

StorageTek.

4220 Cartridge Tape Subsystem

**Installation
Instructions**

Pub. 28740801

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1. Introduction

1.1. Purpose

This installation guide for the StorageTek 4220 Cartridge Tape Subsystem covers pre-installation checks, unpacking, mounting rack slide rails, power up, initial checkout, and then host interface setup.

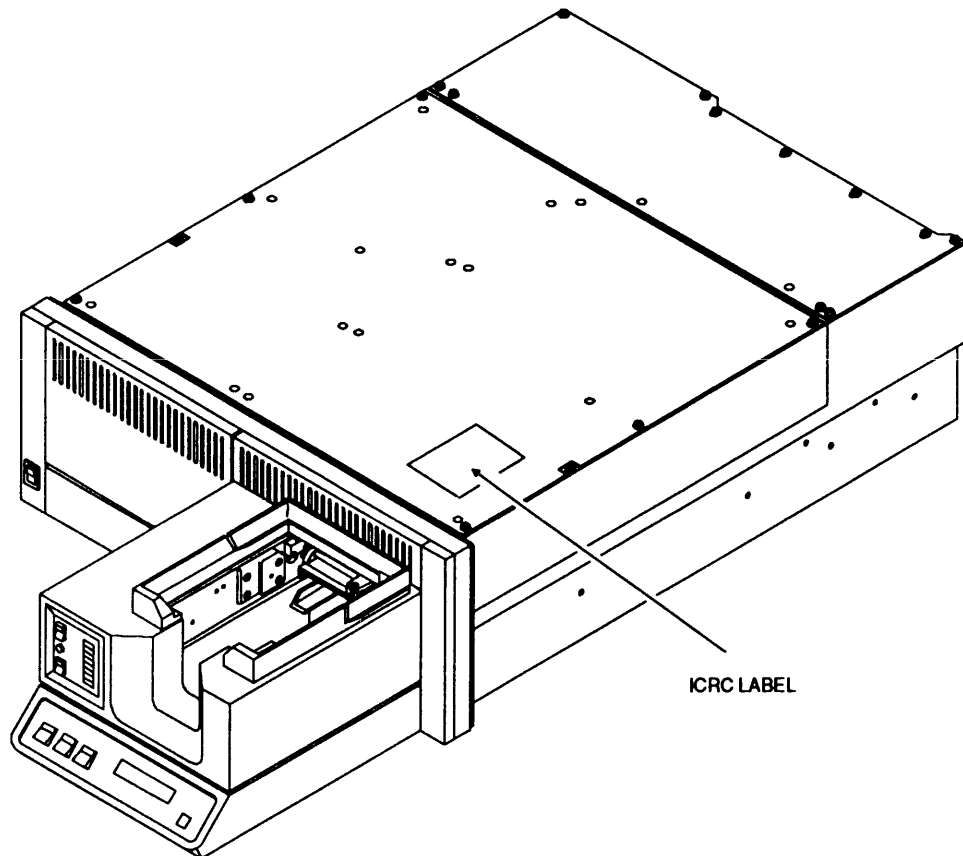


Figure 1.
4220 Cartridge Tape Subsystem (Right-hand Mount)

1. 2. Configurations Of The Unit

A single rack mountable unit with an integral control unit and one tape drive.

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

An optional 10-cartridge-magazine automatic cartridge loader (autoloader) is available.

1. 3. ICRC Identification

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.)

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

1. 4. Required Tools

You will need the following tools to install the 4220:

- Slot head screwdriver
- Phillips head screwdriver
- 3/32" Allen driver
- 5/64" Allen driver
- #10 Torx driver
- #15 Torx driver

WARNING:

An ESD (Electrostatic Device) strap is attached to the 4220 and is accessible once the partition is raised. You must wear the ESD strap any time you work on the 4220.



2. Subsystem Specifications

2.1. General

| | |
|--------------------------|--|
| Recording Method | Double Density GCR(ANSI X3B5) |
| Recording Tracks | 18 |
| Media Specification | ANSI X3B5 |
| Density | All Zeros 1944 ftpmm (49378 ftpi) All Ones 972 ftpmm (24689 frpi) |
| Actual Maximum | 1491 cpmm (37871 frpi) |
| Bytes | 15698 bytes/cm (39872 bytes/in) |
| Tape Format Nominal | |
| Density ID Mark | 2375 mm (93.5 in) |
| ID Separator Mark | 2.0 mm (0.0787 in) |
| Inter Block Gap | 2.0 mm (0.0787 in) |
| Erase Gap | 7.8 mm (0.3069 in) |
| Tape Mark | 1.0 mm (0.0393 in) |
| Bit Cell Length | 1.029 um |
| Tape Length (BOT to EOT) | 165 m minimum |
| Error Correction | Yes |
| Parity | Yes |
| Cyclic Redundancy Chk | Yes |
| Diagonal Redundancy Chk | Yes |
| Vertical Redundancy Chk | Yes |

- Error correction on 4 tracks (of 18) simultaneously, during Read operation without repositioning.

2. 2. Data Transfer Rate

| | |
|--------------------------|----------------------------------|
| Host Interface | 0 - 1.0 MB/s (AS400 2602 attach) |
| Read/Write, from/to Tape | 2.982 MB/s nominal |

2. 3. Tape Motion Characteristics

| | |
|----------------------------|-------------------|
| Tape Speed | 2.0 m/s |
| Start Time | 85 ms |
| Stop Time | 85 ms |
| Maximum Repositioning Time | 280 ms |
| Rewind/Search Speed | 4.0 m/s +/- 5% |
| Load/Unload Time | 13 sec |
| Rewind (From PEOT) | 55 sec max |
| Variation (Speed) | |
| Short Term | +/- 7% of nominal |
| Long Term | +/- 4% of nominal |

2. 4. Autoloader Positioning Time

| | |
|------------------------------|---------|
| Cartridge Load | 16 sec |
| Vertical Slot-to-Slot | 1.5 sec |
| Magazine Eject from Top Slot | 9 sec |

2. 5. Physical Dimensions (4220)

| | |
|------------------------|--------------------|
| Height | 17.7 cm (6.97 in) |
| (With Table Top Cover) | 20.1 cm (7.92 in) |
| Width | |
| Enclosure | 44.7 cm (17.60 in) |
| Front Cover | 48.3 cm (19.02 in) |
| Depth | 55.9 cm (22.00 in) |
| Protrusion | 6.3 cm (2.47 in) |

2. 6. Physical Dimensions (Autoloader)

| | |
|------------------------|--------------------|
| Height | 15.9 cm (6.25 in) |
| Width | 21.6 cm (8.50 in) |
| Protrusion | 26.9 cm (10.60 in) |
| Weight | |
| 4220 w/o autoloader | 30.4 kg (67 lbs) |
| Optional autoloader | 2.7 kg (6 lbs) |
| Full 10 Cart. Magazine | 3.6 kg (8 lbs) |

2. 7. Power Specifications

| | |
|--|---|
| Operating Frequency | 47 to 63 Hz |
| Required Power (including optional autoloader operation) | 0.71 KVA max. 360 Watts avg. max. (1230 BTUH) |
| Phasing | Single phase |
| Nominal Input Voltages | Two ranges (automatically switched): 100-120 Vac rms (low range) 200-240 Vac rms (high range) |
| Maximum Input Voltage Range | Low range: 90-132 Vac rms High range: 180-264 Vac rms |

2. 8. Environmental Operating Range

| | |
|----------------------|---|
| Dry Bulb Temperature | 10 ⁰ to 40 ⁰ C (50 ⁰ to 90 ⁰ F) |
| Relative Humidity | 10% to 90% noncondensing |
| Wet Bulb Temperature | 25 ⁰ C (77 ⁰ F) maximum wet bulb |
| Barometric Pressure | 58 kPa to 109 kPa (17 inHg to 32 inHG) |
| Altitude | Sea Level to 3 km (10000 ft) |
| Temperature Shock | Max rate of change = 15 ⁰ C/min over 2 minutes |

2.9. Host (SCSI) Interconnection

| | |
|------------------|--|
| Maximum Distance | |
| Single Ended | 6.0 m (19.75 ft) |
| Double Ended | 25.0 m (82.3 ft) |
| Cable Type | 50 Conductor Shielded Twisted Pair |
| Connector Type | 50 Conductor Shielded D Type Ribbon Connector (Northern Technology), P/N 57-30500 or AMP P/N 554953 & 554946-1 |
| Cables Required | 2, Daisy Chain |

3. Pre-installation Considerations

The following items should be considered before unpacking and installing a 4220 Cartridge Tape Subsystem.

3.1. Power Requirements

WARNING:

Make sure the unit is connected to an earth ground by a suitable conductor that is securely connected to the unit. Pay particular attention to supply connections other than direct connections to the branch, for example, use of power strips.

