P4=0A) User Zone 0A:	02	11	15	08	33	31
(P4=0B) User Zone 0B:	02	11	15	08	33	2F
(P4=0C) User Zone 0C:	02	11	15	08	33	2F
(P4=0D) User Zone 0D:	02	10	14	07	32	2E
(P4=0E) User Zone 0E:	02	10	13	07	32	2D
(P4=0F) User Zone 0F:	02	10	12	07	32	2A
(P4=80) System Zone 00:	02	10	12	06	31	2A

The following is an example of the RAP Head Format Budget Parameters information that will be displayed.

(P1=01) RAP:

(P2=08) RAP Head Format Budget Parms:

Format Budget Rev: 01

(P3=00) Head 00:

	SeqSgToWg
(P4=00) User Zone 00:	0F
(P4=01) User Zone 01:	10
(P4=02) User Zone 02:	11
(P4=03) User Zone 03:	11
(P4=04) User Zone 04:	12
(P4=05) User Zone 05:	12

```
(P4=06) User Zone 06:      12
(P4=07) User Zone 07:      12
(P4=08) User Zone 08:      12
(P4=09) User Zone 09:      12
(P4=0A) User Zone 0A:      12
(P4=0B) User Zone 0B:      12
(P4=0C) User Zone 0C:      12
(P4=0D) User Zone 0D:      12
(P4=0E) User Zone 0E:      12
(P4=0F) User Zone 0F:      11
(P4=80) System Zone 00:    11
```

The following is an example of the RAP TCC Temperature Point Parameters information that will be displayed.

```
(P1=01) RAP:

  (P2=09) RAP TCC Temp Point Parms: 19 37 FFFFFFF6
```

The following is an example of the RAP TCC Preamp Parameters information that will be displayed.

```
(P1=01) RAP:

  (P2=0A) RAP TCC Preamp Parms:

    (P3=00) Head 00:

                                WrCur    WrDamp   WrDampDur  WrPreHt   WrHt     RdHt
                                (P4=0)   (P4=1)   (P4=2)     (P4=3)    (P4=4)   (P4=5)
      (P5=00) User Zone 00:      0F       08        0E         20        1E       1F
      (P5=01) User Zone 01:      0F       08        0E         20        1E       1F
      (P5=02) User Zone 02:      0F       08        0E         28        26       27
      (P5=80) System Zone 00:    0F       08        0E         28        26       27
```

The following is an example of the RAP TCC Preamp Offset Parameters information that will be displayed.

```
(P1=01) RAP:

  (P2=0B) RAP TCC Preamp Offset Parms:

    (P3=00) Set 00:

      (P4=00) Head 00:

                                  WrCurOff  WrDampOff  WrDampDurOff  WrPreHtOff  WrHtOff
                                   (P5=0)    (P5=1)       (P5=2)       (P5=3)     (P5=4)
        (P6=00) User Zone 00:        00        00           00           00         00
        (P6=01) User Zone 01:        00        00           00           00         00
        (P6=02) User Zone 02:        00        00           00           00         00
        (P6=80) System Zone 00:      00        00           00           00         00

    (P3=01) Set 01:

      (P4=00) Head 00:

                                  WrCurOff  WrDampOff  WrDampDurOff  WrPreHtOff  WrHtOff
                                   (P5=0)    (P5=1)       (P5=2)       (P5=3)     (P5=4)
        (P6=00) User Zone 00:        00        00           00           00         00
```

	WrCurOff (P5=0)	WrDampOff (P5=1)	WrDampDurOff (P5=2)	WrPreHtOff (P5=3)	WrHtOff (P5=4)
(P6=01) User Zone 01:	00	00	00	00	00
(P6=02) User Zone 02:	00	00	00	00	00
(P6=80) System Zone 00:	00	00	00	00	00

(P3=02) Set 02:

(P4=00) Head 00:

	WrCurOff (P5=0)	WrDampOff (P5=1)	WrDampDurOff (P5=2)	WrPreHtOff (P5=3)	WrHtOff (P5=4)
(P6=00) User Zone 00:	00	00	00	00	00
(P6=01) User Zone 01:	00	00	00	00	00
(P6=02) User Zone 02:	00	00	00	00	00
(P6=80) System Zone 00:	00	00	00	00	00

The following is an example of the RAP CRC display.

(P1=01) RAP:

(P2=0C) RAP CRC: 00000000

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

if RAP_FORMAT_14_REV_2
0012.0000 Changed Gamma values. Added new TCS values.
endif

Display / Modify RAP revision 10 (Level 2, 7 'I,1')

Description:

This command displays and optionally modifies the value of the specified read adaptive parameter.

Quick Help:

"DisplayModifyRap, I[ParmValue],1,[ParmId],[P3],[P4],[P5],[P6],[UpdateOpts]";

Input Parameters:

0 - P0 (New RAP Value).

If this parameter is entered, the adaptive value specified by command parameters 1 though 7 will be set equal to the value of this parameter. If this parameter is not entered, the RAP values specified by command parameters 1 and 2 will be displayed.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: None

1 - P1 (RAP Group ID = 1).

This parameter specifies the RAP ID (1).

Type: Unsigned 32-bit value

Range: 1 is the only valid value.

Default: NA

2 - P2 (RAP Value ID).

This parameter specifies the ID of the RAP value to be displayed or modified. If Parameter 0 is not entered, entering a value of zero for this parameter will display all of the parameters in the group RAP.

The Adaptive Parameter IDs and the values of parameters 3-6 are defined as follows:

0x00 = All RAP Parameters

Parameters 3-6 are not used

0x01 = Drive Configuration

Parameters 3-6 are not used

0x02 = Temperature Sensor Configuration

Parameters 3-6 are not used

0x03 = Zone Configuration

Parameters 3-6 are not used

0x04 = Tuned Drive parameters

Parameter 3 = Register Group
Parameter 4 = Register Index
Parameter 5 = not used
Parameter 6 = not used

0x05 = Tuned Zone parameters

Parameter 3 = Register Group
Parameter 4 = Register Index

Parameter 5 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

Parameter 6 = not used

0x06 = Tuned Head parameters

Parameter 3 = Head
Parameter 4 = Register Group

Parameter 5 = Register Index

Parameter 6 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

0x07 = Zone Format Budget parameters

Parameter 3 = Zone Format Budget Parameter Index

Parameter 4 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

Parameter 5 = not used
Parameter 6 = not used

0x08 = Head Format Budget parameters

Parameter 3 = Head

Parameter 4 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

Parameter 5 = not used
Parameter 6 = not used

0x09 = TCC Preamp Temperature Point parameters

Parameters 3-6 are not used

0x0A = TCC Preamp parameters

Parameter 3 = Head
Parameter 4 = TCC Preamp Parameter Index

Parameter 5 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

Parameter 6 = not used

0x0B = TCC Preamp Offset parameters

Parameter 3 = Set Number
Parameter 4 = Head
Parameter 5 = TCC Preamp Parameter Index

Parameter 6 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

0x0C = RAP CRC

Parameters 3-6 are not used

0x0D = AFH drive parameters
Parameter 3 = AFH drive parameter index
NOTE: Enter value in IEEE 754 float 32 bit representation!

Parameters 4-6 are not used

0x0E = AFH head parameters

Parameter 3 = Head
Parameter 4 = AFH head parameter index
NOTE: Enter value in IEEE 754 float 32 bit representation!

Parameter 5-6 = not used

0x0F = AFH head/zone parameters

Parameter 3 = Head
Parameter 4 = AFH head/zone parameter index
Parameter 5 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

Parameter 6 = not used

0x10 = Shared registers

Parameter 3 = Set
Parameter 4 = Head
Parameter 5 = Parameter index
Parameter 6 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

0x11 = VBAR Configuration

Parameters 3-6 are not used

0x12 = Channel Parameters Information Table

Parameter 0 = Index
Parameter 3 = Table
Parameter 4 = Table offset

0xFF = RAP Table of Contents

Parameters 3-6 are not used

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

3 - P3 (select value to be modified).

If Parameter 0 is entered, this parameter is used to select the value to be modified. The definition of this parameter depends on the value entered for Parameter 2. See the Parameter 2 description for more information.

If Parameter 0 is not entered and Parameter 1 is set to display RAP, this parameter will specifies the heads to display their adaptive value based on the display mode that is set by Level T O comamnd. With Verbose Formatted ASCII Output Mode, the adaptive value on all heads will be displayed. With Formatted ASCII Output Mode, if Parameter3 is not entered only the adaptive value on the existing heads will be displayed; if Parameter3 is entered only the adaptive value on the requested head will be displayed. Otherwise this parameter is not used.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

4 - P4 (select value to be modified).

If Parameter 0 is entered, this parameter is used to select the value to be modified. The definition of this parameter depends on the value entered for Parameter 2. See the Parameter 2 description for more information.

If Parameter 0 is not entered, this parameter is not used.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

5 - P5 (select value to be modified).

If Parameter 0 is entered, this parameter is used to select the value to be modified. The definition of this parameter depends on the value entered for Parameter 2. See the Parameter 2 description for more information.

If Parameter 0 is not entered, this parameter is not used.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

6 - P6 (select value to be modified).

If Parameter 0 is entered, this parameter is used to select the value to be modified. The definition of this parameter depends on the value entered for Parameter 2. See the Parameter 2 description for more information.

If Parameter 0 is not entered, this parameter is not used.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

7 - RAP Update Option.

This parameter is a bit significant value that specifies how the modified RAP values are to be applied. The bits are defined as follows:

Bits 31-2: not used

Bit 1: Enable Track Format update.

If this bit is equal to 1, the Track Format will be updated based on the RAP values that were modified. If this bit is equal to 0, the Track Format will not be modified.

Bit 0: Enable Channel Parameter Reload.

If this bit is equal to 1, the Channel Registers will be updated based on the RAP values that were modified. If this bit is equal to 0, the Channel Registers will not be modified.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0 (Disable Track Format Update and Channel Parameter Reload)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred and the RAP data is being displayed ...

The following is an example of the RAP Drive Configuration information that will be displayed.

(P1=01) RAP:

```
      (P2=01) RAP Drive Config:

         Format Rev: 0010
         Contents Rev: 0D00
         Drive Serial Number: Invalid
         RAP Heads: 0001
         RAP User Zones: 0010
         RAP System Zones: 0001
```

The following is an example of the RAP Temperature Sensor Configuration information that will be displayed.

```
   (P1=01) RAP:

     (P2=02) RAP Temp Sensor Config:

       Thermistor Temp Sensor Offset: 00
       Thermistor Temp Sensor Scale: 64
       Thermistor Temp Table Elements: 1E

       Thermistor Temp Lookup Table:
                          0    1    2    3    4    5    6    7
         Temperature:  FFD0 FFDA FFE3 FFEC FFFE 000F 001F 002F
         A to D Value: FF91 FF8D FF89 FF86 FF7E FF76 FF6E FF67

                          8    9    A    B    C    D    E    F
         Temperature:  003E 004D 005B 0076 0090 00A9 00D9 0107
         A to D Value: FF5F FF57 FF50 FF40 FF31 FF21 FF02 FEE3

                         10   11   12   13   14   15   16   17
         Temperature:  0138 016D 01A9 01CA 01EE 0214 023E 0254
         A to D Value: FEC5 FEA6 FE87 FE77 FE68 FE58 FE49 FE41

                         18   19   1A   1B   1C   1D
         Temperature:  026B 0283 029C 02B6 02D2 02EE
         A to D Value: FE3A FE32 FE2A FE22 FE1B FE13
```

The following is an example of the RAP Zone Configuration information that will be displayed.

```
   (P1=01) RAP:

     (P2=03) RAP Zone Config:

       Min Alt Tracks Per Zone: 00

                       StartCyl   NumCyls  SpareCyls
       User Zone   00: 00000000   002BD1   000011
       User Zone   01: 00002BD1   002940   000010
       User Zone   02: 00005511   0026E4   00000F
       System Zone 00: 00007BF5   00012C   00000E
```

The following is an example of the RAP Tuned Drive Parameters information that will be displayed.

```
   (P1=01) RAP:

     (P2=04) Tuned Drive Parms:
```

```
    (P3=00) Reg Group 00:

           P4=    0    1    2    3    4    5    6    7    8    9    A    B    C    D
     Reg Addr: 0000 0001 0055 0084 0085 0086 008C 008E 0090 0092 0095 0099 009B 009C 0
     Reg Data: 0390 000B 01C7 8078 11D2 0092 4100 8A00 0073 0003 0021 01E9 0000 000F 0

           P4=   10   11   12   13   14   15   16   17   18   19   1A   1B   1C   1D
     Reg Addr: 009F 00A0 00A1 00A3 00A4 00A5 00A6 00A7 00B7 00B8 00BC 00BD 00BE 00BF 0
     Reg Data: 0000 2000 0000 0000 38DA 14D1 0048 7880 FA00 1986 0000 1525 00F0 7F00 0

           P4=   20   21   22   23   24   25   26   27   28   29   2A   2B   2C   2D
     Reg Addr: 00DA 00DC 00DD 00DE 00E0 00E2 00E5 00E9 00EB 00EC 00ED 00EE 00EF 00F0 0
     Reg Data: 2100 00D4 0000 0000 6817 0000 0000 0000 0000 0000 0000 0000 0000 001C 0

           P4=   30   31   32   33   34   35   36   37   38   39   3A
     Reg Addr: 00F3 00F5 00F6 00F7 00F8 00F9 00FA 00FB 00FC 00FD 00FE
     Reg Data: 0000 0088 0020 0020 0000 0FFF 0000 0000 0000 0040 0000

    (P3=01) Reg Group 01:

           P4=    0    1    2    3    4    5    6    7    8    9    A    B    C    D
     Reg Addr: 0061 0062 0063 0064 0075 0076 00E4 00E5 00E6 00EA 00EB 00EC 00ED 00EE 0
     Reg Data: 204F 0044 2630 0000 0520 0000 F20B 0000 0000 0000 0000 0D07 0000 4020 0

           P4=   10   11   12   13   14   15   16   17   18   19
     Reg Addr: 00F4 00F5 00F6 00F7 00F8 00F9 00FB 00FD 00FE 00FF
     Reg Data: 0004 0002 0024 0000 0000 0000 015A 1847 0000 0400
```

The following is an example of the RAP Tuned Zone Parameters information that will be displayed.

```
  (P1=01) RAP:

    (P2=05) RAP Tuned Zone Parms:

      (P3=00) Reg Group 00:

                         P4=    0
                   Reg Addr: 0086
       (P5=00) User Zone 00:   006A
       (P5=01) User Zone 01:   0067
       (P5=02) User Zone 02:   0065
       (P5=80) System Zone 00: 0062

      (P3=01) Reg Group 01:

                         P4=    0    1    2
                   Reg Addr: 0060 0061 0063
       (P5=00) User Zone 00:   E1D3 204F 2630
       (P5=01) User Zone 01:   E1D3 204F 262B
       (P5=02) User Zone 02:   E1D3 204F 2633
       (P5=80) System Zone 00: E1D3 204F 262F
```

The following is an example of the RAP Tuned Head Parameters information that will be displayed.

```
  (P1=01) RAP:

    (P2=06) RAP Tuned Head Parms:

      (P3=00) Head 00:
```

```
        (P4=00) Reg Group 00:

                                       P5=    0    1    2    3    4    5    6    7    8
                                 Reg Addr: 0089 008A 008B 0093 0094 0096 0098 0097 0098 0
          (P6=00) User Zone 00 Reg Data:   3DF4 3DF4 A1EF 0804 0CB8 0004 0500 C900 0100 98
          (P6=01) User Zone 01 Reg Data:   3DF4 3DF4 A1EF 0804 0C60 0004 0500 C900 0100 AA
          (P6=02) User Zone 02 Reg Data:   3DF4 3DF4 A1EF 0804 0C20 0004 0500 C900 0100 A3
          (P6=80) System Zone 00 Reg Data: 3DF4 3DF4 A1EF 0804 0BC0 0004 0500 C900 0100 A4

                                       P5=   10   11   12   13   14   15   16   17   18
                                 Reg Addr: 00B9 00BB 00C0 00C1 00C2 00C3 00C4 00C5 00C6 0
          (P6=00) User Zone 00 Reg Data:   4026 0800 0000 0000 0000 0000 2828 2828 2828 28
          (P6=01) User Zone 01 Reg Data:   4026 0800 0000 0000 0000 0000 2828 2828 2828 28
          (P6=02) User Zone 02 Reg Data:   4026 0800 0000 0000 0000 0000 2828 2828 2828 28
          (P6=80) System Zone 00 Reg Data: 4026 0800 0000 0000 0000 0000 2828 2828 2828 28

                                       P5=   20   21   22   23   24   25   26
                                 Reg Addr: 00CE 00CF 00D0 00D1 00D2 00D3 00D4
          (P6=00) User Zone 00 Reg Data:   7C7C 7C00 0000 0000 0000 0000 0000
          (P6=01) User Zone 01 Reg Data:   7C7C 7C00 0000 0000 0000 0000 0000
          (P6=02) User Zone 02 Reg Data:   7C7C 7C00 0000 0000 0000 0000 0000
          (P6=80) System Zone 00 Reg Data: 7C7C 7C00 0000 0000 0000 0000 0000
```

The following is an example of the RAP Zone Format Budget Parameters information that will be displayed.

```
   (P1=01) RAP:

     (P2=07) RAP Zone Format Budget Parms:

       Format Budget Rev: 01

                                InitialPlo  Plo   Isg   PreSrvGap PostSrvGap SeqPlo1 SeqPlo
                                  (P3=0)  (P3=1) (P3=2)  (P3=3)     (P3=4)    (P3=5)  (P3=6)
       (P4=00) User Zone 00:        1C      26     0D      20         04        14      1E
       (P4=01) User Zone 01:        1B      25     0C      20         05        13      1D
       (P4=02) User Zone 02:        1C      26     0B      20         05        13      1D
       (P4=03) User Zone 03:        1D      26     0B      20         05        14      1D
       (P4=04) User Zone 04:        1C      26     0B      21         05        13      1D
       (P4=05) User Zone 05:        1D      25     0B      21         05        14      1C
       (P4=06) User Zone 06:        1C      24     0C      21         05        14      1C
       (P4=07) User Zone 07:        1B      24     0C      21         05        13      1C
       (P4=08) User Zone 08:        1C      25     0A      21         04        13      1C
       (P4=09) User Zone 09:        1D      24     0A      20         04        14      1B
       (P4=0A) User Zone 0A:        1C      23     0A      20         04        13      1A
       (P4=0B) User Zone 0B:        1C      23     0A      20         05        13      1A
       (P4=0C) User Zone 0C:        1C      23     0A      1F         04        13      1A
       (P4=0D) User Zone 0D:        1B      22     0A      1F         04        13      1A
       (P4=0E) User Zone 0E:        1B      21     09      1F         04        12      18
       (P4=0F) User Zone 0F:        1B      20     09      1D         04        12      17
       (P4=80) System Zone 00:      1A      20     09      1D         04        11      17

                                SeqPad SeqIsgWr SeqIsgRd SeqSgToRg SeqSkipRdDelay SeqSyncTo
                                (P3=7)  (P3=8)   (P3=9)   (P3=A)       (P3=B)       (P3=C)
       (P4=00) User Zone 00:      02      13       19       08           34           34
       (P4=01) User Zone 01:      02      12       18       08           33           34
       (P4=02) User Zone 02:      02      12       18       09           34           34
       (P4=03) User Zone 03:      02      12       18       09           34           34
       (P4=04) User Zone 04:      02      12       18       09           34           34
       (P4=05) User Zone 05:      02      12       17       09           35           32
       (P4=06) User Zone 06:      02      12       17       09           35           32
```

(P4=07) User Zone 07:	02	12	17	08	33	32
(P4=08) User Zone 08:	02	11	16	08	33	32
(P4=09) User Zone 09:	02	11	16	08	34	32
(P4=0A) User Zone 0A:	02	11	15	08	33	31
(P4=0B) User Zone 0B:	02	11	15	08	33	2F
(P4=0C) User Zone 0C:	02	11	15	08	33	2F
(P4=0D) User Zone 0D:	02	10	14	07	32	2E
(P4=0E) User Zone 0E:	02	10	13	07	32	2D
(P4=0F) User Zone 0F:	02	10	12	07	32	2A
(P4=80) System Zone 00:	02	10	12	06	31	2A

The following is an example of the RAP Head Format Budget Parameters information that will be displayed.

(P1=01) RAP:

(P2=08) RAP Head Format Budget Parms:

Format Budget Rev: 01

(P3=00) Head 00:

	SeqSgToWg
(P4=00) User Zone 00:	0F
(P4=01) User Zone 01:	10
(P4=02) User Zone 02:	11
(P4=03) User Zone 03:	11
(P4=04) User Zone 04:	12
(P4=05) User Zone 05:	12
(P4=06) User Zone 06:	12
(P4=07) User Zone 07:	12
(P4=08) User Zone 08:	12
(P4=09) User Zone 09:	12
(P4=0A) User Zone 0A:	12
(P4=0B) User Zone 0B:	12
(P4=0C) User Zone 0C:	12
(P4=0D) User Zone 0D:	12
(P4=0E) User Zone 0E:	12
(P4=0F) User Zone 0F:	11
(P4=80) System Zone 00:	11

The following is an example of the RAP TCC Temperature Point Parameters information that will be displayed.

(P1=01) RAP:

(P2=09) RAP TCC Temp Point Parms: 19 37 FFFFFFF6

The following is an example of the RAP TCC Preamp Parameters information that will be displayed.

(P1=01) RAP:

(P2=0A) RAP TCC Preamp Parms:

(P3=00) Head 00:

	WrCur (P4=0)	WrDamp (P4=1)	WrDampDur (P4=2)
(P5=00) User Zone 00:	0F	08	0E

```
          (P5=01) User Zone 01:     0F      08       0E
          (P5=02) User Zone 02:     0F      08       0E
          (P5=80) System Zone 00:   0F      08       0E
```

The following is an example of the RAP TCC Preamp Offset Parameters information that will be displayed.

```
   (P1=01) RAP:

     (P2=0B) RAP TCC Preamp Offset Parms:

       (P3=00) Set 00:

         (P4=00) Head 00:

                                  WrCurOff  WrDampOff  WrDampDurOff
                                   (P5=0)    (P5=1)       (P5=2)
           (P6=00) User Zone 00:     00        00           00
           (P6=01) User Zone 01:     00        00           00
           (P6=02) User Zone 02:     00        00           00
           (P6=80) System Zone 00:   00        00           00

       (P3=01) Set 01:

         (P4=00) Head 00:

                                  WrCurOff  WrDampOff  WrDampDurOff
                                   (P5=0)    (P5=1)       (P5=2)
           (P6=00) User Zone 00:     00        00           00
           (P6=01) User Zone 01:     00        00           00
           (P6=02) User Zone 02:     00        00           00
           (P6=80) System Zone 00:   00        00           00

       (P3=02) Set 02:

         (P4=00) Head 00:

                                  WrCurOff  WrDampOff  WrDampDurOff
                                   (P5=0)    (P5=1)       (P5=2)
           (P6=00) User Zone 00:     00        00           00
           (P6=01) User Zone 01:     00        00           00
           (P6=02) User Zone 02:     00        00           00
           (P6=80) System Zone 00:   00        00           00
```

The following is an example of the RAP CRC display.

```
   (P1=01) RAP:

     (P2=0C) RAP CRC: 00000000
```

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

if RAP_FORMAT_14_REV_2
0012.0000 Changed Gamma values. Added new TCS values.

endif

Display / Modify RAP revision 11 (Level 2, 7 'I,1')

Description:

This command displays and optionally modifies the value of the specified read adaptive parameter.

Quick Help:

"DisplayModifyRap, I[ParmValue],1,[ParmId],[P3],[P4],[P5],[P6],[UpdateOpts]";

Input Parameters:

0 - P0 (New RAP Value).

If this parameter is entered, the adaptive value specified by command parameters 1 though 7 will be set equal to the value of this parameter. If this parameter is not entered, the RAP values specified by command parameters 1 and 2 will be displayed.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: None

1 - P1 (RAP Group ID = 1).

This parameter specifies the RAP ID (1).

Type: Unsigned 32-bit value

Range: 1 is the only valid value.

Default: NA

2 - P2 (RAP Value ID).

This parameter specifies the ID of the RAP value to be displayed or modified. If Parameter 0 is not entered, entering a value of zero for this parameter will display all of the parameters in the group RAP.

The Adaptive Parameter IDs and the values of parameters 3-6 are defined as follows:

0x00 = All RAP Parameters

Parameters 3-6 are not used

0x01 = Drive Configuration

Parameters 3-6 are not used

0x02 = Temperature Sensor Configuration

Parameters 3-6 are not used

0x03 = Zone Configuration

```
         Parameters 3-6 are not used

0x04 = Tuned Drive parameters

         Parameter 3 = Register Group
         Parameter 4 = Register Index
         Parameter 5 = not used
         Parameter 6 = not used

0x05 = Tuned Zone parameters

         Parameter 3 = Register Group
         Parameter 4 = Register Index

         Parameter 5 = Zone Number

             0x00 = User Zone 0
             0x01 = User Zone 1
                     .
                     .
                     .
             0x80 = System Zone

         Parameter 6 = not used

0x06 = Tuned Head parameters

         Parameter 3 = Head
         Parameter 4 = Register Group
         Parameter 5 = Register Index

         Parameter 6 = Zone Number

             0x00 = User Zone 0
             0x01 = User Zone 1
                     .
                     .
                     .
             0x80 = System Zone

0x07 = Zone Format Budget parameters

         Parameter 3 = Zone Format Budget Parameter Index

         Parameter 4 = Zone Number

             0x00 = User Zone 0
             0x01 = User Zone 1
                     .
                     .
                     .
             0x80 = System Zone

         Parameter 5 = not used
         Parameter 6 = not used

0x08 = Head Format Budget parameters

         Parameter 3 = Head

         Parameter 4 = Zone Number
```

```
        0x00 = User Zone 0
        0x01 = User Zone 1
                .
                .
                .
        0x80 = System Zone

    Parameter 5 = not used
    Parameter 6 = not used

0x09 = TCC Preamp Temperature Point parameters

    Parameters 3-6 are not used

0x0A = TCC Preamp parameters

    Parameter 3 = Head
    Parameter 4 = TCC Preamp Parameter Index

    Parameter 5 = Zone Number

        0x00 = User Zone 0
        0x01 = User Zone 1
                .
                .
                .
        0x80 = System Zone

    Parameter 6 = not used

0x0B = TCC Preamp Offset parameters

    Parameter 3 = Set Number
    Parameter 4 = Head
    Parameter 5 = TCC Preamp Parameter Index

    Parameter 6 = Zone Number

        0x00 = User Zone 0
        0x01 = User Zone 1
                .
                .
                .
        0x80 = System Zone

0x0C = RAP CRC

    Parameters 3-6 are not used

0x0D = AFH drive parameters
    Parameter 3 = AFH drive parameter index
       NOTE: Enter value in IEEE 754 float 32 bit representation!

    Parameters 4-6 are not used

0x0E = AFH head parameters

    Parameter 3 = Head
    Parameter 4 = AFH head parameter index
       NOTE: Enter value in IEEE 754 float 32 bit representation!

    Parameter 5-6 = not used
```

0x0F = AFH head/zone parameters

Parameter 3 = Head
Parameter 4 = AFH head/zone parameter index
Parameter 5 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

Parameter 6 = not used

0x10 = Shared registers

Parameter 3 = Set
Parameter 4 = Head
Parameter 5 = Parameter index
Parameter 6 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

0x11 = VBAR Configuration

Parameters 3-6 are not used

0x12 = Channel Parameters Information Table

Parameter 0 = Index
Parameter 3 = Table
Parameter 4 = Table offset

0xFF = RAP Table of Contents

Parameters 3-6 are not used

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

3 - P3 (select value to be modified).

If Parameter 0 is entered, this parameter is used to select the value to be modified. The definition of this parameter depends on the value entered for Parameter 2. See the Parameter 2 description for more information.

If Parameter 0 is not entered and Parameter 1 is set to display RAP, this parameter will specifies the heads to display their adaptive value based on the display mode that is set by Level T O comamnd. With Verbose Formatted ASCII Output Mode, the adaptive value on all heads will be displayed. With Formatted ASCII Output Mode, if Parameter3 is not entered only the adaptive value on the existing heads will be displayed; if Parameter3 is entered only the adaptive value on the requested head will be displayed. Otherwise this parameter is not used.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

4 - P4 (select value to be modified).

If Parameter 0 is entered, this parameter is used to select the value to be modified. The definition of this parameter depends on the value entered for Parameter 2. See the Parameter 2 description for more information.

If Parameter 0 is not entered, this parameter is not used.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

5 - P5 (select value to be modified).

If Parameter 0 is entered, this parameter is used to select the value to be modified. The definition of this parameter depends on the value entered for Parameter 2. See the Parameter 2 description for more information.

If Parameter 0 is not entered, this parameter is not used.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

6 - P6 (select value to be modified).

If Parameter 0 is entered, this parameter is used to select the value to be modified. The definition of this parameter depends on the value entered for Parameter 2. See the Parameter 2 description for more information.

If Parameter 0 is not entered, this parameter is not used.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

7 - RAP Update Option.

This parameter is a bit significant value that specifies how the modified RAP values are to be applied. The bits are defined as follows:

Bits 31-2: not used

Bit 1: Enable Track Format update.

If this bit is equal to 1, the Track Format will be updated based on the RAP values that were modified. If this bit is equal to 0, the Track Format will not be modified.

Bit 0: Enable Channel Parameter Reload.

If this bit is equal to 1, the Channel Registers will be updated based on the RAP values that were modified. If this bit is equal to 0, the Channel Registers will not be modified.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0 (Disable Track Format Update and Channel Parameter Reload)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred and the RAP data is being displayed ...

The following is an example of the RAP Drive Configuration information that will be displayed.

```
(P1=01) RAP:

   (P2=01) RAP Drive Config:

      Format Rev: 0010
      Contents Rev: 0D00
      Drive Serial Number: Invalid
      RAP Heads: 0001
      RAP User Zones: 0010
      RAP System Zones: 0001
      Tracks/zone:
      Alts/volume:
      Sec/track:
      Total Cyls:
```

The following is an example of the RAP Temperature Sensor Configuration information that will be displayed.

```
(P1=01) RAP:

  (P2=02) RAP Temp Sensor Config:

    Thermistor Temp Sensor Offset: 00
    Thermistor Temp Sensor Scale: 64
    Thermistor Temp Table Elements: 1E

    Thermistor Temp Lookup Table:
                     0    1    2    3    4    5    6    7
      Temperature:  FFD0 FFDA FFE3 FFEC FFFE 000F 001F 002F
      A to D Value: FF91 FF8D FF89 FF86 FF7E FF76 FF6E FF67

                     8    9    A    B    C    D    E    F
      Temperature:  003E 004D 005B 0076 0090 00A9 00D9 0107
```

```
        A to D Value: FF5F FF57 FF50 FF40 FF31 FF21 FF02 FEE3

                        10   11   12   13   14   15   16   17
        Temperature:  0138 016D 01A9 01CA 01EE 0214 023E 0254
        A to D Value: FEC5 FEA6 FE87 FE77 FE68 FE58 FE49 FE41

                        18   19   1A   1B   1C   1D
        Temperature:  026B 0283 029C 02B6 02D2 02EE
        A to D Value: FE3A FE32 FE2A FE22 FE1B FE13
```

The following is an example of the RAP Zone Configuration information that will be displayed.

```
   (P1=01) RAP:

     (P2=03) RAP VBAR Zone Config:

      If firmware supports ID System Partition Location:
         NominalFirstSysTrack: 0002448A
         NumSysTracks: 0000012C
         SysSpareTracksPerHd: 0F
         ActiveSerpentsPerZoneGroup: 00

      If firmware supports MD System Partition Location (or a location enveloped
      by the User Partition):
         SysStartMinizoneIndex: 02D6
         SysNumMinizones: 0002
         LBAsPerSysZoneCopy: 000132EA
         ActiveSerpentsPerZoneGroup: 00


         Head 0
                            Minizones
            User Zone   00:    127
            User Zone   01:    127
            User Zone   02:    12E
            User Zone   03:    A1
            User Zone   04:    8A
            User Zone   05:    A5
            User Zone   06:    CC
            User Zone   07:    103
            User Zone   08:    9B
```

The following is an example of the RAP Tuned Drive Parameters information that will be displayed.

```
   (P1=01) RAP:

     (P2=04) Tuned Drive Parms:

       (P3=00) Reg Group 00:

               P4=    0    1    2    3    4    5    6    7    8    9    A    B    C    D
         Reg Addr: 0000 0001 0055 0084 0085 0086 008C 008E 0090 0092 0095 0099 009B 009C 0(
         Reg Data: 0390 000B 01C7 8078 11D2 0092 4100 8A00 0073 0003 0021 01E9 0000 000F 0(

               P4=   10   11   12   13   14   15   16   17   18   19   1A   1B   1C   1D
         Reg Addr: 009F 00A0 00A1 00A3 00A4 00A5 00A6 00A7 00B7 00B8 00BC 00BD 00BE 00BF 0(
         Reg Data: 0000 2000 0000 0000 38DA 14D1 0048 7880 FA00 1986 0000 1525 00F0 7F00 0(

               P4=   20   21   22   23   24   25   26   27   28   29   2A   2B   2C   2D
```

```
          Reg Addr: 00DA 00DC 00DD 00DE 00E0 00E2 00E5 00E9 00EB 00EC 00ED 00EE 00EF 00F0 0
          Reg Data: 2100 00D4 0000 0000 6817 0000 0000 0000 0000 0000 0000 0000 0000 001C 0

                P4=   30   31   32   33   34   35   36   37   38   39   3A
          Reg Addr: 00F3 00F5 00F6 00F7 00F8 00F9 00FA 00FB 00FC 00FD 00FE
          Reg Data: 0000 0088 0020 0020 0000 0FFF 0000 0000 0000 0040 0000

        (P3=01) Reg Group 01:

                P4=    0    1    2    3    4    5    6    7    8    9    A    B    C    D
          Reg Addr: 0061 0062 0063 0064 0075 0076 00E4 00E5 00E6 00EA 00EB 00EC 00ED 00EE 0
          Reg Data: 204F 0044 2630 0000 0520 0000 F20B 0000 0000 0000 0000 0D07 0000 4020 0

                P4=   10   11   12   13   14   15   16   17   18   19
          Reg Addr: 00F4 00F5 00F6 00F7 00F8 00F9 00FB 00FD 00FE 00FF
          Reg Data: 0004 0002 0024 0000 0000 0000 015A 1847 0000 0400
```

The following is an example of the RAP Tuned Head Parameters information that will be displayed.

```
   (P1=01) RAP:

     (P2=06) RAP Tuned Head/Zone Parms:

       (P3=00) Head 00:

         (P4=00) Reg Group 00:

                                         P5=    0    1    2    3    4    5    6    7    8
                                   Reg Addr: 0089 008A 008B 0093 0094 0096 0098 0097 0098 0
           (P6=00) User Zone 00 Reg Data:   3DF4 3DF4 A1EF 0804 0CB8 0004 0500 C900 0100 9
           (P6=01) User Zone 01 Reg Data:   3DF4 3DF4 A1EF 0804 0C60 0004 0500 C900 0100 A
           (P6=02) User Zone 02 Reg Data:   3DF4 3DF4 A1EF 0804 0C20 0004 0500 C900 0100 A
           (P6=80) System Zone 00 Reg Data: 3DF4 3DF4 A1EF 0804 0BC0 0004 0500 C900 0100 A

                                         P5=   10   11   12   13   14   15   16   17   18
                                   Reg Addr: 00B9 00BB 00C0 00C1 00C2 00C3 00C4 00C5 00C6 0
           (P6=00) User Zone 00 Reg Data:   4026 0800 0000 0000 0000 0000 2828 2828 2828 2
           (P6=01) User Zone 01 Reg Data:   4026 0800 0000 0000 0000 0000 2828 2828 2828 2
           (P6=02) User Zone 02 Reg Data:   4026 0800 0000 0000 0000 0000 2828 2828 2828 2
           (P6=80) System Zone 00 Reg Data: 4026 0800 0000 0000 0000 0000 2828 2828 2828 2

                                         P5=   20   21   22   23   24   25   26
                                   Reg Addr: 00CE 00CF 00D0 00D1 00D2 00D3 00D4
           (P6=00) User Zone 00 Reg Data:   7C7C 7C00 0000 0000 0000 0000 0000
           (P6=01) User Zone 01 Reg Data:   7C7C 7C00 0000 0000 0000 0000 0000
           (P6=02) User Zone 02 Reg Data:   7C7C 7C00 0000 0000 0000 0000 0000
           (P6=80) System Zone 00 Reg Data: 7C7C 7C00 0000 0000 0000 0000 0000
```

The following is an example of the RAP Zone Format Budget Parameters information that will be displayed.

```
   (P1=01) RAP:

     (P2=07) RAP Zone Format Budget Parms:

       Format Budget Rev: 01

                                InitialPlo  Plo    Isg   PreSrvGap PostSrvGap SeqPlo1 SeqPl
                                  (P3=0)   (P3=1) (P3=2)  (P3=3)     (P3=4)    (P3=5)  (P3=6
       (P4=00) User Zone 00:        1C       26     0D      20         04        14      1E
```

(P4=01) User Zone 01:	1B	25	0C	20	05	13	1D
(P4=02) User Zone 02:	1C	26	0B	20	05	13	1D
(P4=03) User Zone 03:	1D	26	0B	20	05	14	1D
(P4=04) User Zone 04:	1C	26	0B	21	05	13	1D
(P4=05) User Zone 05:	1D	25	0B	21	05	14	1C
(P4=06) User Zone 06:	1C	24	0C	21	05	14	1C
(P4=07) User Zone 07:	1B	24	0C	21	05	13	1C
(P4=08) User Zone 08:	1C	25	0A	21	04	13	1C
(P4=09) User Zone 09:	1D	24	0A	20	04	14	1B
(P4=0A) User Zone 0A:	1C	23	0A	20	04	13	1A
(P4=0B) User Zone 0B:	1C	23	0A	20	05	13	1A
(P4=0C) User Zone 0C:	1C	23	0A	1F	04	13	1A
(P4=0D) User Zone 0D:	1B	22	0A	1F	04	13	1A
(P4=0E) User Zone 0E:	1B	21	09	1F	04	12	18
(P4=0F) User Zone 0F:	1B	20	09	1D	04	12	17
(P4=80) System Zone 00:	1A	20	09	1D	04	11	17

	SeqPad (P3=7)	SeqIsgWr (P3=8)	SeqIsgRd (P3=9)	SeqSgToRg (P3=A)	SeqSkipRdDelay (P3=B)	SeqSyncTo (P3=C)
(P4=00) User Zone 00:	02	13	19	08	34	34
(P4=01) User Zone 01:	02	12	18	08	33	34
(P4=02) User Zone 02:	02	12	18	09	34	34
(P4=03) User Zone 03:	02	12	18	09	34	34
(P4=04) User Zone 04:	02	12	18	09	34	34
(P4=05) User Zone 05:	02	12	17	09	35	32
(P4=06) User Zone 06:	02	12	17	09	35	32
(P4=07) User Zone 07:	02	12	17	08	33	32
(P4=08) User Zone 08:	02	11	16	08	33	32
(P4=09) User Zone 09:	02	11	16	08	34	32
(P4=0A) User Zone 0A:	02	11	15	08	33	31
(P4=0B) User Zone 0B:	02	11	15	08	33	2F
(P4=0C) User Zone 0C:	02	11	15	08	33	2F
(P4=0D) User Zone 0D:	02	10	14	07	32	2E
(P4=0E) User Zone 0E:	02	10	13	07	32	2D
(P4=0F) User Zone 0F:	02	10	12	07	32	2A
(P4=80) System Zone 00:	02	10	12	06	31	2A

The following is an example of the RAP TCC Temperature Point Parameters information that will be displayed.

(P1=01) RAP:

(P2=09) RAP TCC Temp Point Parms: 19 37 FFFFFFF6

The following is an example of the RAP Preamp Parameters information that will be displayed.

(P1=01) RAP:

(P2=0A) RAP Tuned Preamp Parms:

(P3=00) Head 00:

	WrCur (P4=0)	WrDamp (P4=1)	WrDampDur (P4=2)
(P5=00) User Zone 00:	0F	08	0E
(P5=01) User Zone 01:	0F	08	0E
(P5=02) User Zone 02:	0F	08	0E
(P5=80) System Zone 00:	0F	08	0E

The following is an example of the RAP TCC Preamp Offset Parameters information that will be displayed.

```
   (P1=01) RAP:

     (P2=0B) RAP TCC Preamp Offset Parms:

       (P3=00) Set 00:

         (P4=00) Head 00:

                                   WrCurOff  WrDampOff  WrDampDurOff
                                    (P5=0)    (P5=1)       (P5=2)
           (P6=00) User Zone 00:      00        00           00
           (P6=01) User Zone 01:      00        00           00
           (P6=02) User Zone 02:      00        00           00
           (P6=80) System Zone 00:    00        00           00

       (P3=01) Set 01:

         (P4=00) Head 00:

                                   WrCurOff  WrDampOff  WrDampDurOff
                                    (P5=0)    (P5=1)       (P5=2)
           (P6=00) User Zone 00:      00        00           00
           (P6=01) User Zone 01:      00        00           00
           (P6=02) User Zone 02:      00        00           00
           (P6=80) System Zone 00:    00        00           00

       (P3=02) Set 02:

         (P4=00) Head 00:

                                   WrCurOff  WrDampOff  WrDampDurOff
                                    (P5=0)    (P5=1)       (P5=2)
           (P6=00) User Zone 00:      00        00           00
           (P6=01) User Zone 01:      00        00           00
           (P6=02) User Zone 02:      00        00           00
           (P6=80) System Zone 00:    00        00           00
```

The following is an example of the RAP CRC display.

```
   (P1=01) RAP:

     (P2=0C) RAP CRC: 00000000
```

The following is an example of the RAP AFH drive parameters information that will be displayed.

```
   (P1=01) RAP:

     (P2=0D) RAP AFH Drive Parms:

        C1 (P3=x)      C2             C3             C4             C5             C6
        +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.0000(

        C8             C9             C10            C11            C12            C13
        +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.0000(

        C15            C16            C17            C18            C19            C20
```

```
+0.000000E-0   +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.00000

RC1            RC2            RC3            RC4            RC5            RC6
+0.000000E-0   +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.00000

WC1            WC2            WC3            WC4            WC5            WC6
+0.000000E-0   +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.00000

WC8            WC9            WC10
+0.000000E-0   +0.000000E-0   +0.000000E-0

Preheat Time (P3=25) = 03E8
TargIdleClr (P3=26) =  00
CertTemp (P3=27) = 35
```

The following is an example of the RAP AFH head parameters information that will be displayed.

```
(P1=01) RAP:

  (P2=0E) RAP AFH Head Parms:

                           TC1 (P4=x)     TC2
    (P3=00) Head 00:       +0.000016E-3   +0.000000E-0
    (P3=01) Head 01:       +0.000016E-3   +0.000000E-0
```

The following is an example of the RAP AFH head/zone parameters information that will be displayed:

```
(P1=01) RAP:

  (P2=0F) RAP AFH Head Zone Parms:

    Heater DAC

      (P3=00) Head 00:

                               WrPreHt    WrHt     RdHt
                               (P4=0)     (P4=1)   (P4=2)
      (P5=00) User Zone 00:      20         1E       1F
      (P5=01) User Zone 01:      20         1E       1F
      (P5=02) User Zone 02:      28         26       27
      (P5=80) System Zone 00:    28         26       27

    Clearance

      (P3=00) Head 00:

                               W+HtClr    RHtClr   TargWrClr TargPreClr TargRdClr   TargMa
                               (P4=3)     (P4=4)   (P4=5)     (P4=6)     (P4=7)     (P4=8)
      (P5=00) User Zone 00:      20         1E       1F         20         1E         1F
      (P5=01) User Zone 01:      20         1E       1F         20         1E         1F
      (P5=02) User Zone 02:      28         26       27         28         26         27
      (P5=80) System Zone 00:    28         26       27         28         26         27

    SWD

      (P3=00) Head 00:
                               SWDAvg    SWDDelta SWDFilt
                               (P4=9)     (P4=A)   (P4=B)
      (P5=00) User Zone 00:      20         1E       1F
```

```
(P5=01) User Zone 01:     20       1E      1F
(P5=02) User Zone 02:     28       26      27
(P5=80) System Zone 00:   28       26      27
```

The following is an example of the RAP Drive Configuration information that will be displayed.

```
(P1=01) RAP:

   (P2=11) RAP VBAR Config:

       Nominal Serpent Width: 32

       Serpent Width  Cyl Skew Adj
Head 0    32             0000
Head 1    32             0000
Head 2    32             0000
Head 3    32             0000
Head 4    32             0000
Head 5    32             0000
Head 6    32             0000
Head 7    32             0000

Num Sector Size Configs: 0C

Sector Size: 0200
Max LBA: 1C6BA999

Sector Size: 0202
Max LBA: 0000B000

Sector Size: 0204
Max LBA: 0000A000
```

The following is an example of the RAP Tuned Head Parameters information that will be displayed.

```
(P1=01) RAP:

  (P2=12) RAP Channel Parms Info:

        Idx      Tbl [Drive=0; Zone=1]  Offset
        (P3=xx)         (P4=xx)         (P5=xx)
        0               0                 0
        1               0                 2
        2               1                 0
        3               1                 3
```

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

if RAP_FORMAT_14_REV_2
0012.0000 Changed Gamma values. Added new TCS values.
endif

Display / Modify RAP revision 14 (Level 2, 7 'I,1')

Description:

This command displays and optionally modifies the value of the specified read adaptive parameter.

Quick Help:

"DisplayModifyRap, I[ParmValue],1,[ParmId],[P3],[P4],[P5],[P6],[UpdateOpts]";

Input Parameters:

0 - P0 (New RAP Value).

If this parameter is entered, the adaptive value specified by command parameters 1 though 7 will be set equal to the value of this parameter. If this parameter is not entered, the RAP values specified by command parameters 1 and 2 will be displayed.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: None

1 - P1 (RAP Group ID = 1).

This parameter specifies the RAP ID (1).

Type: Unsigned 32-bit value

Range: 1 is the only valid value.

Default: NA

2 - P2 (RAP Value ID).

This parameter specifies the ID of the RAP value to be displayed or modified. If Parameter 0 is not entered, entering a value of zero for this parameter will display all of the parameters in the group RAP.

The Adaptive Parameter IDs and the values of parameters 3-6 are defined as follows:

0x00 = All RAP Parameters

Parameters 3-6 are not used

0x01 = Drive Configuration

Parameters 3-6 are not used

0x02 = Temperature Sensor Configuration

Parameters 3-6 are not used

0x03 = Zone Configuration

Parameters 3-6 are not used

0x04 = Tuned Drive parameters

Parameter 3 = Register Group
Parameter 4 = Register Index
Parameter 5 = not used
Parameter 6 = not used

0x05 = Tuned Zone parameters

Parameter 3 = Register Group
Parameter 4 = Register Index

Parameter 5 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

Parameter 6 = not used

0x06 = Tuned Head parameters

Parameter 3 = Head
Parameter 4 = Register Group
Parameter 5 = Register Index

Parameter 6 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

0x07 = Zone Format Budget parameters

Parameter 3 = Zone Format Budget Parameter Index

Parameter 4 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

Parameter 5 = not used
Parameter 6 = not used

0x08 = Head Format Budget parameters

Parameter 3 = Head

Parameter 4 = Zone Number

0x00 = User Zone 0

0x01 = User Zone 1
.
.
.
0x80 = System Zone

Parameter 5 = not used
Parameter 6 = not used

0x09 = TCC Preamp Temperature Point parameters

Parameters 3-6 are not used

0x0A = TCC Preamp parameters

Parameter 3 = Head
Parameter 4 = TCC Preamp Parameter Index

Parameter 5 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

Parameter 6 = not used

0x0B = TCC Preamp Offset parameters

Parameter 3 = Set Number
Parameter 4 = Head
Parameter 5 = TCC Preamp Parameter Index

Parameter 6 = Zone Number

0x00 = User Zone 0
0x01 = User Zone 1
.
.
.
0x80 = System Zone

0x0C = RAP CRC

Parameters 3-6 are not used

0x0D = AFH drive parameters
Parameter 3 = AFH drive parameter index
NOTE: Enter value in IEEE 754 float 32 bit representation!

Parameters 4-6 are not used

0x0E = AFH head parameters

Parameter 3 = Head
Parameter 4 = AFH head parameter index
NOTE: Enter value in IEEE 754 float 32 bit representation!

Parameter 5-6 = not used

0x0F = AFH head/zone parameters

```
          Parameter 3 = Head
          Parameter 4 = AFH head/zone parameter index
          Parameter 5 = Zone Number

              0x00 = User Zone 0
              0x01 = User Zone 1
                      .
                      .
                      .
              0x80 = System Zone

          Parameter 6 = not used

 0x10 = Shared registers

          Parameter 3 = Set
          Parameter 4 = Head
          Parameter 5 = Parameter index
          Parameter 6 = Zone Number

              0x00 = User Zone 0
              0x01 = User Zone 1
                      .
                      .
                      .
              0x80 = System Zone

 0x11 = VBAR Configuration

          Parameters 3-6 are not used

 0x12 = Channel Parameters Information Table

          Parameter 0 = Index
          Parameter 3 = Table
          Parameter 4 = Table offset

 0xFF = RAP Table of Contents

          Parameters 3-6 are not used

Type:    Unsigned 32-bit value

Range:   0 to 0xFFFFFFFF

Default: 0
```

3 - P3 (select value to be modified).

If Parameter 0 is entered, this parameter is used to select the value to be modified. The definition of this parameter depends on the value entered for Parameter 2. See the Parameter 2 description for more information.

If Parameter 0 is not entered and Parameter 1 is set to display RAP, this parameter will specifies the heads to display their adaptive value based on the display mode that is set by Level T 0 comamnd. With Verbose Formatted ASCII Output Mode, the adaptive value on all heads will be displayed. With Formatted ASCII Output Mode, if Parameter3 is not entered only the adaptive value on the existing heads will be displayed; if Parameter3 is entered only the adaptive value on the requested head will be displayed. Otherwise this parameter is not used.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

4 - P4 (select value to be modified).

If Parameter 0 is entered, this parameter is used to select the value to be modified. The definition of this parameter depends on the value entered for Parameter 2. See the Parameter 2 description for more information.

If Parameter 0 is not entered, this parameter is not used.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

5 - P5 (select value to be modified).

If Parameter 0 is entered, this parameter is used to select the value to be modified. The definition of this parameter depends on the value entered for Parameter 2. See the Parameter 2 description for more information.

If Parameter 0 is not entered, this parameter is not used.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

6 - P6 (select value to be modified).

If Parameter 0 is entered, this parameter is used to select the value to be modified. The definition of this parameter depends on the value entered for Parameter 2. See the Parameter 2 description for more information.

If Parameter 0 is not entered, this parameter is not used.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

7 - RAP Update Option.

This parameter is a bit significant value that specifies how the modified RAP values are to be applied. The bits are defined as follows:

Bits 31-2: not used

Bit 1: Enable Track Format update.

If this bit is equal to 1, the Track Format will be updated based on the RAP values that were modified. If this bit is equal to 0, the Track Format will not be modified.

Bit 0: Enable Channel Parameter Reload.

If this bit is equal to 1, the Channel Registers will be updated based on the RAP values that were modified. If this bit is equal to 0, the Channel Registers will not be modified.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0 (Disable Track Format Update and Channel Parameter Reload)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred and the RAP data is being displayed ...

The following is an example of the RAP Drive Configuration information that will be displayed.

```
(P1=01) RAP:

   (P2=01) RAP Drive Config:

      Format Rev: 0010
      Contents Rev: 0D00
      Drive Serial Number: Invalid
      RAP Heads: 0001
      RAP User Zones: 0010
      RAP System Zones: 0001
      Tracks/zone:
      Alts/volume:
      Sec/track:
      Total Cyls:
```

The following is an example of the RAP Temperature Sensor Configuration information that will be displayed.

```
(P1=01) RAP:

  (P2=02) RAP Temp Sensor Config:

    Thermistor Temp Sensor Offset: 00
    Thermistor Temp Sensor Scale: 64
    Thermistor Temp Table Elements: 1E

    Thermistor Temp Lookup Table:
                      0    1    2    3    4    5    6    7
      Temperature:  FFD0 FFDA FFE3 FFEC FFFE 000F 001F 002F
      A to D Value: FF91 FF8D FF89 FF86 FF7E FF76 FF6E FF67

                      8    9    A    B    C    D    E    F
      Temperature:  003E 004D 005B 0076 0090 00A9 00D9 0107
      A to D Value: FF5F FF57 FF50 FF40 FF31 FF21 FF02 FEE3
```

```
                 10   11   12   13   14   15   16   17
Temperature:  0138 016D 01A9 01CA 01EE 0214 023E 0254
A to D Value: FEC5 FEA6 FE87 FE77 FE68 FE58 FE49 FE41

                 18   19   1A   1B   1C   1D
Temperature:  026B 0283 029C 02B6 02D2 02EE
A to D Value: FE3A FE32 FE2A FE22 FE1B FE13
```

The following is an example of the RAP Zone Configuration information that will be displayed.

```
(P1=01) RAP:

  (P2=03) RAP VBAR Zone Config:

   If firmware supports ID System Partition Location:
      NominalFirstSysTrack: 0002448A
      NumSysTracks: 0000012C
      SysSpareTracksPerHd: 0F
      ActiveSerpentsPerZoneGroup: 00

   If firmware supports MD System Partition Location (or a location enveloped
   by the User Partition):
      SysStartMinizoneIndex: 02D6
      SysNumMinizones: 0002
      LBAsPerSysZoneCopy: 000132EA
      ActiveSerpentsPerZoneGroup: 00


      Head 0
                           Minizones
         User Zone   00:    127
         User Zone   01:    127
         User Zone   02:    12E
         User Zone   03:    A1
         User Zone   04:    8A
         User Zone   05:    A5
         User Zone   06:    CC
         User Zone   07:    103
         User Zone   08:    9B
```

The following is an example of the RAP Tuned Drive Parameters information that will be displayed.

```
(P1=01) RAP:

  (P2=04) Tuned Drive Parms:

    (P3=00) Reg Group 00:

            P4=    0    1    2    3    4    5    6    7    8    9    A    B    C    D
      Reg Addr: 0000 0001 0055 0084 0085 0086 008C 008E 0090 0092 0095 0099 009B 009C 0
      Reg Data: 0390 000B 01C7 8078 11D2 0092 4100 8A00 0073 0003 0021 01E9 0000 000F 0

            P4=   10   11   12   13   14   15   16   17   18   19   1A   1B   1C   1D
      Reg Addr: 009F 00A0 00A1 00A3 00A4 00A5 00A6 00A7 00B7 00B8 00BC 00BD 00BE 00BF 0
      Reg Data: 0000 2000 0000 0000 38DA 14D1 0048 7880 FA00 1986 0000 1525 00F0 7F00 0

            P4=   20   21   22   23   24   25   26   27   28   29   2A   2B   2C   2D
      Reg Addr: 00DA 00DC 00DD 00DE 00E0 00E2 00E5 00E9 00EB 00EC 00ED 00EE 00EF 00F0 0
```

```
      Reg Data: 2100 00D4 0000 0000 6817 0000 0000 0000 0000 0000 0000 0000 0000 001C 0

            P4=   30   31   32   33   34   35   36   37   38   39   3A
      Reg Addr: 00F3 00F5 00F6 00F7 00F8 00F9 00FA 00FB 00FC 00FD 00FE
      Reg Data: 0000 0088 0020 0020 0000 0FFF 0000 0000 0000 0040 0000

    (P3=01) Reg Group 01:

            P4=    0    1    2    3    4    5    6    7    8    9    A    B    C    D
      Reg Addr: 0061 0062 0063 0064 0075 0076 00E4 00E5 00E6 00EA 00EB 00EC 00ED 00EE 0
      Reg Data: 204F 0044 2630 0000 0520 0000 F20B 0000 0000 0000 0000 0D07 0000 4020 0

            P4=   10   11   12   13   14   15   16   17   18   19
      Reg Addr: 00F4 00F5 00F6 00F7 00F8 00F9 00FB 00FD 00FE 00FF
      Reg Data: 0004 0002 0024 0000 0000 0000 015A 1847 0000 0400
```

The following is an example of the RAP Tuned Head Parameters information that will be displayed.

```
(P1=01) RAP:

  (P2=06) RAP Tuned Head/Zone Parms:

    (P3=00) Head 00:

      (P4=00) Reg Group 00:

                                   P5=    0    1    2    3    4    5    6    7    8
                             Reg Addr: 0089 008A 008B 0093 0094 0096 0098 0097 0098 0
        (P6=00) User Zone 00 Reg Data:   3DF4 3DF4 A1EF 0804 0CB8 0004 0500 C900 0100 9
        (P6=01) User Zone 01 Reg Data:   3DF4 3DF4 A1EF 0804 0C60 0004 0500 C900 0100 A
        (P6=02) User Zone 02 Reg Data:   3DF4 3DF4 A1EF 0804 0C20 0004 0500 C900 0100 A
        (P6=80) System Zone 00 Reg Data: 3DF4 3DF4 A1EF 0804 0BC0 0004 0500 C900 0100 A

                                   P5=   10   11   12   13   14   15   16   17   18
                             Reg Addr: 00B9 00BB 00C0 00C1 00C2 00C3 00C4 00C5 00C6 0
        (P6=00) User Zone 00 Reg Data:   4026 0800 0000 0000 0000 0000 2828 2828 2828 2
        (P6=01) User Zone 01 Reg Data:   4026 0800 0000 0000 0000 0000 2828 2828 2828 2
        (P6=02) User Zone 02 Reg Data:   4026 0800 0000 0000 0000 0000 2828 2828 2828 2
        (P6=80) System Zone 00 Reg Data: 4026 0800 0000 0000 0000 0000 2828 2828 2828 2

                                   P5=   20   21   22   23   24   25   26
                             Reg Addr: 00CE 00CF 00D0 00D1 00D2 00D3 00D4
        (P6=00) User Zone 00 Reg Data:   7C7C 7C00 0000 0000 0000 0000 0000
        (P6=01) User Zone 01 Reg Data:   7C7C 7C00 0000 0000 0000 0000 0000
        (P6=02) User Zone 02 Reg Data:   7C7C 7C00 0000 0000 0000 0000 0000
        (P6=80) System Zone 00 Reg Data: 7C7C 7C00 0000 0000 0000 0000 0000
```

The following is an example of the RAP Zone Format Budget Parameters information that will be displayed.

```
(P1=01) RAP:

  (P2=07) RAP Zone Format Budget Parms:

    Format Budget Rev: 01

                            InitialPlo  Plo    Isg   PreSrvGap PostSrvGap SeqPlo1 SeqPl
                             (P3=0)   (P3=1) (P3=2)   (P3=3)     (P3=4)   (P3=5) (P3=6)
    (P4=00) User Zone 00:      1C       26     0D       20         04       14     1E
    (P4=01) User Zone 01:      1B       25     0C       20         05       13     1D
```

(P4=02) User Zone 02:	1C	26	0B	20	05	13	1D
(P4=03) User Zone 03:	1D	26	0B	20	05	14	1D
(P4=04) User Zone 04:	1C	26	0B	21	05	13	1D
(P4=05) User Zone 05:	1D	25	0B	21	05	14	1C
(P4=06) User Zone 06:	1C	24	0C	21	05	14	1C
(P4=07) User Zone 07:	1B	24	0C	21	05	13	1C
(P4=08) User Zone 08:	1C	25	0A	21	04	13	1C
(P4=09) User Zone 09:	1D	24	0A	20	04	14	1B
(P4=0A) User Zone 0A:	1C	23	0A	20	04	13	1A
(P4=0B) User Zone 0B:	1C	23	0A	20	05	13	1A
(P4=0C) User Zone 0C:	1C	23	0A	1F	04	13	1A
(P4=0D) User Zone 0D:	1B	22	0A	1F	04	13	1A
(P4=0E) User Zone 0E:	1B	21	09	1F	04	12	18
(P4=0F) User Zone 0F:	1B	20	09	1D	04	12	17
(P4=80) System Zone 00:	1A	20	09	1D	04	11	17

	SeqPad (P3=7)	SeqIsgWr (P3=8)	SeqIsgRd (P3=9)	SeqSgToRg (P3=A)	SeqSkipRdDelay (P3=B)	SeqSyncTo (P3=C)
(P4=00) User Zone 00:	02	13	19	08	34	34
(P4=01) User Zone 01:	02	12	18	08	33	34
(P4=02) User Zone 02:	02	12	18	09	34	34
(P4=03) User Zone 03:	02	12	18	09	34	34
(P4=04) User Zone 04:	02	12	18	09	34	34
(P4=05) User Zone 05:	02	12	17	09	35	32
(P4=06) User Zone 06:	02	12	17	09	35	32
(P4=07) User Zone 07:	02	12	17	08	33	32
(P4=08) User Zone 08:	02	11	16	08	33	32
(P4=09) User Zone 09:	02	11	16	08	34	32
(P4=0A) User Zone 0A:	02	11	15	08	33	31
(P4=0B) User Zone 0B:	02	11	15	08	33	2F
(P4=0C) User Zone 0C:	02	11	15	08	33	2F
(P4=0D) User Zone 0D:	02	10	14	07	32	2E
(P4=0E) User Zone 0E:	02	10	13	07	32	2D
(P4=0F) User Zone 0F:	02	10	12	07	32	2A
(P4=80) System Zone 00:	02	10	12	06	31	2A

The following is an example of the RAP TCC Temperature Point Parameters information that will be displayed.

(P1=01) RAP:

(P2=09) RAP TCC Temp Point Parms: 19 37 FFFFFFF6

The following is an example of the RAP Preamp Parameters information that will be displayed.

(P1=01) RAP:

(P2=0A) RAP Tuned Preamp Parms:

(P3=00) Head 00:

	WrCur (P4=0)	WrDamp (P4=1)	WrDampDur (P4=2)
(P5=00) User Zone 00:	0F	08	0E
(P5=01) User Zone 01:	0F	08	0E
(P5=02) User Zone 02:	0F	08	0E
(P5=80) System Zone 00:	0F	08	0E

The following is an example of the RAP TCC Preamp Offset Parameters information that will be displayed.

```
(P1=01) RAP:

  (P2=0B) RAP TCC Preamp Offset Parms:

    (P3=00) Set 00:

      (P4=00) Head 00:

                                  WrCurOff  WrDampOff  WrDampDurOff
                                   (P5=0)    (P5=1)       (P5=2)
        (P6=00) User Zone 00:        00        00           00
        (P6=01) User Zone 01:        00        00           00
        (P6=02) User Zone 02:        00        00           00
        (P6=80) System Zone 00:      00        00           00

    (P3=01) Set 01:

      (P4=00) Head 00:

                                  WrCurOff  WrDampOff  WrDampDurOff
                                   (P5=0)    (P5=1)       (P5=2)
        (P6=00) User Zone 00:        00        00           00
        (P6=01) User Zone 01:        00        00           00
        (P6=02) User Zone 02:        00        00           00
        (P6=80) System Zone 00:      00        00           00

    (P3=02) Set 02:

      (P4=00) Head 00:

                                  WrCurOff  WrDampOff  WrDampDurOff
                                   (P5=0)    (P5=1)       (P5=2)
        (P6=00) User Zone 00:        00        00           00
        (P6=01) User Zone 01:        00        00           00
        (P6=02) User Zone 02:        00        00           00
        (P6=80) System Zone 00:      00        00           00
```

The following is an example of the RAP CRC display.

```
(P1=01) RAP:

  (P2=0C) RAP CRC: 00000000
```

The following is an example of the RAP AFH drive parameters information that will be displayed.

```
(P1=01) RAP:

  (P2=0D) RAP AFH Drive Parms:

    C1 (P3=x)      C2             C3             C4             C5             C6
    +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.00000

    C8             C9             C10            C11            C12            C13
    +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.00000

    C15            C16            C17            C18            C19            C20
    +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.000000E-0   +0.00000
```

RC1	RC2	RC3	RC4	RC5	RC6
+0.000000E-0	+0.000000E-0	+0.000000E-0	+0.000000E-0	+0.000000E-0	+0.0000(

WC1	WC2	WC3	WC4	WC5	WC6
+0.000000E-0	+0.000000E-0	+0.000000E-0	+0.000000E-0	+0.000000E-0	+0.0000(

WC8	WC9	WC10
+0.000000E-0	+0.000000E-0	+0.000000E-0

Preheat Time (P3=25) = 03E8
TargIdleClr (P3=26) = 00
CertTemp (P3=27) = 35

The following is an example of the RAP AFH head parameters information that will be displayed.

(P1=01) RAP:

(P2=0E) RAP AFH Head Parms:

	TC1 (P4=x)	TC2
(P3=00) Head 00:	+0.000016E-3	+0.000000E-0
(P3=01) Head 01:	+0.000016E-3	+0.000000E-0

The following is an example of the RAP AFH head/zone parameters information that will be displayed:

(P1=01) RAP:

(P2=0F) RAP AFH Head Zone Parms:

Heater DAC

(P3=00) Head 00:

	WrPreHt (P4=0)	WrHt (P4=1)	RdHt (P4=2)
(P5=00) User Zone 00:	20	1E	1F
(P5=01) User Zone 01:	20	1E	1F
(P5=02) User Zone 02:	28	26	27
(P5=80) System Zone 00:	28	26	27

Clearance

(P3=00) Head 00:

	W+HtClr (P4=3)	RHtClr (P4=4)	TargWrClr (P4=5)	TargPreClr (P4=6)	TargRdClr (P4=7)	TargMa: (P4=8)
(P5=00) User Zone 00:	20	1E	1F	20	1E	1F
(P5=01) User Zone 01:	20	1E	1F	20	1E	1F
(P5=02) User Zone 02:	28	26	27	28	26	27
(P5=80) System Zone 00:	28	26	27	28	26	27

SWD

(P3=00) Head 00:

	SWDAvg (P4=9)	SWDDelta (P4=A)	SWDFilt (P4=B)
(P5=00) User Zone 00:	20	1E	1F
(P5=01) User Zone 01:	20	1E	1F

```
(P5=02) User Zone 02:     28       26      27
(P5=80) System Zone 00:   28       26      27
```

The following is an example of the RAP Drive Configuration information that will be displayed.

```
(P1=01) RAP:

   (P2=11) RAP VBAR Config:

         Nominal Serpent Width: 32

         Serpent Width  Cyl Skew Adj
Head 0     32             0000
Head 1     32             0000
Head 2     32             0000
Head 3     32             0000
Head 4     32             0000
Head 5     32             0000
Head 6     32             0000
Head 7     32             0000

Num Sector Size Configs: 0C

Sector Size: 0200
Max LBA: 1C6BA999

Sector Size: 0202
Max LBA: 0000B000

Sector Size: 0204
Max LBA: 0000A000
```

The following is an example of the RAP Channel Parameters information that will be displayed.

```
(P1=01) RAP:

  (P2=12) RAP Channel Parms Info:

        Idx      Tbl [Drive=0; Zone=1]  Offset
        (P3=xx)        (P4=xx)         (P5=xx)
        0              0                 0
        1              0                 2
        2              1                 0
        3              1                 3
```

Revision History:

```
0001.0000   Initial revision.
0011.0000   Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External
            Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes
            (DiagError).

if RAP_FORMAT_14_REV_2
0012.0000   Changed Gamma values.  Added new TCS values.
endif
```

Display / Modify RW Working Parameters (Level 2, 7 'I,3')

Description:
This command displays and optionally modifies the specified value of the Read/Write Working Parameters.

Quick Help:

"DisplayModifyRwWorkingParms, I[ParmValue],3,[ParmId],[P3],[P4],,,[P7]";

Input Parameters:

0 - P0 (New RW Working Parameter Value).

If this parameter is entered, the adaptive value specified by command parameters 3 through 5 will be set equal to the value of this parameter.

Type: Unsigned 32-bit value.

Range: 0 to 0xFFFFFFFF

Default: None.

1 - P1 (RW Working Parameter Group ID = 3).

This parameter specifies the Group ID of the RW Working Parameters, which is 3.

Type: Unsigned 32-bit value.

Range: 3 is the only valid value.

Default: None.

2 - P2 (Head).

This parameter specifies the head. If no head is specified, all heads' data are displayed.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: None

3 - P3 (RW Working Parameter Subgroup ID).

This parameter specifies the RW Working Parameters Subgroup ID. The following are valid values for the Subgroup ID:

0x00: WRITE_CURRENT_OFS
0x01: WRITE_DAMPING_OFS
0x02: WRITE_DAMPING_DUR_OFS
0x03: TWEAK_TEMP_OFS
0x04: WRITE_PREHEAT_OFS
0x05: WRITE_HEAT_OFS
0x06: READ_HEAT_OFS
0x07: MAINTENANCE_HEAT_OFS
0x08: RANGE_BITS_OFS

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

4 - P4 (Zone).

This parameter specifies the zone.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

Output Data:

```
(P1=03) RW Working:

  (P2=00) Head 00:
                               WrkIW    WrkIWDamp   WrkIWDur    WrkTweakTemp
                               (P3=00)  (P3=01)     (P3=02)     (P3=03)
      (P4=00) User Zone 00:     07       02          05          1A
      (P4=01) User Zone 01:     07       02          05          1A
         .                      .        .           .           .
         .                      .        .           .           .
         .                      .        .           .           .
      (P4=0F) User Zone 0F:     07       02          05          1A
      (P4=10) User Zone 10:     07       02          05          1A
      (P4=80) System Zone 00:   07       02          05          1A

                               WrkPreHt WrkWriteHt  WrkReadHt   WrkMaintHt  WrkHtRange
                               (P3=04)  (P3=05)     (P3=06)     (P3=07)
      (P4=00) User Zone 00:     2D       26          1A          29          00
      (P4=01) User Zone 01:     31       2A          1E          31          00
         .                      .        .           .           .           .
         .                      .        .           .           .           .
         .                      .        .           .           .           .
      (P4=0F) User Zone 0F:     29       22          14          29          00
      (P4=10) User Zone 10:     29       22          14          29          00
      (P4=80) System Zone 00:   29       23          14          1E          00
```

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display / Modify SAP (Level 2, 7 'I,2')

Description:
This command displays the values of the specified servo adaptive parameters.

Quick Help:

"DisplayModifySap, I[ParmValue],2,[ParmId],[P3],[P4],[P5]";

Input Parameters:

0 - New SAP Value.

If this parameter is entered, the adaptive value specified by command parameters 3 through 5 will be set equal to the value of this parameter.

Type: Unsigned 32-bit value.

Range: 0 to 0xFFFFFFFF

Default: None.

1 - SAP Group ID.

This parameter specifies the Group ID of the SAP, which is 2.

Type: Unsigned 32-bit value.

Range: 2 is the only valid value.

Default: None.

2 - SAP Subgroup ID.

This parameter specifies the ID of the SAP value to be displayed or modified. If Parameter 0 is not entered, entering a value of zero for this parameter will display all of the parameters in the SAP. The following SAP parameters are supported:

0x00: RAW_HEX_SUBGROUP_ID - Raw Hex dump of the entire SAP

0x01: ALL_SAP_SUBGROUPS_SUBGROUP_ID - All SAP Subgroups ID

0x02: MAX_HEAD_SUBGROUP_ID - Max Head (maximum head supported by servo)

0x03: MR_BIAS_SUBGROUP_ID - MR Bias Table (table of MR bias values)

0x04: MAX_MR_BIAS_SUBGROUP_ID - Max MR Bias Table (table of Max MR bias values)

0x05: BIAS_TABLE_SUBGROUP_ID - Bias Table (table of Flex Bias values)

0x06: BIAS_HYST_TABLE_SUBGROUP_ID - Bias Hysteresis Table (table of Bias Hysteresis valu

0xFF: SAP_TOC_SUBGROUP_ID - Table of Contents (all subgroups currently supported by this

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

3 - Parameter 3.

This parameter's meaning depends on the SAP Subgroup ID (P2). The information about it's meaning is available in the display of the SAP data.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: None.

4 - Parameter 4.

This parameter's meaning depends on the SAP Subgroup ID (P2). The information about it's meaning is available in the display of the SAP data.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

5 - Parameter 5.

This parameter's meaning depends on the SAP Subgroup ID (P2). The information about it's meaning is available in the display of the SAP data.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, then the output of this command will be displayed as follows:

If the option to display a raw hex dump of the SAP was selected, then the following will be displayed:

```
Addr 0000: xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx
Addr 0010: xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx
Addr 0020: xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx
......
where xx is the SAP data at the specified index position
```

If the option to display the Display/Modify SAP Table Of Contents was selected, then the following will be displayed:

```
(P2=00) SAP: Raw Hex dump of the entire SAP
(P2=01) SAP: All SAP Subgroups
(P2=02) SAP: Max Head (maximum head supported by servo)
(P2=03) SAP: MR Bias Table (table of MR bias values)
```

```
(P2=04) SAP: Max MR Bias Table (table of Max MR bias values)
(P2=05) SAP: Bias Table (table of Flex Bias values)
(P2=06) SAP: Bias Hysteresis Table (table of Bias Hysteresis values)
(P2=FF) SAP: Table of Contents
```

If the option to display servo's Max Head SAP value is selected, then the following is displayed:

```
(P2=ss) Max Head: hh

where:
ss = Subgroup ID
hh = Max Head
```

If the option to display the entire MR Bias table is selected, then the following is displayed:

```
                  (P3=0) ... (P3=x)
(P2=ss) MR Bias:   aabb  ...  aabb

where:
  ss = Subgroup ID
   x = Max Head supported by servo
aabb = MR Bias value (including register address)
```

If the option to display a single MR Bias value is selected, then the following is displayed:

```
                  (P3=h)
(P2=ss) MR Bias:   aabb

where:
  ss = Subgroup ID
   h = Head
aabb = MR Bias value (including register address)
```

If the option to display the entire Max MR Bias table is selected, then the following is displayed:

```
                      (P3=0) ... (P3=m)
(P2=ss) Max MR Bias:   aaaa  ...  aaaa

where:
  ss = Subgroup ID
   m = Max Head supported by servo
aaaa = Max MR Bias value
```

If the option to display a single Max MR Bias value is selected, then the following is displayed:

```
                      (P3=h)
(P2=ss) Max MR Bias:   aaaa

where:
  ss = Subgroup ID
   h = Head
aaaa = Max MR Bias value
```

If the option to display servo's Flex Bias Table was selected, then the following will be displayed for each of the requested table entries.

```
                 Bias Value
   (P3=aaaa)     bbbb

   where:
     aaaa = is the Offset from the start of the Bias Table
     bbbb = is the Bias value at that table location.
```

If the option to display servo's Bias Hysteresis Table was selected, then the following will be displayed for each of the requested table entries.

```
                 Bias Hysteresis Value
   (P3=aaaa)     bbbb

   where:
     aaaa = is the Offset from the start of the Bias Hysteresis Table
     bbbb = is the Bias Hysteresis value at that table location.
```

Examples:

Example #1:
To display a raw hex dump of the SAP:

```
F3 2>I,2
F3 2>I,2,0
```

Example #2:
To display the SAP Table of Contents:

```
F3 2>I,2,FF
```

Example #3:
To display all of the supported SAP subgroups in a humanized format:

```
F3 2>I,2,1
```

Example #4:
To display any supported SAP subgroup in a humanized format:

```
F3 2>I,2,s
where 's' is a supported SAP subgroup ID
```

Example #5:
To display the MR Bias value for head 0:

```
F3 2>I,2,3,0
```

Example #6:
To write the Max MR Bias value for head 1 to 0x003E:

```
F3 2>I3E,2,4,1
```

Revision History:

0001.0000	Initial revision.
0001.0001	Added support for access to Max Head, MR Bias, and Max MR Bias
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

0012.0000 Added support for modifying/reading SAP Bias Table and SAP Bias Hysteresis Table

Display / Modify ZAP Table (Level 4 't')

Description:

This command displays or modifies the RAM ZAP table.

Quick Help:

"DisplayModifyZapTable, t[EntryNum],[EntryValue]";

Input Parameters:

0 - ZAP Table Entry Number.

This parameter specifies the number of the ZAP Table entry to be modified. If this parameter and / or Parameter 1 are not entered, the ZAP table will be displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

1 - ZAP Table Entry Data.

This parameter specifies the value to be written to the specified ZAP table entry. If this parameter and / or Parameter 0 are not entered, the ZAP table will be displayed.

Type: Signed 16-bit value

Range: 0 to 0xFFFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the whole Zap Table will be displayed with the following format:

```
Row 000 xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx
Row 001 xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx
Row 002 xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx
......
```

where xxxx is the ZAP data at the specified index position of the ZAP table

Revision History:

0001.0000   Initial revision.
0011.0000   Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display Native Interface and Read/Write Command History (Online Control X)

Description:
This command displays the command history of the Native Interface and Read/Write subsystem.

