StorageTek.®

4220 Cartridge Tape Subsystem

Operator's Manual

Pub. 28741901

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WARNING: This equipment generates, uses, and can radiate radio frequency energies, and if not installed and used according to instructions in accompanying manual, may cause interference to radio communications.

It has been tested and found to comply with the limits for a Class A computing device pursuant to subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

CHANGE PAGE

Change History:

28741900-A	Initial Release	May 1991	
28741901	Revision	August 1992	EC35730

<u>Page</u>   <u>Change</u>

Incorporated Engineering Changes since last iteration, and
Addition of ICRC.

CAUTION:

If "<40c" appears in the LCD display of the 4220, and the
ALERT indicator blinks, an overtemperature condition
has occurred. Check the air flow (is the fan operating)
and the air conditioning in the room.

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1. 4220 Quick Reference

> **CAUTION:**
>
> If ">40c" appears in the LCD display of the 4220, and the ALERT indicator blinks, an overtemperature condition has occurred. Check the air flow (is the fan operating?) and the air conditioning in the room.

LEFT-HAND MOUNT

4220 CARTRIDGE TAPE
SUBSYSTEM

AUTOMATIC
CARTRIDGE
LOADER

ICRC LABEL

FLOPPY DISK DRIVE
LOCATED BEHIND
THIS FRONT COVER

RIGHT-HAND MOUNT

FLOPPY DISK DRIVE
LOCATED BEHIND
THIS FRONT COVER

Figure 1.
4220 Cartridge Tape Subsystem with Autoloader

2. 4220 Description

The 4220 Cartridge Tape Subsystem (Figure 1) is a full-featured, full-power, full- function IBM 3480-compatible cartridge tape subsystem. State-of-the-art technology and innovative design drastically reduce computer room floor space requirements and enhance a computer operator's efficiency. The subsystem consists of an integrated controller and tape drive, and uses a 3480-type tape cartridge.

2.1. Integrated Controller

The integrated controller of the 4220 subsystem contains hardware for reading and writing data, data error correction, data path control, data buffering, and some channel operations. It contains a microprocessor that manages the data buffer and performs error recovery procedures, and another microprocessor that controls all operations for the tape drive.

Controller functions can be monitored and directed from the operator control panel of the tape drive.

2.2. Subsystem Tape Drive

The 4220 integrated tape drive is a compact, self-threading drive for magnetic tape cartridges. The drive contains a mechanical assembly that moves and threads the tape, electronic circuitry that reads and writes, and a microprocessor that controls tape motion. No capstans or vacuum columns are needed.

The drive can be on the right side of the unit, as viewed from the front (right-hand mount), or on the left side (left-hand mount).

The drive has the following associated hardware:

- Tape transport
- Servo electronics
- Disk drive electronics
- Read/Write electronics
- Pneumatics
- An operator control panel.
- DC power supply

The operator control panel contains a 16-character LCD message display, switches that move through and use the display menus, and switches that unload tape cartridges. The message display shows drive conditions, subsystem error information, and messages sent by an attached host processor.

To access the floppy disk drive, pull the top of the front blank cover straight forward until the top two retention pins on the back of the cover clear the bezel. Once the pins have cleared the bezel, use your other hand to push the bottom of the cover straight up, and set the cover aside.

When reinstalling the front blank cover, make sure the two retention pins are aligned with mating holes in the bezel before pushing the cover against the bezel.

2.3. ICRC Identification

The ICRC feature is 100% compatible with IBM's IDRC feature. The optional ICRC feature improves the effective data storage capacity of a cartridge, using data compression and reblocking of the host data. The ANSI specification on extended tapes format and binary arithmetic encoding is used to create tapes compatible with other 18-track systems.

If a drive has ICRC or is ICRC Ready, a label will be attached to the top right corner of the drive. (Refer to Figure 1.)

To see if a label is attached, either remove the table-top cover or slide the unit out from the cabinet.

An "ICRC Ready" label indicates that the drive is mechanically, electrically, and firmware structured to receive the ICRC upgrade kit.

An "ICRC" label indicates that the drive already has ICRC.

2.4. Automatic Cartridge Loader

An (optional) automatic cartridge loader (Autoloader)–see Figure 1–sequentially loads and unloads up to ten cartridges from a magazine. Refer to Section 6 and following sections for more information about the Autoloader.

LEADER
BLOCK

FILE PROTECT
THUMBWHEEL
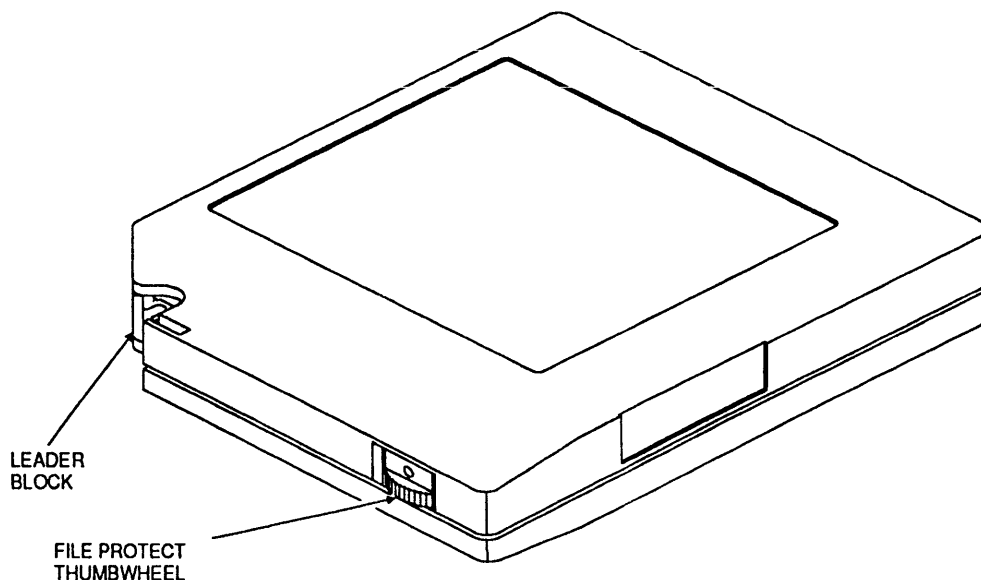
Figure 2.
4220 Tape Cartridge

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2.5. Magnetic Tape Cartridge

Magnetic tape for a 4220 (Figure 2) is contained in a cartridge. The cartridge is closed by a leader block (attached to the end of the tape) to protect the tape from contamination when the cartridge is out of the drive. When the cartridge is inserted into a drive, the threading mechanism seizes the leader block and pulls the tape out of the cartridge, across the read/write head, and onto a non-removable machine reel.

CAUTION:

Do not try to pull the leader block away from the cartridge: you can damage the tape and reduce the reliability of the cartridge.

Each tape cartridge has a file-protect thumbwheel that, when set to the file-protect position, prevents data from being written on or erased from the tape. See the section, "Setting the File Protect Thumbwheel."

A tape cartridge can be identified by a volume/serial number label on the side of the cartridge. In addition, a larger customer information label can be affixed to the top of the cartridge.

A special cleaning cartridge is available to maintain drive operating efficiency.

2.6. 4220 Operator Controls

An operator panel on the front of the unit contains the switches, indicators, and displays that control and operate the entire subsystem (see Fig. 3).

2.6.1.Subsystem Power Switch

A two-position recessed switch on the left side of the front bezel turns on and off all dc voltages used in the subsystem enclosure and (optional) attached Autoloader. AC power is used only by the dc power supply.

NOTE:

Do not move the subsystem power switch during normal operation. If the switch is moved accidentally while the subsystem is operating, the effect on jobs that are running is unpredicatable. Lost pathing arrays, job termination, missing interrupts, and data integrity problems may occur. To restore power and load the operating program, refer to the section, "Restoring Power After An Emergency". Then tell the system operator or your supervisor about the power loss.

