

Bering 800 Series 4.5 GB Fixed Disk User's Guide



Bering Technology, Inc.
Campbell, CA, USA

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Bering products sold in the U.S.A. and Canada carry a standard 90 day warranty against defects in materials and workmanship. This drive mechanism is covered by the original manufacturer's warranty following the end of the 90 day warranty. During the warranty period, Bering will, at its option, repair or replace equipment which proves to be defective. If a drive mechanism fails after the initial 90 day warranty, the original manufacturer of the drive should be contacted for warranty repair at 1-800-468-3472 in the U.S.A and Canada, or log onto their web site at <http://www.seagate.com> to contact them or to find the location of an international repair center.

Printed in the U.S.A.

The Bering Box 4.5 GB Fixed Disk

The Option 04 fixed disk in this model is the Seagate Medalist Pro 4520 SCSI, model ST34520N. This drive is a 3.5 inch form factor drive. Depending on the model of the Bering Box you have, the drive may be paired with another 4.5 GB fixed disk, a DDS-2 tape drive, or a DDS-3 tape drive. The operating instructions and specifications for the tape drives will be in a separate booklet included with your Bering●Box.

Operation

Refer to your computer system's operation manual for specific instructions on using this drive with your system. This document provides only specifications for the drive. Refer to the *Bering●Box 800 User's Manual* for physical hookup instructions.

Specifications

PERFORMANCE

Formatted capacity	4.55 GB formatted
Interface	50-pin Ultra SCSI (SCSI-2)
Number of discs (physical)	2
Number of heads (physical)	4
Total cylinders	9,006
Total tracks	36,024
Avg. sustained transfer rate	12.4 MBytes/sec
Max external transfer rate	20 MB/sec
Avg. seek time, read	9.5 msec
Avg. seek time, write	10.5 msec
Track-to-track seek, read	2.5 msec
Track-to-track seek, write	3.5 msec
Full disk seek, read	21 msec
Full disk seek, write	23.5 msec
Avg. latency	4.17 msec
Default buffer (cache) size	512 Kbytes
Spindle speed	7,200 RPM
Power-on to ready time	20 sec
MTBF	800,000 POH, 12% duty

ENVIRONMENTAL (operational)

Temperature	0 to 55° C 32 to 131° F
Temperature gradient	20 °C/hour
Relative humidity	10 - 90%
Vibration	0.5G
Altitude	0 ~ 3,048Meters 0 ~ 10,000 Feet

ENVIRONMENTAL (non-operational)

Temperature	-40 to 70 °C -40 to 158 °F
Relative Humidity	5 - 95%
Vibration	2 G
Shock	200G peak, 2msec
Altitude	0 ~ 12,210 Meters 0 ~ 40,000 Feet

Bering 800 Series 9.1 GB Fixed Disk User's Guide



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Printed in the U.S.A.

Bering 9.1 GB Fixed Disk

The Option 09 fixed disk in this model is the Seagate Cheetah 18LP, model ST39103LW. This drive is a 3.5 inch form factor drive. Depending on the model of the Bering Box you have, the drive may be paired with another 9.1 GB fixed disk.

Operation

Refer to your computer system's operation manual for specific instructions on using third drive with your system. This document provides only specifications for the drive. Refer to the *Bering Box 800 User's Manual* for physical hookup instructions.

Specifications

PERFORMANCE

Formatted capacity	9.1 GB
Interface	68-pin Ultra2 SCSI (SCSI-3)
Number of discs (physical)	3
Number of heads (physical)	6
Total cylinders	9,801
Total tracks	117,612
Max external transfer rate	80 MB/sec
Avg. seek time, read	5 msec
Avg. seek time, write	6 msec
Track-to-track seek, read	.6 msec
Track-to-track seek, write	.9 msec
Full disk seek, read	12 msec
Full disk seek, write	13 msec
Avg. latency	2.99 msec
Default buffer (cache) size	1,024 Kbytes
Spindle speed	10,016 RPM
Power-on to ready time	30 sec

ENVIRONMENTAL (operational)

