Tape Help Package

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September 29, 2004

Description of the Tape Help Package contents

The Tape Help Package is a collection of eServer pSeries and RS/6000 tape drive information that is available elsewhere but is not always easy to find or understand. This package attempts to collect the information in one area under one topic for easier reference.

Table of Contents

Information Regarding Tape Drive Environment and Use

IBM's goal is to provide you with a product that you can configure and use reliably. Tape drives require specific maintenance and environmental conditions to operate well over time. Using high quality, data grade media, handling and storing this media properly, operating the tape drive in a clean environment and keeping the tape drive properly cleaned can help you to avoid problems with your IBM tape drive.

Media Grades

IBM uses two different grades of media. We supply Program Transmittal Fixes (PTFs) on a tape that is designed to be written to only once and read from a few times. This tape is not designed to be used as a backup medium. IBM also sells media designed to be used for storage.

IBM supports the tape that we sell. If IBM service personnel analysis indicates a problem with non-IBM media it may be necessary for the customer to replace the media.

Tape Handling and Storage

Most tape is supplied in a sealed cartridge. It is provided this way so that the tape will remain in a clean environment. Opening the cartridge allows dirt and airborne particles to enter and then become a source of contamination. The cartridge should only be opened by the tape drive and not an operator. The tape also is held under proper tension inside the cartridge. If the cartridge is dropped, this tension will be relaxed. Inserting a dropped cartridge into a tape drive can cause incorrect loading and result in a jam. This will ruin the tape and can cause physical damage if the cartridge is not removed properly.

When the tapes are stored, they must be replaced in their protective containers and stored on their end. The storage area must be clean, dry, normal room temperature and away from any magnetic fields.

Environmental Issues

Tape drives are designed to operate in a clean environment. Problem factors are dirt, dust, fibers and airborne particles. Airborne particles are the most difficult to address. When a tape is installed in the tape drive, the clearance between the heads and the tape is measured in microns. Particles can damage the tape or the head if they come in contact with either.
Customers are responsible to provide a clean operating environment for the tape drive

and system.

Tape Drive Cleaning

No matter how clean the environment, debris may build up on the heads of any tape drive. Every time tape motion occurs, some of the media surface comes off on the heads. Over time, this builds up and causes errors in reading and writing. Customers are responsible to clean the tape drive in accordance with the cleaning information provided with the tape drive.

We only recommend that you use IBM cleaning cartridges for IBM tape drives.

Cleaning cartridges can be used a limited number of times. Once a cleaning cartridge has been used to its maximum number of times, the cartridge is considered expired. When cartridges expire, they must be replaced. Never reuse an expired cleaning cartridge. Doing so allows previously removed dirt to be reintroduced to the tape drive. When you have cleaned the tape drive, mark the usage on the cartridge in order to best determine when your IBM cleaning cartridge has expired.

SCSI Hardware Issues

SCSI bus cables and terminators may affect tape drive performance. IBM cables and terminators are designed specifically to keep the SCSI bus as free of noise as possible. Use of non-IBM cables or terminators may adversely affect the SCSI bus performance. If IBM service personnel analysis indicates a problem with non-IBM cables, it may be necessary for the customer to replace them with the appropriate IBM cables.

Microcode Updates

IBM constantly works to provide the best possible tape drive products. To make certain that the drives work their very best, IBM occasionally releases changed microcode for the tape drives. When a microcode change is developed, IBM makes it available to you through the service organization or by electronic delivery.

pSeries and RS/6000 customers

Microcode changes are available from the following IBM Web site:
http://techsupport.services.ibm.com/server/mdownload/download.html

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Summary

Your tape drive must be installed in the cleanest possible environment. Additionally, IBM tape drives require high quality, data grade tapes and cleaning on a regular basis. Media must also be stored and handled properly. Improper use, storage or handling of

tape drives or media may void your IBM warranty or service agreement

If a tape drive stops functioning due to a component failure during the tape drive warranty or maintenance time, IBM will replace the tape drive unit. IBM will replace any defective tape drive under the terms and conditions of the IBM warranty or service agreement. It is our objective to work with you to identify the cause of any tape drive problems and provide a solution.

Tape Drive LED Information

1/4" Tape Drives

150mb, 525mb, and 1.2GB 1/4" tape drives

The meaning of the LED is:

Color	Meaning
Off	One of the following conditions: • The Power-On Self Test(POST) has completed successfully, and the drive is not busy running a system command. • A tape is loaded and the drive is not busy running a system command. • The drive is powered off
GREEN	One of the following conditions: • POST is running • A tape is loaded and the drive is busy running a system command.
RED(AMBER in 1.2GB only)	The tape drive has detected an internal fault that requires corrective action. Internally mounted tape drives may require the system to be shutdown, powered off then powered on to clear the internal fault in the drive. If the condition cannot be cleared using this method, refer to your service guide or system diag- nostics for further assistance. The AIX diagnostic command: diag -c -d rmtx <-where x is the tape drive # will issue a reset to the tape drive if AIX is able to communicate with the drive.

4GB SLR5 1/4" tape drive

The meaning of the LED is:

Color	Meaning

Off	One of the following conditions: • The Power-On Self Test(POST) has completed successfully, and the drive is not busy running a system command. • A tape is loaded and the drive is not busy running a system command. • The drive is powered off
GREEN	One of the following conditions: • POST is running • A tape is loaded and the drive is busy running a system command.
AMBER	One of the following conditions: • The tape drive has detected an internal fault that requires corrective action. Internally mounted tape drives may require the system to be shutdown, powered off then powered on to clear the internal fault in the drive. If the condition cannot be cleared using this method, refer to your service guide or system diag- nostics for further assistance. The AIX diagnostic command: diag -c -d rmtx <-where x is the tape drive # will issue a reset to the tape drive if AIX is able to communicate with the drive. • The LED will flash when the cleaning cartridge has expired. Replace the cleaning cartridge • The LED will flash when the cleaning cartridge when a tape runs off the end of the cartridge or breaks. Replace the data cartridge • The tape drive has detected an internal fault that requires corrective action. Power OFF then ON the tape drive to clear the internal fault in the drive. If the condition cannot be cleared using this method, refer to your service guide or system diagnostics for further assistance. The AIX diagnostic command: diag -c -d rmtx <-where x is the tape drive # will issue a reset to the tape drive if AIX is able to communicate with the drive.

1/4" QIC-5010 13GB, 30GB SLR60, 50GB SLR100 tape drives:

LED's description are from left to right. The meaning of the LED's are:

Green	**Green**	**Amber**	**Meaning**
Ready(tape loaded)	Reading or Writing	Disturbance	
On*	On*	On*	The Power-On Self Test(POST) is running
Flashing	Off	Off	The Power-On Self Test(POST) is running with the Diagnostic tape inserted.

Off	Off	Off	One of the following conditions: • The power is Off • The POST has completed successfully, but no tape cartridge has been inserted.
On	Off	**	A tape cartridge has been inserted and the drive is ready to receive commands from the system.
On	Flashing	**	One of the following conditions: • A tape cartridge has been inserted and the tape drive is busy running a device command. • The tape drive is performing a tape load/unload operation,
***	***	On	The "tape path needs cleaning"(refer to the tape drive cleaning instructions).
Off	Flashing	On	The tape drive is in a cleaning operation. Note: Once the tape drive recognizes that a cleaning cartridge has been inserted the tape drive will turn On the "tape path needs cleaning" LED even if it was Off previously. The "tape path needs cleaning" LED will stay On until a successful cleaning operation has been done. If cleaning is attempted with a used up cleaning cartridge NO cleaning will be done and the "tape path needs cleaning" LED will be left On even if it was Off prior to attempting to clean the drive. To turn Off the "tape drive needs cleaning" LED a cleaning cartridge that has NOT reached the end of its useful life must be used to clean the drive.
Off	Off	Flashing	The tape drive has detected an internal fault that requires corrective action. Reset the drive by pressing the blue Eject button. If this does not clear the condition, power the drive off then back on. Internally mounted tape drives may require the system to be shutdown, powered off then powered on to clear the internal fault in the drive. If the condition cannot be cleared using this method, refer to your service guide or system diagnostics for further assistance. The AIX diagnostic command: diag -c -d rmtx <-where x is the tape drive# will issue a reset to the tape drive if AIX is able to communicate with the drive.

Note: Where:
* is On for approximately 2 seconds at POST

** is On or Off
*** is On, Off, or Flashing

4mm Tape Drives

2GB, 4GB and 12GB 4mm tape drive:

LED's description are from left to right. The meaning of the LEDs are:

Green	Green	Amber	Meaning
Ready(tape loaded)	Reading or Writing	Disturbance	
*	*	On	One of the following conditions: • The tape path needs cleaning(refer to the tape drive cleaning instructions). • A cleaning cartridge has been inserted and the cleaning cartridge has exceeded the maximum number of cleanings for the cleaning cartridge.
On	On	On	The Power-On Self Test(POST) is running
Flashing	Off	Off	The Power-On Self Test(POST) is running or the Diagnostic tape is running
Off	Off	Off	One of the following conditions: • The power is Off • The POST has completed successfully, but no tape cartridge has been inserted.
On	Off	Off	A tape cartridge has been inserted and the drive is ready to receive commands from the system.
On	Flashing	Off	One of the following conditions: • A tape cartridge has been inserted and the tape drive is busy running a device command. • The tape drive is performing a tape load/unload operation, • The tape drive is in a cleaning operation.
*	*	Flashing	One of the following conditions: • The drive is unable to write to the tape cartridge • A Diagnostic cartridge has been inserted and the Diagnostic cartridge has exceeded the maximum number of usage allowed(50).

	• The tape drive has detected an internal fault that requires corrective action. Reset the drive by pressing the blue Eject button. If this does not clear the condition, power the drive off then back on. Internally mounted tape drives may require the system to be shutdown, powered off then powered on to clear the internal fault in the drive. If the condition cannot be cleared using this method, refer to your service guide or system diagnostics for further assistance. The AIX diagnostic command: diag -c -d rmtx <-where x is the tape drive# will issue a reset to the tape drive if AIX is able to communicate with the drive. • A manual microcode download was attempted and failed. Power the drive off and then back on to clear this condition.

Note: Where
* is On, Off, or Flashing

20GB and 36GB 4mm tape drive:

LED's description are from left to right. The meaning of the LEDs are:

Green	Green	Amber	Meaning
Ready(tape loaded)	Reading or Writing	Disturbance	
*	*	On	One of the following conditions: • The tape path needs cleaning(refer to the tape drive cleaning instructions). • A cleaning cartridge has been inserted and the cleaning cartridge has exceeded the maximum number of cleanings for the cleaning cartridge.
Flashing	Off	Off	The Power-On Self Test(POST) is running
Off	Off	Off	One of the following conditions: • The power is Off • The POST has completed successfully, but no tape cartridge has been inserted.
On	Off	**	A tape cartridge has been inserted and the drive is ready to receive commands from the system.

On	Flashing	Off	One of the following conditions: • A tape cartridge has been inserted and the tape drive is busy running a device command. • The tape drive is performing a tape load/unload operation, • The tape drive is in a cleaning operation.
*	*	Flashing	One of the following conditions: • The tape drive has detected an internal fault that requires corrective action. Reset the drive by pressing the blue Eject button. If this does not clear the condition, power the drive off then back on. If the condition cannot be cleared using this method, refer to your service guide or system diagnostics for further assistance. The AIX diagnostic command: diag -c -d rmtx <-where x is the tape drive# will issue a reset to the tape drive if AIX is able to communicate with the drive. • A manual microcode download was attempted and failed. Power the drive off and then back on to clear this condition.

Note: Where
* is On, Off, or Flashing

24/48GB 4mm DDS2 Internal Autoloader:

LCD description information for the 24/48GB 4mm DDS2 Internal Autoloader.

Feature Code	Description
6153	Horizontal mount
6137	Vertical mount

The following table lists some of the error messages you might encounter. Also provide are descriptions of the messages and suggested courses of action. These messages appear on the LCD. Messages longer than 10 characters scroll across the LCD.

Table 1. DDS2 Internal Autoloader

Message	Meaning	Recommended Action
At BOT	A SPACE command encountered Beginning of Data(BOD) unexpectedly.	Retry the backup/restore operation.

At EOD	A Read or Space command encountered End of Data(EOD) area unexpectedly.	Retry the backup/restore operation.
Tape has DC Data	A Read command has encountered compressed data on the tape, and the drive is not currently set up to decompress data.	Make sure the configuration switches are set correctly.
SCSI Error	A SCSI command error has been detected.	Check the SCSI bus connection and then retry the backup/restore operation.
Partition1 Too large	A command to format the tape has failed because the requested size for partition 1 is too large.	Retry the backup operation using a 120 meter tape.
Tape Full	A Read, Space, Write, or Write Filemarks command encountered End of Partition(EOP) unexpectedly.	Retry backup operation with a longer or new tape.
Bad Media	A Read or Space command has failed because the tape is not in DDS format.	Replace tape with a Media Recognition Supported(MRS) Data Grade DDS1, or DDS2 tape. Then retry the operation.
Cannot Write Non-MRS Tape	A Write, Write Filemark or Erase command has been attempted on a non-MRS tape.	Replace the tape with DDS-Certified tape, then retry operation.
Clean Me	A high error rate has been detected while reading or writing.	Insert a cleaning cartridge to clean the tape heads, then retry the operation.
Close Door	The front panel door is open. Any autoloader motion will be delayed until the door is closed.	Close the door.
Eject Fail	An Eject command has failed.	Press the Eject button for 5 seconds(Forced Eject) to recover the cartridge and magazine. Try turning the power off and then back on. Check that labels are correctly affixed to the magazine and cartridge.
Error x	The mechanism has jammed.	Press the Eject button for 5 seconds(Forced Eject) to recover the cartridge and magazine. Try turning the power off and then back on. Check that labels are correctly affixed to the magazine and cartridge. If the problem persists, call for service.

Force Eject	A forced ejection is in operation.	Wait for the 35-second pause to elapse.
FW DataErr	The Autoloader has failed to upgrade the drive firmware because the new firmware is unreliable.	Obtain a good copy of the firmware upgrade.
FW Read Fail	A firmware upgrade failed because of an error in reading data from the tape.	Clean the tape heads, then retry operation.
FW Tape Write Protected	A firmware upgrade failed because the tape is write-protected.	Change the write-protect switch on the tape and retry the operation.
Illegal FW	The Autoloader has failed to upgrade the drive firmware because the new firmware is incompatible with the hardware.	Obtain a correct version of the firmware upgrade, then retry operation
Illegal HW	The Autoloader has failed to upgrade the drive firmware because the new firmware is incompatible with the hardware.	Obtain a correct version of the firmware upgrade, then retry operation
Load Fail	A Load command has failed, or a Load Partitions or Change Partitions command has failed to read the System area of the tape.	
No EODmark	A Read command has encountered blank tape: that is, no DDS-format End of Data(EOD) pattern has been recognized.	Retry the operation with another tape.
Read Fail	A Read command has failed.	Clean the tape heads, then retry the operation.
Try again	The cartridge in the drive is faulty, possibly because the tape has snapped, or the cartridge has an invalid pattern of identification holes.	Retry the operation with a new cartridge.
Tape Position Lost	A Write, Read, Space, or Rewind command has failed. The tape is on the far side of the bad data.	Clean the tape heads, then retry backup/restore operation.
Tape Stuck	The cartridge is stuck in the drive.	Try forcing an ejection.
UpgradeErr	The Autoloader has failed to download an upgrade of the firmware via SCSI.	Check the SCSI bus connection, then retry the operation.

Worn Media.	A high error rate was detected while writing. The tape probably is nearing the end of its useful life.	Clean the tape heads and/or replace the cartridge with a new one. then retry the operation.
Write Fail	A Write, Write Filemark, or Erase command has failed.	Clean the tape heads/or use a new cartridge. Then retry the backup operation.
Write Protected Tape	A Write, Write Filemark or Erase command was attempted on a write-protected tape.	Change the write-protect switch on the tape and retry the operation.
Drive Comms Error	The drive is not communicating with the changer mechanism.	Call for Service.
FRU 1 Dead	The controller board for the drive has failed its self-test.	Call for Service.
FRU 2 Dead	The drive mechanism has failed the self-test.	Call for Service.

7332-005 and 7332-110 4mm Autoloader:

LED's description are from left to right. The meaning of the 4 LEDs and the 2 buttons are:

Table 2. Top Row

Green LED - Ready (Tape Loaded)	**Amber LED - Disturbance**	**Blue Button - Open/Close, used to eject the current loaded tape cartridge and remove the magazine.**
Meaning		

Table 3. Bottom Row

Green LED - Read-Write activity	**Green LED - Write protected**	**Ivory Button - Step, used to manually select any tape cartridge in the magazine.**

Ready	**Read/Write**	**Disturbance**	**Write Protected**	**Meaning**

On/Off	*	On	On/Off	One of the following: • Tape Path needs cleaning. • A cleaning cartridge has been inserted and the cleaning cartridge has exceeded the maximum number of cleanings for the cleaning cartridge.
Flashing	Off	Off	Off	The Power-On Self Test(POST) is running or the Diagnostic test tape is running.
Off	Off	Off	Off	One of the following conditions: • Power is Off • The Post has completed successfully, but no tape cartridge has been inserted.
On	Off	Off	On/Off	A data cartridge has been loaded and the 7332-005 is ready to receive commands from the system
On	Flashing	Off	On/Off	A data cartridge has been loaded and is in motion. Or a cleaning operation is taking place.
Off	Off	Flashing	Off	Autoloader has detected a fault: • Tape cartridge failure • Diagnostic cartridge has exceeded its 50 usages. • Tape drive internal fault

Note: Where
* is Off, or Flashing

Table 4. 8-digit alphanumeric LED display information:

Displayed	Meaning
_____	Data gauge, Alternatively displayed with READ or WRITE to show the position of the tape in the tape cartridge.
0 TAPE	Alternatively displayed with CHK MAG to indicate 0 tapes in the magazine.
n TAPE	Displayed 2 seconds after magazine is mounted and scanned.
CHK MAG	The tape cartridge is not correctly inserted in the magazine.
CLEAN	A cleaning cycle, tape cartridge loaded manually.

CLEAN n	A cleaning cycle, tape cartridge loaded from magazine.
CLOSING	The drawer is closing.
DISMOUNT	The magazine is ready to be dismounted.
END MAG	The end of the magazine has been reached in sequential mode.
EJECT	Ejecting a manually loaded tape cartridge.
EJECT n	Ejecting a tape cartridge to slot n.
EJECTING	Ejecting a magazine to the dismount position
ERASE	Erasing a manually loaded tape cartridge.
ERASE n	Erasing a tape cartridge from slot n.
ERROR n	Indicates a loader mechanism error.
LOAD	Loading a manually loaded tape cartridge
LOAD n	Loading a tape cartridge from slot n.
OPENING	The drawer is opening.
OPERATOR	No Magazine, operation action is required.
READ	The autoloader is reading a manually loaded tape cartridge
READ n	The autoloader is reading tape cartridge from slot n.
READY	The autoloader is ready with a manually loaded tape cartridge.
READY n	The autoloader is ready with a tape cartridge from slot n.
REWIND	Rewind operation on a manually loaded tape cartridge.
REWIND n	Rewind operation on a tape cartridge from slot n.
SCANNING	The magazine is being scanned
SEARCH	Search operation on a manually loaded tape cartridge.
SEARCH n	Search operation on a tape cartridge from slot n.
SEL n	Indicates which slot is being selected by the pushbutton.
SEL SLOT	Display when a magazine is present but the autoloader does not have a tape cartridge.
SLOT n	Alternative displayed with CHK MAG to indicate a slot with incorrectly inserted tape cartridge.
WRITE	The autoloader is writing a manually loaded tape cartridge
WRITE n	The autoloader is writing tape cartridge from slot n.

Note: n represents a digit from 1 to 12.

7332-220 4mm Autoloader:

The informational area of the autoloader contains 2 information areas, LEDs and a multifunctional LCD.

