Scalar 1000 Library

SCSI Reference Manual

Advance Digital Information Corp

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Contents

1

Introduction

Overview 1-3
Intended Audience 1-3
Organization 1-3
Associated Documents 1-4
Explanation of Symbols and Notes 1-4
Assistance 1-5

2

General SCSI Information

Overview 2-3
General Characteristics 2-3
General SCSI Bus Relationship 2-4
Initiator Operation 2-4
Target Operation 2-4
SCSI Bus 2-4

Element Addressing 2-4

SCSI Communications 2-6
Bus Phases 2-6

SCSI Message System 2-7
COMMAND COMPLETE (00h) 2-7
SAVE DATA POINTERS (02h) 2-7
RESTORE POINTERS (03h) 2-7
DISCONNECT (04h) 2-8
INITIATOR DETECTED ERROR (05h) 2-8
ABORT (06h) 2-8
MESSAGE REJECT (07h) 2-8
NO-OP (08h) 2-8
MESSAGE PARITY ERROR (09h) 2-8
BUS DEVICE RESET (0Ch) 2-8
IDENTIFY (80h or C0h) 2-9

SCSI Commands 2-9
Device Commands 2-9
SCSI Command Format 2-10

SCSI Command Status Byte 2-11

SCSI Operations 2-12
Parity Checking 2-12
Disconnection 2-12
Resetting the Scalar 1000 2-12
Power-On Behavior 2-12
SCSI Device Reset Behavior 2-12
Other SCSI Functionality 2-13
Unit Attention Condition 2-13

3

Initialize Element Status (07h)

Overview 3-3

Initialize Element Status (07h) Command 3-3
CDB Format 3-4
Logical Unit Number 3-4
NBL 3-4

Initialize Element Status (07h) Status 3-4
Good 3-4
Busy 3-4

Reservation Conflict 3-4
Check Condition 3-4

4

Initialize Element Status With Range (E7h)

Overview 4-3

Initialize Element Status With Range (E7h) Command 4-3
CDB Format 4-4
Logical Unit Number 4-4
Range 4-4
Starting Element Address 4-4
Number of Elements 4-5
NBL 4-5

Initialize Element Status With Range (E7h) Status 4-5
Good 4-5
Busy 4-5
Reservation Conflict 4-5
Check Condition 4-5

5

Inquiry (12h)

Overview 5-3

Inquiry (12h) Command 5-3
CDB Format 5-3
Enable Vital Product Data (EVPD). 5-3
Allocation Length 5-4

Inquiry (12h) Response 5-4
Standard Inquiry Data Format 5-5
Peripheral Qualifier 5-5
Peripheral Device Type 5-6
RMB 5-6
Device-Type Modifier 5-6
ISO Version 5-6
ECMA Version 5-6

ANSI (Approved Version) 5-6
Asynchronous Event Notification Capability (AENC) 5-6
Terminate I/O Process (TrmIOP) 5-6
Response Data Format 5-6
Additional Length 5-6
Relative Address (RelAdr) 5-6
Wide Bus 32 (Wbus32) 5-7
Wide Bus 16 (Wbus16) 5-7
Synchronous Transfer (Sync) 5-7
Linked Commands (Linked) 5-7
Command Queuing (CmdQue) 5-7
Soft Reset (SftRe) 5-7
Vendor Identification 5-7
Product Identification 5-7
Firmware Revision Level 5-8
Full Firmware Revision Level 5-8
Vendor Specific 5-8
Bar Code (BarC) 5-8
Typical Response Bytes 00 through 55 5-8
Supported Vital Product Data Page 5-8
Peripheral Qualifier 5-9
Peripheral Device Type 5-9
Page Code 5-9
Page Length 5-9
First Page Code Supported 5-9
Second Page Code Supported 5-10
Third Page Code Supported 5-10
Fourth Page Code Supported 5-10
Fifth Page Code Supported 5-10
Unit Serial Number Page 5-10
Peripheral Qualifier 5-10
Peripheral Device Type 5-11
Page Code 5-11
Page Length 5-11
Serial Number 5-11
Firmware Revision Page 5-11
Peripheral Qualifier 5-12
Peripheral Device Type 5-12
Page Code 5-12
Page Length 5-12
Revision 5-13
Build Date 5-13
Checksum 5-13
Implemented SCSI-2 Command Page 5-13
Peripheral Qualifier 5-15
Peripheral Device Type 5-15
Page Code 5-15
Page Length 5-15
Implemented SCSI-2 Commands 5-15

Implemented Vendor Specific Command Page 5-15
Peripheral Qualifier 5-16
Peripheral Device Type 5-16
Page Code 5-16
Page Length 5-16
Implemented Vendor Specific SCSI-2 Command 5-16

Inquiry (12h) Status 5-16
Good 5-17
Busy 5-17
Reservation Conflict 5-17
Check Condition 5-17

6

Log Sense (4Dh)

Overview 6-3

Log Sense (4Dh) Command 6-3
CDB Format 6-4
PPC 6-4
SP 6-4
PC 6-4
Page Code 6-4
Parameter Pointer 6-5
Allocation Length 6-6

Log Sense (4Dh) Response 6-6
Log Page Format 6-6
Page Code 6-7
Page Length 6-7
Log Parameters 6-7
Log Parameter Format 6-7
Parameter Code 6-8
Disabled Update (DU) 6-8
Disable Save (DS) 6-8
Target Save Disable (TSD) 6-8
Enable Threshold Comparison (ETC) 6-8
Threshold Met Criteria (TMC) 6-9
List Parameter (LP) 6-9
Page Code 6-10
Page Length 6-10
Supported Log Page 6-10
System Statistics Log Page 6-10
State Log Page 6-10

History of Events Log Page 6-10
Element Statistics Log Page 6-11
Cartridge Scan Retries Log Page 6-11
Element Position Log Page 6-11
Supported Media Page 6-11
System Statistics Log 6-11
State Log 6-12
History of Events Log 6-12
Parameter Code 6-13
Parameter Length 6-13
Element Statistics Log 6-13
Parameter Code 6-14
Parameter Length 6-14
Total Puts 6-15
Total Put Retries 6-15
Total Pick Retries 6-15
Cartridge Scan Retries Log 6-15
Parameter Code 6-16
Parameter Length 6-16
Total Scan Retries 6-16
Element Position Page Log 6-16
Parameter Code 6-17
Parameter Length 6-17
Vertical Axis Position 6-17
Picker Position 6-17
Horizontal Axis Position 6-18
Supported Media Log 6-18

Log Sense (4Dh) Status 6-19
Good 6-19
Busy 6-19
Reservation Conflict 6-19
Check Condition 6-19

7

Mode Select (15h)

Overview 7-3

Mode Select (15h) Command 7-3
CDB Parameters 7-4
PF 7-4
SP 7-4
Parameter List Length 7-4
Parameter List Header 7-5

Element Address Assignment Page (1Dh) 7-5
Page Code 7-7
Parameter List Length 7-8
First Medium Transport Element Address 7-8
Number of Medium Transport Elements 7-8
First Storage Element Address 7-8
Number of Storage Elements 7-8
First Import/Export Element Address 7-8
Number of Import/Export Elements 7-8
First Data Transfer Element Address 7-9
Number of Data Transfer Elements 7-9
LCD Mode Page (22h) 7-9
Page Code 7-10
Parameter List Length 7-10
LCD Security Valid 7-10
LCD Security 7-10
Write Line 1 7-11
Write Line 2 7-11
Write Line 3 7-11
Write Line 4 7-11
Display Line 1 7-11
Display Line 2 7-11
Display Line 3 7-11
Display Line 4 7-12
Parity Page (00h) 7-14
Page Code 7-14
Parameter List Length 7-14
Parity 7-14
Maximum Parity Retries 7-14
Mixed Media Page (2Ah) 7-15
Page Code 7-15
Parameter List Length 7-15
Volser Extension Enable (Volser Enable) 7-15
Vendor ASCQ 7-15
RES Extension Enable (Extend RES) 7-16
Mixed Media Enable (MM Enable) 7-16

Mode Select (15h) Status 7-16
Good 7-16
Busy 7-16
Reservation Conflict 7-16
Check Condition 7-16

8

Mode Sense (1Ah)

Overview 8-5

Mode Sense (1Ah) Command 8-5
CDB Format 8-6
DBD. 8-6
PC 8-6
Page Code 8-6
Allocation Length 8-7

Mode Sense (1Ah) Response 8-7
Parameter List Header 8-7
Sense Data Length 8-8
Element Address Assignment Page (1Dh) 8-8
PS (Page Savable) 8-9
Page Code 8-10
Parameter List Length 8-10
Transport Geometry Descriptor Page (1Eh) 8-10
PS. 8-10
Page Code 8-10
Parameter Length 8-10
Rotate 8-11
Member Number in Transport Element Set 8-11
Device Capabilities Page (1Fh) 8-11
PS. 8-11
Page Code 8-12
Parameter Length 8-12
Data Transfer (DT) 8-12
Import/Export (I/E). 8-12
Storage Location (ST) 8-12
Medium Transport (MT) 8-12
MT to DT 8-12
MT to I/E 8-12
MT to ST. 8-12
MT to MT 8-12
ST to DT 8-13
ST to I/E. 8-13
ST to ST. 8-13
ST to MT. 8-13
I/E to DT 8-13
I/E to I/E 8-13
I/E to ST. 8-13
I/E to MT 8-13

DT to DT 8-14
DT to I/E 8-14
DT to ST 8-14
DT to MT 8-14
LCD Mode Page (22h) 8-14
PS 8-15
Page Code 8-15
Parameter List Length 8-15
LCD Security Valid 8-15
LCD Security 8-16
Write Line 1 8-16
Write Line 2 8-16
Write Line 3 8-16
Write Line 4 8-16
Display Line 1 8-17
Display Line 2 8-17
Display Line 3 8-17
Display Line 4 8-17
Parity Page (00h) 8-17
PS 8-18
Page Code 8-18
Parameter List Length 8-18
Parity 8-18
Maximum Parity Retries 8-18
Mixed Media Page (2Ah) 8-18
PS 8-19
Page Code 8-19
Parameter List Length 8-19
Volser Extension Enable (Volser Enable) 8-19
Vendor ASCQ 8-19
RES Extension Enable (Extend RES) 8-20
Mixed Media Enable (MM Enable) 8-20
Library Geometry Descriptor Page (2Bh) 8-20
PS 8-22
Page Code 8-22
Parameter Length 8-22
Section X, Frame Y, Column Z Descriptor 8-22

Mode Sense (1Ah) Status 8-23
Good 8-23
Busy 8-23
Reservation Conflict 8-23
Check Condition 8-23

9

Move Medium (A5h)

Overview 9-3

Move Medium (A5h) Command 9-3
CDB Format 9-4
Transport Element Address 9-4
Source Address 9-4
Destination Address 9-4
Invert 9-5
Cartridge Inventory 9-5

Move Medium (A5h) Status 9-8
Good 9-8
Busy 9-8
Reservation Conflict 9-8
Check Condition 9-9

10

Position to Element (2Bh)

Overview 10-3

Position to Element (2Bh) Command 10-3
CDB Format 10-4
Transport Element Address 10-4
Destination Element Address 10-4
Invert 10-4

Position To Element (2Bh) Status 10-4
Good 10-4
Busy 10-4
Reservation Conflict 10-4
Check Condition 10-4

11

Prevent/Allow Medium Removal (1Eh)

Overview 11-3

Prevent / Allow Medium Removal(1Eh) Command 11-3
CDB Format 11-4
Prevent 11-4
P / A Options 11-4

Prevent / Allow Medium Removal (1Eh) Status 11-4
Good 11-4
Busy 11-4
Reservation Conflict 11-5
Check Condition 11-5

12

Read Buffer (3Ch)

Overview 12-3

Read Buffer (3Ch) Command 12-3
CDB Format 12-3
Mode 12-3
Data Mode 12-4
Descriptor Mode 12-4
Buffer ID 12-5
Buffer Offset 12-6
Allocation Length 12-6

Read Buffer (3Ch) Response 12-6

Read Buffer (3Ch) Status 12-6
Good 12-6
Busy 12-6
Reservation Conflict 12-6
Check Condition 12-6

13

Read Element Status (B8h)

Overview 13-5

Read Element Status (B8h) Command 13-5
CDB Format 13-6
VolTag 13-6
Element Type Code 13-6
Starting Element Address 13-6
Number of Elements 13-6
CurData 13-6
DVCID 13-7
Allocation Length 13-7

Read Element Status (B8h) Response 13-7
Element Status Header 13-7
First Element Address Reported 13-8
Number of Elements Reported 13-8
Byte Count of Report Available 13-8
Element Status Page 13-8
Element Type Code 13-9
PVolTag 13-9
AVolTag 13-9
Element Descriptor Length 13-9
Byte Count of Descriptor Data Available 13-10
Element Descriptors 13-10
Medium Transport Element 13-10
Except 13-12
Full 13-12
Additional Sense Code 13-12
Additional Sense Code Qualifiers 13-12
SValid 13-12
Invert 13-12
Source Storage Element Address 13-12
Primary Volume Tag 13-12
Media Domain 13-12
Media Type 13-12
Element Domain 13-12
Element Type 13-12
Storage Element Descriptor 13-12
Element Address 13-13
Access 13-14
Except 13-14
Full 13-14

Additional Sense Code (ASC) 13-14
Additional Sense Code Qualifier (ASCQ) 13-14
SValid 13-14
Invert 13-14
Source Element Address 13-14
Primary Volume Tag Information 13-15
Media Domain 13-15
Media Type 13-15
Element Domain 13-15
Element Type 13-16
Import/Export Element Descriptor 13-16
Element Address 13-18
InEnab 13-18
ExEnab 13-18
Access 13-18
Except 13-18
Imp/Exp 13-18
Full 13-19
Additional Sense Code (ASC) 13-19
Additional Sense Code Qualifier 13-19
SValid 13-19
Invert 13-19
Source Element Address 13-19
Primary Volume Tag Information 13-19
Media Domain 13-19
Media Type 13-20
Element Domain 13-20
Element Type 13-20
Data Transfer Element Descriptor Page 13-20
Element Address 13-22
Access 13-22
Except 13-22
Full 13-22
Additional Sense Code (ASC) 13-22
Additional Sense Code Qualifier (ASCQ) 13-22
NotBus 13-22
IDValid 13-23
LUValid 13-23
Logical Unit Number 13-23
SCSI Bus Address 13-23
SValid 13-23
Invert 13-23
Source Element Address 13-23
Primary Volume Tag Information 13-23
Code Set 13-23
Identifier Type 13-23
Identifier Length 13-24
Identifier 13-24
Media Domain 13-24

Media Type 13-24
Element Domain 13-24
Element Type. 13-25
ASC and ASCQ Values for 13-25

Read Element Status (B8h) Status 13-26
Good 13-26
Busy 13-26
Reservation Conflict 13-26
Check Condition 13-26

14

Receive Diagnostic Results (1Ch)

Overview 14-3

Receive Diagnostic Results (1Ch) Command 14-3
CDB Format 14-4
Allocation Length 14-4

Receive Diagnostic Results (1Ch) Response 14-4
Supported Diagnostics Page 14-4
Page Code 14-5
Page Length 14-5
Supported Page List 14-5
Diagnostic Page Format 14-6
Page Code 14-6
Parameter List Length 14-6
Requested Test Count 14-6
Completed Test Count 14-6

Receive Diagnostic Results (1Ch) Status 14-7
Good 14-7
Busy 14-7
Reservation Conflict 14-7
Check Condition 14-7

15

Release (17h)

Overview 15-3

Release (17h) Command 15-3
CDB Format 15-3
3rdPty 15-3
Third Party Device ID 15-3
Element. 15-3
Reservation Identification 15-4

Release (17h) Status 15-4
Good 15-4
Busy 15-4
Reservation Conflict 15-4
Never returned.. 15-4
Check Condition 15-4

16

Request Sense (03h)

Overview 16-3

Request Sense (03h) Command 16-3
CDB Format 16-3
Allocation Length 16-3

Request Sense (03h) Response 16-3
Sense Information Format 16-3
Sense Key 16-4
Information Bytes 16-5
Additional Sense Length 16-5
Command Specific Bytes 16-5
Additional Sense Code (ASC). 16-5
ASCQ 16-5
Service Action Code 16-5
Sense Key Specific Value (SKSV) 16-5
Command / Data (C / D) 16-6
Bit Pointer Valid (BPV) 16-6

Bit Pointer 16-6
Field Pointer 16-6
Returned Error Codes 16-6

Request Sense (03h) Status 16-10
Good 16-10
Busy 16-11
Reservation Conflict 16-11
Check Condition 16-11

17

Request Volume Element Address (B5h)

Overview 17-3

Request Volume Element Address (B5h) Command 17-3
CDB Format 17-4
VolTag 17-4
Element Type Code 17-4
Starting Element Address 17-5
Number of Elements 17-5
Allocation Length 17-5

Request Volume Element Address (B5h) Response 17-5
Volume Element Address Header 17-5
First Element Address Reported 17-6
Number of Elements Reported 17-6
Send Action Code 17-6
Byte Count of Report Available 17-6
Element Status Page 17-7
Element Type Code 17-7
PVolTag 17-7
AVolTag 17-7
Element Descriptor Length 17-7
Byte Count of Descriptor Data Available 17-8
Element Descriptors 17-8
Storage Element Descriptor 17-8
Element Address 17-9
Access 17-10
Except 17-10
Full 17-10
Additional Sense Code 17-10
Additional Sense Code Qualifier 17-10
SValid 17-10
Invert 17-10

Source Element Address 17-10
Primary Volume Tag Information 17-10
Media Domain. 17-11
Media Type 17-11
Element Domain 17-11
Element Type. 17-12
Import/Export Element Descriptor 17-12
Element Address. 17-14
InEnab. 17-14
ExEnab 17-14
Access 17-14
Except 17-14
Imp/Exp. 17-14
Full 17-15
Additional Sense Code (ASC). 17-15
Additional Sense Code Qualifier (ASCQ). 17-15
SValid 17-15
Invert. 17-15
Source Element Address 17-15
Primary Volume Tag Information 17-15
Media Domain. 17-15
Media Type 17-16
Element Domain 17-16
Element Type. 17-16
Data Transfer Element Descriptor 17-16
Element Address. 17-17
Access 17-18
Except 17-18
Full 17-18
Additional Sense Code (ASC). 17-18
Additional Sense Code Qualifier (ASCQ). 17-18
NotBus 17-18
IDValid 17-19
LUValid 17-19
Logical Unit Number 17-19
SCSI Bus Address 17-19
SValid 17-19
Invert. 17-19
Source Element Address 17-19
Primary Volume Tag Information 17-19
Media Domain. 17-19
Media Type 17-20
Element Domain 17-20
Element Type. 17-20
ASC and ASCQ Values For Abnormal Conditions 17-21

Request Volume Element Address (B5h) Status 17-21
Good 17-21
Busy 17-22
Reservation Conflict 17-22

Check Condition 17-22

18

Reserve (16h)

Overview 18-3

Reserve (16h) Command 18-3
CDB Format 18-4
3rdPty 18-4
Third Party Device ID 18-4
Element. 18-4
Reservation Identification 18-4
Element List Length 18-4
Element List Descriptors 18-4
Number of Elements 18-5
Element Address. 18-5

Reserve (16h) Status 18-5
Good 18-5
Busy 18-5
Reservation Conflict 18-6
Check Condition 18-6

19

Re-Zero Unit (01h)

Overview 19-3

Re-Zero (01h) Command 19-3
CDB Format 19-3

Re-Zero (01h) Status 19-3
Good 19-3
Busy 19-3
Reservation Conflict 19-4
Check Condition 19-4

20

Send Diagnostic (1Dh)

Overview 20-3

Send Diagnostic (1Dh) Command 20-3
CDB Format 20-3
Page Format (PF). 20-3
SelfTest 20-3
DevOfl (Device Offline) 20-4
UnitOfl (Unit Offline). 20-4
Parameter List Length 20-4
Send Diagnostic Parameter List 20-5
4 Byte Send Diagnostic Parameter 20-5
Page Code 20-5
Page Length 20-5
Page Code 20-6
Parameter List Length. 20-6
Test Parameters 20-6
Test Count. 20-6

Send Diagnostic (1Dh) Status 20-7
Good 20-7
Busy 20-7
Reservation Conflict 20-8
Check Condition 20-8

21

Send Volume Tag (B6h)

Overview 21-3

Send Volume Tag (B6h) Command 21-3
CDB Format 21-4
Element Type Code 21-4
Starting Element Address 21-4
Send Action Code 21-5
Parameter List Length 21-5
Volume ID Template Field 21-5

Send Volume Tag (B6h) Status 21-6
Good 21-6
Busy 21-6
Reservation Conflict 21-6
Check Condition 21-6

22

Test Unit Ready (00h)

Overview 22-3

Test Unit Ready (00h) Command 22-3

Test Unit Ready (00h) Status 22-4
Good 22-4
Busy 22-4
Reservation Conflict 22-4
Check Condition 22-4

23

Write Buffer (3Bh)

Overview 23-3

Write Buffer (3Bh) Command 23-3
CDB Format 23-3
Mode 23-3
Write Data Mode. 23-4
Download Microcode and Save Mode 23-4
Buffer Id 23-4
Buffer Offset 23-5
Parameter List Length 23-5

Write Buffer (3Bh) Status 23-5
Good 23-5
Busy 23-5
Reservation Conflict 23-5
Check Condition 23-5

Index

Figures

Figure 3-1 INITIALIZE ELEMENT STATUS CDB 3-3
Figure 4-1 INITIALIZE ELEMENT STATUS WITH RANGE CDB 4-4
Figure 5-1 INQUIRY CDB 5-3
Figure 5-2 Standard Inquiry Data 5-5
Figure 5-3 Supported Vital Product Data Page 5-9
Figure 5-4 Serial Number Page 5-10
Figure 5-5 Firmware Revision Page 5-12
Figure 5-6 Implemented SCSI-2 Command Page 5-14
Figure 5-7 Implemented Vendor Specific Command Page 5-16
Figure 6-1 LOG SENSE CDB 6-3
Figure 6-2 Log Sense Page Header Format 6-7
Figure 6-3 LOG Parameter Format 6-8
Figure 6-4 Supported Log Page 6-10
Figure 6-5 History of Events Log Page Format 6-13
Figure 6-6 Element Statistics Page Format 6-14
Figure 6-7 Cartridge Scan Retries Page Format 6-15
Figure 6-8 Element Position Page Format 6-17
Figure 7-1 MODE SELECT CDB 7-4
Figure 7-2 Parameter List Header Format 7-5
Figure 7-3 Element Address Assignment Page Format 7-7
Figure 7-4 LCD Mode Page Format 7-10
Figure 7-5 Character Set 7-13

Figure 7-6 Parity Page Format 7-14
Figure 7-7 Mixed Media Page Format 7-15
Figure 8-1 MODE SENSE CDB 8-5
Figure 8-2 Parameter List Header 8-7
Figure 8-3 Element Address Assignment Page Format 8-9
Figure 8-4 MODE SENSE Descriptor Page 8-10
Figure 8-5 Device Capabilities Page Code Format 8-11
Figure 8-6 LCD Mode Page Code 8-15
Figure 8-7 Parity Page Code 00h 8-17
Figure 8-8 Mixed Media Page Format 8-19
Figure 8-9 Library Geometry Descriptor Page Format 8-22
Figure 8-10 Scalar 1000 Configuration Example 8-23
Figure 9-1 MOVE MEDIUM CDB 9-4
Figure 10-1 POSITION TO ELEMENT CDB 10-3
Figure 11-1 PREVENT/ALLOW MEDIUM REMOVAL CDB 11-3
Figure 12-1 READ BUFFER CDB 12-3
Figure 12-2 Read Buffer Descriptor 12-4
Figure 13-1 READ ELEMENT STATUS CDB 13-5
Figure 13-2 Element Status Header 13-8
Figure 13-3 Element Status Page Format 13-9
Figure 13-4 Medium Transport Element Descriptor Format 13-11
Figure 13-5 Storage Element Descriptor Format 13-13
Figure 13-6 Import/Export Element Descriptor Format 13-17
Figure 13-7 Data Transfer Element Descriptor Page Format 13-22
Figure 14-1 RECEIVE DIAGNOSTIC RESULTS CDB 14-3
Figure 14-2 Receive Diagnostic Result Data Format 14-5
Figure 14-3 Diagnostic Page Format 14-6
Figure 15-1 RELEASE CDB 15-3
Figure 16-1 REQUEST SENSE CBD 16-3
Figure 16-2 Sense Information Format 16-4
Figure 17-1 REQUEST VOLUME ELEMENT ADDRESS CDB 17-4
Figure 17-2 Request Volume Element Address Header 17-6
Figure 17-3 Element Status Page 17-7

Figure 17-4 Storage Element Format 17-9
Figure 17-5 Import/Export Element Descriptor 17-13
Figure 17-6 Data Transfer Element Descriptor Format. 17-17
Figure 18-1 RESERVE CDB 18-3
Figure 18-2 Element List Descriptor Format 18-5
Figure 19-1 RE-ZERO CDB 19-3
Figure 20-1 SEND DIAGNOSTIC CDB. 20-3
Figure 20-2 4 Byte Send Diagnostic Parameter List. 20-5
Figure 20-3 6 Byte Send Diagnostic Parameter List. 20-6
Figure 21-1 SEND VOLUME TAG CDB 21-4
Figure 21-2 Send Volume Tag Parameter List 21-5
Figure 22-1 TEST UNIT READY CDB. 22-3
Figure 23-1 WRITE BUFFER CDB 23-3

Tables

Table 2-1 Default Addressing Scheme for Half-inch and DLT 2-5
Table 2-2 Default Addressing Scheme for 8mm AIT. 2-5
Table 2-3 Bus Phases 2-6
Table 2-4 Supported SCSI Messages 2-7
Table 2-5 Supported SCSI Commands 2-9
Table 2-6 Command Format 2-10
Table 2-7 Status Bytes. 2-11
Table 2-8 Invalid Parameters in the CDB 4-6
Table 5-1 Invalid Parameters in the CDB 5-17
Table 6-1 Legal values for Page Code Field 6-5
Table 6-2 System Statistics Saved in Nonvolatile RAM 6-11
Table 6-3 Log Parameters for Digital Sensors. 6-12
Table 6-4 Log Parameters for Supported Media 6-18
Table 6-5 Invalid Parameters in the CDB 6-20
Table 7-1 MODE SELECT Page Lengths 7-5
Table 7-2 Invalid Parameters in the CDB 7-17
Table 8-1 MODE SENSE Page Control Definition 8-6
Table 8-2 Supported Pages 8-7
Table 8-3 Invalid Parameters in the CDB 8-24
Table 9-1 Successful Move Operation 9-5
Table 9-2 Move Operation with Empty Source 9-6
Table 9-3 Move Operation with Destination Full 9-7

Table 9-4 Move Operation with Identical Source and Destination 9-8
Table 9-5 Invalid Parameters in the CDB 9-9
Table 10-1 Invalid Parameters in the CDB 10-5
Table 11-1 P/A Options 11-4
Table 11-2 Invalid Parameters in the CDB 11-5
Table 12-1 Mode Field Definition 12-4
Table 12-2 Buffer Offset Boundary 12-5
Table 12-3 Buffer ID Description 12-5
Table 13-1 Element Type Code 13-6
Table 13-2 Element Descriptor Length 13-9
Table 13-3 ASC and ASCQ Values 13-26
Table 13-4 Invalid Parameters in the CDB 13-27
Table 15-1 Invalid Parameters in the CDB 15-5
Table 16-1 Sense Keys 16-5
Table 16-2 Additional Sense Codes and Qualifiers 16-7
Table 17-1 ASC and ASCQ Values 17-21
Table 17-2 Invalid Parameters in the CDB 17-22
Table 18-1 Invalid Parameters in the CDB 18-6
Table 20-1 Parameter List Length Values for Self Test 20-4
Table 20-2 Diagnostic Test Availability 20-7
Table 20-3 Invalid Parameters in the CDB 20-8
Table 21-1 Invalid Parameters in the CDB 21-7
Table 23-1 Mode Field Definition 23-4
Table 23-2 Buffer ID and Description 23-4
Table 23-3 Invalid Parameters in the CDB 23-6

1

Introduction

Overview 1-3
Intended Audience 1-3
Organization 1-3
Associated Documents 1-4
Explanation of Symbols and Notes 1-4
Assistance 1-5

Overview

This manual contains information for the Scalar 1000 [1] library Small Computer System Interface (SCSI) interface, commands, and status. The topics discussed in this chapter of the manual are:

- Overview
- Intended Audience
- Organization
- Associated Documents
- Explanation of Symbols and Notes
- Assistance

Intended Audience

This manual is intended for use by those individuals who are using the SCSI interface to communicate with the Scalar 1000.

Organization

This publication contains the following information.

Chapter 1	*Introduction* - Describes the contents of the *Scalar 1000 SCSI Reference* guide.
Chapter 2	*General SCSI Information* - Describes a general overview of SCSI bus operations, messages, and commands.
	The following chapters describe detailed SCSI command formats and definitions.
Chapter 3	*Initialize Element Status (07h)*
Chapter 4	*Initialize Element Status with Range (E7h)*
Chapter 5	*Inquiry (12h)*
Chapter 6	*Log Sense (4Dh)*
Chapter 7	*Mode Select (15h)*
Chapter 8	*Mode Sense (1Ah)*

1. Scalar 1000 is a trademark of ADIC Throughout the remainder of this document, we refer to the Scalar 1000 library as Scalar 1000.

Chapter 9	*Move Medium (A5h)*
Chapter 10	*Position to Element (2Bh)*
Chapter 11	*Prevent/Allow Medium Removal (1Eh)*
Chapter 12	*Read Buffer (3Ch)*
Chapter 13	*Read Element Status (B8h)*
Chapter 14	*Receive Diagnostic Results (1Ch)*
Chapter 15	*Release (17h)*
Chapter 16	*Request Sense (03h)*
Chapter 17	*Request Volume Element Address (B5h)*
Chapter 18	*Reserve (16h)*
Chapter 19	*Re-Zero (01h)*
Chapter 20	*Send Diagnostic (1Dh)*
Chapter 21	*Send Volume Tag (B6h)*
Chapter 22	*Test Unit Ready (00h)*
Chapter 23	*Write Buffer (3Bh)*
Index	

Associated Documents

Additional information related to the Scalar 1000 family is available in the following publications:

600602-A	Scalar 1000 Maintenance Guide
600603-A	Scalar 1000 Planning Guide
600605-A	Scalar 1000 Operator Guide

Explanation of Symbols and Notes

	☞ **Note**

Important information for understanding this guide.

