Magstar MP 3570 Tape Subsystem

Hardware Reference

C-Series Models

GA32-0394-01

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C-Series Models

GA32-0394-01

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Second Edition, October 1999

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Preface

This publication contains information on how to use and program the IBM Magstar® MP 3570 Tape Subsystem.

Organization

The information in this book is organized as follows:

- “Chapter 1. Introduction” on page 1 provides an overview of the IBM Magstar MP 3570 Tape Subsystem.
- “Chapter 2. Drive SCSI Commands” on page 21 describes the SCSI commands supported for the Magstar MP drive (LUN 0).
- “Chapter 3. Library SCSI Commands” on page 179 describes the SCSI commands supported for the Magstar MP library (LUN 1)
- “Appendix A. SCSI Messages and Status” on page 219 describes SCSI-3 protocol implementation details for the Magstar MP.
- “Appendix B. SCSI Error Sense” on page 221 describes Magstar MP sense and status conditions.
- “Appendix C. Implementation Considerations” on page 225 provides additional details for log counters, SCSI ID assignments, data transfer, and drive cleaning.
- “Glossary” on page 233 defines the terms, abbreviations, and acronyms that are used in this publication.
- “Index” on page 237 includes keywords and terms to help retrieve information in this publication.

Magstar® MP Publications

For additional information about the Magstar MP 3570 Tape Subsystem, see:

- *IBM Magstar MP 3570 Tape Subsystem Introduction and Planning Guide C-Series Models*, GA32-0392
- *IBM Magstar MP 3570 Tape Subsystem Operator Guide C-Series Models*, GA32-0393
- *IBM Magstar MP 3570 Tape Subsystem Maintenance Information, C-Series Models*

For additional information about the Magstar MP 3575 Tape Library Dataserver, see:

- *Magstar MP 3575 Tape Library Dataserver Introduction and Planning Guide*, GA32-0380
- *Magstar MP 3575 Tape Library Dataserver Operator Guide*, GA32-0381
- *Magstar MP 3575 Tape Library Dataserver Hardware Reference*, GA32-0382
- *Magstar MP 3575 Tape Library Dataserver Maintenance Information for Model L06*, SA37–0413
- *Magstar MP 3575 Tape Library Dataserver Maintenance Information for Models L12, L18, L24, and L32*, SA37–0414

Related Information

For related information about the Magstar MP 3570 Tape Subsystem, see the American National Standard of the National Committee for Information Technology Standards (NCITS) documents:

- *Small Computer System Interface–3 (SCSI–3) Primary Commands (SPC), X3.301-1997*
- *SCSI–3 Stream Device Commands (SSC), X3T10/997D*
- *SCSI–3 Medium Changer Commands (SMC), NCITS.314-1998*
- *Care and Handling of Computer Magnetic Storage Media* by S. G. Geller, National Bureau of Standards Special Publication 500-101, for sale by the Superintendent of Documents, U.S.A. Government Printing Office, Washington, DC 20402
- *External Devices Translated Safety Notices* , SA26-7192
- *IBM General Information Installation Manual–Physical Planning* , GC22-7072
- *9309 Rack Enclosure General Information and Site Preparation* , GA24-4103
- *7015 Installation and Service Guide* , SA23-2628

RISC System/6000® Publications

For additional information about RISC System/6000 systems, see:

- *RISC System/6000 Getting Started: Using RISC System/6000*, GC23-2521
- *RISC System/6000 Getting Started: Managing RISC System/6000*, GC23-2378
- *RISC System/6000 V4 Problem Solving Guide*, SC23-2606
- *RISC System/6000 V4 Message Guide & Reference*, SC23-2641
- *RISC System/6000 Problem Solving Guide*, SC23-2204
- *RISC System/6000 Planning for System Installation*, SA38-0508
- *RISC System/6000 Adapters, Devices, and Cable Information for Multiple Bus Systems*, SA38-0516
- *Adapters, Devices, and Cable Information for Micro Channel Bus Systems*, SA23-2764

AS/400® Publications

For additional information about AS/400 systems, see:

- *AS/400 Basic System Operation, Administration and Problem Handling* , SC41-5206
- *AS/400 Backup and Recovery*, SC41-5304
- *AS/400 CL Reference Guide* , SC41-5772
- *AS/400 Physical Planning Reference* , SA41-3109 (IMPI)
- *AS/400 Physical Planning Reference* , SA41-5109 (RISC)

- *AS/400 System API Reference* , SC41-5801
- *Automated Tape Library Planning and Management*, SC41-3309 (IMPI)
- *Automated Tape Library Planning and Management*, SC41-5309 (RISC)
- *Backup Recovery and Media Services for AS/400* , SC41-4345
- *Hierarchical Storage Management*, SC41-5351
- *A Practical Approach to Managing Backup Recovery and Media Services* , SG24-4840

Related Software Information

For information about software related to the Magstar MP 3570 Tape Subsystem, see:

- *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers Installation and User's Guide*, GC35-0154

Additional publications may be ordered as required for training.

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Chapter 1. Introduction

This section provides an overview of the IBM Magstar MP (Multi-Purpose) Tape Subsystem and summarizes the tape subsystem's primary applications, available models, components, Fast Access Linear Tape, cartridge magazine, library modes of operation, library configurations, and performance considerations.

Magstar MP 3570 Tape Subsystem models are compact, high-capacity, integrated storage devices that are available as stand-alone or rack-mounted units. The subsystems are well-suited for a variety of applications and thus are referred to as Magstar MP (Multi-Purpose) units.

The Magstar MP 3570 Tape Subsystem is attached to host processors that use the Small Computer System Interface (SCSI-2). It is intended for use on mid-range systems that require reliable tape support for backup, restore, archive, and data interchange operations, as well as applications that require rapid data access or high data capacity. These systems include but are not limited to the RISC System/6000®, RS/6000® SP™, AS/400® systems, Sun systems, HP-UX systems, IBM PC Servers, Netfinity systems, and other Windows NT® systems.

The Magstar MP 3570 Tape Subsystem is available as a table-top, stand-alone, drive-only unit (Model C00) (see Figure 1 on page 2), or as library Models C01, C02, C11, C12, C21, and C22 (see Figure 2 on page 2). Models C01 and C02 are stand-alone library units, and Models C11, C12, C21, and C22 are rack-mounted library units. Models C01, C11, and C21 have a single tape drive, and Models C02, C12, and C22 have two tape drives.

Note: The Magstar MP Tape Subsystem Models C21 and C22 are designed only for installation in the IBM Netfinity rack or the NETBAY22 rack. The 3570 Models C21 and C22 emulate 3570 Models C11 and C12.

All of the Magstar MP units use the Magstar MP Fast Access Linear Tape cartridges with longitudinal serpentine recording. These cartridges use a unique design that is approximately one half the size of IBM 3480, 3490, or 3590 tape cartridges. This cartridge style provides two tape spools with mid-point load for fast access to the metal particle media. See "Magstar MP Fast Access Linear Tape Cartridge" on page 6 for additional details.

There are three versions, or formats, of 3570 tape cartridges:

- B-Format (original)
- C-Format
- C-Format XL (eXtended Length)

The B-Format cartridge is fully read/write compatible between all Magstar MP tape drives. The C-Format cartridge enables the performance features of the Magstar MP 3570 C-Series Tape Subsystem. The C-Format XL cartridge increases the data capacity from 5GB to 7GB native, 21GB with 3:1 data compression (1 gigabyte equals 1 000 000 000 bytes). See "Compatibility with other Magstar MP Tape Drives" on page 4 and "Performance" on page 18 for additional details.

Model C00 consists of one tape drive, the integrated microprocessor control unit, and all necessary power and cooling components. The unit attaches to a host processor through a differential SCSI-2 channel adapter. The integrated control unit contains the electronics and microcode for reading and writing data. The control unit functions include management of the data buffer, error recovery procedures, and the control of all tape drive operations and some channel operations. The Model C00 tape drive contains a compact loading mechanism that handles the Magstar MP Fast Access Linear Tape cartridges. The operator communications and the message interface are handled by a combination of three LED indicators.

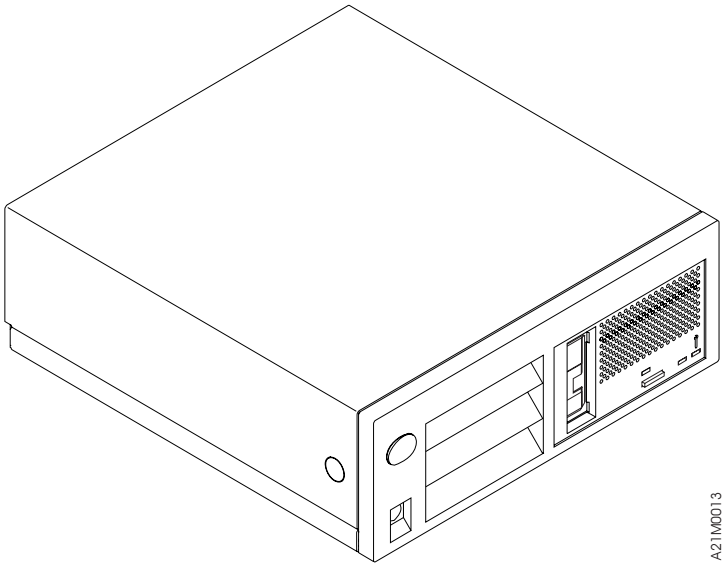


Figure 1. Magstar MP Model C00

Note: Model C21 and C22 are modified to fit in the Netfinity rack.

Figure 2. Magstar MP Models C01, C02, C11, C12, C21, and C22

The library models each contain two removable 10-cartridge magazines and use a cartridge loading and transport mechanism to move the tapes to and from the storage magazines and the tape drive. Each library unit has an operator panel with buttons and a display. The operator panel is the interface for all operator functions. Each library unit can operate in automatic, manual, or random mode (see “Library Modes of Operation” on page 12). The dual-drive models (Models C02, C12, and C22) may operate in

Base Configuration or Split Configuration as selected in the operator menus. With two magazines of cartridges, the Magstar MP can provide up to 420GB of online data capacity with a data transfer rate of up to 54GB per hour at maximum compression. The dual-drive models can provide up to double this data transfer rate (up to 108GB per hour at maximum compression).

The cleaning function allows the Magstar MP to maintain drive operating efficiency. The need to clean the tape head is determined by microcode.

- For Model C00, the Clean LED flashes to prompt the operator to load the cleaning cartridge. The cleaning cartridge is automatically unloaded when cleaning is complete.
- For the library models, the cleaning cartridge is stored inside the unit. Options are available on the operator panel to use the cleaning cartridge.

Table 1 lists the available Magstar MP models (device type 3570).

Table 1. Magstar MP Tape Subsystem Models (Device Type 3570)

Model	Type	Drives	Color	Cartridges
C00	Stand-alone, drive-only unit (see Figure 1)	1	Black	1
C01	Stand-alone library unit (see Figure 2)	1	Black	Up to 20
C02	Stand-alone library unit (see Figure 2)	2	Black	Up to 20
C11	Rack-mounted library unit (see Figure 2)	1	Black	Up to 20
C12	Rack-mounted library unit (see Figure 2)	2	Black	Up to 20
C21	Rack-mounted library unit (Netfinity only) (see Figure 2)	1	Black	Up to 20
C22	Rack-mounted library unit (Netfinity only) (see Figure 2)	2	Black	Up to 20

Compatibility with other Magstar MP Tape Drives

The Magstar MP C-Series tape drive can be distinguished from the Magstar MP B-Series tape drive by the color of the unload button on the drive front panel. The C-Series unload button is green while the B-Series unload button is blue. In order to distinguish between the different versions of tape cartridges, see "Magstar MP Fast Access Linear Tape Cartridge" on page 6.

The original B-Format tape cartridges can be written, read, and interchanged between Magstar MP 3570 B-Series Tape Subsystems, Magstar MP 3570 C-Series Tape Subsystems, and all tape drives in the 3575 Tape Library Dataserver.

The newer C-Format and C-Format XL tape cartridges can only be written, read, and interchanged between Magstar MP 3570 C-Series Tape Subsystems and the Magstar MP Model C Tape Drives feature of the 3575 Tape Library Dataserver. The C-Format and C-Format XL tape cartridges cannot be used in Magstar MP 3570 B-Series Tape Subsystems or in Magstar MP 3570 Model B1A tape drives in a 3575 Tape Library Dataserver.

Note: A particular level of microcode or higher is required to be able to use the C-Format XL cartridges. If the required level of microcode is loaded, a label, which reads XL READY, will be posted on the rear of the unit (next to the serial number label).

When B-Format cartridges are used in the C-Series tape drives, the tape drives operate with better performance than the B-Series tape drives. Even higher performance is achieved by using C-Format or C-Format XL tape cartridges (see "Performance" on page 18).

Table 2. Compatibility with other Magstar MP Tape Drives

Description	B-Format Cartridge	C-Format Cartridge	C-Format XL Cartridge
3570 B-Series Tape Drive	Supported	Not supported	Not supported
3570 C-Series Tape Drives	Supported	Supported	Supported if Feature Code 2007 or 9007 is installed
3575 with 3570 Model B1A Tape Drive(s)	Supported	Not supported	Not supported
3575 with Magstar MP Model C Tape Drive(s)	Supported	Supported	Supported if Feature Code 2007 or 9007 is installed
Note: If a cartridge is loaded into a drive which does not support it, the drive will respond to Test Unit Ready and other SCSI commands with CHECK CONDITION status and associated sense data of 3/3000 (Medium Error, Incompatible Medium Installed).			

Magstar MP Bar Code Reader

The Bar Code Reader enables the host application software to inventory cartridges efficiently. It is part of the cartridge picker sub-assembly. It reads the bar code portion of the top cartridge label as the cartridges enter the picker. The host can issue SCSI commands to read the bar code volser.

The Bar Code Reader is provided to enhance application performance using the Magstar MP 3570 Tape Subsystem. For Standard Label tape processing, the bar code labels and internally recorded VOLSER must match. Most IBM tape management systems, like ADSM and BRMS/400, use Standard Label tape processing. For further information, see “Bar Code Format” on page 8.

The Bar Code Reader is included on all Models C01, C02, C11, C12, C21, and C22 Magstar Tape Subsystems.

Magstar MP Fast Access Linear Tape Cartridge

Using the Magstar MP C-Format or C-Format XL cartridges, the Magstar MP 3570 Tape Subsystem drive reads and writes data on 128 tracks per cartridge, eight tracks at a time. The subsystem uses an interleaved serpentine longitudinal recording format. The first set of eight tracks is written from the mid-point along the length of the tape to near the end of the tape, where the head is indexed to the next set of eight tracks for return to the tape mid-point. This process continues until all 128 tracks are written, and then is repeated for the other half of the medium until the tape is full. Operation using the Magstar MP B-Format cartridges is similar to the C-Format or C-Format XL cartridge operation; except that four tracks, instead of eight tracks, are written at a time until all 128 tracks have been written.

Data is written on or read from metal particle tape that is enclosed in a tape cartridge (Figure 3). The Magstar MP Fast Access Linear Tape cartridges are different from cartridges that are used in other IBM tape storage products, and cannot be interchanged with the media that is used in other IBM tape products.

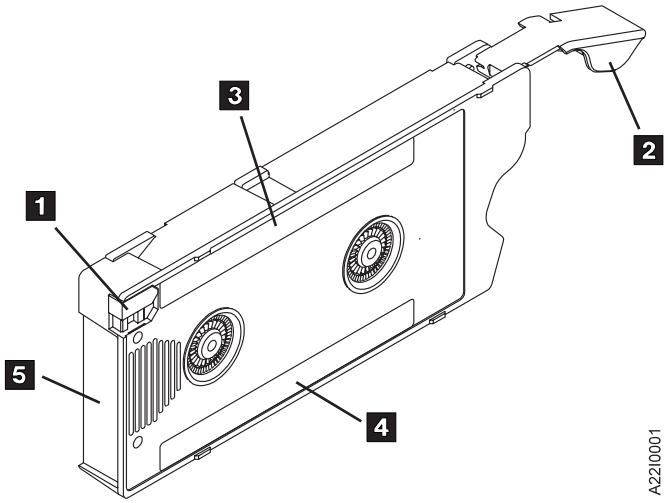


Figure 3. Magstar MP Fast Access Linear Tape Cartridge

Each tape cartridge includes a file-protect selector **1** that, when placed in the upward position as indicated, file protects the tape and prevents data from being written on it. The cartridge can be written on when the file-protect selector is in the downward position. The automatic cartridge loader in the drive opens the cartridge door **2** and allows the read/write element to access the tape path.

The Magstar MP Tape Subsystem design provides faster data access than other tape technologies by eliminating the time that is spent threading the tape before it can be used to read or write data. In addition, the load point for the tape is near the mid-point of the tape length, with half the media wound onto each of two spools. As a result, the average distance that must be traveled to access data is one quarter of the length of the tape, which shortens the data acquisition time and reduces the head wear.

The Magstar MP Fast Access Linear Tape cartridge contains major enhancements over conventional data recording cartridges. It has a rugged case that is designed for repetitive handling by automated pickers and protects the medium in an enclosed environment. The cartridge contains advanced metal-particle tape media that is developed for high capacity and durability. The tape never leaves the cartridge, and maintains a self-enclosed tape path that allows the medium to avoid being handled by external pickers, rollers, or external guides. The unique tape path eliminates tape thread time, reduces complexity, and provides higher reliability. The new tape path also permits quick loading and, combined with the mid-point load position, provides unparalleled tape performance.

The cartridge door remains closed during storage and handling to protect the medium and tape path from contamination.

A data cartridge has a blue, green, or red file-protect selector (see Table 3) and is marked IBM Magstar MP Fast Access Linear Tape. A cleaning cartridge has a gray file-protect selector and is marked IBM Magstar MP Cleaning Cartridge.

Each data cartridge is identified by a factory-applied volume serial (volser) number and a bar code. The volser and bar code appear on a label (see **3** in Figure 3) along the edges of both the data and cleaning cartridges that face the operator as the cartridge goes into the Magstar MP. Label **3** also has a small space in which the operator may write a note.

Note: Do not write on, mark over, or otherwise obscure either of the bar codes on a cartridge; doing so may cause the system to malfunction.

Another label is placed on the cartridge along the bottom of the plastic face (see **4** in Figure 3). It is marked IBM Magstar MP Fast Access Linear Tape (or IBM Magstar MP Cleaning Cartridge in the case of a cleaning cartridge). The C-Format cartridge includes the words “C-Format” on this label and the label for the C-Format XL cartridge includes the words “C-Format XL 7GB”.

Table 3. Magstar MP Cartridge Differences

Description	Native Capacity	BarCode/Volser Label	File Protect Switch
Magstar MP Cleaning Cartridge	N/A	FCLNxxx	Gray
Magstar MP B-Format Data Cartridge	5GB	Fxxxxxx	Blue
Magstar MP C-Format Data Cartridge	5GB	Gxxxxxx	Green
Magstar MP C-Format XL Data Cartridge	7GB	Hxxxxxx	Red

User-supplied labels should not be affixed to the cartridge because they may interfere with the proper handling of the cartridge in either the drive or the library transport mechanism.

Label **5** is located on the end of the cartridge, opposite the cartridge door, and contains a bar code identical to the one that is located on the top label.

If a cartridge label needs to be replaced, a kit containing enough labels for 10 cartridges can be ordered. See “Custom Label Ordering” on page 8 for more information.

Bar Code Format

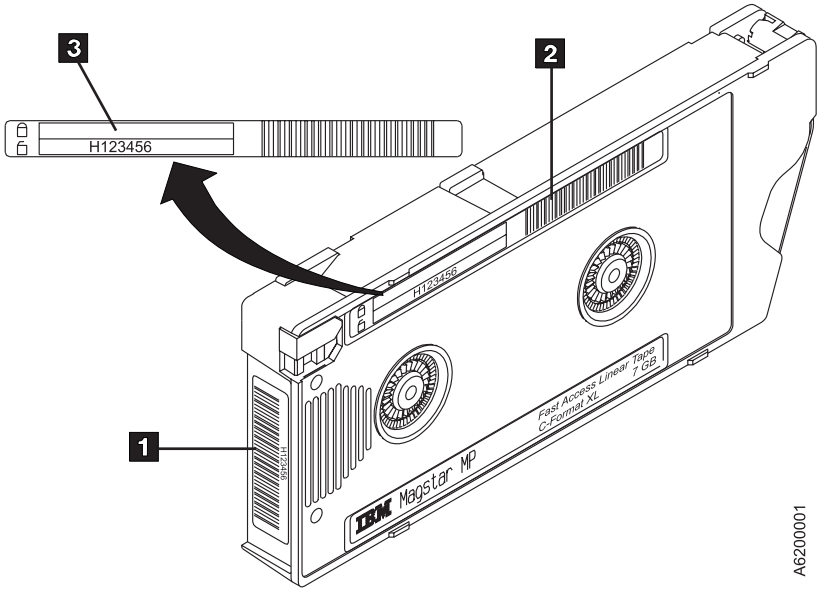


Figure 4. Magstar MP C-Format XL Tape Cartridge Labels

The bar code is seven characters in length not including the start/stop characters.

- The first character (left-most character) is the media type character and is an uppercase "H" for all Magstar MP C-Format XL cartridges (see **3** in Figure 4), "G" for C-Format cartridges, and "F" for B-Format cartridges and for the cleaning cartridge.
- The remaining six (right-most) characters are used to uniquely identify the cartridges. The valid bar code characters are as follows:
  - Uppercase Alpha - A through Z.
  - Numeric - 0 through 9.
  - Blanks (or Spaces) - Trailing only.

  The bar code can be any mixture of alpha and numeric characters such as the following :
  - "HABC123" "HABC2C3" "H123ABC".
  - "H12345 " (with a trailing blank character).
  - "HA3B " (with 3 trailing blank characters).
- The bar code is located on two labels on the Magstar MP cartridge (see **1** and **2** in Figure 4).
- Some operating systems or applications, like ADSM and BRMS/400, only display the last six characters. (The media type "F", "G", or "H" is not displayed.)
- For Standard Label tape processing using the Bar Code Reader, the bar code labels and internally recorded VOLSER must match. If there are existing cartridges where there is a mismatch between the Bar Code Label and the VOLSER with which the tape was initialized, a set of custom cartridge labels can be ordered to match the Bar Code Label to the internal VOLSER.

Custom Label Ordering

To receive the custom labels, order part number 05H9643 for B-Format cartridges, 08L6192 for C-Format cartridges, or 08L6666 for C-Format XL cartridges from IBM Supply Fulfillment Operations:

- 1-888-IBM-MEDIA in the United States, or
- +31 433 502 576 in Europe.

Cartridge Magazine

Model C00 can hold only one cartridge at a time. Models C01, C02, C11, C12, C21, and C22 can each contain two 10-cartridge tape magazines, which give these models the capability of holding up to 20 cartridges.

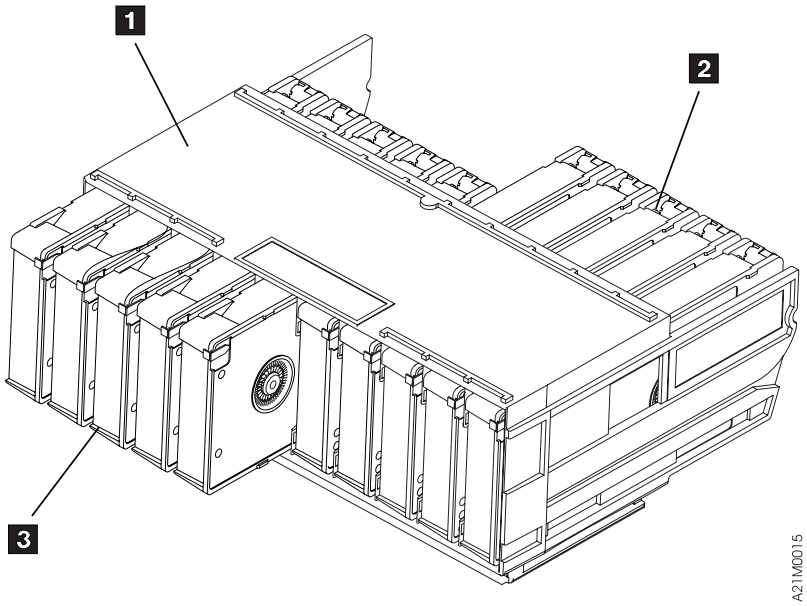


Figure 5. Magstar MP Cartridge Magazine (Viewed from the Operator Side)

As shown in Figure 5, each magazine **1** stores tape cartridges in one of 10 storage cells in two possible physical positions: the *import* position **2** or the *export* position **3** . In the import position, the cartridge transport mechanism can access the cartridge. The transport in each library unit moves processed cartridges to the export position in automatic and manual modes where they are accessible for removal by the operator.

Operator and Service Message Interface

This section describes the operator and service message interface facilities for Model C00 and Models C01, C02, C11, C12, C21, and C22.

Model C00

Figure 6 shows the operator panel for Model C00.

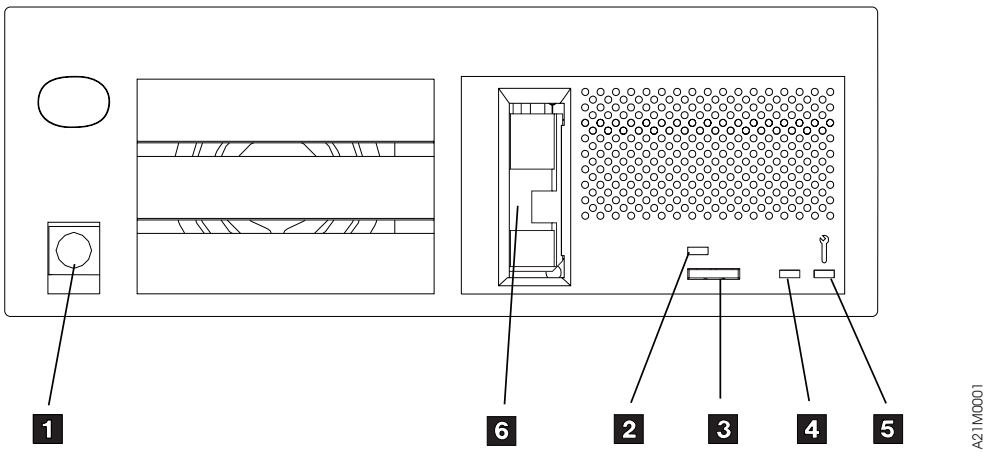


Figure 6. Model C00 Operator Panel

1. Power On/Off Switch
2. Tape Busy LED Indicator
3. Tape Unload Button
4. Clean LED Indicator
5. Maintenance LED Indicator
6. Drive Door

Model C00 uses the three LEDs in various combinations to indicate operator messages and error conditions. See *IBM Magstar MP 3570 Tape Subsystem Operator Guide C-Series Models* for additional information.

Models C01, C02, C11, C12, C21, and C22

The LCD display screen on the front panel assembly (see 1 in Figure 7) of the library models, along with the three LEDs (see 7, 8, and 9 in Figure 7) on the front assembly, provides operator and service messages.

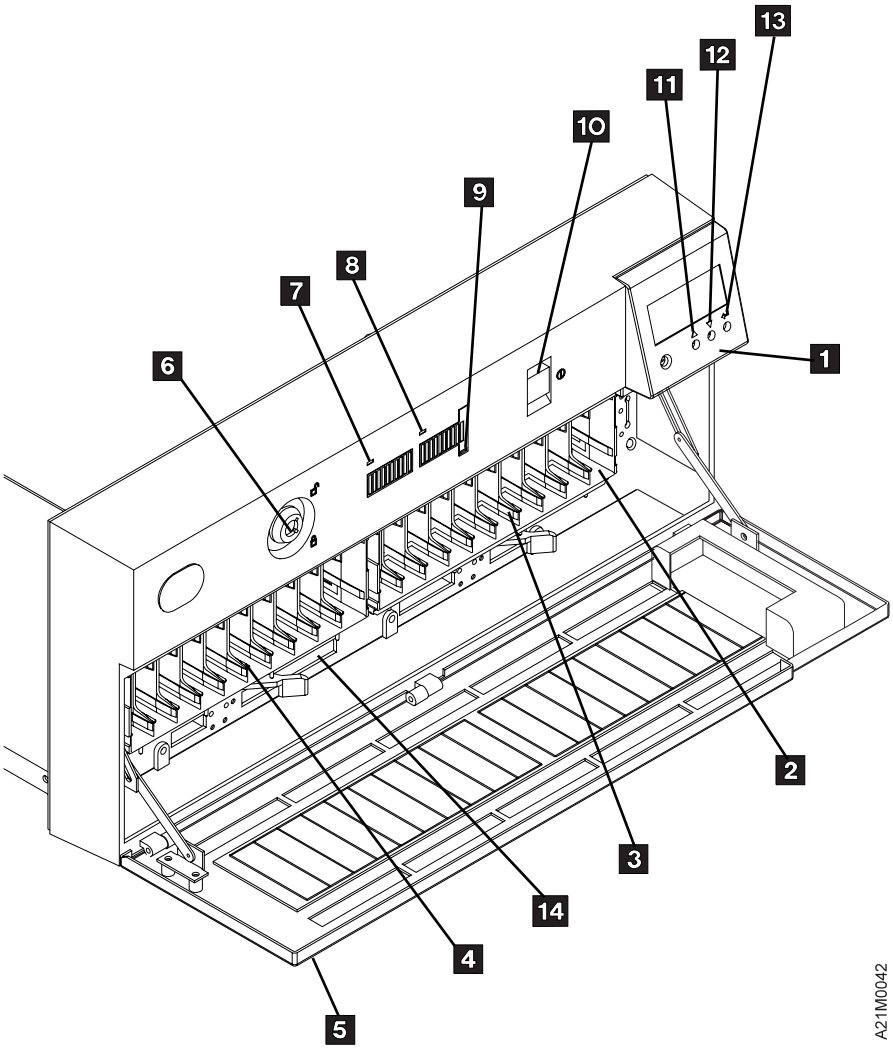


Figure 7. Magstar MP Library Front Panel Assembly

1 Operator Panel	**8** Magazine 1 in use indicator
2 Priority Cell	**9** Priority Cell in use indicator
3 Magazine 1 location	**10** Power On/Off switch
4 Magazine 2 location	**11** Scroll Up
5 Door	**12** Scroll Down
6 Security key lock	**13** Enter
7 Magazine 2 in use indicator	**14** Serial number label

Models C01, C02, C11, C12, C21, and C22 have a priority cell **2** that can be used to load or unload cartridges from the subsystem without removing the cartridge magazine. Because cartridges can be inserted without opening the door, the integrity of the tape inventory is not violated. To use this feature, the rightmost cartridge cell in magazine 1 **3** must be unused. Magazine 1 must always be present if the priority cell is to be used.

Library Modes of Operation

The library processes cartridges either sequentially or non-sequentially. For sequential processing, the library is capable of operating in either automatic or manual modes, selectable at the operator panel. These two modes are identical except that following each unload operation in manual mode the operator must push a button to initiate the next load operation.

In order to process cartridges in a non-sequential manner, the library must be set to random mode at the operator panel.

The mode selected by the operator is stored in non-volatile memory and becomes the default mode during subsequent power-on cycles.

Note: When using ADSM with a Magstar MP model C02, C12, or C22, it is recommended the Magstar MP be configured to operate in Random Mode and Base Configuration. This allows ADSM to use the second drive for reclamation.

Random Mode

Random mode allows the Magstar MP to act as a self-contained library of up to 19 cartridges, controlled entirely by SCSI hosts. In addition, access is provided to a 20th cartridge through the priority cell. The host uses SCSI commands to a Medium Changer device to select a cartridge from a source element and move it to its destination element. Control of the source and destination elements is left entirely to the host.

A request for an external cartridge to be mounted can be satisfied by inserting the cartridge into the priority cell in the import position. The Magstar MP notifies hosts of the presence of a cartridge in the priority cell, but the host must specifically address that cell to access the cartridge.

When the destination of a move is a magazine cell, the transport mechanism places the cartridge in the cell in the import position for possible later re-use. However, if the destination is the priority cell, the transport mechanism places the cartridge in the cell in the export position.

Because the library door must be closed while in random mode, the priority cell is used as an import/export station to add or remove cartridges from the library without violating the integrity of the magazine inventory. A host can cause cartridges from the priority cell to be moved to any empty magazine cell or to a device. It can also cause cartridges from a magazine or a device to be moved to the priority cell. Requests for external cartridges to be mounted can only be satisfied when magazine 1 (the rightmost magazine) is present. Library inventory and control is entirely the responsibility of the hosts. If the library door is opened while in random mode, the drive responds to the next command with a Unit Attention condition.

Automatic (Sequential) Mode

Automatic mode provides the customer the ability to operate the library as a sequential autoloader, keeping the tape drive continually fed with cartridges. The initiator controls only the unload of a cartridge from the tape drive. The library will automatically load the next available cartridge into the drive after the ejected cartridge is put back into the magazine. All media changer operations are effectively hidden from the system.

When automatic mode is selected, the cartridges are automatically processed according to their positions in the magazines. The library processes all cartridges that are in import positions sequentially, beginning at the rightmost cell position and then proceeding from right to left as viewed from the front of the library. After processing a cartridge, the library returns it to its original magazine cell and places it in the export position.

The operator can supply external cartridges to an application by inserting a cartridge in the priority cell in the import position. Any cartridge inserted in the priority cell will automatically be the next cartridge that is loaded into the drive. When that specific cartridge is unloaded, the library returns the cartridge to the priority cell in the export position and resumes processing cartridges from the magazine. The library continues to search for cartridges until it has searched all cells without finding a cartridge in the import position.

The operator can remove cartridges that are in the export position from magazines and add cartridges in the import position to the magazine while the library is in automatic mode. The library stops when the door is opened and resumes operation when the door is closed. If a cartridge is in a drive when the door is opened, processing continues until complete. When the door is closed, the cartridge is returned to the cell from which it was removed. An operator may also insert full magazines into the library when it is in automatic mode.

If the operator unloads a cartridge from the tape drive by using the operator panel on the Magstar MP 3570 Tape Subsystem, the operator must select START on the operator panel to load the next cartridge. If the cartridge is unloaded from the tape drive by the host, the next cartridge is automatically loaded in the tape drive. There is no need for the operator to select START on the operator panel.

Manual (Sequential) Mode

In manual mode, the library functions the same as in the automatic mode, except the operator initiates each load operation. Each time the operator selects START from the **Options Menu**, the library selects the cartridge from the next unprocessed magazine cell and mounts it in the drive. Manual mode operation is also activated by placing a cartridge in the import position of the priority cell and selecting START. Only one cartridge is processed for each operator action. After being unloaded, each cartridge is returned to the magazine location from which it was taken and placed in the export position.

The library starts processing cartridges beginning at the rightmost cell in the library. The search for unprocessed cartridges is from right to left across the magazine(s) as viewed from the front of the library.

Library Configurations

Models C02 , C12, and C22 may operate in Base Configuration or Split Configuration as selected in the operator menus. Models C01, C11, and C21 do not support Split Configuration.

Note: If attached to an AS/400 system, when switching between Base and Split configuration, the I/O processor must be reloaded. To reload the I/O processor, vary off and on with reset, or use STRSST to IPL the I/O processor.

Base Configuration Modes of Operation

In a Base Configuration, all magazine cells are accessible to all initiators on the bus. This is the default configuration for all library models. The library mode of operation is selected at the operator panel for drive 1 only, but it applies to the entire library.

Random Mode - Base Configuration

See “Random Mode” on page 12 for an overview of this mode. Magstar MP acts as a self-contained library of up to 19 cartridges with additional access to a 20th cartridge through the priority cell. In models with 2 drives, the source and destination elements of a move can indicate either drive. See “SCSI Medium Changer Addressing for Base and Split Configuration” on page 16.

Automatic Mode - Base Configuration

See “Automatic (Sequential) Mode” on page 12 for an overview of this mode. In models with 2 drives, only drive 1 is used for this mode. Drive 2 is unused. The library processes all cartridges that are in import positions sequentially, beginning at the rightmost priority cell position, then proceeding from right to left across both magazines as viewed from the library front.

Manual Mode - Base Configuration

See “Manual (Sequential) Mode” on page 13 for an overview of this mode. In models with 2 drives, only drive 1 is used for this mode. Drive 2 is unused. The library processes all cartridges that are in import positions sequentially, beginning at the rightmost priority cell position, then proceeding from right to left across both magazines as viewed from the library front.

Split Configuration Modes of Operation

It is advantageous to be able to share a single library between host systems. Unfortunately, some applications (and some systems) do not allow for sharing devices between systems. Split Configuration allows for a single library to be used by multiple systems by having the library manage this 'sharing'. This is accomplished by having the library appear as two separate half-size libraries on one or two SCSI busses. Two SCSI busses are created when the SCSI Bus Jumper is removed between the drive 1 and drive 2 SCSI ports.

Split Configuration is created by logically dividing one physical library into two logical libraries.
Logical Library 1 consists of:

- Drive 1,
- Magazine 1 (including the priority cell), and
- The transport mechanism.

Logical Library 2 consists of:

- Drive 2,
- Magazine 2, and
- The transport mechanism.

Logical Library 1 is available to host systems via the drive 1 SCSI port, and Logical Library 2 is available to host systems via the drive 2 SCSI port. Cartridges not in the logical library associated with a port are not accessible to commands received on that port.

In a Split Configuration, the library mode of operation is selected separately for drive 1 (Logical Library 1) and drive 2 (Logical Library 2). All possible combinations of modes of operation are allowed in Split Configuration.

Random Mode - Split Configuration

See "Random Mode" on page 12 for an overview of this mode. All operations for the priority cell are associated with Logical Library 1 only. For Logical Library 1, Magstar MP acts as a self-contained library of up to 9 cartridges with additional access to a 10th cartridge through the priority cell. For Logical Library 2, the Magstar MP acts as a self-contained library of up to 10 cartridges, with no host access to the priority cell.

Automatic Mode - Split Configuration

See "Automatic (Sequential) Mode" on page 12 for an overview of this mode. All operations for the priority cell are associated with Logical Library 1 only. For Logical Library 1, the operation begins at the right-most priority cell position, then proceeds from right to left across magazine 1. For Logical Library 2, the operation begins at the right-most cell in magazine 2, then proceeds from right to left across magazine 2.

Manual Mode - Split Configuration

See "Manual (Sequential) Mode" on page 13 for an overview of this mode. All operations for the priority cell are associated with Logical Library 1 only. For Logical Library 1, the operation begins at the right-most priority cell position, then proceeds from right to left across magazine 1. For Logical Library 2, the operation begins at the right-most cell in magazine 2, then proceeds from right to left across magazine 2.