SCROLL

SELECT

UNLOAD

OPERATOR
DISPLAY
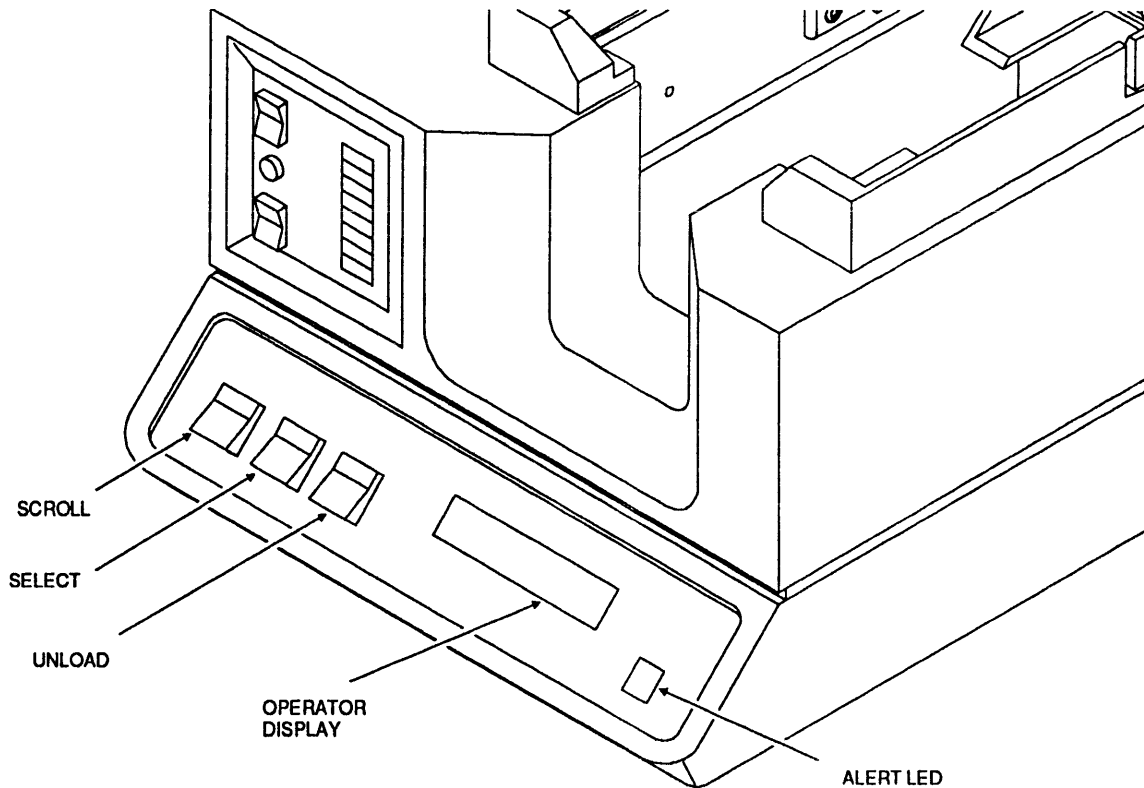
ALERT LED

Figure 3.
4220 Operator's Panel

2.6.2. Operator Control Panel

Refer to Figure 3.

Each installed cartridge tape transport has an operator control panel that contains four monentary push button switches, a 16-character display, and an Alert LED. The function of each switch is not carried out until the button is released.

2.6.2.1. SCROLL Button

This button advances the operator display through a menu list at a given level. See the section, "Display Menu Functions," for a complete description of this switch.

2.6.2.2.SELECT Button

This button either selects or executes a given function, or branches the operator display to a lower menu list. See the section, "Display Menu Functions," for a complete description of this switch.

2.6.2.3.UNLOAD Button

When the subsystem is online, pressing this button twice unloads and releases a loaded tape and makes the drive Not Ready. However, if the host is accessing a drive when the Unload button is pressed twice, unpredictable host system problems can result.

When the system is offline, pressing this button once unloads and releases a loaded tape.

This button can be used with the Scroll and Select buttons. See the section, "Display Menu Functions," for a complete description of this switch.

2.6.2.4.Operator Display

A one-line, 16-character display posts various drive messages, error codes, and menu items. See the section, "Display Menu Functions," for a list of all the display messages.

2.6.2.5.ALERT LED

This LED flashes whenever an operator's attention is required, either when a permanent error or hardware fault has occurred, or when the Alert LED has been directed to flash by the Load Display command for a cartridge mount-type message.

3. 4220 Display Menu Functions

There are two sets of menu displays, one when the 4220 is online, and a second when it is offline.

3.1. Online Menu

When the cartridge tape subsystem is online, you can access three different displays by repeatedly pressing the Scroll button.

3.1.1. Operator Display

The default operator display contains the drive- and host-loaded messages.

3.1.2. Status Display

The status display includes fields for channel enable indication, control unit status, host-loaded messages, and abbreviated drive messages.

3.1.3. Subsystem Status Menu

When the subsystem status menu appears in the display, pressing the Select button causes a branch to a list of menu items than can be scrolled through with the Scroll button. You can select and execute each menu item by pressing the Select button twice.

3.2. Offline Menu

When the cartridge tape subsystem is offline, you can view five different displays by repeatedly pressing the Scroll button.

3.2.1. Status Display

The status display includes fields for channel enable indication, control unit status, and abbreviated drive messages.

3.2.2. Subsystem Status Menu

When the Subsystem Status Menu appears in the display, pressing the Select button causes a branch to a list of menu items that can be scrolled through with the Scroll button. You can select and execute each menu item by pressing the Select button twice.

3.2.3. Set or Display Menu

When the set or display menu appears in the display, you can press the Select button and branch to a list of menu items than can be scrolled through with the Scroll button. Included in that list are Set Clean message threshold and Display

Code Revision Level. You select and execute each menu item by pressing the Select button twice. For those items which require you to change a value, select the proper value by simultaneously pressing the Select and Unload buttons until the desired number is displayed. Then press the Select button again to set that value.

3.2.4.Save Trace Menu

When the Save Trace menu appears in the display, you can press the Select button and branch to a list of menu items than can be scrolled through with the Scroll button. The list includes the various microprocessor save-traces or save-all-traces selections. You select and execute each menu item by pressing the Select button twice.

3.2.5.Diagnostics Menu

When the diagnostic menu appears in the display, pressing the select button displays a list of menu items that can be scrolled through with the Scroll button. The list includes all the subsystem diagnostics described in the diagnostic section of the 4220 maintenance manual. You select and execute each menu item by pressing the Select button twice.

3.3. Additional Button Functions

By pressing two or three control buttons simultaneously, you can initiate additional functions:

SCROLL + SELECT

This returns the display from a second-level menu item to a first-level menu item, or from a first-level item to the default display.

SCROLL + UNLOAD

This button combination is equivalent to a reverse scroll operation, the opposite of the Scroll button only.

SELECT + UNLOAD

This button combination selects second-level values, so you can set various attributes.

SCROLL + SELECT + UNLOAD

Pressing all three buttons for two seconds or less initiates a soft reset on the cartridge tape subsystem. Pressing them for five or more seconds starts an initial program load (IPL).

4. 4220 Operating Procedures

The following are typical things you do when you operate the 4220 Cartridge Tape Subsystem:

- Load programs into the controller
- Remove and restore power to the subsystem
- Place the subsystem online or offline to the host
- Set the file protect thumbwheel on a cartridge
- Insert, remove, and rewind a tape cartridge
- Rewind loosely wound tape

The following paragraphs tell you how to do these things.

4.1. Load a Program into the Controller

To load a program into the controller, two conditions must be met:

- There must be a functional/diagnostic diskette in the diskette drive.
- The controller must be IPL'd

To insert a diskette into the diskette drive (refer to figure 4):

1. Pull the panel from the front of the unit next to the drive or autoloader.

2. Insert the diskette into the diskette drive. The label on the diskette must be up and nearer to you than to the drive.

To IPL the controller,

1. If the unit is off, turn the power on (4.2).

2. If the unit is on, press the SCROLL, SELECT, and UNLOAD button-switches simultaneously and hold them down for more than five seconds.

4.2. Power On The 4220 In Normal Circumstances

1. Turn On the ac power switch on the rear of the unit.
2. Turn On the dc power switch on the front of the unit.

4.3. Placing The Subsystem Online To The Host System(s)

For the host to access the 4220, it must be in the online mode. When the subsystem is online, the display menus do not list dignostic and configuration functions.

To place the subsystem online, do the following at the operator control panel:

1. Press and release the Scroll button until the +Subsys Status menu appears in the display.

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2. Press Select. "*Online Request" should be displayed.