☞ **Note**	Important notes for understanding this guide.
Italics	Headline, e. g., Chapter 3, *Initialize Element Status (07h)*
Bold	Terms appearing on the Scalar 1000 operating panel Special term, commands or responses, e. g., **RELEASE** Operating element / key on the operating panel, e.g., **ESCAPE**
`Courier`	Line appearing in an input window, e. g., `PARK`

Assistance

If problems cannot be solved with the aid of this document, contact the ADIC Technical Assistance Center (ATAC).

- United States 1-800-827-3822

  — or —

  303-7900-2083
- Europe / Africa +49-69-7590-9246

2

General SCSI Information

Overview 2-3

General Characteristics 2-3

General SCSI Bus Relationship 2-4
- Initiator Operation 2-4
- Target Operation 2-4
- SCSI Bus 2-4
- Element Addressing 2-4

SCSI Communications 2-6
- Bus Phases 2-6

SCSI Message System 2-7
- COMMAND COMPLETE (00h) 2-7
- SAVE DATA POINTERS (02h) 2-7
- RESTORE POINTERS (03h) 2-7
- DISCONNECT (04h) 2-8
- INITIATOR DETECTED ERROR (05h) 2-8
- ABORT (06h) 2-8
- MESSAGE REJECT (07h) 2-8
- NO-OP (08h) 2-8
- MESSAGE PARITY ERROR (09h) 2-8
- BUS DEVICE RESET (0Ch) 2-8
- IDENTIFY (80h or C0h) 2-9

SCSI Commands 2-9
- Device Commands 2-9
- SCSI Command Format 2-10

SCSI Command Status Byte 2-11

SCSI Operations 2-12
- Parity Checking 2-12
- Disconnection 2-12
- Resetting the Scalar 1000 2-12

Power-On Behavior 2-12
SCSI Device Reset Behavior 2-12
Other SCSI Functionality 2-13
Unit Attention Condition 2-13

Overview

This chapter details the Scalar 1000 Medium Changer SCSI protocol. The supported commands, messages, and options are listed.

General Characteristics

The Scalar 1000 contains the following major components:

- The basic model consists of a single Control Module (CM). A CM contains tape drives, storage cells, and an Insert / Eject station. The CM connects to host(s) by 1 or 2 SCSI ports. The Scalar 1000 can be reconfigured by adding one to three additional Expansion Modules (EM). The EM contains additional storage cells and may contain additional tape drives.
- An operator panel.
- A medium changer, referred to as the accessor, moves cartridges to and from the storage cells, Insert / Eject station, and tape drive(s).
- A barcode scanner reads volume barcode labels on the cartridges.

Note
The mode of operation determines how the Scalar 1000 responds to the SCSI **INQUIRY** command. SCSI command processing performs as described in this manual.

The Scalar 1000 can operate in one of four modes of operation; an ADIC native mode, an EXABYTE compatible mode, a STK compatible mode, or ADIC compatibility mode.

The Scalar 1000 supports half inch and / or DLT configurations or 8mm AIT configurations with the following storage capacity:

- Storage cell cartridge capacity ranges from 118 to 788 for half-inch and DLT configuration. The Scalar 1000 supports 3480, 3590, and DLT tape cartridge configurations. The Insert / Eject station has a capacity of twelve storage cells.
- Storage cell cartridge capacity ranges from 237 to 1182 for 8mm AIT configuration. The Insert / Eject station has a capacity of eighteen storage cells.

General SCSI Bus Relationship

The SCSI interface is a standard that enables hosts to communicate with peripheral devices. The Scalar 1000 is considered a peripheral device. The components of the SCSI system include the initiator, target, and physical connection between the initiator and target devices.

Initiator Operation

A SCSI bus adapter card in a host computer acts as the initiator of SCSI operations. The host can initiate commands, messages, and send data to the target. The initiator can also receive messages, data, and status from the target.

Target Operation

The target medium changer or tape drive receives commands, messages, and data from the host initiator. Since the Scalar 1000 cannot act as an initiator, it cannot perform the following:

- Generate unsolicited interrupts to the host
- Initiate its own SCSI commands
- Assert bus resets

The Scalar 1000 responds with data, messages, and status.

SCSI Bus

The SCSI cables which connect the host initiator and target peripheral devices form the SCSI bus. The bus provides the pathway for exchanges between the host initiator and target peripheral. Up to sixteen devices, either single ended or differential, connect to the bus. The SCSI bus must be terminated at both ends.

Element Addressing

A host initiator references a storage location with element addresses. The Scalar 1000 has a default addressing scheme for half-inch and DLT and a separate addressing scheme for AIT.

Refer to Table 2-1 on page 2-5 for the half-inch and DLT default addressing scheme. Storage cells are addressed from the top left to lower right, column by column. Tape drives are addressed from lower left to upper right, column by column, drive bay by drive bay. The Insert/Eject station is addressed from top to bottom.

Table 2-1 on page 2-5 takes into account all of the various Scalar 1000 half-inch and DLT configurations. For each additional drive bay, remove 40 storage cells from the maximum allowable. Regardless of the configuration, all tape drive and storage cell addresses must be consecutive within their type.

Table 2-1 Default Addressing Scheme for Half-inch and DLT

Addressing Range	Cell Definition
0 - 787 (Storage Elements)	Storage Cell (maximum allowable)
788 - 799 (Import/Export Elements)	Insert/Eject Station
800 - 847 (Data Transport Elements)	Tape Drive
848 (Media Transport Element)	Accessor

See Table 2-2 for the 8mm AIT default addressing scheme. Storage Cells are addressed from the top left to lower right, column by column. Tape drives are addressed from lower left to upper right, column by column within a drive bay. The Insert/Eject station is addressed from top to bottom.

Table 2-2 takes into account all of the various Scalar 1000 8mm AIT configurations. For each additional drive bay, remove 60 storage cells from the maximum allowable. Regardless of the configuration, all tape drive and storage cell addresses must be consecutive within their type.

Table 2-2 Default Addressing Scheme for 8mm AIT

Addressing Range	Cell Definition
0 - 1181 (Storage Elements)	Storage Cell (maximum allowable)
1182 - 1199 (Import/Export Elements)	Insert/Eject Station
1200 - 1247 (Data Transport Elements)	Tape Drive
1248 (Media Transport Element)	Accessor

SCSI Communications

Scalar 1000 communications are implemented across the SCSI bus. The following paragraphs discuss the bus phases.

Bus Phases

The Scalar 1000 conforms to the bus state transition table of the SCSI-2 standard, *Phase Sequences*. Bus phases determine the type of information and direction on the interface. Refer to Table 2-3 on page 2-6.

Table 2-3 Bus Phases

Phase	Description
Bus Free	The Bus Free phase indicates that the bus is idle.
Arbitration	The Arbitration phase allows devices to compete for bus access.
Selection	The Selection phase allows the host initiator to select the target destination for communication.
Reselection	The Reselection phase allows the target to reconnect to the host initiator after a disconnect.
Transfer	The Scalar 1000 supports asynchronous data transfer phases with differential and single ended communications. Odd parity is generated during all information transfer phases from the Scalar 1000. Parity is checked during all information transfer phases to the Scalar 1000. Parity checking can be disabled. Information Transfer phases are: • The Message In / Message Out phases manage the physical path between the host initiator and target destination. Message In is a message to the host initiator while Message Out is a message to the target destination. • Command Out phase is a command from the host initiator to the target destination. • Data In / Data Out phase is either data sent from the target to the host initiator (Data In) or data sent from the host initiator to the target destination (Data Out). • Status In is a target status byte response to a host initiated command.

SCSI Message System

The SCSI message system (Message In / Message Out) allows communication between an initiator and a target for the purpose of physical path management.

The messages shown in Table 2-4 on page 2-7 are supported.

Table 2-4 Supported SCSI Messages

Description	Code	Direction
COMMAND COMPLETE	00h	In
SAVE DATA POINTERS	02h	In
RESTORE POINTERS	03h	In
DISCONNECT	04h	In
INITIATOR DETECTED ERROR	05h	Out
ABORT	06h	Out
MESSAGE REJECT	07h	Both
NO-OP	08h	Out
MESSAGE PARITY ERROR	09h	Out
BUS DEVICE RESET	0Ch	Out
IDENTIFY	80h or C0h	Both

COMMAND COMPLETE (00h)

The COMMAND COMPLETE message is sent from a target to an initiator to indicate that the execution of a command completed and valid status has been sent to the initiator.

SAVE DATA POINTERS (02h)

The SAVE DATA POINTERS message is issued before every disconnect message following a Data In or Data Out phase. The message is not sent when disconnecting after a Command Descriptor Block (CDB) that did not transfer data.

RESTORE POINTERS (03h)

The RESTORE POINTERS message is sent from a target to direct the initiator to continue sending data.

DISCONNECT (04h)

The DISCONNECT message is sent by a target to inform an initiator that the present data transfer will be suspended. The target will reselect the initiator at a later time to continue the current operation.

INITIATOR DETECTED ERROR (05h)

The INITIATOR DETECTED ERROR message is sent from an initiator to inform a target that an error occurred. This allows the target to retry the operation.

ABORT (06h)

The ABORT message is sent from the initiator to the target to clear the current or pending operation. The target goes directly to the BUS FREE phase after successful receipt of this message.

MESSAGE REJECT (07h)

The MESSAGE REJECT message is sent from the initiator or target to indicate that the last message received was inappropriate or not implemented.

NO-OP (08h)

The NO-OP message is sent from the initiator to inform the target that no message is valid in response to the target request for a message.

MESSAGE PARITY ERROR (09h)

The MESSAGE PARITY ERROR message is sent from the initiator to the target to indicate that one or more bytes in the last message received contained a parity error.

BUS DEVICE RESET (0Ch)

The BUS DEVICE RESET message is sent from an initiator to clear all commands, data, and status at the target. When the target recognizes this message, it aborts the command currently being executed, proceeds to the BUS FREE state, and executes a hard reset.

IDENTIFY (80h or C0h)

The IDENTIFY messages are sent either by the initiator or by the target to establish (or re-establish) the logical connection path between an initiator and target for a particular logical unit. The Scalar 1000 only supports a logical unit of 0.

SCSI Commands

The following SCSI command information relates exclusively to the operation of the Scalar 1000. For detailed information about each command, see the indicated reference page.

Device Commands

Table 2-5 shows the SCSI medium changer commands that are supported by the Scalar 1000.

Table 2-5 Supported SCSI Commands

Opcode	Command	Reference Page
07h	INITIALIZE ELEMENT STATUS	3-3
E7h	INITIALIZE ELEMENT STATUS WITH RANGE	4-3
12h	INQUIRY	5-3
4Dh	LOG SENSE	6-3
15h	MODE SELECT	7-3
1Ah	MODE SENSE	8-5
A5h	MOVE MEDIUM	9-3
2Bh	POSITION TO ELEMENT	10-3
1Eh	PREVENT/ALLOW MEDIUM REMOVAL	11-3
3Ch	READ BUFFER	12-3
B8h	READ ELEMENT STATUS	13-5
1Ch	RECEIVE DIAGNOSTICS RESULTS	14-3
17h	RELEASE	15-3
03h	REQUEST SENSE	16-3

Table 2-5 Supported SCSI Commands (Continued)

Opcode	Command	Reference Page
B5h	REQUEST VOLUME ELEMENT ADDRESS	17-3
16h	RESERVE	18-3
01h	RE-ZERO	19-3
1Dh	SEND DIAGNOSTIC	20-3
B6h	SEND VOLUME TAG	21-3
00h	TEST UNIT READY	22-3
3Bh	WRITE BUFFER	23-3

SCSI Command Format

The SCSI command format adheres to the SCSI-2 standard. Table 2-6 describes the CDB fields that are common to all commands.

Table 2-6 Command Format

Command Field	Description
Logical Unit Number Field	The Scalar 1000 has a single Logical Unit Number (LUN). The library always appears as LUN 0. If the LUN is specified in the IDENTIFY message, the LUN field in the CDB is ignored by the Scalar 1000.
Reserved Field	The word Reserved or Rsvd refers to a field defined by the SCSI standard as 0. The library checks the field for 0. If the field is not 0, the library returns Check Condition status with a sense key of Illegal Request.
Control Byte Field	The vendor unique portion of the Control Byte is defined in the specific command.
Field Not Implemented	This description indicates that the field is a SCSI standard but is not supported by the Scalar 1000.

SCSI Command Status Byte

The Scalar 1000 enters the status phase once per command, unless a retry is requested by the initiator. See Table 2-7 for the library return status bytes.

Table 2-7 Status Bytes

Status	Value	Description
Good	00h	This status indicates the library successfully completed the command.
Check Condition	02h	An error condition occurred during command processing. The **REQUEST SENSE** command responds with detailed error information.
Busy	08h	The target is busy. This status is returned when the device is unable to accept a command from an otherwise acceptable initiator. The initiator should reissue the command at a later time.
Reservation Conflict	18h	This status is returned by the Scalar 1000 when a SCSI initiator attempts to access the library after it is reserved by another initiator with a **RESERVE** command.

SCSI Operations

The following sections detail Scalar 1000 SCSI communication behavior.

Parity Checking

To enable parity checking on information received by the Scalar 1000, set the parity bit on the Parity Page of the **MODE SELECT** command. Refer to *Mode Select (15h) Command* on page 7-3.

Disconnection

The library disconnects from the SCSI bus whenever a command requires a lengthy time to complete. The library receives the permission to disconnect from the initiator. The initiator grants permission by:

- Selecting the library with the Attention signal.
- Sending an Identify message with the DiscPriv bit set to 1.

Once the command processing completes, the library reselects the initiator and sends the Identify message.

Resetting the Scalar 1000

The Scalar 1000 is reset by a Power-On Reset (POR) or a SCSI Device Reset.

Power-On Behavior

- The library goes to the Bus Free phase.
- The checksum of the flash EEPROM is validated.
- All library parameters are loaded with either saved or default values.
- A Power On SelfTest is performed.
- Within 10 seconds of power on, the Scalar 1000 responds to the SCSI bus.

SCSI Device Reset Behavior

- The library goes to the Bus Free phase.
- All library parameters are returned to their saved or default values.
- A Self Test is performed.

- Within 250 milliseconds, the Scalar 1000 responds to the SCSI bus.

Other SCSI Functionality

Unit Attention Condition

Unit Attentions are reported under the following circumstances:

- Reset occurred
- A firmware (microcode) update completes
- A library door closes
- The Insert/Eject station closes
- Another initiator changes the Mode Parameters

3

Initialize Element Status (07h)

Overview 3-3

Initialize Element Status (07h) Command 3-3
CDB Format 3-4
Logical Unit Number 3-4
NBL 3-4

Initialize Element Status (07h) Status 3-4
Good 3-4
Busy 3-4
Reservation Conflict 3-4
Check Condition 3-4

Overview

Note
If the Scalar 1000 is operating in Auto Inventory Mode, the inventory is guaranteed and an **INITIALIZE ELEMENT STATUS** command will not cause any barcode scan operations, but rather return successful status immediately.

The **INITIALIZE ELEMENT STATUS** command causes the Scalar 1000 to examine the storage cells for cartridge presence. Bar code labels are always scanned. Use the **READ ELEMENT STATUS** command to return the information obtained by the **INITIALIZE ELEMENT STATUS** command.

The Scalar 1000 supports two **INITIALIZE ELEMENT STATUS** commands:

- Use the **INITIALIZE ELEMENT STATUS** command to update the entire cartridge inventory
- Use the **INITIALIZE ELEMENT STATUS WITH RANGE** command to update a specific part of the cartridge inventory.
-

Initialize Element Status (07h) Command

The **INITIALIZE ELEMENT STATUS** CDB format is shown in Figure 3-1.

Bits / Bytes	7	6	5	4	3	2	1	0
0	0	0	0	0	0	1	1	1
1	Logical Unit Number			Reserved				
2	Reserved							
3								
4								
5	NBL	Reserved						

Figure 3-1 INITIALIZE ELEMENT STATUS CDB

CDB Format

The following section describes the parameters in the CDB.

Logical Unit Number

This field is always set to 0.

NBL

Unlabeled cartridges are not supported.

This field is always set to 0.

Initialize Element Status (07h) Status

After processing the **INITIALIZE ELEMENT STATUS** command, the Scalar 1000 returns a status byte as follows:

Good

The Scalar 1000 returns a Good status when it was able to process the command without errors.

Busy

The Scalar 1000 returns Busy status when it is processing a command for a different initiator or when a motion command is in the process of being aborted.

Reservation Conflict

The Scalar 1000 returns Reservation Conflict status when it is reserved by a different initiator.

Check Condition

The Scalar 1000 returns the Check Condition status when the following situations occur:

- The message system is enabled and a message error occurs during the command processing.
- An unrecoverable parity error occurs while receiving the CDB.
- The command is issued to an invalid LUN.
- A Unit Attention condition is pending for the initiator.
- An unrecoverable hardware error is experienced.
- A reserved bit is set to 1 or a parameter is invalid in the CDB.
- A problem is encountered while scanning the cartridges.

- The Scalar 1000 is not ready because the door or Insert / Eject station is open, or the Scalar 1000 is offline.

4

Initialize Element Status With Range (E7h)

Overview 4-3

Initialize Element Status With Range (E7h) Command 4-3
CDB Format 4-4
Logical Unit Number 4-4
Range 4-4
Starting Element Address 4-4
Number of Elements 4-5
NBL 4-5

Initialize Element Status With Range (E7h) Status 4-5
Good 4-5
Busy 4-5
Reservation Conflict 4-5
Check Condition 4-5

Overview

The **INITIALIZE ELEMENT STATUS WITH RANGE** command causes the Scalar 1000 to examine a range of storage cells for cartridge presence. Barcode labels are always scanned. Use the **READ ELEMENT STATUS** command to return the information obtained by the **INITIALIZE ELEMENT STATUS WITH RANGE** command.

The Scalar 1000 supports two **Initialize Element Status** commands:

- Use the **INITIALIZE ELEMENT STATUS WITH RANGE** command to update a specific part of the cartridge inventory
- Use the **INITIALIZE ELEMENT STATUS** command to update the entire cartridge inventory.

Initialize Element Status With Range (E7h) Command

The **INITIALIZE ELEMENT STATUS WITH RANGE** CDB format is shown in Figure 4-1 on page 4-4.

Bits / Bytes	7	6	5	4	3	2	1	0
0	1	1	1	0	0	1	1	1
1	Logical Unit Number			Reserved				Range
2	MSB			Starting Element Address				
3								LSB
4	Reserved							
5								
6	MSB			Number of Elements				
7								LSB
8	Reserved							
9	NBL	Reserved						

Figure 4-1 INITIALIZE ELEMENT STATUS WITH RANGE CDB

CDB Format

The following section describes the parameters in the CDB.

Logical Unit Number

This field is always set to 0.

Range

The Range field indicates which elements to check. Values are:

- 0 - Initialize all elements
- 1 - Initialize the range of elements specified by the Element Address field and Number of Elements field

Note
The Starting Element Address must be a valid address.

Starting Element Address

The Starting Element Address specifies the start address of a set of Element Addresses. This field is ignored if the Range field is 0.

Number of Elements

This field specifies the number of elements to scan. This field is ignored if the Range field is 0.

NBL

Unlabeled cartridges are not supported.

This field is always set to 0.

Initialize Element Status With Range (E7h) Status

After processing the **INITIALIZE ELEMENT STATUS WITH RANGE** command, the Scalar 1000 returns a status byte as follows:

Good

The Scalar 1000 returns GOOD status when it was able to process the command without errors.

Busy

The Scalar 1000 returns BUSY status when it is processing a command for a different initiator or when it is aborting a motion command.

Reservation Conflict

The Scalar 1000 returns Reservation Conflict status when it is reserved by a different initiator.

Check Condition

Check Condition status is returned for the following reasons:

- The message system is enabled and a message error occurs while the Scalar 1000 is processing the command.
- The Scalar 1000 detects an unrecoverable parity error while receiving the CDB.
- The command is issued to an invalid LUN.
- A Unit Attention condition is pending for the initiator.
- The Scalar 1000 has experienced an unrecoverable hardware error.
- A reserved bit is set to 1 or a parameter in the CDB is invalid. Refer to Table 2-8 on page 4-6.
- The Scalar 1000 encounters a problem while scanning the cartridges.

- The Scalar 1000 is not ready because the door or Insert / Eject station is open, or the Scalar 1000 is offline.

Table 2-8 Invalid Parameters in the CDB

Error	Sense Key	ASC	ASCQ	SKSV Bit	C/D Bit	BPV Bit	Bit Pointer	Field Pointer
Invalid Element Address	5h	21h	01h	1	1	0	0	0002h

5

Inquiry (12h)

Overview 5-3

Inquiry (12h) Command 5-3
CDB Format 5-3
Enable Vital Product Data (EVPD). 5-3
Allocation Length 5-4

Inquiry (12h) Response 5-4
Standard Inquiry Data Format 5-5
Peripheral Qualifier 5-5
Peripheral Device Type 5-6
RMB 5-6
Device-Type Modifier 5-6
ISO Version 5-6
ECMA Version 5-6
ANSI (Approved Version). 5-6
Asynchronous Event Notification Capability (AENC). 5-6
Terminate I/O Process (TrmIOP). 5-6
Response Data Format 5-6
Additional Length 5-6
Relative Address (RelAdr) 5-6
Wide Bus 32 (Wbus32). 5-7
Wide Bus 16 (Wbus16). 5-7
Synchronous Transfer (Sync) 5-7
Linked Commands (Linked). 5-7
Command Queuing (CmdQue) 5-7
Soft Reset (SftRe). 5-7
Vendor Identification 5-7
Product Identification 5-7
Firmware Revision Level. 5-8
Full Firmware Revision Level. 5-8
Vendor Specific 5-8
Bar Code (BarC) 5-8
Typical Response Bytes 00 through 55 5-8

Supported Vital Product Data Page 5-8
Peripheral Qualifier 5-9
Peripheral Device Type 5-9
Page Code 5-9
Page Length 5-9
First Page Code Supported 5-9
Second Page Code Supported 5-10
Third Page Code Supported 5-10
Fourth Page Code Supported 5-10
Fifth Page Code Supported 5-10
Unit Serial Number Page 5-10
Peripheral Qualifier 5-10
Peripheral Device Type 5-11
Page Code 5-11
Page Length 5-11
Serial Number 5-11
Firmware Revision Page 5-11
Peripheral Qualifier 5-12
Peripheral Device Type 5-12
Page Code 5-12
Page Length 5-12
Revision 5-13
Build Date 5-13
Checksum 5-13
Implemented SCSI-2 Command Page 5-13
Peripheral Qualifier 5-15
Peripheral Device Type 5-15
Page Code 5-15
Page Length 5-15
Implemented SCSI-2 Commands 5-15
Implemented Vendor Specific Command Page 5-15
Peripheral Qualifier 5-16
Peripheral Device Type 5-16
Page Code 5-16
Page Length 5-16
Implemented Vendor Specific SCSI-2 Command 5-16

Inquiry (12h) Status 5-16
Good 5-17
Busy 5-17
Reservation Conflict 5-17
Check Condition 5-17

Overview

The **INQUIRY** command requests that the Scalar 1000 return information about its device parameters.

Inquiry (12h) Command

The **INQUIRY** CDB format is shown in Figure 5-1.

Bits / Bytes	7	6	5	4	3	2	1	0
0	0	0	0	1	0	0	1	0
1	Logical Unit Number			Reserved				EVPD
2	Page Code							
3	Reserved							
4	Allocation Length							
5	Reserved							

Figure 5-1 INQUIRY CDB

CDB Format

Enable Vital Product Data (EVPD)

The EVPD bit indicates which Vital Product Data pages option to report. Set the EVPD bit to request the following:

0 - Standard inquiry data. Refer to Figure 5-2 on page 5-5.

1 - Vital product data, based on the Page Code field. Refer to Figure 5-3 on page 5-9.

Page Code

This field contains the page number of the vital product data page to be returned for this INQUIRY command, if the EVPD bit is set to 1. The Scalar 1000 supports the following page codes:

- 00h - Supported Vital Product Data pages
- 80h - Unit Serial Number page
- C0h - Firmware Revision page
- E0h - Implemented SCSI - Command page
- E1h - Implemented Vendor Specific Command page

If the EVPD bit is set to 0, the Page Code must be 00h.

Allocation Length

The Allocation Length field specifies the maximum number of bytes that the initiator allocated for returned inquiry data. An Allocation Length of 0 indicates that no Inquiry data is to be transferred. This condition is not considered an error.

The Scalar 1000 terminates the Data In phase when it has transferred the lesser of either the number of bytes specified by the Allocation Length field or all of the available inquiry data. The lengths for inquiry data returned by the Scalar 1000 are:

- 38h (56) bytes for the standard inquiry data
- 09h (9) bytes for the Supported Vital Product Data page
- 0Eh (14) bytes for the Unit Serial Number page
- 3Bh (59) bytes for the Firmware Revision page
- 18h (24) bytes for the Supported SCSI-2 Command page
- 05h (5) bytes for the Vendor Specific Command page

Inquiry (12h) Response

The Scalar 1000 returns the information shown in Figure 5-2 on page 5-5, Figure 5-3 on page 5-9, or Figure 5-4 on page 5-10.

Standard Inquiry Data Format

Bits / Bytes	7	6	5	4	3	2	1	0
0	Peripheral Qualifier			Peripheral Device Type				
1	RMB	Device-Type Modifier						
2	ISO Version		ECMA Version		ANSI-Approved Version			
3	AENC	TrmIOP	Reserved		Response Data Format			
4	Additional Length							
5	Reserved							
6								
7	RelAdr	WBus32	WBus16	Sync	Linked	Rsvd	Cmd Que	SftRe
08 : 15	MSB Vendor Identification LSB							
16 : 31	MSB Product Identification LSB							
32 : 35	MSB Firmware Revision Level LSB							
36 : 54	MSB Full Firmware Revision Level LSB							
55	Vendor Specific							BarC

Figure 5-2 Standard Inquiry Data

Peripheral Qualifier

The return value 0 indicates that the Scalar 1000 is a single LUN device. If a LUN other than 0 was specified, this field returns 011b which indicates that only LUN 0 is supported.

Peripheral Device Type

The value returned by this field is set to 01000b, indicating a Medium Changer device. Any LUN other than 0 returns 11111b which indicates that the device is unknown.

RMB

The Removable Medium Bit is set to 1 to indicate that media is removable.

Device-Type Modifier

Returned as 0000000b, indicating no modification.

ISO Version

Returned as 00b.

ECMA Version

Returned as 00b.

ANSI (Approved Version)

Returned as 0010b, indicating compliance with ANSI Version SCSI-2.

Asynchronous Event Notification Capability (AENC)

Returned as 0 which indicates that AENC is not supported.

Terminate I/O Process (TrmIOP)

Returned as 0 which indicates that TrmIOP message is not supported.

Response Data Format

Returned as 0010b which indicates that data is in SCSI-2 format.

Additional Length

Returned as 33h which indicates 51 additional bytes of data, exclusive of the Additional Length byte, that is available to the initiator.

Relative Address (RelAdr)

Returned as 0 which indicates that the Scalar 1000 does not support relative addressing.

Wide Bus 32 (Wbus32)

Returned as 0 to indicate that 32 bit transfer are not supported.

Wide Bus 16 (Wbus16)

Returned as 0 to indicate that 16 bit transfer are not supported.

Synchronous Transfer (Sync)

Returned as 0 to indicate that synchronous transfers are not supported.

Linked Commands (Linked)

Returned as 0 which indicates that linked commands are not supported.

Command Queuing (CmdQue)

Returned as 0 which indicates that command queuing is not supported.

Soft Reset (SftRe)

Returned as 0 to indicate that the Scalar 1000 does not support a soft reset alternative to a reset condition.

Vendor Identification

Note
The compatibility mode applies to the inquiry command only. SCSI Command processing performs as described in this manual.

Unused bytes are padded with the space character.

Returned as **ADIC** in ASCII if the Scalar 1000 is operating in native mode.

Returned as **EXABYTE** in ASCII if the Scalar 1000 is operating in EXABYTE compatibility mode.

Returned as **STK** in ASCII if the Scalar 1000 is operating in Storage Technology compatibility mode.

Return as **ADIC** in ASCII if the Scalar 1000 is operating in ADIC compatibility mode.

Product Identification

Unused bytes are padded with the space character.

Returned as **Scalar 1000** in ASCII if the Scalar 1000 is operating in native mode.

Returned as **EXB-480** in ASCII if the Scalar 1000 is operating in EXABYTE compatibility mode.

Returned as **9710** in ASCII if the Scalar 1000 is operating in Storage Technology compatibility mode.

Return as **Scalar 1000** in ASCII if the AML'S is operating in ADIC compatibility mode.

Firmware Revision Level

Unused bytes are padded with the space character.

Returned as the ASCII representation of the firmware revision level.

Full Firmware Revision Level

Unused bytes are padded with the space character.

Returned as the ASCII representation of the full firmware revision level.

Vendor Specific

Returned as 0000000b to indicate no vendor specific parameter.

Bar Code (BarC)

Returned as a 1 which indicates that a bar code scanner is installed.

Typical Response Bytes 00 through 55

Typical returned data for bytes 00 through 55 is as follows:

```
08h  80h  02h  02h  33h  00h  00h  10h  (bytes 00 - 07)
ADIC                                    (bytes 08 - 15)
Scalar 1000                             (bytes 16 - 31)
1.00                                    (bytes 32 - 35)
1.00.0144                               (bytes 36 - 54)
01h                                     (byte 55)
```

Unused bytes in each field contain an ASCII space character.