Quick Help:

"DisplayInterfaceAndRwCmdHistory";

Input Parameters:
None

Output Data:

If an error occurred, the following information will be displayed.

```
"DiagError aaaaaaaa "

where

   aaaaaaaa is the Diagnostic Error Code
```

If no error occurred, following information will be displayed.

```
"ATA ccc Cmds"
"Ts(ms)     dT(ms)    Op Cnt  LBA"
"dddddddddd eeeeeeee ff gggg hhhhhhhhhhhh"                    *  see remark below

"RW iii Cmds"
"Ts(ms)     dT(ms)    xT(ms)  Type Option Mode  St EC       Info"
"jjjjjjjjjj kkkkkkkk llllllll oo  pppppp qqqqqq r ssssssss"      ** see remark below

where

ccc is the number of ATA commands to display. The oldest one is displaed first
dddddddddd is the time stamp(ms) of the ATA command when it was recorded
eeeeeeee is the time difference(ms) from the previous ATA command
ff is the ATA Op-code. For example, EC is for Identify Device command
gggg is the block count specified in the ATA task file
hhhhhhhhhhhh is the LBA number specified in the ATA task file

iii is the number of Read/Write commands to display. The oldest one is displayed first
jjjjjjjjjj is the time stamp(ms) of the Read/Write command when it was recorded
kkkkkkkk is the time difference(ms) from the previous Read/Write command.
         If this is 99999999, it means the time difference is indeterminate
llllllll is the excution time duration for which the Read/Write request ran.
         If this is 99999999, it means the excution time is indeterminate

Also some supplementary information may be displayed in the "Info" field.
That includes request types, options, modes, input/output(information/response) frames
and buffer configuration, etc.

oo is the Read/Write command request type.
```

0x00	SEEK	Seek request
0x01	XFR_ALT	Read/Write transfer alternate sector request
0x02	XFR	Read/Write transfer request
0x03	RD_CHNL	Access Read Channel request
0x04	SRV_MEM	Access Servo Memory request
0x05	SRV_FLW	Add Primary Servo Flaw request
0x06	DITH	Dithering request
0x07	DITH_WR	Dithering write enhance request
0x08	CAL	Drive Calibration request
0x09	ERA_TRK	Erase Track request
0x0A	FDB	Execute FDB Motor Leakage Detection test request
0x0B	FMT_TRK	Format Track request
0x0C	FMT_SYS	Format System Partition request
0x0D	FMT_UNT	Format Unit request
0x0E	HD_RES	Get Head Resistance request
0x0F	HTR_RES	Get Heater Resistance request
0x10	GET_RVFF	Get Servo RVFF sensor status
0x11	ACFF_RECAL	ACFF Recalibrate status
0x12	TEMP	Get Temperature request
0x13	TWK_FH	Tweak fly height values request
0x14	VOLT	Get Voltage Levels request
0x15	HD_DIAG	Head diagnostics test request
0x16	HD_SPK	Head Spike Screen request
0x17	REALLOC	Immediate Reallocation request
0x18	MRK_PND	Mark Block for Pending Reallocation request
0x19	HD_FH	Measure Head Fly Heights request
0x1A	VCM_TEMP	Measure VCM Temperature and Resistance request
0x1B	MEM_DBG	Memory mapped debug capture request
0x1C	PROC_DL	Process defect lists request
0x1D	SCRB_DL	Scrub the defect lists request
0x1E	PROC_GDL	Process growth defect lists request
0x1F	REF_SRV_MEM	Refresh servo memory request
0x20	RELD_RAP	Reload RAP parameters request
0x21	ERR_RATE	Measure error rate
0x22	DL	Retrieve defect list request
0x23	SRV_EC	Retrieve the servo error code FIFO request
0x24	SCN_DFCT	Scan defect adjacent sectors request
0x25	SELF_SK	Self seek request
0x26	SK_TUNE	Seek profile tuning request
0x27	SND_SRV	Send servo request
0x28	FIX_RAP	Fixup RAP for depop request
0x29	DEPOP	Send Servo Electrical Depop request
0x2A	INIT_DITH	Initialize Dithering parameters
0x2B	PES	Servo PES FIFO access request
0x2C	PREAMP	Set Preamp mode request
0x2D	SET_VOLT	Configure voltage margin level request
0x2E	ZAP	Configure the ZAP correction mode request
0x2F	SPN_UP	Spinup request
0x30	SPN_DN	Spindown request
0x31	ZLR	Track ZLR request
0x32	UNKNOWN	Unsupported request
0x33	UNMRK	Unmark Block for Pending Reallocation request
0x34	TCC	Update TCC Manager request
0x35	ALT_TONE	Write SMART Alternating Tones Request
0x36	XFR_TRK	Read/Write transfer track request
0x37	XFR_WDG	Read/Write transfer wedge request
0x38	PWR	Set R/W Power Management request
0x39	CLR_ALT	Clear R/W User Alt List request
0x3A	LATCH	Put heads on the latch request
0x3B	SV_ALT	Save R/W User Alt List to Media request
0x3C	MATLAB	Enter Servo Matlab Shell request
0x3D	SWEEP	Perform sweep of media to knock off particles request

```
0x3E     CLR_SLIP    Clear R/W Slip List request
0x3F     FA_AFH      Field Adjust AFH request
0x40     TWK_WR_PWR  Tweak write power request
0x41     SEC2RLL     Convert sector data to RLL data
0x42     SWD         SWD(Skip Write Detect) Enable/Disable request
0x43     CLR_ALT_ENT Clear User Alt List Entry request
0x44     ADJ_CLR     Adjust Target Clearance request
0x45     FALL        Control drive free-fall protection request
0x46     XFR_SEC     Read/Write transfer sector request
0x47     DISC_SLIP   Update servo disc slip parameters request
0x48     RE_ALT      Restore R/W User Alt List from Media request
0x49     RST_RVFF    Reset Servo RVFF sensor status request
0x4A     HST         Head Stability Test
```

qqqqqq is the Read/Write command request mode

```
Transfer/Seek Request Modes:
0x00000001           Skip mask mode enabled
0x00000002           Transfer of EDC/ECC data enabled (R/W Long)
0x00000004           Disable on-the-fly ECC correction
0x00000008           Read-continuous mode enabled
0x00000010           Apply specified seek speed (Seek Request Only)
0x00000020           Apply track offset with seek
0x00000040           Disable disc IOEDC Error Detection
0x00000080           Report override data integrity escape seed to Data Manager
0x00000100           Disable block address prepending
0x00000200           Disable block address prepend error detection
0x00000400           Apply override block address prepend and IOEDC seed
0x00000800           Media format mode enabled
0x00001000           Force Read Gate On during transfer
0x00002000           Disable seeks during transfer (track crossings are not allowed
0x00004000           Mask out pre-amp faults
0x00008000           Prime seek mode enabled (Seek Request Only)
0x00010000           Enable forced sync on read (Transfer Requests Only)
0x00020000           Seek without destination cylinder validation (Seek Request Onl
0x00040000           Track ZLR mode
0x00080000           Do not reload channel on next seek
0x00100000           Single track transfer with zero latency start and wrap around
0x00200000           Single track transfer with wrap around logical end
```

pppppp is the Read/Write request options.

```
Transfer/Seek Request Options:
0x00000001 LBA       LBA Format Address Type
0x00000002 PBA       PBA Format Address Type
0x00000003 SEC       Sector Format Address Type
0x00000004 TRK       Track Format Address Type
0x00000005 WDG       Wedge Format Address Type
0x00000010 USR       User Partition Area
0x00000020 SYS       System Partition Area
0x00000030 SOD       SMART OD Partition Area
0x00000040 SID       SMART ID Partition Area
0x000000F0           Invalid Partition Area
0x00000100 RD        Normal Read Transfer Type
0x00000200 CMP       Compare Read Transfer Type
0x00000300 CRT       Cert Read Transfer Type
0x00000400 WR        Normal Write Transfer Type
0x00001000           Read Seek Type
0x00002000           Write Seek Type
0x00003000           Write Header Seek Type
0x00004000           Physical Seek Type
0x00010000           Apply long delay after seek completion
0x00020000           Log seek related statistics
```

```
0x00040000           Disable the heater on read seek
                     Valid only if ALTITUDE_FLY_HEIGHT_MODULATION_WORKAROUND compil
0x00040000           Track unique randomizer seeding.
                     Valid only if TRACK_UNIQUE_RANDOMIZER_SEED compile switch is t
0x00080000           LBA numbering of BIPS Parity Sectors
0x00100000           Indicate track skew should be computed
0x00200000           Use worst-case delta-L value

Spinup Request Options:
0x00000000 NORMAL    Normal Spinup
0x00000001 ONLY      Spin-only Spinup

Spindown Request Options:
0x00000000 NORMAL    Normal Spindown
0x00000001 QCK       Quick Spindown
0x00000002           Quick Low-power Spindown
0x00000003           Late Entry Spindown

Read Track Request Options:
0x00000001           Use LBA to access track
0x00000002           Assert read gate for entire track regardless of errors

Write Track Request Options:
0x00000001           Use LBA to access track
0x00000002           Disable IOEDC parity checking

Reallocate Block Request Options:
0x00000001 L1        Does attempt a data scrub (i.e. write-verify) of the original
                     Does a hard reallocate if it fails.
0x00000002 L2        Does attempt a data scrub (i.e. write-verify) of the original
                     Does NOT do a hard reallocate if fails (unless it becomes an u
0x00000004 HARD      Does not attempt a data scrub (i.e. write-verify) of the origi
0x00000008 MRK       Adds the input LBA to the pending reallocation list.
0x00000010 UNMRK     Removes the input LBA from the pending reallocation list.
0x00000020 RGD       If reallocated, defect is categorized as Reserved Grown defect.

Configure voltage margin level request options:
0x00000000           No change in the voltage margin
0x00000001           Configure for low voltage margin
0x00000002           Configure for nominal voltage margin
0x00000003           Configure for high voltage margin

Configure the ZAP correction mode request options:
0x00000000           Disable all ZAP correction
0x00000001           Enable Write ZAP only
0x00000002           Enable Read ZAP only
0x00000003           Enable Read and Write ZAP
0x00000004           Apply ZAP from Servo RAM

Clear Alt List Request Options:
0x00000000           Disable save of list to media
0x10000000           Enable of save of list to media

Clear Slip List Request Options:
0x00000000           Disable of save of list to media
0x10000000           Enable of save of list to media

Clear Alt List Entry Request Options:
0x00000000           Disable of save of list to media
0x10000000           Enable of save of list to media

Update Servo Disc Slip Parms Request Options:
0x80000000           Request servo re-cal pending status only.
```

0x40000000 Force servo re-cal and update of disc slip parameters.
0x20000000 Send updated (if calibration was performed) disc slip paramete
0x10000000 Send saved disc slip parameters (from media file) to servo.

r is the R/W Sense Status.

0x0 RW_REQUEST_SATISFIED_WITH_RECOVERY - Request was satisfied with error recovery
0x1 RW_REQUEST_SATISFIED - Request was satisfied (no error recovery performed)
0x2 RW_REQUEST_FAILED -Request was not satisfied

ssssssss is the R/W Sense Error Code.

Read/Write request information and response frames
B Aaaaaaaa where Aaaaaaaa is the LBA or PBA number
L Bbbbbbbb where Bbbbbbbb is the Transfer Length
CH Cccccc.D where Cccccc is the cylinder and D is the head number
CHS Cccccc.D.Eeee where Cccccc is the cylinder, D is the head and Eeee is the secto

Read/Write request buffer configuration
BO Ffffff where Ffffff is the buffer config option
VL Gggg.Hhhh where Gggg is the start VBM index and Hhhh is the length in sectors of the VBM buffer segment
BES Iiiiiiii.Jjjjjjjj.Kkkkkkkk where Iiiiiiii is the base address and Jjjjjjjj the top address and Kkkkkkkk the start address of the non-VBM buffer segment

Remarks
* - This line is repeated for the number of ATA commands, specified by the ccc descri
** - This line is repeated for the number of Read/Write commands, specified by the iii

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display Native Interface Command State (Online '~')

Description:
This command displays state of the Native Interface command.

Quick Help:

"DisplayInterfaceCmdState";

Input Parameters:
None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, following information will be displayed.

```
"ATA St cc Er dd Op ee f gggggggggggg, hhhh iiii jjjj"
"Ts(ms)     dT(ms)   xT(ms)  Type Option Mode  St EC       Info"
"kkkkkkkkkk llllllll oooooooo pp  qqqqqq rrrrrr s tttttttt"
```

where

cc is the AT Status register
dd is the AT Error register
ee is the AT Command register
f is the upper 4-bits of the AT device/head register
gggggggggggg is the AT LBA registers which is concatenation of multiple registers
hhhh is the AT Starting Sector Count register
iiii is the AT (current) Sector Count register
jjjj is the AT Feature register

kkkkkkkkkk is the time stamp(ms) of the Read/Write command when it was recorded
llllllll is the time difference(ms) from the previous Read/Write command.
If this is 99999999, it means the time difference is indeterminate
oooooooo is the excution time duration for which the Read/Write request ran.
If this is 99999999, it means the excution time is indeterminate
pp is the Read/Write command request type
qqqqqq is the Read/Write command request options
rrrrrr is the Read/Write command request mode
s is the R/W Sense Status.
tttttttt is the R/W Sense Error Code.

For more detail description of RW command state please refer Online Control-X, Native Interface and Read/Write Command History Information, command

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display Native Interface Configuration (Online Control E)

Description:
This command displays the Native Interface configuration information.

Quick Help:

"DisplayInterfaceConfig";

Input Parameters:
None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred and the native interface is AT or SATA, the following information will be displayed.

"CurrentCHS=cccc/dd/ee MltSiz=fgg DMAMod=hi"

where

cccc is the number of Current Logical Cylinders

dd is the number of Current Logical Heads

ee is the number of Current Logical Sectors

f is the AT Interface Multiple Block validity, 0 = Disabled 1 = Enabled

gg is the AT Interface Multiple Block Size
This is valid only if AT Interface Multiple Block validity, f above, is 1

h is the current AT Interface DMA Mode. 2 = Multiword DMA 4 = Ultra DMA

i is the current AT Interface DMA Mode Level
This is valid only if current AT Interface DMA Mode, h above, is valid

Else

"Unsupported Native Interface Type"

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display Native Interface Read Cache Information (Online Control F)

Description:
This command displays the Native Interface's read cache information.

Quick Help:

"DisplayInterfaceRdCacheInfo";

Input Parameters:
None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the read cache information will be displayed as follows.

```
"VBM Cache SRAM                    VBM Remap Table"
"Ix LBA          Scnt Dlta Stat | LBA           Scnt Atch Strt End  Next Prev AC FL"
"cc dddddddddddd eeee ffff gggg   dddddddddddd eeee hhhh iiii jjjj kkkk llll mm nn"

"Cache Search Hardware Info"
"Target LBA oooooooooooo Count pppp"
"Config qqqq Status rrrr"
"Start Entry ss End Entry tt"
"Total Hits uuu Best Hit vvv"
"Active Entry ww Delta xxxxxxxxxx"
"First Hit Entry yy Last Hit Entry zz"

"Cache Segments MV-LV Linked List Info"
"MV Index Aa LV Index Bb Number of Valuable Segments Cc"
"Dd->Dd->Dd->Dd->Dd->Dd->Dd->Dd->Dd->Dd->Dd->Dd->Dd->Dd->Dd->Dd->"

"Free Cache Segments Linked List Info"
"Free Head Ee Free Tail Ff Number of Free Segments Gg"
"Hh->Hh->Hh->Hh->Hh->Hh->Hh->Hh->Hh->Hh->Hh->Hh->Hh->Hh->Hh->Hh->"

"Sector Size: User(VBM) Iiii(Jjjj) System Kkkk"
"HBACI Llll HMACI Mmmm FBUFI Nnnn FBACI Oooo"
```

where

cc is the cache segment entry number, also referred as cache segment index
dddddddddddd is the starting Logical Block Address in the cache segment
eeee is the valid number of sectors in the cache segment
ffff is the difference between target LBA and Start LBA of the cache table entry
gggg is the cache search result status indicating hit type (Full, Partial, etc)
hhhh is the number of sectors attached to this cache segment
iiii is the first sector's VBM Map Index into buffer memory
jjjj is the last sector's VBM Map Index into buffer memory
kkkk is the linked list pointer to the next cache segment entry
llll is the linked list pointer to the previous cache segment entry
mm is the number of commands which have reserved this cache segment
nn is the flag that indicates the cache segment's status (Write pending, etc)

oooooooooooo is the target LBA that will be compared to the cache table entries for the purpose of determining cache hits
pppp is the target sector count that will be compared to the cache table entries
qqqq is the configuration of the cache search engine
rrrr is the status that indicates cache search result
ss is the first cache entry number to be searched for cache hits
tt is the last cache entry number to be searched for cache hits
uuu is the total number of cache entries that had a hit during the cache search
vvv is the entry number of the best cache hit for the cache search
ww is the entry number used to determine which of several candidate hits is labeled as the best hit
xxxxxxxxxx is the value, Target LBA ?Start LBA, for the cache table entry currently being searched
yy is the first cache entry of cache hit of any kind detected during the search
zz is the last cache entry of cache hit of any kind detected during the search

Aa is the Most Valuable cache segment's entry number
Bb is the Least Valuable cache segment's entry number
Cc is the number of Valuable cache segment entries
Dd is the entry numbers of Valuable cache segments showing from the Most to the Least
Ee is the entry number of the Free Head cache segment
Ff is the entry number of the Free Tail cache segment

Gg is the number of Free cache segment entries
Hh is the entry numbers of Free cache segments showing from Head to Tail

Iiii is the User area sector size in bytes including IODEC field
Jjjj is the User area sector size in bytes including IODEC field, for VBM conversion
Kkkk is the System area sector size in bytes
Llll is the Host FIFO Buffer Address Counter (VBM Index)
Mmmm is the Host FIFO Memory Address Counter (VBM Index)
Nnnn is the Formatter FIFO VBM index for buffer
Oooo is the Formatter FIFO VBM index for formatter

Remarks
*   - This line is repeated for the number of cache segment entries implemented
** - This line is repeated until all Valuable cache entries, indicated by Cc above, are displayed. 16 entries are displayed per line
*** - This line is repeated until all Free cache entries, indicated by Gg above, are displayed. 16 entries are displayed per line

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display Preamp Head Resistance (Level 7 'X')

Description:
This command measures and displays the resistance of all heads.

Quick Help:

"DisplayPreampHdResistance, X";

Input Parameters:
None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following information will be displayed for each head.

"Head cc Resistance dddd"

where

cc is the logical head address

dddd is the head's resistance value

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display Read/Write Statistics (Online '`')

Description:

This command displays read and write error counters for each head.

Use online '$' to get error rates by zone.

Error 100C DETSEC 00008000
- this error is caused by the error stats log being not initialized.
Hit ctl-W to initialize the error log.

Related Commands:

```
any level Ctl-W - enables RW statistics gathering and zeros out the error counters
level L i    - L>iFFFD will zero out the error counters.
level L E    - L>E,,0 will disable statistics gathering
             - L>E,,1 will enable statistics gathering
             - L>E,,2 will zero out the error counters
```

Quick Help:

"DisplayRwStats";

Input Parameters:

None

Output Data:

```
Rbit  Hard  Soft  OTF   Raw   Rsym  Sym   Wbit  Whrd  Wrty
X.X   X.X   X.X   X.X   X.X   X.X   X.X   X.X   X.X   X.X
X.X   X.X   X.X   X.X   X.X   X.X   X.X   X.X   X.X   X.X
```

Where X.X is the log base 10 value as follows:

Rbit: The number of BITS drive attempted to read. This counter increments by 512*8 for each sector attempted to be read.

This value is forced to be at least equal to the raw error rate.

Hard: Records errors that could not be read. This counter increments by one per set of retires.

Soft: Records errors that required one or more retries, including errors that could no be read. This counter increments by one per set of retries.

OTF: Records any error that caused the disk sequencer to stop. This counter increments by one for each separate retry.

Raw: Records count of all sectors in error that the disk encountered, including those sectors the disk was able to correct. A given sector will only increment this counter by 1 no matter how many symbols are in error. (This accounting is just like ST-10 code.)

Rsym: The number of symbols the drive attempted to read. This includes user data, IOECD, and ECC fields. Each time a sector read is retried, the number of symbols read is incremented by the number of symbols in a sector.

Sym: Symbol based error rate. This is
-1 * log10 (bad symbols reported by hardware / symbols read)

Wbit: The number of BITS drive attempted to write. This counter increments by 512*8 once for each sector attempted to be written.

This value is forced to be at least equal to the Wrty value.

Whrd: Write hard errors. This counter increments by one each time the drive fails to write a sector. This counter only increments once per set of retries.

Wrty: Records errors that required one or more retries but did not require full error recovery configuration to write. This counter increments by one per set of retries.

```
Example:
    10 sectors read  ( 10*512*8 bits )
    18 OTF corrections
    4 soft errors
    2 hard errors
  --- --- --- --- --- --- --- --- ---
  rbit = log10 (10*512*8)
  hard = log10 (    2     / (10*512*8) )
  soft = log10 (  (2+4)   / (10*512*8) )
  OTF  = log10 ( (2+4+18) / (10*512*8) )
```

Examples:

Example #1:

```
F3 2> `
       Rbit  Hard  Soft  OTF   Raw   Rsym  Sym   Wbit  Whrd  Wrty
Hd 0   9.4   9.4   9.4   9.4   5.9   8.5   4.9   0.0   0.0   0.0
Hd 1   9.3   9.3   9.3   9.3   5.9   8.4   4.9   0.0   0.0   0.0
```

Revision History:

0001.0000	Initial revision.
0001.0001	Changed how stats are calculated if no successful transfers have occurred.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).
0011.0001	Improve accuracy of logarithm math.
0012.0000	Added support for symbol based error rates.

Display Read/Write Statistics By Zone (Online '$')

Description:

This command displays read and write error counters for each head and zone.

Error 100C DETSEC 00008000
- this error is caused by the error stats log being not initialized.
Hit ctl-W to initialize the error log.

Related Commands:

any level Ctl-W - enables RW statistics gathering and zeros out the error counters
level L i   - L>iFFFD will zero out the error counters.
level L E   - L>E,,0 will disable statistics gathering
             - L>E,,1 will enable statistics gathering
             - L>E,,2 will zero out the error counters

Quick Help:

"DisplayRwStatsByZone";

Input Parameters:

None

Output Data:

```
Rbit  Hard  Soft  OTF   Raw   Rsym  Sym   Wbit  Whrd  Wrty
X.X   X.X   X.X   X.X   X.X   X.X   X.X   X.X   X.X   X.X
X.X   X.X   X.X   X.X   X.X   X.X   X.X   X.X   X.X   X.X
```

Where X.X is the log base 10 value as follows:

Rbit: The number of BITS drive attempted to read. This counter increments by 512*8 for each sector attempted to be read.

This value is forced to be at least equal to the raw error rate.

Hard: Records errors that could not be read. This counter increments by one per set of retires.

Soft: Records errors that required one or more retries, including errors that could not be read. This counter increments by one per set of retries.

OTF: Records any error that caused the disk sequencer to stop. This counter increments by one for each separate retry.

Raw: Records count of all sectors in error that the disk encountered, including those sectors the disk was able to correct. A given sector will only increment this counter by 1 no matter how many symbols are in error. (This accounting is just like ST-10 code.)

Rsym: The number of symbols the drive attempted to read. This includes user data, IOECD, and ECC fields. Each time a sector read is retried, the number of symbols read is incremented by the number of symbols in a sector.

Sym: Symbol based error rate. This is
-1 * log10 (bad symbols reported by hardware / symbols read)

Wbit: The number of BITS drive attempted to write. This counter increments by 512*8 once for each sector attempted to be written.

This value is forced to be at least equal to the Wrty value.

Whrd: Write hard errors. This counter increments by one each time the drive fails to write a sector. This counter only increments once per set of retries.

Wrty: Records errors that required one or more retries but did not require full error recovery configuration to write. This counter increments by one per set of retries.

```
Example:
     10 sectors read  ( 10*512*8 bits )
     18 OTF corrections
     4 soft errors
     2 hard errors
   --- --- --- --- --- --- --- --- ---
   rbit = log10 (10*512*8)
   hard = log10 (    2     / (10*512*8) )
   soft = log10 (  (2+4)   / (10*512*8) )
   OTF  = log10 ( (2+4+18) / (10*512*8) )
```

Examples:

Example #1:

```
F3 2> $
```

Hd	Zn	Rbit	Hard	Soft	OTF	Raw	Rsym	Sym	Wbit	Whrd	Wrty
0	0	8.1	8.1	8.1	7.4	5.7	7.2	4.6	0.0	0.0	0.0
0	1	7.8	7.8	7.8	7.0	5.9	6.9	4.6	0.0	0.0	0.0
0	2	7.9	7.9	7.9	7.3	5.7	6.9	4.3	0.0	0.0	0.0
0	3	8.0	8.0	8.0	7.1	6.1	7.0	4.6	0.0	0.0	0.0
0	4	7.9	7.9	7.9	7.1	5.7	7.0	4.5	0.0	0.0	0.0
0	5	8.0	8.0	8.0	7.1	5.5	7.1	4.4	0.0	0.0	0.0
0	6	8.1	8.1	8.1	7.2	5.7	7.1	4.4	0.0	0.0	0.0
0	7	7.9	7.9	7.9	7.2	5.7	7.0	4.5	0.0	0.0	0.0
0	8	7.5	7.5	7.5	7.5	5.3	6.6	4.0	0.0	0.0	0.0
0	9	7.9	7.9	7.9	7.0	5.6	6.9	4.3	0.0	0.0	0.0
0	A	7.8	7.8	7.8	6.9	5.5	6.9	4.3	0.0	0.0	0.0
0	B	7.9	7.9	7.9	7.0	5.0	6.9	3.8	0.0	0.0	0.0
0	C	7.5	7.5	7.5	7.0	5.3	6.6	4.2	0.0	0.0	0.0
0	D	7.9	7.9	7.9	6.9	5.5	6.9	4.2	0.0	0.0	0.0
0	E	7.5	7.5	7.5	7.0	5.6	6.6	4.4	0.0	0.0	0.0
0	F	7.5	7.5	7.5	6.9	5.4	6.5	4.1	0.0	0.0	0.0
Sumry:		9.1	9.1	9.1	7.1	5.5	8.1	4.2	0.0	0.0	0.0

Hd	Zn	Rbit	Hard	Soft	OTF	Raw	Rsym	Sym	Wbit	Whrd	Wrty
1	0	7.9	7.9	7.9	7.2	6.0	6.9	4.6	0.0	0.0	0.0
1	1	7.8	7.8	7.8	7.0	5.8	6.9	4.5	0.0	0.0	0.0
1	2	7.9	7.9	7.9	7.2	5.8	6.9	4.5	0.0	0.0	0.0
1	3	7.9	7.9	7.9	7.3	5.8	7.0	4.6	0.0	0.0	0.0
1	4	8.1	8.1	8.1	7.2	6.0	7.2	4.6	0.0	0.0	0.0
1	5	8.1	8.1	8.1	7.2	5.8	7.2	4.5	0.0	0.0	0.0
1	6	8.1	8.1	8.1	7.1	6.0	7.1	4.5	0.0	0.0	0.0
1	7	8.0	8.0	8.0	7.1	5.7	7.1	4.4	0.0	0.0	0.0
1	8	8.0	8.0	8.0	7.1	5.9	7.0	4.6	0.0	0.0	0.0
1	9	8.0	8.0	8.0	7.1	5.8	7.0	4.4	0.0	0.0	0.0
1	A	7.6	7.6	7.6	7.3	5.7	6.6	4.4	0.0	0.0	0.0
1	B	7.5	7.5	7.5	7.5	5.8	6.6	4.7	0.0	0.0	0.0
1	C	7.8	7.8	7.8	6.9	5.7	6.9	4.5	0.0	0.0	0.0
1	D	7.5	7.5	7.5	7.2	5.6	6.6	4.4	0.0	0.0	0.0
1	E	8.0	8.0	8.0	7.1	5.6	7.0	4.3	0.0	0.0	0.0
1	F	7.7	7.7	7.7	7.0	5.8	6.7	4.3	0.0	0.0	0.0
Sumry:		9.1	9.1	9.1	7.2	5.8	8.1	4.5	0.0	0.0	0.0

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).
0011.0001	Improve accuracy of logarithm math.
0012.0000	Added support for symbol based error rates.

Display Sign On Message (Online Control L)

Description:

This command displays the sign on message, which includes Product configuration, HDA configuration, PCBA configuration, Firmware revision and Feature configuration information.

Quick Help:

"DisplaySignOnMsg";

Input Parameters:

None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred , the following information will be displayed.

"Product FamilyId: cc, MemberId: dd"

where

cc is the Product Family ID

dd is the Product Family Member ID

"HDA SN: eeeeeeee, RPM: ffff, Wedges: gggg, Heads: h, Lbas: jjjjjjjj, PreampType: kk kk

where

eeeeeeee is the HDA Serial Number

ffff is the spin speed in Rotations per Minute

gggg is the number of servo wedges per track in hex

h is the number of heads

jjjjjjjj is the number of user LBAs in hex

kk kk is the Preamp Type (Preamp Registers 0 and 1)

"PCBA SN: llllllll, Controller: mmmmm, Channel: pppp, PowerAsic: qqqq Rev rr, BufferBy

where

llllllll is the PCBA Serial Number

mmmm is an ASCII string that specifies the controller type nnnn is the controlle clock speed in MHz

pppp is an ASCII string that specifies the Read Channel type

qqqq is an ASCII string that specifies the Power ASIC type

rr is the Power ASIC revision

ssssssss is the data buffer size in bytes

"Package Version: CCCCCC.CCCC.CCCCCC.CCCCCCCC, Package P/N: DDDDDDDDD, Package Builder ID: EE,
Package Build Date: MM-DD-YYYY, Package Build Time: HH:MM:SS, Package CFW Version: GGGG.GGGG.
Package SFW1 Version: IIII, Package SFW2 Version: JJJJ, Package SFW3 Version: KKKK, Packag

where

CCCCCC.CCCC.CCCCCC.CCCCCCCC is the Package Version Field.

DDDDDDDDD is the Package Part Number Field.

EE is the Package Builder ID Field.

MM/DD/YYYY is the Package Build Date Field.

HH:MM:SS is the Package Build Time Field.

GGGG.GGGG.GGGGGG.GGGG is the Package CFW Component Version Field.

IIII Package SFW Component 1 Version Field.

JJJJ Package SFW Component 2 Version Field.

KKKK Package SFW Component 3 Version Field.

LLLL Package SFW Component 4 Version Field.

example output:
Package Version: MS1240.STD1.AA0502.STD10013, Package P/N: 100421943, Package Builder ID:
Package Build Date: 03/08/2007, Package Build Time: 151452, Package CFW Version: MS12.STD
Package SFW 1 Version: B413, Package SFW 2 Version: C415, Package SFW 3 Version: ----, Pa

A warning message may be printed which indicates that some of the Firmware Package informatio
has been truncated. The most likely causes of this warning would be that Package information
invalid or that this diagnostic does not support the Firmware Package format returned by the

example output:
Warning: Package Info truncation occurred.

"Controller FwRev CCCCCCCC, CustomerRel DDDDDD, Changelist EEEE, ProdType FFFF, Date GG/GG/GG

where

CCCCCCCC is the Controller Firmware Revision.

DDDD is the Customer Release number.

EEEEEEEE is the Perforce Changelist Number.

FFFF is the Product Type.

GG/GG/GGGG is the date the code was built.

HHHHHH is the time the code was built.

IIIIIII is the global ID of the person that built the code.

"Servo FwRev CCCC

where

CCCC is the Servo Firmware Revision.

"RAP FW Implementation Key: CC, RAP FormatRev DD, ContentsRev EE";

where

CC is the RAP FW Implemenation Key.

DD is the RAP Format Revision.

EE is the RAP Contents Revision.

```
"Features:"
"- AFH tttttttt"
"- VBAR tttttttt" or "- VBAR with adjustable zone boundaries tttttttt"
"- Volume Based Sparing tttttttt"
"- IOEDC tttttttt"
"- IOECC tttttttt"
"- DERP Read Retries tttttttt"
"- LTTC-UDR2 uuuuuuuu"

where

   tttttttt = "enabled" or "disabled"
   uuuuuuuu = "enabled" or "disabled" or "compiled off"
```

Revision History:

0001.0000	Initial revision.
0002.0000	Added IOEDC and IOECC enabled status.
0003.0000	Added Firmware Package Information to the output data.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).
0012.0000	Added LTTC-UDR2 disabled, enabled, or compiled off indication
0013.0000	Added RAP FW Implementation Key.

Display Super Parity RAM (Level G 'E')

Description:

This command displays the specified segment of the Super Parity RAM.

Quick Help:

"DisplaySuperParityRam, G[StartAddr],[EndAddr]";

Input Parameters:

0 - Start Address Offset of Super Parity RAM.

This parameter specifies the start address offset of the super parity RAM.

Type: Unsigned 16-bit value

Range: 0 to 0xffff,

Default: 0

1 - End Address Offset of Super Parity RAM.

This parameter specifies the end address offset of the super parity RAM.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display Temperature (Levels 7 'D')

Description:
This commmand displays the temperature of the specified device (preamp or thermistor).

Quick Help:

"DisplayTemperature, D,[DevSelect]";

Input Parameters:

0 - not used.

This parameter is not currently used. For the legacy ST10 code, entering this parameter forced the cert temperature to be equal the current temperature.

Type: None

Range: None

Default: None

1 - Device Select.

This parameter selects the device for which the temperature is to be displayed.

If this parameter is equal to 2, the Preamp temperature will be displayed, else the Thermistor temperature will be displayed.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: 0 (Display Thermistor temperature)

2 - not used.

This parameter is not currently used. For the legacy ST10 code, if this parameter was equal to 0x22, the temperature value was written to the disk with the Adaptive parameters.

Type: None

Range: None

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred and the Preamp temperature was returned, the following message will be displayed.

"Preamp temp cccc, CCd"

where

cccc is the temperature value obtained from preamp (hexadecimal)
CC is the temperature value obtained from preamp (decimal)

If no error occurred and the Thermistor temperature was returned, the following message will be displayed.

"Ref voltage dddd Thermistor voltage eeee Thermistor temp in degrees C ffff, FFd"

where

dddd is the A to D Reference Voltage

eeee is the Thermistor Voltage

ffff is the Thermistor Temperature in degrees Celsius (hexadecimal)
FF is the Thermistor Temperature in degrees Celsius (decimal)

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).
0012.0000 Added Temperature in degrees Celsius (decimal) to output.

Display Track Information (Level 2 'X' or Level A '1')

Description:

This command displays information about the specified track. If no track address is specified, this command will display information about the current Target Track.

Quick Help:

```
   Level 2
"DisplayTrkSectorInfo, X[LogCyl],[Hd],[SysAreaOpt],[Opts],[RowsPerPage]";
   Level 1
"DisplayTrkInfo, 1[LogCyl],[Hd],[SysAreaOpt],[Opts],[RowsPerPage]";
```

Input Parameters:

0 - Logical Cylinder Address.

If Parameter 2 is not entered, this parameter is the User Area logical cylinder address of the track for which information is to be displayed. If Parameter 2 is entered, this parameter is the System Area logical cylinder address of the track for which information is to be displayed.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: Next logical cylinder address in the Test Space

1 - Logical Head Address.

This parameter is the logical head address of the track for which information is to be displayed.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: Next logical head address in the Test Space

2 - System Area Flag.

If any value is entered for this parameter, then Parameter 0 specifies a System Area logical cylinder address, else it specifies a User Area logical cylinder address.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

3 - Display Sector Information option.

If this parameter is equal to 0, the specified tracks sector information will not be displayed, else the specified tracks sector information will be displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: For Level 2 'X' the default is 1 (Display track's Sector Information)
         For Level A 'l' the default is 0 (Don't display track's Sector Information)

4 - Sector Information Rows Per Page.

If Parameter 3 is entered and this parameter is entered, the sector information display will pause after the number of rows specified by this parameter and wait for the user to enter a character. If this parameter is not entered, all of the sector information will be displayed without pausing.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None (Don't pause the sector information display)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following information will be displayed:

```
"Track Info:"
"Partition PhyCyl   LogCyl   NomCyl   Radius_mils LogHd Zn FirstLba FirstPba LogSecs PhySe
"User      cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
"System    cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
```

where

cccccccc   is the Logical Cylinder address where Logical Cylinders do not include the cylinders in other partitions.

dddddddd   is the Physical Cylinder address where Physical Cylinders include User Area Cylinders, System Area Cylinders and Spare Cylinders.

ee   is the Logical Head address where Logical Heads do not include heads that have been depopulated.

ff   is the number of the zone that contains the track.

gggggggg is the first Logical Block Address (LBA) on the track.

hhhhhhhh is the first Physical Block Address (PBA) on the track.

iiii is the number of logical sectors on the track.

jjjj is the number of physical sectors on the track.

kkkk is the skew in wedges from index to the wedge that contains physical sector 0.

llll is the number of physical sectors per frame.

mmmm is the number of wedges per frame.

nnnnnnnn is the Nominal Cylinder address where Nominal Cylinders remove the VBAR scaling factor.

o.ooooooEoo is the Radius in milliinches as measured from the hub.

If the Sector Information display is enabled, the following additional information will be displayed:

```
"Sector Info:"

"PhySec(LogSec) Wdg SFI        PhySec(LogSec) Wdg SFI        PhySec(LogSec) Wdg SFI        Phy
  cccc   dddd   eee ffffffff    gggg   hhhh   iii jjjjjjjj    kkkk   llll   mmm nnnnnnnn    pp
```

As shown above, the sector information is displayed in four columns. For each column, the Physical Sector Address (PhySec) increments sequentially for each row. All of the sectors in a given row are at the same sector offset from the start of the frame and frames are seperated by a blank line. The displayed information is defined as follows:

cccc, gggg, kkkk and pppp are the Physical Sector Address.

dddd, hhhh, llll and qqqq are the Logical Sector Address.

eee, iii, mmm and rrr are the number of the Servo Burst that preceeds the sector.

ffffffff, jjjjjjjj, nnnnnnnn, tttttttt are the number of NRZ Symbols from Index to the start of the sector.

qqq is the number of bytes before the servo burst that splits the sector for all sectors in the row.

rrr is the number of bytes after the servo burst that splits the sector for all sectors in the row.

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display Zone Information (Levels 2, 7 'x')

Description:

This command displays information about the media partitions (System and User) and data zones.

Quick Help:

"DisplayZoneInfo, x[Partition],[Hd],[Zone],[DisplayWedgeOpSyms]";

Input Parameters:

0 - Partition.

This parameter specifies the partition for which the zone information is to be displayed.

0 = User Partition
1 = System Partition

Type: Unsigned 8-bit value

Range: 0 or 1

Default: If this paremater is not entered, the information will be displayed for all partitions.

1 - Head.

This parameter specifies the head for which the zone information is to be displayed.

Type: Unsigned 8-bit value

Range: 0 to 0xff

Default: If this parameter is not entered, the zone information will be displayed for all heads.

2 - Zone.

This parameter specifies the zone for which the zone information is to be displayed.

Type: Unsigned 8-bit value

Range: 0 to 0xff

Default: If this parameter is not entered, the zone information will be displayed for all zones.

3 - Options.

This parameter is a bit significant value that selects the following options:

Bits 31-1: not used

Bit 0: Display Wedge Operation NRZ Symbol Information option.

If this bit is equal to 1, the number of NRZ Symbols for the following wedge operations will be displayed: Unformatted Direct Write, Unformatted Direct Read, Formatted Direct Write, Formatted Direct Read.

This option is only valid for drives that implement VBAR.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 0 (Don't display the Wedge Operation NRZ Symbol information)

Output Data:

For Non VBAR drives:

If no error occurred, the following information will be displayed.

```
"System Partition"
"  LastLba  LastPba  HdSkew CylSkew MiniZnSkew"
"  cccccccc dddddddd  eeee   ffff      gggg"

"  Hd FirstCyl LastCyl MiniZnCyls"
"   h  iiiiii  jjjjjj    kkkkkk"

"  Zones: ll"
"     First  Total  Spare   First   Sec   Wedge    Spare     Cum     Last  LastMini CumMin
"  Zn  Cyl   Cyls   Cyls     Lba    Trk  NrzSyms   Secs     Slips   MiniZn  ZnCyls  ZnSkew
"  mm nnnnnn pppppp qqqqqq rrrrrrrr ssss tttttttt uuuuuuuu vvvvvvvv  wwww   xxxxxx   yyyy"

"User Partition"
"  LastLba  LastPba  HdSkew CylSkew MiniZnSkew"
"  CCCCCCCC DDDDDDDD  EEEE   FFFF      GGGG"

"  Hd FirstCyl LastCyl MiniZnCyls"
"   H  IIIIII  JJJJJJ    KKKKKK"

"  Zones: LL"
"     First  Total  Spare   First   Sec   Wedge    Spare     Cum     Last  LastMini CumMin
"  Zn  Cyl   Cyls   Cyls     Lba    Trk  NrzSyms   Secs     Slips   MiniZn  ZnCyls  ZnSkew
"  MM NNNNNN PPPPPP QQQQQQ RRRRRRRR SSSS TTTTTTTT UUUUUUUU VVVVVVVV  WWWW   XXXXXX   YYYY"
```

where

cccccccc is the ending Logical Block Address (LBA) of the System Partition.

dddddddd is the ending Physical Block Address of the System Partition.

eeee is the Head Skew in data wedges for the System Partition.

ffff is the Cylinder Skew in data wedges for the System Partition.

gggg is the mini zone skew in data wedges for the System Partition.

h is the Logical Head Address in the System Partition.

iiiiii is the starting physical cylinder address of the System Partition on the specified head.

jjjjjj is the ending physical cylinder address of the System Partition on the specified head.

kkkkkk is the mini zone size in cylinders for the System Partition.

ll is the number of System Partition data zones.

mm is the System Partition data zone number.

nnnnnn is the starting physical cylinder address of the System Partition data zone.

pppppp is the total number of physical cylinders contained in the System Partition data zone.

qqqqqq is the number of spare cylinders contained in the System Partition data zone.

rrrrrrrr is the starting Logical Block Address (LBA) of the System Partition data zone.

ssss is the number of physical sectors per track in the System Partition data zone.

tttttttt is the size of a data wedge in NRZ Symbols.

uuuuuuuu is the number of spare sectors in the System Partition data zone.

vvvvvvvv is the cummulative number of slips in the System Partition data zone.

wwww is the index of the last mini zone in the System Partition data zone.

xxxxxx is the number of cylinders contained in the last mini zone of the System Partition data zone.

yyyy is the cummulative skew per mini zone in System Partition data zone.

CCCCCCCC is the ending Logical Block Address (LBA) of the User Partition.

DDDDDDDD is the ending Physical Block Address of the User Partition.

EEEE is the Head Skew in data wedges for the User Partition.

FFFF is the Cylinder Skew in data wedges for the User Partition.

GGGG is the mini zone skew in data wedges for the User Partition.

H is the Logical Head Address in the User Partition.

IIIIII is the starting physical cylinder address of the User Partition on the specified head.

JJJJJJ is the ending physical cylinder address of the User Partition on the specified head.

KKKKKK is the mini zone size in cylinders for the User Partition.

LL is the number of User Partition data zones.

MM is the User Partition data zone number.

NNNNNN is the starting physical cylinder address of the User Partition data zone.

PPPPPP is the total number of physical cylinders contained in the User Partition data zone.

QQQQQQ is the number of spare cylinders contained in the User Partition data zone.

RRRRRRRR is the starting Disk Logical Block Address (LBA) of the User Partition data zone.

SSSS is the number of physical sectors per track in the User Partition data zone.

TTTTTTTT is the size of a data wedge in NRZ Symbols.

UUUUUUUU is the number of spare sectors in the User Partition data zone.

VVVVVVVV is the cummulative number of slips in the User Partition data zone.

WWWW is the index of the last mini zone in the User Partition data zone.

XXXXXX is the number of cylinders contained in the last mini zone of the User Partition data zone.

YYYY is the cummulative skew per mini zone in User Partition data zone.

For VBAR drives:

If no error occurred, the following information will be displayed.

```
"User Partition"
" LBAs CCCCCCCC - DDDDDDDD"
" PBAs EEEEEEEE - FFFFFFFF"
" HdSkew GGGG CylSkew HHHH"
" ZonesPerHd JJ"

"  Head K, PhyCyls LLLLLLLL - MMMMMMMM, LogCyls NNNNNNNN - PPPPPPPP"

"     First    Sec   Sym   Sym"
"  Zn Cyl      Track Wedge Track    MHz"
"  QQ RRRRRRRR SSSS  TTTT  UUUUUUUU VVVVVVVV"

"System Partition"
" LBAs cccccccc - dddddddd"
" PBAs eeeeeeee - ffffffff"
" HdSkew gggg CylSkew hhhh"
" ZonesPerHd jj"

"  Head k, PhyCyls llllllll - mmmmmmmm, LogCyls nnnnnnnn - pppppppp"

"     First    Sec   Sym   Sym"
"  Zn Cyl      Track Wedge Track    MHz"
"  qq rrrrrrrr ssss  tttt  uuuuuuuu vvvvvvvv"
```

where

CCCCCCCC is the first Logical Block Address (LBA) of the User Partition.

DDDDDDDD is the last Logical Block Address (LBA) of the User Partition.

EEEEEEEE is the first Physical Block Address (PBA) of the User Partition.

FFFFFFFF is the last Physical Block Address (PBA) of the User Partition.

GGGG is the Head Skew in data wedges for the User Partition.

HHHH is the Cylinder Skew in data wedges for the User Partition.

JJ is the number of zones per head in the User Partition.

K is the Logical Head Address of the User Partition zone information to follow.

LLLLLLLL is the starting physical cylinder address of the User Partition on the specified head.

MMMMMMMM is the ending physical cylinder address of the User Partition on the specified head.

NNNNNNNN is the starting logical cylinder address of the User Partition on the specified head.

PPPPPPPP is the ending logical cylinder address of the User Partition on the specified head.

QQ is the User Partition data zone number.

RRRRRRRR is the starting physical cylinder address of the User Partition data zone.

SSSS is the number of physical sectors per track in the User Partition data zone.

TTTT is the size of a data wedge in NRZ Symbols for the User Partition data zone.

UUUUUUUU is the size of a track in NRZ Symbols for the User Partition data zone.

VVVVVVVV is the data frequency, in MHz, for the User Partition data zone.

cccccccc is the first Logical Block Address (LBA) of the System Partition.

dddddddd is the last Logical Block Address (LBA) of the System Partition.

eeeeeeee is the first Physical Block Address (PBA) of the System Partition.

ffffffff is the last Physical Block Address (PBA) of the System Partition.

gggg is the Head Skew in data wedges for the System Partition.

hhhh is the Cylinder Skew in data wedges for the System Partition.

jj is the number of zones per head in the System Partition.

k is the Logical Head Address of the System Partition zone information to follow.

llllllll is the starting physical cylinder address of the System Partition on the specified head.

mmmmmmmm is the ending physical cylinder address of the System Partition on the specified head.

nnnnnnnn is the starting logical cylinder address of the System Partition on the specified head.

pppppppp is the ending logical cylinder address of the System Partition on the specified head.

qq is the System Partition data zone number.

rrrrrrrr is the starting physical cylinder address of the System Partition data zone.

ssss is the number of physical sectors per track in the System Partition data zone.

tttt is the size of a data wedge in NRZ Symbols for the System Partition data zone.

uuuuuuuu is the size of a track in NRZ Symbols for the System Partition data zone.

vvvvvvvv is the data frequency, in MHz, for the System Partition data zone.

If the Display Wedge Operation NRZ Symbol Information option is enabled (Parameter 3 Bit 0 set), the following additional information will be displayed for each User and System partition zone.

```
"Sym         Sym         Sym       Sym"
"UnFmtDirWr UnFmtDirRd FmtDirWr FmtDirRd"
"WWWW       XXXX       YYYY     ZZZZ"
```

where

WWWW is the number of NRZ Symbols for an Unformatted Direct Wedge Write operation in the zone.

XXXX is the number of NRZ Symbols for an Unformatted Direct Wedge Read operation in the zone.

YYYY is the number of NRZ Symbols for an Formatted Direct Wedge Write operation in the zone.

ZZZZ is the number of NRZ Symbols for an Formatted Direct Wedge Read operation in the zone.

Revision History:

0001.0000	Initial revision.
0002.0000	Modified to display the logical cylinder range for each head for VBAR drives.
0002.0001	Modified to display the NRZ Symbols per sector for each partition for VBAR drives. Modified to display the NRZ Symbols per Wedge for Unformatted Direct Wedge Write and Read and Formatted Direct Wedge Write and Read operations on VBAR drives.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Display Directed Offline Scan Information (Level 7 'm')

Description:
This command is used to display information from the Directed Offline Scan subsystem.

Quick Help:

"DOS, m[Flags],[StartLba],[EndLba],[MinCount]";

Input Parameters:

0 - Action Mask

This input is a bitmask of what should be displayed:
0x01 counter values
0x02 counter group descriptors
0x04 miscellaneous DOS data
0x08 cylinder and head data

0x10 number of ought to and need to scans due
0x100 clear DOS tables and write to disk

Type: Unsigned 16-bit value

Range: 0 to 0x100

Default: 4 (thresholds)

1 - Start LBA

This input is to set the LBA of the first data elements to display.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

2 - End LBA

This input is to set the LBA of the last data elements to display

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: Start LBA (parm 1)

3 - Minimum Count To Display

Count values lower than this input will not be displayed.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

__Output Data:__

```
                                                    Group      Group
 First    log   phys    Last     log   phys      Descriptor  Descriptor
  LBA     cyl    cyl     LBA     cyl    cyl Count     Type        Value    Hd Zn
     0      0      0     34D3      5      5    0      IDX            0     0  0
   aaaa   bbbb   cccc     dddd   eeee   ffff   gg     hhh          iii     j  k
```

aaaa - First LBA of DOS scan area
only visible if action mask contains 1h or 2h

bbbb - First logical cylinder of DOS scan area
only visible if action mask contains 08h

cccc - First physical cylinder of DOS scan area
only visible if action mask contains 08h

dddd - Last LBA of DOS scan area
only visible if action mask contains 1h or 2h

eeee - Last logical cylinder of DOS scan area
only visible if action mask contains 08h

ffff - Last physical cylinder of DOS scan area

```
              only visible if action mask contains 08h

  gg   - Number of writes for this DOS scan area
              only visible if action mask contains 1h or 2h

  hhh  - Type of group descriptor.  This will be:
         IDX: The DOS counter group descriptor points to a counter
         CTR: The DOS counter group descriptor is itself a counter
              only visible if action mask contains 2h

  iii  - The value in the group descriptor.  This value is most meaningful if the "Group
         Descriptor Type" is CTR.
              only visible if action mask contains 2h

  j    - The head that the DOS scan area resides on
              only visible if action mask contains 08h

  k    - The zone that the DOS scan area resides in
              only visible if action mask contains 08h
```

Examples:

```
F3 7>m1


   First     Last
    LBA       LBA  Count
        0     34D3    0    0  0

F3 7>m2
                            Counter    Counter
                             Group      Group
   First     Last         Descriptor  Descriptor
    LBA       LBA  Count    Type       Value
        0     34D3    0     IDX           0    0  0

F3 7>m7
                            Counter    Counter
                             Group      Group
   First     Last         Descriptor  Descriptor
    LBA       LBA  Count    Type       Value
        0     34D3    0     IDX           0    0  0
 OughtToScanThreshold: 2000
 NeedToScanThreshold:  2000
 Writes since last save:       0
 Ought to save threshold:    7D0
 Need to save threshold:     FA0

F3 7>m1f
                                                               Counter    Counter
                                                                Group      Group
   First    log   phys    Last     log   phys      Descriptor  Descriptor
    LBA     cyl    cyl     LBA     cyl    cyl Count    Type       Value    Hd Zn
        0      0      0    34D3      5      5    0     IDX           0     0  0
 OughtToScanThreshold: 2000
 NeedToScanThreshold:  2000
 Writes since last save:       0
 Ought to save threshold:    7D0
 Need to save threshold:     FA0
 Scans over ought to threshold: 0
 Scans over need to threshold: 0
```

Revision History:

0001.0000 Initial revision.
0001.0001 Add ability to clear counters, add display writes since save, add display limits of writes until save.
0001.0002 Add ability to display cylinder and head information.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Download Generic File (Level T 'P')

Description:
This command downloads a generic file to the drive.

Quick Help:

"DownloadGenericFile, P[FileBytes]";

Input Parameters:

0 - File Bytes.

This parameter specifies the number file bytes to be downloaded.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: None

Output Data:
None.

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Drive Free Fall Protection (Level 5 'F')

Description:
This command does the drive free fall protection control, measurement and simulation.

Quick Help:

"DriveFreeFallProtection, F[OpCode],[SimDur],[SimSensorOutputs]";

Input Parameters:

0 - Operation Code Of Drive Free Fall Protection

This parameter specifies the operation code of the drive free fall protection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

1 - Free-Fall Timer Sensitivity

This parameter specifies the free-fall timer sensitvity.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

2 - Tumble Timer Sensitivity

This parameter specifies the tumble timer sensitvity.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

3 - Simulation Duration

This parameter specifies the duration to simulate the drive free fall protection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

4 - Simulation Sensor Outputs

This parameter specifies the simulation outputs value to be applied.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following will be displayed

Read/Write Drive Free Fall Protection Info

Read/Write Free Fall Protection is AA
Read/Write Free Fall Protection Event is BB
Read/Write Free Fall Protection is CC

Servo Drive Free Fall Protection Info
Servo Free Fall Protection is DD
Servo Free Fall Protection Event is EE
Servo Free Fall Sensor Health = FF

where

AA is the status of Read/Write Free Fall Protection.

BB is the status of Read/Write Free Fall Protection Event.

CC is the status of Read/Write Free Fall Protection Activation.

DD is the status of Servo Free Fall Protection.

EE is the status of Servo Free Fall Protection Event.

FF is the value of Servo Free Fall Sensor Health.

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Edit Buffer Memory Byte (Level 1 'U')

Description:

The Edit Buffer Memory Byte command displays the contents of the specified buffer memory location and prompts the user (-->) to enter a new value to be written to the location. While waiting for the new value to be entered, this command will monitor the memory location and display its value if it changes.

Entering a Line Feed (Control J) character following the prompt will increment the buffer memory address and display the value of the next location.

The command is terminated when a carriage return is entered following the prompt.

This command default to editing memory one byte (8-bits) at a time.

************************************** NOTE **
This command should be used with great caution, since it has the potential to corrupt critical data stored in the data buffer.
****

Quick Help:

"EditBufferMemoryByte, U[AddrHi],[AddrLo],[MemValue],[NumBytes]";

Input Parameters:

0 - Memory Address or Memory Address High.

If Parameter 1 is not entered, this parameter contains the 32-bit address of the first memory byte to be edited. If Parameter 1 is entered, this parameter contains the upper 16-bits of the address of the first memory byte to be edited.

Type: Unsigned 32-bit value, if parameter 1 is not entered
Unsigned 16-bit value, if parameter 1 is entered

Range: 0 to 0xffff, if parameter 1 is not entered
0 to 0xffffffff, if parameter 1 is entered

The specified address must be properly aligned for the number of bytes to be edited. Parameter 3 specifies the number of bytes to be edited. If Parameter 3 is equal to 4, the specified address must be a multiple of 4. If Parameter 3 is equal to 2, the specified address must be a multiple of 2.

Default: 0

1 - Memory Address Low.

If entered, this parameter contains the lower 16-bits of the address of the first memory byte to be edited.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

The specified address must be properly aligned for the number of bytes to be edited. Parameter 3 specifies the number of bytes to be edited. If Parameter 3 is equal to 4, the specified address must be a multiple of 4. If Parameter 3 is equal to 2, the specified address must be a multiple of 2.

Default: None. If this parameter is not entered, Parameter 0 is assumed to specify the entire 32-bit address of the first memory byte to be edited.

2 - Memory Data.

If entered, this parameter contains the value with which the specified memory address is to be written.

Type: Unsigned 32-bit value, if parameter 3 is equal to 4
Unsigned 16-bit value, if parameter 3 is equal to 2
Unsigned 8-bit value, if parameter 3 is not entered or is equal to 1

Range: 0 to 0xffffffff, if parameter 3 is equal to 4
0 to 0xffff, if parameter 3 is equal to 2
0 to 0xff, if parameter 3 was not entered or is equal to 1

Default: None. If this parameter is not entered, the specified memory address will be read, the value will be displayed and the user will be prompted to enter a new value. While waiting for a new value to be entered, this command will monitor the value of the specified memory location and display the value if it changes.

3 - Number of Bytes.

This parameter specifies the number of memory bytes to be displayed or modified. The memory address specified by Parameters 0 and 1 must be a multiple of this value. For example, if this parameter is equal to 4, the specified address must be a multiple of 4 and if this parameter is equal to 2, the specified address must be a multiple of 2.

Type: Unsigned 8-bit value

Range: 1, 2 and 4 are the allowed values

Default: 1 byte for the Level 1 'U' and 'S'
2 bytes for the Level 1 'm'

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the memory data will be displayed as follows.

```
"Adr cccccccc ( dddddddd ) = ee --> "          or
"Adr cccccccc ( dddddddd ) = ffff --> "        or
"Adr cccccccc ( dddddddd ) = gggggggg --> "
```

where

cccccccc is the byte offset from the start of the memory

dddddddd is the processor address

ee is an 8-bit value written to or read from memory

ffff is a 16-bit value written to or read from memory

gggggggg is a 32-bit value written to or read from memory

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Edit Processor Memory Byte (Level 1 'S')

Description:

The Edit Processor Memory Byte command displays the contents of the specified processor memory location and prompts the user (-->) to enter a new value to be written to the location. While waiting for the new value to be entered, this command will monitor the memory location and display its value if it changes.

Entering a Line Feed (Control J) character following the prompt will increment the processor memory address and display the value of the next location.

The command is terminated when a carriage return is entered following the prompt.

This command default to editing memory one byte (8-bits) at a time.

Quick Help:

"EditProcessorMemoryByte, S[AddrHi],[AddrLo],[MemValue],[NumBytes],[Opts]";

Input Parameters:

0 - Memory Address or Memory Address High.

If Parameter 1 is not entered, this parameter contains the 32-bit address of the first memory byte to be edited. If Parameter 1 is entered, this parameter contains the upper 16-bits of the address of the first memory byte to be edited.

Type: Unsigned 32-bit value, if parameter 1 is not entered
Unsigned 16-bit value, if parameter 1 is entered

Range: 0 to 0xffff, if parameter 1 is not entered
0 to 0xffffffff, if parameter 1 is entered

The specified address must be properly aligned for the number of bytes to be edited. Parameter 3 specifies the number of bytes to be edited. If Parameter 3 is equal to 4, the specified address must be a multiple of 4. If Parameter 3 is equal to 2, the specified address must be a multiple of 2.

Default: 0

1 - Memory Address Low.

If entered, this parameter contains the lower 16-bits of the address of the first memory byte to be edited.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

The specified address must be properly aligned for the number of bytes to be edited. Parameter 3 specifies the number of bytes to be edited. If Parameter 3 is equal to 4, the specified address must be a multiple of 4. If Parameter 3 is equal to 2, the specified address must be a multiple of 2.

Default: None. If this parameter is not entered, Parameter 0 is assumed to specify the entire 32-bit address of the first memory byte to be edited.

2 - Memory Data.

If entered, this parameter contains the value with which the specified memory address is to be written.

Type: Unsigned 32-bit value, if parameter 3 is equal to 4
Unsigned 16-bit value, if parameter 3 is equal to 2
Unsigned 8-bit value, if parameter 3 is not entered or is equal to 1

Range: 0 to 0xffffffff, if parameter 3 is equal to 4
0 to 0xffff, if parameter 3 is equal to 2
0 to 0xff, if parameter 3 was not entered or is equal to 1

Default: None. If this parameter is not entered, the specified memory address will be read, the value will be displayed and the user will be prompted to enter a new value. While waiting for a new value to be entered, this command will monitor the value of the specified memory location and display the value if it changes.

3 - Number of Bytes.

This parameter specifies the number of memory bytes to be displayed or modified. The memory address specified by Parameters 0 and 1 must be a multiple of this value. For example, if this parameter is equal to 4, the specified address must be a multiple of 4 and if this parameter is equal to 2, the specified address must be a multiple of 2.

Type: Unsigned 8-bit value

Range: 1, 2 and 4 are the allowed values

Default: 1 byte for the Level 1 'U' and 'S'
2 bytes for the Level 1 'm'

4 - Options.

Parameter 4 bit 0 controls the validation of the processor memory address.

Bit 15-1: not used

Bit 0: Disable Memory Address Validation

If this bit is cleared, the specified memory address will be validated before attempting to read or write the location. If this bit is set, the specified memory address will be used without first validating it against the memory map.

******************************** NOTE **********************************
Attempting to read or write an invalid memory address may hang the drive.
****

Type: Unsigned 16-bit value

Range: 0 to 0x0001

Default: 0 (Enable Memory Address Validation)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the memory data will be displayed as follows.

```
"Adr cccccccc ( dddddddd ) = ee --> "          or
"Adr cccccccc ( dddddddd ) = ffff --> "        or
"Adr cccccccc ( dddddddd ) = gggggggg --> "
```

where

cccccccc is the byte offset from the start of the memory

dddddddd is the processor address

ee is an 8-bit value written to or read from memory

ffff is a 16-bit value written to or read from memory

gggggggg is a 32-bit value written to or read from memory

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Edit Processor Memory Word (Level 1 'm')

Description:

The Edit Processor Memory Word command displays the contents of the specified processor memory location and prompts the user (-->) to enter a new value to be written to the location. While waiting for the new value to be entered, this command will monitor the memory location and display its value if it changes.

Entering a Line Feed (Control J) character following the prompt will increment the processor memory address and display the value of the next location.

The command is terminated when a carriage return is entered following the prompt.

This command default to editing memory two bytes (16-bits) at a time.

Quick Help:

"EditProcessorMemoryWord, m[AddrHi],[AddrLo],[MemValue],[NumBytes],[Opts]";

Input Parameters:

0 - Memory Address or Memory Address High.

If Parameter 1 is not entered, this parameter contains the 32-bit address of the first memory byte to be edited. If Parameter 1 is entered, this parameter contains the upper 16-bits of the address of the first memory byte to be edited.

Type: Unsigned 32-bit value, if parameter 1 is not entered
Unsigned 16-bit value, if parameter 1 is entered

Range: 0 to 0xffff, if parameter 1 is not entered
0 to 0xffffffff, if parameter 1 is entered

The specified address must be properly aligned for the number of bytes to be edited. Parameter 3 specifies the number of bytes to be edited. If Parameter 3 is equal to 4, the specified address must be a multiple of 4. If Parameter 3 is equal to 2, the specified address must be a multiple of 2.

Default: 0

1 - Memory Address Low.

If entered, this parameter contains the lower 16-bits of the address of the first memory byte to be edited.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

The specified address must be properly aligned for the number of bytes to be edited. Parameter 3 specifies the number of bytes to be edited. If Parameter 3 is equal to 4, the specified address must be a multiple of 4. If Parameter 3 is equal to 2, the specified address must be a multiple of 2.

Default: None. If this parameter is not entered, Parameter 0 is assumed to specify the entire 32-bit address of the first memory byte to be edited.

2 - Memory Data.

If entered, this parameter contains the value with which the specified memory address is to be written.

Type: Unsigned 32-bit value, if parameter 3 is equal to 4
Unsigned 16-bit value, if parameter 3 is equal to 2
Unsigned 8-bit value, if parameter 3 is not entered or is equal to 1

Range: 0 to 0xffffffff, if parameter 3 is equal to 4
0 to 0xffff, if parameter 3 is equal to 2
0 to 0xff, if parameter 3 was not entered or is equal to 1

Default: None. If this parameter is not entered, the specified memory address will be read, the value will be displayed and the user will be prompted to enter a new value. While waiting for a new value to be entered, this command will monitor the value of the specified memory location and display the value if it changes.

3 - Number of Bytes.

This parameter specifies the number of memory bytes to be displayed or modified. The memory address specified by Parameters 0 and 1 must be a multiple of this value. For example, if this parameter is equal to 4, the specified address must be a multiple of 4 and if this parameter is equal to 2, the specified address must be a multiple of 2.

Type: Unsigned 8-bit value

Range: 1, 2 and 4 are the allowed values

Default: 1 byte for the Level 1 'U' and 'S'
2 bytes for the Level 1 'm'

4 - Options.

Parameter 4 bit 0 controls the validation of the processor memory address.

Bit 15-1: not used

Bit 0: Disable Memory Address Validation

If this bit is cleared, the specified memory address will be validated before attempting to read or write the location. If this bit is set, the specified memory address will be used without first validating it against the memory map.

******************************* NOTE **********************************
Attempting to read or write an invalid memory address may hang the drive.
****

Type: Unsigned 16-bit value

Range: 0 to 0x0001

Default: 0 (Enable Memory Address Validation)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the memory data will be displayed as follows.

```
"Adr cccccccc ( dddddddd ) = ee --> "          or
"Adr cccccccc ( dddddddd ) = ffff --> "        or
"Adr cccccccc ( dddddddd ) = gggggggg --> "
```

where

cccccccc is the byte offset from the start of the memory

dddddddd is the processor address

ee is an 8-bit value written to or read from memory

ffff is a 16-bit value written to or read from memory

gggggggg is a 32-bit value written to or read from memory

Revision History:

0001.0000   Initial revision.
0011.0000   Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Enable and Init RW Statistics (Online Control W)

Description:
This command turns on and read / write statistics gathering and zeros the error counters.

Related Commands:

```
any level ` - display error counters
level L i   - L>iFFFD will zero out the error counters.
level L E   - L>E,,0 will disable statistics gathering
            - L>E,,1 will enable statistics gathering
            - L>E,,2 will zero out the error counters.
```

Quick Help:

"RwStatsEnableAndInit";

Input Parameters:

none

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

The following will be displayed

"Rd/Wr stats On"

or

"Rd/Wr stats Off"

(always "Rd/Wr Stats On" for Ctl-W)

Revision History:

0001.0000 Initial revision.

0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Enable/Disable Channel/Preamp Register Display (Level 2 'u')

Description:

This command enables or disables the display of channel registers during retries.

Quick Help:

"EnableDisableChannelPreampRegDisplay, u[EnableDisableOpt]";

Input Parameters:

0 - Enable/Disable Channel/Preamp Register Display.

This parameter will enable or disable the display of channel registers during retries. If this parameter is set to 1, then channel registers will be displayed during retries. If this parameter is not entered or set to 0, then channel will not be displayed during retries.

Type: Unsigned 8-bit value

Range: 0 to 1

Default: 0 (Disable channel/preamp tracing)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following information will be displayed.

"Channel tracing enabled"

"Preamp tracing enabled"

or

"Channel Tracing disabled"

"Preamp Tracing disabled"

to indicate whether Channel/Preamp tracing has been enabled or disabled. NOTE: If the read/write does NOT support Channel or Preamp Tracing, then the message will ALWAYS indicate that the feature is "disabled".

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Enable / Disable Logging (Level L 'E')

Description:

This command enables / disables Error Logging, ASCII Logging and / or Read/Write Statistics Logging. It also allows a user-created log to be selected.

The following are the default or special log files supported by the diagnostics:
0x0000: ACTIVE_ERROR_LOG_ID - Indicates the currently active error log.
0x0001: ACTIVE_ASCII_LOG_ID - Indicates the currently active ASCII log.
0x0002: ACTIVE_RW_STATISTICS_LOG_ID - Indicates the currently active R/W statistics log.
0xFFFC: DEFAULT_ERROR_LOG_ID - Indicates the default error log.
0xFFFD: DEFAULT_RW_STATISTICS_LOG_ID - Indicates the default R/W statistics log.
0xFFFE: TEMPORARY_LOG_ID - This log is used internally for copy operations.
0xFFFF: INVALID_LOG_ID - Indicates an invalid log.

Quick Help:

"EnableDisableLogging, E[ErrLoggingOpt],[AsciiLoggingOpt],[RwStatsLoggingOpt]";

Input Parameters:

0 - Enable or Disable Error Logging.

This parameter enables Error Logging and selects the Active Error Log or disables Error Logging. If this parameter is not entered, the current Error Logging mode will not be changed. If this parameter is set to 1, then Error Logging will be enabled and the Default Error Log will be selected as the Active Error Log. If this parameter is set to 2 or greater, then Error Logging will be enabled and this parameter will specify the ID of the log to be selected as the Active Error Log.

0 = Disable Error Logging
1 = Enable Error Logging and select Default Error Log
2 to 0xFFFF = Enable Error Logging and select specified log

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

1 - Enable or Disable ASCII Logging.

This parameter enables or disables ASCII Logging. If this parameter is not entered, the current ASCII Logging mode will not be changed.

0 = Disable ASCII Logging
1 = Enable ASCII Logging

Type: Unsigned 8-bit value

Range: 0 or 1

Default: None

2 - Enable or Disable Read / Write Statistics Logging.

This parameter enables or disables Read / Write Statistics Logging. If this parameter is not entered, the current Read / Write Statistics Logging mode will not be changed.

0 = Disable Read / Write Statistics Logging
1 = Enable Read / Write Statistics Logging
2 = Zero Read / Write Statistics Log

Type: Unsigned 8-bit value

Range: 0 to 2

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).
0011.0001	Added support for selecting a user-created error log.

Enable / Disable PES Output (Level 4 'e')

Description:

This command is used to enable / disable PES Output. When PES Output is enabled, real time PES signal will be outputted to AMUX test pin. A Left Shift Number is used to control the signal's resolution. First, the 16-bit PES value (Bit 15: sign bit, Bits 14 - 12: number of full tracks, Bits 11 - 0: fraction of one track. So 1000h means a full track and 800h is half of a track) is left shifted by the number specified in this command, and then the high byte of the shifted result is sent out to AMUX.

Quick Help:

"EnableDisablePesOutput, e[PesLeftShiftCnt],[DisablePesOut]";

Input Parameters:

0 - PES Output Left Shift Count.

This parameter specifies the number of bits the PES value is to be shifted left before it is outputted.

This parameter is only valid if Parameter 1 is not entered. If Parameter 1 is not entered and this parameter is not entered, then the current PES output state will be displayed.

Type: Unsigned 16-bit value

Range: 0 to 0x000E

Default: None.

1 - Disable PES Output.

If this parameter is entered, PES output will be disabled. If this parameter is not entered and Parameter 0 is entered, PES output will be enabled. If this parameter is not entered and Parameter 0 is not entered, the current PES output state will be displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None.

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

When PES Output is enabled, the result is displayed as:

```
DiagDac On with Resolution = 2^ xx
   where xx is the PES Left Shift Number (in Hex format)
```

When PES Output is disabled, the result is displayed as:

```
PES output Disabled
```

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Enable / Disable RVFF (Level 4 'B')

Description:
This command is used to enable / disable RVFF control in servo.

Quick Help:

"EnableDisableRvff, B[NewRvffControlMode]";

Input Parameters:

0 - New RVFF control mode to be used in servo.

This parameter specifies the new RVFF control mode to be used in servo.
Here is meaning of each bit of the RVFF control mode:

```
Bit 0 = 0 then disable rv current injection
      = 1 then enable rv current injection
Bit 1 = 0 then bypass velocity control portion of rv_ff code
      = 1 then execute velocity control portion of rv_ff code
Bit 2 = 0 then bypass track following control portion of rv_ff code
      = 1 then execute track following control portion of rv_ff code
Bit 3 = 0 then disable the averaging funtion in the track following portion
      = 1 then enable the averaging funtion in the track following portion
Bit 4 = 0 then disable filtx gain parameter adaptation
      = 1 then enable filtx gain parameter adaptation
Bit 5 = 0 then disable rv data acquisition during twiddle
      = 1 then enable rv data acquisition during twiddle
Bit 6 reserved
Bit 7 = 0 then disable rv current injection in velocity/settle mode
      = 1 then enable rv current injection in velocity/settle mode
Bit 8 = 0 then Normal Code (RVFF IIR is tuned up for NearLine RV Spec)
      = 1 then Enable 2nd RVFF IIR Tuneup for DeskTop RV Spec
Bit 9 = 0 Normal code
      = 1 McKinley DT Shock Detect method with external shock sensor is enabled
Bits 10 - 15 reserved
```

When this parameter is not entered, this command will simply display the current RVFF control mode without changing it.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None.

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

RVFF control mode: xxxx:
where xxxx is the RVFF control mode in servo (in Hex format)

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Enable / Disable Servo Updates (Level 5 'U')

Description:
This command enables or disables servo VCM DAC and / or A to D updates.

Quick Help:

"EnableDisableServoUpdates, U[VcmDacUpdateOpt],[AToDUdateOpt]";

Input Parameters:

0 - Disable / Enable VCM DAC Updates.

If this parameter is equal to 0, servo updates of the VCM DAC will be disabled, else servo updates of the VCM DAC will be enabled.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: 1

1 - Disable / Enable A to D Updates.

If this parameter is equal to 0, servo A to D updates will be disabled, else servo A to D updates will be enabled.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: 1

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If Servo VCM DAC updates are enabled, the following information will be displayed.

"Servo VCM DAC Updates enabled"

If Servo VCM DAC updates are enabled, the following information will be displayed.

"Servo VCM DAC Updates disabled"

If Servo A to D updates are enabled, the following information will be displayed.

"Servo A to D Updates enabled"

If Servo A to D updates are enabled, the following information will be displayed.

"Servo A to D Updates disabled"

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Enable / Disable Write Fault (Level 7 'u')

Description:
This command enables or disables Write Fault errors.

Quick Help:

"EnableDisableWrFault, u[Op]";

Input Parameters:

0 - Operation.

If Parameter 0 is not set, toggle the current state (not currently supported)
If Parameter 0 is set to 0, turn write faults off
If Parameter 0 is set to non-0, turn write faults on

Type: Unsigned 32-bit value

Range: 0 to 1

Default: none (toggle)

Output Data:

If no error occurred and write faults were disabled, the following message will be displayed.

"Write Faults Disabled"

If no error occurred and write faults were enabled, the following message will be displayed.

"Write Faults Enabled"

If the user tried to use the deprecated toggle mode, an error will be set and the following message will also be displayed.

"Write Fault Toggle Unsupported"

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Enable Looping (All Levels 'L')

Description:

This command enables looping, with the specified loop count and options, on the next diagnostic command received.

Quick Help:

"EnableLooping, L[Opts],[CountOrStopOnErrCode]";

Input Parameters:

0 - Looping Options.

This parameter is a bit-significant value that specifies the following options:

Bit 15-7: reserved

Bit 6: Enable Stop on Test Space Wrapped

If this bit is equal to 1, then looping will stop when the Test Space wraps. This means that when the current head and track have incremented past the end of the Test Space and have been wrapped back to the beginning of the Test Space, then looping will stop.

Bit 5: Enable Stop on Specified Error

If this bit is equal to 1, looping will be halted if the command completes with the error code specified by Parameter 1.

Bit 4: Disable Error Display

If this bit is equal to 1, errors that occur while looping will not be displayed.

Bit 3: reserved

Bit 2: Enable Spin Down on Error

If this bit is equal to 1, the drive will be spun down if the command completes with an error.

Bit 1: Enable Stop on No Error

If this bit is equal to 1, looping will be halted if the command completes with no error.

Bit 0: Enable Continue on Error

If this bit is equal to 1, looping will continue if the command completes with an error.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: All options disabled

1 - Stop On Error Code / Loop Count.

If Parameter 0 bit 5 is equal to 1, this parameter will specify the Error Code on which looping should be halted. If Parameter 0 bit 5 is equal to 0, this parameter will specify the number of times the command will be looped. Setting the Loop Count to 0 will cause the command to loop until one of the stop conditions specified by Parameter 1 occurs or until looping is aborted by the user entering a Carriage Return.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 0

Output Data:
None

Revision History:

0001.0000 Initial revision.
0001.0001 Increased the size of Parameter 1 (Error Code or Loop Count) to 32-bits.
0001.0002 Add option to enable stopping when the Test Space wraps.

Enable ESLIP Serial Port Mode (Online Control T)

Description:
This command enables ESLIP serial port mode. In this mode, ASCII online and diagnostic mode commands are disabled and packet serial port mode is selected.

Quick Help:

"EnableEslipSerialPortMode";

Input Parameters:
None

Output Data:
None

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Enable ASCII Diagnostic Serial Port Mode (Online Control Z)

Description:
This command enables ASCII Diagnostic Serial Port mode. In this mode, non-packet serial port mode is selected and online and ASCII seriap port diagnostic mode commands are enabled.

Quick Help:

"EnableAsciiDiagSerialPortMode";

Input Parameters:
None

Output Data:
None

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Enable ASCII Online Serial Port Mode (Online Control R)

Description:
This command enables ASCII Online Serial Port Mode. In this mode, non-packet serial port mode is selected, ASCII online serial port commands are enabled and diagnostic mode commands are disabled.

Quick Help:

"EnableAsciiOnlineSerialPortMode";

Input Parameters:
None

Output Data:
None

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Enter Batch File (Level 6 'E')

Description:

This command inputs the specified Diagnostic Command Batch File. A Batch File is sequence of Diagnostic Commands entered by the user via the serial port interface. The user terminates the Batch File by entering the '|' character.

A Batch File may contain both Diagnostic Mode and Online commands.

Quick Help:

"EnterBatchFile, E[BatchFileNum]";

Input Parameters:

0 - Batch File Number.

This parameter specifies the number of the Batch File to be entered.

Type: Unsigned 8-bit value

Range: 0 to 2

Default: 0

Output Data:

None

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Enter Servo Matlab Shell (Level 5 'S')

Description:

This command enters servo matlab shell and never returns. It also spins down the drive first before entering the servo matlab shell.

Quick Help:

"EnterServoMatlabShell, S";

Input Parameters:

None

Output Data:

None

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Erase Seacos Data And Code (Level T 'Z')

Description:

This command performs various functions associated with Seacos. This function will overwrite the Seacos overlay, Seacos security sector, ConGen, disk code and serial flash.

Input Parameters:

0 - Minimal erase level

"0" to erase serial flash and reboot to mask ROM code   Not supported yet
"1" to erase Appcode   Not supported yet
"2" to erase Cert   Not supported yet
"3" to erase Cert Table   Not supported yet
"4" to erase AT Overlays
"5" to erase Congen   Not supported yet
"6" to erase Security
"7" to erase Seasos

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

1 - Erase mode

This parameter specifies the following options:

"1" means to erase the level the first param specify.

"0" means to erase from 7th level to the minimal level the first param specify.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

2 - Valid Command Key.

this parameter must be equal to 22 Hex. If this parameter is not equal to 22 Hex, the command will not be executed.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, one of the following messages will be output to indicate the status of the Seacos operation performed.

"Resetting"
"Erased Seacos"
"Erased Security"
"ConGen, not supported"
"Cert, not supported"
"Cert Table, not supported"
"Erased AT Overlays"
"AppCode, not supported"
"SFlash, not supported"
"Invalid level"
"Request dummy file failed"
"Open SIM file failed"
"Write SIM file failed"
"Erase Overlay failed"

Revision History:

0001.0000   Initial revision.

Erase Track (Level 7 'b')

Description:

This command erases the target track and the specified number of tracks on each side of the target track.

Quick Help:

"EraseTrk, b[AdjacentTrkCnt],[EraseCntPerTrk],[AcEraseOpt]";

Input Parameters:

0 - Adjacent Tracks to Erase.

This parameter specifies the number of adjacent tacks on each side of the target track to be erased.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0

1 - Erase Count per Track.

This parameter specifies the number of times each track should be erased.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 1

2 - AC Erase Option.

If any value is entered for this parameter, an AC erase will be performed, else a DC erase is performed.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Fast MSESER Measurement (Level E 'm')

Description:

This command collects hardware data while reading sector data from the disk. Statistic analysis will be conducted for collected hardware data and results will be displayed.

Quick Help:

"FastMseserMeasurement, m[]";

Input Parameters:

0 - Start Sector.

This parameter specifies the sector on which to start the read.

When 0xFFFF, it means zero latency read.

Type: Unsigned 16-bit value

Range: 0 to max sector number on track

Default: 0

1 - Number of Sectors to Read.