LED's description are from top to bottom:

Green - Ready (Magazine Loaded)	Green - Tape and Tape Activity	Amber - Disturbance	Meaning
*	*	On	One of the following conditions: • The tape path needs cleaning(refer to the tape drive cleaning instructions). • A cleaning cartridge has been inserted and the cleaning cartridge has exceeded the maximum number of cleanings for the cleaning cartridge.
Flashing	Off	Off	The Power-On Self Test(POST) is running OR A magazine is being installed, checked or ejected.
Off	Off	Off	One of the following conditions: • The power is Off • The POST has completed successfully, but no tape cartridge has been inserted.
On	Off	*	A magazine has been installed.
On	Flashing	Off	One of the following conditions: • A tape cartridge has been inserted and the tape drive is busy running a device command. • The tape drive is performing a tape load/unload operation, • The tape drive is in a cleaning operation.
On	On	*	A tape cartridge has been inserted and the drive is ready to receive commands from the system.
*	*	Flashing	One of the following conditions: • The tape drive has detected an internal fault that requires corrective action. Reset the drive by pressing the blue Eject button. If this does not clear the condition, power the drive off then back on. If the condition cannot be cleared using this method, refer to your service guide or system diagnostics for further assistance. The AIX diagnostic command: diag -c -d rmtx <-where x is the tape drive# will issue a reset to the tape drive if AIX is

	able to communicate with the drive. • A manual microcode download was attempted and failed. Power the drive off and then back on to clear this condition.

Note: Where
* is On, Off, or Flashing

LCD Meaning:

The Liquid Crystal Display(LCD) has five(5) display regions that provide information about the autoloader:

- The 10-character dot matrix display provides information on the autoloader operating status and potential error conditions.
- The 7-segment display shows the number of current cartridge loaded in the drive, or the cartridge selected whey you press the Select button repeatedly.
- **DC** (Data Compression) and **WP** (Write-Protected) in the center of the LCD indicate when data compression is being used for writing, and if the cartridge is write-protected.
- The six(6) numbered boxes on the right of the LCD are individually lit to show which magazine slot contain a cartridge.
- The "Odometer" lines appear at the bottom of the LCD. These lines show how much tape has been used. The more lines shown, the more tape has been used.

LCD Message Categories

There are three(3) LCD message categories:

- S - Status Information
- I - Informational Message
- E - Error information

Each message in the following chart is categorized by these three(3) categories in the Type section of the chart.

The **OAR** section of the chart indicates the state of the Operator Attention LED(AMBER LED):

- On
- Flashing

LCD 4 Digit Codes

Table 5. LCD Messages

LCD Message	Numeric Code	Type	OAR	Meaning
At BOT	1019	E	F	A SPACE command encountered at the Beginning of Data(BOD) unexpectedly. The tape is now positioned at BOD.
At EOT	1018	E	F	A READ or SPACE command encountered at the End of Data(EOD) unexpectedly. The tape is now positioned at EOD.
Bad Media	8014	E	F	A READ or SPACE command has failed because the tape is not in DDS format. Action: Unload the tape and us a DDS2, DDS3, or DDS4 tape.
Cannot Write Non-MRS Tape	8021	E	F	A WRITE, WRITE FILEMARK or ERASE command has been attempted on a non-DDS tape. Action: Unload the tape and us a DDS2, DDS3, or DDS4 tape.
Clean Fail: Check Cleaning Tape	8009	E	O	Cleaning Failed, possibly due to an expired cleaning tape. Action: Use a new Cleaning Cartridge.
Clean Me	2001	E	O	The 7332 requires cleaning. Action: Use a Cleaning Cartridge to clean the drive.
Cleaning	1008	S		A Cleaning Cartridge has been inserted into the drive and cleaning is being done.
Close Door	2006	E	F	The front panel door is open. Any Autoloader motion will be delayed. Action: Close the front panel door.
Drive Comms Error	8002	E	F	The drive has stopped communicating with the changer mechanism.
Eject Fail	8004	E	F	An eject command has failed, either after you pressed the Eject button or after a host command. Action: Use a new cartridge, or try forcing an eject. To force an eject hold the eject button for 5 seconds. For a detail of the forced eject refer to "Emergency Ejection" in the 7332-220 Setup and operator guide.

Eject Mag	2010	I		This is displayed when you press the Eject button.
Erase	1015	S		The drive is erasing data from the tape.
Error X	8000	E	F	The mechanism has jammed. Action: Press the Eject button to attempt to recover the cartridge. If this fails, power the drive OFF then ON again.
Error: No tape in slot 1	4003	I		The autoloader requires a cartridge is slot 1.
Error: Unable to boot from tape	4001	I		The tape drive cannot boot from Autoloader control tape.
Forced Eject	1023	I		A forced ejection is in progress.
Format	1014	S		A SCSI command to generate a tape is being processed.
FW Check	3002	S		Firmware upgrade data is being checked for compatibility.
FW Data Err	8024	E	F	The autoloader has failed to upgrade the drive firmware, because the new firmware is corrupt. Action: Obtain a good copy of the firmware upgrade.
FW Program	3003	S		The drive is being upgraded with the new firmware.
FW Tape	3005	S		The cartridge loaded in the drive mechanism is a firmware upgrade tape.
FW Upgrade	3001	S		Firmware upgrade data is being read either through a tape or the SCSI bus.
FW Read Fail	8025	E	F	A firmware upgrade failed because of an error in reading data from the tape. Action: Try again
FW Tape Write Protected	8027	E	F	A firmware upgrade failed because the tape is write protected. Action: Change the write protect tab on the tape and try again
FW Write Fail	8026	E	F	A firmware upgrade failed because of an error in writing a modified upgrade count to the tape.

				Action: Try again
Insert Mag	2002	S		The autoloader is waiting for you to insert a magazine.
Language		I		Available languages will be displayed Action: The text on the 8mm Tape Drive LCD is available in several languages. To change the language: Press and hold the unload button after you turn the power on to the 8mm Tape Drive or, if your system unit is already running, press and hold the unload button for approximately 15 seconds until the LCD displays "RESET". Release the unload button for approximately one second. Then press and hold the unload button again. After the LCD cycles through all the reset messages it cycles through the available languages. When the desired language displays, release the unload button. The "Language" prompt appears after the "SCSI ID" message, followed by a list of the languages in a slow scrolling sequence. When the desired language appears on the display, release the unload button. The drive RESETS again, even if it is the same language, and begins with the new/same language. English Francais Deutsch Espanol Italiano Portugues
Load Fail: Try New Tape	8003	E	F	A load command has failed to read the System area of the tape. Action: Use a new cartridge.
Load Fail: Press Eject	8007	E	F	A load command has failed, or a load or change partitions command has failed to read the System area of the tape. Action: Press the eject button.
Load Lock	1021	I		Manual loading is locked. Prevent Media Removal is in operation. displayed.

Load Tape	2009	I		This is displayed when you press the Load Tape Button.
Loading	1003	S		Either a cartridge is being moved from the magazine and placed into the drive mechanism, or the drive is loading a cartridge.
Locate	1016	S		The drive is moving the tape to point specified by the host.
Mag Check	1002	S		The autoloader is examining the magazine to find which slots are occupied.
Mag Eject	1001	S		The autoloader is ejecting the magazine.
Mag Loaded	1006	S		A magazine is present in the autoloader and the magazine check has been carried out.
Media Removal Prevented	8005	E	F	An eject command has been attempted when Media Removal Prevention is in force. Action: Try again when the Media Removal Prevention has been removed. This can be achieved by the host sending a SCSI Allow Medium Removal command, or by resetting the autoloader, or cycling the power OFF then ON again.
New FW!!!!	3004	S		The firmware upgrade process has been successfully completed.
No EOD Mark	8016	E	F	The drive is trying to read what appears to be a blank tape (one with no DDS-Format EOD pattern). This is probably a result of a power failure while writing the tape.
Press Eject	2007	I		Press the Eject Button.
Read Fail	8012	E	F	A READ has failed. The host should reposition and try again.
Rewind	1013	S		The drive is rewinding the tape.
SCSI Error	8020	E	R	A SCSI command error has been detected. Action: Check the SCSI interface connection and try again.
Search <<	1012	S		The drive is searching for a record, filemark, setmark, or Beginning of Data(BOD) toward the beginning of the tape.
Search >>	1011	S		The drive is searching for a record, filemark, setmark, or End of Data(EOD) toward the end of the tape.

Select Lock	1022	I		Tape selection is locked. SCSI Prevent Medium Removal is in operation.
Select Tape	2008	I		This is displayed when you press the Select button, and for a short time after the button is released.
Self Test	0000	S		The autoloader is preforming its power-on self-test.
Semi Loaded	1007	S		A cartridge is in the drive but not loaded.
Stray Tape: Insert Empty Mag	2003	I		There is a cartridge in the autoloader but there is no magazine present to put it into. Action: Insert an empty magazine to retrieve the cartridge.
Tape Fault	8006	E	F	The cartridge in the drive is faulty, possibly because the tape has snapped, or the cartridge has an invalid pattern of identification holes. Action: Use a new cartridge and insure it is a DDS2, DDS3, or DDS4 cartridge.
Tape Full	1024	E	F	A READ, SPACE, WRITE, or WRITE Filemark command encountered End Of Tape(EOT) unexpectedly. When reading this may mean the required data is on the next cartridge.
Tape has DC data	8019	E	F	A READ command has encountered compressed data on the tape, and the drive is not currently configured to decompress data. The host may have disabled data compression. Action: Check that the host has not disabled data compression.
Tape Position Lost	8013	E	F	A WRITE, READ, SPACE, or REWIND command has failed to complete. The Tape is positioned on the far side of the bad data.
Tape Stuck	8008	E	F	The cartridge is stuck in the drive. Action: Try forcing an eject. To force an eject hold the eject button for 5 seconds. For a detail of the forced eject refer to "Emergency Ejection" in the 7332-220 Setup and operator guide.
Unable to boot Cleaning tape	4002	I		The system cannot boot from a cleaning tape.

Unloading	1004	S		Either the drive is unloading a cartridge, or a cartridge is being ejected from the drive and replaced in the magazine.
Upgrade Err	8022	E	F	The autoloader has failed to download an upgrade of the firmware via SCSI. Action: Check the SCSI connection and try again.
Worn Media	8015	E	O	A high error rate has been detected while writing, suggesting that the tape is nearing the end of its useful life. Action: Copy any data you wish to keep from the cartridge onto a new cartridge and discard the old cartridge.
Write x.y	1010	S		The drive is writing data to the tape. x.y:1 is the cumulative compression ration since power-on, or since the compression ration was last cleared. For example, Write 2.1 means a compression ratio of 2.1:1. The compression ration is on displayed after about 1 megabyte of data has been written since power-on.
Write Protected Tape	8018	E	F	Protected Tape. A WRITE, WRITE Filemark, or ERASE command has been attempted on a write-protected tape. Action: Remove the cartridge and change it to WRITE enabled.
Write Fail	8010	E	F	Protected Tape. A WRITE, WRITE Filemark, or ERASE command has failed Action: Use a new cartridge.
Write Fail: Clean or use new tape	8003	E	F	The drive could not write to the tape, which may be worn or damaged. Action: Insert a cleaning cartridge to clean the tape drive heads. Ensure the cleaning cartridge has not been used up, or use a new cleaning cartridge. Replace the media or mark the tape as possibly bad.
Wrong FW	8023	E	F	The firmware is not compatible. The drive has not been programmed.

LCD 2 Digit Codes

This chart is a supplement to the 7332-220 Service Guide. Often these two digit codes will indicate that a drive needs to be replace. However some times the cause for these errors is simple to correct and should be attempted instead of replacing the tape drive.

Possible causes for the 2 digit codes are:

- Screws used to secure the tape drive to the drive mounting bracket are too long. These screws can be a maximum of 4mm long, longer screws will interfere with the internal operation of the autoloader.

  Note: The screws used to secure the 7332-220 cover and other parts of the drive are 6mm long.

- Cartridges that are damaged may not operate properly and may impede the operation of the autoloader.

- Improperly mounted or secured labels on cartridges may impede the operation of the autoloader.

- Loose or damaged SCSI cable inside the 7332-220.

In general:

- Remove any cartridge from the drive. If the cartridge will not eject, recycle power to the tape drive.

- Remove the magazine.

- Recycle power to the tape drive.

- Try a different cartridge.

- Check cables, terminators, system connections, etc.

- Check for other causes for interference to the magazine.

Definitions

The following is a description of the R, X, Y, and Z motions:

- R-motion:
  The rotational movement of the carousel inside the autoloader.

- X-motion:
  The movement of the picker arm in an autoloader when moving the cartridges in and out of the magazine.

- Y-motion:
  The movement up and down of the platform in an autoloader when carrying cartridges between the magazine and the drive.

- Z-motion:

The motion of the magazine transport in an autoloader when it takes a magazine that the user has inserted and conveys it to the carousel. The same motion in reverse is used to eject the magazine.

Table 6. LCD 2 Digit Error Display

Code	Description	LCD	
61	Z-motor jammed while loading or ejecting the magazine	8	While pulling in
		9	While reversing load
		10	While pushing out
		11	While starting to unload
		12	While unloading
		13	Diagnostic
62	Z-motor has not responded within the time-out period.	16	Completing load
		17	Loading a magazine
		18	Pulling the magazine in
		19	Starting the unload
		20	Unloading the magazine
		21	Diagnostic
63	A magazine load was attempted, but no magazine was in the autoloader. This should never occur and is likely a firmware error.	24	Magazine not loaded
		25	Magazine reinserted
64	The R-motor is jammed, failing to rotate the carousel.	32	Leaving the home position
		33	Moving away from the home position
		34	Turning to the away position
		35	Leaving the away position
		36	Moving away from the away position
		37	Turning to the home position
		38	Recovering position
65	The R-motor has not responded within the time-out period	40	Leaving the home position
		42	Unexpected home R-switch
		43	Turning to the away position
		44	Unexpected away R-switch

		45	Turning to the home position
		46	Recovering position
66	The Y-motor has not responded within the time-out period on upward motion	48	At power-on
		49	Going up to the home position
		50	Going up
		51	Going up to the slot
		52	Going up with the cartridge
		53	Going up to the slot with the cartridge
		54	Leaving the door open
		55	Closing the door
67	The Y-motor is jammed on upward motion	56	At power-on
		57	Going up to the home position
		58	Going up
		59	Going up to the slot
		60	Going up with the cartridge
		61	Going up to the slot with the cartridge
		62	Leaving the door open
		63	Closing the door
68	The Y-motor is jammed on downward motion	64	Going down to the home position
		65	going down
		66	Going down to the slot
		67	Going down with a cartridge
		68	Going down to the slot with a cartridge
		69	Going below the home position
		70	Going down to the door
		71	Opening the door
69	The X-motor is jammed with the picker arm forward or backward	72	Looking for a slot
		73	Moving in with a cartridge
		74	Moving in with a cartridge, the picker arm is open
		75	Moving in without a cartridge

		76	Moving in without a cartridge, the picker arm is open
		77	Moving out without a cartridge
		78	Moving out without a cartridge, the picker arm is closed
		79	Moving out with the cartridge
6A	The X-motor has not responded within the time-out period	80	Looking for a slot
		81	Moving in with a cartridge
		82	Moving in with a cartridge, the picker arm is open
		83	Moving in without a cartridge
		84	Moving in without a cartridge, the picker arm is open
		85	Moving out without a cartridge
		86	Moving out without a cartridge, the picker arm is closed
		87	Moving out with the cartridge
6B	There is no cartridge on the platform when one was expected	88	In the home position
		89	With the door open
		90	At completion
		91	Unexpectedly
		92	No cartridge in the magazine
		93	Already on the platform at the start of the load
6C	There is a cartridge on the platform when there should not be one	96	In the home position
		97	With the door open
		98	At completion
		99	Unexpectedly
		100	Cartridge is still in the picker arm
		101	Already on the platform at the start of the load
6D	The door is open after a magazine has been inserted, or after an attempt to lock it	104	After a load
		105	When the door is locked
		106	Door did not close

		107	Lock broken
6E	A cartridge in the picker fingers has become loose	112	During X-motion
		113	During upward Y-motion
		114	During Y-motion up to the slot
		115	During downward Y-motion
		116	During Y-motion down to the slot
		117	During unload
6F	The tape has not been loaded in the drive successfully, even though the changer mechanism has apparently delivered it successfully.	120	Premature ejection. The drive accepted the tape, but then had a problem, such as a snapped tape or misload.
		121	The drive failed to induct the cartridge, probably because of a changer mechanism problem
70	The X-motor is jammed	128	Approaching the door without a cartridge
		129	Approaching the door with a cartridge
		130	Leaving the cartridge
		131	Looking for no slot
		132	Pushing the cartridge
71	The X-motor has not responded within the time-out period	136	Approaching the door without a cartridge
		137	Approaching the door with a cartridge
		138	Looking for no slot
		139	Pushing the cartridge
		140	Retrying initialization
72	The diagnostic to test sensor status detected that the sensor is inactive. This is not necessarily a fault.	144	
73	The Y-motor has not responded within the time-out period on downward motion	152	Going down to the home position
		153	Going down
		154	Going down to the slot
		155	Going down with a cartridge
		156	Going down to the slot with a cartridge

		157	Going down below the home position
		158	Going down to the door
		159	Opening the door
74	A cartridge has been accidentally pushed into the drive. The cartridge was then either physically loaded, or ejected and returned to the magazine.	160	Cartridge pushed into drive
		161	Unload pushed into drive
75	A cartridge has been inserted into the drive but has not been successfully loaded or ejected.	168	Cartridge pushed into drive
		169	Stuck in the drive after an unload
76	The door has failed to open	176	
77	An unsupported or unrecognizable medium changer-type command has been sent to the autoloader. Alternatively, the parameters for the command are inadequate, or out of range. This code indicates a firmware defect.	184	This is a possible host application error.
78	A command has been received that expects a magazine in the autoloader, and there is none.	192	This is a possible host application error.
79	A command requesting the autoloader to insert a tape in the drive has been received, and there is already a tape in the drive.	200	This is a possible host application error.
7A	The current magazine location already has a cartridge in it.	208	This is a possible host application error.
7B	The host has sent a LOG SENSE or LOG SELECT command with an invalid page code.	216	This is a possible host application error.
7C	The host has issued a command with an invalid magazine slot(that is not in the range of 1-6).	200	This is a possible host application error.
7D	The current magazine slot is empty, when it was expected to contain a cartridge	232	This is a possible host application error.
7E	A diagnostic has been sent, but the autoloader is not in diagnostic mode.	240	
7F	Communications between the drive and the front panel display have	248	

	been aborted. This is an internal error code.

VXA Tape Drives

VXA-2 80GB Tape Drive

LED's description are from left to right. The meaning of the LED's are:

Table 7. LED Information

Green On Power On Indicator	Green On Activity(Tape/SCSI bus) Indicator	Amber On Cleaning Required Indicator	Amber Flashing/On Fault/Over Temperature Indicator	Description of what the LED(s) are indicating.
On	On	On	On	Power On test in operation, On for 2 seconds
Flashing	Off	Off	Off	Power On Self Test(POST) in operation
Off	Off	Off	Off	Cartridge not loaded or drive not powered on
Off	Off	On	Off	Cartridge not loaded and Drive Cleaning is Required
On	Off	On or Off	Off	Cartridge loaded and no tape motion or SCSI bus activity
On	Flashing	On or Off	Off	Cartridge loaded and tape motion or SCSI bus activity
On	Off	On	Off	Cartridge loaded and Drive Cleaning is Required
On	Flashing	On	Off	Cartridge loaded and tape motion and Drive Cleaning is required
Off	Flashing	On or Off	Off	Cartridge loading or unloading
Off	Flashing	On	Off	Cartridge loading or unloading and Drive Cleaning is required

On or Off	Off	On or Off	Flashing	Unrecovered drive failure or microcode download failure. Hold eject button in for 10 seconds to cause the drive to reset to clear the fault indication. If this does not clear the fault indication the drive must be powered Off then back On to clear the fault indication.
Flashing	Off	On or Off	Off	Microcode is being Downloaded and Verified in the tape drive.
Flashing	Flashing	On or Off	Off	Microcode is being Updated in the tape drive.
Off	Off	On or Off	On	The tape drive has exceeded its designed maximum internal operating temperature of 47 Degrees Centigrade. The tape will be ejected, if present. The Over Temperature/Fault LED will stay ON until the internal drive temperature goes below the preset maximum temperature. **Note:** AIX will see the over temperature condition as if the tape drive went from ready to not ready. No error will be logged in the AIX error log.