SCSI Medium Changer Addressing for Base and Split Configuration

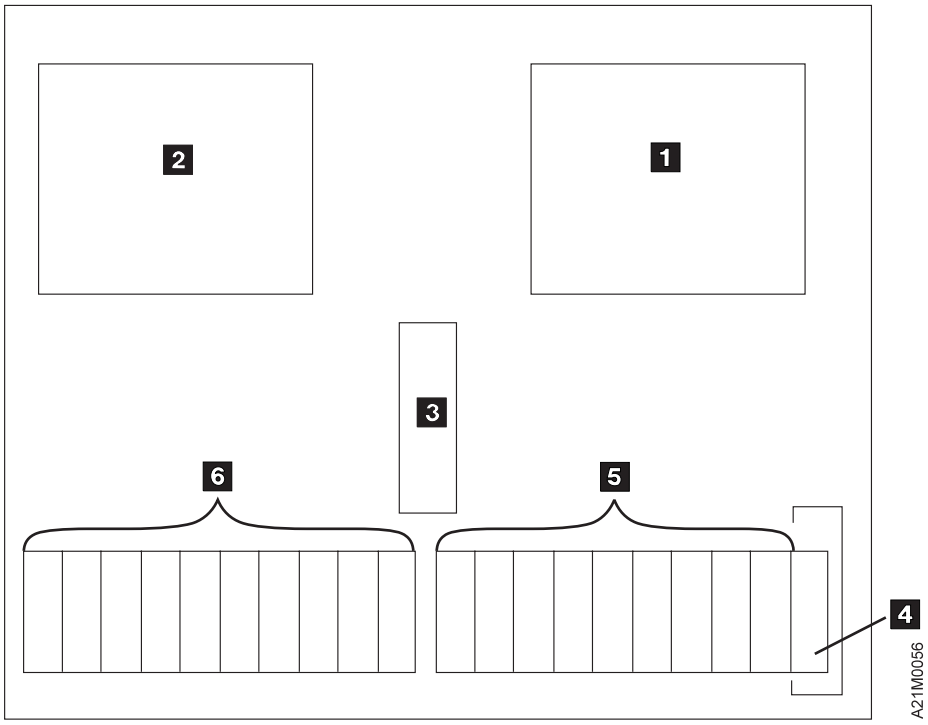
Magstar MP library models are consistent with the SCSI standard for Sequential Access and Medium Changer devices. Each tape drive in a Magstar MP library has a unique SCSI device ID. In Random mode, the library control interface consists of a SCSI Medium Changer device available as a logical unit through one or both drive ports, depending on the library configuration.

For a Base Configuration, a Medium Changer device is available through the drive 1 SCSI port only.

For Split configuration, the transport mechanism is shared, but it appears as two Medium Changer devices, one for each drive SCSI port.

Mapping Element Addresses To Physical Locations

Each physical location capable of holding a tape cartridge is assigned an element address value. The physical cartridge locations and their element address values are shown in Figure 8, which is a top view of the library with the back at the top of the figure.



1 Drive 1 (Data Transfer, Element Address 16)
2 Drive 2 (Data Transfer, Element Address 17)
3 Transport Mechanism (Medium Transport, Element Address 0)
4 Priority Cell (Import/Export, Element Address 31)
5 Magazine 1, excluding Priority Cell (Storage, Element Addresses 32-40 from right to left)
6 Magazine 2 (Storage, Element Addresses 41-50 from right to left)

Figure 8. Magstar MP Element Addresses

The SCSI-2 model assumes that each physical component has one unique element address and that all elements are visible to all hosts. SCSI-2 does not directly discuss library segmentation which occurs in a Split Configuration. Segmentation results in a subset of the library physical components becoming unavailable to a host. To handle library segmentation, the following rules apply:

1. The element address mapping (as indicated in Figure 8) is unchanged for a Split Configuration.
2. If a physical component is unavailable to a host because of Split Library configuration, the element address associated with that physical component is also unavailable as reflected in Mode Page X'1D' (Element Address Assignment) and in the response to a Read Element Status command.
3. Mode Page X'1F' (Device Capabilities) is unchanged for a Split Configuration.
4. For a Move Medium command or Reserve command, the elements which are unavailable are treated as invalid element addresses. Any attempt to access or reserve an unavailable element results in a CHECK CONDITION status.

Performance

Users who run applications that are highly dependent on tape processing speed can take advantage of the significant performance improvements that are provided by the Magstar MP Tape Subsystem.

Each Magstar MP Model C tape drive has the following performance characteristics:

- 7MB/sec sustained data rate for C-Format or C-Format XL media (native)
- 15MB/sec sustained data rate for C-Format or C-Format XL media with maximum compression
- 3.5MB/sec sustained data rate for B-Format media (native)
- 10.5MB/sec sustained data rate for B-Format media with 3:1 compression
- 20MB/sec burst data rate
- 8 sec average load-to-ready time
- 14 sec average search time to first byte of data for C-Format XL media
- 5 sec average unload time

Because data transfer rates and throughput are enhanced with data compression, users can process more tape applications and run tape-related workloads faster. Users with limited time for system backup or with large amounts of disk storage can use these tape subsystems efficiently to back up their systems. The Magstar MP Tape Subsystem provides efficient tape operations and provides relief to users who have difficulty completing tape activities in the time available. In the event of loss or damage to files on disk storage, the high performance of the subsystem permits faster system recovery.

By using the built-in data-compression capability, the user can achieve greater data rates than the native data rate.However, the actual throughput is a function of many components, such as the host system processor, disk data rate, block size, data compression ratio, SCSI bus capabilities, and system or application software. Optimum performance can be achieved by using the largest block size available. Although the Magstar MP drive is capable of up to a 15MB/sec sustained data rate, other components of the system may limit the actual effective data rate.

Software Support

Program support for the Magstar MP 3570 Tape Subsystem is provided in the AS/400 environment by OS/400 V3R1 or later.

AS/400 Note:

PTFs (Program Temporary Fixes) are required prior to attaching a Magstar MP 3570 Tape Subsystem to an AS/400 system. The PTFs for all supported AS/400 releases are listed in INFO APAR II10363. This information APAR contains the most current PTF information for all supported releases and important information concerning attachment of the Magstar MP 3570 Tape Subsystem to the AS/400.

After installing the appropriate PTFs, a SAVSYS must be done to ensure that the new IOP code is available during a system recovery.

Specific Magstar MP device support is provided by a device driver shipped with the unit for the following operating environments:

- HP-X/Open Company Limited UNIX systems
- RS/6000 systems
- Sun systems
- Windows NT systems

The 3570 Tape Subsystem is supported in the following environments:

- AIX/6000® 3.2.5, 4.1.1 and later, or 4.2.0 and later releases.
- RISC System/6000
- Hewlett Packard: 9000 Series 800, /T, and /K class servers running HP-UX 10.0X through 10.3X.
- Sun Solaris: Solaris 2.3, 2.4, 2.51, and 2.6 for Sun and Sun Sparc
- Windows NT: Microsoft® Windows NT Server Version 4.0 with service pack 3 or greater
- Netfinity attach Model C21 and C22 only

The following software products support the IBM Magstar MP 3570 subsystems:

- Computer Associates - ARCserveIT
- Help/Systems - Robot/SAVE
- IBM ADSM
- IBM Backup Recovery and Media Services/400 (BRMS/400)
- IBM Sysback/6000
- Legato Systems NetWorker
- RDARS
- SCH Technologies REELlibrarian and REELbackup
- Sterling Software - Alexandria
- Veritas Media Librarian and NetBackup

Additional software support is available from many industry-leading tape application vendors. A complete list of compatible software, and the minumum level required for each, is available from http://www.storage.ibm.com/hardsoft/tape/

Chapter 2. Drive SCSI Commands

This chapter describes the SCSI commands supported for the Magstar MP drive (LUN 0).

"Chapter 3. Library SCSI Commands" on page 179 describes the SCSI commands supported for the Magstar MP library (LUN 1).

The following SCSI command descriptions have a table describing the fields in the Command Descriptor Block (CDB), similar to the style used in the applicable *ANSI Small Computer System Interface-3* standard. The descriptions following each CDB specify the options, values, and ranges for the fields described in the CDB as supported by the Magstar MP drive. See the applicable *ANSI Small Computer System Interface-3* standard for a description of the CDB and its fields.

Any parameters or data required by each command follow these descriptions and are described in a "term-definition" format. In this format, the bits or bytes to be described are highlighted and listed on the left. The definition for the bits or bytes is to the right (not highlighted).

Bit Numbering Conventions:

Bit numbering follows ANSI standards as follows:

- Bit 0 is the least significant bit (LSB) occupying the rightmost bit position in the diagrams
- Bits 1–6 continue from right to left in ascending order
- Bit 7 is the most significant bit (MSB) occupying the leftmost bit position in the diagrams

Commands Not Supported:

Certain commands or features of some commands are not currently supported but may be in the future. All such cases are noted in the command description or in Table 4 on page 22. The following features or commands are not currently supported but may be later: Format Medium, and Volume Partitioning. The Copy, Verify, Compare, Copy/Verify, and Send commands are also not supported.

The Write Buffer command is supported but not all buffers are described in this document because most buffers are intended only to be written by the Service Representative or by Manufacturing. OEM customers who intend to support host microcode download on a new platform should contact IBM for a complete description of the Write Buffer command for this purpose. Note that new microcode may also be loaded without requiring the use of the SCSI Write Buffer command, by using the Field Microcode Replacement (FMR tape) process described in the maintenance information manual for this product (see "Magstar® MP Publications" on page x).

Drive SCSI Commands Listed Alphabetically

Table 4 provides a list of all commands defined by the referenced SCSI-3 standard or by this product as vendor-unique for sequential access devices. For each command, the operation code, reference page for this specification, applicable SCSI-3 standard, and applicability of certain conditions to the command are shown.

Table 4. Magstar MP Drive Commands (LUN 0)

Command Name	Operation Code	See Page	SCSI Document	Applicable Conditions: RVC[1] UAT NRD WRP MFC DCC
Change Definition	X'40'	25	SPC	Y Y - - - -
Compare (Not Supported)	X'39'	NS	SPC	Y Y - - - Y
Copy (Not Supported)	X'18'	NS	SPC	Y Y - - - Y
Copy and Verify (Not Supported)	X'3A'	NS	SPC	Y Y - - - Y
Display Message	X'C0'	26	VU	Y Y - - - -
Erase	X'19'	29	SSC	Y Y Y Y Y Y
Format Medium (Not currently supported)	X'04'	NS	VU	Y Y Y Y Y[7] Y
Inquiry	X'12'	30	SPC	- - - - - -
Load Unload	X'1B'	38	SSC	Y Y Y[4] - Y[5] Y
Locate	X'2B'	39	SSC	Y Y Y - Y Y
Log Select	X'4C'	40	SPC	Y Y - - - -
Log Sense	X'4D'	42	SPC	Y - - - - -
Mode Select (6)	X'15'	84	SPC	Y Y - - - Y[8]
Mode Select (10)	X'55'	88	SPC	Y Y - - - Y[8]
Mode Sense (6)	X'1A'	91	SPC	- Y - - - -
Mode Sense (10)	X'5A'	95	SPC	- Y - - - -
Prevent Allow Medium Removal	X'1E'	121	SPC	Y Y - - - -
Read	X'08'	122	SSC	Y Y Y - Y Y
Read Block Limits	X'05'	124	SSC	Y Y - - - -
Read Buffer	X'3C'	125	SPC	Y - - - - -
Read Position	X'34'	128	SSC	Y Y Y - - -
Read Reverse	X'0F'	131	SSC	Y Y Y - Y Y
Receive Diagnostic Results	X'1C'	133	SPC	Y Y - - - -
Recover Buffered Data	X'14'	135	SSC	Y Y Y - - Y
Release (6)	X'17'	136	SPC	-[2] Y - - - -
Report Density Support	X'44'	137	SSC	Y Y - - - -
Request Sense	X'03'	139	SPC	- - - - - -
Reserve (6)	X'16'	147	SPC	Y[3] Y - - - -
Rewind	X'01'	148	SSC	Y Y Y - Y[5] Y
Send (Not Supported)	X'0A'	NS	SPC	- - - - - -

Table 4. Magstar MP Drive Commands (LUN 0) (continued)

Command Name	Operation Code	See Page	SCSI Document	Applicable Conditions: RVC[1] UAT NRD WRP MFC DCC
Send Diagnostic	X'1D'	149	SPC	Y Y Y[9] - Y[6] -
Space	X'11'	174	SSC	Y Y Y - Y Y
Test Unit Ready	X'00'	175	SPC	Y Y Y - - Y[10]
Verify (Not Supported)	X'13'	NS	SPC	Y Y Y - Y Y
Write	X'0A'	176	SSC	Y Y Y Y Y Y
Write Buffer	X'3B'	177	SPC	Y Y - - - -
Write Filemarks	X'10'	178	SSC	Y Y Y Y Y Y

Legend:

```
M  Mandatory              RVC  Reservation Conflict status
O  Optional               UAT  CHECK CONDITION status for Unit Attention
VU Vendor-Unique          NRD  CHECK CONDITION status for Not Ready
-  Not Applicable         WRP  CHECK CONDITION status for Write Protected
NS Not Supported          MFC  CHECK CONDITION status for Medium Format Corrupted
                          DCC  Deferred CHECK CONDITION
                          Y    Yes (Condition applies)
                          Yn   Yes (Condition applies per note n below)
```

Notes:

1. If an I/O process consists of linked commands and begins with a command that is not subject to the RVC condition, subsequent commands in the I/O process may be subject to Reservation Conflict status, if a linked command is subject to the RVC condition and a reservation conflict exists.
2. Performs no operation if the logical unit is reserved to another initiator.
3. Condition applies if the logical unit is reserved to another initiator.
4. CHECK CONDITION status for a not ready device is not presented to a Load Unload command that requests the load function. CHECK CONDITION status for a not ready device is presented to a Load Unload command that requests the unload function.
5. The command is not subject to the condition unless the medium format corrupted condition has not yet been reported to the initiator on some prior command.
6. This CHECK CONDITION is diagnostic dependent. Refer to the specific diagnostic in question.
7. The medium must be completely blank and degaussed with a strong degausser before it is possible to reformat it with the Format Medium command.
8. The deferred CHECK CONDITION only applies to mode page 23.
9. Currently Set SCSI ID and Library Diagnostics return CHECK CONDITION status unless the device is NOT READY (no loaded cartridge). All others require the device to be READY.
10. Reporting of deferred CHECK CONDITION status for the Test Unit Ready command is optional based on a vendor-unique field in the CDB.

Control Byte Definition

This description of the control byte fields is to be used for all of the Magstar MP commands.

The control byte occurs in the last byte of a command, that is, byte 5 (6-byte commands), byte 9 (10-byte commands), or byte 11 (12-byte commands). “Control Byte Definition” shows the bit significance of the control byte.

Table 5. Control Byte Definition

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
5,9, or 11	Vendor Specific B’00’		Reserved B’0000’				Flag	Link

Note:

The Flag bit specifies which message the target returns to the initiator after transferring status if the Link bit is 1 and the command completes without an error (that is, for INTERMEDIATE status).

The Link bit is used to continue an I/O process from one command to an additional command. When the Link bit = 1, the initiator requests that the I/O process be continued and that the target enter the command phase upon successful completion of the current command. If the command completes successfully, the target reports INTERMEDIATE status and sends one of two messages as defined by the Flag bit.

The Flag and Link bits interact as follows:

- If the Link bit is 0, the Flag bit must also be zero.
- If the Link bit is 0 and the Flag bit is 1, the target returns a CHECK CONDITION status with sense key set to ILLEGAL REQUEST.
- If the Flag bit is 0 and the Link bit is 1, and if the command completes successfully, the target sends the LINKED COMMAND COMPLETE message.
- If the Flag bit is 1 and the Link bit is 1, and if the command completes successfully, the target sends the LINKED COMMAND COMPLETE (WITH FLAG) message.

Change Definition —X’40’

The Change Definition command is supported by the Magstar MP drive. Table 6 shows the command format.

Table 6. Change Definition Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X’40’)							
1	Logical Unit Number			Reserved				
2	Reserved							Save
3	Reserved	Definition Parameter						
4	Reserved							
5	Reserved							
6	Reserved							
7	Reserved							
8	Parameter Data Length							
9	Vendor Specific (B’00’)		Reserved (B’0000’)				Flag	Link

The following Magstar MP-specific parameters apply:

- Save:
  - B'0': The default operating definition is not changed.
  - B'1': The default operating definition is changed.
- Definition Parameter:

  An initiator can request one of several operating definitions to be established. If the command is accepted, the new operating definition applies to all initiators.

  After a power on condition, the drive sets its operating definition to its default value. Any other hard reset condition does not affect the current operating definition.

  Definition Parameter description:

  X'00' Use Current Operating Definition

  X'03' SCSI-3

  SCSI-3 is the only operating definition for this device.

  X'49' 3570 Tape Subsystem Conversion

  This option is used to convert any Magstar MP drive in a 3575 library to a drive operating as specified for a Magstar MP 3570 Tape Subsystem. The Save bit must be set to B'1' for this option to be accepted. Conversion does not occur until a subsequent hard reset condition.

  X'4A' 3575 Conversion

  This option is used to convert any drive in a Magstar MP 3570 Tape Subsystem to a drive operating as specified for a 3575 library. The Save bit must be set to B'1' for this option to be accepted. Conversion does not occur until a subsequent hard reset condition.
- Parameter Data Length: X'00'
- See “Control Byte Definition” on page 24 for Flag and Link bit descriptions.

Display Message —X'C0'

The Display Message command is supported by Magstar MP library Models C01, C02, C11, and C12 which are equipped with a message display. For models not equipped with a message display, the command will be rejected with CHECK CONDITION status and associated sense data of 5/2000 (Illegal Request, Invalid Command Operation Code). Table 7 shows the command format.

Table 7. Display Message Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'C0')							
1	Logical Unit Number			Reserved				
2	Reserved							
3	Reserved							
4	Parameter List Length							
5	Vendor Specif (B'00')		Reserved (B'0000')				Flag	Link

The Display Message command allows the initiator to use the device to display messages to the operator regarding the status and the needs of the device. Having this information at the device allows for more efficient use of the device.

The Display Message command is a vendor-unique command and, therefore, is not described in the SCSI standard. This document describes the fields in the Parameter list in general terms, such as the SCSI standard might, and follows each item with the Magstar MP implementation of that field.

- Parameter List Length: X'18'

  The parameter list length field specifies the length in bytes of the message display parameter list that is transferred from the initiator to the target.
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

The message display parameter list follows:

Parameter List

Byte **Description**

0 Display Type

This field is not meaningful. Any value is allowed (and ignored).

1 Message Processing

The Message Processing field specifies the types of messages and how to process the messages.

Bit **Description**

7-5 Message Type

Value **Description**

0 General Status Message

Message 0, Message 1, or both are displayed according to bits 4-2, until the drive next initiates tape motion or the message is updated with a new message.

1 Demount/Verify Message

Message 0, Message 1, or both are displayed according to bits 4-2, until the current volume is unloaded. If the volume is currently unloaded, the message display is not changed and the command performs no operation.

2 Mount with Immediate Action Indicator

Message 0, Message 1, or both are displayed according to bits 4-2, until the volume is loaded. An attention indicator is activated. If the volume is currently loaded, the message display is not changed and the command performs no operation.

3-6 Reserved (invalid)

7 Demount/Mount with Immediate Action Indicator

When Message Control bits 4-2 are set to a value of 4 (B'100'), Message 0 and Message 1 are displayed alternately until the currently mounted volume, if any, is unloaded. When Message Control bits 4-2 are set to any other value, Message 0 is displayed until the currently mounted volume, if any, is unloaded. Message 1 is displayed from the time the volume is unloaded (or immediately, if the volume is already unloaded) until another volume is loaded. An attention indicator is activated.

4-2 Message Control

Value	Description
0	Display Message 0
1	Display Message 1
2	Flash Message 0
3	Flash Message 1
4	Alternate Message 0 and Message 1
5-7	Reserved (Invalid)

The life and sequences of each message must interact with the requirements of other messages, both sent or internally generated by the device.

1-0 Reserved

2-5 Reserved

6-7 Message Length

The Message Length field specifies the length of the Message field.

For the Magstar MP drive, the Message Length field is always X'0010'.

8-15 Message 0

Eight-character ASCII message. If both Message 0 and Message 1 consist entirely of blanks, all messages are cleared, except for ATTN, FID, and CLEAN messages.

The Message 0 field contains the data to be displayed. Characters in the message are limited to uppercase alphabetic, numeric, blank, and the following special characters:

@ $ # , . / ' ( ) * & + - = % : _ < > ? ;

All lowercase alphabetic characters are converted to uppercase. All other characters not listed above, including nulls (X'00'), are displayed as if they had been blanks. Real blanks (X'20') must be used to force the message clearing function described above.

16-23 Message 1

Eight-character ASCII message. If both Message 0 and Message 1 consist entirely of blanks, all messages are cleared, except for ATTN, FID, and CLEAN messages.

The Message 1 field contains the data to be displayed. Characters in the message are limited to uppercase alphabetic, numeric, blank, and the following special characters:

@ $ # , . / ' ( ) * & + - = % : _ < > ? ;

All lowercase alphabetic characters are converted to uppercase. All other characters not listed above, including nulls (X'00'), are displayed as if they had been blanks. Real blanks (X'20') must be used to force the message clearing function described above.

Erase —X'19'

The Erase command is supported by the Magstar MP drive. Table 8 shows the command format.

Table 8. Erase Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'19')							
1	Logical Unit Number			Reserved			Immed	Long
2	Reserved							
3	Reserved							
4	Reserved							
5	Vendor Specif (B'00')		Reserved (B'0000')				Flag	Link

The following Magstar MP-specific parameters apply:

- Immed (Immediate)
  - B'0': return status when the erase operation has completed.
  - B'1': return status when the CDB has been validated.
- Long: B'1'
  All remaining medium in the current partition is erased beginning at the current logical position.
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

The Erase command performs a physical medium erase from the current position to the end of the current or only partition.

Inquiry — X'12'

Table 9. Inquiry Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'12')							
1	Logical Unit Number			Reserved			CmdDt	EVPD
2	Page Code							
3	Reserved							
4	Allocation Length							
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

There are several forms of Inquiry data. The following are supported and described in more detail as follows:

- "Inquiry Standard Data: Valid LUN (Logical Unit Number)"
- "Inquiry Standard Data: Invalid LUN" on page 32
- "Inquiry Page X'00'" on page 34
- "Inquiry Page X'03': ASCII Information" on page 35
- "Inquiry Page X'80': Unit Serial Number" on page 36
- "Inquiry Page X'83': Device Identification" on page 37
- "Inquiry Page X'C7'" (the contents of this page are not specified in this document)
- "Inquiry Page X'D0'" (the contents of this page are not specified in this document)
- "Inquiry Page X'D1'" (the contents of this page are not specified in this document)

Inquiry Standard Data: Valid LUN (Logical Unit Number)

The following Magstar MP-specific parameters apply to this request:

- CmdDt: B'0'
- EVPD (Enable Vital Product Data): B'0'
- Page Code: X'00'
- Allocation Length: X'38' (56) bytes available
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

For a logical unit number (LUN) that is associated with an installed device (see "SCSI-ID and LUN Assignments" on page 225), the following standard inquiry data is returned (character fields are in ASCII):

Byte Description

0

Bit	Description
7-5	Peripheral Qualifier: B'000'
4-0	Peripheral Device Type: X'01' or X'08' • X'01': Sequential Access device (LUN 0) • X'08': Medium Changer device (LUN 1)

1

Bit	Description
7	RMB (Removable Medium Bit): B'1'
6-0	Reserved

2

Bit	Description
7-6	ISO/IEC Version: B'00'
5-3	ECMA Version: B'000'
2-0	ANSI Approved Version: B'011'

3

Bit	Description
7	AERC (Asynchronous Event Reporting Capability): B'0'
6	Obsolete: B'0'
5	NormACA (Normal ACA supported): B'0'
4	HiSupport (Hierarchical Support): B'0'
3-0	Response Data Format: B'0010'

4 Additional Length (n-4): X'33'

5

Bit	Description
7	SCCS (An SCC Supported): B'0'
6-0	Reserved

6

Bit	Description
7	BQue (Basic Queueing): B'0'
6	EncServ (Enclosure Service): B'0'
5	BarC: • B'0': Indicates a bar code reader/scanner device is not attached. • B'1': Indicates a bar code reader/scanner device is attached.
4	MultiP (Multi-Port): B'0'
3	Mchngr (Medium Changer): B'0'
2	AckReqQ: B'0'
1	Addr32: B'0'
0	Addr16: B'1'

7

Bit	Description
7	RelAdr (Relative Addressing): B'0'
6	WBus32 (Wide Bus 32): B'0'
5	WBus16 (Wide Bus 16): B'1'
4	Sync (Synchronous Transfer): B'1'
3	Linked: B'1'
2	TranDis (Transfer Disable): B'0'
1	CmdQue (Command Queuing): B'0'
0	SftRe (Soft Reset): B'0'

8-15 Manufacturer: ‘IBM ’ (in ASCII)

16-31 Device Type and Model Number:

The device type is ‘03570’ and the model number is ‘xxx’; ‘xxx’ can be ‘C00’, ‘C01’, ‘C02’, ‘C11’, or ‘C12’.

32-35 Product Revision Level (Magstar MP Microcode Revision Level in ASCII)

36-37 IBM Plant of Manufacture Code.

38-49 Serial Number of device, right justified with leading zeroes, in ASCII.

50-51 ’ 0’ (in ASCII)

52 Equipment Flags

Bit	Description
7-4	Reserved
3	Independent Medium Changer Installed • B'0': Indicates a Medium Changer is not addressable at this SCSI ID. • B'1': Indicates a Medium Changer is addressable at LUN 1 of this SCSI ID see “SCSI-ID and LUN Assignments” on page 225.
2	Reserved
1	IBM Magstar MP Library Model • B'0': The device is a stand-alone drive Model C00. • B'1': The device is one of the library Models C01, C02, C11, and C12.
0	Message Display: • B'0': The device is not equipped with a message display. • B'1': The device is equipped with a message display.

Note: The Magstar MP drive Model C00 is not equipped with a message display. However, the library Models C01, C02, C11, and C12 are, and for those models the message display will give certain information about the status and activities of the device.

53 SCSI Customization byte: X'00'

54 Reserved

55 Message Display Type
- X'00': If the Inquiry is to a Magstar MP stand-alone drive model.
- X'82': If the Inquiry is to a Magstar MP library model.

Inquiry Standard Data: Invalid LUN

The following Magstar MP-specific parameters apply to this request:

- CmdDt: B'0'
- EVPD (Enable Vital Product Data): B'0'
- Page Code: X'00'
- Allocation Length: X'24' (36) bytes available
- See “Control Byte Definition” on page 24 for Flag and Link bit descriptions.

For a LUN that is not associated with an installed device, the following standard inquiry data is returned (character fields are in ASCII). See “SCSI-ID and LUN Assignments” on page 225 for more information.

Byte **Description**

0

Bit	Description
7-5	Peripheral Qualifier: B'011'
4-0	Peripheral Device Type: X'1F'

1

Bit	Description
7	RMB (Removable Medium Bit): B'0'
6-0	Reserved

2

Bit	Description
7-6	ISO/IEC Version: B'00'
5-3	ECMA Version: B'000'
2-0	ANSI Approved Version: B'011'

3

Bit	Description
7	AERC (Asynchronous Event Reporting Capability): B'0'
6	Obsolete: B'0'
5	NormACA (Normal ACA Supported): B'0'
4	HiSupport (Hierarchical Support): B'0'
3-0	Response Data Format: B'0010'

4 Additional Length (n-4): X'1F' (31 bytes)

5

Bit	Description
7	SCCS (An SCC Supported): B'0'
6-0	Reserved

6

Bit	Description
7	BQue (Basic Queueing): B'0'
6	EncServ (Enclosure Service): B'0'
5	BarC: • B'0': Indicates a bar code reader/scanner device is not attached. • B'1': Indicates a bar code reader/scanner device is attached.
4	MultiP (Multi-Port): B'0'
3	Mchngr (Medium Changer): B'0'
2	AckReqQ: B'0'
1	Addr32: B'0'
0	Addr16: B'1'

7

Bit	Description
7	RelAdr (Relative Addressing): B'0'
6	WBus32 (Wide Bus 32): B'0'
5	WBus16 (Wide Bus 16): B'1' (2-byte wide attachment only)
4	Sync (Synchronous transfer): B'1'
3	Linked: B'1'
2	TranDis (Transfer Disable): B'0'
1	ComQue (Command Queuing): B'0'
0	SftRe (Soft Reset): B'0'

8-15 Manufacturer: ‘IBM ’ (in ASCII code)

16-31 Device Type and Model Number: ASCII blanks are returned

32-35 Product Revision Level: ASCII blanks are returned

Inquiry Page X'00'

The following Magstar MP-specific parameters apply to this request:

- CmdDt: B'0'
- EVPD (Enable Vital Product Data): B'1'
- Page Code: X'00'
- Allocation Length: X'0B' bytes available
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

For a LUN that is associated with an installed device (see "SCSI-ID and LUN Assignments" on page 225), the following data is returned:

Byte	Description
0	Peripheral Data **Bit** **Description** **7-5** Peripheral Qualifier: B'000' **4-0** Peripheral Device Type: X'01'
1	Page Code: X'00'
2	Reserved
3	Page Length (n-3): X'07'
4	Supported Page: X'00'
5	Supported Page: X'03'
6	Supported Page: X'80'
7	Supported Page: X'83'
8	Supported Page: X'C7'
9	Supported Page: X'D0'
10	Supported Page: X'D1'

Inquiry Page X'03': ASCII Information

The following Magstar MP-specific parameters apply to this request:

- CmdDt: B'0'
- EVPD (Enable Vital Product Data): B'1'
- Page Code: X'03'
- Allocation Length: X'25' (37) bytes available
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

For a LUN that is associated with an installed device (see "SCSI-ID and LUN Assignments" on page 225), the following data is returned:

Byte	Description
0	**Bit** **Description** **7-5** Peripheral Qualifier: B'000' **4-0** Peripheral Device Type: X'01' or X'08'
1	Page Code: X'03'
2	Reserved
3	Page Length: X'21'
4	ASCII Length: X'00'
5-7	Reserved
8-11	Load ID The Load ID of ROM microcode, represented by eight hex characters, is used to determine if the microcode to be downloaded is compatible with the device electronics.
12-15	Rev Level The Revision Level of the device microcode, represented with four ASCII characters, is used to determine if the latest level of microcode is downloaded. As each change is implemented, the Rev Level chosen must be numerically larger than any previous Rev Level used, as determined by converting the ASCII characters to numerical format and subtracting. For example, if the old Rev Level is ASCII 2M3P, and the new Rev Level is ASCII 2M3Q, that is equivalent to X'50775180' and X'50775181', respectively. When the two values are compared numerically, the new Rev Level is one greater than the old Rev Level, which satisfies the requirement.
16-19	PTF Number: Not used. This field is Reserved.
21-23	Patch Number: Not Used. This field is Reserved.
24-31	RU Name Used by the attaching system. This is an 8-byte EBCDIC field that is incremented each time the Load ID is incremented.
32-36	Reserved: Vendor-Unique

Inquiry Page X'80': Unit Serial Number

The following Magstar MP-specific parameters apply to this request:

- CmdDt: B'0'
- EVPD (Enable Vital Product Data): B'1'
- Page Code: X'80'
- Allocation Length: X'10' (16) bytes available
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

For a LUN that is associated with an installed device (see "SCSI-ID and LUN Assignments" on page 225), the following data is returned:

Byte	Description
0	**Bit** **Description** **7-5** Peripheral Qualifier: B'000' **4-0** Peripheral Device Type: X'01' or X'08'
1	Page Code: X'80'
2	Reserved
3	Page Length: X'0C'
4-15	Serial Number of device, right justified with leading zeroes, in ASCII (same as Inquiry Standard Data bytes 38–49)

Inquiry Page X'83': Device Identification

The following Magstar MP-specific parameters apply to this request:

- CmdDt: B'0'
- EVPD (Enable Vital Product Data): B'1'
- Page Code: X'83'
- Allocation Length: X'2C' (44) bytes available
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

For a LUN that is associated with an installed device (see "SCSI-ID and LUN Assignments" on page 225), the following data is returned:

Byte	Description
0	**Bit** **Description** **7-5** Peripheral Qualifier: B'000' **4-0** Peripheral Device Type: X'01'
1	Page Code: X'83'
2	Reserved
3	Page Length: X'28'
	Identification Descriptor
4	**Bit** **Description** **7-4** Reserved **3-0** Code Set: X'2' (Identifier is all ASCII)
5	**Bit** **Description** **7-6** Reserved **5-4** Association: B'00' **3-0** Identifier Type: X'1'
6	Reserved
7	Identifier Length: X'24'
8-15	Vendor ID (same as Inquiry Standard Data bytes 8-15)
16-31	Device Type and Model Number (same as Inquiry Standard Data bytes 16-31)
32-43	Serial Number of device, right justified with leading zeroes, in ASCII (same as Inquiry Standard Data bytes 38-49)

Load Unload—X'1B'

The Load Unload command is supported by the Magstar MP drive. Table 10 shows the command format.

Table 10. Load Unload Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'1B')							
1	Logical Unit Number			Reserved				Immed
2	Reserved							
3	Reserved							
4	Reserved					EOT	Re-Ten	Load
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

The following Magstar MP-specific parameters apply:

- Immed (Immediate)
  - B'0': Indicates the drive is to present status when the command is completed.
  - B'1': Indicates the drive is to present status as soon as all buffered commands have completed execution and the CDB of the Load Unload command has been validated. With the exception of Inquiry, Request Sense, and Test Unit Ready, subsequent commands are queued until the load/unload operation is complete. The completion status of the load/unload operation may be polled by sending a Request Sense command until the sense data returned is no longer 2/0407 (Not Ready, Logical Unit Not Ready, Operation in Progress).
- EOT (End of Tape): B'0'
- Re-Ten (Retention): B'0'
- Load:
  - B'0': In all models, causes an eject of the cartridge from the drive. If this command is received and there is no cartridge present in the drive, the command is presented with CHECK CONDITION status and associated sense data of 2/3A00 (Not Ready, Medium Not Present).

    Note: The Load Unload command with the Load bit set to B'0' is sometimes called an 'unload command'. The subsequent action of the library in response to the unload event is library mode-dependent:

    - For manual and automatic modes, the library automatically, without further initiator commands, takes the ejected cartridge from the device and places it in the appropriate cell of the library.
    - For random mode, the library does not respond automatically, but moves the cartridge to its destination only when ordered by a Move Medium command from an initiator.
  - B'1': The response is dependent upon the cartridge position.

    If a cartridge is present in the loaded position, this command performs a write of all buffered data followed by a rewind to BOP0.

    If a cartridge is present in the ejected position (unloaded but not removed from the drive), this command performs a reload function that may be useful during certain error recovery processes.

    If a cartridge is not present in any position, CHECK CONDITION status is returned with associated sense data of 2/3A00 (Not Ready, Medium Not Present).
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

Locate —X'2B'

The Locate command is supported by the Magstar MP drive. Table 11 shows the command format.

Table 11. Locate Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'2B')							
1	Logical Unit Number			Reserved		BT	CP	Immed
2	Reserved							
3	Block Address							
4								
5								
6								
7	Reserved							
8	Partition							
9	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

The following Magstar MP-specific parameters apply:

- BT (Block address Type): B'0'
- CP (Change Partition):

  Note: Partitioning of a volume is not currently supported, but may be in the future.
  - B'0': no partition change is to be made; locate to the specified block address within the current partition. The Partition field is to be ignored.
  - B'1': change to the partition specified by the Partition field prior to locating to the specified Block Address within the partition.
- Immed (Immediate):
  - B'0': present status when command is completed.
  - B'1': present status when all buffered commands have completed execution and the CDB of the Locate command is validated.
- Block Address:

  The destination of the locate operation. This field is a value from X'0000 0000' to X'FFFF FFFF'.
- Partition:

  Note: Partitioning of a volume is not currently supported, but may be in the future.

  The partition field specifies the partition to select, when the CP field is B'1'.
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

If the drive encounters End-of-Data (EOD) while executing this command, the command is terminated at the EOD position and CHECK CONDITION status is returned with associated sense data of 8/0005 (Blank Check, End-of-Data Detected). If the next motion command is another request to move forward (beyond EOD), the drive accepts the command and attempts to position beyond EOD in order to allow recovery of old data.

Log Select — X’4C’

Table 12. Log Select Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X’4C’)							
1	Logical Unit Number			Reserved			PCR	SP
2	PC		Reserved					
3	Reserved							
4	Reserved							
5	Reserved							
6	Reserved							
7	Parameter List Length							
8								
9	Vendor Specific (B’00’)		Reserved (B’0000’)				Flag	Link

The following Magstar MP-specific parameters apply:

- PCR (Parameter Code Reset):
  - B'0': Indicates that the log parameters will not be reset.
  - B'1': If the parameter list length is zero, all cumulative and threshold log counter values will be reset to their default values except Page X'3D' (Library Statistics). If the parameter list length is not zero, the command is terminated with CHECK CONDITION status and associated sense data of 5/2400 (Illegal Request, Invalid Field in CDB).
- SP (Save Parameters): B'0' (Saving of the Log Select parameters is not supported)
- PC (Page Control):
  - B'00' (Threshold Values): Supported for all log pages with log counters (LP field set to B'0' in the Log Parameter Control Byte) except for Page X'3D' (Library Statistics).

    Threshold Notes:

    1. The Magstar MP drive treats each threshold value as a maximum value for the log counter field. Generally, when a threshold/maximum is reached, all log counters in that specific log page are locked (no longer updated) until a subsequent reset via Log Select command.
    2. Only the overflowed log counter is locked for Page X'38' (Blocks/Bytes Transferred) - all other log counters continue incrementing for this log page.
    3. Log counters for Page X'3D' (Library Statistics) will lock at maximum values and cannot be reset.
    4. If the RLEC bit is set to B'1' in Mode Page X'0A' (Control Mode) and a log counter reaches its threshold/maximum, the drive will report a deferred CHECK CONDITION status with associated sense data of 1/5B02 (Recovered Error, Log Counter at Maximum) on the next command eligible for a deferred check condition (see Table 4 on page 22). The drive does not report error sense associated with the threshold condition being met.
  - B'01' (Cumulative Values): Supported for all log pages with log counters (LP field set to B'0' in the Log Parameter Control Byte) except for Page X'3D'.
  - B'10' (Default Threshold Values): Not supported. The default threshold value for all two-byte log counter fields is X'FFFF'. The default threshold value for all four-byte log counter fields is X'FFFF FFFF'.
  - B'11' (Default Cumulative Values): Not supported. The default cumulative value for all two-byte log counter fields is X'0000'. The default cumulative value for all four-byte log counter fields is X'0000 0000'.

If the PCR field is set to B'1', the PC field is ignored.

- Parameter List Length:

  This field specifies the length, in bytes, of the parameter list which is to be transferred to the drive. A parameter list length of zero indicates no pages are to be transferred. A parameter list length of zero indicates that no pages are to be transferred. If the parameter list length is zero and the PC field is set to B'00' (Current Threshold Values), the current threshold parameters are set to the default threshold values. If the parameter list length is zero and the PC field is set to B'01' (Current Cumulative Values), the current cumulative parameters are set to the default cumulative values (zero).

  Note: If the PCR field is set to B'1', this field must be set to zero.

  If the parameter list length results in the truncation of any log parameter, the command is terminated with CHECK CONDITION status and associated sense data of 5/2400 (Illegal Request, Invalid Field in CDB).
- See “Control Byte Definition” on page 24 for Flag and Link bit descriptions.

Only one log page is accepted for each Log Select command. For each log page, any combination of the supported log parameters may be sent. If multiple log parameters are sent, they must be sent in ascending order by parameter code value. Only the Parameter Value field may be changed from the log parameters that are returned from Log Sense (see Table 15 on page 43). Changes to the Log Parameter Control Byte are not supported.

Note: Initiators should issue a Log Sense command prior to issuing a Log Select command to determine supported log parameter fields.

If a parameter list is received with an un-supported log page, a log parameter code out of order, or a change to a log parameter field other than the Parameter Value, the command is terminated with CHECK CONDITION status and associated sense data of 5/2600 (Illegal Request, Invalid Field in Parameter List).

The following log pages are supported for the Log Select command:

- “Log Page X’02’: Write Error Counters” on page 46
- “Log Page X’03’: Read Error Counters” on page 48
- “Log Page X’06’: Non-Medium Errors” on page 50
- “Log Page X’0C’: Sequential Access Device Page” on page 51
- “Log Page X’32’: Write Errors” on page 58
- “Log Page X’34’: Read Forward Errors” on page 62
- “Log Page X’36’: Read Reverse Errors” on page 68
- “Log Page X’38’: Blocks/Bytes Transferred” on page 69
- “Log Page X’39’: SCSI Interface Errors” on page 73
- “Log Page X’3B’: Equipment Check Errors” on page 75

Log Sense —X'4D'

The Log Sense command is supported by the Magstar MP drive. Table 13 shows the command format.