Supported Vital Product Data Page

Figure 5-3 on page 5-9 shows the format of the Supported Vital Product Data Page.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Peripheral Qualifier			Peripheral Device Type				
1	Page Code							
2	Reserved							
3	Page Length							
4	First Page Code Supported							
5	Second Page Code Supported							
6	Third Page Code Supported							
7	Fourth Page Code Supported							
8	Fifth Page Code Supported							

Figure 5-3 Supported Vital Product Data Page

Peripheral Qualifier

The return value 0 indicates that the Scalar 1000 is a single LUN device. If a LUN other than 0 was initially specified, this field returns 011b.

Peripheral Device Type

The value returned by this field is set to 01000b, indicating a Medium Changer device. Any LUN other than 0 returns 11111b.

Page Code

Returned as 00h which indicates the Supported Vital Product Data Page.

Page Length

Returned as 02h which indicates the remaining bytes in this page exclusive of the Page Length byte.

First Page Code Supported

Returned as 00h which indicates support for the Supported Vital Product Data Page.

Second Page Code Supported

Returned as 80h which indicates support for the Unit Serial Number Page.

Third Page Code Supported

Returned as C0h which indicates support for the Firmware Revision Page.

Fourth Page Code Supported

Returned as E0h which indicates support for the Implemented SCSI-2 Command Page.

Fifth Page Code Supported

Returned as E1h which indicates support for the Implemented Vendor Specific Command Page.

Unit Serial Number Page

Figure 5-4 shows the format of the Unit Serial Number Page.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Peripheral Qualifier			Peripheral Device Type				
1	Page Code							
2	Reserved							
3	Page Length							
4 : 19	Serial Number							

Figure 5-4 Serial Number Page

Peripheral Qualifier

The return value 0 indicates that the Scalar 1000 is a single LUN device. If a LUN other than 0 was initially specified, this field returns 011b.

Peripheral Device Type

The value returned by this field is set to 01000b, indicating a Medium Changer device. Any LUN other than 0 returns 11111b.

Page Code

The value returned for this field is 80h, which is the Page Code for the Unit Serial Number page.

Page Length

The value returned for this field is 10h, which indicates the number of remaining bytes in this page exclusive of the Page Length byte.

Serial Number

The Serial number is padded with blank characters as needed.

The value returned for this field is the serial number for the Scalar 1000, as read by the barcode scanner, prefixed with the vendor identification, e.g., "^ADIC123456789."

The MSB is contained in byte 4. If the serial number can not be read by the bar code scanner, the value returned for this field is the vendor identifier followed by "**0000000000"** in ASCII, followed by trailing blanks.

Firmware Revision Page

Figure 5-5 on page 5-12 shows the format of the Firmware Revision Page.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Peripheral Qualifier			Peripheral Device Type				
1	Page Code							
2	Reserved							
3	Page Length							
04 : 25	MSB Revision LSB							
26 : 44	MSB Build Date LSB							
45 : 58	MSB Checksum LSB							

Figure 5-5 Firmware Revision Page

Peripheral Qualifier

The return value 0 indicates that the Scalar 1000 is a single LUN device. If a LUN other than 0 was specified, this field returns 011b which indicates that only LUN 0 is supported.

Peripheral Device Type

The value returned by this field is set to 01000b, indicating a Medium Changer device. Any LUN other than 0 returns 11111b which indicates that the device is unknown.

Page Code

The value returned for this field is C0h, which is the Page Code for the Firmware Revision page.

Page Length

The value returned for this field is 37h, which indicates the number of remaining bytes in this page exclusive of the Page Length byte.

Revision

Returned as the ASCII representation (22 bytes) of the firmware revision level in the form *FIRMWARE REVISION=x.xx* where x.xx is equal to the firmware level.

Build Date

Returned as the ASCII representation (19 bytes) of the firmware build date in the form *Build Date=mm/dd/yy* where mm is equal to the month, dd is equal to the day, and yy is equal to the year.

Checksum

Returned as the ASCII representation (14 bytes) of the firmware checksum in the form *Checksum=cccch* where cccc is equal to the ASCII-hexidecimal representation of the 16 bit checksum.

Implemented SCSI-2 Command Page

Figure 5-6 on page 5-14 shows the format of the Implemented SCSI-2 Command Page.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Peripheral Qualifier			Peripheral Device Type				
1	Page Code							
2	Reserved							
3	Page Length							
4	TEST UNIT READY							
5	RE-ZERO							
6	REQUEST SENSE							
7	INITIALIZE ELEMENT STATUS							
8	INQUIRY							
9	MODE SENSE							
10	MODE SELECT							
11	RESERVE							
12	RELEASE							
13	RECEIVE DIAGNOSTIC RESULT							
14	SEND DIAGNOSTIC							
15	PERVENT / ALLOW MEDIUM REMOVAL							
16	POSITION TO ELEMENT							
17	WRITE BUFFER							
18	READ BUFFER							
19	LOG SENSE							
20	MOVE MEDIUM							
21	REQUEST VOLUME ELEMENT ADDRESS							
22	SEND VOLUME TAG							
23	READ ELEMENT STATUS							

Figure 5-6 Implemented SCSI-2 Command Page

Peripheral Qualifier

The return value 0 indicates that the Scalar 1000 is a single LUN device. If a LUN other than 0 was specified, this field returns 011b which indicates that only LUN 0 is supported.

Peripheral Device Type

The value returned by this field is set to 01000b, indicating a Medium Changer device. Any LUN other than 0 returns 11111b which indicates that the device is unknown.

Page Code

The value returned for this field is E0h, which is the Implemented SCSI-2 Command page.

Page Length

The value returned for this field is 14h, which indicates the number of remaining bytes in this page exclusive of the Page Length byte.

Implemented SCSI-2 Commands

Byte 04 through byte 23 list the implemented SCSI-2 commands for the Scalar 1000 library. Refer to Table 2-5 on page 2-9 for the command code associated with each command.

Implemented Vendor Specific Command Page

Figure 5-7 on page 5-16 shows the format of the Implemented Vendor Specific Command Page.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Peripheral Qualifier			Peripheral Device Type				
1	Page Code							
2	Reserved							
3	Page Length							
4	INITIALIZE ELEMENT STATUS WITH RANGE							

Figure 5-7 Implemented Vendor Specific Command Page

Peripheral Qualifier

The return value 0 indicates that the Scalar 1000 is a single LUN device. If a LUN other than 0 was specified, this field returns 011b which indicates that only LUN 0 is supported.

Peripheral Device Type

The value returned by this field is set to 01000b, indicating a Medium Changer device. Any LUN other than 0 returns 11111b which indicates that the device is unknown.

Page Code

The value returned for this field is E1h, which is the Implemented Vendor Specific Command page.

Page Length

The value returned for this field is 01h, which indicates the number of remaining bytes in this page exclusive of the Page Length byte.

Implemented Vendor Specific SCSI-2 Command

Byte 04 lists the implemented vendor specific SCSI commands for the Scalar 1000 library. Refer to Table 2-5 on page 2-9 for the command code associated with this command.

Inquiry (12h) Status

After processing the **INQUIRY** command, the Scalar 1000 returns a status byte as follows:

Good

Good status returns when the command processes without errors.

Busy

Busy status is never returned for the **INQUIRY** command.

Reservation Conflict

Reservation Conflict status is never returned.

Check Condition

Check Condition status is returned for the following reasons:

- The message system is enabled and a message error occurs during command processing.
- An unrecoverable parity error is detected while receiving the CDB.
- A reserved bit is set to 1 or a parameter is invalid in the CDB. See Table 5-1.

Table 5-1 Invalid Parameters in the CDB

Error	Sense Key	ASC	ASCQ	SKSV Bit	C/D Bit	BPV Bit	Bit Pointer	Field Pointer
Invalid Page Code	5h	24h	00h	1	1	0	0	0002h

6

Log Sense (4Dh)

Overview 6-3

Log Sense (4Dh) Command 6-3
CDB Format 6-4
PPC 6-4
SP 6-4
PC 6-4
Page Code 6-4
Parameter Pointer 6-5
Allocation Length 6-6

Log Sense (4Dh) Response 6-6
Log Page Format 6-6
Page Code 6-7
Page Length 6-7
Log Parameters 6-7
Log Parameter Format 6-7
Parameter Code 6-8
Disabled Update (DU) 6-8
Disable Save (DS) 6-8
Target Save Disable (TSD) 6-8
Enable Threshold Comparison (ETC) 6-8
Threshold Met Criteria (TMC) 6-9
List Parameter (LP) 6-9
Page Code 6-10
Page Length 6-10
Supported Log Page 6-10
System Statistics Log Page 6-10
State Log Page 6-10
History of Events Log Page 6-10
Element Statistics Log Page 6-11
Cartridge Scan Retries Log Page 6-11
Element Position Log Page 6-11
Supported Media Page 6-11

System Statistics Log 6-11
State Log 6-12
History of Events Log 6-12
Parameter Code. 6-13
Parameter Length 6-13
Element Statistics Log 6-13
Parameter Code. 6-14
Parameter Length 6-14
Total Puts 6-15
Total Put Retries 6-15
Total Pick Retries 6-15
Cartridge Scan Retries Log 6-15
Parameter Code. 6-16
Parameter Length 6-16
Total Scan Retries 6-16
Element Position Page Log 6-16
Parameter Code. 6-17
Parameter Length 6-17
Vertical Axis Position 6-17
Picker Position. 6-17
Horizontal Axis Position 6-18
Supported Media Log 6-18

Log Sense (4Dh) Status 6-19
Good 6-19
Busy 6-19
Reservation Conflict 6-19
Check Condition 6-19

Overview

The **LOG SENSE** command allows the initiator to retrieve statistical information about the Scalar 1000.

When this command is used, the following information is returned:

- Operational statistics
- Recent events history
- Hardware condition
- Element statistics
- Cartridge scan retries
- Element position information

Log Sense (4Dh) Command

The **LOG SENSE** CDB format is shown in Figure 6-1.

Bits / Bytes	7	6	5	4	3	2	1	0
0	0	1	0	0	1	1	0	1
1	Logical Unit Number			Reserved			PPC	SP
2	PC		Page Code					
3	Reserved							
4								
5	MSB Parameter Pointer							
6								LSB
7	MSB Allocation Length							
8								LSB
9	Reserved							

Figure 6-1 LOG SENSE CDB

CDB Format

PPC

The Parameter Pointer Control (PPC) bit is always 0. A Parameter Pointer Control bit value of 0 requests that the Scalar 1000 return data starting with the parameter code specified in the Parameter Pointer field and return the number of bytes specified in the Allocation Length field in ascending order. A PPC bit of 0 and a Parameter Pointer field of 0 requests that the Scalar 1000 return all available parameter data for that page code.

SP

The Save Parameters (SP) bit is always set to 0 and indicates that the Scalar 1000 performs the **LOG SENSE** command and does not save the log parameters.

PC

The Page Control (PC) field is always set to 01b. This value causes the Scalar 1000 to return cumulative values of any log parameter rather than threshold or default values.

Page Code

The Page Code field identifies which log page is being requested by the initiator. Refer to Table 6-1 on page 6-5. If the page is not supported, the command terminates with a CHECK CONDITION status with the sense key set to ILLEGAL REQUEST and the ASC is set to INVALID FIELD IN CDB.

Table 6-1 Legal values for Page Code Field

Page Code	Page Name	Page Description
00h	Supported Log Pages	Returns list of supported log pages
30h	System Statistics Log	Returns system statistics and retry counts
31h	State Log	Returns hardware state of the Scalar 1000 which includes the sensors
32h	History of Events Log	Returns history of most recent operational events
33h	Element Statistics Log	Returns element statistics and retry counts
34h	Cartridge Scan Retries Log	Returns number of times the Scalar 1000 had to retry scanning the cartridge at specific element address
35h	Element Position Log	Returns vertical and horizontal axis positions and picker position of the specified element
3Eh	Supported Media Log	Returns drive type and media support information

Note

A Parameter Pointer of 0 requests all available log parameters for the specified log page.

Parameter Pointer

The Parameter Pointer field allows the initiator to specify at which parameter within a log page the requested data should begin.

- When requesting the System Statistic Log page or State Log page, the Parameter Pointer specifies the first Log Parameter Code from which parameter data is to be sent. The Scalar 1000 returns data for the specified code and all other codes in ascending order.
- When requesting the History of Events Log page, the Parameter Pointer specifies an index value between -299 and 0. The library returns a history record for that index and all other indexes in order up to 250 events, where 0 is the index of the most recent event and -299 is the index of the oldest event.

- When the initiator requests the Element Statistics Log page, the Cartridge Scan Retries Log page, or the Element Position Log page, the Parameter Pointer specifies an element address value. The Scalar 1000 returns the parameter data for that element and all other elements in ascending order. Data is returned until the value specified in the Allocation Length field has been reached or until the Scalar 1000 completes sending parameter data for the element with the highest element address.
- When the initiator requests the Supported Media Log page, the Parameter Pointer specifies a media domain / type. The Scalar 1000 returns the parameter data for that domain / type and all other domain / types in ascending order. Data is returned until the value specified in the allocation length field has been reached or until the Scalar 1000 completes parameter data for the element with the highest domain / type definition.

Allocation Length

The Allocation Length field is used to determine the maximum amount of returned data. If the Allocation Length value exceeds the amount of transfer data, the Scalar 1000 terminates the Data In phase after all of the data transfers. Specify FFFFh to include all available data.

Log Sense (4Dh) Response

The **Log Sense** command returns a single log page specified in the Page Code field of the CDB.

Log Page Format

The following is a description of the log pages and their respective log page structure. The 4-byte page header, followed by zero or variable length log parameters, is returned in ascending order. Refer to Figure 6-2 on page 6-7.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Reserved		Page Code					
1	Reserved							
2	MSB							
3	Page Length (n-3)							LSB
4 : n	Log Parameter (First)							
	Log Parameter (Last)							

Figure 6-2 Log Sense Page Header Format

Page Code

The Page Code field identifies which log page is being transferred. Refer to Table 6-1 on page 6-5 for the legal values.

Page Length

The Page Length field indicates the total number of bytes that follow the Page Length byte. The value returned for this field depends on the value specified for the Page Code and the Parameter Pointer in the CDB. Refer to *CDB Format* on page 6-4.

Log Parameters

Log Parameters are data structures that are contained in log pages as follows:

- Data counters that capture a count of a particular event
- A numeric value indicating the state of the Scalar 1000 hardware
- A string that contains the library event history

Log Parameter Format

Following the four byte page header are one or more log parameters. Figure 6-3 on page 6-8 indicates the format of the log parameter structure.

Bits / Bytes	7	6	5	4	3	2	1	0
0	MSB							
1	Parameter Code							LSB
2	DU	DS	TSD	ETC	TMC		RSVD	LP
3	Parameter Length (n-3)							
4	Parameter Value							
n								

Figure 6-3 LOG Parameter Format

Parameter Code

The Parameter Code field identifies which log parameter was transferred. The valid values for this field depend on the type of requested log page.

Disabled Update (DU)

The DU parameter control bit is always 0 which indicates that the Scalar 1000 updates the log parameter value to reflect all events that should be recorded by that parameter.

Disable Save (DS)

The DS parameter control bit is always 1 which indicates that the Scalar 1000 does not support saving of the particular log parameter.

Target Save Disable (TSD)

The TSD parameter control bit is always 0 which indicates that the Scalar 1000 provides a self-defined method for saving log parameters.

Enable Threshold Comparison (ETC)

The ETC parameter control bit is always 0 which indicates a comparison to the threshold value is not performed whenever the cumulative value is updated.

Threshold Met Criteria (TMC)

The TMC parameter control bit is always 0 which indicates the basis for comparison of the cumulative and threshold values.

List Parameter (LP)

The LP parameter control bit is set to 0 for counter data and set to 1 for a list parameter.

Parameter Length

The Parameter Length field specifies the length in bytes of the Parameter Value field.

Parameter Value

The Parameter Value field can be designated by one of the following:

- A data counter for an event which can be either a one byte flag or two-byte or four-byte value.
- A value that indicates the state of a component of the Scalar 1000 hardware. If this field is 1, the state of the component is *on*. If this field is 0, that state of the component is *off*.
- A string that describes a history event.

Supported Log Page

The Supported Log Page lists all log pages that the Scalar 1000 supports. Figure 6-4 on page 6-10 lists the format for the log page header and respective supported log pages.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Reserved		Page Code					
1	Reserved							
2	Page Length							
3								
4	Supported Log Page							
5	System Statistics Log Page							
6	State Log Page							
7	History of Events Log Page							
8	Element Statistics Log Page							
9	Cartridge Scan Retries Log Page							
10	Element Positions Page							
11	Supported Media Page							

Figure 6-4 Supported Log Page

Page Code

This value is always 000000b for the Support Log Pages.

Page Length

This value is 0008h.

Supported Log Page

This value is 00h.

System Statistics Log Page

This value is 30h.

State Log Page

This value is 31h.

History of Events Log Page

This value is 32h.

Element Statistics Log Page

This value is 33h

Cartridge Scan Retries Log Page

This value is 34h.

Element Position Log Page

This value is 35h.

Supported Media Page

This value is 3Eh.

System Statistics Log

The System Statistics Log page returns the cumulative library system statistics from nonvolatile RAM. See Table 6-2. The format is shown in *Log Parameter Format* on page 6-7. These values are not reset after power cycles or resets.

Table 6-2 System Statistics Saved in Nonvolatile RAM

Log Parameter Function	Log Parameter Code	DU	DS	TSD	ETC	TMC	LP	Parameter Length
Total Number of Moves	0000h	0	1	0	0	0	0	4
Total Number of Pick Retries	0001h	0	1	0	0	0	0	4
Total Number of Put Retries	0002h	0	1	0	0	0	0	4
Total Number of Scans	0003h	0	1	0	0	0	0	4
Total Number of Scan Retries	0004h	0	1	0	0	0	0	4
Reserved	0005h	0	1	0	0	0	0	4
Total Number of I/E Station Insert Cycles	0006h	0	1	0	0	0	0	4
Reserved	0007h	0	1	0	0	0	0	4

State Log

The State Log page returns log parameters that indicate the current state of the Scalar 1000 hardware digital sensors. See Table 6-3.

There is a corresponding log parameter for each sensor that shows the value for that sensor. A 1 in the parameter field indicates the sensor corresponding to the log parameter is *on*. A 0 indicates that the sensor is *off*.

Table 6-3 Log Parameters for Digital Sensors

Log Parameter Function	Log Parameter Code	DU	DS	TSD	ETC	TMC	LP	Parameter Length
Door Open	0000h	0	1	0	0	0	0	1
Reserved	0001h	0	1	0	0	0	0	1
Retract Complete	0002h	0	1	0	0	0	0	1
Cartridge Present	0003h	0	1	0	0	0	0	1
Reserved	0004h	0	1	0	0	0	0	1
Horizontal Axis Home	0005h	0	1	0	0	0	0	1
Reserved	0006h	0	1	0	0	0	0	1
Reserved	0007h	0	1	0	0	0	0	1
Vertical Axis Home	0008h	0	1	0	0	0	0	1
Insert/Eject Station Locked	0009h	0	1	0	0	0	0	1
Insert/Eject Station Open	000Ah	0	1	0	0	0	0	1

History of Events Log

The History of Events Log page returns a history of the most recent events that have happened in the Scalar 1000. The Scalar 1000 history buffer contains 128 entries. The library is able to receive up to 250 events from the history buffer in response to each **LOG SENSE** command. For all 128 entries, use two **LOG SENSE** commands.

Each of the events is a string that consists of two fields:

- A description of the event
- A time stamp indicating the time and date

Figure 6-5 shows the History of Events Log Page format.

Bits / Bytes	7	6	5	4	3	2	1	0
0	MSB							
1				Parameter Code				LSB
2	0	1	0	0	0	0	0	1
3	Parameter Length							
4 : 83	80 characters of events							

Figure 6-5 History of Events Log Page Format

Parameter Code

The Parameter Code field indicates the index of the history record as follows:

- 0 is the index of the most recent event
- -127 is the index of the oldest event

The library keeps 128 of the most recent events. The event history that the library maintains includes information about SCSI commands and phases, motion commands, retries and errors, diagnostics, and system status.

Parameter Length

The Parameter Length field indicates the number of bytes that follow exclusive of the Parameter Length field. The value is 80.

Element Statistics Log

The Element Statistics page returns cumulative statistics of total cartridge puts, put retries, and pick retries. These values are stored in nonvolatile RAM for each element.

The value specified for the Parameter Pointer field of the CDB determines the value that is returned in the Parameter Code field of the Element Statistics page. This value specifies the first element for the returned information.

Note
The starting element address specified in the CDB must be a valid element address.

An Element Statistics page is returned in ascending order for all subsequent elements until the allocation length specified is reached or all information elements are returned. Element addresses can be changed with the **MODE SELECT** command.

Figure 6-6 shows the Element Statistics Page format.

Bits / Bytes	7	6	5	4	3	2	1	0
0	MSB							
1	Parameter Code (Element Address)							LSB
2	0	1	0	0	0	0	0	0
3	Parameter Length							
4 : 7	MSB			Total Puts				LSB
8	MSB							
9	Total Put Retries							LSB
10	MSB							
11	Total Pick Retries							LSB

Figure 6-6 Element Statistics Page Format

Parameter Code

The Parameter Code field indicates the element address for the returned statistical information. Use the **MODE SELECT** command to set the element address.

Parameter Length

The Parameter Length field indicates the number of bytes that follow exclusive of the Parameter Length field. The value is 8.

Total Puts

The Total Puts field indicates the total number of cartridge puts to the element location.

Total Put Retries

The Total Put Retries field indicates the total number of retry puts to the element indicated by the element address.

Total Pick Retries

The Total Pick Retries field indicates the number of retry pick operations from the element address.

Cartridge Scan Retries Log

The Cartridge Scan Retries page returns the total number of retried cartridge scans of the element address. This value is reset whenever the Scalar 1000 is reset, powered on, or the door is opened.

The value specified for the Parameter Pointer field of the CDB determines the value that is returned in the Parameter Code field of the Cartridge Scan Retries page. This value specifies the first element for the returned information.

Note
The element starting address specified in the CDB must be a valid element address.

A Cartridge Scan Retries page is returned for all subsequent elements until the allocation length specified is reached or all element are returned. Element addresses can be changed with the **MODE SELECT** command.

Figure 6-7 shows the Cartridge Scan Retries Page format.

Bits / Bytes	7	6	5	4	3	2	1	0
0	MSB							
1				Parameter Code				LSB
2	0	1	0	0	0	0	0	0
3	Parameter Length							
4	MSB							
5				Total Scan Retries				LSB

Figure 6-7 Cartridge Scan Retries Page Format

Parameter Code

The Parameter Code field indicates the element address for the returned statistical information. Use the **MODE SELECT** command to set the element address.

Parameter Length

The Parameter Length field indicates the number of bytes that follow exclusive of the Parameter Length field. The value is 2.

Total Scan Retries

The Total Scan Retries field indicates the total number of retried scans of the cartridge in the element address. Scan retries are kept with the cartridge and are reset each time the library is reset, powered-on, or the door is opened.

Element Position Page Log

The Element Position page returns the axis positions of the specified element.

The value specified for the Parameter Pointer field of the CDB determines the value returned in the Parameter Code field of the Element Position page. This value specifies the first element for the returned information.

Note
The starting element address specified in the CDB must be a valid element address.

An Element Position page is returned in ascending order for all subsequent elements until the allocation length specified is reached or all element information are returned. Element addresses can be changed with the **MODE SELECT** command.

Figure 6-8 on page 6-17 shows the Element Position Page format.

Bits / Bytes	7	6	5	4	3	2	1	0
0	MSB							
1	Parameter Code (Element Address)							LSB
2	0	1	0	0	0	0	0	0
3	Parameter Length							
4	MSB							
5	Vertical Axis Position							LSB
6	MSB							
7	Picker Position							LSB
8	MSB							
9	Horizontal Axis Position							LSB

Figure 6-8 Element Position Page Format

Parameter Code

The Parameter Code field indicates the element address for the returned statistical information. Use the **MODE SELECT** command to set the element address.

Parameter Length

The Parameter Length field indicates the number of bytes that follow exclusive of the Parameter Length field. The value is 6.

Vertical Axis Position

The Vertical Axis Position field indicates the distance the Accessor must move vertically from the home position to the specified element.

Picker Position

The Picker Position field indicates distance the Picker must move from its home position to touch a cartridge in a specified storage cell.

Horizontal Axis Position

The Horizontal Axis Position field indicates the distance the Accessor must move horizontally from the home position to the specified element.

Supported Media Log

The Supported Media Log page returns log parameters that indicate the current media support. The parameter code specifies the media domain and media type. Table 6-4 shows the structure of the Supported Media Log page.

Table 6-4 Log Parameters for Supported Media

Log Parameter Function	Log Parameter Code	DU	DS	TSD	ETC	TMC	LP	Parameter Length [a]
8490 Media	0001h	0	1	0	0	0	1	2
NCTP Media	0002h	0	1	0	0	0	1	1
3590 Media	0003h	0	1	0	0	0	1	1
DLT 4000 Media	0103h	0	1	0	0	0	1	3
DLT 7000 Media	0104h	0	1	0	0	0	1	3
8mm AIT Media	0201h	0	1	0	0	0	1	1

a. The Parameter Value field, which follows the Parameter Length field, contains ASCII characters representing one or more media type(s) supported within the requested media domain/type.
Supported values are:

1 3480 media
E 3480E media
J 3590 media
M NCTP media
C DLT III
E DLT IIIXT
D DLT IV
A 8mm AIT

Log Sense (4Dh) Status

After processing the **LOG SENSE** command, the Scalar 1000 returns a status byte as follows:

Good

The Scalar 1000 returns GOOD status when it is able to process the command without errors.

Busy

The Scalar 1000 returns BUSY status when it is processing a command for a different initiator or when it is aborting a motion command.

Reservation Conflict

The Scalar 1000 returns Reservation Conflict status when it is reserved by a different initiator.

Check Condition

Check Condition status is returned for the following reasons:

- The message system is enabled and a message error occurs while the Scalar 1000 is processing the command.
- The Scalar 1000 detects an unrecoverable parity error while receiving the CDB.
- The command is issued to an invalid LUN.
- A Unit Attention condition is pending for the initiator.
- A reserved bit set to 1 or a parameter is invalid in the CDB. Refer to Table 6-5 on page 6-20.

Table 6-5 Invalid Parameters in the CDB

Error	Sense Key	ASC	ASCQ	SKSV Bit	C/D Bit	BPV Bit	Bit Pointer	Field Pointer
A Reserve Bit is set in the CDB. The bit error is contained in the pointer field.	5h	24h	00h	1	1	1	-	-
The PC field is not set to 01b.	5h	24h	00h	1	1	1	7	0002h
Invalid page code	5h	24h	00h	1	1	1	5	0002h
Invalid Parameter Pointer	5h	24h	00h	1	1	0	0	0005h

7

Mode Select (15h)

Overview 7-3

Mode Select (15h) Command 7-3
CDB Parameters 7-4
PF. 7-4
SP. 7-4
Parameter List Length 7-4
Parameter List Header 7-5
Element Address Assignment Page (1Dh) 7-5
Page Code 7-7
Parameter List Length 7-8
First Medium Transport Element Address. 7-8
Number of Medium Transport Elements 7-8
First Storage Element Address 7-8
Number of Storage Elements 7-8
First Import/Export Element Address 7-8
Number of Import/Export Elements. 7-8
First Data Transfer Element Address. 7-9
Number of Data Transfer Elements 7-9
LCD Mode Page (22h) 7-9
Page Code 7-10
Parameter List Length 7-10
LCD Security Valid. 7-10
LCD Security 7-10
Write Line 1 7-11
Write Line 2 7-11
Write Line 3 7-11
Write Line 4 7-11
Display Line 1 7-11
Display Line 2 7-11
Display Line 3 7-11
Display Line 4 7-12
Parity Page (00h) 7-14
Page Code 7-14

Parameter List Length 7-14
Parity. 7-14
Maximum Parity Retries 7-14
Mixed Media Page (2Ah) 7-15
Page Code 7-15
Parameter List Length 7-15
Volser Extension Enable (Volser Enable) 7-15
Vendor ASCQ 7-15
RES Extension Enable (Extend RES) 7-16
Mixed Media Enable (MM Enable) 7-16

Mode Select (15h) Status 7-16
Good 7-16
Busy 7-16
Reservation Conflict 7-16
Check Condition 7-16

Overview

The **MODE SELECT** command allows a host to send new operating parameters to the Scalar 1000. The specified parameters configure the Scalar 1000 for current operations, and future operations beyond reset and power-up sequences, if the command specified that the values need to be saved.

- Issue a **MODE SENSE** command with the PC field set to 1h and the Page Code field set to 3Fh before the **MODE SELECT** command is issued. This determines which mode parameters are supported, which mode parameters are changeable, and the supported length of each page.
- When issuing a **MODE SELECT** command, the parameters are not changed until the Scalar 1000 verifies the new parameters. If the parameters are invalid, the parameters are not changed and the appropriate errors are returned.

The values sent to the Scalar 1000 apply to all initiators in a multiple initiator environment. When an initiator issues a MODE SELECT command that changes any current operating parameters, the Scalar 1000 returns a Check Condition status with a sense key of Unit Attention (6h), an ASC (2Ah), and an ASCQ (01h) to all other initiators that issue a request to the library.

Mode Select (15h) Command

The **MODE SELECT** CDB format is shown in Figure 7-1 on page 7-4.

Bits / Bytes	7	6	5	4	3	2	1	0
0	0	0	0	1	0	1	0	1
1	Logical Unit Number			PF	Reserved			SP
2	Reserved							
3	Reserved							
4	Parameter List Length							
5	Reserved							

Figure 7-1 MODE SELECT CDB

CDB Parameters

PF

The Page Format (PF) bit indicates that the data sent by the host after the MODE SELECT header and block descriptors complies with the definition of pages in the SCSI-2 specification. The value must be set to 1.

SP

The Save Parameters (SP) bit instructs the library to save all savable pages as follows

- 0 - Current values are changed by those values sent to the Scalar 1000. Values stored in nonvolatile RAM.
- 1 - Current values are changed and saved to nonvolatile RAM and used by the Scalar 1000.