3. Press Select twice to select and execute the online function.

4. Press and release Scroll and Select simultaneously to return to the default display.
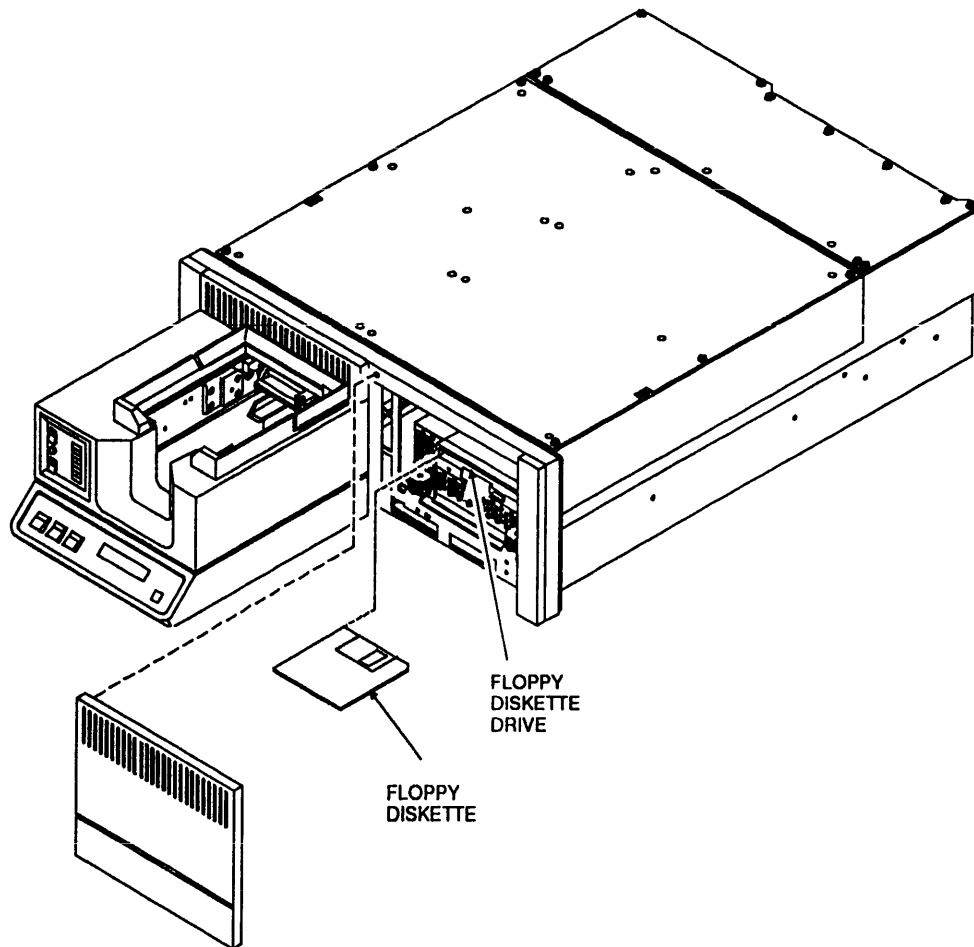
Figure 4
Inserting the Floppy Diskette into the Diskette Drive

FLOPPY
DISKETTE
DRIVE

FLOPPY
DISKETTE

4.4. Placing The Subsystem Offline To The Host System(s)

To put the subsystem offline, do the following at the operator control panel:

1. Press and release the Scroll button until the +Subsys Status menu appears in the display.

2. Press Select.

3. Press and release the Scroll button until "*Offline Request" is displayed.

4. Press Select twice to put the unit offline.

4220 Cartridge Tape Subsystem
OPERATOR'S MANUAL

StorageTek.

5. Press and release Scroll and Select at the same time to return to the default display.

4.5. Removing Power During Normal Operation

If you want to turn off a subsystem outside of an emergency,

1. From a console, take the subsystem offline to the channel over all paths. (The subsystem may be available to the host processor over more than one path.) Wait for the console message that tells you the subsystem is offline.

2. Place the 4220 subsystem offline. Refer to 4.4.

3. Wait for the display to indicate that the subsystem is offline. Normally, the off-line message appears within five seconds. However, if a job is running that consists of many chained read or write commands, the offline meassage may not appear for up to five minutes. If the offline message does not appear within five minutes, channel activity may be caused by something not under the control of the subsystem. Stop trying to get the controller offline and notify your system operator or supervisor.

4. Unload the cartridges currently loaded in the transport(s). Press the Unload bottons on each of the drive operator control panels.

5. Turn the power switch off. The backlit LCD display on the operator control panel should go off immediately.

4.6. Restoring Power During Normal Operation

If you want to turn on a subsystem after turning it off according to the procedure in 4.5.,

1. Turn the susbsystem power switch on. The backlit LCD operator control display comes on when power is restored.

2. Wait for the subsystem to complete diagnostics and IPL (Initial Program Load). This is indicated by "IPL:COMPLETE on the display.

3. Use the Scroll button to sequence the display to the susbsytem status menu.

4. Select and execute Enable or Disable for each channel that connects the subsystem to a host processor, if applicable.

5. Place the subsystem online, if necessary (refer to 4.3).

4.7. Removing Power In An Emergency

To remove power to the subsystem in an emergency, turn off the power switch on the back of the 4220.

NOTE:

Do not use the power switch, EXCEPT IN AN EMERGEN-CY, without first following the steps listed in 4.5.

4.8. Restoring Power After an Emergency

If a power shut down was due to an overheating or overtemperature condition, you must wait until the internal temperature of the controller is within specification before you try to restore power. To restore power after a power failure or emergency power-down, do the following:

NOTE:

If the subsystem power switch is not in the Off position, you must toggle it to the Off position before taking the following steps.

1. Turn the subsystem power switch on. The backlit LCD operator control display comes on when power is restored.

2. Wait for the subsystem to finish diagnostics and IPL (Initial Program Load), indicated by "IPL:COMPLETE" on the display.

3. Press the Unload button to unload any tape cartridge that was in the transport when the power went off.

4. Place the subsystem Online, if necessary (refer to 4.3).

4.9. Setting The File Protect Thumbwheel On A Cartridge

A thumbwheel selector (refer to Figure 2) on the side of the cartridge can be set to one of two positions by rolling the thumbwheel to the left or right. Be sure the selector is in the correct position for the job that is to be run.

When the selector is in the file-protected position, a white dot shows on the flat surface of the selector. This symbol means the cartridge is file-protected and can be used only for reading data.

When the selector is in the unprotected position, the rounded surface of the selector is visible and no symbol shows. This means the cartridge can be used for reading, writing, and erasing data.

4.10. Inserting A Tape Cartridge Into A Transport

Before you insert a cartridge into a transport, inspect the cartridge for damage. A damaged cartridge can prevent the tape from threading correctly and cause damage to the drive. A cartridge should be taken out of service if

- The tape was wound completely out of the cartridge onto the machine reel and then reattached to the cartridge reel. This repair is temporary and permits the cartridge to be loaded one time, so that data can be copied onto a replacement cartridge.
- The cartridge is cracked, broken, or has any other obvious damage.
- The leader block is broken.
- The file-protect selector is damaged.
- The cartridge case contains any liquid.

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If you have a damaged cartridge, substitute a back-up version of the data from another cartridge.

If the cartridge has a detached leader block, but no other damage, you can repair the cartridge. See 5.2.6, "Reattaching A Leader Block," to find out how to repair a detached leader block.

If a cartridge is already inserted, you should first unload the cartridge by pressing the Unload button. If there is a problem, see 5., "What to Do if a Problem Occurs."

To insert a cartridge

1. Hold the cartridge with the smooth side on top and the leader block toward the drive.

2. Line up the cartridge with the cartridge entry slot and slide the cartridge all the way into the drive opening until you feel it stop. If you can't insert the cartridge all the way, remove it and make sure it is properly oriented.

CAUTION:
<u>Never</u> force a cartridge into a transport.

---

3. After about 15 seconds the tape drive should complete the loading process and the display should indicate this fact. It should also show whether the cartridge is file-protected (F) or unprotected (U).

NOTE:

The host processor can replace this message with its own message.