Table 13. Log Sense Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'4D')							
1	Logical Unit Number			Reserved			PPC	SP
2	PC		Page Code					
3	Reserved							
4	Reserved							
5	Parameter Pointer							
6								
7	Allocation Length							
8								
9	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

The Log Sense command supports the following page codes: X'00', X'02', X'03', X'06', X'0C' , X'31', X'32', X'34', X'36', X'38', X'39', X'3A', X'3B', and X'3D'. Page code X'00' lists all page codes supported by the Magstar MP drive. Page codes X'00', X'02', X'03', and X'06' are defined by the referenced SCSI-3 standard. All other page codes are vendor-unique pages.

The following Magstar MP-specific parameters apply:

- PPC (Parameter Pointer Control): B'0'
- SP (Save Parameters): B'0'
- PC (Page Control):
  - B'00' (Threshold Values): Supported for all log pages with log counters (LP field set to B'0' in the Log Parameter Control Byte). For additional information, see "Threshold Notes" on page 40.
  - B'01' (Cumulative Values): Supported for all log pages.
  - B'10' (Default Threshold Values): Supported for all log pages with log counters. The default threshold value for all two-byte log counter fields is X'FFFF'. The default threshold value for all four-byte log counter fields is X'FFFF FFFF'.
  - B'11' (Default Cumulative Values): Not supported. The default cumulative value for all two-byte log counter fields is X'0000'. The default cumulative value for all four-byte log counter fields is X'0000 0000'.
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

Log Page Format

Each log page begins with a 4-byte header, followed by zero or more variable-length log parameters defined for that page. Table 14 on page 43 shows the log page format.

Table 14. Log Page Format

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Reserved		Page Code (identifies the Log Page being transferred)					
1	Reserved							
2	Page Length (n-3)							
3								
	Log Parameters “Log Parameter Format”							
4	Log Parameter (first)							
x+3	(Length = x)							
	.							
	.							
n-y+3	Log Parameter (last)							
n	Length =y)							

Log Parameter Format

Each log parameter begins with a 4-byte parameter header, followed by one or more bytes of parameter data. Table 15 shows the log parameter format. The fields of byte 2 are described under “Log Parameter Byte 2-Control Byte”.

Table 15. Log Parameter Format

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Parameter Code							
1								
2	DU	DS	TSD	ETC	TMC		Reserved	LP
3	Parameter Length (n-3)							
4	Parameter Value							
n								

Log Parameter Byte 2-Control Byte

A Log Parameter Control Byte is returned for each parameter code described in the log pages. The Log Parameter Control Byte is described here one time only. Any parameters using a different Log Parameter Control Byte have that byte described within that parameter.

Note: The contents of this byte are fixed by the Magstar MP drive; the user cannot set these values. This byte is part of the returned data described in the referenced SCSI-3 standard; it is described in the following list:

Bit	Description
7	DU (Disable Update): B'0'
6	DS (Disable Save): B'1'
5	TSD (Target Save Disable): B'1'
4	ETC (Enable Threshold Comparison): B'0'
3-2	TMC (Threshold Met Comparison): B'00'
1	Reserved
0	LP (List Parameter): B'0' (indicates this is a log counter)

Log Page X'00': Supported Log Pages

This log page returns the list of log pages supported by the Magstar MP drive. This page does not contain any log parameters.

Byte	Description
0	

Bit	Description
7-6	Reserved
5-0	Page Code (B'000000')

1	Reserved
2-3	Page Length (X'000E')
4	Supported Log Pages (X'00')
5	Write Error Counters page (X'02')
6	Read Error Counters page (X'03')
7	Non-Medium Errors page (X'06')
8	Sequential Access Device page (X'0C')
9	SIM/MIM page (X'31')
10	Write Errors page (X'32')
11	Read Forward Errors page (X'34')
12	Read Reverse Errors page (X'36')
13	Blocks/Bytes Transferred page (X'38')
14	SCSI Interface Errors page (X'39')
15	Reserved page (X'3A')
16	Equipment Check Errors page X'3B')
17	Subsystems Statistics page (X'3D')

Log Page X'02': Write Error Counters

This page is one of the defined error counter pages in the referenced SCSI-3 standard. This page is for Write Errors. It is reset when the cartridge is loaded.

Byte	Description
0	

Bit	Description
7-6	Reserved
5-0	Page Code: X'02'

1	Reserved
2-3	Page length: The page length is determined by the parameters and the number of parameters selected for transmission to the initiator.

The following parameter codes are supported for the Write Error Counter page (page code X'02'):

X'0002' Total Write Errors

The sum of the total corrected Write Errors and total Uncorrected Write Errors.

Byte	Description
0-1	Parameter code field: X'0002'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Total Write error count (2-byte binary format)

X'0003' Total Corrected Write Errors

The total of the Corrected Write errors. These errors are corrected by ECC "on the fly" and do not require error recovery procedures (ERPs). Each count represents one block in error that was corrected and written.

Byte	Description
0-1	Parameter code field: X'0003'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Corrected write error count (2-byte binary format)

X'0005' Total Write Bytes Processed

Each count represents a kilobyte (1024 bytes) of data processed across the SCSI interface during write-type commands. The count does not include ERP retries. This field is identical to the SCSI Write Kilobytes Processed field of Page Code X'38', parameter code X'0001'.

Byte	Description
0-1	Parameter code field: X'0005'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Total kilobytes processed count (4-byte binary format)

Refer to "Scaled Log Page Counters" on page 225 for a description of this scaled counter.

X'0006' Total Uncorrected Write Errors

The total number of write errors that could not be corrected by ECC “on the fly,” no servo error was reported, and the error was not a transient error. Each count represents one block in error that was not corrected “on the fly” but was recovered by ERPs and successfully written.

Byte	Description
0-1	Parameter code field: X'0006'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Uncorrected write error count (2-byte binary format)

Log Page X'03': Read Error Counters

This page is one of the defined error counter pages. This page is for Read Errors. It is reset when a cartridge is loaded.

Byte	Description
0	

Bit	Description
7-6	Reserved
5-0	Page Code: X'03'

1 Reserved

2-3 Page length:

The page length is determined by the parameters and by the number of parameters selected for transmission to the initiator.

The following parameters are supported for the Read Error Counter page (page code X'03'):

X'0002' Total Read Errors

The sum of the total corrected Read Errors and the total Uncorrected Read Errors.

Byte	Description
0-1	Parameter code field: X'0002'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Total Read error count (2-byte binary format)

X'0003' Total Corrected Read Errors

The total of the Corrected Read errors. These are errors that are corrected by ECC "on the fly" and do not require error recovery procedures (ERPs). Each count represents one block in error that was corrected and read.

Byte	Description
0-1	Parameter code field: X'0003'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Corrected read error count (2-byte binary format)

X'0005' Total Read Bytes Processed

Each count represents a kilobyte (1024 bytes) processed across the SCSI interface during read-type commands. The count does not include ERP retries. This field is identical to the SCSI Read Kilobytes Processed field of Page Code X'38', parameter code X'0003'.

Byte	Description
0-1	Parameter code field: X'0005'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Total kilobytes processed count (4-byte binary format)

Refer to "Scaled Log Page Counters" on page 225 for a description of this scaled counter.

X'0006' Total Uncorrected Read Errors

The total number of read errors that could not be corrected by ECC “on the fly,” no servo error was reported, and the error was not a transient error. Each count represents one block in error that was not corrected “on the fly,” but was recovered by ERPs and successfully read.

Byte	Description
0-1	Parameter code field: X'0006'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Uncorrected read error count (2-byte binary format)

Log Page X'06': Non-Medium Errors

This page permits you to sum the occurrences of error events other than write or read failures. Parameter codes do not discriminate among the various types of events. This page is reset when a cartridge is loaded.

Byte	Description
0	

Bit	Description
7-6	Reserved
5-0	Page Code: X'06'

1	Reserved
2-3	Page length:

The page length is determined by the parameters and the number of parameters selected for transmission to the initiator.

The following parameters are supported for the Non-Medium Error Counter page (page code X'06'):

X'0000' Non-Medium Error Count

Byte	Description
0-1	Parameter code field: X'0000'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Non-medium error count (4-byte binary format)

Log Page X'0C': Sequential Access Device Page

This page is one of the defined pages in the referenced SSC standard. This page is for counters specific to tape drives.

Byte	Description
0	

Bit	Description
7-6	Reserved
5-0	Page Code: X'0C'

1	Reserved
2-3	Page length:

The page length is determined by the parameters and the number of parameters selected for transmission to the initiator.

The following parameter codes are supported for the Sequential Access Device page (page code X'0C'):

X'0000' Total Channel Write Bytes

The total number of bytes written between the host and the tape device on this mount.

Byte	Description
0-1	Parameter code field: X'0000'
2	Parameter control byte (see page 44)
3	Parameter length: X'06'
4-9	Total Channel Write Bytes

X'0001' Total Device Write Bytes

The total number of bytes written to tape on this mount.

Byte	Description
0-1	Parameter code field: X'0001'
2	Parameter control byte (see page 44)
3	Parameter length: X'06'
4-9	Total Device Write Bytes

X'0002' Total Device Read Bytes

The total number of bytes read from tape on this mount.

Byte	Description
0-1	Parameter code field: X'0002'
2	Parameter control byte (see page 44)
3	Parameter length: X'06'
4-9	Total Device Read Bytes

X'0003' Total Channel Read Bytes

The total number of bytes read by the host on this mount.

Byte	Description
0-1	Parameter code field: X'0003'
2	Parameter control byte (see page 44)
3	Parameter length: X'06'
4-9	Total Channel Read Bytes

X'0100' Cleaning Required

A non-zero value indicates cleaning required.

Byte	Description
0-1	Parameter code field: X'0100'
2	Parameter control byte (see page 44)
3	Parameter length: X'01'
4	Cleaning Required

Log Page X'31': SIM/MIM

Page Code 31 is designed to support SIMs (Service Information Messages), and MIMs (Medium Information Messages). SIMs and MIMs provide the initiator and operator details on service problems encountered by the device.

This page is **not** reset when a cartridge is loaded. When read with a Log Sense command, only the returned SIM or MIM is no longer available for subsequent retrieval. SIMs and MIMs are stored in and retrieved from a first-in first-out (FIFO) queue. Only 1 SIM or MIM is returned for each Log Sense command that requests Page Code X'31'. The first 9 bytes are common to both the SIMs and the MIMs.

SIM/MIM Header Data

Byte	Description
0	Page Code

Bit	Description
7-6	Reserved
5-0	Page Code: X'31'

1	Reserved
2-3	Page Length: X'0044'
4-5	Parameter code field: X'0000'
6	Parameter control byte

Bit	Description
7	DU (Disable Update) field: B'0'
6	DS (Disable Save) field: B'1'
5	TSD (Target Save Disable) field: B'1'
4	ETC (Enable Threshold Comparison) field: B'0'
3-2	TMC (Threshold Met Comparison) field: B'00'
1	Reserved
0	LP (List Parameter) field B'1'

7	Parameter length: X'40'
8	SIM/MIM Indicator

Value	Description
X'00'	Bytes 9 through 71 are invalid.
X'01'	Bytes 9 through 71 are a SIM message. See "SIM Messages" on page 54.
X'02'	Bytes 9 through 71 are a MIM message. See "MIM Messages" on page 56.
X'03-FF'	Bytes 9 through 71 are invalid.

SIM Messages

The following data are the parameters for the hardware SIM message:

Byte	Description
9-15	Reserved
16-19	Engineering Data
20-21	SIM Message Code

Value (ASCII)	Description
'00'	No Message
'41'	Device Degraded. Call for Service
'42'	Device Hardware Failure. Call for Service
'43'	Service Circuits Failed, Operations Not Affected. Call for Service
'55'	Drive Needs Cleaning. Load Cleaning Cartridge
'57'	Drive Has Been Cleaned
All Others	Device Message

22-23	Reserved
24	Exception Message Code

Value (ASCII)	Description
'0'	Reserved
'1'	Effect of Failure Is Unknown
'2'	Device Exception. No Performance Impact
'3'	Exception on SCSI Interface
'4'	Device Exception on Library
'5'	Device Exception on Operator Panel
'6'	Device Exception on Tape Path
'7'	Device Exception in Drive
'8'	Cleaning Required
'9'	Cleaning Done
'A-F'	Reserved

25 Service Message Code

Value (ASCII)	Description
'0'	Reserved
'1'	Repair Impact is Unknown
'2-6'	Reserved
'7'	Repair Will Disable Access to Device serno (serno refers to serial number in bytes 52-63 of this SIM record)
'8'	Repair Will Disable Message Display IDs on Device
'9'	Clean Device
'A'	Device Cleaned
'B'	Device Cleaning for Performance Reasons is Required
'C-F'	Reserved

26 Service Message Severity Code

Value (ASCII)	Description
'0'	SIM severity code "Service"
'1'	SIM severity code "Moderate"
'2'	SIM severity code "Serious"
'3'	SIM severity code "Acute"
'4-9, A-F'	Reserved

27 Reserved

28-29 Reserved - Vendor-Unique

30-33 FRU Identifier

34-37 First FSC

38-41 Last FSC

42-45 Product ID: '8000' (these four bytes define "TAPE")

46-63 Product Identifier

Byte	Description
46-48	Manufacturer: "IBM"
49-50	Plant of Manufacture
51	' - ' (Dash symbol)
52-63	Serial Number

64-71 Device Type and Model Number (same as Inquiry Standard Data bytes 16-23)

MIM Messages

Media Information Messages (MIMs) are supported for Magstar MP Model C tape drives. The following data are the parameters for the MIM:

Byte	Description
9-15	Reserved
16-19	Expert Systems Data (microcode link level)
20-21	MIM Message Code

Value (ASCII)	Description
'00'	No message
'60'	Bad Media, Read Only permitted
'61'	Rewrite Media if possible
'62'	DBM Invalid. Re-read media if possible
'64'	Bad Media--Cannot Read or Write
'72'	Replace Cleaner Cartridge
Others	Reserved

22-23	Engineering Data--First Failing Test
24	Exception Message Code

Value (ASCII)	Description
'2'	Data Degraded
'4'	Medium Degraded
'6'	Block 0 Error
'7'	Medium Exception
Others	Reserved

25	Reserved
26	Media Message Modifier Severity Code

Value (ASCII)	Description
'0'	"Service"
'1'	"Moderate"--High Temp Read/Write Errors Detected
'2'	"Serious"--Permanent Read/Write Errors Detected
'3'	"Acute"--Block 0 Error
Others	Reserved

27-29	Reserved
30-33	Fault Symptom Code (FSC)
34-39	VOLID (in ASCII). Only valid if indicated by VOLID Valid Flag (byte 40)

40 VOLID Valid Flag

Value (ASCII)	Description
'0'	VOLID (bytes 34-39 not valid)
'1'	VOLID valid, obtained from tape
'3'	VOLID valid, obtained from cartridge label
'5'	VOLID valid, obtained from cartridge label
Others	Reserved for future use (odd number will always indicate VOLID valid)

41 Reserved

42-45 Product ID: '8000' (these four bytes define "TAPE")

46-63 Product Identifier

Byte	Description
46-48	Manufacturer: "IBM"
49-50	Plant of Manufacture
51	' - ' (Dash symbol)
52-63	Serial Number

64-71 Device Type and Model Number (same as Inquiry Standard Data bytes 16-23)

Log Page X'32': Write Errors

Page code 32 contains detailed counters related to write operations. This page is reset when a cartridge is loaded.

Byte **Description**

0

Bit	Description
7-6	Reserved
5-0	Page Code: X'32'

1 Reserved

2-3 Page length:

The page length is determined by the parameters and the number of parameters selected for transmission to the initiator.

The following parameters are supported for the Write Error page (page code X'32'):

X'0000' Blocks Corrected

ECC is done "on the fly" by hardware. Each count represents one block in error that was successfully corrected and written. When multiple errors occur on a block, the counter that is updated is based on the first error detected.

Byte	Description
0-1	Parameter code field: X'0000'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Blocks corrected count (2-byte binary format)

X'0001' Servo Transient Condition

ERP action was required because of a servo detected error and the first retry was successfully in place. Each count represents one block in error that was successfully recovered and written. When multiple errors occur on a block, the counter that is updated is based on the first error detected.

Byte	Description
0-1	Parameter code field: X'0001'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Servo transient condition count (2-byte binary format)

X'0002' RDF/ECC Transient Conditions

ERP action was required because of a RDF (Read Data Flow) or ECC detected error and the first retry was successfully in place. Each count represents one block in error that was successfully recovered and written. When multiple errors occur on a block, the counter that is updated is based on the first error detected.

Byte	Description
0-1	Parameter code field: X'0002'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	RDF/ECC transient condition count (2-byte binary format)

X'0003' Write Velocity Errors

The count of detected write velocity errors. Each count represents one occurrence, not just the count of affected blocks. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0003'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Write Velocity Error Count (2-byte binary format)

X'0004' Servo Data Acquisition Errors

A servo error (servo dropout or off-track shutdown) was detected while trying to acquire an IBG or block at the beginning of a write append sequence; ERP action was required, and servo transient condition criteria were not met. Each count represents one block in error that was successfully recovered and written. When multiple errors occur on a block, the counter that is updated is based on the first error detected.

Byte	Description
0-1	Parameter code field: X'0004'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Servo data acquisition error count (2-byte binary format)

X'0005' RDF Data Acquisition Errors

During read-back check, the Read Data Flow (RDF) failed to acquire an IBG or block at the beginning of a write append sequence and no servo error was reported, ERP action was required, and RDF/ECC transient condition criteria were not met. Each count represents one block in error that was successfully recovered and written. When multiple errors occur on a block, the counter that is updated is based on the first error detected.

Byte	Description
0-1	Parameter code field: X'0005'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	RDF data acquisition error count (2-byte binary format)

X'0006' Servo Data Errors

A servo error (servo dropout or off-track shutdown) was detected while writing data, ERP action was required, and servo transient condition criteria were not met. Each count represents one block in error that was successfully recovered and written. When multiple errors occur on a block, the counter that is updated is based on the first error detected.

Byte	Description
0-1	Parameter code field: X'0006'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Servo data error count (2-byte binary format)

X'0007' ECC Data Errors

An uncorrectable error, CRC error, instantaneous speed variation (ISV) error, or no ending burst error occurred during read back check of a block, and no servo error was reported; ERP action was required, and RDF/ECC transient condition criteria were not met. Each count represents one block in error that was successfully recovered and written. When multiple errors occur on a block, the counter that is updated is based on the first error detected.

Byte	Description
0-1	Parameter code field: X'0007'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	ECC data error count (2-byte binary format)

The following counts are included in the write errors page as potentially useful information.

X'0008' Total Write Retries

The count of the total number of ERP actions. Each count represents one occurrence, not just one time per block. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0008'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Total Write Retries (2-byte binary format)

X'000A' Bellcord Actions

The count of write ERP actions based on error profiles. Each count represents one occurrence, not just one time per block. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'000A'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Count of Write ERP actions (2-byte binary format)

X'000B' Servo Demark Blocks Written

The count of servo demark blocks written. Multiple occurrences per block are not recorded. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'000B'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Count of servo demark blocks written (2-byte binary format)

X'000C' VCR Write Errors

The count of write errors in the Volume Control Region. Each count represents one occurrence, not just one time per block. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'000C'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	VCR Write Error count (2-byte binary format)

X'000E' Blocks Lifted

The total number of times the device had to lift and move a block. Each count represents one occurrence, not just one time per block. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'000E'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Blocks Lifted Error count (2-byte binary format)

X'000F' Write Gap Misses

The number of times that the drive overran the buffer and had to stop and restart during a write. Each count represents one occurrence, not just one time per write.

Byte	Description
0-1	Parameter code field: X'000F'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Write Gap Miss count (2-byte binary format)

Log Page X'34': Read Forward Errors

Page code 34 contains detailed counters related to read operations. This page is reset when a cartridge is loaded.

Byte **Description**

0

Bit	Description
7-6	Reserved
5-0	Page Code: X'34'

1 Reserved

2-3 Page length:

The page length is determined by the parameters and the number of parameters selected for transmission to the initiator.

The following parameters are supported for the Read Forward Error page (page code X'34'):

Read errors are broken into nine main counters that are mutually exclusive.

X'0000' Blocks Corrected

ECC is done "on the fly" by hardware. Each count represents one block in error that was successfully corrected and read. When multiple errors occur on a block, the counter that is updated is based on the first error detected.

Byte	Description
0-1	Parameter code field: X'0000'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Blocks corrected count (2-byte binary format)

X'0001' Servo Transient Condition

ERP action was required because of a servo detected error and the first retry was successfully in place. Each count represents one block in error that was successfully recovered and read. When multiple errors occur on a block, the counter that is updated is based on the first error detected.

Byte	Description
0-1	Parameter code field: X'0001'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Servo transient condition count (2-byte binary format)

X'0002' RDF/ECC Transient Conditions

ERP action was required because of a RDF (Read Data Flow) or ECC detected error and the first retry was successfully in place. Each count represents one block in error that was successfully recovered and read. When multiple errors occur on a block, the counter that is updated is based on the first error detected.

Byte	Description
0-1	Parameter code field: X'0002'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	RDF/ECC transient condition count (2-byte binary format)

X'0003' Read Velocity Errors

The count of detected read velocity errors. Each count represents one occurrence, not just the count of affected blocks. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0003'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Read Velocity Error Count (2-byte binary format)

X'0004' Servo Data Acquisition Errors

A servo error (servo dropout or off track shutdown) was detected while trying to acquire an IBG or block, ERP action was required, and servo transient condition criteria were not met. Each count represents one block in error that was successfully recovered and read. When multiple errors occur on a block, the counter that is updated is based on the first error detected.

Byte	Description
0-1	Parameter code field: X'0004'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Servo data acquisition error count (2-byte binary format)

X'0005' RDF Data Acquisition Errors

The RDF (Read Data Flow) failed to acquire an IBG or block, and no servo error was reported; ERP action was required, and RDF/ECC transient condition criteria were not met. Each count represents one block in error that was successfully recovered and read. When multiple errors occur on a block, the counter that is updated is based on the first error detected.

Byte	Description
0-1	Parameter code field: X'0005'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	RDF data acquisition error count (2-byte binary format)

X'0006' Servo Data Errors

A servo error (servo drop out) was detected while reading a block; ERP action was required, and servo transient condition criteria were not met. Each count represents one block in error that was successfully recovered and read. When multiple errors occur on a block, the counter that is updated is based on the first error detected.

Byte	Description
0-1	Parameter code field: X'0006'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Servo data error count (2-byte binary format)

X'0007' ECC Data Errors

An uncorrectable error, CRC error, or no ending burst error occurred while reading a block, and no servo error was reported; ERP action was required, and RDF/ECC transient condition criteria were not met. Each count represents one block in error that was successfully recovered and read. When multiple errors occur on a block, the counter that is updated is based on the first error detected.

Byte	Description
0-1	Parameter code field: X'0007'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	ECC data error count (2-byte binary format)

X'0008' Sequence Errors

A Block Id number out of sequence, and no Servo or RDF/ECC error reported; ERP action was required, and no transient condition criteria were not met. Each count represents one block in error that was successfully recovered and read. When multiple errors occur on a block, the counter that is updated is based on the first error detected.

Byte	Description
0-1	Parameter code field: X'0008'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Block ID Sequence Error count (2-byte binary format)

The following counts are included in the Read Errors Page as statistics regarding what specific ERP action or combination of actions appeared to have resulted in a successful recovery. Each count represents one block in error that was successfully recovered and read. However, more than one counter per block can be updated.

X'0009' Read Opposite

The block was recovered by reading in the opposite direction. Each count represents one block in error that was successfully recovered and read. However, more than one counter per block can be updated.

Byte	Description
0-1	Parameter code field: X'0009'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Read Backward Recovery count (2-byte binary format)

X'000A' Tension Adjust High

The tension adjusted higher than nominal. Each count represents one block in error that was successfully recovered and read. However, more than one counter per block can be updated.

Byte	Description
0-1	Parameter code field: X'000A'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Tension Adjust High count (2-byte binary format)

X'000B' Tension Adjust Low

The tension adjusted lower than nominal. Each count represents one block in error that was successfully recovered and read. However, more than one counter per block can be updated.

Byte	Description
0-1	Parameter code field: X'000B'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Tension Adjust Low count (2-byte binary format)

X'000C' Servo Adjust High

The track following servo offset high. Each count represents one block in error that was successfully recovered and read. However, more than one counter per block can be updated.

Byte	Description
0-1	Parameter code field: X'000C'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Servo Adjust High (2-byte binary format)

X'000D' Servo Adjust Low

The track following servo offset low. Each count represents one block in error that was successfully recovered and read. However, more than one counter per block can be updated.

Byte	Description
0-1	Parameter code field: X'000D'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Servo Adjust Low (2-byte binary format)

X'000E' Dead Reckon Nominal

Dead reckoning at nominal position. Each count represents one block in error that was successfully recovered and read. However, more than one counter per block can be updated.

Byte	Description
0-1	Parameter code field: X'000E'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Dead Reckoning Nominal (2-byte binary format)

X'000F' Dead Reckon High

Dead reckoning offset high. Each count represents one block in error that was successfully recovered and read. However, more than one counter per block can be updated.

Byte	Description
0-1	Parameter code field: X'000F'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Dead Reckoning High (2-byte binary format)

X'0010' Dead Reckon Low

Dead reckoning offset low. Each count represents one block in error that was successfully recovered and read. However, more than one counter per block can be updated.

Byte	Description
0-1	Parameter code field: X'0010'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Dead Reckoning Low (2-byte binary format)

X'0011' Filter Coefficients

Changed read filter coefficients. Each count represents one block in error that was successfully recovered and read. However, more than one counter per block can be updated.

Byte	Description
0-1	Parameter code field: X'0011'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Read Filter Coefficients (2-byte binary format)

X'0012' Opposite Gap

Block recovered by using opposite read gap. Each count represents one block in error that was successfully recovered and read. However, more than one counter per block can be updated.

Byte	Description
0-1	Parameter code field: X'0012'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Opposite Read Gap (2-byte binary format)

The following counts are included in the Read Errors Page as potentially useful information:

X'0015' Total Read Retries

The count of the total number of read ERP actions. Each count represents one occurrence, not just one time per block. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0015'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Total Read Retries (2-byte binary format)

X'0016' Bellcord Actions

The count of read ERP actions based on error profiles. Each count represents one occurrence, not just one time per block. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0016'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Count of Read ERP actions (2-byte binary format)

X'0017' VCR Read Errors

The count of read errors in the Volume Control Region. Each count represents one occurrence, not just one time per block. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0017'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	VCR Read Error count (2-byte binary format)

X'0018' Cartridge Initialization Errors

The count of servo acquisition errors during tape load. Each count represents one occurrence, not just one time per block. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0018'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Cartridge Initialization Error count (2-byte binary format)

X'0019' Read Gap Misses

The number of times that the drive overran the buffer and had to stop and restart during a read. Each count represents one occurrence, not just one time per read.

Byte	Description
0-1	Parameter code field: X'0019'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Read Gap Miss count (2-byte binary format)

X'001B' Servo Demarks Read

The count of Servo Demark blocks read. Each count represents one occurrence, not just one time per block. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'001B'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Count of Servo Demark Blocks read (2-byte binary format)

X'001C' This log parameter is reserved for future use.

Log Page X’36’: Read Reverse Errors

Byte	Description
0	

Bit	Description
7-6	Reserved
5-0	Page Code: X'36'

1	Reserved
2-3	Page length: The page length is determined by the parameters and the number of parameters selected for transmission to the initiator.

The parameters supported for the Read Reverse Error page (page code X'36') are identical to those described in “Log Page X’34’: Read Forward Errors” on page 62, except that this data is recorded when the device is performing Read Reverse operations rather than Read Forward operations. This page is reset when a cartridge is loaded.

Log Page X’38’: Blocks/Bytes Transferred

This page is reset when a cartridge is loaded.

Byte **Description**

0

Bit	Description
7-6	Reserved
5-0	Page Code: X'38'

1 Reserved

2-3 Page length:

The page length is determined by the parameters and the number of parameters selected for transmission to the initiator.

The following parameters are supported for the Blocks/Bytes Transferred page (page code X'38'):

X'0000' SCSI Write Blocks Processed

Each count represents a block processed across the SCSI interface during a Write. The count does not include ERP retries.

Byte	Description
0-1	Parameter code field: X'0000'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	SCSI write blocks processed (4-byte binary format)

X'0001' SCSI Write Bytes Processed

Each count represents a kilobyte (1024 bytes) processed across the SCSI interface during a Write. The count does not include ERP retries. You can divide this count by Device Write Bytes Processed, X'0005', to calculate an approximate write compression ratio.

Byte	Description
0-1	Parameter code field: X'0001'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	SCSI write kilobytes processed (4-byte binary format)

Refer to “Scaled Log Page Counters” on page 225 for a description of this scaled counter.

X'0002' SCSI Read Blocks Processed

Each count represents a block processed across the SCSI interface during a Read. The count does not include ERP retries.

Byte	Description
0-1	Parameter code field: X'0002'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	SCSI read blocks processed (4-byte binary format)

X'0003' SCSI Read Bytes Processed

Each count represents a kilobyte (1024 bytes) processed across the SCSI interface during a Read. The count does not include ERP retries. You can divide this count by Device Read Bytes Processed, X'0007', to calculate an approximate read compression ratio.

Byte	Description
0-1	Parameter code field: X'0003'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	SCSI read kilobytes processed (4-byte binary format)

Refer to “Scaled Log Page Counters” on page 225 for a description of this scaled counter.

X'0004' Device Write Blocks Processed

Each count represents a block processed on the medium. The count does not include ERP retries.

Byte	Description
0-1	Parameter code field: X'0004'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Device write blocks processed (4-byte binary format)

X'0005' Device Write Bytes Processed

Each count represents a kilobyte (1024 bytes) processed on the medium. The count does not include ERP retries or any tape formatting overhead bytes.

Byte	Description
0-1	Parameter code field: X'0005'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Device write kilobytes recorded (4-byte binary format)

Refer to “Scaled Log Page Counters” on page 225 for a description of this scaled counter.

X'0006' Device Read Blocks Processed

Each count represents a block read and processed from the medium. The count does not include ERP retries or overhead.

Byte	Description
0-1	Parameter code field: X'0006'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Device read blocks processed (4-byte binary format)

X'0007' Device Read Bytes Processed

Each count represents a kilobyte (1024 bytes) read and processed from the medium. The count does not include ERP retries or overhead.

Byte	Description
0-1	Parameter code field: X'0007'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Device read kilobytes processed (4-byte binary format)

X'0008' Device Write Blocks Transferred

Each count represents a block written and processed to the medium. The count includes ERP retries and repositioning.

Byte	Description
0-1	Parameter code field: X'0008'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Device write blocks transferred (4-byte binary format)

X'0009' Device Write Bytes Transferred

Each count represents a kilobyte (1024 bytes) written and processed on the medium. The count includes ERP retries, and tape formatting overhead bytes.

Byte	Description
0-1	Parameter code field: X'0009'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Device write kilobytes transferred (4-byte binary format)

Refer to “Scaled Log Page Counters” on page 225 for a description of this scaled counter.

X'000A' Device Read Blocks Transferred

Each count represents a block read and processed from the medium. The count includes ERP retries and repositioning.

Byte	Description
0-1	Parameter code field: X'000A'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Device read blocks transferred (4-byte binary format)

X'000B' Device Read Bytes Transferred

Each count represents one byte read and processed from the medium. The count includes ERP retries and tape formatting overhead bytes.

Byte	Description
0-1	Parameter code field: X'000B'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Device read kilobytes transferred (4-byte binary format)

Refer to “Scaled Log Page Counters” on page 225 for a description of this scaled counter.

X'000C' Nominal Capacity of Partition

Note: Partitioning of a volume is not currently supported, but may be in the future.

The nominal capacity of the current partition (in kilobytes).

Byte	Description
0-1	Parameter code field: X'000C'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Nominal capacity of partition in kilobytes (4-byte binary format)

Note: Partitioning of a volume is not currently supported, but may be in the future.

Refer to “Scaled Log Page Counters” on page 225 for a description of this scaled counter.

X'000D' Fractional Part of Partition Currently Traversed

Note: Partitioning of a volume is not currently supported, but may be in the future.

The fractional part of the partition traversed (N/255).

Byte	Description
0-1	Parameter code field: X'000D'
2	Parameter control byte (see page 44)
3	Parameter length: X'01'
4	Fraction of partition currently traversed (X'00 to FF')

X'000E' Nominal Capacity of the Volume

The nominal capacity of the volume (in kilobytes)

Byte	Description
0-1	Parameter code field: X'000E'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Nominal capacity of volume in kilobytes (4-byte binary format)

Refer to “Scaled Log Page Counters” on page 225 for a description of this scaled counter.

X'000F' Fractional Part of Volume Currently Traversed

The fractional part of the volume traversed (N/255).

Byte	Description
0-1	Parameter code field: X'000F'
2	Parameter control byte (see page 44)
3	Parameter length: X'01'
4	Fraction of volume currently traversed (X'00 to FF')

Log Page X'39': SCSI Interface Errors

The count of errors which have occurred while the Magstar MP drive is active on the SCSI bus. This page is reset when a cartridge is loaded.

Byte	Description
0	

Bit	Description
7-6	Reserved
5-0	Page Code: X'39'

1	Reserved
2-3	Page length:

The page length is determined by the parameters and the number of parameters selected for transmission to the initiator.

The following parameters are supported for the SCSI

X'0000' SCSI Protocol Errors

Each count represents one occurrence. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0000'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	SCSI protocol errors (2-byte binary format)

X'0007' SCSI Aborts

Each count represents one occurrence. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0007'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	SCSI aborts (2-byte binary format)

X'0008' SCSI Bus Resets

Each count represents one occurrence. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0008'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	SCSI bus resets (2-byte binary format)

X'0009' Reserved

Byte	Description
0-1	Parameter code field: X'0009'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Reserved (2-byte binary format)

X'000A' Reserved

Byte	Description
0-1	Parameter code field: X'000A'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Reserved (2-byte binary format)

Log Page X'3B': Equipment Check Errors

The following counters all deal with errors where a logic problem in the drive hardware is suspected (as opposed to errors with write or read data to or from the tape or the SCSI bus). This page is reset when a cartridge is loaded.

Byte	Description
0	

Bit	Description
7-6	Reserved
5-0	Page Code: X'3B'

1 Reserved

2-3 Page length:

The page length is determined by the parameters and the number of parameters selected for transmission to the initiator.

The following parameters are supported for the Equipment Check Errors page (page code X'3B'):

X'0001' Operator Panel Errors

Each count represents one occurrence. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0001'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Operator panel errors (2-byte binary format)

X'0002' SCSI Protocol Chip Errors

Each count represents one occurrence. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0002'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	SCSI protocol chip errors (2-byte binary format)

X'0003' SCSI Buffer Errors

Each count represents one occurrence. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0003'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	SCSI buffer errors (2-byte binary format)

X'0004' Compactor Errors

Each count represents one occurrence. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0004'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Compactor errors (2-byte binary format)

X'0005' Format Buffer Errors

Each count represents one occurrence. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0005'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Format buffer errors (2-byte binary format)

X'0006' Data Flow Hardware Errors

Each count represents one occurrence. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0006'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Data flow hardware errors (2-byte binary format)

X'0007' ECC Hardware Errors

Each count represents one occurrence. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0007'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	ECC hardware errors (2-byte binary format)

X'0008' Analog Card Hardware Errors

Each count represents one occurrence. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0008'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Analog card hardware errors (2-byte binary format)

X'0009' Mailbox Interface Errors

Each count represents one occurrence. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0009'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Mailbox interface errors (2-byte binary format)

Log Page X'3D: Subsystem Statistics

The following counters all deal with subsystem statistics and errors. This page is never reset. The counters are maintained in VPD and persist across Log Selects, Log Sense, Power On Resets, and even microcode download. Current values are written to VPD every eight operating hours when the drive is in a not ready state. The user may also save these counters to VPD at other times (such as just prior to powering off) by selecting the *Save* option from the operator panel Statistics menu. The counters lock at maximum values.

Note: The page is currently returned; however, more fields may be supported in the future.

Byte **Description**

0

Bit	Description
7-6	Reserved
5-0	Page Code: X'3D'

1 Reserved

2-3 Page length:

The page length is determined by the parameters and the number of parameters selected for transmission to the initiator.

The following parameters are supported for the Subsystem Statistics Page (page code X'3D'):

X'0000'

Library Errors

Each count represents one occurrence. Counts may include occurrences from both temporary and permanent errors.

Byte	Description
0-1	Parameter code field: X'0000'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Library errors (2-byte binary format)

X'0001'

Library Failures of Put to Drive Actions

Each count represents one occurrence where a library attempt to move a cartridge to the drive failed.

Byte	Description
0-1	Parameter code field: X'0001'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Library put to drive failures (2-byte binary format)

X'0002'

Library Failures of Get from Drive Actions

Each count represents one occurrence where a library attempt to remove a cartridge from the drive failed.

Byte	Description
0-1	Parameter code field: X'0002'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Library get from drive failures (2-byte binary format)

X'0003'

Library Failures of Put to Magazine Actions

Each count represents one occurrence where a library attempt to move a cartridge to the magazine failed.

Byte	Description
0-1	Parameter code field: X'0003'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Library put to magazine failures (2-byte binary format)

X'0004'

Library Failures of Get from Magazine Actions

Each count represents one occurrence where a library attempt to remove a cartridge from the magazine failed.

Byte	Description
0-1	Parameter code field: X'0004'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Library get from magazine failures (2-byte binary format)

X'0005'

Library Failures of Put to Priority Cell Actions

Each count represents one occurrence where a library attempt to move a cartridge to the priority cell failed.

Byte	Description
0-1	Parameter code field: X'0005'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Library put to priority cell failures (2-byte binary format)

X'0006'

Library Failures of Get from Priority Cell Actions

Each count represents one occurrence where a library attempt to remove a cartridge from the priority cell failed.

Byte	Description
0-1	Parameter code field: X'0006'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Library get from priority cell failures (2-byte binary format)

X'0007'

Library Pinch Motor Errors

Each count represents one occurrence of a library pinch motor error.

Byte	Description
0-1	Parameter code field: X'0007'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Library pinch motor errors (2-byte binary format)

X'0008'

Library Feed Motor Errors

Each count represents one occurrence of a library feed motor error.

Byte	Description
0-1	Parameter code field: X'0008'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Library feed motor errors (2-byte binary format)

X'0009'

Library Elevator Motor Errors

Each count represents one occurrence of a library elevator motor error.

Byte	Description
0-1	Parameter code field: X'0009'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Library elevator motor errors (2-byte binary format)

X'000A'

Library Moves

Each count represents a move from one cell to a different cell. Cells may be Storage cells, Data cells, or Import/Export cells.

Byte	Description
0-1	Parameter code field: X'000A'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Library moves (2-byte binary format)

X'000B'

Library Recalibrations

Each count represents one occurrence of a library calibration.

Byte	Description
0-1	Parameter code field: X'000B'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Library recalibrations (2-byte binary format)

X'000C'

Library Drive Mounts

Each count represents one occurrence of a library mount to drive.

Byte	Description
0-1	Parameter code field: X'000C'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Library mounts to drive (2-byte binary format)

X'000D'

Library Priority Cell Mounts

Each count represents one occurrence of a library mount from the Priority cell.

Byte	Description
0-1	Parameter code field: X'000D'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Library mounts using the priority cell (2-byte binary format)

X'000E'

Library Magazine Cell Mounts

Each count represents one occurrence of a library mount from a magazine cell.