This parameter specifies the number of sectors to read.
When 0, it means the whole track.

Type: Unsigned 16-bit value

Range: 0 to total number of sectors per track

Default: 0

2 - Data Collection Options.

This parameter is a bit-significant value that allows the user to control the data to be collected.

Bit 15-3: Reserved

Bit 1: If this bit is set, will collect MSE, VGAR, and a controller register. Higher priority than bit 0

Bit 0: If this bit is set, will collect MSE, VGAR, and a channel register.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (MSE, VGAR, and rotate through all FIR Taps and NLFR registers)

3 - Register Address

This parameter specifies the address of the register to read, when bit 1 or 0 of Parameter 2 is set. If bit 1 is set, the entire 32-bit value is used to address a controller register. If bit 0 is set, the lower 16-bit is used to address a Read Channel register.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

4 - Register Bit Mask

This parameter specifies the bit mask that will be bit-AND'ed with data read from the register specified by parameter 3.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0xFFFF (all bits valid)

5 - Sectors to Ingore.

This parameter specifies the number of beginning sectors to ignore during statistic calculation.

Type: Unsigned 16-bit value

Range: 0 to Number of Sectors to Read

Default: 0

6 - Percentage to trim.

This parameter specifies the percent trimming to apply to the data at both low and high ends.

Type: Unsigned 8-bit value

Range: 0 to 32h

Default: 0

7 - Display Options.

This parameter is a bit-significant value that allows the user to control the level of output detail.

Bit 15-2: Reserved

Bit 1: If this bit is set, will display the statistical results of the measured values in Decimal format.

Bit 0: If this bit is set, will display the raw data of the measured values in Hex format

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0xFFFF (display everything)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Next User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

or

"Next System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem eeeeeeee is the Disk Logical Block Address of the sector in error

ffffff is the Logical Cylinder Address of the sector in error

g is the Logical Head Address of the sector in error

hhhh is the Logical Sector Address of the sector in error

iiiiii is the Physical Cylinder Address of the sector in error

j is the Logical Head Address of the sector in error

kkkk is the Physical Sector Address of the sector in error

llllllll is the number of sectors remaining to be read or written

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: Enable the Next Address to be displayed
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed
Bit 4: Enables the Recovery Status to be displayed
Bit 5: Enables the Fault Status to be displayed
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 1 is set, the Next Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed as follows.

"Target User LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

or

"Target System LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

where

pppppppp is the starting Disk Logical Block Address

qqqqqq is the starting Logical Cylinder Address r is the starting Logical Head Address

ssss is the starting Logical Sector Address

tttttt is the starting Physical Cylinder Address

u is the starting Logical Head Address

vvvv is the starting Physical Sector Address

wwwwwwww is the starting Transfer Length

If Bit 4 is set, the Recovery Status will be displayed as follows.

"Recovered User LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

or

"Recovered System LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

where

AAAAAAAA is the Disk Logical Block Address of the last recovered sector

BBBBBB is the Logical Cylinder Address of the last recovered sector

C is the Logical Head Address of the last recovered sector

DDDD is the Logical Sector Address of the last recovered sector

EEEEEE is the Physical Cylinder Address of the last recovered sector

F is the Logical Head Address of the last recovered sector

GGGG is the Physical Sector Address of the last recovered sector

HHHH are the Recovery Flags reported by the Read/Write code

II is the Recovery Count reported by the Read/Write code

If Bit 5 is set, the Fault Status will be displayed as follows.

"Drive Fault Status JJJJ Preamp Fault Status KKKK"

where

JJJJ is the Drive Fault Status reported by the Read/Write code

KKKK is the Preamp Fault Status reported by the Read/Write code

If Bit 6 is set, the Elapsed Time for the read/write operation will be displayed.

"Elapsed Time a mins b secs" or
"Elapsed Time b.c secs" or
"Elapsed Time c.d msecs"

where

a is minutes
b is seconds

c is milliseconds
d is microseconds

Examples:

There are prerequisites for issuing this diag command.
First, user should issue a diag command to set the next target location to where the Fast MSE measurement should occur. A simple seek command would do the job.
Second, user should issue a Set Track Format (Level 7 'K') command to set the track format to single-sector-per-wedge format.
Typical example of usage is like following.

```
F3 T>A0          (Select User Area and not to update cylinder and head)
F3 T>/7          (Change diagnostic command level to 7)
F3 7>S1000,0     (Seek to the target track)
F3 7>K2          (Set track format to single sector per wedge format)
F3 7>W,,,1       (Write the track with physical sector address flag on)
F3 7>/E          (Change diagnostic command level to E)
F3 E>m           (issue the Fast MSESER Measurement command)
```

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Fill Correction Buffer (Level G 'B')

Description:

This command fills the specified segment of Correction Buffer with the specified data pattern. If the verification of fill is enabled, the command reads the data back and compares with the patten it writes.

Quick Help:

"FillCorrectionBuffer, B[StartAddr],[EndAddr],[Pattern],[Opts]";

Input Parameters:

0 - Start Address Offset of Correction Buffer.

This parameter specifies the start address offset of the correction buffer.

Type: Unsigned 16-bit value

Range: 0 to 0xffff,

Default: 0

1 - End Address Offset of Correction Buffer.

This parameter specifies the end address offset of the correction buffer.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: 0

2 - Data Pattern.

This parameter specifies the fill pattern specified. The specified pattern is assumed to be right justified. If the value of the patten is greater than 0x03FF, the command will take the lower 10 bits of the address as its pattern to write in the Correction Buffer instead of the input pattern.

Type: Unsigned 16-bit value

Range: 0 to 0x03ff

Default: 0

3 - Options.

This parameter is a bit-significant value that selects the following options.

Bits 15-1: not used

Bit 0: Verify the patten written to the correction buffer.

If this bit is cleared, the patten is written into the correction buffer without the verification of reading back and comparing with the written patten.

If this bit is set, the patten is written into the correction buffer followed by the verification of reading back and comparing with the written patten.

Type: Unsigned 8-bit value

Range: 0 to 0xff

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Fill Super Parity RAM (Level G 'F')

Description:

This command fills the specified segment of the Super Parity RAM with the specified data pattern.

Quick Help:

"FillSuperParityRam, F[StartAddr],[EndAddr],[Pattern]";

Input Parameters:

0 - Start Address Offset of Super Parity RAM.

This parameter specifies the start address offset of the super parity RAM.

Type: Unsigned 16-bit value

Range: 0 to 0xffff,

Default: 0

1 - End Address Offset of Super Parity RAM.

This parameter specifies the end address offset of the super parity RAM.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: 0

2 - Data Pattern.

This parameter specifies the fill pattern. The specified pattern is assumed to be right justified. If the value of the input pattern is 0x0FFF, the Write Super Parity RAM diagnostics will set the pattern to 0 to start the write. After each writing to the even address location, the value of the pattern will be incremented for the next even address location. If the pattern reaches the value of 0x0FFF, the pattern will be wrapped back to 0 for the next write.

Type: Unsigned 16-bit value

Range: 0 to 0x0fff

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Fine RW Offset Measurement (Level E 'o')

Description:

This command measures the Fine Reader/Writer Offset at the current track.
The algorithm used here to measure the offset, a.k.a. micro-jog or MR offset, was basically ported from ST-10 code. Please see Pete Harllee for more detail about it.

The algorithm used here can be divided into two big steps.

The first step is to find a legitimate coarse MSE tub.
Since the real offset is unknown, conventional method to find the tub is to sweep certain ranges of the offset with coarse offset increment. The range must be wide enough to cover the worst(biggest) ever heads and the increment must be narrow enough not to miss the tub. Because of this dilemma, finding the coase rw offset can be a very time consuming process.

However, the alogorithm used here uses a different approach to find the coarse tub. Assuming the real offset should be fairly close to the current default, it scans one direction from the current default with a coarse increment of the offset. It then repeats the same process, alternating the direction, until a valid tub is found. If three measurements with finding good sync marks at more than half number of wedges in a track, it's regarded as having found a valid tub. This method is very fast especially if the real offset is close to the current default because the code would find the coarse tub after even a few measurements.

The second step is to find the fine rw offset.
The conventional method for doing this is to scan small range, for example, one track, with a fine, in many cases, the smallest possible, offset increments. This is also a time consuming process because the increment is very small even though the range is fairly small.

The algorithm used here does this job differently from the conventional method.
Once the coarse tub is found, the code tried to balance two sides of the tub since it's assumed that the MSE tub is bowl shaped and it is. If the code finds it's at the left side of the tub, it'll move to right direction and vice versa. When the code changes the scanning direction, it reduces the increment. If the increment becomes to zero or the MSE curve is so well balanced at both ends, the code calculates the fine rw offset that gives the same off-track margin(read capability) at both sides.

Quick Help:

"FineRwOffset, o[NumAvgs],[TrkStepSize],[NumGuardTrks]";

Input Parameters:

0 - Number of averages.

This parameter specifies the number of target tracks to measure fine rw offset then average the measurement results to filter out any possible outliers.

Type: Unsigned 16-bit value

Range: 1 to 0xFFFF

Default: 5

1 - Track step size.

This parameter specifies the number of tracks between the sample tracks where the measurements occur.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 4

2 - Number of guard tracks.

This parameter specifies the number of guard tracks at each side, ID and OD, of the sample tracks. These areas will be erased.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 10

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, following information will be displayed.

"Cyl/Hd cccccc/d OffsetPerTrk: eeeee OffsetDelta: fffff(sh.iiiEsj)"

where

cccccc is the physical cylinder number where the fine RW Offset measurement occurred
d is the logical head number where the fine RW Offset measurement occurred
eeeee is the RW Offset amount value for a data track at the target track
ffffff is the measured RW offset difference(delta) from the current default offset
sh.iiiEsj is the floating point value for the RW offset delta value, in percentage, over the Offset amount value for a data track

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Firmware Reset (Online Control C)

Description:
This command spins down the drive, delays 5 seconds and jumps to the Power On Reset function. A Control Z command will be required to enable the Diagnostic Mode commands following the completion of the reset.

Quick Help:

"FirmwareReset";

Input Parameters:

None

Output Data:

The following string will be output to indicate that the drive is in the process of spinning down.

"Spinning Down"

When the spin down is complete, the following information will be displayed.

"Spin Down Complete"

"Elapsed Time a mins b secs" or
"Elapsed Time b.c secs" or
"Elapsed Time c.d msecs"

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

When delaying following spin down, the following string will be displayed.

"Delaying eeee msec"

where

eeee is the length of the delay in milliseconds

After the delay is complete, the following string will be output to indicate that the reset is being performed.

"Jumping to Power On Reset"

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Format Partition (Level T 'm')

Description:

This command formats the specified partition.

Quick Help:

"FormatPartition, m[Partition],[FormatOpts],[DefectListOpts],[MaxWrRetryCnt],[MaxRdRetryCnt],\`
"[MaxEccTLevel],[MaxCertifyTrkRewrites],[ValidKey],[DataPattern]";

Input Parameters:

0 - Partition Number.

This parameter specifies the media partition to be formatted.

0 = User Partition
1 = System Partition

Type: Unsigned 8-bit value

Range: 0 or 1

Default: 0

1 - Format Options.

This parameter is a bit significant value that selects the following options:

Bits 31-6: not used

Bit 5: Enable SeaCOS XF Space Format.

This bit is only valid when the User Partition is selected. If this bit is equal to 1, the the Format Partition command will only format SeaCOS Extended File (XF) space.
NOTE: This feature can be enabled or disabled at compile-time. Use the quick help to determine whether your code supports this feature.

Bit 4: Enable Zone Re-format Skipping.

If this bit is equal to 1, then the Format Partition command will enable the zone re-format skipping mode during the format operation. With this mode enabled, the format operation will not re-format a zone if grown defects were found in the zone.
NOTE: This feature can be enabled or disabled at compile-time. Use the quick help to determine whether your code supports this feature.

Bit 3: Enable Event-based Format Logging.

If this bit is equal to 1, then the Format Partition command will display information about error events that occur during the format operation. This information will be displayed as interim status as these events occur.
NOTE: This feature can be enabled or disabled at compile-time. Use the quick help to determine whether your code supports this feature.

Bit 2: Disable User Partition Certify.

This bit is only valid when the User Partition is selected. If this bit is equal to 1, media certification and defect deallocation will be disabled.

Bit 1: Disable User Partition Format.

This bit is only valid when the User Partition is selected. If this bit is equal to 1, the User Partition sectors will not be written with a constant data pattern.

Bit 0: Corrupt User Partition Primary Defects.

This bit is only valid when the User Partition is selected. If this bit is equal to 1, the primary defective sectors will be corrupted.

Type: Unsigned 32-bit value

Range: 0 or 0xFFFFFFFF

Default: 0 (Enable User partition Certify,
Enable User Partition Format,
Don't Corrupt Primary Defects)

2 - Defect List Options.

This parameter is a bit significant value that selects the following options:

Bits 31-3: not used

Bit 2: Process the Active Error Log.

This bit is only valid when the User Partition is selected. If this bit is equal to 1, the Format Client Defect List will be written with contents of the Active Error Log and the option to process the Client Defect List will be enabled. If there is no Active Error Log or there are no R/W-related entries in the Active Error Log, then this bit will be ignored.

Bit 1: Process Primary Defect Lists.

This bit is only valid when the User Partition is selected. If this bit is equal to 1, the the Primary Defect Lists will be used when creating the defect list to be used by the format operation.

Bit 0: Process Grown Defect Lists.

This bit is only valid when the User Partition is selected. If this bit is equal to 1, the the Grown Defect Lists will be used when creating the defect list to be used by the format operation.

Type: Unsigned 32-bit value

Range: 0 or 0xFFFFFFFF

Default: 0x00000003 (Process Grown Defect Lists,
Process Primary Defect Lists,
Do not process the Active Error Log)

3 - Maximum Write Retry Count.

If this parameter is entered, the maximum write retry count will be set to the specified value. This parameter is only valid when the User Partition is being formatted (Parameter 0 is equal to 0). If this parameter is not entered, the maximum write retry count will not be changed.

Type: Unsigned 16-bit value

Range: 0 or 0xFFFF

Default: None.

4 - Maximum Read Retry Count.

If this paremeter is entered, the maximum read retry count will be set to the specified value. This parameter is only valid when the User Partition is being formatted (Parameter 0 is equal to 0). If this parameter is not entered, the maximum read retry count will not be changed.

Type: Unsigned 16-bit value

Range: 0 or 0xFFFF

Default: None.

5 - Maximum ECC T-Level.

If this paremeter is entered, the maximum ECC T-Level will be set to the specified value. This parameter is only valid when the User Partition is being formatted (Parameter 0 is equal to 0). If this parameter is not entered, the ECC T-Level will not be changed.

Type: Unsigned 16-bit value

Range: 0 or 0xFFFF

Default: None.

6 - Track Rewrite During Certify Retry Threshold.

If this parameter is entered, it specifies the maximum number of rewrite retries to be performed during the user partition certification pass.

Type: Unsigned 16-bit value

Range: 0 or 0xFFFF

Default: None. If this parameter is not entered, the default value recommended by the R/W Firmware will be used.

7 - Valid Command Key.

For a User Partition format, this parameter must be equal to 22 Hex. If this parameter is not equal to 22 Hex, the command will not be executed.

For a System Partition format, this parameter must be equal to DD Hex. If this parameter is not equal to DD Hex, the command will not be executed.

Type: Unsigned 8-bit value

Range: 0x22 or 0xDD

Default: None

8 - Data Pattern For Format.

This parameter specifies the data pattern to be used when formatting the specified partition. If this parameter is not entered, the specified partition will be formatted with a 0x00000000 data pattern.

Type: Unsigned 32-bit value

Range: 0 or 0xFFFFFFFF

Default: 0x00000000.

Output Data:

If the error occurred while processing the defect lists, the following additional information will be displayed.

"Process Defect List Error"
"R/W Sense cccccccc, R/W Error dddddddd, List Offset eeeeeeee, File Error ffffffff"

where

cccccccc is the sense status that was returned by the R/W subsystem

dddddddd is the error code that was returned by the R/W subsystem

eeeeeeee is the offset of the defect list entry at which the error occurred

ffffffff is the error code that was returned by the system information manager (SIM)

If the error occurred during the format operation, the following additional information will be displayed.

```
"User Partition Format Failed - Elapsed Time c"
"R/W Sense dddddddd, R/W Error eeeeeeee, File Error ffffffff"
"Blk Addr gggggggg, Blk Addr Type hh, Cyl iiiiiiii, Hd jj";
```

where

c is the amount of time that has elapsed since the format operation was started

dddddddd is the sense status that was returned by the R/W subsystem

eeeeeeee is the error code that was returned by the R/W subsystem

ffffffff is the error code that was returned by the system information manager (SIM)

gggggggg is the R/W block address at which the error occurred

hh is the R/W block address type at which the error occurred

iiiiiiii is the R/W cylinder address at which the error occurred

jj is the R/W head address at which the error occurred

If no error occurred and the format operation is still in progress, the following information will be displayed.

```
"Max Wr Retries = cc, Max Rd Retries = dd, Max ECC T-Level = ee, Max Certify Rewrite Re
"User Partition Format  gg% complete, Zone hh, Pass ii, LBA jjjjjjjj, ErrCode kkkkkkkk,
```

where

cc is the maximum write retry count to be used

dd is the maximum read retry count to be used

ee is the maximum ECC T-Level to be used

ffff is the certify rewrite rety threshold

gg is the percent of the format operation that has been completed

hh is the data zone that is currently being formatted

ii is the number of the current pass through the data zone

jjjjjjjj is the last LBA that was formatted

kkkkkkkk is the error code that was reported by the R/W subsystem

l is the amount of time that has elapsed since the format operation was started

If no error occurred, the format operation is still in progress, a format event occurs, and format event reporting is enabled, the following information will be displayed.

```
"Event: Media Write Start, aaa Format, Zone bb, Start Blk cccccccc, Num Sectors dddddd

   or

"Event: Write Xfer, Start Blk cccccccc, Len eeeeeeee, Next Blk ffffffff, Erc gggggggg,

   or

"Event: Media Certify Start, New Format, Zone bb, Start Blk cccccccc, Num Sectors dddd

   or

"Event: Certify Xfer, Start Blk cccccccc, Len eeeeeeee, Next Blk ffffffff, Erc gggggggg

   or

"Event: Unrec Err, LBA iiiiiiii, PBA jjjjjjjj, Erc gggggggg, Trk llll, Hd mm, Sctr nn,
"Event: Unrec Err, LBA iiiiiiii, PBA jjjjjjjj, Erc gggggggg, Trk llll, Hd mm, Sctr nn,
"Event: Unrec Err, LBA iiiiiiii, PBA jjjjjjjj, Erc gggggggg, Trk llll, Hd mm, Sctr nn,
"Event: Unrec Err, LBA iiiiiiii, PBA jjjjjjjj, Erc gggggggg, Trk llll, Hd mm, Sctr nn,

 NOTES: ZnGrp information is only available on drives supporting VBAR
        DOS information is only available on drives supporting Directed Offline Scan

   or

"Event: Cert Trk Rewrite, Retry Blk kkkkkkkk, Len eeeeeeee, Next Blk ffffffff, Erc ggg

   or

"Event: Cert Trk Rewrite Cntr Update, Cnt 0001"
```

where

aaa indicates whether this is a "New Format" or a "Reformat"

bb is the zone

cccccccc is the starting block

dddddddd is the number of blocks to be formatted

eeeeeeee is the length of the transfer

ffffffff is the next starting block

gggggggg is the error code that was reported by the R/W subsystem

hh is the read/write status

iiiiiiii is the logical block address (LBA)

jjjjjjjj is the physical block address (PBA)

kkkkkkkk is the block which causes the rewrite retry

llll is the track on which the error occurred

mm is the head on which the error occurred nn is the sector on which the error occurred

oo is the wedge on which the error occurred

pp is the zone group in which the error occurred

qq is the zone in which the error occurred

rr is the DOS scan unit associated with the error

ss is the DOS relative cylinder in scan unit associated with the error

tt is the DOS surface cylinder unit associated with the error

If no error occurred and the format operation has successfully completed, the following information will be displayed.

" User Partition Format Successful - Elapsed Time m"

where

m is the amount of time that has elapsed since the format operation was started

If at least one zone re-format was skipped then the following will also be displayed upon successful completion of the format:

"Zone re-format was skipped."

Examples:

Example #1:
Perform a "quick format" (process defect lists, clear format corrupt, do not write or certify the drive)

```
F3 T>m0,6,,,,,,22
```

Example #2:
Perform a "quick format" (don't process defect lists i.e. unslip and unalt, do not write or certify the drive)

```
F3 T>m0,6,0,,,,,22
```

Example #3:
Perform a format with the default data pattern 0x00000000 and certify with event reporting enabled:

```
F3 T>m0,8,,,,,,22
```

Example #4:
Perform a format and certify with event reporting enabled, set max write retries to 16, set max read retry count to 8, max ECC T-Level to 0, and track rewrite during certify retry threshold to 20:

```
F3 T>m0,8,,10,8,0,14,22
```

Example #5:
Perform a format with user input data pattern 0xFFFFFFFF and certify with event reporting enabled:

```
F3 T>m0,8,,,,,,22,ffffffff
```

Revision History:

```
0001.0000   Initial revision.
0001.000X   Added ability to enable and display event-based output.
0011.000X   Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External
            Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes
            (DiagError).
0012.000X   Added additional parameter 8 for users to input data pattern for format. The
            default data pattern is 0x00000000 instead of the 0x77777777 for the User
            Partition and 0xFFFFFFFF for the System Partition.
0012.001X   Added option to process the Active Error Log.

Note on Minor Rev:
----.ZZZX   ZZZ represents the minor rev base value.
            X represents set of conditional feature flags.
              - If bit 0 of X is set, then the ability to enable and display
                event-based output is supported.
              - If bit 1 of X is set, then the ability to enable zone re-format
                skipping and output command result information if at least one
                zone re-format was skipped is supported.
              - If bit 2 of X is set, then the ability to format only SeaCOS
                Extended File (XF) space is supported.
              - (Bit 3 of X is reserved for future conditional features.)
```

Generic Read/Write Request (Level 1 'G' and Level 7 'i')

Description:

The Generic Read/Write Request commmand provides a pass through to the Read/Write subsystem. The command parameters are passed to the Read/Write subsystem without being interpreted.

Quick Help:

```
   Level 1
"GenericRwRequest, G[Parm0],[Parm1],[Parm2],...[Parm9]";
   Level 7
"GenericRwRequest, i[Parm0],[Parm1],[Parm2],...[Parm9]";
```

Input Parameters:

0 - Generic Read/Write Request Parameter 0.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 0

1 - Generic Read/Write Request Parameter 1.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 0

2 - Generic Read/Write Request Parameter 2.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 0

3 - Generic Read/Write Request Parameter 3.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 0

4 - Generic Read/Write Request Parameter 4.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 0

5 - Generic Read/Write Request Parameter 5.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 0

6 - Generic Read/Write Request Parameter 6.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 0

7 - Generic Read/Write Request Parameter 7.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 0

8 - Generic Read/Write Request Parameter 8.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 0

9 - Generic Read/Write Request Parameter 9.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Generic Servo Command (Level 5 'C')

Description:

The Generic Servo command executes the servo command user specified and displays all result data returned by Servo, which includes Servo Command Status, Servo Diagnostic Reg, and Servo Data Response. Please note that it is the user's responsibility to enter the correct internal servo command number and the parameters associated with this servo command. This command itself does not verify the command number and parameters. It simply accepts what user entered and then passes them to the servo code.

Quick Help:

"GenericServoCmd, C[CmdNum],[Parm1],...[Parm7]";

Input Parameters:

0 - Internal Servo Command Number.

This parameter specifies the internal servo command to be run.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

1 - 1st parameter following the Internal Servo Command number.

This parameter specifies the the 1st parameter following the Servo Command number.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0

2 - 2nd parameter following the Internal Servo Command number.

This parameter specifies the the 2nd parameter following the Servo Command number.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0

3 - 3rd parameter following the Internal Servo Command number.

This parameter specifies the the 3rd parameter following the Servo Command number.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0

4 - 4th parameter following the Internal Servo Command number.

This parameter specifies the the 4th parameter following the Servo Command number.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0

5 - 5th parameter following the Internal Servo Command number.

This parameter specifies the the 5th parameter following the Servo Command number.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0

6 - 6th parameter following the Internal Servo Command number.

This parameter specifies the the 6th parameter following the Servo Command number.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0

7 - 7th parameter following the Internal Servo Command number.

This parameter specifies the the 7th parameter following the Servo Command number.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the follwing information will be displayed.

"Status aaaa, Diagnostic bbbb, Response cccc1 ccc2 ccc3 ccc4 ccc5 ccc6 ccc7 ccc8 cc

where

aaaa is the status of the command

bbbb is the diagnostic register value of the command

ccc1 - ccc16 is the servo data response values of the command

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Get Thermistor Temperature (Online Control B)

Description:
This command get the thermistor temperature of the drive.

Quick Help:

"GetThermistorTemperature";

Input Parameters:
None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred and the Preamp temperature was returned, the following message will be displayed.

"Preamp temp cccc, CCd"

where

cccc is the temperature value obtained from preamp (hexadecimal)
CC is the temperature value obtained from preamp (decimal)

If no error occurred and the Thermistor temperature was returned, the following message will be displayed.

"Ref voltage dddd Thermistor voltage eeee Thermistor temp in degrees C ffff, FFd"

where

dddd is the A to D Reference Voltage

eeee is the Thermistor Voltage

ffff is the Thermistor Temperature in degrees Celsius (hexadecimal)
FF is the Thermistor Temperature in degrees Celsius (decimal)

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).
0012.0000 Added Temperature in degrees Celsius (decimal) to output.

Goop Plot (Level C 'T')

Description:

This function runs a goop plot. It reads the specified tracks, putting each sector into a category based on the ECC correction required to read it:

- perfect
- not perfect but equal to or less than user specified threshold
- requires more correction than user specified threshold (includes sync errors and unreadable sectors)

Quick Help:

"GoopPlot, T[Hd],[StartTrk],[EndTrk],[ECCLvl],[NoFrcSync],[SkipCnt]";

Input Parameters:

0 - Head.

If FF entered, test all heads
If FE entered, test current head

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: Current head

1 - Starting Track

This input indicates the first logical track to be tested. 0 means first track of drive.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: Current track

2 - Ending Track

This input indicates the last logical track to be tested. 0 means last track of drive.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: Starting Track

3 - Correction level threshold

This input indicates the T-level for the less than T versus greater than T split.

Type: Unsigned 32-bit value

Range: 0 to MaxECC

Default: 2

4 - Disable Force Sync

If any value is input, Force Sync will NOT be used.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: None

5 - Skip Count

This input indicates how many tracks are skipped between those tracks that are scanned.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

```
F3 C>T0,20,40,,,8
  Cyl Hd #Sec   T=0 02

   20 0  1456d 1451d     4d     1d
   29 0  1456d 1452d     4d     0d
   32 0  1456d 1452d     3d     1d
   3B 0  1456d 1448d     8d     0d
```

Note the 'd' indicating decimal values.

```
F3 C>
```

Examples:

```
Example #1:
To scan tracks 80 - 84 with correction threshold 6 on the current head:
  F3 C>T,80,84,6
    Cyl Hd #Sec    T=0 06
     80 0  1456d    0d     1d  1455d
     81 0  1456d 1451d     5d     0d
     82 0  1456d 1454d     2d     0d
     83 0  1456d 1455d     1d     0d
     84 0  1456d 1450d     6d     0d

Example #2:
To scan every 4th track (that is, skipping three tracks) from C0 to D0 on head 0 with
threshold 2 (default):

  F3 C>T0,c0,d0,,,3
    Cyl Hd #Sec    T=0 02
     C0 0  1456d    0d     1d  1455d
     C4 0  1456d 1450d     6d     0d
     C8 0  1456d 1451d     5d     0d
     CC 0  1456d 1454d     2d     0d
     D0 0  1456d 1455d     1d     0d
```

Revision History:

0001.0000	Initial revision.
0001.0001	Update code to properly handle tracks with no sectors.
0002.0000	Make columns even, output cylinder in hex, add ability to skip tracks.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Head Smash Test (Level 8 'd')

Description:

This command is used to perform head smash test towards OD or ID with given acceleration and deceleration currents / duration.

Quick Help:

"HeadSmashTest, d[HeadDirection],[AccelerationDuration],[DecelerationDuration],[AccelerationCu

Input Parameters:

0 - Head Smashing Direction.

This parameter specifies the direction the head is going to be smashed to. Only 0 or 1 are valid input. The default value is 0 when not entered.

0: Smash head towards OD
1: Smash head towards ID

Type: Unsigned 16-bit value

Range: 0 to 1

Default: 0

1 - Acceleration Duration.

This parameter specifies the duration (in 0.1 ms uint) to be used for head acceleration. The default value is 10 (= 10 * 0.1ms = 1ms) when not entered.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0Ah (10 Decimal)

2 - Deceleration Duration.

This parameter specifies the duration (in 0.1 ms uint) to be used for head deceleration. The default value is 10 (= 10 * 0.1ms = 1ms) when not entered.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0Ah (10 Decimal)

3 - Acceleration Current.

This parameter specifies the current (in mA unit) to be used for head acceleration. The default value is 1000 (= 1000mA = 1A) when not entered.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 03E8h (1000 Decimal)

4 - Deceleration Current.

This parameter specifies the current (in mA unit) to be used for head deceleration. The default value is 0 when not entered.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Examples:

Example #1:
Smash head towards OD with acceleration duration 8 ms (= 50h * 0.1ms), deceleration duration 1.6 ms (= 10h * 0.1ms), acceleration current 32 mA (= 20h * 1mA), deceleration current 16 mA (= 10h * 1mA)

F3 8>d,50,10,20,10

Example #2:
Smash head towards OD with acceleration duration 6.4 ms (= 40h * 0.1ms), deceleration duration as default (= 1 ms), acceleration current 48 mA (= 30h * 1mA), deceleration current as default (= 0 mA)

F3 8>d0,40,,30

Example #3:
Smash head towards ID with acceleration duration as default (= 1 ms), deceleration duration 0.8 ms (= 8h * 0.1ms), acceleration current as default (= 1000 mA), deceleration current 32 mA (= 20h * 1mA)

F3 8>d1,,8,,20

Example #4:
Smash head towards ID with acceleration duration as default (= 1 ms), deceleration duration as default (= 1 ms), acceleration current as default (= 1000 mA), deceleration current as default (= 0 mA)

F3 8>d1

Revision History:

0001.0000 Initial revision.

Increment Read/Write Scope Sync (Online '>')

Description:
This command increments the number of the Servo Wedge for which the Scope Sync Pulse will be generated.

Quick Help:

"IncRwScopeSync";

Input Parameters:
None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following information will be displayed.

"   Burst cccc"

where

cccc is the current Scope Sync Wedge number

Revision History:

0001.0000   Initial revision.
0011.0000   Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Initialize Defect List (Level T 'i')

Description:
This command initializes the Defect List to contain no defects.

Quick Help:

"InitDefectList, i[DefectListSelect],[SaveListOpt],[ValidKey]";

Input Parameters:

0 - List Selection.

This parameter is a bit significant value that specifies which defect lists are to be initialized. Setting a bit indicates that the corresponding defect list is to be initialized.

bits 31-3: Reserved for possible use for additional lists
bit 2:   User Alt List
bit 1:   Reserved (ignored)
bit 0:   User Slip List

Type: Unsigned 32-bit value

Range: 1 or 4 or 5

Default: None

1 - Action

0 - defects will be cleared in the current, volatile, copy of the defect list(s) in RAM , but lists won't be written to disk : modification is TEMPORARY .
1 - modified (cleared) versions of defect lists will be written to disk : defects are PERMANENTLY cleared.
2 - the defect list will be read from non-volatile memory, overwriting any changes in volatile memory.

Type: Unsigned 32-bit value

Range: 0 to 2

Default: 0

2 - Valid Command Key.

This parameter must be equal to 22 Hex. If this parameter is not equal to

22 Hex, the command will not be executed.

Type: Unsigned 8-bit value

Range: 0x22

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Examples:

Example #1:
To initialize the slip list to zeros:

T> i1,,22

Example #2:
To initialize the alt list to zeroes and save the zeroed list to disk:

T> i4,1,22

Example #3:
To reread the alt list from disk:

T> i4,2,22

Revision History:

0001.0000	Initial revision.
0001.0001	Add ability to reload alt list.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Initialize Log File (Level L 'i')

Description:
This command initializes the specified log file to be empty.

Quick Help:

"InitLogFile, i[Log]";

Input Parameters:

0 - Log Number.

This parameter specifies the number of the log to be initialized.

The following are the default or special log files supported by the diagnostics:
0x0000: ACTIVE_ERROR_LOG_ID - Indicates the currently active error log.
0x0001: ACTIVE_ASCII_LOG_ID - Indicates the currently active ASCII log.
0x0002: ACTIVE_RW_STATISTICS_LOG_ID - Indicates the currently active R/W statistics log.
0xFFFC: DEFAULT_ERROR_LOG_ID - Indicates the default error log.
0xFFFD: DEFAULT_RW_STATISTICS_LOG_ID - Indicates the default R/W statistics log.
0xFFFE: TEMPORARY_LOG_ID - This log is used internally for copy operations.
0xFFFF: INVALID_LOG_ID - Indicates an invalid log.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Load/Unload Heads (Level 3 'b')

Description:
The command loads or unloads the heads for drives that support this feature.

Quick Help:

"LoadUnloadHeads, b[Cmd],[Velocity],[Dwell],[Lock]";

Input Parameters:

0 - Command Type ID.

This parameter specifies which operation is to be performed.

0x00: LOAD_HEADS_CMD - Indicates that a Load Heads servo command will be issued.
0x01: UNLOAD_HEADS_CMD - Indicates that an Unload Heads servo command will be issued.

Type: Unsigned hexadecimal value

Range: 0 to Maximum valid command type

Default: 0

1 - Load or Unload Velocity.

For a 'Load Heads' command, this parameter specifies the load velocity.
For a 'Unload Heads' command, this parameter specifies the unload velocity.

If a value of 0 is entered then the load/unload velocity will not be modified and the default value in the servo firmware will be used.

If a non-zero value is entered, then the velocity will be modified for the load/unload command. After completion of the command, the original value will then be restored.

The units are ADC counts.

Type: Signed decimal value

Range: -999 to 999

Default: 0

2 - Enable Demod Sync.

This parameter will enable or disable Demod Sync during the Load command.

A value of 1 will enable Sync, a value of 0 will disable Sync.

This parameter is ignored by the Unload command.

Type: Unsigned hexadecimal value

Range: 0 or 1

Default: 0

3 - Enable Dwell.

This parameter will enable or disable Dwell during the Load command.

A value of 1 will enable Dwell, a value of 0 will disable Dwell.

This parameter is ignored by the Unload command.

Type: Unsigned hexadecimal value

Range: 0 or 1

Default: 0

4 - Unload Type.

This parameter specifies the unload type to be done.

0: VCM_BEMF_VELOCITY_CONTROL - Vcm Bemf Control will be used.
1: UNLOAD_IMMEDIATE - Unload Immediate will be used.
2: HARDWARE_RETRACT - Hardware Retract will be used.

This parameter is ignored by the Load command.

Type: Unsigned hexadecimal value

Range: 0 or Maximum number of supported unload types.

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred and Verbose Output Mode is selected, the following information will be displayed.

```
AAAA LOAD/UNLOAD TYPE
Elapsed Time bbb.bbb msecs
    cc Velocity in firmware
     d Velocity Cmd
     e Enable Demod Sync Cmd
     f Enable Dwell Cmd
     g Unload Type Cmd
  hhhh Load/Unload Time
 iiiii Bemf Calibrated Gain
     j Calibrated Vcm Bemf Offset
   kkk Bemf Calibrated Residual Error
     l Bemf Cal Retries
 mmmmm Load/Unload Peak Current
    nn Load/Unload Max Spin Dip Error
   ooo Load/Unload Peak Velocity
     p Load Heads Retries
  qqqq Load/Unload Status Code
```

where:

AAAA is the servo command: 0F00 for a Load operation or 0E00 for a Unload operation.

bbb.bbb is the time in miliseconds for the execution of the servo command.

cc is the Velocity as read from servo, which will be used as the default value.
For a Load operation, the value of the load heads target velocity will be displayed.
For an Unload operation, the value of unload heads target velocity will be displayed.

The next several values are entries 'echoed' from the command line:

d is the requested Velocity as entered via the command line.

e is the Enable Demod Sync value as entered via the command line.

f is the Enable Dwell value as entered via the command line.

g is the Unload Type value as entered via the command line.

The remaining values are data returned by servo after command completion:

hhhh is the Load/Unload Time

iiiii is the Bemf Calibrated Gain

j is the value of the Calibrated Vcm Bemf Offset

kkk is the value of Bemf Calibrated Residual Error

l is the number Bemf Cal Retries used

mmmmm is the value of Load/Unload Peak Current

nn is the value of Load/Unload Max Spin Dip Error

ooo if the value of Load/Unload Peak Velocity

p is the nuber of Load Heads Retries

qqqq is the value of Load/Unload Status Code

Examples:

To load the heads with a velocity of -85:
F3 3>b0,-85

To unload the heads with a velocity of 317
F3 3>b1,317

Revision History:

0001.0000   Initial revision.

Mark Media Flaw (Level 7 'h')

Description:

This command marks tracks around an target area so that the target area may be found after the disk is developed.

Note this command may take 10's of seconds.

Diagram below shows erased areas as 'E'.

```
OD
                       *    E
         pointer length *    E
                       *    E
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE  *
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE   *  erase band width
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE  *
                     *
   undisturbed radius *
                     *
                        target flaw
                     *
   undisturbed radius *
                     *
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE  *
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE   *  erase band width
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE  *
                       *    E
         pointer length *    E
                       *    E
  ID
```

Quick Help:

"MarkMediaFlaw, h[PhyCyl],[Hd],[PhySec],[UndisturbedRadius],[EraseBandTrks],[PtrLen],[WgSpec],

Input Parameters:

0 - Cylinder

This input specifies the physical cylinder to be marked. This cylinder will not be written.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: none

1 - Head.

This input specifies the head number of the track to be marked.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: none

2 - Sector or SFI or Wedge

This input specifies which wedge is marked.

If parameter 6 is 0 (default), this value is a physical sector number in the wedge to be marked.
If parameter 6 is 1, this value is servo wedge number of the wedge to be marked.
If parameter 6 is 2, this value is symbols from index in the wedge to be marked.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: none

3 - Undisturbed Radius

This input specifies how many tracks on each side of the defect are left undisturbed before the erase tracks begin.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0xF

4 - Erase Band Width

This input specifies how many tracks wide the full track erase mark will be. This value must be at least three because the erase operation affects a minimum of three tracks.

Type: Unsigned 32-bit value

Range: 3 to 0xFFFFFFFF

Default: 0x1E

5 - Pointer Length

This input specifies how many tracks wide the single wedge erase pointer will be. This pointer appears both inside the inner erase bands and outside the outer erase bands.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0x3C

6 - Wedge Specifier Type

This input specifies the units of parameter 2 (sector or SFI or wedge) will be.

If this value is 0 (default), parameter 2 is physical sector number.
If this value is 1, parameter 2 is servo wedge number.
If this value is 2, parameter 2 is symbols from index.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0 (physical sector)

7 - OD / ID Specifier

This input indicates whether to mark the OD, the ID, or both.

If this value is 1, mark only the OD.
If this value is 2, mark only the ID.
If this value is neither 1 nor 2, mark both the OD and the ID.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0 (mark both OD and ID)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Examples:

Example #1:
To mark the wedge holding sector 17h of physical track 90, head 0:

```
F3 7>h90,0,17
```

or

```
F3 7>h90,0,17,,,,0
```

Example #2:
To mark the wedge containing 7300h symbols from index of physical track 90, head 0:

```
F3 7>h90,0,7300,,,,1
```

Example #3:
To mark wedge 8 of physical track 90, head 0:

```
F3 7>h90,0,8,,,,2
```

Example #4:
To mark wedge 5 of physical track 90, head 0, leaving 0xC tracks undisturbed on either side of the defect, erasing 0x20 tracks on each side, and making pointers 0x55 tracks long:

```
F3 7>h90,0,5,C,20,55,2
```

Example #5:
To mark the wedge holding sector 5 of physical track 20h, head 1, using only tracks toward the ID from the defect:

```
F3 7>h20,1,5,,,,,2
```

Revision History:

0001.0000	Initial revision.
0001.0001	Add support for inputting wedge or SFI as well as physical sector.
0001.0002	Fix bug that prevented operation at extreme OD. Add ability to mark only one side of a defect.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).
0011.0001	Improve accuracy of tracks erased

Measure Disc Eccentricity (Level 5 'E')

Description:
This command performs the Measure Disc Eccentricity operation.

Quick Help:

"MeasureDiscEccentricity";

Input Parameters:
None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, then the following will be displayed for each supported head:

Disc Eccentricity In Microinches

Head	Magnitude	Real	Imag
a	b.bbbbb	c.cccccc	d.dddddd

where

a is the head used for the measurement

b.bbbbb is the magnitude in microinches complex eccentricity for the designated head

c.ccccc is the real component in microinches of the complex eccentricity for the designated head

d.ddddd is the imaginary component in microinches of the complex eccentricity for the designated head

Examples:

Example #1:
To measure disc eccentricity on all heads:

F3 5>E

Revision History:

0001.0000 Initial revision.

Measure Latch Force (Level 3 'c')

Description:

For drives that support this feature, this diagnostic will measure the force required to push the actuator off of the latch. The diagnostic will perform the measurement the user-specified number of times and return the minimum, average, and maximum values. The output data is unscaled (in dac counts).

Quick Help:

"Measure Latch Force, c[NumberOfSamples]";

Input Parameters:

0 - Number of Samples.

This parameter specifies the number of times that the Latch Force Measurement should be done.

Type: Positive decimal value

Range: 1 .. 999

Default: 10

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred the following information will be displayed.

```
Latch Force:
Min      Avg     Max
aaaaa    bbbbb   ccccc
```

Where:
aaaaa is the Minimum Latch Force Value
bbbbb is the Average Latch Force Value
ccccc is the Maximum Latch Force Value

Examples:

Example #1:
To measure the latch force 10 times (this is the default):

F3 3>c

Example #2:
To measure the latch force 64 times:

F3 3>c64

Revision History:

0001.0000   Initial revision.

Measure Seek Access Time (Levels 3, 4, 'D')

Description:
Performs seek access time test on the current head. This diag supports two modes:
1) Logical random-length seeks, 2) Logical fixed-length seeks.

Quick Help:

"MeasureSkAccessTime, D[SkLength],[SkType],[NumSks]";

Input Parameters:

0 - Seek Length.

This parameter sets the seek length to be used during the seek access time testing. If set to zero, then the seeks performed will be of random lengths. If the value entered exceeds the drive's max track, then the seek length will be set to the max track.

Type: Unsigned 32-bit decimal value (8 digits max)

Range: 0 to Max Track

Default: 0 (Random Seeks)

1 - Seek Type.

This parameter sets the type of seek to be performed during the seek access time testing. The following are the valid seek types that this command accepts:

0 - Read seeks: Specifies seeks to the read track follow position.
1 - Write seeks: Specifies seeks to the write track follow position.
2 - Write header seeks: Specifies seeks to the write header track follow position. (This positions the writer to the read track follow position, that is, to the negative reader/writer offset.)

Type: Unsigned 8-bit value

Range: 0 to 2

Default: 0 (Read Seeks)

2 - Number of Seeks.

This parameter specifies the number of seeks to perform during the seek access time testing.

Type: Unsigned 32-bit decimal value (5 digits max)

Range: 1 to 99,999

Default: 1000

Output Data:

If no error occurred and the Seek Access Time data was returned, the following message will be displayed.

```
"Sk Length = _____"
"SEEKTYPE"
"Num Seeks = _____"
"Avg Time usec = _____"
"Min Time usec = _____"
"Max time usec = _____"
```

Examples:

To perform 1000 random read seeks:

```
F3 3>D0,0,1000
F3 3>D         <-- This works because the defaults are 1000 random read seeks.
```

To perform 10000 full-stroke write seeks:

```
F3 3>D9999999,1,10000
```

To perform 10000 random JIT 3 read seeks:

```
F3 4>u1,3      <-- Sets the seek speed to JIT 3.
F3 3>D,,10000  <-- No parameters 0 and 1 because the default is random read seeks.
```

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Measure Throughput (Level 2 'T')

Description:
This command is used to test the drive's read and write speed.

Quick Help:

"MeasureThroughput, T[Opts],[MinSkew],[MaxSkew],[SkewStep]";

Input Parameters:

0 - Command Flags

This input sets read or write and determines disk access range.

bit 15:	set	write
	cleared	read
bit 14:	set	scan entire full pack, ignore bits 0-13
	cleared	sample first cylinders of zones specified below
bit 13:	set	all zones, ignore bits 0-12
	cleared	single zone
bits 4-12	ignored	
bits 0-3	zone number	

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (read zone zero)

1 - Minimum skews

This input establishes the minimum skews.

bits 8-15: minimum cylinder skew
bits 0-7: minimum head skew

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: normal drive cylinder and head skew

2 - Maximum Skews

This input establishes the maximum skews.

bits 8-15: maximum cylinder skew
bits 0-7: maximum head skew

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: normal drive cylinder and head skew

3 - Skew Step Size

This input establishes how much the skews
increment between tests.

Type: Unsigned 16-bit value

Range: 1 to DIAG_THROUGHPUT_MAX_SKEW_STEP (10 dec)

Default: 1

Output Data:

throughput KBS = kilobytes / second

Example:

```
F3 2>T9,1300,1700,1
Min Max Cyl: 13 17
Min Max Head: 0 0
 Zone 9   cyl skew 13  head skew 0   throughput KBS:    6.134
 Zone 9   cyl skew 14  head skew 0   throughput KBS:   10.589
 Zone 9   cyl skew 15  head skew 0   throughput KBS:   10.837
 Zone 9   cyl skew 16  head skew 0   throughput KBS:   10.832
 Zone 9   cyl skew 17  head skew 0   throughput KBS:   10.826
```

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Memory Block Display (Level 1, F 'D')

Description:

The Memory Block Display command reads and displays the contents of memory starting at the specified address. Optionally, the memory data being displayed can be compared to a specified value, with miscomparing bytes displayed as highlighted text. This command also optionally supports specifying the size of the memory unit to be addressed. It can support reading and displaying 8-bit, 16-bit, 32-bit, and 64-bit memory unit sizes.

************************************* NOTE ***
This command allows attempts to read addresses without validation. But reading invalid addresses may hang the drive. This command should be used with great caution if the option to override address validation is enabled.
****

Quick Help:

"DisplayMemoryBlock, D[AddrHi],[AddrLo],[CompVal],[NumBytes],[Opts],[SizeInBytes]";

Input Parameters:

0 - Memory Address or Memory Address High.

If parameter 1 is not entered, this parameter contains the 32-bit address of the first memory location to be read and displayed. If parameter 1 is entered, this parameter contains the upper 16-bits of the address of the first memory location to be read and displayed.

Type: Unsigned 32-bit value, if parameter 1 is not entered

Unsigned 16-bit value, if parameter 1 is entered

Range: 0 to 0xffff, if parameter 1 is not entered
0 to 0xffffffff, if parameter 1 is entered

Default: 0

1 - Memory Address Low.

If entered, this parameter contains the lower 16-bits of the address of the first memory location to be read and displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: None. If this parameter is not entered, parameter 0 is assumed to specify the entire 32-bit address of the first memory location to be read and displayed.

2 - Data Compare Value.

If entered, this parameter specifies a value that will be compared to the contents of the specified memory locations. If the contents of the memory location are different than the specified value, they will be displayed in high-intensity mode, If the contents of the memory location are equal to the specified value, they will be displayed in low-intensity mode. The value passed in this parameter must not be larger than number of bytes specified in parameter 5.

Type: Unsigned 8-bit, 16-bit, 32-bit, or 64-bit value

Range: If parameter 5 is 1: 0 to 0xFF
If parameter 5 is 2: 0 to 0xFFFF
If parameter 5 is 4: 0 to 0xFFFFFFFF
If parameter 5 is 8: 0 to 0xFFFFFFFFFFFFFFFF

Default: None

3 - Number of Bytes to display.

This parameter specifies the number of memory bytes to be displayed.

Type: Unsigned 32-bit value

Range: 1 to 0xFFFFFFFF

Default: 0x200

4 - Options.

This parameter is a bit-significant value that selects the following options.

Bits 31-2: not used

Bit 1: Disable Validation of Memory Address

If this bit is cleared, the memory address will be validated. If this bit is set, the input memory address will be used without checking with the memory map.

Bit 0: Disable pause after each block displayed.

If this bit is cleared, the display will pause after each 512-byte block and wait for the user to enter a character.

If this bit is set, all of the requested bytes will be displayed without pausing.

Type: Unsigned 32-bit value

Range: 0 to 0x00000003

Default: 0

5 - Number Of Bytes Per Memory Access.

This parameter indicates to the diagnostic command what memory unit size in bytes to use when reading the memory block. The only valid values for this parameter are 8, 4, 2, and 1.

Type: Unsigned 8-bit value

Range: Valid values are 8, 4, 2, and 1

Default: 1

Output Data:

If an error occurred, the following information will be displayed.

```
"DiagError aaaaaaaa "
```

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following header will be displayed.

```
"Processor Memory at Addr cccccccc"                     or
"Processor Memory at Addr cccccccc compared to dd hex"
```

where

cccccccc is the address of the first Processor Memory byte displayed

dd is the byte to which the displayed data was compared

If the memory data is being displayed as bytes, the following information will be displayed following the header.

```
"  Addr    0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F"
"eeeeeeee  ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff"  (repeated)
```

If the memory data is being displayed as half-words (2 bytes), the following information will be displayed following the header.

```
"  Addr    0    2    4    6    8    A    C    E"
"eeeeeeee  ffff ffff ffff ffff ffff ffff ffff ffff"  (repeated)
```

If the memory data is being displayed as words (4 bytes), the following information will be displayed following the header.

```
"  Addr    0        4        8        C"
"eeeeeeee  ffffffff ffffffff ffffffff ffffffff"  (repeated)
```

If the memory data is being displayed as double-words (8 bytes), the following information will be displayed following the header.

```
"  Addr    0               8"
"eeeeeeee  ffffffffffffffff ffffffffffffffff"  (repeated)
```

where

eeeeeeee is the address of the first byte in the row.

ff is the memory data byte.

If a displayed data is being compared to a reference byte, the bytes or symbols that are not equal to the reference will be displayed as highlighted text.

Examples:

Example #1: Display 512 bytes of memory starting at address 0 in 8-bit chunks

```
F3 1>D
F3 1>D0,,,200
F3 1>D0,0,,200
```

Example #2: Display 1024 bytes of memory starting at 04000000 in 16-bit chunks

```
F3 1>D04000000,,,400,,2
F3 1>D0400,0000,,400,,2
```

Example #3: Display 512 bytes of memory from address 0 in 64-bit chunks and compare each element to the value 0xE580C000E12CC38E

```
F3 1>D,,E580C000E12CC38E,,,8
```

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Merge Alternate List into Slip List (Level A 'P')

Description:
The Merge Alternate List Into Slip List command merges all defects from the G list into the P list and then regenerates the alt and slip lists. This in effect changes alternated sectors to slipped sectors.

Quick Help:

"MergeAltListIntoSlipList, P";

Input Parameters:
None

Output Data:
The command's output is as follows.

```
F3 A>P
```

Command may take 10's of seconds, be patient...

This is good advice.

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Modify Track Defect List (Level 2 'F')

Description:

The Modify Track Defect List command modifies the defect list for the specified sector(s).

Quick Help:

"ModTrkDfctLst, F[PSctr/LBA],[Action]";

Input Parameters:

0 - Physical Sector or LBA to Modify.

If Parameter 1 is A1, B1, C1, or F1, this value is an LBA.
If parameter 1 is some other value, this parameter is the physical sector number of the block to be affected. The cylinder and head come from the current address.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

Note: The track and head used are the current track. When working with sectors that are already alted, it is best to use the LBA mode actions (B1 and C1 below) .

1 - Defect List Action.

Parameter 1 specifies the format action to be taken. The valid choices are:
A - Add Sector to Alternated Sector List
A1 - Add LBA to Alternated Sector List
B - Add Sector to Pending Sector List
B1 - Add LBA to Pending Sector List
C1 - Remove LBA from Alternated Sector List
F1 - Remove LBA from Alternated Sector List (same as C1 above)

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0x0C1

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Examples:

Example #1:
To remove LBA 1234 from the alt list:

F3 2>F1234,f1

Revision History:

0001.0000 Initial Revision.
0002.0000 Remove 2>Fx,F; add Fx,F1 to unalt by sector.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Odd Even Encroachment Test (Level T 'T')

Description:
This command will read the specified range of tracks. It will determine how many sectors fall into various ranges of retry counts.

Quick Help:

"OddEvenEncroachmentTest, T[strt tk],[end tk],[hd],[rtry thrshld][ECC thrshld]";

Input Parameters:

0 - Start Logical Cylinder

This parameter specifies the first logical cylinder to be tested.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: none

1 - End Logical Cylinder

This parameter specifies the last logical cylinder to be tested. Up to 100d tracks can be tested in one command. Attempting to test more tracks will cause an error.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: none

2 - Head

This parameter specifies logical head to test.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: none

3 - Retry Threshold

This parameter specifies the boundary between two retry buckets. Retries less than or equal to this value go into one bucket, retries greater than this value go into another bucket.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 4

4 - Ecc Level Threshold

This parameter specifies how much ECC correction is done on the fly. This ECC level defines the "no retries but corrected" retry bucket.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0xA

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

The list header displays the logical head number and the ECC threshold. The column headings indicate the threshold value. The body of the list displays:

Logical cylinder
Number of sectors that required no retries and no ECC correction
Number of sectors that required no retries but did require ECC correction
Number of sectors that required at least one retry but less than of equal to the threshold number of retries
Number of sectors that were readable but required more than the threshold number of retries
Number of sectors that were unreadable

Examples:

```
F3 T>T20,23,0,3,4
Head 0  ECC threshold 4
L Cyl  perfct OTF   <=3    >3   Unreadable
   20   789     7     0     0     0
   21   789     7     0     0     0
   22   78C     4     0     0     0
   23   78C     4     0     0     0
```

F3 T>

Revision History:

0001.0000	Initial revision.
0002.0000	Added ECC level threshold
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Off Track Capability (Level 7 'c')

Description:

This command is used to test the drive's ability to read offtrack.

Quick Help:

"OffTrackCapability, c[Sec],[NumSecs],[SecIncrement],[Offset]";

Input Parameters:

0 - Starting Sector

This input is to set the starting physical sector number.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFFFFFF

Default: None

1 - Sector Count

This input is to set the number of sectors to test.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFFFFFF

Default: None

2 - Sector Increment

This input specifies how much to increment the sector number between each test.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

3 - Offset to one side

This input specifies how far offtrack the test will start and finish.

Type: Unsigned 16-bit value

Range: 0 to 0x200

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

```
The first two lines show column headings:
   wedge    - data wedge where sector begins
   log      - logical sector number of wedge
   phy      - physical sector number of wedge
   8888
   048C etc - offset (read down, example shows 80, 84, 88 8C...)

The following lines show the sector being tested, and the results at
each offset.  The results are shown with character codes:
   .  -> Read OK
   *  -> Read error
   |  -> Read OK at track centerline
   +  -> Read error at track centerline

The bottom line shows the average bathtub mid point, the average
greatest readable offset, and the average loweset readable offset.
```

```
F3 7>c1B,5,1,80

                  88889999AAAABBBBCCCCDDDDEEEEFFFF00001111222233334444555566667778
wedge  log (phy)  048C048C048C048C048C048C048C048C048C048C048C048C048C048C048C048C0
  107 001B(001B)  ***.............................|.......................********* FF8C   5C
  107 001C(001C)  **.*............................|.......................*.******* FF88   5C
    0 001D(001D)  ****............................|....................*.********** FF90   50
    0 001E(001E)  ***.............................|......................********** FF8C   58
    0 001F(001F)  ******..........................|....................**.********* FF98   50
Average FF8F   56 FFF3
```

Revision History:

0001.0000   Initial revision.
0011.0000   Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Particle Sweep (Level 2 'J')

Description:

This command performs the particle sweep operation. To perform particle sweep, a seek length is calculated to satisfy the conditions imposed by the input parameters. Seeks of this length are repeatedly issued to move the head from the Start Cylinder towards the End Cylinder, while pausing the specified dwell time between each successive seek. All seeks will be done using head 0, and will be of equal length, time, and dwell. The time needed to complete the particle sweep will be approximately equal to the time specified by the Duration parameter.

Quick Help:

"ParticleSweep, J[Start Cyl],[End Cyl],[Duration mSec],[Dwell mSec],[JIT mode]";

Input Parameters:

0 - Start Cylinder.

This parameter is the cylinder from which the particle sweep will begin.
Notes:
1) if Start Cylinder and End Cylinder are the same, then the particle sweep range will default to the drive's Max and Min cylinders respectively.
2) Start Cylinder may be greater than or less than End Cylinder.

Type: Unsigned 32-bit value

Range: 0 to Maximum Cylinder

Default: 0

1 - End Cylinder.

This parameter is the cylinder on which the particle sweep will end.
Notes:
1) if Start Cylinder and End Cylinder are the same, then the particle sweep range will default to the drive's Max and Min cylinders respectively.
2) End Cylinder may be greater than or less than Start Cylinder.

Type: Unsigned 32-bit value

Range: 0 to Maximum Cylinder

Default: 0

2 - Duration.

This parameter specifies the time in milliseconds that the particle sweep will use to move from the Start Cylinder to the End Cylinder including the Dwell time.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 5000 mSec

3 - Dwell Time In Milliseconds.

This parameter specifies the amount of time in milliseconds for the head to remain on track before the next seek is issued.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 1 Rev Time In mSec

4 - Servo Seek Speed (JIT mode).

This parameter specifies one of the servo JIT modes, which controls how fast the actuator can move from cylinder to cylinder.
Note: if a JIT mode is requested that is slower than supported, then the slowest supported JIT mode will be used.

0x00: RW_SEEK_SPEED_0 - Indicates normal seeks should be executed.
0x01: RW_SEEK_SPEED_1 - If supported, indicates JIT1 seeks should be executed.
0x02: RW_SEEK_SPEED_2 - If supported, indicates JIT2 seeks should be executed.
0x03: RW_SEEK_SPEED_3 - If supported, indicates JIT3 seeks should be executed.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: Slowest JIT mode

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If an error occurred, then the following will be displayed:

DiagError aaaaaaaa

where

aaaaaaaa is the diagnostic error code detected

If R/W status information is available upon completion of the diagnostic, then the following will be displayed:

"Particle Sweep"
"R/W Status c, R/W Error dddddddd

where

c is the status that was returned by the R/W subsystem

dddddddd is the error code that was returned by the R/W subsystem

Examples:

Example #1:
To do a particle sweep using the default conditions, i.e. Start Cylinder = Max Cylinder,

End Cylinder = Min Cylinder, 5-second duration, 1-rev dwell, and slowest JIT mode:

```
F3 2>J
```

Example #2:
To do a particle sweep using Start Cylinder = 10, End Cylinder = 1000, 6-second duration, 200 mSec dwell, and slowest JIT mode:

```
F3 >J10,1000,6000,200
```

Example #3:
Error handling of an invalid cylinder entry:

```
F3 2>Jfffffff

DiagError   00003013
```

Revision History:

0001.0000   Initial revision.

Pause Interface Task (Online Control S)

Description:
If Diagnostic Mode is not currently enabled, this command pauses the Interface Task and enables Diagnostic Mode.

Quick Help:

"PauseInterfaceTask";

Input Parameters:
None

Output Data:
None

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Pause Output (Online Space)

Description:
This command pauses the output of a diagnostic command that is in progress. Entering any character will cause the command output to continue.

Quick Help:

"PauseOutput";

Input Parameters:
None

Output Data:

None

Revision History:

0001.0000 Initial revision.

Peek Memory Byte (All Levels '+')

Description:

The Peek Memory Byte command reads and displays the specified byte (8-bits) of processor memory.

Quick Help:

"PeekMemoryByte, +[AddrHi],[AddrLo],[Opts]";

Input Parameters:

0 - Memory Address or Memory Address High.

If parameter 1 is not entered, this parameter contains the 32-bit address of the memory location to be read and displayed. If parameter 1 is entered, this parameter contains the upper 16-bits of the address of the memory location to be read and displayed.

Type: Unsigned 32-bit value, if parameter 1 is not entered
Unsigned 16-bit value, if parameter 1 is entered

Range: 0 to 0xffff, if parameter 1 is not entered
0 to 0xffffffff, if parameter 1 is entered

Default: 0

1 - Memory Address Low.

If entered, this parameter contains the lower 16-bits of the address of the memory location to be read and displayed

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: None. If this parameter is not entered, parameter 0 is assumed to specify the entire 32-bit address of the memory location to be read and displayed.

2 - Peek Memory Address Options.

Parameter 2 bit 0 controls the validation of the processor memory address.

Bit 15-1: not used

Bit 0: Disable Validation of Memory Address

If this bit is cleared, the memory address will be validated. If this bit is set, the input memory address will be used without checking with the memory map.

Type: Unsigned 16-bit value

Range: 0 to 0x0001

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the memory data will be displayed as follows.

"Adr cccccccc (dddddddd) = ee"

where

cccccccc is the byte offset from the start of the memory

dddddddd is the processor address

ee is an 8-bit value written to or read from memory

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Peek Memory Word (All Levels '-')

Description:
The Peek Memory Word command reads and displays the specified word (16-bits) of processor memory.

Quick Help:

"PeekMemoryWord, -[AddrHi],[AddrLo],[Opts]";

Input Parameters:

0 - Memory Address or Memory Address High.

If parameter 1 is not entered, this parameter contains the 32-bit address of the memory location to be read and displayed. If parameter 1 is entered, this parameter contains the upper 16-bits of the address of the memory location to be read and displayed.

Type: Unsigned 32-bit value, if parameter 1 is not entered
         Unsigned 16-bit value, if parameter 1 is entered

Range: 0 to 0xffff, if parameter 1 is not entered

0 to 0xfffffffe, if parameter 1 is entered

The specified address must be a multiple of 2.

Default: 0

1 - Memory Address Low.

If entered, this parameter contains the lower 16-bits of the address of the memory location to be read and displayed

Type: Unsigned 16-bit value

Range: 0 to 0xfffe

The specified address must be a multiple of 2.

Default: None. If this parameter is not entered, parameter 0 is assumed to specify the entire 32-bit address of the memory location to be read and displayed.

2 - Peek Memory Address Options.

Parameter 2 bit 0 controls the validation of the processor memory address.

Bit 15-1: not used

Bit 0: Disable Validation of Memory Address

If this bit is cleared, the memory address will be validated. If this bit is set, the input memory address will be used without checking with the memory map.

Type: Unsigned 16-bit value

Range: 0 to 0x0001

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the memory data will be displayed as follows.

"Adr cccccccc (dddddddd) = ffff"

where

cccccccc is the byte offset from the start of the memory

dddddddd is the processor address

ffff is a 16-bit value written to or read from memory

Revision History:

0001.0000   Initial revision.
0011.0000   Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Poke Memory Byte (All Levels '=')

Description:

The Poke Memory Byte command writes the specified byte (8-bits) of processor memory with the specified data.

Quick Help:

"PokeMemoryByte, =[AddrHi],[AddrLo],[Data],[Opts]";

Input Parameters:

0 - Memory Address or Memory Address High.

If parameter 2 is not entered, this parameter contains the 32-bit address of the memory location to be written. If parameter 2 is entered, this parameter contains the upper 16-bits of the address of the memory location to be written.

Type: Unsigned 32-bit value, if parameter 2 is not entered
Unsigned 16-bit value, if parameter 2 is entered

Range: 0 to 0xffff, if parameter 2 is not entered
0 to 0xffffffff, if parameter 2 is entered

Default: 0

1 - Memory Address Low or Memory Data.

If parameter 2 is not entered, this parameter contains the 8-bit data with which the memory location is to be written. If parameter 2 is entered, this parameter contains the lower 16-bits of the address of the memory location to be written.

Type: Unsigned 8-bit value, if parameter 2 is not entered
Unsigned 16-bit value, if parameter 2 is entered

Range: 0 to 0xff, if parameter 2 is not entered
0 to 0xffff, if parameter 2 is entered

Default: 0

2 - Memory Data.

If entered, this parameter contains the 8-bit data with which the memory location is to be written.

Type: Unsigned 8-bit value

Range: 0 to 0xff

Default: None

3 - Poke Memory Options.

Parameter 3 bit 0 controls the validation of the processor memory address.

Bit 15-1: not used

Bit 0: Disable Validation of Memory Address

If this bit is cleared, the memory address will be validated. If this bit is set, the input memory address will be used without checking with the memory map.

Type: Unsigned 16-bit value

Range: 0 to 0x0001

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the memory data will be displayed as follows.

"Adr cccccccc (dddddddd) = ee"

where

cccccccc is the byte offset from the start of the memory

dddddddd is the processor address

ee is an 8-bit value written to or read from memory

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Read CHS (Levels 2, 7 'R')

Description:

This command reads data from the disk starting at the specified sector on the target track for the specified number of sectors. The data is read into the Diagnostic Read Buffer.

Quick Help:

"RdChs, R[Sec],[NumSecs],,[PhyOpt],[Opts]";

Input Parameters:

0 - Logical or Physical Sector Address.

If any value is entered for Parameter 3, this parameter contains the physical sector address of the first sector to read, else this parameter contains the User Area logical sector address of the first sector to read.

Type: Unsigned 16-bit value

Range: 0 to maximum logical or physical sector address on the target track

Default: 0

1 - Transfer Length.

This parameter specifies the number of consecutive sectors to read.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: If the Sector Address was entered and the Transfer Length was not entered, then only the specified sector will be read.

If both the Sector Address and Transfer Length are not entered, then the Transfer Length will be set based on the Test Space that is selected. If the Random Transfer Length option is selected, a random value will be used that is less than or equal to the number of sectors remaining on the track. If the Random Transfer Length option is not selected, the number of sectors remaining on the track will be read.

If a Transfer Length is entered, it will be limited to the number of sectors remaining on the track.

2 - not used.

Type: None

Range: None

Default: None

3 - Physical Sector Address Flag.

If any value is entered for this parameter, then Parameter 0 specifies a physical sector address, else Parameter 0 specifies a User Area logical sector address.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

4 - Options.

This parameter is a bit-significant value that allows the user to select the following options.

Bits 15-5: not used.

Bit 4: Read All Test Space Sectors.

If this bit is set, all of the sectors in the Test Space will be read, else only the sectors specified by Parameters 0 and 1 will be read.

Bit 3: not used.

Bit 2: Rotate Buffer Sector Offset.

If this bit is set, the Target Buffer Sector Offset will be rotated by 1 prior to the execution of this diagnostic command.
This bit was originally added to help writing random data pattern reduce execution time by not having to re-fill the diagnostic buffer with new random data pattern, which takes great amount of time, but just rotating the Target Buffer Sector Offset at every time this diagnostic command is executed with this option set.
To see or change the current Targer Buffer Sector Offset, please refer all Level 'A', Set Test Space, diagnostic command for detail how-to.

Bit 1: Enable Dynamic Sparing.

If this bit is set, sectors containing media defects that meet the failure criteria will be spared.

Bit 0: Continue On Error.

If this bit is set and an error occurs, the read operation will continue and attempt to read all of the requested sectors. Each error encountered will be displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Read the requested sectors,
Stop On Error)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Next User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

or

"Next System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is the Disk Logical Block Address of the sector in error

ffffff is the Logical Cylinder Address of the sector in error

g is the Logical Head Address of the sector in error

hhhh is the Logical Sector Address of the sector in error

iiiiii is the Physical Cylinder Address of the sector in error

j is the Logical Head Address of the sector in error

kkkk is the Physical Sector Address of the sector in error

llllllll is the number of sectors remaining to be read or written

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: Enable the Next Address to be displayed
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed
Bit 4: Enables the Recovery Status to be displayed
Bit 5: Enables the Fault Status to be displayed
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 1 is set, the Next Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed as follows.

"Target User LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

or

"Target System LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"

"Starting Transfer Length wwwwwwww"

where

pppppppp is the starting Disk Logical Block Address

qqqqqq is the starting Logical Cylinder Address

r is the starting Logical Head Address

ssss is the starting Logical Sector Address

tttttt is the starting Physical Cylinder Address

u is the starting Logical Head Address

vvvv is the starting Physical Sector Address

wwwwwwww is the starting Transfer Length

If Bit 4 is set, the Recovery Status will be displayed as follows.

"Recovered User LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

or

"Recovered System LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

where

AAAAAAAA is the Disk Logical Block Address of the last recovered sector

BBBBBB is the Logical Cylinder Address of the last recovered sector

C is the Logical Head Address of the last recovered sector

DDDD is the Logical Sector Address of the last recovered sector

EEEEEE is the Physical Cylinder Address of the last recovered sector

F is the Logical Head Address of the last recovered sector

GGGG is the Physical Sector Address of the last recovered sector

HHHH are the Recovery Flags reported by the Read/Write code

II is the Recovery Count reported by the Read/Write code

If Bit 5 is set, the Fault Status will be displayed as follows.

"Drive Fault Status JJJJ Preamp Fault Status KKKK"

where

JJJJ is the Drive Fault Status reported by the Read/Write code

KKKK is the Preamp Fault Status reported by the Read/Write code

If Bit 6 is set, the Elapsed Time for the read/write operation will be displayed.

```
"Elapsed Time a mins b secs"  or
"Elapsed Time b.c secs"       or
"Elapsed Time c.d msecs"
```

where

```
a is minutes
b is seconds
c is milliseconds
d is microseconds
```

Examples:

Example #1:
To read a single logical sector
(in this case logical sector 23 on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>R23
```

Example #2:
To read multiple logical sectors
(in this case logical sectors 23 to 26 on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>R23,4
```

Example #3:
To read all of the logical sectors on a track
(in this case all logical sectors on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>R
```

Example #4:
To read all of the logical sectors on multiple tracks
(in this case all logical sectors on logical cylinders 45 to 49 head 0)

Note: You must seek to the track before the first one to be read.

```
F3 2>A3
F3 2>S44,0
F3 2>L,5
F3 2>R
```

Example #5:
To read all of the logical sectors on a track and continue on error
(in this case all logical sectors on logical cylinder 45 head 0)

Note: An error message will be displayed for each sector in error.

```
F3 2>A0
F3 2>S45,0
F3 2>R,,,,1
```

Example #6:
To read all of the logical sectors in the test space and continue on error

Note: The Test Space is selected by the all level 'A' command. An error message will be displayed for each sector in error.

```
F3 2>R,,,,11
```

Example #7:
To read a single physical sector
(in this case physical sector 32 on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>R32,,,1
```

Example #8:
To read multiple physical sectors
(in this case physical sectors 32 to 35 on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>R32,4,,1
```

Example #9:
To read all of the physical sectors on a track
(in this case all physical sectors on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>R,,,1
```

Example #10:
To read a single logical sector to a specific sector offset in the diagnostic read buffer
(in this case logical sector 23 on logical cylinder 45 head 1,
to the sector offset of 5 in the diagnostic read buffer)

```
F3 2>A0
F3 2>AF,5
F3 2>S45,1
F3 2>R23
```

Example #11:
To rotate the buffer sector offset by 1 and read a single logical sector to the rotated sector offset in the diagnostic read buffer.
(This example assumes user ran the Example #10 above right before this example,
in this case logical sector 24 on logical cylinder 45 head 1,
to the sector offset of 6 in the diagnostic read buffer)

```
F3 2>R24,,,,4
```

Revision History:

0001.0000	Initial revision.
0001.0001	Eliminated the Enable ZAP Updates and Enable Track Skipping option.
0001.0002	Moved the Enable Dynamic Sparing option from the parameter 2 to the bit 1 of the parameter 4. Added new Rotate Buffer Sector Offset option to the bit 2 of the parameter 4.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Read Current Servo Destination (Level 3,8 'R')

Description:

This command will display the Current Servo Destination information. The firmware components that make up the current position will also be displayed. These include: Destination Track Id, Destination Position, Mr Jog Value, and Offset Value MrJog.

Quick Help:

"ReadCurrentServoDestination, R";

Input Parameters:

None.

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following will be displayed

AAAAAAAA DestinationTrackId Q0

BBBBBBBB DestinationPosition Q12

CCCCCCCC MrJogValue Q8

DDDDDDDD OffsetValueMrJog Q8

EEEEE.EEE Current Servo Destination

where

AAAAAAAA is a Q0 number (whole integer) that represents the servo track number.

BBBBBBBB is a Q12 number (12 bits of fractional position) that represents the offset from DestinationTrackID. This offset includes the read-to-write offset (aka microjog, reader/writer offset, MR jog, etc.) and any commanded diagnostic offsets from all sources. It can also span many tracks (there are 20 bits of whole track information).

CCCCCCCC is the total contribution of offset in servo counts that is computed by servo to account for the read-to-write offsets. It is a Q8 number (8 bits of fractional information).

DDDDDDDD is a diagnostic offset that is almost exclusively used by self-test to perform microjog calibration. It's a Q8 number (8 bits of fractional information).

EEEEE.EEE the actual target track with fractional position information that servo uses for its reference.

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Read LBA (Level A 'R')

Description:

This command reads data from the disk starting at the specified LBA (Logical Block Address) for the specified number of LBAs. The data is read into the Diagnostic Read Buffer.

Quick Help:

"RdLba, R[Lba],[NumLbas],,[Opts]";

Input Parameters:

0 - LBA.

If Parameter 3 bit 5 is set, then this parameter specifies the address of the first System Area LBA to be read, else it specifies the address of the first User Area LBA to be read.

Type: Unsigned 32-bit value

Range: 0 to maximum User Area LBA, if parameter 3 bit 5 is set
0 to maximum System Area LBA, if parameter 3 bit 5 is cleared

Default: Current Target Address

1 - Transfer Length.

This parameter specifies the number of consecutive LBAs to read.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: If the LBA (Parameter 0) was entered and the Transfer Length (Parameter 1) was not entered, then only the specified LBA will be read.

If both the LBA (Parameter 0) and Transfer Length (Parameter 1) are not entered, then the Transfer Length will be set based on the Test Space that is selected. If the Random Transfer Length option is selected, a random value will be used that is less than or equal to the number of LBAs remaining in the Test Space. If the Random Transfer Length option is not selected, the number of LBAs remaining on the track containing the current Target LBA will be read.

If a Transfer Length is entered, it will be limited to the number of LBAs remaining in the Test Space.

2 - not used.

In the legacy ST10 code, entering this parameter enables a 512-byte block to be read even if it is marked as alternated or pending. This feature was added as part of the support for block sizes greater than 512-bytes. This feature is not currently supported by the platform architecture.

Type: None

Range: None

Default: None

3 - Options.

This parameter is a bit-significant value that allows the user to select the following options.

Bits 15-6: not used.

Bit 5: Read System Area LBAs.

If this bit is set, then parameter 0 specifies a System Area LBA, else parameter 0 specifies a User Area LBA.

Bit 4: Read All Test Space LBAs.

If this bit is set, all of the LBAs in the Test Space will be read, else only the LBAs specified by Parameters 0 and 1 will be read.

Bit 3: not used.

Bit 2: Rotate Buffer Sector Offset.

If this bit is set, the Target Buffer Sector Offset will be rotated by 1 prior to the execution of this diagnostic command.
This bit was originally added to help writing random data pattern reduce execution time by not having to re-fill the diagnostic buffer with new random data pattern, which takes great amount of time, but just rotating the Target Buffer Sector Offset at every time this diagnostic command is executed with this option set.
To see or change the current Targer Buffer Sector Offset, please refer all Level 'A', Set Test Space, diagnostic command for detail how-to.

Bit 1: Enable Dynamic Sparing.

If this bit is set, sectors containing media defects that meet the failure criteria will be spared.

Bit 0: Continue On Error.

If this bit is set and an error occurs, the read operation will continue and attempt to read all of the requested LBA. Each error encountered will be displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Read User Area LBAs,
Read the requested sectors,
Disable Dynamic Sparing,
Stop On Error)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Next User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

or

"Next System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is the Disk Logical Block Address of the sector in error

ffffff is the Logical Cylinder Address of the sector in error

g is the Logical Head Address of the sector in error

hhhh is the Logical Sector Address of the sector in error

iiiiii is the Physical Cylinder Address of the sector in error

j is the Logical Head Address of the sector in error

kkkk is the Physical Sector Address of the sector in error

llllllll is the number of sectors remaining to be read or written

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: Enable the Next Address to be displayed
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed
Bit 4: Enables the Recovery Status to be displayed
Bit 5: Enables the Fault Status to be displayed
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 1 is set, the Next Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or

"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed as follows.

"Target User LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

or

"Target System LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

where

pppppppp is the starting Disk Logical Block Address

qqqqqq is the starting Logical Cylinder Address

r is the starting Logical Head Address

ssss is the starting Logical Sector Address

tttttt is the starting Physical Cylinder Address

u is the starting Logical Head Address

vvvv is the starting Physical Sector Address

wwwwwwww is the starting Transfer Length

If Bit 4 is set, the Recovery Status will be displayed as follows.

"Recovered User LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

or

"Recovered System LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

where

AAAAAAAA is the Disk Logical Block Address of the last recovered sector

BBBBBB is the Logical Cylinder Address of the last recovered sector

C is the Logical Head Address of the last recovered sector

DDDD is the Logical Sector Address of the last recovered sector

EEEEEE is the Physical Cylinder Address of the last recovered sector

F is the Logical Head Address of the last recovered sector

GGGG is the Physical Sector Address of the last recovered sector

HHHH are the Recovery Flags reported by the Read/Write code

II is the Recovery Count reported by the Read/Write code

If Bit 5 is set, the Fault Status will be displayed as follows.

"Drive Fault Status JJJJ Preamp Fault Status KKKK"

where

JJJJ is the Drive Fault Status reported by the Read/Write code

KKKK is the Preamp Fault Status reported by the Read/Write code

If Bit 6 is set, the Elapsed Time for the read/write operation will be displayed.