4.11. Removing A Tape Cartridge From A Transport

CAUTION:

When the drive is Online, unloading the cartridge by pressing the Unload button can cause unpredictable host system problems.

During normal operation, the drive automatically rewinds and unloads tape when a job is finished, ejecting it so that you can grasp the cartridge and remove it. If, however, you need to unload the tape before you can remove the cartridge,

1. Press the Unload switch twice. The message display shows the drive condition while the rewind-and-unload operation is in progress, then shows an asterisk (*) when the rewind-and-unload operation is finished.

2. When the cartridge is ejected, remove it by pulling it toward you.

4.12. Cleaning Procedures

The transport tape path and cartridges must be kept clean to prevent errors caused by contamination. The cleaning cartridge shipped with each subsystem should be replaced after 500 uses. Keep track of the number of times you use it by marking the label on the cartridge (do not use a china-marking (grease) pencil.) The cleaning cartridge must be undamaged and clean.

4.12.1. When To Clean The Tape Path

When a predetermined usage count is reached, a "CLEAN" message appears in the display after a cartridge unload and during a rewind or locate operation. After the host processor unloads the data cartridge, insert the cleaning cartridge, even if a mount message is also displayed.

If the outstanding mount is satisfied without cleaning the drive, the "CLEAN" message is overlaid by other messages, but reappears after the next dismount, rewind or locate operation. This continues until the cleaning cartridge is used in the tape drive. Once the cleaning cartridge is used, the counter is reset and the message does not appear until the usage count is reached again.

4.12.2. Cleaning the Tape Path

Clean the tape path by inserting a cleaning cartridge into the transport as you would a data cartridge. The transport recognizes the the cleaning cartridge and initiates a cleaning cycle, which takes only 15 seconds, then unloads the cartridge. This process does not generate any interrupts to the controller or the host processor, so it can be done at idle time or while a mount is outstanding.

4.12.3. Cleaning a Tape Cartridge

Before you insert a cartridge into a transport, inspect the cartridge for damage or dirt. Damaged or dirty cartridges can reduce subsystem reliability. If the cartridge is dirty, wipe the outside surfaces with a lint-free cloth.

> **WARNING:**
> Do not let anything wet contact the tape. All cartridge surfaces must be dry before you insert the cartridge into a drive.

5. What To Do If A Problem Occurs In The 4220

This section identifies problems in the following areas that can occur in a 4220 Subsystem:

- IPL Procedure
- Cartridge loading and unloading
- Tape cartridge
- Message display
- Error messages

5.1. Basic Recovery Procedure

You should always take several basic recovery steps before you try to correct an error condition:

1. Try to recover the media from the tape drive:

   a. Vary the drive offline.

   b. If there is a relevant message on the system operator's console, perform the action described on the system console.

   c. If there is an error code on the operator control panel, follow the error recovery actions listed in the error code section of the 4220 maintenance manual.

2. If the message is cleared by following the indicated actions, vary the drive on-line and retry the operation.

3. If the message is not cleared by following the indicated actions, record the error code and time, and call your field engineer.

5.2. Error Conditions

The following subsections identify some specific error conditions that can occur in the subsystem during normal use. Possible solutions are listed after each condition.

5.2.1. IPL Procedure Fails

If the Alert LED is flashing and an error code is displayed, an error occurred during the IPL procedure.

1. Re-IPL the 4220 by either powering the subsystem off, waiting 10 seconds, and then powering it on with the subsystem power switch, or depress and hold the Scroll, Select, and Unload pushbuttons on the operator control panel for at least 5 seconds.

2. If the IPL procedure still fails, note the error code and call your field engineer.

5.2.2.You Cannot Insert A Cartridge

1. Inspect the cartridge for damage. See 4.10, "Inserting A Tape Cartridge Into A Transport."

2. If the cartridge is undamaged, but you cannot insert it, call your field engineer.

5.2.3.Tape Does Not Unload

1. If there is an error code message on the message display, record the error code, press the Unload Switch, and try the operation again.

2. If the drive still does not unload, record the error code message on the display and report it to your field engineer.

5.2.4.Unloading A Cartridge After A Power Failure

1. Restore power (see 4.8, "Restoring Power After An Emergency").

2. Press the Unload Switch.

5.2.5.Tape Winds Completely Out Of Cartridge

Call your field engineer. If there is an error code message on the display, record the code and report it to your field engineer.

5.2.6.Reattaching A Leader Block

1. Use the materials in a leader block repair kit to replace the leader block on the tape. The kit contains the instructions you need.

NOTE:

Replacing the leader block is a temporary repair and lets you insert the cartridge one time so that data can be copied to a replacement cartridge. After you repair the leader block and recover the data, do not use the cartridge again.

2. If the leader block does not come out of the drive when you remove the cartridge, do not use that drive. The leader block could be stuck in the threading mechanism. Instead, call your service representative.

5.2.7.Message Display Is Blank

Make sure the subsystem is receiving power from the main ac source. Also make sure the ac power switch on the rear of the 4220 is ON.

Turn OFF, then ON, the dc power switch on the left side of the front bezel. If the display is blank, call your field engineer.

5.2.8.Drive Does Not Become Ready

1. Determine if the 4220 subsystem is online by scrolling the display to Status Display and examining the channel enable field.

2. If the unit is offline, scroll to the Subsystem Status Menu, then select and execute the online function (4.3).

3. If the drive still does not become ready, the cartridge may be inserted incorrectly. Remove the cartridge from the transport and insert it again. See 4.10, "Inserting A Tape Cartridge Into A Transport," or 4.11, "Removing a Tape Cartridge From A Transport."

4. If there is an error code message on the display, record the error code, press the Unload Switch, and try the operation again.

5. If the drive still does not become ready, call your service representative. If there is an error code on the message display, record the code and report it to your service representative.

5.2.9.Error Messages

1. If there is an INTERVENTION REQUIRED message on the system operator's console, take the steps listed on the system console.

2. If there is an error code message on the message display, always record the code, then call your service representative.

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6. Autoloader Quick Reference

7. Autoloader Overview

The StorageTek automatic cartridge loader (Autoloader) automatically mounts
and demounts cartridges for the 4220 magnetic tape drive. The Autoloader uses
removable magazines that hold up to ten 3480 cartridges. Each magazine has a
storage capacity of more than 2 gigabytes. (Refer to Figure 5).
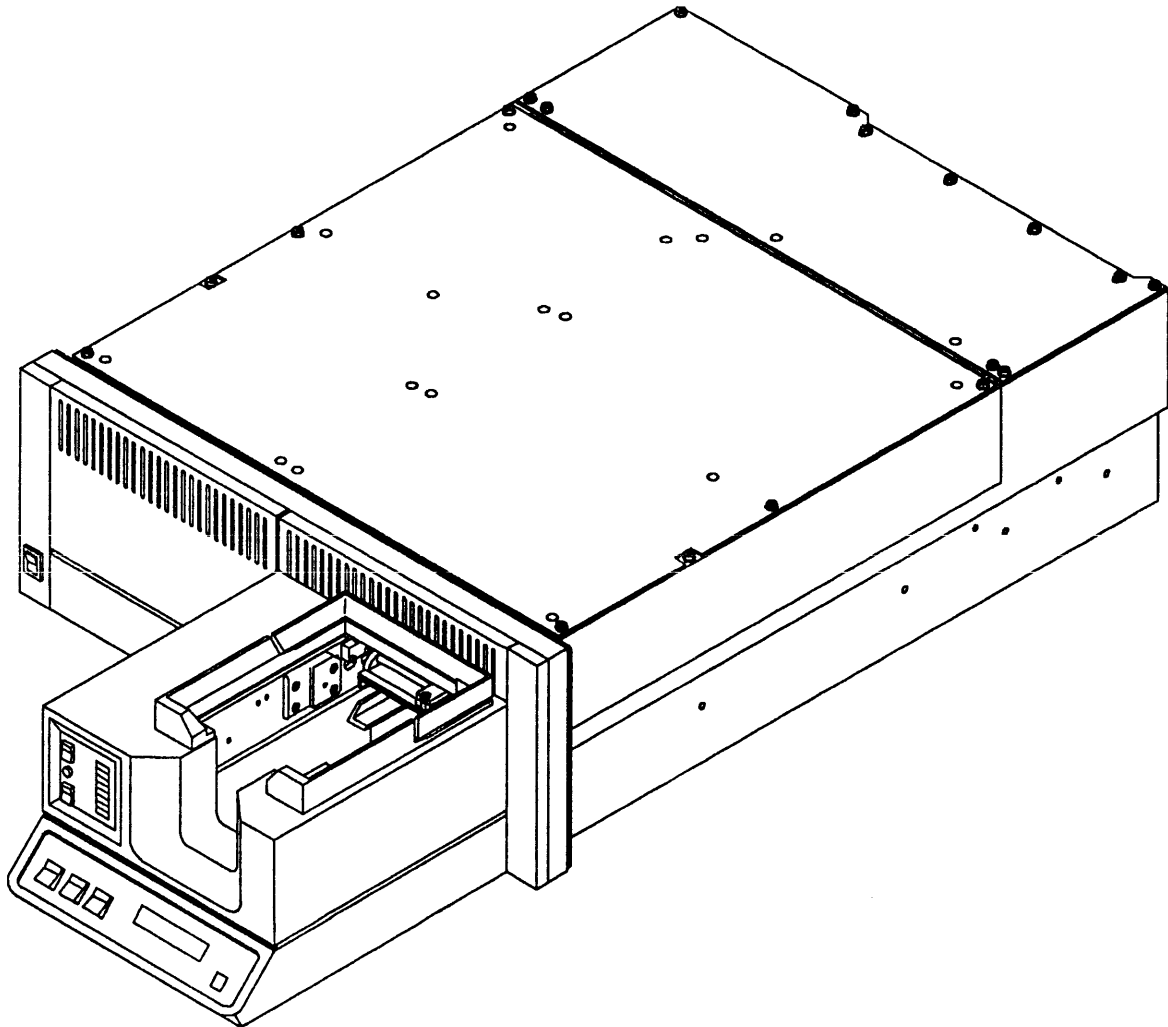
Figure 5
4220 Cartridge Tape Subsystem with Autoloader (Right-hand Mount)