MTBF	1,000,000 POH
Temperature	5 to 50° C 41 to 122° F
Temperature gradient	20 °C/hour
Relative humidity	10 - 95%
Vibration	0.5G
Shock	5 G peak, 11 msec
Altitude	-305 ~ 3,048Meters -1,000 ~ 10,000 Feet

ENVIRONMENTAL (non-operational)

Temperature	-40 to 70 °C -40 to 158 °F
Relative Humidity	5 - 95%
Vibration	2 G
Shock	175 G peak, 2 msec
Altitude	-305 ~ 12,210 Meters -1,000 ~ 40,000 Feet

Bering 800 Series 18.2 GB Fixed Disk User's Guide



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Printed in the U.S.A.

Bering 18.2 GB Fixed Disk

The Option 18 fixed disk in this model is the Seagate Cheetah 18LP, model ST318203LW. This drive is a 3.5 inch form factor drive. Depending on the model of the Bering Box you have, the drive may be paired with another 18.2 GB fixed disk.

Operation

Refer to your computer system's operation manual for specific instructions on using this drive with your system. This document provides only specifications for the drive. Refer to the *Bering Box 800 User's Manual* for physical hookup instructions.

Specifications

PERFORMANCE

Formatted capacity	18.2 GB
Interface	68-pin Ultra2 SCSI (SCSI-3)
Number of discs (physical)	3
Number of heads (physical)	6
Total cylinders	9,801
Total tracks	117,612
Max external transfer rate	80 MB/sec
Avg. seek time, read	5.2 msec
Avg. seek time, write	6 msec
Track-to-track seek, read	0.6 msec
Track-to-track seek, write	0.9 msec
Full disk seek, read	12 msec
Full disk seek, write	13 msec
Avg. latency	2.99 msec
Default buffer (cache) size	1,024 Kbytes
Spindle speed	10,016 RPM
Power-on to ready time	30 sec
MTBF	1,000,000 POH

ENVIRONMENTAL (operational)

Temperature	5 to 50° C 41 to 122° F
Temperature gradient	20 °C/hour
Relative humidity	10 - 95%
Vibration	0.5G
Shock	5 G peak, 11 msec
Altitude	-305 ~ 3,048Meters -1,000 ~ 10,000 Feet

ENVIRONMENTAL (non-operational)

Temperature	-40 to 70 °C -40 to 158 °F
Relative Humidity	5 - 95%
Vibration	2 G
Shock	175 G peak, 2 msec
Altitude	-305 ~ 12,210 Meters -1,000 ~ 40,000 Feet

Bering 800 Series DDS-2 Tape Drive User's Guide



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Bering●Box DDS Tape Drive

The tape drive is DDS tape drive with a SCSI-2 (Ultra-SCSI) interface. Option 42 is a DDS-2 drive. The DDS drive conforms to the DDS format standard for storing computer data and offers hardware data compression using the DCLZ compression algorithm to increase both capacity and transfer rate.

The DDS-2 format allows 4 GB of data to be stored without compression on a single DDS-2 (120m) tape. The drive offers a transfer rate of 512 KB/s (30 MB/min) without data compression. Using data compression, the capacity and transfer rate are both increased by between a factor of 1.5 and 6, depending on the data being stored. A compression ratio of 2:1 will produce a capacity of 8 gigabytes for a DDS-2 (120M) cartridge, and a transfer rate of 1 MB/s.

Media Recognition System

The DDS logos indicate that a cartridge contains data-grade quality tape. Although non-DDS cartridges (such as DAT tapes) may appear to work satisfactorily in the drive, their inferior specification threatens the integrity of your data. The Media Recognition System allows the drive to detect DDS cartridges.

DDS Media Recognition System tapes have a series of strips on the transparent leader tape at the beginning of the tape. The Bering DDS drives can detect these, and is configured to treat any tape without stripes as write-protected. The logos show below tell you what type of tape you have.



Old DDS-1 logo



New DDS-1 logo



DDS-2 logo



DDS-3 logo

Tapes with the old DDS logo cannot be recognized as being DDS quality. This drive does not support DDS3 tapes.