Parameter List Length

The Parameter List Length field specifies the length in bytes of the MODE SELECT parameter list that is transferred during the DATA OUT phase. A 0 parameter list length indicates that no data is transferred. The parameter list length is equal to the length of a single Parameter List Header (4 bytes) plus the lengths of all pages to be transferred. Refer to Table 7-1 on page 7-5.

Table 7-1 MODE SELECT Page Lengths

Page	Length in Bytes
Element Address Assignment Page (1Dh)	14h (20)
Parity Page (00h)	04h (4)
LCD Mode Page (22h)	54h (84)
Mixed Media Page (2Ah)	02h (2)

Parameter List Header

Figure 7-2 shows the 4-byte Parameter List header. All fields are reserved and are set to 0. Send the header only if sending additional mode pages.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Reserved							
1	Reserved							
2	Reserved							
3	Reserved							

Figure 7-2 Parameter List Header Format

Element Address Assignment Page (1Dh)

Note
The host has the option of changing the element addressing scheme via the **MODE SELECT** command. Internally, the library maintains the same base addressing but correlates the new addresses as needed.

Element address assignments refer to the physical components in the Scalar 1000. There are four element types:

- Storage cells
- Insert / Eject station
- Tape drives.
- Accessor

The Scalar 1000 has default element addresses assigned to each element. The format of the Element Address Assignment page is shown in Figure 7-3 on page 7-7.

A Scalar 1000 has a single medium changer and a 12 cell half-inch and DLT, or 18 cell 8mm AIT Insert/Eject station. A fully configured Scalar 1000 (4 frames) supports a maximum of 48 drives and allows storage cell configurations of 20 columns with 42 rows for half-inch and DLT media, or 63 rows for 8mm AIT media. However, the Insert/Eject station reduces the storage capacity by 12 cells for half-inch and DLT, or 18 cells for 8mm AIT, and each installed drive bay (up to 2 bays per frame for half-inch and DLT, 1 bay per frame for 8mm AIT) reduces the capacity by 40 storage cells for half-inch and DLT, or 60 storage cells for 8mm AIT. This leaves a maximum capacity of 788 storage cells for half-inch and DLT, or 1182 storage cells for 8mm AIT.

Element addresses must not overlap. The highest possible element address cannot exceed FFFEh.

Bits / Bytes	7	6	5	4	3	2	1	0
0	RSVD		Page Code					
1	Parameter List Length							
2	MSB							
3	First Medium Transport Element Address							LSB
4	MSB							
5	Number of Medium Transport Elements							LSB
6	MSB							
7	First Storage Element Address							LSB
8	MSB							
9	Number of Storage Elements							LSB
10	MSB							
11	First Import/Export Element Address							LSB
12	MSB							
13	Number of Import/Export Elements							LSB
14	MSB							
15	First Data Transfer Element Address							LSB
16	MSB							
17	Number of Data Transfer Elements							LSB
18	Reserved							
19								

Figure 7-3 Element Address Assignment Page Format

Page Code

The Page Code identifies the Element Address Assignment page. The value of this field must be 1Dh.

Parameter List Length

This field indicates the length of the address assignment parameter list. The value of the field is 12h which indicates 18 additional bytes of parameter data.

First Medium Transport Element Address

This identifies the address of the accessor. The default value for this field is 350h (848) for half-inch and DLT or 4E0h (1248) for 8mm AIT.

Number of Medium Transport Elements

This field identifies the number of accessors. The Scalar 1000 uses one accessor. The value for this field must be 1.

First Storage Element Address

This field identifies the starting address of the storage cells. The default starting address is 00h (0).

Number of Storage Elements

This field identifies the number of storage cells. This value ranges from 76h (118) to 314h (788) for half-inch and DLT or EDh (237) to 49Eh (1182) for 8mm AIT. The library automatically determines the number of storage cells during power-up. The actual number of storage cells cannot be changed by this field. Specifying a value other than the determined number returns a Check Condition status with the sense key set to Illegal Request.

The element addressing scheme for the storage elements begins with the first cell below the Insert/Eject Station. The addressing continues from the column top to bottom and left to right across each of the individual frames.

First Import/Export Element Address

This field identifies the address of the Insert/Eject Station. The default value of this field is 314h (788) for half-inch and DLT or 49Eh (1182) for 8mm AIT.

Number of Import/Export Elements

This field identifies the total number of storage cells in the Insert/Eject Station. The valid value for this field is 0Ch (12) for half-inch and DLT or 12 (18) for 8mm AIT since there are twelve storage cells for half-inch and DLT or eighteen storage cells for 8mm AIT in the Insert/Eject Station.

For the Insert / Eject Station, all addresses begin at the top cell and increment to the bottom cell.

First Data Transfer Element Address

This field identifies the starting address of the installed tape drives. The default starting address is 320h (800) for half-inch and DLT or 4B0h (1200) for 8mm AIT.

Note
At the present time, a maximum of 16 drives are supported.

Number of Data Transfer Elements

This field identifies the number of installed tape drives. The value for this field ranges from 01h (1) through 30h (48). The library automatically determines the number of tape drives during power-up. The actual number of installed tape drives cannot be changed by this field. Specifying a value other than the determined number a returns a Check Condition status with the sense key set to Illegal Request.

For the Data Transfer Elements, the addressing begins at the lower left drive and increments left to right and bottom to top of each individual frame.

LCD Mode Page (22h)

This section describes the fields and associated values for the LCD Mode page. Figure 7-4 shows the format of the LCD Mode Page.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Reserved		Page Code					
1	Parameter List Length							
2	LCD Security Valid	LCD Security	Reserved		Write Line 1	Write Line 2	Write Line 3	Write Line 4
3	Reserved							
4 : 23	Display Line 1							
24 : 43	Display Line 2							

44 : 63	Display Line 3
64 : 83	Display Line 4

Figure 7-4 LCD Mode Page Format

Page Code

The value of the Page Code field of the LCD page is 22h.

Parameter List Length

This field indicates the length of the LCD Mode parameter list. The value of the field is 52h which indicates 82 additional bytes of parameter data.

LCD Security Valid

This bit indicates whether a change is requested. The change is as follows:

- 0 - Do not change the LCD security.
- 1 - Change the LCD security according to the LCD Security bit.

LCD Security

This bit controls the LCD security change. If the LCD Security Valid bit is 1, LCD security can be enabled or disabled as follows:

- 0 - Disable
- 1 - Enable

LCD Security can be enabled using the operator panel or Mode Select command. If LCD Security is activated via the operator panel or Mode Select command, it must be deactivated by the same means.

If the LCD security is enabled, the following events are disabled:

- Performing diagnostics from the operator panel
- All Setup options
- Changing the mode or state
- Operator Panel command options that involve cartridge movement

Attempts to perform any of the above events result in an error message.

Write Line 1

This field controls the line 1 text. Two values are available:

0 - ^ADIC^SCALAR^1000^^ (each ^ represents an ASCII space character)

1 - Text specified by bytes 4 through 23

Write Line 2

This field controls the line 2 text. Two values are available:

0 - *MM/DD/YY*^^^^*HH:MM:SS* (each ^ represents an ASCII space character)

1 - Text specified by bytes 24 through 43

Write Line 3

This field controls the line 3 text. Two values are available:

0 - High level status message

1 - Text specified by bytes 44 through 63

Write Line 4

This field controls the line 4 text. Two values are available:

0 - Low level status message

1 - Text specified by bytes 64 through 83

Display Line 1

This field is used in conjunction with Write Line 1 to display 20 ASCII text characters. For less than 20 ASCII text characters, the last byte must be 00h. Refer to Figure 7-5 on page 7-13 for the character set.

Display Line 2

This field is used in conjunction with Write Line 2 to display 20 ASCII text characters. For less than 20 ASCII text characters, the last byte must be 00h. Refer to Figure 7-5 on page 7-13 for the character set.

Display Line 3

This field is used in conjunction with Write Line 3 to display 20 ASCII text characters. For less than 20 ASCII text characters, the last byte must be 00h. Refer to Figure 7-5 on page 7-13 for the character set.

Display Line 4

This field is used in conjunction with Write Line 4 to display 20 ASCII text characters. For less than 20 ASCII text characters, the last byte must be 00h. Refer to Figure 7-5 on page 7-13 for the character set.

Upper Nibble / Lower Nibble	0	2	3	4	5	6	7	A	B	C	D	E	F
0	CG (1)		0	@	P	`	p	Available But Not Used					
1	(2)	!	1	A	Q	a	q						
2	(3)	"	2	B	R	b	r						
3	(4)	#	3	C	S	c	s						
4	(5)	$	4	D	T	d	t						
5	(6)	%	5	E	U	e	u						
6	(7)	&	6	F	V	f	v						
7	(8)	'	7	G	W	g	w						
8	(1)	(	8	H	X	h	x						
9	(2)	)	9	I	Y	i	y						
A	(3)	*	:	J	Z	j	z						
B	(4)	+	;	K	[	k	{						
C	(5)	,	<	L	¥	l	|						
D	(6)	-	=	M	]	m	}						
E	(7)	.	>	N	^	n	→						
F	(8)	/	?	O	_	o	←						

Figure 7-5 Character Set

Parity Page (00h)

Figure 7-6 shows the format of the Parity Page.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Reserved		Page Code					
1	Parameter List Length							
2	Reserved		Parity	Reserved				
3	Maximum Parity Retries							

Figure 7-6 Parity Page Format

Page Code

This Parity Page field contains a value of 00h.

Parameter List Length

This field indicates the length of the Parity page. The Parameter List Length is 02h (2), which specifies two additional bytes of parameter data.

Parity

This field enables or disables parity checking of the SCSI bus. Two values are available:

- 0 - Disable parity checking
- 1 - Enable parity checking

The Parity bit may also be enabled by the operator panel parity option. Use the same method to disable the parity bit.

Maximum Parity Retries

This field designates the maximum number of times to retry the message out, command out, or data out phase after a parity error. The valid values for this field range from:

- 0 - no retries are performed
- 255 - the maximum retries are performed

The default value for this field is 1.

Note
After modifying the mixed media configuration, an **Initialize Element Status** command must be used to update the Scalar 1000 database.

Mixed Media Page (2Ah)

The vendor unique Mixed Media page provides support for different media types and associated tape drives that reside in a single Scalar 1000. Figure 7-7 shows the format of the Mixed Media page.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Reserved		Page Code					
1	Parameter List Length							
2	Reserved				Volser Enable	Vendor ASCQ	Extend RES	MM Enable
3	Reserved							

Figure 7-7 Mixed Media Page Format

Page Code

The Page code field has a value of 2Ah.

Parameter List Length

The Parameter List length field has a value of 02h.

Volser Extension Enable (Volser Enable)

This field enables the Volser extension identification for **Read Element Status** and **Request Volume Element Address** commands. Two values are available:

1 - The media identification byte is returned as the first byte of the volume tag (volser) information.

0 - The volume tag (volser) information returns only the 6 character volser label.

Vendor ASCQ

The Vendor ASCQ bit field indicates which ASC / ASCQ shall be returned if a **Move Media** command is issued to an invalid location:

0 - **Move Medium** command is rejected with a sense key of Illegal Request and ASC / ASCQ of 3Bh / A0h (Media Incompatible with Destination).

1 - **Move Medium** command is rejected with a sense keg of Illegal Request and ASC / ASCQ of 30h / 00h (Incompatible Media installed).

RES Extension Enable (Extend RES)

This field indicates whether the **Read Element Status** and **Request Volume Element Address** commands return extended element status information:

0 - Extended Status is not returned.

1 - Extended Status is returned.

Mixed Media Enable (MM Enable)

This field determines the Scalar 1000 Mixed Media mode. Two values are available:

0 - Mixed Media mode is disabled. The Scalar 1000 operates in standard operating mode. All bits in byte 2 are ignored.

1 - Mixed Media mode is enabled. The Scalar 1000 returns media type information for media and elements.

Mode Select (15h) Status

After processing the **MODE SELECT** command, the Scalar 1000 returns a status byte as follows:

Good

A Good status is returned when the Scalar 1000 processes the command without errors.

Busy

The Scalar 1000 returns Busy status when the library is processing a command for a different initiator or when the library is in the process of aborting a motion command.

Reservation Conflict

The Scalar 1000 returns Reservation Conflict status when it is reserved by a different initiator.

Check Condition

The Scalar 1000 returns a Check Condition for the following reasons:

- The command is issued to an invalid LUN.
- The message system is enabled and a message error occurs while the Scalar 1000 is processing the command.
- The Scalar 1000 detects an unrecoverable parity error while receiving the CDB.
- A Unit Attention condition is pending for the initiator.
- A reserved bit is set to 1 or a parameter is invalid in the CDB. See Table 7-2.
- The library detects a non-correctable parity error while receiving the MODE SELECT data.
- A parameter in the MODE SELECT data is invalid.

Table 7-2 Invalid Parameters in the CDB

Error	Sense Key	ASC	ASCQ	SKSV Bit	C/D Bit	BPV Bit	Bit Pointer	Field Pointer [a]
Invalid Error List Length	5h	1Ah	00h	1	1	0	0	0004h
Invalid Page Format	5h	24h	00h	1	1	1	4h	0001h
Invalid values in List Header	5h	26h	00h	1	0	0	0	See Note a
Invalid Page Code	5h	26h	00h	1	0	1	5h	See Note a
Reserved bits set in the 1st byte of Mode Select pages	5h	26h	00h	1	0	1	7h	See Note a
Invalid Parameter List Length	5h	26h	00h	1	0	0	0	See Note a
Reserved bits in reserved fields 22 or 23	5h	26h	00h	1	0	0	0	See Note a
Address overlap	5h	26h	02h	1	0	0	0	See Note a
Invalid number of transport elements	5h	26h	02h	1	0	0	0	See Note a

Table 7-2 Invalid Parameters in the CDB

Error	Sense Key	ASC	ASCQ	SKSV Bit	C/D Bit	BPV Bit	Bit Pointer	Field Pointer [a]
Invalid number of medium storage elements	5h	26h	02h	1	0	0	0	See Note a
Invalid number of import/ export elements	5h	26h	02h	1	0	0	0	See Note a
Invalid number of data transfer elements	5h	26h	02h	1	0	0	0	See Note a

a. Field pointer depends on the order that the pages are sent.

8

Mode Sense (1Ah)

Overview 8-5

Mode Sense (1Ah) Command 8-5
CDB Format 8-6
DBD. 8-6
PC 8-6
Page Code 8-6
Allocation Length 8-7

Mode Sense (1Ah) Response 8-7
Parameter List Header 8-7
Sense Data Length 8-8
Element Address Assignment Page (1Dh) 8-8
PS (Page Savable) 8-9
Page Code 8-10
Parameter List Length 8-10
Transport Geometry Descriptor Page (1Eh) 8-10
PS. 8-10
Page Code 8-10
Parameter Length 8-10
Rotate 8-11
Member Number in Transport Element Set 8-11
Device Capabilities Page (1Fh) 8-11
PS. 8-11
Page Code 8-12
Parameter Length 8-12
Data Transfer (DT) 8-12
Import/Export (I/E). 8-12
Storage Location (ST) 8-12
Medium Transport (MT) 8-12
MT to DT 8-12
MT to I/E 8-12
MT to ST. 8-12
MT to MT 8-12

ST to DT 8-13
ST to I/E 8-13
ST to ST 8-13
ST to MT 8-13
I/E to DT 8-13
I/E to I/E 8-13
I/E to ST 8-13
I/E to MT 8-13
DT to DT 8-14
DT to I/E 8-14
DT to ST 8-14
DT to MT 8-14
LCD Mode Page (22h) 8-14
PS 8-15
Page Code 8-15
Parameter List Length 8-15
LCD Security Valid 8-15
LCD Security 8-16
Write Line 1 8-16
Write Line 2 8-16
Write Line 3 8-16
Write Line 4 8-16
Display Line 1 8-17
Display Line 2 8-17
Display Line 3 8-17
Display Line 4 8-17
Parity Page (00h) 8-17
PS 8-18
Page Code 8-18
Parameter List Length 8-18
Parity 8-18
Maximum Parity Retries 8-18
Mixed Media Page (2Ah) 8-18
PS 8-19
Page Code 8-19
Parameter List Length 8-19
Volser Extension Enable (Volser Enable) 8-19
Vendor ASCQ 8-19
RES Extension Enable (Extend RES) 8-20
Mixed Media Enable (MM Enable) 8-20
Library Geometry Descriptor Page (2Bh) 8-20
PS 8-22
Page Code 8-22
Parameter Length 8-22
Section X, Frame Y, Column Z Descriptor 8-22

Mode Sense (1Ah) Status 8-23
Good 8-23
Busy 8-23
Reservation Conflict 8-23

Check Condition 8-23

Overview

The **MODE SENSE** command reports one or all mode parameter pages to the initiator. The transfer data includes four bytes of parameter list header and the specific number of the requested page bytes. Byte counts are:

- 20 bytes for the Element Address Assignment page
- 4 bytes for the Transport Geometry Descriptor page
- 20 bytes for the Device Capabilities page
- 84 bytes for the LCD Mode page
- 4 bytes for the Parity page
- 4 bytes for the Mixed Media page
- 84 bytes for the Library Geometry Descriptor page

The **MODE SENSE** command complements the **MODE SELECT** command.

Note
Neither the Transport Geometry Descriptor page, the Device Capabilities page, nor the Library Geometry page may be changed with the **Mode Select** command.

Mode Sense (1Ah) Command

The **MODE SELECT** CDB format is shown in Figure 8-1.

Bits / Bytes	7	6	5	4	3	2	1	0
0	0	0	0	1	1	0	1	0
1	Logical Unit Number			Rsvd	DBD	Reserved		
2	PC		Page Code					
3	Reserved							
4	Allocation Length							
5	Reserved							

Figure 8-1 MODE SENSE CDB

CDB Format

DBD

The Disable Block Descriptor (DBD) bit is not used, and must be set to 1.

PC

The Page Control field indicates the type of page parameter values to be returned to the host as shown in Table 8-1.

Table 8-1 MODE SENSE Page Control Definition

Page Control		Description
0	0	Report Current Parameter Values defined by: • The values set by the last successful **MODE SELECT** command. • The saved values since the last power-on or reset after a successful **MODE SELECT** command. • The default values if no saved values exist.
0	1	Report Changeable Values
1	0	Report Default Values
1	1	Report Saved Values (default values if no pages are previously saved)

Note

Before issuing a **MODE SELECT** command, issue a **MODE SENSE** command with the PC parameter set to 1 and the Page Code parameter set to 3Fh. This returns an indication of the supported pages, changeable parameters in the pages, and the supported length of the page.

Page Code

The Page Code field determines which pages should be reported. Refer to Table 8-2 on page 8-7.

Table 8-2 Supported Pages

Page Code	Description
1Dh	Element Address Assignment page
1Eh	Transport Geometry Descriptor page
1Fh	Device Compatibilities page
22h	LCD Mode page
00h	Parity page
2Ah	Mixed Media page
2Bh	Library Geometry Descriptor page
3Fh	All pages (in above order)

Allocation Length

This field specifies the number of bytes that the host allocated for returned MODE SENSE data. An Allocation Length of 0 means that the Scalar 1000 returns no MODE SENSE data. This is not considered an error and GOOD status is returned. An allocation length of E0h (224) indicates all pages.

Mode Sense (1Ah) Response

Parameter List Header

See Figure 8-2 for the format of the Parameter List header.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Sense Data Length							
1	Reserved							
2	Reserved							
3	Reserved							

Figure 8-2 Parameter List Header

Sense Data Length

The Sense Data Length specifies the length in bytes that is available to be transferred during the DATA IN phase. The Sense Data Length does not include itself but does include the remaining 3 bytes of parameter list header.

Element Address Assignment Page (1Dh)

Figure 8-3 on page 8-9 shows the format of the Element Address Assignment page.

Bits / Bytes	7	6	5	4	3	2	1	0
0	PS	Rsvd	Page Code					
1	Parameter List Length							
2	MSB							
3	First Medium Transport Element Address							LSB
4	MSB							
5	Number of Medium Transport Elements							LSB
6	MSB							
7	First Storage Element Address							LSB
8	MSB							
9	Number of Storage Elements							LSB
10	MSB							
11	First Import/Export Element Address							LSB
12	MSB							
13	Number of Import/Export Elements							LSB
14	MSB							
15	First Data Transfer Element Address							LSB
16	MSB							
17	Number of Data Transfer Elements							LSB
18	Reserved							
19								

Figure 8-3 Element Address Assignment Page Format

PS (Page Savable)

The value of the PS field is 1. This indicates that the page can be saved.

Page Code

The Page Code identifies the Element Address Assignment page. The value of this field is 1Dh.

Parameter List Length

This field indicates the length of the Element Address Assignment parameter list. The value of the field is 12h which indicates 18 additional bytes of parameter data.

For the remaining field definitions, refer to *Element Address Assignment Page (1Dh)* on page 7-5.

Transport Geometry Descriptor Page (1Eh)

Figure 8-4 shows the format of the Transport Geometry Descriptor page.

Bits / Bytes	7	6	5	4	3	2	1	0
0	PS	Rsvd	Page Code					
1	Parameter Length							
2	Reserved							Rotate
3	Member Number in Transport Element Set							

Figure 8-4 MODE SENSE Descriptor Page

PS

The Page Savable (PS) field value is 0. This indicates that the Scalar 1000 cannot save this page to nonvolatile memory.

Page Code

The Page Code identifies the Transport Geometry Descriptor page. The value of this filed is 1Eh.

Parameter Length

This field indicates the length of the Transport Geometry Descriptor parameter list. The value of the field is 02h which indicates 2 additional bytes of parameter data.

Rotate

The Rotate bit identifies the ability of the accessor to handle two-sided media. Since the library uses only one-sided media, the value for this field is 0.

Member Number in Transport Element Set

This field identifies the specific accessor in the system to which this descriptor applies. Since the Scalar 1000 has only one transport element, the value for this field is 0.

Device Capabilities Page (1Fh)

See Figure 8-5 for the format of the Device Capabilities page format.

Bits Bytes	7	6	5	4	3	2	1	0
0	PS	Rsvd	Page Code					
1	Parameter List Length							
2	Reserved				DT 1	I/E 1	ST 1	MT 0
3	Reserved							
4	Reserved				MT to DT 0	MT to I/E 0	MT to ST 0	MT to MT 0
5	Reserved				ST to DT 1	ST to I/E 1	ST to ST 1	ST to MT 0
6	Reserved				I/E to DT 1	I/E to I/E 1	I/E to ST 1	I/E to MT 0
7	Reserved				DT to DT 1	DT to I/E 1	DT to ST 1	DT to MT 0
8 : 19	Reserved							

Figure 8-5 Device Capabilities Page Code Format

PS

The value returned for this field is 0. The Scalar 1000 cannot save this page to nonvolatile memory.

Page Code

This field identifies the page code for the Device Capabilities page. The returned value is 1Fh.

Parameter Length

The Parameter Length is 12h (18) which indicates 18 additional bytes of device capabilities data.

Data Transfer (DT)

The value returned for this field is 1. The tape drives can store cartridges.

Import/Export (I/E)

The value returned for this field is 1. The Insert / Eject Station can store cartridges.

Storage Location (ST)

The value returned for this field is 1. The storage cells can store cartridges.

Medium Transport (MT)

The value returned for this field is 0. The accessor cannot store cartridges.

MT to DT

The value returned for this field is 0. The Scalar 1000 does not support the **MOVE MEDIUM** (A5h) command when the source is the accessor and the destination is a tape drive.

MT to I/E

The value returned for this field is 0. The Scalar 1000 does not support the **MOVE MEDIUM** (A5h) command when the source is the accessor and the destination is the Insert / Eject station.

MT to ST

The value returned for this field is 0. The Scalar 1000 does not support the **MOVE MEDIUM** (A5h) command when the source is the accessor and the destination is a storage cell.

MT to MT

The value returned for this field is 0. The Scalar 1000 does not support the **MOVE MEDIUM** (A5h) command when the source is the accessor and the destination is the accessor.

ST to DT

The value returned for this field is 1. The Scalar 1000 supports the **MOVE MEDIUM** (A5h) command when the source is a storage cell and the destination is a tape drive.

ST to I/E

The value returned for this field is 1. The Scalar 1000 supports the **MOVE MEDIUM** (A5h) command when the source is a storage cell and the destination is the Insert/Eject station.

ST to ST

The value returned for this field is 1. The Scalar 1000 supports the **MOVE MEDIUM** (A5h) command when the source is a storage cell and the destination is a storage cell.

ST to MT

The value returned for this field is 0. The Scalar 1000 does not support the **MOVE MEDIUM** (A5h) command when the source is a storage cell and the destination is the accessor.

I/E to DT

The value returned for this field is 1. The Scalar 1000 supports the **MOVE MEDIUM** (A5h) command when the source is the Insert/Eject station and the destination is a tape drive.

I/E to I/E

The value returned for this field is 1. The library supports the **MOVE MEDIUM** (A5h) command when the source is the Insert/Eject station and the destination is the Insert/Eject station.

I/E to ST

The value returned for this field is 1. The Scalar 1000 supports the **MOVE MEDIUM** (A5h) command when the source is the Insert/Eject station and the destination is a storage cell.

I/E to MT

The value returned for this field is 0. The Scalar 1000 does not support the **MOVE MEDIUM** (A5h) command when the source is the Insert/Eject station and the destination is the accessor.

DT to DT

The value returned for this field is 1. The Scalar 1000 supports the **MOVE MEDIUM** (A5h) command when the source is a tape drive and the destination is a tape drive.

DT to I/E

The value returned for this field is 1. The Scalar 1000 supports the **MOVE MEDIUM** (A5h) command when the source is a tape drive and the destination is the Insert/Eject station.

DT to ST

The value returned for this field is 1. The Scalar 1000 supports the **MOVE MEDIUM** (A5h) command when the source is a tape drive and the destination is a storage cell.

DT to MT

The value returned for this field is 0. The library does not support the **MOVE MEDIUM** (A5h) command when the source is a tape drive and the destination is the accessor.

LCD Mode Page (22h)

The format of the LCD Mode page is shown on Figure 8-6 on page 8-15.

Bits Bytes	7	6	5	4	3	2	1	0
0	PS	Rsvd	Page Code					
1	Parameter List Length							
2	Rsvd	LCD Security	Reserved		Write Line 1	Write Line 2	Write Line 3	Write Line 4
3	Reserved							
4 : 23	Display Line 1							
24 : 43	Display Line 2							
44 : 63	Display Line 3							
64 : 83	Display Line 4							

Figure 8-6 LCD Mode Page Code

PS

The value returned for this field is 1. The Scalar 1000 can save this page to nonvolatile memory.

Page Code

The value of this field is 22h.

Parameter List Length

The Parameter List Length is 52h (82) which indicates 82 additional bytes of data.

LCD Security Valid

This bit indicates whether a change is requested. The change is as follows:

- 0 - Do not change the LCD security.
- 1 - Change the LCD security according to the LCD Security bit.

LCD Security

This bit controls the LCD security change. If the LCD Security Valid bit is 1, LCD security can be enabled or disabled as follows:

- 0 - Disable
- 1 - Enable

LCD Security can be enabled using the operator panel or Mode Select command. If LCD Security is activated via the operator panel or Mode Select command, it must be deactivated by the same means.

If the LCD security is enabled, the following events are disabled:

- Performing diagnostics from the operator panel
- All Setup options
- Changing the mode or state
- Operator Panel command options that involve cartridge movement

Attempts to perform any of the above events result in an error message.

Write Line 1

This field controls the line 1 text. Two values are available:

0 - ^^*ADIC*^*SCALAR*^*1000*^^ (each ^ represents an ASCII space character)

1 - Text specified by bytes 4 through 23

Write Line 2

This field controls the line 2 text. Two values are available:

0 - *MM/DD/YY*^^^^*HH:MM:SS* (each ^ represents an ASCII space character)

1 - Text specified by bytes 24 through 43

Write Line 3

This field controls the line 3 text. Two values are available:

0 - High level status message

1 - Text specified by bytes 44 through 63

Write Line 4

This field controls the line 4 text. Two values are available:

0 - Low level status message

1 - Text specified by bytes 64 through 83

Display Line 1

This field is used in conjunction with Write Line 1 to display 20 ASCII text characters. For less than 20 ASCII text characters, the last byte must be 00h. Refer to Figure 7-5 on page 7-13 for the character set.

Display Line 2

This field is used in conjunction with Write Line 2 to display 20 ASCII text characters. For less than 20 ASCII text characters, the last byte must be 00h. Refer toFigure 7-5 on page 7-13 for the character set.

Display Line 3

This field is used in conjunction with Write Line 3 to display 20 ASCII text characters. For less than 20 ASCII text characters, the last byte must be 00h. Refer to Figure 7-5 on page 7-13 for the character set.

Display Line 4

This field is used in conjunction with Write Line 4 to display 20 ASCII text characters. For less than 20 ASCII text characters, the last byte must be 00h. Refer to Figure 7-5 on page 7-13 for the character set.

Parity Page (00h)

The format of the Parity page is shown in Figure 8-7.

Bits / Bytes	7	6	5	4	3	2	1	0
0	PS	Rsvd	Page Code					
1	Parameter List Length							
2	Reserved		Parity	Reserved				
3	Maximum Parity Retries							

Figure 8-7 Parity Page Code 00h.

PS

The value returned for this field is 1 which specifies the ability to save this page to nonvolatile memory.

Page Code

The return value of 00h identifies the Parity page.

Parameter List Length

The Parameter Length is 02h (2) which indicates 2 additional bytes of data.

Parity

This field enables or disables parity checking of the SCSI bus. Two values are available:

- 0 - Disable parity checking
- 1 - Enable parity checking

The Parity bit may also be enabled by the operator panel parity option. Use the same method to disable the parity bit.

Maximum Parity Retries

This field designates the maximum number of times to retry the message out, command out, or data out phase after a parity error. The valid values for this field range from:

- 0 - no retries are performed
- 255 - the maximum retries are performed

The default value for this field is 1.

Mixed Media Page (2Ah)

The format for the Mixed Media page is shown in Figure 8-8 on page 8-19.

