Magstar MP 3570 Tape Subsystem

Introduction and Planning Guide

B-Series Models

GA32-0348-04

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GA32-0348-04

Note

Before using this information and the product that it supports, be sure to read the general information under “Notices” on page ix.

Fifth Edition (September 1998)

This edition, GA32-0348-04, is a revision to GA32-0348-03, which is now obsolete. Changes or additions are indicated by a vertical line to the left of the change.

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A danger notice calls attention to a situation that is potentially lethal or extremely hazardous to people.

The following danger notices appear in this publication:

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To prevent a possible electrical shock from touching two surfaces with different electrical grounds, use one hand, when possible, to connect or disconnect signal cables. *(RSFTD004)*

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. *(RSFTD201)*

DANGER

To prevent a possible electrical shock when adding or removing any devices to or from the system, ensure that the power cords for those devices are unplugged before the signal cables are connected or disconnected. If possible, disconnect all power cords from the existing system before you add or remove a device.*(RSFTD203)*

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To prevent a possible electrical shock when installing the device, ensure that the power cord for that device is unplugged before installing signal cables. *(RSFTD204)*

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The weight caution symbol indicates that Magstar® MP Library Model B01 weighs approximately 35 kilograms (77 pounds), Model B02 weighs approximately 40 kilograms (88 pounds), Model B11 and Model B21 weigh approximately 24 kilograms (53 pounds), and Model B12 and Model B22 weigh approximately 29 kilograms (64 pounds). It takes two persons to safely lift a B01, and three to lift a B02.

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Possible safety hazards are:

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An electrically charged frame can cause serious or lethal electrical shock.

Mechanical
Hazards, such as a safety cover missing, are potentially harmful to people.

Chemical
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Preface

This publication contains planning, installation, and migration information for the IBM® Magstar® MP (Multipurpose) Tape Subsystem.

Organization

The information in this book is organized as follows:

- "Chapter 1. Introduction" on page 1 provides an overview of the Magstar MP Tape Subsystem, summarizes its primary applications, available models, and components, describes the Magstar MP Fast Access Linear Tape cartridges, and outlines the cartridge magazine, library modes of operation, library configurations, and performance considerations.
- "Chapter 2. Standard Functions and Features" on page 17 describes standard functions, feature codes, licensed program support available for the subsystem, and the hardware and programming requirements for migrating or converting to the Magstar MP Tape Subsystem.
- "Chapter 3. Planning Considerations" on page 23 discusses supplies and equipment, programming support, operator training, application-related topics, operation-related topics, and data migration to the Magstar MP Tape Subsystem.
- "Chapter 4. Site Planning" on page 33 describes physical specifications, power characteristics, environmental specifications, cooling requirements, and acoustical considerations.
- "Chapter 5. SCSI Configuration" on page 43 discusses the SCSI physical interface characteristics, configuration, and cabling issues.
- "Chapter 6. Planning Tasks and Checklists" on page 49 discusses task assignments, configuration planning, and site planning.
- "Appendix. Statement of Limited Warranty" on page 51 contains the IBM warranty statement.
- "Glossary" on page 55 defines the terms, abbreviations, and acronyms that are used in this publication.
- "Index" on page 59 includes keywords and terms to help retrieve information in this publication.

Magstar MP Publications

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

- *Magstar MP Tape Subsystem Operator Guide B-Series Models* , GA32-0345
- *Magstar MP Tape Subsystem Hardware Reference B-Series Models* , GA32-0365
- *Magstar MP Tape Subsystem Maintenance Information B-Series Models*

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 Problem Solving Guide* , SC23-2204
- *RISC System/6000 V4 Problem Solving Guide* , SC23-2606
- *RISC System/6000 V4 Message Guide & Reference* , SC23-2641
- *RISC System/6000 Planning for System Installation* SA38-0508

AS/400 Publications

For additional information about AS/400® systems, see:

- *AS/400 Physical Planning Guide and Reference* , GA41-9571
- *AS/400 Control Language Reference* , SC41-0030
- *AS/400 Service: Service Functions* , SY44-3902
- *AS/400 System Operation* , SC41-3203
- *AS/400 Physical Planning Reference* , SA41-3109
- *AS/400 Physical Planning Summary* , SX41-3108
- *AS/400 Control Language Reference* , SC41-0030
- *AS/400 Security Concepts and Planning* , SC41-8083
- *AS/400 System/370™ Connectivity* , GG24-3336
- *Automated Tape Library Planning and Management Guide* , SC41-3309

Netfinity and PC Server Publications

- *Netfinity Rack Planning Installation Guide* , S24L-8055
- *IBM Netfinity Rack Solutions* , G221-6110
- *IBM Netfinity Systems Management* , G221-6111
- *IBM PC Servers Rack HMM Type 9306* , S83H-9585

Related Information

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

- *American National Standard Institute (ANSI) Small Computer System Interface-2 (SCSI-2)* , X3.131-1994
- *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

Related Software Information

For information about software related to the Magstar MPTape 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.

Web Site Information

The following Web sites can be used as an alternate resource for questions and/or comments.

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Chapter 1. Introduction

This section provides an overview of the IBM Magstar MP Tape Subsystem, summarizes its primary applications, available models, and components, describes the Magstar MP Fast Access Linear Tape cartridges, and outlines the cartridge magazine, library modes of operation, and performance considerations.

Magstar MP (Multi-Purpose) 3570 Tape Subsystem

The 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 are thus referred to as Magstar MP (Multi-Purpose) units.

Note: The 3570 Models B21 and B22 emulate 3570 Models B11 and B12.

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 storage 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 Microsoft® Windows NT® systems,.

In addition, the Magstar MP 3570 Tape Subsystem may be used on a variety of systems through support of leading storage management offerings, such as:

- IBM ADSTAR® Distributed Storage Manager (ADSM)
- IBM Backup Recovery and Media Services/400 (BRMS/400)
- IBM Sysback/6000
- Cheyenne
- Help Systems
- Legato
- LXI
- RDARS
- VERITAS

The technology in the Magstar MP 3570 Tape Subsystem is designed to fit current and emerging tape applications primarily when automatic tape handling is desired.

The Magstar MP 3570 Tape Subsystem may be used to:

- Create tape archive files
- Back up and restore systems
- Store large, sequential application data sets
- Store temporary data sets
- Satisfy off-site data storage requirements for disaster recovery
- Support hierarchical storage
- Function as network server storage
- Store mixed digital libraries
- Support image processing
- Support I/O intensive data recall operations when multi-user access is required

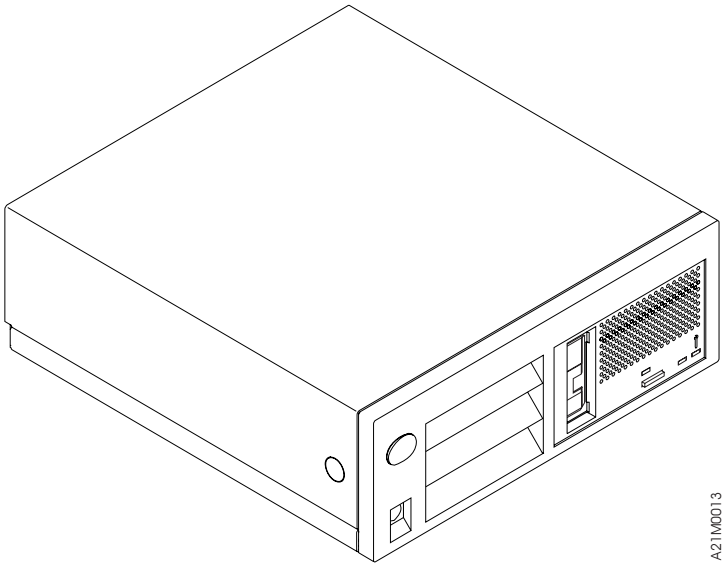


Figure 1. Magstar MP Model B00

Note: Model B21 and B22 are modified to fit in the Netfinity rack.

Figure 2. Magstar MP Model B01, B02, B11, B12, B21, or B22

Each tape drive in a Magstar MP 3570 Tape Subsystem provides:

- 2.2MB/sec sustained data rate (native)
- 6.6MB/sec sustained data rate (3:1 compression)
- 14MB/sec sustained data rate (maximum compression)
- 20MB/sec burst data rate

- Block level access to data
- Automatic data buffering to balance system read/write speed
- High streaming and start/stop performance

Note: The Compression ratios represent hypothetical scenarios. These values are not user-selectable, but are dependent on the data being processed. Some data will compress more efficiently than other data, and will provide a higher data throughput.

Low-cost external storage of data allows for random retrieval of infrequently used data. These applications require access to archived data, such as financial and medical records where large storage facilities are costly. The Magstar MP 3570 Tape Subsystem allows users to keep more data available for longer periods. It also supports automated backup storage for mid-range systems or UNIX® (or AIX®) LAN (local area network) servers that have large disk capacity or need unattended storage capacity for multiple volume backup. It is designed to be an efficient, low-cost storage solution by using the cost advantages of tape over disk and optical media.

The Magstar MP 3570 Tape Subsystem is available as a table-top, stand-alone, drive-only unit (Model B00) (see Figure 1) or as library Models B01, B02, B11, B12, B21, and B22 (see Figure 2). Models B01 and B02 are stand-alone library units, and Models B11, B12, B21, and B22 are rack-mounted library units. Model B01, B11, or B21 has a single tape drive, and Model B02, B12, or B22 has two tape drives.

Note: The Magstar MP Tape Subsystem Models B21 and B22 are designed only for installation in the IBM Netfinity rack or the NETBAY22 rack.

All of the Magstar MP units use the Magstar MP Fast Access Linear Tape cartridges with longitudinal serpentine recording. These cartridges use a new, unique design that is approximately one half the size of IBM 3480, 3490, or 3590 cartridges. The new cartridge style provides two tape spools with mid-point load for fast access to the metal particle media. Each cartridge has an uncompressed data capacity of approximately 5GB (1 gigabyte equals 1 000 000 000 bytes) and up to 15GB of compressed data with 3:1 data compression. The Magstar MP drives have sustainable data rates of 2.2MB/sec (native), 6.6 MB/sec (3:1 compression), and up to 14MB/sec (maximum compression). The burst data rate is 20 MB/sec. The average load and initialize time is 8 seconds, and the average search time to data for a loaded cartridgeis 8 seconds. Each tape drive in a Magstar MPsubsystem contains a mechanical assembly for moving the tape, electronic circuitry for reading and writing, and microprocessors that control tape functions.

Model B00 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 B00 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.

Models B01, B02, B11, B12, B21, and B22 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 11). Models B02, B12, and B22 may operate in Base Configuration or Split Configuration as selected in the operator menus (see “Library Configurations” on page 13). With two magazines of cartridges, the Magstar MP can provide up to 300GB of online data capacity with a data access rate of up to 20GB per hour at a 3:1 data compression ratio. Dual-drive Models B02, B12, and B22 can provide up to double this data access rate (up to 40GB per hour at a 3:1 data compression ratio).

A cleaning cartridge is supplied with the Magstar MP to maintain drive operating efficiency.The need to clean the tape head is determined by microcode. For Model B00, the Clean LED flashes to prompt the operator to load the cleaning cartridge (see Figure 6 on page 9). The cleaning cartridge is automatically ejected 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 6 on page 33 shows the physical specifications of the Magstar MP Tape Subsystem. 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
B00	Stand-alone, drive-only unit (see Figure 1)	1	Black	1
B01	Stand-alone library unit (see Figure 2)	1	Black	Up to 20
B02	Stand-alone library unit (see Figure 2)	2	Black	Up to 20
B11	Rack-mounted library unit (see Figure 2)	1	Black	Up to 20
B12	Rack-mounted library unit (see Figure 2)	2	Black	Up to 20
B21	Rack-mounted library unit (Netfinity only) (see Figure 2)	1	Black	Up to 20
B22	Rack-mounted library unit (Netfinity only) (see Figure 2)	2	Black	Up to 20

Model Conversions

The following model conversions are allowed for the Magstar MP Tape Subsystem:
- Model B01 to Model B02
- Model B01 to Model B11
- Model B11 to Model B12
- Model B02 to Model B12

Note: A second drive for Model B21 may be ordered as part number 08L6516.