Byte	Description
0-1	Parameter code field: X'000E'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Library mounts using the magazine cell (2-byte binary format)

X'000F'

Library Cleaning Mounts to Device

Each count represents one mount of the cleaning cartridge into the device. All cleaning mounts are counted regardless of whether a library was configured with the drive or not.

Byte	Description
0-1	Parameter code field: X'000F'
2	Parameter control byte (see page 44)
3	Parameter length: X'02'
4-5	Library cleaning cartridge mounts (2-byte binary format)

X'0020'

Volume Lifetime Mounts

The count represents the total number of successful cartridge unloads performed during the lifetime of a cartridge. This field is not updated for those mounts that occur with the volume physically write protected.

Byte	Description
0-1	Parameter code field: X'0020'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Volume lifetime mounts

X'0021'

Volume Lifetime Megabytes Written

The count represents the total number of bytes in Megabytes written during the lifetime of the cartridge. On each unload, an approximate value is calculated and stored by rounding up to the nearest Megabyte. These bytes are counted as they are processed to the medium (compressed bytes), not at the SCSI interface. This field is not updated during those mounts that occur with the volume physically write protected.

Byte	Description
0-1	Parameter code field: X'0021'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Volume lifetime Megabytes written

X'0022'

Volume Lifetime Megabytes Read

The count represents the total number of bytes in Megabytes read during the lifetime of the cartridge. On each unload, an approximate value is calculated and stored by rounding up to the nearest Megabyte. These bytes are counted as they are processed to the medium (compressed bytes), not at the SCSI interface. This field is not updated during those mounts that occur with the volume physically write protected.

Byte	Description
0-1	Parameter code field: X'0022'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Volume lifetime Megabytes read

X'0040'

Drive Lifetime Mounts

Each count represents the total number of successful cartridge unloads performed during the lifetime of the drive.

Byte	Description
0-1	Parameter code field: X'0040'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Volume lifetime mounts

X'0041'

Drive Lifetime Megabytes Written

The count represents the total number of bytes in Megabytes written during the lifetime of the drive. On each unload, an approximate value is calculated and stored by rounding up to the nearest Megabyte. These bytes are counted as they are processed to the medium (compressed bytes), not at the SCSI interface.

Byte	Description
0-1	Parameter code field: X'0041'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Data flow hardware errors (2-byte binary format)

X'0042'

Drive Lifetime Megabytes Read

The count represents the total number of bytes in Megabytes read during the lifetime of the drive. On each unload, an approximate value is calculated and stored by rounding up to the nearest Megabyte. These bytes are counted as they are processed to the medium (compressed bytes), not at the SCSI interface.

Byte	Description
0-1	Parameter code field: X'0042'
2	Parameter control byte (see page 44)
3	Parameter length: X'04'
4-7	Drive lifetime Megabytes read

Mode Select (6) — X’15’

The Mode Select (6) command is supported by the Magstar MP drive. Table 16 shows the command format.

Note: In the future, the length of the mode parameter list for Mode Sense Page Code X'3F' (return all pages) may exceed 255 bytes. At that time, use of the Mode Select (10) and Mode Sense (10) commands will be required in order to transfer all mode pages with one command. For this reason, use of the Mode Select (6) and Mode Sense (6) commands is not recommended.

Table 16. Mode Select (6) Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X’15’)							
1	Logical Unit Number			PF	Reserved			SP
2	Reserved							
3	Reserved							
4	Parameter List Length							
5	Vendor Specific (B’00’)		Reserved (B’0000’)				Flag	Link

Mode pages X'01', X'02', X'0A', X'0F' , X'10', X'11', X'20', X'21', X'22', X'23', and X'25' are supported. The following Magstar MP-specific parameters apply:

- PF (Page Format) field: B'1'

  The PF (Page Format) bit is explicitly **not** checked.
- SP (Save Pages) field: B'0'
- Parameter List Length:

  This field specifies the length in bytes of the mode parameter list that is transferred from the initiator to the target. A parameter list length of zero indicates that no data is transferred. This condition is not considered as an error.

  The target terminates the command with CHECK CONDITION status with associated sense data of 5/1A00 (Illegal Request, Parameter List Length Error) if the parameter list length results in the truncation of the mode parameter header, the mode parameter block descriptor, or any mode page.
- See “Control Byte Definition” on page 24 for Flag and Link bit descriptions.

Note: Issuing a Mode Sense for current values before a Mode Select is generally recommended to avoid accidentally attempting to set fields that cannot be changed by the initiator.

Mode Parameter List for Mode Select (6)

The mode pages are preceded by a 4-byte mode parameter header (see Table 18 on page 86) and an optional 8-byte block descriptor (see Table 19 on page 87). Mode page descriptions begin at “Mode Page X’01’: Read-Write Error Recovery” on page 100

Table 17 shows the format of the mode parameter list.

Table 17. Mode Parameter List for Mode Select (6)

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0-3	Mode Parameter Header							
4-11	Block Descriptor (if Block Descriptor Length is X’08’)							
4-n or 12-n	Mode Pages							

Mode Parameter Header for Mode Select (6)

There is one copy of the mode parameter header for each initiator. Table 18 shows the format of the mode parameter header for Mode Select (6).

Table 18. Mode Parameter Header for Mode Select (6)

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Mode Data Length (Reserved for Mode Select)							
1	Medium Type							
2	Device-Specific Parameter							
3	Block Descriptor Length							

Mode parameter header field descriptions follow:

Byte **Description**

0 Reserved

1 Medium Type: Any value is allowed and ignored.

2 Device-Specific Parameter - Sequential Access Devices

Bit **Description**
7 Undefined (field is ignored)
6-4 Buffered Mode

Value **Description**
0 Good status is reported when data is on medium
1 Good status is reported when data is in the buffer
2 Good status is reported when data is in the buffer and data from other initiators is written on medium
3-7 Reserved

This field is changeable. The default value for this field is 1.
3-0 Speed: X'0' (use default speed)

3 Block Descriptor Length:

- Set to X'00' if no block descriptor follows.
- Set to X'08' if a single block descriptor follows.

This is a changeable field.

Block Descriptor for Mode Select (6) or Mode Select (10)

The presence of the block descriptor in the Mode Select command depends on the value of the Block Descriptor Length in the mode parameter header. There is one copy of the block descriptor for each initiator. Table 19 shows the format of the block descriptor.

Table 19. Block Descriptor for Mode Select (6) or Mode Select (10)

Bit Byte	7 LSB	6	5	4	3	2	1	0 MSB
0	Density Code							
1-3	Number of Blocks							
4	Reserved							
5-7	Block Length							

The block descriptor field definitions follow:

Byte **Description**

0 Density Code:

Value	**Description**
X'00'	Use default density
X'7F'	No change from previous density-NOP
X'82'	Use B-Format density
X'83'	Use C-Format density

A change to this field is allowed and ignored.

1-3 Number of Blocks: X'000000'

4 Reserved

5-7 Block Length:

Block length is a changeable field. Any value of block length can be specified between the minimum and the maximum block lengths, inclusive, specified in the Read Block Limits command. A Block Length value of X'000000' indicates that the logical block size to be written to or read from the medium is specified by the Transfer Length field in the CDB (see “Read —X’08’” on page 122 and “Write — X’0A’” on page 176).

Mode Select (10) — X’55’

The Mode Select (10) command is supported by the Magstar MP drive. Table 20 shows the command format.

Table 20. Mode Select (10) Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X’55’)							
1	Logical Unit Number			PF	Reserved			SP
2	Reserved							
3	Reserved							
4	Reserved							
5	Reserved							
6	Reserved							
7	Parameter List Length							
8								
9	Vendor Specific (B’00’)		Reserved (B’0000’)				Flag	Link

Mode pages X'01', X'02', X'0A', X'0F' , X'10', X'11', X'20', X'21', X'22', X'23', and X'25' are supported. The following Magstar MP-specific parameters apply:

- PF (Page Format): B'1'

  The PF (Page Format) bit is explicitly **not** checked.
- SP (Save Pages): B'0'
- Parameter List Length:

  This field specifies the length in bytes of the mode parameter list that is transferred from the initiator to the target. A parameter list length of zero indicates that no data is transferred. This condition is not considered as an error.

  The target terminates the command with CHECK CONDITION status with associated sense data of 5/1A00 (Illegal Request, Parameter List Length Error) if the parameter list length results in the truncation of the mode parameter header, the mode parameter block descriptor, or any mode page.
- See “Control Byte Definition” on page 24 for Flag and Link bit descriptions.

Note: Issuing a Mode Sense for current values before a Mode Select is generally recommended to avoid accidentally attempting to set fields that cannot be changed by the initiator.

Mode Parameter List for Mode Select (10)

The mode pages are preceded by a 8-byte mode parameter header (see “Mode Parameter Header for Mode Select (10)” on page 90) and an optional 8-byte block descriptor (see “Block Descriptor for Mode Select (6) or Mode Select (10)” on page 87). Mode page descriptions begin at “Mode Page X’01’: Read-Write Error Recovery” on page 100.

Table 21 shows the format of the mode parameter list.

Table 21. Mode Parameter List for Mode Select (10)

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0-7	Mode Parameter Header							
8-15	Block Descriptor (if block Descriptor Length is X’08.’)							
8-n or 16-n	Mode Pages							

Mode Parameter Header for Mode Select (10)

There is one copy of the mode parameter header for each initiator. Table 22 shows the format of the mode parameter header for Mode Select (10).

Table 22. Mode Parameter Header for Mode Select (10)

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Mode Data Length (Reserved for Mode Select)							
1								
2	Medium Type							
3	Device-Specific Parameter							
4	Reserved							
5	Reserved							
6	Block Descriptor Length							
7								

Mode parameter header field descriptions follow:

Byte **Description**

0-1 Reserved

2 Medium Type: Any value is allowed and ignored.

3 Device-Specific Parameter - Sequential Access Devices

Bit **Description**

7 Undefined (field is ignored)

6-4 Buffered Mode

Value **Description**

0 Good status is reported when data on medium

1 Good status is reported when data is in buffer

2 Good status is reported when data in buffer and data from other initiators is written on medium

3-7 Reserved

This field is changeable. The default value for this field is 1.

3-0 Speed: X'0' (use default speed)

4-5 Reserved

6-7 Block Descriptor Length:

- Set to X'0000' if no block descriptor follows.
- Set to X'0008' if a single block descriptor follows.

This is a changeable field.

Mode Sense (6) —X'1A'

The Mode Sense (6) command is supported by the Magstar MP drive. Table 23 shows the command format.

Note: In the future, the length of the mode parameter list for Mode Sense Page Code X'3F' (return all pages) may exceed 255 bytes. At that time, use of the Mode Select (10) and Mode Sense (10) commands will be required in order to transfer all mode pages with one command. For this reason, use of the Mode Select (6) and Mode Sense (6) commands is not recommended.

Table 23. Mode Sense (6) Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'1A')							
1	Logical Unit Number			Reserved	DBD	Reserved		
2	PC		Page Code					
3	Reserved							
4	Allocation Length							
5	Vendor Specific (B'00″)		Reserved (B'0000')				Flag	Link

The following Magstar MP-specific parameters apply:

- DBD (Disable Block Descriptors): B'0' or B'1'. (See Block Descriptor Length in "Mode Parameter Header for Mode Sense (6)" on page 93.)
- PC (Page Control): B'00', B'01', or B'10' supported.
- Page Code: X'01', X'02', X'0A', X'0F' , X'10', X'11', X'20', X'21', X'22', X'23', X'25', and X'3F' (return all pages) are supported.
- Allocation Length: The maximum number of bytes to be transferred.

  If the allocation length specified is less than the amount available, then the allocated amount is transferred and no error is reported.
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

Mode Parameter List for Mode Sense (6)

The mode pages are preceded by a 4-byte mode parameter header (see “Mode Parameter Header for Mode Sense (6)” on page 93) and an optional block descriptor. If the DBD field is B'0', an 8-byte block descriptor follows the mode parameter header (see “Block Descriptor for Mode Sense (6) or Mode Sense (10)” on page 94). If the DBD field is B'1', the block descriptor is not present and the first mode page follows the mode parameter header. Mode page descriptions begin at “Mode Page X’01’: Read-Write Error Recovery” on page 100.

Table 24 shows the format of the mode parameter list.

Table 24. Mode Parameter List for Mode Sense (6)

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0-3	Mode Parameter Header							
4-11	Block Descriptor (if DBD is set to B’0’)							
4-n or 12-n	Mode Pages							

Mode Parameter Header for Mode Sense (6)

There is one copy of the mode parameter header for each initiator. Table 25 shows the format of the mode parameter header for Mode Sense (6).

Table 25. Mode Parameter Header for Mode Sense (6)

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Mode Data Length							
1	Medium Type							
2	Device-Specific Parameter							
3	Block Descriptor Length							

Mode parameter header field descriptions follow:

Byte **Description**

0 Mode data length

The length in bytes of the following data that is available to be transferred. (The mode data length does not include itself; that is, the length value is 1 less than the total length of the data available for transfer.)

1 Medium Type:

Value	**Description**
X'00'	No medium present
X'42'	Magstar MP Fast Access Linear Tape, B-Format
X'43'	Magstar MP Fast Access Linear Tape, C-Format
X'44'	Magstar MP Fast Access Linear Tape, C-Format XL

2 Device-Specific Parameter - Sequential Access Devices

Bit **Description**

7 WP (Write Protect):
- B'0': indicates that the medium is not write protected
- B'1': indicates that the medium is write protected

Note: For the Mode Select commands, this field is ignored.

6-4 Buffered Mode

Value	**Description**
0	Good status is reported after data is on the medium
1	Good status is reported after data is in the buffer
2	Good status is reported after data is in the buffer and data from other initiators is written on the medium
3-7	Reserved

This field is changeable. The default value for this field is 1.

3-0 Speed field: X'0' (use default speed)

3 Block Descriptor Length:
- If DBD = B'0', the Block Descriptor Length field is set to X'08' and a block descriptor follows.
- If DBD = B'1', the Block Descriptor Length field is set to X'00' and no block descriptor follows.

Block Descriptor for Mode Sense (6) or Mode Sense (10)

The presence of the block descriptor in the Mode Sense command depends on the value of the DBD bit in the CDB. There is one copy of the block descriptor for each initiator. Table 26 shows the format of the block descriptor.

Table 26. Block Descriptor for Mode Sense (6) or Mode Sense (10)

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Density Code							
1	Number of Blocks							
2								
3								
4	Reserved							
5	Block Length							
6								
7								

The block descriptor definition follows:

Byte **Description**

0 Density Code:

Value	**Description**
X'00'	No medium present
X'82'	Medium has B-Format density
X'83'	Medium has C-Format density

1-3 Number of Blocks: X'000000'

4 Reserved

5-7 Block Length:

Block length is a changeable field. Any value of block length can be specified between the minimum and the maximum block lengths, inclusive, specified in the Read Block Limits command. A Block Length value of X'000000' indicates that the logical block size to be written to or read from the medium is specified by the Transfer Length field in the CDB (see “Read —X’08’” on page 122 and “Write — X’0A’” on page 176).

Mode Sense (10) —X'5A'

The Mode Sense (10) command is supported by the Magstar MP drive. Table 27 shows the command format.

Table 27. Mode Sense (10) Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'5A')							
1	Logical Unit Number			Reserved	DBD	Reserved		
2	PC		Page Code					
3	Reserved							
4	Reserved							
5	Reserved							
6	Reserved							
7	Allocation Length							
8								
9	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

The following Magstar MP-specific parameters apply:

- DBD (Disable Block Descriptors): B'0' or B'1'. (See Block Descriptor Length in "Mode Parameter Header for Mode Sense (10)" on page 97.)
- PC (Page Control): B'00', B'01'; or B'10' supported
- Page Code: X'01', X'02', X'0A', X'0F' , X'10', X'11', X'20', X'21', X'22', X'23', X'25', and X'3F' (return all pages) are supported.
- Allocation Length: The maximum number of bytes to be transferred.

  If the allocation length specified is less than the amount available, then the allocated amount is transferred and no error is reported.
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

Mode Parameter List for Mode Sense (10)

The mode pages are preceded by an 8-byte mode parameter header (see “Mode Parameter Header for Mode Sense (10)” on page 97) and an optional block descriptor. If the DBD field is B'0', an 8-byte block descriptor follows the mode parameter header (see “Block Descriptor for Mode Sense (6) or Mode Sense (10)” on page 94). If the DBD field is B'1', the block descriptor is not present and the first mode page follows the mode parameter header. Mode page descriptions begin at “Mode Page X’01’: Read-Write Error Recovery” on page 100.

Table 28 shows the format of the mode parameter list.

Table 28. Mode Parameter List for Mode Sense (10)

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0-7	Mode Parameter Header							
8-16	Block Descriptor (if DBD is set to B’0’)							
8-n or 16-n	Mode Pages							

Mode Parameter Header for Mode Sense (10)

There is one copy of the mode parameter header for each initiator. Table 29 shows the format of the mode parameter header for Mode Sense (10).

Table 29. Mode Parameter Header for Mode Sense (10)

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Mode Data Length							
1								
2	Medium Type							
3	Device-Specific Parameter							
4	Reserved							
5	Reserved							
6	Block Descriptor Length							
7								

Mode parameter header field descriptions follow:

Byte **Description**

0-1 Mode data length

The length in bytes of the following data that is available to be transferred. (The mode data length does not include itself; that is, the length value is 1 less than the total length of the data available for transfer.)

2 Medium Type

Value	**Description**
X'00'	No medium present
X'42'	Magstar MP Fast Access Linear Tape, B-Format
X'43'	Magstar MP Fast Access Linear Tape, C-Format
X'44'	Magstar MP Fast Access Linear Tape, C-Format XL

3 Device-Specific Parameter - Sequential Access Devices

Bit **Description**

7 WP (Write Protect):
- B'0': indicates that the medium is not write protected
- B'1': indicates that the medium is write protected

Note: For the Mode Select commands, this field is ignored.

6-4 Buffered Mode

Value	**Description**
0	Good status is reported after data is on the medium
1	Good status is reported after data is in the buffer
2	Good status is reported after data is in the buffer and data from other initiators is written on the medium
3-7	Reserved

This field is changeable. The default value for this field is 1.

3-0 Speed field: X'0' (use default speed)

4-5 Reserved

6-7 Block Descriptor Length
- If DBD = B'0', the Block Descriptor Length field is set to X'0008' and a block descriptor follows.
- If DBD = B'1', the Block Descriptor Length field is set to X'0000' and no block descriptor follows.

Mode Page Format

Table 30 shows the format of the mode parameter list. The individual mode page descriptions that follow this table include the field descriptions. Each field is non-changeable unless specifically identified otherwise.

Table 30. Mode Page Format

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	PS	Reserved	Page code					
1	Page Length (n-1)							
2	Mode Parameters							
n								

Mode Page X’01’: Read-Write Error Recovery

| See the *ANSI Small Computer System Interface-3* standard.

This page is defined as common to all initiators.

Byte **Description**

0

Bit	**Description**
7	PS (Parameter Saveable): B'0'
6	Reserved
5-0	Page Code: X'01'

1 Page Length: X'0A'

2

Bit	**Description**
7-6	Reserved
5	TB (Transfer Block): B'1'
4	Reserved
3	EER (Enable Early Recovery): B'1'
2	PER (Post Error): • B'0': The device does not create CHECK CONDITION status for recovered errors except for associated sense data of: – 1/0017 (Recovered Error, Warning: Drive Needs Cleaning) for a Load Unload command, – 1/3700 (Recovered Error, Rounded Parameter) for a Mode Select command, and – 1/8383 (Recovered Error, Drive Has Been Cleaned) for a Load Unload command. For reporting of VCR errors, see “Mode Page X’25’: Read/Write Control” on page 119. • B'1': The device will report a CHECK CONDITION status for all recovered data and non-data errors with a sense key of 1 in the sense data. This field is changeable. The default value is B'0'.
1	DTE (Disable Transfer on Error): Any value is allowed and ignored for this field. The default value is B'0'.
0	DCR (Disable Correction): B'0'

3 Read Retry Count

Value	**Description**
X'05'	Limited error recovery; < 5 seconds.
X'FF'	Full Recovery Routines allowed.

This field is changeable. The default value is X'FF'. The device rounds all other values to X'05'.

4-7 Reserved

8 Write Retry Count

Value	**Description**
X'05'	Limited error recovery; < 5 seconds.
X'FF'	Full Recovery Routines allowed.

This field is changeable. The default value is X'FF'. The device rounds all other values to X'05'.

9-11 Reserved

Mode Page X'02': Disconnect-Reconnect

See the *ANSI Small Computer System Interface-3* standard.

There is one copy of this page for each initiator.

Byte	Description
0	

Bit	Description
7	PS: B'0'
6	Reserved
5-0	Page Code: X'02'

1	Page Length: X'0E'
2	Buffer Full Ratio: X'00'
3	Buffer Empty Ratio: X'00'
4-5	Bus Inactivity Limit: X'0000' (no limit)
6-7	Disconnect Time Limit: X'0000' (no limit)
8-9	Connect Time Limit: X'0000' (no limit)
10-11	Maximum Burst Size: X'0000' (no limit) This field is changeable. X'0000' is the default value.
12	

Bit	Description
7	EMDP (Enable Modify Data Pointers): B'0'
6	FARd (Fair Arbitration Read): B'0'
5	FAWrt (Fair Arbitration Write): B'0'
4	FAStat (Fair Arbitration Status): B'0'
3	Dimm (Disconnect Immediate): B'0'
2-0	DTDC (Data Transfer Disconnect Word): B'000'

13	Reserved
14-15	First Burst Size: X'0000'

Mode Page X'0A': Control Mode

See the *ANSI Small Computer System Interface-3* standard.

There is one copy of this page for each initiator.

Byte **Description**

0

Bit	Description
7	PS: B'0'
6	Reserved
5-0	Page Code: X'0A'

1 Page Length: X'0A'

2

Bit	Description
7-5	TST (Task Set Type): B'000'
4-2	Reserved
1	GLTSD (Global Logging Target Save Disable): B'0'
0	RLEC (Report Log Exception Condition):

- B'0': Do not report log exception conditions
- B'1': Report log exception conditions

This is a changeable field. The default value is B'0'

3

Bit	Description
7-4	Queue Algorithm Modifier: B'0000'
3-2	Reserved
1	QErr (Queue Error): B'0'
0	DQue (Disable Queuing): B'1'

Note: The Magstar MP drive does not support tagged queuing.

4

Bit	Description
7	Reserved
6	RAC (Report A Check): B'0'
5-3	Reserved
2	RAERP (Ready Asynchronous Event Reporting): B'0'
1	UAAERP (Unit Attention Asynchronous Event Reporting): B'0'
0	EAERP (Error Asynchronous Event Reporting): B'0'

5 Reserved

6-7 Ready AEN Holdoff Period: X'0000'

If AEN is disabled (Byte 4 bit 2 = 0), this field is not meaningful.

8-9 Busy timeout period: X'FFFF'

10 Reserved

11 Reserved

Mode Page X'0F': Data Compression

See the *ANSI Small Computer System Interface-3* standard.

This page is defined as common to all initiators.

Byte	Description
0	
	Bit **Description** **7** PS: B'0' **6** Reserved **5-0** Page Code: X'0F'
1	Page Length: X'0E'
2	
	Bit **Description** **7** DCE (Data Compression Enabled): • B'0' Data compression is not enabled • B'1' Data compression is enabled This field is changeable. The default value is B'1'. **6** DCC (Data Compression Capable): B'1' **5-0** Reserved
3	
	Bit **Description** **7** DDE: B'1' **6-5** RED (Report Exception on Decompression): B'00' **4-0** Reserved
4-7	Compression Algorithm: X'000000FF' (Unregistered algorithm)
8-11	Decompression Algorithm: X'000000FF' (Unregistered algorithm)
12	Reserved
13	Reserved
14	Reserved
15	Reserved

Mode Page X‘10’: Device Configuration

See the *ANSI Small Computer System Interface-3* standard.

This page is defined as common to all initiators.

Byte **Description**

0

Bit	**Description**
7	PS: B'0'
6	Reserved
5-0	Page Code: X'10'

1 Page Length: X'0E'

2

Bit	**Description**
7	Reserved
6	CAP (Change Active Partition): • B'0': No partition change is specified. • B'1': Logical partition is to be changed to the partition specified in the Active Partition field. **Note:** Partitioning of a volume is not currently supported, but may be in the future. This is a changeable field. The default value is B'0'.
5	CAF (Change Active Format): B'0'
4-0	Active Format: B'00000' (This field has no meaning with this product.)

3 Active Partition:

Note: Partitioning of a volume is not currently supported, but may be in the future.

For Mode Select, this is the logical partition to be changed to, if the CAP bit is on.

For Mode Sense, this is the current logical partition.

4 Write Buffer Full Ratio: X'00' (value not specified)

5 Read Buffer Empty Ratio: X'00' (value not specified)

6-7 Write Delay Time: X'0014' (about 2 sec)

8

Bit	**Description**
7	DBR (Data Buffer Recovery): B'1'
6	BIS (Block Identifier Supported): B'1'
5	RSmk (Report Setmarks): B'0'
4	AVC (Automatic Velocity Control): B'0'
3-2	SOCF (Stop on Consecutive Filemarks): This is not a changeable field. • B'00' (read ahead to fill buffer, without regard for filemarks)
1	RBO (Recover Buffer Order): • B'0' (FIFO) • B'1' (LIFO) This field is changeable. The default value is B'0' (FIFO).
0	REW (Report Early Warning): B'0'

9 Gap Size: X'00'

10

Bit	Description
7-5	EOD Defined (End Of Data Defined): B'000'
4	EEG (Enable EOD Generation): B'1'
3	SEW (Synchronize at Early-Warning): B'1'
2	SWP (Soft Write Protect): B'0'
1-0	Reserved

11-13 Buffer Size at Early Warning: X'000000'

14 Select Data Compression Algorithm:

Value	Description
X'00'	No compression used
X'01'	Use default compression algorithm (LZ1)
X'02-FF'	Reserved

This field is changeable. The default value is X'01'.

Note: On a Mode Sense, the value of byte 14 will always match up with what is found on Mode Page X'0F', Byte 2, Bit 7. If this byte alone is updated on a Mode Select, and Mode Page X'0F' is not sent, then Mode Page X'0F' Byte 2, Bit 7 is updated to match what was set in this field. If both Page X'10' and X'0F' are sent, then what is in Page X'0F' is used to update both fields and any legal value in byte 14 is ignored.

15

Bit	Description
7-3	Reserved
2	ASOCWP (Associated Write Protect) • B'0': No soft write protect is in effect • B'1': No write type commands will be allowed for the current mount This field is changeable. The default value is B'0'.
1	PERSWP (Persistent Write Protect) • B'0': Persistent Write Protect not in effect • B'1': No write type commands will be allowed on this tape. This field is changeable. The default value is B'0'.
0	PRMWP (Permanent Write Protect) • B'0': No soft write protect is in effect • B'1': No write type commands will ever be allowed for the mounted tape. This field is changeable (but cannot be reset). The default value is B'0'.

These write protect bits are new to SCSI-3 . The identical functions are provided by the write protect bits in vendor unique Mode Page 23. On a Mode Sense, the values in byte 15 will always match up with what is found on vendor unique Mode Page X'23', Byte 10. On a Mode Select, if this byte alone is updated, and Mode Page X'23' is not sent, then Mode Page X'23', Byte 10 is updated to match what was set in this field. If both Page X'10' and Page X'23' are sent, then what is in Page X'10', Byte 15 is used to update both fields and any legal value in Mode Page X'23', Byte 10 is ignored.

Mode Page X’11’: Medium Partition Page (1)

Note: Partitioning of a volume is not currently supported, but may be in the future.

This page is defined as common to all initiators.

This mode page allows the initiator to change the number of partitions on a volume. Two modes are implemented: Select Data Partitions (SDP) and Initiator-Defined Partitions (IDP). The Fixed Data Partition mode (FDP) is not supported.

The partitioning of the mounted volume is not changed until a subsequent Format Medium command is issued while the volume is mounted.

Notes:

1. There is an overhead associated with each additional partition, regardless of the size of the partition, that subtracts from the customer data space on the volume. The larger the number of possible partitions, the more overhead is consumed when the volume is partitioned.
2. A volume with a capacity scaling of less than 100 percent cannot be partitioned using this function. That is, if partitioning is selected, the Capacity Scaling field (byte 12) of Mode Page X'23' is forced to X'00' (100 percent capacity) when the Format Medium command is received.
3. For Mode Select, if this mode page is received with the FDP, SDP, and IDP fields all set to B'0', the mode page is allowed and ignored.
4. For Mode Sense of a cartridge that has never been partitioned (factory default), this mode page indicates SDP mode with one partition.

Mode Page X’11’ Medium Partition Page(1) for SDP

Byte **Description**

0

Bit	Description
7	PS (Page Save): B'0'
6	Reserved
5-0	Page Code: X'11'

1 Page Length:

The page length depends on the number of partitions on the volume. For one partition (partition 0), Page Length is set to X'08'. For two or more partitions, Page Length is set to X'86'.

2 Maximum Additional Partitions: X'00' or X'3F'

This field specifies the maximum number of additional partitions supported by this drive. It can be thought of as the value N-1 where N is the maximum number of partitions allowed.

If the drive is ready, the value is X'3F'. If the drive is not ready, the value is X'00'.

This field may not be changed.

3 Additional Partitions Defined:

This field specifies the number of additional partitions on the mounted volume (in addition to partition 0). It can be thought of as the value N-1 where N is the total number of partitions.

The values for this field may be X'00, 01, 03, 07, 0F, 17, 1F, 27, 2F, 37, or 3F' for SDP. If the drive is not ready, the value is X'00'.

This is a changeable field and subject to rounding (values are rounded up). This field may not be changed when the drive is not ready.

The partitioning of the mounted volume is not changed until a subsequent Format Medium command is issued while the volume is mounted.

4

Bit	Description
7	FDP (Fixed Data Partitions): B'0'
6	SDP (Select Data Partitions): For Mode Sense, this bit is set to B'1'. For Mode Select, • B'0': All values of this mode page are ignored. • B'1': The drive is to partition according to the Additional Partitions Defined field.
5	IDP (Initiator Defined Partitions): B'0'
4-3	PSUM (Partition Size Unit of Measure): B'10' (Unit of measure is MB)
2	POFM (Partition on Format Medium): B'1' This bit indicates that the Mode Select command will not cause changes to the partition sizes or user data, either recorded or buffered. Actual media partitioning occurs with a subsequent Format Medium command using the mode data for Medium Partition Page (1). Field values specified by a Mode Select command for Medium Partition Page (1) will not be changed by the drive before the media is unloaded or the drive is reset.
1	CLEAR (Partition clearing): B'0'
0	ADDP (Adding Partitions): B'0'

5 Medium Format Recognition: X'03' (Capable of format and partition recognition)

6

Bit	Description
7-4	Reserved
3-0	Partition Units: X'0'

7 Reserved

8-9 or 8-135 Partition Size Descriptors (2 bytes each):

Each 2 byte field specifies the size of a partition (in MB) whose partition number is in the range of 0..63, beginning with partition 0. Summing the partition sizes provides a mechanism for an initiator to calculate the volume capacity with Mode Sense in a standard way as opposed to Magstar MP vendor unique Mode Page X'23'.

For Mode Select, any values for these fields are allowed and ignored for SDP. These fields are updated by the drive when an initiator specifies a new number of partitions.

Note: When more than one partition is defined, the sum of the partition sizes may be less than when only a single partition is defined. Each partition requires a certain amount of overhead space on a volume, which reduces the usable customer data space.

Mode Page X’20’: Library (Loader) Control

This page is defined as common to all initiators. This page is reported by LUN 0 regardless of the current operating definition.

Page Code 20 is designed to support the library.

Byte **Description**

0

Bit	Description
7	PS (Page Save): B'0'
6	Reserved
5-0	Page Code: X'20'

1 Page Length: X'0A'

2 Loader Mode

Value	Description
X'00'	No Loader or undefined type of loader
X'02'	Random Mode (SCSI Medium Changer mode) Only the operator can cause the library to enter Random mode. Random mode can be selected from the operator panel Set Library Mode menu. At least one magazine must be present and in a locked condition before the command is accepted. Refer to “Random Mode” on page 12 for a full description of Random mode.
X'03'	Manual Mode Only the operator can cause the library to enter Manual mode. Manual mode can be selected from the operator panel Set Library Mode menu. Refer to “Manual (Sequential) Mode” on page 13 for a full description of Manual mode.
X'05'	Automatic (Sequential) Mode Only the operator can cause the library to enter Automatic mode. It can be selected from the operator panel Set Library Mode menu. Refer to “Automatic (Sequential) Mode” on page 12 for a complete description of Automatic mode.

The Loader Mode field is **not** changeable from the SCSI interface. If the mode is changed from the operator panel, all initiators receive a Unit Attention. Any mode set through the operator panel becomes effective immediately and is stored in nonvolatile memory as the default mode for subsequent power-on cycles.

3 Reserved

4 Loader Qualifier

The loader qualifier field allows for variations of operation within a given mode.

Bit	Description
7	Multiple Access: B'0'
6	Priority Cell Enabled: B'1'
5-0	Reserved

5-11 Reserved

Note: The fields in Mode Page X'20' are not changeable from the SCSI interface. If a Mode Select command is issued with values other than those returned by a Mode Sense command, the device returns CHECK CONDITION status with associated sense data of 5/2600 (Illegal Request, Invalid Field in Parameter List).

Mode Page X'21: TOD Control

The TOD (Time-of-Day) control is used to provide the device with an estimate of the correct time. The device adds the current TOD clock to every block transferred to media. These time traces can then be used by engineering for analysis of medium at a later time.

The Time-of-Day clock is a binary counter with a 64-bit format: bit 63 being the highest value; bit 0 being the lowest. Bit 12 represents a 1 microsecond clock; that is, the TOD is incremented by 1 in bit position 12, once every microsecond. This gives the TOD clock a cycle time of approximately 143 years. Setting the high order byte to any number greater than X'F0' will result in parameter rounding down to X'F0' with CHECK CONDITION status and associated sense data of 1/3700 (Recovered Error, Rounded Parameter).

The time of day may be set only when the device is in the Not Ready state. If an initiator attempts to set the TOD when the device is Ready, the command is terminated with CHECK CONDITION status and associated sense data of 1/3700 (Recovered Error, Rounded Parameter). Note that this choice is made to avoid failing applications for incorrect attempts at setting the TOD clock. Rounding in this case results in no change.

This page is defined as common to all initiators.

Page Code 21 is designed to provide the time-of-day clock setting to the device for Magstar MP format data.

Byte **Description**

0

Bit	**Description**
7	PS (Page Save): B'0'
6	Reserved
5-0	Page Code: X'21'

1 Page Length: X'0A'

2-9 Time of Day

This is a changeable field.

The default time setting at power on is X'0000 0000 0000 0000'. The Time of Day (TOD) clock begins counting relative time from that point.

The TOD clock can be set by any initiator at any time the device is in the Not Ready state. When sensed, the TOD field returns the time of day last set into the device by an initiator. If the TOD field has never been set by an initiator, the TOD field contains X'0000 0000 0000 0000'. A clock value of X'0000 0000 0000 0000' corresponds to a time of January 1, 1900, 0:00 AM, Greenwich Mean Time.

10 Time-of-Day Flags

Bit	Description
7-3	Reserved
2	TOD Reset Valid • B'0': The TOD clock will not be reset. Default value on Mode Sense • B'1': The TOD clock will be reset (valid only on Mode Select)
1	SysSet TOD • B'0': The TOD was not set by an initiator • B'1': The TOD was set by an initiator This field is not a changeable field. It describes the state of the TOD counter.
0	Relative TOD • B'0': The TOD was not set by the device • B'1': The TOD was set by the device This field is not a changeable field. It describes the state of the TOD counter.

11 Reserved

Mode Page X’22: Language

The Language page is used to provide the initiator with the ability to request a change of the language displayed on the operator panel.

This page is defined as common to all initiators.

Page Code 22 is designed to report or request a change to the language displayed on the operator panel. This page is supported for all models, even for models with no operator panel.

Byte **Description**

0

Bit	**Description**
7	PS (Page Save): B'0'
6	Reserved
5-0	Page Code: X'22'

1 Page Length: X'02'

2 Present Language

When sensed, this field indicates the current language. The following languages are supported:

Code	**Language**
X'00'	U.S. English
X'01'	Spanish
X'02'	German
X'(03-FF)'	Reserved

The default setting at power on is the current value in VPD. This field is not directly changeable, although it may be indirectly changed by updating the “Requested Language” field of this mode page or by selecting a different language at the operator panel.

3 Requested Language

The codes described for “Present Language” above apply to the selection of a requested language. This field is changeable. When sensed, this field has the same value as the “Present Language” field. When selected, this field will result in an update to the “Present Language” field.

Mode Page X'23': Medium Sense

The Medium Sense page provides information about the state of the medium currently associated with the device, if any.

This page is defined as common to all initiators.

Note: Issuing a Mode Sense for current values before a Mode Select is generally recommended to avoid accidentally attempting to set fields that cannot be changed by the initiator. ***Not all fields in this page can be set by users. All fields other than those explicitly indicated that can be set by users are read-only.***

Byte **Description**

0

Bit	Description
7	PS (Page Save): B'0'
6	Reserved
5-0	Page Code: X'23'

1 Page Length: X'22'

2-3 Reserved

4-5 Medium Identifier:

When there is an associated medium, this field contains the medium identifier of the associated medium.

Value	Description
X'0000'	No medium present
X'0201'	Magstar MP Fast Access Linear Tape, B-Format
X'0202'	Magstar MP Fast Access Linear Tape, C-Format
X'0203'	Magstar MP Fast Access Linear Tape, C-Format XL

6 Format Identifier

When there is an associated medium, this field contains the format identifier of the associated medium.

Value	Description
X'00'	No medium present
X'20'	B-Format
X'21'	C-Format

7-9 Reserved

10 Write Protect Flags

There are two forms of write protect: logical and physical, and three types of logical write protect. Each performs essentially the same function: each protects the customers data from change. Each write protect method performs that function; the only difference is the permanence of the effect (but note the differences with respect to VCR validity for Associated Write Protection).

Bits **Description**

7 Physical Write Protect

This field is also found in Table 42 on page 139 (byte 24, bit 1).

This field indicates the state of the physical Write Protect switch located on the cartridge. This switch is controlled by the user. When the switch is set to 1, the entire physical volume is set to the write protected state; when the switch is set to 0, the volume is physically write enabled.

- B'0': The cartridge write protect switch is set to write enabled.
- B'1': The cartridge write protect switch is set to write protected state.

This field is not changeable.

This field may be changed only by physically changing the state of the switch on the cartridge. After the cartridge is loaded into the device, the write protect switch is not available to the user, and, therefore, does not change states while mounted.

6 Associated Write Protect

An OR condition of the three forms of logical write protect may be found in Table 42 on page 139 (byte 24, bit 0).

This field allows an initiator to set the logical volume to the Associated Write Protected state. Associated Write Protect protects a volume only while the logical volume is associated with (mounted on) the device.

For a Mode Select command, this field has the following meaning:
- B'0': Do not change the Associated Write Protect state.
- B'1': Set this logical volume to the Associated Write Protect state.

For a Mode Sense command, this field responds with a B'1' only if the logical volume is set to Associated Write Protect, or it responds with a B'0'.

The logical volume can be set to Associated Write Protect *at any time*. The medium need *not* be positioned to Beginning of Partition (BOP).

When the initiator accepts the GOOD status from the Mode Select command, the logical volume is write protected. Buffered write data is not necessarily transferred to the medium prior to the completion of the Mode Select command. It is transferred at such time as it would have been had no further writes been issued (in any case prior to cartridge unload).

The Associated Write Protect state remains only as long as the medium is associated with (mounted on) the device. Both Unload and Power Off return the logical volume to the default state of write enabled. The initiator can also write enable the logical volume by issuing the Mode Select command with the Reset Associated Write Protect field set to B'1'.