Bits / Bytes	7	6	5	4	3	2	1	0
0	PS	Reserved	Page Code					
1	Parameter List Length							
2	Reserved				Volser Enable	Vendor ASCQ	Extend RES	MM Enable
3	Reserved							

Figure 8-8 Mixed Media Page Format

PS

The value returned for this field is 1. The AML / A can save this page to nonvolatile memory.

Page Code

The value of this field is 2Ah.

Parameter List Length

The Parameter List Length is 02h (2) which indicates 2 additional bytes of data.

Volser Extension Enable (Volser Enable)

This field enables the Volser extension identification for **Read Element Status** and **Request Volume Element Address** commands. Two values are available:

1 - The media identification byte is returned as the first byte of the volume tag (volser) information.

0 - The volume tag (volser) information returns only the 6 character volser label.

Vendor ASCQ

The Vendor ASCQ bit field indicates which ASC / ASCQ shall be returned if a **Move Media** command is issued to an invalid location:

0 - **Move Medium** command is rejected with a sense log of Illegal Request and ASC / ASCQ of 3Bh / A0h (Media Incompatible with Destination).

1 - **Move Medium** command is rejected with a sense log of Illegal Request and ASC / ASCQ of 30h / 00h (Incompatible Media installed).

RES Extension Enable (Extend RES)

This field indicates whether the **Read Element Status** and **Element Address** commands return extended element status information:

0 - Extended Status is not returned.

1 - Extended Status is returned.

Mixed Media Enable (MM Enable)

This field determines the Scalar 1000 Mixed Media mode. Two values are available:

0 - Mixed Media mode is disabled. The Scalar 1000 operates in standard operating mode. All bits in byte 2 are ignored.

1 - Mixed Media mode is enabled. The Scalar 1000 returns media type information for media and elements.

Library Geometry Descriptor Page (2Bh)

The format for the Library Geometry Descriptor page is shown in Figure 8-9 on page 8-22.

Bits Bytes	7	6	5	4	3	2	1	0
0	PS	Rsvd	Page Code					
1	Parameter List Length							
2	Reserved							
3	Reserved							
4 : 8	Section 0, Frame 0, Column A Descriptor : Section 0, Frame 0, Column E Descriptor							
9 : 13	Section 0, Frame 1, Column A Descriptor : Section 0, Frame 1, Column E Descriptor							
14 : 18	Section 0, Frame 2, Column A Descriptor : Section 0, Frame 2, Column E Descriptor							
19 : 23	Section 0, Frame 3, Column A Descriptor : Section 0, Frame 3, Column E Descriptor							
24 : 28	Section 1, Frame 0, Column A Descriptor : Section 1, Frame 0, Column E Descriptor							
29 : 33	Section 1, Frame 1, Column A Descriptor : Section 1, Frame 1, Column E Descriptor							
34 : 38	Section 1, Frame 2, Column A Descriptor : Section 1, Frame 2, Column E Descriptor							
39 : 43	Section 1, Frame 3, Column A Descriptor : Section 1, Frame 3, Column E Descriptor							
44 : 48	Section 2, Frame 0, Column A Descriptor : Section 2, Frame 0, Column E Descriptor							
49 : 53	Section 2, Frame 1, Column A Descriptor : Section 2, Frame 1, Column E Descriptor							

54 : 58	Section 2, Frame 2, Column A Descriptor : Section 2, Frame 2, Column E Descriptor
59 : 63	Section 2, Frame 3, Column A Descriptor : Section 2, Frame 3, Column E Descriptor
64 : 68	Section 3, Frame 0, Column A Descriptor : Section 3, Frame 0, Column E Descriptor
69 : 73	Section 3, Frame 1, Column A Descriptor : Section 3, Frame 1, Column E Descriptor
74 : 78	Section 3, Frame 2, Column A Descriptor : Section 3, Frame 2, Column E Descriptor
79 : 83	Section 3, Frame 3, Column A Descriptor : Section 3, Frame 3, Column E Descriptor

Figure 8-9 Library Geometry Descriptor Page Format

PS

The value returned for this field is 0. The Scalar 1000 cannot save this page to nonvolatile memory.

Page Code

This field identifies the page code for the Library Geometry Descriptor page. The value for this field is 2Bh.

Parameter Length

The Parameter Length is 52h (82) which indicates 82 additional bytes of data.

Section X, Frame Y, Column Z Descriptor

The description fields identify the configuration of any of the columns A to E (Z) within sections 0 to 3 (X) of frame 1 to 4 (Y). Each frame is divided into 4 sections, numbered top to bottom. Each section is divided into 5 columns, lettered left to right. The column on the top most section is 12 storage cells in height for half-inch and DLT media cells, or 18 storage sells in height for 8mm AIT media cells. All other sections are 10 cells in height for half-inch and DLT, or 15 cells in height for 8mm AIT media.

Each description field describes the respective configuration. The description bytes can have the following configuration types:

- “I” Insert/Eject station
- “S” storage cell
- “D” right half of drive position; 1 to 3 drives installed
- “#” (1 - 6) number of drives installed in following column
- “^”(space character) frame is not present
- “-” not installed drive bay

The following example illustrates the configuration of a Scalar 1000 with two frames containing four drives. See Figure 8-10.

```
Bytes   4 - 23    ISSSSSSSSS^^^^^^^^^^
       24 - 43    SSSSSSSSSS^^^^^^^^^^
       44 - 63    S1D- -SSSSS^^^^^^^^^^
       64 - 83    S1D1DS1D- -^^^^^^^^^^
```

Figure 8-10 Scalar 1000 Configuration Example

Mode Sense (1Ah) Status

After processing the **MODE SENSE** command, the Scalar 1000 returns a status byte as follows:

Good

The Scalar 1000 returns GOOD status when it is able to process the command without errors.

Busy

The Scalar 1000 returns BUSY status when it is processing a command for a different initiator or when it is aborting a motion command.

Reservation Conflict

The Scalar 1000 returns Reservation Conflict status when it is reserved by a different initiator.

Check Condition

Check Condition status is returned for the following reasons:

- The message system is enabled and a message error occurs while the Scalar 1000 is processing the command.
- The Scalar 1000 detects a non-correctable parity error while receiving the CDB.
- The command is issued to an invalid LUN.
- A Unit Attention condition is pending for the initiator.
- A reserved bit is set to 1 or a parameter is invalid in the CDB. See Table 8-3.

Table 8-3 Invalid Parameters in the CDB

Error	Sense Key	ASC	ASCQ	SKSV Bit	C/D Bit	BPV Bit	Bit Pointer	Field Pointer
Invalid Value for Allocation Length	5h	1Ah	00h	1	1	0	0	0004h
Invalid Value in the DBD Field	5h	24h	00h	1	1	1	3h	0001h
Invalid Page Code	5h	24h	00h	1	0	1	5h	0002h

9

Move Medium (A5h)

Overview 9-3

Move Medium (A5h) Command 9-3
CDB Format 9-4
Transport Element Address 9-4
Source Address 9-4
Destination Address 9-4
Invert 9-5
Cartridge Inventory 9-5

Move Medium (A5h) Status 9-8
Good 9-8
Busy 9-8
Reservation Conflict 9-8
Check Condition 9-9

Overview

Note

Attempting to move a cartridge from a tape drive, while the tape remains inside the tape drive, returns Check Condition status with the sense key set to Hardware Error. Refer to Table 9-5 on page 9-9.

The **MOVE MEDIUM** command allows the initiator to request that the accessor move a cartridge from one element address to another specific element address. Refer to *Chapter 8 Mode Sense (1Ah)* for a matrix with the valid source and destination element address combination.

When using this command with the source and destination address set to the same tape drive, the accessor pushes the cartridge back into the drive. Use this method if a move from the drive failed because the cartridge was not ejected far enough, to allow the initiator to eject the cartridge again and repeat the **Move Medium** command.

Move Medium (A5h) Command

The **MOVE MEDIUM** CDB format is shown in Figure 9-1 on page 9-4.

Bits / Bytes	7	6	5	4	3	2	1	0
0	1	0	1	0	0	1	0	1
1	Logical Unit Number			Reserved				
2	MSB Transport Element Address							
3	LSB							
4	MSB Source Address							
5	LSB							
6	MSB Destination Address							
7	LSB							
8	Reserved							
9								
10	Reserved							Invert
11	Reserved							

Figure 9-1 MOVE MEDIUM CDB

CDB Format

Transport Element Address

This field is checked for the value set by the MODE SELECT (15h) command and should be 0 or the element address of the accessor.

Source Address

This field specifies the element address from where the cartridge is to be taken.

Destination Address

This field specifies the element address where the cartridge is to be placed.

Invert

This field indicates whether the medium needs to be flipped. The library does not support the Invert function. The value for this field must be 0.

Cartridge Inventory

The cartridge inventory is updated after the accessor completes a cartridge operation, regardless of whether or not the cartridge move was successful. See Table 9-1 through Table 9-4.

Table 9-1 Successful Move Operation

Cartridge Inventory Field	Source Address Changes	Destination Address Changes
Occupied	0	1
Occupied valid	1	1
Label	Blanks	Copied from source
Label valid	0	Copied from source
Label error	0	Copied from source
Label scan retries	0	Copied from source
Send volume match	0	Copied from source
Tape drive accessible	1	0
Pick retries	Update if retried	No change
Put retries	No change	Update if retried
Total puts	No change	Incremented
Source address	Invalid	Source element index

The Scalar 1000 does not attempt to move a cartridge if the cartridge inventory indicates that the source is empty. Refer to Table 9-2 on page 9-6.

Table 9-2 Move Operation with Empty Source

Cartridge Inventory	Source Address Changes	Destination Address Changes
Occupied	0	No change
Occupied valid	1	No change
Label	Blanks	No change
Label valid	0	No change
Label error	0	No change
Label scan retries	0	No change
Send volume match	0	No change
Tape drive accessible	No change	No change
Pick retries	No change	No change
Put retries	No change	No change
Total puts	No change	No change
Source address	No change	No change

The Scalar 1000 does not perform the move operation if the cartridge inventory indicates that the destination is occupied. Refer to Table 9-3 on page 9-7.

Table 9-3 Move Operation with Destination Full

Cartridge Inventory	Source Address Changes	Destination Address Changes
Occupied	1	1
Occupied valid	1	1
Label	No change	No change
Label valid	No change	No change
Label error	No change	No change
Label scan retries	No change	No change
Send volume match	No change	No change
Tape drive accessible	1	No change
Pick retries	Update if retried	No change
Put retries	Update if retried	No change
Total puts	Incremented	No change
Source address	No change	No change

If the occupied valid flag is set to 1 for the source and destination address and the location is a storage cell, the Scalar 1000 does not attempt to move the cartridge. Refer to Table 9-4 on page 9-8.

Table 9-4 Move Operation with Identical Source and Destination

Cartridge Inventory	Source Address Changes	Destination Address changes
Occupied	0	1
Occupied valid	1	1
Label	Blanks	No change
Label valid	0	No change
Label error	0	No change
Label scan retries	0	No change
Send volume match	0	No change
Tape drive accessible	No change	0
Pick retries	No change	Update if retried
Put retries	No change	Update if retried
Total puts	No change	Incremented
Source address	Invalid	Source element index

Move Medium (A5h) Status

After processing the **MOVE MEDIUM** command, the Scalar 1000 returns a status byte as follows:

Good

The Scalar 1000 returns a Good status when it is able to process the command without errors.

Busy

The library returns Busy status when it is processing a command for a different initiator or when a motion command is in the process of being aborted.

Reservation Conflict

The Scalar 1000 returns Reservation Conflict status when it is reserved by a different initiator.

Check Condition

The Scalar 1000 returns the Check Condition status when the following situations occur:

- The message system is enabled and a message error occurs while the Scalar 1000 is processing the command.
- The Scalar 1000 detects an unrecoverable parity error while the Scalar 1000 processes the command.
- A Unit Attention condition is holding for the initiator.
- The command was issued to an invalid LUN.
- The Scalar 1000 has experienced an unrecoverable hardware error.
- A reserved bit is set to 1 or a parameter is invalid in the CDB. See Table 9-5.
- The cartridge inventory indicates that the move operation cannot be performed.
- After a move attempt, the Scalar 1000 finds that the source is empty or the destination is occupied.
- The library is not ready because the library is offline, a door is open, or the Insert/Eject station is open.
- A drive may report an error.

Table 9-5 Invalid Parameters in the CDB

Error	Sense Key	ASC	ASCQ	SKSV Bit	C/D Bit	BPV Bit	Bit Pointer	Field Pointer
Invalid Transport Element Address	05h	21h	01h	1	1	0	0	0002h
Invalid Source Element Address	05h	21h	01h	1	1	0	0	0004h
Invalid Destination Element Address	05h	21h	01h	1	1	0	0	0006h
Invalid Invert Field	05h	24h	00h	1	1	1	0	000Ah
Destination Element Full	05h	3Bh	0Dh	0	0	0	0	0000h

Table 9-5 Invalid Parameters in the CDB

Error	Sense Key	ASC	ASCQ	SKSV Bit	C/D Bit	BPV Bit	Bit Pointer	Field Pointer
Source Element Empty	05h	3Bh	0Eh	0	0	0	0	0000h
Source Cartridge is Loaded, Not Accessible	05h	3Bh	90h	0	0	0	0	0000h
Destination for Move Operation Cannot be Accessor	05h	3Bh	85h	0	0	0	0	0000h
Source for Move Cannot be Accessor	05h	3Bh	86h	0	0	0	0	0000h
Cartridge Stuck in Tape Drive	05h	3Bh	87h	0	0	0	0	0000h
Media is not Compatible with Destination	05h	3Bh	A0h	0	0	0	0	0000h
Barcode Label and Full Status is Questionable	05h	83h	03h	0	0	0	0	0000h
Incompatible Media Installed	05h	30h	00h	0	0	0	0	0000h
I/E Station Door is Open	05h	53h	81h	0	0	0	0	0000h

10

Position to Element (2Bh)

Overview 10-3

Position to Element (2Bh) Command 10-3
CDB Format 10-4
Transport Element Address 10-4
Destination Element Address 10-4
Invert. 10-4

Position To Element (2Bh) Status 10-4
Good 10-4
Busy 10-4
Reservation Conflict 10-4
Check Condition 10-4

Overview

The **POSITION TO ELEMENT** command allows the initiator to move the accessor to a specific element address position.

Position to Element (2Bh) Command

The **POSITION TO ELEMENT** CDB format is shown in Figure 10-1.

Bits / Bytes	7	6	5	4	3	2	1	0
0	0	0	1	0	1	0	1	1
1	Logical Unit Number			Reserved				
2	MSB							
3				Transport Element Address				LSB
4	MSB							
5				Destination Address				LSB
6				Reserved				
7								
8	Reserved							Invert
9	Reserved							

Figure 10-1 POSITION TO ELEMENT CDB

CDB Format

Transport Element Address

This field contains either 0 or the element address of the accessor.

Destination Element Address

This field contains the element address for the move. Specifying the accessor address positions parks the accessor in the home position. Using this address allows easy access to cartridges.

Invert

This field indicates whether the medium needs to be flipped. The library does not support the invert function. The value for this field must be 0.

Position To Element (2Bh) Status

After processing the **POSITION TO ELEMENT** command, the Scalar 1000 returns a status byte as follows:

Good

The Scalar 1000 returns a Good status when it is able to process the command without errors.

Busy

The Scalar 1000 returns Busy status when it is processing a command for a different initiator or when a motion command is in the process of being aborted.

Reservation Conflict

The Scalar 1000 returns Reservation Conflict status when it is reserved by a different initiator.

Check Condition

The Scalar 1000 returns the Check Condition status when the following situations occur:

- The message system is enabled and a message error occurs while the Scalar 1000 is processing the command.
- The command is issued to an invalid LUN.
- The Scalar 1000 finds an unrecoverable parity error while receiving the CDB.

- The Scalar 1000 has experienced an unrecoverable hardware error.
- A Unit Attention condition is pending for the initiator.
- The Scalar 1000 is not ready because the door or Insert/Eject station is open, or the Scalar 1000 is offline.
- A reserved bit is set to 1 or a parameter is invalid in the CDB. See Table 10-1.
- The Scalar 1000 encounters a problem during the positioning operation.

Table 10-1 Invalid Parameters in the CDB

Error	Sense Key	ASC	ASCQ	SKSV Bit	C/D Bit	BPV Bit	Bit Pointer	Field Pointer
Invalid Transport Element Address	05h	21h	01h	1	1	0	-	0002h
Invalid Destination Element Address	05h	21h	01h	1	1	0	-	0004h
Invalid Invert Field	05h	24h	01h	1	1	1	0	0008h

11

Prevent/Allow Medium Removal (1Eh)

Overview 11-3

Prevent / Allow Medium Removal(1Eh) Command 11-3
CDB Format 11-4
Prevent 11-4
P / A Options 11-4

Prevent / Allow Medium Removal (1Eh) Status 11-4
Good 11-4
Busy 11-4
Reservation Conflict 11-5
Check Condition 11-5

Overview

The **PREVENT/ALLOW MEDIUM REMOVAL** command enables or disables the opening of the Insert / Eject station.This command also prevents the following operator actions:

- Opening the Insert / Eject station
- Inserting a cartridge
- Ejecting a cartridge
- Self Test

If any initiator issues this command, no other initiator can perform the listed functions.

Prevent/Allow Medium Removal(1Eh) Command

The **PREVENT/ALLOW MEDIUM REMOVAL** CDB format is shown in Figure 11-1.

Bits / Bytes	7	6	5	4	3	2	1	0
0	0	0	0	1	1	1	1	0
1	Logical Unit Number			Reserved				
2	Reserved							
3								
4	Reserved							Prevent
5	P / A Options		Reserved					

Figure 11-1 PREVENT / ALLOW MEDIUM REMOVAL CDB

CDB Format

Prevent

The Prevent bit indicates the following:

0 - Allow removal of the Insert / Eject station.

1 - Prevent removal through the Insert / Eject station. Use the P / A Option field to determine which action to prevent. This field is applicable until either a power on reset, command reset, or all initiators have issued an **ALLOW MEDIUM REMOVAL** command by setting the Prevent field to 0.

P/A Options

The P / A Options field specifies which action to prevent. See Table 11-1.

Table 11-1 P/A Options

P/A 1	P/A 2	Description
0	0	Opening the Insert / Eject station
0	1	Invalid (causes a Check Condition status)
1	0	Opening the Insert / Eject station
1	1	Ignored

Prevent/Allow Medium Removal (1Eh) Status

After processing the **PREVENT/ALLOW MEDIUM REMOVAL** command, the Scalar 1000 returns a status byte as follows:

Good

The Scalar 1000 returns a Good status when it is able to process the command without errors.

Busy

The Scalar 1000 returns Busy status when it is processing a command for a different initiator or when a motion command is in the process of being aborted.

Reservation Conflict

The Scalar 1000 returns Reservation Conflict status when it is reserved by a different initiator.

Check Condition

The Scalar 1000 returns the Check Condition status when the following situations occur:

- The message system is enabled and a message error occurs while the Scalar 1000 is processing the command.
- The Scalar 1000 finds an unrecoverable parity error while receiving the CDB.
- The command is issued to an invalid LUN.
- A Unit Attention condition is pending for the initiator.
- A reserved bit is set to 1 or a parameter is invalid in the CDB. See Table 11-2.
- The value of a field in the P/A options field is invalid.

Table 11-2 Invalid Parameters in the CDB

Error	Sense Key	ASC	ASCQ	SKSV Bit	C/D Bit	BPV Bit	Bit Pointer	Field Pointer
Invalid P/A 2 bit in P/A Options Field	05h	24h	00h	1	1	1	6h	0005h

12

Read Buffer (3Ch)

Overview 12-3

Read Buffer (3Ch) Command 12-3
CDB Format 12-3
Mode 12-3
Data Mode 12-4
Descriptor Mode 12-4
Buffer ID 12-5
Buffer Offset 12-6
Allocation Length 12-6

Read Buffer (3Ch) Response 12-6

Read Buffer (3Ch) Status 12-6
Good 12-6
Busy 12-6
Reservation Conflict 12-6
Check Condition 12-6

Overview

The **READ BUFFER** command is used in conjunction with the **WRITE BUFFER** command as a diagnostic function for testing target memory, SCSI bus integrity, up-loading trace, and log information. This command does not alter the behavior of the library.

Read Buffer (3Ch) Command

The **READ BUFFER** CDB format is shown in Figure 12-1.

Bits / Bytes	7	6	5	4	3	2	1	0
0	0	0	1	1	1	1	0	0
1	Logical Unit Number			Reserved		Mode		
2	Buffer ID							
3	MSB							
4	Buffer Offset							
5								LSB
6	MSB							
7	Allocation Length							
8								LSB
9	Reserved							

Figure 12-1 READ BUFFER CDB

CDB Format

The function of this command and the meaning of fields within the command descriptor block depend on the contents of the mode field.

Mode

The mode field is defined in Table 12-1 on page 12-4.

Table 12-1 Mode Field Definition

Mode Bit 2	Bit 1	Bit 0	Description
0	1	0	Data
0	1	1	Descriptor

Data Mode

In Data Mode, the Data In phase contains buffer data from the buffer identified in the buffer ID field.

Descriptor Mode

In Descriptor Mode, a maximum of four bytes of READ BUFFER descriptor information is returned. The Scalar 1000 returns the descriptor information for the buffer specified by the buffer ID. If there is no buffer associated with the specified buffer ID, the Scalar 1000 returns all zeros in the READ BUFFER descriptor. The buffer offset field is reserved in this mode. The location length should be set to four or greater. The Scalar 1000 transfers the lesser of the allocation length or four bytes of READ BUFFER descriptor. The READ BUFFER descriptor is defined as shown in Figure 12-2.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Offset Boundary							
1	MSB							
2				Buffer Length				
3								LSB

Figure 12-2 Read Buffer Descriptor

The Offset Boundary field returns the boundary alignment within the selected buffer for subsequent **WRITE BUFFER** commands. The value contained in the offset boundary field is interpreted as a power of two. Refer to Table 12-2 on page 12-5.

Table 12-2 Buffer Offset Boundary

Offset Boundary	2**Offset Boundary	Buffer Offsets
0	$2^0 = 1$	Byte boundaries
1	$2^1 = 2$	Even Byte boundaries
2	$2^2 = 4$	Four Byte boundaries
3	$2^3 = 8$	Eight Byte boundaries
4	$2^4 = 16$	Sixteen Byte boundaries
:	:	:
FFh	Not Applicable	0 is the only supported buffer offset

The Buffer Length field returns the size of the selected buffer in bytes.

Buffer ID

Buffer ID code assignments for the **READ BUFFER** command are the same as for the **WRITE BUFFER** command. If an unsupported buffer ID code is selected, the Scalar 1000 returns CHECK CONDITION status, sets the sense key to ILLEGAL REQUEST and sets the additional sense code to ILLEGAL FIELD in the CDB. The Scalar 1000 terminates the Data In phase when allocation length bytes are transferred to the initiator or the end of the buffer is reached, whichever amount is less.

Table 12-3 outlines the supported buffer ID and the associated description.

Table 12-3 Buffer ID Description

Buffer ID	Description	R/W	Modes
0	Dump	RO	2, 3
1	Microcode	RW	2, 3
2	Engineering	RW	2, 3
3	Reserved	RO	2, 3
4	Reserved	RO	2, 3

Table 12-3 Buffer ID Description

5	Reserved	RO	2, 3

Buffer Offset

The buffer offset field contains the byte offset within the specified buffer from which data is transferred. The initiator should conform to the offset boundary requirements returned in the READ BUFFER descriptor. If the Scalar 1000 is unable to accept the specified buffer offset, it returns CHECK CONDITION status, sets the sense key to ILLEGAL REQUEST, and sets the additional sense code to ILLEGAL FIELD in the CDB.

Allocation Length

The Allocation Length is determined by the Mode and Buffer ID.

Read Buffer (3Ch) Response

The Buffer Response is determined by the mode and Buffer ID.

Read Buffer (3Ch) Status

After processing the **READ BUFFER** command, the Scalar 1000 returns a status byte as follows:

Good

The Scalar 1000 returns a Good status when it is able to process the command without errors.

Busy

The Scalar 1000 returns Busy status when it is processing a command for a different initiator or when a motion command is in the process of being aborted.

Reservation Conflict

The Scalar 1000 returns Reservation Conflict status when it is reserved by a different initiator.

Check Condition

The Scalar 1000 returns the Check Condition status when the following situations occur:

- The message system is enabled and a message error occurs while the Scalar 1000 is processing the command.
- The Scalar 1000 finds an unrecoverable parity error while receiving the CDB.
- The command is issued to an invalid LUN.
- A Unit Attention condition is pending for the initiator.
- A reserved bit is set to 1 or a parameter is invalid in the CDB.

13

Read Element Status (B8h)

Overview 13-5

Read Element Status (B8h) Command 13-5
CDB Format 13-6
VolTag 13-6
Element Type Code 13-6
Starting Element Address 13-6
Number of Elements 13-6
CurData 13-6
DVCID 13-7
Allocation Length 13-7

Read Element Status (B8h) Response 13-7
Element Status Header 13-7
First Element Address Reported 13-8
Number of Elements Reported 13-8
Byte Count of Report Available 13-8
Element Status Page 13-8
Element Type Code 13-9
PVolTag 13-9
AVolTag 13-9
Element Descriptor Length 13-9
Byte Count of Descriptor Data Available 13-10
Element Descriptors 13-10
Medium Transport Element 13-10
Except 13-12
Full 13-12
Additional Sense Code 13-12
Additional Sense Code Qualifiers 13-12
SValid 13-12
Invert 13-12
Source Storage Element Address 13-12
Primary Volume Tag 13-12
Media Domain 13-12

Media Type 13-12
Element Domain 13-12
Element Type. 13-12
Storage Element Descriptor 13-12
Element Address. 13-13
Access 13-14
Except 13-14
Full 13-14
Additional Sense Code (ASC). 13-14
Additional Sense Code Qualifier (ASCQ). 13-14
SValid 13-14
Invert. 13-14
Source Element Address 13-14
Primary Volume Tag Information 13-15
Media Domain. 13-15
Media Type 13-15
Element Domain 13-15
Element Type. 13-16
Import/Export Element Descriptor 13-16
Element Address. 13-18
InEnab. 13-18
ExEnab 13-18
Access 13-18
Except 13-18
Imp/Exp. 13-18
Full 13-19
Additional Sense Code (ASC). 13-19
Additional Sense Code Qualifier 13-19
SValid 13-19
Invert. 13-19
Source Element Address 13-19
Primary Volume Tag Information 13-19
Media Domain. 13-19
Media Type 13-20
Element Domain 13-20
Element Type. 13-20
Data Transfer Element Descriptor Page 13-20
Element Address. 13-22
Access 13-22
Except 13-22
Full 13-22
Additional Sense Code (ASC). 13-22
Additional Sense Code Qualifier (ASCQ). 13-22
NotBus 13-22
IDValid 13-23
LUValid 13-23
Logical Unit Number 13-23
SCSI Bus Address 13-23
SValid 13-23

Invert. 13-23
Source Element Address 13-23
Primary Volume Tag Information 13-23
Code Set 13-23
Identifier Type. 13-23
Identifier Length 13-24
Identifier. 13-24
Media Domain. 13-24
Media Type 13-24
Element Domain 13-24
Element Type. 13-25
ASC and ASCQ Values for 13-25

Read Element Status (B8h) Status 13-26
Good 13-26
Busy 13-26
Reservation Conflict 13-26
Check Condition 13-26

Overview

The **READ ELEMENT STATUS** command allows an initiator to request the status of the element addresses. This command returns the data created by the **INITIALIZE ELEMENT STATUS** command or **INITIALIZE ELEMENT STATUS WITH RANGE** command.

Read Element Status (B8h) Command

The **READ ELEMENT STATUS** CDB format is shown in Figure 13-1.

Bits / Bytes	7	6	5	4	3	2	1	0
0	1	0	1	1	1	0	0	0
1	Logical Unit Number			VolTag	Element Type Code			
2	MSB							
3	Starting Element Address							LSB
4	MSB							
5	Number of Elements							LSB
6	Reserved						CurData	DVCID
7	MSB							
8	Allocation Length							
9								LSB
10	Reserved							
11	Reserved							

Figure 13-1 READ ELEMENT STATUS CDB

CDB Format

VolTag

This field indicates whether the volume tag (bar code label) information is returned. The possible values are:

- 0 - Do not return volume tag information
- 1 - Return volume tag information

Element Type Code

This field specifies the selected element types for the return information. See Table 13-1.

Table 13-1 Element Type Code

Bit 3	Bit 2	Bit 1	Bit 0	Selected Element type
0	0	0	0	All element types reported (from starting address)
0	0	0	1	Accessor
0	0	1	0	Storage
0	0	1	1	Insert/Eject Station
0	1	0	0	Tape Drives

The accessor transfers a cartridge for one element location to another and does not retain a cartridge. If the VolTag bit is set to 1 and the Element Type Code is 0001b, the library returns element status information only. It returns NULLs for the volume tag information.

Note

The Starting Element Address field must indicate a valid element but does not necessarily have to match the Element Type Code field.

Starting Element Address

This field indicates the starting element address. Elements with equal or greater starting address are returned.

Number of Elements

This field specifies the maximum number of element descriptors to return.

CurData

This field is ignored.

DVCID

This field indicates whether device identifiers for a specified range are returned. The possible values are:

- 0 - Do not return device identifiers
- 1 - If available, return the device identifiers

Allocation Length

This field specifies the byte length for returned element descriptors. Only complete element descriptors are returned. The library returns element descriptors until one of the following conditions are met:

- All available element descriptors are returned

— or —

- The number of element descriptors specified in the Number of Elements field are returned

— or —

- The number of bytes of complete element descriptors specified in the Allocation Length field are returned

— or —

- There is less allocation length space available than is required by the next complete element descriptor

Read Element Status (B8h) Response

Element Status Header

Figure 13-2 on page 13-8 provides the format for the element status header. The Scalar 1000 returns one header for each **READ ELEMENT STATUS** command.