"Elapsed Time a mins b secs" or
"Elapsed Time b.c secs" or
"Elapsed Time c.d msecs"

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

Examples:

Example #1:
To read a single LBA
(in this case LBA 51237)

```
F3 A>R51237
```

Example #2:
To read multiple LBAs
(in this case LBAs 51237 to 51247)

```
F3 A>R51237,11
```

Example #3:
To read all of the LBAs remaining on the track containing the target LBA
(in this case all LBAs remaining on the cylinder that contains LBA 51237)

```
F3 A>S51237
F3 A>R
```

Example #4:
To read all of the LBAs remaining on the track containing the target LBA
and continue on error
(in this case all LBAs remaining on the cylinder that contains LBA 51237)

Note: An error message will be displayed for each LBA in error.

```
F3 A>S51237
F3 A>R,,,1
```

Example #5:
To read all of the LBAs in the test space and continue on error

Note: The Test Space is selected by the all level 'A' command. An error message will be displayed for each LBA in error.

```
F3 A>R,,,11
```

Example #6:
To read a single system LBA
(in this case system LBA 1237)

```
F3 A>R1237,,,20
```

Example #7:
To read multiple system LBAs
(in this case system LBAs 1237 to 1247)

```
F3 A>R1237,11,,20
```

Example #8:
To read all of the LBAs remaining on the track containing the target system LBA
(in this case all LBAs remaining on the cylinder that contains LBA 1237)

```
F3 A>S1237,,,,,1
F3 A>R,,,20
```

Example #9:
To read a single LBA to a specific sector offset in the diagnostic read buffer
(in this case LBA 51237 to the sector offset of 5 in the diagnostic read buffer)

```
F3 2>AF,5
F3 A>R51237,,,4
```

Example #10:
To rotate the buffer sector offset by 1 and read a single LBA to the rotated sector offset in the diagnostic read buffer
(This example assumes user ran the Example #9 above right before this example, in this case LBA 51238 to the sector offset of 6 in the diagnostic read buffer)

```
F3 A>R51238,,,4
```

Revision History:

0001.0000	Initial revision.
0001.0001	Eliminated the Enable ZAP Updates and Enable Track Skipping option.
0001.0002	Modified to read only the LBAs remaining on the track containing the target LBA, if the LBA and Transfer Length are not entered by the user.
0001.0003	Added new Rotate Buffer Sector Offset option to the bit 2 of the parameter 3.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Read Long CHS or Read System CHS (Level 2 'r')

Description:
This command performs either a read long of the specified sectors or a System Area read starting at the specified sector on the target track for the specified number of sectors. For a read long operation, the data and ECC bytes will be read into the Diagnostic Read Buffer. For a System Area read, the data will be read into the Diagnostic Read Buffer.

Quick Help:

"RdLongOrSystemChs, r[LongSec],[LongSecsOrSysSec],[SysSecs],[LongPhySecOpt],[LongOpts],[SysOp

Input Parameters:

0 - Read Long Starting Logical or Physical Sector Address.

If this parameter is entered, a Read Long operation will be performed starting at the sector address specified by this parameter. If any value is entered for Parameter 3, this parameter contains a physical sector address, else it contains a User Area logical sector address.

If this parameter is not entered, a System Area Read operation will be performed.

Type: Unsigned 16-bit value

Range: 0 to maximum logical or physical sector address on the target track

Default: none

1 - Read Long Transfer Length / System Area Read Starting Logical Sector Address.

If Parameter 0 is entered, this parameter is the number of consecutive sectors to read long.

If Parameter 0 is not entered, then this parameter contains the address of the first logical sector to be read on the System Area target track.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: For a Read Long operation, the default Transfer Length is 1.

For a System Area Read operation, the default starting Logical Sector Address is 0.

2 - System Area Read Transfer Length.

If Parameter 0 is entered, this parameter is not used.

If Parameter 0 is not entered, this parameter is the number of consecutive System Area sectors to read.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: If the System Area Logical Sector Address was entered and the Transfer Length was not entered, then only the specified sector will be read.

If both the System Area Logical Sector Address and Transfer Length are not entered, then the Transfer Length will be set based on the Test Space that is selected. If the Random Transfer Length option is selected, a random value will be used that is less than or equal to the number of sectors remaining on the track. If the Random Transfer Length option is not selected, the number of sectors remaining on the track will be read.

If a Transfer Length is entered, it will be limited to the number of sectors remaining on the track.

3 - Read Long Physical Sector Address Flag.

If Parameter 0 is entered and any value is entered for this parameter, then Parameter 0 specifies a physical sector address. If Parameter 0 is entered and this parameter is not entered, then Parameter 0 specifies a User Area logical sector address.

If Parameter 0 is not entered, then this parameter is not used.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

4 - Read Long Options.

If Parameter 0 is not entered, this parameter is not used.

If Parameter 0 is entered, this parameter is a bit-significant value that specifies the following options for a Read Long operation.

Bits 15-1: not used.

Bit 0: Enable ECC Correction for Read Long.

If this bit is set ECC Correction will be enabled for the read long operation, else ECC Correction will be disabled.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (ECC Correction disabled)

5 - System Area Read Options.

If Parameter 0 is entered, this parameter is not used.

If Parameter 0 is not entered, this parameter is a bit-significant value that allows the user to select the following options for a System Area Read operation.

Bits 15-5: not used.

Bit 4: Read All Test Space Sectors.

If this bit is set, all of the System Area Sectors in the Test Space will be read, else only the System Area Sectors specified by Parameters 1 and 2 will be read.

Bit 3: not used.

Bit 2: Rotate Buffer Sector Offset.

If this bit is set, the Target Buffer Sector Offset will be rotated by 1 prior to the execution of this diagnostic command.
This bit was originally added to help writing random data pattern reduce execution time by not having to re-fill the diagnostic buffer with new random data pattern, which takes great amount of time, but just rotating the Target Buffer Sector Offset at every time this diagnostic command is executed with this option set.
To see or change the current Targer Buffer Sector Offset, please refer all Level 'A', Set Test Space, diagnostic command for detail how-to.

Bit 1: Enable Dynamic Sparing.

If this bit is set, sectors containing media defects that meet the failure criteria will be spared.

Bit 0: Continue On Error.

If this bit is set and an error occurs, the read operation will continue and attempt to read all of the requested sectors. Each error encountered will be displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Read the requested sectors,
Disable Dynamic Sparing,
Stop On Error)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Next User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

or

"Next System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is the Disk Logical Block Address of the sector in error

ffffff is the Logical Cylinder Address of the sector in error

g is the Logical Head Address of the sector in error

hhhh is the Logical Sector Address of the sector in error

iiiiii is the Physical Cylinder Address of the sector in error

j is the Logical Head Address of the sector in error

kkkk is the Physical Sector Address of the sector in error llllllll is the number of sectors remaining to be read or written

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0:	Enables the R/W Status and R/W Error to be displayed
Bit 1:	Enable the Next Address to be displayed
Bit 2:	Enables the Track Position and Track Follow Offset to be displayed
Bit 3:	Enables the Target Address to be displayed
Bit 4:	Enables the Recovery Status to be displayed
Bit 5:	Enables the Fault Status to be displayed
Bit 6:	Enables the Elapsed Time to be displayed
Bits 31-7:	NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 1 is set, the Next Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed as follows.

"Target User LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

or

"Target System LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

where

pppppppp is the starting Disk Logical Block Address

qqqqqq is the starting Logical Cylinder Address

r is the starting Logical Head Address

ssss is the starting Logical Sector Address

tttttt is the starting Physical Cylinder Address

u is the starting Logical Head Address

vvvv is the starting Physical Sector Address

wwwwwwww is the starting Transfer Length

If Bit 4 is set, the Recovery Status will be displayed as follows.

"Recovered User LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

or

"Recovered System LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

where

AAAAAAAA is the Disk Logical Block Address of the last recovered sector

BBBBBB is the Logical Cylinder Address of the last recovered sector

C is the Logical Head Address of the last recovered sector

DDDD is the Logical Sector Address of the last recovered sector

EEEEEE is the Physical Cylinder Address of the last recovered sector

F is the Logical Head Address of the last recovered sector

GGGG is the Physical Sector Address of the last recovered sector

HHHH are the Recovery Flags reported by the Read/Write code

II is the Recovery Count reported by the Read/Write code

If Bit 5 is set, the Fault Status will be displayed as follows.

"Drive Fault Status JJJJ Preamp Fault Status KKKK"

where

JJJJ is the Drive Fault Status reported by the Read/Write code

KKKK is the Preamp Fault Status reported by the Read/Write code

If Bit 6 is set, the Elapsed Time for the read/write operation will be displayed.

"Elapsed Time a mins b secs" or
"Elapsed Time b.c secs" or
"Elapsed Time c.d msecs"

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

Examples:

Example #1:
To read a single logical system sector
(in this case logical sector 23 on logical system cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1,,,,1
F3 2>r,23
```

Example #2:
To read multiple logical system sectors
(in this case logical sectors 23 to 26 on logical system cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1,,,,1
F3 2>r,23,4
```

Example #3:
To read all of the logical system sectors on a track
(in this case all logical sectors on logical system cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1,,,,1
F3 2>r
```

Example #4:
To read all of the logical system sectors on multiple tracks
(in this case all logical sectors on logical system cylinders 45 to 49 head 0)

Note: You must seek to the track before the first one to be read.

```
F3 2>A3
F3 2>S44,0,,,,1
F3 2>L,5
F3 2>r
```

Example #5:
To read all of the logical system sectors on a track and continue on error
(in this case all logical sectors on logical cylinder 45 head 0)

Note: An error message will be displayed for each sector in error.

```
F3 2>A0
F3 2>S45,0,,,,1
F3 2>r,,,,,1
```

Example #6:
To read all of the logical system sectors in the test space and continue on error

Note: The Test Space is selected by the all level 'A' command. An error message will be displayed for each sector in error.

```
F3 2>r,,,,,11
```

Example #7:
To read long a single logical sector
(in this case logical sector 32 on logical cylinder 54 head 0)

```
F3 2>A0
F3 2>S54,0
F3 2>r32
```

Example #8:
To read long multiple logical sectors
(in this case logical sectors 32 to 33 on logical cylinder 54 head 0)

```
F3 2>A0
F3 2>S54,0
F3 2>r32,2
```

Example #9:
To read long a single physical sector

(in this case physical sector 32 on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>r32,,,1
```

Example #10:
To read long multiple physical sectors
(in this case physical sectors 32 to 33 on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>r32,2,,1
```

Example #11:
To read a single logical system sector to a specific sector offset in the diagnostic read buffer
(in this case logical sector 23 on logical system cylinder 45 head 1,
to the sector offset of 5 in the diagnostic read buffer)

```
F3 2>A0
F3 2>AF,5
F3 2>S45,1,,,,1
F3 2>r,23
```

Example #12:
To rotate the buffer sector offset by 1 and read a single logical system sector to the rotated sector offset in the diagnostic read buffer
(This example assumes user ran the Example #11 above right before this example,
in this case logical sector 24 on logical system cylinder 45 head 1,
to the sector offset of 6 in the diagnostic read buffer)

```
F3 2>r,24,,,,4
```

Revision History:

0001.0000	Initial revision.
0001.0001	Eliminated the Enable ZAP Updates and Enable Track Skipping option.
0001.0002	Added new Rotate Buffer Sector Offset option to the bit 2 of the parameter 5.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Read Non-Volatile Adaptive Parameters (Level 7 'r' and Level T 'R')

Description:
This command reads the specified adaptive parameters from non-volatile memory.

Quick Help:

Level 7
"RdNonVolatileAdaptiveParms, r[Opts]";
Level T
"RdNonVolatileAdaptiveParms, R[Opts]";

Input Parameters:

0 - Read Adaptive Parameter Options.

This parameter is a bit significant value that specifies which adaptive parameters are to be read from non-volatile memory.

Bits 31-3: not used

Bit 2: Read SAP.

If this bit is set the Servo Adaptive Parameters (SAP) will be read from non-volatile memory.

Bit 1: Read RAP.

If this bit is set the Read/Write Adaptive Parameters (RAP) will be read from non-volatile memory.

Bit 0: Read CAP.

If this bit is set the Controller Adaptive Parameters (CAP) will be read from non-volatile memory.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff,

Default: 0x7 (Read the SAP, RAP and CAP)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Read Peripheral Register - channel or preamp (Level 7 't')

Description:

This command reads and displays the contents from the specified register(s) from the specified peripheral device.

Quick Help:

"RdPeripheralReg, t[OpType],[RegAddr],[NumRegs],[RegMask],[RegPagAddr]";

Input Parameters:

0 - Operation Type.

This parameter selects the type of peripheral device operation to be performed.

0 = Read Preamp Register
1 = Read Read Channel Register

Type: Unsigned 8-bit value

Range: 0 or 1

Default: 1 (Read Read Channel Register)

1 - Register Address Offset.

This parameter specifies the address offset of the peripheral register to be read. If the peripheral registers has the page address mode, this parameter specifies the address offset in the page, which has been specified by the parameter 1, Register Page Address. Otherwise, it simply specifies the register address offset in the whole range of the register address.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0

2 - Number of Registers to Read.

This parameter specifies the number of consecutive peripheral registers to read and display.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 1

3 - Register Mask.

This parameter specifies the bit mask with which the specified field of the register value is to be read from the register, when Parameter 3, Number of Registers to Read, is equal to one.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0xFFFF

4 - Register Page Address.

This parameter specifies the page address of the peripheral register to be read. If the peripheral registers do not have page address in its address mode, this input parameter is not needed and its defaul value does not affect the read from the peripheral register.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

```
"DiagError aaaaaaaa "
```

where

aaaaaaaa is the Diagnostic Error Code

If a single Preamp register was read, the following information will be displayed.

```
"Preamp Reg cc = dd"
```

where

cc is the address of the register that was read

dd is the value that was read from the register

If multiple Preamp registers were read, the following information will be displayed.

```
"Preamp"
"    0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F"
"cc: dd dd dd dd dd dd dd dd dd dd dd dd dd dd dd dd"
```

where

cc is the address of the first register in the row

dd is the value that was read from the register

If a single Read Channel register was read, the following information will be displayed.

```
"Read Channel Reg cccc = dddd"
```

where

cccc is the address of the register that was read

dddd is the value that was read from the register

If multiple Read Channel registers were read, the following information will be displayed.

```
"Read Channel"
"      0    1    2    3    4    5    6    7    8    A    B    C    D    E    F"
"cccc: dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd"
```

where

cccc is the address of the first register in the row

dddd is the value that was read from the register

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External

Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Read Servo RAM at Address (Level 5 'R')

Description:

The Read Servo RAM at Address command reads and displays the data contained in the specified Servo RAM locations.

Quick Help:

"RdServoRamAtAddr, R[Addr],[NumBytes]";

Input Parameters:

0 - Servo RAM Address.

This parameter specifies the address of the first servo RAM byte to be read.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: None

1 - Number of Bytes.

This parameter specifies the number of servo RAM bytes to be read and displayed.

Type: Unsigned 8-bit value

Range: 1, 2 and 4 are the allowed values

Default: 2

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following information will be displayed.

"Servo Data RAM Addr cccccccc RAM Data dd" or
"Servo Data RAM Addr cccccccc RAM Data eeee" or
"Servo Data RAM Addr cccccccc RAM Data ffffffff"

where

cccccccc is the address of the first servo RAM byte that was read

dd is an 8-bit value that was read from servo RAM

eeee is a 16-bit value that was read from servo RAM ffffffff is a 32-bit value that was read from servo RAM

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Read Servo RAM at Index (Level 5 'r')

Description:

The Read Servo RAM at Index command reads and displays data contained in Servo RAM. The base address of the Servo RAM location to be read is retrieved from the Servo Symbol Table at the specified index and an optional byte offset is added to it.

Quick Help:

"RdServoRamAtIndex, r[Index],[NumBytes],[ByteOffset]";

Input Parameters:

0 - Servo Symbol Table Index.

This parameter specifies the index of the Servo Symbol Table entry that contains the base address of the Servo RAM location to be read.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

1 - Number of Bytes.

This parameter specifies the number of servo RAM bytes to be read and displayed.

Type: Unsigned 8-bit value

Range: 1, 2 and 4 are the allowed values

Default: 2

2 - Byte offset from base address.

This parameter is an optional byte offset which will be added to the address of the servo RAM location to be read.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following information will be displayed.

"Servo Symbol Table Index cccc RAM Data dd" or
"Servo Symbol Table Index cccc RAM Data eeee" or
"Servo Symbol Table Index cccc RAM Data ffffffff"

where

cccccccc is the index of the Servo Symbol Table entry that contains the address of the Servo RAM location to be read.

dd is an 8-bit value that was read from servo RAM

eeee is a 16-bit value that was read from servo RAM

ffffffff is a 32-bit value that was read from servo RAM

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Read Servo Symbol Table at Index (Level 5 'i')

Description:
The Read Servo Symbol Table at Index command reads and displays the Servo Symbol Table entry at the specified index.

Quick Help:

"RdServoSymbolTableAtIndex, i[Index]";

Input Parameters:

0 - Servo Symbol Table Index.

This parameter specifies the index of the Servo Symbol Table entry to be read.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the follwing information will be displayed.

"Servo Symbol Table Index cccc Value dddddddd"

where

cccccccc is the index of the Servo Symbol Table entry that was read

dddddddd is the data that was read from the Servo Symbol Table

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Read System CHS (Level F 'r')

Description:

This command reads data from the disk starting at the specified sector on the System Area target track for the specified number of sectors. The data is read into the Diagnostic Read Buffer.

Quick Help:

"RdSystemChs, r[LogSec],[NumSecs],[Opts]";

Input Parameters:

0 - System Area Logical Sector Address.

This parameter contains the System Area logical sector address of the first sector to read.

Type: Unsigned 16-bit value

Range: 0 to maximum logical sector address on the target track

Default: 0

1 - Transfer Length.

This parameter specifies the number of consecutive sectors to read.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: If the Sector Address was entered and the Transfer Length was not entered, then only the specified sector will be read.

If both the Sector Address and Transfer Length are not entered, then the Transfer Length will be set based on the Test Space that is selected.
If the Random Transfer Length option is selected, a random value will be used that is less than or equal to the number of sectors remaining on the track. If the Random Transfer Length option is not selected, the number of sectors remaining on the track will be read.

If a Transfer Length is entered, it will be limited to the number of sectors remaining on the track.

2 - Options.

This parameter is a bit-significant value that allows the user to select the following options.

Bits 15-5: not used.

Bit 4: Read All Test Space Sectors.

If this bit is set, all of the sectors in the Test Space will be read, else only the sectors specified by Parameters 0 and 1 will be read.

Bit 3: not used.

Bit 2: Rotate Buffer Sector Offset.

If this bit is set, the Target Buffer Sector Offset will be rotated by 1 prior to the execution of this diagnostic command.
This bit was originally added to help writing random data pattern reduce execution time by not having to re-fill the diagnostic buffer with new random data pattern, which takes great amount of time, but just rotating the Target Buffer Sector Offset at every time this diagnostic command is executed with this option set.
To see or change the current Targer Buffer Sector Offset, please refer all Level 'A', Set Test Space, diagnostic command for detail how-to.

Bit 1: Enable Dynamic Sparing.

If this bit is set, sectors containing media defects that meet the failure criteria will be spared.

Bit 0: Continue On Error.

If this bit is set and an error occurs, the read operation will continue and attempt to read all of the requested sectors. Each error encountered will be displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Read the requested sectors,
Disable Dynamic Sparing,
Stop On Error)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Next User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

or

"Next System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is the Disk Logical Block Address of the sector in error

ffffff is the Logical Cylinder Address of the sector in error

g is the Logical Head Address of the sector in error

hhhh is the Logical Sector Address of the sector in error

iiiiii is the Physical Cylinder Address of the sector in error

j is the Logical Head Address of the sector in error

kkkk is the Physical Sector Address of the sector in error

llllllll is the number of sectors remaining to be read or written

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: Enable the Next Address to be displayed
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed
Bit 4: Enables the Recovery Status to be displayed
Bit 5: Enables the Fault Status to be displayed
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 1 is set, the Next Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or

"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed as follows.

"Target User LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

or

"Target System LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

where

pppppppp is the starting Disk Logical Block Address

qqqqqq is the starting Logical Cylinder Address

r is the starting Logical Head Address

ssss is the starting Logical Sector Address

tttttt is the starting Physical Cylinder Address

u is the starting Logical Head Address

vvvv is the starting Physical Sector Address

wwwwwwww is the starting Transfer Length

If Bit 4 is set, the Recovery Status will be displayed as follows.

"Recovered User LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

or

"Recovered System LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

where

AAAAAAAA is the Disk Logical Block Address of the last recovered sector

BBBBBB is the Logical Cylinder Address of the last recovered sector

C is the Logical Head Address of the last recovered sector

DDDD is the Logical Sector Address of the last recovered sector

EEEEEE is the Physical Cylinder Address of the last recovered sector

F is the Logical Head Address of the last recovered sector

GGGG is the Physical Sector Address of the last recovered sector

HHHH are the Recovery Flags reported by the Read/Write code

II is the Recovery Count reported by the Read/Write code

If Bit 5 is set, the Fault Status will be displayed as follows.

"Drive Fault Status JJJJ Preamp Fault Status KKKK"

where

JJJJ is the Drive Fault Status reported by the Read/Write code

KKKK is the Preamp Fault Status reported by the Read/Write code

If Bit 6 is set, the Elapsed Time for the read/write operation will be displayed.

```
"Elapsed Time a mins b secs"  or
"Elapsed Time b.c secs"       or
"Elapsed Time c.d msecs"
```

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

Examples:

Example #1:

To read a single logical system sector
(in this case logical sector 23 on logical system cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1,,,,1
F3 2>/F
F3 F>r23
```

Example #2:

To read multiple logical system sectors
(in this case logical sectors 23 to 26 on logical system cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1,,,,1
F3 2>/F
F3 F>r23,4
```

Example #3:

To read all of the logical system sectors on a track
(in this case all logical sectors on logical system cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1,,,,1
F3 2>/F
F3 F>r
```

Example #4:

To read all of the logical system sectors on multiple tracks
(in this case all logical sectors on logical system cylinders 45 to 49 head 0)

Note: You must seek to the track before the first one to be read.

```
F3 2>A3
F3 2>S44,0,,,,1
F3 2>/F
F3 F>L,5
F3 F>r
```

Example #5:
To read all of the logical system sectors on a track and continue on error
(in this case all logical sectors on logical cylinder 45 head 0)

Note: An error message will be displayed for each sector in error.

```
F3 2>A0
F3 2>S45,0,,,,1
F3 2>/F
F3 F>r,,1
```

Example #6:
To read all of the logical system sectors in the test space and continue on error

Note: The Test Space is selected by the all level 'A' command. An error message will be displayed for each sector in error.

```
F3 F>r,,11
```

Example #7:
To read a single logical system sector to a specific sector offset in the diagnostic read buffer
(in this case logical sector 23 on logical system cylinder 45 head 1,
to the sector offset of 5 in the diagnostic read buffer)

```
F3 2>A0
F3 2>AF,5
F3 2>S45,1,,,,1
F3 2>/F
F3 F>r23
```

Example #8:
To rotate the buffer sector offset by 1 and read a single logical system sector to the rotated sector offset in the diagnostic read buffer
(This example assumes user ran the Example #7 above right before this example,
in this case logical sector 24 on logical system cylinder 45 head 1,
to the sector offset of 6 in the diagnostic read buffer)

```
F3 F>r24,,4
```

Revision History:

0001.0000	Initial revision.
0001.0001	Eliminated the Enable ZAP Updates and Enable Track Skipping option.
0001.0002	Added new Rotate Buffer Sector Offset option to the bit 2 of the parameter 2.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Read / Unlock DDR Buffer (Level 5 'D')

Description:

This command is used to either read the entire DDR data from DDR buffer, or unlock DDR buffer to resume DDR data collection.

Quick Help:

"ReadUnlockDdrBuffer, B[OperateCode]";

Input Parameters:

0 - Operate code to determine if this is a read or unlock command

When this parameter is entered as the value of 0FFFFh, it is an Unlock DDR Buffer command. The purpose is to resume DDR data collection in servo.

When this parameter is not entered or entered as a valid value other than 0FFFFh, it is a Read Entire DDR Data from DDR Buffer command.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0.

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

When this is an Unlock DDR Buffer command, the result is
DDR buffer is unlocked

When this is a Read Entire DDR Buffer command, the result is

```
DDR buffer locked: a
Total Revs:        bbbbb
Revs after Event:  ccccc
Data per Servo:    ddddd
Servos per Rev:    eeeee
 ffff gggg hhhh ...
 ...
 xxxx yyyy zzzz ...
```

where

a is either 0 or 1. 0 means DDR buffer is not locked and 1 means DDR buffer is locked.
bbbbb is the total revs of data stored in DDR buffer (in decimal format)
ccccc is the revs of data after the DDR event (in decimal format)
ddddd is the number of DDR data per servo wedge (in decimal format)
eeeee is the number of servo wedges per rev (in decimal format)
ffff, gggg, hhhh, ... , xxxx, yyyy, and zzzz are autual DDR data (in hex format)
The DDR data are displayed in the way that all DDR data from the same servo wedge are at the same line. So the total number of lines of actual DDR data = Total Revs (bbbbb) * Servos per Rev (eeee).

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Read Verify CHS (Level 2 'V')

Description:

This command reads data from the disk starting at the specified sector on the target track for the specified number of sectors. The data is read into the Diagnostic Read Buffer and is compared to the data contained in the specified buffer.

Quick Help:

"RdVerifyChs, V[Sec],[NumSecs],[CompareBlk],[Opts]";

Input Parameters:

0 - Logical or Physical Sector Address.

If Parameter 3 bit 5 is set, this parameter contains the physical sector address of the first sector to read, else this parameter contains the User Area logical sector address of the first sector to read.

Type: Unsigned 16-bit value

Range: 0 to maximum logical or physical sector address on the target track

Default: 0

1 - Transfer Length.

This parameter specifies the number of consecutive sectors to read.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: If the Sector Address was entered and the Transfer Length was not entered, then only the specified sector will be read.

If both the Sector Address and Transfer Length are not entered, then the Transfer Length will be set based on the Test Space that is selected. If the Random Transfer Length option is selected, a random value will be used that is less than or equal to the number of sectors remaining on the track. If the Random Transfer Length option is not selected, the number of sectors remaining on the track will be read.

If a Transfer Length is entered, it will be limited to the number of sectors remaining on the track.

2 - Compare Buffer Block Number.

This parameter specifies the number of the buffer block that contains the data to be compared to the data that is read.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: If a Compare Buffer Block Number is not specified, the data read will be compared to the data contained in the Diagnostic Write Buffer.

3 - Options.

This parameter is a bit-significant value that allows the user to select the following options.

Bits 15-6: not used.

Bit 5: Read and Verify Physical Sectors.

If this bit is set, Parameter 0 specifies a physical sector address, else it specifies a User Area logical sector address.

Bit 4: Read All Test Space Sectors.

If this bit is set, all of the sectors in the Test Space will be read, else only the System Area Sectors specified by Parameters 0 and 1 will be read.

Bit 3: not used.

Bit 2: Rotate Buffer Sector Offset.

If this bit is set, the Target Buffer Sector Offset will be rotated by 1 prior to the execution of this diagnostic command.
This bit was originally added to help writing random data pattern reduce execution time by not having to re-fill the diagnostic buffer with new random data pattern, which takes great amount of time, but just rotating the Target Buffer Sector Offset at every time this diagnostic command is executed with this option set.
To see or change the current Targer Buffer Sector Offset, please refer all Level 'A', Set Test Space, diagnostic command for detail how-to.

Bit 1: Enable Dynamic Sparing.

If this bit is set, sectors containing media defects that meet the failure criteria will be spared.

Bit 0: Continue On Error.

If this bit is set and an error occurs, the read operation will continue and attempt to read all of the requested sectors. Each error encountered will be displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Read and Verify Logical User Area Sectors,
Read the requested sectors,
Disable Dynamic Sparing,
Stop On Error)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Next User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

or

"Next System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is the Disk Logical Block Address of the sector in error

ffffff is the Logical Cylinder Address of the sector in error

g is the Logical Head Address of the sector in error

hhhh is the Logical Sector Address of the sector in error

iiiiii is the Physical Cylinder Address of the sector in error

j is the Logical Head Address of the sector in error

kkkk is the Physical Sector Address of the sector in error

llllllll is the number of sectors remaining to be read or written

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: Enable the Next Address to be displayed
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed
Bit 4: Enables the Recovery Status to be displayed
Bit 5: Enables the Fault Status to be displayed
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 1 is set, the Next Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed as follows.

"Target User LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

or

"Target System LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

where

pppppppp is the starting Disk Logical Block Address

qqqqqq is the starting Logical Cylinder Address

r is the starting Logical Head Address

ssss is the starting Logical Sector Address

tttttt is the starting Physical Cylinder Address

u is the starting Logical Head Address

vvvv is the starting Physical Sector Address

wwwwwwww is the starting Transfer Length

If Bit 4 is set, the Recovery Status will be displayed as follows.

"Recovered User LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

or

"Recovered System LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

where

AAAAAAAA is the Disk Logical Block Address of the last recovered sector

BBBBBB is the Logical Cylinder Address of the last recovered sector

C is the Logical Head Address of the last recovered sector

DDDD is the Logical Sector Address of the last recovered sector

EEEEEE is the Physical Cylinder Address of the last recovered sector

F is the Logical Head Address of the last recovered sector

GGGG is the Physical Sector Address of the last recovered sector

HHHH are the Recovery Flags reported by the Read/Write code

II is the Recovery Count reported by the Read/Write code

If Bit 5 is set, the Fault Status will be displayed as follows.

"Drive Fault Status JJJJ Preamp Fault Status KKKK"

where

JJJJ is the Drive Fault Status reported by the Read/Write code

KKKK is the Preamp Fault Status reported by the Read/Write code

If Bit 6 is set, the Elapsed Time for the read/write operation will be displayed.

"Elapsed Time a mins b secs" or
"Elapsed Time b.c secs" or
"Elapsed Time c.d msecs"

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

or

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If a data miscompare was detected during a read compare operation, the followed information will be displayed.

"DiagError aaaaaaaa"

followed by

"User LBA cccccccc LLL CHS dddddd.e.ffff PLP CHS gggggg.h.iiii"
"Byte Offset = jjjj Expected = kk Actual = ll"

or

"System LBA cccccccc LLL CHS dddddd.e.ffff PLP CHS gggggg.h.iiii"
"Byte Offset = jjjj Expected = kk Actual = ll"

where

aaaaaaaa is the Diagnostic Error Code

cccccccc is the Disk Logical Block Address of the sector that miscompared

dddddd is the Logical Cylinder Address of the sector that miscompared

e is the Logical Head Address of the sector that miscompared ffff is the Logical Sector Address of the sector that miscompared

gggggg is the Physical Cylinder Address of the sector that miscompared

h is the Logical Head Address of the sector that miscompared

iiii is the Physical Sector Address of the sector that miscompared

jjjj is the byte offset from the start of the sector to the byte that miscompared

kk is the expected byte value

ll is the actual byte value

Examples:

Example #1:
To read and verify a single logical sector
(in this case logical sector 23 on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>V23
```

Example #2:
To read and verify multiple logical sectors
(in this case logical sectors 23 to 26 on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>V23,4
```

Example #3:
To read and verify all of the logical sectors on a track
(in this case all logical sectors on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>V
```

Example #4:
To read and verify all of the logical sectors on multiple tracks
(in this case all logical sectors on logical cylinders 45 to 49 head 0)

Note: You must seek to the track before the first one to be read.

```
F3 2>A3
F3 2>S44,0
F3 2>L,5
F3 2>V
```

Example #5:
To read and verify all of the logical sectors on a track and continue on error
(in this case all logical sectors on logical cylinder 45 head 0)

Note: An error message will be displayed for each sector in error.

```
F3 2>A0
F3 2>S45,0
F3 2>V,,,1
```

Example #6:
To read and verify all of the logical sectors in the test space and continue on error

Note: The Test Space is selected by the all level 'A' command. An error message will be displayed for each sector in error.

```
F3 2>V,,,11
```

Example #7:
To read and verify a single physical sector
(in this case physical sector 32 on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>V32,,,20
```

Example #8:
To read and verify multiple physical sectors
(in this case physical sectors 32 to 35 on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>V32,4,,20
```

Example #9:
To read and verify all of the physical sectors on a track
(in this case all physical sectors on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>V,,,20
```

Example #10:
To read a single logical sector to a specific sector offset in the diagnostic read buffer, then compare the data at the sector offset in the diagnostic read buffer against the data at the same sector offset in the diagnostic write buffer to verity the data
(in this case logical sector 23 on logical cylinder 45 head 1,
to the sector offset of 5 in the diagnostic read buffer)

```
F3 2>A0
F3 2>AF,5
F3 2>S45,1
F3 2>V23
```

Example #11:
To rotate the buffer sector offset by 1 and read a single logical sector to the rotated sector offset in the diagnostic read buffer, then compare the data at the sector offset in the diagnostic read buffer against the data at the same sector offset in the diagnostic write buffer to verity the data
(This example assumes user ran the Example #10 above right before this example,
in this case logical sector 24 on logical cylinder 45 head 1,
to the sector offset of 6 in the diagnostic read buffer)

```
F3 2>V24,,,4
```

Revision History:

0001.0000	Initial revision.
0001.0001	Eliminated the Enable ZAP Updates and Enable Track Skipping option.
0001.0002	Added new Rotate Buffer Sector Offset option to the bit 2 of the parameter 3.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Read Wedge (Level 2 'j' or Level E 'C')

Description:

This command reads data from the disk starting at the specified data wedge for the specified number of data wedges. The data is read into the Diagnostic Read Buffer. At meanwhile the channel registers are sampled, if the register address are specified.

Quick Help:

```
   Level 2
"RdWedge, j[WedgeAddr],[NumWedges],[NumSkipedWedges],[TranSize],[Opts],[RegAddr0],...,[RegAdd
   Level E
"RdWedge, C[WedgeAddr],[NumWedges],[NumSkipedWedges],[TranSize],[Opts],[RegAddr0],...,[RegAdd
```

Input Parameters:

0 - Wedge Address.

This parameter specifies the address of the first wedge to be read.

Type: Unsigned 16-bit value

Range: 0 to maximum Wedge Address

Default: 0

1 - Transfer Length.

This parameter specifies the number of wedges to be read.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: If the Wedge Address is entered and the Transfer Length is not entered, then only the specified wedge will be read.

If both the Wedge Address and Transfer Length are not entered, then the Transfer Length will be set based on the Test Space that is selected. If the Random Transfer Length option is selected, a random value will be used that is less than or equal to the number of wedges remaining on the track. If the Random Transfer Length option is not selected, the number of wedges remaining on the track will be read.

If a Transfer Length is entered, it will be limited to the number of wedges remaining on the track.

2 - Skipped Wedges.

This parameter specifies the number of wedges to skip after each wedge read.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Disable wedge skipping)

3 - Wedge Size in NRZ Symbols.

This parameter specifies the number of NRZ symbols to be transfered from each wedge.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0 (Use native (max) wedge size)

4 - Options.

This parameter is a bit significant value that selects the following options:

Bit 1 - Continue on Sync Error.

If this bit is equal to 1, the wedge read operation will not stop when a sync error occurs.

Bit 0 - Formatted Wedge Read.

If this bit is equal to 1, a formatted wedge read operation will be performed. If this bit is equal to 0, an unformatted wedge read operation will be performed. A formatted wedge read attempts to detect a sync mark preceeding the wedge data. An unfomatted wedge read does not attempt to detect a sync mark before the wedge data.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0x00000001 (Stop on Sync Error, Formatted Wedge Read)

5 - Channel Register Address.

This parameter specifies the address of the 1st Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

6 - Channel Register Address.

This parameter specifies the address of the 2nd Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

7 - Channel Register Address.

This parameter specifies the address of the 3rd Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

8 - Channel Register Address.

This parameter specifies the address of the 4th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

9 - Channel Register Address.

This parameter specifies the address of the 5th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

10 - Channel Register Address.

This parameter specifies the address of the 6th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

11 - Channel Register Address.

This parameter specifies the address of the 7th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

12 - Channel Register Address.

This parameter specifies the address of the 8th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

13 - Channel Register Address.

This parameter specifies the address of the 9th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

14 - Channel Register Address.

This parameter specifies the address of the 10th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

15 - Channel Register Address.

This parameter specifies the address of the 11th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

16 - Channel Register Address.

This parameter specifies the address of the 12th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

17 - Channel Register Address.

This parameter specifies the address of the 13th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

18 - Channel Register Address.

This parameter specifies the address of the 14th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

Output Data:

If no error occurred and one or more read channel register was specified for data collection, the following information will be displayed.

```
"  RegAddr      aaaa      aaaa      aaaa      ... aaaa"
"  Min          bbbbbbbb  bbbbbbbb  bbbbbbbb  ... bbbbbbbb"
"  Max          cccccccc  cccccccc  cccccccc  ... cccccccc"
"  Mean         dddddddd  dddddddd  dddddddd  ... dddddddd"
"  StdDev       eeeeee.ee eeeeee.ee eeeeee.ee ...  eeeeee.ee"
```

where

aaaa is the address of the channel register that was read

bbbbbbbb is the minimum value that was read from the channel register

cccccccc is the maximum value that was read from the channel register

dddddddd is the mean of the values read from the channel register

eeeeee.ee is the standard deviation of the values read from the channel register

If no error occurred, one or more read channel register was specified for data collection and Raw ASCII output mode is selected, the following additional information will be displayed for each wedge and channel register for which data was collected.

"Wedge ffff RegAddr gggg RegData hhhhhhhh Error ii"

where

ffff is the wedge address

gggg is the address of the channel register that was read

hhhhhhhh is the value read from the channel register

ii is the error that was logged for the wedge

00 = No Error
04 = Sync Error

If no error occurred, no read channel registers were specified for data collection and the Continue On Sync Error option was selected, the following additional information will be displayed.

"Wedges with Sync Errors: jjjj jjjj jjjj ... jjjj"

where

jjjj is the address of a wedge with a sync error

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Next User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

or

"Next System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is the Disk Logical Block Address of the sector in error

ffffff is the Logical Cylinder Address of the sector in error

g is the Logical Head Address of the sector in error

hhhh is the Logical Sector Address of the sector in error

iiiiii is the Physical Cylinder Address of the sector in error

j is the Logical Head Address of the sector in error

kkkk is the Physical Sector Address of the sector in error

llllllll is the number of sectors remaining to be read or written

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: Enable the Next Address to be displayed
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed
Bit 4: Enables the Recovery Status to be displayed
Bit 5: Enables the Fault Status to be displayed
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 1 is set, the Next Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed as follows.

"Target User LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

or

"Target System LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

where

pppppppp is the starting Disk Logical Block Address

qqqqqq is the starting Logical Cylinder Address

r is the starting Logical Head Address

ssss is the starting Logical Sector Address

tttttt is the starting Physical Cylinder Address

u is the starting Logical Head Address

vvvv is the starting Physical Sector Address

wwwwwwww is the starting Transfer Length

If Bit 4 is set, the Recovery Status will be displayed as follows.

"Recovered User LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

or

"Recovered System LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

where

AAAAAAAA is the Disk Logical Block Address of the last recovered sector

BBBBBB is the Logical Cylinder Address of the last recovered sector

C is the Logical Head Address of the last recovered sector

DDDD is the Logical Sector Address of the last recovered sector

EEEEEE is the Physical Cylinder Address of the last recovered sector

F is the Logical Head Address of the last recovered sector

GGGG is the Physical Sector Address of the last recovered sector

HHHH are the Recovery Flags reported by the Read/Write code

II is the Recovery Count reported by the Read/Write code

If Bit 5 is set, the Fault Status will be displayed as follows.

"Drive Fault Status JJJJ Preamp Fault Status KKKK"

where

JJJJ is the Drive Fault Status reported by the Read/Write code

KKKK is the Preamp Fault Status reported by the Read/Write code

If Bit 6 is set, the Elapsed Time for the read/write operation will be displayed.

```
"Elapsed Time a mins b secs"  or
"Elapsed Time b.c secs"       or
"Elapsed Time c.d msecs"
```

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

Examples:

Example #1:
To read a single wedge
(in this case wedge 23 on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>j23
```

Example #2:
To read multiple wedges
(in this case wedges 23 to 26 on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>j23,4
```

Example #3:
To read all of the wedges on a track
(in this case all wedges on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>j
```

Example #4:
To read all of the wedges on multiple tracks
(in this case all wedges on logical cylinders 45 to 49 head 0)

Note: You must seek to the track before the first one to be read.

```
F3 2>A3
F3 2>S44,0
F3 2>L,5
F3 2>j
```

Example #5:

To read all of the wedges on a track and continue on sync errors
(in this case all logical sectors on logical cylinder 45 head 0)

Note: An error message will be displayed for each sector in error.

```
F3 2>A0
F3 2>S45,0
F3 2>j,,,,2
```

Revision History:

0001.0000	Initial revision.
0001.0001	Increase the number of channel registers for the data collection.
0002.0000	Added Continue on Sync Error and Formatted Wedge Read options.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Read Zap from Disc to Table (Level 5 'Z')

Description:

The Read Zap from Disc to Table command reads ZAP data from disc into ZAP table in Servo ZAP Table.

Quick Help:

"RdZapFromDiscToTable, Z";

Input Parameters:

None

Output Data:

None

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Real Time Servo Trace (Level 3 'f')

Description:

The Real Time Servo Trace command executes the specified Real Time Servo Data Collection function which collects specified data at every servo burst and then sends out the result in binary data format.

3>f0 collects PES (16-bits) data at the current track for the speficied revs (or until the maximum data allowed).

3>f2 seeks for the spefified length, reads/writes one sector at the target track, and collects 3 words in the following order: Servo Loop Code, 16-bit PES, and Servo Unsafe status. The collection is from the beginning of the seek until specified extra revs after the head is settled. (Note: 2 extra 0FFFFh are added at the end of data collected).
Note: The high byte of this sub-command ID is used to determine if this is a read or write seek. When the high byte is 1, it is a write seek. When the high byte is 0, it

is a read seek. So 3>f102 is a write seek and 3>f2 is a read seek.

3>f3 writes the full track at the current location and collects 4 words in the following order: Servo Loop Code, PES (16-bits), Servo Burst Number, and Servo Unsafe Code for the whole writing process. (Note: 2 extra 0FFFFh are added at the end of data collected).

Quick Help:

"RealTimeServoTrace, f[SubCmd],[SubCmdParm0],[SubCmdParm1]";

Input Parameters:

0 - Sub-command ID.

The low byte of this parameter specifies the ID of the Real Time Servo Trace command to be executed and the hugh byte is used to determine operation type that will be perform before collecting servo data.

0 = PES Collection

2 = Seek Profile (High byte value of 1 means a write seek and high byte value of 0 means a read seek. So 3>f102 is a write seek and 3>f2 is a read seek)

3 = Write And Collect Servo Data

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0

If Parameter 0's low byte is equal to 0 (PES Collection)

1 - Revs to Collect.

This parameter specifies the revs to collect the PES data. If this parameter is not entered, the default value is 100 revs.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: 100

If Parameter 0's low byte is equal to 2 (Seek Profile)

1 - Seek Length

This parameter specifies the seek length for the seek operation.

Type: Signed 32-bit value

Range: 0x80000000 to 0x7fffffff

Default: 0

2 - Number of extra revs to be collected after the head is settled

This parameter specifies the number of extra revs to be collected after the head is settled. When this parameter is not entered, 3 extra revs of data will be collected after the head is settled.

Type: Unsigned 16-bit value

Range: 0x0000 to 0xffff

Default: 3

Output Data:

The following data will be displayed:

[[[xxxxxxxx...]]]

Where:
xx is a continuous stream of binary data. The data is delimited by triple opening and closing brackets.

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).
0012.0000	Changed the output of 3>f2 command from 2 words (Servo Loop Code and PES) to 3 words (Servo Loop Code, PES, and Servo Unsafe Status).

Resume Interface Task (Online Control Q)

Description:
If the Interface Task was previously paused by the Online Control S command, this command resumes execution of the Interface Task.

Quick Help:

"ResumeInterfaceTask";

Input Parameters:
None

Output Data:
None

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Run Batch File (Level 6 'B')

Description:
This command runs the specified Diagnostic Batch File. A Batch File is sequence of Diagnostic Commands entered by the user via the serial port interface.

Quick Help:

"RunBatchFile, B[BatchFileNum],[DisplayOpt]";

Input Parameters:

0 - Batch File Number.

This parameter specifies the number of the Batch File to be executed.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: 0

1 - Options Mask.

This parameter is a bit significant value that selects the following options:

0x08 Continue Predefined Batch File Sequence On Failure.

Continue executing the predefined batch file sequence when a failure occurs.

0x04 Run Predefined Batch File Sequence.

Starting with the predefined batch file specified by Parameter 0, execute the predefined batch files in sequence. If Parameter 0 is not entered, start with the first predefined batch file and execute all of the predefined batch files in sequence.

0x02 Single Step.

Execute the batch file one command at a time, pausing and waiting for a character to be input between commands.

0x01 Display Batch File Commands.

Type: Unsigned 8-bit value

Range: 0 to 0x01

Default: 0x01 (Display batch file commands)

Output Data:

None

Revision History:

0001.0000 Initial revision.

0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Read or Write Power ASIC Register (Level 3 'V')

Description:

This command reads or writes the specified Power ASIC registers.

Quick Help:

"RwPowerAsicReg, V[RegAddr],[RegValue],[WrOpt]";

Input Parameters:

0 - Register Address.

This parameter specifies the address of the Power ASIC register to be read or written. If this parameter is not entered, all Power ASIC registers will be read and displayed.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: Read and display all Power ASIC registers

1 - Write Register Value.

If entered, this parameter specifies the value with which the Power ASIC register is to be written. If this value is not entered, the specified Power ASIC register will be read and its value displayed.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: None

2 - Write Register Valid Command Key.

For register writes, this parameter must be equal to 1. This parameter is not used for register reads.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

Output Data:

If a single Power ASIC register was read, the following information will be displayed.

"Power ASIC Reg cc = dddd"

where

cc is the address of the register that was read

dddd is the value that was read from the register

If multiple Power ASIC registers were read, the following information will be displayed.

```
"Power ASIC"
"    0    1    2    3    4    5    6    7    8    9    A    B    C    D    E    F"
"cc: dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd dddd"
```

where

cc is the address of the first register in the row

dddd is the value that was read from the register

If a Power ASIC register was written, the following information will be displayed.

"Power ASIC Reg cc = dddddddd"

where

cc is the address of the register that was written

dddddddd is the data with which the register was written

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

SATA Debug SPI SSIP (Level F 'z')

Description:
The SATA Debug command executes the specified SATA Debug function for SPI SSIP.

Input Parameters:

0 - Sub-command ID.

This parameter specifies the ID of the SATA Debug sub-command to be executed.

0 = Peek/Poke SATA registers

1 = Dump SATA registers

2 = Toggle Phy

3 = Send ALIGN pattern

4 = Send High Frequency (D10.2) pattern

5 = Send Mid Frequency (D24.3) pattern

6 = Send Lone Bit pattern

7 = Send Low Frequency (K28.7) pattern

8 = Send User Specified pattern

9 = Send PRBS pattern

A = Enable PRBS checker and watch the results
(Note: This sub-command never returns.)

B = Toggle TX SSC

C = Wait for OOB

D = Toggle speed

E = Set OOB Chirp style

F = Enable Test Muxes

10 = Phy Power Mode

11 = Loopback Mode

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

If Parameter 0 is equal to 0 (Peek / Poke SATA Registers)

1 - not used.

In the Super10 code this parameter selected the register group (Normal SATA registers or SSPI registers) to be read or written. In the Super10 Yuma architecture these registers shared the same address space and a page bit determined which registers were being accessed. In the Delta architecture each register group has its own, unique address space, so this parameter is no longer needed.

Type: NA

Range: NA

Default: NA

2 - Register Offset.

This parameter specifies the byte offset from the start of the SATA registers to the register to be read or written.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: None

3 - Register Data.

This parameter specifies the data to be written to the specified register. If this parameter is not entered, the register will be read and its value displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: None

If Parameter 0 is equal to 8 (Send User Pattern)

1 - Pattern.

This parameter specifies the 16-bit pattern to be sent.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: None

If Parameter 0 is equal to 0xE (Set OOB Type)

1 - OOB Type.

This parameter specifies the OOB Type to be set.

1 = Normal ALIGN
2 = Normal D24.3
3 = Bit Doubled ALIGN
4 = Bit Doubled D24.3

Type: Unsigned 8-bit value

Range: 1 to 4

Default: None

Output Data:

If Parameter 0 is equal to 0 (Peek / Poke SATA Registers)

If no error occurred and the SATA register was read, the following information will be displayed.

"   cccc (dddddddd) eeee"

where

cccc is the offset of the SATA register that was read

dddddddd is the address of the SATA register that was read

eeee is the register value

If no error occurred and the SATA register was written, the following information will be displayed.

"   gggg (hhhhhhhh) iiii --> jjjj = llll"

where

gggg is the offset of the register that was written

hhhhhhhh is the address of the register that was written

iiii is the value read from the register before it was written

jjjj the value with which the register was written

llll is the value read from the register after it was written

If Parameter 0 is equal to 1 (Dump SATA registers)

```
   If no error occurred, the following information will be displayed.

         "ATA registers"
         "cccc:  dddd dddd dddd ... dddd"  (repeated)

         "SATA SSIP registers"
         "cccc:  dddd dddd dddd ... dddd"  (repeated)

         "SATA Vis Mux registers"
         "cccc:  dddd dddd dddd ... dddd"  (repeated)

         "SATA Core TXB registers"
         "cccc:  dddd dddd dddd ... dddd"  (repeated)

         "SATA Core TXW registers"
         "cccc:  dddd dddd dddd ... dddd"  (repeated)

         "SATA Core TXWB registers"
         "cccc:  dddd dddd dddd ... dddd"  (repeated)

         "SATA Core Test registers"
         "cccc:  dddd dddd dddd ... dddd"  (repeated)

      where

         cccc is the address of the first register in the row

         dddd is the register value

If Parameter 0 is equal to 2 (Toggle Phy)


   If no error occurred, the following information will be displayed.

      "Phy Disabled"                         or
      "Phy Enabled - force from initial"     or
      "Invalid Phy State"

If Parameter 0 is equal to 3 (Send ALIGN pattern) or
                           4 (Send High Frequency pattern) or
                           5 (Send Mid Frequency pattern) or
                           6 (Send Lone Bit pattern) or
                           7 (Send Low Frequency pattern) or
                           8 (Send User Specified pattern) or
                           9 (Send PRBS pattern)


   If no error occurred, the following information will be displayed.

      "Phy spew ALIGN primitives"
      "Cycle power to end"                      or

      "Phy spew High freq pattern (D10.2)"
      "Cycle power to end"                      or

      "Phy spew Mid freq pattern (D24.3)"
      "Cycle power to end"                      or

      "Phy spew Lone Bit pattern (0x0C8B)"
      "Cycle power to end"                      or

      "Phy spew Low freq pattern (K28.7)"
      "Cycle power to end"                      or
```

"Phy spew Generic pattern"
"Cycle power to end" or

"Phy spew PRBS pattern"

"Phy spew Invalid pattern"

If Parameter 0 is equal to A (Enable PRBS checker and watch the results)

If no error occurred, the following information will be displayed.

"PRBS Checker enabled"
"Cycle power to end"
"Press CTRL/Z to return"
"PRBS loop ccccc: ***...*" (repeated)

where

ccccc is the number of times the Error Count saturated and was reset to zero and a '*' is output for each error that is detected.

If Parameter 0 is equal to B (Toggle TX SSC)

If no error occurred, the following information will be displayed.

"Enable SSC" or
"Disable SSC"

If Parameter 0 is equal to C (Wait for OOB)

If no error occurred, the following information will be displayed.

"OOB Test" and
"Waiting for COMRESET" and / or
"Phy went not ready, probably saw COMRESET" and / or
"COMRESET detected" and / or
"Waiting for COMWAKE" and / or
"COMWAKE detected" and / or
"Invalid OOB State"

If Parameter 0 is equal to D (Toggle speed)

If no error occurred, the following information will be displayed.

"Speed: 1.5gbit" or
"Speed: 3.0gbit"

If Parameter 0 is equal to 0xE (Set OOB Type)

If no error occurred, the following information will be displayed.

"Normal ALIGN" or
"Normal D24.3" or
"Bit doubled ALIGN" or
"Bit doubled D24.3" or
"Invalid OOB Type"

Else

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

SATA Debug Athos MiPhy 365 (Level F 'z')

Description:

The SATA Debug command executes the specified SATA Debug function for the Athos MiPhy365.

Input Parameters:

0 - Sub-command ID.

This parameter specifies the ID of the SATA Debug sub-command to be executed.

0 = Peek/Poke SATA registers

1 = Dump SATA registers

2 = Toggle Phy

3 = Send ALIGN pattern

4 = Send High Frequency (D10.2) pattern

5 = Send Mid Frequency (D24.3) pattern

6 = Send Lone Bit pattern

7 = Send Low Frequency (K28.7) pattern

8 = Send User Specified pattern

9 = Send PRBS pattern

A = Enable PRBS checker and watch the results
(Note: This sub-command never returns.)

B = Toggle TX SSC

C = Wait for OOB

D = Toggle speed

E = Set OOB Chirp style

F = Enable Test Muxes

10 = Phy Power Mode

11 = Loopback Mode

12 = Eye Diagram data

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

If Parameter 0 is equal to 0 (Peek / Poke SATA Registers)

0 - Peek/Poke SATA registers sub-command (0)

Type: Unsigned 16-bit value

Range: 0

Default: None

1 - Register group

In the Super10 code this parameter selected the register group (Normal SATA registers or SSPI registers) to be read or written. In the Super10 Yuma architecture these registers shared the same address space and a page bit determined which registers were being accessed. In the Delta architecture each register group has its own, unique address space, so this parameter is no longer needed.

Type: Unsigned 16 bit

Range: 1 - 2

Default: NA

2 - Register Offset.

This parameter specifies the byte offset from the start of the SATA registers to the register to be read or written.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: None

3 - Register Data.

This parameter specifies the data to be written to the specified register. If this parameter is not entered, the register will be read and its value displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: None

If Parameter 0 is equal to 8 (Send User Pattern)

0 - Send User Specified pattern sub-command (8)

Type: Unsigned 16-bit value

Range: 8

Default: None

1 - Pattern.

This parameter specifies the 16-bit pattern to be sent.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: None

If Parameter 0 is equal to 0xE (Set OOB Type)

0 - Set OOB Chirp style sub-command (0xE)

Type: Unsigned 16-bit value

Range: 0xE

Default: None

1 - OOB Type.

This parameter specifies the OOB Type to be set.

1 = Normal ALIGN
2 = Normal D24.3
3 = Bit Doubled ALIGN
4 = Bit Doubled D24.3

Type: Unsigned 8-bit value

Range: 1 to 4

Default: None

Output Data:

If Parameter 0 is equal to 0 (Peek / Poke SATA Registers)

If no error occurred and the SATA register was read, the following information will be displayed.

" SATA dddddddd eeee"
" Phy dddd ee"

where

SATA/Phy is the type of the SATA register that was read

dddddddd or dddd is the address of the SATA or Phy register that was read eeee or ee is the register value

If no error occurred and the SATA register was written, the following information will be displayed.

```
"    SATA hhhhhhhh iiii --> jjjj = llll"
"    Phy  hhhh iiii --> jj = ll"
```

where

gggg or gg is the offset of the register that was written

hhhhhhhh or hhhh is the address of the register that was written

iiii or ii is the value read from the register before it was written

jjjj or jj the value with which the register was written

llll or ll is the value read from the register after it was written

If Parameter 0 is equal to 1 (Dump SATA registers)

If no error occurred, the following information will be displayed.

```
"ATA registers"
"cccc:  dddd dddd dddd ... dddd"  (repeated)

"SATA SSIP registers"
"cccc:  dddd dddd dddd ... dddd"  (repeated)

"SATA Vis Mux registers"
"cccc:  dddd dddd dddd ... dddd"  (repeated)

"SATA Core TXB registers"
"cccc:  dddd dddd dddd ... dddd"  (repeated)

"SATA Core TXW registers"
"cccc:  dddd dddd dddd ... dddd"  (repeated)

"SATA Core TXWB registers"
"cccc:  dddd dddd dddd ... dddd"  (repeated)

"SATA Core Test registers"
"cccc:  dddd dddd dddd ... dddd"  (repeated)
```

where

cccc is the address of the first register in the row

dddd is the register value

If Parameter 0 is equal to 2 (Toggle Phy)

If no error occurred, the following information will be displayed.

```
"Phy Disabled"                        or
"Phy Enabled - force from initial"    or
"Invalid Phy State"
```

If Parameter 0 is equal to 3 (Send ALIGN pattern) or

4 (Send High Frequency pattern) or
5 (Send Mid Frequency pattern) or
6 (Send Lone Bit pattern) or
7 (Send Low Frequency pattern) or
8 (Send User Specified pattern) or
9 (Send PRBS pattern)

If no error occurred, the following information will be displayed.

"Phy spew ALIGN primitives"
"Cycle power to end" or

"Phy spew High freq pattern (D10.2)"
"Cycle power to end" or

"Phy spew Mid freq pattern (D24.3)"
"Cycle power to end" or

"Phy spew Lone Bit pattern (0x0C8B)"
"Cycle power to end" or

"Phy spew Low freq pattern (K28.7)"
"Cycle power to end" or

"Phy spew Generic pattern"
"Cycle power to end" or

"Phy spew PRBS pattern"

"Phy spew Invalid pattern"

If Parameter 0 is equal to A (Enable PRBS checker and watch the results)

If no error occurred, the following information will be displayed.

"PRBS Checker enabled"
"Cycle power to end"
"Press CTRL/Z to return"
"PRBS loop ccccc: ***...*" (repeated)

where

ccccc is the number of times the Error Count saturated and was reset to zero and a '*' is output for each error that is detected.

If Parameter 0 is equal to B (Toggle TX SSC)

If no error occurred, the following information will be displayed.

"Enable SSC" or
"Disable SSC"

If Parameter 0 is equal to C (Wait for OOB)

If no error occurred, the following information will be displayed.

"OOB Test" and
"Waiting for COMRESET" and / or
"Phy went not ready, probably saw COMRESET" and / or

"COMRESET detected" and / or
"Waiting for COMWAKE" and / or
"COMWAKE detected" and / or
"Invalid OOB State"

If Parameter 0 is equal to D (Toggle speed)

If no error occurred, the following information will be displayed.

"Speed: 1.5gbit" or
"Speed: 3.0gbit"

If Parameter 0 is equal to 0xE (Set OOB Type)

If no error occurred, the following information will be displayed.

"Normal ALIGN" or
"Normal D24.3" or
"Bit doubled ALIGN" or
"Bit doubled D24.3" or
"Invalid OOB Type"

Else

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

SATA Debug Athos Shanghai 390 (Level F 'z')

Description:

The SATA Debug command executes the specified SATA Debug function for the Athos Shanghai 390.

Input Parameters:

0 - Sub-command ID.

This parameter specifies the ID of the SATA Debug sub-command to be executed.

0 = Peek/Poke SATA registers

1 = Dump SATA registers

2 = Toggle Phy

3 = Send ALIGN pattern

4 = Send High Frequency (D10.2) pattern

5 = Send Mid Frequency (D24.3) pattern

6 = Send Lone Bit pattern

7 = Send Low Frequency (K28.7) pattern

8 = Send User Specified pattern

9 = Send PRBS pattern

A = Enable PRBS checker and watch the results
(Note: This sub-command never returns.)

B = Toggle TX SSC

C = Wait for OOB

D = Toggle speed

E = Set OOB Chirp style

F = Enable Test Muxes

10 = Phy Power Mode

11 = Loopback Mode

12 = EyeQ data

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

If Parameter 0 is equal to 0 (Peek / Poke SATA Registers)

0 - Peek/Poke SATA registers sub-command (0)

Type: Unsigned 16-bit value

Range: 0

Default: None

1 - Register group

In the Super10 code this parameter selected the register group (Normal SATA registers or SSPI registers) to be read or written. In the Super10 Yuma architecture these registers shared the same address space and a page bit determined which registers were being accessed. In the Delta architecture each register group has its own, unique address space, so this parameter is no longer needed.

Type: Unsigned 16 bit

Range: 1 - 2

Default: NA

2 - Register Offset.

This parameter specifies the byte offset from the start of the SATA registers to the register to be read or written.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: None

3 - Register Data.

This parameter specifies the data to be written to the specified register. If this parameter is not entered, the register will be read and its value displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: None

If Parameter 0 is equal to 8 (Send User Pattern)

0 - Send User Specified pattern sub-command (8)

Type: Unsigned 16-bit value

Range: 8

Default: None

1 - Pattern.

This parameter specifies the 16-bit pattern to be sent.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: None

If Parameter 0 is equal to 0xE (Set OOB Type)

0 - Set OOB Chirp style sub-command (0xE)

Type: Unsigned 16-bit value

Range: 0xE

Default: None

1 - OOB Type.

This parameter specifies the OOB Type to be set.

1 = Normal ALIGN
2 = Normal D24.3
3 = Bit Doubled ALIGN
4 = Bit Doubled D24.3

Type: Unsigned 8-bit value

Range: 1 to 4

Default: None

Output Data:

If Parameter 0 is equal to 0 (Peek / Poke SATA Registers)

If no error occurred and the SATA register was read, the following information will be displayed.

```
"    SATA dddddddd eeee"
"    Phy  dddd ee"
```

where

SATA/Phy is the type of the SATA register that was read

dddddddd or dddd is the address of the SATA or Phy register that was read

eeee or ee is the register value

If no error occurred and the SATA register was written, the following information will be displayed.

```
"    SATA hhhhhhhh iiii --> jjjj = llll"
"    Phy  hhhh iiii --> jj = ll"
```

where

gggg or gg is the offset of the register that was written

hhhhhhhh or hhhh is the address of the register that was written

iiii or ii is the value read from the register before it was written

jjjj or jj the value with which the register was written

llll or ll is the value read from the register after it was written

If Parameter 0 is equal to 1 (Dump SATA registers)

If no error occurred, the following information will be displayed.

```
"ATA registers"
"cccc:  dddd dddd dddd ... dddd"  (repeated)

"SATA SSIP registers"
"cccc:  dddd dddd dddd ... dddd"  (repeated)

"SATA Vis Mux registers"
"cccc:  dddd dddd dddd ... dddd"  (repeated)

"SATA Core TXB registers"
"cccc:  dddd dddd dddd ... dddd"  (repeated)

"SATA Core TXW registers"
"cccc:  dddd dddd dddd ... dddd"  (repeated)
```

```
      "SATA Core TXWB registers"
      "cccc:  dddd dddd dddd ... dddd"  (repeated)

      "SATA Core Test registers"
      "cccc:  dddd dddd dddd ... dddd"  (repeated)

   where

      cccc is the address of the first register in the row

      dddd is the register value
```

If Parameter 0 is equal to 2 (Toggle Phy)

If no error occurred, the following information will be displayed.

```
   "Phy Disabled"                         or
   "Phy Enabled - force from initial"     or
   "Invalid Phy State"
```

```
If Parameter 0 is equal to 3 (Send ALIGN pattern) or
                           4 (Send High Frequency pattern) or
                           5 (Send Mid Frequency pattern) or
                           6 (Send Lone Bit pattern) or
                           7 (Send Low Frequency pattern) or
                           8 (Send User Specified pattern) or
                           9 (Send PRBS pattern)
```

If no error occurred, the following information will be displayed.

```
   "Phy spew ALIGN primitives"
   "Cycle power to end"                       or

   "Phy spew High freq pattern (D10.2)"
   "Cycle power to end"                       or

   "Phy spew Mid freq pattern (D24.3)"
   "Cycle power to end"                       or

   "Phy spew Lone Bit pattern (0x0C8B)"
   "Cycle power to end"                       or

   "Phy spew Low freq pattern (K28.7)"
   "Cycle power to end"                       or

   "Phy spew Generic pattern"
   "Cycle power to end"                       or

   "Phy spew PRBS pattern"

   "Phy spew Invalid pattern"
```

If Parameter 0 is equal to A (Enable PRBS checker and watch the results)

If no error occurred, the following information will be displayed.

```
      "PRBS Checker enabled"
      "Cycle power to end"
      "Press CTRL/Z to return"
      "PRBS loop ccccc: ***...*"    (repeated)
```

where

ccccc is the number of times the Error Count saturated and was reset to zero and a '*' is output for each error that is detected.

If Parameter 0 is equal to B (Toggle TX SSC)

If no error occurred, the following information will be displayed.

"Enable SSC" or
"Disable SSC"

If Parameter 0 is equal to C (Wait for OOB)

If no error occurred, the following information will be displayed.

"OOB Test" and
"Waiting for COMRESET" and / or
"Phy went not ready, probably saw COMRESET" and / or
"COMRESET detected" and / or
"Waiting for COMWAKE" and / or
"COMWAKE detected" and / or
"Invalid OOB State"

If Parameter 0 is equal to D (Toggle speed)

If no error occurred, the following information will be displayed.

"Speed: 1.5gbit" or
"Speed: 3.0gbit"

If Parameter 0 is equal to 0xE (Set OOB Type)

If no error occurred, the following information will be displayed.

"Normal ALIGN" or
"Normal D24.3" or
"Bit doubled ALIGN" or
"Bit doubled D24.3" or
"Invalid OOB Type"

Else

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes

(DiagError).

Save Adaptives To Flash (Level 7 'w' or Level T 'W')

Description:

The Save Adaptives To Flash command writes the adaptives currently in memory to flash. This command takes about 10 seconds to complete.

Quick Help:

"SaveAdaptivesToFlash, w[Seg],,22";
"SaveAdaptivesToFlash, W[Seg],,22";

Input Parameters:

0 - Which adaptive set to save

This parameter specifies which adaptives set to save.

NOTE: If you specifiy an adaptive set that the drive does not have in its flash, the drive will flash LED.
NOTE: This command will only work once per power cycle.

0 CAP Controller adaptive parameters
1 SAP Servo adaptive parameters
2 RAP Read / write adaptive parameters
3 IAP Interface Adaptive parameters

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

1 - Not used.

2 - Valid Command Key.

This value must be 0x22 for the command to execute.

Range: 0x22

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Examples:

Example #1:

To save current RAP values to flash:

```
    F3 7>w2,,22
 or F3 T>W2,,22
```

Example #2:
To save current CAP values to flash:

```
    F3 7>w0,,22
 or F3 T>W0,,22
```

Revision History:

0001.0000	Initial revision.
0002.0000	Add valid command key protection.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Scan Track for Servo Defects and ZAP (Level 4 '1')

Description:
This command scans the target track for servo defects and ZAPs.

Quick Help:

"ScanTrackForServoDefectsAndZap, 1[RdPositionOpt]";

Input Parameters:

0 - Scan at Read Position option.

If this parameter is entered, the scan will be performed at the read position, else the scan will be performed at the write position.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Seek Repeatedly Between Physical Cylinders (Level 2 or 3 'O')

Description:

The Seek From Cyl To Cyl commmand seeks repeatedly from the cylinder in parameter 0 to the cylinder in parameter 1 for the specified number of 2-seek cycles or the specified duration.

The Butterfly Seek Test commmand performs the following seeks on the specified head:

1) Seek to specified 1st (minimum cyl addr , OD) cylinder, then to specified 2nd (maximum cyl addr , ID) cylinder.
2) Repeat Steps 1) until test duration or desired number seeks is complete.

Quick Help:

"SeekFromCylToCyl, O[StartPhyCyl0],[StartPhyCyl1],[NumSkPairs],[NumSeconds],[Hd]";

Input Parameters:

0 - Starting first Physical cylinder of seek
Expected to be OD-most bound, but code functions correctly with either OD or ID .

Type: Signed 32-bit value

Range: 0 to 0xFFFFFFFF

Default: Minimum (OD) physical cylinder for current head

1 - Starting Second Physical cylinder of seek
Expected to be ID-most bound, but code functions correctly with either OD or ID .

Type: Signed 32-bit value

Range: 0 to 0xFFFFFFFF

Default: Maximum (ID) physical cylinder for current head

2 - Number of seek pairs (a seek to "second" cylinder, then to "first") to do for this test if Parameter 3 not entered,
ELSE time in seconds to run seek test
ELSE if == 0 , continue test for large arbitrary time .

Type: Unigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 5 (Seconds)

3 - Select test duration to be time or number of seek pairs. If not entered , perform Parameter 2 seek pairs . If entered, run seeks for Parameter 2 seconds, for "forever", or for number of seconds specified by parameter 2 .

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Perform counted seeks, not timed)

4 - Head on which to perform seek test

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000   Initial revision.
0011.0000   Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Seek to LBA (Level A 'S')

Description:

This command performs a seek to the specified User or System Area LBA (Logical Block Address). If no address is specified, this command will seek to the next Test Space LBA.

Quick Help:

"SkToLba, S[LbaHi],[LbaLo],[Offset],[OffsetUnitsOpt],[SkType],[Options]";

Input Parameters:

0 - LBA or LBA High.

If Parameter 1 is not entered, then this parameter contains the 32-bit LBA to which the seek is to be performed. If Parameter 1 is entered, then this parameter contains the upper 16-bits of the LBA to which the seek is to be performed.

If Parameter 4 is entered, then the specified LBA is located in the System Area, else it's located in the User Area.

Type: Unsigned 32-bit value, if Parameter 1 is not entered
         Unsigned 16-bit value, if Parameter 1 is entered

Range: 0 to 0xffffffff, if Parameter 1 is not entered
         0 to 0xffff, if Parameter 1 is entered

Default: None. If this parameter is not entered and Parameter 1 is entered, the upper 16-bits of the LBA will be set equal to zero and the lower 16-bits of the LBA will be set equal to the Parameter 1 value. If both Parameter 0 and 1 are not entered, the LBA will be set to the next LBA in the test space.

1 - LBA Low.

This parameter contains the lower 16-bits of the LBA to which the seek is to be performed.

If Parameter 4 is entered, then the specified LBA is located in the System Area, else it's located in the User Area.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: None. If this parameter is not entered and Parameter 0 is entered, the 32-bit LBA will be set equal to the Parameter 0 value. If both Parameter 0 and 1 are not entered, the LBA will be set to the next LBA in the test space.

2 - Track Follow Offset value.

This parameter is a signed 16-bit number representing the amount of tracking offset to apply in the servo system. If Parameter 3 is equal to 0, the specified offset will be in units of 1/256th of the servo track width. If Parameter 3 is equal to 1, the specified offset will be in units of 0.1% of the data track width.

Type: Signed 16-bit value

Range: 0x8000 to 0x7FFF

Default: 0

3 - Track Follow Offset Units option.

This parameter specifies the units of the Track Follow Offset value. If this parameter is equal to 0, the specified offset will be in units of 1/256th of the servo track width. If this parameter is equal to 1, the specified offset will be in units of 0.1% of the data track width.

Type: Unsigned 8-bit value

Range: 0 or 1

Default: 0 (Offset is in units of 1/256th of the servo track width)

4 - Seek Type.

This parameter specifies whether the seek should be performed to the read, write or write header track follow position.

0 = Seek to the read track follow position
1 = Seek to the write track follow position
2 = Seek to the write header track follow position

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: Seek to the read track follow position

5 - Options.

This parameter is a bit-significant value that allows the user to select the following options.

Bits 15-2: not used.

Bit 1: Disable Reload Channel Parameters With Seek Flag.

If this bit is set, the channel parameters will not be reloaded into the channel registers with the seek, else the channel parameters will be reloaded into the channel registers.

Bit 0: System Area Flag.

If this bit is set, Parameter 0 specifies a System Area LBA, else Parameter 0 specifies a User Area LBA.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Reload the channel paramters, Seek to user area)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Target User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"

or

"Target System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is a Disk Logical Block Address on the track to which the seek was performed

ffffff is the Logical Cylinder Address of the track to which the seek was performed

g is the Logical Head Address of the track to which the seek was performed

hhhh is a Logical Sector Address on the track to which the seek was performed

iiiiii is the Physical Cylinder Address of the track to which the seek was performed

j is the Logical Head Address of the track to which the seek was performed kkkk is a Physical Sector Address on the track to which the seek was performed

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: NA
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed
Bit 4: NA
Bit 5: NA
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 6 is set, the Elapsed Time for the seek operation will be displayed.

"Elapsed Time a mins b secs" or
"Elapsed Time b.c secs" or
"Elapsed Time c.d msecs"

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

Regardless of verbose mode status, the following output may occur:

If a seek mode was specified, the Elapsed Time for the seek operation will be displayed. The data displayed will be formatted as shown above, under Bit 6 of verbose mode.

Some commands use an output control bit flag (specified in the input parameters above).

If "Output Control Flag- Data Track Width" is set, the following information will be displayed

"Data Track Width wwww"

where

wwww is the width of a data track, in units of servo position. Q14 scaling, so 0x4000 is the width of a data track at nominal TPI (before VTPI and warping). Hexadecimal output.

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Seek to Logical Cylinder and Head (Levels 2, 3, 4, 7, 8, H 'S')

Description:

This commmand performs a seek operation to the specified User or System Area logical cylinder and logical head address. If no address is specified, this command will seek to the next logical track in the Test Space.

Quick Help:

"SkToLogCyl, S[Cyl],[Hd],[Offset],[OffsetUnitsOpt],[SkType],[Options]";

Input Parameters:

0 - Logical Cylinder Address.

If Parameter 4 is not entered, this parameter is the address of the User Area logical cylinder to which the seek is to be performed. If Parameter 4 is entered, this parameter is the address of the System Area logical cylinder to which the seek is to be performed. If both Parameter 0 and 1 are not entered, a seek will be performed to the next logical track in the Test Space.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: None

1 - Logical Head Address.

If entered, this parameter contains the address of the logical head to which the seek is to be performed. If both Parameter 0 and 1 are not entered, a seek will be performed to the next logical track in the Test Space.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

2 - Track Follow Offset value.

This parameter is a signed 16-bit number representing the amount of tracking offset to apply in the servo system. If Parameter 3 is equal to 0, the specified offset will be in units of 1/256th of the servo track width. If Parameter 3 is equal to 1, the specified offset will be in units of 0.1% of the data track width.

Type: Signed 16-bit value

Range: 0x8000 to 0x7FFF

Default: 0

3 - Track Follow Offset Units option.

This parameter specifies the units of the Track Follow Offset value. If this parameter is equal to 0, the specified offset will be in units of 1/256th of the servo track width. If this parameter is equal to 1, the specified offset will be in units of 0.1% of the data track width.

Type: Unsigned 8-bit value

Range: 0 or 1

Default: 0 (Offset is in units of 1/256th of the servo track width)

4 - Seek Type.

This parameter specifies whether the seek should be performed to the read, write or write header track follow position.

0 = Seek to the read track follow position
1 = Seek to the write track follow position
2 = Seek to the write header track follow position

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: Seek to the read track follow position

5 - Options.

This parameter is a bit-significant value that allows the user to select the following options.

Bits 15-3: not used.

Bit 2:   Display the Data Track Width.

If this bit is set, the width of the destination track will be displayed in Q14 servo counts.

Bit 1:   Disable Reload Channel Parameters With Seek Flag.

If this bit is set, the channel parameters will not be reloaded into the channel registers with the seek, else the channel parameters will be reloaded into the channel registers.

Bit 0:   System Area Flag.

If this bit is set, Parameter 0 specifies a System Area logical cylinder, else Parameter 0 specifies a User Area logical cylinder.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0   (Reload the channel paramters,
Seek to user area)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Target User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"

or

"Target System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is a Disk Logical Block Address on the track to which the seek was performed

ffffff is the Logical Cylinder Address of the track to which the seek was performed

g is the Logical Head Address of the track to which the seek was performed

hhhh is a Logical Sector Address on the track to which the seek was performed

iiiiii is the Physical Cylinder Address of the track to which the seek was performed

j is the Logical Head Address of the track to which the seek was performed

kkkk is a Physical Sector Address on the track to which the seek was performed

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: NA
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed
Bit 4: NA
Bit 5: NA
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 6 is set, the Elapsed Time for the seek operation will be displayed.

"Elapsed Time a mins b secs" or
"Elapsed Time b.c secs" or
"Elapsed Time c.d msecs"

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

Regardless of verbose mode status, the following output may occur:

If a seek mode was specified, the Elapsed Time for the seek operation will be displayed. The data displayed will be formatted as shown above, under Bit 6 of verbose mode.

Some commands use an output control bit flag (specified in the input parameters above).

If "Output Control Flag- Data Track Width" is set, the following information will be displaye

"Data Track Width wwww"

where

wwww is the width of a data track, in units of servo position. Q14 scaling, so 0x4000 is the width of a data track at nominal TPI (before VTPI and warping). Hexadecimal output.

Examples:

Example #1:
To seek to a logical cylinder and head at the read track follow position (in this case logical cylinder 45 head 1)

```
F3 2>S45,1
```

Example #2:
To seek to a logical cylinder and head at the write track follow position (in this case logical cylinder 45 head 1)

```
F3 2>S45,1,,,1
```

Example #3:
To seek to a logical cylinder and head at the write header track follow position (in this case logical cylinder 45 head 1)

```
F3 2>S45,1,,,2
```

Example #4:
To seek to a logical cylinder and head at the read track follow position with an additional offset specified in servo counts

(in this case logical cylinder 45 head 1 at an offset of plus 100/256ths of the servo track width)

```
F3 2>S45,1,64
```

Example #5:
To seek to a logical cylinder and head at the read track follow position with an additional offset specified in percent of data track width
(in this case logical cylinder 45 head 1 at an offset of -10% of the data track width)

```
F3 2>S45,1,FFF6,1
```

Example #6:
To seek to a logical cylinder and head at the read track follow position and display the data track width in Q14 servo counts
(in this case logical cylinder 45 head 1)

```
F3 2>S45,1,,,,4
```

Example #7:
To seek to a logical cylinder and head at the read track follow position and disable reloading of the channel parameters by the seek
(in this case logical cylinder 45 head 1)

```
F3 2>S45,1,,,,2
```

Example #8:
To seek to a system logical cylinder and head at the read track follow position
(in this case logical system cylinder 54 head 0)

```
F3 2>S54,0,,,,1
```

Revision History:

0001.0000	Initial revision.
0001.0001	Changed the parameters to allow some fine output control. Added a new parameter to allow the output of the data track width of the destination track, in Q14 servo counts.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Seek to Physical Cylinder and Head (Levels 2, 3, F 's')

Description:

This commmand performs a seek operation to the specified physical cylinder and logical head address. If no address is specified, this command will seek to the next physical track in the Test Space.

Quick Help:

"SkToPhyCyl, s[Cyl],[Hd],[ValidKey],[Offset],[OffsetUnitsOpt],[SkType],[Options]";

Input Parameters:

0 - Physical Cylinder Address.

If entered, this parameter is the address of the physical cylinder to which the seek is to be performed. If both Parameter 0 and 1 are not entered, a seek will be performed to the next physical track in the Test Space.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: None

1 - Logical Head Address.

If entered, this parameter is the address of the logical head to which the seek is to be performed. If both Parameter 0 and 1 are not entered, a seek will be performed to the next physical track in the Test Space.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

2 - Valid Command Key.

This parameter must be equal to 22 Hex.

Type: Unsigned 8-bit value

Range: 0x22

Default: None

3 - Track Follow Offset value.

This parameter is a signed 16-bit number representing the amount of tracking offset to apply in the servo system. If Parameter 4 is equal to 0, the specified offset will be in units of 1/256th of the servo track width. If Parameter 4 is equal to 1, the specified offset will be in units of 0.1% of the data track width.

Type: Signed 16-bit value

Range: 0x8000 to 0x7FFF

Default: 0

4 - Track Follow Offset Units option.

This parameter specifies the units of the Track Follow Offset value. If this parameter is equal to 0, the specified offset will be in units of 1/256th of the servo track width. If this parameter is equal to 1, the specified offset will be in units of 0.1% of the data track width.

Type: Unsigned 8-bit value

Range: 0 or 1

Default: 0 (Offset is in units of 1/256th of the servo track width)

5 - Seek Type.

This parameter specifies whether the seek should be performed to the read, write or write header track follow position.

0 = Seek to the read track follow position
1 = Seek to the write track follow position

2 = Seek to the write header track follow position

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: Seek to the read track follow position

6 - Options.

This parameter is a bit-significant value that allows the user to select the following options.

Bits 15-1: not used.

Bit 0: Disable Reload Channel Parameters With Seek Flag.

If this bit is set, the channel parameters will not be reloaded into the channel registers with the seek, else the channel parameters will be reloaded into the channel registers.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Reload the channel paramters)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Target User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"

or

"Target System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is a Disk Logical Block Address on the track to which the seek was performed

ffffff is the Logical Cylinder Address of the track to which the seek was performed

g is the Logical Head Address of the track to which the seek was performed

hhhh is a Logical Sector Address on the track to which the seek was performed

iiiiii is the Physical Cylinder Address of the track to which the seek was performed j is the Logical Head Address of the track to which the seek was performed

kkkk is a Physical Sector Address on the track to which the seek was performed

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: NA
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed
Bit 4: NA
Bit 5: NA
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 6 is set, the Elapsed Time for the seek operation will be displayed.

"Elapsed Time a mins b secs" or
"Elapsed Time b.c secs" or
"Elapsed Time c.d msecs"

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

Regardless of verbose mode status, the following output may occur:

If a seek mode was specified, the Elapsed Time for the seek operation will be displayed. The data displayed will be formatted as shown above, under Bit 6 of verbose mode.

Some commands use an output control bit flag (specified in the input parameters above).

If "Output Control Flag- Data Track Width" is set, the following information will be displayed

"Data Track Width wwww"

where

wwww is the width of a data track, in units of servo position. Q14 scaling,
so 0x4000 is the width of a data track at nominal TPI (before VTPI and warping).
Hexadecimal output.

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Select Data Output Mode (Level T 'O')

Description:
This command selects the specified Data Output Mode.

Quick Help:

"SelectDataOutputMode, O[Mode],[VerboseOpts]";

Input Parameters:

0 - Data Output Mode.

This parameter specifies the data output mode to be selected.

0 = Quiet Mode. This mode disables the outputting of all diagnostic status.

1 = Raw Binary Mode. This mode outputs the status packets returned by the diagnostic functions as raw binary data.

2 = Raw ASCII Mode. This function outputs an ASCII representation of the raw data returned in the status packets by the diagnostic functions.

3 = Formatted ASCII Mode. This function formats the data returned in the status packets by the diagnostic functions and outputs it as ASCII.

4 = Verbose Formatted ASCII Mode. This function formats the data returned in the status packets by the diagnostic functions and outputs it as ASCII. This mode will output additional information that is not typically output by the standard Formatted ASCII Mode.

5 = Simplified Formatted ASCII Mode. This function formats the data returned in the status packets by the diagnostic functions and outputs it as ASCII. This mode will simplfy the output information that is normally output by the standard Formatted ASCII Mode.

Type: Unsigned 8-bit value

Range: 0 to 5

Default: 3 (Formatted ASCII Mode)

1 - Verbose Formatted ASCII Mode Options.

This parameter is a bit-significant value that can be used to enable / disable the outputting of various verbose mode data. Setting a bit enables the outputting of the verbose mode data associated with the bit. Clearing a bit disables the outputting of the verbose mode data associated with the bit. The data that is enabled or disabled by each bit is unique to each command and is described in the command's data output section.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 0xffffffff (Output all verbose data)

Output Data:

Displays the Data Output Mode that is selected.

Revision History:

0001.0000 Initial revision.

Select Logical Head (Levels 2, 3, 4, 7 'H')

Description:

This commmand performs a seek operation to the specified logical head address. If no address is specified, this command will seek to the next logical head in the Test Space.

Quick Help:

"SelectHd, H[Hd],[SkType],[Options]";

Input Parameters:

0 - Logical Head Address.

If entered, this parameter is the address of the logical head to be selected. If Parameter 0 is not entered, the next logical head in the Test Space will be selected.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

1 - Seek Type.

This parameter specifies whether the seek should be performed to the read, write or write header track follow position.

0 = Seek to the read track follow position
1 = Seek to the write track follow position
2 = Seek to the write header track follow position

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: Seek to the read track follow position

2 - Options.

This parameter is a bit-significant value that allows the user to select the following options.

Bits 15-1: not used.

Bit 0: Disable Reload Channel Parameters With Seek Flag.

If this bit is set, the channel parameters will not be reloaded into the channel registers with the seek, else the channel parameters will be reloaded into the channel registers.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Reload the channel paramters)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Target User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"

or

"Target System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is a Disk Logical Block Address on the track to which the seek was performed

ffffff is the Logical Cylinder Address of the track to which the seek was performed

g is the Logical Head Address of the track to which the seek was performed

hhhh is a Logical Sector Address on the track to which the seek was performed

iiiiii is the Physical Cylinder Address of the track to which the seek was performed

j is the Logical Head Address of the track to which the seek was performed

kkkk is a Physical Sector Address on the track to which the seek was performed

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: NA
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed

Bit 4: NA
Bit 5: NA
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 6 is set, the Elapsed Time for the seek operation will be displayed.

"Elapsed Time a mins b secs" or
"Elapsed Time b.c secs" or
"Elapsed Time c.d msecs"

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

Regardless of verbose mode status, the following output will be displayed:

"Hd h"

where

h is selected head

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Select Servo Controller (Level 5 'G')

Description:
This command allows for one of serveral different servo controllers to be selected.

The servo controllers available have been pre-designed with dynamic characteristics which have been optimized for particular operating conditions.

Quick Help:

"SelectServoController, G[Head],[Controller],[InputShift]";

Input Parameters:

If no parameters are entered, then the command will display the current "controller" for all heads. Then the current "input shift" will be displayed.

0 - Head

This parameter specifies the head or heads to select the servo controller.

If only parameter 0 is specified:
The command will display the current "controller" selection for the specified head.
Then the "input shift" will be displayed.

If parameter 0 is specified,
And either or both parameter 1 and parameter 2 are specified:
The "controller" for the specified head is changed to the specified values and/or the "input shift" will be set to the specified value.
Then the command will display the current "controller" for the specified head.
Then the "input shift" will be displayed.

If parameter 0 is NOT specified
but either or both parameter 1 and parameter 2 are specified:
All the current "controller" are changed to the specified values for all heads and/or the "input shift" will be changed to the specified value.
The command will then display the current "controller" for all heads.
Then the "input shift" will be displayed.

Other combinations are invalid.

Type: Unsigned 8-bit value

Range: 0 .. Max Head

Default: None

1 - Controller

This parameter specifies the servo controller to be used.

Type: Unsigned 8-bit value

Range: Defined by Servo

Default: None

2 - Controller Input Shift

This parameter specifies the Conroller Input Shift

Type: Unsigned 8-bit value

Range: Defined by Servo

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following will be displayed

Head Controller
AA   BB

Input Shift = CC

where

AA is the Head Number

BB is the Controller Number selected for the specified head

CC is the Input Shift value.

Note:
Controller Data will be either for a single head or for all heads depending on parameters selections when the diag is executed.

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Servo Batch Test sub commands (Level 4 'U')

Description:

The Servo Batch Test command executes the specified servo batch tests function.

Quick Help:

"ServoBatchTest, U[SubCmd],[SubCmdParm0],[SubCmdParm1],[SubCmdParm2]";

Input Parameters:

0 - Sub-command ID.

This parameter specifies the sub-command ID of the Servo Batch Test command to be executed.

100D = Plot PES on Screen

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

If Parameter 0 is equal to 100D (Plot PES on Screen)

0 - Plot PES on Screen sub-command ID (100D)

Type: Unsigned 16-bit value

Range: 100D

Default: None

1 - Revs to collect for RRO calculation.

This parameter specifies the revs to collect the PES data for RRO calculation. If this parameter is not entered, the default value is 100 revs.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: 100

2 - Revs to collect for NRRO calculation.

This parameter specifies the revs to collect the PES data for NRRO calculation. If this parameter is not entered, the default value is 100 revs.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: 100

Output Data:

If Parameter 0 is equal to 100D (Plot PES on Screen)

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Track number, Write Fault Threshold, PES plot, RRO 3 Sigma, and NRRO 3 Sigma are displayed with the following format:

```
01000.0, WFT 333 (+1.9E+1 %)

000 FEF2 0060 013A          <                -       |  *     +               >
001 FF10 FFE7 00BE          <                 -      *    +                   >
002 FF08 FFDB 00BC          <                 -     *|    +                   >
003 FED7 FFBF 00D0          <               -      * |     +                  >
004 FE8C FF97 00E0          <             -       *  |      +                 >
005 FE75 FF87 0153          <            -        *  |         +              >
......
(Repeat for every servo sector)

3 sigma RRO  = +4.92E-0 % track
3 sigma NRRO = +7.08E-0 % track
```

**End

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Servo Bode Plot (Level 5, 'B')

Description:

This command implements the Servo Bode Plot diagnostic. It is implemented as a single-frequency DFT with an injected sine-wave distrubance, which is either a current or position disturbance, depending on the selected measurement.

It has the ability to perform a single frequency measurement or loop through a range of frequencies to create a swept-sine frequency response measurement.

The measurement will be done at the current servo position.

A special 'Trace Mode' is supported which will return the raw time-domain data for Signal1 and Signal2. The data for only one frequency will be returned. If swept-sine measurement is done, then time-domain data will be returned for only the last frequency used.

Quick Help:

"Servo Bode Plot, B[BodeType],[InjAmp],[Fmin],[Fmax],[NumFreq],[NumSamples],[EnableTracing]";

Input Parameters:

0 - Select the Bode measurement type.

Parameter 0 is used to specify the type of servo bode measuement to be done.

Note: for the following measurements, Signal1 is the 'output', Signal2 is the 'input', and the transfer function is output/input = Signal1/Signal2.

If 0, then the diagnostic will be configured for an open-loop bode measurement, using vcm current disturbance.