8mm Tape Drives

2.3GB 8mm tape drive:

LED's description are from left to right. Meaning of the LEDs:

Amber -	**Green -**	**Meaning**

Read / Write or Disturbance	Ready (Tape Loaded)	
Off	Off	One of the following conditions: • The power is Off • The Power On SelfTest(POST) has completed successfully, but no tape cartridge has been inserted.
Off	On	Drive has tape loaded and is ready.
On	On	Drive is performing a Power-on Self Test (POST). (All LED's will remain ON if the drive is powered on and the system to which the drive is connected is powered off or the SCSI cables and terminator are connected to the drive but not to a system.)
Flashing	On	Drive is writing or reading.
On	Off or Flashing	The tape drive has detected an internal fault that requires corrective action. Reset the drive by pressing the blue Eject button. If this does not clear the condition, power the drive off then back on. Internally mounted tape drives may require the system to be shutdown, powered off then powered on to clear the internal fault in the drive. If the condition cannot be cleared using this method, refer to your service guide or system diagnostics for further assistance. The AIX diagnostic command: diag -c -d rmtx <-where x is the tape drive # will issue a reset to the tape drive if AIX is able to communicate with the drive it will issue a reset to the tape drive.

5GB, 7GB, 20GB and 60GB 8mm tape drives:

LED's description are from left to right. Meaning of the LEDs:

Amber - Disturbance	Green - Ready (Magazine Loaded)	Green - Tape and Tape Activity	Meaning
On	*	*	One of the following conditions: • The tape path needs cleaning(refer to the tape drive cleaning instructions). • A cleaning cartridge has been inserted and the cleaning cartridge has exceeded the maximum number of cleanings for the cleaning cartridge.

On	On	On	The Power-On Self Test(POST) is running (All LED's will remain ON if the drive is powered on and the system to which the drive is connected is powered off or the SCSI cables and terminator are connected to the drive but not to a system.)
Off/On	Off	Off	One of the following conditions: • The power is Off • The POST has completed successfully, but no tape cartridge has been inserted.
Off/On	On	Off	A tape cartridge has been inserted and the tape drive is ready to receive commands from the system.
Off/On	On	Flashing	A tape cartridge has been inserted and the tape drive is busy running a device operation.
Off/On	Off	Flashing	A tape cartridge has been inserted and the tape drive is performing a tape load/unload operation.
Flashing	*	*	The tape drive has detected an internal fault that requires corrective action. Reset the drive by pressing the blue Eject button. If this does not clear the condition, power the drive off then back on. Internally mounted tape drives may require the system to be shutdown, powered off then powered on to clear the internal fault in the drive. If the condition cannot be cleared using this method, refer to your service guide or system diagnostics for further assistance. The AIX diagnostic command: diag -c -d rmtx <-where x is the tape drive # will issue a reset to the tape drive if AIX is able to communicate with the drive.

Note: Where
* is On, Off, or Flashing

8mm 20GB drive ONLY

Meaning of the LEDs

The next 2 LED settings apply only to the 20GB 8mm drive.
LED's description are from left to right:

Amber - Disturbance	**Green - Ready (Magazine Loaded)**	**Green - Tape and Tape Activity**	**Meaning**

Flashing	Flashing	Flashing	When all 3 LEDs are flashing same as 3 LEDs ON (All LED's can Flash if the drive is powered on and the system to which the drive is connected is powered off or the SCSI cables and terminator are connected to the drive but not to a system.).
Flashing	*	*	The tape drive has detected an internal fault that can either indicate an error, as above, or the system is powered off and the tape drive is powered on and connected to the SCSI cable and terminator, same as 3 LEDs ON condition. The LCD will be showing the last 3 errors

Note: Where
* is On, Off, or Flashing

20GB and 60GB 8mm tape drive LCD messages:

The 16-digit alphanumeric LCD display information:

Display	**Meaning**
RESET	During the PowerUp Sequence the RESET Message comes up
RESETTING	First to indicate that the drive is going thru the boot sequence. Then after about 5 seconds, the following messages appear in sequence for 3-4 seconds each. These messages indicate the
MODEL: IBM-xxGB	MODEL
SUBMODEL: xxxxxxx	SUBMODEL: EEimage in the drive
SN: xxxxxxxxxx	SN: drive serial number
CODE: aaaaaaa	CODE: microcode level in the drive
LAST CLEAN: xxxhr	LAST CLEAN: hours since last cleaning
COMPRESSION: ON	COMPRESSION: indicates whether data compression mode is ON or OFF
SINGLE ENDED	Single Ended interface.
DIFFERENTIAL	Differential interface.
LV DIFFERENTIAL	Low Voltage Differential(LVD) interface. (LVD drives will show as Single Ended on Single Ended SCSI bus)
WIDE	WIDE interface only
SCSI ID: xx	SCSI ID: number 0-15 While the drive is completing the reset the LEDs show that the drive is in the RESET(Power up or Reset) mode . The drive usually completes the reset before all messages complete. Note: To cause the drive to reset press and hold the eject button

	until *** RESET is displayed. Releasing the eject button will allow the reset to proceed.
LANGUAGE	Available languages will be displayed Action: The text on the 8mm Tape Drive LCD is available in several languages. To change the language: Press and hold the unload button after you turn the power on to the 8mm Tape Drive or, if your system unit is already running, press and hold the unload button for approximately 15 seconds until the 3 LEDs are illuminated. Release the unload button for approximately one second, the drive will then display the words "*** RESETTING". Then press and hold the unload button again. After the LCD cycles through all the reset messages it cycles through the available languages. When the desired language displays, release the unload button. The "Language" prompt appears after the "SCSI ID" message, followed by a list of the languages in a slow scrolling sequence. When the desired language appears on the display, release the unload button. The drive RESETS again, even if it is the same language, and begins with the new/same language. English Francais Deutsch Espanol Italiano Portugues
CLEAN SOON	If the drive cleaning criteria has been reached, the MUST CLEAN CLEAN SOON message displays, with the ICON flashing, CLEANING... during the time that the drive is normally idle, DEPLETED When READY is typically displayed. The Disturbance, AMBER CLEAN LED, is also ON. When the drive has recognized that a clean is in process the word CLEANING... will be displayed during the cleaning process. If the Cleaning Cartridge is at the end of it length, the cartridge is ejected and the DEPLETED message is displayed until a new cleaning cartridge is used or a data tape is installed. When a tape motion command is given, that new message is displayed even though the AMBER CLEAN LED is still on. Then, until the drive is properly cleaned, at each idle opportunity, CLEAN SOON is displayed. Note: MUST CLEAN - (20GB drive only) The MUST CLEAN message is displayed when the tape is switched from MP to AME and the drive cannot be used to write to the AME tape without cleaning the tape drive. Any AME TAPE WILL BE EJECTED until the tape drive is cleaned. After reading an MP tape, the 20GB drive MUST BE CLEANED before being able to use AME tapes, refer to the MUST CLEAN message. After reading MP tapes insert an AME tape and wait

	for the AME tape to be ejected and the MUST CLEAN message to be displayed before doing this cleaning. This is necessary because there is a special cleaning cycle the tape drive will do when changing from MP to AME media. Cleaning tapes supported by the 2.3GB, 5GB and 7GB 8mm tape drive are NOT supported in this drive, if these cleaning cartridges are inserted the "ILLEGAL TAPE" message will be displayed, and the tape ejected.
READY-NO-TAPE	This message appears at the end of the RESET sequence if no tape is loaded.
LOADING	This message appears when tape is loading. The ICON will flash during this time.
READY-TAPE	This message appears at the end of Loading Tape.
M2 READY-TAPE	(M2)This message appears at the end of Loading Tape.
ILLEGAL TAPE	If a customer inserts an ILLEGAL TAPE, like a cloth cleaning tape, then the tape will be ejected and the ILLEGAL TAPE message will be displayed until a suitable tape is loaded. Note: ILLEGAL TAPE - Only tapes labeled AME can be written by these drives. Tapes labeled 15m, 54m, 112m, or 160m are Metal Particle(MP) and cannot be written. The 20GB drive can read MP tapes, the 60GB drive cannot read MP tapes and it will eject MP tapes. After reading an MP tape, the 20GB drive MUST BE CLEAN ED before being able to use AME tapes, refer to the MUST CLEAN message. After reading MP tapes insert an AME tape and wait for the AME tape to be ejected and the MUST CLEAN message to be displayed before doing this cleaning. This is necessary because there is a special cleaning cycle the tape drive will do when changing from MP to AME media. Cleaning tapes supported by the 2.3GB, 5GB and 7GB 8mm tape drive are NOT supported in this drive, if these cleaning cartridges are inserted the "ILLEGAL TAPE" message will be displayed, and the tape ejected.
EJECT **	This message will be displayed, with the ICON flashing whenever the eject button is pressed and the eventual result is to eject the tape. For example, this message will appear even thought the tape drive is continuing to flush the buffer during a READ or a Write, because the eventual result is to rewind and eject the tape. This will give instant acknowledgement to the operator that the button press was received by the drive. The ICON will change to < < (same as Rewind) when the rewind phase is in process.
EJECT PREVNT	This message will be displayed if the system has issued a "prevent media removal" command and the drive unload button is pressed. The tape will rewind and unload into the tape cartridge, but the cartridge will not eject from the drive.

READ + **	The + sign appears whenever the drive is in compression mode. The boxes show the amount of tape used as a percent of the total tape length. The empty area is shown as equal sign so that the line is complete. There are up to 6 solid squares to follow the message as shown in the following 5 messages.
WRITE + **	The + sign appears whenever the drive is in compression mode.
PROTECTED	If a write is attempted on a Write Protected tape, the PROTECTED message is displayed.
ILLEGAL WRT	The ILLEGAL WRT message is displayed if write is attempted to a for which writing is not supported on this tape drive. This message remains until another tape is inserted that is the correct type or another legal command is issued such as a READ, REWIND, or the eject button is pushed. Note: ILLEGAL WRT - Only tapes labeled AME can be written by these drives. Tapes labeled 15m, 54m, 112m, or 160m are Metal Particle(MP) and cannot be written.
SEARCH **	Used for high speed searching to indicate the position on the cartridge. The display bar will increase or decrease for forward or backward searches.
REWIND **	Self explanatory. Display bar reduces in size as rewind occurs.
ERASE **	Self explanatory. This occurs very quickly for a short erase.
WORN TAPE	This message is displayed when the tape in the drive is beyond the end of its useful life(20,000 passes of the tape drive head over any spot on the tape). This counter is an internal counter that is not accessible to the user. This counter was implemented starting in microcode level 40HA in the 20GB drive and first shipment of 60GB drive. To avoid the possibility of data loss, copy the data you need from this tape to a new tape as soon as possible.
OVER TEMP	The tape drive detected an internal temperature of 47 degrees C or greater. If a data cartridge is in the tape drive when this condition occurs, the tape drive will complete the current tape operation, and then rewind and eject the data cartridge. After the tape drive temperature returns to a normal operating temperature of 42 degrees C or less, the OVER TEMP message continues to display until one of the following occurs: • Front-panel reset(press and hold the Unload button. • Power cycle(tape drive power is turned off and then on) • Tape load(load a tape in the tape drive)
LOADING CODE.. CODE LOAD FAIL RETRY CODE	If a code load tape is inserted and the tape is recognized as such, or a code load is in process via the SCSI or Monitor port, then the LOADING CODE.. message is displayed. At the completion of the code load, if there was a failure, CODE LOAD FAIL and RETRY CODE LOAD messages scroll. Otherwise, if the code load was successful,

LOAD	the drive will automatically RESET and come READY again.
DIAG-LOAD TAPE DIAG-TESTING DIAG-PASSED DIAG-FAILED DIAG-WRT xx.x% DIAG-READ xx.x% DIAG-ECC xx.x%	If a SCSI Send Diagnostic command is received, or a Diagnostic tape is used, then this series of messages appears. DIAG-LOAD TAPE is used if the command is via SCSI and no tape is present. DIAG-TESTING appears during this test. If the test passes OK, then the DIAG-PASSED appears for 15 seconds. If there is a failure, then DIAG-FAILED appears and the 3 statistics messages appear for 2 seconds each in a rotating loop. Pressing the Eject button to remove the tape will clear this display. Otherwise this message will continue to display DIAG-FAIL(plus the 3 statistics messages) until the drive is RESET.
ERR 1: xx yy zz ERR 2: xx yy zz ERR 3: xx yy zz	Failing error codes displayed when the drive is first powered on or during tape drive operation. Where xx is the fault symptom code. Where yy is the primary error code. Where zz is the secondary error code. Whenever errors are displayed it will be helpful in problem determination if they are written down and provided to support.

Note:
* Indicates that there is an ICON accompanying this message. To see what the ICON looks like you will have to look at a drive or the Operator Guide or the Service guide.
** Progress symbols

DLT Tape Drives

7205-311 35GB DLT tape drive:

There are 10 LEDs on the tape drive and another LED on the 7205-311 power supply. The following is the description of the 10 LEDs on the tape drive:

Left side LEDs(6)

Label or Symbol*	Color	State	Meaning
2.6	Green	ON	Tape is recorded in 2.6GB format
6.0	Green	ON	Tape is recorded in 6.0GB format
10.0/15.0	Green	ON	Tape is recorded in 10.0/15.0GB format
20.0	Green	ON	Tape is recorded in 20.0GB format
35.0	Green	ON	Tape is recorded in 35.0GB format
Compression*	Green	ON	Compression mode is enabled. Compression can be done in 10, 15, 20, and 35GB Density only.

Note:
In a read operation, the indicators will reflect the density and compression status of the pre-written tape.

* On the drive this is an international symbol the wording here is a description of what that symbol means.

Right side LEDs(4)

Label or Symbol*	Color	State	Meaning
Write Protected*	Green	ON	Tape is write-protected.
		OFF	Tape is write-enabled.
Tape In Use*	Green	ON	Tape is loaded, ready for use.
		Flashing	Tape is moving.
Use Cleaning Cartridge*	Amber	ON	Drive head needs cleaning, or the previous data tape was worn out.
		ON	Remains ON after you unload the cleaning cartridge. If this condition occurs the likely cause is cleaning cartridge has expired(been used up) and the cleaning was not done.
		OFF then ON	If the Use Cleaning Cartridge LED comes ON and Remains ON after you unload the cleaning cartridge the likely cause is cleaning cartridge has expired(been used up) and the cleaning was not done.
		OFF then ON	If after cleaning the LED turns on again when you reload the data cartridge. When n this condition occurs the likely cause is a worn out data cartridge. Clean the drive again and try another data cartridge. If the problem persists, do the problem determination procedures.
		OFF	Cleaning is complete, or cleaning is not required.
Operate Handle*	Green	ON	It is OK to operate the cartridge Insert/Release handle.
		OFF	Do not operate the cartridge Insert/Release handle.

Note: Not all errors(Flashing LEDs) are drive failures. Media can cause these failures. Before replacing the drive clean the drive and try new media.

LEDs	State	Meaning

All Left LEDs or All Right LEDs	ON	Power On Self Test(POST) has started.
All Left LEDs and All Right LEDs	Flashing	Error was detected during POST.
All Left LEDs	Flashing	Servo controller error was detected.
All Right LEDs**	Flashing	Drive controller error was detected.
Right top 3 LEDs and Right Bottom LED**	On	Drive controller error was detected.
All Right LEDs	Flashing in Sequence	Drive Microcode download failure

Note:
* On the drive this is an international symbol the wording here is a description of what that symbol means.
** Likely caused by a detached leader on the drive, have the drive leader replaced by service personnel and check all tape cartridges as this is normally caused by a leader problem on a tape cartridge.

7205-440 40GB DLT tape drive:

There are 9 LEDs on the tape drive and another LED on the 7205-440 power supply. The following is the description of the 9 LEDs on the tape drive:

Left side LEDs(5)

Label or Symbol*	Color	State	Meaning
10.0/15.0	Green	ON	Tape is recorded in 10.0/15.0GB format
20.0	Green	ON	Tape is recorded in 20.0GB format
35.0	Green	ON	Tape is recorded in 35.0GB format
40.0	Green	ON	Tape is recorded in 40.0GB format
Compression*	Green	ON	Compression mode is enabled.

Note:
In a read operation, the indicators will reflect the density and compression status of the pre-written tape.
* On the drive this is an international symbol the wording here is a description of what that symbol means.

Right side LEDs(4)

Label or Symbol*	Color	State	Meaning
Write Protected*	Green	ON	Tape is write-protected.
		OFF	Tape is write-enabled.
Tape In Use*	Green	ON	Tape is loaded, ready for use.
		Flashing	Tape is moving.
Use Cleaning cartridge*	Amber	ON	Drive head needs cleaning, or the previous data tape was worn out.
		ON	Remains ON after you unload the cleaning cartridge. If this condition occurs the likely cause is cleaning cartridge has expired(been used up) and the cleaning was not done.
		OFF then ON	If the Use Cleaning Cartridge LED comes ON and Remains ON after you unload the cleaning cartridge the likely cause is cleaning cartridge has expired(been used up) and the cleaning was not done.
		OFF then ON	If after cleaning the LED turns on again when you reload the data cartridge. When n this condition occurs the likely cause is a worn out data cartridge. Clean the drive again and try another data cartridge. If the problem persists, do the problem determination procedures.
		OFF	Cleaning is complete, or cleaning is not required.
Operate Handle*	Green	ON	It is OK to operate the cartridge Insert/Release handle.
		OFF	Do not operate the cartridge Insert/Release handle.

Note: Not all errors(Flashing LEDs) are drive failures. Media can cause these failures. Before replacing the drive clean the drive and try new media.

LEDs	State	Meaning
All Left LEDs or All Right LEDs	ON	Power On Self Test(POST) has started.
All Left LEDs and All Right LEDs	Flashing	Error was detected during POST.
All Left LEDs	Flashing	Servo controller error was detected.
All Right LEDs**	Flashing	Drive controller error was detected.

Right top 3 LEDs and Right Bottom LED**	On	Drive controller error was detected.
All Right LEDs	Flashing in Sequence	Drive Microcode download failure

Note:
* On the drive this is an international symbol the wording here is a description of what that symbol means.
** Likely caused by a detached leader on the drive, have the drive leader replaced by service personnel and check all tape cartridges as this is normally caused by a leader problem on a tape cartridge.

7205-550 160GB DLT tape drive:

There are 3 LEDs on the tape drive and another LED on the 7205-550 power supply. The following is the description of the 3 LEDs on the tape drive:

LEDs meanings from Left to Right

Label or Symbol*	Color	State	Meaning
Density	Green	ON	The tape in the drive is formatted for a maximum data capacity of 220GB compressed or 110GB uncompressed.
		OFF	The tape in the drive is formatted for a maximum data capacity of 320GB compressed or 160GB uncompressed.
Drive Status	Green	Flashing	The tape is moving. The drive is calibrating, reading, writing, or rewinding the tape. The tape is loading, unloading, or rewinding.
		On	The drive is idle, there may or may not be a cartridge in the tape drive.
		Off	There is no power to the drive.
Use Cleaning Cartridge*	Amber	ON	Drive head needs cleaning, or the previous data tape was worn out.
		ON	Remains ON after you unload the cleaning cartridge. If this condition occurs the likely cause is cleaning cartridge has expired(been used up) and the cleaning was not done.
		OFF then ON	If the Use Cleaning Cartridge LED comes ON and Remains ON after you unload the cleaning cartridge the likely cause is cleaning cartridge has expired(been used up) and the

			cleaning was not done.
		OFF then ON	If after cleaning the LED turns on again when you reload the data cartridge. When n this condition occurs the likely cause is a worn out data cartridge. Clean the drive again and try another data cartridge. If the problem persists, do the problem determination procedures.
		OFF	Cleaning is complete, or cleaning is not required.