8. The Autoloader Magazine

(Refer to Figure 6.) The Autoloader magazine is a 10-cartridge tape holder. The magazine can be used to store 3480 tape cartridges when the magazine is not inserted into the Autoloader, as well as load cartridges into the drive when the magazine is in the Autoloader. A handle on top makes it easy to carry the magazine.
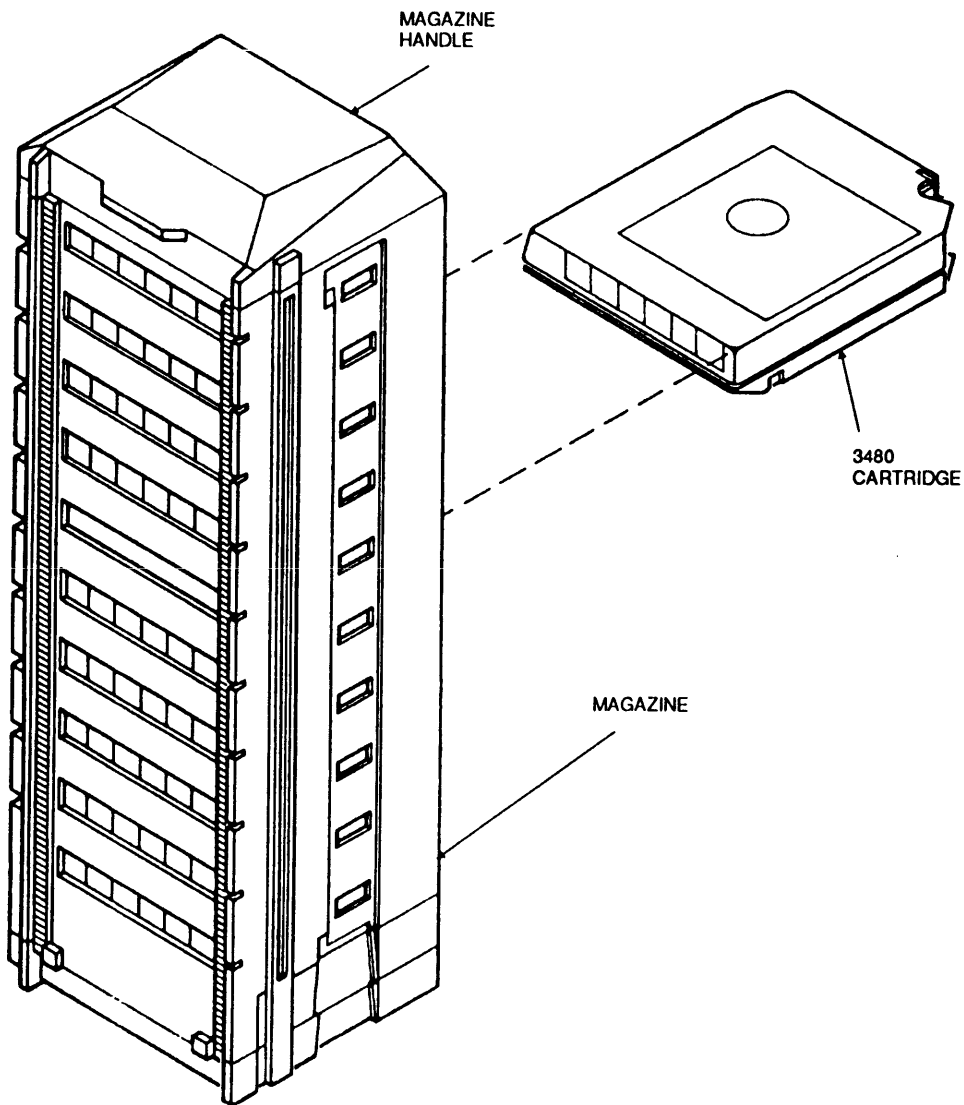
MAGAZINE
HANDLE

3480
CARTRIDGE

MAGAZINE

Figure 6.
Autoloader Magazine

9. Autoloader Operator Panel

(Refer to Figure 7.) The Autoloader has a separate operator panel with three switches and ten LEDs that control the Autoloader and work in conjunction with the 4220 drive switches. These switches and LEDs are described on the next several pages.
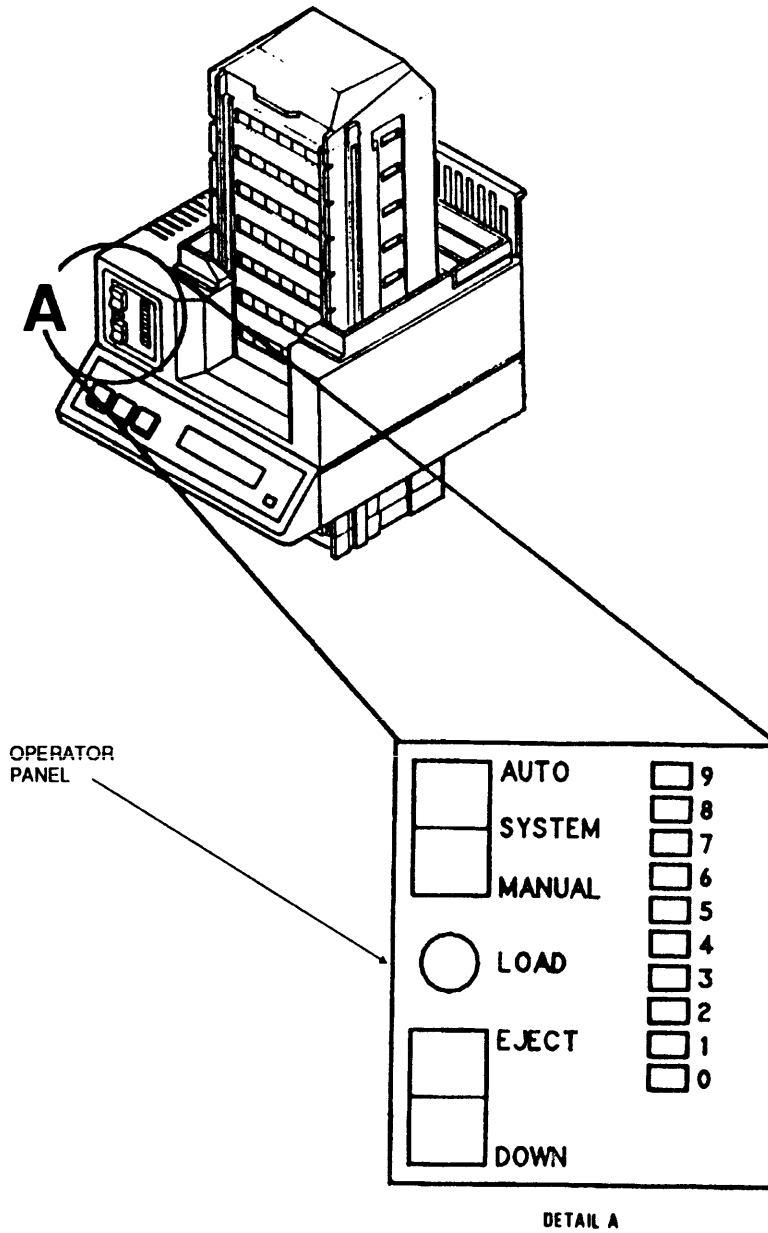