Magstar MP Bar Code Reader Feature (FC 2011)

Note: Not available on Models B21 or B22.

The Bar Code Reader feature 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. Library inventory takes place each time the library door is opened and closed, or after power on. In addition, the host can issue SCSI commands to initiate a library inventory.

The bar code feature is recommended for the best application performance using the Magstar MP Tape library. 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.

The Bar Code Reader feature can be installed on new or currently installed Magstar MP libraries, with the exception of models B21 or B22.

Magstar MP Fast Access Linear Tape Cartridge

The Magstar MP 3570 Tape Subsystem drive reads and writes data on 128 tracks per cartridge, four tracks at a time. The subsystem uses an interleaved serpentine longitudinal recording format. The first set of four 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 four 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.

Data is written on or read from metal particle tape enclosed in a tape cartridge (Figure 3). The Magstar MP Fast Access Linear Tape cartridges are different from cartridges used in other IBM tape storage products, and cannot be interchanged with the media used in other IBM tape products.
Each tape cartridge includes a file-protect selector 1 that, when placed in the

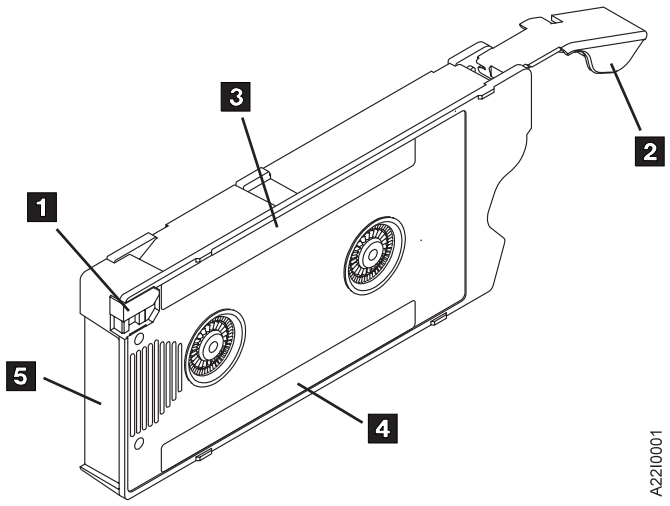


Figure 3. Magstar MP Fast Access Linear Tape Cartridge

upward position as indicated, file protects the tape and prevents data from being written on it. When the file-protect selector is in the downward position, the cartridge

can be written on. 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 3570 Tape Subsystem design provides faster data access than other tape technologies by eliminating the time 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 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 file-protect selector 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).

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 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 “Planning for Supplies and Equipment” on page 23 for ordering information.

Bar Code Format

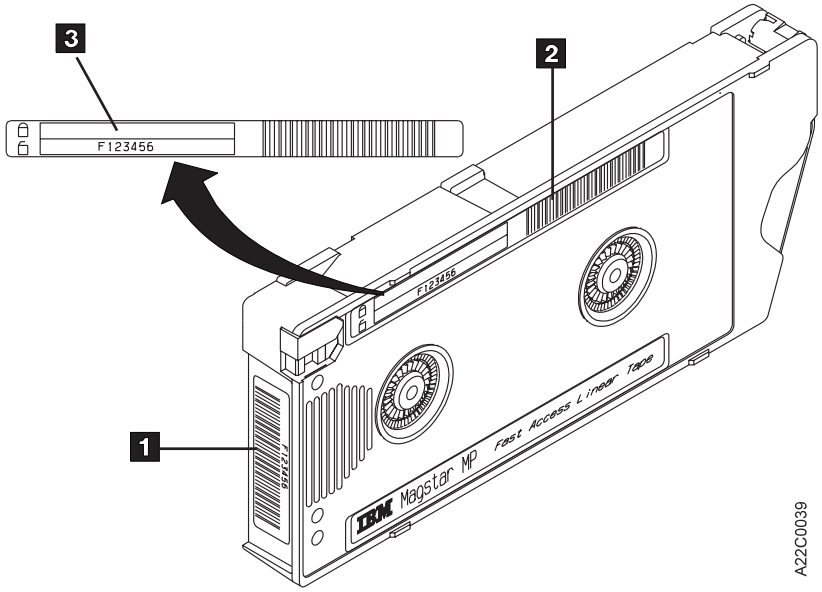


Figure 4. Magstar MP Tape Cartridge Labels

- 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 upper case “F” for all Magstar MP cartridges (see **3** in Figure 4).
- 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:
  - `"FABC123""FA1B2C3" "F123ABC"`
  - `"FA12345 "` (with a trailing blank character).
  - `"FA3B  "` (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 “F” is not displayed).
- For Standard Label tape processing using the Bar Code reader feature 2011, the bar code labels and internally recorded VOLSER must match. If there are existing cartridges that have 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. To receive the custom labels, order part number 05H9643 from IBM Supply Fulfillment Operations:
  - 1–888–IBM-MEDIA in the United States, or
  - +31 433 502 576 in Europe.

Cartridge Magazine

Model B00 can hold only one cartridge at a time. Models B01, B02, B11, B12, B21, and B22 can each contain two 10-cartridge tape magazines, which give these models the capability of holding up to 20 cartridges.

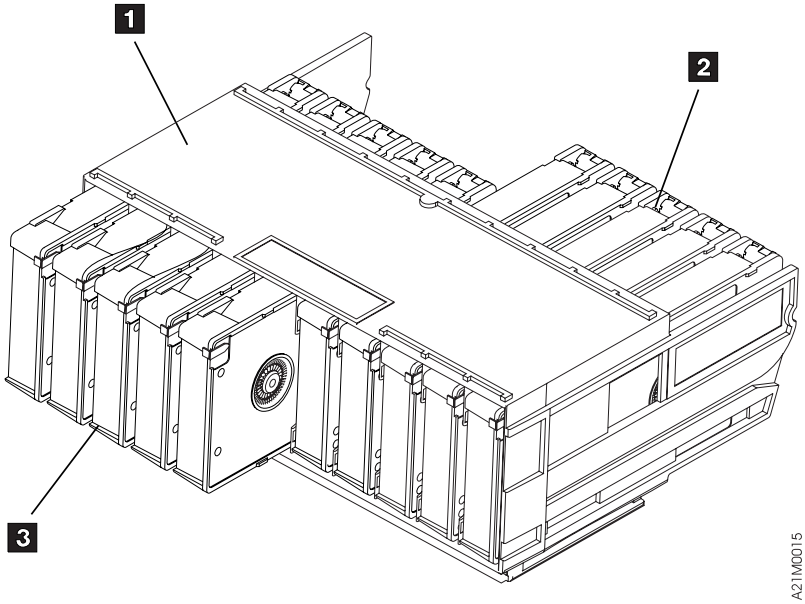


Figure 5. Magstar MP Cartridge Magazine (Viewed from the Operator Side)

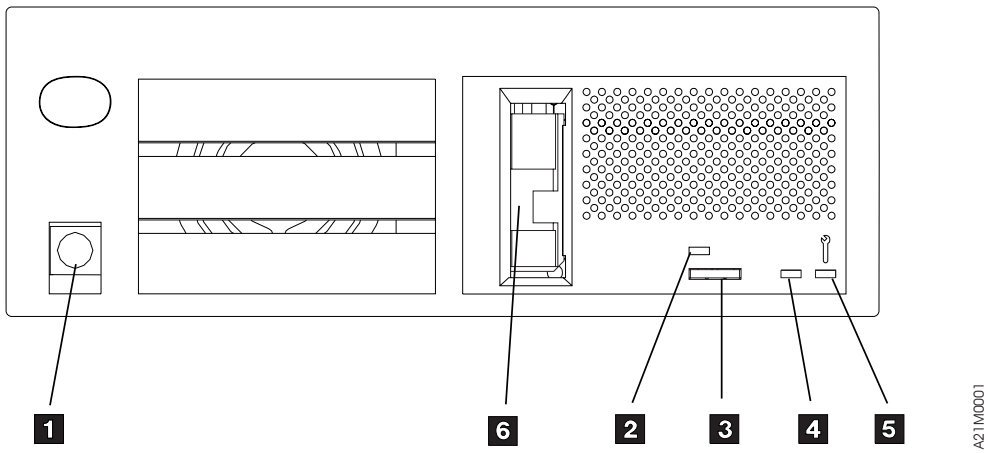
As shown in Figure 5, each magazine **1** stores tape cartridges in one of 10 storage cells in two possible physical positions: the *import* position **2** or the *export* position **3** . In the import position, the cartridge transport mechanism can access the cartridge. The transport in each library 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 Models B00, B01, B02, B11, B12, B21, and B22.

Model B00

Figure 6 on page 9 shows the operator panel for Model B00.



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

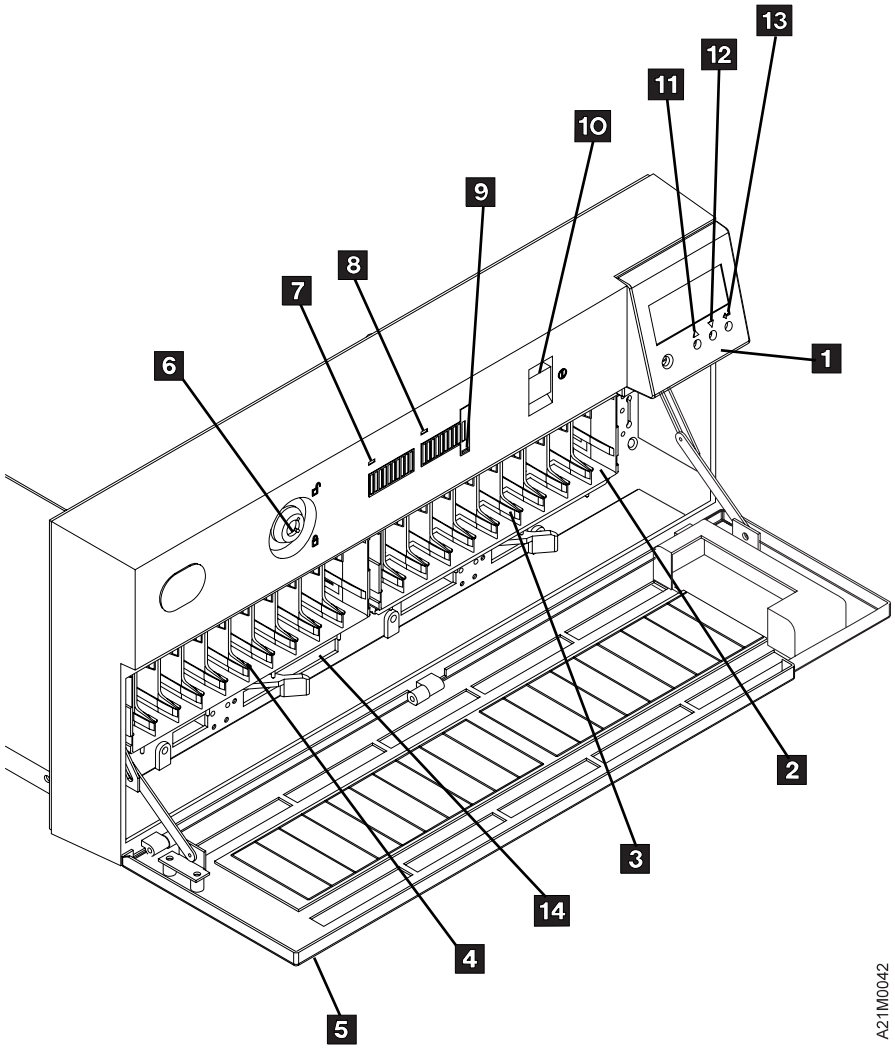
Figure 6. Model B00 Operator Panel

Model B00 uses the three LEDs in various combinations to indicate operator messages and error conditions. See *Magstar MP Tape Subsystem Operator B-Series Models* for additional information.

Models B01, B02, B11, B12, B21, and B22

With 20 tape cartridges available, each model can hold 100–300GB of data, depending on the compression ratio. Several library units may be attached through one SCSI bus to allow large quantities of online storage. See *Magstar MP Tape Subsystem Operator Guide B-Series Models* for the location and functional description of the cartridge transport mechanism for the library unit.

