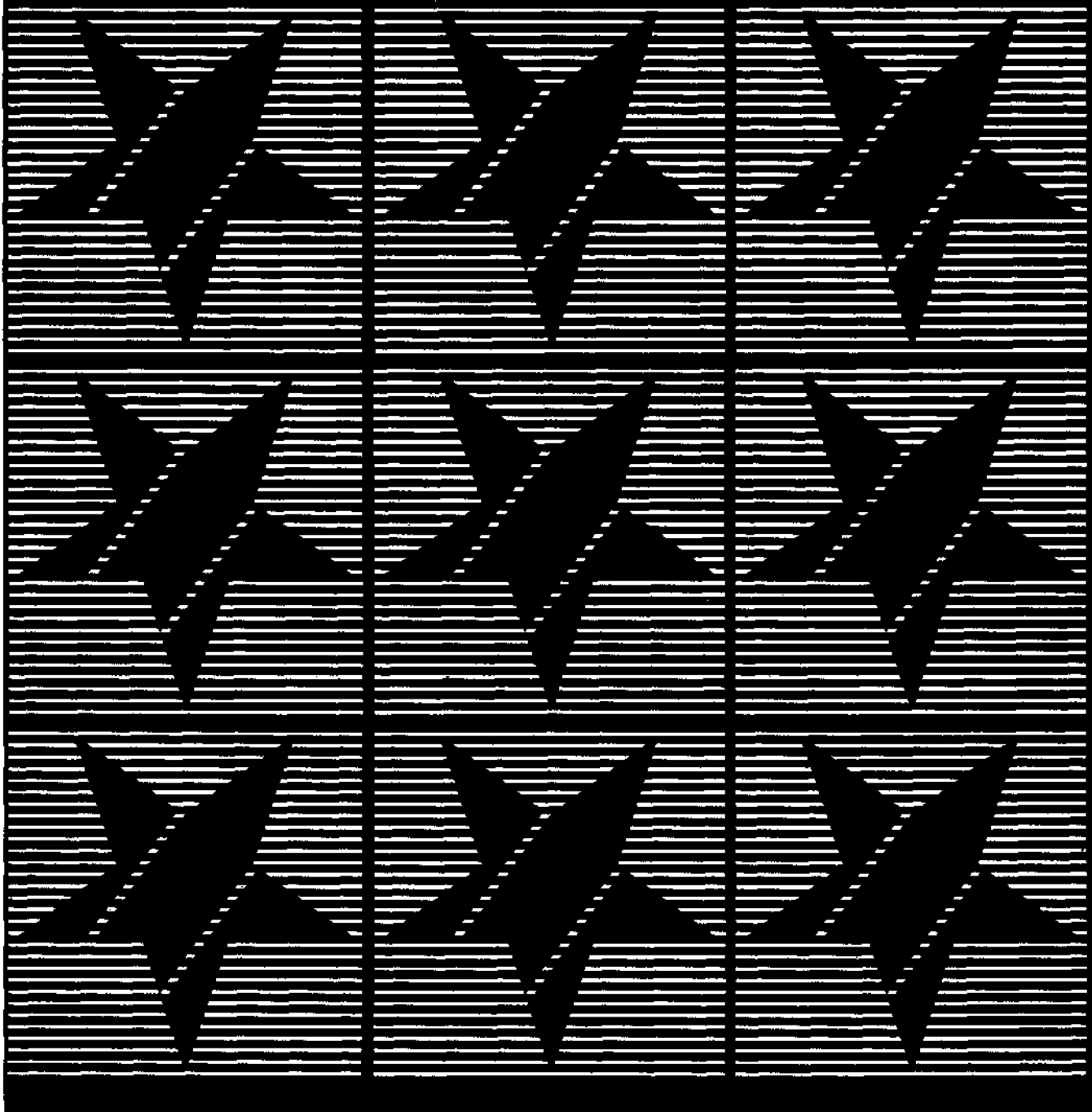


**HORIZON<sup>®</sup>**  
**Hard Disk**  
**Installation Guide**



**HARD DISK INFORMATION**

Model: **MTLS5**

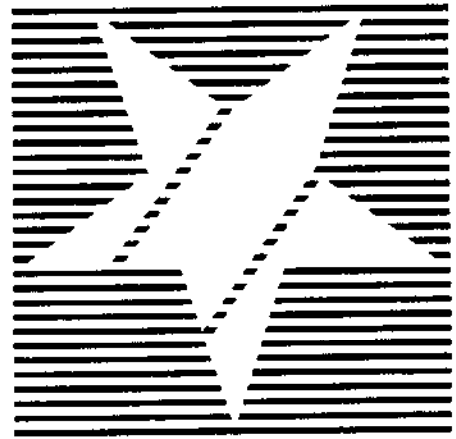
**MAP TABLE**

CYLINDER	HEAD	CYLINDER	HEAD	CYLINDER	HEAD
139	6				
140	6				

new error  
 Cyl · Head  
 140 6



HORIZON<sup>®</sup>  
Hard Disk  
Installation Guide



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**To reorder this guide order part number 03745**

**WARNING:** This equipment has been certified to comply with the limits for a Class A computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class A limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.

---

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## WARRANTY INFORMATION

---

North Star Computers, Inc., warrants the electrical and mechanical parts and workmanship of this product to be free of defects for a period of 90 days from date of purchase. If such defects occur, North Star Computers, Inc., will repair the defect at no cost to the purchaser. This warranty does not extend to defects resulting from improper use or assembly by purchaser, nor does it cover transportation to the factory. Also, the warranty is invalid if all instructions included in the accompanying documentation are not carefully followed.

Should a unit returned for warranty repair be deemed by North Star Computers, Inc. to be defective due to purchaser's action, then a repair charge (not to exceed \$50 without purchaser's consent) will be assessed. ANY UNIT(S) or PART(S) RETURNED FOR WARRANTY REPAIR MUST BE ACCOMPANIED BY A DATED COPY OF THE ORIGINAL SALES RECEIPT. The item should be returned to the dealer from whom the product was purchased, for implementation of the warranty. When sending the item to the factory for repair, the dealer must call North Star to receive a Return Material Authorization (RMA) number to accompany the item to the factory. Terminals and printers are covered under separate warranties.

The following warranty limitation applies to units located outside the United States of America: All costs and arrangements for transportation of the product to and from the factory are borne entirely by the customer.