OPERATOR
PANEL

DETAIL A

Figure 7.
Autoloader with Operator Panel

9.1. Mode Selection Switch

(Refer to Figure 8.) This 3-position switch selects the mode in which you operate the Autoloader. The three positions of the switch are labeled AUTO, SYSTEM, and MANUAL, corresponding to the three modes: automatic, system, and manual.

The Autoloader operates in automatic and manual modes on any operating system that supports the 3480 subsystem. System mode requires an MVS operating system with 3480 full-function support, or an operating system with similar abilities.

Changing Modes

You can change the setting of the mode selection switch at any time. However, if a function is in progress at the time you try to select a new mode, it will finish before the Autoloader switches to the new mode. For example, if a cartridge is being processed on the drives, the process continues until it is finished, then the cartridge is unloaded and the unit changes to the new mode..

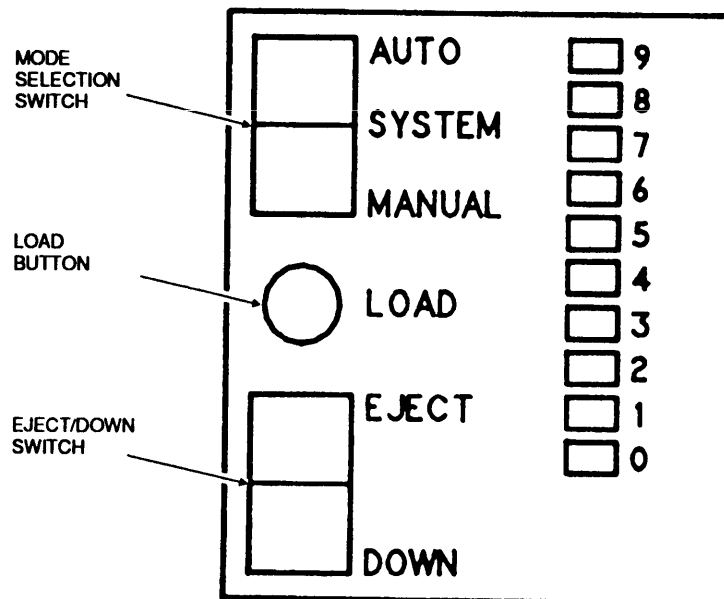After you change modes, you must press the load switch to restart the Autoloader operation.
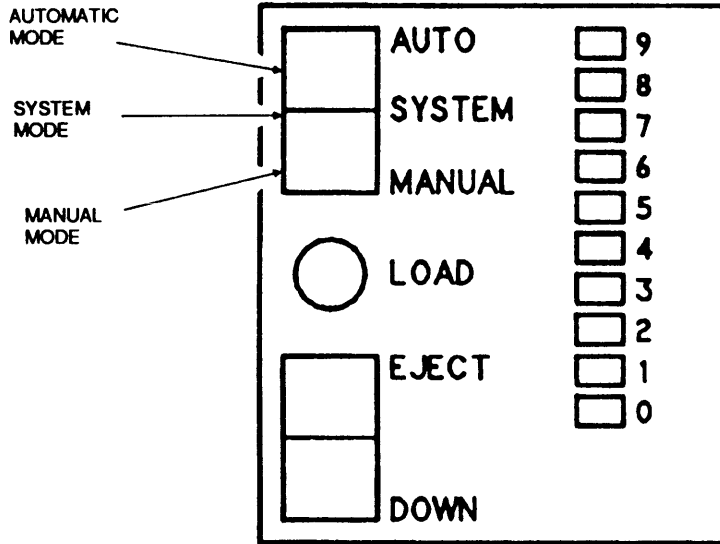

Figure 8.
Operator Panel Switches

Automatic Cartridge Loader Feature
OPERATOR'S MANUAL

StorageTek ..

Figure 9.
Operator Panel: Modes

9.1.1. Auto Mode

(Refer to Figure 9.) Automatic mode allows an operator to premount up to ten cartridges, (a full magazine), which are automatically mounted and demounted sequentially on the drive. All cartridges in the magazine load and unload automatically until the cartridge in the bottom slot has been unloaded. Then the magazine is ejected (released from the frame). An unload command from the system is needed for each unload sequence.

Automode is most effective:

• To premount scratch cartridges when only scratch cartridges are going to be requested by the system.

• To premount cartridges when several specific cartridges are required in a certain order.

9.1.2. System Mode

(Refer to Figure 9.) In system mode the Autoloader accepts mount commands directly from the system. When the host issues a Load Display (LDD) command, bit 7 is set for Automatic Load Request. An automatic load request is passed from the system to the Autoloader, which mounts the cartridge that is in the next sequential occupied cell.

System mode is most effective when you premount up to ten scratch cartridges, which are mounted and demounted on the drive automatically in response to non-specific volume requests (mount messages for scratched cartridges).

NOTE:

An MVS operating system with full function support is
required for System mode. System mode is the preferred
mode for such installations.

NOTE:

The Autoloader will not automatically mount or demount
cartridges if a specific volume request is received.

NOTE:

If you select system mode on a system which does not support
messages to the drive display, no automatic operation occurs.

9.1.3. Manual Mode

(Refer to Figure 9.) When you select manual mode, the tape drive operates as
it would if an Autoloader were not attached. You must press the Load push
button to load each cartridge.

Manual mode is the most effective mode to use

• When you want to hold premounted cartridges in the magazine until the
  job that requires them is ready to run. (When the job is ready to run,
  press the Load switch to start the load operation.)

• When you want to stop the automatic feeding and loading of cartridges in
  automatic or system mode.

• To continue using the 3480 tape drive if the Autoloader fails.

9.2. Load Button

(Refer to Figure 8.) Pressing the Load Button starts a load operation, which
moves the cartridge into the tape drive and threads the tape.

Press the Load Button to:

• Start activity in the new mode after you change the Mode selection
  switch

• Cause a cartridge to be loaded.

• Continue recovery actions after a problem is resolved.

NOTE:

If you press the Load Button when it is not required, the
subsystem ignores you.

9.3. Eject/Down Switch

(Refer to Figure 8.) The Eject/Down switch is a dual-purpose momentary switch. Pressing Eject causes the magazine to travel up through slot location 0 and eject (disengage from the Autoloader frame). The magazine rests above the gears, on the load cams. You can then remove the magazine from the Autoloader, or position any cell in the magazine in front of the load station by repeatedly pressing the Down switch.

The Eject function operates only if no tape is loaded. If the Eject switch is pressed while a cartridge is loaded, ejection occurs after the next unload.

Each time you press the Down switch, the magazine moves one slot lower, until slot 9 is in front of the load station. If you press the Down switch again, eject occurs. (If a cartridge is loaded when the Down switch is pressed, the switch is ignored.)

9.4. LEDs

(Refer to Figure 10.) There are ten LEDs representing the ten slot locations of the magazine. They are numbered 0-9, with 0 corresponding to the bottom slot of the magazine. The correlation between the state of the LEDs and the state of the Autoloader is shown below.