While in the Associated Write Protect state, any attempt to repartition, reformat, or write results in CHECK CONDITION status with associated sense data of 7/2700 (Data Protect, Write Protected).

Note: For models with an operator panel, the write protect icon will appear on the status screen when the medium is physically or logically write protected. Except for the time span covered by cartridge loading and cartridge unloading, the icon will remain on until the initiator requests the write protection status to change or unload or power-off occurs, which reset the status by default. During load and unload the icon will revert to the unprotected indicator. This is due to updates to the tape VCR region, which requires writing. Unlike Physical Write Protection, Persistent Write Protection, or Permanent Write Protection, the VCR is subject to change when under Associated Write Protection. This means that unexpected power-offs during the load or unload process while Associated Write Protection is set may result in the VCR being in an invalid state, just as is possible when no write protection is active. Subsequent locate and space operations to the volume will operate at low speed until new records are written and the VCR is rebuilt.

5 Reset Associated Write Protect

A 1 in this field causes the Associated Write Protect state to be reset; that is, to change the state of the logical volume from write protected to write enabled. After being reset, the logical volume again accepts write commands.

For a Mode Select command, this field has the following meaning:
- B'0': Do not change the Associated Write Protect state.
- B'1': Reset the Associated Write Protect state for this logical volume.

For a Mode Sense command, this field is B'0'.

When the device successfully executes a Reset Associated Write Protect, the device immediately resets the write protected state to the write enabled state and allows write commands from that point.

4 Persistent Write Protect

An OR condition of the three forms of logical write protect may be found in Table 42 on page 139 (byte 24, bit 0).

This field allows an initiator to set the logical volume to the write protected state. Unlike the Associated Write Protect, Persistent Write Protect 'persists' across mount cycles because the state is written in the VCR of the volume.

For a Mode Select command, this field has the following meaning:
- B'0': Do not change the Persistent Write Protect state.
- B'1': Set this logical volume to the Persistent Write Protect state.

For a Mode Sense command, this field responds with a B'1' only if the logical volume is set to Persistent Write Protect; otherwise, it responds with a B'0'.

The volume can be set to Persistent Write Protect only when the medium is positioned to Beginning of Partition 0 (BOP 0). The device writes the Persistent Write Protect field in the VCR and presents status to the initiator. If the command fails, persistent write protection cannot be guaranteed.

Unlike Permanent Write Protect (see below), the volume may be write enabled by issuing a Mode Select with the Reset Persistent Write Protect field set to B'1'. Similar to Permanent Write Protect, if a partition is set to Persistent Write Protect, the physical volume may not be repartitioned unless all partitions on the volume are write enabled. Any attempt to repartition, reformat, or write results in CHECK CONDITION status with associated sense data of 7/2700 (Data Protect, Write Protected).

3 Reset Persistent Write Protect

A 1 in this field causes the Persistent Write Protect field to be reset; that is, to change the state of the logical volume from write protected to write enabled. After being reset, the logical volume again accepts write commands.

For a Mode Select command, this field has the following meaning:
- B'0': Do not change the Persistent Write Protect state.
- B'1': Reset the Persistent Write Protect state for this logical volume.

For a Mode Sense command, this field is B'0'.

The device must be at BOP 0 to accept Reset Persistent Write Protect.

2-1 Reserved

0 Permanent Write Protect

An OR condition of the three forms of logical write protect may be found in Table 42 on page 139 (byte 24, bit 0).

This field allows an initiator to set the logical volume to a permanently write protected state. Similar to the Persistent Write Protect, Permanent Write Protect 'persists' across mount cycle because the state is written in the VCR of the physical volume. Unlike Persistent Write Protect, *Permanent Write Protect can never be reset except by degaussing*.

For a Mode Select command, this field has the following meaning:
- B'0': Do not change the Permanent Write Protect state.
- B'1': Set this logical volume to the Permanent Write Protect state. After being set, *THIS LOGICAL VOLUME CAN NEVER BE WRITTEN ON AGAIN!*

Notes:

1. Only if the physical medium is completely degaussed and reformatted can the writing again be done.
2. The Format Medium command is not currently supported but may be in the future.

For a Mode Sense command, this field responds with a B'1' only if the logical volume is set to the Permanent Write Protect state; otherwise, it responds with a B'0'.

The volume can be set to the Permanent Write Protect state only when the medium is positioned to Beginning of Partition 0 (BOP 0). The device writes the Permanent Write Protect field in the VCR and presents status to the initiator. Any attempt to repartition, reformat, or write results in CHECK CONDITION status with associated sense data of 7/2700 (Data Protect, Write Protected).

11 Capacity Scaling Control

Bits	Description
7-1	Reserved
0	CapScalV (Capacity Scaling Valid) • B'0': Indicates that the device should not scale the medium in accordance with the value in the Capacity Scaling field. • B'1': Indicates that the device should scale the medium in accordance with the value in the Capacity Scaling field. ***This field is changeable.*** The default value is B'0'. For Mode Sense commands, this field is B'0'.

Scaling of the capacity is accepted only at Beginning of Partition 0 (BOP 0). **A valid Capacity Scaling request causes all data on the entire physical volume to be lost.** If this command is received at other than BOP 0, the command is presented CHECK CONDITION status with associated sense data of 5/2600 (Illegal Request, Invalid Field in Parameter List).

12 Capacity Scaling

This field allows an initiator to **logically change the size** of partition 0. One effect is faster access to data at the expense of data capacity. This byte indicates or sets the currently formatted medium capacity in relationship to the maximum medium capacity. Formatted medium capacity in this context refers to the amount of data that can be potentially written on the medium, independently of the amount that is currently written. The capacity is reduced to a value of n/256*100 percent of this maximum capacity where n is the value in the Capacity Scaling field and ranges between 1 and 256 (X'01 - FF, 00'). (The value X'00' represents 256, or 100% of capacity.) For example, a Capacity Scaling value of 128 (X'80') reduces the capacity of a single partition volume to 50% of its maximum value, but also reduces the average access time to any given data.

This field is changeable. The default value is X'00'. This medium is changed to the percent indicated in this field only if the CapScalV bit is also set to B'1'.

Only certain values are supported: X'00', X'C0', X'80', and X'40', all other values are rounded up to the next highest value, with all values between X'C1-FF' being rounded 'up' to X'00', which

represents 100%. If a value is rounded, the device responds to the Mode Select command with CHECK CONDITION status and associated sense data of 1/3700 (Recovered Error, Rounded Parameter). The device responds to the values in the Capacity Scaling field as follows:

- X'C1-FF,00': 100% Capacity
- X'81-C0': 75% Capacity
- X'41-80': 50% Capacity
- X'01-40': 25% Capacity

This command is accepted only at Beginning of Partition 0 (BOP 0). **A valid Capacity Scaling command causes all data on the entire physical volume to be lost and only partition 0 to remain at some size.** If this command is received at other than BOP 0, the command is presented CHECK CONDITION status with associated sense data of 5/2600 (Illegal Request, Invalid Field in Parameter List).

Mode Sense values returned are X'00', X'C0', X'80', or X'40', corresponding to 100% of maximum capacity, 75% of maximum capacity, 50% of maximum capacity, or 25% of maximum capacity, respectively.

13-16 Medium Capacity

This field specifies the nominal capacity, in kilobytes, of the program accessible portion of the medium indicated by the Medium Identifier in bytes 4-5. If capacity scaling is in effect, this field reflects the capacity after scaling. If the medium is currently partitioned, the nominal capacity of the medium is the sum of the nominal capacity of all partitions. The value in the field multiplied by 1024 yields the approximate capacity in bytes. The field is set to 0 if the capacity is unknown. ***This field is not changeable.*** It is for reporting only.

17 Partition Number

Note: Partitioning of a volume is not currently supported, but may be in the future.

This field specifies the partition number of the currently active partition. The field is set to X'00' if there is only one partition on the medium or if the partition number is unknown. This field cannot be set by a user but reflects changes effected by “Mode Page X‘10’: Device Configuration” on page 104.

See also Table 11 on page 39 for changing the active partition and “Mode Page X‘10’: Device Configuration” on page 104 for creating partitions.

18-19 Reserved

20 Test Flags

Bit	Description
7-1	Reserved
0	Edge Track • B'0': Disable edge track write mode. • B'1': Activate edge track write mode. This field invokes a mode used for Edge Track testing when the device is being used as a medium tester. This field can **only** be used when the device is being used as a medium tester. If the initiator sets Edge Track and the device is in Tester Mode and the medium is at BOP 0, the device writes on one outside track while the medium is moving towards EOT, and writes on the other outside track while the medium is moving toward BOP 0.

This field is changeable. The default value is B'0', but this field may only be set to B'1' when (1) the device is previously placed in Tester Mode (a mode that can be set at installation time only) and (2) the medium is at BOP 0.

If the device is not in Tester Mode and an initiator attempts to write this field, CHECK CONDITION status is presented with associated sense data of 5/2600 (Illegal Request, Invalid Field in Parameter List).

If an initiator attempts to write this field at other than BOP 0, the command is presented CHECK CONDITION status with associated sense data of 5/2600 (Illegal Request, Invalid Field in Parameter List).

21 Internal-VOLID Flags

Bits	Description
7	Internal-VOLID Valid • B'0': Indicates that the fields are not valid. • B'1': Indicates that the internal volume-identifier field and the remainder of the internal-VOLID flags field are valid.
6	DBM Valid • B'0': Indicates that the Device Block Map is not valid. • B'1': Indicates that the Device Block Map is valid.
5-3	Reserved
2-0	Internal-VOLID Information Source

Value	Description
0	Internal-VOLID from external source, that is, a library manager.
1	Internal VOLID from medium, namely the VOL1 record.
2-7	Reserved

22-27 Internal-Volume Identifier

If available, this field contains the volume identifier, which is recorded on the medium. The field is left-justified and padded with X'20' (ASCII blanks). If the Volume Identifier is not valid, it is set to X'0000 0000 0000'.

28-31 Partition Capacity

Note: Partitioning of a volume is not currently supported, but may be in the future.

This field specifies the nominal capacity, in kilobytes, of the program accessible portion of the currently active partition. The value in the field multiplied by 1024 yields the number of bytes in the partition. The field is set to 0 if the capacity is unknown. ***This field is not changeable but does reflect changes by other activity.*** It is for reporting only.

32-35 Kilobytes Traversed

This field specifies the current position on the tape measured in kilobytes (1024 bytes) traversed (user data only). The value at the logical end of tape should equal the nominal capacity of the tape. All values are rounded down to the nearest kilobyte.

Mode Page X’25’: Read/Write Control

This page is defined as common to all initiators.

Byte **Description**

0

Bit	Description
7	PS (Page Save): B'0'
6	Reserved
5-0	Page Code: X'25'

1 Page Length: X'1E'

2

Bit	Description
7-3	Reserved
2	Ignore Sequence Checks on Locate command • B'0': Do not ignore sequence checks • B'1': Ignore sequence checks This is a changeable field. The default value is B'0'.
1	Ignore Sequence Checks on Space command for blocks • B'0': Do not ignore sequence checks • B'1': Ignore sequence checks This is a changeable field. The default value is B'0'.
0	Ignore Sequence Checks on Space command for filemarks • B'0': Do not ignore sequence checks • B'1': Ignore sequence checks This is a changeable field. The default value is B'0'.

3

Bit	Description
7-3	Reserved
2	Ignore Data Checks on Locate command • B'0': Do not ignore data checks • B'1': Ignore data checks This is a changeable field. The default value is B'1'.
1	Ignore Data Checks on Space command for blocks • B'0': Do not ignore data checks • B'1': Ignore data checks This is a changeable field. The default value is B'1'.
0	Ignore Data Checks on Space command for filemarks • B'0': Do not ignore data checks • B'1': Ignore data checks This is a changeable field. The default value is B'1'.

4-5 Reserved

6-7 Logical End of Partition — Early Warning (LEOP-EW)

This field provides a vehicle for the initiator to enable an early warning indication of the approach of the Logical End of Partition (LEOP). This warning may be used by the initiator to ensure it has sufficient remaining space on the current tape partition to commit all of its internal write buffers. The early warning is provided in the form of a deferred CHECK CONDITION status with associated sense data of 6/0002 (Unit Attention, End-of-Partition/Medium Detected). This CHECK CONDITION status is returned when the first device block is committed to the medium which comes within the specified number of megabytes of the LEOP. The normal initiator response may be to stop further writes and flush all initiator buffered data to the drive.

This field is changeable and is specified in megabytes. The default value is X'0000'. A value of X'0000' results in no warning being given. Any value from X'0001' to X'000B' results in a warning 11 megabytes prior to the LEOP. Any other value specifies the number of megabytes prior to the LEOP that the warning will occur. The device makes a worst case compression assumption.

8

Bit	Description
7-1	Reserved
0	Report VCR Errors • B'0': If the Mode Page X'01' PER bit is set to B'0', do not report VCR errors. • B'1': Report CHECK CONDITION status and associated sense data of 1/0000 (Recovered Error, No Additional Sense Information) for permanent read/write VCR errors including Device Block Map (DBM) invalid. This field is changeable. The default value is B'0'.

9-31 Reserved

Prevent Allow Medium Removal —X'1E'

The Prevent Allow Medium Removal command is supported by the Magstar MP drive only for the 'Prevent Cartridge Removal' option. Table 31 shows the command format.

Table 31. Prevent Allow Medium Removal Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operational code (X'1E')							
1	Logical Unit Number			Reserved				
2	Reserved							
3	Reserved							
4	Reserved						Prevent	
5	Vendor Specific (B'00')		Reserved				Flag	Link

The following Magstar MP-specific parameters apply:

- The Prevent field values follow:

  Value **Description**
  B'00' Allow Cartridge Removal
  B'01' Prevent Cartridge Removal
  B'10' Not Supported
  B'11' Not Supported

- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

The Magstar MP drive supports Prevent Cartridge Removal by disabling the unload button on the stand-alone drive model or by removing the Unload option from the operator panel menu. Cartridge removal is enabled again when the initiator issues the Prevent Allow Medium Removal command, this time with the Prevent field set to B'00' (Allow Cartridge Removal). A reset (bus device reset, reset message, or power on reset) also restores the Magstar MP drive to the allow removal state.

For physical security in an unattended environment, the Magstar MP library supports a manual lock on the library door. The locked door prevents access to the cartridges in the magazines and removal of the magazines.

Read —X'08'

The Read command is supported by the Magstar MP drive. Table 32 shows the command format.

Table 32. Read Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operational code (X'08')							
1	Logical Unit Number			Reserved			SILI	Fixed
2	Transfer Length							
3								
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

The following Magstar MP-specific parameters apply:

- SILI (Suppress Incorrect Length Indicator) (per SCSI-3 standard).
- Fixed:
  - B'0': Variable length blocks are supported
  - B'1': Fixed length blocks are supported
- Transfer Length: value from X'000000' (zero bytes) to X'FFFFFF'. Although the maximum block size for this tape drive is X'040000' (262,144) bytes, any transfer length is accepted and the underlength condition rules are applied for transfer requests bigger than the actual block size. A transfer Length of X'000000' indicates that no bytes/blocks are transferred. This condition is not considered an error and the logical position is not changed.
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

For further explanation, see "Data Transfer, Block Limits, and Fixed Block Option" on page 225.

A successful Read command with a Fixed bit of 1 transfers the requested Transfer Length, times the current block length in bytes to the initiator. A successful Read command with a Fixed bit of 0 transfers the requested Transfer Length in bytes to the initiator. Upon completion, the logical position is after the last block transferred (end-of-partition side).

If SILI bit is B'1' and the Fixed bit is B'0', the target performs one of the following actions:

1. Reports CHECK CONDITION status for an incorrect block length condition only if the overlength condition exists(see SCSI section 10.4) and the Block Length field in the mode parameter block descriptor is nonzero(see SCSI section 8.3.3). The associated sense data is 0/0000 (Incorrect Length, No Sense Data).
2. Does not report CHECK CONDITION status if the only error is the underlength condition(see SCSI-2 section 10.4), or if the only error is the overlength condition and Block Length field of the mode parameters block descriptor is B'0'. (See note 1 on page 123.)

If the SILI bit is B'1' and the Fixed bit is B'1', the target terminates the command with CHECK CONDITION status with associated sense data of 5/2400 (Illegal Request, Invalid Field in CDB).

If the SILI bit is B'0' and an incorrect length block is read, CHECK CONDITION status is returned and the ILI and valid bits are set to B'1' in the sense data. Upon termination, the logical position is after the incorrect length block (end-of-partition side). If the Fixed bit is 1, the information field is set to the requested Transfer Length, minus the actual number of blocks read (not including the incorrect length block).

If the Fixed bit is B'0', the information field is set to the requested Transfer Length, minus the actual block length in two's complement format.

If the logical unit encounters a filemark during a Read command, CHECK CONDITION status is returned and the filemark and valid bits are set to B'1' in the sense data. The associated sense data is set to 0/0001 (No Sense, Filemark Detected). Upon termination, the logical position is after the filemark (end-of-partition side). If the Fixed bit is B'1', the information field is set to the requested Transfer Length, minus the actual number of blocks read (not including the filemark). If the Fixed bit is B'0', the information field is set to the requested Transfer Length.

If the logical unit encounters end-of-medium during a Read command, CHECK CONDITION status is returned and the EOM and valid bits are set to B'1' in the sense data. Associated sense data is set to 3/0002 (Medium Error, End of Medium).

If the logical unit encounters early warning and the REW bit is set to 1 in the device configuration page, CHECK CONDITION status is returned and the EOM and valid bits are set to B'1' in the sense data. Associated sense data is set to D/0002 (Overflow, End-of-Partition/Medium Detected). If the Fixed bit is B'1', the information field is set to the requested Transfer Length, minus the actual number of blocks transferred. If the Fixed bit is B'0', the information field is set to the requested Transfer Length.

If the drive encounters End-of-Data (EOD) while executing this command, the command is terminated at the EOD position and CHECK CONDITION status is returned with associated sense data of 8/0005 (Blank Check, End-of-Data Detected). If the next motion command is another request to move forward (beyond EOD), the drive accepts the command and attempts to position beyond EOD in order to allow recovery of old data.

Notes:

1. Because the residue information normally provided in the information field of the sense data may not be available when the SILI bit is set, use other methods to determine the actual block length (for example, including length information in the data block).
2. In the case of the Fixed bit of 1 with an overlength condition, only the position of the incorrect-length logical block can be determined from the sense data. The actual length of the incorrect block is not reported. Other means may be used to determine the actual length (for example, backspace and read it again with Fixed bit set to B'0').

Read Block Limits —X'05'

The Read Block Limits command is supported by the Magstar MP drive. Table 33 shows the command format.

Table 33. Read Block Limits Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'05')							
1	Logical Unit Number			Reserved				
2	Reserved							
3	Reserved							
4	Reserved							
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

The following Magstar MP-specific parameters apply to the Read Block Limits data:

Byte **Description**

0 Reserved

1-3 Maximum Block Length Limit: X'040000' (262,144 bytes)

4-5 Minimum Block Length Limit: X'0001' (1 byte)

See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

Any block length in the range of 1 to 262,144 is supported.

For further explanation, see "Data Transfer, Block Limits, and Fixed Block Option" on page 225.

Read Buffer —X'3C'

The Read Buffer command is supported by the Magstar MP drive. Table 34 shows the command format.

Table 34. Read Buffer Command

Bit / Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'3C')							
1	Logical Unit Number			Reserved		Mode		
2	Buffer ID							
3	Buffer Offset							
4								
5								
6	Allocation Length							
7								
8								
9	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

The following Magstar MP-specific parameters apply:

- Mode: B'001' or B'011'
  - B'001': Vendor Specific mode (returns data contained in the buffer specified by Buffer ID)
  - B'011': Descriptor mode (returns the offset boundary and buffer size in bytes, for the buffer specified in Buffer ID)
- Buffer ID: The buffers supported in the Magstar MP drive are described in Table 35 on page 126.
- Buffer Offset: In mode B'001', the starting address in the buffer to be read. For mode B'011', this field must be X'000000'.
- Allocation Length: The maximum number of bytes to be transferred.

  The device transfers the number of bytes specified in the Allocation Length field or the number of bytes in the header and buffer being read, whichever is less. This is not an error.
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

Each buffer image has its own unique format, describing where certain key data may be found. Certain buffers contain embedded data in the buffer image describing the length of the total buffer image, and a CRC field that checks the total buffer image. Uploading the microcode buffer is one such example.

"Magstar MP Drive Buffers" on page 126 lists the accessible buffers.

Magstar MP Drive Buffers

Table 35 lists the Magstar MP drive buffers and their IDs:

Table 35. Magstar MP Drive Buffers

Buffer	ID	Offset Boundary
Dump and Error Data (Read Only)	X'00'	4
Microcode (Write Only)	X'00' or X'01'	4
Vital Product Data (DRAM)	X'07'	4
Vital Product Data (EEProm)	X'08'	4
Dump Data 2	X'09'	4
Test Buffer	X'0A'	4
Drive Serial Number	X'0F'	4

Each buffer is described in the following list, ordered by buffer ID.

Buffer ID **Buffer**

X'00' Dump and Error Data (Read Only)

This buffer is read-only and supports Read Buffer modes 1 and 3.

In these modes, the Buffer Offset field provides an offset into the buffer. The Allocation Length specifies the maximum number of bytes to be read from the buffer, starting at the offset specified by the Buffer Offset field. For this buffer, the Buffer Offset must be on a 16-byte boundary. If the Buffer Offset is not on a 16-byte boundary, the device returns CHECK CONDITION status with associated sense data of 5/2400 (Illegal Request, Invalid Field in CDB).

If an initiator attempts to issue a Write Buffer command to this buffer, the device returns CHECK CONDITION status with associated sense data of 5/2400 (Illegal Request, Invalid Field in CDB).

X'07' Vital Product Data (DRAM)

This buffer is read-only and supports Read Buffer modes 1 and 3.

In Read Buffer mode 1, the Buffer Offset field provides an offset into the buffer, and must be on a 16-byte boundary. If the Buffer Offset exceeds the size of the buffer or is otherwise incorrect, the device returns CHECK CONDITION status with associated sense data of 5/2400 (Illegal Request, Invalid Field in CDB).

The Allocation Length field specifies the maximum number of bytes to be read from the buffer, starting at the offset specified by the Buffer Offset field.

X'08' Vital Product Data (EEPROM)

This buffer is read only and supports Read Buffer modes 1 and 3.

In Read Buffer mode 1, the Buffer Offset field provides an offset into the buffer. The Allocation Length specifies the maximum number of bytes to be read from the buffer, starting at the offset specified by the Buffer Offset field. For this buffer, the Buffer Offset must be on a 16-byte boundary. If the Buffer Offset is not on a 16-byte boundary, the device returns CHECK CONDITION status with associated sense data of 5/2400 (Illegal Request, Invalid Field in CDB).

If an initiator attempts to issue a Write Buffer command to this buffer, the device returns CHECK CONDITION status with associated sense data of 5/2400 (Illegal Request, Invalid Field in CDB).

X'09' Dump Data 2

This buffer is read only and supports Read Buffer modes 1 and 3.

In Read Buffer mode 1, the Buffer Offset field provides an offset into the buffer. The Allocation Length specifies the maximum number of bytes to be read from the buffer, starting at the offset specified by the Buffer Offset field. For this buffer, the Buffer Offset must be on a 16-byte boundary. If the Buffer Offset is not on a 16-byte boundary, the device returns CHECK CONDITION status with associated sense data of 5/2400 (Illegal Request, Invalid Field in CDB).

If an initiator attempts to issue a Write Buffer command to this buffer, the device returns CHECK CONDITION status with associated sense data of 5/2400 (Illegal Request, Invalid Field in CDB).

X'0A' Test Buffer

This buffer may be written and supports Read Buffer modes 1 and 3.

In Read Buffer mode 1, the Buffer Offset field provides an offset into the buffer. The Allocation/Parameter List Length specifies the maximum number of bytes to be read from/written to the buffer, starting at the offset specified by the Buffer Offset field. For this buffer, the Buffer Offset must be on a 16-byte boundary. If the Buffer Offset is not on a 16-byte boundary, the device returns CHECK CONDITION status with associated sense data of 5/2400 (Illegal Request, Invalid Field in CDB).

X'0F' Drive Serial Number with Checksum

This buffer is write only and supports Write Buffer Mode 1 with a Buffer Offset of 0 only.

The Parameter List Length field must be set to 13. The first 12 bytes of parameter data are the new serial number and the last byte is a checksum of the first 12 bytes. The drive serial number may be read at bytes 38-49 of standard Inquiry data.

If an initiator attempts to issue a Read Buffer command to this buffer, the device returns CHECK CONDITION status with associated sense data of 5/2400 (Illegal Request, Invalid Field in CDB).

Read Position —X'34'

The Read Position command is supported by the Magstar MP drive. Table 36 shows the command format.

Table 36. Read Position Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'32')							
1	Logical Unit Number			Reserved		TCLP	LONG	BT
2	Reserved							
3	Reserved							
4	Reserved							
5	Reserved							
6	Reserved							
7	Reserved							
8	Reserved							
9	Vendor Specific (B'00')			Reserved (B'0000')			Flag	Link

The following Magstar MP-specific parameters apply:

- TCLP (Total Current Logical Position): B'0' or B'1'
- LONG: B'0' or B'1'

  The LONG and TCLP fields must be equal. If they are not, the device returns CHECK CONDITION status with associated sense data of 5/2400 (Illegal Request, Invalid Field in CDB).
- BT (Block address Type): B'0'
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

The Read Position data format when TCLP = B'0' is defined below:

Byte **Description**

0

Bit **Description**

7 BOP (Beginning of Partition):

Note: Partitioning of a volume is not currently supported, but may be in the future.
- B'0': indicates that the current logical position is not at the beginning-of-partition.
- B'1': indicates the device is at the beginning-of-partition in the current partition.

6 EOP (End of Partition):

Note: Partitioning of a volume is not currently supported, but may be in the future.
- B'0': indicates that the device is not between early-warning and end-of-partition.
- B'1': indicates the device is positioned between early-warning and end-of-partition in the current partition.

5 BCU (Block Count Unknown):
- B'0': indicates that the block count is known
- B'1': indicates that the block count is unknown

4 BYCU (Byte Count Unknown):
- B'0': indicates that the byte count is known
- B'1': indicates that the byte count is unknown

3 Reserved

| **2** BPU (Block Position Unknown):
| • B'0': indicates that the block position is known
| • B'1': indicates that the block position is unknown
| **1** PERR (Position Error): B'0'
| **0** Reserved

| **1** Partition Number:

Note: Partitioning of a volume is not currently supported, but may be in the future.

Reports the partition number for the current logical position. When the medium has only one partition, this field is set to 0.

2-3 Reserved

4-7 First Block Location:

Specifies the block address associated with the current logical position. The value indicates the block address of the next data block to be transferred between the initiator and the target if a Read or Write command is issued, in the range X'0000 0000' to X'FFFF FFFF'.

8-11 Last Block Location:

After a write command, this field specifies the block address associated with the next data block to be transferred from the buffer to the medium. After a read command, this field specifies the block address associated with the last (most recent) data block to be transferred from the medium to the buffer. For any case where the buffer no longer contains a whole block of data or is empty, the value reported for the Last Block Location is equal to the value reported for the First Block Location, in the range X'0000 0000' to X'FFFF FFFF'.

12 Reserved

13-15 Number of Write Blocks in Buffer:

The number of data blocks in the buffer that have not been written to the medium. (This value is zero if the device is reading rather than writing.)

16-19 Number of Write Bytes in Buffer:

The total number of data bytes (before compaction) in the buffer that have not been written to the medium.

| The Read Position data format when TCLP = B'1' is defined below:

| **Byte** **Description**

| **0**

| **Bit** **Description**
| **7** BOP (Beginning of Partition):

| **Note:** Partitioning of a volume is not currently supported, but may be in the future.
| • B'0': indicates that the current logical position is not at the beginning-of-partition.
| • B'1': indicates the device is at the beginning-of-partition in the current partition.
| **6** EOP (End of Partition):

| **Note:** Partitioning of a volume is not currently supported, but may be in the future.
| • B'0': indicates that the device is not between early-warning and end-of-partition.
| • B'1': indicates the device is positioned between early-warning and end-of-partition in the current partition.
| **5-4** Reserved

3 MPU (Mark Position Unknown):
- B'0': indicates that the current logical block position is known
- B'1': indicates that the current logical block position is unknown

2 BPU (Block Position Unknown):
- B'0': indicates that the block position is known
- B'1': indicates that the block position is unknown

1–0 Reserved

1 Reserved

2 Reserved

3 Reserved

4-7 Partition Number:

Note: Partitioning of a volume is not currently supported, but may be in the future.

Reports the partition number for the current logical position. When the medium has only one partition, this field is set to 0.

8-15 Block Number:

Specifies the block address associated with the current logical position. The value indicates the block address of the next data block to be transferred between the initiator and the target if a Read or Write command is issued, in the range X'0000 0000' to X'FFFF FFFF'.

16-23 File Number:

Specifies the number of filemarks between Beginning of Partition and the current logical position.

24-31 Set Number

Current Set Number: B'0'

Read Reverse —X'0F'

The Read Reverse command is supported by the Magstar MP drive. Table 37 shows the command format.

Table 37. Read Reverse Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'0F')							
1	Logical Unit Number			Reserved		Byte Order	SILI	Fixed
2	Transfer Length							
3								
4								
5	Control							

The following Magstar MP-specific parameters apply:

- Byte Order field: B'1'

  This field defines the order in which bytes are transferred to the initiator.

  Byte Order to the initiator is in the logical forward direction (first byte written is transferred to the initiator before the last byte written).
- SILI (Suppress Incorrect Length Indicator): This bit is defined the same as for the Read command.
- Fixed: This bit is defined the same as for the Read command.
  - B'0': Variable length blocks are supported
  - B'1': Fixed length blocks are supported
- Transfer Length: value from X'000000' (zero bytes) to X'FFFFFF'. Although the maximum block size for this tape drive is X'040000' (262,144) bytes, any transfer length is accepted and the underlength condition rules are applied for transfer requests bigger than the actual block size. A transfer Length of X'000000' indicates that no bytes/blocks are transferred. This condition is not considered an error and the logical position is not changed.

A successful Read Reverse command with a Fixed bit of 1 transfers the requested Transfer Length, times the current block length in bytes to the initiator. A successful Read Reverse command with a Fixed bit of 0 transfers the requested Transfer Length in bytes to the initiator. Upon completion, the logical position is before the last block transferred (beginning-of-partition side).

If the SILI bit is B'1' and the Fixed bit is B'0', the target performs one of the following actions:

1. Report CHECK CONDITION status and associated sense data of 0/0000 (Incorrect Length, No Sense Data) for an incorrect length condition only if the overlength condition exists(see SCSI section 10.4), and the Block Length field in the mode parameter block descriptor is nonzero(see SCSI section 8.3.3).
2. Not report CHECK CONDITION status if the only error is the underlength condition(see SCSI section 10.4), or if the only error is the overlength condition and Block Length field of the mode parameters block descriptor is B'0'. (See note 1 on page 132.)

If the SILI bit is B'1' and the Fixed bit is B'1', the target terminates the command with CHECK CONDITION status with associated sense data of 5/2400 (Illegal Request, Invalid Field in CDB).

If the SILI bit is B'0' and an incorrect length block is read, CHECK CONDITION status is returned and the ILI and valid bits are set to B'1' in the sense data. Upon termination, the logical position is before the incorrect length block (beginning-of-partition side).

If the Fixed bit is B'1', the information field is set to the requested Transfer Length, minus the actual number of blocks read (not including the incorrect length block).

If the Fixed bit is B'0', the information field is set to the requested Transfer Length, minus the actual block length. Targets that do not support negative values set the information field to zero if the overlength condition exists(see SCSI section 10.4).

If the logical unit encounters a filemark during a Read Reverse command, CHECK CONDITION status is returned and the filemark and valid bits are set to B'1' in the sense data. The associated sense data is set to 0/0001 (No Sense, Filemark Detected). Upon termination, the logical position is before the filemark (beginning-of-partition side).

If the Fixed bit is B'1', the information field is set to the requested Transfer Length, minus the actual number of blocks read (not including the filemark). If the Fixed bit is B'0', the information field is set to the requested Transfer Length.

If the logical unit encounters beginning-of-medium during a Read Reverse command, CHECK CONDITION status is returned and the EOM and valid bits are set to B'1' in the sense data. Associated sense data is set to 0/0004 (No Sense, Beginning of Medium).

If the Fixed bit is B'1', the information field is set to the requested Transfer Length, minus the actual number of blocks transferred.

If the Fixed bit is B'0', the information field is set to the requested Transfer Length.

If the logical unit encounters End of Data (EOD) while reading, a sequence error is generated 3/1404 (Medium Error, Block Sequence Error).

Notes:

1. Because the residue information normally provided in the information field of the sense data may not be available when the SILI bit is set, use other methods for determining the actual block length (For example, including length information in the data block).
2. In the case of the Fixed bit of 1 with an overlength condition, only the position of the incorrect-length logical block can be determined from the sense data. The actual length of the incorrect block is not reported. Other means may be used to determine the actual length (for example, read it again with Fixed bit set to B'0').

Receive Diagnostic Results — X’1C’

The Receive Diagnostic Results command is supported by the Magstar MP drive. After a Send Diagnostic command completes, use the Receive Diagnostic Results command to receive the results.

Note: For diagnostics that produce diagnostic results, the Receive Diagnostic Result command should be linked to the Send Diagnostic command, or the LUN should be reserved. See the *ANSI Small Computer System Interface-3* standard for details.

Table 38 shows the command format.

Table 38. Receive Diagnostic Results Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X’1C’)							
1	Logical Unit Number			Reserved				
2	Reserved							
3	Allocation Length							
4								
5	Vendor Specific (B’00’)		Reserved (B’0000’)				Flag	Link

The following Magstar MP-specific parameters apply:

- Allocation Length is the maximum number of bytes to be returned in the page of data following the command (if any).
- See “Control Byte Definition” on page 24 for Flag and Link bit descriptions.

Diagnostic Results Page Formats

The Magstar MP drive supports two diagnostic pages: Page Code X'00' and Page Code X'80'.

Page Code X’00’

The format for the Receive Diagnostic Results command follows:

Byte	Description
0	Page Code: X'00'
1	Reserved
2-3	Page Length: X'0002'
4	Page Code Supported: X'00'
5	Page Code Supported: X'80'

Page Code X’80’

Is a general purpose page for returning diagnostic data to the initiator. The format for the Receive Diagnostic Results command follows:

Byte	Description
0	Page Code: X'80'
1	Reserved
2-3	Page Length (n-3)
4-5	Diagnostic ID

This field contains the same value as that sent with the Send Diagnostic command for which this response is associated.

6 Flags

Set to X'00' for the Receive Diagnostic Results command.

7 Reserved

8-n Diagnostic Results

The Diagnostic Results field contains the results from the diagnostic. See the individual Send Diagnostic parameter descriptions for the field contents.

Refer to “Magstar MP-Supported Diagnostics” on page 152 for a list of diagnostic parameters supported by the Magstar MP drive.

Recover Buffered Data —X'14'

The Recover Buffered Data command is supported by the Magstar MP drive.

Table 39. Recover Buffered Data Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'14')							
1	Logical Unit Number			Reserved			SILI	Fixed
2	Transfer Length							
3								
4								
5	Control							

The following Magstar MP-specific parameters apply:

- SILI (Suppress Incorrect Length Indicator): This bit is defined the same as for the Read command.
- Fixed: This bit is defined the same as for the Read command.
  - B'0': Variable length blocks are supported
  - B'1': Fixed length blocks are supported
- Transfer Length: value from X'000000' (zero bytes) to X'040000' (262,144 bytes)

Note: Having begun to recover data through the use of the Recover Buffer Data command, the initiator should not change the RBO (Recover Buffer Order) field in mode page X'10', until all the data in the buffer is read or until the device has received and successfully executed a Locate command, a Load Unload command, or a Rewind command. If the initiator attempts to change the RBO field while the device still has data in the buffers, the device rejects the command with associated sense data of with 5/2602 (Illegal Request, Parameter Value Invalid).

For further explanation, see "Data Transfer, Block Limits, and Fixed Block Option" on page 225.

Release (6) —X'17'

The Release (6) command is supported by the Magstar MP drive. Table 40 shows the command format.

Table 40. Release (6) Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'03')							
1	Logical Unit Number			Reserved				
2	Reserved							
3	Reserved							
4	Allocation Length							
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

The following Magstar MP-specific parameters apply:

- 3rdPty (Third Party): B'0'
- Third Party Device ID: B'000'
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

Report Density Support —X‘44’

The Report Density Support command is supported by the Magstar MP drive. Table 41 shows the command format.

Table 41. Report Density Support

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'44')							
1	Reserved							Media
2	Reserved							
3	Reserved							
4	Reserved							
5	Reserved							
6	Reserved							
7	Allocation Length							
8								
9	Control Byte							

The following Magstar MP-specific parameters apply:

- Media:
  - B'0' report all supported densities for all supported medium types.
  - B'1' report all supported densities for the current medium in the drive.
- Allocation Length is the maximum number of bytes to be transferred.

  There are two densities supported by the device. If Media = B'0', the number of bytes returned will be 108 bytes. If Media = B'1', the number of bytes returned will be 56 bytes.

If Media = B'1' and the device is not ready, the drive will return 2/0400 (Not Ready, Not Ready Cause Not Reportable).

The Report Density Support data format returned is defined below:

Byte	Description
0-1	Available Density Support Length
2	Reserved
3	Reserved
4-n	Density Support Data Block Descriptors

The Report Density Block descriptor for B—format tape is defined below.

Byte	Description
0	Primary Density Code: X'82'
1	Secondary Density Code: X'00'
2	

Bit	Description
7	WRTOK: The device can write this format. B'1'
6	DUP: Only one data block for this density code. B'0'

| | **5** DEFLT: The current format is the default format: B'1'
| | **4-0** Reserved

| **3** Reserved

| **4** Reserved

| **5-7** Bits Per MM: X'000D05'

| **8-9** Media Width (in millimeters): X'0008'

| **10-11** Tracks: X'0080'

| **12-15** Capacity (in Megabytes): X'00001388'

| **16-23** Assigning Organization: `'IBM '` (in ASCII)

| **24-31** Density Name: `'3570B '` (in ASCII)

| **32-51** Description: `' '` (in ASCII)

| The Report Density Block descriptor for C-Format tape is defined below:

| **Byte** **Description**

| **0** Primary Density Code: X'83'

| **1** Secondary Density Code: X'00'

| **2**

| | **Bit** **Description**
| | **7** WRTOK: The device can write this format. B'1'
| | **6** DUP: Only one data block for this density code. B'0'
| | **5** DEFLT: This format is the default format: B'1'
| | **4-0** Reserved

| **3** Reserved

| **4** Reserved

| **5-7** Bits Per MM: X'000D05'

| **8-9** Media Width (in millimeters): X'0008'

| **10-11** Tracks: X'0080'

| **12-15** Capacity (in Megabytes): X'00001388'

| **16-23** Assigning Organization: `'IBM '` (in ASCII)

| **24-31** Density Name: `'3570C '` (in ASCII)

| **32-51** Description: `' '` (in ASCII)

|

Request Sense —X'03'

The Request Sense command is supported by the Magstar MP drive. Table 42 shows the command format.

Table 42. Request Sense Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'03')							
1	Logical Unit Number			Reserved				
2	Reserved							
3	Reserved							
4	Allocation Length							
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

The following Magstar MP-specific parameters apply:

- Allocation Length: The maximum number of bytes to be transferred.

  This device has 96 bytes of sense data. If the allocation length specified is less, then the allocated amount is transferred, the remaining sense data is lost, and no error is reported. If the allocated length specified is greater, then only 96 bytes of sense data are transferred and no error is reported.
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

Each field of sense data returned is only valid if it is related to the LUN which has been specified (drive or library).