No warranty, expressed or implied, is extended concerning completeness, correctness, or suitability of the North Star equipment for any particular application. There are no warranties which extend beyond those expressly stated herein. This limited warranty is made in lieu of all other warranties, expressed or implied, and is limited to repair or replacement of the product.

**Introduction** North Star offers three different 5 1/4" hard disk drive upgrade kits for the North Star HORIZON computer. They are called the HD-5, the HD-15, and the HD-30; they contain five, fifteen, and thirty megabyte hard disk drives, respectively. The purpose of this guide is to familiarize you with the tools, parts, and procedures necessary for installing these hard disk drive kits.

The guide presents generic installation procedures when possible, but it should be noted that exceptions between the kits do exist. If installation of a particular drive requires alternate steps, these steps are indicated in the text, or a reference is made to a manual containing appropriate installation instructions.

**Recommended Tools** The following tools are recommended for installing a hard disk drive in the HORIZON computer:

- o A medium Phillips screwdriver
- o A medium flat-head screwdriver
- o A tube of thermal compound/silicon grease



## INTRODUCTION (cont.)

---

**Parts**                   The parts shown below, except for miscellaneous hardware such as screws and washers, are special items designed for use with your computer. We recommend that you do not substitute parts unless you receive confirmation of their acceptability from a North Star dealer or dealer's representative.

**Generic Parts for Hard Disk Drive Kits**           The following parts are supplied for all HORIZON hard disk drive kits.

- o Hard disk drive
- o Hard disk power supply assembly
- o Hard disk drive support bracket
- o Hard disk power supply cable
- o A 20-conductor pre-folded ribbon cable
- o A 34-conductor pre-folded ribbon cable
- o Disk drive brace
- o Hard Disk Information label
- o Plastic cable tie wrap
- o Two #4-40 x 3/8" screws
- o Two #4 split lockwashers
- o Two #4 flat washers
- o Three #10 male terminals
- o Three #10-32 x 3/8" slotted screws
- o Four #6-32 x 1/4" screws
- o Four #6 flat washers

**Additional Parts for HD-30 Hard Disk Drive Upgrades**           The following additional parts are supplied for installation of the HD-30 hard disk drive in the HORIZON computer.