Operation

Front Panel LED

This section gives details of the basic operation of the drive, and the meaning of the front panel displays.

The front panel of each 4mm tape drive has two LEDs. Green is used to indicate normal operation, and amber is used to imply warning conditions. Pulsing shows activity between the drive and the SCSI bus. The Tape LED (left) uses green to show tape activity as follows:

- Slow flashing green while the tape is being loaded or unloaded
- Steady green when the tape is loaded
- Fast flashing green when read or write operations occur

The Clean/Attention LED (right) uses amber to show the following conditions:

- Slow flashing amber (the Media Caution signal) indicates that the heads need cleaning, or the cartridge is near the end of its useful life
- Steady amber indicates a hard fault

The following table lists all the possibilities.

Tape	Clean/ Attention	Meaning
		Activity—load or unload
		Activity—read or write
		Cartridge loaded, drive on-line
		Media Caution signal
		Fault
		Self-test in progress

Key	
	Off
	Green
	Amber
	Flash Green 1/2s on, 1/2s off
	Flash Amber (1/2s on, 1/2s off)
	Fast Flash Green (1/4s on, 1/4s off)

Media Caution Signal

If an excessive number of read-after-write or error correction (ECC) errors are detected during normal operation, the Clean/Attention light flashes amber.

This signal can indicate that the cartridge is nearing the end of its useful life. Try using a new cartridge.

- If the Media Caution signal is not repeated, copy the data from the old cartridge onto a new one and discard the old cartridge.
- If the Media Caution signal still shows with the new cartridge, the tape heads probably need cleaning.

The Media Caution signal is cleared when the drive is powered off and on again, and also after cleaning the tape heads.

Self-Test Results

During power-up, the drive executes a self-test diagnostic sequence. This is shown by the Tape light flashing green at a rate of 1 cycle per second.

If the self-test fails, the Clean/Attention light shows steady amber. If this condition is not cleared when the drive is power-cycled, the drive has a hardware fault.

Loading a Cartridge

Caution:

Loading a data cartridge is very much like loading a cassette in your tape player.

Only DDS (Digital Data Storage) tapes with the DDS logo should be used in the 800 Series drives. The use of DAT (Digital Audio Tape) tape will endanger the integrity of your data. Also, DAT cartridges have a different mechanical specification which can cause them to jam in the mechanism.

You should also ensure that no more than one label is stuck to the label area of the cartridge, and that it is stuck firmly. Never use non-standard labels, and never stick anything to the cartridge other than in the label area.

Bering Technology reserves the right to exclude from the warranty any damage caused by use of non-approved media, such as DAT tape.

1. Make sure the Bering Box is turned on before you load a cartridge
2. Insert the DDS cartridge into the drive slot with the arrowhead pointing toward the slot and the write-protect switch toward you. Push the cartridge straight in, keeping it parallel with the top and bottom of the drive.

The drive will complete the loading process, threading the tape and performing a load sequence. The tape will be examined and the read/write circuits will be tested. This procedure should take approximately 20 seconds. When the load sequence is complete the green Tape LED will light to tell you the drive is ready.

Unloading a Cartridge

It is important to remove the cartridge before you turn off the unit.

Note:

You can not unload a cartridge when the tape drive is turned off.

1. Press the Unload button.

The drive will rewind the tape, open the door, and eject the cartridge.

2. Remove the cartridge carefully and place it in the protective plastic storage case immediately.

Remember to label and date the cartridge for future reference. Do not mark on labels with a graphite pencil. The graphite dust may contaminate the tape surface.

Forcing the Ejection of a Cartridge

Only force ejection if there is no other way of retrieving a cartridge, or if you are not prepared to wait for the normal eject procedure and urgently need to unload the cartridge, even at the risk of losing data.

Caution:

You may lose data if you force an eject. The tape can also end up invalidly formatted, because EOD (End of Data) may not have been written. Because of this, only force ejection as a last resort to recover a cartridge.

There are two ways of forcing ejection.