The format of the sense data follows:

Byte Description

0

Bit	Description
7	Valid: • B'0' indicates that information bytes 3-6 are not valid. • B'1' indicates that information bytes 3-6 are valid.
6-0	Error Code (X'70' or X'71')

1 Segment Number: X'00'

2

Bit	Description
7	Filemark: • B'0' indicates that the current read command has not encountered a filemark. • B'1' indicates that the current read command has encountered a filemark. This device does not report Setmarks, per Mode Page 10, Byte 8(5).
6	EOM (End-Of-Medium): • B'0' indicates that the device is not at the end of medium. • B'1' indicates that the device is at the end of medium.
5	ILI (Incorrect Length Indicator): This bit is set to B'1' if a Read command reads a block of incorrect length and the SILI field in the Read Command was set to B'0'.
4	Reserved
3-0	Sense Key: See "Appendix B. SCSI Error Sense" on page 221.

3-6 Information: The content of this field varies depending on the failing command and error. This field is only valid when the Valid bit (byte 0, bit 7) is set to B'1'.

- Non-Deferred Errors with Fixed bit = B'0':

  The Information field reflects the number of bytes (uncompacted) in the buffer.
- Non-Deferred Errors with Fixed bit = B'1':

  The Information field reflects the number of blocks in the buffer (regardless of block size).
- Deferred Errors and non-deferred errors for all other command types:
  - If the Block Length field in the block descriptor area of the Mode Select command is X'000000':

    The Information field reflects the number of bytes (uncompacted) in the buffer.
  - If the Block Length field in the block descriptor area of the Mode Select command is any value other than X'000000':

    The Information field reflects the number of blocks in the buffer.

7 Additional Sense Length (n-7): X'0A' or X'58'

- The Magstar MP drive supports a total of 96 bytes of sense data (a value of X'58' in the Additional Sense Length field). The first 18 bytes are standard.
- Only the first 18 bytes of sense data are returned (a value of X'0A' in the Additional Sense Length field) in association with an underlength condition for a read command with SILI bit of B'0' and a Fixed bit of B'0'.

8-11 Command-Specific Information: X'0000 0000'

The Magstar MP drive does not support the commands associated with this field.

12 Additional Sense Code: See “Appendix B. SCSI Error Sense” on page 221.

13 Additional Sense Code Qualifier: See “Appendix B. SCSI Error Sense” on page 221.

14 Field Replaceable Unit Code

- A nonzero value specifies a failed FRU or FRU group.
- A zero value indicates that no specific FRU is identified as failing or that the data is not available.

15-17 Sense Key Specific

When the sense key field value is Illegal Request, the SKSV bit is B'1' and bytes 15-17 are interpreted as follows:

Byte	Description
15	Sense Key Specific

Bit	Description
7	SKSV (Sense Key Specific Valid): B'1'
6	C/D (Control/Data) • B'0' specifies that the error is in a data field of the parameter list. • B'1' specifies that the error is in a CDB field.
5-4	Reserved
3	BPV (Bit Pointer Valid) • B'0' specifies that the Bit Pointer Field is not valid. • B'1' specifies that the Bit Pointer Field is valid.
2-0	Bit Pointer field • When BPV is set to B'1', this field points to the bit in error of the field specified by the Field Pointer.

16-17 Field Pointer

- Points to the CDB byte or parameter byte in error.

When the sense key field value is not Illegal Request, the SKSV bit is B'0' and bytes 15-17 are interpreted as follows:

Byte **Description**

15 Vendor-Unique Indicators

Bit	Description
7	SKSV (Sense Key Specific Valid): B'0'
6-3	Tape Position Indicators

Value	Description
0	BOT (Beginning of Tape)
1	Data
2	LEOP-EW (Logical End of Partition - Early Warning)
3	Data
4	LEOP (Logical End of Partition)

Bit	Description
2	Reserved
1	Permanent Error • B'0': Indicates that the error was recovered • B'1': Indicates that the error is permanent
0	SIM/MIM Flag • B'0': Indicates that a SIM/MIM is not available • B'1': Indicates that a SIM/MIM is available in Log Page X'31'

16-17 First Error Code

18

Bit	Description
7	Reserved - Vendor-Unique
6	Sequential Medium Loader Active • B'0': There is not another cartridge available for processing in Automatic Mode. • B'1': There is another cartridge available for processing in Automatic Mode or the status is indeterminate (for example, the library door is open).
5	Microcode Dump Available • B'0': Indicates there is no microcode dump currently available. • B'1': Indicates a microcode dump is available. Notify IBM Service personnel. The dump is lost at the next power off or operator panel reset.
4	DBM Invalid **Note:** This field is not valid if the drive is not ready or when the sense data is associated with a prior CHECK CONDITION status (contingent allegiance condition). • B'0': Indicates the Device Block Map is valid • B'1': Indicates the Device Block Map is invalid
3-0	Reserved

19 SCSI IDs

Bit	Description
7-4	SCSI ID for the device This field contains the SCSI ID of the device. This ID can be changed on a stand-alone drive model by rotating a hex switch (X'0-F') on the front of the drive. This ID can be changed on a Library model from the operator panel. When changed by either method, the permanent address stored in the VPD is also changed. The change to the ID does not take effect until the next Power-On-Reset or Reset (issued from the Operator panel).

The SCSI ID can be temporarily changed using the Change SCSI ID diagnostic routine. Although a SCSI ID may be temporarily changed by this routine, the default value of the SCSI ID is given in this sense command, not the temporary value assigned.

3-0 Reserved

20 Library Status

Bit	Description
7	Reserved
6	Automatic Cleaning Enabled • B'0': Automatic drive cleaning is disabled in the library. • B'1': Automatic drive cleaning is enabled in the library.
5	Reserved
4	Unload Cartridge This field indicates the state of the Unload button on the device faceplate which is hidden when the device is mounted in a library. • B'0': Leave cartridge in device. • B'1': Unload cartridge from device to magazine.
3	Door Lock • B'0': The cartridges may be removed from the magazine. • B'1': The cartridges are locked behind the door.
2	Magazine 2 Available • B'0': Magazine 2 is not mounted in the library. • B'1': Magazine 2 is mounted in the library.
1	Magazine 1 Available • B'0': Magazine 1 is not mounted in the library. • B'1': Magazine 1 is mounted in the library.
0	Reserved

21-22 Reserved - Vendor-Unique

23

Bit	Description
7-4	Medium Access Field

Value	Description
0	Position unknown (during power-on initialization or unusual conditions)
1	Load error (cartridge loaded, but drive not ready)
4	Cartridge unloaded or removed
5	Cartridge is currently loading
6	Cartridge is currently unloading
9	Cartridge is loaded

3-0 Reserved

24 Medium Descriptor flags

Bit	Description
7	Initialization Required • B'0': Not defined. • B'1': The medium requires initialization. The device cannot detect initialization on the volume at BOV.
6	VCR Integrity Check

- B'0': Not defined.
- B'1': An error condition is detected in the volume control region of the medium

5 Partitioned

Note: Partitioning of a volume is not currently supported, but may be in the future.

- B'0': The volume does not have multiple partitions.
- B'1': The volume has multiple partitions.

4 Partitioning Integrity

Note: Partitioning of a volume is not currently supported, but may be in the future.

- B'0': Not defined.
- B'1': An error condition is detected in the partitioning definition of the VCR.

3 Medium Check

- B'0': Not defined.
- B'1': A medium check was detected for the medium, and the medium cannot be processed by the device.

2 Incompatible Format

- B'0': Not defined.
- B'1': The device does not recognize the format of the medium.

1 PWP (Physical Write Protect)

- B'0': The volume Physical Write Protect switch is off.
- B'1': The volume Physical Write Protect switch is on.

0 Logical Write Protect

- B'0': The volume is not logically write protected.
- B'1': The volume is logically write protected.

25 Reserved - Vendor-Unique

26-29 Reserved - Vendor-Unique

30 Failing Command

- Request under execution at time of error

31-32 First Error Code Flag Data

- Optional encoded flag data for bytes 16-17

33-34 Second Error Code

- Second error code encountered

35-36 Second Error Code Flag Data

- Optional encoded flag data that relates to the second error code

37-38 Next-to-Last Error Code

- Next-to-last error code encountered

39-40 Next-to-Last Error Code Flag Data

- Optional encoded flag data that relates to the next-to-last error code

41-42 Last Error Code

- Last error code encountered

43-44 Last Error Code Flag Data

- Optional encoded flag data that relates to the last error code

45 Reserved

46-49 Logical Block Number

- The next block that would be accessed in the forward direction

50-52 Device Block Number

- The number of the current physical device block (Bytes 13-15 in Block Control). Valid values are from X'000000' to X'FFFFFF'

53 Wrap Half and Direction

Bit	Description
7-6	Reserved
5-0	Wrap Half Number (0-63)

54-55 Partition Number

Note: Partitioning of a volume is not currently supported, but may be in the future.

- X'0000-00FF'

56 Device Block Control Flag

Bit	Description

7-6 Block Control Field Format

Value	Description
0	Magstar MP block control field format
1-3	Reserved

5 Beginning of Partition

Note: Partitioning of a volume is not currently supported, but may be in the future.

- B'0': The drive is not positioned at the BOP
- B'1': The drive is positioned at the BOP

4-2 Reserved

1 Logical Block Input Spanning

0 Logical Block Output Spanning

57 Device Block Type ID

- The identification of the device block type

58-61 First Logical Block Number

- Contains the device block number of the first host logical block that is at least partially contained within the current device block

62-63 Number of Logical Blocks in the device block

- The number of logical blocks that are at least partially contained within the current device block

64 Number of MIUs in the device block

- The number of MIUs that are contained in the device block

65-68 Volume Recipe/Step Index

69 Error Recovery Summary Qualifier

70 Cleaning Required Indicator (Static)

Bit	Value

7 B'1': Cleaning Required - Normal Maintenance (Reset to B'0' when the cleaning cartridge is loaded.)

6 B'1': Cleaning Required - Threshold Reached

Reset to B'0' when the cleaning cartridge is loaded.

5-0 Reserved

71 Reserved

72-78 Microcode EC Number (in ASCII)

79 Reserved

80 Volume Label Flags

Bit	Description
7	Volume Label Fields Valid • B'0': Indicates sense bytes 81-88 are not valid. • B'1': Indicates sense bytes 81-88 are valid for the media that is loaded.
6	Volume Label Source External • B'0': Indicates the source of sense bytes 81-88 is block 0 of the media. • B'1': Indicates the source of sense bytes 81-88 is the cartridge bar code label.
5-0	Reserved

81 Reserved

82 Volume Label Cartridge Type

Value	Description
'F' (in ASCII)	Magstar MP Fast Access Linear Tape, B-Format
'G' (in ASCII)	Magstar MP Fast Access Linear Tape, C-Format
'H' (in ASCII)	Magstar MP Fast Access Linear Tape, C-Format XL

83-88 Volume Label (in ASCII or EBCDIC, depending on the source)

89-95 Reserved

Reserve (6) —X'16'

The Reserve (6) command is supported by the Magstar MP drive. Table 43 shows the command format.

Table 43. Reserve (6) Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'16')							
1	Logical Unit Number			3rdPty	Third Party Device ID			Reserved
2	Reserved							
3	Reserved							
4	Reserved							
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

The following Magstar MP-specific parameters apply:

- 3rdPty (Third Party): B'0'
- Third Party Device ID: B'000'
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

Rewind —X'01'

The Rewind command is supported by the Magstar MP drive. Table 44 shows the command format.

Table 44. Rewind Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'1D')							
1	Logical Unit Number			PF	Reserved	SelfTest	DevOfl	UnitOfl
2	Reserved							
3	Parameter List Length							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

The following Magstar MP-specific parameters apply:

- Immed (Immediate):
  - B'0': present status when command is completed.
  - B'1': present status when all buffered data is successfully written to the media.
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

Send Diagnostic —X'1D'

The Send Diagnostic command is supported by the Magstar MP drive. Send Diagnostic is used to execute the Magstar MP diagnostics and to perform special functions that would normally only be available from the operator panel.

Note: For diagnostics that produce diagnostic results, the Receive Diagnostic Result command should be Linked to the Send Diagnostic command, or the LUN should be reserved. See the referenced SCSI-3 specification for details.

Table 45 shows the command format.

Table 45. Send Diagnostic Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'1D')							
1	Logical Unit Number			PF	Reserved	SelfTest	DevOfl	UnitOfl
2	Reserved							
3	Parameter List Length							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

The following Magstar MP-specific parameters apply:

- PF (Page Format): Set to B'1'.
- SelfTest: The values can be the following:
  - B'0': perform the diagnostic operation specified in the parameter list.
  - B'1': perform self-test. See "Self-Test" on page 153 for details of this diagnostic.

  Note: When Self-Test is requested, no other diagnostics may be simultaneously requested.
- DevOfL (Device Off Line): The values can be the following:
  - B'0' is supported and prohibits any diagnostic operations that may be detected by subsequent I/O processes.
  - B'1' is supported and grants permission to the target to perform diagnostic operations that may affect all the logical units on a target; that is, alteration of reservations, log parameters, or sense data.
  - B'x' in the diagnostic description indicates that either B'0' or B'1' may be used with identical effects.

  Note: DevOfl and UnitOfl are set by the system. These bits grant permission to the target to perform vendor-specific diagnostic operations on the target that may be visible to attached initiators. Thus, by preventing operations that are not enabled by these bits, the target assists the operating system in protecting its resources.
- UnitOfL (Unit Off Line): The values can be the following:
  - B'0' is supported and prohibits any diagnostic operations that may be detected by subsequent I/O processes.
  - B'1' is supported and grants permission to the target to perform diagnostic operations that may affect the user medium on the logical unit; for example, write operations to the user-accessible medium, or operations that reposition the medium on sequential access devices.
  - B'x' in the diagnostic description indicates that either B'0' or B'1' may be used with identical effects.

- Parameter List Length: This field specifies the length in bytes of the parameter list that is transferred from the initiator to the target.

  A parameter list length value of zero specifies that no data is transferred. This condition is not considered an error. If the specified parameter list length results in truncation of one or more pages (PF bit set to 1), the target returns CHECK CONDITION status with associated sense data of 5/2400 (Illegal Request, Invalid Field in CDB).
- Flag and Link: See “Control Byte Definition” on page 24 for Flag and Link bit descriptions.

Diagnostic Page Formats

The Magstar MP drive supports two diagnostic page formats: Page Code X'00' and Page Code X'80'.

Page Code X’00’

The format for the Send Diagnostic command follows:

Byte	Description
0	Page Code: X'00'
1	Reserved (X'00')
2-3	Page Length: X'0000'

Page Code X’80’

Is a general purpose page for sending flags and diagnostic parameters to the target. The format for the Send Diagnostic command follows:

Byte	Description
0	Page Code: X'80'
1	Reserved
2-3	Page Length (n-3)
4-5	Diagnostic ID This field specifies the diagnostic that is to be run.
6	Flags (Send Diagnostic command) **Bits** **Description** **7-1** Reserved **0** Cartridge Required Set to 1 when a cartridge is required for a diagnostic. When 1, a cartridge must be loaded and ready for the Send Diagnostic command to be accepted. See specific diagnostic descriptions for cartridge use: some diagnostics require this bit to be set to 1, some require it to be set to 0, and some do not require a specific bit setting. • B'0': No cartridge required • B'1': Cartridge required
7	Reserved
8-n	Diagnostic Parameters The Diagnostic Parameters field contains the parameters required to run the diagnostic.

See “Magstar MP-Supported Diagnostics” on page 152 for a list of diagnostic routines supported by the Magstar MP drive.

Magstar MP-Supported Diagnostics

Table 46 shows the diagnostic routines supported by the Magstar MP drive. These diagnostics reside in the device. (See “Send Diagnostic —X’1D’” on page 149 and Table 38 on page 133 for additional information on the commands.) Individual diagnostic descriptions follow Table 46.

Table 46. Supported Diagnostic Routines

Diagnostic Name	Diagnostic ID	See page
Self-Test	None	153
Change SCSI ID	X'0001'	154
POST A Diagnostic	X'0100'	156
POST B Diagnostic	X'0101'	158
Library Diagnostic	X'0102'	160
Force Dump	X'0160'	162
Write Dump to Cartridge	X'0161'	163
Create FMR Cartridge	X'0170'	165
Set Traps	X'0190'	168
Remove Traps	X'0191'	169
Set Drive Parameters	X'2000'	170
Reset VSARS	X'2001'	172
Reset Drive	X'2002'	173

The Change SCSI ID and the Library Diagnostics require the drive to have no cartridge loaded.

Self-Test

When you set the SelfTest (SelfTest) bit to 1 in a Send Diagnostic command, the target runs the normal power-on self-test (POST A) diagnostics that occur at bring-up. No diagnostic results are returned.

Send Diagnostic Command — Self-Test

Table 47 shows the Send Diagnostic command format to specify Self-Test (the SelfTest bit is set to 1).

Table 47. Send Diagnostic Command — Self-Test

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'1D')							
1	Logical Unit Number B'000'			PF (B'1')	Reserved B('0')	SelfTest (B'1')	DevOfl (B'0')	UnitOfl (B'0')
2	Reserved							
3	Parameter List Length (X'0000')							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

When you set the SelfTest bit to 1 in a Send Diagnostic command, you direct the target to complete its default power-on self-test. If the self-test successfully passes, the command is terminated with Good status. If the self-test detects a failure, the command is terminated with CHECK CONDITION status and the sense key is set to Hardware Error.

Receive Diagnostic Results Command — Self-Test

There are no diagnostic results for the self-test.

Change SCSI ID Diagnostic

Allows an initiator to change the SCSI ID of the selected target from its current setting to a specified new target address. After the diagnostic completes successfully, the target responds only to the new SCSI ID until the target receives a power-on reset (POR). After a power-on reset, the target responds only to its default SCSI ID. The temporary SCSI ID is discarded.

Send Diagnostic Command — Change SCSI ID

Table 48 shows the Send Diagnostic command format to specify Change SCSI ID.

Table 48. Send Diagnostic Command — Change SCSI ID

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'1D')							
1	Logical Unit Number (B'000')			PF (B'1')	Reserved (B'0')	SelfTest (B'0')	DevOfl (B'1')	UnitOfl
2	Reserved (X'00')							
3	Parameter List Length (X'009')							
4								
5	Vendor Specific (B'00')		Reserved (B'000')				Flag	Link
Note: Either the Link bit should be set or the LUN should be reserved if the Receive Diagnostic Results SCSI command is issued.								

Send Diagnostic Parameter Data — Change SCSI ID

Table 49 shows the parameter data for the Send Diagnostic command.

Table 49. Send Diagnostic Parameter Data — Change SCSI ID

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Page Code (X'80')							
1	Reserved (X'00')							
2	Page Length (X'0005')							
3								
4	Diagnostic ID (X'0001')							
5								
6	Flags (X'00')							
7	Reserved (X'00')							
8	UpdDef	Reserved (B'000')				New SCSI ID		
Note: Because the Flags field is set to X'00', any cartridge in the drive is unloaded.								

Receive Diagnostic Results Command — Change SCSI ID

The initiator issues a Receive Diagnostic Results to the old SCSI ID, which returns Page Code X'80' with the default SCSI ID, the new SCSI ID, and the Diagnostic ID.

The target SCSI ID is modified after the Receive Diagnostic Results command is successfully received. The default SCSI ID is unchanged by this process. Any reservations for all LUNs under the target are reset when the ID is changed.

The target maintains the new SCSI ID until either a POR is received (at which time it reverts to the default SCSI ID stored), or until it receives another Change SCSI ID diagnostic command.

Table 50 shows the Receive Diagnostic Results command format for the Change SCSI ID diagnostic.

Table 50. Receive Diagnostic Results Command — Change SCSI ID

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'1C')							
1	Logical Unit Number B'000'			Reserved (B'00000')				
2	Reserved (X'00')							
3	Allocation Length							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

Receive Diagnostic Results Data — Change SCSI ID

Table 51 shows the diagnostic results data received from the Change SCSI ID diagnostic.

Table 51. Receive Diagnostic Results Data — Change SCSI ID

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Page Code (X'80')							
1	Reserved (X'00')							
2	Page Length (X'0006')							
3								
4	Diagnostic ID (X'0001')							
5								
6	Flags (X'00')							
7	Reserved (X'00')							
8	Reserved (X'0')				New SCSI ID			
9	Reserved (X'0')				Default SCSI ID			

POST A Diagnostic

This diagnostic runs the POST A (power-on self-test) diagnostics, as does running the Self-Test diagnostic by setting the SelfTest bit to 1 in a Send Diagnostic command. However, unlike Self-Test, the POST A diagnostic returns data through the Receive Diagnostic Results command.

Send Diagnostic Command — POST A

Table 52 shows the Send Diagnostic command format to specify running the POST A diagnostic.

Table 52. Send Diagnostic Command — POST A

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'1D')							
1	Logical Unit Number B'000'			PF (B'1')	Reserved (B'0')	SelfTest (B'0')	DevOfl (B'x')	UnitOFl (B'x')
2	Reserved (X'00')							
3	Parameter List Length (X'0008')							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link
Note: Either the Link bit should be set or the LUN should be reserved if the Receive Diagnostic Results SCSI command is issued.								

Send Diagnostic Parameter Data — POST A

Table 53 shows the parameter data for the Send Diagnostic command.

Table 53. Send Diagnostic Parameter Data — POST A

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Page Code (X'80')							
1	Reserved (X'00')							
2	Page Length (X0004')							
3								
4	Diagnostic ID (X'0100')							
5								
6	Flags (B'0000000')							Cartridge Required (B'x')
7	Reserved (X'00')							
Note: The Cartridge Required flag can be set to 0 or 1. If a cartridge is in the drive when this diagnostic is received, some diagnostics will not run. If the diagnostic is blocked because a cartridge is loaded in the drive or for any other reason, the Diagnostic Blocked bit is set in the Receive Diagnostics Results data.								

Receive Diagnostic Results Command — POST A

Table 54 shows the Receive Diagnostic Results command format for the POST A diagnostic.

Table 54. Receive Diagnostic Results Command — POST A

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'1C')							
1	Logical Unit Number B'000'			Reserved (B'00000')				
2	Reserved (X'00')							
3	Allocation Length							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

Receive Diagnostic Results Data — POST A

Table 55 shows the diagnostic results data received from the POST A diagnostic.

Table 55. Receive Diagnostic Results Data — POST A

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Page Code (X'80')							
1	Reserved (X'00')							
2	Page Length (X'004D')							
3								
4	Diagnostic ID (X'0100')							
5								
6	Flags (X'00')							
7	Reserved (X'00')							
8	Reserved (B'00000')					Diagnostic Blocked	SIM/MIM Present	Error
9-80	SIM/MIM messages or all zeros							

Note:

The Error bit in byte 8 is set when the diagnostic detects an error.

The SIM/MIM Present bit in byte 8 is set when a SIM or MIM message is contained in the diagnostic results.

SIM/MIM messages are defined exactly as described under the Log Sense command, Page Code X'31'; the SIM/MIM is not valid if the SIM/MIM Present bit is 0.

The Diagnostic Blocked bit is set when the diagnostic cannot run all its tests. This occurs if a cartridge is in the drive.

POST B Diagnostic

This diagnostic causes all of the Magstar MP drive read, write, and motion test diagnostics to be executed. Thus, a cartridge is required to be loaded to run the diagnostic.

Send Diagnostic Command — POST B

Table 56 shows the Send Diagnostic command format to specify running the POST B diagnostic.

Table 56. Send Diagnostic Command — POST B

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'1D')							
1	Logical Unit Number B'000'			PF (B'1')	Reserved (B'0')	SelfTest (B'0')	DevOfl (B'x')	UnitOFl (B'x')
2	Reserved (X'00')							
3	Parameter List Length (X'0008')							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link
Note: Either the Link bit should be set or the LUN should be reserved if the Receive Diagnostic Results SCSI command is issued.								

Send Diagnostic Parameter Data — POST B

Table 57 shows the parameter data for the Send Diagnostic command.

Table 57. Send Diagnostic Parameter Data — POST B

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Page Code (X'80')							
1	Reserved (X'00')							
2	Page Length (X0004')							
3								
4	Diagnostic ID (X'0101')							
5								
6	Flags (B'0000000')							Cartridge Required (B'1')
7	Reserved (X'00')							
Note: The Cartridge Required flag is set to 1, a cartridge must be loaded and ready before the diagnostic run.								

Receive Diagnostic Results Command — POST B

Table 58 shows the Receive Diagnostic Results command format for the POST B diagnostic.

Table 58. Receive Diagnostic Results Command — POST B

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'1C')							
1	Logical Unit Number B'000'			Reserved (B'00000')				
2	Reserved (X'00')							
3	Allocation Length							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

Receive Diagnostic Results Data — POST B

Table 59 shows the diagnostic results data received from the POST B diagnostic.

Table 59. Receive Diagnostic Results Data — POST B

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Page Code (X'80')							
1	Reserved (X'00')							
2	Page Length (X'004D')							
3								
4	Diagnostic ID (X'0101')							
5								
6	Flags (X'00')							
7	Reserved (X'00')							
8	Reserved (B'00000')					Diagnostic Blocked	SIM/MIM Present	Error
9-80	SIM/MIM messages or all zeros							

Notes:

1. The Error bit in byte 8 is set when the diagnostic detects an error.
2. The SIM/MIM Present bit in byte 8 is set when a SIM or MIM message is contained in the diagnostic results.
3. SIM/MIM messages are defined exactly as described under the Log Sense command, Page Code X'31'; the SIM/MIM is not valid if the SIM/MIM Present bit is 0.

Library Diagnostic

This command causes all the library functions to be executed on library models, including the library/drive interface.

Send Diagnostic Command — Library

Table 60 shows the Send Diagnostic command format to specify running the Library Diagnostic.

Table 60. Send Diagnostic Command — Library

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'1D')							
1	Logical Unit Number B'000'			PF (B'1')	Reserved (B'0')	SelfTest (B'0')	DevOfl (B'x')	UnitOfl (B'x')
2	Reserved (X'00')							
3	Parameter List Length (X'0008')							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link
Note: Either the Link bit should be set or the LUN should be reserved if the Receive Diagnostic Results SCSI command is issued.								

Send Diagnostic Parameter Data — Library

Table 61 shows the parameter data for the Send Diagnostic command.

Table 61. Send Diagnostic Parameter Data — Library

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Page Code (X'80')							
1	Reserved (X'00')							
2	Page Length (X'0004')							
3								
4	Diagnostic ID (X'0102')							
5								
6	Flags (B'0000000')							Cartridge Required (B'0')
Note: The Cartridge Required flag must be set to 0.								

Receive Diagnostic Results Command — Library

Table 62 shows the Receive Diagnostic Results command format for the Library Diagnostic.

Table 62. Receive Diagnostic Results Command — Library

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'1C')							
1	Logical Unit Number B'000'			Reserved (B'00000')				
2	Reserved (X'00')							
3	Allocation Length							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

Receive Diagnostic Results Data — Library

Table 63 shows the diagnostic results data received from the Library Diagnostic.

Table 63. Receive Diagnostic Results Data — Library

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Page Code (X'80')							
1	Reserved (X'00')							
2	Page Length (X'004D')							
3								
4	Diagnostic ID (X'0102')							
5								
6	Flags (X'00')							
7	Reserved (X'00')							
8	Reserved (B'000000')					Diag- nostic Blocked	SIM/MIM Present	Error
9-80	SIM/MIM message or all zeros							

Notes:

1. The Error bit in byte 8 is set when the diagnostic detects an error.
2. The SIM/MIM Present bit in byte 8 is set when a SIM or MIM message is contained in the diagnostic results.
3. SIM/MIM messages are defined exactly as described under the Log Sense command, Page Code X'31'; the SIM/MIM is not valid if the SIM/MIM Present bit is 0.

Force Dump Diagnostic

This diagnostic forces a dump. The dump data is stored in Magstar MP drive control storage and can be read by the Read Buffer command (Buffer ID of X'00'). See “Read Buffer —X’3C’” on page 125.

When a higher priority dump has been generated automatically by the drive but has not yet been read, the drive will ignore this Send Diagnostic command and return GOOD status.

Send Diagnostic Command — Force Dump

Table 64 shows the Send Diagnostic command format to specify Force Dump.

Table 64. Send Diagnostic Command — Force Dump

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X’1D’)							
1	Logical Unit Number B’000’			PF (B’1’)	Reserved (B’0’)	SelfTest (B’0’)	DevOfl (B’x’)	UnitOfl (B’x’)
2	Reserved (X’00’)							
3	Parameter List Length (X’0008’)							
4								
5	Vendor Specific (B’00’)		Reserved (B’0000’)				Flag	Link

Send Diagnostic Parameter Data — Force Dump

Table 65 shows the parameter data for the Send Diagnostic command.

Table 65. Send Diagnostic Parameter Data — Force Dump

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Page Code (X’80’)							
1	Reserved (X’00’)							
2	Page Length (X’0004’)							
3								
4	Diagnostic ID (X’0160’)							
5								
6	Flags (B’0000000’)							Cartridge Required (B’x’)
7	Reserved (X’00’)							
Note: The Cartridge Required flag can be set to 0 or 1.								

Receive Diagnostic Results Command — Force Dump

There are no diagnostic results for this function.

Write Dump to Cartridge Diagnostic

This diagnostic causes dump information residing in the Magstar MP drive control storage to be written to a cartridge without the need to retrieve the dump data across the SCSI interface. A cartridge is required to be loaded to run the diagnostic.

Send Diagnostic Command — Write Dump to Cartridge

Table 66 shows the Send Diagnostic command format to specify Write Dump to Cartridge.

Table 66. Send Diagnostic Command — Write Dump to Cartridge

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'1D')							
1	Logical Unit Number B'000'			PF (B'1')	Reserved (B'0')	SelfTest (B'0')	DevOfl (B'x')	UnitOfl (B'1')
2	Reserved (X'00')							
3	Parameter List Length (X'0008')							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link
Note: Either the Link bit should be set or the LUN should be reserved if the Receive Diagnostic Results SCSI command is issued.								

Send Diagnostic Parameter Data — Write Dump to Cartridge

Table 67 shows the parameter data for the Send Diagnostic command.

Table 67. Send Diagnostic Parameter Data — Write Dump to Cartridge

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Page Code (X'80')							
1	Reserved (X'00')							
2	Page Length (X'0004')							
3								
4	Diagnostic ID (X'0161')							
5								
6	Flags (B'0000000')							Cartridge Required (B'1')
7	Reserved (X'00')							
Note: Because the Cartridge Required flag is set to 1, a cartridge must be loaded and ready before the diagnostic is run.								

Receive Diagnostic Results Command — Write Dump to Cartridge

Table 68 shows the Receive Diagnostic Results command format for the Write Dump to Cartridge diagnostic.

Table 68. Receive Diagnostic Results Command — Write Dump to Cartridge

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'1C')							
1	Logical Unit Number B'000'			Reserved (B'00000')				
2	Reserved (X'00')							
3	Allocation Length							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

Receive Diagnostic Results Data — Write Dump to Cartridge

Table 69 shows the diagnostic results data received from the Write Dump to Cartridge diagnostic.

Table 69. Receive Diagnostic Results Data — Write Dump to Cartridge

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Page Code (X'80')							
1	Reserved (X'00')							
2	Page Length (X'004D')							
3								
4	Diagnostic ID (X'0161')							
5								
6	Flags (X'00')							
7	Reserved (X'00')							
8	Reserved (B'00000')					Diagnostic Blocked	SIM/MIM Present	Error
9-80	SIM/MIM message or all zeros							

Note:

The Error bit in byte is set if an error occurs while writing the tape.

The SIM/MIM Present bit in byte 8 is set when a SIM or MIM message is contained in the diagnostic results.

The SIM/MIM messages are defined exactly as described under the Log Sense command, Page Code X'31'; the SIM/MIM is not valid if the SIM/MIM Present bit is 0.

Create FMR Cartridge Diagnostic

This diagnostic causes the Magstar MP drive microcode to write a copy to a cartridge to make it a field microcode replacement (FMR) cartridge. A cartridge is required to be loaded to run the diagnostic.

This permits you to copy a functional microcode load onto a cartridge for transporting to another drive when a FMR cartridge is not available.

Note: This function is also available from the operator panel.

Send Diagnostic Command — Create FMR Cartridge

Table 70 shows the Send Diagnostic command format to specify Create FMR Cartridge.

Table 70. Send Diagnostic Command — Create FMR Cartridge

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'1D')							
1	Logical Unit Number B'000'			PF (B'1')	Reserved (B'0')	SelfTest (B'0')	DevOfl (B'x')	UnitOfl (B'1')
2	Reserved (X'00')							
3	Parameter List Length (X'0008')							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link
Note: Either the Link bit should be set or the LUN should be reserved if the Receive Diagnostic Results SCSI command is issued.								

Send Diagnostic Parameter Data — Create FMR Cartridge

Table 71 shows the parameter data for the Send Diagnostic command.

Table 71. Send Diagnostic Parameter Data — Create FMR Cartridge

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Page Code (X'80')							
1	Reserved (X'00')							
2	Page Length (X'0004')							
3								
4	Diagnostic ID (X'0170')							
5								
6	Flags (B'0000000')							Cartridge Required (B'1')
7	Reserved (X'00')							
Note: Because the Cartridge Required flag is set to 1, a cartridge must be loaded and ready before the diagnostic is run.								

Receive Diagnostic Results Command — Create FMR Cartridge

Table 72 shows the Receive Diagnostic Results command format for the Create FMR Cartridge diagnostic.

Table 72. Receive Diagnostic Results Command — Create FMR Cartridge

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'1C')							
1	Logical Unit Number B'000'			Reserved (B'00000')				
2	Reserved (X'00')							
3	Allocation Length							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

Receive Diagnostic Results Data — Create FMR Cartridge

Table 73 shows the diagnostic results data received from the Create FMR Cartridge diagnostic.

Table 73. Receive Diagnostic Results Data — Create FMR Cartridge

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Page Code (X'80')							
1	Reserved (X'00')							
2	Page Length (X'004D')							
3								
4	Diagnostic ID (X'0170')							
5								
6	Flags (X'00')							
7	Reserved (X'00')							
8	Reserved (B'000000')					Diagnostic Blocked	SIM/MIM Present	Error
9-80	SIM/MIM message or all zeros							

Note:

The Error bit in byte 8 is set if an error occurs while creating the FMR cartridge.

The SIM/MIM Present bit in byte 8 is set when a SIM or MIM message is contained in the diagnostic results.

SIM/MIM messages are defined exactly as described under the Log Sense command, Page Code X'31'; the SIM/MIM is not valid if the SIM/MIM Present bit is 0.

Set Traps Diagnostic

This diagnostic permits a SCSI interface user to set a microcode trap that causes a dump to occur when the trap is sprung. The drive continues to operate after the dump completes.

Send Diagnostic Command — Set Traps

Table 74 shows the Send Diagnostic command format to specify Set Traps.

Table 74. Send Diagnostic Command — Set Traps

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'1D')							
1	Logical Unit Number B'000'			PF (B'1')	Reserved (B'0')	SelfTest (B'0')	DevOfl (B'x')	UnitOfl (B'x')
2	Reserved (X'00')							
3	Parameter List Length (X'000A')							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

Send Diagnostic Parameter Data — Set Traps

Table 75 shows the parameter data for the Send Diagnostic command.

Table 75. Send Diagnostic Parameter Data — Set Traps

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Page Code (X'80')							
1	Reserved (X'00')							
2	Page Length (X'0006')							
3								
4	Diagnostic ID (X'0190')							
5								
6	Flags (B'0000000')							Cartridge Required (B'x')
7	Reserved (X'00')							
8	Fault Symptom Code							
9								

Note:

If the Cartridge Required flag is set to 1, a cartridge must be loaded and ready before the diagnostic is run.

Receive Diagnostic Results Command — Set Traps

There are no diagnostic results for this function.

Remove Traps Diagnostic

This diagnostic permits a SCSI interface user to remove a microcode trap that was set either via the operator panel or the SCSI Set Traps Diagnostic.

Send Diagnostic Command — Remove Traps

Table 76 shows the Send Diagnostic command format to specify Remove Traps.

Table 76. Send Diagnostic Command — Remove Traps

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'1D')							
1	Logical Unit Number B'000'			PF (B'1')	Reserved (B'0')	SelfTest (B'0')	DevOfl (B'x')	UnitOfl (B'x')
2	Reserved (X'00')							
3	Parameter List Length (X'000A')							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

Send Diagnostic Parameter Data — Remove Traps

Table 77 shows the parameter data for the Send Diagnostic command.

Table 77. Send Diagnostic Parameter Data — Remove Traps

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Page Code (X'80')							
1	Reserved (X'00')							
2	Page Length (X'0006')							
3								
4	Diagnostic ID (X'0191')							
5								
6	Flags (B'0000000')							Cartridge Required (B'x')
7	Reserved (X'00')							
8	Fault Symptom Code							
9								

Note:

If the Cartridge Required flag is set to 1, a cartridge must be loaded and ready before the diagnostic is run.

Receive Diagnostic Results Command — Remove Traps

There are no diagnostic results for this function.

Set Drive Parameters Diagnostic

This diagnostic changes selected Magstar MP drive parameters.

Send Diagnostic Command — Set Drive Parameters

Table 78 shows the Send Diagnostic command format to specify running the Set Drive Parameters diagnostic.

Table 78. Send Diagnostic Command — Set Drive Parameters

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'1D')							
1	Logical Unit Number B'000'			PF (B'1')	Reserved (B'0')	SelfTest (B'0')	DevOfl (B'1')	UnitOfl (B'x')
2	Reserved (X'00')							
3	Parameter List Length (X'0014')							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

Send Diagnostic Parameter Data — Set Drive Parameters

Table 79 shows the parameter data for the Send Diagnostic command.

Table 79. Send Diagnostic Parameter Data — Set Drive Parameters

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Page Code (X'80')							
1	Reserved (X'00')							
2	Page Length (X'0010')							
3								
4	Diagnostic ID (X'2000')							
5								
6	Flags (B'0000000')							Cartridge Required
7	Reserved (X'00')							
8	Tension Value							
9								
10	Compressor Value							
11								
12	Reserved (B'0000000')							Single MIU Mode
13	Reserved (X'00')							
14	Reserved (X'00')							
15	Reserved (X'00')							
16	Reserved (X'00')							
17	Reserved (X'00')							
18	Reserved (X'00')							
19	Reserved (X'00')							

Receive Diagnostic Results Command — Set Drive Parameters

There are no diagnostic results for this function.

Reset VSARS Diagnostic

This diagnostic resets the VOLUME SARS data in the Magstar MP drive.

Send Diagnostic Command — Reset VSARS

Table 80 shows the Send Diagnostic command format to specify running the Reet VSARS diagnostic.

Table 80. Send Diagnostic Command — Reset VSARS

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'1D')							
1	Logical Unit Number B'000'			PF (B'1')	Reserved (B'0')	SelfTest (B'0')	DevOfl (B'1')	UnitOfl (B'x')
2	Reserved (X'00')							
3	Parameter List Length (X'0008')							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

Send Diagnostic Parameter Data — Reset VSARS

Table 81 shows the parameter data for the Send Diagnostic command.

Table 81. Send Diagnostic Parameter Data — Reset VSARS

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Page Code (X'80')							
1	Reserved (X'00')							
2	Page Length (X'0004')							
3								
4	Diagnostic ID (X'2001')							
5								
6	Flags (B'0000000')							Cartridge Required (B'1')
7	Reserved							

Receive Diagnostic Results Command — Reset VSARS

There are no diagnostic results for this function.

Reset Drive Diagnostic

This diagnostic aborts all current drive operations and restarts the functional microcode. This reset is equivalent to a power on reset. (This function can also be specified from the operator panel.)

Send Diagnostic Command — Reset Drive

Table 82 shows the Send Diagnostic command format to specify Reset Drive.