CAUTION:

Make sure that the maximum current rating of the electrical supply circuit to the unit is greater than the maximum current rating shown on the nameplate in the unit.

As noted in the specifications, the 4220 can be powered from standard wall socket power. The power frequency can range between 47 and 63 Hz. There is a switchable dual range power supply that can adjust to almost any standard wall ac power voltage. An IEC-320 compatible ac input connector is provided for a "universal" power cord connection. A power cord is not a standard item on the unit, but a U.S.-compatible and a Continental Europe-compatible 115 Vac power cord can be ordered from StorageTek.

The power cord is 2.44 meters (8 feet) long and is terminated in an IEC 320 connector. Two power cable choices are available:

For North America applications:

- Use right angle power cord P/N 3170760318.

For international applications:

- Use right angle power cord P/N 3170950318

The power cords consists of the following parts molded together:

Flexible Cord Type, North America

- Plug - Parallel blade, grounding type, rated 15 Amp, 125 V.
- Cord - Type SJT, 18 Ga., 3 conductor.
- Connector - IEC 320 type, rated 10 Amp, 250 V.

Flexible Cord Type, continental Europe

- Plug - "Schuko", grounding type, rated 10 Amp, 250 V.
- Cord - HAR, H07, 1.0 mm, 3 conductor.
- Connector - IEC 320 type, rated 10 Amp, 250 V.

3.2. Rack Standard

The unit can be mounted on commercial slides in an Electronics Industries Association (EIA-310-C) rack configuration with a minimum depth of 762 mm (30 in). The slides should permit 0.9 m (36 in) extension and be rated for a maximum load of 55 kg (120 lbs) for serviceability of the unit:

NOTE:

Customers must consider mounting requirements. StorageTek will not be responsible for personal injury resulting from improper mounting or failure to comply with common safety requirements

CAUTION:

Because a fully configured subsystem may weigh as much as 42.6 KG (94 lb), make sure that the rack it is in is sufficiently bottom-loaded so that when the unit is extended from the rack, as well as when it is completely in the rack, the rack will not tip over.

3.3. Recommended Installation Height

The unit should be installed at a height of between 91 cm (36 in) and 137 cm (54 in) above the floor for ease of loading, viewing operator display, and

servicing. (Note that the cabinet will tend to be more stable the lower the subsystem is mounted.)

3. 4. Autoloader Height Clearance Requirements

The areas above and below the autoloader are to remain free of obstacles to permit magazine loading and operation.

Area above autoloader - 40.6 cm (16 in) above the top edge of 4220 enclosure
Area below autoloader - 27.9 cm (11 in) below the bottom edge of 4220 enclosure

3. 5. Horizontal Clearance - (Tabletop Use)

To allow for proper operation of the autoloader and magazine when you install the unit on a tabletop or desktop, position the unit so that the stop bar does not set on the table. The stop bar can be flush with the table front, but cannot sit on the tabletop. There should be not obstacles above or below unit which extend more than 1 inch beyond edge of desktop (Figure 3).

NOTE:

If you are bench testing a rack mount unit before installing it in a rack, and no footpads are present, make sure the rear edge of the front cover is flush with front of desktop or 1/2" off edge of desktop to allow for autoloader I-Guard clearance of the desk.

3. 6. Cooling Considerations

CAUTION:

Because ambient temperature in a closed or multi-unit rack may be more than room ambient temperature, you must make sure temperature in the rack does not exceed maximum operating dry-bulb temperature listed in the subsystem specification. Therefore, if the unit is in a rack, make sure nothing nearby restricts the free flow of air to and from the machine.

3. 7. Operator's Manual

You should be familiar with the 4220 controls and operating procedures. Take time to read and understand the 4220 Operator's Manual before preceding with the installation.

4. Unpacking

1. Inspect the shipping container for damage. Note any damage or concerns on the installation form found on the last page of the installation instructions.
2. Cut the plastic banding, using appropriate caution to prevent personal injury.
3. Remove the top cover from the pallet assembly.
4. Remove the autoloader cover and accessory tray.
5. With one person on each side of the shipping container, pull down the sidewalls of the bottom tray.

WARNING:

This procedure requires two people to lift the 4220 out its shipping container. A 4220 can weigh as much as 42.6 kg (94 lbs.) in the box depending on its configuration.

CAUTION:

The front end of the unit is heavier than the rear. As the unit clears the packaging box it may become unbalanced and tip toward the front. This must not happen, because the autoloader covers will slide into the packaging and jam the switches. To counteract this motion, lift the front and rear evenly when you remove the unit from packaging box. DO NOT GRASP THE UNIT BY THE AUTOLOADER!

6. With one person on each side of the packaging box, slide all four hands below the unit, lifting slowly until the unit clears the packaging box.
7. Set unit at working station and remove antistatic sheet.
8. Inspect the unit for any damage. If you see or suspect damage, contact the freight carrier and file a damage claim before you proceed with the installation.
9. Make sure the unit and other contents of the shipping container are as specified on the packing list.

5. Install Unit on Table Top

You may install a unit on top of a desk or table instead of in a rack. (Refer to Figures 2 and 3.) If the unit has autoloader, observe the restrictions described in sections 3.4. and 3.5., and Figure 3.

WARNING:

Never lift the unit by yourself. Always have someone else help you. The unit (with autoloader) weighs 94 lb (42.6 Kg).

CAUTION:

Do not lift the unit by the autoloader, or you will damage the unit.

1. Make sure the table will support the weight of the unit.

NOTE:

Clearance from rear of unit to the wall must be 4.5 inches minimum to prevent cables from being crimped as they exit the machine. Refer to Figure 3 for restrictions on front clearance.

2. Place the unit on the table.

CAUTION:

Do not slide the unit on the surface of a table or desk; you may mar the surface.

3. Proceed to Power Up section of this manual.

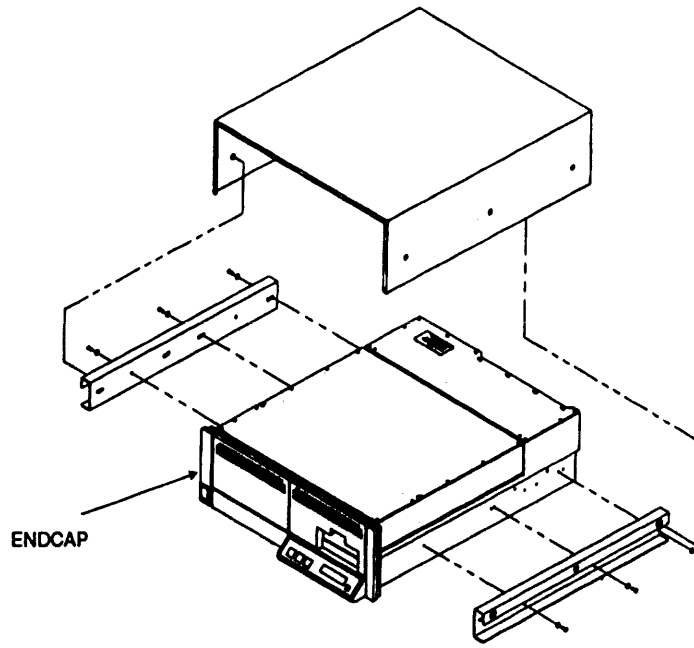


Figure 2.
Table Top Mount Cover

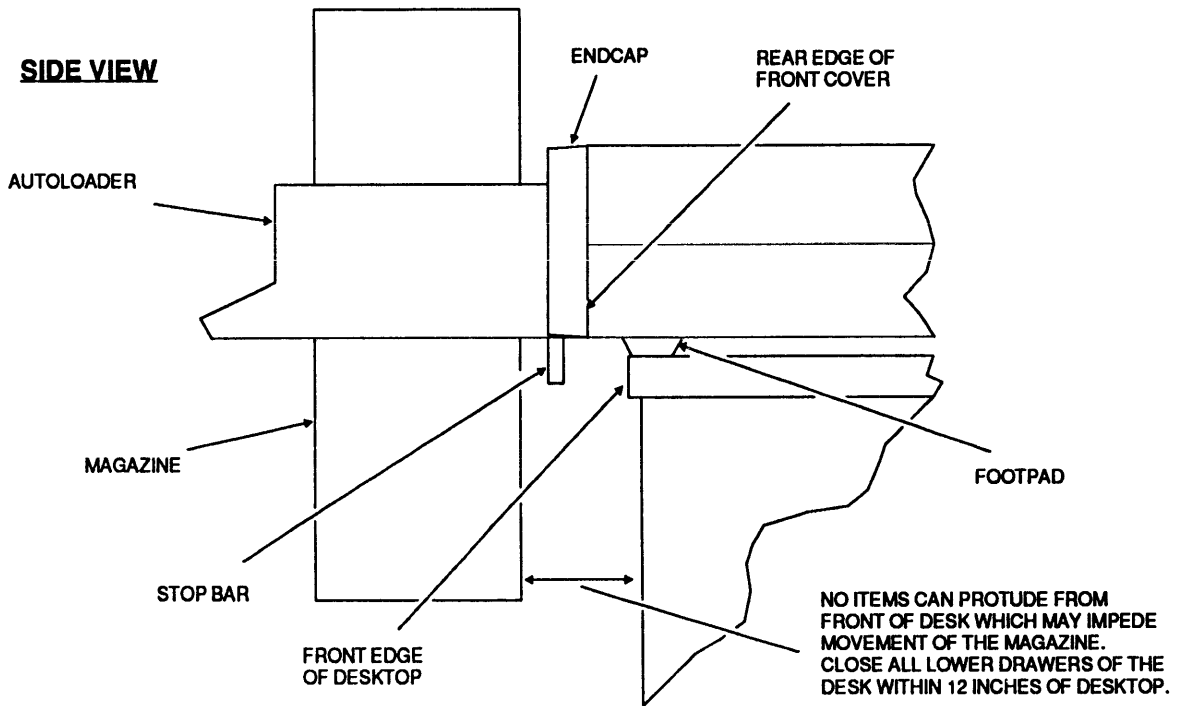


Figure 3.
Horizontal Clearance Requirement for Proper Autoloader Functioning

6. Install Unit in Rack (Cabinet)

NOTE:

The 4220 conforms to EIA-310-C rack standard specifications.

Installing the unit into a rack consists of two tasks (refer to Figure 4):

1. Attaching slide rails to the unit and rack
2. Inserting the unit into the slide rails

6.1. Attach Rails

Slide rails consists of three parts:

- The outer section of the slide has two brackets connected to it, and it is this section that attaches to the rack.
- The middle section is basically a sliding mechanism.
- The inner section is detachable from the other two sections and is the section of the slide that attaches to the 4220.

6.1.1. Attaching inner slide to unit

1. The curved end of the inner section is to be placed at the rear of the 4220 with the curve facing away from the 4220 unit. The angled metal rollers will be on the outside, allowing them to match the angled slot in the slide rail's middle section.
2. Secure the inner section of the slide to the 4220 using four binder head, 8 - 32 x 3/8 screws.
3. At the front of the cabinet, add a clipnut to the third hole above the slide rail.

6.1.2. Preparing slide rails

1. Move the window of the middle section so that the two adjusting screws on the front bracket show. Loosen these screws and adjust the bracket so that it is flush with the outer rail. Tighten the two screws. (Refer to Figure 3, Detail A.)
2. Slide the middle rail forward and remove the rear bracket of the outer section. (Refer to Figure 3, Detail B.)

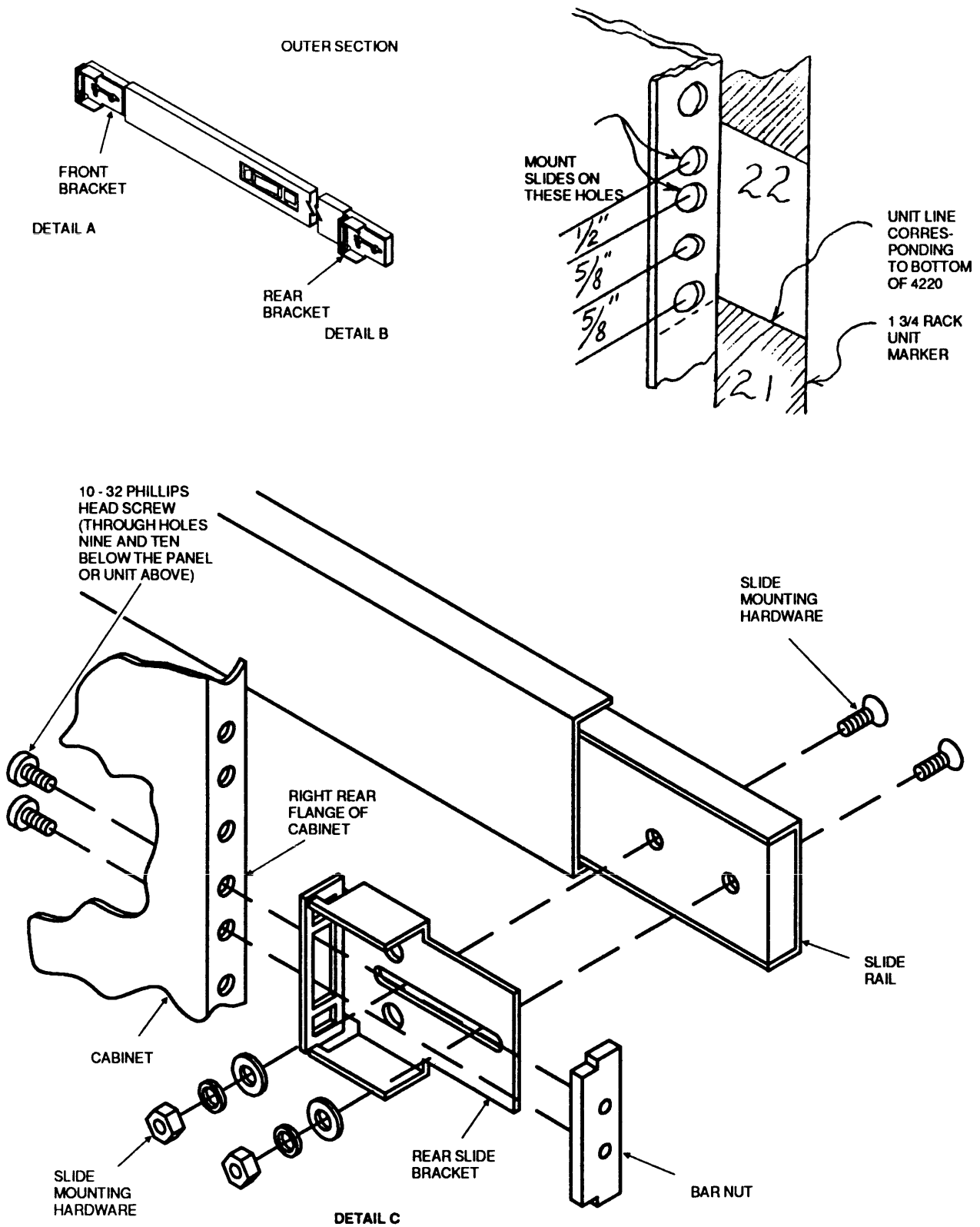


Figure 4.
Jonathan Slide Rail

To determine where to install the slide rails on the cabinet, count the holes in the rear flange of the cabinet, down from the panel or unit above. Insert the 10 - 32 Phillips head screws, with a #10 external tooth star washer on each screw, through holes nine and ten, leaving the head of the screw toward the rear of cabinet. (Refer to Figure 3, Detail C.)

4. Mount the rear bracket to the rear cabinet holes with the bracket pointing toward the rear of cabinet. Secure the bracket with two 10 - 32 Phillips head screws (that you inserted in the previous step) going through cabinet hole first, then the bracket, and finally into the bar nut. (Refer to Figure 3, Detail C.)
5. Mount the slide rail to the rear bracket, but don't tighten the screws (Figure 3, Detail C).
6. Mount the front bracket to the front of the cabinet behind the front cabinet holes, pointing toward the rear of the cabinet. Secure the bracket with two 10 - 32 Phillips head screws going through the cabinet hole first, then the bracket, and finally into the bar nut. (Refer to Figure 3.)
7. Tighten the screws securing the front bracket to the rack flange.
8. Tighten the screws securing the rear bracket to the rack flange.

6.1.3. Install the second slide

Attach the second slide rail using the same procedure that you used above.

6.2. Insert Unit Into Slides

WARNING:

Before you go any farther, make sure you understand the sections entitled "Rack Standard."

CAUTION:

Before you go any farther, make sure you understand the sections entitled "Cooling Considerations."

1. Once the slides and rails are properly attached, extend the middle sections as far as they will go.

NOTE:

The "Power Up" section assumes that the rear of the 4220 enclosure is accessible through the back of the rack cabinet or when the unit is fully extended from the cabinet. If this is not the case, you might skip this step until the very end of the installation and checkout.

CAUTION:

This procedure requires two people to lift the 4220 to insert it into a rack. A 4220 can weigh as much as 42.6 Kg (94 lb) depending on the number of tape drives and autoloaders installed.

CAUTION:

Do not lift the 4220 by the front bezel or autoloader. The 4220 should be lifted only by the sheet metal enclosure.

CAUTION:

When the upper front partition of the 4220 is raised, the partition arm must be seated in the slot of the slide rail to insure the operator's safety.