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.



1 Operator Panel

2 Priority Cell

3 Magazine 1 Location

4 Magazine 2 Location

5 Door

6 Security Key Lock

7 Magazine 2 In Use Indicator

8 Magazine 1 In Use Indicator

9 Priority Cell In Use Indicator

10 Power On/Off Switch

11 Scroll Up

12 Scroll Down

13 Enter

Models B01, B02, B11, B12, B21, and B22 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 **3** in magazine 1 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 under direction of the host. 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.

ADSM Note: When using ADSM with a Magstar MP Model B02, B12, or B22, it is recommended that 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 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.

Under some conditions when the door is opened, the library may report back to the host that there are no cartridges left in the library for loading in the drive. This can occur if the host operation requests status after the library door is opened, but before the Magstar MP can complete the cartridge inventory caused by opening the library door. If the Magstar MP is to be used for an unattended operation, it is recommended that the library door not be opened once a cartridge has been loaded in the drive. 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 B02, B12, and B22 may operate in Base Configuration or Split Configuration as selected in the operator menus. Models B01, B11, and B21 do not support Split Configuration.

Base Configuration is intended for attaching the library to a single SCSI bus. A single bus is created on models with 2 drives when the SCSI Bus Jumper is installed between the drive 1 and drive 2 SCSI ports. For a Base Configuration, a Medium Changer device is available through the drive 1 SCSI port only. This is the default configuration for all library models.

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

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 11 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. (Both drives can be used.)

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 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.

Split Configuration

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 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 11 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 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.

SCSI 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.

Performance

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

Each Magstar MP drive has the following performance characteristics:

- 2.2MB/sec sustained data rate (native)
- 6.6MB/sec sustained data rate (3:1 compression)
- 14MB/sec sustained data rate (maximum compression)
- 20MB/sec burst data rate

Note: The Compression ratios represent hypothetical scenarios. These values are not user-selectable, but are dependent on the data being processed. Some data will compress more efficiently than other data, and will provide a higher data throughput.

Because data transfer rates and throughput are enhanced with data compression, users can process more tape applications and run tape-related workloads more quickly. 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. Although the Magstar MP drive is capable of up to a 14MB/sec sustained data rate, other components of the system may limit the actual effective data rate.

Chapter 2. Standard Functions and Features

This section describes the following information about the Magstar MP 3570 Tape Subsystem:

- Standard functions
- Feature codes
- Device orientation
- Read/write buffering
- Program support
- Data migration tasks

Standard Functions

The Magstar MP 3570 Tape Subsystem has the following functions:

- Support for SCSI-2, the ANSI standard command set for sequential access and medium changer devices, plus several SCSI-3 extensions.
- 2-byte wide differential SCSI-3 connector and electrical system (P cable)
- Support for initiators, such as the RISC System/6000, RS/6000 SP, and AS/400 systems
- 2MB buffer
- Read/write data flow with error checking code and cyclic redundancy checking
- Cartridge capacity of 5GB uncompressed and 15GB compressed data.
- Support for data compression (LZ-1)
- Timing-based track-following servo system
- New cartridge with dual reels that eliminate threading and pneumatics
- Data security (lock and key) for Models B01, B02, B11, B12, B21, and B22
- Impressive RAS (reliability, availability, serviceability) supported by:
  - Real-time diagnostics
  - Real-time failure isolation
  - Hardware/media isolation
  - Service information messages (SIMs)
  - Online microcode update capability

Also, the subsystem design permits:

- Complete self-testing when the subsystem is powered on.
- Operator notification when a failure is detected.
- Pre-mounting and automatic feeding of 20 cartridges in either automatic or random mode on Models B01, B02, B11, B12, B21, and B22.
- Low power and cooling requirements as a result of using small size components and advanced logic technology.
- Fast data access. The cartridge's normal load/unload point is in the center of the media with an equal amount of media on each reel.

Feature Codes

Features and specific codes are used to:

- Identify the tape media technology
- Provide greater configuration flexibility
- Identify the specific attachment type

Several features are available for the Magstar MP models. Some features are standard on a particular model while other features are optional. The feature codes are listed in Table 2. For additional information, see Table 10 on page 38 for power cords and Table 14 on page 45 for SCSI cables.

Table 2. Attachment Features (All Features Not Available for All Models)

Feature Code	Description	Magstar MP Models
2011	Bar Code Reader	B01, B02, B11, and B12
2891	Interposer HD68/HD50 Fast/Narrow (F/N) for RISC System/6000 SCSI-2 Differential High-Performance External I/O Controller (FC 2420)	B00, B01, B02, B11, and B12
2892	Interposer HD68/CC68 for RISC System/6000 Enhanced SCSI-2 Differential Fast/Wide (F/W) Adapter/A (FC 2412) or the SCSI-2 Differential Fast/Wide (F/W) Adapter/A (FC 2416)	B00, B01, B02, B11, and B12
2895	Interposer for AS/400 Magnetic Media Subsystem Controller (FC 6501)	B00, B01, B02, B11, and B12
5205	0.5 m (2 ft) SCSI Cable	B00, B01, B02, B11, and B12
5212	12 m (39 ft) SCSI Cable	B00, B01, B02, B11, and B12
5218	18 m (59 ft) SCSI Cable	B00, B01, B02, B11, and B12
5245	4.5 m (15 ft) SCSI Cable	B00, B01, B02, B11, and B12
6516 (part number 08L6516)	Second B Drive for B21	B21
6517 (part number 08L6517)	3570 Adapter Card Kit (for second SCSI bus).	B21 and B22
8701	10 Data Cartridges and 1 Cleaner Cartridge	B00, B01, B02, B11, and B12
8702	20 Data Cartridges and 1 Cleaner Cartridge	B01, B02, B11, and B12
8750	1 Cleaner Cartridge	B00, B01, B02, B11, and B12
8752	10 Pack of Data Cartridges	B00, B01, B02, B11, and B12
8753	1 Magazine	B01, B02, B11, and B12
9066	Pearl White Cover	B01 and B02
9068	Raven Black Cover	B01 and B02
9076	Attached to SP2	B00, B01, B02, B11, and B12
9080	Watertight Plug	B00, B01, and B02
9400	Attached to AS/400	B00, B01, and B02
9570	1 Data Cartridge and 1 Cleaner Cartridge	B00, B01, B02, B11, and B12
9600	Attached to RS/6000	B00, B01, B02, B11, and B12
9800	9 ft Power Cord, 125V, 10A U.S.A./Canada	B00, B01, and B02
9820	2.7 m Power Cord, 250V, 10A France	B00, B01, and B02
9821	2.7 m Power Cord, 250V, 10A Denmark	B00, B01, and B02
9825	2.7 m Power Cord, 250V, 10A U.K.	B00, B01, and B02
9827	2.7 m Power Cord, 250V, 10A Israel	B00, B01, and B02
9828	2.7 m Power Cord, 250V, 10A Switzerland	B00, B01, and B02
9829	2.7 m Power Cord, 250V, 10A South Africa	B00, B01, and B02
9830	2.7 m Power Cord, 250V, 10A Italy	B00, B01, and B02

Table 2. Attachment Features (All Features Not Available for All Models) (continued)

Feature Code	Description	Magstar MP Models
9831	2.7 m Power Cord, 250V, 10A Australia	B00, B01, and B02
9833	9 ft Power Cord, 250V, 10A U.S.A./Canada	B00, B01, and B02
9986	6 ft Power Cord, 125V, 10A Chicago	B00, B01, and B02
Note: Two power cords are required for two-drive Models B02 and B12 and are provided for Model B22.		

Device Orientation

Model B00 operates in two orientations:

- Horizontal when the cartridge loader cell is vertical
- Vertical when the cartridge loader cell is horizontal and the power switch is near the bottom

Models B01, B02, B11, B12, B21 or B22 operate:

- in horizontal orientation only.

Read/Write Buffering

The integrated control unit contains a 2MB storage area used to buffer the flow of read and write data. This buffering action permits the subsystem to respond rapidly to read and write data requests.

Buffered read mode is always used for reading data. It permits the rapid transfer of data from the buffer to the host processor. The buffered read operation allows the drive to anticipate demands for data by reading ahead and storing multiple blocks of data in the buffer. Data, when written on the subsystem tape, can only be read forward (never backward).

The modes of operation for writing data are buffered write and unbuffered write modes. Each mode can be selected by a command from the host processor. The buffered write mode is the default mode of operation.

Buffered write mode permits data to be transferred at full channel speeds into the buffer. After the complete data block is transferred to the buffer, the drive signals normal completion before the data is written to tape. The drive transfers the data to the tape medium without further initiator assistance.

Unbuffered write mode differs from buffered write mode in that the data is written on tape and verified before the next block of data can be transferred from the initiator to the drive buffer.

Software Support

Program support for the Magstar MP 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 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 Tape Subsystem to the AS/400.

After installing the appropriate PTFs, a SAVSYS must be done to ensure 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:

- RS/6000 systems
- Sun systems
- HP-UNIX systems
- Windows NT systems

The 3570 Tape Subsystem is supported in the following environments:

- RISC System/6000
- AIX/6000 3.2.5, 4.1.1 and later, or 4.2.0 and later releases.
- Hewlett Packard: 9000 Series 800, /T, and /K class servers running HP-UX 10.0X through 10.3X.
- Windows NT: Microsoft Windows NT Server Version 4.0 with service pack 3 or greater
- Sun Solaris: Solaris 2.3, 2.4, 2.51, and 2.6 for Sun and Sun Sparc
- Netfinity attach Model B21 and B22 only

The following software products support the IBM Magstar MP 3575 subsystems:

- Cheyenne ARCserve
- IBM ADSM
- IBM AIX 3.2.5, 4.1.1 and later, and 4.2.0 and later
- IBM NetTAPE for AIX
- Legato Systems NetWorker
- SCH Technologies REELlibrarian and REELbackup
- Spectra Logic Alexandria
- VERITAS Media Librarian and NetBackup
- IBM Backup Recovery and Media Services/400 (BRMS/400)
- IBM Sysback/6000
- RDARS

Data Migration Tasks

Migration to the Magstar MP 3570 Tape Subsystem involves the following basic tasks:

1. Modifying the system to identify the SCSI adapter paths as required.
2. Installing the tape units and testing them under control of the operating system.

3. Testing applications by using the operating system, magnetic tape subsystem, application programs, and Magstar MP Fast Access Linear Tape cartridges.
4. Modifying datasets (if required) and application programs that are used with the subsystem.
5. Moving existing data (if necessary) from the current tape format to IBM Magstar MP tape format.

A migration strategy must include a consideration of multiple tape format, the choice of cartridge system tapes, and the available magnetic tape subsystems and features.

For additional information, see “Planning for Data Migration” on page 28.

Chapter 3. Planning Considerations

Planning considerations for the IBM Magstar MP Tape Subsystem include:

Planning for Supplies and Equipment

Magstar MP Fast Access Linear Tapes, cleaner cartridges, and magazines can be specified with feature codes (not available for all models) on the initial Magstar MP order or for field installation.

One data cartridge and one cleaner cartridge are supplied with each Magstar MP Model B00 unit. For the Magstar MP library units, the ship group includes either one data cartridge and one cleaner cartridge (FC 9570), 10 data cartridges and one cleaner cartridge (FC 8701), or 20 data cartridges and one cleaner cartridge (FC 8702). Two 10-cartridge magazines are also supplied with each Magstar MP Model B01, B02, B11, B12, B21, or B22.

At the time of order, Model B00 users must specify one and only one FC 9570. Model B01, B02, B11, and B12 library users must specify one and only one of FC 9570, FC 8701, or FC 8702.

The following additional supplies and equipment are recommended:

- A supply of tape cartridges for storing data
- Storage shelves for storing shelf-resident tape cartridges
- Additional library magazines for transporting and loading tape cartridges
- For Standard Label tape processing using the Bar Code Reader feature 2011, 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. To receive the custom labels, order part number 05H9643 from IBM Supply Fulfillment Operations:
  - 1-888-IBM-MEDIA in the United States, or
  - +31 433 502 576 in Europe.