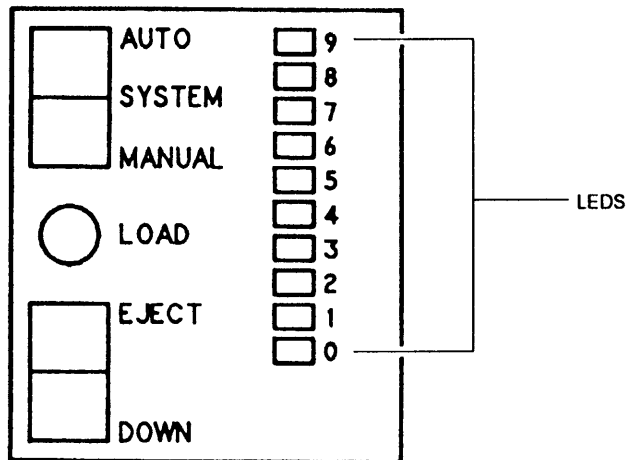| LEDs	ACTIVE CONDITION
One LED	The magazine is locked at the indicated cell location.
No LEDs	No magazine is present or magazine is in Eject Position.
All LEDs	Reset in progress; switches are ignored.

Figure 10.
Operator Panel: LEDs

10. Inserting and Removing Cartridges in a Magazine

(Refer to Figure 11.) To insert cartridges into a magazine, position the magazine vertically with the carrying handle up. Insert each cartridge, with the volume serial number sticker toward the magazine. The cartridge will snap into place.

To remove a cartridge from a magazine, first remove the magazine from the Autoloader, then grasp the cartridge where it protrudes from the magazine, and pull the cartridge out.

NOTE:

Errors will occur if cartridges are removed or inserted while the Autoloader is in System Mode or if the magazine is not out of the Autoloader when you remove a cartridge.

CAUTION:
Always use a magazine to load a cartridge. Never try to manually load a cartridge into an autoloader, or you may cause damage.
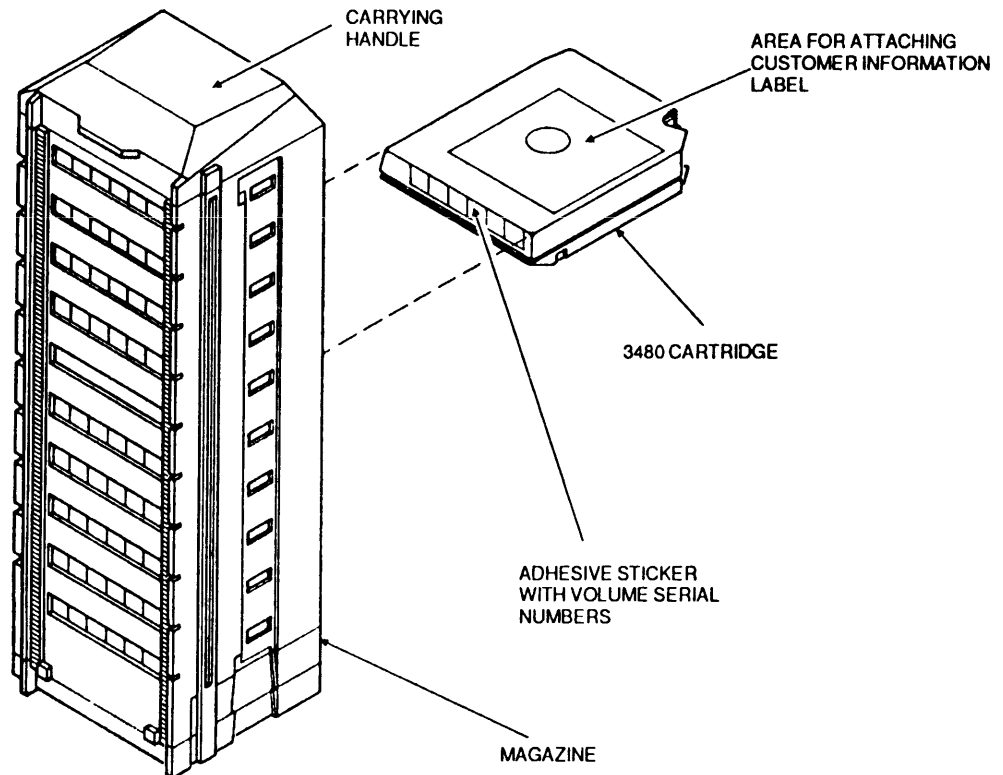

Figure 11.
Inserting/Removing A Cartridge in a Magazine

11. Loading a Magazine into an Autoloader

(Refer to Figure 12.) When you want to load a magazine into an Autoloader:

1. Make sure the correct cartridges are in the magazine.

2. With the volume serial numbers facing away from the tape drive, lower the magazine into the Autoloader. Do not drop the magazine into the Autoloader, as this may damage the system. The magazine is now positioned on a set of load cams, but is not yet lowered and locked into the Autoloader. (You can still remove it from the Autoloader if you want to.)

3. Set the desired mode with the Mode Select Switch and press the Load switch. This lowers the magazine and positions the first (lowest) cell containing a cartridge in front of the load station of the Autoloader. The cartridge aligned with the load station is then loaded into the tape drive.
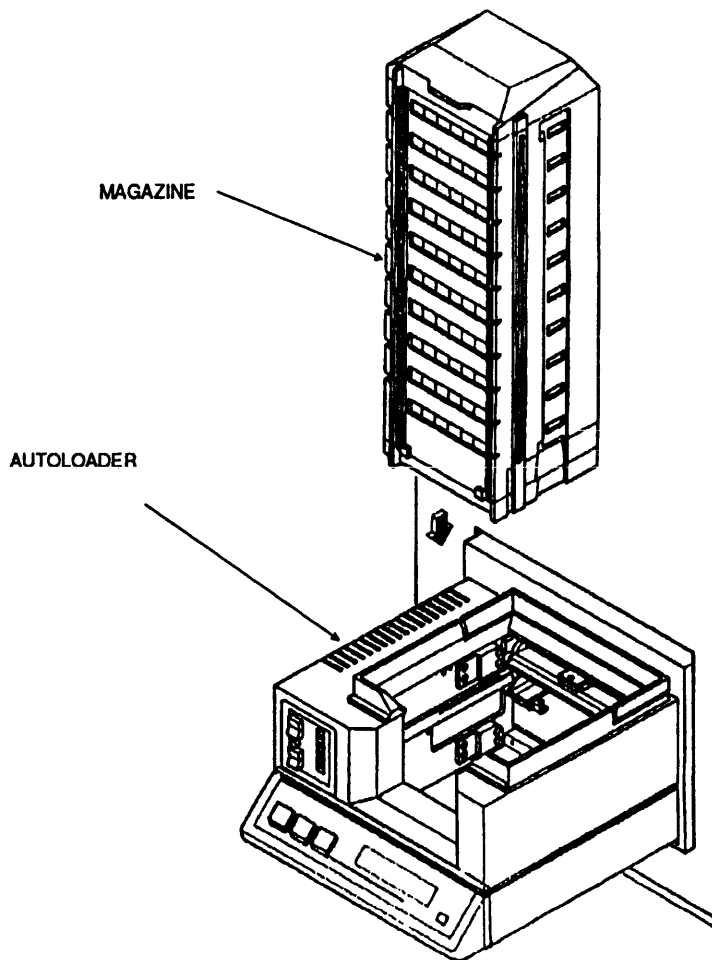
MAGAZINE

AUTOLOADER

Figure 12
Loading a Magazine into an Autoloader

12. Removing a Magazine from an Autoloader

(Refer to Figure 13.) You remove a magazine from the Autoloader by simply lifting the magazine straight up.

NOTE:

Before you can remove a magazine from an Autoloader, the cartridge must be ejected. An ejection is performed in either of two ways:

• When the Autoloader is in automatic mode, the magazine is automatically ejected after the last cartridge is unloaded.

• If the Autoloader is in manual mode, pressing the Eject switch ejects the magazine if no cartridge is loaded.