2. With a person on each side of the 4220, support the unit with a hand at the rear and a hand next to the front bezel.
3. Lift the 4220 and slide the inner section of the slide into the angled slot of the middle section. Be sure all rollers enter the angled slot of the middle section. Push the 4220 until it is completely in the cabinet.
4. Attach filler panels on rack above and below 4220.
5. The endcap (refer to Figure 2) on each side of the 4220 should be popped off. Insert a 10 - 32 screw through the hole of the 4220 and into the clipnut, securing the 4220 to the cabinet. This should be done on both sides of the 4220. Replace both endcaps.

7. Read After Write Verification

In some circumstances or environments, you may wish to verify that valid data is being written to the tape; the 4220 subsystem allows you to do this. A read head next to the write head reads the data just written. These signals are available at a port on the SBI (system) board, and you may sample them with an instrument that you provide.

Table 1 shows the signals available at the port, which is a 26-pin straight connector with 0.1 x 0.1 pin spacing. The full names of the signals are listed below the table

| Signal | Pin No. | Pin No. | Signal |
|--------|---------|---------|--------------|
| Gnd | 1 | 2 | EN_SMC_INTF* |
| Gnd | 3 | 4 | SMC_RBC_CLK* |
| Spare | 5 | 6 | SMC_RBC_MODE |
| Gnd | 7 | 8 | SMC_D(0) |
| Gnd | 9 | 10 | SMC_D(1) |
| Gnd | 11 | 12 | SMC_D(2) |
| Gnd | 13 | 14 | SMC_D(3) |
| Gnd | 15 | 16 | SMC_D(4) |
| Gnd | 17 | 18 | SMC_D(5) |
| Gnd | 19 | 20 | SMC_D(6) |
| Spare | 21 | 22 | SMC_D(7) |
| Gnd | 23 | 24 | SMC_PTY |
| Gnd | 25 | 26 | SMC_EOD |

Table 1 - Read-After-Write Verification Signals

| Signal | Meaning |
|--------------|---|
| EN_SMC_INTF* | MINUS ENABLE SEISMIC INTERFACE ⁽¹⁾ |
| SMC_RBC_CLK* | MINUS SEISMIC INTERFACE READ BACK CHECK CLOCK |
| SMC_RBC_MODE | PLUS SEISMIC INTERFACE READ BACK CHECK MODE |
| SMC_D(0) | PLUS SEISMIC INTERFACE DATA BIT 0 (LS bit) |
| SMC_D(1) | PLUS SEISMIC INTERFACE DATA BIT 1 |
| SMC_D(2) | PLUS SEISMIC INTERFACE DATA BIT 2 |

| | |
|----------|--|
| SMC_D(3) | PLUS SEISMIC INTERFACE DATA BIT 3 |
| SMC_D(4) | PLUS SEISMIC INTERFACE DATA BIT 4 |
| SMC_D(5) | PLUS SEISMIC INTERFACE DATA BIT 5 |
| SMC_D(6) | PLUS SEISMIC INTERFACE DATA BIT 6 |
| SMC_D(7) | PLUS SEISMIC INTERFACE DATA BIT 7 (MS bit) |
| SMC_PTY | PLUS SEISMIC INTERFACE DATA PARITY |
| SMC_EOD | MINUS SEISMIC INTERFACE END OF DATA |

- (1) EN_SMC_INF* is an input to the SBI board provided by the user. When EN_SMC_INTF* is set to TTL low, the other signals of the interface on J25 are "un-tristated."

The 4220 Product Description Manual provides a complete description of the signals, signal format, and signal timing available at the connector on the SBI board, as well as the connector type.

Attaching The Read-after-Write Connector

If you wish to attach to the 4220 a device to verify that valid data is being written to the tape,

1. Remove the screws securing the front cover of the unit and raise it.
2. With a pair of pliers, break off the scored tab (Figure 5) on the front edge of the front cover.
3. Join the connector from your read instrumentation to the connector (J25) on the SBI board, next to the area from which you removed the tab.
4. Route the cable from your instrument through the opening created when you broke off the tab in step 2. Holding the cable, close the front cover and secure it with the screws you removed earlier. If the unit is mounted in a rack, route the cable so it is not in the way when you slide the unit into the rack.

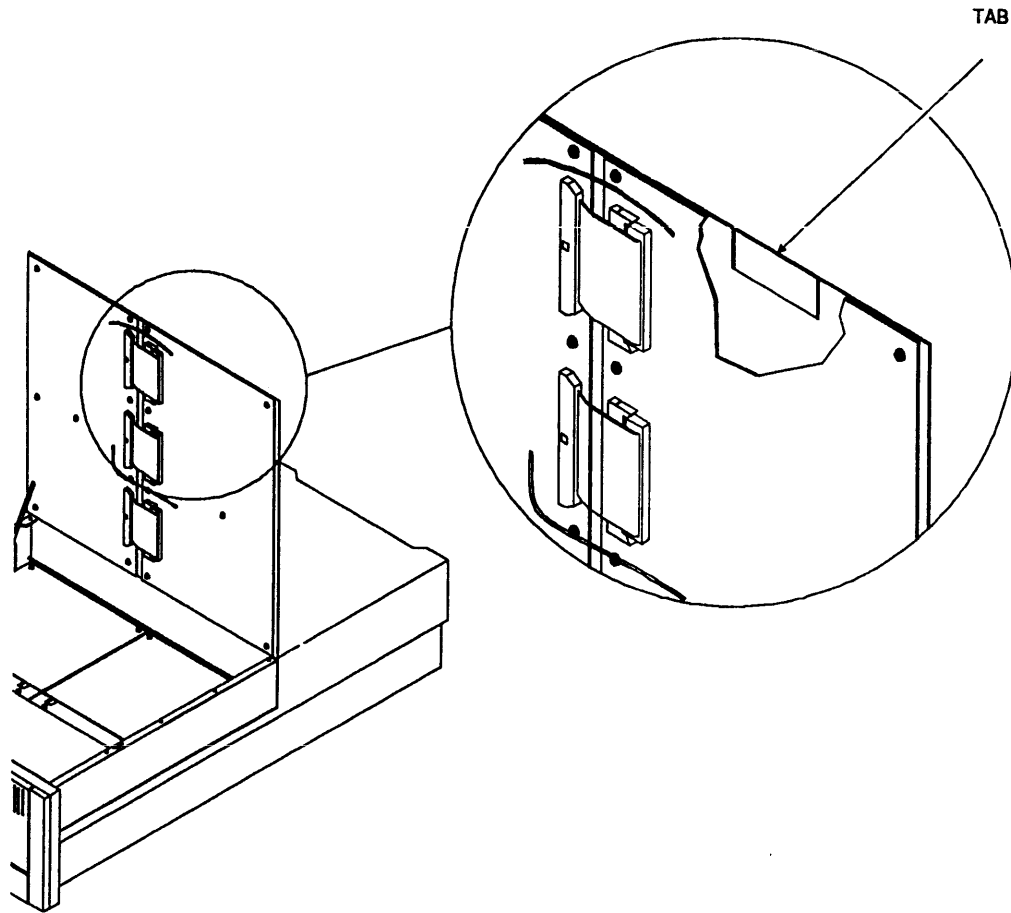


Figure 5
Read After Write Connection

8. Power Up

To power up the unit, you must be able to access the rear of the 4220. If you cannot do this when the unit is installed in the rack, you will have to remove it from the rack. For the locations of the ac power switch and the ac power cord connector on the rear of the unit refer to Figure 6. At this time, both power switches, dc in the front and the ac on the back, should be OFF.

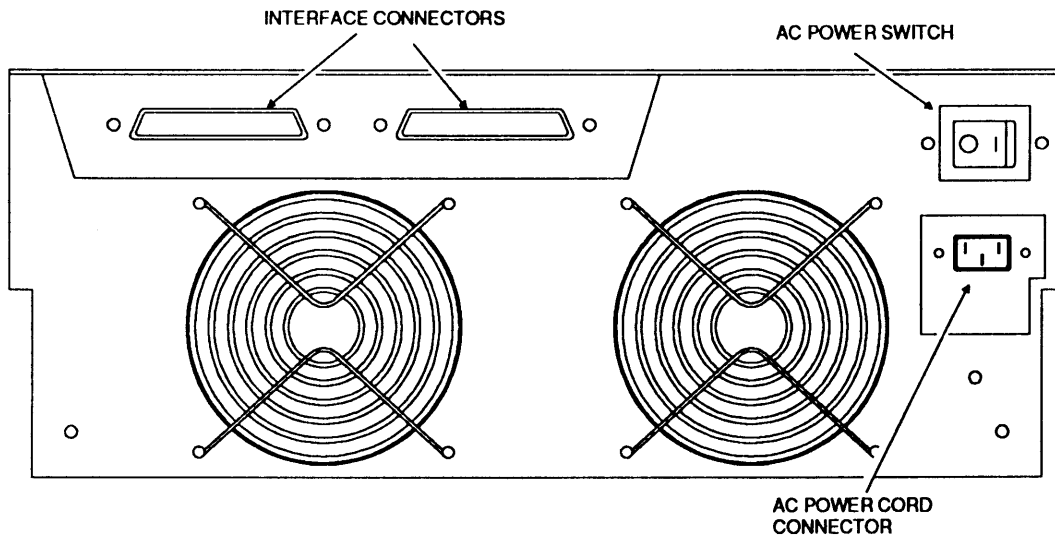


Figure 6.
4220 Rear View

8.1. Attach The AC Power Cord

WARNING:

Make sure the unit is connected to an earth ground by a suitable conductor that is securely connected to the unit. Pay particular attention to supply connections other than direct connections to the branch, for example, use of power strips.