Bits / Bytes	7	6	5	4	3	2	1	0
0	MSB							
1				First Element Address Reported				LSB
2	MSB							
3				Number of Elements Reported				LSB
4				Reserved				
5	MSB							
6				Byte Count of Report Available				
7								LSB

Figure 13-2 Element Status Header

First Element Address Reported

This field indicates the lowest element address found.

Number of Elements Reported

This field indicates the number of elements found.

Byte Count of Report Available

This field indicates the number of available element status bytes that meet the CDB requirements. The value does not include the 8 byte element status header and is not adjusted to match the value specified in the Allocation Length field of the CDB.

Element Status Page

Figure 13-3 shows the format of the Element Status Page header. The Scalar 1000 returns one Element Status Page header for each group of element descriptors of the same type.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Element Type Code							
1	PVolTag	AVolTag	Reserved					
2	MSB							
3	Element Descriptor Length							LSB
4	Reserved							
5	MSB							
6	Byte Count of Descriptor Data Available							
7								LSB

Figure 13-3 Element Status Page Format

Element Type Code

This field indicates the specific element type being returned by the element descriptor. Refer to Table 13-1 on page 13-6.

PVolTag

This field indicates that the primary volume tag (bar code label) information is present or not as follows:

- 0 - Volume tag bytes are omitted
- 1 - Volume tag bytes are included

AVolTag

Alternate volume tags are not supported. The return value for this bit field is 0.

Element Descriptor Length

This field indicates the number of bytes contained in a single element descriptor.

Table 13-2 Element Descriptor Length

Dependency	Field		Value
None	PVolTag = 0	DVCID = 0	10 h (16)

Table 13-2 Element Descriptor Length

Dependency	Field		Value
None	PVolTag = 0	DVCID = 1	1Ah (26)
Scalar 1000 operating in Mixed Media Mode with RES Extend disabled	PVolTag = 1	DVCID = 0	34h (52)
	PVolTag = 1	DVCID = 1	3Eh (62)
Scalar 1000 operating in Mixed Media Mode with RES Extend enabled	PVolTag = 1	DVCID = 0	38h (56)
	PVolTag = 0	DVCID = 1	42h (66)

Byte Count of Descriptor Data Available

This field indicates the number of element descriptor data bytes available for the elements of this element type that met the CDB requirements. This value represents the Element Descriptor Length field multiplied by the number of element descriptors for this element type. This value does not include the 8 byte Element Status Page header.

Element Descriptors

The following sections contain the field definitions for the following element descriptors:

- Medium transport element: accessor
- Storage elements: each storage cell
- Import/Export elements: each Insert/Eject station cell
- Data transfer elements: each tape drive

Each element descriptor includes the element address and status flags. Sense code and other information depends on the element type.

Medium Transport Element Descriptor

Only one Medium Transport element, the accessor, exists. Figure 13-4 on page 13-11 shows the Medium Transport Element Descriptor format.

Bits / Bytes	7	6	5	4	3	2	1	0
0	MSB							
1	Element Address							LSB
2	Reserved					Except	Reserved	Full
3	Reserved							
4	Additional Sense Code							
5	Additional Sense Code Qualifier							
6	Reserved							
7								
8								
9	SValid	Invert	Reserved					
10	MSB							
11	Source Storage Element Address							LSB
12 : 47	Primary Volume Tag Information (Field omitted if PVolTag = 0)							
48 : 51	Reserved (Field moved up if Primary Volume Tag Information field is omitted)							
52	Media Domain (Field moved up if Primary Volume Tag Information field is omitted)							
53	Media Type (Field moved up if Primary Volume Tag Information field is omitted)							
54	Element Domain (Field moved up if Primary Volume Tag Information field is omitted)							
55	Element Type (Field moved up if Primary Volume Tag Information field is omitted)							

Figure 13-4 Medium Transport Element Descriptor Format

Element Address

This field contains the element address of the accessor.

Except

This field is set to 0.

Full

This field is set to 0.

Additional Sense Code

This field is set to 0.

Additional Sense Code Qualifiers

This field is set to 0.

SValid

This field is set to 0.

Invert

This field is set to 0.

Source Storage Element Address

This field is set to 0.

Primary Volume Tag

This field is set to 0.

Media Domain

This field is set to FFh (domain not determined).

Media Type

This field is set to FFh (type not determined).

Element Domain

This field is set to 80h (support for all media domain).

Element Type

This field is set to 0.

Storage Element Descriptor

Each storage cell is a storage element (788 maximum). Figure 13-5 shows the format of the Storage Element Descriptor.

Bits / Bytes	7	6	5	4	3	2	1	0
0	MSB							
1	Element Address							LSB
2	Reserved				Access	Except	Reserved	Full
3	Reserved							
4	Additional Sense Code							
5	Additional Sense Code Qualifier							
6	Reserved							
7								
8								
9	SValid	Invert	Reserved					
10	MSB							
11	Source Element Address							LSB
12 : 47	Primary Volume Tag Information (Field omitted if PVolTag = 0)							
48 : 51	Reserved (Field moved up if Primary Volume Tag Information field is omitted)							
52	Media Domain (Field moved up if Primary Volume Tag Information field is omitted)							
53	Media Type (Field moved up if Primary Volume Tag Information field is omitted)							
54	Element Domain (Field moved up if Primary Volume Tag Information field is omitted)							
55	Element Type (Field moved up if Primary Volume Tag Information field is omitted)							

Figure 13-5 Storage Element Descriptor Format

Element Address

This field contains the address of the cartridge storage cell.

Access

This field indicates that the Accessor can access the storage cell. The value of this field is 1.

Except

The exception field indicates the current condition of the cartridge cell as follows:

- 0 - The storage cell is in a normal condition
- 1 - The storage cell is in an abnormal condition as specified in the *Additional Sense Code (ASC)* and *Additional Sense Code Qualifier (ASCQ)* fields.

Full

This field indicates if a storage cell contains a cartridge as follows:

- 0 - The storage cell is empty
- 1 - The storage cell is full

Additional Sense Code (ASC)

Refer to Table 13-3 on page 13-26 for the supported ASC values.

Additional Sense Code Qualifier (ASCQ)

Refer to Table 13-3 on page 13-26 for the supported ASCQ values.

SValid

This bit field indicates the validity of the Source Element Address field as follows:

- 0 - The Source Element Address field is invalid
- 1 - The Source Element Address field is valid

Invert

Double sided media is not supported. This field is 0.

Source Element Address

This field indicates the previous element address of the cartridge.

Primary Volume Tag Information

When the PVolTag field in the CDB is set to 1, this field contains the volume tag (bar code label) information for the element address.

Only six or seven bytes of volser information is returned, depending on the Scalar 1000 operating mode parameters MM Enable and Volser Enable. Refer to *Mixed Media Page (2Ah)* on page 7-15.

Media Domain

This byte specifies the domain for which the media located within this descriptor belongs. The list of values is:

00h - The media is half inch (3480, 3490E, 3590, NCTP)

01h - The media is DLT (DLT III, DLT IIIXT, DLT IV)

02h - The media is 8mm AIT

FFh - The media domain can not be determined

Media Type

This byte specifies the exact type of media (based on the Media Domain byte). The list of values is:

- For Media Domain byte value of 00h:
  - 1 The media is a 3480 or 3490 cartridge
  - E The media is a 3490E cartridge
  - J The media is a 3590 cartridge
  - M The media is a NCTP cartridge
  - FFh The media cannot be determined
- For Media Domain byte value of 01h:
  - C The media is a DLT III cartridge
  - D The media is a DLT IV cartridge
  - E The media is a DLT IIIXT cartridge
  - FFh The media cannot be determined
- For Media Domain byte value of 02h:
  - A The media is an 8mm AIT cartridge
  - FFh The media cannot be determined

Element Domain

This byte specifies the domain of media (half inch or DLT) that can be placed into this element. The list of values are:

00h - The media is half inch (3480, 3490E, 3590, NCTP)

01h - The media is DLT (DLT III, DLT IIIXT, DLT IV)

02h - The media is 8mm AIT

80h - The media is either half inch or DLT

FFh - The media domain can not be determined

Element Type

This byte is only used for Data Transport Element Descriptors (tape drives). For all other descriptors, this byte is 00h.

Import/Export Element Descriptor

One Insert/Eject station is supported. Each cell in the Insert/Eject station has an element address. Figure 13-6 on page 13-17 shows the format of the Import/Export Element Descriptor.

Bits / Bytes	7	6	5	4	3	2	1	0
0	MSB Element Address							
1								LSB
2	Reserved		InEnab	ExEnab	Access	Except	Imp/Exp	Full
3	Reserved							
4	Additional Sense Code							
5	Additional Sense Code Qualifier							
6	Reserved							
7								
8								
9	SValid	Invert	Reserved					
10	MSB Source Element Address							
11								LSB
12 : 47	Primary Volume Tag Information (Field omitted if PVolTag = 0)							
48 : 51	Reserved (Field moved up if Primary Volume Tag Information field is omitted)							
52	Media Domain (Field moved up if Primary Volume Tag Information field is omitted)							
53	Media Type (Field moved up if Primary Volume Tag Information field is omitted)							
54	Element Domain (Field moved up if Primary Volume Tag Information field is omitted)							
55	Element Type (Field moved up if Primary Volume Tag Information field is omitted)							

Figure 13-6 Import/Export Element Descriptor Format

Element Address

This field contains the address of the Insert/Eject station element cell.

InEnab

This field indicates that the Insert/Eject station supports cartridge loading mechanism to enable accessor access (the Insert/Eject station is closed). The value for this field is 1.

ExEnab

This field indicates that the Insert/Eject station supports cartridge unloading mechanism to disable accessor access (the Insert/Eject station is open). The value for this field is 1.

Access

This field indicates whether the accessor can access the cartridge in the Insert/Eject station as follows:

- 0 - The Insert/Eject station is opened and the accessor cannot access cartridges
- 1 - The Insert/Eject station is closed and the accessor can access the cartridge

Except

This field indicates the current condition of the Insert/Eject station cell as follows:

- 0 - The Insert/Eject station cell is in a normal state
- 1 - The Insert/Eject station cell is in an abnormal state as indicated by *Additional Sense Code (ASC)* and *Additional Sense Code Qualifier* field

Imp/Exp

This field indicates how the cartridge was placed in the Insert/Eject station cell:

- 0 - The accessor placed the cartridge in the Insert/Eject station
- 1 - The operator placed the cartridge in the Insert/Eject station

Full

This field indicates that this Insert / Eject station cell contains a cartridge as follows:

- 0 - No cartridge in the cell
- 1 - Cartridge in the cell

Additional Sense Code (ASC)

If the Insert / Eject station cell is in an abnormal state, this field contains 83h (131). Refer to Table 13-3 on page 13-26 for supported ASC values.

Additional Sense Code Qualifier

Supported ASCQ values are listed in Table 13-3 on page 13-26.

SValid

This bit field indicates the validity of the Source Element Address field as follows:

- 0 - The Source Element Address field is invalid
- 1 - The Source Element Address field is valid

Invert

Double sided media is not supported. This field is 0.

Source Element Address

This field indicates the previous element address of the cartridge.

Primary Volume Tag Information

When the PVolTag field in the CDB is set to 1, this field contains the volume tag (bar code label) information for the element address.

Only six or seven bytes of volser information is returned, depending on the Scalar 1000 operating mode parameters MM Enable and Volser Enable. Refer to *Mixed Media Page (2Ah)* on page 7-15.

Media Domain

This byte specifies the domain for which the media located within this descriptor belongs. The list of values is:

00h - The media is half inch (3480, 3490E, 3590, NCTP)

01h - The media is DLT (DLT III, DLT IIIXT, DLT IV)

02h - The media is 8mm AIT

FFh - The media domain can not be determined

Media Type

This byte specifies the exact type of media (based on the Media Domain byte). The list of values is:

- For Media Domain byte value of 00h:
  - 1 The media is a 3480 or 3490 cartridge
  - E The media is a 3490E cartridge
  - J The media is a 3590 cartridge
  - M The media is a NCTP cartridge
  - FFh The media cannot be determined
- For Media Domain byte value of 01h:
  - C The media is a DLT III cartridge
  - D The media is a DLT IV cartridge
  - E The media is a DLT IIIXT cartridge
  - FFh The media cannot be determined
- For Media Domain byte value of 02h:
  - A The media is an 8mm AIT cartridge
  - FFh The media cannot be determined

Element Domain

This byte specifies the domain of media (half inch or DLT) that can be placed into this element. The list of values are:

00h - The media is half inch (3480, 3490E, 3590, NCTP)

01h - The media is DLT (DLT III, DLT IIIXT, DLT IV)

02h - The media is 8mm AIT

80h - The media is either half inch or DLT

FFh - The media domain can not be determined

Element Type

This byte is only used for Data transport Element Descriptors (tape drives). For all other descriptors, this byte is 00h.

Data Transfer Element Descriptor Page

The Data Transfer Elements are the tape drives. Figure 13-7 shows the format of the Data Transfer Element Descriptor page.

Bits Bytes	7	6	5	4	3	2	1	0
0	MSB Element Address							
1								LSB
2	Reserved				Access	Except	Reserved	Full
3	Reserved							
4	Additional Sense Code							
5	Additional Sense Code Qualifier							
6	NotBus	Reserved	IDValid	LUValid	Reserved	Logical Unit Number		
7	SCSI Bus Address							
8	Reserved							
9	SValid	Invert	Reserved					
10	MSB Source Element Address							
11								LSB
12 : 47	Primary Volume Tag Information (Omitted if PVolTag = 0)							
48	Reserved				Code Set			
49	Reserved				Identifier Type			
50	Reserved							
51	Identifier Length							
52 : 61	Identifier (Omitted if DVCID = 0)							
62	Media Domain (Field moved up if Primary Volume Tag Information field or device identifier field is omitted)							
63	Media Type (Field moved up if Primary Volume Tag Information field or device identifier field is omitted)							
64	Element Domain (Field moved up if Primary Volume Tag Information field or device identifier field is omitted)							

65	Element Type (Field moved up if Primary Volume Tag Information field or device identifier field is omitted)

Figure 13-7 Data Transfer Element Descriptor Page Format

Element Address

This field contains the element address of the tape drive.

Access

This field indicates whether the Accessor can pick or place a cartridge at the tape drive location as follows:

- 0 - The cartridge at the tape drive is not accessible to the accessor (cartridge is not unloaded)
- 1 - The cartridge at the tape drive is accessible by the accessor (cartridge is unloaded)

Except

The exception field indicates the current condition of the tape drive as follows:

- 0 - The tape drive is in a normal state
- 1 - The tape drive is in an abnormal state as indicated by the *Additional Sense Code (ASC)* and the *Additional Sense Code Qualifier (ASCQ)* fields

Full

This field indicates if the tape drive contains a cartridge as follows:

- 0 - No cartridge in tape drive
- 1 - Cartridge in tape drive

Additional Sense Code (ASC)

This field contains the value 83h (131) or 42h (66) if the tape drive is in an abnormal state. Refer to Table 13-3 on page 13-26 for supported ASC values.

Additional Sense Code Qualifier (ASCQ)

Supported ASCQ values are listed in Table 13-3 on page 13-26.

NotBus

This field is not supported and is set to 0.

IDValid

This field indicates whether the drive SCSI id (byte 7) is valid:

- 0 - The SCSI id is not valid
- 1 - The SCSI id is valid

LUValid

This field is not supported and is set to 0.

Logical Unit Number

This field is not supported and is set to 0.

SCSI Bus Address

This field contains the tape drive SCSI address (0 .. F).

SValid

This bit field indicates the validity of the Source Element Address field as follows:

- 0 - The Source Element Address field is invalid
- 1 - The Source Element Address field is valid

Invert

Double sided media is not supported. This field is 0.

Source Element Address

This field indicates the previous element address location of a cartridge.

Primary Volume Tag Information

When the PVolTag field in the CDB is set to 1, this field contains the volume tag (bar code label) information for the element address.

Only six or seven bytes of volser information is returned, depending on the Scalar 1000 operating mode parameters MM Enable and Volser Enable. Refer to *Mixed Media Page (2Ah)* on page 7-15.

Note

If the Except field is set to 1, the Primary Volume Tag Information could be invalid due to an inaccurate cartridge inventory. Scan the barcode label with the **Initialize Element Status** or **Initialize Element Status with Range** command.

Code Set

This field is set to 2h to indicate that ASCII values are returned.

Identifier Type

This field is set to 0h.

Identifier Length

This field contains the length in bytes of the Identifier field, and is set to 0Ah. If no device identifier is available, or the DVCID bit in the CDB is zero, the Identifier Length field is 0h and the Code Set and Identifier Type field are also 0h.

Identifier

This field provides the serial number of the device associated with the data transfer element. If no device identifier is available for the element, or the DVCID bit in the CDB is zero, this field is omitted.

Media Domain

This byte specifies the domain for which the media located within this descriptor belongs. The list of values is:

00h - The media is half inch (3480, 3490E, 3590, NCTP)

01h - The media is DLT (DLT III, DLT IIIXT, DLT IV)

02h - The media is 8mm AIT

FFh - The media domain can not be determined

Media Type

This byte specifies the exact type of media (based on the Media Domain byte). The list of values is:

- For Media Domain byte value of 00h:
  - 1 The media is a 3480 or 3490 cartridge
  - E The media is a 3490E cartridge
  - J The media is a 3590 cartridge
  - M The media is a NCTP cartridge
  - FFh The media cannot be determined
- For Media Domain byte value of 01h:
  - C The media is a DLT III cartridge
  - D The media is a DLT IV cartridge
  - E The media is a DLT IIIXT cartridge
  - FFh The media cannot be determined
- For Media Domain byte value of 02h:
  - A The media is an 8mm AIT cartridge
  - FFh The media cannot be determined

Element Domain

This byte specifies the domain of media (half inch or DLT) that can be placed into this element. The list of values are:

00h - The media is half inch (3480, 3490E, 3590, NCTP)

01h - The media is DLT (DLT III, DLT IIIXT, DLT IV)

02h - The media is 8mm AIT

80h - The media is either half inch or DLT

FFh - The media domain can not be determined

Element Type

This byte is only used for Data transport Element Descriptors (tape drives). For all other descriptors, this byte is 00h. The list of values for tape drives is:

- For Element Domain byte value of 00h:
  - 01h The drive is an ADIC 8490
  - 02h The drive is a NTCP
  - 03h The drive is an IBM 3590
  - FFh The drive cannot be determined
- For Element Domain byte value of 01h:
  - 03h The drive is a Quantum DLT4000
  - 04h The drive is a Quantum DLT7000
  - FFh The drive cannot be determined
- For Element Domain byte value of 02h:
  - 01h The drive is an AIT 3102
  - FFhThe drive cannot be determined

ASC and ASCQ Values for Abnormal States

Table 13-3 on page 13-26 describes the ASC and ASCQ values and corrective actions for an abnormal element descriptor condition.

Table 13-3 ASC and ASCQ Values

ASC	ASCQ	Description	Action
83h	00h	Label Questionable	The barcode label is questionable. Issue an **INITIALIZE ELEMENT STATUS** (07h) or **INITIALIZE ELEMENT STATUS WITH RANGE** (E7H) command.
83h	03h	Label and Full Status Questionable	The library was powered on or a front door was opened. Either action could invalidate the cartridge inventory.
83h	0Ah	Unable to calibrate offset	Reteach the Scalar 1000 from the Operator Panel.
42h	00h	Drive status error	The tape requires intervention to become operational. If the tape is unloaded, issue a **MOVE MEDIA** command to initialize the tape drive.

Read Element Status (B8h) Status

After processing the **READ ELEMENT STATUS** command, the Scalar 1000 returns a status byte as follows:

Good

The Scalar 1000 returns a Good status when it is able to process the command without errors.

Busy

The Scalar 1000 returns Busy status when it is processing a command for a different initiator or when a motion command is in the process of being aborted.

Reservation Conflict

The Scalar 1000 returns Reservation Conflict status when it is reserved by a different initiator.

Check Condition

The Scalar 1000 returns the Check Condition status when the following situations occur:

- The message system is enabled and a message error occurs while the Scalar 1000 is processing the command.
- The Scalar 1000 detects an unrecoverable parity error while receiving the CDB.
- The command is issued to an invalid LUN.

- A Unit Attention condition is pending for the initiator.
- A reserved bit is set to 1 or a parameter is invalid in the CDB. See Table 13-4.
- The Scalar 1000 is not ready because a door or the Insert/Eject station is open, or the Scalar 1000 is offline.

Table 13-4 Invalid Parameters in the CDB

Error	Sense Key	ASC	ASCQ	SKSV Bit	C/D Bit	BPV Bit	Bit Pointer	Field Pointer
Invalid Start Element Address	05h	21h	01h	1	1	0	0	0002h
Invalid Element Type Code	05h	24h	00h	1	1	1	3h	0001h

14

Receive Diagnostic Results (1Ch)

Overview 14-3

Receive Diagnostic Results (1Ch) Command 14-3
CDB Format 14-4
Allocation Length 14-4

Receive Diagnostic Results (1Ch) Response 14-4
Supported Diagnostics Page 14-4
Page Code 14-5
Page Length 14-5
Supported Page List 14-5
Diagnostic Page Format 14-6
Page Code 14-6
Parameter List Length 14-6
Requested Test Count 14-6
Completed Test Count 14-6

Receive Diagnostic Results (1Ch) Status 14-7
Good 14-7
Busy 14-7
Reservation Conflict 14-7
Check Condition 14-7

Overview

The **RECEIVE DIAGNOSTIC RESULTS** command allows the initiator to request analysis data determined by a **SEND DIAGNOSTIC** command sent earlier. The library returns good status with no diagnostic data if the **RECEIVE DIAGNOSTIC RESULTS** command is sent after a **SEND DIAGNOSTIC** Self Test request or, if a **SEND DIAGNOSTIC** command has not been issued earlier.

Receive Diagnostic Results (1Ch) Command

The **RECEIVED DIAGNOSTIC RESULTS** CDB format is shown in Figure 14-1.

Bits / Bytes	7	6	5	4	3	2	1	0
0	0	0	0	1	1	1	0	0
1	Logical Unit Number			Reserved				
2	Reserved							
3	MSB Allocation Length							
4	Allocation Length LSB							
5	Reserved							

Figure 14-1 RECEIVE DIAGNOSTIC RESULTS CDB

In a multiple initiator environment, reserve the entire library using the **RESERVE** (16h) command. Do not issue the **RELEASE** (17h) command until after successfully obtaining data with the **RECEIVE DIAGNOSTIC RESULTS** command.

The following four ordered commands illustrate the command sequence:

- RESERVE (16h)
- SEND DIAGNOSTIC (1Dh)
- RECEIVE DIAGNOSTIC RESULTS (1Ch)

- RELEASE (17h)

CDB Format

Note
If no return diagnostic data is desired, set the Allocation Length field to 0.

Allocation Length

This field specifies the number of bytes allocated for the returned diagnostic data. The returned data length is equal to or less than the allocation length.

Receive Diagnostic Results (1Ch) Response

Supported Diagnostics Page

The Supported Diagnostics Page lists all diagnostic page codes in ascending order, beginning with page code 00h. The format of the Supported Diagnostic page is shown in Figure 14-2 on page 14-5.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Page Code							
1	Reserved							
2	MSB			Page Length				
3								LSB
4	00h - Supported Diagnostics							
5	81h -Home Accessor							
6	82h- Cycle Get / Put cartridge							
7	83h- Cycle Gripper Fingers							
8	85h- Cycle Vertical Axis							
9	86h - Cycle Horizontal Axis							
10	88h- Cycle Insert / Eject Station Lock							
11	89h - Teach New Configuration							
12	8Ah - Teach Current Configuration							
13	8Bh - Dump Current State							

Figure 14-2 Receive Diagnostic Result Data Format

Page Code

This field identifies the Supported Diagnostics page. The value for this field is 00h.

Page Length

This field specifies the number of bytes following the Page Length field. The value for this field is 0Ah (10).

Supported Page List

These bytes, bytes 04 through 13, list the diagnostic pages that the library supports, as shown in Figure 14-2.

Diagnostic Page Format

Page Codes 81h, 82h, 83h, 85h, 86h, 88h, 8Ah and 8Bh return diagnostic results in the Diagnostic page format. See Figure 14-3.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Page Code							
1	Reserved							
2	MSB			Parameter List Length				
3								LSB
4	Requested Test Count							
5	Completed Test Count							

Figure 14-3 Diagnostic Page Format

Page Code

This field identifies the returned page. Values for this field are 81h through 83h, 85h through 86h, and 88h through 8Bh.

Parameter List Length

This field specifies the number of bytes follow the Parameter List Length field. The value for this field is 02h.

Requested Test Count

This field reports the number of diagnostic test counts previously requested. The value corresponds to the Test Count field in the Parameter List of the **SEND DIAGNOSTICS** command.

Completed Test Count

This field reports the number of completed diagnostic tests. If this value differs from the Requested Test Count value, the Scalar 1000 was unable to complete the requested number of test cycles.

Receive Diagnostic Results (1Ch) Status

After processing the **RECEIVE DIAGNOSTIC RESULTS** command, the Scalar 1000 returns a status byte as follows:

Good

The Scalar 1000 returns a Good status when it is able to process the command without errors.

Busy

The Scalar 1000 returns Busy status when it is processing a command for a different initiator or when a motion command is in the process of being aborted.

Reservation Conflict

The Scalar 1000 returns Reservation Conflict status when it is reserved by a a different initiator.

Check Condition

The Scalar 1000 returns the Check Condition status when the following situations occur:

- The message system is enabled and a message error occurs while the Scalar 1000 is processing the command.
- The Scalar 1000 identifies an unrecoverable parity error while receiving the CDB.
- The command is issued to an invalid LUN.
- A Unit Attention condition is pending for the initiator.
- A reserved bit is set to 1 or a parameter is invalid in the CDB.

15

Release (17h)

Overview 15-3

Release (17h) Command 15-3
CDB Format 15-3
3rdPty 15-3
Third Party Device ID 15-3
Element. 15-3
Reservation Identification 15-4

Release (17h) Status 15-4
Good 15-4
Busy 15-4
Reservation Conflict 15-4
Never returned.. 15-4
Check Condition 15-4

Overview

The **RELEASE** command allows the initiator to release a previous reservation. It is not an error to issue the **RELEASE** command when no previous reservation was made. The Release command is initiator dependent. Only the initiator previously reserving the library may release the library.

Release (17h) Command

The **RELEASE** CDB format is shown in Figure 15-1.

Bits / Bytes	7	6	5	4	3	2	1	0
0	0	0	0	1	0	1	1	1
1	Logical Unit Number			3rdPty	Third Party Device ID			Element
2	Reservation ID							
3	Reserved							
4								
5	Reserved							

Figure 15-1 RELEASE CDB

CDB Format

3rdPty

The third-party (3rdPty) field is not supported. This value must be set to 0.

Third Party Device ID

The Third Party Device ID is not supported. This field must be set to 0.

Element

The values of the Element bit field are as follows:

- 0 - Release any elements previously reserved by the initiator.
- 1 - Release elements previously reserved by the initiator with matching Reservation Identification.

Reservation Identification

This field indicates the initiator established value to identify a specific reservation request. If the Element field is set to 0, this field is ignored.

Release (17h) Status

After processing the **RELEASE** command, the Scalar 1000 returns a status byte as follows:

Good

The Scalar 1000 returns a Good status when it is able to process the command without errors.

Busy

The Scalar 1000 returns Busy status when it is processing a command for a different initiator or when a motion command is in the process of being aborted.

Reservation Conflict

Never returned.

Check Condition

The Scalar 1000 returns the Check Condition status when the following situations occur:

- The message system is enabled and a message error occurs while the Scalar 1000 is processing the command.
- The Scalar 1000 detects an unrecoverable parity error while receiving the CDB.
- A Unit Attention condition is pending for the initiator.
- The command is issued to an invalid LUN.
- A reserved bit is set to 1 or a parameter is invalid in the CDB. Refer to Table 15-1 on page 15-5.

Table 15-1 Invalid Parameters in the CDB

Error	Sense Key	ASC	ASCQ	SKSV Bit	C/D Bit	BPV Bit	Bit Pointer	Field Pointer
Error in Third Party Field	05h	24h	00h	1	1	1	4h	0001h
Error in Third Party ID Field	05h	24h	00h	1	1	1	3h	0001h

16

Request Sense (03h)

Overview 16-3

Request Sense (03h) Command 16-3
CDB Format 16-3
Allocation Length 16-3

Request Sense (03h) Response 16-3
Sense Information Format 16-3
Sense Key 16-4
Information Bytes 16-5
Additional Sense Length 16-5
Command Specific Bytes 16-5
Additional Sense Code (ASC) 16-5
ASCQ 16-5
Service Action Code 16-5
Sense Key Specific Value (SKSV) 16-5
Command / Data (C / D) 16-6
Bit Pointer Valid (BPV) 16-6
Bit Pointer 16-6
Field Pointer 16-6
Returned Error Codes 16-6

Request Sense (03h) Status 16-10
Good 16-10
Busy 16-11
Reservation Conflict 16-11
Check Condition 16-11

Overview

The **REQUEST SENSE** command allows the initiator to request sense data from the target. Sense data (18 bytes) is provided in extended sense data format. The sense data is saved for each individual initiator. The data is preserved for each initiator until either the **REQUEST SENSE** command or any other command is received.

Request Sense (03h) Command

The **REQUEST SENSE** CDB format is shown inFigure 16-1.

Bits / Bytes	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	1	1
1	Logical Unit Number			Reserved				
2	Reserved							
3								
4	Allocation Length							
5	Reserved							

Figure 16-1 REQUEST SENSE CBD

CDB Format

Allocation Length

This field specifies the number of sense bytes requested by the initiator.

Request Sense (03h) Response

Sense Information Format

The Sense Information format is shown in Figure 16-2 on page 16-4.

Bits Bytes	7	6	5	4	3	2	1	0
0	Reserved	1	1	1	0	0	0	0
1	Reserved							
2	Reserved				Sense Key			
3 : 6	MSB Information Bytes LSB							
7	Additional Sense Length							
8 : 11	MSB Command Specific Bytes LSB							
12	Additional Sense Code (ASC)							
13	Additional Sense Code Qualifier (ASCQ)							
14	Service Action Code							
15	SKSV	C/D	Reserved		BPV	Bit Pointer		
16	MSB Field Pointer							
17	LSB							

Figure 16-2 Sense Information Format

Sense Key

Table 16-1 on page 16-5 describes the Sense Key values.