- Press the Unload button three times within a 5-minute period (or press the Unload button twice in the 5 minutes following a SCSI UNLOAD command).
- Hold the Unload button down for at least 5 seconds.

Following either of these actions, the drive waits until 35 seconds have passed from the time of the first press, to give the normal eject procedure a chance to proceed. Once this period has elapsed, the drive immediately unthreads the tape and ejects the cartridge, regardless of what operation it was performing. The drive is then reset as though the power has been switched off and then on again.

Note:

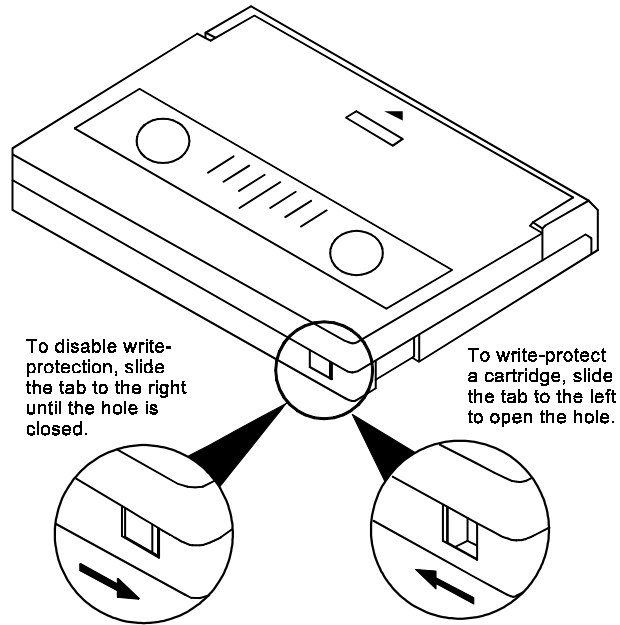
Forced ejection overrides and SCSI PREVENT MEDIA REMOVAL command which may be in effect, and can abort any SCSI operations which may be in progress on the drive.

Write-Protecting a 4mm Cartridge

You may want to write-protect the cartridge after removing it from your Echo. Write-protection prevents accidentally erasing or overwriting data on the cartridge tape. The write-protection switch is located at the front of the cartridge.

1. To write-protect a cartridge, use a fingernail or a non-magnetized small screwdriver to slide the switch sideways toward the center of the cartridge.

When the hole on the edge of the cartridge is open, data cannot be written to the cartridge and existing data cannot be changed or erased by the Echo.



1. To disable write-protection, slide the switch toward the closest edge of the cartridge.

When the hole in the cartridge is closed, data can be written to the cartridge and existing data can be changed or erased by the Echo.

Head Cleaning

To supplement the highly effective head sweeper in the drive, Bering recommends regular cleaning of the tape heads. The following table gives guidelines for how often you should do this.

<i>Tapes used per day</i>	1	2	3	4+
<i>Recommended cleaning frequency</i>	8 weeks	4 weeks	3 weeks	weekly

1. Insert a cleaning cartridge into the drive. The drive automatically takes the cartridge, loads it, and cleans the heads.
2. After about 30 seconds, at the end of the cleaning cycle, the drive ejects the cartridge.

If the cartridge is ejected after only 14 seconds, this means that the cleaning cartridge reached the end of its life, and no cleaning has occurred. If this happens, discard the cartridge, and repeat the operation with a new cleaning cartridge.

3. Take the cleaning cartridge out of the drive.
4. Make a mark on the label on the cartridge.

This provides a record of how many times the cartridge has been used. you need to know this, because a cleaning cartridge has a life of typically 50 cycles.