CAUTION:

Make sure that the maximum current rating of the electrical supply circuit to the unit is greater than the maximum current rating shown on the nameplate in the unit.

Plug the supplied ac power cord connector, or one that is compatible with the ac power socket that you will be using, into the IEC-320 "universal" power connector on the back of the 4220. Then insert the other plug into a "live" ac power receptacle.

8.2. Turn On AC Power Switch

The 4220 power supply will switch to the correct range automatically for the input voltage supplied.

Place the ac power switch (on the rear of the unit) in the "ON" or "1" position. Note that this is only a switch and not a circuit breaker. The power supply module is fused internally. (Refer to Figure 6.)

8.3. Insert Code Into Floppy Drive

The latest level of microcode is shipped in an anti-static bag with the unit. Pull the top of front blank cover straight forward until top two retention pins on the back of the cover clear the bezel. Once the pins have cleared the bezel, use other hand to push bottom of cover straight up and set the cover aside. Insert code into the floppy drive with the label side up.

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

8.4. Turn On The DC Power Switch

Once ac power is applied to the 4220, the unit is powered up and down only with the dc power switch on the lower left side of the front bezel. This switch enables all of the dc voltages from the power supply module.

Place this switch in the "ON" or "1" position to power up the 4220.

The endcap (refer to Figure 2) on each side of the 4220 should be popped off. Insert a 10 - 32 screw through the hole of the 4220 and into the clipnut, securing the 4220 to the cabinet. This should be done on both sides of the 4220. Replace both endcaps.

9. Complete The Installation

9.1. Initial Checkout

When the dc power switch is switched on, the LCD display on the operator control panel should become backlit and display an IPL (initial program load) message: [IPL:INITIALIZING].

If this is not the case, review the power-on procedure and, if everything was done correctly, proceed to the Start section of the 4220 maintenance manual to begin diagnosing the problem.

The total IPL process should take less than four minutes. As the program progresses, the names of files being loaded from the floppy diskette are displayed. Next, [IPL:COMPLETE] appears for several seconds. Finally, either [xx:IDLE:xxxxxx] (indicating that the unit is online) or [OF:DIAG:xxxxxx] (indicating that the unit is offline) appears, where x = a character or blank space.

If an error code is displayed, proceed to the error code dictionary section in the 4220 maintenance manual for the error code description and a suggested action.

If the 4220 is online,

1. Press SCROLL once. [+SUBSYS STATUS] should appear.
2. Press SELECT three times to take the unit offline. [OF:DIAG: *] should appear.

9.2. Test The Cartridge Loader

Make sure each drive can load and unload a cartridge. Using a scratch cartridge and the procedures in the operator's manual for inserting and removing a cartridge, load and unload a cartridge in each drive.

No error should occur, but if one does, an error code should be displayed. Refer to the error code dictionary in the 4220 maintenance manual for the error code description and a suggested action.

If an automatic cartridge loader (autoloader) is installed, follow the procedures in the operator's manual for installing a magazine, and loading and unloading cartridges.

WARNING:

Make sure you have sufficient upper and lower clearance, before attempting to load the magazine.

9.3. Run Diagnostics

After you know that each drive can load and unload cartridges successfully, run the unit checkout diagnostics.

If any errors occur, refer to the error code dictionary section in the 4220 maintenance manual for the error code description and a suggested action.

Note: At this time, go to sections 11.2 and 11.3 and become familiar with the diagnostic tests that you must run. Do not attempt to run them. Just read those two sections and learn what tests you will run in a few minutes. Then return to step 1 below. As you run diagnostics using the procedure below, refer to sections 11.2 and 11.3 when the directions refer you to them and when you do not understand something in the procedure.

1. Press and release the SCROLL button until [+DIAGNOSTICS] appears in the display.
2. Press the SELECT button and [*Diag Test 1] appears in the display.
3. Press the SELECT button and display should flash ON/OFF (indicating that the test is armed).
4. Press the SELECT button a second time. [#Test 1:Busy] appears in the display.
5. When [#Test 1:Pass] appears (after approximately ten minutes), press and hold all three push buttons (SCROLL, SELECT, and UNLOAD) for at least four seconds. This will re-IPL the 4220. This IPL is necessary because #TEST 1 corrupts the contents of the memory.
6. After the IPL is complete, [OF:DIAG *] will appear in the display. perform steps 1 and 2 above.
7. Load a good scratch cartridge into the transport.
8. Press the SCROLL button and [*Diag Test 2] appears in the display.
9. Press the select button (test armed).

10. Press the SELECT button a second time. [#Test 2:Busy] appears in the display.
 11. [#Test 2:Pass] " appears when test two is complete.
 12. Continue to run offline diagnostics, following the procedure in section 13.3. If an error occurs (indicated by an error code appearing in the display), refer to Chapters 3 and 2 in the maintenance manual.
13. When offline diagnostics are complete
- a. If the ICRC feature is installed and the microcode loaded, run inline diagnostics (refer to section 11.3). Then proceed to section 9.4.
 - b. If the ICRC feature is not installed, proceed to section 9.4.

9.4. Set Up The Host Interface

When the 4220 has been powered up and tested, the host interface can be setup to allow checkout from the host system. The three following sections detail the steps needed to set up the available interfaces on the 4220.

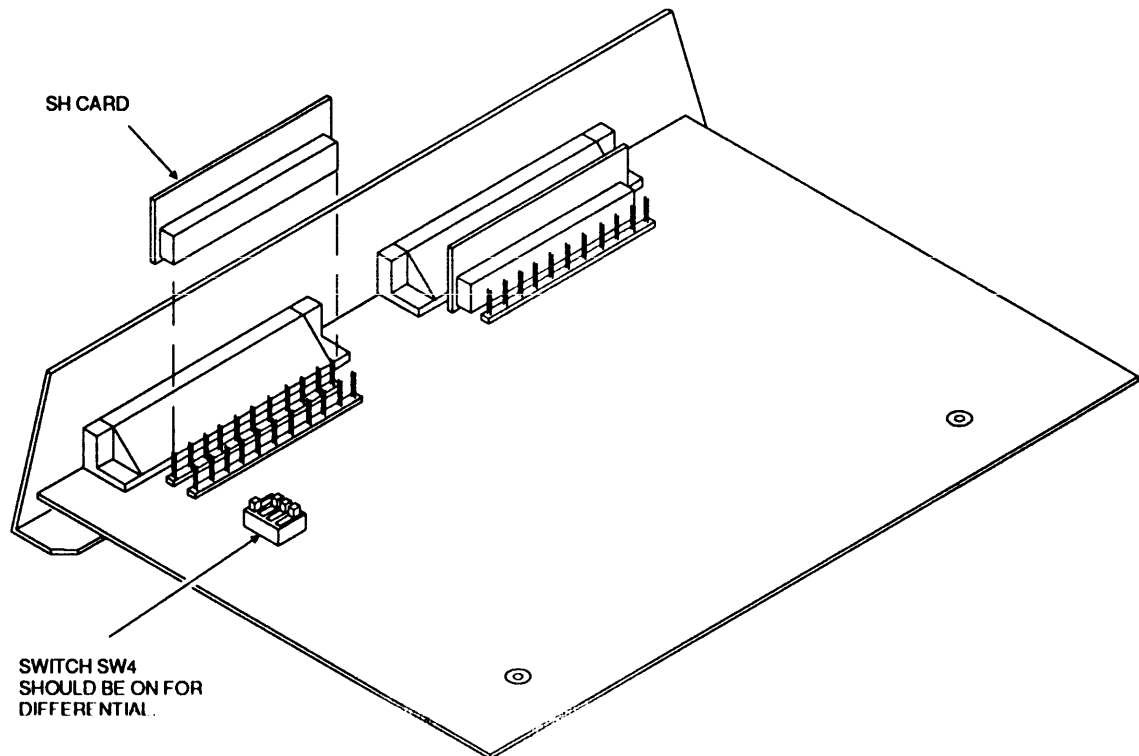


Figure 7.
SCSI Interface (SZ) Card

9.4.1. Set Up Physical Interface

The SCSI (Small Computer Standard Interface) allows the connection of up to seven different peripherals to a common bus. The 4220 can transfer data on the bus up to 3.3 MB/s (3.0 MB/s sustained). The setup requires determination of signal drivers used, what bus termination to use, what the SCSI ID should be.