Table 16-1 Sense Keys

Sense Key	Description
0h	No Sense. No specific sense key information to report.
2h	Not Ready. The library is not ready to perform motion commands.
4h	Hardware Error. A hardware error was detected and operator intervention may be required.
5h	Illegal Request. The CDB or supplied parameter data contains an unsupported or illegal parameter.
6h	Unit Attention. The Scalar 1000 operating status changed. The cartridge inventory may be invalid.
Bh	Command Aborted. The library aborted a command. The initiator may try the command again.

Information Bytes

This field is not supported and is set to 0.

Additional Sense Length

This field specifies the number of additional sense bytes to follow after this byte.The value returned is 0Ah (10) to indicate that 10 more bytes of sense data are available.

Command Specific Bytes

Command Specific Bytes are not supported by the library. The value returned is 0.

Additional Sense Code (ASC)

This field denotes a specific error condition. Refer to Table 16-2 on page 16-7. Additional information is provided in the Additional Sense Code Qualifier (ASCQ).

ASCQ

This field provides additional information for the ASC. Refer to Table 16-2 on page 16-7.

Note
It is possible for the Service Action code to change after a SCSI command or Operator Panel operation completes.

Service Action Code

This field contains a service action code that indicates to a Customer Service representative what problem is to be fixed.

Sense Key Specific Value (SKSV)

The SKSV returns the following values:

- 0 - The information in bytes 15 through 17 are not valid
- 1 - The information in bytes 15 through 17 are valid for a Sense Key of Illegal Request (05h) only.

Command/Data (C/D)

The C/D byte indicates which parameter, command or data caused the Check Condition status:

- 0 - Indicates that the illegal parameter was detected in the Parameter List supplied by the initiator.
- 1 - Indicates that the illegal parameter was detected in the CDB.

Bit Pointer Valid (BPV)

0 - Indicates that the Bit Pointer field is not valid

1 - Indicates that the Bit Pointer field is valid

Bit Pointer

This field indicates which bit of the byte designated by the field pointer is in error. For a multi-bit field, it points to the most significant bit of the field.

Field Pointer

This field indicates which byte of the CDB or Parameter List (starting with 00) was in error. For a multi-byte field, the Field Pointer points to the most significant byte.

Returned Error Codes

Table 16-2 on page 16-7 lists the additional Sense Codes (ASC) and Additional Sense Code Qualifiers (ASCQ) associated with the particular Sense Keys.

Table 16-2 Additional Sense Codes and Qualifiers

Sense Key	Condition	ASC	ASCQ	Description
00h	No Sense			No Additional Sense Code
02h	Not Ready	04h	00h	The Scalar 1000 is not ready due to an unknown cause
			01h	The Scalar 1000 is becoming ready
			03h	The Scalar 1000 is not ready and a manual intervention is required
			83h	Aisle power is disable; a door could be open
			8Dh	Offline
			90h	Scalar 1000 needs teaching

Table 16-2 Additional Sense Codes and Qualifiers (Continued)

Sense Key	Condition	ASC	ASCQ	Description
04h	Hardware Error	15h	01h	A mechanical positioning error occurred
			80h	The accessor dropped a cartridge
			81h	The accessor could not pick a cartridge
			83h	The accessor could not put a cartridge
		3Bh	0Dh	The destination element is full
			0Eh	The source element is empty
		3Fh	80h	Could not erase EEPROM
			84h	Could not program EEPROM
		40h	01h	Cartridge in gripper at power-on
			80h	Component (number - 80) failure
			91h	Gripper error
			A0h	The accessor could not move on the vertical (Y) axis
			A1h	Could not home the vertical (Y) axis
			B0h	The accessor could not move on the horizontal (X) axis
			B1h	Could not home the horizontal (X) axis
			C0h	The accessor could not move
			E0h	The accessor lost power
		44h	00h	Internal target failure
		53h	00h	A drive did not load or unload a tape.
			82h	Cannot lock the I/E station
			83h	Cannot unlock the I/E station
		83h	01h	Cannot read a barcode label due to scanner problem
		84h	00	Firmware error

Table 16-2 Additional Sense Codes and Qualifiers (Continued)

Sense Key	Condition	ASC	ASCQ	Description
05h	Illegal Request	1Ah	00h	Parameter list length error
		20h	00h	Illegal opcode in CDB
		21h	01h	Invalid element address in CDB
		24h	00h	Invalid field in CDB
			80h	Attempt to write a read only buffer
		25h	00h	Illegal LUN
		26h	00h	Invalid field in Parameter List
			02h	Invalid parameter in Parameter List
			80h	Parameter data checksum failure
		30h	00h	Incompatible media installed
		3Bh	0Dh	Destination element full for **MOVE MEDIUM** command
			0Eh	Source element empty for **MOVE MEDIUM** command
			85h	Destination of **MOVE MEDIUM** command cannot be accessor
			86h	Source of MO**VE MEDIUM** command cannot be accessor
			87h	Cartridge stuck in tape drive
			90h	Source cartridge loaded into tape drive and not accessible
			A0h	Media type does not match destination media type
		3Dh	00h	Invalid bit in “Identify” message
		53h	01h	A drive did not unload a tape.
			80h	Cartridge rejected in the Insert/Eject station because it was not properly loaded.
			81h	Insert/Eject station door is open
		83h	03h	Cell status and barcode questionable

Table 16-2 Additional Sense Codes and Qualifiers (Continued)

Sense Key	Condition	ASC	ASCQ	Description
06h	Unit Attention	28h	00h	Door(s) opened and closed
			01h	Insert / Eject station opened
		29h	00h	Power-on, SCSI bus reset, or Bus device reset occurred
			80h	Reset for permanent error occurred
			81h	Reset into degraded mode of operation
		2Ah	01h	Mode parameters have been changed
		3Fh	01h	New firmware loaded
0Bh	Abort	43h	00h	Message received at inappropriate time
		45h	00h	Host rejected “Identify” message sent for reselection
		47h	00h	Message system was disabled during parity error detection on SCSI bus, message system enabled but initiator rejected “Restore Data Pointer,” or all parity error retries exhausted
		48h	00h	Received an “Initiator Detected Error” or initiator rejected “Restore Data Pointer” in response to an “Initiator Detected Error”
		4Eh	00h	Disconnect during command processing

Request Sense (03h) Status

After processing the **REQUEST SENSE** command, the Scalar 1000 returns a status byte as follows:

Good

The Scalar 1000 returns a Good status when it is able to process the command without errors.

Busy

A Busy status is never returned.

Reservation Conflict

A Reservation Conflict is never returned.

Check Condition

The Scalar 1000 returns the Check Condition status when the following situations occur:

- The message system is enabled and a message error occurs while the Scalar 1000 is processing the command.
- The Scalar 1000 detects an unrecoverable parity error while receiving the CDB.
- A reserved bit is set to 1 or a parameter is invalid in the CDB.

17

Request Volume Element Address (B5h)

Overview 17-3

Request Volume Element Address (B5h) Command 17-3
CDB Format 17-4
VolTag 17-4
Element Type Code 17-4
Starting Element Address 17-5
Number of Elements 17-5
Allocation Length 17-5

Request Volume Element Address (B5h) Response 17-5
Volume Element Address Header 17-5
First Element Address Reported 17-6
Number of Elements Reported 17-6
Send Action Code 17-6
Byte Count of Report Available 17-6
Element Status Page 17-7
Element Type Code 17-7
PVolTag 17-7
AVolTag 17-7
Element Descriptor Length 17-7
Byte Count of Descriptor Data Available 17-8
Element Descriptors 17-8
Storage Element Descriptor 17-8
Element Address 17-9
Access 17-10
Except 17-10
Full 17-10
Additional Sense Code 17-10
Additional Sense Code Qualifier 17-10
SValid 17-10
Invert 17-10
Source Element Address 17-10
Primary Volume Tag Information 17-10

Media Domain. 17-11
Media Type 17-11
Element Domain 17-11
Element Type. 17-12
Import / Export Element Descriptor 17-12
Element Address. 17-14
InEnab. 17-14
ExEnab 17-14
Access 17-14
Except 17-14
Imp / Exp. 17-14
Full 17-15
Additional Sense Code (ASC). 17-15
Additional Sense Code Qualifier (ASCQ). 17-15
SValid 17-15
Invert. 17-15
Source Element Address 17-15
Primary Volume Tag Information 17-15
Media Domain. 17-15
Media Type 17-16
Element Domain 17-16
Element Type. 17-16
Data Transfer Element Descriptor 17-16
Element Address. 17-17
Access 17-18
Except 17-18
Full 17-18
Additional Sense Code (ASC). 17-18
Additional Sense Code Qualifier (ASCQ). 17-18
NotBus 17-18
IDValid 17-19
LUValid 17-19
Logical Unit Number 17-19
SCSI Bus Address 17-19
SValid 17-19
Invert. 17-19
Source Element Address 17-19
Primary Volume Tag Information 17-19
Media Domain. 17-19
Media Type 17-20
Element Domain 17-20
Element Type. 17-20
ASC and ASCQ Values For Abnormal Conditions 17-21

Request Volume Element Address (B5h) Status 17-21
Good 17-21
Busy 17-22
Reservation Conflict. 17-22
Check Condition 17-22

Overview

The **REQUEST VOLUME ELEMENT ADDRESS** command allows the initiator to request the element descriptors created by the **SEND VOLUME TAG** command. Data is returned in ascending element address order.

In a multiple initiator environment, reserve the entire library using the **RESERVE** command before requesting element descriptors. Do not issue the **RELEASE** command until successfully obtaining data with the **REQUEST VOLUME ELEMENT ADDRESS** command.

The following four ordered commands illustrate the command sequence:

- **Reserve** (16h)
- **Send Volume Tag** (B6h)
- **Request Volume Element Address** (B5)
- **Release** (17h)

Request Volume Element Address (B5h) Command

The **REQUEST VOLUME ELEMENT ADDRESS** CDB format is shown in Figure 17-1 on page 17-4.

Bits / Bytes	7	6	5	4	3	2	1	0
0	1	0	1	1	0	1	0	1
1	Logical Unit Number			VolTag	Element Type Code			
2	MSB Starting Element Address							
3	LSB							
4	MSB Number of Elements							
5	LSB							
6	Reserved							
7 : 9	MSB Allocation Length LSB							
10	Reserved							
11	Reserved							

Figure 17-1 REQUEST VOLUME ELEMENT ADDRESS CDB

CDB Format

VolTag

The values in this field are as follows:

- 0 - Do not return volume tag (barcode) information
- 1 - Return volume tag (barcode) information

Element Type Code

This field specifies the element types that reports data. The library supports the following Element Type Codes:

- 0h - All element types reported (from Starting Element Address field)
- 1h - Medium transport element (Accessor)
- 2h - Storage element (Storage Cells)
- 3h - Import / Export element (Insert / Eject Station)
- 4h - Data transfer element (Tape Drives)

Note

The Starting Element Address field must indicate a valid element but does not necessarily have to match the Element Type Code field.

Starting Element Address

This field indicates the starting element address. Elements with equal or greater address are returned.

Number of Elements

This field indicates the maximum number of returned element descriptors.

Allocation Length

This field specifies the length in bytes allocated for returned element descriptors. Only complete element descriptors are returned. Element descriptors are returned until:

- All available element descriptors are returned

— or —

- The number of element descriptors specified in the Number of Elements are returned.

— or —

- The number of bytes of complete element descriptor specified in the Allocation Length field are returned.

— or —

- There is less allocation length space available than is required by the next complete element descriptor.

Request Volume Element Address (B5h) Response

Volume Element Address Header

Figure 17-2 on page 17-6 shows the Volume Element Address Header.

Bits / Bytes	7	6	5	4	3	2	1	0
0	MSB							
1				First Element Address Reported				LSB
2	MSB							
3				Number of Elements Reported				LSB
4	Reserved				Send Action Code			
5	MSB							
6				Byte Count of Report Available				
7								LSB

Figure 17-2 Request Volume Element Address Header

For each **REQUEST VOLUME ELEMENT ADRESS** command that is received, one Volume Element Address Header is returned.

First Element Address Reported

This field contains the address of the first element that matched the volume tag template sent by the **SEND VOLUME TAG** command.

Number of Elements Reported

This field indicates the number of elements found.

Send Action Code

This field contains the action code set in the **SEND VOLUME TAG** command. The value is 05h.

Byte Count of Report Available

This field indicates the number of available element status bytes that meet the CDB requirements. The value does not include the 8 byte element status header and is not adjusted to match the value specified in the Allocation Length field of the CDB.

Element Status Page

Figure 17-3 shows the format of the Element Status Page header. The Scalar 1000 returns one Element Status Page header for each group of element descriptors of the same type.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Element Type Code							
1	PVolTag	AVolTag	Reserved					
2	MSB							
3	Element Descriptor Length							LSB
4	Reserved							
5	MSB							
6	Byte Count of Report Available							
7								LSB

Figure 17-3 Element Status Page

Element Type Code

This field indicates the specific element type being returned by the element descriptor.

PVolTag

This field indicates that the primary volume tag (bar code label) information is present or not as follows:

- 0 - Volume tag bytes are omitted
- 1 - Volume tag bytes are included

AVolTag

Alternate volume tags are not supported. The value for this bit field is 0.

Element Descriptor Length

This field indicates the number of bytes contained in a single element descriptor.

If PVolTag is equal to 0, the length is 10h (16) bytes.

— or —

If PVolTag is equal to 1, this length value is 34h (52) if the Scalar 1000 is operating in mixed media mode with Res Extend disabled.

— or —

If PVolTag is equal to 1, this length value is 38h (56) if the Scalar 1000 is operating in mixed media mode with Res Extend enabled.

Byte Count of Descriptor Data Available

This field indicates the number of element descriptor data bytes available for the elements of this element type that met the CDB requirements. This value represents the Element Descriptor Length field multiplied by the number of element descriptors for this element type. This value does not include the 8 byte Element Status Page header.

Element Descriptors

The following sections contain the field definitions for the following element descriptors:

- Medium transport Element: accessor
- Storage elements: each storage cell
- Import/Export elements: each Insert/Eject station cell
- Data transfer elements: each tape drive

Each element descriptor includes the element address and status flags. Sense code and other information depends on the element type.

Storage Element Descriptor

Each of the storage cells is a storage element. Refer to Figure 17-4 on page 17-9 for the Storage Element Descriptor format.

Bits / Bytes	7	6	5	4	3	2	1	0
0	MSB							
1				Element Address				LSB
2	Reserved				Access	Except	Reserved	Full
3	Reserved							
4	Additional Sense Code							
5	Additional Sense Code Qualifier							
6 : 8	Reserved							
9	SValid	Invert	Reserved					
10	MSB							
11				Source Element Address				LSB
12 : 47	Primary Volume Tag Information (field omitted if PVolTag = 0)							
48 : 51	Reserved (field moved up if Primary Volume Tag Information field is omitted)							
52	Media Domain (Field moved up if Primary Volume Tag Information field is omitted)							
53	Media Type (Field moved up if Primary Volume Tag Information field is omitted)							
54	Element Domain (Field moved up if Primary Volume Tag Information field is omitted)							
55	Element Type (Field moved up if Primary Volume Tag Information field is omitted)							

Figure 17-4 Storage Element Format

Element Address

This field contains the address of the cartridge storage cell.

Access

This field indicates that the Accessor can access the storage cell. The value of this field is 1.

Except

This field indicates the current condition of the cartridge cell as follows:

- 0 - The storage cell is in a normal condition
- 1 - The storage cell is in an abnormal condition as specified in the *Additional Sense Code* and *Additional Sense Code Qualifier* fields.

Full

This field value is set to 1.

Additional Sense Code

Refer to Table 17-1 on page 17-21 for the supported ASC values.

Additional Sense Code Qualifier

Refer to Table 17-1 on page 17-21 for the supported ASCQ values.

SValid

This bit field indicates the validity of the Source Element Address field as follows:

- 0 - The Source Element Address field is invalid
- 1 - The Source Element Address field is valid

Invert

Double sided media is not supported. This field is 0.

Source Element Address

This field shows the previous element address of the cartridge.

Primary Volume Tag Information

When the PVolTag field in the CDB is set to 1, this field contains the volume tag (bar code label) information for the element address.

Only six or seven bytes of volser information is returned, depending on the Scalar 1000 operating mode parameters MM Enable and Volser Enable. Refer to *Mixed Media Page (2Ah)* on page 7-15.

Media Domain

This byte specifies the domain for which the media located within this descriptor belongs. The list of values is:

00h - The media is half inch (3480, 3490E, 3590, NCTP)

01h - The media is DLT (DLT III, DLT IIIXT, DLT IV)

02h - The media is 8mm AIT

FFh - The media domain can not be determined

Media Type

This byte specifies the exact type of media (based on the Media Domain byte). The list of values is:

- For Media Domain byte value of 00h:
  - 1 The media is a 3480 or 3490 cartridge
  - E The media is a 3490E cartridge
  - J The media is a 3590 cartridge
  - M The media is a NCTP cartridge
  - FFh The media cannot be determined
- For Media Domain byte value of 01h:
  - C The media is a DLT III cartridge
  - D The media is a DLT IV cartridge
  - E The media is a DLT IIIXT cartridge
  - FFh The media cannot be determined
- For Media Domain byte value of 02h:
  - A The media is an 8mm AIT cartridge
  - FFh The media cannot be determined

Element Domain

This byte specifies the domain of media (half inch or DLT) that can be placed into this element. The list of values are:

00h - The media is half inch (3480, 3490E, 3590, NCTP)

01h - The media is DLT (DLT III, DLT IIIXT, DLT IV)

02h - The media is 8mm AIT

80h - The media is either half inch or DLT

FFh - The media domain can not be determined

Element Type

This byte is only used for Data transport Element Descriptors (tape drives). For all other descriptors, this byte is 00h.

Import/Export Element Descriptor

One Insert / Eject station is supported. Each cell in the Insert / Eject station has an element address. Refer to Figure 17-5 on page 17-13

Bits / Bytes	7	6	5	4	3	2	1	0
0	MSB							
1	Element Address							LSB
2	Reserved		InEnab	ExEnab	Access	Except	Imp/Exp	Full
3	Reserved							
4	Additional Sense Code							
5	Additional Sense Code Qualifier							
6	Reserved							
7								
8								
9	SValid	Invert	Reserved					
10	MSB							
11	Source Element Address							LSB
12 : 47	Primary Volume Tag Information (field omitted if PVolTag = 0)							
48 : 51	Reserved (field moved up if Primary Volume Tag Information field is omitted)							
52	Media Domain (Field moved up if Primary Volume Tag Information field is omitted)							
53	Media Type (Field moved up if Primary Volume Tag Information field is omitted)							
54	Element Domain (Field moved up if Primary Volume Tag Information field is omitted)							
55	Element Type (Field moved up if Primary Volume Tag Information field is omitted)							

Figure 17-5 Import/Export Element Descriptor

Element Address

This field contains the address of the Insert / Eject station storage cell.

InEnab

This field indicates that the Insert / Eject station supports cartridge loading mechanism to enable accessor access (the Insert / Eject station is closed). The value for this field is 1.

ExEnab

This field indicates that the Insert / Eject station supports cartridge unloading mechanism to disable accessor access (the Insert / Eject station is open). The value for this field is 1.

Access

The value of this field is as follows:

- 0 - The Insert / Eject station is opened and the accessor cannot access cartridges
- 1 - The Insert / Eject station is closed and the accessor can access the cartridge

Except

The value of the field is as follows:

- 0 - The Insert / Eject Station is in a normal condition
- 1 - The Insert / Eject Station is in an abnormal condition as indicated by *Additional Sense Code (ASC)* and *Additional Sense Code Qualifier (ASCQ)* fields.

Imp/Exp

This field indicates how the cartridge was placed in the Insert / Eject Station storage cell. The values are as follows:

- 0 - The accessor placed the cartridge in the Insert / Eject station
- 1 - The operator placed the cartridge in the Insert / Eject station

Full

This field indicates if the Insert/Eject Station storage cell contains a cartridge. The values are as follows:

- 0 - No cartridge in the cell
- 1 - Cartridge in the cell

Additional Sense Code (ASC)

If the Insert/Eject station cell is in an abnormal state, this field contains 83h (131). Refer to Table 17-1 on page 17-21.

Additional Sense Code Qualifier (ASCQ)

Supported ASCQ values are listed in Table 17-1 on page 17-21.

SValid

The field values are as follows:

- 0 - Source Element Address field is invalid
- 1 - Source Element Address fields is valid

Invert

Double sided media is not supported. This field is 0.

Source Element Address

This field indicates the previous element address of the cartridge.

Primary Volume Tag Information

When the PVolTag field in the CDB is set to 1, this field contains the volume tag (bar code label) information for the element address.

Only six or seven bytes of volser information is returned, depending on the Scalar 1000 operating mode parameters MM Enable and Volser Enable. Refer to *Mixed Media Page (2Ah)* on page 7-15.

Media Domain

This byte specifies the domain for which the media located within this descriptor belongs. The list of values is:

00h - The media is half inch (3480, 3490E, 3590, NCTP)

01h - The media is DLT (DLT III, DLT IIIXT, DLT IV)

02 - The media is 8mm AIT

FFh - The media domain can not be determined

Media Type

This byte specifies the exact type of media (based on the Media Domain byte). The list of values is:

- For Media Domain byte value of 00h:
  - 1 The media is a 3480 or 3490 cartridge
  - E The media is a 3490E cartridge
  - J The media is a 3590 cartridge
  - M The media is a NCTP cartridge
  - FFh The media cannot be determined
- For Media Domain byte value of 01h:
  - C The media is a DLT III cartridge
  - D The media is a DLT IV cartridge
  - E The media is a DLT IIIXT cartridge
  - FFh The media cannot be determined
- For Media Domain byte value of 02h:
  - A The media is an 8mm AIT cartridge
  - FFh The media cannot be determined

Element Domain

This byte specifies the domain of media (half inch or DLT) that can be placed into this element. The list of values are:

00h - The media is half inch (3480, 3490E, 3590, NCTP)

01h - The media is DLT (DLT III, DLT IIIXT, DLT IV)

02h - The media is 8mm AIT

80h - The media is either half inch or DLT

FFh - The media domain can not be determined

Element Type

This byte is only used for Data transport Element Descriptors (tape drives). For all other descriptors, this byte is 00h.

Data Transfer Element Descriptor

The Data Transfer Elements are the tape drives. Figure 17-6 on page 17-17 shows the format of the Data Transport Element Descriptor page.

Bits / Bytes	7	6	5	4	3	2	1	0
0	MSB							
1	Element Address							LSB
2	Reserved				Access	Except	Reserved	Full
3	Reserved							
4	Additional Sense Code							
5	Additional Sense Code Qualifier							
6	NotBus	Reserved	IDValid	LUValid	Reserved	Logical Unit Number		
7	SCSI Bus Address							
8	Reserved							
9	SValid	Invert	Reserved					
10	MSB							
11	Source Element Address							LSB
12 : 47	Primary Volume Tag Information (field omitted if PVolTag = 0)							
48 : 51	Reserved (field moved up if Primary Volume Tag Information field is omitted)							
52	Media Domain (Field moved up if Primary Volume Tag Information field is omitted)							
53	Media Type (Field moved up if Primary Volume Tag Information field is omitted)							
54	Element Domain (Field moved up if Primary Volume Tag Information field is omitted)							
55	Element Type (Field moved up if Primary Volume Tag Information field is omitted)							

Figure 17-6 Data Transfer Element Descriptor Format

Element Address

This field contains the element address of the tape drive.

Access

This field indicates whether the accessor can pick or place a cartridge at the tape drive location as follows:

- 0 - The cartridge at the tape drive is not accessible to the accessor (cartridge is not unloaded)
- 1 - The cartridge at the tape drive is accessible by the accessor (cartridge is unloaded)

Except

The exception field indicates the current condition of the tape drive as follows:

- 0 - The tape drive is in a normal state
- 1 - The tape drive is in an abnormal state as indicated by the *Additional Sense Code (ASC)* and *Additional Sense Code Qualifier (ASCQ)*fields

Full

This field indicates if the tape drive contains a cartridge as follows:

- 0 - No cartridge in tape drive
- 1 - Cartridge in tape drive

Additional Sense Code (ASC)

This field contains the value 83h (131) if the tape drive is in an abnormal state. Refer to Table 17-1 on page 17-21.

Additional Sense Code Qualifier (ASCQ)

Supported ASCQ values are listed in Table 17-1 on page 17-21.

NotBus

This field is not supported and is set to 0.

IDValid

This field indicates whether the drive SCSI id (byte 7) is valid:

- 0 - The SCSI id is not valid
- 1 - The SCSI id is valid

LUValid

This field is not supported and is set to 0.

Logical Unit Number

This field is not supported and is set to 0.

SCSI Bus Address

This field contains the tape drive SCSI address (0 .. F).

SValid

This bit field indicates the validity of the Source Element Address field as follows:

- 0 - The Source Element Address is invalid
- 1 - The Source Element Address is valid

Invert

Double sided media is not supported. This field is 0.

Source Element Address

This field indicates the cartridge previous element address.

Primary Volume Tag Information

When the PVolTag field in the CDB is set to 1, this field contains the volume tag (bar code label) information for the element address.

Only six or seven bytes of volser information is returned, depending on the Scalar 1000 operating mode parameters MM Enable and Volser Enable. Refer to *Mixed Media Page (2Ah)* on page 7-15.

Note

If the Except field is set to 1, the Primary Volume Tag Information could be invalid due to an inaccurate cartridge inventory. Scan the barcode label with the **Initialize Element Status** or **Initialize Element Status with Range** command.

Media Domain

This byte specifies the domain for which the media located within this descriptor belongs. The list of values is:

00h - The media is half inch (3480, 3490E, 3590, NCTP)

01h - The media is DLT (DLT III, DLT IIIXT, DLT IV)

02h - The media is 8mm AIT

FFh - The media domain can not be determined

Media Type

This byte specifies the exact type of media (based on the Media Domain byte). The list of values is:

- For Media Domain byte value of 00h:
  - 1 The media is a 3480 or 3490 cartridge
  - E The media is a 3490E cartridge
  - J The media is a 3590 cartridge
  - M The media is a NCTP cartridge
  - FFh The media cannot be determined
- For Media Domain byte value of 01h:
  - C The media is a DLT III cartridge
  - D The media is a DLT IV cartridge
  - E The media is a DLT IIIXT cartridge
  - FFh The media cannot be determined
- For Media Domain byte value of 02h:
  - A The media is an 8mm AIT cartridge
  - FFh The media cannot be determined

Element Domain

This byte specifies the domain of media (half inch or DLT) that can be placed into this element. The list of values are:

00h - The media is half inch cartridge (3480, 3490E, 3590, NCTP)

01h - The media is DLT (DLT III, DLT IIIXT, DLT IV)

02h - The media is 8mm AIT

80h - The media is either half inch or DLT

FFh - The media domain can not be determined

Element Type

This byte is only used for Data transport Element Descriptors (tape drives). For all other descriptors, this byte is 00h. The list of values for tape drives is:

- For Element Domain byte value of 00h:
  - 01h The drive is an ADIC 8490
  - 02h The drive is a NTCP
  - 03h The drive is an IBM 3590
  - FFh The drive cannot be determined

- For Element Domain byte value of 01h:
  - 01h The drive is a Quantum DLT4000
  - 04h The drive is a Quantum DLT7000
  - FFh The drive cannot be determined
- For Element Domain byte value of 02h:
  - 03h The drive is an AIT 3102
  - FFh The drive cannot be determined

ASC and ASCQ Values For Abnormal Conditions

Table 17-1 describes the ASC and ASCQ values and corrective actions for an abnormal element descriptor conditions.

Table 17-1 ASC and ASCQ Values

ASC	ASCQ	Description	Remedy
83h	00h	Label Questionable	The barcode label is questionable. Issue an **INITIALIZE ELEMENT STATUS** (07h) or **INITIALIZE ELEMENT STATUS WITH RANGE** (E7h) command.
83h	03h	Label and full status questionable	The library was powered on or a front door was opened. Either action could invalidate the cartridge inventory.
83h	0Ah	Unable to calibrate offset	Reteach the Scalar 1000 from the Operator Panel.

Request Volume Element Address (B5h) Status

After processing the **REQUEST VOLUME ELEMENT ADDRESS** command, the Scalar 1000 returns a status byte as follows:

Good

The Scalar 1000 returns a Good status when it is able to process the command without errors.

Busy

The Scalar 1000 returns Busy status when it is processing a command for a different initiator or when a motion command is in the process of being aborted.

Reservation Conflict

The Scalar 1000 returns Reservation Conflict status when it is reserved by a different initiator.

Check Condition

The Scalar 1000 returns the Check Condition status when the following situations occur:

- The message system is enabled and a message error occurs while the Scalar 1000 is processing the command.
- The Scalar 1000 detects an unrecoverable parity error while receiving the CDB.
- The command is issued to an invalid LUN.
- A Unit Attention condition is pending for the initiator.
- A reserved bit is set to 1 or a parameter is invalid in the CDB. See Table 17-2.
- The Scalar 1000 is not ready because a door or Insert / Eject station is open, or the Scalar 1000 is offline.

Table 17-2 Invalid Parameters in the CDB

Error	Sense Key	ASC	ASCQ	SKSV Bit	C/D Bit	BPV Bit	Bit Pointer	Field Pointer
Invalid Starting Address Element	05h	21h	01h	1	1	0	0	0002h
Invalid Element Type Code	05h	24h	00h	1	1	1	3h	0001h

18

Reserve (16h)

Overview 18-3

Reserve (16h) Command 18-3
CDB Format 18-4
3rdPty 18-4
Third Party Device ID 18-4
Element. 18-4
Reservation Identification 18-4
Element List Length 18-4
Element List Descriptors 18-4
Number of Elements 18-5
Element Address. 18-5

Reserve (16h) Status 18-5
Good 18-5
Busy 18-5
Reservation Conflict 18-6
Check Condition 18-6

Overview

The **RESERVE** command allows the initiator to reserve the entire Scalar 1000, or specific elements. The reservation remains in effect until:

- The initiator that made the reservation sends another **RESERVE** command with the same Reservation Identification number (this supersedes any previous reservation).
- The initiator that made the reservation sends a **RELEASE** command.
- A reset, or a power-on of the library is preformed.