Specifications

PERFORMANCE	Storage capacity	4.0 to 8.0 GB (4GB native, 120m tape) with data compression enabled
	Max. sustained transfer rate	510 KB/sec (native uncompressed)
	SCSI burst transfer rate	5 MB/sec (asynchronous) 10 MB/sec (synchronous)
	Error rate	1 in 10 ¹⁵ bits read
	MTBF	300,000 POH, 12% duty
ENVIRONMENTAL (operational)	Temperature	5 to 40 °C 41 to 104 °F
	Temperature gradient	10 °C/hour
	Relative humidity	20 - 80%
	Vibration	0.3G rms, 5 to 500Hz
	Shock	5 G peak, 3 ms 8 G peak, 11 ms
	Altitude	0 ~ 4,600 Meters 0 ~ 15,000 Feet
ENVIRONMENTAL (non-operational)	Temperature	-40 to 70 °C -40 to 158 °F
	Relative Humidity	5 - 95%
	Vibration	0.75 G rms, 5 to 500 Hz
	Shock	90G peak, 3 ms 30G peak, 26 ms
	Altitude	0 ~ 15,200 Meters 0 ~ 50,000 Feet
Accessories	ACCS-3038	DDS-2 tape cartridge (120M)

Data Capacity

The native (uncompressed) capacities of different length cartridges are shown below. Note that the drive will only write DDS-2 (120m) cartridges in DDS-2 format. It automatically writes to DDS-1 (60m and 90m) cartridges in DDS-1 format. the drive will eject DDS-3 (125m) cartridges.

Format	Length	Native Capacity
DDS-1	60m	1.3 GB
DDS-1	90m	2 GB
DDS-2	120m	4 GB
DDS-3	125m	not supported

With data compression, capacity can be expected to increase by a factor between 1.5 and 6, depending on the exact nature of the data.

Bering 800 Series DDS-3 Tape Drive User's Guide



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Bering●Box DDS Tape Drive

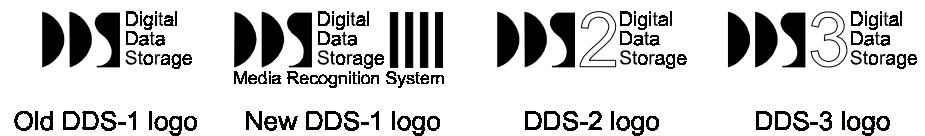
The tape drive is DDS tape drive with a SCSI-2 (Ultra-SCSI) interface. Option 43 contains a DDS-3 drive. The DDS drive conforms to the DDS format standard for storing computer data and offers hardware data compression using the DCLZ compression algorithm to increase both capacity and transfer rate.

The DDS-3 format allows 12 GB of data to be stored without compression on a single DDS-3 (125m) tape. The drive offers a transfer rate of 1 MB/s (60 MB/min) without data compression. Using data compression, the capacity and transfer rate are both increased by between a factor of 1.5 and 6, depending on the data being stored. A compression ratio of 2:1 will produce a capacity of 24 gigabytes for a DDS-3 (125M) cartridge, and a transfer rate of 2 MB/s.

Media Recognition System

The DDS logos indicate that a cartridge contains data-grade quality tape. Although non-DDS cartridges (such as DAT tapes) may appear to work satisfactorily in the drive, their inferior specification threatens the integrity of your data. The Media Recognition System allows the drive to detect DDS cartridges.

DDS Media Recognition System tapes have a series of strips on the transparent leader tape at the beginning of the tape. The Bering DDS drives can detect these, and is configured to treat any tape without stripes as write-protected. The logos show below tell you what type of tape you have.



Tapes with the old DDS logo cannot be recognized as being DDS quality.

Operation

Front Panel LED

This section gives details of the basic operation of the drive, and the meaning of the front panel displays.

The front panel of each 4mm tape drive has two LEDs. Green is used to indicate normal operation, and amber is used to imply warning conditions. Pulsing shows activity between the drive and the SCSI bus. The Tape LED (left) uses green to show tape activity as follows:

- Slow flashing green while the tape is being loaded or unloaded
- Steady green when the tape is loaded
- Fast flashing green when read or write operations occur

The Clean/Attention LED (right) uses amber to show the following conditions:

- Slow flashing amber (the Media Caution signal) indicates that the heads need cleaning, or the cartridge is near the end of its useful life
- Steady amber indicates a hard fault

The following table lists all the possibilities.