Table 82. Send Diagnostic Command — Reset Drive

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'1D')							
1	Logical Unit Number B'000'			PF (B'1')	Reserved (B'0')	SelfTest (B'0')	DevOfl (B'1')	UnitOfl (B'x')
2	Reserved (X'00')							
3	Parameter List Length (X'0008')							
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

Send Diagnostic Parameter Data — Reset Drive

Table 83 shows the parameter data for the Send Diagnostic command.

Table 83. Send Diagnostic Parameter Data — Reset Drive

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Page Code (X'80')							
1	Reserved (X'00')							
2	Page Length (X'0004')							
3								
4	Diagnostic ID (X'2002')							
5								
6	Flags (B'0000000')							Cartridge Required (B'1')
7	Reserved							

Receive Diagnostic Results Command — Reset Drive

There are no diagnostic results for this function.

Space —X'11'

The Space command is supported by the Magstar MP drive. With the Magstar MP medium format, this command is implemented similar to the Locate command, causing the tape to move at high speed when appropriate (5 m/s). Table 84 shows the command format.

Table 84. Space Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'11')							
1	Logical Unit Number			Reserved		Code		
2	Count							
3								
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

The following Magstar MP-specific parameters apply:

- Code

  The following codes are supported:
  - B'000' Blocks
  - B'001' Filemarks
  - B'010' Sequential Filemarks
  - B'011' End of Data
- Count

  When spacing over blocks or filemarks, the count field specifies the number of blocks or filemarks to be spaced over in the current partition. A positive value N in the count field causes forward positioning (toward End of Partition) over N blocks or filemarks ending on the End of Partition side of the last block or filemark. A zero value in the count field causes no change of logical position. A negative value -N (two's complement notation) in the count field causes reverse positioning (toward Beginning Of Partition) over N blocks or filemarks ending on the Beginning of Partition side of the last block or filemark.
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

If the drive encounters End-of-Data (EOD) while executing this command, the command is terminated at the EOD position and CHECK CONDITION status is returned with associated sense data of 8/0005 (Blank Check, End-of-Data Detected). If the next motion command is another request to move forward (beyond EOD), the drive accepts the command and attempts to position beyond EOD in order to allow recovery of old data.

Test Unit Ready — X’00’

The Test Unit Ready command is supported by the Magstar MP drive. Table 85 shows the command format.

Table 85. Test Unit Ready Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X’10’)							
1	Logical Unit Number			Reserved				
2	Reserved							DDCC
3	Reserved							
4	Reserved							
5	Vendor Specific (B’00’)		Reserved (B’0000’)				Flag	Link

The following Magstar MP-specific parameters apply:

- DDCC (Disable Deferred CHECK CONDITION)
  - B'0': Deferred CHECK CONDITION status may be reported for this command.
  - B'1': Deferred CHECK CONDITION status is not to be reported for this command.
- See “Control Byte Definition” on page 24 for Flag and Link bit descriptions.

Write — X'0A'

The Write command is supported by the Magstar MP drive. Table 86 shows the command format.

Table 86. Write Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'0')							
1	Logical Unit Number			Reserved				Fixed
2	Transfer Length							
3								
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

The following Magstar MP-specific parameters apply:

- The Fixed option of the Write command is supported. See also "Data Transfer, Block Limits, and Fixed Block Option" on page 225.
- Transfer Length: value from X'000000' (zero bytes) to X'040000' (262,144 bytes).A Transfer Length of X'000000' indicates that no data is transferred. This condition is not considered an error and the logical position is not changed.
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

Write Buffer —X'3B'

The Write Buffer command is supported, but not all buffers are described in this document because most buffers are intended only to be written by the service representative or by manufacturing. OEM customers who intend to support host microcode download on a new platform should contact IBM for a complete description of the Write Buffer command for this purpose. Note that new microcode may also be loaded without requiring the use of the SCSI Write Buffer command, by using the Field Microcode Replacement (FMR tape) process described in the maintenance information manual for this product (see "Magstar® MP Publications" on page x). See "Magstar MP Drive Buffers" on page 126 for a list of the buffers supported by the drive. (Table 87 shows the command format.)

Table 87. Write Buffer Command

Bit / Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'1D')							
1	Logical Unit Number			Reserved		Mode		
2	Buffer ID							
3	Buffer Offset							
4								
5								
6	Parameter List Length							
7								
8								
9	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

The following Magstar MP-specific parameters apply:

- Mode: Mode 1 (Vendor Unique) and Mode 5 (Download Microcode and Save) are supported. The Model C tape drive also supports Mode 6 (Download Microcode With Offsets) and Mode 7 (Download Microcode With Offsets and Save).
- Buffer ID: The buffers supported in the Magstar MP drive are described in Table 35 on page 126.
- Buffer Offset: The Magstar MP drive defines the buffer offset field to be the address of the first location to be written by the current Write Buffer command.
- Parameter List Length field: The number of bytes to be transferred.
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

Note: If a Download Microcode and Save option is in progress and an error or abort occurs, the drive will proceed with a power-on reset in order to recover.

Write Filemarks —X'10'

The Write Filemarks command is supported by the Magstar MP drive. Table 88 shows the command format.

Table 88. Write Filemarks Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'10')							
1	Logical Unit Number			Reserved			WSmk	Immed
2	Transfer Length							
3								
4								
5	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

The following Magstar MP-specific parameters apply:

- The WSmk (Write Setmark): B'0'
- Immed (Immediate):
  - B'0': present status when command is completed.
  - B'1': present status when command is verified.
- Transfer Length:

  Because the WSmk is set to B'0', the field indicates the number of filemarks to be written.
- See "Control Byte Definition" on page 24 for Flag and Link bit descriptions.

After any buffered write operation completes, the initiator can issue a Write Filemarks command with the Immed bit set to B'0' and the Transfer Length set to X'000000' to ensure that all buffered data and filemarks are successfully written to the medium (synchronized).

Chapter 3. Library SCSI Commands

This chapter describes the SCSI commands supported for the Magstar MP library when addressed as an Independent Medium Changer device at LUN-1 (2-LUN addressing).

"Chapter 2. Drive SCSI Commands" on page 21 describes the SCSI commands supported for the Magstar MP drive.

The following SCSI command descriptions have a table describing the fields in the Command Descriptor Block (CDB), similar to the style used in the applicable *ANSI Small Computer System Interface-3* standard. The descriptions following each CDB specify the options, values, and ranges for the fields described in the CDB as supported by the Magstar MP library. See the applicable *ANSI Small Computer System Interface-3* standard for a description of the CDB and its fields.

Library SCSI Commands Listed Alphabetically

Table 89 provides a list of all commands defined by the referenced SCSI-3 standard for medium changer devices. For each command, the operation code, reference page for this specification, applicable SCSI-3 standard, and applicability of certain conditions to the command are shown.

Table 89. Magstar MP Library Commands (LUN 1)

Command Name	Operation Code	See page	SCSI Document	Applicable Conditions: RVC[1] UAT NRD WRP MFC DCC
Change Definition	X'40'	NS	SPC	Y Y - - - -
Exchange Medium	X'A6'	NS	SMC	Y Y Y - - Y
Initialize Element Status	X'07'	182	SMC	Y Y Y - - Y
Inquiry	X'12'	183	SPC	- - - - - -
Log Select	X'4C'	NS	SPC	Y Y - - - -
Log Sense	X'4D'	186	SPC	Y - Y - - -
Mode Select (6)	X'15'	187	SPC	Y Y - - - -
Mode Select (10)	X'55'	188	SPC	Y Y - - - -
Mode Sense (6)	X'1A'	189	SPC	- Y Y - - -
Mode Sense (10)	X'5A'	191	SPC	- Y Y - - -
Move Medium	X'A5'	198	SMC	Y Y Y - - Y
Position to Element	X'2B'	200	SMC	Y Y Y - - Y
Prevent Allow Medium Removal	X'1E'	NS	SPC	Y Y Y - - -
Read Buffer	X'3C'	NS	SPC	Y - - - - -
Read Element Status	X'B8'	201	SMC	- Y Y - - -
Receive Diagnostic Results	X'1C'	212	SPC	Y Y - - - -
Release Element (6)	X'17'	213	SMC	-[2] Y - - - -
Request Sense	X'03'	214	SPC	- - - - - -
Request Volume Element Address	X'B5'	NS	SMC	Y Y - - - Y
Reserve Element (6)	X'16'	215	SMC	Y[3] Y - - - -
Rezero Unit	X'01'	NS	SPC	Y Y - - - -
Send Diagnostic	X'1D'	217	SPC	Y Y - - - -
Send Volume Tag	X'B6'	NS	SMC	Y Y Y - - Y
Test Unit Ready	X'00'	175	SPC	Y Y Y - - Y[4]
Write Buffer	X'3B'	177	SPC	Y Y - - - -

Table 89. Magstar MP Library Commands (LUN 1) (continued)

Command Name	Operation Code	See page	SCSI Document	Applicable Conditions: RVC[1] UAT NRD WRP MFC DCC

Legend:

M	Mandatory	RVC	Reservation Conflict status
O	Optional	UAT	CHECK CONDITION status for Unit Attention
VU	Vendor-Unique	NRD	CHECK CONDITION status for Not Ready
-	Not Applicable	NRD	CHECK CONDITION status for Not Ready
NS	Not Supported	WRP	CHECK CONDITION status for Write Protected
		MFC	CHECK CONDITION status for Medium Format Corrupted
		DCC	Deferred CHECK CONDITION
		Y	Yes (Condition Applies)
		Y^n	Yes (Condition applies per note n below)

Notes:

1. If an I/O process consists of linked commands and begins with a command which is not subject to the RVC condition, subsequent commands in the I/O process are subject to Reservation Conflict status if the command is subject to the RVC condition and a reservation conflict exists.
2. Performs no operation if logical unit is reserved to another initiator.
3. Condition applies if logical unit is reserved to another initiator.
4. Reporting of deferred CHECK CONDITION status for the Test Unit Ready command is optional based on a vendor-unique field in the CDB.

Initialize Element Status — X‘07’

Table 90. Initialize Element Status Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X’07’)							
1	Logical Unit Number			Reserved				
2	Reserved							
3	Reserved							
4	Reserved							
5	Control							

The Initialize Element Status command will cause the library to check all elements for media present and any other status relevant to that element. The intent of this command is to enable the initiator to get a quick response from a subsequent Read Element Status command.

This command is only accepted when the library door is closed and the library is in random mode. If this command is received while the library door is open or while the library is not in random mode, the device will return CHECK CONDITION status with the associated sense data of 2/0485 (Not Ready, Open Door), 2/048E (Not Ready, In Automatic/Sequential Mode), or 2/048D (Not Ready, In Manual Mode).

Inquiry —X‘12’

The Inquiry command supported by the library (LUN 1) is the same as the Inquiry command supported by the drive (LUN 0).

The Inquiry data returned by the library is different from the drive. There are several forms of Inquiry data. The following are supported and described in more detail as follows:

- “Inquiry Standard Data: Valid LUN (Logical Unit Number)” on page 30
- “Inquiry Standard Data: Invalid LUN” on page 32
- “Inquiry Page X‘00’” on page 184
- “Inquiry Page X’03’: ASCII Information” on page 35
- “Inquiry Page X’80’: Unit Serial Number” on page 36
- “Inquiry Page X‘83’: Device Identification” on page 185
- “Inquiry Page X'D0'” (the contents of this page are not specified in this document)

Refer to Table 9 on page 30 for a description of the Inquiry command.

Split Configuration

For a Split Configuration, LUN 1 is a valid LUN for both the drive 1 port and the drive 2 port. In a Base configuration, LUN 1 is an invalid LUN for the drive 2 port.

Inquiry Page X‘00’

The following Magstar MP-specific parameters apply to this request:

- CmdDt: B'0'
- EVPD (Enable Vital Product Data): B'1'
- Page Code: X'00'
- Allocation Length: X'09' bytes available
- See “Control Byte Definition” on page 24 for Flag and Link bit descriptions.

For a LUN that is associated with an installed device (see “SCSI-ID and LUN Assignments” on page 225), the following data is returned:

Byte	Description
0	Peripheral Data
	Bit **Description** **7-5** Peripheral Qualifier: B'000' **4-0** Peripheral Device Type: X'08'
1	Page Code: X'00'
2	Reserved
3	Page Length (n-3): X'05'
4	Supported Page: X'00'
5	Supported Page: X'03'
6	Supported Page: X'80'
7	Supported Page: X'83'
8	Supported Page: X'D0'

Inquiry Page X‘83’: Device Identification

The following Magstar MP-specific parameters apply to this request:

- CmdDt: B'0'
- EVPD (Enable Vital Product Data): B'1'
- Page Code: X'83'
- Allocation Length: X'30' (48) bytes available

For a LUN that is associated with an installed device (see “SCSI-ID and LUN Assignments” on page 225), the following data is returned:

Byte	Description
0	**Bit** **Description** **7-5** Peripheral Qualifier: B'000' **4-0** Peripheral Device Type: X'08'
1	Page Code: X'83'
2	Reserved
3	Page Length: X'2C'
	Identification Descriptor
4	**Bit** **Description** **7-4** Reserved **3-0** Code Set: X'2' (Identifier is all ASCII)
5	**Bit** **Description** **7-6** Reserved **5-4** Association: B'00' **3-0** Identifier Type: X'1'
6	Reserved
7	Identifier Length: X'28'
8-15	Vendor ID (same as Inquiry Standard Data bytes 8-15)
16-31	Device Type and Model Number (same as Inquiry Standard Data bytes 16-31)
32-43	Serial Number of device, right justified with leading zeroes, in ASCII (same as Inquiry Standard Data bytes 38-49)
44-47	First Storage Element Address (ASCII representation of 4 hexadecimal digits from Mode Page X'1D', Bytes 6–7)

Log Sense —X‘4D’

The Log Sense command supported by the library (LUN 1) is the same as the Log Sense command supported by the drive (LUN 0).

The log pages supported for the Magstar MP library Log Sense command are:

- “Log Page X‘00’: Supported Log Pages”
- “Log Page X’31’: SIM/MIM” on page 53

The parameter code byte is the same for the library as for the drive.

Refer to “Log Sense —X’4D’” on page 42 for a description of the Log Sense command.

Log Page X‘00’: Supported Log Pages

This log page returns the list of log pages supported by the Magstar MP library.

Byte	Description
0	
	Bit **Description** **7-6** Reserved **5-0** Page Code (B'000000')
1	Reserved
2-3	Page Length (X'0002')
4	Supported Log Pages (X'00')
5	SIM/MIM page (X'31')

Mode Select (6) — X‘15’

The Mode Select (6) command supported by the library (LUN 1) is the same as the Mode Select (6) command supported by the drive (LUN 0).

The mode pages supported by the Magstar MP library are:
- “Mode Page X’0A’: Control Mode” on page 102
- “Mode Page X‘1D’: Element Address Assignment” on page 194
- “Mode Page X‘1E’: Transport Geometry Parameters” on page 195
- “Mode Page X‘1F’: Device Capabilities” on page 196
- “Mode Page X’20’: Library (Loader) Control” on page 108

Refer to “Mode Select (6) — X’15’” on page 84 for a description of the Mode Select (6) command.

Mode Parameter Header for Mode Select (6)

The Mode Pages for the Mode Select (6) command are preceded by a four byte Mode Parameter Header.

There is one copy of this header for each initiator.

Byte	Description
0	Mode Data Length: X'00' This field is reserved when used with the Mode Select (6) command. (When used with the Mode Sense commands, this field specifies the length in bytes of the following data that is available to be transferred. The length field does not include itself.)
1	Medium Type: X'00' This field is reserved on Medium Changer Devices.
2	Device-Specific Parameter: X'00' This field is reserved on Medium Changer Devices.
3	Block Descriptor Length: X'00' Block descriptors are not used on the Magstar MP library.

Mode Select (10) — X‘55’

The Mode Select (10) command supported by the library (LUN 1) is the same as the Mode Select (10) command supported by the drive (LUN 0).

The mode pages supported by the Magstar MP library are:

- “Mode Page X’0A’: Control Mode” on page 102
- “Mode Page X‘1D’: Element Address Assignment” on page 194
- “Mode Page X‘1E’: Transport Geometry Parameters” on page 195
- “Mode Page X‘1F’: Device Capabilities” on page 196
- “Mode Page X’20’: Library (Loader) Control” on page 108

Refer to “Mode Select (10) — X’55’” on page 88 for a description of the Mode Select (10) command.

Mode Parameter Header for Mode Select (10)

The Mode Pages for the Mode Select (10) command are preceded by an eight-byte Mode Parameter Header.

There is one copy of this header for each initiator.

Byte	Description
0-1	Mode Data Length: X'0000' This field is reserved when used with the Mode Select (10) command. (When used with the Mode Sense commands, this field specifies the length in bytes of the following data that is available to be transferred. The length field does not include itself.)
2	Medium Type: X'00' This field is reserved on Medium Changer Devices.
3	Device-Specific Parameter: X'00' This field is reserved on Medium Changer Devices.
4-5	Reserved
6-7	Block Descriptor Length: X'0000' Block descriptors are not used on the Magstar MP library.

Mode Sense (6) — X‘1A’

The Mode Sense (6) command supported by the library (LUN 1) is the same as the Mode Sense (6) command supported by the drive (LUN 0).

The mode pages supported by the Magstar MP library are:

- “Mode Page X’0A’: Control Mode” on page 102
- “Mode Page X‘1D’: Element Address Assignment” on page 194
- “Mode Page X‘1E’: Transport Geometry Parameters” on page 195
- “Mode Page X‘1F’: Device Capabilities” on page 196
- “Mode Page X’20’: Library (Loader) Control” on page 108

Refer to “Mode Sense (6) —X’1A’” on page 91 for a description of the Mode Sense (6) command.

Mode Parameter Header for Mode Sense (6)

The Mode Pages for the Mode Sense (6) command are preceded by a four byte Mode Parameter Header.

There is one copy of this header for each initiator.

Byte	Description
0	Mode Data Length: When used with the Mode Sense commands, this field specifies the length in bytes of the following data that is available to be transferred. The length field does not include itself. (This field is reserved when used with the Mode Select (6) command.)
1	Medium Type: X'00' This field is reserved on Medium Changer Devices.
2	Device-Specific Parameter: X'00' This field is reserved on Medium Changer Devices.
3	Block Descriptor Length: X'00' Block descriptors are not used on the Magstar MP library.

Split Configuration

For a Split Configuration, Mode Page X'1D' (Element Address Assignment) will be reported by the Medium Changer LUN for drive 1 with the following changes:

- Number of Storage Elements: X'0009'
- Number of Data Transfer Elements: X'0001'

All other values remain the same as “Mode Page X‘1D’: Element Address Assignment” on page 194.

For a Split Configuration, Mode Page X'1D' will be reported by the Medium Changer LUN for drive 2 with the following changes:

- First Storage Element Address: X'0029'
- Number of Storage Elements: X'000A'
- First Import/Export Element Address: X'FFFF'
- Number of Import/Export Elements: X'0000'
- First Data Transfer Element Address: X'0011'
- Number of Data Transfer Elements: X'0001'

All other values remain the same as “Mode Page X‘1D’: Element Address Assignment” on page 194.

For a Split Configuration, the Loader Mode field reported in Mode Page X'20' will reflect the Library Mode that was selected at the operator panel for the drive which is associated with the responding Medium Changer LUN.

Mode Sense (10) — X‘5A’

The Mode Sense (10) command supported by the library (LUN 1) is the same as the Mode Sense (10) command supported by the drive (LUN 0).

The mode pages supported by the Magstar MP library are:

- “Mode Page X’0A’: Control Mode” on page 102
- “Mode Page X‘1D’: Element Address Assignment” on page 194
- “Mode Page X‘1E’: Transport Geometry Parameters” on page 195
- “Mode Page X‘1F’: Device Capabilities” on page 196
- “Mode Page X’20’: Library (Loader) Control” on page 108

Refer to “Mode Sense (10) —X’5A’” on page 95 for a description of the Mode Sense (10) command.

Mode Parameter Header for Mode Sense (10)

The Mode Pages for the Mode Sense (10) command are preceded by an eight-byte Mode Parameter Header.

There is one copy of this header for each initiator.

Byte	Description
0-1	Mode Data Length: When used with the Mode Sense commands, this field specifies the length in bytes of the following data that is available to be transferred. The length field does not include itself. (This field is reserved when used with the Mode Select (10) command.)
2	Medium Type: X'00' This field is reserved on Medium Changer Devices.
3	Device-Specific Parameter: X'00' This field is reserved on Medium Changer Devices.
4-5	Reserved
6-7	Block Descriptor Length: X'0000' Block descriptors are not used on the Magstar MP library.

Split Configuration

For a Split Configuration, Mode Page X'1D' (Element Address Assignment) will be reported by the Medium Changer LUN for drive 1 with the following changes:

- Number of Storage Elements: X'0009'
- Number of Data Transfer Elements: X'0001'

All other values remain the same as “Mode Page X‘1D’: Element Address Assignment” on page 194.

For a Split Configuration, Mode Page X'1D' will be reported by the Medium Changer LUN for drive 2 with the following changes:

- First Storage Element Address: X'0029'
- Number of Storage Elements: X'000A'
- First Import/Export Element Address: X'FFFF'
- Number of Import/Export Elements: X'0000'

- First Data Transfer Element Address: X'0011'
- Number of Data Transfer Elements: X'0001'

All other values remain the same as “Mode Page X‘1D’: Element Address Assignment” on page 194.

For a Split Configuration, the Loader Mode field reported in Mode Page X'20' will reflect the Library Mode that was selected at the operator panel for the drive which is associated with the responding Medium Changer LUN.

Mode Page Format

Table 91 shows the format of the mode parameter list. The individual mode page descriptions that follow this table include the field descriptions. Each field is non-changeable unless specifically identified otherwise.

Table 91. Mode Page Format

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	PS	Reserved	Page code					
1	Page Length (n-1)							
2	Mode Parameters							
n								

Mode Page X‘1D’: Element Address Assignment

See the *ANSI Small Computer System Interface-3* standard.

This page is defined as common for all initiators. This page is a static page. Addresses defined here are those which should be used by the Move Medium command.

Byte	Description
0	

Bit	Description
7	PS: B'0'.
6	Reserved
5-0	Page Code: X'1D'

1	Parameter Length: X'12'
2-3	Medium Transport Element Address: X'0000'
4-5	Number of Medium Transport Elements: X'0001'
6-7	First Storage Element Address (magazine cell address)- X'0020'
8-9	Number of Storage Elements- X'0013'
10-11	First Import/Export Element Address (import/export elements are more often referred to as the “priority cell” or “priority slot”- X'001F'
12-13	Number of Import/Export Elements- X'0001'
14-15	First Data Transfer Element Address (the data transfer element is more commonly known as the drive, the unit with the read/write head)- X'0010'
16-17	Number of Data Transfer Elements- X'0001' (X'0002' for models with 2 drives)
18-19	Reserved

Note: The fields in Mode Page X'1D' are not changeable. If a Mode Select command is issued with values other than those returned by a Mode Sense command, the device returns CHECK CONDITION status with associated sense data of 5/2600 (Illegal Request, Invalid Field in Parameter List).

Mode Page X‘1E’: Transport Geometry Parameters

The transport geometry parameters page defines whether each medium transport element is a member of a set of elements that share a common robotics subsystem and whether the element is capable of medium rotation. One transport geometry descriptor is returned for each medium transport element. Because the Magstar MP library has only one medium transport element, only one descriptor is returned.

This page is defined as common to all initiators. This page is a static page.

There are no changeable parameters in this mode page.

Byte	Description
0	
	Bit **Description**
	7 PS: B'0'
	6 Reserved
	5-0 Page Code: X'1E'
1	Page Length: X'02'
2	
	Bit **Description**
	7-1 Reserved
	0 Rotate: B'0'
	Magstar MP library does not support media rotation.
3	Member Number in Transport Element Set: X'00'

Mode Page X‘1F’: Device Capabilities

| See the *ANSI Small Computer System Interface-3* standard.

This page is defined as common for all initiators. This page is a static page.

Byte	Description
0	

Bit	Description
7	PS: B'0'
6	Reserved
5-0	Page Code: X'1F'

1	Parameter Length: X'0E'
2	Store XX Field

Bit	Description
7-4	Reserved
3	StorDT (Store in Data Transfer): B'1'
2	StorI/E (Store in Import/Export): B'1'
1	StorST (Store in Storage Element): B'1'
0	StorMT (Store in Medium Transport): B'0'

3	Reserved
4	Medium Transport Capabilities

Bit	Description
7-4	Reserved
3	MT->DT (Can move from an MT element to a DT element): B'1'
2	MT->I/E (Can move from an MT element to an I/E element): B'1'
1	MT->ST (Can move from an MT element to a ST element): B'1'
0	MT->MT (Can move from an MT element to a MT element): B'0'

5	Storage Element Capabilities

Bit	Description
7-4	Reserved
3	ST->DT (Can move from a ST element to a DT element): B'1'
2	ST->I/E (Can move from an ST element to an I/E element): B'1'
1	ST->ST (Can move from a ST element to a ST element): B'1'
0	ST->MT (Can move from an ST element to an MT element): B'0'

6	Import/Export Element Capabilities

Bit	Description
7-4	Reserved
3	I/E->DT (Can move from an I/E element to a DT element): B'1'
2	I/E->I/E (Can move from an I/E element to an I/E element): B'1'
1	I/E->ST (Can move from an I/E element to an ST element): B'1'
0	I/E->MT (Can move from an I/E element to an MT element): B'0'

7 Data Transfer Element Capabilities

Bit	Description
7-4	Reserved
3	DT->DT (Can move from a DT element to a DT element): B'0'
	Note: A move from one drive to another drive is not supported. A move from one drive back to the same drive (reload) is supported.
2	DT->I/E (Can move from an DT element to an I/E element): B'1'
1	DT->ST (Can move from a DT element to a ST element): B'1'
0	DT->MT (Can move from a DT element to an MT element): B'0'

8-11 Reserved

12 Medium Transport Element Exchange Capabilities

Bit	Description
7-4	Reserved
3	MT<>DT: B'0'
2	MT<>I/E: B'0'
1	MT<>ST: B'0'
0	MT<>MT: B'0'

13 Storage Element Exchange Capabilities

Bit	Description
7-4	Reserved
3	ST<>DT: B'0'
2	ST<>I/E: B'0'
1	ST<>ST: B'0'
0	ST<>MT: B'0'

14 Import/Export Element Exchange Capabilities

Bit	Description
7-4	Reserved
3	I/E<>DT: B'0'
2	I/E<>I/E: B'0'
1	I/E<>ST: B'0'
0	I/E<>MT: B'0'

15 Data Transport Element Exchange Capabilities

Bit	Description
7-4	Reserved
3	DT<>DT: B'0'
2	DT<>I/E: B'0'
1	DT<>ST: B'0'
0	DT<>MT: B'0'

Note: The fields in Mode Page X'1F' are not changeable. If a Mode Select command is issued with values other than those returned by a Mode Sense command, the device returns CHECK CONDITION status with associated sense data of 5/2600 (Illegal Request, Invalid Field in Parameter List).

Move Medium — X‘A5’

This command is only accepted by the Magstar MP library when the library door is closed. If this command is received while the library door is open, the device will return CHECK CONDITION status with the associated sense data of 2/0485 (Not Ready, Open Door). Table 92 shows the command format.

Table 92. Move Medium Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'A5')							
1	Logical Unit Number			Reserved				
2	Transport Element Address							
3								
4	Source Address							
5								
6	Destination Address							
7								
8	Reserved							
9	Reserved							
10	Reserved							Invert
11	Vendor Specific (B’00’)		Reserved (B’0000’)				Flag	Link

This command is only accepted when the library door is closed and the library is in random mode. If this command is received while the library door is open or while the library is not in random mode, the device will return CHECK CONDITION status with the associated sense data of 2/0485 (Not Ready, Open Door), 2/048E (Not Ready, In Automatic/Sequential Mode), or 2/048D (Not Ready, In Manual Mode).

This command may be executed even though one of the magazines is not present, provided it is not the source or destination of the move operation.

The following Magstar MP-specific parameters apply:

- Transport Element Address: X'0000' (or X'0001', which instructs the library to choose the Medium Transport). Because there is only one, either address gets the same results.
- Source/Destination Addresses:
  - Data Transfer Elements (Drives) — X'0010' (and X'0011' in models with 2 drives)
  - Import Export Element (Priority Cell) — X'001F'
  - Storage Elements (Magazine cells) — X'0020-0032' (right to left at front panel starting with the cell to the left of the Priority cell)
  - Cleaner Cartridge Storage Element (Vendor-unique) — X'00FF'

    Note: Access to this vendor-unique element is available only through this command. It is not defined in the referenced SCSI-3 standard and it is not reported in response to the Read Element Status and Mode Sense commands.

For additional information on element addresses and descriptions, see “Mode Page X‘1D’: Element Address Assignment” on page 194, “Mode Page X‘1F’: Device Capabilities” on page 196, and “Read Element Status — X‘B8’” on page 201.

Split Configuration

For a Split Configuration, initiators to either port may only move cartridges to and from elements assigned to that port (magazine 1 including the priority cell for drive 1, magazine 2 for drive 2).

If either a source or a destination element is specified that is not assigned to that port, the device will return CHECK CONDITION status and associated sense data of 5/2101 (Illegal Request, Invalid Element Address).

Position to Element — X‘2B’

Table 93. Position to Element Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'2B')							
1	Logical Unit Number			Reserved				
2	Transport Element Address							
3								
4	Destination Element Address							
5								
6	Reserved							
7	Reserved							
8	Reserved							Invert
9	Control							

This command will position the transport element (the picker) in front of the destination element specified.

This command is only accepted when the library door is closed and the library is in random mode. If this command is received while the library door is open, or while the library is not in random mode, the device will return CHECK CONDITION status with the associated sense data of 2/0485 (Not Ready, Open Door), 2/048E (Not Ready, In Automatic/Sequential Mode), or 2/048D (Not Ready, In Manual Mode).

The following Magstar MP-specific parameters apply:

- Transport Element Address: X'0000' (Or X'0001', which instructs the library to choose the Medium Transport. Because there is only one, either address gets the same results.)
- Destination Addresses:
  - Data Transfer Elements (drives)-X'0010' (and X'0011' in models with 2 drives)
  - Import Export Element (Priority Cell)-X'001F'
  - Storage Elements (Magazine cells)-X'0020-0032' (right to left at front panel starting with the cell to the left of the Priority cell)

  Note: The Medium Transport Element is not capable of storing a media element. If this element address is specified as a Destination Address in a Position to Element command, the command is presented CHECK CONDITION status with associated sense data of 5/2101 (Illegal Request, Invalid Element Address).
- Invert: B'0'
- See “Control Byte Definition” on page 24 for Flag and Link bit descriptions.

For further information on element addresses and descriptions refer to “Mode Page X‘1D’: Element Address Assignment” on page 194 and to “Read Element Status — X‘B8’” on page 201.

Read Element Status — X‘B8’

Table 94 shows the command format.

Table 94. Read Element Status Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation code (X'B8')							
1	Logical Unit Number			VolTag	Element Type Code			
2	Starting Element Address							
3								
4	Number of Elements							
5								
6	Reserved						CURDATA	DVCID
7	Allocation Length							
8								
9								
10	Reserved							
11	Vendor Specific (B'00')		Reserved (B'0000')				Flag	Link

The following Magstar MP-specific parameters apply:

- VolTag (Volume Tags):
  - B'0': Requests the device to not report volume tag information.
  - B'1': Requests the device to report volume tag information.
- Element Type Code:

  Value **Description**
  X'0' Report all element types
  X'1' Report Medium Transport Elements only
  X'2' Report Storage Elements only
  X'3' Report Import/Export Elements only
  X'4' Report Data Transfer Elements only
- Starting Element Address is the minimum element address to report.
- Number of Elements is the maximum number of elements to be included in this report.
- CURDATA
  - B'0': Motion is allowed as needed in order to return a maximum set of valid element status data.
  - B'1': Motion is not allowed — a minimum set of valid data may be returned. This field is supported for SCSI-3 compliance, but it is not required to be set to B'1' in order to obtain the Device IDs for the Data Transfer Elements. All other data will be returned as invalid with an ASC/ASCQ in each element descriptor set to 81/00 or 82/00 (Status is Questionable).
- DVCID
  - B'0': Requests the library to report status for the element(s) indicated in the Element Type Code field.
  - B'1': Requests the library to report device identifiers, if available, for the Data Transfer Elements. If this bit is set to B'1', the Voltage field must be set to B'0' and the Element Type Code field must be set to X'4'. Otherwise, the device returns CHECK CONDITION status with associated sense data of 5/2400 (Illegal Request, Invalid Field in CDB).
- Allocation Length is the maximum number of bytes of data to be returned for this report.

- See “Control Byte Definition” on page 24 for Flag and Link bit descriptions.

Element Status Data

This data is a header that precedes the specific element type information, if any. Following this data are zero or more Element Status Pages, up to one for each of the four Element Types supported, if the command permits. Following each Element Status Page are zero or more Element Descriptors, up to one Element Descriptor for each element cell of that element type in the library, again if the data in the CDB permits.

Byte	Description
0-1	First Element Address Reported: The smallest element address found to meet the CDB request. For the Magstar MP library, the lowest value is X'0000' and the highest value is X'0032'.
2-3	Number of Elements The number of elements meeting the request in the CDB. For the Magstar MP library, the lowest value is X'0000' and the highest value is X'0016' (or X'0017' for models with 2 drives).
4	Reserved
5-7	Byte Count of Report Available

Element Status Page

There is one status page for each of the element types to be reported.

Byte	Description
0	Element Type Code Indicates the element type reported by this page. (The Element Type Codes allowed for the Element Status Page are 1, 2, 3, and 4; 0 is allowed for the CDB only.)
1	Tag Byte

Bit	Description
7	PVolTag (Primary Volume Tag): • B'0': Indicates that the primary volume tag information is omitted from the element descriptors that follow. • B'1': Indicates that the primary volume tag information field is present in each of the element descriptors that follow.
6	AVolTag (Alternate Volume Tag): B'0' The Magstar MP library does not support AVolTag.
5-0	Reserved

2-3	Element Descriptor Length: X'0010' or X'0034' (if VolTag=B'1' or DVCID=B'1' in CDB).
4	Reserved
5-7	Byte Count of Descriptor Data Available The number of bytes of element descriptor data available for elements of this element type meeting the request in the CDB.

Element Descriptors

For each Element Type, there is a set of Element Descriptors, one descriptor for each element in the library of that Element Type, up to the limit imposed by the CDB. These pages are described below.

Element Type 1: Medium Transport Element Descriptor. This is the element associated with the transport mechanism. Cartridges are never stored in the transport mechanism. However, this element descriptor can indicate the transport contains a cartridge in certain error conditions.

Byte **Descriptor**

0-1 Element Address: X'0000'

The element address field gives the address of the medium changer element whose status is reported by this element descriptor block. There is only one medium transport element in the library. For additional details regarding physical locations, see “Mapping Element Addresses To Physical Locations” on page 17.

2

Bit	Description
7-3	Reserved
2	Except • B'0': The transport is in a normal state. • B'1': The transport is in an abnormal state.
1	Reserved
0	Full • B'0': The transport does not contain a cartridge. • B'1': The transport contains a cartridge. A value of B'1' indicates an error has occurred and recovery is required. Recovery of the cartridge from the transport can be performed by the host using the Move Medium command or by the operator using operator panel menus.

3 Reserved

4-5 Additional Sense Code (ASC)/Additional Sense Code Qualifier (ASCQ):

The ASC/ASCQ fields may provide specific information on an abnormal element state when the Except bit is set to B'1':

11/00 Unable to Read Bar Code Label

81/00 Status is Questionable (for example, the door is open)

6-8 Reserved

9

Bit	Description
7	SValid: • B'0': Indicates that the Source Storage Element Address field is not valid. • B'1': Indicates that the Source Storage Element Address field is valid.
6	Invert: B'0' The Magstar MP library does not invert cartridges.
5-0	Reserved

10-11 Source Storage Element Address

When SValid is B'1', this field provides the address of the last storage element from which this cartridge was moved.

12-47 Primary Volume Tag information

The presence or absence of this field is indicated by the PVolTag field in byte 1 of the Element Status Page (see “Element Status Page” on page 203). This is a 36-byte ASCII field containing the

cartridge bar code label, left-adjusted and padded on the right with blanks. The first character of this field is ASCII 'F' for the original ("B-Format") version of the Magstar MP data cartridge and for the Magstar MP cleaning cartridge. The first character of this field is ASCII 'G' for the C-Format version of the Magstar MP data cartridge. The first character of this field is ASCII 'H' for the C-Format XL version of the Magstar MP cartridge.

Normally, there is no cartridge present in the picker when this command is processed; however, if a cartridge is present and label information is available, it will be returned.

48-51 Reserved (Bytes 12-15 if PVolTag is set to B'0')

Element Type 2: Storage Element Descriptor. This is the element used for cartridge storage.

Byte	Descriptor
0-1	Element Address: The range of element addresses reported in this field may be a subset of the values listed below based upon the library configuration. The range of addresses for Magstar MP are X'0020-0032'. For additional details regarding physical locations, see "Mapping Element Addresses To Physical Locations" on page 17.
2	**Bit** **Description** **7-4** Reserved **3** Access • B'0': Indicates that access to the storage element by a medium transport element is denied. • B'1': Indicates that access to the storage element by a medium transport element is allowed. **Note:** An example of when access would be denied is when the magazine cell has a cartridge in the Export position. **2** Except • B'0': The element is in a normal state. • B'1': The element is in an abnormal state. **1** Reserved **0** Full • B'0': The element does not contain a cartridge. • B'1': The element cell contains a cartridge.
3	Reserved
4-5	Additional Sense Code (ASC)/Additional Sense Code Qualifier (ASCQ): The ASC/ASCQ fields may provide specific information on an abnormal element state when the Except bit is set to B'1': **11/00** Unable to Read Bar Code Label **3B/11** Medium Magazine Not Accessible (can be caused by magazine removed or magazine unlocked) **81/00** Status is Questionable (for example, the door is open)
6-8	Reserved
9	**Bit** **Description** **7** SValid: • B'0': Indicates that the Source Storage Element Address field is not valid. • B'1': Indicates that the Source Storage Element Address field is valid. **6** Invert: B'0'

The Magstar MP library does not invert cartridges.

5-0 Reserved

10-11 Source Storage Element Address

When SValid is B'1', this field provides the address of the last storage element from which this cartridge was moved.

12-47 Primary Volume Tag information

The presence or absence of this field is indicated by the PVolTag field in byte 1 of the Element Status Page (see “Element Status Page” on page 203). This is a 36-byte ASCII field containing the cartridge bar code label, left-adjusted and padded on the right with blanks. The first character of this field is ASCII ‘F’ for the original (“B-Format”) version of the Magstar MP data cartridge and for the Magstar MP cleaning cartridge. The first character of this field is ASCII ‘G’ for the C-Format version of the Magstar MP data cartridge. The first character of this field is ASCII ‘H’ for the C-Format XL version of the Magstar MP cartridge.

48-51 Reserved (Bytes 12-15 if PVolTag is set to B'0')

Element Type 3: Import/Export Element Descriptor. This is the element used for moving volumes into and out of the medium changer.

Byte **Descriptor**

0-1 Element Address:

The element address field gives the address of the element whose status is reported by this element descriptor block. The address for the Import/Export Element is X'001F'. For additional details regarding physical locations, see “Mapping Element Addresses To Physical Locations” on page 17 .