```
Signal1:    i16_Current2,
Signal2:    i16_Current2Out,
Injection:  i16_TrackingVcmDisturbanceCurrent
```

If 1, then the diagnostic will be configured for a closed-loop bode measurement, using vcm current disturbance.

```
Signal1:    i16_Current2,
Signal2:    i16_TrackingVcmDisturbanceCurrent,
Injection:  i16_TrackingVcmDisturbanceCurrent
```

If 2, then the diagnostic will be configured for a structrual bode measurement, using vcm current disturbance.

```
Signal1:    i16_DemodPositionError,
Signal2:    i16_Current2Out,
Injection:  i16_TrackingVcmDisturbanceCurrent
```

If 3, then the diagnostic will be configured for an open-loop bode measurement, using position disturbance.

```
Signal1:    i16_DemodPositionMeasurementIn,
```

Signal2:   i16_DemodPositionMeasurementOut,
Injection: i16_TrackingDemodDisturbancePosition

If 4, then the diagnostic will be configured for a sensitivity measurement, using position disturbance.

Signal1:   i16_DemodPositionError,
Signal2:   i16_TrackingDemodDisturbancePosition,
Injection: i16_TrackingDemodDisturbancePosition

Type: Hexadecimal value

Range: 0 .. Maximum Number of Bode Types

Default: 0 (Open Loop - Vcm current distrubance)

1 - Specify the Injection Amplitude

Parameter 1 specifies the peak amplitude of the injected sine-wave disturbance. For bode types using VCM current disturbance, the units will be DAC counts. For bode types using pes distrubance, the units will be pes counts.

Type: Positive decimal value

Range:

Default: 400

2 - Set the lowest frequency to be measured.

Parameter 2 specifies lowest frequency in Hertz to be used for the servo bode measurement.

Type: Positive decimal value

Range: 10 Herts to the Nyquist frequency

Default: 10 Hz

3 - Set the highest frequency to be measured.

Parameter 3 specifies highest frequency in Hertz to be used for the servo bode measurement. This frequency must be greater than Parameter 2. Entering any value larger than the Nyquist frequency will default to the Nyquist frequency.

Type: Positive decimal value

Range: 10 Herts to the Nyquist frequency

Default: Nyquist frequency

4 - Set the number of frequencies to use.

Parameter 4 specifies number of linearly-spaced frequencies, between the minimum frequency (Parameter 2) and the maximum frequency (Parameter 3) to be used for the servo bode measurement.

Type: Positive decimal value

Range: 1 .. 1024

Default: 200

5 - Set the number of samples to collect.

Parameter 5 specifies the length of the time-domain data record to be collected for each of the specified frequencies.

Type: Positive decimal value

Range: 1 .. 32768

Default: 4096

6 - Enable Tracing

Parameter 7 is used to enable a trace-mode that will return the raw time-domain data of the last frequency to be analyzed. If Parameter 6 equals 0, then the trace-mode is disabled. If Parameter 6 equals 1, the the trace-mode is enabled.

Type: Hexadecimal value

Range: 0 or 1

Default: 0 (Trace disabled)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred the bode type will be displayed.
example:
OPEN LOOP - POSITION DISTURBANCE

Then the frequency response data will be displayed in floating-point format.

Freq	Re1	Im1	Re2	Im2
A	B	C	D	E

where:

A represents the measurement frequency in Hertz.
B represents the REAL component of the frequency in Signal 1
C represents the IMAG component of the frequency in Signal 1
D represents the REAL component of the frequency in Signal 2
E represents the IMAG component of the frequency in Signal 2

Examples:

The following command will measure the open loop frequency response using the defaults parameters.

B

This command will measure the open loop frequency response with a TrackingDemodDisturbancePosition amplitude of 100, in the range of 2000Hz to 3000Hz, with a linear spacing of 20Hz=(3000-2000)/50, and a time record of 5000 samples per frequency.

B3,100,2000,3000,50,5000

This example uses the default bode type and injection amplitude, starting frequency of 5000, ending frequency of 5010, using only 1 frequency only do 5000Hz), collect 264 samples, and use Trace Mode. Trace mode will return the servo sector number, and the raw time-domian data for Signal1 and Signal2.

B,,5000,5010,1,264,1

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Servo Diagnostic Sub Commands (Level 8 'C')

Description:

The Servo Diagnostic Sub Commands execute the following servo diagnostic sub commands:

8>C05: Set Seek Delay command. This command sets the seek delay, logical / physical seek type, and write / read seek settle for other 8>C seek related commands (such as 8>C08 and 8>C0C).

8>C08: Random Seeks command. This command performs random seeks across the entire disk or just by switching heads only.

8>C0C: Seek Between 2 Physical Cylinders command. This command performs seeks between 2 physical tracks at the same head.

8>C15: Change Write Threshold command. This command changes write threshold.

Quick Help:

"ServoDiagSubCmds, C[SubCmd],[Parm0],[Parm1],[Parm2]";

Input Parameters:

0 - Servo Diag Sub command ID.

This parameter specifies the ID of the servo diag sub command to be executed

05h = Set Seek Delay
08h = Random Seeks
0Ch = Seek Between 2 Physical Cylinders
15h = Change Write Threshold

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

Set Seek Delay command 8>C05 (Parameter 0 is 05h)

Input Parameters:

0 - Level 8 C command's Set Seek Delay sub-command ID (05h)

Type: Unsigned 16-bit value

Range: 05h

Default: None

1 - Seek Delay in the format of servo sectors

This parameter specifies the new seek delay. If this parameter is not entered, then the seek delay is not going to be changed

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: None

2 - Seek Type

This parameter specifies the new seek type. Its Bit 0 controls slow/fast settle setting and the Bit 1 controls the logical/physical seek setting. If this parameter is not entered, then the seek type is not going to be changed.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

The following will be displayed

Delay between xxxx settle seeks = yyyy servo sectors
zzzz Seeks Enabled

where

xxxx is either slow or fast

yyyy is the seek delay number in servo sectors

zzzz is either Logical or Physical

Random Seeks command 8>C08 (Parameter 0 is 08h)

Input Parameters:

1 - Random Head Only Indicator

This parameter indicates if the seek destination is random head only. When this parameter is not entered or entered as 0, both track number and head number are generated randomly, otherwise, only head number changes randomly while the track number stays the same.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, seek average time is displayed with the following format:

-Average = xxx.yyy msecs-
Note: The beginning and ending chars are rotating all the time to reflect the fact that the command is running

Seek Between 2 Physical Cylinders command 8>C0C (Parameter 0 is 0Ch)

Input Parameters:

1 - First physical cylinder to be seeked. When this parameter is not entered, the minimum physical cylinder at the current head is used.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: Minimum physical cylinder at the current head

2 - Second physical cylinder to be seeked. When this parameter is not entered, the maximum physical cylinder at the current head is used.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: Maximum physical cylinder at the current head

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, seek average time is displayed with the following format:

-Average = xxx.yyy msecs-
Note: The beginning and ending chars are rotating all the time to reflect the fact that the command is running

Change Write Threshold command 8>C15 (Parameter 0 is 15h)

Input Parameters:

1 - Position Threshold

This parameter specifies the new position write threshold. If this parameter is not entered, then position write threshold is not going to be changed

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: None

2 - Velocity Threshold (Not supported yet by servo)

This parameter specifies the new velocity write threshold. If this parameter is not entered, then velocity write threshold is not going to be changed

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following will be displayed

```
Head  XThresh  VThresh
00    XXXX     VVVV
01    XXXX     VVVV
...
```

where

XXXX is the position write threshold

VVVV is the velocity write threshold

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Set Baud Rate (Level T 'B', Level F 'b')

Description:

The Set Baud Rate command sets the serial port baud rate to the specified value.

Quick Help:

```
   Level T
"SetBaudRate, B[BaudRate],[MsecDelay]";
   Level F
"SetBaudRate, b[BaudRate],[MsecDelay]";
```

Input Parameters:

0 - Desired Baud Rate.

This parameter specifies the desired serial port baud rate. If this parameter is not entered or a value of 0 is entered, the baud rate will be set to the default value. If an unsupported baud rate value is entered, a list of the valid baud rates will be displayed.

Type: Decimal value

Range: 0 to 9999999

Default: 38400

1 - Delay Time in Milliseconds.

This parameter specifies the number of milliseconds that the drive will wait for the host to send a carriage return at the new baud rate. If a carriage return is not received within the specified amount of time, the baud rate will be set back to its value before the command was received. If this parameter is not entered or a value of 0 is entered, the drive will not wait for a carriage return after selecting the specified baud rate.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: 0

Output Data:

If an unsupported baud rate value is entered, this command will display a list of the supported baud rates.

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Set Buffer Pattern (Levels 2, 7, F 'P')

Description:

This command loads the specified data buffer blocks with the specified data pattern.

This command supports both the legacy ST-10 mode and a new mode that allows the user to enter data patterns of up to 16-bytes (128-bits in length). The Legacy ST-10 mode only allowed the user to enter 4-byte (32-bit) patterns.

In legacy ST-10 mode Parameter 0 selects either a pre-defined pattern (i.e. If Parameter 0 is equal to 0x1212, random data will be selected) or it contains the lower 16-bits of a user specified pattern. In this mode Parameter 1 contains the upper 16-bits of a user specified pattern, Parameter 2 specifies the pattern length, in bits, and the pattern is assumed to be right justified. For example if Parameter 0 is equal to 0x5678, Parameter 1 is equal to 0x1234 and Parameter 2 is equal to 0x14, the buffer will be filled with the repeating 20-bit pattern 0100 0101 0110 0111 1000 which are the least significant 4-bits of Parameter 1 followed by the 16-bits of Parameter 0 (45678).

The new 16-byte user pattern mode is selected by entering 0x1818 for Parameter 0. In this mode Parameter 1 contains the 16-byte pattern to be used, Parameter 2 specifies the pattern length, in bits, and the pattern is assumed to be left justified. The pattern should be entered as a 1 to 32 character hexadecimal value with no spaces or commas separating the bytes. For example if Parameter 0 is equal to 0x1818, Parameter 1 is equal to 0x123456789ABC and Parameter 2 is equal to 0x24, the buffer will be filled with the repeating 36-bit pattern 0001 0010 0011 0100 0101 0110 0111 1000 1001 which are the most significant 36-bits of Parameter 1 (123456789).

Quick Help:

"BufferSetPattern, P[PatternSelOrPatternLow],[PatternHi],[PatternBits],[Opts],[BlkNum],[NumBl

Input Parameters:

0 - Select Pre-Defined Data Pattern or Data Pattern Low.

If Parameter 3 bit 1 is cleared, the value of Parameter 0 will first be checked to determine if it selects any of the following pre-defined patterns and only if no match is found with any of the pre-defined patterns, will Parameter 0 be interpreted as the data pattern low.

0x1111 = Incrementing Pattern.

Each buffer block will be filled with a 16-bit value containing its block offset relative to the first block filled.

0x1212 = Random Pattern.

The buffer will be filled with random data.

0x1313 = Alternating Pattern.

The number of buffer blocks to be filled will be divided in half and the first group of blocks will be filled with 0x1313 and the second group of blocks will be filled with random data.

0x1414 = Isolated Pulse Pattern.

The buffer will be filled with the 64-bit pattern 0xffff0000.

0x1515 = Incrementing 2-Byte Pattern.

Each buffer block will be filled with a 16-bit incrementing pattern that resets to zero at the start of each block.

0x1616 = Repeating 127-bit Pattern.

If the first 11 blocks will be filled with the following 127-bit repeating binary pattern and the remaining blocks, if any, will be filled with zeroes.

```
00010011 00010111 01011011 00000110 (13 17 5B 06 hex)
01101010 01110011 11011010 00010101 (6A 73 DA 15 hex)
01111101 00101000 11011100 01111111 (7D 28 DC 7F hex)
00001110 11110010 11001001 0000001  (0E F2 C9 02 hex)
```

Note: When loading the buffer with the repeating 127-bit pattern, each byte will be flipped end to end. So when displayed, the filled buffer will actually contain the following data.

```
11001000 11101000 11011010 01100000 (C8 E8 DA 60 hex)
01010110 11001110 01011011 10101000 (56 CE 5B A8 hex)
10111110 00010100 00111011 11111110 (BE 14 3B FE hex)
01110000 01001111 10010011 01000000 (70 4F 93 40 hex)
```

0x1717 = Repeating 15 byte 6T Pattern.

The buffer will be filled with the following 15-byte repeating pattern.

F0 F3 F3 C3 03 03 03 0F 3F 3F 3F 3C 30 30 F0 hex

0x1818 = Repeating 1 to 128 bit user specified pattern.

The buffer will be filled with the 1 to 128 bit (16 byte) pattern entered for Parameter 1. The number of Parameter 1 bits to be repeated will be specified by Parameter 2.

If Parameter 3 bit 1 is set or Parameter 0 is not equal to any of the values listed above, Parameter 0 will specify the least significant 16-bits of the data pattern with which the buffer is to be loaded. In this case Parameter 1 will specify the most significant 16-bits of the data pattern, the maximum pattern length will be 32-bits and the specified pattern will be assumed to be right justified.

Type: Unsigned 16-bit value

Range: 0 to 0xffff,

Default: 0x1212 (Random Data)

1 - Data Pattern high or 16-byte Data Pattern.

If Parameter 3 bit 1 is set or Parameter 0 does not select one of the pre-defined data patterns (0x1111, 0x1212, etc.), Parameter 1 specifies the most significant 16-bits of the data pattern with which the buffer is to be loaded. In this case Parameter 0 will specify the least significant 16-bits of the data pattern, the maximum pattern length will be 32-bits and the specified pattern will be assumed to be right justified.

If Parameter 3 bit 1 is cleared and Parameter 0 is equal to 0x1818, Parameter 1 will specify a 1-bit to 16-byte pattern. The number of Parameter 1 bits to be repeated will be specified by Parameter 2. In this case the specified pattern is assumed to be left justified.

Type: Unsigned 16-byte value

Range: 0 to 0xffffffffffffffffffffffffffffffff

Default: 0

2 - Data Pattern Bits.

This parameter specifies the length, in bits, of the fill pattern specified by parameters 0 and 1.

Type: Unsigned 16-bit value

Range: 0 to 0x80

Default: 0x20 (32-bit pattern)

3 - Options.

This parameter is a bit-significant value that selects the following options.

Bits 31-1: not used

Bit 0: Disable Pre-Defined Data Patterns.

If this bit is set, the value of Parameter 0 will not be used to select pre-defined data patterns and will always be interpreted as the data pattern low. For example, setting this bit allows the user to specify a 16-bit data pattern of 1212 hex instead of a random data pattern.

If this bit is cleared, the value of Parameter 0 will first be checked to determine if it selects any of the pre-defined patterns and only if no match is found with any of the pre-defined patterns, will Parameter 0 be interpreted as the data pattern low.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0 (Enable Pre-Defined Data Patterns)

4 - First Buffer Block Number to fill.

This parameter specifies the number of the first buffer block to be filled.

************************************ NOTE ***
This option should be used with great caution, since it has the potential to corrupt critical data stored in the data buffer.
****

Type: Unsigned 16-bit value

Range: 0 to last buffer block number

Default: If this parameter is not entered, the first block of Diagnostic Write Buffer will be the first buffer block filled.

5 - Number of consecutive Buffer Blocks to fill.

This parameter specifies the number of consecutive buffer blocks to be filled.

************************************ NOTE **
This option should be used with great caution, since it has the potential to corrupt critical data stored in the data buffer.
****

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: If this parameter is not entered and Parameter 4 was not entered, the entire Diagnostic Write Buffer will be filled. If this parameter is not entered and Parameter 4 was entered, only the buffer block specified by Parameter 4 will be filled.

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Examples:

The following commands will load the Diagnostic Write Buffer with pre-defined patterns:

```
F3 2>P1111      (Incrementing Pattern - 1st block 0x0000, 2nd block 0x0001, etc.)
F3 2>P1212      (Random Pattern)
F3 2>P1313      (Alternating Pattern - 0x1313 and Random Data)
F3 2>P1414      (Isolated Pulse Pattern - 0xFFFF0000)
F3 2>P1515      (Incrementing 2-Byte Pattern - 0x0000000100020003...)
F3 2>P1616      (Pre-Defined 127-bit Pattern - 0x13175B06...)
F3 2>P1717      (Pre-Defined 15 byte 6T Pattern - 0xF0F3F3C303...)
```

The following commands will load the Diagnostic Write Buffer with user defined patterns:

```
F3 2>P1818,0102030405060708091011213141516,80  (User 128-bit pattern 0x010203...16)
F3 2>P0304,0102                                (User 32-bit pattern 0x01020304)
F3 2>P4,,3                                     (User 3-bit pattern 100b)
F3 2>P1111,,10,1                               (User 16-bit pattern 0x1111)
```

The following commands will load the specified buffer blocks with a user defined pattern:

```
F3 2>P0304,0102,,,D5C,4  (Buffer Blocks D5C-D5F with user 32-bit pattern 0x01020304)
```

Revision History:

0001.0000	Initial revision.
0001.0001	Added support for 6T pattern and user specified 16-byte pattern.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Description:

This command allows the user to display and / or modify the Congen parameters by using either relational references or byte offset references to Congen data. Relational references are provided through parameter names entered as double-quote-delimited strings.

Some known quirkiness:

1) YASPP is fickle about double quotes when using the arrow-up and arrow-down keys. Sometimes it will mysteriously remove the quote characters, the single character command, or both while perusing the command history.
2) The even number requirement has been fixed. When specifying a byte offset, you may now use an odd number of characters to specify the offset.

WARNING! Using byte offset references to modify Congen parameters must be done thoughtfully. This usage of the command provides extremely permissive access to the Congen and is provided for convenience when using the diagnostics in an interactive way. Use of this option requires intimate knowledge of the layout of the Congen data and this layout is NOT guaranteed to stay the same from one code release to the next. It is preferred that relational references are used to change Congen and is REQUIRED if Congen changes are to made by programs or scripts.

Quick Help:

"SetCongenParmCmdHelpMsg, F[ValueRef],[Data],[ResetEnable]";

Input Parameters:

0 - Congen Value Reference.

This parameter references the Congen value to be modified using a quote-delimited string (double quotes) or using a hex value.

Type: Quote-delimited string or hex value

Range: 1 to 63 character string or 0000 to FFFF (if hex value)

Default: If this parameter is not entered, the entire current Congen data will be displayed.

1 - Congen Data.

This parameter specifies the data to be written to the Congen value specified by parameter 0. This data can be entered as either a quote-delimited string (double quotes) or as a variable-lengthed sequence of hex values.

Type: Quote-delimited string or sequence of hex values

Range: 1 to 63 character string or 1 to 64 byte hex sequence

Default: If this parameter is not entered, then the Congen value associated with parameter 0 will be displayed.

2 - Reset Congen Info Enable.

If parameter 0 and parameter 1 are not entered and this parameter is set to the value "0x22" (hex), then this will cause the drive to reset the Congen to its compile-time default values.

Type: Hex number

Range: 0x22 is the only valid value.

Default: None.

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred and Parameter 0 is not entered, the Congen data will be displayed as follows:

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F3 T>F

           RWErrorRecovery Mode Page
              RWErrorRecovery Group
Byte:0082:       RWRecoveryFlags = C0
Byte:0082:           Bit:0, DISABLE_CORRECTION = 0
Byte:0082:           Bit:1, DISABLE_TRANSFER_ON_ERROR = 0
Byte:0082:           Bit:2, POST_ERROR = 0
Byte:0082:           Bit:3, ENABLE_EARLY_RECOVERY = 0
Byte:0082:           Bit:4, READ_CONTINUOUS = 0
Byte:0082:           Bit:5, TRANSFER_BLOCK = 0
Byte:0082:           Bit:6, READ_SPARING_ENABLED = 1
Byte:0082:           Bit:7, WRITE_SPARING_ENABLED = 1
Byte:0083:       ReadRetries = 08
Byte:0084:       CorrectionSpan = FF
Byte:0085:       HeadOffset = 00
Byte:0086:       DataStrobeOffset = 00
Byte:0088:       WriteRetries = 05
Byte:008A:       RecoveryLimitMSB = FF
Byte:008B:       RecoveryLimitLSB = FF

           FormatParameters Mode Page
              FormatParameters Group
Byte:008E:       TracksPerZoneMSB = 0D
Byte:008F:       TracksPerZoneLSB = BE
Byte:0090:       AltSectorsPerZoneMSB = 00
Byte:0091:       AltSectorsPerZoneLSB = 00
Byte:0092:       AltTracksPerZoneMSB = 00
Byte:0093:       AltTracksPerZoneLSB = 0E
Byte:0094:       AltTracksPerVolumeMSB = 00
Byte:0095:       AltTracksPerVolumeLSB = 00
Byte:0096:       SectorsPerTrackMSB = 06
Byte:0097:       SectorsPerTrackLSB = 46
Byte:0098:       BytesPerSectorMSB = 02
Byte:0099:       BytesPerSectorLSB = 00
Byte:009A:       InterleaveMSB = 00
Byte:009B:       InterleaveLSB = 01
Byte:009C:       TrackSkewMSB = 01
Byte:009D:       TrackSkewLSB = 18
Byte:009E:       CylinderSkewMSB = 01
Byte:009F:       CylinderSkewLSB = 18
Byte:00A0:       FormatFlags = 40
```

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           DriveGeometry Mode Page
              DriveGeometry Group
Byte:00A6:       CylindersMSB = 02
Byte:00A7:       CylindersMDB = 44
Byte:00A8:       CylindersLSB = 8A
Byte:00A9:       Heads = 02
Byte:00AA:       WritePrecompMSB = 00
Byte:00AB:       WritePrecompMDB = 00
Byte:00AC:       WritePrecompLSB = 00
Byte:00AD:       ReducedCurrentMSB = 00
Byte:00AE:       ReducedCurrentMDB = 00
Byte:00AF:       ReducedCurrentLSB = 00
Byte:00B0:       StepRateMSB = 00
Byte:00B1:       StepRateLSB = 00
Byte:00B2:       LandingZoneMSB = 00
Byte:00B3:       LandingZoneMDB = 00
Byte:00B4:       LandingZoneLSB = 00
Byte:00B5:       PositionLocking = 00
Byte:00B6:       RotationalOffset = 00
Byte:00B8:       RotationRateMSB = 1C
Byte:00B9:       RotationRateLSB = 20

           VerifyError Mode Page
              VerifyError Group
Byte:00BE:       VerifyRecoveryFlags = 00
Byte:00BE:           Bit:0, VE_DISABLE_CORRECTION = 0
Byte:00BE:           Bit:1, VE_DISABLE_TRANSFER_ON_ERROR = 0
Byte:00BE:           Bit:2, VE_POST_ERROR = 0
Byte:00BE:           Bit:3, VE_ENABLE_ERROR_RECOVERY = 0
Byte:00BF:       VerifyCount = 08
Byte:00C0:       VerifySpan = FF
Byte:00C6:       VerifyTimeLimitMSB = FF
Byte:00C7:       VerifyTimeLimitLSB = FF

           CacheControl Mode Page
              CacheControl Group
Byte:00CA:       CacheFlags = 14
Byte:00CA:           Bit:0, READ_CACHING_DISABLED_ON_POWER_UP = 0
Byte:00CA:           Bit:1, MULTIPLICATION_FACTOR = 0
Byte:00CA:           Bit:2, WRITE_CACHING_ENABLED_ON_POWER_UP = 1
Byte:00CA:           Bit:4, DISCONTINUITY = 1
Byte:00CA:           Bit:5, CACHING_ANALYSIS_PERMITTED = 0
Byte:00CA:           Bit:6, ABORT_PREFETCH = 0
Byte:00CA:           Bit:7, DISABLE_ADAPTIVE_READ_AHEAD = 0
Byte:00CB:       RetentionPriority = 00
Byte:00CC:       DisablePrefetchLengthMSB = FF
Byte:00CD:       DisablePrefetchLengthLSB = FF
Byte:00CE:       MinPrefetchMSB = 00
Byte:00CF:       MinPrefetchLSB = 00
Byte:00D0:       MaxPrefetchMSB = FF
Byte:00D1:       MaxPrefetchLSB = FF
Byte:00D2:       MaxPrefetchCeilingMSB = FF
Byte:00D3:       MaxPrefetchCeilingLSB = FF
Byte:00D4:       SpecialCacheFlags = 80
Byte:00D5:       CacheSegmentNum = 20
Byte:00D6:       CacheSegSizeMSB = 00
Byte:00D7:       CacheSegSizeLSB = 00
Byte:00D9:       NonCacheSegSizeMSB = 00
Byte:00DA:       NonCacheSegSizeMDB = 00
Byte:00DB:       NonCacheSegSizeLSB = 00

           ControlMode Mode Page
              ControlMode Group
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Byte:00DE:       LogFlags = 02
Byte:00DF:       QueueFlags = 00
Byte:00E0:       AllegianceFlags = 00
Byte:00E2:       RAERHoldOffMSB = 00
Byte:00E3:       RAERHoldOffLSB = 00
Byte:00E4:       BusyTimeoutMSB = 00
Byte:00E5:       BusyTimeoutLSB = 00
Byte:00E6:       ExtendedDstestTimeMSB = 00
Byte:00E7:       ExtendedDstestTimeLSB = 00

           PowerCondition Mode Page
              PowerCondition Group
Byte:00EB:       PowerFlags = 02
Byte:00EC:       IdleTimerMSB = 00
Byte:00ED:       IdleTimerNMSB = 00
Byte:00EE:       IdleTimerNLSB = 00
Byte:00EF:       IdleTimerLSB = 05
Byte:00F0:       StandbyTimerMSB = 00
Byte:00F1:       StandbyTimerNMSB = 00
Byte:00F2:       StandbyTimerNLSB = 00
Byte:00F3:       StandbyTimerLSB = 04

           BackgroundMediaScan Mode Page
              BGMS Group
Byte:00F7:       BGMSBusIdleIn100ms = 05
Byte:00F8:       OtherScanFlags = 00
Byte:00F9:       IRAWWriteCachePercentage = 00
Byte:00FA:       IRAWDelayInMilliSecs = 00
Byte:00FB:       IRAWMaxQDepth = 00
Byte:00FC:       BGMSFlags = 00
Byte:00FD:       BGMSECCTLevel = 0A
Byte:0104:       ReadAfterWriteControl = 00
Byte:0104:           Bit:0, MP_RAW_ENABLE_BIT = 0
Byte:0104:           Bit:1, MP_RAW_TRIP_1ST_N_WRITES = 0
Byte:0104:           Bit:2, MP_RAW_FORCE_RAW_MODE = 0
Byte:0104:           Bit:3, MP_RAW_UDS_DEBUG_MODE = 0
Byte:0105:       NWritesAfterSWDFail = 00
Byte:0106:       NWritesAfterRAWFail = 00
Byte:0107:       NWritesAfterIRAWFail = 00
Byte:0108:       N1stWrites = 00
Byte:0109:       RAWOnColdThreshold = 00
Byte:010A:       RAWOnHotThreshold = 00
Byte:010B:       RAWATAMode = 02
Byte:010C:       RAWVerifyNSectors = 00 00 00 00
Byte:0114:       SWDControl = 00
Byte:0114:           Bit:0, MP_SWD_ENABLE_BIT = 0
Byte:0114:           Bit:1, MP_SWD_DONT_REPORT_BIT = 0
Byte:0114:           Bit:2, MP_SWD_DEBUG_MODE_BIT = 0
Byte:0115:       SWDDvgasEventsBeforeFail = 00
Byte:0116:       SWDRvgasEventsBeforeFail = 00
Byte:0117:       SWDFvgasEventsBeforeFail = 00

           DriveNativeInfo Mode Page
              DriveNativeInfo Group
Byte:011E:       PartNumber = 30 32 36 46 51 30 32 34 31
                 '026FQ0241'
Byte:0127:       PartNumberWhitespacePad = 00 00 00 00 00 00 00 00
                 ''
Byte:012F:       PartNumberPad = 00
Byte:0130:       ProcessControlVersion = 01 37
Byte:0132:       CongenConfigurationState = 03
Byte:0133:       WrittenCount = 40
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          ANSIBackgroundMediaScan Mode Page
             ANSIBackgroundMediaScan Group
Byte:0138:      BGMSFlags = 01
Byte:0139:      Prescan = 00
Byte:013A:      BGMSIntervalTimeHoursMSB = 00
Byte:013B:      BGMSIntervalTimeHoursLSB = 18
Byte:013C:      PrescanTimeoutHoursMSB = 00
Byte:013D:      PrescanTimeoutHoursLSB = 02

          Congen Mode Page
             Congen Group
Byte:0148:      GeneralConfiguration = 5A 0C
Byte:0148:          Bit:1, HARD_SECTORED = 1
Byte:0148:          Bit:2, SOFT_SECTORED = 0
Byte:0148:          Bit:3, NOT_MFM_ENCODED = 1
Byte:0148:          Bit:4, HEAD_SWITCH_TIME_ABOVE_15_MICROSECONDS = 1
Byte:0148:          Bit:5, SPINDLE_MOTOR_CONTROL_IMPLEMENTED = 0
Byte:0148:          Bit:6, NON_REMOVABLE_DEVICE = 1
Byte:0148:          Bit:7, REMOVABLE_CARTRIDGE_DRIVE = 0
Byte:0149:          Bit:0, DISK_XFER_RATE_LESS_THAN_5_MEGABYTES_PER_SECOND = 0
Byte:0149:          Bit:1, DISK_XFER_RATE_BETWEEN_5_AND_10_MEGABYTES_PER_SECOND = 0
Byte:0149:          Bit:2, DISK_XFER_RATE_ABOVE_10_MEGABYTES_PER_SECOND = 1
Byte:0149:          Bit:3, ROTATIONAL_SPEED_TOLERANCE_ABOVE_POINT_5_PERCENT = 1
Byte:0149:          Bit:4, DATA_STROBE_OFFSET_OPTION_AVAIL = 0
Byte:0149:          Bit:5, TRACK_OFFSET_OPTION_AVAIL = 0
Byte:0149:          Bit:6, FORMAT_SPEED_TOLERANCE_GAP_REQUIRED = 0
Byte:014A:      NumDefaultATCyls = FF 3F
Byte:014C:      SpecificConfiguration = 37 C8
Byte:014E:      NumDefaultATHeads = 10 00
Byte:0154:      NumDefaultATSectors = 3F 00
Byte:015C:      SerialNumber =
                00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
                00 00 00 00
                ''
Byte:0172:      BufferSize = 00 40
Byte:0174:      NumECCBytesForLongCmds = 04 00
Byte:0176:      FirmwareRevision = 20 20 20 20 20 20 20 20
                '        '
Byte:017E:      ModelNumber =
                53 54 45 33 32 34 34 38 31 30 41 53 20 20 20 20
                20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
                20 20 20 20 20 20 20 20
                'STE3244810AS                            '
Byte:01A6:      MaximumMultipleSize = 10
Byte:01A7:      Word47Byte1 = 00
Byte:01A8:      Word48 = 00 00
Byte:01AA:      Capabilities = 20 2F
Byte:01AB:          Bit:0, DMA_SUPPORTED = 1
Byte:01AB:          Bit:1, LBA_SUPPORTED = 1
Byte:01AB:          Bit:2, ABLE_TO_DISABLE_IORDY = 1
Byte:01AB:          Bit:3, IORDY_SUPPORTED = 1
Byte:01AB:          Bit:5, STANDARD_STANDBY_TIMER_VALUES_SUPPORTED = 1
Byte:01AC:      CapabilitiesII = 00 40
Byte:01AE:      PIOModeTiming = 00 02
Byte:01B0:      DMAModeTiming = 00 02
Byte:01B2:      ValidFields = 00 00
Byte:01B2:          Bit:0, IDENTIFY_WORDS_54_TO_58_ARE_VALID = 0
Byte:01B2:          Bit:1, IDENTIFY_WORDS_64_TO_70_ARE_VALID = 0
Byte:01B2:          Bit:2, IDENTIFY_WORD_88_IS_VALID = 0
Byte:01B4:      NumCurrentATCyls = FF 3F
Byte:01B6:      NumCurrentATHeads = 10 00
Byte:01B8:      NumCurrentATSectors = 3F 00
Byte:01BA:      CurrentATCHSCapacity = 10 FC FB 00
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Byte:01BE:      CurrentMultipleSize = 10 01
Byte:01C0:      TotalUserCapacity = FF FF FF 0F
Byte:01C6:      MultiwordDMAModesSupported = 07
Byte:01C6:          Bit:0, MULTIWORD_DMA_MODE_0_SUPPORTED = 1
Byte:01C6:          Bit:1, MULTIWORD_DMA_MODE_1_SUPPORTED = 1
Byte:01C6:          Bit:2, MULTIWORD_DMA_MODE_2_SUPPORTED = 1
Byte:01C7:      MultiwordDMAModeSelected = 04
Byte:01C8:      AdvancedPIOModesSupported = 23 00
Byte:01C8:          Bit:0, PIO_MODE_3_SUPPORTED = 1
Byte:01C8:          Bit:1, PIO_MODE_4_SUPPORTED = 1
Byte:01CA:      MinimumMultiwordDMACycleTime = 78 00
Byte:01CC:      RecommendedMultiwordDMACycleTime = 78 00
Byte:01CE:      MinimumPIOTimeWithoutFlowControl = 78 00
Byte:01D0:      MinimumPIOTimeWithFlowControl = 78 00
Byte:01D2:      Word69 = 00 00
Byte:01D4:      Word70 = 00 00
Byte:01D6:      Word71 = 00 00
Byte:01D8:      Word72 = 00 00
Byte:01DA:      Word73 = 00 00
Byte:01DC:      Word74 = 00 00
Byte:01DE:      QDepth = 1F 00
Byte:01E0:      SATACapabilities = 26 21
Byte:01E0:          Bit:1, SATA_GEN1_SIGNALING_SPEED = 1
Byte:01E0:          Bit:2, SATA_GEN2_SIGNALING_SPEED = 1
Byte:01E0:          Bit:3, SATA_FUTURE_SIGNALING_SPEED_RESERVED = 0
Byte:01E1:          Bit:0, SATA_NCQ_SUPPORTED = 1
Byte:01E1:          Bit:1, HOST_INITIATED_PHY_POWER_MANAGEMENT_SUPPORTED = 0
Byte:01E1:          Bit:2, SATA_PHY_EVENT_COUNTERS_SUPPORTED = 0
Byte:01E1:          Bit:4, UNLOAD_WHILE_NCQ_CMDS_OUTSTANDING_SUPPORTED = 0
Byte:01E2:      Word77 = 00 00
Byte:01E4:      SATAFeaturesSupported = 20 20
Byte:01E4:          Bit:1, DMA_SETUP_NON_ZERO_OFFSET_SUPPORTED = 0
Byte:01E4:          Bit:2, DMA_AUTOACTIVATE_SUPPORTED = 0
Byte:01E4:          Bit:3, DEVICE_INITIATED_POWER_MANAGEMENT_SUPPORTED = 0
Byte:01E4:          Bit:6, PRESERVE_SETTINGS_ON_COMRESET_SUPPORTED = 0
Byte:01E6:      SATAFeaturesEnabled = 20 20
Byte:01E6:          Bit:1, DMA_SETUP_NON_ZERO_OFFSET_ENABLED = 0
Byte:01E6:          Bit:2, DMA_AUTOACTIVATE_ENABLED = 0
Byte:01E6:          Bit:3, DEVICE_INITIATED_POWER_MANAGEMENT_ENABLED = 0
Byte:01E6:          Bit:4, IN_ORDER_DATA_DELIVERY_ENABLED = 0
Byte:01E6:          Bit:6, PRESERVE_SETTINGS_ON_COMRESET_ENABLED = 0
Byte:01E8:      MajorVersionNumber = 7E 20
Byte:01E8:          Bit:1, ATAPI_1_SUPPORTED = 1
Byte:01E8:          Bit:2, ATAPI_2_SUPPORTED = 1
Byte:01E8:          Bit:3, ATAPI_3_SUPPORTED = 1
Byte:01E8:          Bit:4, ATAPI_4_SUPPORTED = 1
Byte:01E8:          Bit:5, ATAPI_5_SUPPORTED = 1
Byte:01E8:          Bit:6, ATAPI_6_SUPPORTED = 1
Byte:01E8:          Bit:7, ATAPI_7_SUPPORTED = 0
Byte:01EA:      MinorVersionNumber = 1B 00
Byte:01EC:      CommandSetSupported = 6B 34
Byte:01EC:          Bit:0, SMART_SUPPORTED = 1
Byte:01EC:          Bit:1, SECURITY_MODE_FEATURE_SET_SUPPORTED = 1
Byte:01EC:          Bit:3, POWER_MANAGEMENT_SUPPORTED = 1
Byte:01EC:          Bit:5, WRITE_CACHE_SUPPORTED = 1
Byte:01EC:          Bit:6, READ_LOOKAHEAD_SUPPORTED = 1
Byte:01EC:          Bit:7, RELEASE_INTERRUPT_SUPPORTED = 0
Byte:01ED:          Bit:0, SERVICE_INTERRUPT_SUPPORTED = 0
Byte:01ED:          Bit:1, DEVICE_RESET_CMD_SUPPORTED = 0
Byte:01ED:          Bit:2, HOST_PROTECTED_AREA_SUPPORTED = 1
Byte:01ED:          Bit:4, WRITE_BUFFER_CMD_SUPPORTED = 1
Byte:01ED:          Bit:5, READ_BUFFER_CMD_SUPPORTED = 1
Byte:01ED:          Bit:6, NOP_CMD_SUPPORTED = 0
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Byte:01EE:        CommandSetsSupported = 01 7F
Byte:01EE:            Bit:0, DOWNLOAD_MICROCODE_CMD_SUPPORTED = 1
Byte:01EE:            Bit:1, READ_WRITE_DMA_QUEUED_SUPPORTED = 0
Byte:01EE:            Bit:2, CFA_FEATURE_SUPPORTED = 0
Byte:01EE:            Bit:3, ADVANCED_POWER_MANAGEMENT_SUPPORTED = 0
Byte:01EE:            Bit:4, REMOVABLE_MEDIA_STATUS_NOTIFICATION_FEATURE_SET_SUPPORTED = 0
Byte:01EE:            Bit:5, POWER_UP_IN_STANDBY_SUPPORTED = 0
Byte:01EE:            Bit:6, SET_FEATURES_SPINUP_REQUIRED_SUPPORTED = 0
Byte:01EF:            Bit:0, SET_MAX_SECURITY_EXTENSION_SUPPORTED = 1
Byte:01EF:            Bit:1, AUTO_ACOUSTIC_MANAGEMENT_SUPPORTED = 1
Byte:01EF:            Bit:2, FOURTYEIGHT_BIT_SUPPORTED = 1
Byte:01EF:            Bit:3, DCO_COMMAND_SETS_SUPPORTED = 1
Byte:01EF:            Bit:4, FLUSH_CACHE_SUPPORTED = 1
Byte:01EF:            Bit:5, FLUSH_CACHE_EXT_SUPPORTED = 1
Byte:01F0:        CommandSetSupportedExtension = 03 40
Byte:01F0:            Bit:0, SMART_ERROR_LOGGING_SUPPORTED = 1
Byte:01F0:            Bit:1, SMART_SELF_TEST_SUPPORTED = 1
Byte:01F0:            Bit:2, MEDIA_SERIALNUMBER_SUPPORTED = 0
Byte:01F0:            Bit:3, MEDIA_CARD_PASS_THROUGH_CMD_FEATRUE_SET_SUPPORTED = 0
Byte:01F0:            Bit:4, STREAMING_FEATURE_SET_SUPPORTED = 0
Byte:01F0:            Bit:5, GENERAL_PURPOSE_LOGGING_SUPPORTED = 0
Byte:01F0:            Bit:6, FUA_WRITE_EXT_COMMANDS_SUPPORTED = 0
Byte:01F0:            Bit:7, FUA_WRITE_QUEUED_EXT_COMMANDS_SUPPORTED = 0
Byte:01F1:            Bit:0, SIXTYFOUR_BIT_WWN_SUPPORTED = 0
Byte:01F1:            Bit:1, URG_FOR_READ_STREAM_SUPPORTED = 0
Byte:01F1:            Bit:2, URG_FOR_WRITE_STREAM_SUPPORTED = 0
Byte:01F1:            Bit:3, AV_LITE_SUPPORTED = 0
Byte:01F1:            Bit:4, AV_LITE_RC_WC_SUPPORTED = 0
Byte:01F1:            Bit:5, IDLE_IMMEDIATE_UNLOAD_SUPPORTED = 0
Byte:01F1:            Bit:6, BASE_VALUE_OF_IDENTIFY_WORD_84 = 1
Byte:01F2:        CommandSetEnabled = 28 34
Byte:01F2:            Bit:0, SMART_ENABLED = 0
Byte:01F2:            Bit:1, SECURITY_MODE_FEATURE_SET_ENABLED = 0
Byte:01F2:            Bit:3, POWER_MANAGEMENT_ENABLED = 1
Byte:01F2:            Bit:5, WRITE_CACHE_ENABLED = 1
Byte:01F2:            Bit:6, READ_LOOKAHEAD_ENABLED = 0
Byte:01F2:            Bit:7, RELEASE_INTERRUPT_ENABLED = 0
Byte:01F3:            Bit:0, SERVICE_INTERRUPT_ENABLED = 0
Byte:01F3:            Bit:2, HOST_PROTECTED_AREA_ENABLED = 1
Byte:01F3:            Bit:4, WRITE_BUFFER_CMD_ENABLED = 1
Byte:01F3:            Bit:5, READ_BUFFER_CMD_ENABLED = 1
Byte:01F4:        CommandSetsEnabled = 01 3C
Byte:01F4:            Bit:0, DOWNLOAD_MICROCODE_CMD_ENABLED = 1
Byte:01F4:            Bit:1, READ_WRITE_DMA_QUEUED_ENABLED = 0
Byte:01F4:            Bit:2, CFA_FEATURE_SET_ENABLED = 0
Byte:01F4:            Bit:3, ADVANCED_POWER_MANAGEMENT_ENABLED = 0
Byte:01F4:            Bit:4, REMOVABLE_MEDIA_STATUS_NOTIFICATION_FEATURE_SET_ENABLED = 0
Byte:01F4:            Bit:5, POWER_UP_IN_STANDBY_ENABLED = 0
Byte:01F4:            Bit:6, SET_FEATURES_SPINUP_REQUIRED_ENABLED = 0
Byte:01F4:            Bit:7, ADDRESS_OFFSET_RESERVED_AREA_BOOT = 0
Byte:01F5:            Bit:0, SET_MAX_SECURITY_EXTENSION_ENABLED = 0
Byte:01F5:            Bit:1, AUTO_ACOUSTIC_MANAGEMENT_ENABLED = 0
Byte:01F5:            Bit:2, FOURTYEIGHT_BIT_ENABLED = 1
Byte:01F5:            Bit:3, DCO_COMMAND_SETS_ENABLED = 1
Byte:01F5:            Bit:4, FLUSH_CACHE_ENABLED = 1
Byte:01F5:            Bit:5, FLUSH_CACHE_EXT_ENABLED = 1
Byte:01F6:        CommandSetEnabledExtension = 03 40
Byte:01F6:            Bit:0, SMART_ERROR_LOGGING_ENABLED = 1
Byte:01F6:            Bit:1, SMART_SELF_TEST_ENABLED = 1
Byte:01F6:            Bit:2, MEDIA_SERIALNUMBER_IS_VALID = 0
Byte:01F6:            Bit:3, MEDIA_CARD_PASSTHROUGH_FEATURE_SET_ENABLED = 0
Byte:01F6:            Bit:4, STREAMING_FEATURE_SET_ENABLED = 0
Byte:01F6:            Bit:5, GENERAL_PURPOSE_LOGGING_ENABLED = 0
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Byte:01F6:          Bit:6, FUA_WRITE_EXT_COMMANDS_ENABLED = 0
Byte:01F6:          Bit:7, FUA_WRITE_QUEUED_EXT_COMMANDS_ENABLED = 0
Byte:01F7:          Bit:0, SIXTYFOUR_BIT_WWN_ENABLED = 0
Byte:01F7:          Bit:1, URG_FOR_READ_STREAM_ENABLED = 0
Byte:01F7:          Bit:2, URG_FOR_WRITE_STREAM_ENABLED = 0
Byte:01F7:          Bit:3, AV_LITE_ENABLED = 0
Byte:01F7:          Bit:4, AV_LITE_RC_WC_ENABLED = 0
Byte:01F7:          Bit:5, IDLE_IMMEDIATE_UNLOAD_ENABLED = 0
Byte:01F8:      UltraDMAModesSupported = 7F
Byte:01F8:          Bit:0, ULTRA_DMA_MODE0_SUPPORTED = 1
Byte:01F8:          Bit:1, ULTRA_DMA_MODE1_AND_BELOW_SUPPORTED = 1
Byte:01F8:          Bit:2, ULTRA_DMA_MODE2_AND_BELOW_SUPPORTED = 1
Byte:01F8:          Bit:3, ULTRA_DMA_MODE3_AND_BELOW_SUPPORTED = 1
Byte:01F8:          Bit:4, ULTRA_DMA_MODE4_AND_BELOW_SUPPORTED = 1
Byte:01F8:          Bit:5, ULTRA_DMA_MODE5_AND_BELOW_SUPPORTED = 1
Byte:01F8:          Bit:6, ULTRA_DMA_MODE6_AND_BELOW_SUPPORTED = 1
Byte:01F9:      UltraDMAModeSelected = 00
Byte:01F9:          Bit:0, ULTRA_DMA_MODE0_SELECTED = 0
Byte:01F9:          Bit:1, ULTRA_DMA_MODE1_SELECTED = 0
Byte:01F9:          Bit:2, ULTRA_DMA_MODE2_SELECTED = 0
Byte:01F9:          Bit:3, ULTRA_DMA_MODE3_SELECTED = 0
Byte:01F9:          Bit:4, ULTRA_DMA_MODE4_SELECTED = 0
Byte:01F9:          Bit:5, ULTRA_DMA_MODE5_SELECTED = 0
Byte:01F9:          Bit:6, ULTRA_DMA_MODE6_SELECTED = 0
Byte:01FA:      SecurityEraseTime = 00 00
Byte:01FC:      EnhancedSecurityEraseTime = 00 00
Byte:01FE:      CurrentAPMValue = FE FE
Byte:0200:      MasterPasswordRevisionCode = FE FF
Byte:0202:      EightyConductorCableDetection = 00 00
Byte:0202:          Bit:0, DEV0_RESULT = 0
Byte:0202:          Bit:1, DEV0_RESULT_JUMPER_USED_TO_DETERMINE_DEV_NUM = 0
Byte:0202:          Bit:2, DEV0_RESULT_CSEL_USED_TO_DETERMINE_DEV_NUM = 0
Byte:0202:          Bit:3, DEV0_RESULT_PASSED_DIAGNOSTICS = 0
Byte:0202:          Bit:4, DEV0_RESULT_DETECTED_PDIAG = 0
Byte:0202:          Bit:5, DEV0_RESULT_DETECTED_DASP = 0
Byte:0202:          Bit:6, DEV0_RESULT_DEV0_RESPONDS_WHEN_DEV1_SELECTED = 0
Byte:0203:          Bit:0, DEV1_RESULT = 0
Byte:0203:          Bit:1, DEV1_RESULT_JUMPER_USED_TO_DETERMINE_DEV_NUM = 0
Byte:0203:          Bit:2, DEV1_RESULT_CSEL_USED_TO_DETERMINE_DEV_NUM = 0
Byte:0203:          Bit:3, DEV1_RESULT_ASSERTED_PDIAG = 0
Byte:0203:          Bit:5, EIGHTY_CONDUCTOR_CABLE_PRESENT_BIT = 0
Byte:0204:      AcousticLevel = 00 FE
Byte:0206:      StreamMinRequestSize = 00 00
Byte:0208:      StreamXferTimeDMA = 00 00
Byte:020A:      StreamAccessLatency = 00 00
Byte:020C:      StreamPerformanceGranularity = 00 00 00 00
Byte:0210:      FortyEightBitAddress = 99 A9 6B 1C 00 00 00 00
Byte:0218:      StreamXferTimePIO = 00 00
Byte:021A:      Word105 = 00 00
Byte:021C:      PhysicalLogicalSectorSize = 00 00
Byte:021E:      InterSeekDelayForISO7779 = 00 00
Byte:0220:      NAAIEEEOUIHigh = 00 00
Byte:0222:      IEEEOUILowAndUniqueIDHigh = 00 00
Byte:0224:      UniqueIDMid = 00 00
Byte:0226:      UniqueIDLow = 00 00
Byte:0230:      AVLiteWorstCaseTimer = 00 00
Byte:0232:      WordsPerLogicalSector = 00 00 00 00
Byte:0236:      ATACommandSetSupportedExt2 = 24 20
Byte:0236:          Bit:1, WRITE_READ_VERIFY_SUPPORTED = 0
Byte:0236:          Bit:2, WRITE_UNCORRECTABLE_SUPPORTED = 1
Byte:0236:          Bit:3, READ_AND_WRITE_DMA_EXP_GPL_COMMANDS_SUPPORTED = 0
Byte:0236:          Bit:4, SEGMENTED_DOWNLOAD_MICROCODE_SUPPORTED = 0
Byte:0238:      ATACommandSetEnabledExt2 = 22 20
```

```
Byte:0238:          Bit:1, WRITE_READ_VERIFY_ENABLED = 1
Byte:0238:          Bit:3, READ_AND_WRITE_DMA_EXP_GPL_COMMANDS_ENABLED = 0
Byte:0238:          Bit:4, SEGMENTED_DOWNLOAD_MICROCODE_ENABLED = 0
Byte:0248:      SecurityStatus = 21 00
Byte:0248:          Bit:0, SECURITY_SUPPORTED = 1
Byte:0248:          Bit:1, SECURITY_ENABLED = 0
Byte:0248:          Bit:2, SECURITY_LOCKED = 0
Byte:0248:          Bit:3, SECURITY_FROZEN = 0
Byte:0248:          Bit:4, SECURITY_COUNT_EXPIRED = 0
Byte:0248:          Bit:5, ENHANCED_SECURITY_ERASE_SUPPORTED = 1
Byte:0249:          Bit:1, SECURITY_LEVEL_MAXIMUM = 0
Byte:024A:      FirstATAVendorSpecificPad = 00 00 00 00 00 00 00 00 00 00
                ''
Byte:0254:      CompaqWord = 02 00
Byte:0254:          Bit:1, COMPAQ_CAM_COMPLIANT = 1
Byte:0256:      SecondATAVendorSpecificPad =
                00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
                00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
                00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
                00 00
                ''
Byte:0288:      Word160 = 00 00
Byte:028A:      CFAWords =
                00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
                00 00 00 00 00 00 00 00 00 00 00 00 00 00
                ''
Byte:02A8:      MediaSerialNumberCopy =
                00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
                00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
                00 00 00 00 00 00 00 00
                ''
Byte:02D0:      MediaManufacturerCopy =
                00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
                00 00 00 00
                ''
Byte:02E4:      ATATransportMajorRevisionNumber = 08 10
Byte:02E6:      ATATransportMinorRevisionNumber = 20 20
Byte:0346:      ATACheckSum = 00 00
Byte:0348:      ATSMARTConfig =
                0F 00 06 00 03 00 00 00 32 00 14 00 33 00 24 00
                0F 00 1E 00 32 00 00 00 13 00 61 00 32 00 14 00
                32 00 00 00 3A 00 00 00 22 00 2D 00 32 00 00 00
                32 00 00 00 32 00 00 00 22 00 00 00 1A 00 00 00
                12 00 00 00 10 00 00 00 3E 00 00 00 00 00 00 00
                00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
                00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
                00 00 00 00 00 00 00 00
Byte:0348:      SMART1Status = 0F 00
Byte:034A:      SMART1Threshold = 06
Byte:034C:      SMART2Status = 03 00
Byte:034E:      SMART2Threshold = 00
Byte:0350:      SMART3Status = 32 00
Byte:0352:      SMART3Threshold = 14
Byte:0354:      SMART4Status = 33 00
Byte:0356:      SMART4Threshold = 24
Byte:0358:      SMART5Status = 0F 00
Byte:035A:      SMART5Threshold = 1E
Byte:035C:      SMART6Status = 32 00
Byte:035E:      SMART6Threshold = 00
Byte:0360:      SMART7Status = 13 00
Byte:0362:      SMART7Threshold = 61
Byte:0364:      SMART8Status = 32 00
Byte:0366:      SMART8Threshold = 14
```

```
Byte:0368:        SMART9Status = 32 00
Byte:036A:        SMART9Threshold = 00
Byte:036C:        SMART10Status = 3A 00
Byte:036E:        SMART10Threshold = 00
Byte:0370:        SMART11Status = 22 00
Byte:0372:        SMART11Threshold = 2D
Byte:0374:        SMART12Status = 32 00
Byte:0376:        SMART12Threshold = 00
Byte:0378:        SMART13Status = 32 00
Byte:037A:        SMART13Threshold = 00
Byte:037C:        SMART14Status = 32 00
Byte:037E:        SMART14Threshold = 00
Byte:0380:        SMART15Status = 22 00
Byte:0382:        SMART15Threshold = 00
Byte:0384:        SMART16Status = 1A 00
Byte:0386:        SMART16Threshold = 00
Byte:0388:        SMART17Status = 12 00
Byte:038A:        SMART17Threshold = 00
Byte:038C:        SMART18Status = 10 00
Byte:038E:        SMART18Threshold = 00
Byte:0390:        SMART19Status = 3E 00
Byte:0392:        SMART19Threshold = 00
Byte:0394:        SMART20Status = 00 00
Byte:0396:        SMART20Threshold = 00
Byte:0398:        SMART21Status = 00 00
Byte:039A:        SMART21Threshold = 00
Byte:039C:        SMART22Status = 00 00
Byte:039E:        SMART22Threshold = 00
Byte:03A0:        SMART23Status = 00 00
Byte:03A2:        SMART23Threshold = 00
Byte:03A4:        SMART24Status = 00 00
Byte:03A6:        SMART24Threshold = 00
Byte:03A8:        SMART25Status = 00 00
Byte:03AA:        SMART25Threshold = 00
Byte:03AC:        SMART26Status = 00 00
Byte:03AE:        SMART26Threshold = 00
Byte:03B0:        SMART27Status = 00 00
Byte:03B2:        SMART27Threshold = 00
Byte:03B4:        SMART28Status = 00 00
Byte:03B6:        SMART28Threshold = 00
Byte:03B8:        SMART29Status = 00 00
Byte:03BA:        SMART29Threshold = 00
Byte:03BC:        SMART30Status = 00 00
Byte:03BE:        SMART30Threshold = 00
Byte:03C0:        ATSMARTDefaultFlags = 00 00
Byte:03C0:            Bit:0, SMARTDEFAULTON = 0
Byte:03C2:        SCTCommandSetSupported = 40 4B
Byte:03C4:        SCTFanControlMaxOperatingTemp = 00
Byte:03C5:        SCTFanControlOverRangeTemp = 00
Byte:03C6:        SCTFanControlUnderRangeTemp = 00
Byte:03C7:        SCTFanControlMinOperatingTemp = 00
Byte:03C8:        SCTVendorFlags = 00 00
Byte:03C8:            Bit:0, SCT_VENDORFLAGS_SEATOOLS = 0
Byte:03C8:            Bit:1, SCT_VENDORFLAGS_WRITE_SAME = 0
Byte:03C8:            Bit:2, SCT_VENDORFLAGS_CORRECTABLE_BIT = 0
Byte:03C9:            Bit:7, SCT_VENDORFLAGS_DEBUG_MODE = 0
Byte:03CA:        SCTTimerReadDefault = 00
Byte:03CB:        SCTTimerWriteDefault = 00
Byte:03CC:        SCTTenMsecCount = 00
Byte:03CD:        SCTPerformanceFlags = 00
Byte:03CE:        ATAPadSlewRate = 00
Byte:03CF:        ATAIORDYPadControl = 00
Byte:03D0:        PreampHotTweak = 00
```

```
Byte:03D1:        PreampColdTweak = 00
Byte:03D2:        LubeMitigationRetries = 00 00
Byte:03D4:        LengthOfWriteCommandToTriggerFlush = 00 00
Byte:03D6:        LengthOfWriteSpaceToFlush = 00 00
Byte:03D8:        NDSLBAThresholdA = 00 00
Byte:03DA:        NDSLBAThresholdB = 00 00
Byte:03DC:        NDSPartitionDependencies = 00 00
Byte:03DE:        NDSODOffsetConfig = 00
Byte:03DF:        NDSIDOffsetConfig = 00
Byte:03E0:        APMTimer1mSec = 40 04
Byte:03E2:        APMTimer2mSec = 00 15
Byte:03E4:        APMStandByTimer = 20 00
Byte:03E6:        APMTimerForDither = 2C 01
Byte:03E8:        ReadDelayMinimum = 00
Byte:03E9:        ReadDelayIncremental = 00
Byte:03EA:        WriteDelayMinimum = 00
Byte:03EB:        WriteDelayIncremental = 00
Byte:03EC:        NativeCapacity = 99 A9 6B 1C
Byte:03F0:        HDACapacity = 99 A9 6B 1C
Byte:03F4:        FeatureFlags = 00 A0 08 00
Byte:03F4:            Bit:0, WRITE_CONFIG_DATA_TO_FLASH = 0
Byte:03F4:            Bit:1, SPINUP_WRITE_FAULT_THRESHOLDS_ENABLED = 0
Byte:03F4:            Bit:2, IOEDC_CHECK_ENABLED = 0
Byte:03F4:            Bit:3, IOEDC_ERROR_ENABLED = 0
Byte:03F4:            Bit:4, DOWNLOAD_MICROCODE_FUTURE_USE_ONLY = 0
Byte:03F4:            Bit:5, SUPPRESS_SERIAL_PORT_PRINTS = 0
Byte:03F4:            Bit:6, DRQ_CLEAR_ON_PIO_READ_ERR_SUPPORTED = 0
Byte:03F4:            Bit:7, OFFLINE_SEEK_AWAY = 0
Byte:03F5:            Bit:0, DELAY_SLEEP_STANDBY_CMDCOMPLETE = 0
Byte:03F5:            Bit:1, IDLE_IMMEDIATE_UNLOAD_EMERGENCY = 0
Byte:03F5:            Bit:2, ENABLE_ALLOW_RAW_ERROR_RATE_UPDATE = 0
Byte:03F5:            Bit:3, OP_SHOCK_DETECTION_ENABLED = 0
Byte:03F5:            Bit:4, LOG99_CONTROL = 0
Byte:03F5:            Bit:5, READ_WRITE_LONG_EXTENDED_ENABLED = 1
Byte:03F5:            Bit:6, WRITE_REORDERING_DISABLED = 0
Byte:03F5:            Bit:7, ALLOW_AAM_FEATURE_SET = 1
Byte:03F6:            Bit:0, DATA_LOG_ENABLED = 0
Byte:03F6:            Bit:1, HOST_STREAM_RECORD_FIRST_ERROR_BLOCK = 0
Byte:03F6:            Bit:2, SAVE_ATA_COMMAND_HISTORY_TO_DISC = 0
Byte:03F6:            Bit:3, EIB_ON_POWERUP = 1
Byte:03F6:            Bit:4, LEFT_JUSTIFY_SERIAL_NUMBER = 0
Byte:03F6:            Bit:5, SUN_MICRO_MODEL_NUMBER_UPDATE = 0
Byte:03F6:            Bit:6, REVERTING_TO_POWER_ON_DEFAULTS_SUPPORTED = 0
Byte:03F6:            Bit:7, RIGHT_JUSTIFY_FIRMWARE_REVISION = 0
Byte:03F8:        PerformanceFlags = 00 00
Byte:03F8:            Bit:0, REDUCED_RAW_TRANSITION_FLUSH = 0
Byte:03F8:            Bit:1, REDUCED_AV_RETRIES = 0
Byte:03F8:            Bit:2, READ_LOOKAHEAD_DISABLED_ON_POWER_UP = 0
Byte:03F8:            Bit:3, JIT3 = 0
Byte:03F8:            Bit:4, JIT2 = 0
Byte:03F8:            Bit:5, JIT1 = 0
Byte:03F8:            Bit:6, JIT0 = 0
Byte:03F8:            Bit:7, ZERO_LATENCY_RD_ENABLED = 0
Byte:03F9:            Bit:0, DAR_ENABLED = 0
Byte:03F9:            Bit:1, OFFLINE_SPARING_ENABLED = 0
Byte:03FA:        AggressivelyScanThisManyTimes = 00 00
Byte:03FC:        DOSNeedToScanThreshold = 00
Byte:03FD:        DOSOughtToScanThreshold = 00
Byte:03FE:        SleepStandbyDelay = 00 00
Byte:0400:        CustomerUniques = 00 00 00 00
Byte:0404:        CustomerType = 00 00 00 00
Byte:0408:        AdditionalSATAFeatureConfig = 00 00 00 00
Byte:0408:            Bit:0, SATA_FORCE_EARLY_STATUS = 0
```

```
Byte:0408:          Bit:1, SATA_EARLY_STATUS_FORCE_COMRESET = 0
Byte:0408:          Bit:2, SATA_INTRACOMMAND_PHY_MANAGEMENT_ENABLED = 0
Byte:0408:          Bit:3, SATA_ENABLE_PHY_PM_CALIBRATION = 0
Byte:0408:          Bit:4, SATA_ENABLE_SPI_VIS_MODE = 0
Byte:0408:          Bit:5, SATA_AGGRESSIVE_PHY_SUPPORTED = 0
Byte:0408:          Bit:6, SATA_ENABLE_SSC = 0
Byte:0408:          Bit:7, SATA_ACTIVITY_LED = 0
Byte:0409:          Bit:0, SATA_DISABLE_PRIMITIVE_SCRAMBLING = 0
Byte:040C:      FactoryODScanMBytes = D0 07
Byte:040E:      FactoryIDScanMBytes = E8 03
Byte:0410:      MaxDSTSelfTestTime = 54 15
Byte:0412:      DSTShortTestTimeLimit = 3C 00
Byte:0414:      CongenDriveType = 00 26
Byte:0416:      BootFlagsForROM = 00 00
Byte:0416:          Bit:0, BOOT_FLAG_POWER_ON_IN_STANDBY = 0
Byte:0416:          Bit:1, BOOT_FLAG_PARTIAL_OOB = 0
Byte:0416:          Bit:2, USE_SMALL_ID_FORMAT = 0
Byte:0416:          Bit:3, LOW_CURRENT_SPINUP = 0
Byte:0418:      LastCongenWriteCaller = 00 00
Byte:041A:      RealTimeUpdatedFlags = 08 00
Byte:041A:          Bit:0, HPA_SET_BY_SETMAX = 0
Byte:041A:          Bit:1, HPA_SET_BY_SETMAX_EXT = 0
Byte:041A:          Bit:2, DCO_SET_ACTIVE = 0
Byte:041A:          Bit:3, CONGEN_READ_FROM_MEDIA = 1
Byte:041C:      CheckSum = 00 00
Byte:041E:      HostStreamJumpSizeInSectors = 00 00
Byte:0420:      HostStreamTotalJumpSteps = 00
Byte:0421:      SerialDebugLevel = 00
Byte:0422:      DefaultStandbyTimer = 00

Bytes Returned = 0.
F3 T>
```

Note: Congen words that can not be modified will be highlighted.

If no error occurred, Parameter 0 is entered and Parameter 1 is not entered, the current value of the specified Congen Parameter will be displayed.

If no error occurred and Parameter 0 and 1 are both entered, the new value of the specified Congen Parameter will be displayed.

Examples:

To display the full Congen in a humanized way:

In:
F3 T>F

Out:
(See above for example of full humanized output)

To display a single Congen parameter in a humanized way:
(The byte offset of the Congen Parameter, SerialDebugLevel, could be at a different byte offset than this example shows. Use this example with caution!)

In:
F3 T>F421
F3 T>F0421
F3 T>F"SerialDebugLevel"

Out:
Byte:0421:   SerialDebugLevel = 00

To modify the Congen:
(Although these are syntactically valid usages, they are nonsensical; However, they all do the same thing)

```
In:
F3 T>F421,41
F3 T>F421,"A"
F3 T>F0421,41
F3 T>F0421,"A"
F3 T>F"SerialDebugLevel",41
F3 T>F"SerialDebugLevel","A"

Out:
Byte:0421:       SerialDebugLevel = 41
```

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Set Controller Test Port (Level A 'M')

Description:
This command is used to set the controller test port mux.

Quick Help:

"SetControllerTestPort, M[Port],[Value]";

Input Parameters:

0 - Test Port.

This input specifies the Test port to set.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

1 - Test Port Value.

This input specifies the Value to set to the Test port. If this input is set to 0xFF then the test port will be disabled.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Set Retries - DERP (Level 2, 7, A, F 'Y')

Description:
This command allows the user to specify the error recovery parameters that will be used for subsequent diagnostic commands. (This version of the Set Retries command is only available if the drive supports DERP! To know whether your drive supports DERP, issue the Online "^L" command to see a list of features supported by the drive.)

Quick Help:

"SetDerpRetries, Y[Mode],[MaxRdRetries],[MaxWrtRetries],[OtcTLevel],[Options]";

Input Parameters:

0 - Error Recovery Mode.

This parameter specifies the error recovery mode to be used. The following error recovery modes are available:

0 = Maximum Normal
1 = Maximum Full
2 = Default Normal
3 = Default Full
4 = Minimum Normal
5 = Minimum Full
6 = Simple

The Maximum Error Recovery Modes (0 and 1) are typically used for system information recovery.

The Default Error Recovery Modes (2 and 3) are typically used by the native interface.

The Minimum Error Recovery Modes (4 and 5) are typically used for diagnostic and media certification operations.

The Normal Error Recovery Modes (0, 2 and 4) should be used for multiple sector transfers. The retry steps for these modes employ less extreme tweaks to recover the data. This increases the chance of successfully reading subsequent sectors without resetting tweaks.

The Full Error Recovery Modes (1, 3 and 5) should be used for single sector transfers. The retry steps for these modes employ more extreme tweaks to recover the data. The tweaks used by these modes would make it difficult to read subsequent sectors without error.

The Simple Error Recover Mode is a "Normal" type error recovery mode but with no additional options enabled.

Error Recovery Mode 0 (Default Normal) is the default configuration used by the native interface (aka, "Interface Level Retries")

TIP: Setting the Error Recovery Mode without setting any other parameters will restore the default settings for the specified Error Recovery Mode.

Type: Unsigned 8-bit value

Range: 0 to 6

Default: If this parameter is not entered, the current error recovery mode will not be changed.

1 - Maximum read retry count allowed.

If entered, this parameter specifies the maximum allowed read retry count. NOTE: Specifying this parameter will cause the corresponding Error Recovery Options bit to be set that enables the use of this value.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: If this parameter is not entered, the maximum allowed read retry count for the specified error recovery mode will not be changed.

2 - Maximum write retry count allowed.

If entered, this parameter specifies the maximum allowed write retry count. NOTE: Specifying this parameter will cause the corresponding Error Recovery Options bit to be set that enables the use of this value.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: If this parameter is not entered, the maximum allowed write retry count for the specified error recovery mode will not be changed.

3 - On-the-fly Correction ECC T-Level.

If entered, this parameter specifies the ECC T-Level to be used for on-the-fly correction. Although any value from 0x00 to 0xFF may be entered, the diagnostic will automatically round down to the nearest available value from the entered value. NOTE: Specifying this parameter will cause the corresponding Error Recovery Options bit to be set that enables the use of this value.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: If this parameter is not entered, the on-the-fly correction ECC T-Level for the specified error recovery mode will not be changed.

4 - Error Recovery Options.

If entered, this parameter specifies the options that are allowed to be set for the Error Recovery system. The definition of each bit is specified below:

Bit 0: Enable maximum OTF ECC correction.

If set, maximum on-the-fly ECC correction will be applied.

Bit 1: Apply only minimum ECC correction.

If set, only minimum on-the-fly ECC correction will be applied.

Bit 2: Enable transfer of uncorrectable data block.

If set, uncorrectable sectors will be transfered from the Correction Buffer to the Read Buffer.

Bit 3: Enable restricted servo flaws coast - read.

If set, restrict servo flaw coasting during a read only if one of the following conditions applies:

1) The failed block is not associated with a known grown servo flaw
2) New servo flaws are detected on the target track
3) Forced servo coast tweaks

Bit 4: Enable restricted servo flaws coast - write.

If set, restrict servo flaw coasting during a write only if one of the following conditions applies:

1) The failed block is not associated with a known grown servo flaw
2) New servo flaws are detected on the target track
3) Forced servo coast tweaks

Bit 5: Enable early error recovery exit.

If set, error recovery will terminate when the retry step is equal to the early exit retry step.

Bit 6: Disable normal retry tweak steps.

If set, all retry tweak steps will be disabled for normal error recovery modes.

Bit 7: Disable full-hidden retry tweak steps.

If set, the hidden retry steps will be disabled for the full error recovery modes. The first 9 steps of the full error recovery modes are defined as hidden retries.

Bit 8: Disable full retry tweak steps.

If set, all retry steps will be disabled for the full error recovery modes.

Bit 9: Disable undo of retry tweaks.

If set, the retry tweaks will not be undone after the retry completes.

Bit 10: Disable on-the-fly ECC correction - initial access.

If set, on-the-fly ECC correction will be disabled for the initial attempt to access a sector.

Bit 11: Disable on-the-fly ECC correction - normal retry tweak steps.

If set, on-the-fly ECC correction will be disabled for the normal error recovery modes for all retry steps.

Bit 12: Disable on-the-fly ECC correction - full-hidden retry tweak steps.

If set, on-the-fly ECC correction will be disabled for the full error recovery modes for all hidden retry steps. The first 9 steps of the full error recovery modes are defined as hidden retries.

Bit 13: Disable on-the-fly ECC correction - full retry tweak steps.

If set, on-the-fly ECC correction will be disabled for the full error recovery modes for all retry steps following the hidden retries. The first 9 retry steps of the full error recovery modes are defined as hidden retries.

Bit 14: Enable selected ER retry step.

If this bit is set and Mode Options Bit 15 is also set, a specified error recovery step will be used for the initial sector access.

Bit 15: Skip initial read/write access of request.

Typically, the initial access of a sector is performed without error recovery. If this bit is set, the initial sector access will be performed using error recovery. If Mode Options Bit 14 is also set, a specified error recovery step will be used for the initial sector access. If Mode Options Bit 14 is cleared, the first error recovery step will be used for the initial sector access.

Bit 16: Enable ECC selection setting - normal retries only.

If set, a specified ECC T-Level will be used for on-the-fly correction only during NORMAL retries. (This bit is a "don't care" if Bit 23 is set.)

Bit 17: Disable retry on track integrity error.

If set, retries will be disabled on track integrity errors.

Bit 18: Allow one retry.

If set, only a single, normal retry will be enabled. (This feature is not typically enabled in OEM code.)

Bit 19: Disable PFast.

If set, P-Fast will be disabled during preamp fast tweaks.

Bit 20: Enable use of selected maximum read retry count.

If set, only a specified number of read retries will be allowed when read retries are required.

Bit 21: Enable use of selected maximum write retry count.

If set, only a specified number of write retries will be allowed when write retries are required.

Bit 22: Enable selected maximum retry counts in non-User media partition.

If set, the maximum read and write retry counts that have been enabled by Bits 20 and 21 will be applied to retries in non-user partitions.

Bit 23: Enable ECC selection setting.

If set, a specified ECC T-Level will be used for on-the-fly correction for all retry modes. Setting this bit causes Bit 16 to be considered a "don't care."

Bit 24: Disable the extended retries applied to Write Unsafe error.

If set, the extended retries applied to Write Unsafe errors will be disabled.

Bit 25: Enable reporting of recovered servo seek error to host.

If set, recovered servo seek errors will be reported to the host.

Bit 26: Enable Read/Write to complete transfers in RAW mode.

If set and the Read-After-Write feature is enabled for the product, the Read/Write firmware is allowed to request that a transfer be completed in RAW mode.

Bit 24: Enable Reduced Erasure correction.

If set and the Reduced Erasure Correction feature is enabled for the product, the level of erasure correction applied during retries will be reduced.

Bit 27: Enable abort during error recovery.

If set, abort request will be honored during error recovery. Note that this bit only applies for single-block error recovery. For non single-block error recovery, abort of error recovery is already allowed.

Bits 28-31: Unused.

To Disable All Retries:
Clear bit 18
Set bits 6, 7, and 8

To Disable OTF Correction:
Set bits 10, 11, 12, and 13

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: If this parameter is not entered, the Error Recovery Options for the specified error recovery mode will not be changed.

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the current Error Recovery configuration will be displayed as follows.