9.4.1.1. Set Up Single or Differential SCSI Bus

The 4220 is capable of supporting both single and differential signals on the bus. The host adapter and all peripherals must be setup the same; devices using single and differential signal drivers can not be mixed on the bus.

Single ended drivers are generally only used for the attachment of one peripheral or when the maximum SCSI cable length is 6.0 m (19.7 ft) or less.

The differential signal SCSI bus is used for SCSI bus lengths of up to 25 m (82.0 ft) and the daisy chaining of up to a total of seven peripherals.

The only way to determine for which type of signals the unit is configured is to look at the interface (SZ) card. If you have any doubts, do the following.

1. Unload the tape drives and power the 4220 unit down with the front subsystem power switch. Unplug the ac power cable from the rear of the 4220.
2. If the unit is rack-mounted, extend it completely out of the rack enclosure on its slides so that the top rear cover totally exposed.
3. Using a Torx driver remove the 12 screws securing the top rear cover. Lift the top rear cover and engage the prop that holds it up.
4. Set DIP switch 4 located on the SZ card to desired settings, On for differential, Off for singled ended. (Refer to Figure 7.)
5. On the SZ card, there are two pairs of terminating jacks (refer to Figure 7). Each pair of jacks has a corresponding terminating SH card. Each card should be inserted into the slot (connector) marked with the type of configuration desired. If necessary, change the location of both terminating SH cards.
6. If the selection is for single ended bus drivers, see the section below on SCSI bus termination to determine if the termination resistor packs should be removed.
7. Close the top rear cover and secure with the 12 Torx screws.
8. If appropriate, slide the unit back into the cabinet.
9. Plug the ac power cable into the rear of the 4220. Power up the 4220 with the front power switch.

9.4.1.2. SCSI Bus Termination

The electrical signals on the SCSI bus must be terminated with a resistor network at the peripheral device farthest away on the cable from host SCSI adapter. The required termination resistor network is different for single and differential driven SCSI buses.

The 4220 provides on board termination when the bus is single ended driven, since it is usually the only peripheral device on the bus. But if multiple peripheral devices are to be daisy chained on the bus then only the last device can have termination. This means the two resistor DIP packs at locations DP26+ and BM19+ on the SZ card would have to be removed from their sockets if the 4220 were not the last daisy chained device on the SCSI bus, see SCSI bus setup. For a differential driven SCSI bus an external terminator must be attached to the vacant SCSI connector when the 4220 is at the end of bus. The external differential terminator is supplied with 4220.

9.4.1.3. SCSI Bus Cable Connection

The SCSI bus cable can be attached to either of the rear SCSI bus connectors. A second connector is provided for either daisy chaining additional peripheral devices or an external bus terminator ID required. Each connector includes a locking mechanism to avoid loose connections.

9.4.1.4. Set Up SCSI Software Configuration

1. Plug the ac power cable into the rear; turn ON the front power switch and wait until the display stops at either [OF:DIAG:xxxx] (indicating that the unit is offline) or [xx:IDLE:xxxx] (indicating that the unit is online). If the unit is online, press SCROLL once and SELECT three times to take it offline.
2. Set the appropriate software switches by going through the menu described in section 11.1, "Configuring the Unit," (Offline Menu).

10. Host System Checkout

After all of the previous host setup has been completed, place the 4220 online to the host system and load cartridges in each drive. Then execute any available tape diagnostics or test tape jobs the host system has to verify total operational capability.

If the ICRC feature is not installed, you can run only offline diagnostics (refer to 11.2). If the ICRC feature is installed, you should run offline diagnostics and inline diagnostics (refer to 11.3).

11. 4220 Operator Display Menu

This section of the install manual takes you step by step through various menus in the subsystem program. Section 11.1 tells you how to configure the unit after you install it. Section 11.2 tells you how to run offline diagnostics. Section 11.3, "Running Inline Diagnostics," applies only to units with the ICRC feature and microcode installed. Section 11.4 describes the online menu, which you may need to use from time to time.

11.1. Configuring the Unit (Offline Menu)

In order to be configured, a unit must be at the beginning of the offline menu. The easiest way to do this when the program is loaded, is to reset by holding down the SCROLL, SELECT, and UNLOAD buttons for less than two seconds. The unit will unload any tape in the drive, then present

| | |
|-------------------|---|
| [OF:DIAG: *] | Press SCROLL to pass to the next menu entry. |
| [+SUBSYS STATUS] | Press SCROLL to pass to the next menu entry. |
| [+SET OR DISPLAY] | Press SELECT to pass to the next menu entry. |
| [**Configuration] | Press SELECT and UNLOAD at the same time to pass to the next menu entry. By default, this menu is <u>not</u> passkey protected, but passkey protection can be enabled through this submenu, and is remembered in NVRAM. If passkey protection is enabled, the following key sequence is required when the flashing [Enter Passkey !] message is displayed. |

1. Press and release SCROLL
2. Press and release SCROLL and SELECT together.
3. Press and release SCROLL and UNLOAD together.

The key sequence must be entered within a five-second window.

If you have entered the passkey sequence, when the [****Configuration**] display returns press and release SELECT and UNLOAD together to pass to the next menu entry.

[>>Set Diags: None] This allows different modes of automatic diagnostics (Normal, None, and Extended) at IPL. Press and release **SELECT** and **UNLOAD** to display Norm, None, or Extd, then press **SELECT** twice to set the desired mode. Extended diagnostics are equivalent to Test 1, and Normal is a subset of Test 1. Approximate IPL times for a 1 x 2 for None, Norm, and Extd modes are 1:20, 3:15, and 11:10 minutes, respectively.

Press **SCROLL** to pass to the next menu entry.

[>>Diag EC Lvl: 0] This setting determines whether certain tests can be run. Press and release **SELECT** and **UNLOAD** together to sequence through eight values (0-7). Only settings of 0, 1, and 2 are supported by the diagnostics. Press **SELECT** twice to set the value into NVRAM. Units that have RI boards of PN 29291200 and higher support an extended Loop-Write-to-Read diagnostic. With these units, a setting of 1 or 2 executes the extended LWR_DIAG subtests as a part of test 1. The extended LWR_DIAG subtests are not run at IPL time. A setting of 2 allows test 7 to run as one of the offline tests.

Press **SCROLL** to pass to the next menu entry.

[>>Set Host: SCSI] If "SCSI" does not appear in your display, you must press and release **SELECT** and **UNLOAD** until SCSI appears, then press **SELECT** twice to set this host type. If you do not set the proper host type, the menus will be different from what you see here. If you set (or re-set or change) the host type, a re-IPL will occur and you will have to start over at the beginning of this menu.

Press **SCROLL** to pass to the next menu entry.

[Lang: English] This menu option allows the user to select English, Français (French), Deutsch (German), Italiano (Italian), or Español (Spanish) for the messages displayed on the operators panel. Press **SELECT** and **UNLOAD** until the desired language setting comes up. Then press **SELECT** twice to set.

Press **Scroll** to pass to the next menu entry.

- [>>Set Part: Auto] (The program skips this step if the ICRC feature--indicated by a DCI card--is installed.)
- Press and release SELECT and UNLOAD until the partition size you want appears, then press SELECT twice to set that value. Buffer sizes of 0.5, 1.0, and 2.0 MB partitions per drive are supported. "Auto" automatically uses 2.0 MB for a 1 x 1, and 1.0 MB for a 1 x 2.
- Press SCROLL to pass to the next menu entry.
- [>>Set Sync TM: 2] There are three values available: 1, 2, and 3. This number signifies the number of sequential tape marks required before the buffer partition is synchronized to the tape. Press SELECT twice to set the value you want to select.
- Press SCROLL to pass to the next menu entry.
- [>>Passkey: Disab] The passkey function can be enabled and disabled through this display. Press SELECT and UNLOAD simultaneously to display the status you want (Enab or Disab), then press SELECT twice to set it. The status of the passkey protection is saved in NVRAM, which survives a reset, IPL, or power off and on. Refer to the "configuration" submenu for the passkey sequence.
- Press SCROLL to pass to the next menu entry.
- [>>Sync Nego: Enab] The menu first indicates whether target-initiated synchronous negotiations are enabled or disabled, by an "Enab" or "Dsab" message. To change the setting, press and release SELECT and UNLOAD, then press SELECT twice to set the displayed mode.
- Press SCROLL to pass to the next menu entry.
- [>>Emulate: None] If you want to emulate an IBM 2440 or IBM 9348, press select and unload simultaneously until the desired mode appears in the display, then press SELECT twice to set that mode.
- Note:** If you have been setting the BRN option on previous code releases to a non-zero value, set the EMULATE menu to Opt(n), where (n) is