Tape	Clean/Attention	Meaning	Key
		Activity—load or unload	Off
		Activity—read or write	Green
		Cartridge loaded, drive on-line	Amber
		Media Caution signal	Flash Green 1/2s on, 1/2s off
		Fault	Flash Amber (1/2s on, 1/2s off)
		Self-test in progress	Fast Flash Green (1/4s on, 1/4s off)

Media Caution Signal

If an excessive number of read-after-write or error correction (ECC) errors are detected during normal operation, the Clean/Attention light flashes amber.

This signal can indicate that the cartridge is nearing the end of its useful life. Try using a new cartridge.

- If the Media Caution signal is not repeated, copy the data from the old cartridge onto a new one and discard the old cartridge.
- If the Media Caution signal still shows with the new cartridge, the tape heads probably need cleaning.

The Media Caution signal is cleared when the drive is powered off and on again, and also after cleaning the tape heads.

Self-Test Results

During power-up, the drive executes a self-test diagnostic sequence. This is shown by the Tape light flashing green at a rate of 1 cycle per second.

If the self-test fails, the Clean/Attention light shows steady amber. If this condition is not cleared when the drive is power-cycled, the drive has a hardware fault.

Loading a Cartridge

Caution:

Loading a data cartridge is very much like loading a cassette in your tape player.

Only DDS (Digital Data Storage) tapes with the DDS logo should be used in the 800 Series drives. The use of DAT (Digital Audio Tape) tape will endanger the integrity of your data. Also, DAT cartridges have a different mechanical specification which can cause them to jam in the mechanism.

You should also ensure that no more than one label is stuck to the label area of the cartridge, and that it is stuck firmly. Never use non-standard labels, and never stick anything to the cartridge other than in the label area.

Bering Technology reserves the right to exclude from the warranty any damage caused by use of non-approved media, such as DAT tape.

1. Make sure the Bering Box is turned on before you load a cartridge
2. Insert the DDS cartridge into the drive slot with the arrowhead pointing toward the slot and the write-protect switch toward you. Push the cartridge straight in, keeping it parallel with the top and bottom of the drive.

The drive will complete the loading process, threading the tape and performing a load sequence. The tape will be examined and the read/write circuits will be tested. This procedure should take approximately 20 seconds. When the load sequence is complete the green Tape LED will light to tell you the drive is ready.

Unloading a Cartridge

It is important to remove the cartridge before you turn off the unit.

Note:

You can not unload a cartridge when the tape drive is turned off.

1. Press the Unload button.

The drive will rewind the tape, open the door, and eject the cartridge.

2. Remove the cartridge carefully and place it in the protective plastic storage case immediately.

Remember to label and date the cartridge for future reference. Do not mark on labels with a graphite pencil. The graphite dust may contaminate the tape surface.

Forcing the Ejection of a Cartridge

Only force ejection if there is no other way of retrieving a cartridge, or if you are not prepared to wait for the normal eject procedure and urgently need to unload the cartridge, even at the risk of losing data.

Caution:

You may lose data if you force an eject. The tape can also end up invalidly formatted, because EOD (End of Data) may not have been written. Because of this, only force ejection as a last resort to recover a cartridge.

There are two ways of forcing ejection.

- Press the Unload button three times within a 5-minute period (or press the Unload button twice in the 5 minutes following a SCSI UNLOAD command).
- Hold the Unload button down for at least 5 seconds.

Following either of these actions, the drive waits until 35 seconds have passed from the time of the first press, to give the normal eject procedure a chance to proceed. Once this period has elapsed, the drive immediately unthreads the tape and ejects the cartridge, regardless of what operation it was performing. The drive is then reset as though the power has been switched off and then on again.