Table 3 shows additional supply items available from IBM Supply Fulfillment Operations. For additional Magstar MP Cartridges, cleaning cartridges, and magazines, contact the appropriate distributor for your location as given in Table 4 on page 24.

Table 3. Magstar MP Supply Items

Description	IBM Part Number
Cleaner Cartridge	P/N 05H2463
Cartridge Magazine	P/N 49G6598

Table 3. Magstar MP Supply Items (continued)

Description	IBM Part Number
Data Cartridge	P/N 05H2462
Replacement Label Kit - 10 Sets of Labels	P/N 05H9393

Table 4. Magstar MP Magstar MP Parts Distributors

Location	Contact	Telephone Number
United States, Canada, Puerto Rico	IBM Media Distribution North America	888-IBM-MEDIA
Central America	General Business Machines	+1-305-539-3470
Spain	IBM Supplies Distribution Europe	900 983131
Italy	IBM Supplies Distribution Europe	1678 78349
France	IBM Supplies Distribution Europe	0590 5871
Germany	IBM Supplies Distribution Europe	0130 818 005
Sweden	IBM Supplies Distribution Europe	0207 94270
Norway	IBM Supplies Distribution Europe	800 11389
Denmark	IBM Supplies Distribution Europe	800 15534
Finland	IBM Supplies Distribution Europe	08001 13110
United Kingdom	IBM Supplies Distribution Europe	0800 968679
Elsewhere in Europe, Middle East, and Africa	IBM Supplies Distribution Europe	+31 433 502 756 (voice) +31 433 262 292 (fax)
Japan	Supply Services, IBM Japan, Ltd.	03-3546-7611

Planning for Programming Support

Most programs that support current IBM magnetic tape subsystems also support the Magstar MP 3570 Tape Subsystem.

See “Software Support” on page 19 for software that supports the Magstar MP 3570 Tape Subsystem. Refer to the system software manuals for additional information.

If the Magstar MP 3570 Tape Subsystem is to be used in an AS/400 environment, it is recommended the *Automated Tape Library Planning and Management Guide*, SC41-3309, be reviewed prior to installation.

Planning for Operator Training

Before the tape subsystem is installed, the tape subsystem operators should be trained. Typical tasks for tape subsystem operators are:

- Switching the tape subsystem on or off
- Setting options on the operator panel
- Inserting or removing tape cartridges from the library
- Inserting or removing cartridge magazines from the library
- Setting or resetting the file-protect selector on the tape cartridge
- Initializing a tape volume
- Disposing of tape cartridges
- Performing problem determination

See *Magstar MP 3570 Tape Subsystem Operator Guide B-Series Models* for more information about operator tasks.

Planning for Installation

- Consider the following items when placing the Magstar MP 3570 Tape Subsystem anywhere that is convenient to the host system:

  The weight caution symbol indicates that Magstar MP Library Model B01 weighs approximately 35 kilograms (77 pounds), Model B02 weighs approximately 40 kilograms (88 pounds), Model B11 and Model B21 weigh approximately 24 kilograms (53 pounds), and Model B12 and Model B22 weigh approximately 29 kilograms (64 pounds). It takes two persons to safely lift a B01, and three to lift a B02.

  - The power cord(s) and the SCSI cable(s) must be the appropriate length (see Table 14 on page 45).
  - The unit should not be placed in a dusty location.
  - Do not stack more than one Magstar MP tape subsystem on top of another.
  - The orientation of Model B00 may be either horizontal (when the cartridge loader cell is vertical) or vertical (when the cartridge loader cell is horizontal and the power switch is near the bottom).
  - The orientation of Models B01, B02, B11, B12, B21, and B22 must be horizontal with the slots arrayed vertically and the priority cell on the right.
- Consider the following issues when installing the Magstar MP 3570 Tape Subsystem:

  Note: It is recommended that a service representative install rack-mounted libraries.

  - Model B00, B01, B02, B21, and B22 may be installed either by the customer or by a service representative. When the service representative installs these models, it is a customer billable service call. Refer to *Magstar MP 3570 Tape Subsystem Operator Guide B-Series Models* for installation procedures.
  - Model B11 or B12 requires installation by a service representative. Installation is described in *Magstar MP 3570 Tape Subsystem Maintenance Information B-Series Models*
  - Conversion of a one-drive model to a two-drive model requires installation by the service representative.
- Consider the following conditions when installing Model B11, B12, B21, or B22 in a rack:

  Note: The Magstar MP Tape Subsystem Models B21 and B22 are designed only for installation in the IBM Netfinity rack or the NETBAY22 rack.

  - The Magstar MP should be installed as low as possible in the rack because of its weight.

    Note: Models B21 and B22 should be installed no higher than EIA unit 28.
  - Elevated operating ambient temperature

    Install this model in an environment compatible with the manufacturer's maximum rated ambient temperature. See Table 12 on page 41.
  - Reduced air flow

Proper air flow is required to avoid compromising the safe operation of the equipment. Ensure that the rack does not impede air flow.

– Mechanical loading

  Mounting of this equipment should not create a hazard due to uneven mechanical loading.

– Circuit overloading and reliable grounding

  Proper over-current protection and grounding are required when installing this model in a rack environment. See Table 8 on page 36 for additional information.

End of Life (EOL) Plan

Each Magstar MP is a purchased unit. Therefore, it is the sole responsibility of the purchaser to dispose of it in accordance with local laws and regulations at the time of disposal.

Verifying Data Migration

Application programming personnel may need to perform several tasks when transferring data to the subsystem. Ensuring that the data is correctly transferred is the highest priority in the overall migration. Tape programming that was written at the device level may require modifications to take advantage of functions available with the subsystem. Typical tasks for application personnel are:

- Setting up a data test plan so that project control personnel can monitor the migration.
- Producing file copies with a special copy program or another utility that provides similar functions. The copies can be used in the early stages of the migration to ensure device and medium integrity before production-controlled migration begins.
- Processing test jobs with test data.
- Verifying results with a production run of the same application.
- Running a tape-compare utility.

Special Application Considerations

The following topics apply to tape programming unique to applications.

Status and Sense Bytes

The subsystem provides additional sense bytes to support the device-specific error-recovery procedures. Many procedures are handled by the drive instead of the initiator. Programs that refer to sense bytes may require modification. See *Magstar MP 3570 Tape Subsystem Hardware Reference B-Series Models* for a description of the status and sense bytes.

Update in Place

Programs that attempt to update a block in place require a special error handling routine. The subsystem does not support update in place operations. This type of program is not recommended. If such a program already exists, it will require modification before being used with the Magstar MP Tape Subsystem. The following Magstar MP characteristics are applicable:

- The Magstar MP checks the blocks during read, write, and space block operations. These programs fail if the block sequence is altered.

- Block ID is not transferred to the system during a read operation. It is only transferred explicitly by a special command.

Note: Most operating systems provide a macro level interface for this function (if it is supported).

Unbuffered Write Mode

Unbuffered write mode is used for applications that require a block to be placed on tape and verified before they can proceed (for example, a data-base log facility). The SCSI bus is freed when the block is in the buffer, but completion status is not sent to the initiator until the read-back check operation after the actual write operation on the tape drive is complete.

Device-Dependent Parameters

Programs that perform certain functions may not give the expected results when they are used with the Magstar MP 3570 Tape Subsystem. Program functions that may depend on the device type and may need alteration include:

- Dynamic device allocation
- Accounting routines
- Stand-alone programs
- Interrupt routines
- Programs that call data security erase

Forward/Backward Space File

Forward space file is performed by the Magstar MP3570 Tape Subsystem.

Data Security Erase Operation

In the subsystem, data security erase writes random data on the tape. Any command that attempts to read over the random data created by the data security erase can receive an indication of permanent error.

Data Compression

The control unit provides a data-compression function, LZ-1. For standard tape processing, the following rules apply to data compression:

- Data compression is not recommended for encrypted data because the resulting compression ratio may be less than one (that is, the block expands). In general, data compression achieves a higher ratio when a logical block from an initiator is not processed by a compression or transformation cipher algorithm (within the host).
- For standard tape processing, when data compression is invoked by an initiator, the function is invoked for all logical blocks within a data file (that is, between any two non-successive tape marks).

Planning for Operations

Planning requirements include modifications in physical layout, subsystem operations, and operator procedures. The changes involve understanding the architecture of the subsystem, tape cartridge handling, the cartridge transport mechanism, storage requirements for the cartridges, and accompanying modifications to the operating system.

Operations personnel play a significant role in subsystem migration. Operations and production control personnel perform many of the tasks described in other sections of this guide, including data migration and media conversion.

Operations requirements include equipment removal, installation, drive assignment schedules, and cartridge initialization. Additional tasks include managing tape cartridges in the computer room, developing or modifying procedures where required, and providing training.

Data Compression Capability

For installations with LZ-1 data compression enabled on all subsystems, there are no additional requirements for managing the tape subsystem or software. Installation controls should ensure that all interchange tapes sent to external destinations are compatible with the receiver's tape subsystem.

Device drivers that support the data-compression function and perform device allocation automatically recognize when data compression is enabled. Other controls, such as system defaults and operator commands, allow the device driver to determine the format of an output tape and to allocate it to a compatible subsystem. Consequently, there are no additional requirements for generating output tapes, except during setup of new device support that involves software installation.

To process an input tape, the volume must be mounted on a device that supports the tape format. To allocate compatible devices for a given job, the initiator must be told the format on the volume or the program must be provided with a device type for allocation purposes. In cases where tapes are premounted, the operator must select a compatible subsystem, or move the tape to an appropriate subsystem when the tape cannot be processed.

When tapes are allocated or mounted on incompatible devices, the control program may detect the situation from information in the volume label (if present).

Planning for Data Migration

For the following discussion, data migration is defined as the movement of data to tape cartridges during the normal processing of jobs.

The following topics explain techniques to categorize tape subsystem use, determine a data movement schedule, balance tape drive requirements, and explore alternatives for forming a general migration strategy.

Most tape libraries are composed of common categories of tapes that are defined by the characteristics of how they are used. Determining the common categories is the first step in developing a migration strategy.

Each category is unique because of special criteria applied to its use and handling in a data-processing environment. The criteria can include life cycle, security requirements, special handling, or various application dependencies. Table 5 describes some standard tape categories.

Table 5. Tape Characteristics by Tape Category

Category	**Tape Characteristics**
Archive	• Contain records held for historical, legal, regulatory, or disaster recovery purposes. • Have a retention period usually more than a year and are often stored off-site. • Processing of these tapes can be done in locations other than the site where they were created. This off-site processing can occur as a part of a comprehensive disaster plan or for various legal or regulatory requirements.
Digital Library	• Fast random file retrieval and storage.
Hierarchical Storage Management	• Involves movement of infrequently accessed data to lowest cost medium. • Cost-managed storage.
Interchange	• Prepared for use in other locations. • May be used in other computer systems or for special purposes like microfilm production. • May be tapes prepared at another location to be used on the local system (for example, tapes created on data collection equipment).
Disk Backup	• Created in normal disk backup jobs. • Represents several generations of disk files stored in a subsystem at any given time. • Used to recover files in the event of a program or system error or other malfunction. The restore function is seldom used, but when it is, the integrity of the copied data is critical. • Files usually have a high turnover rate and may require interchange with other sites.
Journal	• Contain transactions recorded against another dataset. • Allow their companion datasets to be reconstructed by applying the journal data to a previous version of the companion datasets. • Used in data base and online systems applications.
Scratch	• Called the scratch pool. It contains no active data. It often consists of a regular flow of new, unused tapes entering a subsystem to be used for growth and replacement of old tapes. This may be important in determining the number of tape cartridges to order. • Used for the creation of new files during normal processing when the data is to be kept.

Table 5. Tape Characteristics by Tape Category (continued)

Category	Tape Characteristics
Process	• Created during periodic execution of an installation's application programs. • Represent the highest volume of files in a subsystem. For example, multiple generations of a tape master file can be considered process tapes. • Range of criteria and time frames, most commonly, the daily, weekly, or monthly processing cycle.