Note:
* On the drive this is an international symbol the wording here is a description of what that symbol means.

Tape Drive Performance/Reliability Checklist

The Tape Drive Performance/Reliability Checklist is an overview of how to evaluate and prevent tape drive problems.

Media Selection

Media selection is very important as improper or low grade media will not work properly with the tape drive.

- Use only the tape cartridges supported by your tape drive.
- These must be high quality data grade media, such as the IBM data grade cartridge originally supplied with your drive.
- Don't attempt to write on previously written software distribution tapes. Often these tapes will not support being rewritten without modifications to the cartridge. If the cartridges are modified it is possible to cause tape jams or misalignment.

Media Replacement

Cartridges which are used regularly (e.g. daily/weekly backup tapes) should be discarded after about a hundred uses. Cartridges which are in use when media-related errors are reported by your backup application, or are physically dropped, or are exposed to extremely harsh environments should be discarded.

Media Storage

Proper media handling and storage is important to reduce the chance of damage to the media.

- Protect your cartridges from particulate contamination when they're not in use. Put each cartridge in its protective case or place the cartridge in a dust-tight container designed for tape cartridge storage.

- Keep your cartridges in an area where the temperature and humidity are comfortable for you and are relatively constant.
- Orient cartridges in storage so that their cases are on an edge (vs flat). If cartridges are moved between areas whose temperature or humidity differ greatly, let the cartridge adapt for several hours prior to use.

Cleaning Cartridge Selection / Usage

Proper cleaning is important to reduce errors and rereads/rewrites.

- Use only the cleaning cartridges supported by your tape drive. These must be high quality cartridges, such as the IBM cleaning cartridge originally supplied with your drive.
- Refer to the "Media Selection" for proper cleaning cartridge part numbers and their minimum recommended usage.
- Cleaning Cartridges often are specifically designed for specific drive usage, use only the cleaning cartridge specified for the drive being used.
- The need to clean a tape drive is often indicated by an message on the tape drives display or by a cleaning indicator, such as an Amber LED on the drive being on solid(not flashing).
- Clean the tape drive after any media related error is encountered.
- Mark the cleaning cartridge usage counter every time the cartridge is used.
- Often it is possible to observe the remaining cleaning material through the cartridge's window and discard the cartridge when fully used.

Environment

Locate your tape drive at table top level or higher and away from sources of particulate contamination such as outside doorways, high foot traffic areas, printers, and copiers. Maintain comfortable temperature and humidity (ideally 30-40% Relative Humidity) when the tape drive is in use. Note that this may require a timing adjustment of nighttime setbacks. Minimize the amount of time cartridges spend in the drive when not in actual use.

Troubleshooting

If a backup failure occurs, try cleaning the drive and retrying the operation with a new cartridge. Verify that this checklist's recommendations are being followed by the system's operators. Look for trends, process changes, and/or environmental changes. Avoid mechanical loading problems by placing labels only in the designated cartridge spine and top locations and assuring that they are not peeling off or more than two layers thick. Contact your IBM CE if problems persist.

Note: The TAPE DRIVE PERFORMANCE/RELIABILITY CHECKLIST is based on the copyrighted "8MM PERFORMANCE/RELIABILITY CHECKLIST" by the Exabyte Corporation and is distributed free of charge with Exabyte Corporation permission.

Tape Drive Error Information

Details AIX Error Log entries(errpt -a) for tape entries:

Label	Identifier	Likely Cause of Error Log Entry	Effect on User Application	Diagnostic Calls out
TAPE_ERR1	0x4865fa9b	Media (hard error)*	I/O Error	Media
TAPE_ERR2	0x476b351d	H/W(but media can cause H/W errors)*	I/O Error	Drive/Dirty drive/Media
TAPE_ERR3	0xe64ec259	Media (soft error)**	No effect(Not Seen by Application)	Ignores
TAPE_ERR4	0x5537ac5f	Unknown(Requires further analysis)	I/O Error	Ignores
TAPE_ERR5	0xffe2f73a	Unknown(Requires further analysis)	I/O Error	Ignores
TAPE_ERR6	0xb617e928	Dirty Drive (Cleaning LED ON)***	No effect(Not Seen by Application)	Ignores

Note:

- * 4mm tape drives will flash the Amber LED
- ** 4mm tape drives will put the Amber LED on solid
- *** 8mm 5GB, & 7GB put the Amber LED on solid after 30 hours of tape motion without the drive being cleaned. 8mm 20GB put the Amber LED on solid after 70 hours of tape motion with AME media and 20 hours with MP media.
- 8mm 2.3GB, 5GB, 7GB, & 20GB tape drives will log a TAPE_ERR3 when: Rewrite % is equal to or greater than 2% with at least 100mb of data written,
  or
  Reread % is equal to or greater than 1% with at least 20mb of data read.
- The 20GB drive MUST BE CLEANED after using 15m, 54m, 112m, or 160m length media before any subsequent write operation will be allowed.
- TAPE_ERR3 and TAPE_ERR6 are "soft errors" that are posted to the AIX error log. In other words, neither error terminated the tape operation. They are informational errors that may cause AIX to send an informational message to the user.
- TAPE_ERR4 errors are often found to be caused by noise on the SCSI bus. Noise on the SCSI bus can be caused by one or more of the following:
  - Loose SCSI Cables (reseat and tighten all SCSI connections).
  - Bent pins in the SCSI connection (check all SCSI connections for bent pins).
  - Device is not supported on the SCSI adapter/system(insure device is

supported by the SCSI adapter/system).
    - Improper, missing or multiple SCSI bus termination(check SCSI bus termination).
    - SCSI cables(insure the proper IBM SCSI cables are used).
    - SCSI cables exceed the supported length for the bus(check the IBM information on SCSI bus length).
    - Other SCSI devices on the bus(it may be necessary to remove the other SCSI devices one at a time to determine device causing the problem).

Tape Drive Problem Determination

Details the steps that should be taken to resolve problems.

Tape drives are very expensive and often are not the reason a tape cannot be read or written. Often the problem is caused by one or more of the following:

- Not cleaning the tape drive, using cleaning cartridges that are used up, use of cleaning cartridges that are not supported, not following the recommended cleaning frequency, or cleaning instructions.
- Not cleaning the tape drive after an I/O error prior to retrying the failing operation.
- Poor Quality media, or worn out media being used. Clean the drive and retest the operation with a new IBM data cartridge recommended for the drive.
- Misunderstanding of the meaning of the LED's on the tape drive.
- Environment not suitable for tape drive operation.
- PTF's level of the system does not support the tape drive.
- Bad blocksize, attempts to read at one blocksize and the tape is written at another. Or the blocksize, attempting to write at is preceded by a 0 (ZERO), 0512 is not the same as 512. The zero is recognized by the system as Octal and some applications do not support Octal values.
- Device buffering turned off causing the drive to write every block of data as it is received. Normal operation is to buffer the data allowing the drive to stream the data to the tape as a continuous operation.
- Writing a tape with one command then attempting to read the tape with a non compatible command, such as: writing the tape with a "tar" command and attempting to read the tape with a "restore" command.
- Improper SCSI bus termination.
- Conflict of tape drives SCSI address with another device on the bus.
- Electrical problems with the electrical power going to the system and the tape drive. This could be no electrical ground, poor electrical ground, measurable voltage on the ground or neutral, etc..
  This is not for the user to check, a trained professional should check this.
- Other device causing "noise" on the bus.

Problem Determination Steps

When experiencing problems with IBM tape drives, 1/4", 4mm, 8mm, DLT, or VXA tape drives you should do the following before placing a service call:

Cleaning the tape drive

It is very important to follow the recommended cleaning information provided with the tape drive. If the tape drive is not cleaned properly even new media may not perform properly.

Do not over clean the tape drive as over cleaning can damage the tape drive, follow the cleaning information provided with the drive.

If the recommended cleaning schedule or non IBM cleaning cartridges have been used it may be necessary to clean the tape drive more than once to get the drive fully cleaned.

Clean the tape drive using the IBM Cleaning Cartridge:

1/4" Tape Drives

	Model	Description	Cleaning Cartridge P/N
150mb drive	7207-001	QIC-150	16G8572*
520mb drive	7207-011	QIC-525	16G8572*
1.2GB drive	7207-012	QIC-1000	16G8572*
4GB drive	7207-122	SLR5-4GBSL	35L0844*
13GB drive	7207-315	QIC-5010-DC	35L0844*
30GB drive	7207-330	SLR60	35L0844*
50GB drive	7212-102	SLR100	35L0844*

Note: * May be used for up to 50 cleanings

4mm Tape Drives

	Model	Description	Cleaning Cartridge P/N
4mm 2GB drive	7206-001	DDS1(DDS||||)	21F8763*
4mm Internal Autoloader		DDS2	21F8763*
4mm 4GB drive	7206-005 7332-005	DDS2	21F8763*
4mm 12GB drive	7206-110 7332-110	DDS3	21F8763*

4mm 20GB drive	7206-220 7332-220 7212-102	DDS4	21F8764*
4mm 36GB drive	7206-336 7212-102	DAT72	21F8764*

Note: * May be used for up to 50 cleanings

VXA Tape Drives

	Model	**Description**	**Cleaning Cartridge P/N**
80GB drive	7206-VX2	VXA-2	19P4880*

Note: * May be used for up to 20 cleanings

8mm Tape Drives

	Model	**Description**	**Cleaning Cartridge P/N**
2.3GB drive	7208-001		16G8467*
5GB drive	7208-011		16G8467**
7GB drive	7331-205		16G8467**
20GB drive	7208-341 7331-305		35L1409***
60GB drive	7208-345 7334-410		35L1409***

Note:
* May be used for up to 12 cleanings
** May be used for up to 22 cleanings
*** May be used for up to 18+ cleanings(The drive varies the cleaning media usage. The drive will display "Expired" Message and Clean LED(AMBER on solid) if an expired, maximum number of cleanings, cleaning cartridge is inserted into the drive.)

DLT Tape Drives

	Model	**Description**	**Cleaning Cartridge P/N**
35GB DLT drive	7205-311 7337-305/306	DLT7000	59H3092*

40GB DLT drive	7205-440 7337-360	DLT8000	59H3092*
160GB SDLT drive	7205-550	SDLT320	19P4357*

Note: * May be used for up to 20 cleanings

Check the media

Often media problems cause unnecessary drive replacements.

If an user application is failing with media(I/O) errors to a tape drive:

- Check what type and brand of media being used and insure it is supported on the tape drive.
- Clean the tape drive with the appropriate IBM cleaning cartridge.
- After cleaning the tape drive retry the application, and if it fails again, clean the drive again, and retry the operation on new IBM media.

This will often result in replacing a single data cartridge that resolves the problem.

1/4" Tape Drives

	Model	Description	Data Cartridge P/N	Density Setting	Media Description
150mb drive	7207-001	QIC-150	21F8578	15, 16	DC6150
520mb drive	7207-011	QIC-525	21F8697	15, 16, 17	DC6525
		QIC-150	21F8578	15, 16	DC6150
1.2GB drive	7207-012	QIC-1000	21F8730	21 (ONLY)	DC9120
		QIC-525	21F8697	15, 16, 17	DC6525
		QIC-150	21F8578	15, 16	DC6150
4GB drive	7207-122	SLR5-4GB	59H3660	38, 166	SLR5-4GB
		QIC-2GB	16G8436	34, 162	
		QIC-1000	21F8730	21 (ONLY)	DC9120
		QIC-525	21F8697	15, 16, 17	DC6525
		QIC-150	21F8578	15, 16	DC6150
13GB drive	7207-315	MLR1-16GB	59H4175*	33 (ONLY)	MLR1-16GB
		QIC-5010	16G8574**	33 (ONLY)	DC5010 MLR1
		QIC-5010(2GB)	35L0589**	33 (ONLY)	DC5010 MLR1
		QIC-2GB	16G8436	34 (ONLY)	

		QIC-1000	21F8730	21 (ONLY)	DC9120
		QIC-525	21F8697	15, 16, 17	DC6525
		QIC-150	21F8578	15, 16	DC6150
30GB drive	7207-330	SLR60 37.5GB	24R0146	52	SLR60
		SLR60-30GB	19P4209	52	SLR60
		SLR100-5GB	35L0661	52	
		MLR3-25GB	59H4128	48	
		MLR1-16GB	59H4175	33	MLR1-16GB
		MLR1-13GB	16G8574	33	MLR1-16GB
		MLR1-2GB	35L0589	33	MLR1-2GB
		SLR5-4GB	59H3660		Read Only
		SLR5-4GBSL			Read Only
		DC9250			Read Only
		DC9250XL			Read Only
		DC9200			Read Only
		DC9200SL			Read Only
50GB drive	7212-102	SLR100 50GB	35L0968	52	SLR60
		SLR100 37.5GB	24R0146	52	SLR60
		SLR60-30GB	19P4209	52	SLR60
		SLR100-5GB	35L0661	52	
		MLR3-25GB	59H4128	48	
		MLR1-16GB	59H4175	33	MLR1-16GB
		MLR1-13GB	16G8574	33	MLR1-16GB
		MLR1-2GB	35L0589	33	MLR1-2GB
		SLR5-4GB	59H3660		Read Only
		SLR5-4GBSL			Read Only
		DC9250			Read Only
		DC9250XL			Read Only
		DC9200			Read Only
		DC9200SL			Read Only

Note:
* Drive must have a microcode level of 0345 or higher to use this tape.
** Withdrawn(obsolete)

4mm Tape Drives

Note: Do not change the default density settings in AIX for the 4mm tape drive as the 4mm tape drives do automatic media sensing and write and read

the correct format for each tape. Changing the default density settings may cause unpredictable results.

	Model	Description	Data Cartridge P/N
4mm 2GB drive	7206-001	DDS1(DDS||||)	21F8754
4mm 4GB drive	7206-005 7332-005	DDS2	8191151
		DDS1(DDS||||)	21F8754
4mm 12GB drive	7206-110 7332-110	DDS3	59H3465
		DDS2	8191151
		DDS1(DDS||||)	21F8754
4mm 20GB drive*	7206-220 7332-220 7212-102	DDS4	59H4458
		DDS3	59H3465
		DDS2	8191151
		DDS1(DDS||||) is not supported	
4mm 36GB drive**	7206-336 7212-102	DAT72	18P7912
		DDS4	59H4458
		DDS3	59H3465
		DDS2 is not supported	
		DDS1(DDS||||) is not supported	

Note:
* Tapes that are not DDS4, or DDS3, or DDS2 are not supported and will eject when inserted into the 20GB 4mm DDS4 tape drive or DDS4 Autoloader.
** Tapes that are not DAT72, or DDS4, or DDS4 are not supported and will eject when inserted into the 36GB 4mm DAT72 tape drive.

VXA Tape Drives

The Smit density setting for VXA2 format/capacity is "129".
The Smit density setting for VXA1 format/capacity is "128".

	Model	Description	Data Cartridge P/N	Density Setting	Media Description
VXA 80GB drive	7206-VX2	V6	19P4878	129, 128	20GB Blue accent
		V10	N/A	129, 128	40GB Orange accent
		V17	19P4877	129, 128	59GB Red accent
		V23	19P4876	129	80GB Purple accent

8mm Tape drives

2.3GB, 5GB, 7GB and 20GB Drive/Media Capacity

Each 8mm tape drive only supports specific media, the following data will give you information that can be used to make an informed decision on what media to use:

- 8mm media of 15m, 54m, 112m, or 160m length are Metal Particle(MP) media.
- 8mm media of 22m, 45m, 75m, 125m, 150m, 170m or 225m length are Advanced Metal Evaporated(AME) media. Use the AME media on 20GB and 60GB drives ONLY. MP media can only be read on the 20GB drives.
- 8mm drives with 2.3GB or 5.0GB capacity Read/Write 15m, 54m, or 112m length "MP" media only.
- 8mm drives with 7.0GB capacity Read/Write 15m, 54m, 112m, or 160m length "MP" media only.
- 8mm drives with 20.0GB capacity can only Read 15m, 54m, 112m, or 160m length "MP" media.
- 8mm drives with 20.0GB capacity can Read/Write ONLY on 22m, or 170m length "AME" media.
  If the 22m or 170m AME tape has been written in 60GB format, the tape cannot be read by the 20GB drive, it can be rewritten by the 20GB drive as if the tape were blank.
- AME data tapes of lengths: 45m, 75m, 125m, 150m, and 225m are not supported on the IBM 2.3GB, 5GB, 7GB, and 20GB 8mm tape drives
- 8mm media of 22m, 160m, and 170m should bear the Recognition System Logo.

The following chart shows data interchange using IBM data grade tapes among 8mm 2.3GB, 5GB, 7GB, 20GB, and 60GB tape drives. The chart list the external model types as an example but the data applies to the internal versions of the drives also.

Drive	2.3GB NonC	2.3GB Compress	5GB NonC	5GB Compress	7GB NonC	7GB Compress	20GB NonC -	(I

	**	**	**	**	**	**	Compress **	C
7208-001(2.3GB)	R/W	N/S	N/S	N/S	N/S	N/S	N/S	N
7208-011(5GB)	R/W D=20*	R	R/W D=21*	R/W D=140	N/S	N/S	N/S	N
7331-205(7GB)	R/W D=20*	R	R/W D=21*	R/W D=140	N/S	R/W D=140	N/S	N
7208-341(20GB) 7331-305(20GB)	R#	N/S	R#	R#	R#	R#	R/W	N
7208-345(60GB) 7334-410(60GB)	N/S	N/S	N/S	N/S	N/S	N/S	R	R

2.3GB, 5GB, 7GB, 20GB and 60GB supported media

The following chart shows chart shows the supported IBM data grade tapes usage 8mm 2.3GB, 5GB, 7GB, 20GB, and 60GB tape drives.

Drive	15m MP	54m MP	112m MP	160m MP	22m AME	45m AME	75m AME	125m AME	150m AME	170 AME
2.3GB	R/W N/A	R/W N/A	R/W 21F8575	N/S	N/S	N/S	N/S	N/S	N/S	N/S
5GB	R/W N/A	R/W N/A	R/W 21F8575	N/S	N/S	N/S	N/S	N/S	N/S	N/S
7GB	R/W N/A	R/W N/A	R/W 21F8575	R/W 87G1603	N/S	N/S	N/S	N/S	N/S	N/S
20GB	R# N/A	R# N/A	R# 21F8575	R# 87G1603	R/W 59H2671	N/S	N/S	N/S	N/S	R/W 59H
60GB	N/S Eject	N/S Eject	N/S Eject	N/S Eject	R/W*** 59H2671	R/W*** N/A	R/W*** 35L1044	R/W*** N/A	R/W*** 09L5323	R/W 59H

Note:

- **Compress - Compression Capable**
- **NonC - Non Compression Capable**
- **R/W - This drive can both Read and Write this media.**
- **R - This drive can ONLY Read from this media. The drive cannot write on this media.**
- **N/S - Not Supported.**
- **N/A - No IBM media Available.**
- **D= - Density setting**
- **Eject- The drive will eject this media.**
- **# This media is Metal Particle(MP) the 20GB drive MUST BE CLEANED after reading this media prior using Advanced Metal Evaporated(AME) media. When you are ready to use AME media insert the AME media and**

let the drive eject the AME media. The drive then is to be cleaned. Cleaning the drive prior to inserting the AME will still require the drive to be cleaned again as the drive will eject the AME media and display the MUST CLEAN message.

- *** Use the Density setting to write this format/capacity with this drive.**
- **** Data interchange between the 2.3GB, 5GB, and 7GB tape drives is ONLY capable on the 15m, 54m or 112m Data Cartridges, not on the 160m.**
- ***** The 60GB drive can Read tapes written by the 20GB drive but cannot write tapes that can be Read by the 20GB drive. Tapes written by the 60GB drive can only be read on a 60GB drive.**

20GB and 60GB tape drive interchange

The following chart shows data interchange using the IBM 8mm data grade tape between the 8mm 20GB and 60GB tape drives. The chart lists the external model type as the example but the data applies to the internal versions of the 20GB drive also.