```
"Error Recovery Info:

" P0: Mode a (bbbbbb)"

" P4: Options = eeeeee"

"     B26: (f) gggggg R/W allowed to use RAW"
"     B25: (f) gggggg Recovered Servo Sk Err Reporting"
"     B24: (f) gggggg Ext WUS Err Retries OR Reduced Erasure correction"

"     B23: (f) gggggg P3: Selected OTF ECC T-level = jj"
"     B22: (f) gggggg Max Retries In Non-User Partition"
"     B21: (f) gggggg P1: Max Write Retries = hh"
"     B20: (f) gggggg P2: Max Read Retries = ii"

"     B19: (f) gggggg P-Fast"
"     B18: (f) gggggg Single Retry"
"     B17: (f) gggggg Trk Integrity Err Retry"
"     B16: (f) gggggg Selected OTF ECC T-level (Normal Retries ONLY)"

"     B15: (f) gggggg Initial RW Access"
"     B14: (f) gggggg Selected Retry Step = kk"
"     B13: (f) gggggg OTF on Full Retry Steps"
"     B12: (f) gggggg OTF on Full-Hidden Retry Steps"

"     B11: (f) gggggg OTF on Normal Retry Steps"
"     B10: (f) gggggg OTF on Initial Access"
"     B09: (f) gggggg undo of Retry Tweaks"
"     B08: (f) gggggg Full Retries"

"     B07: (f) gggggg Full-Hidden Retries"
"     B06: (f) gggggg Normal Retries"
"     B05: (f) gggggg Early Err Recovery Exit"
"     B04: (f) gggggg Restricted Servo Flaw Coasting during Write"

"     B03: (f) gggggg Restricted Servo Flaw Coasting during Read"
"     B02: (f) gggggg xfer of Uncorrectable Sectors"
"     B01: (f) gggggg Min OTF ECC Correction"
"     B00: (f) gggggg Max OTF ECC Correction"
```

where

a is the Error Recovery Mode number

bbbbbb is a string representing the Error Recovery Mode

eeeeee are the Error Recovery Options that are selected for the current Error Recovery Mode

f is the state of the options bit

gggggg is a string indicating whether the feature controlled by the options bit is enabled or disabled

hh is the maximum number of allowable write retries for the current Error

Recovery Mode

ii is the maximum number of allowable read retries for the current Error Recovery Mode

jj is the ECC T-Level to be used for On-The-Fly Correction for the current Error Recovery Mode

kk is the Selected Error Retry Step for the current Error Recovery Mode

Revision History:

0001.0000 Initial revision.
0002.0000 Added support for recent changes to the "options" parameter (non-DERP).
0010.0000 Added support for DERP and simple retries. (NOTE: Several revisions have been skipped because this command shares the same command letter with the "regular" Set Retries command and the old command must still be supported.)
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Set DERP Retry State (Level 2, 7, A, F 'y')

Description:

This command allows the user to specify the DERP Retry State that will be used by the Read/Write firmware subsystem's Error Recovery system during subsequent diagnostic commands that access the disc. (This command is only available on drives that support DERP! To know whether your drive supports DERP, issue the Online "^L" command to see a list of features supported by the drive.)

Quick Help:

"SetDerpRetryState, y[Type],[PathState],[RetryStateCnt],[LoopCnt1],[LoopCnt2]";

Input Parameters:

IMPORTANT: Either all parameters must be entered or no parameters must be entered. If all parameters are specified, then the Selected DERP Retry State will be enabled and the state values will be set to the specified values. If no parameters are specified, then the Selected DERP Retry State will be disabled. Entering parameters any other way will cause the command to fail.

0 - DERP Error Type.

This parameter specifies the type of error that the DERP Error Recovery system will assume for subsequent diagnostic operations. Valid values for this parameter are given below:

0 = UNDETERMINED
1 = DATA_ERROR
2 = SYNC
3 = TA
4 = DATAORTA
5 = SYNCTA
6 = SYNCORDATA

Type: Unsigned 8-bit value

Range: 0 to Maximum DERP Error Type

Default: None

1 - DERP Path State

This parameter specifies the path count from the current retry sequence that the DERP Error Recovery system will assume for subsequent diagnostic operations. The meaning of the Path State is dependent on the Error Type (parameter 0).

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

2 - DERP Retry State Count.

This parameter specifies the retry path count from the current retry sequence that the DERP Error Recovery system will assume for subsequent diagnostic operations.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

3 - DERP Retry Loop Count 1.

This parameter specifies the first loop counter that the DERP Error Recovery system will assume for subsequent diagnostic operations.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

4 - DERP Retry Loop Count 2.

This parameter specifies the second loop counter that the DERP Error Recovery system will assume for subsequent diagnostic operations.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the current Error Recovery configuration will be displayed as follows.

"Selected DERP Retry State XXXXXXXX"

where XXXXXXXX is either "Enabled" or "Disabled"

If the Selected DERP Retry State is Enabled, then the following will also be displayed:

```
" P0: Error Type:        aa"
" P1: Path State:        bb"
" P2: State Count:       cc"
" P3: Loop Counter 1:    dd"
" P4: Loop Counter 2:    ee"
```

where

aa is the type of error.
bb is the path count from the current retry sequence.
cc is the retry path count from the current retry sequence.
dd is the first loop counter.
ee is the second loop counter.

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Set Diag Idle Mode (Level 2 'M')

Description:

This commmand enables / disables Idle Mode features. The Online Control P command can subsequently toggle selected features off and back on. The mode you set will not change when you move among diag, interface, and online modes (that is, the mode will stay set when you use ctl-T, ctl-R, and ctl-Z).

Quick Help:

"SetDiagIdleMode, M[ModeSelect],[ModeMask],[ResetToPowerOn]";

Input Parameters:

0 - Idle features mode select

This parameter specifies which idle mode features are enabled.

Enable STIR	0x1
Enable TCC	0x2
Enable Continuous Writer Heat	0x4
Enable MR Bias Chop and disable Continuous Preamp Power	0x8
Enable PFAST	0x10
Enable Self Seek	0x20 (only on some drives)
Continuous Channel Power	0x40

Type: Unsigned 32-bit value

Range: 0 to 0x3F

Default: If no value entered, display current features enabled.

1 - Idle features mode mask

This parameter specifies which idle mode features are MODIFIED, both by this command and by subsequent ctl-P commands. For each bit, a 1 in this parameter means this feature will be enabled or disabled depending on how parameter 0 is set. A zero in a bit for this parameter means this feature will remain unchanged regardless of how parameter 0 is set.
Ctl-P toggles the bits set in this parameter.
If this parameter is not entered, all bits are set according to parameter 0 and the Ctl-P mask is unchanged.
If parameter 0 is not entered, this parameter is ignored.

Enable STIR	0x1
Enable TCC	0x2
Enable Continuous Writer Heat	0x4
Enable MR Bias Chop	0x8
Enable PFAST	0x10
Enable Self Seek	0x20
Continuous Channel Power	0x40

Type: Unsigned 32-bit value

Range: 0 to DIAG_POWER_ALL

Default: 0x3F [all features modified]

Example: 2> M3,7 sets STIR and TCC, clears Continuous Writer Heat and MR Bias Chop, and leaves PFAST and Self Seek unchanged. Subsequent clt-P commands toggle only STIR, TCC, and Continuous Writer Heat.

2 - Reset to power on values

If this parameter is entered, the other parameters are ignored. The idle mode is reset to its power on value.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: none

Example: 2> M,,7 sets the idle mode to what it was when the drive powered on.

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, then the following will be displayed:

```
                   Dithering xxx  ctl-P yyyyyyyyyyy
                         TCC xxx  ctl-P yyyyyyyyyyy
 Continuous heat to writer xxx  ctl-P yyyyyyyyyyy
 MR chop / cnt. preamp pwr xxx  ctl-P yyyyyyyyyyy
                       PFast xxx  ctl-P yyyyyyyyyyy
  Continuous channel power xxx  ctl-P yyyyyyyyyyy
```

Where:

xxx is either "On" or "Off"

yyyyyyyyyyy is either "toggles" or "won't toggle"

Examples:

Example #1:
To turn on Dithering and TCC, turn off continuous heat and
MR chop, and leave PFast and channel power unchanged:

```
F3 2>M3,f

                   Dithering On   ctl-P toggles
                         TCC On   ctl-P toggles
 Continuous heat to writer Off  ctl-P toggles
 MR chop / cnt. preamp pwr Off  ctl-P toggles
                       PFast Off  ctl-P won't toggle
  Continuous channel power Off  ctl-P won't toggle
```

Note that the second parameter ('f' above) will control what
toggles with control P.

```
[ issue control P ]

                   Dithering Off  ctl-P toggles     <- used to be ON
                         TCC Off  ctl-P toggles     <- used to be ON
 Continuous heat to writer On   ctl-P toggles     <- used to be OFF
 MR chop / cnt. preamp pwr On   ctl-P toggles     <- used to be OFF
                       PFast Off  ctl-P won't toggle
  Continuous channel power Off  ctl-P won't toggle

[ issue control P ]

                   Dithering On   ctl-P toggles     <- used to be OFF
                         TCC On   ctl-P toggles     <- used to be OFF
 Continuous heat to writer Off  ctl-P toggles     <- used to be ON
 MR chop / cnt. preamp pwr Off  ctl-P toggles     <- used to be ON
                       PFast Off  ctl-P won't toggle
  Continuous channel power Off  ctl-P won't toggle
```

Example #2:
To turn off power chop and see RDX/RDY on all the time:

```
F3 2>M0,8

                   Dithering On   ctl-P won't toggle
                         TCC On   ctl-P won't toggle
 Continuous heat to writer On   ctl-P won't toggle
 MR chop / cnt. preamp pwr Off  ctl-P toggles
```

```
                    PFast Off  ctl-P won't toggle
Continuous channel power Off  ctl-P won't toggle
```

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Set Direct Write Mode (Level 2 'N')

Description:

The Set Direct Write Mode commmand enables or disables Direct Write mode.

Quick Help:

"SetDirectWrite, N[EnableDirWrtModeOpt]";

Input Parameters:

0 - Enable Direct Write Mode.

If Parameter 0 is not entered or is equal to 0, the direct write mode will disabled and the normal write mode will be restored for the diagnostic write operation.

If this parameter is entered and is not equal to 0, the direct write mode will be enabled for the diagnostic write operation.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Examples:

The following command enables the Direct Write Mode:

```
F3 2>N1
```

The following commands disable the Direct Write Mode and restore the normal write mode:

```
F3 2>N
F3 2>N0
```

Revision History:

0001.0000   Initial revision.

Set Retries - Non-DERP (Level 2, 7, A, F 'Y')

Description:

This command allows the user to specify the error recovery parameters that will be used for subsequent diagnostic commands. (This version of the Set Retries command is only available if the drive does NOT support DERP! To know whether your drive supports DERP, issue the Online "^L" command to see a list of features supported by the drive.)

Quick Help:

"SetRetries, Y[Config],[Mode],[MaxRdRetryLevel],[MaxWrRetryLevel],[RetryStep],[OtcTLevel],[Ma

Input Parameters:

0 - Error Recovery Configuration.

NOTE: This parameter is ignored if entered! Since the Error Recovery Configuration can be derived from the Error Recovery Mode, it is not necessary to specify it. However, the parameter is retained for backwards compatibility.

The following error recovery configurations may be set by this command:

0 = Normal error recovery configuration
1 = Format user partition error recovery configuration
2 = Format system partition error recovery configuration
3 = Full error recovery configuration

Error Recovery Configurations 0 through 2 apply to the normal error recovery modes and should be used for multiple sector transfers. The retry steps for these configurations employ less extreme tweaks to recover the data. This increases the chance of successfully reading subsequent sectors without resetting tweaks.

Error Recovery Configuration 3 applies to the full error recovery modes and should be used for single sector transfers. The retry steps for these configurations employ more extreme tweaks to recover the data. The tweaks used by this configuration would make it difficult to read subsequent sectors without error.

Error Recovery Configuration 0 is the default configuration used by the native interface.

Type: Unsigned 8-bit value

Range: 0 to 3

Default: If this parameter is not entered, the current error recovery configuration will not be changed.

1 - Error Recovery Mode.

This parameter specifies the error recovery mode to be used. The following error recovery modes are available.

0 = Maximum Normal
1 = Maximum Full

2 = Default Normal
3 = Default Full
4 = Minimum Normal
5 = Minimum Full
6 = Simple

The Maximum Error Recovery Modes (0 and 1) are typically used for system information recovery.

The Default Error Recovery Modes (2 and 3) are typically used by the native interface.

The Minimum Error Recovery Modes (4 and 5) are typically used for diagnostic and media certification operations.

The Normal Error Recovery Modes (0, 2 and 4) should be used for multiple sector transfers. The retry steps for these modes employ less extreme tweaks to recover the data. This increases the chance of successfully reading subsequent sectors without resetting tweaks.

The Full Error Recovery Modes (1, 3 and 5) should be used for single sector transfers. The retry steps for these modes employ more extreme tweaks to recover the data. The tweaks used by these modes would make it difficult to read subsequent sectors without error.

Error Recovery Mode 0 is the default configuration used by the native interface.

Type: Unsigned 8-bit value

Range: 0 to 5

Default: If this parameter is not entered, the current error recovery mode will not be changed.

2 - Maximum Read Retry Level Allowed.

If entered, this parameter specifies the maximum read retry level allowed.

Note: A retry level consists of one or more retry steps and each retry step performs a single disk transfer after performing one or more tweaks. Therefore, the retry level is not equivalent to the retry count.

Type: Unsigned 8-bit value

Range: 0 to 0x0B

Default: If this parameter is not entered, the maximum read retry level for the specified error recovery mode will not be changed.

3 - Maximum Write Retry Level Allowed.

If entered, this parameter specifies the maximum write retry level allowed.

Note: A retry level consists of one or more retry steps and each retry step performs a single disk transfer after performing one or more tweaks. Therefore, the retry level is not equivalent to the retry count.

Type: Unsigned 8-bit value

Range: 0 to 0x0B

Default: If this parameter is not entered, the maximum write retry level for the specified error recovery mode will be changed.

4 - Retry step to execute.

If entered, this parameter specifies the retry step. If Parameter 2 Bits 14 (Enable selected error recovery step) and 15 (Skip initial read/write access of request) are set, the next read/write access will be performed using the retry tweaks associated with the specified retry step.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: If this parameter is not entered, the retry step for the specified error recovery mode will not be changed.

5 - On-the-fly Correction ECC T-Level.

If entered, this parameter specifies the ECC T-Level to be used for on-the-fly correction. The specified value will only be used by the error recovery algorithm, when Parameter 2 bit 16 is set.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: If this parameter is not entered, the on-the-fly correction ECC T-Level for the specified error recovery mode will not be changed.

6 - User media partition maximum retry count allowed.

If entered, this parameter specifies the maximum retry count for user partition accesses. The specified value will only be used by the error recovery algorithm, when Parameter 2 bit 20 is set.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: If this parameter is not entered, the maximum user partition retry count for the specified error recovery mode will not be changed.

7 - Error Recovery Options.

If entered, this parameter selects the following error recovery options.

Bit 0: Enable maximum OTF ECC correction.

If set, maximum on-the-fly ECC correction will be applied.

Bit 1: Apply only minimum ECC correction.

If set, only minimum on-the-fly ECC correction will be applied.

Bit 2: Enable transfer of uncorrectable data block.

If set, uncorrectable sectors will be transfered from the Correction Buffer to the Read Buffer.

Bit 3: Enable restricted servo flaws coast - read.

If set, restrict servo flaw coasting during a read only if one of the following conditions applies:

1) The failed block is not associated with a known grown servo flaw
2) New servo flaws are detected on the target track
3) Forced servo coast tweaks

Bit 4: Enable restricted servo flaws coast - write.

If set, restrict servo flaw coasting during a write only if one of the following conditions applies:

1) The failed block is not associated with a known grown servo flaw
2) New servo flaws are detected on the target track
3) Forced servo coast tweaks

Bit 5: Enable early error recovery exit.

If set, error recovery will terminate when the retry step is equal to the early exit retry step.

Bit 6: Disable normal retry tweak steps.

If set, all retry tweak steps will be disabled for normal error recovery modes.

Bit 7: Disable full-hidden retry tweak steps.

If set, the hidden retry steps will be disabled for the full error recovery modes. The first 9 steps of the full error recovery modes are defined as hidden retries.

Bit 8: Disable full retry tweak steps.

If set, all retry steps will be disabled for the full error recovery modes.

Bit 9: Disable undo of retry tweaks.

If set, the retry tweaks will not be undone after the retry completes.

Bit 10: Disable on-the-fly ECC correction - initial access.

If set, on-the-fly ECC correction will be disabled for the initial attempt to access a sector.

Bit 11: Disable on-the-fly ECC correction - normal retry tweak steps.

If set, on-the-fly ECC correction will be disabled for the normal error recovery modes for all retry steps.

Bit 12: Disable on-the-fly ECC correction - full-hidden retry tweak steps.

If set, on-the-fly ECC correction will be disabled for the full error recovery modes for all hidden retry steps. The first 9 steps of the full error recovery modes are defined as hidden retries.

Bit 13: Disable on-the-fly ECC correction - full retry tweak steps.

If set, on-the-fly ECC correction will be disabled for the full error recovery modes for all retry steps following the hidden retries. The first 9 retry steps of the full error recovery modes are defined as hidden retries.

Bit 14: Enable selected ER retry step.

If this bit is set and Mode Options Bit 15 is also set, a specified error recovery step will be used for the initial sector access.

Bit 15: Skip initial read/write access of request.

Typically, the initial access of a sector is performed without error recovery. If this bit is set, the initial sector access will be performed using error recovery. If Mode Options Bit 14 is also set, a specified error recovery step will be used for the initial sector access. If Mode Options Bit 14 is cleared, the first error recovery step will be used for the initial sector access.

Bit 16: Enable ECC selection setting - normal retries only.

If set, a specified ECC T-Level will be used for on-the-fly correction only during NORMAL retries. (This bit is a "don't care" if Bit 23 is set.)

Bit 17: Disable retry on track integrity error.

If set, retries will be disabled on track integrity errors.

Bit 18: Allow one retry.

If set, only a single, normal retry will be enabled. (This feature is not typically enabled in OEM code.)

Bit 19: Disable PFast.

If set, P-Fast will be disabled during preamp fast tweaks.

Bit 20: Enable use of selected maximum read retry count.

If set, only a specified number of read retries will be allowed when read retries are required.

Bit 21: Enable use of selected maximum write retry count.

If set, only a specified number of write retries will be allowed when write retries are required.

Bit 22: Enable selected maximum retry counts in non-User media partition.

If set, the maximum read and write retry counts that have been enabled by Bits 20 and 21 will be applied to retries in non-user partitions.

Bit 23: Enable ECC selection setting.

If set, a specified ECC T-Level will be used for on-the-fly correction for all retry modes. Setting this bit causes Bit 16 to be considered a "don't care."

Bit 24: Disable the extended retries applied to Write Unsafe error.

If set, the extended retries applied to Write Unsafe errors will be disabled.

Bit 25: Enable reporting of recovered servo seek error to host.

If set, recovered servo seek errors will be reported to the host.

Bit 26: Enable Read/Write to complete transfers in RAW mode.

If set and the Read-After-Write feature is enabled for the product, the Read/Write firmware is allowed to request that a transfer be completed in RAW mode.

Bit 24: Enable Reduced Erasure correction.

If set and the Reduced Erasure Correction feature is enabled for the product, the level of erasure correction applied during retries will be reduced.

Bit 27: Enable abort during error recovery.

If set, abort request will be honored during error recovery. Note that this bit only applies for single-block error recovery. For non single-block error recovery, abort of error recovery is already allowed.

Bits 28-31: Unused.

To Disable All Retries:
Clear bit 18
Set bits 6, 7, and 8

To Disable OTF Correction:
Set bits 10, 11, 12, and 13

Type: Unsigned 32-bit value

Range: 0 to 0xFFFF

Default: If this parameter is not entered, the current error recovery options will be used.

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the current Error Recovery configuration will be displayed as follows.

```
"Error Recovery Info:

" P0: Config 0 (Normal)"                  or
" P0: Config 1 (Format User Partition)"   or
" P0: Config 2 (Format System Partition)" or
" P0: Config 3 (Full)"                    or
" P0: Config 4 (Customer)"

" P1: Mode 0 (Default Normal)"            or
" P1: Mode 1 (Default Full)"              or
" P1: Mode 2 (Max Normal)"                or
" P1: Mode 3 (Max Full)"                  or
```

```
" P1: Mode 4 (Min Normal)"                or
" P1: Mode 5 (Min Full)"                  or
" P1: Mode 6 (Customer)"

" P2: Max Read Retry Level = cc"
" P3: Max Write Retry Level = dd"

" P7: Options = eeeeee"

"     B26: (1) Enable R/W allowd to use RAW"                     or
"     B26: (0) Disable R/W allowd to use RAW"

"     B25: (1) Enable Recovered Servo Sk Err Reporting"          or
"     B25: (0) Disable Recovered Servo Sk Err Reporting"

"     B24: (1) Disable Extended WUS Err Retries"                 or
"     B24: (0) Enable Extended WUS Err Retries"

"     B22: (1) Enable Max Retries In Non-User Partition"         or
"     B22: (0) Disable Max Retries In Non-User Partition"

"     B21: (1) Enable Max Write Retries (P6: %ff)"               or
"     B21: (0) Disable Max Write Retries (P6: %ff)"

"     B20: (1) Enable Max Read Retries (P6: %ff)"                or
"     B20: (0) Disable Max Read Retries (P6: %ff)"

"     B19: (1) Disable P-Fast"                                   or
"     B19: (0) Enable P-Fast"

"     B18: (1) Enable Single Retry"                              or
"     B18: (0) Disable Single Retry"

"     B17: (1) Disable Trk Integrity Err Retry"                  or
"     B17: (0) Enable Trk Integrity Err Retry"

"     B16: (1) Enable OTF ECC T-Level (P5: gg)"                  or
"     B16: (0) Disable OTF ECC T-Level (P5: gg)"

"     B15: (1) Disable Initial RW Access"                        or
"     B15: (0) Enable Initial RW Access"

"     B14: (1) Enable Selected Err Recovery Step (P4: hh)"       or
"     B14: (0) Disable Selected Err Recovery Step (P4: hh)"

"     B13: (1) Disable OTF on Full Retry Steps"                  or
"     B13: (0) Enable OTF on Full Retry Steps"

"     B12: (1) Disable OTF on Full-Hidden Retry Steps"           or
"     B12: (0) Enable OTF on Full-Hidden Retry Steps"

"     B11: (1) Disable OTF on Normal Retry Steps"                or
"     B11: (0) Enable OTF on Normal Retry Steps"

"     B10: (1) Disable OTF on Initial Access"                    or
"     B10: (0) Enable OTF on Initial Access"

"     B09: (1) Disable undo of Retry Tweaks"                     or
"     B09: (0) Enable undo of Retry Tweaks"

"     B08: (1) Disable Full Retries"                             or
"     B08: (0) Enable Full Retries"
```

"   B07: (1) Disable Full-Hidden Retries"   or
"   B07: (0) Enable Full-Hidden Retries"

"   B06: (1) Disable Normal Retries"   or
"   B06: (0) Enable Normal Retries"

"   B05: (1) Enable Early Err Recovery Exit"   or
"   B05: (0) Disable Early Err Recovery Exit"

"   B04: (1) Enable Restricted Servo Flaw Coasting during Write"   or
"   B04: (0) Disable Restricted Servo Flaw Coasting during Write"

"   B03: (1) Enable Restricted Servo Flaw Coasting during Read"   or
"   B03: (0) Disable Restricted Servo Flaw Coasting during Read"

"   B02: (1) Enable xfer of Uncorrectable Sectors"   or
"   B02: (0) Disable xfer of Uncorrectable Sectors"

"   B01: (1) Enable Min OTF ECC Correction"   or
"   B01: (0) Disable Min OTF ECC Correction"

"   B00: (1) Enable Max OTF ECC Correction"   or
"   B00: (0) Disable Max OTF ECC Correction"

where

cc is the maximum Read Retry Level for the current Error Recovery Mode

dd is the maximum Write Retry Level for the current Error Recovery Mode

eeeeee are the Error Recovery Options that are selected for the current Error Recovery Mode

ff is the Maximum User Partion Retry Count for the current Error Recovery Mode

gg is the ECC T-Level to be used for On-The-Fly Correction for the current Error Recovery Mode

hh is the Selected Error Retry Step for the current Error Recovery Mode

Revision History:

0001.0000 Initial revision.
0002.0000 Added support for "options" changes (only if DERP is disabled).
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Set Seek Speed (Level 4 'u')

Description:
This command sets the JIT seek speed to be used for future diagnostic seek, read and write operations.

Quick Help:

"SetSkSpeed, u[Opts],[SkSpeed]";

Input Parameters:

0 - Options.

This parameter specifies options for modifying the Diagnostic Seek Speed.

0 = Display current Diagnostic Seek Speed status

Selecting this option will display the current Diagnostic Seek Speed status.

1 = Enable Diagnostic Seek Speed specified by Parameter 1

Selecting this option will enable the Seek Speed specified by Parameter 1 for future diagnostic seek, read and write operations.

2 = Disable Diagnostic Seek Speed

Selecting this option will disable the Diagnostic Seek Speed. This will allow the Read/Write subsystem to pick the optimum Seek Speed.

Type: Unsigned 8-bit value

Range: 0 to 2

Default: 0 (Display current Diagnostic Seek Speed status)

1 - Seek Speed.

If Parameter o is equal to 1, this parameter specifies the JIT speed to be used for future diagnostic seek, read and write operations. The JIT seek speed decreases as the parameter value increases, therefore a value of 0 selects the fastest JIT seek speed. If a value is entered that is greater than the maximum value supported, the slowest supported JIT seek speed will be selected.

Type: Unsigned 8-bit value

Range: 0 to FFh

Default: 0 (Fastest JIT Seek Speed)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following information will be displayed.

"Diag Seek Speed c enabled" or
"Diag Seek Speed disabled"

where

c is the Diagnostic Seek Speed that is currently selected.

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Set Test Space (All Levels 'A')

Description:
The Set Test Space command configures the diagnostic Test Space based on the parameters entered.

Quick Help:

"SetTestSpace, A[OptsOrParmSelect],[ParmValue],[AddrType],[HdForCylLimit]";

Input Parameters:

0 - Test Space Parameter select / Test Space Options low.

If Parameter 0 bit 3 is set, Parameter 0 bits 2-0 specify the Test Space Parameter to be modified and Parameter 1 contains the new parameter value. If Parameter 0 bit 3 is cleared, Parameter 0 bits 7-4 and 2-0 select the following Test Space Options. If Parameter 0 is not entered, the Test Space will not be modified and the current Test Space configuration will be displayed.

Bit F-B: not used

Bit A: Sequential 80% and Random 20%

If set, the cylinder and head address will be updated sequentially 80% of the time and randomly 20% of the time.

Bit 9: Random Transfer Length

If set, a random transfer length will be used for read/write operations.

Bit 8: Random Starting Sector

If set, a random starting sector will be used for read/write operations. If cleared, read/write operations will start at sector 0.

Bit 7: Random Data

If set, random data will be used for disk write operations. If cleared, the existing buffer data will be used for write operations.

Bit 6: Sequential Out

If set, the cylinder and head address will be updated sequentially from the Inner Diameter to the Outer Diameter. If cleared, the cylinder and head address will be updated sequentially from the Outer Diameter to the Inner Diameter.

Bit 5: Odd Cylinders

If set, only odd numbered cylinders will be accessed.

Bit 4: Even Cylinders

If set, only even numbered cylinders will be accessed.

Bit 3: Update Test Space Parameter

If set, bits 7-4 will not be used and bits 2-0 will select the following Test Space Parameters to be modified:

0 = Set Minimum Cylinder to Parameter 1 value.

1 = Set Maximum Cylinder to Parameter 1 value.

2 = Set Maximum Head to Parameter 1 value.

3 = Set Minimum LBA to Parameter 1 value.

4 = Set Maximum LBA to Parameter 1 value.

5 = Select the default Test Space.

6 = Set Minimum Head to Parameter 1 value.

7 = Set Target Buffer Sector Offset to Parameter 1 value.

Bit 2: Random Cylinder and / or Head

If Bit 1 (All Cylinders) is set and this bit is set, all cylinders (Minimum Cylinder to Maximum Cylinder) will be accessed in a pseudo-random fashion. If Bit 1 (All Cylinders) is set and this bit is cleared, all cylinders (Minimum Cylinder to Maximum Cylinder) will be accessed in a sequentially fashion. If Bit 1 (All Cylinders) is cleared and this bit is set or cleared, only the current cylinder will be accessed.

If Bit 0 (All Heads) is set and this bit is set, all heads (Minimum Head to Maximum Head) will be accessed in a pseudo-random fashion. If Bit 0 (All Heads) is set and this bit is cleared, all heads (Minimum Head to Maximum Head) will be accessed in a sequentially fashion. If Bit 0 (All Heads) is cleared and this bit is set or cleared, only the current head will be accessed.

Bit 1: All Cylinders

If set, all cylinders (Minimum Cylinder to Maximum Cylinder) will be accessed. If cleared, only the current cylinder will be accessed.

If this bit is set, Bit 2 will specify if the cylinder address is to be updated randomly or sequentially.

Bit 0: All Heads

If set, all heads (Minimum Head to Maximum Head) will be accessed. If cleared, only the current head will be accessed.

If this bit is set, Bit 2 will specify if the head address is to be updated randomly or sequentially.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

1 - Test Space Parameter value.

If Parameter 0 bit 3 is set, Parameter 0 bits 2-0 specify the Test Space Parameter to be modified and Parameter 1 contains the new parameter value. If Parameter 0 bit 3 is cleared, Parameter 1 is not used.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: None

2 - Test Space Address Type.

When specifying a new Test Space minimum or maximum address, this parameter specifies the type of address as follows.

0 = User Area
1 = System Area
2 = Physical

For example:

If Parameter 2 is equal to 0 (User Area) and a new maximum cylinder address is being specified (Parameter 0 equal to 9), Parameter 1 will specify the new maximum logical cylinder address for commands that access the User Area in LLL CHS mode.

If Parameter 2 is equal to 1 (System Area) and a new maximum cylinder address is being specified (Parameter 0 equal to 9), Parameter 1 will specify the new maximum logical cylinder address for commands that access the System Area in LLL CHS mode.

If Parameter 2 is equal to 2 (Physical) and a new maximum cylinder address is being specified (Parameter 0 equal to 9), Parameter 1 will specify the maximum physical cylinder address for commands that use PLP CHS or PLP CHW address modes.

Type: Unsigned 8-bit value

Range: 0 to 2

Default: 0 (User Area)

3 - Head Address of Minimum or Maximum Cylinder.

When specifying a new Test Space minimum or maximum cylinder address (Parameter 0 equal to 8 or 9), this parameter specified the head address for which the minimum or maximum cylinder address is to be set. This parameter is not used if the minimum or maximum cylinder address is not being set.

Type: Unsigned 8-bit value

Range: 0 to maximum head address

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the Test Space Limits for the currently selected Address Modes will be displayed as follows:

One of the following strings will be displayed to indicate the diagnostic address mode that is currently selected.

"User LBA" or
"User LLL CHS" or
"User LLP CHW" or
"System LBA" or
"System LLL CHS" or
"System LLP CHW" or
"PLP CHS" or
"PLP CHW"

This may be followed by one or more of the following strings indicating which Test Space options are selected.

"80% Rnd 20% Seq"	(Update the Cylinder and Head Address randomly 80% of the time and sequentially 20% of the time)
"Rnd Cyls"	(Update the Cylinder Address randomly)
"Rnd Hds"	(Update the Head Address randomly)
"Seq Out"	(Update the Cylinder and Head Address sequentially outward from ID to OD)
"Seq In"	(Update the Cylinder and Head Address sequentially inward from OD to ID)
"Even Cyls"	(Only test even numbered cylinders)
"Odd Cyls"	(Only test odd numbered cylinders)
"Rnd Sec"	(Update the Sector address or LBA randomly)
"Rnd Wedge"	(Update the Wedge address randomly)
"Rnd Lngth"	(Use a random Transfer Length for read and write operations)
"Rnd Data"	(Use random data for write operations)

This will be followed by strings indicating the range of addresses being tested.

For the User LBA and System LBA address modes, the followed string indicates the range of LBAs being tested.

"LBAs cccccccc - dddddddd"

where

cccccccc is the minimum LBA to be tested

dddddddd is the maximum LBA to be tested

For all other address modes, the following strings indicate the range of heads and cylinders being tested.

```
"Hd e"                      (when testing a single head)

"Hds f - g"                 (when testing a range of heads)

"Cyl hhhhhh"                (when testing a single cylinder)

"Cyls iiiiii - jjjjjj"      (when testing a range of cylinders)
```

where

e is the address of the single head being tested

f is the address of the first head being tested

g is the address of the last head being tested

hhhhhh is the address of the single cylinder being tested

iiiiii is the address of the first cylinder being tested

jjjjjj is the address of the last cylinder being tested

The Test Space Limits for all Address Modes will be displayed as follows:

```
"All Addr Modes"
"User LBA Mode
"  LBAs kkkkkkkk - mmmmmmmm"
"System LBA Mode
"  LBAs nnnnnnnn - pppppppp"
"User LLL CHS and User LLP CHW Mode
"  Hd q Cyls rrrrrr - ssssss"          (repeated for each head in the Test Space)
"System LLL CHS and System LLP CHW Mode
"  Hd t Cyls uuuuuu - vvvvvv"          (repeated for each head in the Test Space)
"PLP CHS and User PLP CHW Mode
"  Hd w Cyls xxxxxx - yyyyyy"          (repeated for each head in the Test Space)
```

where

kkkkkkkk is the minimum User Area LBA that will be accessed by commands that use User LBA Address Mode

mmmmmmmm is the maximum User Area LBA that will be accessed by commands that use User LBA Address Mode

nnnnnnnn is the minimum System Area LBA that will be accessed by commands that use System LBA Address Mode

pppppppp is the maximum System Area LBA that will be accessed by commands that use System LBA Address Mode

q is a Logical Head Address that can be accessed by commands that use User LLL CHS or User LLP CHW Address Modes

rrrrrr is the minimum User Area Logical Cylinder Address on the specified head that will be accessed by commands that use User LLL CHS or User LLP CHW Address Modes

ssssss is the maximum User Area Logical Cylinder Address on the specified head that will be accessed by commands that use User LLL CHS or User LLP CHW Address Modes t — is a Logical Head Address that will be accessed by commands that use System LLL CHS or System LLP CHW Address Modes

uuuuuu — is the minimum System Area Logical Cylinder Address that will be accessed by commands that use System LLL CHS or System LLP CHW Address Modes

vvvvvv — is the maximum System Area Logical Cylinder Address that will be accessed by commands that use System LLL CHS or System LLP CHW Address Modes

w — is a Logical Head Address that will be accessed by commands that use PLP CHS or PLP CHW Address Modes

xxxxxx — is the minimum Physical Cylinder Address on the specified head that will be accessed by commands that use PLP CHS or PLP CHW Address Modes

yyyyyy — is the maximum Physical Cylinder Address on the specified head that will be accessed by commands that use PLP CHS or PLP CHW Address Modes

Following the display above, the Target Buffer Sector Offset will be displayed.

"Buffer Sector Offset bbbbbbbb"

where

bbbbbbbb — is the Target Buffer Sector Offset at which from the beginning of diagnostic Read/Write buffer the next Read/Write diagnostic command will transfer data to or from.

Examples:

The following command displays without modifying the Test Space that is currently selected:

F3 2>A

The following commands specify how the target address is to be updated:

F3 2>A0	(single cylinder, single head)
F3 2>A1	(single cylinder, sequential heads)
F3 2>A2	(sequential inward cylinders, single head)
F3 2>A3	(sequential inward cylinders, sequential heads)
F3 2>A5	(single cylinder, random heads)
F3 2>A6	(random cylinders, single head)
F3 2>A7	(random cylinders, random heads)
F3 2>A12	(sequential inward even cylinders, single head)
F3 2>A13	(sequential inward even cylinders, sequential heads)
F3 2>A22	(sequential inward odd cylinders, single head)
F3 2>A23	(sequential inward odd cylinders, sequential heads)
F3 2>A16	(random even cylinders, single head)
F3 2>A17	(random even cylinders, random heads)
F3 2>A26	(random odd cylinders, single head)
F3 2>A27	(random odd cylinders, random heads)
F3 2>A42	(sequential outward cylinders, single head)
F3 2>A43	(sequential outward cylinders, sequential heads)
F3 2>A52	(sequential outward even cylinders, single head)
F3 2>A53	(sequential outward even cylinders, sequential heads)
F3 2>A62	(sequential outward odd cylinders, single head)
F3 2>A63	(sequential outward odd cylinders, sequential heads)

The following commands set the Test Space limits:

```
F3 2>A8,123,,0    (sets the minimum user logical cylinder for head 0 to 123)
F3 2>A9,234,,0    (sets the maximum user logical cylinder for head 0 to 234)
F3 2>A8,567,,1    (sets the minimum user logical cylinder for head 1 to 567)
F3 2>A9,890,,1    (sets the maximum user logical cylinder for head 1 to 890)
F3 2>A8,11,1,0    (sets the minimum system logical cylinder for head 0 to 11)
F3 2>A9,23,1,0    (sets the maximum system logical cylinder for head 0 to 23)
F3 2>A8,567,2,0   (sets the minimum physical cylinder for head 0 to 567)
F3 2>A9,876,2,0   (sets the maximum physical cylinder for head 0 to 876)
F3 2>AA,3         (sets the maximum head to 3)
F3 2>AB,4567      (sets the minimum user LBA to 4567)
F3 2>AC,9876      (sets the maximum user LBA to 9876)
F3 2>AB,223,1     (sets the minimum system LBA to 223)
F3 2>AC,7845,1    (sets the maximum system LBA to 7845)
F3 2>AE,1         (sets the minimum head to 1)
```

The following command resets the Test Space to its default state:

```
F3 2>AD
```

The following command sets the Target Buffer Sector Offset to 0

```
F3 2>AF,0
```

Revision History:

0001.0000	Initial revision.
0002.0000	Modified for VBAR to support minimum and maximum cylinder address values for each head.
0002.0001	Added new capability that enables users to set the Target Buffer Sector Offset to any value they want.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Set Track Format (Level 7 'K')

Description:

This command configures the track layout based on the specified track format type.

Quick Help:

"SetTrackFormat, K[UserAreaTrkFormatType],[SysAreaTrkFormatType]";

Input Parameters:

0 - User Partition Track Format Type.

This parameter specifies the track format type to be applied to user media partition.

0 = Normal Track Format - multiple sectors per wedge w/ splits
1 = No Splits Format - multiple sectors per wedge w/o splits
2 = Single Sector Per Wedge Format

Type: Unsigned 8-bit value

Range: 0, 1, or 2

Default: 0

1 - System Partition Track Format Type.

This parameter specifies the track format type to be applied to system media partition.

0 = Normal Track Format - multiple sectors per wedge w/ splits
1 = No Splits Format - multiple sectors per wedge w/o splits
2 = Single Sector Per Wedge Format

Type: Unsigned 8-bit value

Range: 0, 1, or 2

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Set Tracking Offset (Levels 2, 4 'K')

Description:

This command applies an offset to the servo system and then performs a seek to the specified offset for the current track and head. The type of seek (Read, Write or Write Header) will be the same as the last seek performed.

Quick Help:

"SetTrackingOffset, K[OffsetValue],[PersOrTempOpt],[UnitsOpt],[ChanReload]";

Input Parameters:

0 - Track Follow Offset value.

This parameter is a signed 16-bit number representing the amount of tracking offset to apply in the servo system. Parameter 2 will indicate whether the offset is in units of 1/256th, a.k.a. Q8 format, or 0.1% of the servo or data track width. Parameter 2 will also indicate whether the offset is in servo tracks or in data tracks

Type: Signed 16-bit value

Range: 0x8000 to 0x7FFF

Default: 0

1 - Temporary or Persistent Track Follow Offset option.

This parameter specifies if the Track Follow Offset value is persistent or temporary. If this parameter is equal to 0, the offset value is temporary and will only remain in effect until the next seek is performed. If this parameter is equal to 1, the offset will be persistent and will remain in effect for all subsequent seeks until reset.

Type: Unsigned 8-bit value

Range: 0 or 1

Default: 0 (Offset is temporary)

2 - Track Follow Offset Units option.

This parameter specifies the units of the Track Follow Offset value.

Bits 7-2: not used

Bit 1: Servo or Data Track Width

If this bit is equal to 0, the Track Follow Offset value specified in the Parameter 0 will be in data track width.
If this bit is equal to 1, the Track Follow Offset value specified in the Parameter 0 will be in servo track width.

Bit 0: Unit Selection.

If this bit is equal to 0, the specified offset will be in units of 1/256th of the servo or data track width, a.k.a. Q8 format.
If this bit is equal to 1, the specified offset will be in units of 0.1% of the servo or data track width.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: 0 (Offset is in units of 1/256th of the data track width)

3 - Reload Channel Parameters After Setting Track Offset option.

This parameter enables or disables reloading the channel parameters after the track offset is set. If this parameter is equal to 0, the channel parameters will not be reloaded into the channel registers. If this parameter is equal to 1, the channel parameters will be reloaded into the channel registers.

Type: Unsigned 8-bit value

Range: 0 or 1

Default: 0 (disable reloading the channel parameters in the channel registers)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Target User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"

or

"Target System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is a Disk Logical Block Address on the track to which the seek was performed

ffffff is the Logical Cylinder Address of the track to which the seek was performed

g is the Logical Head Address of the track to which the seek was performed

hhhh is a Logical Sector Address on the track to which the seek was performed

iiiiii is the Physical Cylinder Address of the track to which the seek was performed

j is the Logical Head Address of the track to which the seek was performed

kkkk is a Physical Sector Address on the track to which the seek was performed

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: NA
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed
Bit 4: NA
Bit 5: NA
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 6 is set, the Elapsed Time for the seek operation will be displayed.

"Elapsed Time a mins b secs" or
"Elapsed Time b.c secs" or
"Elapsed Time c.d msecs"

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

Examples:

Example #1:

To persistently apply the servo tracking offset in the amount of 256/256th of data track w
in positive direction

```
F3 2>A0
F3 2>S1000
F3 2>K100,1
```

Example #2:

To persistently apply the servo tracking offset in the amount of 100% of data track width
in negative direction

```
F3 2>A0
F3 2>S1000
F3 2>KFC18,1,1
```

Example #3:

To persistently apply the servo tracking offset in the amount of 256/256th of servo track
in negative direction

```
F3 2>A0
F3 2>S1000
F3 2>KFF00,1,2
```

Example #4:

To persistently apply the servo tracking offset in the amount of 100% of a servo track wid
in positive direction

```
F3 2>A0
F3 2>S1000
F3 2>K3E8,1,3
```

Revision History:

0001.0000	Initial revision.
0001.0001	Added an option flag to allow the offset input in servo tracks.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Slow Write CHS (Level E 'w')

Description:

This command writes data to the disk starting at the specified sector on the target track for the specified number of sectors. The sectors are written consecutively with the specified number of sectors and then followed by the skip of the specified number of sectors to cool down the head. The sectors are written with the data contained in the Diagnostic Write Buffer.

Quick Help:

"SlowWrChs, w[Sec],[NumSecs],[ConSec],[Skip],[UnitOfSkip]";

Input Parameters:

0 - Logical or Physical Sector Address.

If any value is entered for Parameter 5, this parameter contains the physical sector address of the first sector to write, else this parameter contains the User Area logical sector address of the first sector to write.

Type: Unsigned 16-bit value

Range: 0 to maximum logical or physical sector address on the target track

Default: 0

1 - Transfer Length.

This parameter specifies the number of total sectors to write.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: If the Sector Address was entered and the Transfer Length was not entered, then only the specified sector will be written.

If both the Sector Address and Transfer Length are not entered, then the Transfer Length will be set based on the Test Space that is selected. If the Random Transfer Length option is selected, a random value will be used that is less than or equal to the number of sectors remaining on the track. If the Random Transfer Length option is not selected, the number of sectors remaining on the track will be written.

If a Transfer Length is entered, it will be limited to the number of sectors remaining on the track.

2 - Consecutive Sectors to be Written.

This parameter specifies the number of consecutive sectors to be written as a segment.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 1

3 - Skip.

This parameter specifies the amount of skip after the specified consecutive sector are written. Its unit is decided by Parameter 4.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 1

4 - Unit of Skip.

This parameter specifies the unit of skip. If Parameter 4 is equal to 0, the skip is specified in the wedges. If its value is 1, the skip is specified in the sectors. Otherwise, the skip is specified in the time of micro seconds.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (skip in the wedge)

5 - Physical Sector Address Flag.

If any value is entered for this parameter, then Parameter 0 specifies a physical sector address, else Parameter 0 specifies a User Area logical sector address.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Next User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

or

"Next System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is the Disk Logical Block Address of the sector in error

ffffff is the Logical Cylinder Address of the sector in error

g is the Logical Head Address of the sector in error

hhhh is the Logical Sector Address of the sector in error iiiiii is the Physical Cylinder Address of the sector in error

j is the Logical Head Address of the sector in error

kkkk is the Physical Sector Address of the sector in error

llllllll is the number of sectors remaining to be read or written

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: Enable the Next Address to be displayed
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed
Bit 4: Enables the Recovery Status to be displayed
Bit 5: Enables the Fault Status to be displayed
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 1 is set, the Next Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed as follows.

"Target User LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

or

"Target System LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

where

pppppppp is the starting Disk Logical Block Address

qqqqqq is the starting Logical Cylinder Address

r is the starting Logical Head Address

ssss is the starting Logical Sector Address

tttttt is the starting Physical Cylinder Address

u is the starting Logical Head Address

vvvv is the starting Physical Sector Address

wwwwwwww is the starting Transfer Length

If Bit 4 is set, the Recovery Status will be displayed as follows.

"Recovered User LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

or

"Recovered System LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

where

AAAAAAAA is the Disk Logical Block Address of the last recovered sector

BBBBBB is the Logical Cylinder Address of the last recovered sector

C is the Logical Head Address of the last recovered sector

DDDD is the Logical Sector Address of the last recovered sector

EEEEEE is the Physical Cylinder Address of the last recovered sector

F is the Logical Head Address of the last recovered sector

GGGG is the Physical Sector Address of the last recovered sector

HHHH are the Recovery Flags reported by the Read/Write code

II is the Recovery Count reported by the Read/Write code

If Bit 5 is set, the Fault Status will be displayed as follows.

"Drive Fault Status JJJJ Preamp Fault Status KKKK"

where

JJJJ is the Drive Fault Status reported by the Read/Write code

KKKK is the Preamp Fault Status reported by the Read/Write code

If Bit 6 is set, the Elapsed Time for the read/write operation will be displayed.

"Elapsed Time a mins b secs" or
"Elapsed Time b.c secs" or
"Elapsed Time c.d msecs"

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

Examples:

Example #1:
To write a single logical sector

(in this case logical sector 23 on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 E>w23
```

Example #2:
To write multiple logical sectors
(in this case logical sectors 23 to 26 on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 E>w23,4
```

Example #3:
To write all of the logical sectors on a track
(in this case all logical sectors on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 E>w
```

Example #4:
To write all of the logical sectors on multiple tracks
(in this case all logical sectors on logical cylinders 45 to 49 head 0)

Note: You must seek to the track before the first one to be written.

```
F3 2>A3
F3 2>S44,0
F3 2>L,5
F3 E>w
```

Example #5:
To write a single physical sector
(in this case physical sector 32 on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 E>w32,,,,,1
```

Example #6:
To write multiple physical sectors
(in this case physical sectors 32 to 35 on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 E>w32,4,,,,1
```

Example #7:
To write all of the physical sectors on a track
(in this case all physical sectors on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 E>w,,,,,1
```

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

0011.0001   Added physical sector address flag to write in PLP CHS address mode.

SMART Control (Level 1 'N')

Description:
Performs several diagnostic SMART functions.

Quick Help:

"SmartControl, N[SubCmd],[SubCmdParm0],[SubCmdParm1]";

Input Parameters:

0 – Serial Port Command.

This parameter defines which command will be used on the SMART Serial Port. The following are the allowable commands (red indicates that the command is unsupported).

0x00: TOGGLE_SMART – toggles SMART on/off.
0x01: INITIALIZE_SMART_DATA – initializes SMART statistics data (both in RAM and SMART sectors). Also initializes Fast Flush and Media Cache on the disk.
0x02: UPDATE_SMART_ATTRIBUTES – updates SMART's attributes.
0x03: SET_CLEAR_PREFAILURE_BIT – sets/clears specified pre-failure warranty bit.
0x04: INITIALIZE_SMART – is the same as INITIALIZE_SMART_DATA.
0x05: DUMP_SMART_ATTRIBUTES – retrieves SMART's attributes.
0x06: DUMP_SMART_THRESHOLDS – retrieves SMART's thresholds.
0x07: DUMP_SMART_GLIST – retrieves the G-List.
0x08: DUMP_CE_LOG – retrieves the critical event log.
0x09: DUMP_PENDING_LIST – retrieves the pending list.
0x0B: START_SHORT_DST – start the short DST after next power up or ^T.
0x0C: START_LONG_DST – start the long DST after next power up or ^T.
0x10: DUMP_2_HR_LOG – retrieves the 2 hr log.
0x23: CLEAR_PERSISTENT_INFO – clears persistent information.
0xFF: NO_COMMAND

Type: Unsigned 8-bit value

Range: 0x00 to 0x23

Default: None

1 – Variable Parameter

Multi-purpose parameter. Used in command 01 to initialize Fast Flush and Media cache. Used in command 03 as the number of the attribute to change.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

2 – Boolean Bit Value.

Used in command 03 to set/clear the boolean value for the bit.

Type: Boolean value

Range: 0 to 0x1

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

```
N1 - initialize Smart data
N5 - display attribute values
N6 - display threshold values

F3 1>N5
Att
Num  Flgs normlzd worst raw
 1   000F   64     64   00000000000000
 3   0003   64     64   00000000000000
 4   0032   64     64   00000000000001
 5   0033   64     64   00000000000000
 7   000F   64     FD   00000000000001
 9   0032   64     64   00000000000000
 A   0013   64     64   00000000000000
 C   0032   64     64   00000000000001
B8   0032   64     64   00000000000000
BB   0032   64     64   00000000000000
BC   0032   64     FD   00000000000000
BD   003A   64     64   00000000000000
BE   0022   46     46   0000001E1E001E
C2   0022   1E     28   00001E0000001E
C3   001A   64     64   00000000000000
C5   0012   64     64   00000000000000
C6   0010   64     64   00000000000000
    - etc

F3 1>N6
Att  Thresh
  1      6
  3      0
  4     14
  5     24
  7     1E
  9      0
    - etc
```

```
N8 - display critical event log
F3 1>N8
                                                   DERP
 dec                                              error  DERP
Hours -    LBA      R  Theta Z EC         Cmd  type   retry temp  type
 2103 -    10000     D 8E6F  0 C4090081   35   FF      FF    0   recovered write
 2103 -    10002     D 8EB0  0 C4090081   35   FF      FF    0   recovered write
 2103 -    10004     D 8EF1  0 C3160080   25   FF      FF    0   data scrubbed
 2103 -    10006     D 8F32  0 C3160080   25   FF      FF    0   data scrubbed
 2103 -   100000    23 3D2B  1        80  25   FF      FF    0   marked as BBM
 2103 -   100000    23 3D2B  1 C3160080   35   FF      FF    0   write BBM data scrubbed
```

```
 2103 -     12000   FF57 7405  2 C4090081  35  FF     FF    0  wedge reallocated
 2103 -     12000   FF57 7405  2 C4090081  35  FF     FF    0  reallocated
 2103 -     13000   FF57 7445  2 C3160080  35  FF     FF   23  RAW rewrite
 2103 -     13000   FF57 7445  2 C3160080  35  FF     FF   23  RAW reallocated
 2103 - 217CAD77   517E  B2C  5       80  EC  FF     FF   23  BGMS marked as BBM
 2103 - 217CAD78   517E  B51  5       80  EC  FF     FF   23  BGMS marked as BBM
```

Note that the first N entries in the log are preserved from when the drive entered service. The remaining entries form a circular buffer where new entries will overwrite old entries when the log fills up. To find the value of N, see the approriate developer.

What columns mean:

```
LBA        LBA of log entry
R          physical cylinder normalized to range 0 - max physical cylinder
           value shown in DECIMAL not hex
Theta      physical sector number normalized to range 0 - FFFF
Z          head number
EC         error code of log entry
Cmd        interface command prior to event
error type DER error type
retry      DER retry
temp       temperature at time of event
type       text description of log entry type

           For further information on critical event log
           types, please find the developer of the code
           that added the log entry.
```

Revision History:

0001.0000 Initial revision.
0002.0000 Added display of raw data to the SMART data display.
00011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).
0011.0001 Added support for SMART Clear Persistent Information (23)

Special Batch File Function (All Levels '*')

Description:

This command performs the specified Batch File function.

Quick Help:

"SpecialBatchFileFunction, *[FuncId],[FuncParm0],[FuncParm1]";

Input Parameters:

0 - Batch File Function ID.

This parameter selects one of the following special Batch File function to be performed.

0 = No operation.

1 = Pause the execution of the batch file until input is received from the user via the Serial Port interface.

2 = Delay the number of milliseconds specified by Parameter 1.

3 = Branch batch file execution to the label specified by Parameter 1.

4 = Increment the head address and branch batch file execution to the label specified by Parameter 1, if the head address did not wrap.

5 = Clear the display screen.

6 = Stop batch file execution if an error occurred.

7 = Set the batch file Loop Count specified by Parameter 2 to the value specified by Parameter 1.

8 = Decrement the batch file Loop Count specified by Parameter 2 and, if the Loop Count is not equal to zero, branch batch file execution to the label specified by Parameter 1.

9 = Clear the expected batch file error information.

A = Updates the expected batch file error information with the Diagnostic Error Code specified by Parameter 1, the Minimum Count specified by Parameter 2 and the Maximum Count specified by Parameter 3.

B = Display the Active Error Log and compare its contents against the expected batch file errors to determine if the batch file failed.

Type: Unsigned 8-bit value

Range: 0 to B hex

Default: 0

1 - Special Batch File Function Parameter.

This parameter specifies additional information required by the special Batch File function selected by Parameter 0.

If Parameter 0 is equal to 0, 1, 5, 9 or B this parameter will not be used.

If Parameter 0 is equal to 2, this parameter specifies the number of milliseconds to delay.

If Parameter 0 is equal to 3, 4 or 8, this parameter specifies the number of the label to which batch file execution is to branch, when the specified condition is satisfied.

If Parameter 0 is equal to 6 and this parameter is entered, it specifies the Diagnostic Error Code on which Batch File execution is to be terminated.
If Parameter 0 is equal to 6 and this parameter is not entered, Batch File execution will be terminated on any error that occurs.

If Parameter 0 is equal to 7, this parameter specifies the value to which the batch file Loop Count is to be set.

If Parameter 0 is equal to A, this parameter specifies the expected Diagnostic Error Code associated with the error that is expected.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF, if Millisecond Delay
0 to 0xFFFFFFFF, if Loop Count Value
0 to 0xF, if Label Number

0 to 0xFFFFFFFF, if Diagnostic Error Code

Default: None

2 - Special Batch File Function Parameter.

This parameter specifies additional information required by the special Batch File function selected by Parameter 0.

If Parameter 0 is equal to 0, 1, 2, 3, 4, 5, 6, 9 or B this parameter will not be used.

If Parameter 0 is equal to 7 or 8, this parameter specifies the number of the batch file loop count to be set or decremented.

If Parameter 0 is equal to A, this parameter specifies the minimum number of times the error specified by Parameter 1 is expected to occur. Setting this parameter to zero indicates that the error may occur but is not required to occur. Setting this parameter to a value greater than zero indicates that the batch file is attempting to force the error. In this case an error that occurs less than the specified number of times will be considered to be a failing condition.

Type: Unsigned 32-bit value

Range: 0 to 3,   if Loop Count Value
         0 to 0xFFFF,   if Minimum Error Count

Default: 0

3 - Special Batch File Function Parameter.

This parameter specifies additional information required by the special Batch File function selected by Parameter 0.

If Parameter 0 is equal to 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 or B this parameter will not be used.

If Parameter 0 is equal to A, this parameter specifies the maximum number of times the error specified by Parameter 1 is expected to occur. If the error occurs more than the specified number of times this will be considered to be a failing condition.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFF

Default: 0

Output Data:
None

Revision History:

0001.0000   Initial revision.
0011.0000   Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Description:

This command spins down the drive, waits the specified number of milliseconds and jumps to the Power On Reset function or the Boot Strap Loader. When jumping to the Power On Reset function, a Control Z command will be required to enable the Diagnostic Mode commands following the completion of the reset.

Quick Help:

"SpinDownAndResetDrive, e[MsecDelay],[Opts]";

Input Parameters:

0 - Delay After Spin Down.

This parameter specifies the number of milliseconds to delay after spinning down and before resetting the drive.

Type: Unsigned 16-bit value

Range: 0x1388 to 0xFFFF

Default: 0x1388 (5000 msec or 5 seconds)

1 - Jump to Boot Strap Loader option.

If this parameter is equal to 0x0F, the code will jump to the Boot Strap Loader after spinning down the drive. If this parameter is not equal to 0x0F, the code will jump to the Power On Reset function after spinning down the drive.

Type: Signed 8-bit value

Range: 0 to 0xFF

Default: None

Output Data:

The following string will be output to indicate that the drive is in the process of spinning down.

"Spinning Down"

When the spin down is complete, the following information will be displayed.

"Spin Down Complete"

"Elapsed Time a mins b secs" or
"Elapsed Time b.c secs" or
"Elapsed Time c.d msecs"

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

When delaying following spin down, the following string will be displayed.

"Delaying eeee msec"

where

eeee is the length of the delay in milliseconds

After the delay is complete, one of the following strings will be output to indicate that the reset is being performed.

"Jumping to Power On Reset" or
"Jumping to Boot Loader"

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Spin Down Drive (Levels 2, 3, 7, 8, F 'Z')

Description:
This command spins the drive down.

Quick Help:

"SpinDownDrive, Z";

Input Parameters:
None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

In addition, one of the following strings will be output to indicate the current Spin State.

"Spin Down Complete" or
"Spin Up held prior to Unlatch" or
"Spin Up held prior to Demod Sync" or
"Spin Up held prior to Track Follow" or
"Spin Up Complete" or
"Spin Error" or
"Invalid Spin State"

The elapsed time for the spin operation will be displayed as follows.

"Elapsed Time a mins b secs" or
"Elapsed Time b.c secs" or
"Elapsed Time c.d msecs"

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

If a spin error occurred, the following additional information will be displayed.

"R/W Status c R/W Error dddddddd"

where

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem

If a spin error occurred and the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0-6: NA
Bit 7: Enable the Servo Event Log to be displayed
Bits 31-8: NA

If Bit 7 is set, the contents of the Servo Event Log will be displayed as follows.

"Servo Event Log"
"cccc cccc cccc ... cccc" (repeated until all entries have been displayed)

where

cccc is a 16-bit Servo Event Log entry

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Spin Up Drive (Levels 2, 3, 7, 8, F 'U')

Description:

The command spins up the drive. Optionally, the spin up operation can be paused in several intermediate states.

Quick Help:

"SpinUpDrive, U[HoldState],[Hd],[Cyl]";

Input Parameters:

0 - Spin Up Hold State.

This parameter specifies the state in which the Spin Up operation is to be held.

0 = Spin up and attempt to track follow on the default cylinder and head.

1 = Advance to the next Spin Hold State.

2 = Release the Spin Hold State. If this option is selected the drive will spin up to completion and attempt to track follow on the specified cylinder and head.

3 = Spin up and hold with the actuator latched.

4 = Spin up, unlatch the actuator and hold prior to attempting to synchronize the demodulator to the data on the disk.

5 = Spin up, unlatch the actuator, synchronize the demodulator to the data on the disk and hold prior to attempting to track follow.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: 0

1 - Logical Head Address.

If the Spin Hold States are being used (Parameter 0 not equal to 0), this parameter specifies the address of the logical head on which the spin up operation will attempt to synchronize the demodulator and / or track follow. If the Spin Hold States are not being used (Parameter 0 not entered or equal to 0), this parameter specifies the address of the logical head to which a seek will be performed after the drive is spun up.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: First logical head

2 - Physical Cylinder Address.

If the Spin Hold States are being used (Parameter 0 not equal to 0), this parameter specifies the address of the physical cylinder on which the spin up operation will attempt to track follow. If the Spin Hold States are not being used (Parameter 0 not entered or equal to 0), this parameter specifies the address of the physical cylinder to which a seek will be performed after the drive is spun up.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: First user area physical cylinder

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

In addition, one of the following strings will be output to indicate the current Spin State.

```
"Spin Down Complete"                        or
"Spin Up held prior to Unlatch"             or
"Spin Up held prior to Demod Sync"          or
"Spin Up held prior to Track Follow"        or
"Spin Up Complete"                          or
"Spin Error"                                or
"Invalid Spin State"
```

The elapsed time for the spin operation will be displayed as follows.

```
"Elapsed Time a mins b secs"  or
"Elapsed Time b.c secs"       or
"Elapsed Time c.d msecs"
```

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

If a spin error occurred, the following additional information will be displayed.

"R/W Status c R/W Error dddddddd"

where

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem

If a spin error occurred and the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

```
Bit 0-6:    NA
Bit 7:      Enable the Servo Event Log to be displayed
Bits 31-8:  NA
```

If Bit 7 is set, the contents of the Servo Event Log will be displayed as follows.

"Servo Event Log"
"cccc cccc cccc ... cccc" (repeated until all entries have been displayed)

where

cccc is a 16-bit Servo Event Log entry

Revision History:

```
0001.0000   Initial revision.
0011.0000   Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External
            Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes
            (DiagError).
```

Toggle Debug Display Enable (Online Control \)

Description:

This command toggles the Debug Display Enable state.

Quick Help:

"ToggleDebugDisplayEnable";

Input Parameters:

None

Output Data:

If the Debug Display is enabled, the following message will be displayed.

"Debug Display enabled"

If the Debug Display is disabled, the following message will be displayed.

"Debug Display disabled"

Revision History:

```
0001.0000   Initial revision.
0011.0000   Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External
            Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes
            (DiagError).
```

Toggle Diag Idle Mode (Online Control P)

Description:

This command toggles the selected idle mode features. If the selected features are enabled, this command will disable them. If the selected features are disabled, this command will enable them.

Features are selected [and enabled] by being enabled with the level 2 M command.

Quick Help:

"ToggleDiagIdleMode";

Input Parameters:

None

Output Data:

If an error occurred, the following information will be displayed.

```
"DiagError aaaaaaaa "
```

where

```
aaaaaaaa is the Diagnostic Error Code
```

If no error occurred, then the following will be displayed:

```
                Dithering xxx  ctl-P yyyyyyyyyyy
                      TCC xxx  ctl-P yyyyyyyyyyy
Continuous heat to writer xxx  ctl-P yyyyyyyyyyy
MR chop / cnt. preamp pwr xxx  ctl-P yyyyyyyyyyy
                    PFast xxx  ctl-P yyyyyyyyyyy
 Continuous channel power xxx  ctl-P yyyyyyyyyyy
```

Where:

xxx is either "On" or "Off"

yyyyyyyyyyy is either "toggles" or "won't toggle"

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Toggle EIB-Specific R/W Tracing (Online {)

Description:

This command is used to control the display of Read/Write Retry Tracing Characters using the serial port, formatted specifically for use with the Error Injection Board (EIB). Several modes can be selected through the setting of the bits S T R:

```
S  T  R  |  Display Mode
**********************************************************************
0  X  X  |  Vismux signals Enabled during Read/Write of a System Sector
1  X  X  |  Vismux signals Disabled during Read/Write of a System Sector
X  0  1  |  Retry number displayed. (see example below)
X  1  0  |  Tagged or delimited retry number displayed. (see example below)
```

example: Retry number displayed - for each retry, output the mode (R/W) and the retry number.
R0001R0002R0003 or W0001W0002W0003
example: Tagged retry number - this is the same as Retry Number display with the inclusion of a unique character '~', which is used to delimit each retry.
~R0001~R0002~R0003 or ~W0001~W0002~W0003

Quick Help:

"ToggleEibTracing";

Input Parameters:

None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following information will be displayed.

"S T R = a b c"

where

"S T R" is an acronym for "Suppress Vismux", "Tagged Retry number", "Retry number"

a is equal to 1 if the Vismux output is supressed during System Sectors

b is equal to 1 if additional tagging characters are added to the Retry number

c is equal to 1 if the Retry number is to be output

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Toggle Interface Command Echo (Online Control V)

Description:
This command toggles the Interface Command Echo state

Quick Help:

"ToggleInterfaceCmdEcho";

Input Parameters:
None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, following information will be displayed.

If the Toggle Interface Command Echo is enabled, following will be displayed

"EchoInterfaceCmds: On"

If the Toggle Interface Command Echo is disable, following will be displayed

"EchoInterfaceCmds: Off"

If the Toggle Interface Command Echo is enabled, Interface Command State will be displayed when a new Command was received on the Native Interface.
For detail format of the Interface Command State please refer Online '~' Diag Command.

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Toggle R/W Tracing (Online Control D or Control N)

Description:
This command steps through all possible combinations of enabled / disabled states for the following three R/W Tracing functions:

Retry Tracing
Command Tracing
Error Tracing

Quick Help:

"ToggleRwTracing";

Input Parameters:
None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the following information will be displayed.

"e c r = a b c"

where

"e c r" is an acronym for "error", "command", "retry" tracing

a is equal to 1 if error tracing is enabled and 0 if error tracing is disabled

b is equal to 1 if command tracing is enabled and 0 if command tracing is disabled

c is equal to 1 if retry tracing is enabled and 0 if retry tracing is disabled

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Translate LBA (Level A 'F')

Description:

This command translates the specified Logical Block Address (LBA) to the following:

- PBA (Physical Block Address)
- LLL CHS (Logical Cylinder, Logical Head and Logical Sector)
- PLP CHS (Physical Cylinder, Logical Head and Physical Sector)
- Wedge Address
- Symbols From Index
- Zone Number

Quick Help:

"XlateLba, F[LbaHi],[LbaLo],[SysAreaOpt],[NumLbas]";

Input Parameters:

0 - LBA or LBA High.

If Parameter 1 is not entered, then this parameter contains the 32-bit Logical Block Address to be translated. If Parameter 1 is entered, then this parameter contains the upper 16-bits of the Logical Block Address to be translated.

If Parameter 2 is entered, then the specified LBA is located in the System Area, else it is located in the User Area.

Type: Unsigned 32-bit value, if Parameter 1 is not entered
Unsigned 16-bit value, if Parameter 1 is entered

Range: 0 to 0xffffffff, if Parameter 1 is not entered
0 to 0xffff, if Parameter 1 is entered

Default: 0

1 - LBA Low.

This parameter contains the lower 16-bits of the Logical Block Address to be translated.

If Parameter 2 is entered, then the specified LBA is located in the System Area, else it is located in the User Area.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: None. If this parameter is not entered, then Parameter 0 is assumed to specify the entire 32-bit Logical Block Address to be translated.

2 - System Area Flag.

If any value is entered for this parameter, then the Logical Block Address specified by Parameters 0 and 1 is located in the System Area, else it is located in the User Area.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: None

3 - LBA Count.

This value will specify the number of consecutive LBAs to be translated.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 1

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the track information will be displayed as follows.

```
"Track Info:"
"Partition PhyCyl   LogCyl   NomCyl   Radius_mils LogHd Zn FirstLba FirstPba LogSecs PhySec
"User      cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
"System    cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
```

where

cccccccc	is the Logical Cylinder address where Logical Cylinders do not include the cylinders in other partitions.
dddddddd	is the Physical Cylinder address where Physical Cylinders include User Area Cylinders, System Area Cylinders and Spare Cylinders.
ee	is the Logical Head address where Logical Heads do not include heads that have been depopulated.
ff	is the number of the zone that contains the track.
gggggggg	is the first Logical Block Address (LBA) on the track.
hhhhhhhh	is the first Physical Block Address (PBA) on the track.
iiii	is the number of logical sectors on the track.
jjjj	is the number of physical sectors on the track.
kkkk	is the skew in wedges from index to the wedge that contains physical sector 0.

llll	is the number of physical sectors per frame.
mmmm	is the number of wedges per frame.
nnnnnnnn	is the Nominal Cylinder address where Nominal Cylinders remove the VBAR scaling factor.
o.ooooooEoo	is the Radius in milliinches as measured from the hub.

This will be followed by the sector information which will be displayed as follows.

```
"Sector Info:"
"LBA      PBA      LogSec PhySec Wdg  SFI      "
"cccccccc dddddddd eeee   ffff   gggg hhhhhhhh"
```

where

cccccccc	is the Logical Block Address (LBA) of the sector within the User or System Area. All non-defective, non-spare User Area sectors are numbered consecutively starting with zero. Defective sectors do not have a valid LBA and will be skipped when accessing consecutive LBAs. System Area sectors are number similarly starting with 0.
dddddddd	is the Physical Block Address (PBA) of the sector within the User or System Area. All User Area sectors (including spare and defective sectors) are numbered consecutively starting with zero. System Area sectors are number similarly starting with 0.
eeee	is the Logical Sector address where Logical Sectors do not include defective sectors that have been slipped or unused spares.
ffff	is the Physical Sector address where Physical Sectors include all of the sectors on the track (including those marked as defective). It should be noted that the Physical Sector address is skewed from index. This means that the first sector following index is not guaranteed to be Physical Sector 0 and may be the second half of split sector.
gggg	is the number of the Servo Burst preceeding the data wedge that contains the sector.
hhhhhhhh	is the offset in NRZ Symbols from Index.

If the sector is split, the following additional information will be displayed.

```
" Split ppp:qqq bytes at Burst rrrrrr"
```

where

ppp	is the number of bytes before the split.
qqq	is the number of bytes after the split.
rrrrrr	is the number of the servo burst that splits the sector.

Revision History:

0001.0000 Initial revision.
0002.0000 Added Nominal Cylinder and Radius to the Track Info output.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Translate Logical Cylinder, Logical Head and Logical Sector (Level A 'c')

Description:

This command translates the specified LLL CHS (Logical Cylinder, Logical Head and Logical Sector) address to the following:

- LBA (Logical Block Address)
- PBA (Physical Block Address)
- PLP CHS (Physical Cylinder, Logical Head and Physical Sector)
- Wedge Address
- Symbols From Index
- Zone Number

Quick Help:

"XlateLllChs, c[Cyl],[Hd],[Sec],[SysAreaOpt],[NumSecs]";

Input Parameters:

0 - Logical Cylinder Address.

If Parameter 3 was entered, this parameter specifies a System Area Logical Cylinder Address to be translated. If Parameter 3 was not entered, this parameter specifies a User Area Logical Cylinder Address to be translated.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

1 - Logical Head Address.

This parameter specifies the Logical Head Address to be translated.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: 0

2 - Logical Sector Address.

This parameter specifies the Logical Sector Address to be translated.

Type: Unsigned 16-bit value

Range: 0 to maximum logical sector address on specified track

Default: 0

3 - System Area Flag.

If any value is entered for this parameter, then Parameters 0 specifies a System Area Logical Cylinder Address, else it specifies a User Area Logical Cylinder Address.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

4 - Logical Sector Count.

This value will specify the number of consecutive Logical Sectors to be translated. (Note: The value entered will be limited to the Logical Sectors remaining on the track.)

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 1

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the track information will be displayed as follows.

```
"Track Info:"
"Partition PhyCyl   LogCyl   NomCyl   Radius_mils LogHd Zn FirstLba FirstPba LogSecs PhySe
"User      cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
"System    cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
```

where

cccccccc is the Logical Cylinder address where Logical Cylinders do not include the cylinders in other partitions.

dddddddd is the Physical Cylinder address where Physical Cylinders include User Area Cylinders, System Area Cylinders and Spare Cylinders.

ee is the Logical Head address where Logical Heads do not include heads that have been depopulated.

ff is the number of the zone that contains the track.

gggggggg is the first Logical Block Address (LBA) on the track.

hhhhhhhh is the first Physical Block Address (PBA) on the track.

iiii	is the number of logical sectors on the track.

jjjj	is the number of physical sectors on the track.

kkkk	is the skew in wedges from index to the wedge that contains physical sector 0.

llll	is the number of physical sectors per frame.

mmmm	is the number of wedges per frame.

nnnnnnnn	is the Nominal Cylinder address where Nominal Cylinders remove the VBAR scaling factor.

o.ooooooEoo	is the Radius in milliinches as measured from the hub.

This will be followed by the sector information which will be displayed as follows.

```
"Sector Info:"
"LBA      PBA      LogSec PhySec Wdg  SFI      "
"cccccccc dddddddd eeee   ffff   gggg hhhhhhhh"
```

where

cccccccc	is the Logical Block Address (LBA) of the sector within the User or System Area. All non-defective, non-spare User Area sectors are numbered consecutively starting with zero. Defective sectors do not have a valid LBA and will be skipped when accessing consecutive LBAs. System Area sectors are number similarly starting with 0.

dddddddd	is the Physical Block Address (PBA) of the sector within the User or System Area. All User Area sectors (including spare and defective sectors) are numbered consecutively starting with zero. System Area sectors are number similarly starting with 0.

eeee	is the Logical Sector address where Logical Sectors do not include defective sectors that have been slipped or unused spares.

ffff	is the Physical Sector address where Physical Sectors include all of the sectors on the track (including those marked as defective). It should be noted that the Physical Sector address is skewed from index. This means that the first sector following index is not guaranteed to be Physical Sector 0 and may be the second half of split sector.

gggg	is the number of the Servo Burst preceeding the data wedge that contains the sector.

hhhhhhhh	is the offset in NRZ Symbols from Index.

If the sector is split, the following additional information will be displayed.