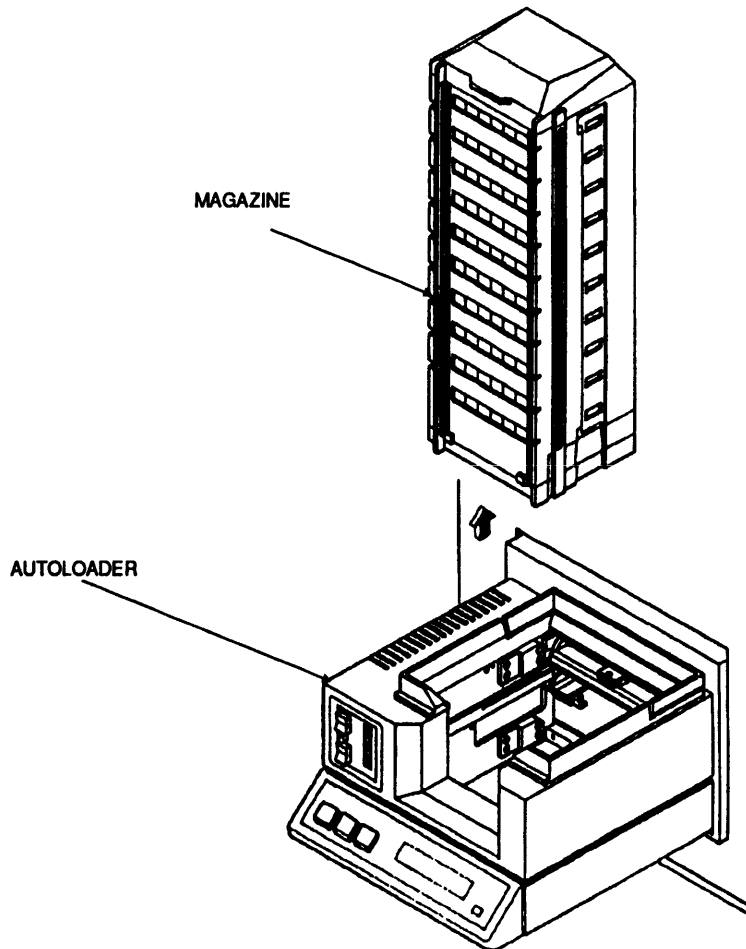After you remove a magazine, the Autoloader is ready for the next magazine.

MAGAZINE

AUTOLOADER

Figure 13.
Removing a Magazine from an Autoloader

Automatic Cartridge Loader Feature
OPERATOR'S MANUAL

StorageTek

13. Error Recovery Procedure

13.1. Error Recovery, General

When the subsystem detects an Autoloader error, it displays an error code. Drive error codes may also be displayed, since the Autoloader functions as a cartridge transport. If there is an error while the Autoloader is operating, always

1. Note the error.

2. Clear the error by pressing Unload on the drive operator panel.

NOTE:

Pressing Rewind and Unload simultaneously causes a soft reset of the drive and Autoloader. If a cartridge is still in the transport, press Unload to remove it.

13.2. Removing A Stuck Magazine From The Autoloader

If a magazine becomes stuck in an autoloader so that pressing the UP switch does not raise the magazine; or if you cannot remove the magazine from the autoloader when it is at the upper limit of its travel, remove it using the emergency clutch (see the next section).

13.3. Removing A Magazine Using The Emergency Clutch

<div style="border:1px solid black; padding:10px;">

WARNING:
The vertical motion clutch is for emergency magazine removal only. If it is used, a power-on reset must be performed before the next magazine is used, to avoid misalignment or damage to the autoloader .

</div>

1. Grasp the carrying handle of the magazine with your right hand.

2. Reach under the front of the vertical transmission and locate the clutch release lever (refer to Figure 14).

<div style="border:1px solid black; padding:10px;">

CAUTION:
Do not release the clutch without first firmly grasping the carrying handle of the magazine. Otherwise, the magazine could fall into the autoloader and cause damage.

</div>

3. Pull the lever toward the left side of chassis and <u>slowly</u> lift the magazine up and out.

4. If the magazine still does not come up out of the Autoloader while the clutch is disengaged, lower the magazine as far as it will go, continuing to grasp it. Look at the portion of the magazine below the autoloader. Remove as many cartridges as you can from the magazine, then slowly raise the magazine and attempt to remove it from the autoloader.

5. If the magazine still will not come out of the autoloader, release the clutch, make sure the magazine is secure, and call service.

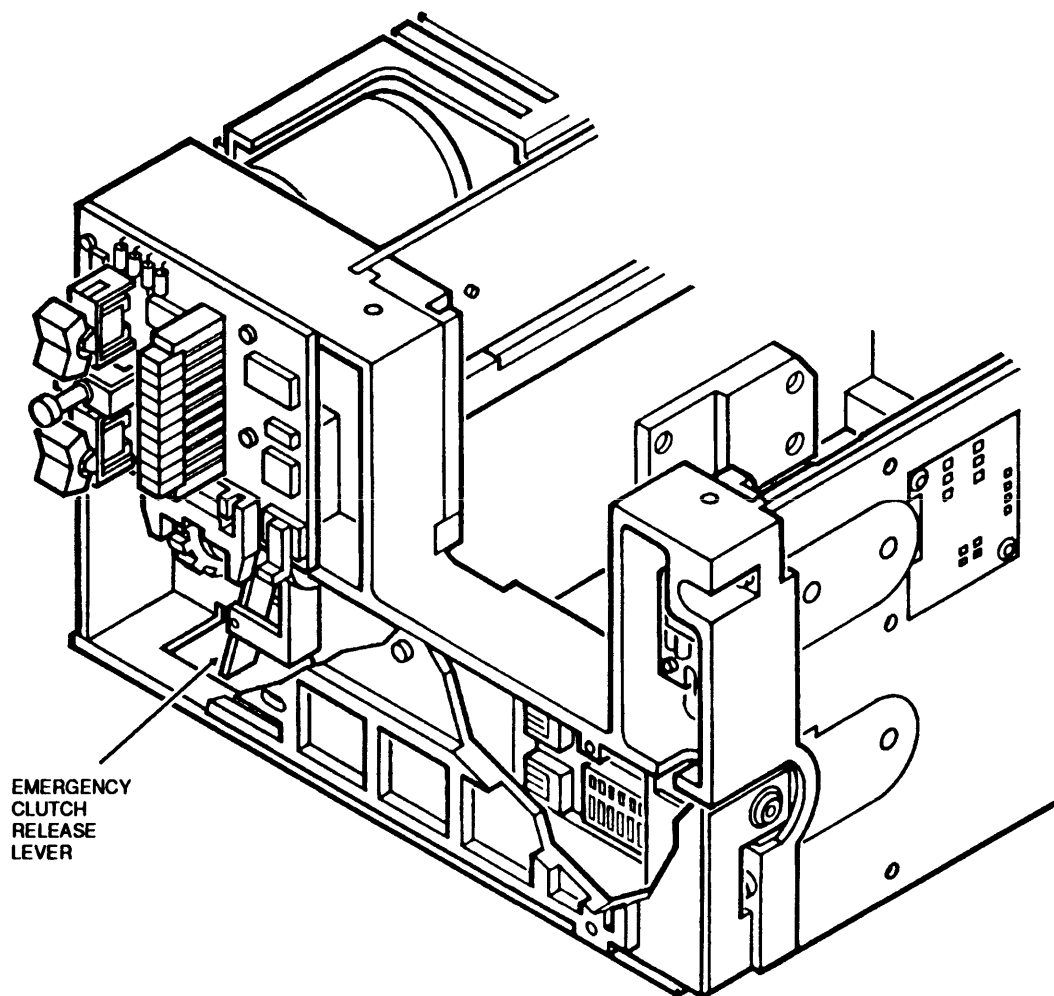6. If the magazine comes out of the autoloader, perform a power-on reset.

EMERGENCY
CLUTCH
RELEASE
LEVER

Figure 14
Emergency Clutch Release Lever

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READER'S COMMENT FORM

StorageTek.

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City/State/Zip: _____

Manual Name: _____

Manual PN: _____

Please check or fill in the items, adding explanations/comments in the space provided.

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   ☐ Yes   ☐ No (explain below)

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   Clarifications on pages _____

   Additions on pages _____

   Deletions on pages _____

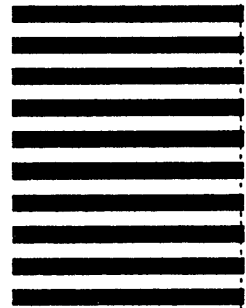   Errors on pages _____

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