- **Metal Particle(MP) media is not supported in the 60GB tape drive and is ejected. MP media is normally 15m, 54m, 112m, 160m lengths.**
- **MP media can only be read on the 20GB drives.**
- **Advanced Metal Evaporated(AME) media is available in 22m, 45m, 75m, 125m, 150m, 170m, or 225m lengths.**
- **AME "SmartClean" data cartridges contain a build in cleaning capability. Cartridges of 75m, 150m, and 225m are "SmartClean" Cartridges.**
- **AME media of 22m, or 170m length are the only AME media supported in the 20GB drive.**
- **Format is a term used to describe the way a tape is written.**
- **The 20GB 8mm tape drive ONLY writes/reads a "Mammoth" format.**
- **The 60GB 8mm tape drive ONLY writes "Mammoth2(M2)" format.**
- **The 60GB 8mm tape drive READS "Mammoth" or "Mammoth2(M2)" format.**
- **It is not possible to write data on a 60GB drive and read the data on the 20GB drive.**
- **If the 22m or 170m AME tape has been written by a 60GB 8mm drive the tape cannot be read by the 20GB drive. The 20GB drive will treat this tape as if the tape were a blank tape.**
- **There is no need to use density settings for writing or reading tapes on either the 20GB or the 60GB drives as the drives do automatic media and tape format recognition.**

Drive	20GB	60GB
7208-341(20GB)	R/W*	N/S
7331-305(20GB)	R/W*	N/S
7208-345(60GB)	R**	R/W**
7334-410(60GB)	R**	R/W**

Note:

- **R/W - This drive can both Read and Write this media.**
- **R - This drive can ONLY Read from this media. The 60GB drive cannot write a format that can be read by the 20GB 8mm drive.**
- **N/S - Not Supported**
- *** Media must be 22m or 170m AME ONLY.**
- **** The 60GB drive can read Mammoth or M2 format but can only write M2 format.**

DLT Tape Drives

The following chart shows the various DLT media and their IBM Part number and the associated density setting:

	Model	**Type of Cartridge**	**Non Compressed Capacity**	**Compressed Capacity**	**Data Cartridge P/N**	**Density Setting**
35GB drive	7205-311 7337-305	DLTtapeIII	2.6GB	2.6GB Compression not supported	N/A	23
			6GB	6GB Compression not supported	N/A	24
			10GB	20GB	N/A	25
		DLTtapeIIIxt	15GB	30GB	59H3411	25
		DLTIV	20GB	40GB	59H3040	26
			35GB	70GB	59H3040	27
40GB drive	7205-440 7337-360	DLTtapeIII	2.6GB	2.6GB Compression not supported	N/A	23
			6GB	6GB Compression not supported	N/A	24
			10GB	20GB	N/A	25
		DLTtapeIIIxt	15GB	30GB	59H3411	25
		DLTIV	20GB	40GB	59H3040	26
			35GB	70GB	59H3040	27
			40GB	80GB	59H3040	65
160GB drive	7205-550	SDLT320	110GB	220GB	35L1119	72

			160GB	320GB	35L1119	73

Note: DLTtapeIV, DLTtapeIIIxt, and DLTtapeIII are the trademarks of Quantum Corp.

Microcode Level

The Tape Drives Microcode level is important in that there have been many fixes for problems incorporated in the new levels of microcode. The level of microcode in the drive is field upgradeable without changing the tape drive. User installable microcode is available from the WEB at:
http://techsupport.services.ibm.com/server/mdownload/download.html

Determine Microcode Level

To determine the microcode level in the tape drive use the following AIX command:
lscfg -vl rmt0 <- the Z1 or FW field will show the microcode level

The current microcode levels are:

Format	Capacity	Model	Description	Current Microcode Level	
1/4"	1.2GB Drive	7207-012		I07:24	
	4GB Drive	7207-122		0940	
	13GB Drive	7207-315		0345	
	30GB Drive	7207-330		0610	
	50GB Drive	7212-102		0610	
4mm	4GB Drive	7206-005	DDS2	4Co0	<--- Generation 1 drive
				5ALL	<--- Generation 2 drive
				6640	<--- Generation 3 drive
	4GB Autoloader	7332-005	DDS2	4Co0	<--- Generation 1 drive
				5ALG	<--- Generation 2 drive
	4GB Library	7336-205	DDS2	5ALG	
	12GB Drive	7206-110	DDS3	758B	

	12 GB Autoloader	7332-110	DDS3	758B	
	20GB Drive	7206-220	DDS4	C209	
	20GB Autoloader	7332-220	DDS4	H211	
	36GB Drive	7206-336	DAT72	V308	
VXA	80GB Drive	7206-VX2	VXA-2	2104	
8mm	5GB Drive	7208-011		807A	
	7GB Library	7331-205		807A	
	20GB Drive	7208-341	Mammoth	41eA	
	20GB Library	7331-305	Mammoth	41eA	
	60GB Drive	7208-345	Mammoth 2	07uR	
	60GB Library	7334-410	Mammoth 2	03sR	
	60GB Library Controller	7334-410		2.2	
DLT	35GB Drive	7205-311	DLT7000	296B	(Also known as V107)
	35GB Library	7337-305 and 306	DLT7000	296B	(Also known as V107)
	35GB Library Controller	7337-305 and 306		1.63	
	40GBDrive	7205-311	DLT8000	0255	(Also known as V85)
	40GB Library	7337-360	DLT8000	0255	(Also known as V85)
	40GB Library Controller	7337-360		2.67.0001	
	160GB Drive	7205-550	SDLT	3A3A	(Also known as V58)

AIX Error Log

Review the AIX Error Log for all errors around the time the application was unable to process the tape.

If there is no error in the AIX error log around the time application was unable to process the tape the following would be likely causes of the problem:

- Data cartridge was not appropriate for the operation. For example the application attempted to write to 5GB 8mm media in 20GB 8mm drive.
- A backup was attempted to a data cartridge that was write protected.
- The amount of data being written to the tape exceeded the capacity of the data cartridge.

AIX error log entries of the form: TAPE_ERR1, TAPE_ERR2, or TAPE_ERR3 are normally media related errors that can be corrected by cleaning the tape drive and retrying the operation. If the error occurs again on the same data cartridge, clean the tape drive and use a new IBM data cartridge.

AIX error log entries of the form: TAPE_ERR6 are caused by the tape drive requesting cleaning. Either the tape drive has exceeded the recommended cleaning interval or the tape drive has exceeded the tape drives internal limit for soft errors and is requesting cleaning.

The AIX command to review the AIX error log is:
errpt -a | pg

Read Previously Written Data Cartridge

If there are problems reading previously written data cartridges it may be necessary to determine if there was data previously written to the data cartridge and at what block size the data was written at.

Read tape on another system

If another system is available attempt to read the tape on the other system. If it can read the tape then check the blocksize set in the "good" system to insure it matches the system where the tape could not be read.

Determine block size of previously written tape

It will be necessary to do a dd of the tape to determine if there is data on the data cartridge and also determine the blocksize the data cartridge was written at.

- To determine the blocksize currently set for the tape drive on the system use the AIX command "lsattr". Write down this blocksize:
  lsattr -El rmt0
- Set the tape drives blocksize to 0 (if not already at 0):
  chdev -a block_size=0 -l rmt0
- Determine the blocksize the tape was written at:
  dd if=/dev/rmt0 bs=128k count=1 | wc -c
- Use the chdev command to set the blocksize for the tape.
- Process the tape.
- Set the tape drives blocksize back to the previous setting you wrote down previously.

Verify mksysb table of contents

There may be times when you want to verify the table of contents of a AIX "mksysb" tape without actually restoring the data. The following AIX command will display the table of contents of the mksysb tape:
restore -s4 -Tvqf /dev/rmt0.1

Note:

- You must use the no rewind setting(.1) for this command to work.
- The blocksize set for the tape drive must match the blocksize the tape was written at. If you cannot determine the blocksize the data on the tape was written at, using a blocksize of "0" will enable the tape drive to read the tape but will take a very long time.

Reset the tape drive

There may be times when you want to reset a tape drive to clear an error condition(including stuck tape) without powering off the tape drive. It is possible on most IBM 1/4", 4mm, 8mm, DLT, and VXA tape drives to reset the tape drive by pressing and holding the eject button depressed for 15-30 seconds(drive power must be ON).
Another way to reset the tape drive is to sign on the system with root authorization and issue the AIX command:
diag -c -d

SCSI Address

Determine that there is no conflict of SCSI addresses between the tape drive and any other SCSI device.
lsdev -Cs scsi

Check Connections

For externally attached tape drives check all external SCSI connections. Check all connectors to be sure there are no bent or damaged pins in the connector. Insure all connections are secure, screws or clips are tightly attached.

Check SCSI Termination

For externally attached tape drives check to insure the proper IBM terminator is in use. Check the P/N. Insure the terminators are securely attached.

AIX Diagnostics

To test the tape drive run the tape drive diagnostics using the IBM test tape or diagnostic tape. To run the AIX diagnostics it is necessary to have root access. From the command line enter the AIX command:
diag

AIX Diagnostic Media

1/4" Tape Drives

Capacity	Model	Description	Test Tape Part Number

150mb drive	7207-001	QIC-150	92X7510
520mb drive	7207-011	QIC-525	21F8586
1.2GB drive	7207-012	QIC-1000	21F8734
4GB drive	7207-122	SLR5-4GBSL	59H3661
13GB drive	7207-315	QIC-5010-DC	87G1626
30GB drive	7207-330	SLR100	35L0967
50GB drive	7212-102	SLR100	35L0967

Note: Diagnostics will fail if the wrong tape is used in the 1/4" drive.

4mm Tape Drives

Capacity	**Model**	**Description**	**Diagnostic Tape Part Number**
2GB drive	7206-001	DDS1(DDS||||)	21F8762*
4GB drive	7206-005 7332-005	DDS2	8191146(No longer available)* or IBM DDS2 Data Cartridge P/N 8191151
			Test Tape P/N
12GB drive	7206-110 7332-110	DDS3	59H3466
4GB	Internal Autoloader	DDS1(DDS||||)	73H3467
20GB drive	7206-220 7332-220 7212-102	DDS4	59H4457
36GB drive	7206-336 7212-102	DDS4	59H4457

Note: * Usage is counted and there is a maximum of 50 uses(tape insertions).

VXA Tape Drives

Capacity	**Model**	**Description**	**Test Tape Part Number**
80GB drive	7206-VX2	VXA-2	19P4879

8mm Tape Drives

Capacity	Model	Description	Test Tape Part Number
2.3GB drive	7208-001		21F8577
5GB drive	7208-011		21F8577
7GB drive	7331-205		21F8577
20GB drive	7208-341 7331-305	Mammoth	59H2677
60GB	7208-345 7334-410	Mammoth 2	59H2677

DLT Tape Drives

Capacity	Model	Description	Test Tape Part Number
35GB	7205-311 7337-305/306	DLT7000	59H3039
40GB	7205-440 7337-360	DLT8000	59H3039
160GB	7205-550	SDLT320	35L1120

Placing a Service Call

Only after all this is done, and the problem persists, should the tape drive service call be placed. When placing a service call have the following information available:

- The type of tape drive you are placing the service call on, 5GB 8mm, or 20GB 4mm, etc..
- The machine type, model, and serial number of the IBM machine where the tape drive is installed. If the tape drive is externally mounted this will be the information from the external enclosure housing the tape drive.
- The type of problem being reported.
- If there were AIX error log entries, what the error log entries were, such as: TAPE_ERR1, TAPE_ERR6, etc..
- Be prepared to assist the support person to do further problem isolation and problem determination, including:
  - You have system access.
  - Have the tape drive test tape or diagnostic tape available.
  - Have the IBM cleaning tape available.
  - Have the failed data cartridges available.
  - Have a new IBM data cartridge available.

Help Desk Guidelines

The following is an outline of how a customer help desk should operate with regard to tape drive operations:

The key to resolving the problems is to determine what is different between success and failure at one site or between sites. To do this the following will help:

- Establish and publish backup practices. This helps all understand the importance of the data being backed up, what is expected to be done, and who is responsible for doing each item.

- Establish and publish help desk procedures. This is helpful to both the help desk and the customer sites. This helps both understand what is expected of each other plus identify what is to be done by each.

- Media must be standardized, sites should get media, both data cartridges and cleaning cartridges from the same source. Provide the sites a simple way to get the data cartridges and cleaning cartridges they need. This reduces the risk of unsupported media from being used.

- Label each data cartridge with the day of the week(on the data cartridge).
  Each site should always have a new sealed spare data cartridge.

- Label each data cartridge and cleaning cartridge with the date the customer first put it in service.

- Manuals shipped from IBM with the system or tape drive need to be kept with the system for Customer and CE use.

- Each tape drive is shipped from IBM with a Diagnostic/Test cartridge. This cartridge needs to be kept with the drive for Customer and CE use.

- Monitor cleaning to insure the tape drives are cleaned when the tape drive requests cleaning.
  The AIX Diagnostic, Task Selection, SCSD Tape Drive Service Aids can be used both locally and remotely to monitor the tape drives need for cleaning. This can be used for the 4GB 1/4", 13GB 1/4", 12GB 4mm, 20GB 4mm, 20GB 8mm, 60GB 8mm, 35GB DLT, 40GB DLT, and VXA tape drives.
- Determine cleaning cartridge status and discard used up cartridges. Each site should always have a new sealed spare cleaning cartridge.

- Monitor backups to determine the following:
  - Insure backup completed successfully
  - Determine the type of backup failure and track the following for that site:
    - Was the backup attempted?
      - Did the backup put an error in the AIX error log.
      - TAPE_ERR1 is likely a media failure.
        Did terminate the backup.
      - TAPE_ERR2 is normally a drive failure, but can be caused by a

media failure.
Did terminate the backup.
- TAPE_ERR3 is likely media starting to fail.
  Did NOT terminate the backup.
- TAPE_ERR4 Unknown cause requires further analysis. Often the cause of this error is found to be poor termination of the devices or excessive media errors.
  Did terminate the backup.
- TAPE_ERR5 Unknown cause requires further analysis.
  Did terminate the backup.
- TAPE_ERR6 Tape drives log this error when the drive exceeds the preset limit of tape motion hours since the drive was last cleaned or when the drive exceeds an internally set recovered error limit. Some drives also log this error when there is an unrecovered media error.
  Did NOT terminate the backup.
- Log the day of the week, and track this to determine if one tape is failing or are all failing. This will identify media or drive problems.

- Cleaning a tape drive will not normally damage most tape drives when the approved cleaning cartridge is used. On every backup failure where backup was attempted and failed, the tape drive should be cleaned with the approved cleaning cartridge.

  Note: On some drives over cleaning may damage the drive, review the drive information on cleaning, on those drives follow the drive recommendation.

- Prior to placing a service call attempt a simple backup to another tape cartridge to help determine the cause of the failure. Often replacing a single data cartridge will resolve the problem.

- When a service call is required, allow time and access for the CE to do problem determination and problem correction. This includes allowing the CE time and access to run diagnostics prior to and after parts replacement. It is desirable to allow the CE authorization to run concurrent diagnostics, a special id may be required for this as it requires root authorization. This will allow the CE to do problem determination without having to take the system down for dedicated CE diagnostics.

- Sites that are dusty should keep the system at least 24" off the floor to reduce the exposure to dirt and contamination.

- Sites that show persistent media and drive failures that are following established cleaning and media procedures should be considered for filter enclosures.

Tape Drive Interchange Information

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rmt settings

rmt Density settings

Density Settings are the internal control information for the tape drive that tell the drive what format(density) to write a data cartridge at. This is important for both interchanging data with another tape drive or to insure the tape is written to its maximum capacity.
A combination of methods is used to control the tape drive. One combination is to use the AIX program "smit" to set the tape drive density and then use the rmt0.x option to choose which density the tape drive will use.
To use the AIX program "smit" enter the following on the AIX command line:
smit tape
Choose change/show device characteristics.
Select the specific density setting you want(Some tape drives do not need you to select the density setting as they will do automatic media recognition. Drives such as the DDS 4mm, 20GB 8mm, and 60GB 8mm do automatic media recognition.).

rmt retension/rewind settings

The following table shows the use of the rmt with both its tape options and density settings:

rmt D1/D2	Retension*	rewind**
rmt0.0/4	no	yes
rmt0.1/5	no	no
rmt0.2/6	yes	yes
rmt0.3/7	yes	no

Note:
D1 = density 1 used
D2 = density 2 used
*** Used on 1/4" drives only, other drives do not do any retension.**
**** Rewind on open, does not control on insertion.**

Formats and Densities

Details the supported tape formats and densities for the 1/4", 4mm, VXA, 8mm, and DLT tape drives.

1/4" QIC-150(7207-001)

Density Settings	None QIC-24	15 QIC-120	16 QIC-150	Maximum Capacity
DC300XLP	R	N/S	N/S	
DC600A *	R	R/W	N/S	
DC6150	R	R/W	R/W	
DC6250 *	R	R/W	R/W	
DC6037	R	R/W	R/W	
DC6320	R	R/W	R/W	150mb
DC6525 *	R	R/W	R/W	
DC6080	R	R/W	R/W	
DC9100	N/S	N/S	N/S	1.0 GB
DC9120	N/S	N/S	N/S	1.2 GB
DC9135	N/S	N/S	N/S	1.35GB
DC9164	N/S	N/S	N/S	1.6 GB
DC9200	N/S	N/S	N/S	2.0 GB
DC9210	N/S	N/S	N/S	2.1 GB
DC9250	N/S	N/S	N/S	2.5 GB

1/4" QIC-525(7207-011)

Density Settings	None QIC-24	15 QIC-120	16 QIC-150	17 QIC-525	Maximum Capacity
DC300XLP	R	N/S	N/S	N/S	
DC600A *	R	R	N/S	N/S	
DC6150	R	R/W	R/W	N/S	
DC6250 *	R	R/W	R/W	N/S	
DC6037	R	R/W	R/W	N/S	
DC6320	R	R/W	R/W	R/W	
DC6525 *	R	R/W	R/W	R/W	
DC6080	R	R/W	R/W	R/W	
DC9100	N/S	N/S	N/S	N/S	1.0 GB
DC9120	N/S	N/S	N/S	N/S	1.2 GB
DC9135	N/S	N/S	N/S	N/S	1.35GB
DC9164	N/S	N/S	N/S	N/S	1.6 GB
DC9200	N/S	N/S	N/S	N/S	2.0 GB
DC9210	N/S	N/S	N/S	N/S	2.1 GB

DC9250	N/S	N/S	N/S	N/S	2.5 GB

1/4" QIC-1000(7207-012)

Density Settings	None QIC-24	15 QIC-120	16 QIC-150	17 QIC-525	21 QIC-1000	Maximum Capacity
DC300XLP	R	N/S	N/S	N/S	N/S	
DC600A *	R	R	N/S	N/S	N/S	
DC6150	R	R/W	R/W	N/S	N/S	
DC6250 *	R	R/W	R/W	N/S	N/S	
DC6037	R	R/W	R/W	N/S	N/S	
DC6320	R	R/W	R/W	R/W	N/S	
DC6525 *	R	R/W	R/W	R/W	N/S	
DC6080	R	R/W	R/W	R/W	N/S	
DC9100	N/S	N/S	N/S	N/S	R/W	1.0 GB
DC9120	N/S	N/S	N/S	N/S	R/W	1.2 GB
DC9135	N/S	N/S	N/S	N/S	N/S	1.35GB
DC9164	N/S	N/S	N/S	N/S	N/S	1.6 GB
DC9200	N/S	N/S	N/S	N/S	N/S	2.0 GB
DC9210	N/S	N/S	N/S	N/S	N/S	2.1 GB
DC9250	N/S	N/S	N/S	N/S	N/S	2.5 GB

1/4" QIC-4GB SLR5(7207-122)

Note: This drive does not support reading or writing QIC-24

Density Settings	15 QIC-120	16 QIC-150	17 QIC-525	21 QIC-1000	34-162 QIC-2GB	38-166 QIC-4GB SLR5-4GB
DC300XLP	N/S	N/S	N/S	N/S	N/S	N/S
DC600A *	R	N/S	N/S	N/S	N/S	N/S
DC6150	R/W	R/W	N/S	N/S	N/S	N/S
DC6250 *	R/W	R/W	N/S	N/S	N/S	N/S
DC6037	R/W	R/W	N/S	N/S	N/S	N/S
DC6320	R/W	R/W	R/W	N/S	N/S	N/S
DC6525 *	R/W	R/W	R/W	N/S	N/S	N/S
DC6080	R/W	R/W	R/W	N/S	N/S	N/S