- o Rear panel
- o Side baffle
- o Two side baffle end retainers
- o Inner baffle
- o Inner baffle holder
- o Transformer/diode assembly
- o Four flat washers
- o Four split lock washers
- o Four screws
- o Cable tie hold-down
- o Cable tie wrap
- o FCC label

**Hard Disk  
Information  
Label**

Each hard disk drive sold by North Star has an information label attached to the side of the drive. The label indicates the name and size of the drive as well as the location of bad spots on the disk. You will need this information during the hard disk format process.

In order to facilitate the use of data on the information label, a blank label is included as part of each installation kit. Copy the data from the label attached to your hard disk drive to the blank label. Attach the new label to the outside of the rear panel of your HORIZON. When you are ready to format the hard disk, you then have access to the required information without removing the cover of your HORIZON computer.

**Handling  
Precautions**

Hard disk drives are sensitive to mechanical shock and should be handled with care. Dropping or jarring a drive can cause damage to the read/write mechanism and may result in a loss of data. Take the following precautions when handling your hard disk drive:

- o Do not remove the drive from the shipping container until you are ready to insert it into the computer.
- o Never place the drive on a hard surface, such as a table. Place a pad on the surface, then rest the drive on the pad.

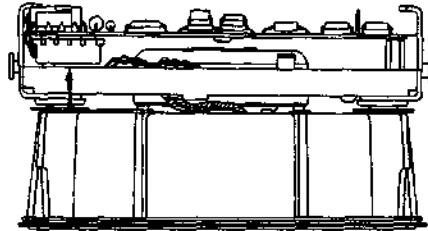
**DC Power  
Connections**

Normally, DC power cables for HORIZON disk drives connect directly to sockets which are integral to the disk drive circuit boards. An exception to this occurs when a MiniScribe HD-15 hard disk drive is installed. The MiniScribe hard disk drive has a power harness, rather than a socket, attached to its circuit board. To supply power to this disk drive, you must connect the HORIZON DC power harness to the MiniScribe power harness. See the figures on the following page.

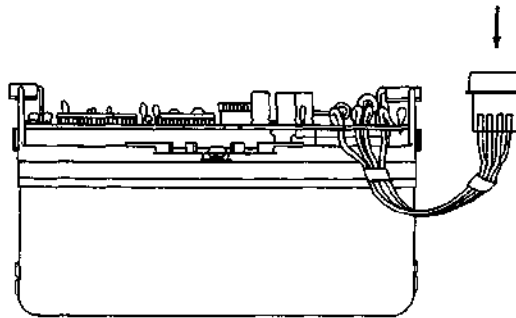
**INTRODUCTION**  
(cont.)

---

**Disk Drive  
DC Power  
Distribution**



DC Power Connector  
Typical Disk Drive



DC Power Connector  
Miniscribe Disk Drive

**Disk Drive  
Support  
Brackets**

There are two types of disk drive support brackets used in the HORIZON computer. If you have an older HORIZON, serial number 40000 or lower and you are installing a hard disk drive for the first time, you should replace the old disk drive support bracket with the new bracket contained in your installation kit.

If you have a newer HORIZON, serial number 40000 or higher, or if you are upgrading your computer to a higher capacity hard disk drive, the bracket contained in your installation kit may be discarded.

**HD-30  
Installation  
Notes**

If you are installing an HD-30 hard disk drive, and if this is not an upgrade from a smaller capacity hard disk drive, and if your machine's serial number is 39999 or less, several changes to the HORIZON's chassis and power supply are necessary. These modifications should be completed before you begin installation of the hard disk drive and the hard disk controller board.

Installation instructions for the chassis and power supply modifications may be found in the HORIZON Power Upgrade Installation Guide (North Star part number 03603). This guide and the necessary parts for the modification are included in the two cartons which accompany your HD-30 hard disk drive.

When you have finished the chassis and power supply modifications, return to this guide to complete the final installation of the HD-30 hard disk drive and the hard disk controller board.