Note:

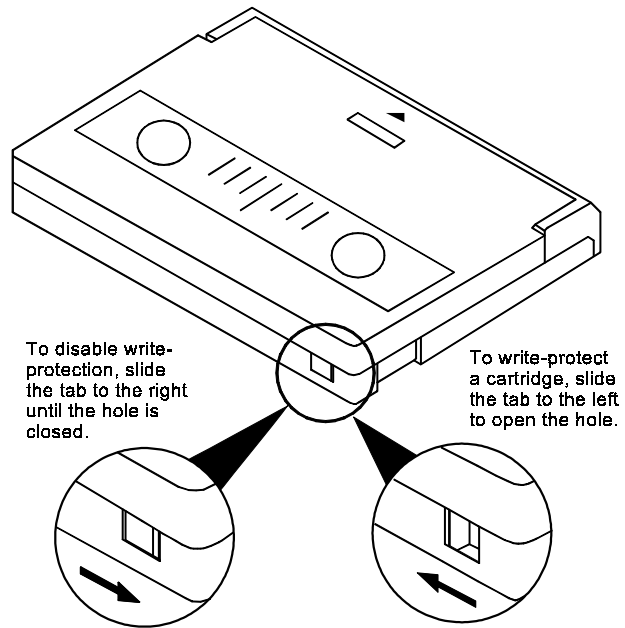
Forced ejection overrides and SCSI PREVENT MEDIA REMOVAL command which may be in effect, and can abort any SCSI operations which may be in progress on the drive.

Write-Protecting a 4mm Cartridge

You may want to write-protect the cartridge after removing it from your Echo. Write-protection prevents accidentally erasing or overwriting data on the cartridge tape. The write-protection switch is located at the front of the cartridge.

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When the hole in the cartridge is closed, data can be written to the cartridge and existing data can be changed or erased by the Echo.

Head Cleaning

To supplement the highly effective head sweeper in the drive, Bering recommends regular cleaning of the tape heads. The following table gives guidelines for how often you should do this.

<i>Tapes used per day</i>	1	2	3	4+
<i>Recommended cleaning frequency</i>	8 weeks	4 weeks	3 weeks	weekly

1. Insert a cleaning cartridge into the drive. The drive automatically takes the cartridge, loads it, and cleans the heads.
2. After about 30 seconds, at the end of the cleaning cycle, the drive ejects the cartridge.

If the cartridge is ejected after only 14 seconds, this means that the cleaning cartridge reached the end of its life, and no cleaning has occurred. If this happens, discard the cartridge, and repeat the operation with a new cleaning cartridge.

3. Take the cleaning cartridge out of the drive.
4. Make a mark on the label on the cartridge.

This provides a record of how many times the cartridge has been used. you need to know this, because a cleaning cartridge has a life of typically 50 cycles.

Specifications

PERFORMANCE	Storage capacity	12.0 to 24.0 GB (12GB native, 125m tape) with data compression enabled
	Max. sustained transfer rate	1.0 MB/sec (native uncompressed)
	SCSI burst transfer rate	3 MB/sec (asynchronous) 10 MB/sec (synchronous)
	Error rate	1 in 10 ¹⁵ bits read
	MTBF	300,000 POH, 12% duty
ENVIRONMENTAL (operational)	Temperature	5 to 40 °C 41 to 104 °F
	Temperature gradient	10 °C/hour
	Relative humidity	20 - 80%
	Vibration	0.3G rms, 5 to 500Hz
	Shock	5 G peak, 3 ms 8 G peak, 11 ms
	Altitude	0 ~ 4,600 Meters 0 ~ 15,000 Feet
ENVIRONMENTAL (non-operational)	Temperature	-40 to 70 °C -40 to 158 °F
	Relative Humidity	5 - 95%
	Vibration	0.75 G rms, 5 to 500 Hz
	Shock	90G peak, 3 ms 30G peak, 26 ms
	Altitude	0 ~ 15,200 Meters 0 ~ 50,000 Feet
Accessories	ACCS-3066	DDS-3 tape cartridge (125M)

Data Capacity

The native (uncompressed) capacities of different length cartridges are shown below. Note that the drive will only write DDS-2 (120m) cartridges in DDS-2 format. It automatically writes to DDS-1 (60m and 90m) cartridges in DDS-1 format.

Format	Length	Native Capacity
DDS-1	60m	1.3 GB
DDS-1	90m	2 GB
DDS-2	120m	4 GB
DDS-3	125m	12 GB

With data compression, capacity can be expected to increase by a factor between 1.5 and 6, depending on the exact nature of the data.