Developing a Data-Migration Sequence

Another aspect of planning involves the sequence to follow during the migration. Specific considerations for each category of a subsystem determine where to begin and the preferred sequence. Some considerations are:

Disk backup tapes: These tapes can be converted easily during the first phase of the plan. They quickly reduce subsystem space requirements and improve performance. Large-scale data transfer is involved that lends itself to device and data-transfer verification with familiar utilities.

Process tapes: These tapes can be converted either selectively or at the normal process rate. Application programming personnel or operations staff who normally audit application job flow may monitor the transition. This category should account for most of the migration workload.

Archive tapes: All new archive volumes can be created on the tape cartridges.

Note: Existing archive tapes can be converted to take advantage of space and data-integrity improvements.

Journal tapes: Unbuffered mode is typically used for journal tapes after each record is written to ensure the accuracy of the data. Because the subsystem is buffered, the unbuffered mode option can be used for these journal tapes. Journal tapes that do require a high level of integrity could remain on the existing media type until the application is modified accordingly. Although the subsystem is a high performance, batch-mode device, it can be used in unbuffered mode for those applications that require low logging activity. It is not recommended for high-activity logging, such as journal tapes, because the effective data rate is lowered.

Interchange tapes: These tapes cannot be migrated initially. They require selective conversion based on the ability of the interchange system to operate with the Magstar MP tape cartridge and its format.

To develop a migration sequence, you should plan for complete migration and conversion of all possible tapes, except interchange and journal tapes. The total number of cartridges required is equal to the sum of process, disk backup, scratch, and archive tapes in the current inventory plus possible additions for growth. Enough of your existing drive types must be kept to process the interchange and critical journal tapes.

Developing a Data-Migration Strategy

The Magstar MP 3570 Tape Subsystem writes and reads data in a format that is not compatible with subsystems that write data in other formats. The discussion that follows may serve as a starting point as you develop your migration strategy.

The assumption is that you will want to replace your existing drives at a pace that allows you to convert your applications and that you will keep one or more existing drives for data interchange and journaling. Possible strategies include:

- Old file in and new file out
- Copy files

The determining factors will be the time that you allot for migration and the number of cataloged datasets in your existing library.

Old File In and New File Out

With this migration technique, files written in other formats are read in and newly created files are written on Magstar MP cartridges. At any given library turnover rate, a given percentage of library cartridges will be written in Magstar MP format. This method involves the gradual transition to Magstar MPhardware from existing hardware.

Copy Files

With this strategy, data can be copied to the Magstar MP tape cartridge. This works best for multiple cartridge read-only files that can benefit from the increased capacity of the Magstar MP format. Presumably, this would be a last step to convert the remaining files not processed by using one of the other strategies.

Chapter 4. Site Planning

The Magstar MP models are integrated tape subsystems, that is, they contain both controller and tape drives in single units and do not require interconnection to other tape subsystem units.

This section lists the following information about the Magstar MP Tape Subsystem:
- Physical specifications
- Subsystem component specifications
- Power characteristics
- Environmental specifications
- Cooling requirements
- Product environment
- Acoustical characteristics

Physical Specifications

Table 6 shows the physical specifications of the Magstar MP Tape Subsystem.

Table 6. Physical Specifications

Dimensions	Model B00	Model B01 **(horizontal)**	Model B02 **(horizontal)**	Model B11 **(rack mounted)**	Model B12 **(rack mounted)**	**Model B21 (rack mounted)**	**Model B22 (rack mounted)**
Height	112 mm (4.4 in)	217 mm (8.5 in)	217 mm (8.5 in)	217 mm (8.5 in)	217 mm (8.5 in)	217 mm (8.5 in)	217 mm (8.5 in)
Width	320 mm (12.6 in)	483 mm (19.0 in)	483 mm (19.0 in)	444 mm (17.5 in)	444 mm (17.5 in)	444 mm (17.5 in)	444 mm (17.5 in)
Depth	338 mm (13.3 in)	771 mm (30.4 in)	771 mm (30.4 in)	714 mm (28.1 in)	714 mm (28.1 in)	714 mm (28.1 in)	714 mm (28.1 in)
Weight	8.4 kg (18.5 lb)	35 kg (77.1 lb)	40 kg (88.2 lb)	24 kg (52.8 lb)	29 kg (63.9 lb)	24 kg (52.8 lb)	29 kg (63.9 lb)
Weight with Pedestal	8.5 kg (18.7 lb) (see note)	39.8 kg (87.7 lb) (see note)	44.8 kg (98.7 lb) (see note)	N/A	N/A	N/A	N/A
Display Panel	No	Yes	Yes	Yes	Yes	Yes	Yes
Magstar MP Media	One cartridge	Up to 20 cartridges	Up to 20 cartridges	Up to 20 cartridges	Up to 20 cartridges	Up to 20 cartridges	Up to 20 cartridges

Notes:
1. Model B00, B01, or B02 stands on a pedestal that raises each unit by 25 mm (1 in) above the floor or table surface.
2. Models B21 and B22 are Netfinity rack-mount only.
3. Models B11, B12, B21 and B22 use slides and require 6 EIA units in a rack.

Subsystem Component Specifications

Table 7 shows a representative configuration of Model B00 in plan view. Figure 8 shows a representative configuration of Model B01 or B02 in plan view.

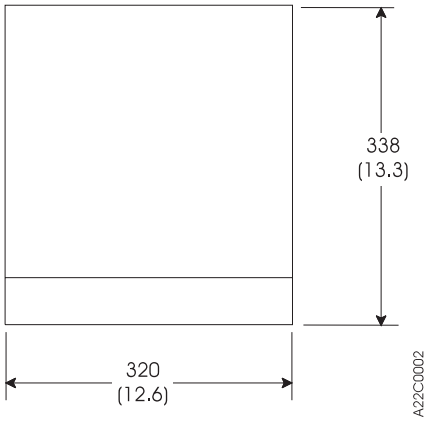
Model B00

Measurements are in millimeters and inches.

English measurements are shown in parentheses.

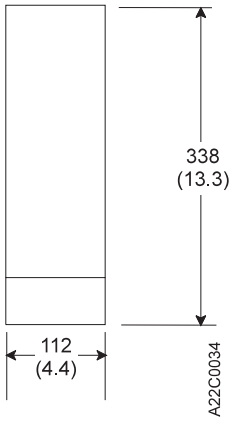
Table 7. Plan View of Model B00

Horizontal Orientation



Dimensions:
Front: 320 mm (12.6 in.)
Side: 338 mm (13.3 in.)
Height: 112 mm (4.4 in.)

Vertical Orientation



Dimensions:
Front: 112 mm (4.4 in.)
Side: 338 mm (13.3 in.)
Height: 320 mm (12.6 in.)

Service Clearance: No additional clearance is needed for service.

Weight: 8.4 kg (18.5 lb)

Weight: 8.5 kg (18.7 lb) with pedestal

Note: Model B00 stands on a pedestal that raises the unit by 25 mm (1 in) above the floor or table surface.

Model B01 or B02

Measurements are in millimeters and inches.

English measurements are shown in parentheses.

Horizontal Orientation

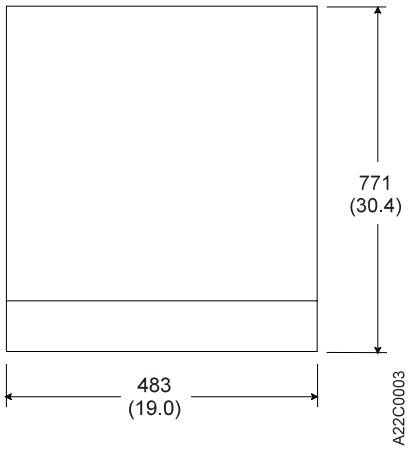


Figure 8. Plan View of Model B01 or B02

Dimensions:

Front: 483 mm (19.0 in.)

Side: 771 mm (30.4 in.)

Height: 217 mm (8.5 in.)

Service Clearance: No additional clearance is needed for service.

Weight for Model B01: 35.0 kg (77.1 lb)

Weight for Model B01: 39.8 kg (87.7 lb) with pedestal

Weight for Model B02: 40.0 kg (88.2 lb)

Weight for Model B02: 44.8 kg (98.7 lb) with pedestal

Note: Model B01 or B02 stands on a pedestal that raises each unit by 25 mm (1 in) above the floor or table surface.

Model B11 or B12 (Rack Mount)

Refer to the appropriate rack specification for service clearances. See *Magstar MP 3570 Tape Subsystem Maintenance Information B-Series Models* or *9309 Rack Enclosure General Information and Site Preparation* for general information about rack installation.

For installation in RISC System/6000-type racks, see *7015 Installation and Service Guide*.

Model B11 or B12 requires 6 EIA units in a rack. These units may be installed in an IBM rack 9309 Model 002 or an IBM rack 7015 Model R00. Model B11 or B12 will also fit into a non-IBM 19-inch rack if it meets all of the following criteria:

1. EIA standard 19-inch rack with a panel size of 19 in (482.6 mm)

2. Enclosure depth of 915 mm (30.0 in.)
3. Width of 452 mm (17.8 in.) with a center mounting hole of 465.1 mm (18.3 in.)
4. EIA mounting holes must not be threaded.

Note: A rack-mounted unit (Model B11 or B12) must be installed by a service representative. It cannot be installed directly by the customer.

Model B21 or B22 Rack Mount (Netfinity)

Note: The Magstar MP Tape Subsystem Models B21 and B22 are designed only for installation in the IBM Netfinity rack or the NETBAY22 rack.

The weight caution symbol indicates that Magstar MP Library, Model B21 weighs approximately 24 kilograms (53 pounds), and Model B22 weighs approximately 29 kilograms (64 pounds). It takes two persons to safely lift Models B21 and B22.

Note: Install height in rack is 28 maximum EIA units.

Model B21 and B22 each requires 6 EIA units in the rack.

Power Characteristics

The ac power to the Magstar MP power supply is supplied from a wall outlet, rack enclosure, or other ac source. Table 8 lists the electrical requirements for the device. (All line voltages are nominal.) The power supply adjusts itself automatically for any combination of voltages and frequencies shown in Table 8.

Table 8. Electrical Requirements

Magstar MP Model	Line Voltage (Vac)	Line Frequency (Hz)	Nominal Power Consumption (W)	Line Current (amps at 100–127 V ac)	Line Current (amps at 200–240 V ac)	kVA
B00 (note 1)	100–127 Nominal or 200–240 Nominal	50–60	60 watts (205 BTU/hr)	0.50 (note 2)	0.25	0.06
B01, B11, or B21 (note 1)	100–127 Nominal or 200–240 Nominal	50–60	70 watts (239 BTU/hr)	0.60 (note 2)	0.30	0.07
B02, B12, or B22 (note 3)	100–127 Nominal or 200–240 Nominal	50–60	130 watts (444 BTU/hr)	1.10 (note 2)	0.55	0.13

Table 8. Electrical Requirements (continued)

Notes:
1. All Magstar MP models are single-phase systems.
2. The readings are in amps (RMS).
3. Two power outlets are required for two-drive Models B02, B12, and B22.

Table 9 shows the heat output values for the device.

Table 9. Heat Output

Model	Calorific Value	kCal/hr Value
B00	14.4	0.052
B01, B11, or B21	16.7	0.060
B02, B12, B22	31.1	0.112

In-Rush Current

The in-rush current is 30 amps peak for 1/2 cycle at 100–127 volts and 50 amps peak for 1/2 cycle at 200–240 volts.

Power Control

A power switch is on the front of each Magstar MP model.

There is no power-on indicator on the device. All models have indicator LEDs on the front that are illuminated for a short time when the device is turned on. Model B01, B02, B11, B12, B21, or B22 has operator panels where power-on status is displayed after the LEDs have been turned off.

Remote power control is not provided by the Magstar MP unit. If required, it is provided by the enclosure or higher level subassembly.

Power Cords, Plugs, and Receptacles

The ship group provides the appropriate power cord(s) for all electrical environments in which the device is expected to operate. An appliance coupler is at the device end of the cord. The other end of the cord is determined by application and country. A customer can also order a power cord separately.

Note: Two power cords are required for two-drive Model B02, B12, or B22.