DC9100	N/S	N/S	N/S	R/W	N/S	N/S
DC9120	N/S	N/S	N/S	R/W	N/S	N/S
DC9120SL	N/S	N/S	N/S	R/W	N/S	N/S
DC9120XL	N/S	N/S	N/S	R/W	N/S	N/S
9200	N/S	N/S	N/S	N/S	R/W-R/W	N/S
DC9200	N/S	N/S	N/S	N/S	R/W-R/W	N/S
DC9200SL	N/S	N/S	N/S	N/S	R/W-R/W	N/S
9210	N/S	N/S	N/S	N/S	N/S	N/S
DC9250XL	N/S	N/S	N/S	N/S	R/W-R/W	N/S
SLR5-4GB	N/S	N/S	N/S	N/S	N/S	R/W-R/W
SLR5-4GBSL	N/S	N/S	N/S	N/S	N/S	R/W-R/W
DC5010(MLR1)	N/S	N/S	N/S	N/S	N/S	N/S
MLR1-16GB	N/S	N/S	N/S	N/S	N/S	N/S
MLR1-25GB	N/S	N/S	N/S	N/S	N/S	N/S

1/4" QIC-5010 MLR1(7207-315)

Note: This drive does not support reading or writing QIC-24

Density Settings	**15 QIC-120**	**16 QIC-150**	**17 QIC-525**	**21 QIC-1000**	**34-162 QIC-2GB**	**38-166 QIC-4GB SLR5-4GB**	**33 QIC-50 MLR1**
DC300XLP	N/S	N/S	N/S	N/S	N/S	N/S	N/S
DC600A *	R	N/S	N/S	N/S	N/S	N/S	N/S
DC6150	R/W	R/W	N/S	N/S	N/S	N/S	N/S
DC6250 *	R/W	R/W	N/S	N/S	N/S	N/S	N/S
DC6037	R/W	R/W	N/S	N/S	N/S	N/S	N/S
DC6320	R/W	R/W	R/W	N/S	N/S	N/S	N/S
DC6525 *	R/W	R/W	R/W	N/S	N/S	N/S	N/S
DC6080	R/W	R/W	R/W	N/S	N/S	N/S	N/S
DC9100	N/S	N/S	N/S	R/W	N/S	N/S	N/S
DC9120	N/S	N/S	N/S	R/W	N/S	N/S	N/S
DC9120SL	N/S	N/S	N/S	R/W	N/S	N/S	N/S
DC9120XL	N/S	N/S	N/S	R/W	N/S	N/S	N/S
9200	N/S	N/S	N/S	N/S	R/W-R/W	N/S	N/S
DC9200	N/S	N/S	N/S	N/S	R/W-R/W	N/S	N/S
DC9200SL	N/S	N/S	N/S	N/S	R/W-R/W	N/S	N/S
9210	N/S	N/S	N/S	N/S	N/S	N/S	N/S

DC9250XL	N/S	N/S	N/S	N/S	R/W-R/W	N/S	N/S
SLR5-4GB	N/S	N/S	N/S	N/S	N/S	N/S	N/S
SLR5-4GBSL	N/S	N/S	N/S	N/S	N/S	N/S	N/S
DC5010(MLR1)	N/S	N/S	N/S	N/S	N/S	N/S	R/W
MLR1-16GB	N/S	N/S	N/S	N/S	N/S	N/S	R/W
MLR1-25GB	N/S	N/S	N/S	N/S	N/S	N/S	N/S

Note:

- R/W - This drive can both Read and Write this media.
- R - This drive can ONLY Read from this media. The drive cannot write on this media.
- N/S - Not Supported
- - Non Compression - Compression Default for 4GB is compression 166. Compression is set only by density setting on 4GB. Not Set with Smit Compression setting.
- * These tapes are not recommended for use on this model 7207 due to incompatibility of the media characteristics and the design of this R/W head of this 7207.
- ** These tapes are supported with microcode level 0345 or higher only

7207-315 Significant Item

This drive is sensitive to the delivery of data to the tape drive. Some applications take the blocksize and block the data block into larger blocks for transfer to the tape drive. Some applications call this the blocksize, or the buffer size or blocking factor. Whatever it is called you need to understand that this tape drives performance(data rate)is greatly effected when the system sends small blocks of data. Try setting the tape drive block size to a large block size and large blocking factor. You should test your application to see at what blocksize and need to test your application to see at what blocking you get the best performance for your tape drive. The minimum recommended blocking for this drive is 32k. Some AIX commands already use 32k or larger blocks when writing, some do not.

The following are a few of the AIX commands and blocking information:

```
backup   <- will either use 32k or 51.2k as default depending if backup
            by name or not.   N/S customer change required.
tar      <- default is 10k (error in tar manual stating 512kb)
tar  needs the customer to use at minimum    -N64
mksysb   <- uses backup on AIX 4.1   N/S customer change required.
dd   needs the customer to use at minimum  bs=32k
cpio needs the customer to use at minimum    -C64
```

Users should insure the blocksize they select is supported by the users application.

1/4" 30GB SLR60(7207-330)

Density Settings	34-162 QIC-2GB	38-166 QIC-4GB SLR5-4GB	33 QIC-5010 MLR1	48 QIC-5210 MLR3	52 SLR60
DC9200	R	N/S	N/S	N/S	N/S
DC9200SL	R	N/S	N/S	N/S	N/S
DC9250XL	R	N/S	N/S	N/S	N/S
SLR5-4GB	N/S	R	N/S	N/S	N/S
SLR5-4GBSL	N/S	R	N/S	N/S	N/S
MLR1(2GB)	N/S	N/S	R/W	N/S	N/S
DC5010(MLR1)	N/S	N/S	R/W	N/S	N/S
MLR1-16GB	N/S	N/S	R/W	N/S	N/S
MLR3-25GB	N/S	N/S	N/S	R/W	N/S
SLR100-50GB	N/S	N/S	N/S	N/S	R/W
SLR60-30GB	N/S	N/S	N/S	N/S	R/W

Note:

- R/W - This drive can both Read and Write this media.
- R - This drive can ONLY Read from this media. The drive cannot write on this media.
- N/S - Not Supported

1/4" 50GB SLR100(7212-102)

Density Settings	34-162 QIC-2GB	38-166 QIC-4GB SLR5-4GB	33 QIC-5010 MLR1	48 QIC-5210 MLR3	52 SLR60
DC9200	R	N/S	N/S	N/S	N/S
DC9200SL	R	N/S	N/S	N/S	N/S
DC9250XL	R	N/S	N/S	N/S	N/S
SLR5-4GB	N/S	R	N/S	N/S	N/S
SLR5-4GBSL	N/S	R	N/S	N/S	N/S
MLR1(2GB)	N/S	N/S	R/W	N/S	N/S
DC5010(MLR1)	N/S	N/S	R/W	N/S	N/S
MLR1-16GB	N/S	N/S	R/W	N/S	N/S
MLR3-25GB	N/S	N/S	N/S	R/W	N/S

SLR100-50GB	N/S	N/S	N/S	N/S	R/W
SLR60-30GB	N/S	N/S	N/S	N/S	R/W

Note:

- R/W - This drive can both Read and Write this media.
- R - This drive can ONLY Read from this media. The drive cannot write on this media.
- N/S - Not Supported

4mm Tape Interchange Information

The following is a chart that shows the interchange using the IBM 4mm data grade tape among the IBM 4mm tape drives.
The chart lists the external model type as the example but the data applies to the internal versions, external autoloader, and library versions of the drive also.

Tape Drive	Non DDS Media	2GB DDS1 DDS||||	4GB DDS2	12GB DDS3	20GB DDS4	36GB DAT72
7206-001(2GB)	R	R/W	N/S	N/S	N/S	N/S
7206-005(4GB)	R	R/W	R/W	N/S	N/S	N/S
7206-110(12GB)	R	R/W	R/W	R/W	N/S	N/S
7206-220(20GB)	Eject	Eject	R/W	R/W	R/W	N/S
7206-336(36GB)	Eject	Eject	Eject	R/W	R/W	R/W

Notes:

- **R/W - This drive can both Read and Write this media.**
- **R - This drive can ONLY Read from this media. The drive cannot write on this media.**
- **N/S - Not Supported**
- **Eject - This media is Not Supported and will be ejected.**

- **There is no need to use density settings for writing or reading tapes as the drives do automatic media and tape format recognition.**
- **The IBM 2GB 4mm DDS1 tape dives will write/read media with a DDS \|\|\|\| identification Only.**
- **The IBM 4GB 4mm DDS2 tape dives will write/read media with a DDS \|\|\|\|, or DDS2 identification Only.**
- **The IBM 12GB 4mm DDS3 tape dives will write/read media with a DDS \|\|\|\|, or DDS2, or DDS3 identification Only.**
- **The IBM 20GB 4mm DDS4 tape drives will write/read media with a DDS2, or DDS3, or DDS4 identification Only, all other media will be ejected.**
- **The IBM 36GB 4mm DAT72 tape drives will write/read media with a DDS3, or DDS4, or DAT72 identification Only, all other media will be**

ejected.

- **Media that does not have a DDS ||||, or DDS2, or DDS3 identification are read ONLY on the IBM 2GB, 4GB, and 12GB 4mm tape dives.**

VXA Tape Interchange Format

The following chart shows data interchange between VXA-1 and VXA-2 tape drives.

Drive and Format	V6(62m)	V10(107m)	V17(170m)	V23(230m)
VXA-1(Non IBM) **VXA1**	R/W D=128	R/W D=128	R/W D=128	N/S *
7206-VX2(VXA-2) **VXA1** 7206-VX2(VXA-2) **VXA2**	R/W D=128 R/W D=129	R/W D=128 R/W D=129	R/W D=128 R/W D=129	N/S* R/W D=129

Note:
*** VXA1 format is Not Suported(N/S) on V23 media, is ejected from the VXA-1 drive.**
D= is the smit density setting for this format.

VXA Tape Capacity

The following chart shows native(non compressed) capacity for the VXA media by tape drive.

Drive and Format	V6(62m)	V10(107m)	V17(170m)	V23(230m)
7206-VX2(VXA-2) **VXA1**	12GB	20GB	33G	N/S *
7206-VX2(VXA-2) **VXA2**	20GB	40GB	59GB	80GB

Note:
*** VXA1 format is Not Suported(N/S) on V23 media.**

8mm Tape Interchange Information

8mm Tape drives

2.3GB, 5GB, 7GB and 20GB Drive/Media Capacity

Each 8mm tape drive only supports specific media, the following data will give you information that can be used to make an informed decision on what media to use:

- 8mm media of 15m, 54m, 112m, or 160m length are Metal Particle(MP) media.
- 8mm media of 22m, 45m, 75m, 125m, 150m, 170m or 225m length are Advanced Metal Evaporated(AME) media. Use the AME media on 20GB and 60GB drives ONLY. MP media can only be read on the 20GB drives.
- 8mm drives with 2.3GB or 5.0GB capacity Read/Write 15m, 54m, or 112m length "MP" media only.
- 8mm drives with 7.0GB capacity Read/Write 15m, 54m, 112m, or 160m length

"MP" media only.

- 8mm drives with 20.0GB capacity can only Read 15m, 54m, 112m, or 160m length "MP" media.
- 8mm drives with 20.0GB capacity can Read/Write ONLY on 22m, or 170m length "AME" media.
  If the 22m or 170m AME tape has been written in 60GB format, the tape cannot be read by the 20GB drive, it can be rewritten by the 20GB drive as if the tape were blank.
- AME data tapes of lengths: 45m, 75m, 125m, 150m, and 225m are not supported on the IBM 2.3GB, 5GB, 7GB, and 20GB 8mm tape drives
- 8mm media of 22m, 160m, and 170m should bear the Recognition System Logo.

The following chart shows data interchange using IBM data grade tapes among 8mm 2.3GB, 5GB, 7GB, 20GB, and 60GB tape drives. The chart list the external model types as an example but the data applies to the internal versions of the drives also.

Drive	**2.3GB NonC ** **	**2.3GB Compress ** **	**5GB NonC ** **	**5GB Compress ** **	**7GB NonC ** **	**7GB Compress ** **	**20GB NonC - Compress ** **	**(I (***
7208-001(2.3GB)	R/W	N/S	N/S	N/S	N/S	N/S	N/S	N
7208-011(5GB)	R/W D=20*	R	R/W D=21*	R/W D=140	N/S	N/S	N/S	N
7331-205(7GB)	R/W D=20*	R	R/W D=21*	R/W D=140	N/S	R/W D=140	N/S	N
7208-341(20GB) 7331-305(20GB)	R#	N/S	R#	R#	R#	R#	R/W	N
7208-345(60GB) 7334-410(60GB)	N/S	N/S	N/S	N/S	N/S	N/S	R	R

2.3GB, 5GB, 7GB, 20GB and 60GB supported media

The following chart shows chart shows the supported IBM data grade tapes usage 8mm 2.3GB, 5GB, 7GB, 20GB, and 60GB tape drives.

Drive	**15m MP**	**54m MP**	**112m MP**	**160m MP**	**22m AME**	**45m AME**	**75m AME**	**125m AME**	**150m AME**	**170 AM**
2.3GB	R/W N/A	R/W N/A	R/W 21F8575	N/S	N/S	N/S	N/S	N/S	N/S	N/S
5GB	R/W N/A	R/W N/A	R/W 21F8575	N/S	N/S	N/S	N/S	N/S	N/S	N/S
7GB	R/W N/A	R/W N/A	R/W 21F8575	R/W 87G1603	N/S	N/S	N/S	N/S	N/S	N/S

20GB	R# N/A	R# N/A	R# 21F8575	R# 87G1603	R/W 59H2671	N/S	N/S	N/S	N/S	R/W 59H
60GB	N/S Eject	N/S Eject	N/S Eject	N/S Eject	R/W*** 59H2671	R/W*** N/A	R/W*** 35L1044	R/W*** N/A	R/W*** 09L5323	R/W 59H

Note:

- **Compress - Compression Capable**
- **NonC - Non Compression Capable**
- **R/W - This drive can both Read and Write this media.**
- **R - This drive can ONLY Read from this media. The drive cannot write on this media.**
- **N/S - Not Supported.**
- **N/A - No IBM media Available.**
- **D= - Density setting**
- **Eject- The drive will eject this media.**
- **# This media is Metal Particle(MP) the 20GB drive MUST BE CLEANED after reading this media prior using Advanced Metal Evaporated(AME) media. When you are ready to use AME media insert the AME media and let the drive eject the AME media. The drive then is to be cleaned. Cleaning the drive prior to inserting the AME will still require the drive to be cleaned again as the drive will eject the AME media and display the MUST CLEAN message.**
- *** Use the Density setting to write this format/capacity with this drive.**
- **** Data interchange between the 2.3GB, 5GB, and 7GB tape drives is ONLY capable on the 15m, 54m or 112m Data Cartridges, not on the 160m.**
- ***** The 60GB drive can Read tapes written by the 20GB drive but cannot write tapes that can be Read by the 20GB drive. Tapes written by the 60GB drive can only be read on a 60GB drive.**

20GB and 60GB tape drive interchange

The following chart shows data interchange using the IBM 8mm data grade tape between the 8mm 20GB and 60GB tape drives. The chart lists the external model type as the example but the data applies to the internal versions of the 20GB drive also.

- **Metal Particle(MP) media is not supported in the 60GB tape drive and is ejected. MP media is normally 15m, 54m, 112m, 160m lengths.**
- **MP media can only be read on the 20GB drives.**
- **Advanced Metal Evaporated(AME) media is available in 22m, 45m, 75m, 125m, 150m, 170m, or 225m lengths.**
- **AME "SmartClean" data cartridges contain a build in cleaning capability. Cartridges of 75m, 150m, and 225m are "SmartClean" Cartridges.**
- **AME media of 22m, or 170m length are the only AME media supported in the 20GB drive.**
- **Format is a term used to describe the way a tape is written.**
- **The 20GB 8mm tape drive ONLY writes/reads a "Mammoth" format.**
- **The 60GB 8mm tape drive ONLY writes "Mammoth2(M2)" format.**

- **The 60GB 8mm tape drive READS "Mammoth" or "Mammoth2(M2)" format.**
- **It is not possible to write data on a 60GB drive and read the data on the 20GB drive.**
- **If the 22m or 170m AME tape has been written by a 60GB 8mm drive the tape cannot be read by the 20GB drive. The 20GB drive will treat this tape as if the tape were a blank tape.**
- **There is no need to use density settings for writing or reading tapes on either the 20GB or the 60GB drives as the drives do automatic media and tape format recognition.**

Drive	20GB	60GB
7208-341(20GB)	R/W*	N/S
7331-305(20GB)	R/W*	N/S
7208-345(60GB)	R**	R/W**
7334-410(60GB)	R**	R/W**

Note:

- **R/W - This drive can both Read and Write this media.**
- **R - This drive can ONLY Read from this media. The 60GB drive cannot write a format that can be read by the 20GB 8mm drive.**
- **N/S - Not Supported**
- *** Media must be 22m or 170m AME ONLY.**
- **** The 60GB drive can read Mammoth or M2 format but can only write M2 format.**

DLT Tape Interchange Information

DLT Significant Item

Older DLT tape drives are sensitive to the delivery of data to the tape drive. Some applications take the blocksize and block the data block into larger blocks for transfer to the tape drive. Some applications call this the blocksize, or the buffer size or blocking factor. Whatever it is called you need to understand that this tape drives performance(data rate)is greatly effected when the system sends small blocks of data. Try setting the tape drive block size to a large block size and large blocking factor. You will need to test your application to see at what blocking you get the best performance for your tape drive. The minimum recommended blocking for this drive is 32k. Some AIX commands already use 32k or larger blocks when writing, some do not. The following are a few of the AIX commands and blocking information:

```
backup   <- will either use 32k or 51.2k as default depending if backup
            by name or not.   N/S customer change required.
tar      <- default is 10k (error in tar manual stating 512kb)
```

```
tar  needs the customer to use at minimum    -N64
mksysb   <- uses backup on AIX 4.1   N/S customer change required.
dd   needs the customer to use at minimum  bs=32k
cpio needs the customer to use at minimum    -C64
```

Users should insure the blocksize they select is supported by the users application.

As an example: Using a blocksize of 1024 and backing up 32GB of data will take approximately 22 hours. Same 32GB of data backed up at a block size of 32k will take approximately 2 hours. Small blocksizes have a significant impact on performance but only a minimal impact on capacity. However 2.6 format(density) and 6 format(density) are significantly impacted in capacity by using small blocksizes, they don't pack the data in the drives internal 8k block.

IBM 7205-311 35GB

The following is a chart that shows the interchange using the IBM 7205-311 tape drive.

Supported Cartridge	Density	Compressed Data Capacity	Smit Density Setting
DLTtapeIII	2.6GB 6GB 10GB	2.6GB (No Compression) 6GB (No Compression) 20GB (Default for drive)	23 24 25
DLTtapeIIIxt	15GB	30GB (Default for drive)	25
DLTtapeIV	20GB 35GB	40GB 70GB (Default for drive)	26 27

Notes:

- The 7205 Tape drive only supports the data densities listed in the table. Supported data cartridges written in other densities will not be recognized by the drive and these cartridges will not be readable by this drive. The 7205 will treat these cartridges as blank cartridges.
- If a DLT IV data cartridge written in 40GB mode is attempted to be read on the 35GB drive the tape will appear to be a blank data cartridge. Interchange of data between the 35GB drive and the 40GB drive can only be done on supported data cartridges with a density setting common between the drives.
- The drive does an automatic determination of the density setting when reading a data cartridge, but for write operations you must set a writing density that matches the data cartridge you are using.
  If an unsupported write density is requested, the density will default to the highest supported density for the currently loaded data cartridge.
- * Compression will depend upon the type of data. A compression ratio of 2:1 is assumed for this compression capacity.
- DLTtapeIII, DLTtapeIIIxt, and DLTtapeIV are trademarks of Quantum Corporation.