After reserving the entire Scalar 1000, only the INQUIRY, RELEASE, REQUEST SENSE, and ALLOW MEDIUM REMOVAL commands are accepted from other initiators. All other commands result in a Reservation Conflict status.

Reserve (16h) Command

The **RESERVE** CDB format is shown in Figure 18-1.

Bits / Bytes	7	6	5	4	3	2	1	0
0	0	0	0	1	0	1	1	0
1	Logical Unit Number			3rdPty	Third Party Device ID			Element
2	Reservation Identification							
3	MSB			Element List Length				
4								LSB
5	Reserved							

Figure 18-1 RESERVE CDB

CDB Format

3rdPty

The third-party (3rdPty) field is not supported. This value must be set to 0.

Third Party Device ID

The Third Party Device ID is not supported. This field must be set to 0.

Element

The value of this field is as follows:

- 0 - The entire Scalar 1000 is reserved
- 1 - A sequence of elements are reserved as identified in the Reservation Identification field and specified in the Element List Descriptor

Reservation Identification

This field allows an assignment of a 1 byte identification number for this elements reservation request. The identification number can be used with a subsequent **RELEASE** command to release the reserved elements associated with the Reservation Identification.

Element List Length

This field specifies the total length of the element list descriptors. Each element list descriptor 6, bytes long. A length of 0, 6, or multiple of 6 may be specified. The maximum value is 5088 (848 elements multiplied by 6 bytes). If the element field is 0, this field is ignored.

Element List Descriptors

Refer to Figure 18-2 on page 18-5 for the Element List Descriptor format.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Reserved							
1								
2	MSB			Number of Elements				
3								LSB
4	MSB			Element Address				
5								LSB

Figure 18-2 Element List Descriptor Format

Number of Elements

This field specifies the number of elements to reserve. Specifying 0 for this field reserves all elements from the starting element address through the last element address.

Element Address

This field specifies the starting address of elements to reserve.

Note
The Starting Element Address must be a valid address.

Reserve (16h) Status

After processing the **RESERVE** command, the Scalar 1000 returns a status byte as follows:

Good

The Scalar 1000 returns a Good status when it is able to process the command without errors.

Busy

The Scalar 1000 returns Busy status when it is processing a command for a different initiator or when a motion command is in the process of being aborted.

Reservation Conflict

The Scalar 1000 returns Reservation Conflict status when it is reserved by a different initiator.

Check Condition

The Scalar 1000 returns the Check Condition status when the following situations occur:

- The message system is enabled and a message error occurs while the Scalar 1000 is processing the command.
- The Scalar 1000 detects an unrecoverable parity error while receiving either the CDB or the element descriptor data.
- The command is issued to an invalid LUN.
- A Unit Attention condition is pending for the initiator.
- A reserved bit is set to 1 or a parameter is invalid in the CDB. See Table 18-1.

Table 18-1 Invalid Parameters in the CDB

Error	Sense Key	ASC	ASCQ	SKSV Bit	C/D Bit	BPV Bit	Bit Pointer	Field Pointer
Invalid Element List Length	05h	1Ah	00h	1	1	0	0	0003h
Error in 3rdPty Field	05h	24h	00h	1	1	1	4h	0001h
Error in Third Party Device Field	05h	24h	00h	1	1	1	3h	0001h
Reserved Field Not 0	05h	26h	00h	1	0	0	0	0000h[a]
Reserved Field Not 0	05h	26h	00h	1	0	0	0	0001h[b]
Invalid Element Address	05h	26h	02h	1	0	0	0	0004h[c]
Overlapping Element Address	05h	26h	02h	1	0	0	0	[d]

a. Since more than one element can be sent, add 6 to this number for each following descriptor.

b. See Note a.
c. See Note a.
d. The field pointer is set to the element address of the first descriptor that overlaps.

19

Re-Zero Unit (01h)

Overview 19-3

Re-Zero (01h) Command 19-3
CDB Format 19-3

Re-Zero (01h) Status 19-3
Good 19-3
Busy 19-3
Reservation Conflict 19-4
Check Condition 19-4

Overview

The **RE-ZERO** command moves the accessor to the home (path) position.

Re-Zero (01h) Command

The **RE-ZERO** CDB format is shown in Figure 19-1.

Bits Bytes	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0	1
1	Logical Unit Number			Reserved				
2	Reserved							
3	Reserved							
4	Reserved							
5	Reserved							

Figure 19-1 RE-ZERO CDB

CDB Format

Bytes 1 to 5 are set to 0.

Re-Zero (01h) Status

After processing the **RE-ZERO** command, the Scalar 1000 returns a status byte as follows:

Good

The Scalar 1000 returns a Good status when it is able to process the command without errors.

Busy

The Scalar 1000 returns Busy status when it is processing a command for a different initiator or when a motion command is in the process of being aborted.

Reservation Conflict

The Scalar 1000 returns Reservation Conflict status when it is reserved by a different initiator.

Check Condition

The Scalar 1000 returns the Check Condition status when the following situations occur:

- The message system is enabled and a message error occurs while the Scalar 1000 is processing the command.
- The Scalar 1000 detects an unrecoverable parity error while receiving either the CDB or the element descriptor data.
- The command is issued to an invalid LUN.
- A Unit Attention condition is awaiting for the initiator.
- A reserve bit is set to 1 or a parameter is invalid in the CDB.

20

Send Diagnostic (1Dh)

Overview 20-3

Send Diagnostic (1Dh) Command 20-3
CDB Format 20-3
Page Format (PF). 20-3
SelfTest 20-3
DevOfl (Device Offline) 20-4
UnitOfl (Unit Offline). 20-4
Parameter List Length 20-4
Send Diagnostic Parameter List 20-5
4 Byte Send Diagnostic Parameter 20-5
Page Code 20-5
Page Length 20-5
Page Code 20-6
Parameter List Length. 20-6
Test Parameters 20-6
Test Count. 20-6

Send Diagnostic (1Dh) Status 20-7
Good 20-7
Busy 20-7
Reservation Conflict 20-8
Check Condition 20-8

Overview

The **SEND DIAGNOSTIC** command instructs the library to perform either a collective diagnostic test or individual diagnostic procedures. Receive the results of the completed diagnostic test by issuing the **RECEIVE DIAGNOSTIC RESULTS** command.

Send Diagnostic (1Dh) Command

The **SEND DIAGNOSTIC** CDB format is shown in Figure 20-1.

Bits / Bytes	7	6	5	4	3	2	1	0
0	0	0	0	1	1	1	0	1
1	Logical Unit Number			PF	Reserved	Self Test	Dev Ofl	UnitOfl
2	Reserved							
3	MSB Parameter List Length							
4								LSB
5	Reserved							

Figure 20-1 SEND DIAGNOSTIC CDB

CDB Format

Page Format (PF)

The value for this field should be set to 1 to conform to the SCSI-2 standard.

SelfTest

The value of this field is as follows:

- 0 - Perform the diagnostic tests specified in the parameter list.
- 1 - Perform a Scalar 1000 Self Test

The Self Test performs the following tests:

- Cycle the Insert / Eject Lock - The Insert / Eject solenoid locks and then unlocks
- Cycle the Gripper Fingers - Gripper fingers are opened and then closed
- Home the Accessor - the accessor is moved to the home position on the vertical and horizontal axes.
- Cycle the Vertical Axis - The accessor is moved to the home position on the vertical axis, moved to the top of the vertical axis and returned to the home position
- Cycle the Horizontal Axis - The accessor is moved to the home position on the horizontal axis, moved to the far right of the horizontal axis and returned to the home position

DevOfl (Device Offline)

This bit field is not supported. The value for this bit must be set to 0.

UnitOfl (Unit Offline)

This bit field is not supported. The value of this bit must be set to 0.

Parameter List Length

This field specifies the parameter list transfer length. See Table 20-1.

Table 20-1 Parameter List Length Values for Self Test

Self-test	Parameter List Length Value Must Be	Self-test Action
1	0	No data is transferred. Good Status is returned.
0	0	No data is transferred. Good status is returned.
	4	A 4-byte parameter list follows.
	6	A 6-byte parameter list follows.

If the parameter list length results in a truncated page, a Check Condition status is returned. Refer to Table 20-3 on page 20-8.

Send Diagnostic Parameter List

Note
If good status returns from the **SEND DIAGNOSTIC** command, issue the **RECEIVE DIAGNOSTIC RESULTS** command to obtain the results of the specified test.

The value in the Parameter List Length field determines the length of the parameter list. Either a 4 byte or 6 byte length is available.

Request one test for each **SEND DIAGNOSTIC** command and specify the number of times to perform each test.

4 Byte Send Diagnostic Parameter

The format for the 4 Byte Send Diagnostic Parameter List is shown in Figure 20-2.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Page Code							
1	Reserved							
2	MSB	Page Length						
3								LSB

Figure 20-2 4 Byte Send Diagnostic Parameter List

Page Code

This field specifies that all supported diagnostic page codes are returned for the next **RECEIVE DIAGNOSTIC RESULTS** command. This field must be set to 0.

Page Length

This field value must be 0, since no additional bytes follow.

6 Byte Send Diagnostic Parameter

Figure 20-3 on page 20-6 shows the 6-Byte Send Diagnostic parameter list format.

Bits / Bytes	7	6	5	4	3	2	1	0
0	Page Code							
1	Reserved							
2	MSB			Parameter List Length				
3								LSB
4	Test Parameters							
5	Test Count							

Figure 20-3 6 Byte Send Diagnostic Parameter List

Page Code

The Page Code specifies which test is requested. Table 20-2 on page 20-7 lists the Page Code field values and a description of the tests.

Parameter List Length

This field value is set to 02h (2), to indicate that 2 additional bytes follow.

Note
Since the Test parameter is a one-byte parameter, not all storage or the I/E station may be accessed.

Test Parameters

This field specifies a storage cell location for the Cycle Get/Put cartridge test (82h). Enter a value between 0 and the maximum installed storage cells. Only storage or Import/Export elements are allowed. For all other page codes, set the field value to 0.

Test Count

This field value specifies the number of times to start the test specified in the Page Code field. See Table 20-2 on page 20-7 for a list of supported test count values.

Table 20-2 Diagnostic Test Availability

Page Code	Test Count	Test Name	Description
81h	1	Home accessor	The accessor is moved to the home position on the vertical and horizontal axes.
82h	1 - 255	Cycle Get / Put Cartridge	The accessor gets the cartridge from the specified element address and puts the cartridge back into the same location.
83h	1 -255	Cycle Gripper Finger	The gripper fingers are opened and then closed.
85h	1 - 255	Cycle Vertical Axis	The accessor is moved to the home position on the vertical axis, moved to the top of the vertical axis and returned to the home position.
86h	1 -255	Cycle Horizontal Axis	The accessor is moved to the home position on the horizontal axis, moved to the far right of the horizontal axis and returned to the home position.
87h	1 - 255	Cycle Door Locks	The door solenoid locks and then unlocks.
88h	1 - 255	Cycle Insert / Eject Station Door Lock	The Insert / Eject solenoid locks and then unlocks.

Send Diagnostic (1Dh) Status

After processing the **SEND DIAGNOSTIC** command, the Scalar 1000 returns a status byte as follows:

Good

The Scalar 1000 returns a Good status when it is able to process the command without errors.

Busy

The Scalar 1000 returns Busy status when it is processing a command for a different initiator or when a motion command is in the process of being aborted.

Reservation Conflict

The Scalar 1000 returns Reservation Conflict status when it is reserved by a different initiator.

Check Condition

The Scalar 1000 returns the Check Condition status when the following situations occur:

- The message system becomes enabled and a message occurs while the Scalar 1000 is processing the command.
- The Scalar 1000 detects an unrecoverable parity error while receiving the CDB.
- The command is issued to an invalid LUN.
- A Unit Attention condition is pending for the initiator.
- The Scalar 1000 is not ready because the door or Insert / Eject Station is open, or the Scalar 1000 is offline.
- A reserved bit is set to 1 or a parameter is invalid in the CDB or **SEND DIAGNOSTIC** command parameter list. See Table 20-3.
- The Scalar 1000 encounters a hardware problem while trying to perform the requested test.

Table 20-3 Invalid Parameters in the CDB

Error	Sense Key	ASC	ASCQ	SKSV Bit	C/D Bit	BPV Bit	Bit Pointer	Field Pointer
Invalid parameter list length	05h	1Ah	00h	1	1	0	0	0003h
Invalid page format field	05h	24h	00h	1	1	1	4h	0001h
Invalid value in DevOfl Field	05h	24h	00h	1	1	1	1h	0001h
Invalid value in UnitOfl Field	05h	24h	00h	1	1	1	0	0001h
Invalid page code	05h	26h	00h	1	0	0	0	0000h
Invalid reserved byte in the parameter list	05h	26h	00h	1	0	0	0	0001h

Table 20-3 Invalid Parameters in the CDB

Error	Sense Key	ASC	ASCQ	SKSV Bit	C/D Bit	BPV Bit	Bit Pointer	Field Pointer
Invalid page length	05h	26h	00h	1	0	0	0	0002h
Invalid test parameter	05h	26h	02h	1	0	0	0	0004h
Invalid test count	05h	26h	02h	1	0	0	0	0005h
Source location for move is empty	05h	3Bh	0Eh	0	0	0	0	0000h
Media removal is prevented. Self test, door lock test, and insert/eject lock test cannot be executed	05h	53h	02h	0	0	0	0	0000h
The accessor is holding a cartridge and the cartridge must be removed before the test can execute	05h	80h	01h	0	0	0	0	0000h

21

Send Volume Tag (B6h)

Overview 21-3

Send Volume Tag (B6h) Command 21-3
CDB Format 21-4
Element Type Code 21-4
Starting Element Address 21-4
Send Action Code 21-5
Parameter List Length 21-5
Volume ID Template Field 21-5

Send Volume Tag (B6h) Status 21-6
Good 21-6
Busy 21-6
Reservation Conflict 21-6
Check Condition 21-6

Overview

The **SEND VOLUME TAG** command instructs the library to compare barcode labels to a template in a parameter list. The list of matching barcode labels can be obtained be issuing the **REQUEST VOLUME ELEMENT ADDRESS** command.

Send Volume Tag (B6h) Command

Note

The Volume Identification Template field is not matched against the bar code label if a label error occurs during the scanning process.

In a multiple initiator environment, reserve the entire library with the **RESERVE** command, then issue the **SEND VOLUME TAG** command. The library supports only the volume tag information scanned on the bar code labels. The library does not allow modification of this information. Use the **REQUEST VOLUME ELEMENT ADDRESS** command to obtain the scanned information, and then issue the **RELEASE** command after the data is successfully obtained.

The **SEND VOLUME TAG** command format is shown in Figure 21-1 on page 21-4.

Bits / Bytes	7	6	5	4	3	2	1	0
0	1	0	1	1	0	1	1	0
1	Logical Unit Number			Reserved	Element Type Code			
2	MSB Starting Element Address							
3	LSB							
4	Reserved							
5	Reserved			Send Action Code				
6	Reserved							
7								
8	MSB Parameter List Length							
9	LSB							
10	Reserved							
11	Reserved							

Figure 21-1 SEND VOLUME TAG CDB

CDB Format

Element Type Code

This field specifies which element types to scan:

- 00h - Scan all elements (report from Starting Element Address)
- 01h - Scan the accessor (only return accessor element status)
- 02h - Scan the storage elements
- 03h - Scan the Insert/Eject station elements
- 04h - Scan the tape drives

Note
The Starting Element Address field must indicate a valid element but does not necessarily have to match the Element Type Code field.

Starting Element Address

This field specifies the element address at which to start the template match. Elements with addresses equal to or greater than the starting element address are searched.

Send Action Code

This field value must be set to 05h which specifies translating, searching all primary volume tags, and ignoring all sequence numbers.

Parameter List Length

This field specifies either 20h (32) bytes or is 28h (40) bytes of parameter list data. Figure 21-2 shows the format of the Send Volume Tag Parameter list.

Bits / Bytes	7	6	5	4	3	2	1	0
0 : 31	Volume ID Template Field							
32 : 39	Reserved							

Figure 21-2 Send Volume Tag Parameter List

Volume ID Template Field

This field contains 20h (32) bytes of volume tag information.

If the Scalar 1000 operates in mixed media mode and the Volser Enable bit is set from the Scalar 1000 operator panel or with a **Mode Select** command, the first character represents the media type identification, the remaining 6 characters represent the volume tag (volser). If the Scalar 1000 operates in default mode, or mixed media mode and the Volser Enable bit is not set, only 6 characters are used to represent the volume tag (volser).

Note
The 7th character identifies the medium type.

Only the first 6 or 7 bytes are valid, All additional bytes must be 00h (null), and the field is terminated at the first 00h.

Valid search characters include:

- ? - used to match any single character in any position
- * - used as a wild card to ignore all characters from that position to the end; all characters past the '*' are ignored

Send Volume Tag (B6h) Status

After processing the **SEND VOLUME TAG** command, the Scalar 1000 returns a status byte as follows:

Good

The Scalar 1000 returns a Good status when it is able to process the command without errors.

Busy

The Scalar 1000 returns Busy status when it is processing a command for a different initiator or when a motion command is in the process of being aborted.

Reservation Conflict

The Scalar 1000 returns Reservation Conflict status when it is reserved by a different initiator.

Check Condition

The Scalar 1000 returns the Check Condition status when the following situations occur:

- The message system is enabled and a message error occurs while the Scalar 1000 is processing the command.
- The Scalar 1000 detects an unrecoverable parity error while receiving the CDB or the parameter list.
- The command is issued to an invalid LUN.
- A Unit Attention condition is pending for the initiator.
- The library is not ready because the door or Insert/Eject Station is open, or the Scalar 1000 is offline.
- A reserved bit is set to 1 or a parameter is invalid in the CDB. Refer to Table 21-1 on page 21-7.

Table 21-1 Invalid Parameters in the CDB

Error	Sense Key	ASC	ASCQ	SKSV Bit	C/D Bit	BPV Bit	Bit Pointer	Field Pointer
Invalid Parameter List Length	05h	1Ah	00h	1	1	0	0	0008h
Invalid Starting Element Address	05h	21h	01h	1	1	0	0	0002h
Invalid Element Type Code	05h	24h	00h	1	1	1	3h	0001h
Invalid Send Action Code	05h	24h	00h	1	1	1	4h	0005h
Invalid Reserved field in parameter list	05h	26h	00h	1	0	0	0	[a]

a. This value is set to the field pointer of the first non-zero reserved field in the parameter list.

22

Test Unit Ready (00h)

Overview 22-3

Test Unit Ready (00h) Command 22-3

Test Unit Ready (00h) Status 22-4
- Good 22-4
- Busy 22-4
- Reservation Conflict 22-4
- Check Condition 22-4

Overview

Note
The Scalar 1000 does not check whether a different initiator has reserved any or all of the Scalar 1000. A Check Condition status, indicating a Reservation Conflict, may be returned for the next command.

The **TEST UNIT READY** command allows the initiator to verify that the Scalar 1000 is ready to accept all commands.

Test Unit Ready (00h) Command

The **TEST UNIT READY** CDB format is shown in Figure 22-1.

Bits / Bytes	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0	0
1	Logical Unit Number			Reserved				
2	Reserved							
3								
4								
5	Reserved							

Figure 22-1 TEST UNIT READY CDB

CDB

Bytes 1 to 5 are set to 0.

Test Unit Ready (00h) Status

After processing the **TEST UNIT READY** command, the Scalar 1000 returns a status byte as follows:

Good

The Scalar 1000 returns a Good status when it is able to process the command without errors.

Busy

The Scalar 1000 returns Busy status when it is processing a command for a different initiator or when a motion command is in the process of being aborted.

Reservation Conflict

The Scalar 1000 never returns a Reservation Conflict.

Check Condition

The Scalar 1000 returns the Check Condition status when the following situations occur:

- The message system is enabled and a message error occurs while the Scalar 1000 is processing the command.
- The Scalar 1000 detects an unrecoverable parity error while receiving the CDB.
- The command is issued to an invalid LUN.
- A Unit Attention condition is pending for the initiator.
- The Scalar 1000 has detected an unrecoverable hardware error.
- The Scalar 1000 is not ready because a door is open, the Scalar 1000 is offline, or the Scalar 1000 has not been taught and initialized.
- A reserved bit is set to 1 or a parameter is invalid in the CDB.

23

Write Buffer (3Bh)

Overview 23-3

Write Buffer (3Bh) Command 23-3
CDB Format 23-3
Mode 23-3
Write Data Mode. 23-4
Download Microcode and Save Mode 23-4
Buffer Id 23-4
Buffer Offset 23-5
Parameter List Length 23-5

Write Buffer (3Bh) Status 23-5
Good 23-5
Busy 23-5
Reservation Conflict 23-5
Check Condition 23-5

Overview

The **WRITE BUFFER** command is used as a diagnostic tool for testing the Scalalr 1000 and in the Firmware upgrade operation. Refer to Table 23-1 on page 23-4 for supported **WRITE BUFFER** command Mode parameter values.

Write Buffer (3Bh) Command

The **WRITE BUFFER** CDB format is shown in Figure 23-1.

Bits / Bytes	7	6	5	4	3	2	1	0
0	0	0	1	1	1	0	1	1
1	Logical Unit Number			Reserved		Mode		
2	Buffer ID							
3	MSB							
4	Buffer Offset							
5								LSB
6	MSB							
7	Parameter List Length							
8								LSB
9	Reserved							

Figure 23-1 WRITE BUFFER CDB

CDB Format

Mode

The Mode field specifies how the Scalalr 1000 interprets the function of the command. The mode field format is defined in Table 23-1 on page 23-4.

Table 23-1 Mode Field Definition

Mode Bit 2	Bit 1	Bit 0	Description
0	1	0	Write Data
1	0	1	Download microcode and save

Note
The last write buffer could take up to 5 minutes to complete. Set the timeout accordingly.

Write Data Mode

In the Write Data mode, data of length Parameter List Length is written to the specified buffer id at the specified buffer offset.

Note
When the Download Microcode and Save mode completes successfully, a Unit Attention condition with the additional sense code set to New Firmware Loaded returns to all initiators except the one that issued the **WRITE BUFFER** command.

Download Microcode and Save Mode

The Download Microcode and Save mode specifies that microcode or control information is written to the control memory space of the Scalalr 1000. Data is written in sections, starting at Buffer offset 0, until all of the data is in the device. The last command returns after the new code is running. The data remains valid even after the Scalalr 1000 is reset.

Buffer Id

This field specifies the buffer identifier for the transfer data. This field definition is dependent on the specified Mode field parameter. See Table 23-2 for the definition.

Table 23-2 Buffer ID and Description

Buffer ID	Description	Buffer Offset	R/W	Modes
0	Dump	0	RO	-
1	Microcode	0	RW	5
2	Engineering	0	RW	2
3	Reserved	0	RO	-
4	Reserved	0	RO	-
5	Reserved	0	RO	-

Buffer Offset

The Buffer Offset field indicates the buffer offset where the write operation should commence. Refer to the **READ BUFFER** command *Buffer Offset* on page 12-6 for valid buffer offset values.

Parameter List Length

This field specifies the data length of the buffer being transferred. Microcode may be written in blocks. Each data block length should be specified until all data blocks have been written.

Write Buffer (3Bh) Status

After processing the **WRITE BUFFER** command, the Scalalr 1000 returns a status byte as follows:

Good

The Scalalr 1000 returns a Good status when it is able to process the command without errors.

Busy

The Scalalr 1000 returns Busy status when it is processing a command for a different initiator or when a motion command is in the process of being aborted.

Reservation Conflict

The Scalalr 1000 returns Reservation Conflict status when it is reserved by a different initiator.

Check Condition

The Scalalr 1000 returns the Check Condition status when the following situations occur:

- The message system is enabled and a message error occurs while the Scalalr 1000 is processing the command.
- The Scalalr 1000 detects an unrecoverable parity error while it receives the CDB.
- LUN has an invalid command issued to it.
- The initiator has a Unit Attention condition pending.
- A reserved bit is set to 1 or a parameter is invalid in the CDB. Refer to Table 23-3 on page 23-6.

Table 23-3 Invalid Parameters in the CDB

Error	Sense Key	ASC	ASCQ	SKSV Bit	C/D Bit	BPV Bit	Bit Pointer	Field Pointer
Flash Erase Fail	04h	3Fh	80h	0	0	0	0	0000h
Flash Program Fail	04h	3Fh	84h	0	0	0	0	0000h
Attempt to Write a Read Only Buffer	05h	24h	80h	0	0	0	0	0000h
Parameter Checksum Fail	05h	26h	80h	0	0	0	0	0000h

Index

-0-

00h - Test Unit Ready 22-3
01h - Re-Zero 19-3
03h - Request Sense 16-3
07h - Initialize Element Status 3-3

- 1 -

12h - Inquiry 5-3
15h - Mode Select 7-3
16h - Reserve 18-3
17h - Release 15-3
1Ah - Mode Sense 8-5
1Ch - Receive Diagnostic Results 14-3
1Dh - Send Diagnostic 20-3
1Eh - Prevent / Allow Medium Removal . . . 11-3

- 2 -

2Bh - Position To Element 10-3

- 3 -

3Bh - Write Buffer 23-3
3Ch - Read Buffer 12-3

- 4 -

4Dh - Log Sense 6-3

- A -

A5h - Move Medium 9-3
Abort 2-8
Accessor 2-3
Arbitration 2-6
Assistance with problems 1-5
Associated Documents 1-4
    Scalar 1000 Maintenance Guide 1-4
    Scalar 1000 Operator Guide 1-4
    Scalar 1000 Planning Guide 1-4

- B -

B5h - Request Volume Element Address . . .17-3
B6h - Send Volume Tag 21-3
B8h - Read Element Status 13-5
barcode labels 2-3
Barcode Scanner 2-3
Bus Device Reset 2-8
Bus Free 2-6
Bus phase 2-6
    Arbitration 2-6
    Bus Free 2-6
    Reselection 2-6
    Selection 2-6
    Transfer 2-6
Busy 2-11

- C -

Check Condition 2-11
Command Complete 2-7
Control Byte Field 2-10
Control Module 2-3

- D -

Disconnect 2-8
Disconnection 2-12

- E -

E7h - Initialize Element Status With Range . . 4-3
Element Addressing 2-4
Expansion Modeule 2-3

- F -

Field Not Implemented 2-10

- G -

General Characteristics 2-3
Good 2-11

- I -

Identify 2-9
Information symbol 1-4
Initialize Element Status 2-9, 3-3
Initialize Element Status With Range . . . 2-9, 4-3
Initiator 2-4
Initiator Detected Error 2-8
Inquiry 2-9, 5-3
Insert / Eject Station 2-3
Intended Audience 1-3

- L -

Log Sense 2-9, 6-3
Logical Unit Number 2-10

- M -

Message Parity Error 2-8
Message Reject 2-8
Mode Select 2-9, 7-3
Mode Sense 2-9, 8-5
Move Medium 2-9, 9-3

- N -

No-Op 2-8
Notes symbol 1-5

- O -

Organization
    Chapters 1-3

- P -

Parity Checking 2-12
Position To Element 2-9, 10-3
Prevent / Allow Medium Removal 2-9, 11-3

- R -

Read Buffer 2-9, 12-3
Read Element Status 2-9, 13-5
Receive Diagnostic Results 2-9, 14-3
Release 2-9, 15-3
Request Sense 2-9, 16-3
Request Volume Element Address . . .2-10, 17-3
Reselection 2-6
Reservation Conflict 2-11
Reserve 2-10, 18-3
Reserve Field 2-10
Reset 2-12
Restore Pointer 2-7
Re-Zero 2-10, 19-3

- S -

Save Data Pointers 2-7
Scalar 1000 Maintenance Guide 1-4
Scalar 1000 Operator Guide 1-4
Scalar 1000 Planning Guide 1-4
SCSI bus 2-4, 2-6
SCSI Bus Relationship 2-4
SCSI cables 2-4
SCSI Command Status Byte 2-11
    Busy 2-11
    Check Condition 2-11
    Good 2-11
    Reservation Conflict 2-11
SCSI Commands 2-9
    Initialize Element Status 2-9, 3-3
    Initialize Element Status With Range 2-9, 4-3
    Inquiry 2-9, 5-3
    Log Sense 2-9, 6-3
    Mode Select 2-9, 7-3
    Mode Sense 2-9, 8-5
    Move Medium 2-9, 9-3
    Position To Element 2-9, 10-3
    Prevent / Allow Medium Removal .2-9, 11-3
    Read Buffer 2-9, 12-3
    Read Element Status 2-9, 13-5
    Receive Diagnostic Results 2-9, 14-3
    Release 2-9, 15-3
    Request Sense 2-9, 16-3
    Request Volume Element Address 2-10, 17-3
    Reserve 2-10, 18-3
    Re-Zero 2-10, 19-3
    Send Diagnostic 2-10, 20-3
    Send Volume Tag 2-10, 21-3
    Test Unit Ready 2-10, 22-3

Write Buffer 2-10, 23-3
SCSI Messages 2-7
Abort 2-8
Bus Device Reset 2-8
Command Complete 2-7
Disconnect 2-8
Identify 2-9
Initiator Detected Error 2-8
Message Parity Error 2-8
Message Reject 2-8
No-Op 2-8
Restore Pointer 2-7
Save Data Pointers 2-7
SCSI Operation
Disconnection 2-12
Parity Checking 2-12
Reset 2-12
Selection 2-6
Send Diagnostic 2-10, 20-3
Send Volume Tag 2-10, 21-3
Storage Cells 2-3
Symbols and Notes 1-4
Information symbol 1-4
Notes symbol 1-5

- T -

Tape Drives 2-3, 2-5
Target 2-4
Test Unit Ready 2-10, 22-3
Transfer 2-6

- U -

Unit Attention Condition 2-13

- W -

Write Buffer 2-10, 23-3