```
" Split ppp:qqq bytes at Burst rrrrrr"
```

where

ppp	is the number of bytes before the split.

qqq   is the number of bytes after the split.

rrrrrr   is the number of the servo burst that splits the sector.

Revision History:

0001.0000   Initial revision.
0002.0000   Added Nominal Cylinder and Radius to the Track Info output.
0011.0000   Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Translate Logical Sector (Level 2 'l', Level 3 'q')

Description:

This command translates the specified Logical Sector address on the current track to the following:

- LBA (Logical Block Address)
- PBA (Physical Block Address)
- PLP CHS (Physical Cylinder, Logical Head and Physical Sector)
- Wedge Address
- Symbols From Index
- Zone Number

Quick Help:

```
   Level 2
"XlateLogSec, l[Sec],[NumSecs]";
   Level 3
"XlateLogSec, q[Sec],[NumSecs]";
```

Input Parameters:

0 - Logical Sector Address.

This parameter specifies the address of the Logical Sector on the current track to be translated.

Type: Unsigned 16-bit value

Range: 0 to maximum logical sector address on current track

Default: 0

1 - Logical Sector Count.

This value will specify the number of consecutive Logical Sectors to be translated. (Note: The value entered will be limited to the Logical Sectors remaining on the track.)

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 1

Output Data:

If an error occurred, the following information will be displayed.

```
"DiagError aaaaaaaa "
```

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the track information will be displayed as follows.

```
"Track Info:"
"Partition PhyCyl   LogCyl   NomCyl   Radius_mils LogHd Zn FirstLba FirstPba LogSecs PhySe
"User      cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
"System    cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
```

where

cccccccc	is the Logical Cylinder address where Logical Cylinders do not include the cylinders in other partitions.
dddddddd	is the Physical Cylinder address where Physical Cylinders include User Area Cylinders, System Area Cylinders and Spare Cylinders.
ee	is the Logical Head address where Logical Heads do not include heads that have been depopulated.
ff	is the number of the zone that contains the track.
gggggggg	is the first Logical Block Address (LBA) on the track.
hhhhhhhh	is the first Physical Block Address (PBA) on the track.
iiii	is the number of logical sectors on the track.
jjjj	is the number of physical sectors on the track.
kkkk	is the skew in wedges from index to the wedge that contains physical sector 0.
llll	is the number of physical sectors per frame.
mmmm	is the number of wedges per frame.
nnnnnnnn	is the Nominal Cylinder address where Nominal Cylinders remove the VBAR scaling factor.
o.ooooooEoo	is the Radius in milliinches as measured from the hub.

This will be followed by the sector information which will be displayed as follows.

```
"Sector Info:"
"LBA      PBA      LogSec PhySec Wdg  SFI      "
"cccccccc dddddddd eeee   ffff   gggg hhhhhhhh"
```

where

cccccccc	is the Logical Block Address (LBA) of the sector within the User or System Area. All non-defective, non-spare User Area sectors are numbered consecutively starting with zero. Defective sectors do not have a valid LBA and will be skipped when accessing consecutive LBAs. System Area sectors are number similarly starting with 0.
dddddddd	is the Physical Block Address (PBA) of the sector within the User or System Area. All User Area sectors (including spare and defective sectors) are numbered consecutively starting with zero. System Area sectors are number similarly starting with 0.
eeee	is the Logical Sector address where Logical Sectors do not include defective sectors that have been slipped or unused spares.
ffff	is the Physical Sector address where Physical Sectors include all of the sectors on the track (including those marked as defective). It should be noted that the Physical Sector address is skewed from index. This means that the first sector following index is not guaranteed to be Physical Sector 0 and may be the second half of split sector.
gggg	is the number of the Servo Burst preceeding the data wedge that contains the sector.
hhhhhhhh	is the offset in NRZ Symbols from Index.

If the sector is split, the following additional information will be displayed.

" Split ppp:qqq bytes at Burst rrrrrr"

where

ppp	is the number of bytes before the split.
qqq	is the number of bytes after the split.
rrrrrr	is the number of the servo burst that splits the sector.

Revision History:

0001.0000	Initial revision.
0002.0000	Added Nominal Cylinder and Radius to the Track Info output.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Translate Nominal Cylinder and Logical Head (Level A 'e')

Description:

This command translates the specified Nominal cylinder and logical head address to the follow

- LBA (Logical Block Address)

- PBA (Physical Block Address)
- LLL CHS (Logical Cylinder, Logical Head and Logical Sector)
- PLP CHS (Physical Cylinder, Logical Head and Physical Sector)
- Wedge Address
- Symbols From Index
- Zone Number

Quick Help:

"XlateNominalCyl, e[Cyl],[Hd],[Sec],[SysAreaOpt]";

Input Parameters:

0 - Nominal Cylinder Address.

This parameter specifies the Nominal Cylinder Address to be translated.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

1 - Logical Head Address.

This parameter specifies the Logical Head Address to be translated.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: 0

2 - Logical Sector Address.

This parameter specifies the Logical Sector Address to be translated.

Type: Unsigned 16-bit value

Range: 0 to maximum logical sector address on specified track

Default: 0

3 - System Area Flag.

If any value is entered for this parameter, then Parameter 0 specifies a System Area Logical Cylinder Address, else it specifies a User Area Logical Cylinder Address.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the track information will be displayed as follows.

```
"Track Info:"
"Partition PhyCyl   LogCyl   NomCyl   Radius_mils LogHd Zn FirstLba FirstPba LogSecs PhySe
"User      cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
"System    cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
```

where

cccccccc	is the Logical Cylinder address where Logical Cylinders do not include the cylinders in other partitions.
dddddddd	is the Physical Cylinder address where Physical Cylinders include User Area Cylinders, System Area Cylinders and Spare Cylinders.
ee	is the Logical Head address where Logical Heads do not include heads that have been depopulated.
ff	is the number of the zone that contains the track.
gggggggg	is the first Logical Block Address (LBA) on the track.
hhhhhhhh	is the first Physical Block Address (PBA) on the track.
iiii	is the number of logical sectors on the track.
jjjj	is the number of physical sectors on the track.
kkkk	is the skew in wedges from index to the wedge that contains physical sector 0.
llll	is the number of physical sectors per frame.
mmmm	is the number of wedges per frame.
nnnnnnnn	is the Nominal Cylinder address where Nominal Cylinders remove the VBAR scaling factor.
o.ooooooEoo	is the Radius in milliinches as measured from the hub.

This will be followed by the sector information which will be displayed as follows.

```
"Sector Info:"
"LBA      PBA      LogSec PhySec Wdg  SFI      "
"cccccccc dddddddd eeee   ffff   gggg hhhhhhhh"
```

where

cccccccc is the Logical Block Address (LBA) of the sector within the User or System Area. All non-defective, non-spare User Area sectors are numbered consecutively starting with zero. Defective sectors do not have a valid LBA and will be skipped when accessing consecutive LBAs. System Area sectors are number similarly starting with 0.

dddddddd — is the Physical Block Address (PBA) of the sector within the User or System Area. All User Area sectors (including spare and defective sectors) are numbered consecutively starting with zero. System Area sectors are number similarly starting with 0.

eeee — is the Logical Sector address where Logical Sectors do not include defective sectors that have been slipped or unused spares.

ffff — is the Physical Sector address where Physical Sectors include all of the sectors on the track (including those marked as defective). It should be noted that the Physical Sector address is skewed from index. This means that the first sector following index is not guaranteed to be Physical Sector 0 and may be the second half of split sector.

gggg — is the number of the Servo Burst preceeding the data wedge that contains the sector.

hhhhhhhh — is the offset in NRZ Symbols from Index.

If the sector is split, the following additional information will be displayed.

" Split ppp:qqq bytes at Burst rrrrrr"

where

ppp — is the number of bytes before the split.

qqq — is the number of bytes after the split.

rrrrrr — is the number of the servo burst that splits the sector.

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Translate PBA (Level A 'C')

Description:

This command translates the specified Physical Block Address (PBA) to the following:

- LBA (Logical Block Address)
- LLL CHS (Logical Cylinder, Logical Head and Logical Sector)
- PLP CHS (Physical Cylinder, Logical Head and Physical Sector)
- Wedge Address
- Symbols From Index
- Zone Number

Note: PBA translations are currently only supported for sectors in the User Area.

Quick Help:

"XlatePba, C[PbaHi],[PbaLow],[NumPbas]";

Input Parameters:

0 - PBA or PBA High.

If Parameter 1 is not entered, then this parameter contains the 32-bit Physical Block Address to be translated. If Parameter 1 is entered, then this parameter contains the upper 16-bits of the Physical Block Address to be translated.

Type: Unsigned 32-bit value, if Parameter 1 is not entered
Unsigned 16-bit value, if Parameter 1 is entered

Range: 0 to 0xffffffff, if Parameter 1 is not entered
0 to 0xffff, if Parameter 1 is entered

Default: 0

1 - PBA Low.

This parameter contains the lower 16-bits of the Physical Block Address to be translated.

Type: Unsigned 16-bit value

Range: 0 to 0xffff

Default: None. If this parameter is not entered, then Parameter 0 is assumed to specify the entire 32-bit Physical Block Address to be translated.

2 - PBA Count.

This value will specify the number of consecutive PBAs to be translated.

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 1

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the track information will be displayed as follows.

```
"Track Info:"
"Partition PhyCyl   LogCyl   NomCyl   Radius_mils LogHd Zn FirstLba FirstPba LogSecs PhySe
"User      cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
"System    cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
```

where

cccccccc	is the Logical Cylinder address where Logical Cylinders do not include the cylinders in other partitions.
dddddddd	is the Physical Cylinder address where Physical Cylinders include User Area Cylinders, System Area Cylinders and Spare Cylinders.
ee	is the Logical Head address where Logical Heads do not include heads that have been depopulated.
ff	is the number of the zone that contains the track.
gggggggg	is the first Logical Block Address (LBA) on the track.
hhhhhhhh	is the first Physical Block Address (PBA) on the track.
iiii	is the number of logical sectors on the track.
jjjj	is the number of physical sectors on the track.
kkkk	is the skew in wedges from index to the wedge that contains physical sector 0.
llll	is the number of physical sectors per frame.
mmmm	is the number of wedges per frame.
nnnnnnnn	is the Nominal Cylinder address where Nominal Cylinders remove the VBAR scaling factor.
o.ooooooEoo	is the Radius in milliinches as measured from the hub.

This will be followed by the sector information which will be displayed as follows.

```
"Sector Info:"
"LBA      PBA      LogSec PhySec Wdg  SFI      "
"cccccccc dddddddd eeee   ffff   gggg hhhhhhhh"
```

where

cccccccc	is the Logical Block Address (LBA) of the sector within the User or System Area. All non-defective, non-spare User Area sectors are numbered consecutively starting with zero. Defective sectors do not have a valid LBA and will be skipped when accessing consecutive LBAs. System Area sectors are number similarly starting with 0.
dddddddd	is the Physical Block Address (PBA) of the sector within the User or System Area. All User Area sectors (including spare and defective sectors) are numbered consecutively starting with zero. System Area sectors are number similarly starting with 0.
eeee	is the Logical Sector address where Logical Sectors do not include defective sectors that have been slipped or unused spares.
ffff	is the Physical Sector address where Physical Sectors include all of the sectors on the track (including those marked as

defective). It should be noted that the Physical Sector address is skewed from index. This means that the first sector following index is not guaranteed to be Physical Sector 0 and may be the second half of split sector.

gggg	is the number of the Servo Burst preceeding the data wedge that contains the sector.
hhhhhhhh	is the offset in NRZ Symbols from Index.

If the sector is split, the following additional information will be displayed.

" Split ppp:qqq bytes at Burst rrrrrr"

where

ppp	is the number of bytes before the split.
qqq	is the number of bytes after the split.
rrrrrr	is the number of the servo burst that splits the sector.

Revision History:

0001.0000	Initial revision.
0002.0000	Added Nominal Cylinder and Radius to the Track Info output.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Translate Physical Sector (Level 2 'h', Level 3 'p')

Description:

This command translates the specified Physical Sector address on the current track to the following:

- LBA (Logical Block Address)
- PBA (Physical Block Address)
- LLL CHS (Logical Cylinder, Logical Head and Logical Sector)
- Wedge Address
- Symbols From Index
- Zone Number

Quick Help:

```
   Level 2
"XlatePhySec, h[Sec],[NumSecs]";
   Level 3
"XlatePhySec, p[Sec],[NumSecs]";
```

Input Parameters:

0 - Physical Sector Address.

This parameter specifies the address of the Physical Sector on the current track to be translated.

Type: Unsigned 16-bit value

Range: 0 to maximum physical sector address on current track

Default: 0

1 - Physical Sector Count.

This value will specify the number of consecutive Physical Sectors to be translated. (Note: The value entered will be limited to the Physical Sectors remaining on the track.)

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 1

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the track information will be displayed as follows.

```
"Track Info:"
"Partition PhyCyl   LogCyl   NomCyl   Radius_mils LogHd Zn FirstLba FirstPba LogSecs PhySe
"User      cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
"System    cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
```

where

cccccccc — is the Logical Cylinder address where Logical Cylinders do not include the cylinders in other partitions.

dddddddd — is the Physical Cylinder address where Physical Cylinders include User Area Cylinders, System Area Cylinders and Spare Cylinders.

ee — is the Logical Head address where Logical Heads do not include heads that have been depopulated.

ff — is the number of the zone that contains the track.

gggggggg — is the first Logical Block Address (LBA) on the track.

hhhhhhhh — is the first Physical Block Address (PBA) on the track.

iiii — is the number of logical sectors on the track.

jjjj — is the number of physical sectors on the track.

kkkk — is the skew in wedges from index to the wedge that contains physical sector 0.

llll is the number of physical sectors per frame.

mmmm is the number of wedges per frame.

nnnnnnnn is the Nominal Cylinder address where Nominal Cylinders remove the VBAR scaling factor.

o.ooooooEoo is the Radius in milliinches as measured from the hub.

This will be followed by the sector information which will be displayed as follows.

```
"Sector Info:"
"LBA      PBA      LogSec PhySec Wdg  SFI      "
"cccccccc dddddddd eeee   ffff   gggg hhhhhhhh"
```

where

cccccccc is the Logical Block Address (LBA) of the sector within the User or System Area. All non-defective, non-spare User Area sectors are numbered consecutively starting with zero. Defective sectors do not have a valid LBA and will be skipped when accessing consecutive LBAs. System Area sectors are number similarly starting with 0.

dddddddd is the Physical Block Address (PBA) of the sector within the User or System Area. All User Area sectors (including spare and defective sectors) are numbered consecutively starting with zero. System Area sectors are number similarly starting with 0.

eeee is the Logical Sector address where Logical Sectors do not include defective sectors that have been slipped or unused spares.

ffff is the Physical Sector address where Physical Sectors include all of the sectors on the track (including those marked as defective). It should be noted that the Physical Sector address is skewed from index. This means that the first sector following index is not guaranteed to be Physical Sector 0 and may be the second half of split sector.

gggg is the number of the Servo Burst preceeding the data wedge that contains the sector.

hhhhhhhh is the offset in NRZ Symbols from Index.

If the sector is split, the following additional information will be displayed.

```
" Split ppp:qqq bytes at Burst rrrrrr"
```

where

ppp is the number of bytes before the split.

qqq is the number of bytes after the split.

rrrrrr is the number of the servo burst that splits the sector.

Revision History:

0001.0000	Initial revision.
0002.0000	Added Nominal Cylinder and Radius to the Track Info output.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Translate Physical Cylinder, Logical Head and Physical Sector (Level A 'd')

Description:

This command translates the specified PLP CHS (Physical Cylinder, Logical Head and Physical Sector) address to the following:

- LBA (Logical Block Address)
- PBA (Physical Block Address)
- LLL CHS (Logical Cylinder, Logical Head and Logical Sector)
- Wedge Address
- Symbols From Index
- Zone Number

Quick Help:

"XlatePlpChs, d[Cyl],[Hd],[Sec],[NumSecs]";

Input Parameters:

0 - Physical Cylinder Address.

This parameter specifies the Physical Cylinder Address to be translated.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

1 - Logical Head Address.

This parameter specifies the Logical Head Address to be translated.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: 0

2 - Physical Sector Address.

This parameter specifies the Physical Sector Address to be translated.

Type: Unsigned 16-bit value

Range: 0 to maximum physical sector address on specified track

Default: 0

3 - Physical Sector Count.

This value will specify the number of consecutive Physical Sectors to be translated.

(Note: The value entered will be limited to the Physical Sectors remaining on the track.)

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 1

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the track information will be displayed as follows.

```
"Track Info:"
"Partition PhyCyl   LogCyl   NomCyl   Radius_mils LogHd Zn FirstLba FirstPba LogSecs PhySe
"User      cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
"System    cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
```

where

cccccccc	is the Logical Cylinder address where Logical Cylinders do not include the cylinders in other partitions.
dddddddd	is the Physical Cylinder address where Physical Cylinders include User Area Cylinders, System Area Cylinders and Spare Cylinders.
ee	is the Logical Head address where Logical Heads do not include heads that have been depopulated.
ff	is the number of the zone that contains the track.
gggggggg	is the first Logical Block Address (LBA) on the track.
hhhhhhhh	is the first Physical Block Address (PBA) on the track.
iiii	is the number of logical sectors on the track.
jjjj	is the number of physical sectors on the track.
kkkk	is the skew in wedges from index to the wedge that contains physical sector 0.
llll	is the number of physical sectors per frame.
mmmm	is the number of wedges per frame.
nnnnnnnn	is the Nominal Cylinder address where Nominal Cylinders remove the VBAR scaling factor.
o.ooooooEoo	is the Radius in milliinches as measured from the hub.

This will be followed by the sector information which will be displayed as follows.

```
"Sector Info:"
"LBA      PBA      LogSec PhySec Wdg  SFI     "
"cccccccc dddddddd eeee   ffff   gggg hhhhhhhh"
```

where

cccccccc	is the Logical Block Address (LBA) of the sector within the User or System Area. All non-defective, non-spare User Area sectors are numbered consecutively starting with zero. Defective sectors do not have a valid LBA and will be skipped when accessing consecutive LBAs. System Area sectors are number similarly starting with 0.
dddddddd	is the Physical Block Address (PBA) of the sector within the User or System Area. All User Area sectors (including spare and defective sectors) are numbered consecutively starting with zero. System Area sectors are number similarly starting with 0.
eeee	is the Logical Sector address where Logical Sectors do not include defective sectors that have been slipped or unused spares.
ffff	is the Physical Sector address where Physical Sectors include all of the sectors on the track (including those marked as defective). It should be noted that the Physical Sector address is skewed from index. This means that the first sector following index is not guaranteed to be Physical Sector 0 and may be the second half of split sector.
gggg	is the number of the Servo Burst preceeding the data wedge that contains the sector.
hhhhhhhh	is the offset in NRZ Symbols from Index.

If the sector is split, the following additional information will be displayed.

```
" Split ppp:qqq bytes at Burst rrrrrr"
```

where

ppp	is the number of bytes before the split.
qqq	is the number of bytes after the split.
rrrrrr	is the number of the servo burst that splits the sector.

Revision History:

0001.0000 Initial revision.
0002.0000 Added Nominal Cylinder and Radius to the Track Info output.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Translate Physical Cylinder, Logical Head and Physical Wedge (Level A 'f')

Description:

This command translates the specified PLP CHW (Physical Cylinder, Logical Head and Physical Wedge) address to the following:

- LBA (Logical Block Address)
- PBA (Physical Block Address)
- LLL CHS (Logical Cylinder, Logical Head and Logical Sector)
- PLP CHS (Physical Cylinder, Logical Head and Physical Sector)
- Symbols From Index
- Zone Number

Quick Help:

"XlatePlpChw, f[Cyl],[Hd],[Wdg],[NumWdgs]";

Input Parameters:

0 - Physical Cylinder Address.

This parameter specifies the Physical Cylinder Address to be translated.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

1 - Logical Head Address.

This parameter specifies the Logical Head Address to be translated.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: 0

2 - Physical Wedge Address.

This parameter specifies the Physical Wedge Address to be translated.

Type: Unsigned 16-bit value

Range: 0 to maximum physical wedge address on specified track

Default: 0

3 - Wedge Count.

This value will specify the number of consecutive Wedges to be translated. (Note: The value entered will be limited to the Wedges remaining on the track.)

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 1

Output Data:

If an error occurred, the following information will be displayed.

```
"DiagError aaaaaaaa "
```

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the track information will be displayed as follows.

```
"Track Info:"
"Partition PhyCyl   LogCyl   NomCyl   Radius_mils LogHd Zn FirstLba FirstPba LogSecs PhySe
"User      cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
"System    cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
```

where

cccccccc	is the Logical Cylinder address where Logical Cylinders do not include the cylinders in other partitions.
dddddddd	is the Physical Cylinder address where Physical Cylinders include User Area Cylinders, System Area Cylinders and Spare Cylinders.
ee	is the Logical Head address where Logical Heads do not include heads that have been depopulated.
ff	is the number of the zone that contains the track.
gggggggg	is the first Logical Block Address (LBA) on the track.
hhhhhhhh	is the first Physical Block Address (PBA) on the track.
iiii	is the number of logical sectors on the track.
jjjj	is the number of physical sectors on the track.
kkkk	is the skew in wedges from index to the wedge that contains physical sector 0.
llll	is the number of physical sectors per frame.
mmmm	is the number of wedges per frame.
nnnnnnnn	is the Nominal Cylinder address where Nominal Cylinders remove the VBAR scaling factor.
o.ooooooEoo	is the Radius in milliinches as measured from the hub.

This will be followed by the sector information which will be displayed as follows.

```
"Sector Info:"
"LBA      PBA      LogSec PhySec Wdg  SFI      "
"cccccccc dddddddd eeee   ffff   gggg hhhhhhhh"
```

where

cccccccc	is the Logical Block Address (LBA) of the sector within the User or System Area. All non-defective, non-spare User Area sectors are numbered consecutively starting with zero. Defective sectors do not have a valid LBA and will be skipped when accessing consecutive LBAs. System Area sectors are number similarly starting with 0.
dddddddd	is the Physical Block Address (PBA) of the sector within the User or System Area. All User Area sectors (including spare and defective sectors) are numbered consecutively starting with zero. System Area sectors are number similarly starting with 0.
eeee	is the Logical Sector address where Logical Sectors do not include defective sectors that have been slipped or unused spares.
ffff	is the Physical Sector address where Physical Sectors include all of the sectors on the track (including those marked as defective). It should be noted that the Physical Sector address is skewed from index. This means that the first sector following index is not guaranteed to be Physical Sector 0 and may be the second half of split sector.
gggg	is the number of the Servo Burst preceeding the data wedge that contains the sector.
hhhhhhhh	is the offset in NRZ Symbols from Index.

If the sector is split, the following additional information will be displayed.

" Split ppp:qqq bytes at Burst rrrrrr"

where

ppp	is the number of bytes before the split.
qqq	is the number of bytes after the split.
rrrrrr	is the number of the servo burst that splits the sector.

Revision History:

0001.0000 Initial revision.
0002.0000 Added Nominal Cylinder and Radius to the Track Info output.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Translate Symbols From Index (Level A 'D')

Description:
This function translates the specified Physical Cylinder, Logical Head, Starting Symbol Offset from Index and Symbol Length to the following:

- LBA (Logical Block Address)
- PBA (Physical Block Address)
- LLL CHS (Logical Cylinder, Logical Head and Logical Sector)
- PLP CHS (Physical Cylinder, Logical Head and Physical Sector)
- Sector Span
- Wedge Address
- Wedge Span
- Zone Number

Quick Help:

"XlateSfi, D[PhyCyl],[Hd],[Sfi],[NumSfis]";

Input Parameters:

0 - Physical Cylinder Address.

This parameter specifies the Physical Cylinder Address to be translated.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

1 - Logical Head Address.

This parameter specifies the Logical Head Address to be translated.

Type: Unsigned 8-bit value

Range: 0 to 0xFF

Default: 0

2 - Symbol From Index.

This parameter specifies the Symbol From Index to be translated.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

2 - Length In Symbols.

This parameter specifies the length in symbols to be translated.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 1

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the track information will be displayed as follows.

```
"Track Info:"
"Partition PhyCyl   LogCyl   NomCyl   Radius_mils LogHd Zn FirstLba FirstPba LogSecs PhySe
"User      cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
"System    cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
```

where

cccccccc — is the Logical Cylinder address where Logical Cylinders do not include the cylinders in other partitions.

dddddddd — is the Physical Cylinder address where Physical Cylinders include User Area Cylinders, System Area Cylinders and Spare Cylinders.

ee — is the Logical Head address where Logical Heads do not include heads that have been depopulated.

ff — is the number of the zone that contains the track.

gggggggg — is the first Logical Block Address (LBA) on the track.

hhhhhhhh — is the first Physical Block Address (PBA) on the track.

iiii — is the number of logical sectors on the track.

jjjj — is the number of physical sectors on the track.

kkkk — is the skew in wedges from index to the wedge that contains physical sector 0.

llll — is the number of physical sectors per frame.

mmmm — is the number of wedges per frame.

nnnnnnnn — is the Nominal Cylinder address where Nominal Cylinders remove the VBAR scaling factor.

o.ooooooEoo — is the Radius in milliinches as measured from the hub.

This will be followed by the sector information which will be displayed as follows.

```
"Sector Info:"
"LBA      PBA      LogSec PhySec Wdg  SFI      SymLen   SecLen WdgLen"
"cccccccc dddddddd eeee   ffff   gggg hhhhhhhh iiiiiiii jjjjjj kkkkkk"
```

where

cccccccc — is the Logical Block Address (LBA) of the sector within the User or System Area. All non-defective, non-spare User Area sectors are numbered consecutively starting with zero. Defective sectors do not have a valid LBA and will be skipped when accessing consecutive LBAs. System Area sectors are number similarly starting with 0.

dddddddd — is the Physical Block Address (PBA) of the sector within the User or System Area. All User Area sectors (including spare and defective sectors) are numbered consecutively starting with zero. System Area sectors are number similarly starting with 0.

eeee — is the Logical Sector address where Logical Sectors do not include defective sectors that have been slipped or unused spares.

ffff — is the Physical Sector address where Physical Sectors include all of the sectors on the track (including those marked as defective). It should be noted that the Physical Sector address is skewed from index. This means that the first sector following index is not guaranteed to be Physical Sector 0 and may be the second half of split sector.

gggg — is the number of the Servo Burst preceeding the data wedge that contains the sector.

hhhhhhhh — is the offset in NRZ Symbols from Index.

iiiiiiii — is the length in NRZ Symbols.

jjjjjj — is the number of consecutive Physical Sectors that contain one or more of the specified Symbols.

kkkkkk — is the number of consecutive data wedges that contain one or more of the specified symbols.

If the sector is split, the following additional information will be displayed.

" Split ppp:qqq bytes at Burst rrrrrr"

where

ppp — is the number of bytes before the split.

qqq — is the number of bytes after the split.

rrrrrr — is the number of the servo burst that splits the sector.

Revision History:

0001.0000 Initial revision.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Translate Wedge (Level 2 't')

Description:

This command translates the specified Physical Wedge address on the current track to the following:

- LBA (Logical Block Address)

- PBA (Physical Block Address)
- LLL CHS (Logical Cylinder, Logical Head and Logical Sector)
- PLP CHS (Physical Cylinder, Logical Head and Physical Sector)
- Symbols From Index
- Zone Number

Quick Help:

"XlateWedge, t[Wdg],[NumWdgs]";

Input Parameters:

0 - Physical Wedge Address.

This parameter specifies the Physical Wedge Address to be translated.

Type: Unsigned 16-bit value

Range: 0 to maximum physical wedge address on specified track

Default: 0

1 - Wedge Count.

This value will specify the number of consecutive Wedges to be translated. (Note: The value entered will be limited to the Wedges remaining on the track.)

Type: Unsigned 32-bit value

Range: 0 to 0xffffffff

Default: 1

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If no error occurred, the track information will be displayed as follows.

```
"Track Info:"
"Partition PhyCyl   LogCyl   NomCyl   Radius_mils LogHd Zn FirstLba FirstPba LogSecs PhySe
"User      cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
"System    cccccccc dddddddd nnnnnnnn o.ooooooEoo ee    ff gggggggg hhhhhhhh iiii    jjjj
```

where

cccccccc is the Logical Cylinder address where Logical Cylinders do not include the cylinders in other partitions.

dddddddd is the Physical Cylinder address where Physical Cylinders include User Area Cylinders, System Area Cylinders and Spare Cylinders.

ee	is the Logical Head address where Logical Heads do not include heads that have been depopulated.
ff	is the number of the zone that contains the track.
gggggggg	is the first Logical Block Address (LBA) on the track.
hhhhhhhh	is the first Physical Block Address (PBA) on the track.
iiii	is the number of logical sectors on the track.
jjjj	is the number of physical sectors on the track.
kkkk	is the skew in wedges from index to the wedge that contains physical sector 0.
llll	is the number of physical sectors per frame.
mmmm	is the number of wedges per frame.
nnnnnnnn	is the Nominal Cylinder address where Nominal Cylinders remove the VBAR scaling factor.
o.ooooooEoo	is the Radius in milliinches as measured from the hub.

This will be followed by the sector information which will be displayed as follows.

```
"Sector Info:"
"LBA      PBA      LogSec PhySec Wdg  SFI     "
"cccccccc dddddddd eeee   ffff   gggg hhhhhhhh"
```

where

cccccccc	is the Logical Block Address (LBA) of the sector within the User or System Area. All non-defective, non-spare User Area sectors are numbered consecutively starting with zero. Defective sectors do not have a valid LBA and will be skipped when accessing consecutive LBAs. System Area sectors are number similarly starting with 0.
dddddddd	is the Physical Block Address (PBA) of the sector within the User or System Area. All User Area sectors (including spare and defective sectors) are numbered consecutively starting with zero. System Area sectors are number similarly starting with 0.
eeee	is the Logical Sector address where Logical Sectors do not include defective sectors that have been slipped or unused spares.
ffff	is the Physical Sector address where Physical Sectors include all of the sectors on the track (including those marked as defective). It should be noted that the Physical Sector address is skewed from index. This means that the first sector following index is not guaranteed to be Physical Sector 0 and may be the second half of split sector.
gggg	is the number of the Servo Burst preceeding the data wedge that contains the sector.

hhhhhhhh is the offset in NRZ Symbols from Index.

If the sector is split, the following additional information will be displayed.

" Split ppp:qqq bytes at Burst rrrrrr"

where

ppp is the number of bytes before the split.

qqq is the number of bytes after the split.

rrrrrr is the number of the servo burst that splits the sector.

Revision History:

0001.0000 Initial revision.
0002.0000 Added Nominal Cylinder and Radius to the Track Info output.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Write CHS (Levels 2, 7 'W')

Description:

This command writes data to the disk starting at the specified sector on the target track for the specified number of sectors. The sectors are written with the data contained in the Diagnostic Write Buffer.

Quick Help:

"WrChs, W[Sec],[NumSecs],,[PhyOpt],[Opts]";

Input Parameters:

0 - Logical or Physical Sector Address.

If any value is entered for Parameter 3, this parameter contains the physical sector address of the first sector to write, else this parameter contains the User Area logical sector address of the first sector to write.

Type: Unsigned 16-bit value

Range: 0 to maximum logical or physical sector address on the target track

Default: 0

1 - Transfer Length.

This parameter specifies the number of consecutive sectors to write.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: If the Sector Address was entered and the Transfer Length was not entered, then only the specified sector will be written.

If both the Sector Address and Transfer Length are not entered, then the Transfer Length will be set based on the Test Space that is selected.
If the Random Transfer Length option is selected, a random value will be used that is less than or equal to the number of sectors remaining on the track. If the Random Transfer Length option is not selected, the number of sectors remaining on the track will be written.

If a Transfer Length is entered, it will be limited to the number of sectors remaining on the track.

2 - not used.

Type: None

Range: None

Default: None

3 - Physical Sector Address Flag.

If any value is entered for this parameter, then Parameter 0 specifies a physical sector address, else Parameter 0 specifies a User Area logical sector address.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

4 - Options.

This parameter is a bit-significant value that allows the user to select the following options.

Bits 15-5: not used.

Bit 4: Write All Test Space Sectors.

If this bit is set, all of the sectors in the Test Space will be written, else only the sectors specified by Parameters 0 and 1 will be written.

Bit 3: not used.

Bit 2: Rotate Buffer Sector Offset.

If this bit is set, the Target Buffer Sector Offset will be rotated by 1 prior to the execution of this diagnostic command.
This bit was originally added to help writing random data pattern reduce execution time by not having to re-fill the diagnostic buffer with new random data pattern, which takes great amount of time, but just rotating the Target Buffer Sector Offset at every time this diagnostic command is executed with this option set.
To see or change the current Targer Buffer Sector Offset, please refer all Level 'A', Set Test Space, diagnostic command for detail how-to.

Bit 1: Enable Dynamic Sparing.

If this bit is set, sectors containing media defects that meet the failure criteria will be spared.

Bit 0: Continue On Error.

If this bit is set and an error occurs, the write operation will continue and attempt to write all of the requested sectors. Each error encountered will be displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Write the requested sectors, Stop On Error)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Next User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

or

"Next System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is the Disk Logical Block Address of the sector in error

ffffff is the Logical Cylinder Address of the sector in error

g is the Logical Head Address of the sector in error

hhhh is the Logical Sector Address of the sector in error

iiiiii is the Physical Cylinder Address of the sector in error

j is the Logical Head Address of the sector in error

kkkk is the Physical Sector Address of the sector in error

llllllll is the number of sectors remaining to be read or written

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: Enable the Next Address to be displayed
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed
Bit 4: Enables the Recovery Status to be displayed
Bit 5: Enables the Fault Status to be displayed
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 1 is set, the Next Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed as follows.

"Target User LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

or

"Target System LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

where

pppppppp is the starting Disk Logical Block Address

qqqqqq is the starting Logical Cylinder Address

r is the starting Logical Head Address

ssss is the starting Logical Sector Address

tttttt is the starting Physical Cylinder Address

u is the starting Logical Head Address

vvvv is the starting Physical Sector Address

wwwwwwww is the starting Transfer Length

If Bit 4 is set, the Recovery Status will be displayed as follows.

"Recovered User LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

or

"Recovered System LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

where

AAAAAAAA is the Disk Logical Block Address of the last recovered sector

BBBBBB is the Logical Cylinder Address of the last recovered sector

C is the Logical Head Address of the last recovered sector

DDDD is the Logical Sector Address of the last recovered sector

EEEEEE is the Physical Cylinder Address of the last recovered sector

F is the Logical Head Address of the last recovered sector

GGGG is the Physical Sector Address of the last recovered sector

HHHH are the Recovery Flags reported by the Read/Write code

II is the Recovery Count reported by the Read/Write code

If Bit 5 is set, the Fault Status will be displayed as follows.

"Drive Fault Status JJJJ Preamp Fault Status KKKK"

where

JJJJ is the Drive Fault Status reported by the Read/Write code

KKKK is the Preamp Fault Status reported by the Read/Write code

If Bit 6 is set, the Elapsed Time for the read/write operation will be displayed.

"Elapsed Time a mins b secs" or
"Elapsed Time b.c secs" or
"Elapsed Time c.d msecs"

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

Examples:

Example #1:
To write a single logical sector
(in this case logical sector 23 on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>W23
```

Example #2:
To write multiple logical sectors
(in this case logical sectors 23 to 26 on logical cylinder 45 head 1)

```
F3 2>A0
```

```
F3 2>S45,1
F3 2>W23,4
```

Example #3:
To write all of the logical sectors on a track
(in this case all logical sectors on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>W
```

Example #4:
To write all of the logical sectors on multiple tracks
(in this case all logical sectors on logical cylinders 45 to 49 head 0)

Note: You must seek to the track before the first one to be written.

```
F3 2>A3
F3 2>S44,0
F3 2>L,5
F3 2>W
```

Example #5:
To write all of the logical sectors on a track and continue on error
(in this case all logical sectors on logical cylinder 45 head 0)

Note: An error message will be displayed for each sector in error.

```
F3 2>A0
F3 2>S45,0
F3 2>W,,,,1
```

Example #6:
To write all of the logical sectors in the test space and continue on error

Note: The Test Space is selected by the all level 'A' command. An error message will be displayed for each sector in error.

```
F3 2>W,,,,11
```

Example #7:
To write a single physical sector
(in this case physical sector 32 on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>W32,,,1
```

Example #8:
To write multiple physical sectors
(in this case physical sectors 32 to 35 on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>W32,4,,1
```

Example #9:
To write all of the physical sectors on a track
(in this case all physical sectors on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>W,,,1
```

Example #10:

To write a single logical sector with data at a specific sector offset in the diagnostic write buffer
(in this case logical sector 23 on logical cylinder 45 head 1,
with data at the sector offset of 5 in the diagnostic write buffer)

```
F3 2>A0
F3 2>AF,5
F3 2>S45,1
F3 2>W23
```

Example #11:

To rotate the buffer sector offset by 1 and write a single logical sector with data at the rotated sector offset in the diagnostic write buffer
(This example assumes user ran the Example #10 above right before this example,
in this case logical sector 24 on logical cylinder 45 head 1,
with data at the sector offset of 6 in the diagnostic write buffer)

```
F3 2>W24,,,,4
```

Revision History:

0001.0000	Initial revision.
0001.0001	Eliminated the Enable ZAP Updates and Enable Track Skipping option.
0001.0002	Moved the Enable Dynamic Sparing option from the parameter 2 to the bit 1 of the parameter 4. Added new Rotate Buffer Sector Offset option to the bit 2 of the parameter 4.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Write LBA (Level A 'W')

Description:

This command writes data to the disk starting at the specified LBA (Logical Block Address) for the specified number of LBAs. The data is written from the Diagnostic Write Buffer.

Quick Help:

"WrLba, W[Lba],[NumLbas],,[Opts]";

Input Parameters:

0 - LBA.

If Parameter 3 bit 5 is set, then this parameter specifies the address of the first System Area LBA to be written, else it specifies the address of the first User Area LBA to be written.

Type: Unsigned 32-bit value

Range: 0 to maximum User Area LBA, if parameter 3 bit 5 is set
         0 to maximum System Area LBA, if parameter 3 bit 5 is cleared

Default: Current Target Address

1 - Transfer Length.

This parameter specifies the number of consecutive LBAs to written.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: If the LBA (Parameter 0) was entered and the Transfer Length (Parameter 1) was not entered, then only the specified LBA will be written.

If both the LBA (Parameter 0) and Transfer Length (Parameter 1) are not entered, then the Transfer Length will be set based on the Test Space that is selected. If the Random Transfer Length option is selected, a random value will be used that is less than or equal to the number of LBAs remaining in the Test Space. If the Random Transfer Length option is not selected, the number of LBAs remaining on the track containing the current Target LBA will be written.

If a Transfer Length is entered, it will be limited to the number of LBAs remaining in the Test Space.

2 - not used.

In the ST-10 code, entering this parameter enables a 512-byte block to be written even if it is marked as alternated or pending. This feature was added as part of the support for block sizes greater than 512-bytes. This feature is not currently supported by the platform architecture.

Type: None

Range: None

Default: None

3 - Options.

This parameter is a bit-significant value that allows the user to select the following options.

Bits 15-6: not used.

Bit 5: Write System Area LBAs.

If this bit is set, then parameter 0 specifies a System Area LBA, else parameter 0 specifies a User Area LBA.

Bit 4: Write All Test Space LBAs.

If this bit is set, all of the LBAs in the Test Space will be written, else only the LBAs specified by Parameters 0 and 1 will be written.

Bits 3-2: not used.

Bit 1: Enable Dynamic Sparing.

If this bit is set, sectors containing media defects that meet the failure criteria will be spared.

Bit 0: Continue On Error.

If this bit is set and an error occurs, the write operation will continue and attempt to write all of the requested LBA. Each error encountered will be displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Write User Area LBAs,
Write the requested sectors,
Disable Dynamic Sparing,
Stop On Error)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Next User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

or

"Next System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is the Disk Logical Block Address of the sector in error

ffffff is the Logical Cylinder Address of the sector in error

g is the Logical Head Address of the sector in error

hhhh is the Logical Sector Address of the sector in error

iiiiii is the Physical Cylinder Address of the sector in error

j is the Logical Head Address of the sector in error

kkkk is the Physical Sector Address of the sector in error

llllllll is the number of sectors remaining to be read or written

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed

Bit 1: Enable the Next Address to be displayed
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed
Bit 4: Enables the Recovery Status to be displayed
Bit 5: Enables the Fault Status to be displayed
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 1 is set, the Next Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed as follows.

"Target User LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

or

"Target System LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

where

pppppppp is the starting Disk Logical Block Address

qqqqqq is the starting Logical Cylinder Address

r is the starting Logical Head Address

ssss is the starting Logical Sector Address

tttttt is the starting Physical Cylinder Address

u is the starting Logical Head Address

vvvv is the starting Physical Sector Address

wwwwwwww is the starting Transfer Length

If Bit 4 is set, the Recovery Status will be displayed as follows.

"Recovered User LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

or

"Recovered System LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"

"Recovery Flags HHHH Count II"

where

AAAAAAAA is the Disk Logical Block Address of the last recovered sector

BBBBBB is the Logical Cylinder Address of the last recovered sector

C is the Logical Head Address of the last recovered sector

DDDD is the Logical Sector Address of the last recovered sector

EEEEEE is the Physical Cylinder Address of the last recovered sector

F is the Logical Head Address of the last recovered sector

GGGG is the Physical Sector Address of the last recovered sector

HHHH are the Recovery Flags reported by the Read/Write code

II is the Recovery Count reported by the Read/Write code

If Bit 5 is set, the Fault Status will be displayed as follows.

"Drive Fault Status JJJJ Preamp Fault Status KKKK"

where

JJJJ is the Drive Fault Status reported by the Read/Write code

KKKK is the Preamp Fault Status reported by the Read/Write code

If Bit 6 is set, the Elapsed Time for the read/write operation will be displayed.

"Elapsed Time a mins b secs" or
"Elapsed Time b.c secs" or
"Elapsed Time c.d msecs"

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

Examples:

Example #1:
To write a single LBA
(in this case LBA 51237)

F3 A>W51237

Example #2:
To write multiple LBAs
(in this case LBAs 51237 to 51247)

F3 A>W51237,11

Example #3:
To write all of the LBAs remaining on the track containing the target LBA

(in this case all LBAs remaining on the cylinder that contains LBA 51237)

```
F3 A>S51237
F3 A>W
```

Example #4:
To write all of the LBAs remaining on the track containing the target LBA and continue on error
(in this case all LBAs remaining on the cylinder that contains LBA 51237)

Note: An error message will be displayed for each LBA in error.

```
F3 A>S51237
F3 A>W,,,1
```

Example #5:
To write all of the LBAs in the test space and continue on error

Note: The Test Space is selected by the all level 'A' command. An error message will be displayed for each LBA in error.

```
F3 A>W,,,11
```

Example #6:
To write a single system LBA
(in this case system LBA 1237)

```
F3 A>W1237,,,20
```

Example #7:
To write multiple system LBAs
(in this case system LBAs 1237 to 1247)

```
F3 A>W1237,11,,20
```

Example #8:
To write all of the LBAs remaining on the track containing the target system LBA
(in this case all LBAs remaining on the cylinder that contains LBA 1237)

```
F3 A>S1237,,,,,1
F3 A>W,,,20
```

Revision History:

0001.0000	Initial revision.
0001.0001	Eliminated the Enable ZAP Updates and Enable Track Skipping option.
0001.0002	Modified to write only the LBAs remaining on the track containing the target LBA, if the LBA and Transfer Length are not entered by the user.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Write Long CHS or Write System CHS (Level 2 'w')

Description:
This command performs either a write long of the specified sectors or a System Area write starting at the specified sector on the target track for the specified number of sectors. For a write long operation, the data and ECC bytes will be written from the **Diagnostic Read Buffer**. For a System Area write, the data will be written from the Diagnostic Write Buffer.

Quick Help:

"WrLongOrSystemChs, w[LongSec],[LongSecsOrSysSec],[SysSecs],[LongPhySecOpt],,[SysOpts]";

Input Parameters:

0 - Write Long Starting Logical or Physical Sector Address.

If this parameter is entered, a Write Long operation will be performed starting at the sector address specified by this parameter. If any value is entered for Parameter 3, this parameter contains a physical sector address, else it contains a User Area logical sector address.

If this parameter is not entered, a System Area Write operation will be performed.

Type: Unsigned 16-bit value

Range: 0 to maximum logical or physical sector address on the target track

Default: none

1 - Write Long Transfer Length / System Area Write Starting Logical Sector Address.

If Parameter 0 is entered, this parameter is the number of consecutive sectors to write long.

If Parameter 0 is not entered, then this parameter contains the address of the first logical sector to be write on the System Area target track.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: For a Write Long operation, the default Transfer Length is 1.

For a System Area Write operation, the default starting Logical Sector Address is 0.

2 - System Area Write Transfer Length.

If Parameter 0 is entered, this parameter is not used.

If Parameter 0 is not entered, this parameter is the number of consecutive System Area sectors to write.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: If the System Area Logical Sector Address was entered and the Transfer Length was not entered, then only the specified sector will be written.

If both the System Area Logical Sector Address and Transfer Length are not entered, then the Transfer Length will be set based on the Test Space that is selected. If the Random Transfer Length option is selected, a random value will be used that is less than or equal to the number of sectors remaining on the track. If the Random Transfer Length option is not selected, the number of sectors remaining on the track will be written.

If a Transfer Length is entered, it will be limited to the number of sectors remaining on the track.

3 - Write Long Physical Sector Address Flag.

If Parameter 0 is entered and any value is entered for this parameter, then Parameter 0 specifies a physical sector address. If Parameter 0 is entered and this parameter is not entered, then Parameter 0 specifies a User Area logical sector address.

If Parameter 0 is not entered, then this parameter is not used.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

4 - not used.

Type: None

Range: None

Default: None

5 - System Area Write Options.

If Parameter 0 is entered, this parameter is not used.

If Parameter 0 is not entered, this parameter is a bit-significant value that allows the user to select the following options for a System Area Write operation.

Bits 15-5: not used.

Bit 4: Write All Test Space Sectors.

If this bit is set, all of the System Area Sectors in the Test Space will be written, else only the System Area Sectors specified by Parameters 1 and 2 will be written.

Bit 3: not used.

Bit 2: Rotate Buffer Sector Offset.

If this bit is set, the Target Buffer Sector Offset will be rotated by 1 prior to the execution of this diagnostic command.
This bit was originally added to help writing random data pattern reduce execution time by not having to re-fill the diagnostic buffer with new random data pattern, which takes great amount of time, but just rotating the Target Buffer Sector Offset at every time this diagnostic command is executed with this option set.
To see or change the current Targer Buffer Sector Offset, please refer all Level 'A', Set Test Space, diagnostic command for detail how-to.

Bit 1: Enable Dynamic Sparing.

If this bit is set, sectors containing media defects that meet the failure criteria will be spared.

Bit 0: Continue On Error.

If this bit is set and an error occurs, the write operation will continue and attempt to write all of the requested sectors. Each error encountered will be displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Write the requested sectors,
Disable Dynamic Sparing,
Stop On Error)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Next User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

or

"Next System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is the Disk Logical Block Address of the sector in error

ffffff is the Logical Cylinder Address of the sector in error

g is the Logical Head Address of the sector in error

hhhh is the Logical Sector Address of the sector in error

iiiiii is the Physical Cylinder Address of the sector in error

j is the Logical Head Address of the sector in error

kkkk is the Physical Sector Address of the sector in error

llllllll is the number of sectors remaining to be read or written

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: Enable the Next Address to be displayed
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed

Bit 4: Enables the Recovery Status to be displayed
Bit 5: Enables the Fault Status to be displayed
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 1 is set, the Next Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed as follows.

"Target User LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

or

"Target System LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

where

pppppppp is the starting Disk Logical Block Address

qqqqqq is the starting Logical Cylinder Address

r is the starting Logical Head Address

ssss is the starting Logical Sector Address

tttttt is the starting Physical Cylinder Address

u is the starting Logical Head Address

vvvv is the starting Physical Sector Address

wwwwwwww is the starting Transfer Length

If Bit 4 is set, the Recovery Status will be displayed as follows.

"Recovered User LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

or

"Recovered System LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

where

AAAAAAAA is the Disk Logical Block Address of the last recovered sector

BBBBBB is the Logical Cylinder Address of the last recovered sector

C is the Logical Head Address of the last recovered sector

DDDD is the Logical Sector Address of the last recovered sector

EEEEEE is the Physical Cylinder Address of the last recovered sector

F is the Logical Head Address of the last recovered sector

GGGG is the Physical Sector Address of the last recovered sector

HHHH are the Recovery Flags reported by the Read/Write code

II is the Recovery Count reported by the Read/Write code

If Bit 5 is set, the Fault Status will be displayed as follows.

"Drive Fault Status JJJJ Preamp Fault Status KKKK"

where

JJJJ is the Drive Fault Status reported by the Read/Write code

KKKK is the Preamp Fault Status reported by the Read/Write code

If Bit 6 is set, the Elapsed Time for the read/write operation will be displayed.

```
"Elapsed Time a mins b secs"  or
"Elapsed Time b.c secs"       or
"Elapsed Time c.d msecs"
```

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

Examples:

Example #1:

To write a single logical system sector
(in this case logical sector 23 on logical system cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1,,,,1
F3 2>w,23
```

Example #2:

To write multiple logical system sectors
(in this case logical sectors 23 to 26 on logical system cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1,,,,1
F3 2>w,23,4
```

Example #3:

To write all of the logical system sectors on a track
(in this case all logical sectors on logical system cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1,,,,1
F3 2>w
```

Example #4:
To write all of the logical system sectors on multiple tracks
(in this case all logical sectors on logical system cylinders 45 to 49 head 0)

Note: You must seek to the track before the first one to be written.

```
F3 2>A3
F3 2>S44,0,,,,1
F3 2>L,5
F3 2>w
```

Example #5:
To write all of the logical system sectors on a track and continue on error
(in this case all logical sectors on logical cylinder 45 head 0)

Note: An error message will be displayed for each sector in error.

```
F3 2>A0
F3 2>S45,0,,,,1
F3 2>w,,,,,1
```

Example #6:
To write all of the logical system sectors in the test space and continue on error

Note: The Test Space is selected by the all level 'A' command. An error message will be displayed for each sector in error.

```
F3 2>w,,,,,11
```

Example #7:
To write long a single logical sector
(in this case logical sector 32 on logical cylinder 54 head 0)

```
F3 2>A0
F3 2>S54,0
F3 2>w32
```

Example #8:
To write long multiple logical sectors
(in this case logical sectors 32 to 33 on logical cylinder 54 head 0)

```
F3 2>A0
F3 2>S54,0
F3 2>w32,2
```

Example #9:
To write long a single physical sector
(in this case physical sector 32 on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>w32,,,1
```

Example #10:
To write long multiple physical sectors
(in this case physical sectors 32 to 33 on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>w32,2,,1
```

Example #11:
To write a single logical system sector with data at a specific sector offset in the diagnostic write buffer
(in this case logical sector 23 on logical system cylinder 45 head 1,
with data at the sector offset of 5 in the diagnostic write buffer)

```
F3 2>A0
F3 2>AF,5
F3 2>S45,1,,,,1
F3 2>w,23
```

Example #12:
To rotate the buffer sector offset by 1 and write a single logical system sector with data at the rotated sector offset in the diagnostic write buffer
(This example assumes user ran the Example #11 above right before this example,
in this case logical sector 24 on logical system cylinder 45 head 1,
with data at the sector offset of 6 in the diagnostic write buffer)

```
F3 2>w,24,,,,4
```

Revision History:

0001.0000	Initial revision.
0001.0001	Eliminated the Enable ZAP Updates and Enable Track Skipping option.
0001.0002	Added new Rotate Buffer Sector Offset option to the bit 2 of the parameter 5.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Write Peripheral Register - channel or preamp (Level 7 's' and Level F 't')

Description:

This command writes the specified value to the specified register in the specified peripheral device.

Quick Help:

Level 7
"WrPeripheralReg, s[OpType],[RegAddr],[RegValue],[RegMask],[RegPagAddr]";
Level F
"WrPeripheralReg, t[OpType],[RegAddr],[RegValue],[RegMask],[RegPagAddr]";

Input Parameters:

0 - Operation Type.

This parameter selects the type of peripheral device operation to be performed.

0 = Write Preamp Register
1 = Write Read Channel Register

2 = Lock Preamp Registers
3 = Unlock Preamp Registers
4 = Toggle Preamp Register Lock

5 = Lock Read Channel Registers
6 = Unlock Read Channel Registers
7 = Toggle Read Channel Register Lock

Type: Unsigned 8-bit value

Range: 0 to 7

Default: 1 (Write Read Channel Register)

1 - Register Address Offset.

This parameter specifies the address offset of the peripheral register to be written. If the peripheral registers has the page address mode, this parameter specifies the address offset in the page, which has been specified by the parameter 1, Register Page Address. Otherwise, it simply specifies the register address offset in the whole range of the register address.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

2 - Register Value.

This parameter specifies the value with which the specified register is to be written.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0

3 - Register Mask.

This parameter specifies the bit mask with which the specified value is to be written into the register.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0xFFFF

4 - Register Page Address.

This parameter specifies the page address of the peripheral register to be written. If the peripheral registers do not have page address in its address mode, this input parameter is not needed and its defaul value does not affect the write operation to the peripheral register.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If the Read Channel was locked, the following message will be displayed.

"Channel Locked"

If the Read Channel was unlocked, the following message will be displayed.

"Channel Unlocked"

If no error occurred and the Preamp was locked, the following message will be displayed.

"Preamp Locked"

If no error occurred and the Preamp was unlocked, the following message will be displayed.

"Preamp Unlocked"

If a Preamp register was written, the following information will be displayed.

"Preamp Reg cc = dd"

where

cc is the address of the register that was written

dd is the data with which the register was written

If a Read Channel register was written, the following information will be displayed.

"Read Channel Reg cccc = dddd"

where

cccc is the address of the register that was written

dddd is the data with which the register was written

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Write, Read, Read CHS (Levels 2, 7 'Q')

Description:

This command performs a disk write, read, read operation starting at the specified sector on the target track for the specified number of sectors. The sectors are written with the data contained in the Diagnostic Write Buffer and they are read into the Diagnostic Read Buffer.

Quick Help:

"WrRdRdChs, Q[Sec],[NumSecs],,[PhyOpt],[Opts]";

Input Parameters:

0 - Logical or Physical Sector Address.

If any value is entered for Parameter 3, this parameter contains the physical sector address of the first sector to write and read else this parameter contains the User Area logical sector address of the first sector to write and read.

Type: Unsigned 16-bit value

Range: 0 to maximum logical or physical sector address on the target track

Default: 0

1 - Transfer Length.

This parameter specifies the number of consecutive sectors to write and read.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: If the Sector Address was entered and the Transfer Length was not entered, then only the specified sector will be written and read.

If both the Sector Address and Transfer Length are not entered, then the Transfer Length will be set based on the Test Space that is selected. If the Random Transfer Length option is selected, a random value will be used that is less than or equal to the number of sectors remaining on the track. If the Random Transfer Length option is not selected, the number of sectors remaining on the track will be written and read.

If a Transfer Length is entered, it will be limited to the number of sectors remaining on the track.

2 - not used.

Type: None

Range: None

Default: None

3 - Physical Sector Address Flag.

If any value is entered for this parameter, then Parameter 0 specifies a physical sector address, else Parameter 0 specifies a User Area logical sector address.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

4 - Options.

This parameter is a bit-significant value that allows the user to select the following options.

Bits 15-5: not used.

Bit 4: Write and Read All Test Space Sectors.

If this bit is set, all of the sectors in the Test Space will be written and read, else only the sectors specified by Parameters 0 and 1 will be written and read.

Bit 3: not used.

Bit 2: Rotate Buffer Sector Offset.

If this bit is set, the Target Buffer Sector Offset will be rotated by 1 prior to the execution of this diagnostic command.
This bit was originally added to help writing random data pattern reduce execution time by not having to re-fill the diagnostic buffer with new random data pattern, which takes great amount of time, but just rotating the Target Buffer Sector Offset at every time this diagnostic command is executed with this option set.
To see or change the current Targer Buffer Sector Offset, please refer all Level 'A', Set Test Space, diagnostic command for detail how-to.

Bit 1: Enable Dynamic Sparing.

If this bit is set, sectors containing media defects that meet the failure criteria will be spared.

Bit 0: Continue On Error.

If this bit is set and an error occurs, the write and read operations will continue and attempt to write and read all of the requested sectors. Each error encountered will be displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Write and Read the requested sectors,
Stop On Error)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Next User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

or

"Next System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is the Disk Logical Block Address of the sector in error

ffffff is the Logical Cylinder Address of the sector in error

g is the Logical Head Address of the sector in error

hhhh is the Logical Sector Address of the sector in error

iiiiii is the Physical Cylinder Address of the sector in error

j is the Logical Head Address of the sector in error

kkkk is the Physical Sector Address of the sector in error

llllllll is the number of sectors remaining to be read or written

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: Enable the Next Address to be displayed
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed
Bit 4: Enables the Recovery Status to be displayed
Bit 5: Enables the Fault Status to be displayed
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 1 is set, the Next Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed as follows.

"Target User LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

or

"Target System LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

where

pppppppp is the starting Disk Logical Block Address

qqqqqq is the starting Logical Cylinder Address

r is the starting Logical Head Address

ssss is the starting Logical Sector Address

tttttt is the starting Physical Cylinder Address

u is the starting Logical Head Address

vvvv is the starting Physical Sector Address

wwwwwwww is the starting Transfer Length

If Bit 4 is set, the Recovery Status will be displayed as follows.

"Recovered User LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

or

"Recovered System LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

where

AAAAAAAA is the Disk Logical Block Address of the last recovered sector

BBBBBB is the Logical Cylinder Address of the last recovered sector

C is the Logical Head Address of the last recovered sector

DDDD is the Logical Sector Address of the last recovered sector

EEEEEE is the Physical Cylinder Address of the last recovered sector

F is the Logical Head Address of the last recovered sector

GGGG is the Physical Sector Address of the last recovered sector

HHHH are the Recovery Flags reported by the Read/Write code

II is the Recovery Count reported by the Read/Write code

If Bit 5 is set, the Fault Status will be displayed as follows.

"Drive Fault Status JJJJ Preamp Fault Status KKKK"

where

JJJJ is the Drive Fault Status reported by the Read/Write code

KKKK is the Preamp Fault Status reported by the Read/Write code

If Bit 6 is set, the Elapsed Time for the read/write operation will be displayed.

```
"Elapsed Time a mins b secs"  or
"Elapsed Time b.c secs"       or
"Elapsed Time c.d msecs"
```

where

```
a is minutes
b is seconds
c is milliseconds
d is microseconds
```

Examples:

Example #1:
To write and read a single logical sector
(in this case logical sector 23 on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>Q23
```

Example #2:
To write and read multiple logical sectors
(in this case logical sectors 23 to 26 on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>Q23,4
```

Example #3:
To write and read all of the logical sectors on a track
(in this case all logical sectors on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>Q
```

Example #4:
To write and read all of the logical sectors on multiple tracks
(in this case all logical sectors on logical cylinders 45 to 49 head 0)

Note: You must seek to the track before the first one to be written and read.

```
F3 2>A3
F3 2>S44,0
F3 2>L,5
F3 2>Q
```

Example #5:
To write and read all of the logical sectors on a track and continue on error
(in this case all logical sectors on logical cylinder 45 head 0)

Note: An error message will be displayed for each sector in error.

```
F3 2>A0
```

```
F3 2>S45,0
F3 2>Q,,,,1
```

Example #6:
To write and read all of the logical sectors in the test space and continue on error

Note: The Test Space is selected by the all level 'A' command. An error message will be displayed for each sector in error.

```
F3 2>Q,,,,11
```

Example #7:
To write and read a single physical sector
(in this case physical sector 32 on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>Q32,,,1
```

Example #8:
To write and read multiple physical sectors
(in this case physical sectors 32 to 35 on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>Q32,4,,1
```

Example #9:
To write and read all of the physical sectors on a track
(in this case all physical sectors on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>Q,,,1
```

Example #10:
To write a single logical sector with data at a specific sector offset in the diagnostic write buffer and read it to the sector offset in the diagnostic read buffer
(in this case logical sector 23 on logical cylinder 45 head 1,
write with data at the sector offset of 5 in the diagnostic write buffer,
read to the sector offset of 5 in the diagnostic read buffer)

```
F3 2>A0
F3 2>AF,5
F3 2>S45,1
F3 2>Q23
```

Example #11:
To rotate the buffer sector offset by 1, write a single logical sector with data at the rotated sector offset in the diagnostic write buffer, then read it to the rotated sector offset in the diagnostic read buffer
(This example assumes user ran the Example #10 above right before this example,
in this case logical sector 24 on logical cylinder 45 head 1,
write with data at the sector offset of 6 in the diagnostic write buffer,
read to the sector offset of 6 in the diagnostic read buffer)

```
F3 2>Q24,,,,4
```

Revision History:

0001.0000 Initial revision.
0001.0001 Eliminated the Enable ZAP Updates and Enable Track Skipping option.
0001.0002 Moved the Enable Dynamic Sparing option from the parameter 2 to the bit 1 of

	the parameter 4. Added new Rotate Buffer Sector Offset option to the bit 2 of the parameter 4.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Write, Read, Read LBA (Level A 'Q')

Description:

This command performs a write, read, read operation starting at the specified LBA (Logical Block Address) for the specified number of LBAs. The LBAs are written with the data contained in the Diagnostic Write Buffer and they are read into the Diagnostic Read Buffer.

Quick Help:

"WrRdRdLba, Q[Lba],[NumLbas],[Opts]";

Input Parameters:

0 - LBA.

If Parameter 2 bit 5 is set, then this parameter specifies the address of the first System Area LBA to be written and read, else it specifies the address of the first User Area LBA to be written and read.

Type: Unsigned 32-bit value

Range: 0 to maximum User Area LBA, if parameter 2 bit 5 is cleared
0 to maximum System Area LBA, if parameter 2 bit 5 is set

Default: Current Target Address

1 - Transfer Length.

This parameter specifies the number of consecutive LBAs to written.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: If the LBA (Parameter 0) was entered and the Transfer Length (Parameter 1) was not entered, then only the specified LBA will be written and read.

If both the LBA (Parameter 0) and Transfer Length (Parameter 1) are not entered, then the Transfer Length will be set based on the Test Space that is selected. If the Random Transfer Length option is selected, a random value will be used that is less than or equal to the number of LBAs remaining in the Test Space. If the Random Transfer Length option is not selected, the number of LBAs remaining on the track containing the current Target LBA will be written and read.

If a Transfer Length is entered, it will be limited to the number of LBAs remaining in the Test Space.

2 - Options.

This parameter is a bit-significant value that allows the user to select the following options.

Bits 15-6: not used.

Bit 5: Write and Read System Area LBAs.

If this bit is set, then Parameter 0 specifies a System Area LBA, else Parameter 0 specifies a User Area LBA.

Bit 4: Write and Read All Test Space LBAs.

If this bit is set, all of the LBAs in the Test Space will be written and read, else only the LBAs specified by Parameters 0 and 1 will be written and read.

Bit 3: not used.

Bit 2: Rotate Buffer Sector Offset.

If this bit is set, the Target Buffer Sector Offset will be rotated by 1 prior to the execution of this diagnostic command.
This bit was originally added to help writing random data pattern reduce execution time by not having to re-fill the diagnostic buffer with new random data pattern, which takes great amount of time, but just rotating the Target Buffer Sector Offset at every time this diagnostic command is executed with this option set.
To see or change the current Targer Buffer Sector Offset, please refer all Level 'A', Set Test Space, diagnostic command for detail how-to.

Bit 1: Enable Dynamic Sparing.

If this bit is set, sectors containing media defects that meet the failure criteria will be spared.

Bit 0: Continue On Error.

If this bit is set and an error occurs, the write and read operations will continue and attempt to write and read all of the requested sectors. Each error encountered will be displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Write and Read User Area LBAs,
Write and Read the requested LBAs,
Disable Dynamic Sparing,
Stop On Error)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Next User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

or

"Next System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is the Disk Logical Block Address of the sector in error

ffffff is the Logical Cylinder Address of the sector in error

g is the Logical Head Address of the sector in error

hhhh is the Logical Sector Address of the sector in error

iiiiii is the Physical Cylinder Address of the sector in error

j is the Logical Head Address of the sector in error

kkkk is the Physical Sector Address of the sector in error

llllllll is the number of sectors remaining to be read or written

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: Enable the Next Address to be displayed
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed
Bit 4: Enables the Recovery Status to be displayed
Bit 5: Enables the Fault Status to be displayed
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 1 is set, the Next Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed as follows.

"Target User LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

or

"Target System LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

where

pppppppp is the starting Disk Logical Block Address

qqqqqq is the starting Logical Cylinder Address

r is the starting Logical Head Address

ssss is the starting Logical Sector Address

tttttt is the starting Physical Cylinder Address

u is the starting Logical Head Address

vvvv is the starting Physical Sector Address

wwwwwwww is the starting Transfer Length

If Bit 4 is set, the Recovery Status will be displayed as follows.

"Recovered User LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

or

"Recovered System LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

where

AAAAAAAA is the Disk Logical Block Address of the last recovered sector

BBBBBB is the Logical Cylinder Address of the last recovered sector

C is the Logical Head Address of the last recovered sector

DDDD is the Logical Sector Address of the last recovered sector

EEEEEE is the Physical Cylinder Address of the last recovered sector

F is the Logical Head Address of the last recovered sector

GGGG is the Physical Sector Address of the last recovered sector

HHHH are the Recovery Flags reported by the Read/Write code

II is the Recovery Count reported by the Read/Write code

If Bit 5 is set, the Fault Status will be displayed as follows.

"Drive Fault Status JJJJ Preamp Fault Status KKKK"

where

JJJJ is the Drive Fault Status reported by the Read/Write code

KKKK is the Preamp Fault Status reported by the Read/Write code

If Bit 6 is set, the Elapsed Time for the read/write operation will be displayed.

"Elapsed Time a mins b secs" or
"Elapsed Time b.c secs" or
"Elapsed Time c.d msecs"

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

Examples:

Example #1:
To write and read a single LBA
(in this case LBA 51237)

```
F3 A>Q51237
```

Example #2:
To write and read multiple LBAs
(in this case LBAs 51237 to 51247)

```
F3 A>Q51237,11
```

Example #3:
To write and read all of the LBAs remaining on the track containing the target LBA
(in this case all LBAs remaining on the cylinder that contains LBA 51237)

```
F3 A>S51237
F3 A>Q
```

Example #4:
To write and read all of the LBAs remaining on the track containing the target LBA and continue on error
(in this case all LBAs remaining on the cylinder that contains LBA 51237)

Note: An error message will be displayed for each LBA in error.

```
F3 A>S51237
F3 A>Q,,1
```

Example #5:
To write and read all of the LBAs in the test space and continue on error

Note: The Test Space is selected by the all level 'A' command. An error message will be displayed for each LBA in error.

```
F3 A>Q,,11
```

Example #6:
To write and read a single system LBA
(in this case system LBA 1237)

```
F3 A>Q1237,,20
```

Example #7:
To write and read multiple system LBAs
(in this case system LBAs 1237 to 1247)

```
F3 A>Q1237,11,20
```

Example #8:
To write and read all of the LBAs remaining on the track containing the target system LBA
(in this case all LBAs remaining on the cylinder that contains LBA 1237)

```
F3 A>S1237,,,,,1
F3 A>Q,,20
```

Example #9:
To write a single LBA with data at a specific sector offset in the diagnostic write buffer and read it to the sector offset in the diagnostic read buffer
(in this case LBA 51237,
write with data at the sector offset of 5 in the diagnostic write buffer,
read to the sector offset of 5 in the diagnostic read buffer)

```
F3 A>AF,5
F3 A>Q51237
```

Example #10:
To rotate the buffer sector offset by 1, write a single LBA with data at the rotated sector offset in the diagnostic write buffer, then read it to the rotated sector offset in the diagnostic read buffer
(This example assumes user ran the Example #9 above right before this example,
in this case LBA 51238,
write with data at the sector offset of 6 in the diagnostic write buffer,
read to the sector offset of 6 in the diagnostic read buffer)

```
F3 A>Q51238,,4
```

Revision History:

0001.0000	Initial revision.
0001.0001	Eliminated the Enable ZAP Updates and Enable Track Skipping option.
0001.0002	Modified to write and read only the LBAs remaining on the track containing the target LBA, if the LBA and Transfer Length are not entered by the user.
0001.0003	Added new Rotate Buffer Sector Offset option to the bit 2 of the parameter 2.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Write, Read, Write, Read CHS (Level 3 'Q')

Description:
This command performs a write, read, write, read operation starting at the specified sector on the target track for the specified number of sectors. The sectors are written with the data contained in the Diagnostic Write Buffer and they are read into the Diagnostic Read Buffer.

Quick Help:

"WrRdWrRdChs, Q[Sec],[NumSecs],[Opts]";

Input Parameters:

0 - Logical or Physical Sector Address.

If Parameter 2 bit 5 is set, this parameter contains the physical sector address of the first sector to write and read else this parameter contains the User Area logical sector address of the first sector to write and read.

Type: Unsigned 16-bit value

Range: 0 to maximum logical or physical sector address on the target track

Default: 0

1 - Transfer Length.

This parameter specifies the number of consecutive sectors to write and read.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: If the Sector Address was entered and the Transfer Length was not entered, then only the specified sector will be written and read.

If both the Sector Address and Transfer Length are not entered, then the Transfer Length will be set based on the Test Space that is selected. If the Random Transfer Length option is selected, a random value will be used that is less than or equal to the number of sectors remaining on the track. If the Random Transfer Length option is not selected, the number of sectors remaining on the track will be written and read.

If a Transfer Length is entered, it will be limited to the number of sectors remaining on the track.

2 - Options.

This parameter is a bit-significant value that allows the user to select the following options.

Bits 15-6: not used.

Bit 5: Write and Read Physical Sectors.

If this bit is set, then Parameter 0 specifies a physical sector address, else Parameter 0 specifies a User Area logical sector address.

Bit 4: Write and Read All Test Space Sectors.

If this bit is set, all of the sectors in the Test Space will be written and read, else only the sectors specified by Parameters 0 and 1 will be written and read.

Bit 3: not used.

Bit 2: Rotate Buffer Sector Offset.

If this bit is set, the Target Buffer Sector Offset will be rotated by 1 prior to the execution of this diagnostic command.
This bit was originally added to help writing random data pattern reduce execution time by not having to re-fill the diagnostic buffer with new random data pattern, which takes great amount of time, but just rotating the Target Buffer Sector Offset at every time this

diagnostic command is executed with this option set.
To see or change the current Targer Buffer Sector Offset, please refer all Level 'A', Set Test Space, diagnostic command for detail how-to.

Bit 1: Enable Dynamic Sparing.

If this bit is set, sectors containing media defects that meet the failure criteria will be spared.

Bit 0: Continue On Error.

If this bit is set and an error occurs, the write and read operations will continue and attempt to write and read all of the requested sectors. Each error encountered will be displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Write and Read Logical sectors,
Write the requested sectors,
Disable Dynamic Sparing,
Stop On Error)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Next User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

or

"Next System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is the Disk Logical Block Address of the sector in error

ffffff is the Logical Cylinder Address of the sector in error

g is the Logical Head Address of the sector in error

hhhh is the Logical Sector Address of the sector in error iiiiii is the Physical Cylinder Address of the sector in error

j is the Logical Head Address of the sector in error

kkkk is the Physical Sector Address of the sector in error

llllllll is the number of sectors remaining to be read or written

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0:	Enables the R/W Status and R/W Error to be displayed
Bit 1:	Enable the Next Address to be displayed
Bit 2:	Enables the Track Position and Track Follow Offset to be displayed
Bit 3:	Enables the Target Address to be displayed
Bit 4:	Enables the Recovery Status to be displayed
Bit 5:	Enables the Fault Status to be displayed
Bit 6:	Enables the Elapsed Time to be displayed
Bits 31-7:	NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 1 is set, the Next Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed as follows.

"Target User LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

or

"Target System LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

where

pppppppp is the starting Disk Logical Block Address

qqqqqq is the starting Logical Cylinder Address

r is the starting Logical Head Address

ssss is the starting Logical Sector Address

tttttt is the starting Physical Cylinder Address

u is the starting Logical Head Address

vvvv is the starting Physical Sector Address

wwwwwwww is the starting Transfer Length

If Bit 4 is set, the Recovery Status will be displayed as follows.

"Recovered User LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

or

"Recovered System LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

where

AAAAAAAA is the Disk Logical Block Address of the last recovered sector

BBBBBB is the Logical Cylinder Address of the last recovered sector

C is the Logical Head Address of the last recovered sector

DDDD is the Logical Sector Address of the last recovered sector

EEEEEE is the Physical Cylinder Address of the last recovered sector

F is the Logical Head Address of the last recovered sector

GGGG is the Physical Sector Address of the last recovered sector

HHHH are the Recovery Flags reported by the Read/Write code

II is the Recovery Count reported by the Read/Write code

If Bit 5 is set, the Fault Status will be displayed as follows.

"Drive Fault Status JJJJ Preamp Fault Status KKKK"

where

JJJJ is the Drive Fault Status reported by the Read/Write code

KKKK is the Preamp Fault Status reported by the Read/Write code

If Bit 6 is set, the Elapsed Time for the read/write operation will be displayed.

"Elapsed Time a mins b secs" or
"Elapsed Time b.c secs" or
"Elapsed Time c.d msecs"

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

Examples:

Example #1:

To write, read, write, read a single logical sector

(in this case logical sector 23 on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>/3
F3 3>Q23
```

Example #2:
To write, read, write, read multiple logical sectors
(in this case logical sectors 23 to 26 on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>/3
F3 3>Q23,4
```

Example #3:
To write, read, write, read all of the logical sectors on a track
(in this case all logical sectors on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>/3
F3 3>Q
```

Example #4:
To write, read, write, read all of the logical sectors on multiple tracks
(in this case all logical sectors on logical cylinders 45 to 49 head 0)

Note: You must seek to the track before the first one to be written and read.

```
F3 2>A3
F3 2>S44,0
F3 2>/3
F3 3>L,5
F3 3>Q
```

Example #5:
To write, read, write, read all of the logical sectors on a track and continue on error (in this case all logical sectors on logical cylinder 45 head 0)

Note: An error message will be displayed for each sector in error.

```
F3 2>A0
F3 2>S45,0
F3 2>/3
F3 3>Q,,,1
```

Example #6:
To write, read, write, read all of the logical sectors in the test space and continue on error

Note: The Test Space is selected by the all level 'A' command. An error message will be displayed for each sector in error.

```
F3 3>Q,,,11
```

Example #7:
To write, read, write, read a single physical sector
(in this case physical sector 32 on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
```

```
F3 2>/3
F3 3>Q32,,,1
```

Example #8:
To write, read, write, read multiple physical sectors
(in this case physical sectors 32 to 35 on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>/3
F3 3>Q32,4,,1
```

Example #9:
To write, read, write, read all of the physical sectors on a track
(in this case all physical sectors on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>/3
F3 3>Q,,,1
```

Example #10:
To write a single logical sector with data at a specific sector offset in the diagnostic write buffer, read it to the specific sector offset in the diagnostic read buffer, then repeat the write and read one more time.
(in this case logical sector 23 on logical cylinder 45 head 1,
write with data at the sector offset of 5 in the diagnostic write buffer,
read to the sector offset of 5 in the diagnostic read buffer,
write with data at the sector offset of 5 in the diagnostic write buffer,
read to the sector offset of 5 in the diagnostic read buffer)

```
F3 2>A0
F3 2>AF,5
F3 2>S45,1
F3 2>/3
F3 3>Q23
```

Example #11:
To rotate the buffer sector offset by 1 and write a single logical sector with data at the rotated sector offset in the diagnostic write buffer, read it to the rotated sector offset in the diagnostic read buffer, then repeat the write and read one more time
(This example assumes user ran the Example #10 above right before this example,
in this case logical sector 24 on logical cylinder 45 head 1,
write with data at the sector offset of 6 in the diagnostic write buffer,
read to the sector offset of 6 in the diagnostic read buffer,
write with data at the sector offset of 6 in the diagnostic write buffer,
read to the sector offset of 6 in the diagnostic read buffer)

```
F3 3>Q24,,4
```

Revision History:

0001.0000	Initial revision.
0001.0001	Eliminated the Enable ZAP Updates and Enable Track Skipping option.
0001.0002	Added new Rotate Buffer Sector Offset option to the bit 2 of the parameter 2.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Write Servo RAM at Address (Level 5 'W')

Description:

The Write Servo RAM at Address command writes the specified Servo RAM locations with the specified data.

Quick Help:

"WrServoRamAtAddr, W[Addr],[NumBytes],[Data]";

Input Parameters:

0 - Servo RAM Address.

This parameter specifies the address of the first servo RAM byte to be written.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: None

1 - Number of Bytes.

This parameter specifies the number of servo RAM bytes to be written.

Type: Unsigned 8-bit value

Range: 1, 2 and 4 are the allowed values

Default: 2

2 - Servo RAM Data.

This parameter specifies that data with which the specified servo RAM location is to be written.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Write Servo RAM at Index (Level 5 ’w’)

Description:

The Write Servo RAM at Index command writes Servo RAM with the specified data. The base address of the Servo RAM location to be written is retrieved from the Servo Symbol Table at the specified index and an optional byte offset is added to it.

Quick Help:

"WrServoRamAtIndex, w[Index],[NumBytes],[Data],[ByteOffset]";

Input Parameters:

0 - Servo Symbol Table Index.

This parameter specifies the index of the Servo Symbol Table entry that contains the base address of the Servo RAM location to be written.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

1 - Number of Bytes.

This parameter specifies the number of servo RAM bytes to be written.

Type: Unsigned 8-bit value

Range: 1, 2 and 4 are the allowed values

Default: 2

2 - Servo RAM Data.

This parameter specifies that data with which the servo RAM is to be written.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

3 - Byte offset from base address.

This parameter is an optional byte offset which will be added to the address of the servo RAM location to be written.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

Revision History:

0001.0000	Initial revision.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Write Verify CHS (Level 2 '7')

Description:

This command writes data to the disk starting at the specified sector on the target track for the specified number of sectors. The specified sectors are then read and the data is compared to the data that was written. The sectors are written with the data contained in the specified buffer and they are read into the the Diagnostic Read Buffer.

Quick Help:

"WrVerifyChs, 7[Sec],[NumSecs],[WrBufBlk],[Opts]";

Input Parameters:

0 - Logical or Physical Sector Address.

If Parameter 3 bit 5 is set, this parameter contains the physical sector address of the first sector to be written and verified, else this parameter contains the User Area logical sector address of the first sector to be written and verified.

Type: Unsigned 16-bit value

Range: 0 to maximum logical or physical sector address on the target track

Default: 0

1 - Transfer Length.

This parameter specifies the number of consecutive sectors to be written and verified.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: If the Sector Address was entered and the Transfer Length was not entered, then only the specified sector will be written and verified.

If both the Sector Address and Transfer Length are not entered, then the Transfer Length will be set based on the Test Space that is selected.
If the Random Transfer Length option is selected, a random value will be used that is less than or equal to the number of sectors remaining on the track. If the Random Transfer Length option is not selected, the number of sectors remaining on the track will be written and verified.

If a Transfer Length is entered, it will be limited to the number of sectors remaining on the track.

2 - Write Data Buffer Block Number.

This parameter specifies the number of the buffer block that contains the data with which the specified sectors are to be written. The data contained in this buffer block will also be compared to the data that is read.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: If a Write Data Buffer Block Number is not specified, the Diagnostic Write Buffer will be used as the write data source and the read compare reference data.

3 - Options.

This parameter is a bit-significant value that allows the user to select the following options.

Bits 15-6: not used.

Bit 5: Write and Verify Physical Sectors.

If this bit is set, Parameter 0 specifies a physical sector address, else it specifies a User Area logical sector address.

Bit 4: Write and Verify All Test Space Sectors.

If this bit is set, all of the sectors in the Test Space will be written and verified, else only the System Area Sectors specified by Parameters 0 and 1 will be written and verified.

Bit 3: not used.

Bit 2: Rotate Buffer Sector Offset.

If this bit is set, the Target Buffer Sector Offset will be rotated by 1 prior to the execution of this diagnostic command.
This bit was originally added to help writing random data pattern reduce execution time by not having to re-fill the diagnostic buffer with new random data pattern, which takes great amount of time, but just rotating the Target Buffer Sector Offset at every time this diagnostic command is executed with this option set.
To see or change the current Targer Buffer Sector Offset, please refer all Level 'A', Set Test Space, diagnostic command for detail how-to.

Bit 1: Enable Dynamic Sparing.

If this bit is set, sectors containing media defects that meet the failure criteria will be spared.

Bit 0: Continue On Error.

If this bit is set and an error occurs, the write and verify operations will continue and attempt to write and verify all of the requested sectors. Each error encountered will be displayed.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Write and Verify Logical User Area Sectors,
Write and Verify the requested sectors,
Disable Dynamic Sparing,
Stop On Error)

Output Data:

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Next User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

or

"Next System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is the Disk Logical Block Address of the sector in error

ffffff is the Logical Cylinder Address of the sector in error

g is the Logical Head Address of the sector in error

hhhh is the Logical Sector Address of the sector in error

iiiiii is the Physical Cylinder Address of the sector in error

j is the Logical Head Address of the sector in error

kkkk is the Physical Sector Address of the sector in error

llllllll is the number of sectors remaining to be read or written

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: Enable the Next Address to be displayed
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed
Bit 4: Enables the Recovery Status to be displayed
Bit 5: Enables the Fault Status to be displayed

Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 1 is set, the Next Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed as follows.

"Target User LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

or

"Target System LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

where

pppppppp is the starting Disk Logical Block Address

qqqqqq is the starting Logical Cylinder Address

r is the starting Logical Head Address

ssss is the starting Logical Sector Address

tttttt is the starting Physical Cylinder Address

u is the starting Logical Head Address

vvvv is the starting Physical Sector Address

wwwwwwww is the starting Transfer Length

If Bit 4 is set, the Recovery Status will be displayed as follows.

"Recovered User LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

or

"Recovered System LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

where

AAAAAAAA is the Disk Logical Block Address of the last recovered sector

BBBBBB is the Logical Cylinder Address of the last recovered sector

C is the Logical Head Address of the last recovered sector

DDDD is the Logical Sector Address of the last recovered sector

EEEEEE is the Physical Cylinder Address of the last recovered sector

F is the Logical Head Address of the last recovered sector

GGGG is the Physical Sector Address of the last recovered sector

HHHH are the Recovery Flags reported by the Read/Write code

II is the Recovery Count reported by the Read/Write code

If Bit 5 is set, the Fault Status will be displayed as follows.

"Drive Fault Status JJJJ Preamp Fault Status KKKK"

where

JJJJ is the Drive Fault Status reported by the Read/Write code

KKKK is the Preamp Fault Status reported by the Read/Write code

If Bit 6 is set, the Elapsed Time for the read/write operation will be displayed.

"Elapsed Time a mins b secs" or
"Elapsed Time b.c secs" or
"Elapsed Time c.d msecs"

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

or

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa "

where

aaaaaaaa is the Diagnostic Error Code

If a data miscompare was detected during a read compare operation, the followed information will be displayed.

"DiagError aaaaaaaa"

followed by

"User LBA cccccccc LLL CHS dddddd.e.ffff PLP CHS gggggg.h.iiii"

"Byte Offset = jjjj Expected = kk Actual = ll"

or

"System LBA cccccccc LLL CHS dddddd.e.ffff PLP CHS gggggg.h.iiii"
"Byte Offset = jjjj Expected = kk Actual = ll"

where

aaaaaaaa is the Diagnostic Error Code

cccccccc is the Disk Logical Block Address of the sector that miscompared

dddddd is the Logical Cylinder Address of the sector that miscompared

e is the Logical Head Address of the sector that miscompared

ffff is the Logical Sector Address of the sector that miscompared

gggggg is the Physical Cylinder Address of the sector that miscompared

h is the Logical Head Address of the sector that miscompared

iiii is the Physical Sector Address of the sector that miscompared

jjjj is the byte offset from the start of the sector to the byte that miscompared

kk is the expected byte value

ll is the actual byte value

Examples:

Example #1:

To write and verify a single logical sector
(in this case logical sector 23 on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>723
```

Example #2:

To write and verify multiple logical sectors
(in this case logical sectors 23 to 26 on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>723,4
```

Example #3:

To write and verify all of the logical sectors on a track
(in this case all logical sectors on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>7
```

Example #4:

To write and verify all of the logical sectors on multiple tracks
(in this case all logical sectors on logical cylinders 45 to 49 head 0)

Note: You must seek to the track before the first one to be written.

```
F3 2>A3
F3 2>S44,0
F3 2>L,5
F3 2>7
```

Example #5:

To write and verify all of the logical sectors on a track and continue on error (in this case all logical sectors on logical cylinder 45 head 0)

Note: An error message will be displayed for each sector in error.

```
F3 2>A0
F3 2>S45,0
F3 2>7,,,1
```

Example #6:

To write and verify all of the logical sectors in the test space and continue on error

Note: The Test Space is selected by the all level 'A' command. An error message will be displayed for each sector in error.

```
F3 2>7,,,11
```

Example #7:

To write and verify a single physical sector (in this case physical sector 32 on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>732,,,2
```

Example #8:

To write and verify multiple physical sectors (in this case physical sectors 32 to 35 on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>732,4,,2
```

Example #9:

To write and verify all of the physical sectors on a track (in this case all physical sectors on physical cylinder 54 head 0)

```
F3 2>A0
F3 2>s54,0,22
F3 2>7,,,2
```

Example #10:

To write a single logical sector with data at a specific sector offset in the diagnostic write buffer, read it to the sector offset in the diagnostic read buffer, then compare the data at the sector offset in the diagnostic read buffer against the data at the same sector offset in the diagnostic write buffer to verity the data (in this case logical sector 23 on logical cylinder 45 head 1, write with data at the sector offset of 5 in the diagnostic write buffer, read to the sector offset of 5 in the diagnostic read buffer and verify the data)

```
F3 2>A0
F3 2>AF,5
F3 2>S45,1
F3 2>723
```

Example #11:

To rotate the buffer sector offset by 1 and write a single logical sector with data at

the rotated sector offset in the diagnostic write buffer, read it to the rotated sector offset in the diagnostic read buffer, then compare the data at the sector offset in the diagnostic read buffer against the data at the same sector offset in the diagnostic write buffer to verity the data
(This example assumes user ran the Example #10 above right before this example,
in this case logical sector 24 on logical cylinder 45 head 1,
write with data at the sector offset of 6 in the diagnostic write buffer,
read to the sector offset of 6 in the diagnostic read buffer and verify the data)

```
F3 2>724,,,4
```

Revision History:

0001.0000	Initial revision.
0001.0001	Eliminated the Enable ZAP Updates and Enable Track Skipping option.
0001.0002	Added new Rotate Buffer Sector Offset option to the bit 2 of the parameter 3.
0011.0000	Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Write Wedge (Level 2 'z' or Level E 'B')

Description:

This command writes data to the disk starting at the specified data wedge on the target track for the specified number of data wedges. The wedges are written with the data contained in the Diagnostic Write Buffer. At meanwhile the channel registers are sampled, if the register address are specified.