IBM 7205-440 40GB

The following is a chart that shows the interchange using the IBM 7205-440 tape drive.

Supported Cartridge	Density	Compressed Data Capacity	Smit Density Setting
DLTtapeIII	10GB	20GB	25
DLTtapeIIIxt	15GB	30GB	25
DLTtapeIV	20GB 35GB 40GB	40GB 70GB 80GB	26 27 65

Notes:

- The 7205 Tape drive only supports the data densities listed in the table. Supported data cartridges written in other densities will not be recognized by the drive and these cartridges will not be readable by this drive. The 7205 will treat these cartridges as blank cartridges.
- The drive does an automatic determination of the density setting when reading a data cartridge, but for write operations you must set a writing density that matches the data cartridge you are using.
  If an unsupported write density is requested, the density will default to the highest supported density for the currently loaded data cartridge.
- * Compression will depend upon the type of data. A compression ratio of 2:1 is assumed for this compression capacity.
- DLTtapeIII, DLTtapeIIIxt, and DLTtapeIV are trademarks of Quantum Corporation.

IBM 7205-550 160GB

The following is a chart that shows the interchange using the IBM 7205-550 tape drive.

Supported Cartridge	Density Format	Density	Compressed Data Capacity	Smit Density Setting
SDLT	SDLT220	110GB	220GB	72
SDLT	SDLT320	160GB	320GB	73

Notes:

- The 7205 Model 550 has full backward read-only compatibility with the currently available IBM 7205 Model 440 (DLT8000) tape drives.
- The 7205 Model 550 is read-only compatible with older 7205 Model 311 (DLT7000), 7205 Model 305 & 306 (DLT4000), and DLT3000 tape drive formats (DLT Tape IV).
- The 7205 Model 550 is also read and write compatible with the SDLT220 tape

format (SDLT Tape 1) at the native transfer rate of the SDLT220 tape drive (11 MB/sec).
- Non-SDLT drives will eject a cartridge written in SDLT320 format.

Tape Drive Cleaning Frequency

Details the recommended tape cleaning frequencies* and proper cleaning cartridge to use for the 1/4", 4mm, VXA, 8mm, and DLT tape drives.

Other information you should be aware of:

- Clean the tape drive at the recommended times and with the recommended IBM cleaning cartridge. Over cleaning may cause premature head wear out, do not over clean the tape drive.

- Whenever a tape drive reports an I/O error the drive should be cleaned prior to retrying the tape operation.

- The 4mm, 8mm, and VXA cleaning cartridges move the cleaning media from the supply spool to the take up spool in the cartridge during the cleaning operation. When cleaning is complete the area of the cleaning media used in cleaning is wound onto the take up spool, unlike data cartridges that rewind all the media back onto the supply spool.

  To determine if a 4mm, 8mm, or VXA cleaning cartridges is used up users should not only check the number of remaining cleanings as marked on the cartridge but also observe the remaining media on the supply spool.
  To do this:

  The user should hold the cleaning cartridge as if they were going to insert the cleaning cartridge into the drive. If all, or most, of the media is on the right hand, take up spool, and very little media is still on the supply spool, the cleaning cartridge is used up and will not clean the tape drive.

- If a 4mm, 8mm, or VXA cleaning cartridge has been used its maximum number of cleanings and the cartridge is inserted into the tape drive the cleaning LED will not go off if it was previously on and if the cleaning LED was off prior to the cleaning cartridges insertion the cleaning LED will be turned on to signify the cleaning was not done and the cleaning cartridge has exceeded its maximum number of uses.

- There are times when it will be necessary to use the recommended cleaning process several times in a row to clean the drive:
  - Tape drives that have not been cleaned according to the recommended schedule.
  - Tape drives where unsupported media or cleaning cartridges were used.
  - Tape drives reporting repeated I/O errors.
  - Tape drives operating in dirty/dust environments.

  If repeated cleanings and new media do not eliminate the I/O errors it may be

necessary to replace the tape drive.

1/4" Tape Drive Cleaning Frequency

Type	Model	Cartridge	Number of Usages	Frequency for Cleaning*
150mb	7207-001	16G8572**	50	After 2 hours of tape movement on a new tape or every 20 hours of tape movement on a used tape.
525mb	7207-011	16G8572**	50	After 2 hours of tape movement on a new tape or every 8 hours of tape movement on a used tape.
1.2GB	7207-012	16G8572**	50	After 2 hours of tape movement on a new tape or every 8 hours of tape movement on a used tape when used in QIC-1000 mode, or every 12 hours of tape movement on a used tape when used in QIC-120/150/525 mode.
4GB	7207-122	35L0844***	50	Every 8 hours of tape movement.
13GB	7207-315	35L0844***	50	Every 8 hours of tape movement or when Amber LED(Disturbance LED) indicates either: • 8 hours of tape motion (Changed from 50 hours to improve reliability with microcode level 0345) • Hard Read or Write Error
30GB	7207-330	35L0844	50	Every 50 hours of tape movement or when Amber LED(Disturbance LED) indicates either: • 50 hours of tape motion • Hard Read or Write Error

50GB	7212-102	35L0844	50	Every 50 hours of tape movement or when Amber LED(Disturbance LED) indicates either: • 50 hours of tape motion • Hard Read or Write Error

Note:
* If tape errors or tape job failures occur the drive may have to be cleaned more frequently.
** Replaced 21F8570, was Isopropyl Alcohol
*** Replaced 59H4366 which replaced 46G2674

4mm Tape Drive Cleaning Frequency

Type	Model	Cartridge	Number of Usages	Frequency for Cleaning*
2GB DDS1 4GB DDS2 12GB DDS3 DDS2 Internal Autoloader DDS2 Autoloader DDS3 Autoloader DDS2 Library	7206-001 7206-005 7206-110 7332-005 7332-110 7336-205	21F8763**	50	Every 30 hours of tape movement or Once a month, or when Amber LED (Disturbance light) indicates recording quality problems.
20GB DDS4 DDS4 Autoloader	7206-220 7212-102 7332-220	21F8763**	50	Every 50 hours of tape movement or when Amber LED(Disturbance LED) indicates recording quality problems.
36GB DAT72	7206-336 7212-102	21F8763**	50	Every 50 hours of tape movement or when Amber LED(Disturbance LED) indicates recording quality problems.

Note:
* If tape errors or tape job failures occur the drive may have to be cleaned more frequently.

** Replaced 59H3090(20 Cleanings) in early 1999
Starting with microcode level 5AL0 the 4GB 4mm drives will not only put ON the cleaning LED based on soft errors but will also put the cleaning LED ON after 30 tape motion hours without the drive being cleaned.

VXA Cleaning Frequency

Type	Model	Cartridge	Number of Usages	Frequency for Cleaning*
80GB	7206-VX2 7212-102	19P4880	20	This tape drive is designed to determine its own cleaning requirements. It is unnecessary to clean the tape drive unless indicated by the cleaning LED or repeated I/O errors. The tape drive will request cleaning at a maximum of every 75 hours of tape head movement.

8mm Tape Drives Cleaning Frequency

Type	Model	Cartridge	Number of Usages	Frequency for Cleaning*
2.3GB	7208-001	16G8467**	12	Every 30 hours of tape movement or once a month, approximately 30GB of data transfer.
5GB	7208-011	16G8467**	22	Every 30 hours of tape movement or Once a month, or when Amber LED (Disturbance LED) indicates 30 hours of tape movement.

7GB	7331-205	16G8467**	22	Every 30 hours of tape movement or Once a month, or when Amber LED (Disturbance LED) indicates 30 hours of tape movement.
20GB	7208-341 7331-305	35L1409***	18+	Every 72 hours of tape movement when using AME media(10 hours with MP media) or Once a month, or when Amber LED (Disturbance LED) indicates 72 or 10 hours of tape movement or when the Amber LED indicates recording quality problems or when the LCD says "MUST CLEAN" or when the LCD says "CLEAN SOON".
60GB	7208-345 7334-410	35L1409***	18+	When using "SmartClean" Data cartridges it will seldom be necessary to manually clean the drive. However: If non "SmartClean" cartridges are used and the Amber LED indicates the need for the drive to be cleaned it will be necessary to clean the drive with this cleaning cartridge. 60GB 8mm tape drive Notes: If SmartClean Data Cartridges are NOT used it will be necessary to manually clean the tape drive with the cleaning cartridge when the tape drive Amber LED

	(Disturbance LED) indicates the drive needs cleaning due to time of tape movement or recording quality problems. The LCD will say "CLEAN SOON". The maximum time between cleanings will be 30 tape motion hours. Extended use of AME media that is not SmartClean media is not recommended as the 60GB 8mm tape drive is optimized for the use of SmartClean media. Even with the exclusive use of "SmartClean" cartridges the drive may request cleaning. If the drive requests cleaning, clean with this cleaning cartridge.

Note:
* If tape errors or tape job failures occur the drive may have to be cleaned more frequently.
** Replaced 21F8593
*** ONLY USE on the 20GB and 60GB 8mm drives.

DLT Tape Drive Cleaning Frequency

Type	Model	Cartridge	Number of Usages	Frequency for Cleaning*
35GB 40GB	7205-311 7205-440	59H3092	20	This tape drive is designed to determine its own cleaning requirements. It is unnecessary to clean the tape drive unless indicated by the cleaning LED or repeated I/O

				errors.
160GB	7205-550	19P4357	20	This tape drive is designed to determine its own cleaning requirements. It is unnecessary to clean the tape drive unless indicated by the cleaning LED or repeated I/O errors.

AIX Diagnostic SCSD Tape Drive Service Aid

Provides the ability to display and monitor tape drive information for tape drives that are supported on AIX by the Self Configuring SCSI device driver.

SCSD Tape Drive Service Aid functions:

- **Display time since drive was last cleaned**
- Capture internal drive trace information into a binary file(Dump).
- Capture internal Log Sense information into a binary file(Log).

Supported Devices:

On AIX 4.1.5, or later, the following Self Configuring SCSI Drives(SCSD) are supported:

- 7205-311 IBM 35GB Digital Linear tape drive
- 7205-440 IBM 40GB Digital Linear tape drive
- 7205-550 IBM 160GB Digital Linear tape drive
- 7206-110 IBM 4mm 12GB tape drive
- 7206-220 IBM 4mm 20GB tape drive
- 7206-336 IBM 4mm 36GB tape drive
- 7206-VX2 IBM VXA 80GB tape drive
- 7207-122 IBM 1/4" 4GB tape drive
- 7207-315 IBM 1/4" 13GB tape drive
- 7207-330 IBM 1/4" 30GB tape drive
- 7208-341 IBM 8mm 20GB tape drive
- 7208-345 IBM 8mm 60GB tape drive
- 7331-305 IBM 8mm tape library

Using the program:

While signed on as root utape can be run as a standalone program or under AIX Diagnostics.

Note: When the program puts out a file for later use it puts the file into the **/tmp** directory.
The binary Trace file is named:
/tmp/TRACE.rmt0
The ASCII Log Sense file is named:
/tmp/LOGSENSE.rmt0

AIX Diagnostics Menu mode

- Run AIX diagnostics by entering the AIX command:
  diag
- Select Task Selection(Diagnostics, Advanced Diagnostics, Service Aids
- Select SCSD Tape Drive Service Aid.
- Select the drive
- Commit the selection
- Select the option you desire.
- Exit diagnostics.

Command mode

It may be necessary to change the language the system is using to run the tool in the command mode. To do this do the following AIX command:
export LANG=C

- Change to the diagnostic program directory by using the following AIX command:
  cd /usr/lpp/diagnostics/bin

For a list of the command structure do the following AIX command:
./utape ?
Usage: utape -h | -d <device> -n|-t|-lceName>
utape -c -v -d <device> -n | -l | -t -f <filename> |-D
where:

- **-c --- command line.**
- **-v --- verbose mode.**
- **-h --- usage statement.**
- **-d --- device name.**
- **-n --- time since last cleaned.**
- **-t --- trace table.**
- **-l --- logsense data.**
- **-f --- write to file.**
- **-D --- write to Unix diskette.**

Sample Utape Usage:

To display the time since the tape drive was last cleaned
./utape -cnd rmt0
The command output is:
4.134564

To capture a tape drive trace(dump) file to disk(File)

./utape -ctfd rmt0
The output will be to the /tmp directory:
/tmp/TRACE.rmt0

To capture a tape drive Log Sense information to disk(File)
./utape -clfd rmt0
The output will be to the /tmp directory:
/tmp/LOGSENSE.rmt0

Tape Part Numbers

Details the recommended IBM tape part numbers for the 1/4", 4mm, VXA, 8mm, and DLT tape drives.

IBM Media offer customer a one-stop shopping for all their quality media and accessories requirements across the removable media storage. Through our business channels, we will be the best of breed in terms of product quality, spectrum and services. The IBM products are designed, developed as a qualified complement to IBM hardware.

1/4" Part Numbers

QIC-150

Part Number	Description	Where Used	Type	Additional Information
21F8578	Data Cartridge	7207-001	QIC-150	
92X7510	Test Cartridge	7207-001	QIC-150	
16G8572*	Cleaning Cartridge (Petrofin)	7207-001		50 cleanings

QIC-525

Part Number	Description	Where Used	Type	Additional Information
21F8697	Data Cartridge	7207-011	DC6525 QIC-525	
21F8586	Test Cartridge	7207-011	QIC-525	
16G8572*	Cleaning Cartridge (Petrofin)	7207-011		50 cleanings

QIC-1000

Part Number	Description	Where Used	Type	Additional Information
21F8730	Data Cartridge	7207-012	DC9120 QIC-1000	
21F8734	Test Cartridge	7207-012	QIC-1000	
16G8572*	Cleaning Cartridge (Petrofin)	7207-012		50 cleanings

DC9250

Part Number	Description	Where Used	Type	Additional Information
16G8436	Data Cartridge(1200')		DC9250 QIC-2GB	
59H3316	Data Cartridge		DC9200 QIC-2GB	950'
16G8438	Test Cartridge		DC9250SL QIC-2GB	155'

SLR5

Part Number	Description	Where Used	Type	Additional Information
59H3660	Data Cartridge	7207-122	SLR5-4GB	1500'
59H3661	Test Cartridge	7207-122	SLR5-4GBSL	155'
35L0844**	Cleaning Cartridge	7207-122, 315, 330, SLR100, Only		50 cleanings

MLR1

Part Number	Description	Where Used	Type	Additional Information
59H4175***	Data Cartridge	7207-315	MLR1-16GB	1500'
16G8574	Data Cartridge	7207-315	MLR1-13GB DC5010	QIC-5010 1200' No longer

				Sold(obsolete)
35L0589	Data Cartridge	7207-315		MLR1-2GB 200'
87G1626	Test Cartridge	7207-315	MLR1 QIC-5010	155'
35L0844**	Cleaning Cartridge	7207-122, 315, 330, SLR100, Only		50 cleanings

SLR60

Part Number	Description	Where Used	Type	Additional Information
24R0146	Data Cartridge	7207-330 7212-102 F/C 1107	SLR60 37.5GB	1200'
19P4209	Data Cartridge	7207-330 7212-102 F/C 1107	SLR60 30GB	900'
35L0661	Data Cartridge	7207-330 7212-102 F/C 1107	SLR100 5GB	155'
35L0967	Test Cartridge	7207-330 7212-102 F/C 1107	SLR100 5GB	155'
35L0844**	Cleaning Cartridge	7207-122, 315, 330, SLR100, Only		50 cleanings

SLR100

Part Number	Description	Where Used	Type	Additional Information
35L0968	Data Cartridge	7212-102 F/C 1108	SLR100 50GB	1500'
24R0146	Data Cartridge	7212-102 F/C 1108	SLR60 37.5GB	1200'
19P4209	Data Cartridge	7212-102 F/C 1108	SLR60 30GB	900'
35L0661	Data Cartridge	7212-102 F/C 1108	SLR100 5GB	155'

35L0967	Test Cartridge	7212-102 F/C 1108	SLR100 5GB	155'
35L0844**	Cleaning Cartridge	7207-122, 315, 330, SLR100, Only		50 cleanings

Note:
* This cartridge replaced 21F8570 old process used Isopropyl Alcohol, New P/N is Petrofin
** This cartridge replaced 59H4366 which had previously replaced 46G2674
*** These tapes are only supported with a microcode level of 0345 or higher.

4mm Part Numbers

DDS|||| (DDS1)

Part Number	Description	Where Used	Type	Additional Information
21F8754	Data Cartridge	7206-001	DDS1(DDS||||)	2GB 90m
21F8762	Diagnostic Cartridge	7206-001		
21F8763*	Cleaning Cartridge			50 cleanings

DDS2

Part Number	Description	Where Used	Type	Additional Information
8191151***	Data Cartridge	7206-005 7332-005	DDS2	4GB 120m
8191146	Diagnostic Cartridge	7206-005 7332-005		
73H3467**	Test Cartridge		DDS1(DDS||||)	Internal Autoloader Use Only
21F8763*	Cleaning Cartridge			50 cleanings

DDS3

Part Number	Description	Where Used	Type	Additional Information

59H3465	Data Cartridge	7206-110 7332-110	DDS3	12GB 125m
59H3466	Test Cartridge	7206-110 7332-110	DDS3	
21F8763*	Cleaning Cartridge			50 cleanings

DDS4

Part Number	Description	Where Used	Type	Additional Information
59H4458	Data Cartridge	7206-220 7212-102 7332-220	DDS4	20GB 150m
59H4457	Test Cartridge	7206-220 7212-102 7332-220	DDS4	11.5m
21F8763*	Cleaning Cartridge			50 cleanings

DAT72

Part Number	Description	Where Used	Type	Additional Information
18P7912	Data Cartridge	7206-336 7212-102	DAT72	36GB 170m
59H4457	Test Cartridge	7206-336 7212-102	DDS4	11.5m
21F8763	Cleaning Cartridge			50 cleanings

Note:
* This cartridge replaced 59H3090
** Not a stocked item use DDS|||| Cartridge P/N 21F8754
*** This cartridge replaces 8191160 withdrawn July 97, was a 5 pack

4mm Autoloader Magazine

Part Number	Description	Where Used	Type	Additional Information
35L1200	4mm 6 Cartridge Autoloader Magazine	Internal Autoloader		
35L1200	4mm 6 Cartridge Autoloader Magazine	7332-220		

87G4885	4mm 4 Cartridge Autoloader Magazine	7332-005, 110		
87G4886	4mm 12 Cartridge Autoloader Magazine	7332-005, not 110		
44H3590	4mm 14 Cartridge Library Magazine	7336-205		

VXA Part Numbers

VXA2

Part Number	Description	Where Used	Type	Additional Information
19P4876	Data Cartridge	7206-VX2 7212-102	V23	230m 80GB Purple accent color
19P4877	Data Cartridge	7206-VX2 7212-102	V17	170m 59GB Red accent color
19P4878	Data Cartridge	7206-VX2 7212-102	V6	60m 20GB Blue accent color
19P4879	Test Cartridge	7206-VX2 7212-102	V6	60m 20GB Blue accent color
19P4880	Cleaning Cartridge	7206-VX2 7212-102	VXA	20 usage Gray accent color

---

8mm Part Numbers

Drives with 2.3GB, or 5GB capacity can read/write 15m, 54m, 112m length media only.

Drives with 7GB capacity can read/write 15m, 54m, 112m, and the 160m length media only.

Drives with 20GB capacity are read only on 15m, 54m, 112m, 160m lengths (MP-Metal Particle), but can read/write on 22m or 170m lengths (AME-Advanced Metal Evaporated).

After reading "MP" media on the 20GB 8mm tape drive it is necessary to clean the 20GB 8mm tape drive prior to using "AME" media.

2.3GB, 5GB, and 7GB 8mm

For use on 2.3GB, 5GB, and 7GB 8mm drives.