2

Bit	Description
7-6	Reserved
5	InEnab (Import Enable): B'1' InEnab indicates that this element supports movement of media into the scope of the library.
4	ExEnab (Export Enable): B'1' ExEnab indicates that this element supports movement of media out of the scope of the library.
3	Access • B'0': Indicates that access to the Import/Export element by a medium transport element is denied. • B'1': Indicates that access to the Import/Export element by a medium transport element is allowed. **Note:** An example of when access would be denied is when the Import/Export cell already has a cartridge in the Export position.
2	Except • B'0': The element is in a normal state. • B'1': The element is in an abnormal state.
1	Reserved
0	Full • B'0': The element does not contain a cartridge. • B'1': The element cell contains a cartridge.

3 Reserved

4-5 Additional Sense Code (ASC)/Additional Sense Code Qualifier (ASCQ):

The ASC/ASCQ fields may provide specific information on an abnormal element state when the Except bit is set to B'1':

11/00 Unable to Read Bar Code Label

3B/11 Medium Magazine Not Accessible (can be caused by magazine removed or magazine unlocked)

81/00 Status is Questionable (for example, the door is open)

6-8 Reserved

9

Bit	Description
7	SValid: • B'0': Indicates that the Source Storage Element Address field is not valid. • B'1': Indicates that the Source Storage Element Address field is valid.
6	Invert: B'0' The Magstar MP library does not invert cartridges.
5-0	Reserved

10-11 Source Storage Element Address

When SValid is B'1', this field provides the address of the last storage element from which this cartridge was moved.

12-47 Primary Volume Tag information

The presence or absence of this field is indicated by the PVolTag field in byte 1 of the Element Status Page (see “Element Status Page” on page 203). This is a 36-byte ASCII field containing the cartridge bar code label, left-adjusted and padded on the right with blanks. The first character of this field is ASCII ‘F’ for the original (“B-Format”) version of the Magstar MP data cartridge and for the Magstar MP cleaning cartridge. The first character of this field is ASCII ‘G’ for the C-Format version of the Magstar MP data cartridge. The first character of this field is ASCII ‘H’ for the C-Format XL version of the Magstar MP cartridge.

48-51 Reserved (Bytes 12-15 if PVolTag is set to B'0')

Element Type 4: Data Transfer Element Descriptor (DVCID=B'0'. This is the element descriptor block used to report the status of the drive(s).

Byte Descriptor

0-1 Element Address:

The element address field gives the address of the element whose status is reported by this element descriptor block. The address for the Data Transfer Element is X'0010' (and X'0011' for drive 2 in library models with 2 drives). For additional details regarding physical locations, see “Mapping Element Addresses To Physical Locations” on page 17.

2

Bit	Description
7-4	Reserved
3	Access • B'0': Indicates that access to the Data Transfer element by a medium transport element is denied. • B'1': Indicates that access to the Data Transfer element by a medium transport element is allowed.
2	Except • B'0': The element is in a normal state. • B'1': The element is in an abnormal state.
1	Reserved
0	Full

- B'0': The element does not contain a cartridge.
- B'1': The element contains a cartridge in a loaded or ejected position.

Note: A cartridge in the loaded position is indicated by the Full bit set to B'1' and the Access bit set to B'0'. A cartridge in the ejected position is indicated by the Full bit set to B'1' and the Access bit set to B'1'.

3 Reserved

4-5 Additional Sense Code (ASC)/Additional Sense Code Qualifier (ASCQ):

The ASC/ASCQ fields may provide specific information on an abnormal element state when the Except bit is set to B'1':

11/00 Unable to Read Bar Code Label
81/00 Status is Questionable (for example, the door is open)
82/00 Drive is Not Present or is Unable to Communicate
83/00 Medium in Drive (Unable to Access Bar Code Label)

6

Bit	Description
7	Not Bus (Not this Bus): B'0' This bit is not supported.
6	Reserved
5	ID Valid: • B'0': Indicates the SCSI Bus Address field is not valid due to a drive communication failure. • B'1': Indicates that the SCSI Bus Address field contains valid information. LU Valid: • B'0': Indicates the Logical Unit Number field is not valid due to a drive communication failure. • B'1': Indicates that the Logical Unit Number field contains valid information.
3	Reserved
2-0	Logical Unit Number: B'000' The LUN is always zero.

7 SCSI bus address

Set to the SCSI ID of the drive.

8 Reserved

9

Bit	Description
7	SValid: • B'0': Indicates that the Source Storage Element Address field is not valid. • B'1': Indicates that the Source Storage Element Address field is valid.
6	Invert: B'0' The Magstar MP library does not invert cartridges.
5-0	Reserved

10-11 Source Storage Element Address

When SValid is B'1', this field provides the address of the last storage element from which this cartridge was moved.

12-47 Primary Volume Tag information

The presence or absence of this field is indicated by the PVolTag field in byte 1 of the Element Status Page (see “Element Status Page” on page 203). This is a 36-byte ASCII field containing the

cartridge bar code label, left-adjusted and padded on the right with blanks. The first character of this field is ASCII 'F' for the original ("B-Format") version of the Magstar MP data cartridge and for the Magstar MP cleaning cartridge. The first character of this field is ASCII 'G' for the C-Format version of the Magstar MP data cartridge. The first character of this field is ASCII 'H' for the C-Format XL version of the Magstar MP cartridge.

48-51 Reserved (Bytes 12-15 if PVolTag is set to B'0')

Element Type 4: Data Transfer Element Descriptor (DVCID=B'1') This is the element descriptor block used to report the device identifiers for the drive(s).

Byte	**Description**
0-1	Element Address:
2	

Bit	**Description**
7-4	Reserved
3	Access: B'0' (Not supported when DVCID = B'1')
2	Except: B'1' (Always set when DVCID = B'1')
1	Reserved
0	Full: B'0' (Not supported when DVCID = B'1')

3 Reserved

4-5 Additional Sense Code (ASC) /Additional Sense Code Qualifier (ASCQ):
- **8100** Status is Questionable, Drive is Present
- **8200** Status is Questionable, Drive is Not Present

6

Bit	**Description**
7	Not Bus (Not this Bus): B'0'
6	Reserved
5	ID Valid: B'0' (Not supported when DVCID = B'1')
4	LU Valid: B'0' (Not supported when DVCID = B'1')
3	Reserved
2-0	Logical Unit Number: B'000'

7 SCSI bus address: X'00'

8 Reserved

9

Bit	**Description**
7	SValid: B'0' (Not supported when DVCID = B'1')
6	Invert: B'0'
5-0	Reserved

10-11 Source Storage Element Address: X'0000'

Identification Descriptor (same as Drive Inquiry Page X'83', bytes 4-43)

If the drive is not present, the following bytes, 12-51, are set to X'00'.

12

Bit	**Description**
7-4	Reserved
3-0	Code Set: X'2' (Identifier is all ASCII)

13

Bit	Description
7-6	Reserved
5-4	Association : B'00'
3-0	Identifier Type: X'1'

| **14** Reserved

| **15** Length of Device Identifier: X'24'

| **16-23** Vendor ID

| **24-39** Device Type and Model Number

| **40-51** Serial Number of device, right justified with leading zeroes, in ASCII

|

Split Configuration

For a Split Configuration, initiators to either port may only move cartridges to and from elements assigned to that port (magazine 1 including the priority cell for drive 1, magazine 2 for drive 2).

The information returned for elements that are assigned to the port that the command was received on are returned as defined for the Base Configuration.

The information returned for elements that are not assigned to that port are not returned in the Element Status Data for that port.

Receive Diagnostic Results —X‘1C’

The Receive Diagnostic Results command supported by the library (LUN 1) is the same as the Receive Diagnostic Results command supported by the drive (LUN 0).

The only Diagnostic ID supported by the Magstar MP library is X'0102', Library Diagnostic (see “Magstar MP-Supported Diagnostics” on page 152).

Refer to Table 38 on page 133 for a description of the Receive Diagnostic Results command.

Release Element (6)— X‘17’

The Release Element (6) command supported by the library (LUN 1) differs from the Release (6) command supported by the drive (LUN 0) in that the library supports the ability to release elements, where the drive does not.

Table 95. Release Element (6) Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'17')							
1	Logical Unit Number			3rdPty	Third Party Device Type			Element
2	Reservation Identification							
3	Reserved							
4	Reserved							
5	Control							

The following Magstar MP specific parameters apply:

- The 3rdPty (Third Party) release is not supported by the Magstar MP library.
- The Third Party Device ID is not supported by the Magstar MP library.
- Element:
  - B'0': The device and any reserved elements are released from any reservation by this initiator.
  - B'1': The reservation from the requesting initiator with a matching reservation identification is terminated. Other reservations from the requesting initiator shall remain in effect.
- Reservation Identification

  Identifies the reservation list to be released. The particular reservation list identified must be owned by the requesting initiator.

Request Sense — X‘03’

The Request Sense command supported by the library (LUN 1) is the same as the Request Sense command supported by the drive (LUN 0).

When acting as an Independent Medium Changer, the device only returns sense data related to the LUN which has been specified.

Refer to Table 42 on page 139 for a description of the Request Sense command.

Reserve Element (6)— X‘16’

The Reserve Element (6) command supported by the library (LUN 1) differs from the Reserve (6) command supported by the drive (LUN 0) in that the library supports the ability to reserve elements, where the drive does not.

Table 96. Reserve Element (6) Command

Bit Byte	7 MSB	6	5	4	3	2	1	0 LSB
0	Operation Code (X'16')							
1	Logical Unit Number			3rdPty	Third Party Device Type			Element
2	Reservation Identification							
3-4	Element List Length							
5	Control							

The following Magstar MP-specific parameters apply:

- The 3rdPty (Third Party) reserve is not supported by the Magstar MP library.
- Third Party Device ID is not supported.
- Element
  - B'0': this command requests that the entire device be reserved for the exclusive use of the initiator making the request.
  - B'1': this command requests that the elements in the element list be reserved for the exclusive use of the initiator making the request.
- Reservation Identification

  This field allows the initiator to assign a specific value to a list of element descriptors. Multiple reservation IDs are permitted.
- Element List Length

  Contains the size of the element list. Values must be 0, 6, or multiples of 6.

Data Format of Element List Descriptors

The element list shall consist of zero or more descriptors. Each element list descriptor defines a series of elements beginning at the specified element address for the specified number of elements.

Byte **Description**

0-1 Reserved

2-3 Number of Elements

Specifies the number of elements included in this descriptor. If the number of elements is zero, the element list shall begin at the specified element address and continue through the last element address on the device.

4-5 Element Address

The beginning element address for this descriptor.

Split Configuration

For a Split Configuration, the operation of the Reserve command is modified as described below:

- Unit reservation only affects commands received on the same port (same SCSI ID) as the reserve command.
- A unit reservation may be outstanding for each port independently.
- Reservation of elements not accessible from the port that the Reserve command was received on are not allowed and the device returns CHECK CONDITION status and associated sense data of 5/2101 (Illegal Request, Invalid Element Address).

Note: All unit and element reservations are cleared when the configuration is changed.

Send Diagnostic — X‘1D’

The Send Diagnostic command supported by the library (LUN 1) is the same as the Send Diagnostic command supported by the drive (LUN 0).

The only Diagnostic ID supported by the Magstar MP library is X'0102', Library Diagnostic (see “Magstar MP-Supported Diagnostics” on page 152).

Refer to “Send Diagnostic —X’1D’” on page 149 for a description of the Send Diagnostic command.

Test Unit Ready — X‘00’

The Test Unit Ready command supported by the library (LUN 1) is the same as the Test Unit Ready command supported by the drive (LUN 0).

Refer to “Test Unit Ready — X’00’” on page 175 for a description of the Test Unit Ready command.

Write Buffer — X‘3B’

The Write Buffer command supported by the library (LUN 1) is the same as the Write Buffer comand supported by the drive (LUN 0).

Refer to “Write Buffer —X’3B’” on page 177 for a description of the Write Buffer command.

Appendix A. SCSI Messages and Status

The Magstar MP Tape Subsystem is comprised of one or more SCSI-2 compliant devices with some important SCSI-3 extensions (deviations are noted). This appendix describes some of the specific Magstar MP implementation choices made within the SCSI architecture under the following headings:

- "Device Messages"
- "Supported SCSI Status Codes" on page 220

Note: Throughout this appendix, the Magstar MP is also called "target" and "device."

Device Messages

Table 97 defines the SCSI messages that are supported by the Magstar MP. In the table, the Target column indicates the messages used while the product is operating as a target. Messages not listed are not supported.

Table 97. Magstar MP Supported Messages

Message Name	Code	Target Send/Accept
ABORT	X'06'	N Y
ABORT TAG	X'0D'	N Y
BUS DEVICE RESET	X'0C'	N Y
COMMAND COMPLETE	X'00'	Y N
DISCONNECT	X'04'	Y N
IDENTIFY	X'80' - X'FF'	Y[1] Y
IGNORE WIDE RESIDUE	X'23'	Y[2] N
INITIATOR DETECTED ERROR	X'05'	N Y
LINKED COMMAND COMPLETE	X'0A'	Y[2] N
LINKED COMMAND COMPLETE (WITH FLAG)	X'0B'	Y[2] N
MESSAGE PARITY ERROR	X'09'	N Y
MESSAGE REJECT	X'07'	Y Y
NO OPERATION	X'08'	N Y
RESTORE POINTERS	X'03'	Y N
SAVE DATA POINTER	X'02'	Y N
SYNCHRONOUS DATA TRANSFER REQUEST	X'01'	Y[2] Y[2]
WIDE DATA TRANSFER REQUEST	X'01'	Y[2] Y[2]

Field Keys:

```
Y - Yes (Supported)
N - No  (Not Supported)
```

Note:

1. Sent during reselection.
2. The drive (LUN 0) and the library (LUN 1) support linked commands, synchronous data transfers, and wide data transfers.

Programmer Note: For the Identify Message, we strongly recommend the Disconnect Privilege bit be set if you desire error recovery on Data phase.

Supported SCSI Status Codes

The SCSI status codes are defined in the SCSI-2 standard. The Magstar MP does not use all these status codes. However, the Magstar MP complies with the SCSI standard for all status codes that it supports. The list of status codes and their use in the Magstar MP follows:

Status	Description
GOOD	Used on the last command of any nexus when the last command finishes correctly. There may be one or more commands per nexus, depending on whether linking has been used.
CHECK CONDITION	Used to report any error condition that generates a contingent allegiance for the command. Unexpected disconnect may be used when the device cannot report by other means. This is an allowable SCSI-2 option. The device prepares sense data for the event that may be retrieved with a Request Sense command. If CHECK CONDITION status is presented, a contingent allegiance does exist. If Unexpected Disconnect is used, sense data is prepared but no contingent allegiance exists (per the SCSI-2 standard).
RESERVATION CONFLICT	Used when an initiator not holding a current reservation attempts to execute an unauthorized command while a reservation is in effect.
INTERMEDIATE	Used as required by SCSI-2. This status code means the equivalent of GOOD status for linked commands (1..n-1).
BUSY	Used when required by SCSI-2 (for example, contingent allegiance). No unnecessary BUSY status is presented. However, some BUSY status reports are required and are presented. BUSY status is presented during the power-up sequence until the diagnostics are complete. Under ordinary circumstances, this is the most common reason for encountering BUSY status.
CONDITION MET	Not Used
INTERMEDIATE-CONDITION MET	Not Used
COMMAND TERMINATED	Not Used
QUEUE FULL	Not Used

Appendix B. SCSI Error Sense

This appendix lists all possible combinations of Sense Keys, Additional Sense Codes (ASC), and Additional Sense Code Qualifiers (ASCQ) that are reported by the Magstar MP.

Sense Key 0 (No Sense)

Table 98. ASC, and ASCQ Summary for Sense Key 0 (No Sense)

ASC ASCQ	Description	Drive	Library
00 00	No Additional Sense Information - EOM	X	
00 00	No Additional Sense Information - ILI	X	
00 00	No Additional Sense Information - FM	X	
00 01	Filemark Detected	X	
00 04	Beginning-of-Partition or Medium Detected	X	

Sense Key 1 (Recovered Error)

Table 99. ASC, and ASCQ Summary for Sense Key 1 (Recovered Error)

ASC ASCQ	Description	Drive	Library
00 00	No Additional Sense Information	X	X
00 17	Drive Needs Cleaning	X	
17 01	Recovered Data with Retries	X	
18 00	Recovered Data with Error Correction Applied	X	
37 00	Rounded Parameter	X	
5B 02	Log Counter at Maximum	X	
83 83	Drive Has Been Cleaned	X	

Sense Key 2 (Not Ready)

Table 100. ASC, and ASCQ Summary for Sense Key 2 (Not Ready)

ASC ASCQ	Description	Drive	Library
04 00	Logical Unit Not Ready, Cause Not Reportable	X	X
04 01	Logical Unit Is in Process of Becoming Ready	X	X
04 03	Logical Unit Not Ready, Manual Intervention Required	X	X
04 04	Logical Unit Not Ready, Format in Progress	X	
04 07	Logical Unit Not Ready, Operation in Progress	X	
04 85	Open Door		X
04 8D	In Manual (Sequential) Mode		X
04 8E	In Automatic (Sequential) Mode		X
15 01	Mechanical Positioning Error, Manual Intervention Required		X
30 03	Cleaning in Progress	X	
3A 00	Medium Not Present	X	
53 00	Media Load or Eject Failed	X	

Sense Key 3 (Medium Error)

Table 101. ASC, and ASCQ Summary for Sense Key 3 (Medium Error)

ASC ASCQ	Description	Drive	Library
03 02	Excessive Write Errors	X	
09 00	Track Following Error	X	
0C 00	Write Error	X	
11 00	Unrecovered Read Error	X	
11 01	Read Retries Exhausted	X	
11 08	Incomplete Block Read	X	
14 00	Recorded Entity Not Found	X	
14 01	Record Not Found	X	
14 02	Filemark or Setmark Not Found	X	
14 03	End-of-Data Not Found	X	
14 04	Block Sequence Error	X	
30 00	Incompatible Medium Installed	X	
30 01	Cannot Read Medium, Unknown Format	X	
30 02	Cannot Read Medium, Incompatible Format	X	
31 00	Medium Format Corrupted	X	
31 01	Format Command Failed	X	
33 00	Tape Length Error	X	
51 00	Erase Failure	X	
85 00	Write Protected Because of Tape or Drive Failure	X	
85 01	Write Protected Because of Tape Failure	X	
85 02	Write Protected Because of Drive Failure	X	

Sense Key 4 (Hardware Error)

Table 102. ASC, and ASCQ Summary for Sense Key 4 (Hardware Error)

ASC ASCQ	Description	Drive	Library
09 00	Track Following Error	X	
15 01	Mechanical Positioning Error	X	
3B 00	Sequential Positioning Error	X	
3B 08	Reposition Error	X	
40 00	Diagnostic Failure	X	
44 00	Internal Target Failure	X	X
	Drive Needs Cleaning, Warning Threshold Exceeded	X	
4C 00	Logical Unit Failed Self-Configuration	X	
52 00	Cartridge Fault	X	
53 00	Media Load or Eject Failed	X	
53 01	Unload Tape Failure	X	

Sense Key 5 (Illegal Request)

Table 103. ASC, and ASCQ Summary for Sense Key 5 (Illegal Request)

ASC ASCQ	Description	Drive	Library
1A 00	Parameter List Length Error	X	X
20 00	Invalid Command Operation Code	X	X
21 01	Invalid Element Address		X
24 00	Invalid Field in CDB	X	X
25 00	Logical Unit Not Supported	X	X
26 00	Invalid Field in Parameter List	X	X
26 01	Parameter Not Supported	X	
26 02	Parameter Value Invalid	X	
26 03	Threshold Parameters Not Supported	X	
2C 00	Command Sequence Error	X	
39 00	Saving Parameters Not Supported	X	
3B 0D	Medium Destination Element Full		X
3B 0E	Medium Source Element Empty		X
3B 11	Medium Magazine Not Accessible		X
3B 80	Medium Transport Element Full		X
3D 00	Invalid Bits in Identify Message	X	X
53 02	Medium Removal Prevented	X	
5B 03	Log List Codes Exhausted	X	
80 00	CU Mode, Vendor-Unique	X	X
85 03	Write Protected Because of Current Tape Position	X	

Sense Key 6 (Unit Attention)

Table 104. ASC, and ASCQ Summary for Sense Key 6 (Unit Attention)

ASC ASCQ	Description	Drive	Library
00 02	End-of-Partition/Medium Detected, Early Warning	X	
28 00	Not Ready to Ready Transition, Medium May Have Changed	X	X
28 01	Import or Export Element Accessed		X
28 80	Not Ready to Ready Transition, Medium Changer		X
29 00	Power On, Reset, or Bus Device Reset Occurred	X	X
2A 01	Mode Parameters Changed	X	X
2A 02	Log Parameters Changed	X	
2F 00	Commands Cleared by Another Initiator	X	
30 00	Incompatible Medium Installed	X	
3B 12	Medium Magazine Removed		X
3B 13	Medium Magazine Inserted		X
3B 14	Medium Magazine Locked		X
3B 15	Medium Magazine Unlocked		X
3F 01	Microcode Has Been Changed	X	X

Table 104. ASC, and ASCQ Summary for Sense Key 6 (Unit Attention) (continued)

ASC ASCQ	Description	Drive	Library
3F 02	Changed Operating Definition	X	X
3F 03	Inquiry Data Has Changed	X	X
5A 01	Operator Medium Removal Request	X	

Sense Key 7 (Data Protect)

Table 105. ASC, and ASCQ Summary for Sense Key 7 (Data Protect)

ASC ASCQ	Description	Drive	Library
27 00	Write Protected	X	

Sense Key 8 (Blank Check)

Table 106. ASC, and ASCQ Summary for Sense Key 8 (Blank Check)

ASC ASCQ	Description	Drive	Library
00 05	End-of-Data Detected	X	
14 01	Record Not Found, Void Tape	X	

Sense Key B (Aborted Command)

Table 107. ASC, and ASCQ Summary for Sense Key B (Aborted Command)

ASC ASCQ	Description	Drive	Library
14 00	Recorded Entity Not Found	X	
14 01	Record Not Found	X	
14 02	Filemark or Setmark Not Found	X	
1B 00	Synchronous Data Transfer Error	X	X
43 00	Message Error	X	X
44 00	Internal Target Failure	X	X
45 00	Select or Reselect Failure	X	X
47 00	SCSI Parity Error	X	X
48 00	Initiator Detected Error Message Received	X	X
49 00	Invalid Message Error	X	X
4A 00	Command Phase Error	X	X
4B 00	Data Phase Error	X	X
4E 00	Overlapped Commands Attempted	X	X

Sense Key D (Volume Overflow)

Table 108. ASC, and ASCQ Summary for Sense Key D (Volume Overflow)

ASC ASCQ	Description	Drive	Library
00 02	End-of-Partition/Medium Detected	X	

Appendix C. Implementation Considerations

Scaled Log Page Counters

For log page counters that add by 1K units (K=1024), the following scaling algorithm applies:

If 0 <= x < 2K items, x = 1 count; if 2K <= x < 3K, x = 2; if 3K <= x < 4K, x = 3; and so on. Drive implementation algorithm: Shift unscaled counter register right 10 bits (divide by 1K), test the remaining contents for zero. If zero, add 1 to scaled log page counter; if greater than zero, add the remaining contents of the unscaled counter to the scaled log page counter. Zero unscaled counter register and restart.

SCSI-ID and LUN Assignments

Each Magstar MP drive can be assigned a single SCSI-ID in the range of 0 to 15, but must be the only device on the bus with that ID.

Magstar MP drives can operate as a 2-LUN device with a separately addressable Sequential Access device and a separately addressable (Independent) Medium Changer device (SCSI-2 or SCSI-3 compatible).

In all cases, the Sequential Access device is always LUN 0. In the 2-LUN case, the Medium Changer device is always LUN 1. All other LUNs are invalid unit addresses as defined in section 7.5.3, Selection of an Invalid Logical Unit in the SCSI-2 standard.

Note that both device types use the same target address. For library models with 2 drives in a Base Configuration, LUN 1 is only valid on drive 1 (the right-most or top-most drive). For a Split Configuration, LUN 1 is valid on both drives.

Notes:

1. The SCSI-ID is factory set to X'0' (and X'2' for drive 2 in library models with 2 drives) but may be changed using the hex rotary switch for stand-alone drive models and operator panel menus for library models. In the event the physical SCSI address switch is different from the address entered from the Operator Panel for library models, the Operator Panel address overrides the physical address switch setting. A changed address will not take effect until a power-on reset occurs.
2. A diagnostic, Change SCSI ID, allows the SCSI-ID to be temporarily set to a value other than its default to allow factory tests at different SCSI-IDs, without physically changing the address.

Data Transfer, Block Limits, and Fixed Block Option

The Magstar MP drive is designed to buffer multiple records. Logical blocks may be prefetched to the buffer before they are requested by a Read command or held in the buffer after they are written by a Write command. For successive sequential-motion operations, the presence of the buffering in the device does not adversely affect the performance of the subsystem. Non-sequential motion does not result in errors, but may result in delays because of requirements to synchronize buffers or discard read ahead data. Buffer management in the device determines when to read additional data from the medium into the buffer, or when to write data from the buffer to the medium. A logical block is not written to tape until the block is entirely received into the buffer.

When the Fixed bit of the Read or Write command is set to B'1', each Read or Write command transfers zero or more logical blocks. The subsystem takes appropriate action to assemble or disassemble the logical blocks being transferred over the interface so that they remain independent blocks on the medium. There is no guarantee that the group of blocks transferred by the Write command is requested as a group by a subsequent Read command, so the device must be prepared to assemble and disassemble on a block boundary. This is managed by treating all blocks and filemarks as independent from one another,

both for data compaction and for recording. The use of the Save Data Pointers message at logical block boundaries during the transfer assists in recovery actions in the middle of the transfer (that is, only the last logical block needs to be retransferred). Disconnection between logical blocks may also occur if the subsystem requires additional time to process logical blocks being transferred.

When the Fixed bit of the Read or Write command is set to B'0', each Read or Write command transfers a single logical block.

After EOT is reached on any Write command, only a single block is transferred before terminating the command with check condition status 0/0000 (No Sense, No Additional Sense Information) and EOM set to B'1'. The same is true for Write Filemark commands.

The device supports a minimum logical block length of 1 and a maximum logical block length is 262,144 bytes (X'040000'). Any block length between the limits is also supported. Refer also to “Read Block Limits —X’05’” on page 124 for further information on block sizes and limitations.

Note: Odd-byte transfer (fixed or variable) width can only be one byte. For these transfers, the maximum burst data rate is 10MB per second (one-half the normal Magstar MP drive burst data rate). The drive negotiates narrow before the data phase.

Drive Cleaning Indicators

For stand-alone drive models, automatic cleaning of the drive is not possible. For library models, automatic cleaning of the drives by the library may be disabled (although it is not recommended). For either case, cleaning of the drives must be managed by the host application or manually, by the operator.

Note: Failure to clean a drive may result in data loss.

This section describes how cleaning indicators are presented from the drive. The cleaning indicators may be presented even with automatic cleaning enabled in a library environment. The cleaning indicators can be presented through the following:

- “Operator Panel Cleaning Indication”
- “SCSI Interface — Dynamic Cleaning Indicators”
- “SCSI Interface — Static Cleaning Indicator (Sense Data Byte 70)” on page 227

Operator Panel Cleaning Indication

For the stand-alone drive model, a yellow Clean LED will flash on the front panel of the Magstar MP drive when cleaning with a cleaning cartridge is required.

For Magstar MP library models, a CLEAN message is displayed on the operator panel display when cleaning with a cleaning cartridge is required. For additional details, see the Operator Guide for this product.

SCSI Interface — Dynamic Cleaning Indicators

Dynamic cleaning indicators that are sent across the SCSI interface include:

- ASC/ASCQ codes related to cleaning in Table 109.

Table 109. ASC/ASCQ Codes Related to Cleaning

Code Description	Sense Key	ASC/ASCQ
Warning: Drive needs cleaning	01	00/17
Drive has been cleaned	01	83/83

Table 109. ASC/ASCQ Codes Related to Cleaning (continued)

Code Description	Sense Key	ASC/ASCQ
Cleaning in progress (cleaner cartridge installed)	02	30/03
Drive Needs Cleaning, Warning Threshold Exceeded	04	44/00

- Service Information Message (SIM) bytes 20-21 of Log Page X'31' (SIM availability is shown in sense data):

  Value (ASCII)
  Description

  '55' Drive Needs Cleaning. Load Cleaning Cartridge

  '57' Drive Has Been Cleaned

  Note: If the device driver shields the application from dynamic notifications, the information is usually available from the system error log.

SCSI Interface — Static Cleaning Indicator (Sense Data Byte 70)

The bit significance of sense data byte 70 follows:

Bit **Description**

7 Set to B'1' "Cleaning Required: Normal Maintenance" when cleaning is required because of the normal preventive maintenance guideline (that is, every 150GB). This bit is set when the Cleaning message is generated for display (for this case).

Reset to B'0' when the cleaning cartridge is loaded.

6 Set to B'1' "Cleaning Required: Threshold Reached" when cleaning is required based on other internal threshold criteria. This bit is set when the Cleaning message is generated for display (for this case).

Reset to B'0' when the cleaning cartridge is loaded.

5-0 Set to B'000000' "Reserved." These bits will be used for future cleaning criteria, including the following:
- Performance-driven cleaning
- Wet cleaning
- Dry brush cleaning

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IBM Magstar 3570 Tape Subsystem

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Properly shielded, grounded and terminated cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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The United Kingdom Telecommunications Act 1984

This apparatus is approved under approval No. NS/G/1234/J/100003 for indirect connection to the public telecommunications systems in the United Kingdom.

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This equipment does not exceed Class A limits per radio noise emissions for digital apparatus, set out in the Radio Interference Regulation of the Canadian Department of Communications.

Avis de conformité aux normes du ministère des Communications du Canada

Cet équipement ne dépasse pas les limites de Classe A d'émission de bruits radioélectriques pour les appareils numériques, telles que prescrites par le Règlement sur le brouillage radioélectrique établi par le ministère des Communications du Canada.

European Union (EU) Electromagnetic Compatibility Directive

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take adequate measures.

Germany Electromagnetic Compatibility Directive

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen EMVG vom 9.Nov.92 das EG-Konformitätszeichen zu führen. Der AuBteller der Konformitätserklärung ist die IBM.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse A. Für diese Klasse von Geräten gilt folgende Bestimmung nach dem EMVG: Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesminesters für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind. (Auszug aus dem EMVG vom 9.Nov.92, Para.3, Abs.4)

Hinweis:

Dieses Genehmigungsverfahren ist von der Deutschen Bundepost noch nicht veroöffentlicht worden.

Japan Voluntary Control Council Information

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Glossary

This glossary defines the special terms, abbreviations, and acronyms that are used in this publication. If you do not find the term you are looking for, refer to the index or to *IBM Dictionary of Computing,* New York: McGraw-Hill, 1994.

A

ABEND. Abnormal end of task.

ADSM. ADSTAR Distributed Storage Manager.

access method. A technique for moving data between processor storage and input/output devices.

ANSI. American National Standards Institute.

archiving. The storage of backup files and associated journals, usually for a given period of time.

archiving application. The retention of records, in machine-readable form, for historical purposes.

argument. Any value of an independent variable.

ASC. Additional Sense Code.

ASCQ. Additional Sense Code Qualifier.

automatic mode. A mode of operation that can be selected on the cartridge loader. This mode allows the automatic feeding and loading of premounted tape cartridges requiring no operator action.

B

beginning of tape (BOT). The location on a magnetic tape that indicates the beginning of the permissible recording area.

block. A collection of contiguous records recorded as a unit. Blocks are separated by interblock gaps, and each block may contain one or more records.

BOT. Beginning of tape.

bpi. Bits per inch.

BPI. Bytes per inch.

buffer. A routine or storage used to compensate for a difference in rate of flow of data, or time of occurrence of events, when transferring data from one device to another.

buffered mode. The buffered mode allows a number of logical blocks to accumulate in the control unit buffer before the data is transferred to the device or channel. This mode is suppressed automatically, if the record exceeds the maximum buffered capacity.

C

capacity. See *media capacity*.

cartridge loader. A standard function for the tape drive that allows the manual loading of single tape cartridges.

CDB. Command description block.

command. A control signal that initiates an action or the beginning of a sequence of actions. See also *channel command*.

contingent allegiance. (1) A condition in which a drive owes a response to a specific channel path because of a unit check. (2) A condition generated by a check condition status during which a target preserves sense data.

conversion. The process of changing from one method of data processing to another or from one data-processing system to another.

D

DASD. Direct-access storage device.

data. Any representations such as characters or analog quantities to which meaning is, or might be, assigned.

data base. A set of data, consisting of at least one file, that is sufficient for a given purpose or for a given data-processing system.

data compaction. An algorithmic data-reduction technique that encodes data from the host and stores it in less space than unencoded data. The original data is recovered by an inverse process called decompaction.

data-compaction ratio. The number of host data bytes divided by the number of encoded bytes. It is variable depending on the characteristics of the data being processed. The more random the data stream, the lower the opportunity to achieve compaction.

dataset. The major unit of data storage and retrieval, consisting of a collection of data in one of several prescribed arrangements and described by control information to which the system has access.

deferred unit check. A condition in which a drive returns a unit check indication for an event that

occurred asynchronously with the channel commands. The deferred unit check may not refer to the command that receives the indication.

drive loaded. A condition of a tape drive in which a tape cartridge has been inserted in the drive, and the tape has been threaded to the beginning-of-tape position.

dump. To write the contents of storage, or of a part of storage, usually from an internal storage to a external medium, for a specific purpose such as to allow other use of storage, as a safeguard against faults or errors, or in connection with debugging.

E

effective data rate. The average number of bits, bytes, characters, or blocks per unit time transferred from a data source to a data sink and accepted as valid. The rate is expressed in bits, bytes, characters, or blocks per second, minute, or hour.

effective recording density. The number of user bytes per unit of length of the recording medium.

enable. To provide the means or opportunity. The modification of system, control unit, or device action through the change of a software module or a hardware switch (circuit jumper) position.

ERA. Error-recovery action performed by the host.

ERP. See *error-recovery procedures*.

error-recovery procedures (ERP). (1) Procedures designed to help isolate and, where possible, to recover from errors in equipment. The procedures are often used in conjunction with programs that record the statistics of machine malfunctions. (2) Error-recovery procedures performed by the subsystem.

explicitly activated. A process in which the attributes of an identifier are specified. Contrast with *implicitly activated*.

extended contingent allegiance. (1) A condition caused by a permanent buffered-write error in which the drive responds only to the channel path group from which the write command was received. The extended contingent allegiance continues until a controlling computer in the channel path group retrieves the unwritten data from the buffer or issues a tape motion command. (2) A condition generated by an initiate recovery message to assist in extended error recovery procedures in multi-initiator systems.

F

field replaceable unit (FRU). An assembly that is replaced in its entirety when any one of its components fails. In some cases a field replaceable unit may contain other field replaceable units; for example, a brush and a brush block that can be replaced individually or as a single unit.

file. A set of related records, treated as a unit; for example, in stock control, a file could consist of a set of invoices.

file protected. Pertaining to a tape volume from which data can be read only. Data cannot be written on or erased from the tape.

format. The arrangement or layout of data on a data medium.

FRU. Field replaceable unit.

G

GB. Gigabyte; 1 000 000 000 bytes of storage.

H

host system. A data-processing system that is used to prepare programs and the operating environments for use on another computer or controller.

I

implicitly activated. A process in which the attributes of an identifier are determined by default. Contrast with *explicitly activated*.

initiator. A SCSI device that requests an I/O process to be performed by another SCSI device (a target). In many cases, an initiator can also be a target.

install. To set up for use or service. The act of adding a product, feature, or function to a system or device either by a singular change or by the addition of multiple components or devices.

interchange application. The preparation of tapes for use on other systems or devices, either local or remote, or the use of tape data prepared by another system.

interposer. An interposer is a part used to convert a 68-pin connector to a 50-pin D-shell connector.

invoke. To petition for help or support. The request for a feature or function to be utilized in future processing activities through the use of software or hardware commands.

J

journaling. Recording transactions against a dataset so that the dataset can be reconstructed by applying transactions in the journal against a previous version of the dataset.

K

KB. Kilobyte; 1 024 bytes of storage.

L

loader. See *cartridge loader*.

load point. The beginning of the recording area on magnetic tape.

logical end of tape. A point on the tape where written data normally ends.

LSB. Least significant bit.

LUN. Logical unit number.

M

MB. Megabyte; 1 000 000 bytes of storage.

magnetic recording. A technique of storing data by selectively magnetizing portions of a magnetizable material.

magnetic tape. A tape with a magnetizable surface layer on which data can be stored by magnetic recording.

magnetic tape drive. A mechanism for moving magnetic tape and controlling its movement.

manual mode. A mode of operation that can be selected on the cartridge loader. This mode allows a single tape cartridge feed, performed by the operator.

media capacity. The amount of data that can be contained on storage media and expressed in bytes of data.

microprocessor. An integrated circuit that accepts coded instructions for execution; the instructions may be entered, integrated, or stored internally.

microprogram. (1) A sequence of elementary instructions that correspond to a specific computer operation which is maintained in special storage; and whose execution is initiated by the introduction of a computer instruction into the instruction register of a computer. (2) A group of micro instructions that when executed perform a preplanned function.

migration. See *conversion*.

MSB. Most significant bit.

O

OEM. Original equipment manufacturer.

P

physical end of tape. A point on the tape beyond which the tape is not permitted to move.

POR. Power-on reset.

primed. Pertaining to a condition of a tape drive when the controlling computer addresses the drive but the drive is not in a ready state.

processing application. The execution of a systematic sequence of operations performed on data to accomplish a specific purpose.

Q

quiesce. To bring a device or system to a halt by a rejection of new requests for work.

R

read-type commands. Any commands that cause data to be read from tape.

record. A collection of related data or words, treated as a unit; for example, in stock control, each invoice could constitute one record.

recording density. The number of bits in a single linear track measured per unit of length of the recording medium.

retension (or refresh). The process or function of tightening the tape onto the cartridge, if it is sensed that the tape has a loose wrap on the cartridge.

S

SCSI. Small Computer System Interface.

SCSI address. The octal representation of the unique address (0-F) assigned to a SCSI device. This address would normally be assigned and set in the SCSI device during system installation.

SCSI device. A host adapter or a target controller that can be attached to the SCSI bus.

SCSI ID. The bit-significant representation of the SCSI address referring to one of the signal lines DB (F-0).

special feature. A specific design addition to an IBM product that is quoted in the IBM Sales Manual and ordered separately.

standard function. The significant design elements of an IBM product that are included as part of the basic standard product.

synchronization. The process of coordinating the activities of the controlling computer and the magnetic tape subsystem to obtain the condition in which the buffer is empty and the tape is in the correct position for the next operation.

system mode. A mode of operation that can be selected on the cartridge loader. This mode allows the automatic feeding and loading of premounted blank or scratch tape cartridges in response to non-specific volume requests, while specific volume requests require operator insertion of the requested tape cartridge.

T

tape cartridge. A container holding magnetic tape that can be processed without separating it from the container.

tape drive. A device that is used for moving magnetic tape and includes the mechanisms for writing and reading data to and from the tape.

tape synchronous mode. The tape synchronous mode transfers records whose length is greater than the limits defined for buffered records. The device operates in the tape synchronous mode, if the format being processed is supported.

tape unit. A device that contains tape drives and their associated power supplies and electronics.

target. A SCSI device that performs an operation requested by the initiator. In many cases, a target can also be an initiator.

target routine. A target routine is an I/O process directed to a target, and not to a logical unit.

terminator. A part used to end a channel or connection on a computer system.

V

volume. (1) A certain portion of data, together with its data carrier, that can be handled conveniently as a unit. (2) A data carrier that is mounted and demounted as a unit, for example, a reel of magnetic tape, a disk pack.

volume control region (VCR). A region on the medium that contains volume control information.

W

write-type commands. Any commands that cause data to be written on tape or affect buffered write data.

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Hardware Reference

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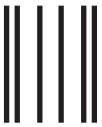

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