Quick Help:

```
   Level 2
"WrWedge, z[WedgeAddr],[NumWedges],[NumSkipedWedges],[TranSize],[Opt],[RegAddr0],...,[RegAddr
   Level E
"WrWedge, B[WedgeAddr],[NumWedges],[NumSkipedWedges],[TranSize],[Opt],[RegAddr0],...,[RegAddr
```

Input Parameters:

0 - Wedge Address.

This parameter specifies the address of the first wedge to be written.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0

1 - Transfer Length.

This parameter specifies the number of wedges to be written.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: If the Wedge Address is entered and the Transfer Length is not entered, then only the specified wedge will be written.

If both the Wedge Address and Transfer Length are not entered, then the Transfer Length will be set based on the Test Space that is selected. If the Random Transfer Length option is selected, a random value will be used that is less than or equal to the number of wedges remaining on the track. If the Random Transfer Length option is not selected, the number of wedges remaining on the track will be written.

If a Transfer Length is entered and not equal to zero, it will be limited to the number of wedges remaining on the track.

2 - Skipped Wedges.

This parameter specifies the number of wedges to skip after each wedge written.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: 0 (Disable wedge skipping)

3 - Wedge Size in NRZ Symbols.

This parameter specifies the number of NRZ symbols to be transfered for each wedge.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0 (Use native (max) wedge size)

4 - Options.

This parameter is a bit significant value that selects the following options:

Bit 0 - Formatted Wedge Write.

If this bit is equal to 1, a formatted wedge write operation will be performed. If this bit is equal to 0, an unformatted wedge write operation will be performed. A formatted wedge write will write a PLO field and sync mark preceeding the wedge data. An unfomatted wedge read will not write a PLO field and sync mark preceeding the wedge data.

Type: Unsigned 32-bit value

Range: 0 to 0xFFFFFFFF

Default: 0x00000001 (Formatted Wedge Write)

5 - Channel Register Address.

This parameter specifies the address of the 1st Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

6 - Channel Register Address.

This parameter specifies the address of the 2nd Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

7 - Channel Register Address.

This parameter specifies the address of the 3rd Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

8 - Channel Register Address.

This parameter specifies the address of the 4th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

9 - Channel Register Address.

This parameter specifies the address of the 5th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

10 - Channel Register Address.

This parameter specifies the address of the 6th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

11 - Channel Register Address.

This parameter specifies the address of the 7th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

12 - Channel Register Address.

This parameter specifies the address of the 8th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

13 - Channel Register Address.

This parameter specifies the address of the 9th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

14 - Channel Register Address.

This parameter specifies the address of the 10th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

15 - Channel Register Address.

This parameter specifies the address of the 11th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

16 - Channel Register Address.

This parameter specifies the address of the 12th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

17 - Channel Register Address.

This parameter specifies the address of the 13th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

18 - Channel Register Address.

This parameter specifies the address of the 14th Read Channel register to be read for data collection.

Type: Unsigned 16-bit value

Range: 0 to 0xFFFF

Default: None

Output Data:

If no error occurred and one or more read channel register was specified for data collection, the following information will be displayed.

```
"  RegAddr      aaaa      aaaa      aaaa      ... aaaa"
"  Min          bbbbbbbb  bbbbbbbb  bbbbbbbb  ... bbbbbbbb"
"  Max          cccccccc  cccccccc  cccccccc  ... cccccccc"
"  Mean         dddddddd  dddddddd  dddddddd  ... dddddddd"
"  StdDev       eeeeee.ee eeeeee.ee eeeeee.ee ...  eeeeee.ee"
```

where

aaaa is the address of the channel register that was read

bbbbbbbb is the minimum value that was read from the channel register

cccccccc is the maximum value that was read from the channel register

dddddddd is the mean of the values read from the channel register

eeeeee.ee is the standard deviation of the values read from the channel register

If no error occurred, one or more read channel register was specified for data collection and Raw ASCII output mode is selected, the following additional information will be displayed for each wedge and channel register for which data was collected.

"Wedge ffff RegAddr gggg RegData hhhhhhhh Error ii"

where

ffff is the wedge address

gggg is the address of the channel register that was read

hhhhhhhh is the value read from the channel register

ii is the error that was logged for the wedge

00 = No Error
04 = Sync Error

If no error occurred, no read channel registers were specified for data collection and the Continue On Sync Error option was selected, the following additional information will be displayed.

"Wedges with Sync Errors: jjjj jjjj jjjj ... jjjj"

where

jjjj is the address of a wedge with a sync error

If an error occurred, the following information will be displayed.

"DiagError aaaaaaaa R/W Status c R/W Error dddddddd"

and

"Next User LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

or

"Next System LBA eeeeeeee LLL CHS ffffff.g.hhhh PLP CHS iiiiii.j.kkkk"
"Remaining Transfer Length llllllll"

where

aaaaaaaa is the Diagnostic Error Code

c is the status returned by the R/W subsystem

0 = R/W request completed successfully with error recovery
1 = R/W request completed successfully (no error recovery performed)
2 = R/W request failed

dddddddd is the error code returned by the R/W subsystem

eeeeeeee is the Disk Logical Block Address of the sector in error

ffffff is the Logical Cylinder Address of the sector in error

g is the Logical Head Address of the sector in error

hhhh is the Logical Sector Address of the sector in error

iiiiii is the Physical Cylinder Address of the sector in error

j is the Logical Head Address of the sector in error

kkkk is the Physical Sector Address of the sector in error

llllllll is the number of sectors remaining to be read or written

If the Verbose Formatted ASCII Data Output Mode is selected, the Verbose Mode option bits will enable the following data to be output when set.

Bit 0: Enables the R/W Status and R/W Error to be displayed
Bit 1: Enable the Next Address to be displayed
Bit 2: Enables the Track Position and Track Follow Offset to be displayed
Bit 3: Enables the Target Address to be displayed
Bit 4: Enables the Recovery Status to be displayed
Bit 5: Enables the Fault Status to be displayed
Bit 6: Enables the Elapsed Time to be displayed
Bits 31-7: NA

If Bit 0 is set, the R/W Status and R/W Error will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 1 is set, the Next Address will be displayed even if no error occurred. The data displayed will be formatted as shown above.

If Bit 2 is set, the Track Position and Track Follow Offset will be displayed as follows.

"Read Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Position, Persistent Offset m.m% Total Offset n.n%" or
"Write Header Position, Persistent Offset m.m% Total Offset n.n%"

where

m.m is the Persistent Track Follow Offset in units of percentage of track width

n.n is the Total Track Follow Offset in units of percentage of track width

If Bit 3 is set, the Target Address will be displayed as follows.

"Target User LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

or

"Target System LBA pppppppp LLL CHS qqqqqq.r.ssss PLP CHS tttttt.u.vvvv"
"Starting Transfer Length wwwwwwww"

where

pppppppp is the starting Disk Logical Block Address

qqqqqq is the starting Logical Cylinder Address

r is the starting Logical Head Address

ssss is the starting Logical Sector Address

tttttt is the starting Physical Cylinder Address

u is the starting Logical Head Address

vvvv is the starting Physical Sector Address

wwwwwwww is the starting Transfer Length

If Bit 4 is set, the Recovery Status will be displayed as follows.

"Recovered User LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

or

"Recovered System LBA AAAAAAAA LLL CHS BBBBBB.C.DDDD PLP CHS EEEEEE.F.GGGG"
"Recovery Flags HHHH Count II"

where

AAAAAAAA is the Disk Logical Block Address of the last recovered sector

BBBBBB is the Logical Cylinder Address of the last recovered sector

C is the Logical Head Address of the last recovered sector

DDDD is the Logical Sector Address of the last recovered sector

EEEEEE is the Physical Cylinder Address of the last recovered sector

F is the Logical Head Address of the last recovered sector

GGGG is the Physical Sector Address of the last recovered sector

HHHH are the Recovery Flags reported by the Read/Write code

II is the Recovery Count reported by the Read/Write code

If Bit 5 is set, the Fault Status will be displayed as follows.

"Drive Fault Status JJJJ Preamp Fault Status KKKK"

where

JJJJ is the Drive Fault Status reported by the Read/Write code

KKKK is the Preamp Fault Status reported by the Read/Write code

If Bit 6 is set, the Elapsed Time for the read/write operation will be displayed.

```
"Elapsed Time a mins b secs"  or
"Elapsed Time b.c secs"       or
"Elapsed Time c.d msecs"
```

where

a is minutes
b is seconds
c is milliseconds
d is microseconds

Examples:

Example #1:
To write a single wedge
(in this case wedge 23 on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>z23
```

Example #2:
To write multiple wedges
(in this case wedges 23 to 26 on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>z23,4
```

Example #3:
To write all of the wedges on a track
(in this case all wedges on logical cylinder 45 head 1)

```
F3 2>A0
F3 2>S45,1
F3 2>z
```

Example #4:
To write all of the wedges on multiple tracks
(in this case all wedges on logical cylinders 45 to 49 head 0)

Note: You must seek to the track before the first one to be written.

```
F3 2>A3
F3 2>S44,0
F3 2>L,5
F3 2>z
```

__Revision History:__

0001.0000 Initial revision.
0001.0001 Increase the number of channel registers for the data collection.
0002.0000 Added Formatted Wedge Write option.
0011.0000 Combined the PSG Diagnostic Error Codes (PSGDEC) and the Diagnostic External Test Service Error Codes (DETSEC) into a single set of Diagnostic Error Codes (DiagError).

Error Codes/Tracing Information

DiagError - Diagnostic Error Codes

```
*****************************************************************************************
0x0000 - 0x0FFF: Diagnostic Infrastructure Errors
*****************************************************************************************
0x0000: No Error
0x0001: Unsupported Diagnostic Feature
0x0002: Online Extrinsic Requests are disabled
0x0003: Diagnostic Mode Extrinsic Requests are disabled
0x0004: Diagnostic External Test Service Busy
0x0005: Invalid Diagnostic External Test Service Request
0x0006: Extrinsic Diagnostic Aborted
0x0007: File Creation Error
0x0008: Memory Allocation Error
0x0009: Unsupported Diagnostic Parameter Revision
0x000A: Invalid Diagnostic Parameter
0x000B: Singular Matrix Error
0x000C: Congen Read Error (Drive Has Probably Never Been "Congened")
0x000D: Congen Write Error: Error Occurred Saving Mode Packet Header
0x000E: File Copy Error
0x000F: Unable to load Diagnostic Overlay
0x0010: Congen Write Error: Mode Page Length Does Not Match Specified Length
0x0011: Congen Write Error: Mode Page Check Member Function Returned Failure
0x0012: Congen Write Error: Attempt To Change Unchangeable Parameter
0x0013: Incoming SDBP is too small for DSB
0x0014: Congen Write Error: Writing Mode Data To Disc Failed
0x0015: Congen Write Error: Writing Partial Mode Data To Disc Failed
0x0016: Congen Write Error: Writing Complete Mode Data To Disc Failed
0x0017: Congen Write Error: Unknown Congen Write Error
0x0018: Congen Reset Error: Reset Congen Failed
0x0019: Drive must be power cycled
0x0020: Invalid ASCII Diag Command
0x0021: Unable to Load Diag Command Processor Overlay
0x0022: Data Received from Unsupported Test Service
```

0x0023: Unsupported Diag Data Type

****
0x1000 - 0x1FFF: Memory Errors
****
0x1000: Invalid Memory Address
0x1001: Bad Servo RAM Read
0x1002: Memory Miscompare Error
0x1003: Buffer Miscompare Error

****
0x2000 - 0x2FFF: Hardware Errors
****
0x2000: Unsupported Hardware Feature
0x2001: Unable to Lock Read Channel
0x2002: Unable to Unlock Read Channel
0x2003: Invalid Read Channel Register Address
0x2004: Read Channel Register Access Error
0x2005: Unable to Lock Preamp
0x2006: Unable to Unlock Preamp
0x2007: Invalid Preamp Register Address
0x2008: Invalid Read or Write Power ASIC Register Request
0x2009: Invalid Controller Register Address
0x200A: Unable to set Preamp Mode
0x200B: Unable to get Preamp Head Resistance
0x200C: Controller Register Target Value Out Of Range
0x200D: Unsupported Controller Register Group

****
0x3000 - 0x3FFF: Drive Geometry Errors
****
0x3000: Invalid Target Address
0x3001: Invalid Read/Write Address
0x3002: Invalid User LBA
0x3003: Invalid User Logical Cylinder, Logical Head and Logical Sector
0x3004: Invalid User Logical Cylinder, Logical Head and Physical Wedge
0x3005: Invalid User Logical Cylinder
0x3006: Invalid System LBA
0x3007: Invalid System Logical Cylinder, Logical Head and Logical Sector
0x3008: Invalid System Logical Cylinder, Logical Head and Physical Wedge
0x3009: Invalid System Logical Cylinder
0x300A: Invalid Physical Cylinder, Logical Head and Physical Sector
0x300B: Invalid Physical Cylinder, Logical Head and Physical Wedge
0x300C: Invalid Drive Geometry Information
0x300D: Invalid NRZ Symbol Extent Address
0x300E: Invalid PBA
0x300F: Unsupported Media Partition
0x3010: No Valid Sectors to Transfer on Target Track
0x3011: Invalid Head
0x3012: Invalid Logical Mode Access
0x3013: Invalid Logical Cylinder entered for Particle Sweep

****
0x4000 - 0x4FFF: Native Interface Errors
****
0x4000: Unsupported Native Interface Feature
0x4001: Invalid Read Cache Segment Information
0x4002: Invalid Read Cache Search Engine Information
0x4003: Invalid Read Cache Most/Least Valuable Indices/Linked List Information
0x4004: Invalid Read Cache Free Segments Information
0x4005: Invalid Read Cache Miscellaneous Information

****

0x5000 - 0x5FFF: Read/Write Errors
****
0x5000: Unsupported Read/Write Feature
0x5001: Invalid Read/Write Sequence
0x5002: Read/Write Request Failed
0x5003: Read Failed
0x5004: Write Failed
0x5005: Wedge Read Failed
0x5006: Wedge Write Failed
0x5007: Track Erase Failed
0x5008: Read Miscompare
0x5009: Pending Block Error
0x500A: Erase Failed
0x500B: Diagnostic R/W Buffer too small
0x500C: Invalid Error Recovery Mode
0x500D: Format Failed
0x500E: Process Defect Lists Error
0x500F: I/F User Table Save Error
0x5010: R/W Subsysten not Ready to Accept Commands
0x5011: No Valid Error Recovery Configuration Given Commanded Mode
0x5012: Drive Free Fall Protection Failed
0x5013: Particle Sweep Request Failed

****
0x6000 - 0x6FFF: Servo Errors
****
0x6000: Unsupported Servo Feature
0x6001: Servo Failure
0x6002: Servo Command Error
0x6003: Read past the end of the Servo Symbol Table
0x6004: Invalid Servo Symbol Table Entry
0x6005: Missed Fast I/O Sample
0x6006: No Fast I/O Response
0x6007: Spin Up request received when spun up
0x6008: Spin Up Failed
0x6009: Spin Down request received when spun down
0x600A: Spin Down Failed
0x600B: Seek Failed
0x600D: Micro Jog Table error

****
0x7000 - 0x7FFF: Adaptive Parameter Errors
****
0x7000: Unsupported Adaptive Feature
0x7001: Unable to open RAP file

0x7010: Unable to find left side of VGAR vs Track Follow Offset bathtub curve
0x7011: Unable to find right side of VGAR vs Track Follow Offset bathtub curve

****
0x8000 - 0x8FFF: Logging Errors
****
0x8000: Invalid Log File
0x8001: Log Full
0x8002: Log File Read or Write Failed

****
0x9000 - 0x9FFF: Defect Management Errors
****
0x9000: Primary Defect List System Disc File Write Error
0x9001: TA PSFT Defect List System Disc File Write Error
0x9002: Could not open Format Client Defect List

```
***************************************************************************************
0xA000 - 0xAFFF: Shared Test API Errors
***************************************************************************************
0xA000: Fast IO Initialization Error
0xA001: Baseline PES collection Error
0xA002: Delta PES collection Error
```

Read/Write Request(Command) Type Codes

```
0x00    SEEK        Seek request
0x01    XFR_ALT     Read/Write transfer alternate sector request
0x02    XFR         Read/Write transfer request
0x03    RD_CHNL     Access Read Channel request
0x04    SRV_MEM     Access Servo Memory request
0x05    SRV_FLW     Add Primary Servo Flaw request
0x06    DITH        Dithering request
0x07    DITH_WR     Dithering write enhance request
0x08    CAL         Drive Calibration request
0x09    ERA_TRK     Erase Track request
0x0A    FDB         Execute FDB Motor Leakage Detection test request
0x0B    FMT_TRK     Format Track request
0x0C    FMT_SYS     Format System Partition request
0x0D    FMT_UNT     Format Unit request
0x0E    HD_RES      Get Head Resistance request
0x0F    HTR_RES     Get Heater Resistance request
0x10    GET_RVFF    Get Servo RVFF sensor status
0x11    ACFF_RECAL  ACFF Recalibrate status
0x12    TEMP        Get Temperature request
0x13    TWK_FH      Tweak fly height values request
0x14    VOLT        Get Voltage Levels request
0x15    HD_DIAG     Head diagnostics test request
0x16    HD_SPK      Head Spike Screen request
0x17    REALLOC     Immediate Reallocation request
0x18    MRK_PND     Mark Block for Pending Reallocation request
0x19    HD_FH       Measure Head Fly Heights request
0x1A    VCM_TEMP    Measure VCM Temperature and Resistance request
0x1B    MEM_DBG     Memory mapped debug capture request
0x1C    PROC_DL     Process defect lists request
0x1D    SCRB_DL     Scrub the defect lists request
0x1E    PROC_GDL    Process growth defect lists request
0x1F    REF_SRV_MEM Refresh servo memory request
0x20    RELD_RAP    Reload RAP parameters request
0x21    ERR_RATE    Measure error rate
0x22    DL          Retrieve defect list request
0x23    SRV_EC      Retrieve the servo error code FIFO request
0x24    SCN_DFCT    Scan defect adjacent sectors request
0x25    SELF_SK     Self seek request
0x26    SK_TUNE     Seek profile tuning request
0x27    SND_SRV     Send servo request
0x28    FIX_RAP     Fixup RAP for depop request
0x29    DEPOP       Send Servo Electrical Depop request
0x2A    INIT_DITH   Initialize Dithering parameters
0x2B    PES         Servo PES FIFO access request
0x2C    PREAMP      Set Preamp mode request
0x2D    SET_VOLT    Configure voltage margin level request
0x2E    ZAP         Configure the ZAP correction mode request
0x2F    SPN_UP      Spinup request
0x30    SPN_DN      Spindown request
0x31    ZLR         Track ZLR request
0x32    UNKNOWN     Unsupported request
```

0x33	UNMRK	Unmark Block for Pending Reallocation request
0x34	TCC	Update TCC Manager request
0x35	ALT_TONE	Write SMART Alternating Tones Request
0x36	XFR_TRK	Read/Write transfer track request
0x37	XFR_WDG	Read/Write transfer wedge request
0x38	PWR	Set R/W Power Management request
0x39	CLR_ALT	Clear R/W User Alt List request
0x3A	LATCH	Put heads on the latch request
0x3B	SV_ALT	Save R/W User Alt List to Media request
0x3C	MATLAB	Enter Servo Matlab Shell request
0x3D	SWEEP	Perform sweep of media to knock off particles request
0x3E	CLR_SLIP	Clear R/W Slip List request
0x3F	FA_AFH	Field Adjust AFH request
0x40	TWK_WR_PWR	Tweak write power request
0x41	SEC2RLL	Convert sector data to RLL data
0x42	SWD	SWD(Skip Write Detect) Enable/Disable request
0x43	CLR_ALT_ENT	Clear User Alt List Entry request
0x44	ADJ_CLR	Adjust Target Clearance request
0x45	FALL	Control drive free-fall protection request
0x46	XFR_SEC	Read/Write transfer sector request
0x47	DISC_SLIP	Update servo disc slip parameters request
0x48	RE_ALT	Restore R/W User Alt List from Media request
0x49	RST_RVFF	Reset Servo RVFF sensor status request
0x4A	HST	Head Stability Test

Read/Write Status Codes

0x0 RW_REQUEST_SATISFIED_WITH_RECOVERY - Request was satisfied with error recovery performed
0x1 RW_REQUEST_SATISFIED - Request was satisfied (no error recovery performed)
0x2 RW_REQUEST_FAILED -Request was not satisfied

Read/Write Sense Error Codes

R/W Sense Error Codes are error codes that R/W reports to its clients. Although they are very similar to traditional SCSI sense codes, there is not a one-to-one correspondence with traditional SCSI sense codes. These R/W Sense Error Codes should be treated and interpreted independently from them.

R/W Sense Error Codes may be reported with one or more bits of their most significant nybble set. These bits are described below:

Bit 31: Move FRU Flag.

If this bit is set, it indicates that the least significant byte of the sense code should be copied into the additional sense code qualifier when it is translated into a SCSI sense code.

Bit 30: Read/Write Retryable Error Type.

If this bit is set, it indicates that the condition that caused R/W to report the R/W Sense Error Code is retryable. This gives R/W clients an opportunity perform higher level retries. IMPORTANT! Please note that R/W Sense Error Codes that are reported in a diagnostic environment (e.g. serial port debug statements) should never be considered hard errors when this bit is set.

```
******************************************************************************
 Internal x0/00 Errors.
******************************************************************************
 0x00000080: RW_NO_ERRORS - No R/W Errors encountered.
```

0x00000081: RW_REQUEST_ABORTED - Request failed due to abort of request.
0x00000082: RW_REQUEST_SOFT_ABORTED - Request failed due to soft abort of request.
0x00000083: RW_DATA_SCRUB_SUCCESSFUL - Reallocate Block - Data scrub of the original sector wa
0x00000084: RW_FILE_ERROR - R/W file error encountered.
0x00000085: RW_XFR_PARTITION_OVERFLOWED - Disc Xfr - Partition overflowed.
0x40000087: RW_BLOCK_REALLOCATED_01 - Disc Xfr - Reallocated block encountered.
0x40000088: RW_BLOCK_REALLOCATED_02 - Disc Xfr - Reallocated block encountered.
0x40000089: RW_BLOCK_REALLOCATED_03 - Disc Xfr - Reallocated block encountered.
0x0000008A: RW_FBA_OBTAINED - This is not an error type. Used for HW_ZERO_LATENCY_RW.
0x0000008B: RW_REQUEST_ABORTED_DUE_TO_INVALID_INPUT - Inputs for the FDB leakage detection tes
0x0000008C: RW_SERVO_OP_ABORTED - Servo operation was aborted.
0x0000008D: RW_SUPER_SECTOR_EARLY_DISC_HALT - Super Sector - Early disc halt.
0x0000008E: RW_POWER_SAVE_INVALID_REQUEST_01 - Power Save - Invalid request.
0x0000008F: RW_READ_AFTER_WRITE_REQ - Read After Write mode requested
0x00000090: RW_SWD_DVGAS_FAULT_RAW_REQ - Read After Write mode due to SWD Dvgas fault requeste
0x00000091: RW_SWD_RVGAS_FAULT_RAW_REQ - Read After Write mode due to SWD Rvgas fault requeste
0x00000092: RW_SWD_FVGAS_FAULT_RAW_REQ - Read After Write mode due to SWD Fvgas fault requeste
0x00000093: RW_SWD_DVGAS_SUM_FAULT_RAW_REQ - RAW mode due to SWD Sum fault, last SWD fault was
0x00000094: RW_SWD_RVGAS_SUM_FAULT_RAW_REQ - RAW mode due to SWD Sum fault, last SWD fault was
0x00000095: RW_SWD_FVGAS_SUM_FAULT_RAW_REQ - RAW mode due to SWD Sum fault, last SWD fault was
0x00000096: RW_SERVICE_DRIVE_FREE_FALL_CONDITION_ABORTED - Servicing of free-fall condition wa
0x00000097: RW_FORMAT_MAX_NUM_SWD_ERRORS_PER_TRACK_EXCEEDED - Format - Number of SWD errors pe
0x00000098: RW_SERVO_DISC_SLIP_RECAL_NOT_ALLOWED - Servo Disc Slip recalibration not allowed.

****
Internal x2/04 Errors.
****
0x02040080: RW_NOT_READY - Initialization - R/W system not ready for client requests.

****
Internal x3/0C Errors.
****
0x430C0080: RW_UPDATE_BVD_FAILED - Disc Xfr - BVD update error.
0x430C0081: RW_WRITE_HALT_CORRECTABLE_IOECC_ERR - Disc Xfr - IOECC error (correctable)

****
Internal x3/11 Errors.
****
0x43110080: RW_READ_PREAMP_UNSAFE_FAULT - Disc Xfr - Read during preamp unsafe fault.
0x43110081: RW_EDAC_HW_UNCORR_ERR - Disc Xfr - EDAC HW uncorrectable error.
0x43110082: RW_EDAC_OVERRUN_ERR - Disc Xfr - EDAC overrun error.
0x031100A0: RW_READ_PREAMP_HTR_OPEN_SHORT_FAULT
0x03110480: RW_WRITE_ALTERNATE_FAILED_NO_SERVO_DEFECTS - Reallocate Block - Write alternate bl
0x03110481: RW_ALTERNATE_BLK_COMPARE_TEST_FAILED - Reallocate Block - Alternate block compare
0x03110482: RW_ALTERNATE_BLK_SYNC_MARK_ERR - Reallocate Block - Alternate block sync mark erro
0x03110483: RW_ALTERNATE_BLOCK_SELECTION_EXHAUSTED - Reallocate Block - Maximum allowed altern
0x03110484: RW_REPETITIVE_REALLOCATION_NOT_ALLOWED - Reallocate Block - Resource is not availa

****
Internal x4/09 Errors.
****
0xC4090080: RW_SERVO_FAULT - Servo fault.
0xC4090081: RW_WRITE_SERVO_UNSAFE_FAULT - Disc Xfr - Write during servo unsafe fault.
0xC4090082: RW_EDAC_BLK_ADDR_ERR - Disc Xfr - EDAC block address error.
0xC4090083: RW_SERVO_MDW_INFO_MISSING - Disc Xfr - Missing MDW information reported by servo d
0xC4090084: RW_SERVO_CMD_TIMED_OUT - Servo command timed out.
0xC4090085: RW_SEEK_TIMED_OUT - Seek operation timed out.
0xC4090086: RW_SEEK_EXCEED_TIME_LIMIT - Seek operation has exceeded the recovery time limit
0xC4090087: RW_SERVICE_DRIVE_FREE_FALL_CONDITION_TIMED_OUT - Servicing of free-fall condition

****
Internal x5/24 Errors.
****

0x0524F380: RW_G_TO_P_WHILE_FORMATTED_WITHOUT_PLIST - G->P operation requested while drive wa
0x0524F381: RW_SERVO_FLAW_ALREADY_EXISTS - Add Primary Servo Flaw - Servo Flaw already exists

****
Internal x5/26 Errors.
****
0x05260080: RW_INVALID_CYLINDER_ERR - Validate Sector Position - Invalid input cylinder.
0x05260081: RW_INVALID_HEAD_ERR - Validate Sector Position - Invalid input head.
0x05260082: RW_INVALID_SECTOR_ERR - Validate Sector Position - Invalid input sector.
0x05260083: RW_INVALID_USER_LBA_01 - Perform Address Translation - Input LBA is invalid.
0x05260084: RW_INVALID_USER_LBA_02 - Perform Address Translation - Input LBA is invalid.
0x05260085: RW_INVALID_USER_LBA_03 - Perform Address Translation - Input LBA is invalid.
0x05260086: RW_INVALID_SYSTEM_LBA - Perform Address Translation - Input LBA is invalid.
0x05260087: RW_CLIENT_DEFECT_LIST_INVALID_SIZE - Format - Client defect list size is invalid.
0x05260088: RW_CLIENT_DEFECT_LIST_INVALID_OFFSET_SORT - Process Defect Lists - Sort error due
0x05260089: RW_CLIENT_DEFECT_LIST_INVALID_HEAD_SORT - Process Defect Lists - Sort error due to
0x0526008A: RW_CLIENT_DEFECT_LIST_INVALID_CYL_SORT - Process Defect Lists - Sort error due to
0x0526008B: RW_CLIENT_DEFECT_LIST_SYMBOL_EXTENT_INFO_ERR - Process Defect Lists - Failed to va
0x0526008C: RW_CLIENT_DEFECT_LIST_SEC_EXTENT_INFO_ERR - Process Defect Lists - Failed to vali
0x0526008D: RW_CLIENT_DEFECT_LIST_INVALID_TRACK - Process Defect Lists - Invalid track in cli
0x0526008E: RW_FTRK_INVALID_TRACK - Track Format - Input track is invalid.
0x0526008F: RW_FTRK_INVALID_LBA - Track Format - First LBA of input track is invalid.
0x05260090: RW_INVALID_READ_SERVO_DATA_BLOCK_COUNT - Read Servo Data Block Memory - Invalid l
0x05260091: RW_INVALID_READ_SERVO_PROGRAM_BLOCK_COUNT - Read Servo Program Block Memory - Inva
0x05260092: RW_INVALID_USER_PBA_01 - Perform Address Translation - Input PBA is invalid.
0x05260093: RW_INVALID_SYMBOL_EXTENT_INFO - Perform Address Translation - Input symbol extent
0x05260094: RW_SUPER_SECTOR_INVALID_WEDGE_XFR_SIZE - Super Sector Transfer - Invalid wedge tra
0x05260095: RW_TRACK_ZLR_INVALID_PARTITION - Track ZLR Transfer - Invalid partition.
0x05260096: RW_TRACK_ZLR_INVALID_LBA_RANGE - Track ZLR Transfer - Invalid LBA range on target
0x05260097: RW_TRACK_ZLR_REALLOCATED_LBA_FOUND - Track ZLR Transfer - Reallocated LBA found on
0x05260098: RW_INVALID_USER_LBA_04 - Perform Address Translation - Input LBA is invalid.
0x05260099: RW_INVALID_USER_LBA_05 - Perform Address Translation - Input LBA is invalid.
0x0526009A: RW_CONVERT_SECTOR_TO_RLL_UNSUPPORTED_SECTOR_SIZE - Convert Sector to RLL Data - Un
0x0526009B: RW_ADD_SERVO_FLAW_INVALID_INPUT_ENTRY - Add Servo Flaw - Invalid input specified.
0x0526009C: RW_ENABLE_SERVO_FREE_FALL_PROTECTION_FAILED_DRIVE_NOT_SPINNING - Invalid condition
0x0526009D: RW_DISABLE_SERVO_FREE_FALL_PROTECTION_FAILED_DRIVE_NOT_SPINNING - Invalid conditio
0x0526009E: RW_DISABLE_SERVO_FREE_FALL_PROTECTION_FAILED_PROTECTION_ALREADY_DISABLED - Invalid
0x0526009F: RW_DISABLE_SERVO_FREE_FALL_PROTECTION_FAILED_PROTECTION_DEACTIVATED - Invalid cond
0x052600A0: RW_DISABLE_SERVO_FREE_FALL_PROTECTION_FAILED_FREE_FALL_ACTIVE - Invalid condition
0x052600A1: RW_INVALID_DRIVE_FREE_FALL_CONTROL_OPTION - Invalid drive free-fall control option
0x052600A2: RW_CHECK_FREE_FALL_EVENT_FAILED_PROTECTION_NOT_FUNCTIONAL - Check free-fall event
0x052600A3: RW_SECTOR_XFR_INVALID_SECTOR_RANGE - Invalid sector range specified.

****
Internal x3/14 Errors.
****
0x83140180: RW_SEARCH_EXHAUSTED - Disc Xfr - Search exhaust error.
0x83140181: RW_REALLOCATED_LBA_WRITE_DISALLOWED - Disc Xfr - Reallocated LBA is restricted fro
0x83140182: RW_REALLOCATED_LBA_READ_DISALLOWED - Disc Xfr - Reallocated LBA is restricted from
0x03140183: RW_RESERVE_ZONE_LOGPAGE_READ_WRITE_FAILURE - Disc Xfr - Reserved zone Read/Write

****
Internal x3/16 Errors.
****
0xC3160080: RW_DATA_SYNC_TIMEOUT - Disc Xfr - Data sync timeout error.
0xC3160081: RW_DISC_FIFO_PARITY_ERR_01 - Disc Xfr - Formatter FIFO parity error.
0xC3160082: RW_DISC_FIFO_PARITY_ERR_02 - Disc Xfr - Formatter FIFO parity error.
0xC3160083: RW_SUPER_SECTOR_DATA_SYNC_TIMEOUT - Super Sector - Data sync timeout error.
0xC3160084: RW_DATA_SPLIT_SYNC_TIMEOUT - Disc Xfr - Data sync timeout error on sector splits.

****
Internal x3/32/01 Errors.
****

```
 0x83320180: RW_SAVE_DEFECT_FILES_FAILED - Reallocate Block - Failed to save defect files.

***************************************************************************
 Internal x4/01 Errors.
***************************************************************************
 0x84010080: RW_MEDIA_MGR_SPINUP_ERR - Spinup - Media Manager error encountered.
 0xC4010081: RW_SEQ_DATA_FIELD_TIMEOUT - Disc Xfr - Data field timeout error.
 0xC4010082: RW_MM_TDT_FIFO_CTR_ERR - Disc Xfr - Media Manager's TDT FIFO Counter error.
 0xC4010083: RW_MM_SERVO_CTR_ERR - Disc Xfr - Media Manager's Servo Counter error.
 0xC4010084: RW_MM_LATENCY_ERR - Disc Xfr - Media Manager's Latency error.
 0xC4010085: RW_MM_INDEX_ERR - Disc Xfr - Media Manager's Index error.
 0xC4010086: RW_MM_SERVO_ERR - Disc Xfr - Media Manager's Servo error.
 0x84010087: RW_CLEAR_MM_ERRORS_FAILED - Disc Xfr - Media Manager errors could not be cleared s
 0x84010088: RW_CLEAR_SERVO_INDUCED_MM_ERRORS_FAILED - Disc Xfr - Clearing of MM errors due to
 0x84010089: RW_SECTOR_WORD_COUNT_ENABLED_ON_SERVO - Disc Xfr - SWCE/SGate overlap error.
 0x8401008A: RW_SEQ_SERVO_GATE_TIMEOUT_01 - Disc Xfr - Servo gate timeout error.
 0x8401008B: RW_SEQ_SERVO_GATE_TIMEOUT_02 - Disc Xfr - Servo gate timeout error.
 0x8401008C: RW_SEQ_SERVO_GATE_TIMEOUT_03 - Disc Xfr - Servo gate timeout error.
 0x8401008D: RW_SEQ_SERVO_GATE_TIMEOUT_04 - Disc Xfr - Servo gate timeout error.
 0x8401008E: RW_SEQ_SERVO_GATE_TIMEOUT_05 - Disc Xfr - Servo gate timeout error.
 0x8401008F: RW_SMART_HANDSHAKE_ERR - Super Sector - Handshake error.
 0x84010090: RW_SMART_SEQ_SGATE_TIMEOUT_01 - Super Sector - Servo gate timeout error.
 0x84010091: RW_SMART_SEQ_SGATE_TIMEOUT_02 - Super Sector - Servo gate timeout error.
 0x84010092: RW_SMART_SEQ_SGATE_TIMEOUT_03 - Super Sector - Servo gate timeout error.
 0x84010093: RW_SMART_SEQ_SGATE_TIMEOUT_04 - Super Sector - Servo gate timeout error.
 0x84010094: RW_ASEEK_REQ_PULSE_SGATE_TIMEOUT - Disc Xfr - Servo gate timeout error during gene
 0x84010095: RW_SEQ_BVD_CHECK_TIMEOUT - Disc Xfr - BVD check timeout error.
 0x84010096: RW_SEQ_NRZ_XFR_DONE_TIMEOUT - Disc Xfr - NRZ sequencer completion timeout error.
 0xC4010097: RW_SEQ_MEDIA_MGR_TIMEOUT - Disc Xfr - Sequencer timeout on Media Manager event.
 0xC4010098: RW_NRZ_XFR_MEDIA_MGR_ERR - Disc Xfr - NRZ xfr error on Media Manager event.
 0x84010099: RW_DISC_SEQ_HANDSHAKE_ERR - Disc Xfr - Handshake error.
 0x8401009A: RW_MEDIUM_LATENCY_SYNC_ERR - Disc Xfr - Medium latency sync error.
 0x8401009B: RW_FAST_PES_MISSED_SAMPLE_ERR - Fast IO - Missed servo sample.
 0xC401009C: RW_MM_AASEEK_SYNC_ERR - Disc Xfr - Media Manager's Anticipatory autoseek error.

***************************************************************************
 Internal x4/03 Errors.
***************************************************************************
 0x84030080: RW_DETECT_NEW_SERVO_FLAWS_FAILED - Detect of new servo flaws failed.
 0xC4030081: RW_PSG_FAULT - Disc Xfr - PSG environment fault.
 0xC4030082: RW_SHOCK_DETECT_FAULT - Disc Xfr - Shock event occurred.
 0xC4030083: RW_UEWG_FAULT - Disc Xfr - Unexpected Extended WGATE fault.
 0x84030084: RW_GATED_CHANNEL_FAULT - Disc Xfr - Channel detected fault during write.
 0x84030085: RW_DISC_LOCKED_CLOCK_FAULT - Disc Xfr - Disc Locked Clock fault detected.
 0xC4030086: RW_SWD_DVGAS_FAULT - Disc Xfr - Skip Write Detect Dvgas fault.
 0xC4030087: RW_SWD_RVGAS_FAULT - Disc Xfr - Skip Write Detect Rvgas fault.
 0xC4030088: RW_SWD_FVGAS_FAULT - Disc Xfr - Skip Write Detect Fvgas fault.

 The following indicate that the  Sum Threshold was exceeded and the
 name indicates what the last SWD fault that occured was...

 0xC4030089: RW_SWD_DVGAS_SUM_FAULT - Disc Xfr - Skip Write Detect Dvgas fault.
 0xC403008A: RW_SWD_RVGAS_SUM_FAULT - Disc Xfr - Skip Write Detect Rvgas fault.
 0xC403008B: RW_SWD_FVGAS_SUM_FAULT - Disc Xfr - Skip Write Detect Fvgas fault.
 0xC403008C: RW_DRIVE_FREE_FALL_EVENT_FAULT - Disc Xfr - Drive free-fall event occurred.
 0xC403008D: RW_LARGE_SHOCK_EVENT_FAULT - Disc Xfer - Large Shock event occured.

***************************************************************************
 Internal x4/15 Errors.
***************************************************************************
 0x84150180: RW_SERVO_SPINUP_FAILED - Spinup - Servo error encountered during drive spin-up.
 0x84150181: RW_SERVO_SPINDOWN_FAILED - Spindown - Servo error encountered during drive spin-up
 0x84150182: RW_SPINDLE_FAILED - Spindle failed error.
```

0x84150183: RW_UNRECOVERED_SEEK - Seek - Unrecovered seek error encountered.
0x84150184: RW_SERVO_CMD_FAILED - Servo command failed.
0xC4150185: RW_HEATER_CONTROL_FAILED - Servo heater timing failed.
0x84150186: RW_SERVO_FREE_FALL_PROTECTION_CMD_FAILED - Servo Free-Fall Protection command fai
0x84150187: RW_SERVO_DISC_SLIP_FULL_TMFF_RECAL_FAILED - Servo Disc Slip Full TMFF recalibratio
0x84150188: RW_SERVO_DISC_SLIP_HDSWITCH_TIMING_RECAL_FAILED - Servo Disc Slip Head Switch Tim
0x84150189: RW_SERVO_DISC_SLIP_HDSWITCH_TRACK_RECAL_FAILED - Servo Disc Slip Head Switch Track

****
Internal x4/19 Errors.
****
0x84190080: RW_FORMAT_RECOVER_SAVED_GROWN_DST_FAILED - Format - Recover of saved Grown DST fi
0x84190081: RW_DEFECT_SCAN_INIT_DEFECT_LISTS_FAILED - Scan Defect - Recovery of saved Non-Res
0x84190082: RW_CLEAR_SLIP_LIST_SAVE_RW_OPERATING_PARMS_FILE_FAILED - Clear R/W Slip List - Sav
0x84190083: RW_RESTORE_ALT_LIST_FILE_FROM_MEDIA_FAILED - Restore Alt List File From media - Fa
0x84190084: RW_SERVO_DISC_SLIP_PARMS_MEDIA_UPDATE_FAILED - Save of Servo Disc Slip Parms to me
0x84190085: RW_SERVO_DISC_SLIP_PARMS_MEDIA_READ_FAILED_01 - Read of Servo Disc Slip Parms from
0x84190086: RW_SERVO_DISC_SLIP_PARMS_MEDIA_READ_FAILED_02 - Read of Servo Disc Slip Parms from
0x84190087: RW_SERVO_DISC_SLIP_FILE_INVALID_FORMAT_REVISION - Servo Disc Slip file - invalid

****
Internal x4/1C Errors.
****
0x841C0081: RW_READ_PRIMARY_DEFECT_LISTS_SUPER_FILE_FOR_REPORTING - Format - Failure to read I
0x841C0082: RW_PLIST_FILE_INVALID_ENTRY_CNT_01 - Format - Invalid entry count in Plist file.
0x841C0083: RW_PLIST_ENTRY_INVALID_SYMBOL_EXTENT - Format - Invalid symbol extent value in Pl
0x841C0084: RW_PRIMARY_DEFECT_LIST_INVALID_OFFSET_SORT - Process Defect Lists - Sort error du
0x841C0085: RW_PRIMARY_DEFECT_LIST_INVALID_HEAD_SORT - Process Defect Lists - Sort error due
0x841C0086: RW_PRIMARY_DEFECT_LIST_INVALID_CYL_SORT - Process Defect Lists - Sort error due to
0x841C0087: RW_PRIMARY_DEFECT_FILES_UNRECOVERABLE - Process Defect Lists - Unable to recover
0x841C0088: RW_REASSIGN_SEEK_TO_DEFECT_FILES_FAILED - Reallocate Block - Failed to seek to de
0x841C0089: RW_UNDO_REASSIGN_SEEK_TO_DEFECT_FILES_FAILED - Reallocate Block - Failed to seek
0x841C008A: RW_WRITE_SAVED_DEFECTS_REPORT_LISTS_FILE_FAILED - Format - Failure to write defec
0x841C008B: RW_READ_SAVED_DEFECTS_REPORT_LISTS_FILE_FAILED - Retrieve Defects Report List - Re
0x841C008C: RW_SAVED_DEFECTS_REPORT_LISTS_DISC_FILE_INVALID_01 - Retrieve Defects Report List
0x841C008D: RW_SAVED_DEFECTS_REPORT_LISTS_DISC_FILE_INVALID_02 - Retrieve Defects Report List
0x841C008E: RW_FORMAT_RESTORE_RW_OPERATING_PARMS_FILE_FAILED - Format - Restore of R/W User Op
0x841C008F: RW_FORMAT_INVALID_PRIMARY_SERVO_FLAWS_DATA - Format - Invalid Primary Servo Flaws
0x841C0090: RW_SAVE_DEFECT_FILES_FAILED_DUE_TO_DATA_MISCOMPARE_ERR - Reallocate Block - Faile
0x841C0092: RW_PRIMARY_DEFECT_LIST_FILE_OVERFLOW_01 - Format - PList overflow error while merg
0x841C0093: RW_FORMAT_MAX_ZONE_RECERTIFY_PASSES_EXCEEDED - Format - maximum certify passes of
0x841C0094: RW_FORMAT_MAX_ZONE_REWRITE_PASSES_EXCEEDED - Format - maximum write passes of a zo
0x841C0095: RW_PRIMARY_SERVO_FLAWS_LIST_UNRECOVERABLE - Primary Servo Flaws data retrieval - U
0x841C0096: RW_PRIMARY_FLAWS_FILE_INVALID_ENTRY_CNT - Primary Servo Flaws data retrieval - In
0x841C0097: RW_DEFECTIVE_SECTORS_LIST_UNRECOVERABLE - Defective Sectors List data retrieval -
0x841C0098: RW_DEFECTIVE_SECTORS_LIST_INVALID_FILE_HEADER - Defective Sectors List data retrie
0x841C0099: RW_PLIST_FILE_INVALID_ENTRY_CNT_02 - PList data retrieval - Invalid entry count in
0x841C009A: RW_PRIMARY_DEFECTS_LIST_UNRECOVERABLE - PList data retrieval - Unable to read Plis
0x841C009B: RW_SYSTEM_FORMAT_CLIENT_LIST_INVALID_ENTRY_CNT - System Format - invalid entry cou

****
Internal x4/32/00 Errors.
****
0x84320080: RW_PROCESS_FORMAT_PENDING_REALLOCATION_FAILED - Format - Processing of pending rea
0x84320081: RW_INSERT_DST_FAILED - Format - Failed to insert defect to DST.
0x84320082: RW_DST_INSERT_PLIST_DEFECTS_FAILED - Format - Failed to insert PList defect to DST
0x84320083: RW_GROWN_DST_FULL_01 - Format - Grown DST file full.
0x84320084: RW_GROWN_DST_FULL_02 - Format - Grown DST file full.
0x84320085: RW_RESIDENT_DST_FULL - Format - Resident DST file full.
0x84320086: RW_INSERT_FORMAT_GROWN_FLAW_DEFECTS_FAILED - Format - Failed to insert defective s
0x84320088: RW_INSERT_SYSTEM_FLAW_DEFECTS_FAILED - Format System Partition - Failed to insert
0x8432008A: RW_SYSTEM_DEFECTS_FILE_FULL - Format System Parition - System Defects file full.
0x8432008B: RW_CLIENT_DEFECT_INSERT_IN_DEFECT_LIST_ERR - Process Defect Lists - Failed to ins

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0x8432008C: RW_ASFT_MAX_FLAWS_PER_TRK_EXCEEDED_01 - ASFT - Max # of servo flaws per track exce
0x8432008D: RW_ASFT_MAX_FLAWS_PER_TRK_EXCEEDED_02 - ASFT - Max # of servo flaws per track exce
0x8432008E: RW_ASFT_FULL_01 - Defect Management - ASFT full (path #1).
0x8432008F: RW_ASFT_FULL_02 - Defect Management - ASFT full (path #2).
0x84320090: RW_ADD_PENDING_REAS_LBA_FAILED - Defect Management - Addition to Reassign Pending
0x84320091: RW_INITIAL_REALLOCATION_NOT_ALLOWED - Reallocate Block - Resource is not available
0x84320092: RW_ALTERNATE_NOT_AVAILABLE - Reallocate Block - No alternates available.
0x84320093: RW_INSERT_POST_FORMAT_GROWN_FLAW_DEFECTS_FAILED - Reallocate Block - Failed to ins
0x84320094: RW_INSERT_COMPROMISED_DEFECTS_FAILED - Format - Failed to deallocate compromised d
0x84320095: RW_INSERT_SYSTEM_COMPROMISED_DEFECTS_FAILED - Format System Partition - Failed to
0x84320096: RW_DDT_INSERT_ENTRY_FAILED - Insertion of DDT entry failed.
0x84320097: RW_CDDT_FILE_FULL - Compressed DDT file full.
0x84320098: RW_INSERT_FORMAT_PRIMARY_FLAW_DEFECTS_FAILED - Format - Failed to insert defective
0x84320099: RW_DEFECTIVE_TRACKS_INSERT_GROWN_DEFECTS_FAILED - Defective Tracks List - Failed t
0x8432009A: RW_DEFECTIVE_TRACKS_INSERT_PRIMARY_DEFECTS_FAILED - Defective Tracks List - Failed
0x8432009B: RW_DEFECTIVE_TRACKS_LIST_FULL - Defective Tracks List - Failed to add new entry to
0x8432009D: RW_PARTIAL_REALLOCATION_NOT_ALLOWED - Reallocate Block - Resource is not available
0x8432009E: RW_BIPS_ALLOCATION_NOT_ALLOWED - BIPS - Not enough non-defective sectors to alloca
0x8432009F: RW_BIPS_DDT_OPERATION_FAILED_01 - BIPS - BIPS defect DDT table operation failed.
0x843200A0: RW_BIPS_DDT_OPERATION_FAILED_02 - BIPS - BIPS defect DDT table operation failed.
0x843200A1: RW_SWD_ERRS_TRACK_DEFECTS_INSERT_DST_FAILED - Format - Failed to add defective tra
0x843200A2: RW_ALTERNATE_NOT_AVAILABLE_02 - Format - Failed to allocate spare sectors.

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Internal x4/32/01 Errors.
****************************************************************************
0x04320181: RW_PRIMARY_DEFECT_LIST_FILE_OVERFLOW_02 - Process Growth Defect List - PList file
0x84320182: RW_PRIMARY_SERVO_FLAW_TABLE_OVERFLOW - Process Defect Lists - PSFT file overflow e
0x84320183: RW_PRIMARY_DEFECT_FILES_UNWRITABLE - Process Defect Lists - Unable to write defec
0x84320184: RW_OPERATING_PARAMETERS_FILE_UPDATE_ERROR - Process Defect Lists - Unable to upda
0x04320185: RW_PRIMARY_DEFECT_LIST_FILE_OVERFLOW_03 - Pad/Fill Defects - PList file overflow e
0x04320186: RW_PRIMARY_DEFECT_LIST_FILE_OVERFLOW_04 - Pad/Fill Defects - PList file overflow e

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Internal x4/40 Errors.
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0x84400080: RW_MAX_TRK_REWRITE_DURING_CERT_RETRIES_EXCEEDED - Format - Exceeded maximum number

****************************************************************************
Internal x4/44 Errors.
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0xC4440080: RW_WRITE_PREAMP_UNSAFE_FAULT - Disc Xfr - Write during preamp unsafe fault.
0x84440081: RW_READ_WRITE_CHANNEL_FAULT - Disc Xfr - Read channel fault.
0x84440082: RW_SFF_FAULT - Disc Xfr - Small form factor fault.
0xC4440083: RW_WRITE_SERVO_FIELD_FAULT - Disc Xfr - Write during servo field fault.
0xC4440084: RW_MM_TPBA_FIFO_CTR_ERR - Disc Xfr - Media Manager's TPBA FIFO Counter error.
0xC4440085: RW_MM_TPBA_FIFO_UNDRN_ERR - Disc Xfr - Media Manager's TPBA FIFO Underrun error.
0xC4440086: RW_MM_DDT_FIFO_CTR_ERR - Disc Xfr - Media Manager's DDT FIFO Counter error.
0x84440087: RW_MM_DDT_FIFO_UNDRN_ERR - Disc Xfr - Media Manager's DDT FIFO Underrun error.
0x84440088: RW_MM_PARITY_ERR - Disc Xfr - Media Manager's Parity error.
0x84440089: RW_MM_TDT_FIFO_UNDRN_ERR - Disc Xfr - Media Manager's TDT FIFO Underrun error.
0xC444008A: RW_MM_SKIP_MASK_UNDRN_ERR - Disc Xfr - Media Manager's Skip Mask Underrun error.
0x8444008B: RW_TEMPERATURE_INVALID - Get Temperature request resulted in invalid temperature.
0x8444008C: RW_VOLTAGE_MARGIN_HW_NOT_SUPPORTED - Detected unsupported H/W in a Set Voltage Mar
0x8444008E: RW_SMART_SEQ_INIT_BUFFER_NOT_READY - Super Sector - Initial buffer ready timeout e
0x8444008F: RW_CORR_BUFR_PARITY_ERR - Disc Xfr - Correction Buffer parity error.
0x84440090: RW_NX_RLL1_ERR - Disc Xfr - NX - RLL1 error.
0x84440091: RW_DISC_BUFR_PARITY_ERR - Disc Xfr - Disc Buffer parity error.
0x84440092: RW_SEQ_EXE_SGATE_OVERLAP_ERR - Disc Xfr - Sequencer encountered an EXE/SGATE overl
0x84440093: RW_NRZ_INTF_FIFO_UNDRN - Disc Xfr - FIFO underrun error detected at the NRZ interf
0x84440094: RW_NRZ_INTF_FIFO_OVRN - Disc Xfr - FIFO overrun error detected at the NRZ interfac
0x84440095: RW_NRZ_INTF_WRT_PARITY - Disc Xfr - Write data parity error detected at the NRZ in
0x84440096: RW_MM_MX_OVERRUN_ERR - Disc Xfr - Media Manager's MX Overrun error.
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0x84440097: RW_MM_NX_OVERRUN_ERR - Disc Xfr - Media Manager's NX Overrun error.
0x84440098: RW_MM_TDT_REQUEST_ERR - Disc Xfr - Meida Manager's TDT Request error.
0x84440099: RW_MM_SST_OVERRUN_ERR - Disc Xfr - Media Manager's SST Overrun error.
0x8444009A: RW_PZT_CALIBRATION_FAILED - Servo PZT calibration failed.
0x8444009B: RW_SERVO_FAST_IO_DATA_UPDATE_TIMEOUT - Fast I/O - Servo data update timeout error.
0x8444009C: RW_SERVO_FAST_IO_FIRST_WEDGE_DATA_AVAILABLE_TIMEOUT - Fast I/O - First wedge servo
0x844400A0: RW_WRITE_PREAMP_HTR_OPEN_SHORT_FAULT

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Internal x4/41/87 Errors.
****
0x04418780: RW_IOEDC_ERROR_WITHOUT_IOECC_ERROR_ON_WRITE - Disc Xfr - IOEDC parity error on wr
0x04418701: RW_IOEDC_ERROR_ON_WRITE_FDE - 04/8087, FRU 01 - FDE IOEDC Error on Write detected
0x04418781: RW_IOEDC_IOECC_PARITY_ERR_ON_WRITE - Disc Xfr - IOExC parity error on write.
0x04418782: RW_IOECC_PARITY_ERROR_ON_WRITE - Disc Xfr - IOECC parity error on write.
****
Internal x4/80/89 Errors.
****
0x84418980: RW_IOEDC_PARITY_ERR_ON_READ - Disc Xfr - IOEDC parity error on read.

****
Internal x4/80/87 Errors.
****
0x04808780: RW_IOEDC_ERROR_WITHOUT_IOECC_ERROR_ON_WRITE - Disc Xfr - IOEDC parity error on wr
0x04808701: RW_IOEDC_ERROR_ON_WRITE_FDE - 04/8087, FRU 01 - FDE IOEDC Error on Write detected
0x04808781: RW_IOEDC_IOECC_PARITY_ERR_ON_WRITE - Disc Xfr - IOExC parity error on write.
0x04808782: RW_IOECC_PARITY_ERROR_ON_WRITE - Disc Xfr - IOECC parity error on write.

****
Internal x4/80/89 Errors.
****
0x84808980: RW_IOEDC_PARITY_ERR_ON_READ - Disc Xfr - IOEDC parity error on read.

****
Internal x9/80 Errors.
****
0x89800082: RW_UNSUPPORTED_FAULT - Unsupported fault.
0x89800083: RW_TRACK_ADDR_FAULT - Track address fault.
0x89800084: RW_SERVO_DISC_SYNC_ERR - Disc Xfr - Servo-Disc synchronization error.
0x89800085: RW_UNKNOWN_ENDING_BLK_ADDR - Disc Xfr - End of transfer reached prematurely.
0x89800086: RW_UNKNOWN_SEQ_TIMEOUT_ERR - Disc Xfr - Unexpected sequencer timeout error.
0x89800087: RW_UNKNOWN_NRZ_XFR_ERR - Disc Xfr - Unknown error in the NRZ Transfer logic.
0x89800088: RW_UNKNOWN_EDAC_ERR - Disc Xfr - Unknown EDAC error.
0x89800089: RW_UNKNOWN_MM_ERR - Disc Xfr - Unknown Media Manager's error.
0x8980008A: RW_INVALID_DISC_HALT - Disc Xfr - Invalid disc halt.
0x8980008B: RW_UNEXPECTED_SEQ_HALT - Disc Xfr - Unexpected sequencer halt condition.
0x8980008C: RW_UNEXPECTED_SMART_SEQ_HALT - Super Sector - Unexpected sequencer halt.
0x8980008D: RW_UNKNOWN_SMART_SEQ_TIMEOUT_ERR - Super Sector - Unknown sequencer timeout error.
0x8980008E: RW_UNKNOWN_NRZ_INTF_ERR - Disc Xfr - Unknown NRZ interface error.
0x8980008F: RW_XFR_SOFT_HALTED - Disc Xfr - Disc was soft halted.
0x89800090: RW_XFR_FAULT - Disc Xfr - Fault condition error.
0x89800091: RW_CORR_BFR_COMPLETION_TIMEOUT - Disc Xfr - Correct Buffer Completion timeout erro
0x89800094: RW_RECOVERED_SEEK - Seek - Recovered seek error encountered.
0xC9800095: RW_FORCED_ER_BEFORE_ERROR_ENCOUNTERED - Forced to enter error recvoery before erro
0x89800096: RW_RECOVERED_SERVO_CMD - Recovered servo command error.
0x89800097: RW_PARTIAL_REALLOCATION_PERFORMED - Reallocate Block - Partial reallocation perfor
0x89800098: RW_XFR_TRUNCATED - Disc Xfr - Transfer was truncated.
0x89800099: RW_XFR_SATISFIED - Disc Xfr - Transfer completed.
0x8980009A: RW_XFR_TRACK_SATISFIED - Disc Xfr - Track transfer completed.
0x8980009B: RW_SCAN_DEFECT_ADJ_SECTORS_TIME_EXCEEDED - Scan Defect - Allocated scan time excee
0x8980009C: RW_IOEDC_IOECC_PARITY_ERR_ON_WRITE - Disc Xfr - IMPOSSIBLE - IOECC parity error on
0x8980009D: RW_IOECC_PARITY_ERROR_ON_WRITE - Disc Xfr - IMPOSSIBLE - IOECC parity error on wri
0x8980009E: RW_WRITE_HALT_CORRECTABLE_IOECC_ERR - Disc Xfr - IMPOSSIBLE - IOECC error (correct

0x8980009F: RW_EDAC_HALTED_FOR_FW_ERASURE
0x898000A0: RW_INVALID_BLOCK_FOR_UNMARK_PENDING_REALLOCATION - Reallocate Block - Input was n
0x898000A1: RW_INPUT_LBA_NOT_FOUND_IN_RST - RST Mgr - Input LBA was not found in the RST.
0x898000A2: RW_RESIDENT_DST_DOES_NOT_CONTAIN_TARGET_PBA_01 - DST Mgr - Input PBA was not foun
0x898000A3: RW_RESIDENT_DST_DOES_NOT_CONTAIN_TARGET_PBA_02 - DST Mgr - Input PBA was not foun
0x898000A4: RW_DST_SKOOTCH_FAILED_01 - DST Mgr - Skootch failed.
0x898000A5: RW_DST_SKOOTCH_FAILED_02 - DST Mgr - Skootch failed.
0x898000A6: RW_DST_INSERT_FAILED - DST Mgr - Insert failed.
0x898000A7: RW_CORRECTION_BUFFER_ERR - Correction Buffer over-run, under-run, or EDC error.

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Internal xE/1D Errors.
****
0x8E1D0080: RW_DATA_MISCOMPARE_01 - Disc Xfr - Data miscompare error.
0x8E1D0081: RW_DATA_MISCOMPARE_02 - Disc Xfr - Data miscompare error at erasure correction.

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Internal x1/40 Errors.
****
0x81400280: RW_SERVO_SPINUP_RECOVERED_01 - Spinup error recovered with buzz retries.
0x81400281: RW_SERVO_SPINUP_RECOVERED_02 - Spinup error recovered without buzz retries.

Read/Write Retry Characters

'*': PATH_ERROR_CHAR - DERP illegal path
'#': RESET_FIR_RECOV_CHAR - Reset FIR tweak recovery character
'~': SM_TOLERANCE_RECOV_CHAR - Sync mark tolerance recovery character
')': POST_ACQUIRE_RECOV_CHAR - Post acquire recovery character
'(': TRACKING_PLO_RECOV_CHAR - Tracking PLO tweak recovery character
'$': TRACKING_PLO_SLIP_RECOV_CHAR - Tracking PLO SLIP tweak recovery character
';': DERP_READ_RECOV_CHAR - Data recovery character
'"': ZGS_VGA_RECOV_CHAR
'&': ID_SPLASH_RETRY_CHAR - Splash retry char
'.': DATA_RECOV_CHAR - Data recovery character
'%': DATA_SCRUB_FIRST_WRITE_1
'2': DATA_SCRUB_FIRST_WRITE_2
'1': DATA_SCRUB_SECOND_WRITE
'1': DATA_SCRUB_READ
'@': DATA_SCRUB_ATTEMPTS_EXCEEDED
'a': ACQUIRE_PLO_RECOV_CHAR - Acquire PLO recovery character
'B': BURNISH_RETRY_CHAR
'b': FILTER_RECOV_CHAR - Filter tweak recovery character
'C': CHANNEL_RELOAD_CHAR - Channel Reload recovery
'c': ECC_OTF_RECOV_CHAR - ECC on-the-fly correction performed character
'D': RG_DELAY_CHAR - RG Delay
'D': SWD_DVGAS_RECOV_CHAR
'd': CLEARANCE_RETRY_CHAR - Clearance value adjusted during recovery
'E': EP0_RETRY_CHAR
'e': EP3_RETRY_CHAR
'F': CLEARANCE_RETRY_CHAR - Clearance value adjusted during recovery
'F': AGC_RECOV_CHAR - AGC tweak recovery character
'f': RESET_FIR_RECOV_CHAR - Reset FIR tweak recovery character
'G': FORCED_NLFR_RECOV_CHAR - Forced NLFR tweak recovery character
'g': TRACKING_PLO_RECOV_CHAR - Tracking PLO tweak recovery character
'H': FILTER_RECOV_CHAR - Filter tweak recovery character
'h': AGC_RECOV_CHAR - AGC tweak recovery character
'h': LOW_SYNC_MARK_TOL_RECOV_CHAR - Low sync mark tolerance tweak recovery character
'i': IOEDC_RECOV_CHAR - IOEDC recovery character
'j': EP2_RETRY_CHAR
'k': HEATER_CONTROL_FAULT_RECOV_CHAR
'L': SERVO_FORCE_COAST_RETRY_CHAR

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'M': MR_BIAS_RETRY_CHAR - MR bias tweak retry character
'm': SM_TOLERANCE_RECOV_CHAR - Sync mark tolerance recovery character
'N': SECOND_SYNC_RETRY_CHAR
'P': POST_ACQUIRE_RECOV_CHAR - Post acquire recovery character
'n': FORCED_NLFR_RECOV_CHAR - Forced NLFR tweak recovery character
'N': DERP_NEW_SEQ_CHAR - Shows start of new DERP sequence
'N': FORCED_NEG_SYNC_RETRY_CHAR - Forced Negitive Sync retry char
'O': OFFSET_ISSUED_CHAR
'o': OFFSET_RETRY_CHAR
'P': FORCED_POS_SYNC_RETRY_CHAR - Forced Positive Sync retry char
'p': ACQUIRE_PLO_RECOV_CHAR - Acquire PLO recovery character
'p': PFAST_RETRY_CHAR - Power chop/pfast retry character
'Q': EP1_RETRY_CHAR
'q': WRITE_SERVO_UNSAFE_RECOV_CHAR - Servo unsafe error recovery character
'S': SEEK_AWAY_RETRY_CHAR
's': LARGE_SHOCK_EVENT_RETRY_CHAR - Retry done to recover form a Large Shock Event
'T': SOFT_EP_RETRY_CHAR
't': SETUP_TA_MODE_RECOV_CHAR - Setup TA modes Character
'u': DERP_CHAN_UNTWEAK_CHAR - Channel Untweak
'V': REV_POL_RETRY_CHAR - Reverse Polarity retry character
'v': RW_PRINT_RETRY_VIBRATION_DETECTION_WRITE
'V': RW_PRINT_RETRY_VIBRATION_WRITE
'U': SWD_FVGAS_RECOV_CHAR - Skip Write Detect recovery characters
'V': SWD_RVGAS_RECOV_CHAR
'W': SLIDING_WINDOW_RETRY_CHAR
'w': WRITE_RECOV_CHAR - Write recovery character
'Y': PREAMP_UNSAFE_RECOV_CHAR - Preamp unsafe recovery character
'Z': TRACK_OFFSET_RETRY_CHAR
'z': ZAP_ENABLE_DISABLE_CHAR - Indicates zap enabled/disabled
'|': PZT_RECAL_RETRY_CHAR
```

Flash LED Codes

```
Codes marked (++) are duplicated in sys.i for assembly language wrappers.
Codes marked (**) are converted to FRU codes for reporting in sense data.

0x00 INVALID_FLASH_LED_CODE          00000000 (**) Invalid flash code
0x08 MICRO_FAIL                      00001000 (++) ARM failure, Unexpected FIQ interrupt
0x0B BUFFER_FAIL                     00001011 (++) DRAM failed powerup or WRAM fail.
0x0C SCC_FAIL                        00001100 (**) Controller failed power up diagnostics
0x0D CTLR_VERSION_FAIL               00001101 Controller not compatible with firmware
0x0E UNOPCODE_OCCUR                  00001110 (**) Unimplemented Opcode interrupt

0x10 XOR_FAIL                        00010000 (**) XOR power up test failed (tested even on non-
0x12 PROG_ERR_EVEN                   00010010 EEPROM verify error, even byte
0x13 ERASE_ERR_EVEN                  00010011 EEPROM erase error, even byte
0x14 DL_TPM_FAIL_0                   00010100 TPM could not program EEPROMs
0x15 DL_TPM_FAIL_1                   00010101 TPM could not program EEPROMs
0x16 DL_TPM_FAIL_2                   00010110 TPM could not program EEPROMs
0x17 DL_TPM_FAIL_3                   00010111 TPM could not program EEPROMs
0x18 DL_TPM_FAIL_4                   00011000 TPM could not program EEPROMs
0x19 DL_TPM_FAIL_5                   00011001 TPM could not program EEPROMs
0x1A DL_TPM_FAIL_6                   00011010 TPM could not program EEPROMs
0x1B DL_TPM_FAIL_7                   00011011 TPM could not program EEPROMs
0x1C DL_TPM_FAIL_8                   00011100 TPM could not program EEPROMs
0x1D DWNLD_VFLT                      00011101 Download voltage fault

0x40 ALU_BUFPE_FAIL                  01000000 ALU buffer parity error
0x42 ERROR_INJECTION_ASSERT_CODE     01000010 Assert code reported when an assert event is trig
                                              by error injection and no assert code has been gi
```

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0x44 BUF_CFG_FAIL                     01000100 DRAM configuration process failed
0x45 FDE_BUSPARITY_ERR                01000101
0x47 PREFETCH_VEC                     01000111 (++) (**) Prefetch abort exception (intvect.a)
0x47 SP_FAIL                          01000111 (**) Stack pointer out of range
0x4C READ_CHIP_ERR                    01001100 (**) Error in writing to read chip
0x4D IER_STACK_OVFL                   01001101 (**) IER stack overflow
0x4E IER_STACK_UNFL                   01001110 (**) IER stack underflow
0x4F IER_STACK_ERR                    01001111 (**) stack not empty on entry to sleep

0x55 IRAW_HAD_IOEDC_ERROR             01010101
0x5f IRAW_HAD_MISCOMPARE              01011111

0x67 UNDEFINED_INSTRUCTION            01100111, (++) Undefined opcode exception (intvect.a)

0x77 LOG_SAVE_FAIL                    01110111, (**) Log save data has exceeded the maximum allo

0x80 PORT_FAIL                        10000000, (**) Ports A & B failed power up diags
0x81 NO_BACKPLANE_DATA_RATE           10000001, (**) Can't find back plane data rate
0x81 DATA_RATE_NOT_FOUND              10000001, Can't find back plane data rate

0x90 CITCM_UNRECOVERABLE_ERROR        10010000, Controller I-TCM unrecoverable error
0x91 CDTCM_UNRECOVERABLE_ERROR        10010001, Controller D-TCM unrecoverable error
0x92 SITCM_UNRECOVERABLE_ERROR        10010010, Servo I-TCM unrecoverable error
0x93 SDTCM_UNRECOVERABLE_ERROR        10010011, Servo D-TCM unrecoverable error
0x9D TCM_CRC_FAIL                     10011101, (**) TCM CRC result is non-zero

0xC4 DRAM_INTEGRITY_FAILURE           11000100, (**) DRAM was detected to be corrupt on a write
0xCC ASSERT_FLASH_CODE                11001100, (++) Assert failure
0xCD ENSURE_FLASH_CODE                11001101, (++) Ensure failure
0xCE REQUIRE_FLASH_CODE               11001110, (++) Require failure

0xD1 SCSI_UNEXP_INT                   11010001, (**) Unexpected SCSI interrupt
0xD2 SCSI_TIMEOUT_FLASH_CODE          11010010, (++) SCSI timeout
0xD3 ILLEGAL_STATUS_CODE_FLASH_CODE   11010011, (++) Illegal status code
0xD4 SCSI_UNDER_OVER_RUN_OCCURED      11010100, SCSI Hardware was Overrun or Underun by the host
0xD5 UNEXPECTED_STATUS_CODE           11010101, Unexpected status code from the sequencer
0xDD DIVBY0_FAIL                      11011101, (++) (**) Divide by zero interrupt, SWI range er

0xEE ABORT_FAIL                       11101110, (**) Data abort exception (intvect.a)

0xF1 CTLR_NUKED_BY_FDE                11110001, FDE Nuke the chip bit set, data transfers not al
0xF4 FLASH_IOEDC_PARITY_ERROR         11110100, (**) temporarily flash on IOEDC_PARITY_ERROR
```