- the setting used for BRN, i.e., set EMULATE to Opt1 if you previously set the BRN menu to 1.
- Press SCROLL to pass to the next menu entry.
- [>Exit] Press SELECT once to exit to the next submenu.
- [*Set SCSI ID: 0] Press SELECT and UNLOAD to increment the ID number. Press SELECT twice to set the SCSI ID to the indicated value. The ID is stored in nonvolatile memory.
- Press SCROLL to pass to the next menu entry.
- [**Set LUN: 0] Press SELECT and UNLOAD to increment the LUN value. Values 0-7 are supported. Press SELECT twice to set the indicated value. The LUN is stored in nonvolatile memory. The default LUN settings for the left and right hand drives (set at the factory) are 0 and 1, respectively.
- Press SCROLL to pass to the next menu entry.
- [**Set Clean:16K] Press SELECT twice to set the threshold at which the Clean message occurs. Press SELECT and UNLOAD together to sequence through 0, 8K, 12K, and 16K. The value 0 clears the clean counter.
- Press SCROLL to pass to the next menu entry.
- [*Exit] Press SCROLL and SELECT simultaneously twice to pass to the beginning of the offline menu ([OF:DIAG:xxxxxx])

11.2. Running Offline Diagnostics - Menu

You can run offline diagnostics immediately after configuring the unit. Otherwise, if the program is loaded, reset the unit by holding down the SCROLL, SELECT, and UNLOAD buttons for less than two seconds. The unit will unload any tape in the drive, then present the first entry of the Offline Menu.

Note:

If the ICRC feature is installed, after test 1 the program skips tests 2 through 6 and goes directly to test 7.

| | |
|--------------------|--|
| [OF:DIAG: *] | Press SCROLL to pass to the next menu entry. |
| [+SUBSYS STATUS] | Press SCROLL to pass to the next menu entry. |
| [+SET OR DISPLAY] | Press SCROLL to pass to the next menu entry. |
| [+DIAGNOSTICS] | Press SELECT to access the offline tests menu: |
| ✓ [*Diag: Test 1] | Press SELECT twice to execute. This test, which runs hardware diagnostics that test the SB, RI, and the SZ boards, runs for approximately <u>10 minutes</u> . (Any attempt to go online after running Test 1 will cause an IPL.) Press SCROLL to pass to the next test. |
| [*Diag: Test 2] | (If the ICRC feature is installed, this test is part of the inline tests and cannot be run from this point in the program.) Press SELECT twice to execute. This test runs basic tape motion and write/read diagnostics. It requires a loaded, ready and unprotected tape. Press SCROLL to pass to the next test. |
| [*Diag: Test 3] | (If the ICRC feature is installed, this test is part of the inline tests and cannot be run from this point in the program.) Press SELECT twice to execute. This test runs an extended write/read reliability test. It executes a write pass from BOT to EOT, a read forward pass BOT to EOT, and then a read backward pass EOT to BOT. If the unit encounters a permanent error or too many blocks are ECC corrected, the test posts an error. It requires a loaded, ready and unprotected tape and runs for about <u>20 minutes</u> . |

Press SCROLL to pass to the next test.

[*Diag: Test 4]

(If the ICRC feature is installed, this test is part of the inline tests and cannot be run from this point in the program.) Press SELECT twice to execute. This is a read reliability test, equivalent to the read passes of test 3. Primarily for testing read interchange between units, it requires a tape written successfully by test 3 loaded and ready.

Press SCROLL to pass to the next test.

[*Diag: Test 5]

(If the ICRC feature is installed, this test is part of the inline tests and cannot be run from this point in the program.) Press Select twice to execute. This is a write reliability test that checks ECCs on writes, equivalent to QUAL3-WRT.

Press SCROLL to pass to the next test.

[*Diag: Test 6]

(If the ICRC feature is installed, this test is part of the inline tests and cannot be run from this point in the program.) Press Select twice to execute. This is a read reliability test that reads the tape generated by test 5 and checks read ECCs. It is equivalent to QUAL3-RD.

Press SCROLL to pass to the next test.

[*Diag: Test 7]

(This test can be run only if Diag EC lvl is set to 2.) Press SELECT twice to execute. This is a read/write, RI/SBI card scan diagnostic. (If you run this test you must IPL the control unit. If you then want to continue diagnostics, you must scroll from the offline menu to this point in the program. This is because this test corrupts memory.

Press SCROLL to pass to the next test.

[*Diag: Load/Unld]

If you have a manual loader, press SELECT twice to repeatedly load and unload a tape without ejecting it. The test runs until you press SCROLL or SELECT, or a hardware error is encountered. If a tape is not loaded, you receive a prompt with a message to load one. If you have an autoloader, press SELECT twice to start a Load/Unload cycle that runs until an error occurs or you press SCROLL or SELECT.

Press SCROLL to pass to the next test.

✓ [*Diag: Loop 1]

Press SELECT and UNLOAD to display the number of loops you wish all subsequent tests to go through. The numbers displayed are 1, 10, 100, and 0. Select '0' to set a continuous looping. Press SELECT twice to set the loop count that you select. (If an error occurs when 1, 10, or 100 has been set, the test stops; if an error occurs when 0 has been set, the test continues.)

Note: This loop count setting does not apply to the autoloader Load/Unld test.

Press SCROLL to pass to the next test.

✓ [*Diag: Test Disp]

Press SELECT twice to execute. This test causes all of the available characters to be displayed on the 16-character display. It does not end unless SELECT or SCROLL is pressed again.

Press SCROLL to pass to the next test.

✓ [*Loader Sensor]

Press SELECT twice to execute. If a manual loader is present, "Done" is displayed. If an autoloader is installed, the display indicates the status of nine sensors in the autoloader.

Each of the first nine positions on the display corresponds to a sensor. If a "1" is displayed, the corresponding sensor is active; if a 0 is displayed, the sensor is inactive. The following table relates the display position to a sensor (position 1 is the leftmost position in the display).

Position Sensor

- | | |
|---|---------------------------------------|
| 1 | Cartridge-in-drive sensor |
| 2 | Carrier-up/down sensor |
| 3 | Horizontal shuttle-at-magazine sensor |
| 4 | Cleaning cartridge sensor |
| 5 | Vertical axle rotational sensor |
| 6 | Magazine index sensor |
| 7 | Magazine slot sensor |
| 8 | Cartridge-in-magazine sensor |
| 9 | Vertical dead-man switch |

Press **SCROLL** to pass to the next test.

/*Disply Pressure]

Press **SELECT** twice to execute. If a tape is inserted, a hex number proportional to the air pressure in the transport deck plenum sensed by the pressure transducer is displayed. Allowable and nominal values (in hex) are:

| | |
|------------------|--------|
| High error limit | 90 |
| Nominal | 70 ±10 |
| Low error limit | 50 |

If no tape is present, the value displayed should be 0.

Press **SCROLL** or **SELECT** once to terminate this test.

Press **SCROLL** to pass to the next menu entry.

/*Disply Tension]

Press **SELECT** twice to execute. This displays a hex number proportional to the air pressure in the right-hand air bearing sensed by the tension transducer. Allowable and nominal values (in hex) are:

| | |
|-------------------------|--------|
| High error limit: | A0 |
| Nominal (moving, 8 oz) | 70 ±10 |
| Nominal (stopped, 6 oz) | 54 ±10 |
| Low error limit | 38 |

If no tape is present, the value displayed should be 0.

Press **SCROLL** or **SELECT** once to terminate this test.

Press **SCROLL** to pass to the next test.

/*Exit]

Press **SCROLL** once to return to test one,

or

press **SELECT** once to pass to the beginning of the offline program.

11.3. Running Inline Diagnostics - Menu**Note:**

This menu is available only if the ICRC microcode is installed.

To run inline diagnostics, the unit must be in inline mode. The first menu entry for the inline mode is (1) below. If you find yourself at an earlier entry, scroll through to the inline menu.

When you reset the unit, the program displays

| | |
|---------------------|--|
| [OF:Diag: xxxx] | Press SCROLL to pass to the next menu item. |
| [+SUBSYS STATUS] | Press SELECT to pass to the next menu item. |
| [*Online Request] | Press SELECT twice to pass to the next menu display. |
| [XX:IDLE: xxxx] | Press SCROLL to pass to the next menu item. |
| [+SUBSY STATUS] | Press SELECT to pass to the next menu item. |
| [*Offline Request] | Press SCROLL to pass to the next menu item. |
| [*Drive Offl Req] | Press SELECT twice to pass to the next item. |
| (1) [FE:IDLE:xxxxx] | (This is the beginning of the inline menu.) |
| | Press SCROLL to pass to the next menu item. |
| [SUBSYS STATUS] | Press SCROLL to pass to the next menu item. |
| [+SET OR DISPLAY] | Press SCROLL to pass to the next menu item. |
| [DIAGNOSTICS] | Press SELECT to pass to the next menu item. |
| [*Diag: Test 2] | Press SELECT twice to execute. This test runs basic tape motion and write/read diagnostics. It requires a loaded, ready and unprotected tape. |
| | Press SCROLL to pass to the next test. |
| [*Diag: Test 3] | Press SELECT twice to execute. This test runs an extended write/read reliability test. It executes a write pass from BOT to EOT, a read forward pass BOT to EOT, and then a read backward pass EOT to BOT. If the unit |

encounters a permanent error or too many blocks are ECC corrected, the test posts an error. It requires a loaded, ready and unprotected tape. Test 3 runs 20 minutes.