Power cords used in the United States and Canada are listed by the Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA). These power cords consist of electrical cords, either type SVT or SJT, terminated by attachment plugs complying with the National Electrical Manufacturer's Association (NEMA).

U.S.A. and Canada models require one of the following plug and receptacle pairs:
- Plug type NEMA 5-15P (100–127 V ac)
- Receptacle NEMA 5-15R (100–127 V ac)
- Plug type NEMA 6-15P (200–240 V ac)

- Receptacle NEMA 6-15R (200–240 V ac)

Check local electrical codes. Ensure that adequate electrical service is available for the device. If it is necessary that the device power cord be plugged into a receptacle that is below a raised floor, the following may be required:
- Plug type RussellStoll 3720DPU2
- Receptacle RussellStoll 3743U-2 (see Figure 9)
- Connector housing RussellStoll 3913U-2 (see Figure 9)
- Power cord style: A8

Service ratings for plug type 3720DPU2 are as follows:
- Maximum voltage: 208–240 V ac
- Current: 15 A
- Phases: 1
- Wires: 3

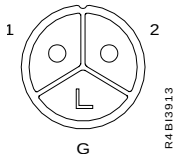


Figure 9. Receptacle Connector for RussellStoll 3743U-2 or 3913U-2

A RussellStoll inline connector used with flexible metal conduit or liquid-tight flexible metal conduit requires a RussellStoll FSA adapter.

Power cords used in countries outside of North America conform to the electrical codes established by that country. These power cords consist of electrical cords, type HD21, terminated by attachment plugs approved by the testing organizations for each specific country.

Table 10 lists power cord specifications, part numbers, countries of use, and index numbers to match with the receptacle illustrations shown in Figure 10 on page 40.

Table 10. Power Cord Specifications for Models B00, B01, and B02

Country	Voltage / Amperes	Length	Power Cord Plug	Feature Code and P/N
Bahamas, Barbados, Bolivia, Brazil, Canada, Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Netherland Antilles, Panama, Peru, Philippines, Taiwan, Tobago, U.S.A. (except Chicago), Venezuela	250 V / 10 A	2.7 m (9 ft)	1	FC 9833 P/N 1838574

Table 10. Power Cord Specifications for Models B00, B01, and B02 (continued)

Country	Voltage / Amperes	Length	Power Cord Plug	Feature Code and P/N
Bahamas, Barbados, Bermuda, Boliva, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Puerto Rico, Saudi Arabia, Suriname, Taiwan, Trinidad, U.S.A. (except Chicago), Venezuela, Vietnam	125 V / 10 A	2.7 m (9 ft)	2	FC 9800 P/N 6952300
U.S.A. Chicago	125 V / 10 A	1.8 m (6 ft)	2	FC 9986 P/N 6952301
U.S.A.-Watertight	125 V / 10 A	4.3 m (14 ft)	12	FC 9080 and FC 9800 P/N 46F5894
U.S.A.-Chicago Watertight	125 V / 10 A	1.8 m (6 ft)	12	FC 9080 and FC 9986 P/N 46F5893
Argentina, Australia, New Zealand	250 V / 10 A	2.7 m (9 ft)	3	FC 9831 P/N 13F9940
Abu Dhabi, Angola, Antigua, Austria, Belgium, Bosnia, Botswana, Bulgaria, Cameroon, Croatia, Czech Republic, Egypt, Finland, France, Germany, Greece, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Korea (South), Lebanon, Liberia, Luxembourg, Macao, Madagascar, Morocco, Mozambique, Netherlands, Netherlands Antilles, Norway, Paraguay, Poland, Portugal, Rhodesia, Romania, Russia, Saudi Arabia, Serbia, Slovakia, Slovenia, Spain, Sudan, Sweden, Syria, Swaziland, Tunisia, Turkey, Yugoslavia, Zaire	250 V / 10 A	2.7 m (9 ft)	4	FC 9820 P/N 13F9979

Table 10. Power Cord Specifications for Models B00, B01, and B02 (continued)

Country	Voltage / Amperes	Length	Power Cord Plug	Feature Code and P/N
Denmark	250 V / 10 A	2.7 m (9 ft)	5	FC 9821 P/N 13F9997
Bangladesh, Burma, Pakistan, South Africa, Sri Lanka	250 V / 10 A	2.7 m (9 ft)	6	FC 9829 P/N 14F0015
Bahrain, Bermuda, Bosnia, Brunei, Channel Islands, Cyprus, Ghana, Hong Kong, India, Iraq, Ireland, Jordan, Kenya, Kuwait, Malawi, Malaysia, Nigeria, Oman, People's Republic of China, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Arab Emirates (Dubai), United Kingdom, Zambia	250 V / 10 A	2.7 m (9 ft)	7	FC 9825 P/N 14F0033
Liechtenstein, Switzerland	250 V / 10 A	2.7 m (9 ft)	8	FC 9828 P/N 14F0051
Chile, Ethiopia, Italy, Libya, Malta, Sierra Leone, Somalia	250 V / 10 A	2.7 m (9 ft)	9	FC 9830 P/N 14F0069
Israel	250 V / 10 A	2.7 m (9 ft)	10	FC 9827 P/N 14F0087

Note: Two power cords are shipped for Model B21 and four power cords are shipped for Model B22. These cords fit in the Netfinity and NETBAY22 racks.

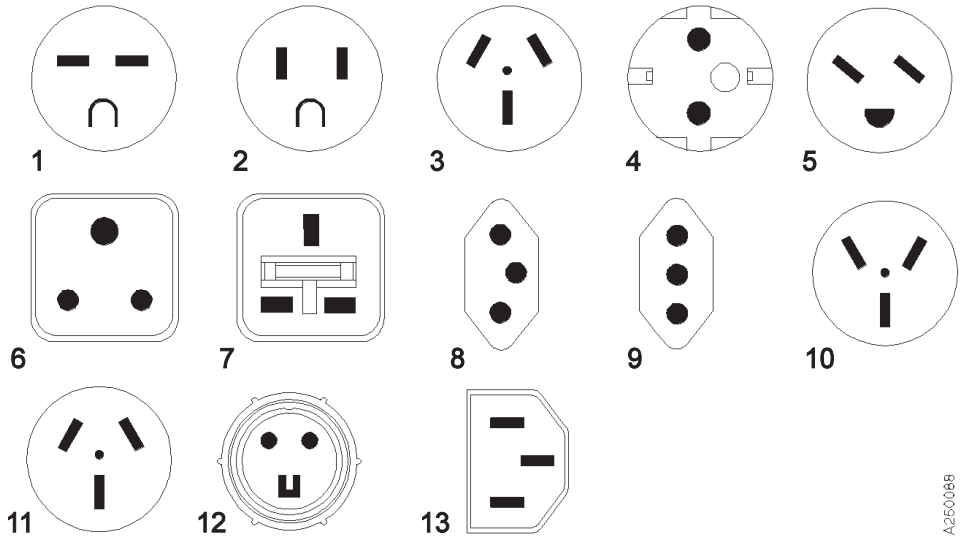


Figure 10. Power Plugs

Table 11 lists the applicable country standard for the plugs shown in Figure 10 on page 40 .

Table 11. Power Cord Plug Country Standards

Plug Number	Standard
1	NEMA WD-1 6-15P
2	NEMA WD-1 5-15P
3	AS 3112=1964 IVZS 198
4	CEE7 VII
5	NORMBLAD 4
6	SABS 164, BS 546
7	BS 1363
8	SEV SN 416534
9	CEI 23-16
10	SII-32-1971
11	CEE7 XVII
12	See note
13	IEC 320 Sheet C14
Note: The applicable plug is RussellStoll 3720DPU1 (or equivalent).	

Environmental Specifications

Table 12 shows the operating and shipping environment allowed for the Magstar MP 3570 Tape Subsystem. These parameters describe a Class B Extended operating and shipping environment.

Table 12. Magstar MP Environmental Specifications

Condition	Temperature (dry bulb)	Relative Humidity	Maximum Wet Bulb	Maximum Elevation (above sea level)
Operating	16 to 32°C (61 to 90°F)	8 to 80% (noncondensing)	26°C (79°F)	2133 m (6975 ft)
Nonoperating	10 to 43°C (50 to 109°F)	8 to 80% (noncondensing)	27°C (81°F)	2133 m (6975 ft)
Storage	1 to 60°C (34 to 140°F)	5 to 80% (noncondensing)	29°C (84°F)	2133 m (6975 ft)
Shipping	-40 to 60°C (-40 to 140°F)	5 to 100% (noncondensing)	29°C (84°F)	No restrictions

Cooling Requirements

The Magstar MP requires ambient room temperatures that are consistent with the environmental specifications. One cooling fan is used to cool the drive and another fan cools the power supply. The air flow for these fans must not be obstructed.

Product Environment

The Magstar MP devices are designed to operate in an office environment. To ensure maximum longevity and reliability of your unit:

- Keep the unit away from high-traffic areas, especially if the floor is carpeted.
- Keep the unit out of computer-printer rooms because of toner and paper dust. Do not store paper supplies next to any unit.
- Keep the unit away from moving air such as doorways, open windows, fans, and air conditioners.

Isolate your unit from heavy traffic and dust to avoid unnecessary contamination. Ensure that the machine covers are always kept closed to minimize any contamination from airborne particles.

Acoustical Characteristics

Models B00, B01, and B02 meet a Class B Extended operating and shipping environment. The noise levels for the Magstar MP 3570 Tape Subsystem are 5.5 bels idle and 5.8 bels operating.

Chapter 5. SCSI Configuration

The Magstar MP 3570 Tape Subsystem can be integrated with any host that supports a SCSI-2 interface and has the proper drivers installed.

SCSI Physical Interface Characteristics

The Magstar MP 3570 Tape Subsystem operates as a SCSI-2 device with SCSI-3 features. The instruction set is SCSI-2, but includes SCSI-3 commands and mode sense data. It supports the option of combining two device types, sequential access and medium changer, under a single logical unit number (LUN), and uses some command changes proposed for SCSI-3, but not available for SCSI-2. Combining the two device types above under a single LUN is not allowed in SCSI-2, but is permitted by SCSI-3.

The Magstar MP 3570 Tape Subsystem attaches to host processors through the Magstar MP fast/wide (16-bit) differential SCSI interface. It uses a shielded high-density SCSI-3 68-pin P connector that accommodates 16 bus addresses.The Magstar MP attaches directly to a differentially driven, wide (16 bit) SCSI-3 P-cable.

The Magstar MP 3570 Tape Subsystem also logically supports the narrow (8-bit) protocol. An interposer is required to connect the Magstar MPsubsystem to an 8-bit SCSI-2 bus.

Note: Only 8 bus addresses (0 to 7) are valid for an 8-bit SCSI bus.

Under the SCSI-2 protocol, this type of attachment allows cable lengths of up to 25 m (81 ft) with the appropriate cable and terminator selection. The stub length at each device must not exceed 0.2 m (0.66 ft).

Bus Termination

An external terminator may be mounted into a socket that is a part of the SCSI cable connector. A terminator must be installed on the last device on each end of a string of multiple devices. In a single-device installation, the terminator is installed in the socket of this device. The Magstar MP 3570 Tape Subsystem is delivered with an external differential terminator included, but it is not installed.

The SCSI bus and all of the wires in the SCSI cable must be properly terminated according to the SCSI standard. This termination is especially important if a system mixes devices or initiators with 68-pin connectors with those of the older 50-pin style.

SCSI Bus Jumper

Dual-drive models include a 0.5 meter SCSI Bus Jumper cable which is attached or removed depending on the library configuration.

Base Configuration

For dual-drive models, set up in a Base Configuration, the 0.5 meter SCSI Bus Jumper is attached between the two drives so the drives are on the same SCSI bus.

Split Configuration

For dual-drive models, set up in a Split Configuration, the SCSI Bus Jumper is removed so each drive port is attached to a separate SCSI bus. Thus, each drive port in a Split Configuration has the same cable and termination requirements as a single-drive model B01, B11, or B21.

SCSI Features and Cables

The following section describes the feature codes for the host system attachment (see Figure 11, Table 13, and Table 14).