Part Number	Description	Where Used	Type	Additional Information
21F8575	Data Cartridge	2.3GB, 5GB, and 7GB drives		112m
21F8595	Data Cartridge			112m
87G1603	Data Cartridge	Use only on 7331-205 and AS/400XL		160m
21F8577	Test Cartridge	2.3GB, 5GB, and 7GB drives		112m
16G8467*	Cleaning Cartridge			12 cleanings 2.3GB 22 cleanings 5.0GB 22 cleanings 7.0GB

20GB and 60GB 8mm

For use on 20GB and 60GB 8mm drives only

Part Number	Description	Where Used	Type	Additional Information
59H2678	Data Cartridge			170m AME Media 20GB
59H2671	Data Cartridge			22m AME Media 2.5GB
59H2677	Test Cartridge			22m AME Media 2.5GB
35L1409***	Cleaning Cartridge			18+ cleanings

60GB 8mm

For use on 60GB 8mm drives only

Part Number	Description	Where Used	Type	Additional Information
18P6484****	Data Cartridge			225m AME/SmartClean

				60GB
09L5323	Data Cartridge			150m AME/SmartClean 40GB
35L1044	Data Cartridge			75m AME/SmartClean 20GB

Note:
* Requires 6S0 microcode or higher on the 5GB tape drive for this cartridge to work. The 2.3GB tape drive requires NO changes for cartridge to work. Replaces 21F8577
** Replaced 59F3907(replaced 21F8577 with 16G8467)
*** Replaced 59H2898 4/2000
****Replaced 09L5321 8/2002
SmartClean is the Trademark of Exabyte Corporation.

8mm Library Magazine.

Part Number	Description	Where Used	Type	Additional Information
86G9310	8mm Library Magazine 10 Cartridge	7331-205/305		

DLT Part Numbers

DLT7000 and DLT8000

For Use on the DLT7000 and DLT8000 Drives

Part Number	Description	Where Used	Type	Additional Information
59H3040	Data Cartridge		DLTtapeIV	549m
59H3039	Test Tape		DLTtapeIV	549m
59H3411	Data Cartridge		DLTtapeIIIxt	549m
59H3092	Cleaning Cartridge			20 Cleanings

S-DLT

For use on the S-DLT Drives Only

Part Number	Description	Where Used	Type	Additional Information
35L1119	S-DLT Data Cartridge	7205-550	S-DLT	160 GB, 549m

35L1120	S-DLT Test Cartridge	7205-550	S-DLT	160 GB, 549m
19P4357	S-DLT Cleaning Cartridge	7205-550	S-DLT	20 Cleanings

Note: DLTtapeIIIxt and DLTtapeIV are trademarks of Quantum Corporation.

IBM Storage Media

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http://www.storage.ibm.com/media/

SCSI Address Setting

SCSI address settings is important as the SCSI address:

- Identifies the device to the bus and system.
  Care must be taken not to set two devices to the same SCSI address as this will cause errors that are often not easy to detect.

- Sets the priority of the device on the bus.
  Tape drives are normally slow devices compared to harddisks and the tape drives should be set to a high priority to insure the tape drive gets access to the bus in a timely manner.
  The SCSI bus priority on a pSeries or RS/6000:
  Highest 7 6 5 4 3 2 1 0 15 14 13 12 11 10 9 8 Lowest

Most SCSI devices will need to be powered OFF then ON again for the device to recognize the new address if the device address was changed with the device powered ON.

In general the SCSI adapter will be set at SCSI address of 7, but this is not always the case, so it is best to determine the SCSI address of the SCSI adapter.

To determine the SCSI adapters in the system do the following AIX command:
lsdev -C | grep scsi
The output will be:
scsi0 Available 00-04 SCSI I/O Controller

To be sure of the SCSI adapter address do the following AIX command for the adapter you are going to attach to:
lsattr -El scsi0 | grep id
The output will be:
id 7 Adapter card SCSI ID

Note: High Availability(HA) systems often use 5 and 6 as the SCSI adapter address. Some systems restrict the SCSI address, refer to your system manuals to determine any system restrictions.
To be sure of the addresses of other devices are already using on the SCSI bus do the AIX command:
lsdev -Cs scsi

Valid SCSI addresses for Narrow devices(8 bit) are 0 thru 7, with 7 usually reserved for the SCSI adapter.

Valid SCSI addresses for Wide devices(16 bit) are 0 thru 15 with 7 usually reserved for the SCSI adapter. When a Wide device is attached to a narrow bus the available addresses are the same as if the device was a narrow device.

Note: On systems that use the Common Hardware Reference Platform(CHRP), the SCSI address 15 may be used for CHRP address. The backplanes use this address on CHRP boxes to ID backplane FRU locations codes in CHRP Error logs. The ID 15 is hard wired into the I-35 backplane. Any devices tagged with a SCSI address of 15 and attached to the SCSI interface used by the backplanes are going to have a conflict of address, so if in doubt don't use the SCSI address of 15. Some systems use more than 1 CHRP and use more than 1 SCSI address on the same SCSI adapter.. Currently the F50, H50, S70, and SP2 equivalents use CHRP.
The lsdev -Cs scsi command will show the following(adapter ID will vary):
ses0 10-68-00-15,0 SCSI-Enclosure Services Device
There may be multiple SCSI adapters in the system an each may have a SCSI-Enclosure Services Device at address 15.

Tape Drive Performance

The following information applies to most AIX tools(tar, cpio, backup, restore, dd, etc..) used to write or read data from tape, backup and restore are used as generic names only.

Customers backing up the same size data or restoring data can find that the amount of time it takes to backup/restore data may vary from backup to backup or restore to restore. Most tape drives work best when the tape drive can keep the tape moving at a constant speed(streaming). The more the tape drive is able to keep the tape streaming

the shorter the backup/restore time will be. The ability of the tape drive to keep the tape streaming is effected by many factors.

These factors include:

- Tape drive rated performance.
- System performance, fast vs slower system. .
- System activity can often effect the time it takes to do a backup/restore. Backup/restore are best done during periods of low system activity to reduce the impact on other system operations and on the backup/restore operation. Make sure the backup is not done with other system activity that could effect the ability of the system to deliver the data to the tape drive. Such as other devices on the SCSI bus with high activity, or other system activity.
- SCSI bus Activity on either the SCSI bus with the disks or the SCSI bus with the tape drives. High activity on either SCSI bus may effect the ability of the system to keep the tape drive streaming.
- Some tape drives, when used on an AIX system, may provide the best performance when written to in the fixed block mode. If your application writes tapes in variable blocked mode, you may find that by changing your application to write in fixed block mode your backup or restore may take less time. It is recommended that if you are currently using variable blocked mode you try changing your backup to a fixed block mode and compare the backup and restore time to the time it took in variable mode.
- AIX commands used. Depending on the AIX command used system backup/restore time may vary. Some tape drives are sensitive to the delivery of data to the tape drive. Some applications take the blocksize and block the data block into larger blocks for transfer to the tape drive. Some applications call this the blocksize, or the buffer size or blocking factor. Whatever it is called you need to understand that some tape drives performance(data rate)is greatly effected when the system sends small blocks of data. Try setting the tape drive block size to a large block size and large blocking factor. You should test your application to see at what blocksize and blocking factor you get the best performance for the tape drive you are using.
- Options chosen on the AIX commands. Some AIX commands have options that can improve performance. Refer to the command reference for the commands you are using for the a description of the options.
- Buffer size(the size of the data transfer AIX uses to communicate with the tape drive). Often increasing the buffer size will reduce the amount of system overhead required to transfer data to or from the tape drive. Reducing system overhead often results in better performance and faster backup/restore times. Refer to the command reference for the commands you are using to increase the buffer size.
- Tape drive compression setting On or Off. Not only does the option have to be set but if compression is selected the tape drive and media must both support compression at the recording density specified.
- The ability of the data to be compressed. Some data, such as text data, is often highly compressible, graphic or binary data is often not very compressible. Data that is more compressible will normally take less time to backup/restore because of the use of specialized compression chips in some tape drives.
- AIX command compression option. Compressing data before sending the data to the tape drive may increase elapsed time depending on the type of data and

system activity. Data compression done by the drive will often result in faster backup/restore, but due to other considerations such as network backup, etc., it may be faster to compress the data prior to sending the data to the tape drive.

- Clean the tape drive with the approved cleaning method. If the tape head is not clean the drive may have to rewrite/reread the data. To reduce the need to rewrite/reread data the tape drive should be cleaned as recommended in the user manuals.
- The physical condition of the tape can have a impact on the time it takes to do a backup or restore. If a tape is not in the best condition the tape drive may have to rewrite/reread data in order to do the backup/restore. This will this will increase the time it takes to do the backup/restore.
- Block size, can effect the time for backup/restore. Using large blocksizes may improve performance. Using small block sizes can increase system overhead but before changing to a large blocksize it is necessary to be sure the user application supports the larger blocksize chosen.
- Very long restore times due to blocksize. If a backup is done with a fixed block length then the restore should be done with the same fixed block length. If a backup is done with a fixed block length and the restore is done with variable block length, the restore may work successfully but it may take many more hours to restore than it took to back up the data. The reason for this is that when AIX reads fixed block length data in variable block mode, a check condition is issued by the tape drive on every read. AIX must interpret every check condition and determine the proper action to take. This often will put the tape drive into a mode of reading that will require the tape drive to stop tape motion, rewind the tape some distance, then start reading again. This will reduce the life expectancy of the tape and increase the time it takes to backup data.
- Eliminate as many rewinds as you can. Do not write one file then rewind only to then space out to the end of the last file written to write a new file. Use the .1 parameter on the rmt to reduce tape repositioning. Do not use this option with the AIX mksysb command as mksysb handles tape positioning and rewind itself.

Device Driver/Robotics Driver(ATAPE)

Atape is the device and robotics driver for the 7332-005, 7332-110, and 7332-220.

Atape is the robotics driver for the 7331-205, 7331-305, 7334-410, and 7336-205.

Note: A minimum Atape level required for microcode download on the 7332-005 or 7332-110 is Atape 2.5.2.10.

To check the level of the Atape driver on a system do the following AIX command:
lslpp -l Atape.driver

The current level of the Atape driver can be obtained(downloaded) via anonymous ftp service. Access the ftp server as you would an anonymous service.

The current level of Atape device driver is available from:

ftp://service.boulder.ibm.com/storage/devdrvr/AIX

You should remove the older Atape driver before installing a newer level. To remove an older level of the Atape driver do the Atape command:
/usr/lpp/Atape/lpp.deinst

You should remove the RMT's that of the devices supported by Atape before installing a newer level of the Atape driver. To do this use the AIX command:
rmdev -dl rmtx <-- where x is the device you wish to remove

Do this for each of the RMT's associated with the device.

The AIX command to install the Atape driver is:
Diskette:
installp -acXd /dev/rfd0 Atape.driver

Directory: **installp -acXd /pathname/filename Atape.driver**

Note: If after rebooting your system you see a defined device at the same address as the 7332-005 you may need to do an AIX command of
rmdev -dl rmtx <--- where the x is the defined device to remove
I may then be necessary to then do the AIX bosboot command, refer to your AIX documentation for information on the bosboot command.

Tape Drive Microcode Download

There are two methods to download microcode to the Self Configuring SCSI Tape Drives(SCSD):

- AIX 5.1(and higher) Diagnostics
- SCSD Tape/Optical Ucode Download Utility(Genucode)

Drive Microcode Download with AIX 5.1 Diagnostics

AIX 5.1 Diagnostics

AIX 5.1(and higher) diagnostics now supports AIX diagnostic microcode download to Self Configuring SCSI Drives (SCSD) that previously required the separate program "Genucode" from the external eServer and RS/6000 web site.

Note: The AIX 5.1 diagnostics must have a minimum PTF/APAR level of:
PTF# U477173 and APAR# IY27025.

Microcode Packaging

As new tape drive microcode is released the tape drive microcode packages will be updated to show how to use both "Genucode" and AIX 5.1 diagnostics and higher.

Using Older Microcode Packages

To use AIX 5.1 diagnostics with tape drive microcode packages that have not been updated yet you can copy the files using the **new naming** conventions to the /etc/microcode directory and use AIX 5.1 to download the microcode to the tape drives.

The following is a sample of how to use the older files with AIX 5.1 diagnostics:

- This example uses DLT8000 microcode in the **/tmp** directory but the same principles apply the other "SCSD" drives:

- Download and the microcode to the /tmp directory
- The /tmp directory contains:
  /tmp/DLT8000.0250.A17002A3
  /tmp/DLT8000.0250.A17002A3.dsdata
  /tmp/dsdata
- Copy and rename the files to the /etc/microcode directory:
  cp /tmp/DLT8000.0250.A17002A3 /etc/microcode/DLT8000.A17002A3.0250
  cp /tmp/DLT8000.0250.A17002A3.dsdata /etc/microcode/DLT8000.A17002A3.dsdata

  Note: The naming convention for the files in the /etc/microcode is:
  MachineTypeModel.DeviceSpecific(LI).MicroCodeLevel
  Or
  MachineTypeModel.DeviceSpecific(LI).dsdata

  The lscfg -vl rmt0 will show the drives information such as:

```
  rmt1             1P-19-00-5,0      Differential SCSI DLT Tape
                                     (40000 MB)
Manufacturer................QUANTUM
Machine Type and Model......DLT8000
Device Specific.(Z1)........0250
Serial Number...............B02P4343
Device Specific.(LI)........A17002A3
Part Number.................19P2026
FRU Number..................19P2042
EC Level....................H27532
Device Specific.(Z0)........0180020283000138
Device Specific.(Z3)........
```

Using AIX diagnostics

There are 2 ways to do the microcode download using the AIX diagnostics.

- Using the AIX Diagnostics menu
- Using the AIX Diagnostics via command line input.

Using the AIX Diagnostics menu

To use the AIX 5.1 diagnostics menu for microcode download do the following:
diag (enter)
Task Selection (enter)
Download Microcode (enter)

Select the drive you wish to download microcode to and follow the system instructions.

Note: When the system asks where the microcode file is to be found select **/etc/microcode, not diskette.**

Using the AIX Diagnostics via command line input.

The command line to download microcode will use the highest level of microcode in the /etc/microcode directory for the device selected. To use the AIX 5.1 diagnostics command line input for microcode download do the following:
diag -c -d rmt0 -T "download" (enter)

Sample Dsdata file

Dsdata files are unique to each drive.

The following is the dsdata file for the 60GB 8mm tape drive for use with the program "Genucode" or the AIX 5.1 diagnostics:

```
* Mammoth 2 Dsdata File   60GB 8mm Tape Drive
* May 9, 2003 V:01
* dsdata - Drive Specific Data for microcode download
*
* The dsdata file is used by both AIX Diagnostics, level 5.1 and higher,
* and the separate program "Genucode" available from IBM external WEB
* site.
*
* Format of the data:
* LINE1: blocksize(3-hex) buffer_offset(3-hex) binary_filesize(decimal)
* LINE1:(continued) timeout_value(decimal) write_buffer_type{4 or 7}
* LINE1:(continued) {PdDVLn string found from odmget -qname=devicex CuDv}
* LINE2: (vendorname) inquiry_page page_offset field_length value
*
* Note:
*      "Genucode" requires the firmware level in line 3 to match the
```

```
*      firmware level you wish to download.
*        Naming conventions for Genucode are:
*        Microcode file:   /tmp/Mammoth2.07pR.A1700295
*        dsdata    file:   /tmp/dsdata
*
*      AIX Diagnostics "Microcode Download" does not require the firmware
*      level in line 3 to match the firmware level you wish to download.
*        Naming conventions for AIX diagnostics are:
*        Microcode file:   /etc/microcode/Mammoth2.A1700295.07pR
*        dsdata    file:   /etc/microcode/Mammoth2.A1700295.dsdata
*
* LINE3: (firmware level) inquiry_page page_offset field_length value
* LINE4: (loadid) inquiry_page page_offset byte_length hexvalue
008000 000000 1201664 0600 07 tape
00 10 08 Mammoth2
00 20 04 07pR
00 2C 04 A1700295
```

SCSD Tape / Optical Ucode Download Utility

Genucode: SCSI microcode download utility for SCSD devices

Genucode is a program that can be used to download microcode to tape drives and other devices attached to an eServer pSeries or RS/6000. The devices Genucode supports use the Self Configuring SCSI Device driver(SCSD) on these systems.

Information about using Genucode

Note: Do not power the tape drive off immediately after the microcode says it is complete as the tape drive may be still doing internal processing that will take a few minutes to complete.

On the 7205-311, wait until all LEDs stop flashing and the Green Open Door LED is the only LED on.

Microcode installation instructions:

- You need to have "root" authority to run the microcode download utility "genucode".
- Remove any tape from the drive.
- Genucode requires the following files:
  Genucode program files from the genucode package:
  - genucode

    - cpcat
    - genucode.cat

  Device specific files from the device package:
    - dsdata
    - microcode file
- "genucode", "cpcat", "genucode.cat", "dsdata", and the microcode file must all be put in the /tmp directory. Use the following AIX command to change to the /tmp directory:
  cd /tmp
- Put "genucode", "cpcat", "genucode.cat", "dsdata", and the microcode file into the /tmp directory.
- Make sure the files "cpcat" and "genucode" are marked executable using the following AIX commands:
  chmod +x cpcat
  chmod +x genucode
- Run cpcat to copy "genucode.cat" to /usr/lpp/diagnostics/catalog/default
  This only needs to be done once per system.
  /tmp/cpcat
- "dsdata" is the file name for the drive's specific data file used for customization of the download procedure. Use the "dsdata" file from the microcode package you downloaded.
- The binary microcode file must be in the form of VENDORNAME.FWLEVEL.LOADID as indicated in the "dsdata" file, such as:

  IBM-7205.V52.A0B00E24

- The load id of the microcode file and the load id in the "dsdata" file must match the load id of the tape drive. The valid load ids are:

12GB 4mm Tape drive
Single Ended Load ID is 00000101 White or Black Bezel

20GB 4mm Tape drive
LVD Load ID is 00000201 Black or White Bezel
Starting with microcode level C009
LVD Load ID is A1700292 Black or White Bezel

13GB 1/4" Tape drive
Differential Load ID is A0B00E11

30GB 1/4" Tape drive
LVD Load ID is A1700298

20GB 8mm Tape drive
Internal White Bezel Load ID is A0000001
7208-341 Load ID is A0000002
7331-305 Load ID is A0000003
Internal Black Bezel Load ID is A0000004

60GB 8mm Tape drive

```
LVD                          Load ID is A1700296

35GB DLT Tape drive
7205-311                     Load ID is A0B00E24
7337-305/306                 Load ID is A0B00E24

40GB DLT Tape drive
7205-440                     Load ID is A17002A3
7337-360                     Load ID is A17002A4

160GB DLT Tape drive
7205-550                     Load ID is A17002A9

80GB VXA Tape drive
7206-VX2                     Load ID is A170029C
```

- Run genucode to download the microcode to the tape drive: /tmp/genucode -s rmt0 {rmt0 is Tape drive name}

Note:

- Genucode will not prompt you before executing the download.
- It is NOT necessary to recycle (powering the OFF then ON) the system or the tape drive to have the tape drive microcode active.
- If you are going to recycle the system or the tape drive, MAKE SURE the microcode download IS COMPLETE. If the tape drive is recycled prior to the microcode download being complete, damage may be done to the internal programming of the drive requiring the drive to have to be replaced.
- If you try multiple microcode downloads to the drive without recycling the tape drive the microcode download may fail.

Genucode Return Codes

Program failed with Return_code: -xx

```
NO INIT ODM     (-1)
EXIT MAIN PANEL (-2)
EXIT SELECT RES (-3)
NO OPEN DSDATA  (-4)
DSDATA ERROR    (-5)
EXIT SELECT DEV (-6)
INQUIRY FAILED  (-7)
MISMATCHED PARM (-8)
EXIT CONF DL    (-9)
DOWNLOAD FAILED (-10)
NO RES DEVS     (-11)
EXIT CFGRES DEV (-12)
CFGREQ FAIL     (-13)
```

```
EXIT RES FAIL   (-14)
RESTORE FAIL    (-15)
NO DL DEVS      (-16)
NO OPEN DEV     (-17)
BAD INPUT PARM  (-18)
```