Press SCROLL to pass to the next test.

[*Diag: Test 4]

Press SELECT twice to execute. This is a read reliability test, which is equivalent to the read passes of test 3. It tests primarily read interchange between units. It requires that a tape be written successfully by test 3 and that it is loaded and ready.

Press SCROLL to pass to the next test.

[*Diag: Test 5]

Press SELECT twice to execute. This is a write reliability test that checks ECCs on writes; it is equivalent to QUAL3-WRT.

Press SCROLL to pass to the next test.

[*Diag: Test 6]

Press SELECT twice to execute. This is a read reliability test. It reads the tape generated by test 5 and checks read ECCs. This test is equivalent to QUAL3-RD.

Press SCROLL to pass to the next test.

[*Diag: Test 8]

(This write ICRC reliability test can be run only if the ICRC code is loaded and the feature is installed and enabled.) Together with test 9, it checks ECCs on writes. It is equivalent to UAL5 - WRT.

Press SCROLL to pass to the next test.

[*Diag: Test 9]

(This read ICRC reliability test can be run only if the ICRC code is loaded and the feature is installed and enabled.) It reads the tape generated in test 8 to check read ECCs. It is equivalent to QUAL5 - RD.

Press SCROLL to pass to the next test.

[*Diag: Load/Unld]

If you have a manual loader, press SELECT twice to repeatedly load and unload a tape without ejecting it. The test runs until you press SCROLL or SELECT, or a hardware error is

encountered. If a tape is not loaded first, you receive a prompt with a message to load a tape. If you have an autoloader, press SELECT twice to start a Load/Unload cycle that runs until an error occurs or you press SCROLL or SELECT.

Press SCROLL to pass to the next test.

[*Diag: Loop 1]

Press SELECT and UNLOAD to display the number of loops you wish all subsequent tests to go through. The numbers displayed are 1, 10, 100, and 0. '0' sets a repeating loop. (If an error occurs when 1, 10, or 100 is set, the test stops; if an error occurs when 0 is set, the test continues.) Press SELECT twice to set the loop count that you select. This loop count setting does not apply to the autoloader Load/Unld test.

Press SCROLL to pass to the next test.

[*Diag: Test Disp]

Press SELECT twice to start. This test causes all of the available characters to be displayed on the 16-character display. It does not end unless SCROLL or SELECT is pressed again.

Press SCROLL to pass to the next test.

[*Loader Sensor]

Press SELECT twice to execute. If a manual loader is present, "Done" is displayed. If an autoloader is installed, the display indicates the status of nine sensors in the autoloader.

Each of the first nine positions on the display corresponds to a sensor. "1" is displayed when the corresponding sensor is active; "0" when it is inactive. Display positions and related sensors are (position 1 is the leftmost position):

| <u>Position</u> | <u>Sensor</u> |
|-----------------|---------------------------------------|
| 1 | Cartridge-in-drive sensor |
| 2 | Carrier-up/down sensor |
| 3 | Horizontal shuttle-at-magazine sensor |
| 4 | Cleaning cartridge sensor |
| 5 | Vertical axle rotational sensor |
| 6 | Magazine index sensor |
| 7 | Magazine slot sensor |
| 8 | Cartridge-in-magazine sensor |
| 9 | Vertical dead-man switch |

Press **SCROLL** to pass to the next test.

[*Display Pressure]

Press **SELECT** twice to execute. If a tape is inserted, a hex number proportional to the air pressure in the transport deck plenum sensed by the pressure transducer is displayed. Allowable and nominal values (in hex) are

| | |
|------------------|--------|
| High error limit | 90 |
| Nominal | 70 ±10 |
| Low error limit | 50 |

If no tape is present, the value in the display should be 0.

Press **SCROLL** or **SELECT** once to terminate this test.

Press **SCROLL** to pass to the next test.

[*Display Tension]

Press **SELECT** twice to execute. If a tape is inserted, a hex number proportional to the air pressure in the right-hand air bearing sensed by the tension transducer is displayed. Allowable and nominal values (in hex) are:

| | |
|-------------------------|--------|
| High error limit: | A0 |
| Nominal (moving, 8 oz) | 70 ±10 |
| Nominal (stopped, 6 oz) | 54 ±10 |
| Low error limit | 38 |

If no tape is present, the value in the display should be 0.

Press **SCROLL** or **SELECT** once to terminate this test.

Press **SCROLL** to pass to the next program entry.

[*Exit]

Press **SCROLL** and **SELECT** simultaneously twice to return to the beginning of the inline display: [FE : IDLE : *] If you then wish to put the unit online, press **SCROLL** once, then **SELECT** twice.

Operator Display

There is a window in the online menu program (the "Operator Display"). It consists of sixteen positions and displays information about the status of the drive. To access this window, start at the Online Status Display ([xx: IDLE : xxxx]) and press SCROLL twice. To return to the Online Status Display, press SCROLL once.

The entries that appear in this window and their significance are

| | |
|-------------------|---|
| * | No tape loaded |
| READY U | Device ready and inactive, not file protected |
| READY U - BOT | Device ready and inactive at logical EOT, not file protected |
| READY U - LEOT | Device ready and inactive at logical EOT, not file protected |
| READY U - PEOT | Device ready and inactive at physical EOT, not file protected |
| READY F | Device ready and inactive, file protected |
| READY F - BOT | Device ready and inactive at BOT, file protected |
| READY F - LEOT | Device ready and inactive at logical EOT, file protected |
| READY F - PEOT | Device ready and inactive at physical EOT, file protected |
| TAPE MOVING | Drive active moving tape |
| TAPE MOVING-LEOT | Drive active moving tape in logical EOT region |
| TAPE REWINDING | Tape rewinding |
| TAPE LOCATING | Tape locating |
| TAPE LOADING | Tape loading |
| TAPE UNLOADING | Tape unloading |
| EJECTING | Ejecting magazine from autoloader |
| POSITIONING UP | Magazine positioning up to next slot |
| POSITIONING DOWN | Magazine positioning down to next slot |
| POSITION TO INDEX | Magazine positioning to slot position 0 |
| TAPE ERASING | Drive performing DSE |
| SCANNING | Scanning magazine for cartridges |
| TAPE TENSIONING | Performing tape tensioning |
| CLEAN ME * | No tape loaded; drive requires cleaning |
| TAPE CLEANING | Displayed when cleaning cartridge installed |
| NO CARTRIDGE | Load failed: no cartridge in current magazine position |
| ERR-UNLOAD TAPE | Permanent error: must abort job |
| LOAD FAILURE | Tape failed to load properly in tape path |
| ERR:IPLorRST RQD | An error that requires a RESET, IPL, or FE intervention |

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READER'S COMMENT FORM

StorageTek.

Account Name: _____ Date: _____

Installation Address: _____

City/State/Zip: _____

Manual Name: _____

Manual PN: _____

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

Which of the following terms best describes your job?

- | | | | |
|--|--|---|--|
| <input type="checkbox"/> Field Engineer | <input type="checkbox"/> Engineer | <input type="checkbox"/> Instructor | <input type="checkbox"/> Manager |
| <input type="checkbox"/> Mathematician | <input type="checkbox"/> Operator | <input type="checkbox"/> Programmer | <input type="checkbox"/> Sales Representative |
| <input type="checkbox"/> Student/Trainee | <input type="checkbox"/> Systems Analyst | <input type="checkbox"/> Systems Engineer | <input type="checkbox"/> Other (explain below) |

How did you use this publication?

- | | | | |
|--|---|--|--|
| <input type="checkbox"/> Introductory text | <input type="checkbox"/> Reference manual | <input type="checkbox"/> Student/Trainee | <input type="checkbox"/> Instructor text |
| <input type="checkbox"/> Other (explain below) | | | |

Did you find the material easy to read and understand?

- Yes No (explain below)

Did you find the material organized for convenient use?

- Yes No (explain below)

Specific criticisms (explain below):

Clarifications on pages _____

Additions on pages _____

Deletions on pages _____

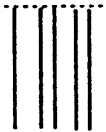
Errors on pages _____

Explanations and other comments:

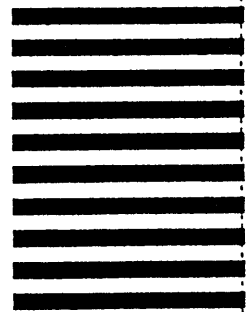
Fold and tape

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