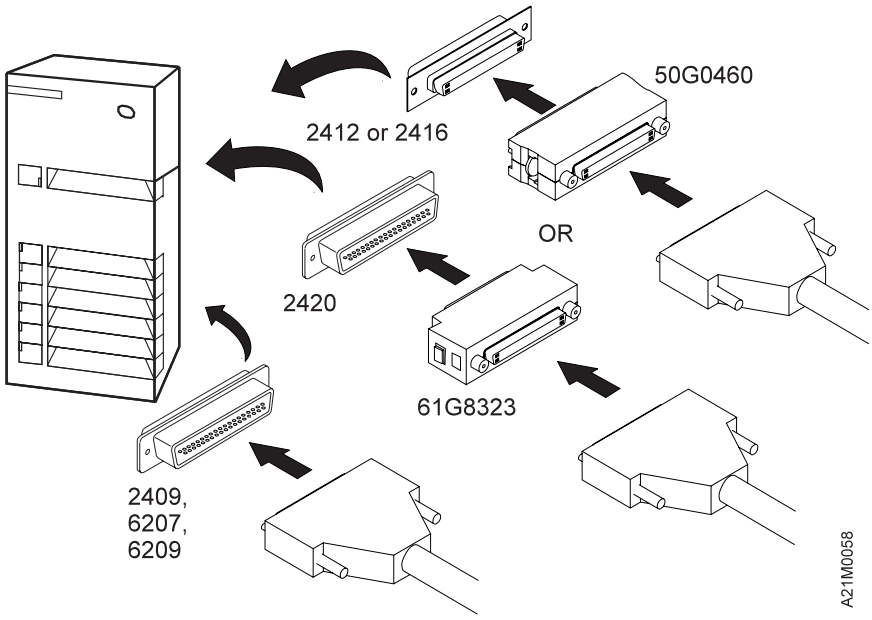


Figure 11. RISC System/6000 SCSI Cable Attachment to Host Systems

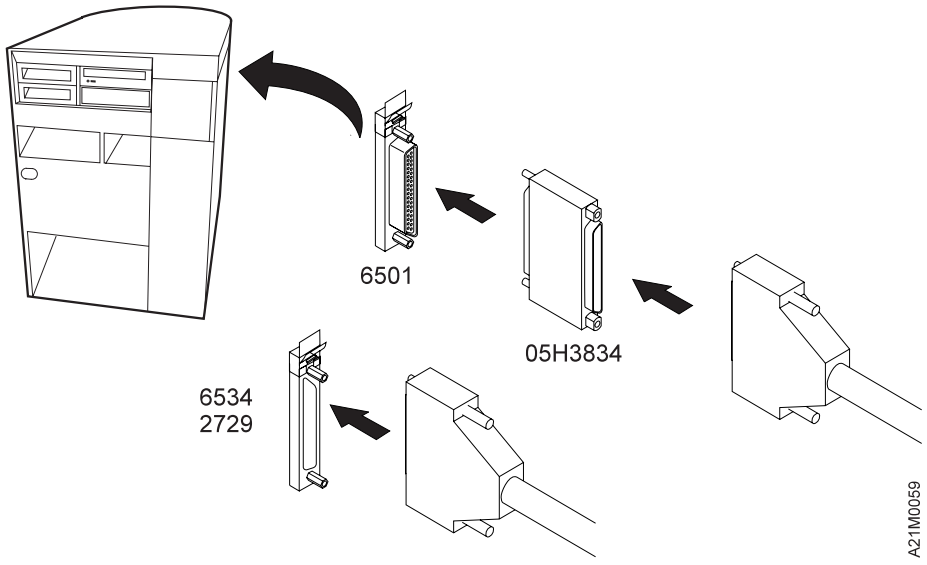


Figure 12. AS/400 SCSI Cable Attachment to Host Systems

Notes:

1. For RISC System/6000, use the host-provided SCSI connectors at the host end to provide the daisy chain for multi-device applications.
2. For Models B02 or B12 set up in the Base Configuration, use the supplied 0.5 meter SCSI Bus Jumper to connect drive 1 to drive 2; select a single SCSI cable feature and a single interposer feature to attach the Magstar MP to one SCSI bus.
3. For Netfinity Model B22 set up in the Base Configuration, use the supplied 0.5 meter SCSI Bus Jumper to connect drive 1 to drive 2; the host SCSI cable is included and there is no interposer required.
4. For Models B02, or B12 set up in the Split Configuration and select 2 SCSI cable features and 2 interposer features for attachment of the Magstar MP to two SCSI busses. The supplied 0.5 meter SCSI Bus Jumper is not used for this configuration.
5. For Netfinity Model B22 set up in the Split Configuration and order the 3570 Adapter Card Kit (PN 08L6517). The supplied 0.5 meter SCSI Bus Jumper is not used for this configuration.

Table 13. RISC System/6000, AS/400, and Netfinity

Host	Host Connection (Feature Codes Are for the Host)	Interposer P/N and Feature Code (Feature Codes Are for Magstar MP)
RS/6000	PCI SCSI-2 Differential Fast/Wide Adapter (FC 2409 Identifier 4–L)	None required
RS/6000	PCI Ultra SCSI Differential Adapter (FC 6207, Identifier 4-B)	None required
RS/6000	PCI SCSI-2 Differential Adapter (FC 6209, Identifier 4-B)	None required
RS/6000	SCSI-2 Differential Fast/Wide Adapter/A (FC 2416)	50G0460 (FC 2892)
RS/6000	Enhanced SCSI-2 Differential Fast/Wide Adapter/A (FC 2412, Identifier 4-C)	50G0460 (FC 2892)
RS/6000	SCSI-2 Differential Fast/Narrow High-Performance External I/O Controller (FC 2420, Identifier 4-2)	61G8323 (FC 2891)
AS/400	Magnetic Media Subsystem Controller (FC 6501)	05H3834 (FC 2895)
AS/400	Magnetic Media Subsystem Controller (FC 6534)	None required
AS/400	Magnetic Media Subsystem Controller (FC 2729)	None required
Netfinity	P/N 08L6517 Differential SCSI Adapter 2944/UW	None required

Table 14. Magstar MP SCSI Cable Feature Codes

Feature Code (for Magstar MP)	IBM Part Number	Cable Length (see notes 1, 2, and 3)
FC 5205	P/N 49G6456	0.5 m (2 ft)
FC 5212	P/N 49G6458	12 m (39 ft)
FC 5218	P/N 49G6459	18 m (59 ft)
FC 5225	P/N 08L6239	25 m (81 ft)
FC 5245	P/N 49G6457	4.5 m (15 ft)

Table 14. Magstar MP SCSI Cable Feature Codes (continued)

Feature Code (for Magstar MP)	IBM Part Number	Cable Length (see notes 1, 2, and 3)

Notes:

1. On RS/6000 systems, cable lengths greater than 18 m (59 ft) are not permitted with feature code 2420. Cable lengths up to 25 m (81 ft) can be used with feature code 2409, 6209, 2412, or 2416.
2. On AS/400 systems, cable lengths up to 25 m (81 ft) can be used with feature code 6501.
3. For Models B21 and B22, the part numbers of the SCSI cables are: 0.5 m SCSI bus jumper, part number 05H9527 and host-to-device 4.5 m cable, part number 05H9651. These cables are shipped with the library.

RISC System/6000 Controller Features 2409, 6207, 6209

Any combination of initiators and targets up to a total of 16 is allowed if:

- The SCSI bus is terminated properly at each end.
- Cable restrictions are followed according to SCSI-2 specification. With RISC System/6000 SCSI controller feature codes 2409 or 6209, the maximum cable length is 25 m (81 ft). Table 14 lists the available cables used to attach the Magstar MP 3570 Tape Subsystem to a RISC System/6000 system.

Multiple RISC System/6000 systems may be linked to the Magstar MP 3570 Tape Subsystem. For maximum performance, the Magstar MP 3570 Tape Subsystem may need to be the only target on the SCSI bus.

RISC System/6000 Controller Feature 2412 or 2416

An interposer, feature code 2892 (see Table 13), is required to attach the Magstar MP 3570 Tape Subsystem to RISC System/6000 controller feature 2412 or 2416. Any combination of initiators and targets up to a total of 16 is allowed if:

- The SCSI bus is terminated properly at each end.
- Cable restrictions are followed according to SCSI-2 specification. With RISC System/6000 SCSI controller feature code 2412 or 2416, the maximum cable length is 25 m (81 ft). Table 14 lists available cables used to attach the Magstar MP 3570 Tape Subsystem to RISC System/6000.

Multiple RISC System/6000 systems may be linked to the Magstar MP 3570 Tape Subsystem. For maximum performance, the Magstar MP 3570 Tape Subsystem may need to be the only target on the SCSI bus.

RISC System/6000 Controller Feature 2420

A 1-byte to 2-byte interposer, feature code 2891 (see Table 13), is required to attach the Magstar MP 3570 Tape Subsystem to RISC System/6000 controller or RS/6000 SP feature 2420. If feature 2420 is used, the Magstar MP must be attached at the end of the SCSI bus. Any combination of initiators and targets up to a total of eight is allowed if:

- A Magstar MP is the last device on the SCSI bus.
- The SCSI bus is properly terminated at each end.
- Cable restrictions are followed according to RISC/6000 requirements. With SCSI controller feature 2420, the maximum cable length is 18 m (59 ft). Table 14 lists the available cables used to attach the Magstar MP 3570 Tape Subsystem to RISC System/6000.

Multiple RISC System/6000 systems may be linked to the Magstar MP 3570 Tape Subsystem. For maximum performance, the Magstar MP 3570 Tape Subsystem may need to be the only target on the SCSI bus.

RS/6000 Note:

Check that the flash memory on the SCSI adapter in the system contains the proper level of microcode. Affected machine types include any system that contains a SCSI-2 Differential F/W adapter (4-6) or SCSI-2 Enhanced Differential F/W adapter (4-C).

To determine if your machine has an adapter with downlevel microcode, type this command on an AIX prompt: **lscfg -vl ascsi* | pg**

To determine if you have a 4-6 or 4-C SCSI adapter, look at the lines labeled **Displayable Message** and **Loadable Microcode Level**.

The **4-6** adapter will indicate:

```
Displayable Message.............SCSI-2FWSD
Loadable Microcode Level........0010
```

The **4-C** adapter will indicate:

```
Displayable Message.............SCSI-2FWSD
Loadable Microcode Level........0080
```

Look for the line **ROS Level and ID** which should show as:

```
ROS Level and ID ..............XX
```

- For the 4-6:
  XX should be either 67, 68, 70, 72, 73, 74, or higher.

  If 74 or higher is displayed, there is no need to apply any update to the 4-6.
- For the 4-C:
  XX should be either C4, C5, C6, or higher.

  If C6 or higher is displayed, there is no need to apply any update.

Level 74 & C6 or higher microcode is strongly recommended for use with IBM Magstar MP tape drives, to ensure optimum performance and reduced errors. It may also resolve problems with other sequential SCSI devices (or devices that do not support command queueing) that are attached to dedicated F/W controllers and used in systems with multiple F/W adapters.

AS/400 System Feature 6501, 6534, or 2729

An interposer, feature code 2895 (see Table 13), is required to connect the Magstar MP 3570 Tape Subsystem to system feature 6501. No interposers are required to connect the Magstar MP 3570 Tape Subsystem to system feature 6534 or 2729.

The following condition applies to AS/400 9404 and 9406 SCSI bus attachment of system feature code 6501 to the Magstar MP 3570 Tape Subsystem:

- Feature code 6501 provides two ports.
- Feature code 6534 and 2729 provide one port.

- Each port can support one Magstar MP 3570 Tape Subsystem. Therefore, two subsystems may be attached.
- No other devices can be supported on a feature 6501 port with the Magstar MP 3570 Tape Subsystem attached.
- An AS/400 system cannot be interconnected with any other system (including another AS/400) on the same SCSI bus. See “Connecting the Magstar MP to Multiple Systems”.
- When the subsystem is attached to AS/400 with feature code 6501, 6534, or 2729, one of the SCSI addresses on the Magstar MP must be set to 0 if the Magstar MP is to be used as an alternate IPL device.

Table 14 lists the available cables of the proper length for attaching the Magstar MP 3570 Tape Subsystem to AS/400 with feature code 6501, 6534, or 2729.

IBM Netfinity and PC Servers

A differential SCSI adapter 2944/UW is included with each model B21 or B22. Part number 08L6517 supplies an additional SCSI Differential adapter 2944/UW for Models B21 or B22. The adapter is designed for a 32-bit PCI bus in an Intel-based computer using the Microsoft Windows NT operating system and is equipped with a 68-pin high-density connector. Included with the adapter card is a 4.5 meter SCSI cable and a terminator.

Other Intel-Based Systems

Requires SCSI F/W or U/W differential to single ended adapter: Adapter 2944 UW Differential.

Hewlett Packard

Requires servers that support HP Precision Bus (HP-PB) fast/wide (F/W) Differential Adapter 28696A.

Sun Solaris

Requires SCSI F/W differential adapter.

Connecting the Magstar MP to Multiple Systems

RS/6000

Multiple RS/6000 systems may be attached to a Magstar MP 3570 Tape Subsystem.

AS/400

An AS/400 system cannot be interconnected with any other system (including another AS/400) on the same SCSI bus. Therefore, a Model B02 or B12 in a Split Configuration is the only Magstar MP 3570 Tape Subsystem that can be attached to an AS/400 system and another system at the same time (on separate SCSI busses).

Chapter 6. Planning Tasks and Checklists

Migration from a non-tape environment or from an existing non-compatible tape environment to the Magstar MP 3570 Tape Subsystem involves the following tasks:

- Ensuring completion of pre-installation planning and migration tasks.
- Selecting the appropriate model and features to satisfy the performance requirements for the applications used.
- Planning the physical environment for installation.
- Determining the software required to support applications.
- Planning for application and operational changes that may be required in a tape subsystem environment.
- Planning for data migration from a non-tape or non-compatible tape environment to the Magstar MP 3570 Tape Subsystem.
- Determining required supplies and equipment.

Planning Personnel

To ensure an efficient installation, define tasks of planning personnel to do the following:

- Ensure that planning and ordering activities proceed on schedule.
- Determine the location of the subsystem, and ensure that environmental, electrical, and space requirements are met.
- Choose, install, and test the licensed programs for the system.
- Define a storage management policy and plan for data migration.

Task Assignments

Before ordering:

- Determine required licensed programs.
- Determine cable requirements.
- Determine location requirements.
- Determine electrical requirements.
- Determine the required number of Magstar MP Fast Access Linear Tapes.
- Determine if extra cleaner cartridges are required.

On order date:

- Order the Magstar MP 3570 Tape Subsystem.
- Order supplies.
- Order any necessary licensed programs.
- Prepare the physical layout.
- Confirm the Magstar MP 3570 Tape Subsystem and supplies orders.

Approximately 10 weeks before delivery:

- Begin the software installation.
- Arrange for the installation of electrical wiring and outlets.

Approximately 6 weeks before delivery:

- Review the progress of the installation.

- Identify and resolve any scheduling problems.

Approximately 4 weeks before delivery:

- Complete site preparation and installation and testing of the electrical wiring and outlets.
- See “Planning for Installation” on page 25 for installation considerations.

At delivery:

“Planning for Installation” on page 25 specifies the models that can be installed by the customer and those that require installation by the service representative. See *IBM Magstar MP 3570 Tape Subsystem Operator Guide B-Series Models* for installation information.

Checklists

The following checklists are provided to aid in identifying all required tasks before installation of or migration to the Magstar MP 3570 Tape Subsystem.

Configuration Planning

Determine the Subsystem Configuration

- Determine the number and length of required cables.
- Determine adapters and interposers.
- Determine data security requirements.
- Identify SCSI IDs.

Site Planning

Ordering Equipment and Consumables

- Order machines and features.
- Order additional cartridge system tapes (if required).
- Order additional magazines if ordering a library model.
- Order additional cleaner cartridges (if required).
- Order custom cartridge labels (if required).

Additional supply items are available from IBM Supply Fulfillment Operations at **1-888-IBM-MEDIA (426-6334)**.

Appendix. Statement of Limited Warranty

The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you originally purchase for your use, and not for resale, from IBM or your reseller. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. Unless IBM specifies otherwise, the following warranties apply only in the country where you acquire the Machine. If you have any questions, contact IBM or your reseller.

Machine: IBM Magstar MP Tape Subsystem
Warranty Period*:Three years

**Contact your place of purchase for warranty service information.*

Production Status

Each Machine is manufactured from new parts, or new and used parts. In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's warranty terms apply.

The IBM Warranty for Machines

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications. The warranty period for a Machine is a specified, fixed period commencing on its Date of Installation. The date on your receipt is the Date of Installation, unless IBM or your reseller informs you otherwise.

During the warranty period, IBM or your reseller, if authorized by IBM, will provide warranty service under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine.

For IBM or your reseller to provide warranty service for a feature, conversion, or upgrade, IBM or your reseller may require that the Machine on which it is installed be 1) for certain Machines, the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Many of these transactions involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the remaining warranty service status of the replaced part. You represent that all removed items are genuine and unaltered. When a type of service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours.

If a Machine does not function as warranted during the warranty period, IBM or your reseller will repair it or replace it with one that is at least functionally equivalent, without charge. The replacement may not be new, but will be in good working order. If IBM or your reseller is unable to repair or replace the Machine, you may return it to your place of purchase and your money will be refunded.

If you transfer a Machine to another user, warranty service is available to that user for the remainder of the warranty period. You should give your proof of purchase and this Statement to that user. However, for Machines which have a life-time warranty, this warranty is not transferable.

Warranty Service

To obtain warranty service for the Machine, you should contact your reseller or call IBM. In the United States, call IBM at **1-800-IBM-SERV (426-7378)**. In Canada, call IBM at **1-800-465-6666**. You may be required to present proof of purchase.

IBM or your reseller will provide certain types of repair and exchange service, either at your location or at IBM's or your reseller's service center, to restore a Machine to good working order.

When a type of service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced. Before IBM or your reseller exchanges a Machine or part, you agree to remove all features, parts, options, alterations, and attachments not under warranty service. You also agree to ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange. You agree to:

1. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
2. where applicable, before service is provided —
   a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provide,
   b. secure all programs, data, and funds contained in a Machine, and
   c. inform IBM or your reseller of changes in a Machine's location.

IBM is responsible for loss of, or damage to, your Machine while it is 1) in IBM's possession or 2) in transit in those cases where IBM is responsible for the transportation charges.

Extent of Warranty

IBM does not warrant uninterrupted or error-free operation of a Machine.

The warranties may be voided by misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, removal or alteration of Machine or parts identification labels, or failure caused by a product for which IBM is not responsible.

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1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages or loss, up to the greater of U.S. $100,000 or the charges (if recurring, 12 months' charges apply) for the Machine that is the subject of the claim.

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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 *Dictionary of Computing,* New York: McGraw-Hill, 1994.

A

AEN. See *asynchronous event notification*.

APAR. Application System Analysis Report

archiving. The storage of backup files and associated journals, usually for a given period.

archiving application. The retention of records, in machine-readable form, for historical purposes.

asynchronous event notification (AEN). The ability of a device to initiate communications with attached hosts.

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

backup and recovery application. The short-term retention of records used for restoring essential business and system files when vital data has been lost because of program or system errors or malfunctions.

bit. A binary digit that may have the value of either 0 or 1.

block. A collection of contiguous data recorded as a unit.

buffer. A routine or storage used to compensate for a difference in the rate of flow of data, or time of occurrence of events, when transferring data from one device to another.

buffered mode. A mode that allows some logical blocks to accumulate in a buffer before the data is transferred to the device or bus.

byte. A binary number containing exactly eight bits.

C

capacity of media. The amount of data that can be contained on storage media and expressed in bytes of data.

cartridge loader. A standard function for the tape drive. It allows the automatic loading of premounted tape cartridges or the manual loading of single tape cartridges.

command. Control information that initiates an action or the beginning of a sequence of actions.

conversion. The process of changing from one method of data processing to another or from one data-processing system to another.

D

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 compression. A technique or algorithm used to encode a quantity of data such that the encoded result can normally be stored in less space than the original data and such that the original data can be recovered from the encoded result through a reverse technique or reverse algorithm.

device driver. A technique for moving data between processor storage and input/output devices.

drive ready. A condition of a tape drive in which a tape cartridge has been inserted in the drive, and the tape has been positioned to the logical beginning-of-tape/load point position.

dump. To write the contents of storage, or 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 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.

EIA. A unit of measure established by the Electronics Industry Association equal to 44.45 mm (1.75 in).

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.

error-recovery procedures (ERP). Procedures designed to help isolate and, where possible, to recover from errors in equipment. The procedures are often used with programs that record the statistics of machine malfunctions.

F

FC. Feature code.

FID. Field Replaceable Unit (FRU) Identifier. FIDs are codes that are associated with error messages and each one indicates a specific problem condition. When a service call is made, the FID code should be given to your service representative.

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 the tape.

format. The arrangement or layout of data on a data medium.

formatted tape volume. A tape volume that has been initialized with certain formatting information (servo tracks) that is required to exist for the recording technique used on the volume before any data can be recorded. Depending on the format and media, formatting may or may not be required to use the media for data-recording purposes.

G

GB. Gigabyte; 1 000 000 000 bytes of storage.

I

index. A function performed by the cartridge loader that moves cartridges down the input or output stack one cartridge position. A loader can perform multiple consecutive indexes.

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. The ability to process (read or write) a given tape volume on any one of a set of tape devices that support the form factor and recording format on the tape volume.

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.

I/O. Input/output.

L

label. A label is a control file that is associated with a data file that provides volume and file identification information. The label is a software construct that appears as any other file to the I/O subsystem.

load point. The beginning of the recording area on magnetic tape.

logical block. A logical block is an independently accessible unit of information created by the program within a file. A logical block may be either a data logical block or a mark logical block.

logical record. A logical record is a string of concatenated data bytes that is passed between an application program and a control program or access method as the result of an I/O request.

loader. A standard function for the tape drive. It allows the automatic loading of premounted tape cartridges or the manual loading of single tape cartridges.

load point. The beginning of the recording area on magnetic tape.

LZ-1. Lempel-Ziv data compression program.

M

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 (sequential) 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.

MB. Megabyte; 1 000 000 bytes of storage.

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, that 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. The process of changing from one method of data processing to another or from one data-processing system to another.

mount. The act of making a tape volume available for processing by a specific tape device.

mounted. The state of a tape volume while it is available for processing by a specific tape device.

MP. Multipurpose. Designates the suitability of the Magstar MPTape Subsystem for a wide variety of applications beyond those for which tape subsystems are ordinarily used. This designation is based on the high-performance characteristics, of the Magstar MP system, the most notable being the unit's high speed.

P

physical-write protection. A facility provided by the mechanical housing of the tape volume that allows a human being or robotics device to write protect a tape volume. Physical-write protection persists until the state of the facility on the tape volume is changed.

processing application. The execution of a systematic sequence of operations performed on data to accomplish a specific purpose.

Program Temporary Fix. PTF

PTF. Program Temporary Fix

Q

quiesce. To bring a device or system to a halt by a rejection of new requests for work.

R

random access. Random access refers to the processing of information on a volume in a manner that requires the device to access nonconsecutive storage locations on the medium.

removable media. Recording media that can be added to or removed from a recording device.

S

SCSI. Small computer system interface.

SCSI address. The hexadecimal 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 a SCSI bus.

sequential access. Refers to the processing of information on a volume in a manner that requires the device to access consecutive storage locations (logical blocks) on the medium.

sequential mode. See *automatic mode* or *manual mode*.

ship group. The group of supplies, cords, or documentation that is shipped with the machine.

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.

T

tape cartridge. A container holding magnetic tape that can be processed without separating it from the container.

tape volume. The recording medium and associated mechanical package that houses the media used by a tape device. See also *volume*.

target. A SCSI device that performs an operation requested by the initiator. A target can also be an initiator.

terminator. A part used to end a SCSI bus.

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 tape cartridge.

W

write protected. A tape volume is write protected if some logical or physical mechanism causes the device processing the tape volume to prevent the program from writing on the volume.

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