## PREPARING THE DISK DRIVE CAVITY

---

### Procedure: Removing the HORIZON Cover

---

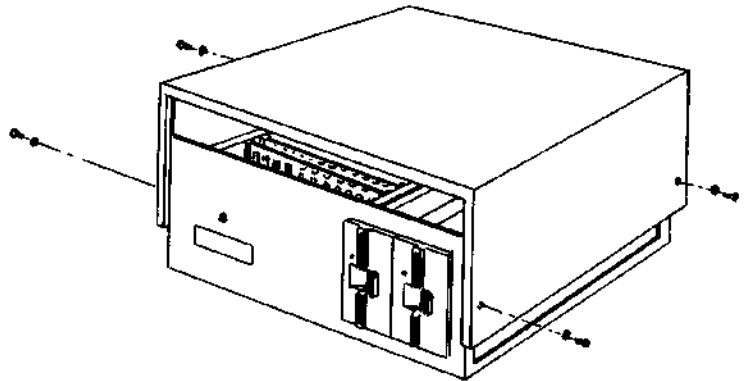
1. Open the disk drive doors and remove all disks.

---
2. Turn the main power switch OFF.

---
3. Unplug the power cord from the wall outlet, and disconnect the power cord from the power receptacle on the back of the computer.

---
4. Make a note of the locations (for later re-connection) of all cables attached to the back panel of the computer. Disconnect the cables.

---
5. Remove the four screws that hold the HORIZON top cover in place and put the screws and lock washers in a safe place.



**PREPARING THE DISK DRIVE CAVITY**  
(cont.)

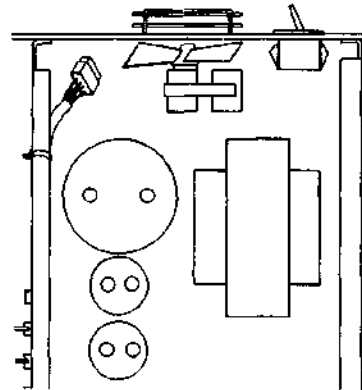
---

**Procedure:        Removing the HORIZON Disk Drives**

The disk drive that you will remove first is Drive #2. Drive #2 is on the right-hand side if you are facing the front of the HORIZON.

- 
1. Remove the ADC brace from the top of the disk drives if one is installed.
- 
2. Unplug the four wire DC power cable from connector J2 on the top rear of the Drive #2 circuit board.
- 
3. Unplug the signal ribbon cable from connector J1 on the bottom rear of the Drive #2 circuit board.
- 

4. Fasten the DC power cable to the metal partition at the center of the HORIZON chassis using the plastic tie wrap supplied in the installation kit. If you do not perform this step, the power cable may be later drawn into the HORIZON fan. Tie wrap the power cable for Drive #2 only.



- 
5. Turn the HORIZON on its side, so that Drive #2 is on top.
- 

----->

## PREPARING THE DISK DRIVE CAVITY (cont.)

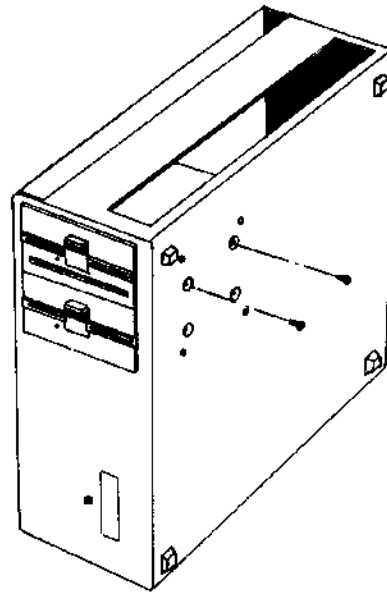
---

### Procedure: Removing the HORIZON Disk Drives

---

- Support Drive #2 with your left hand, to protect the circuit board on Drive #1. Use a Phillips screwdriver to remove the two recessed screws (reached through the access holes) that attach drive #2 to the disk drive mounting bracket.

CAUTION
Be careful not to touch the disk drive assembly if you use a magnetized screwdriver to remove the screws.



**Note:** Do not re-use the two screws you just removed from Drive #2 when you install the hard disk drive. Use two of the #6-62 x 1/4" screws supplied in the shipping kit.

---

- Pull drive #2 out of the front of the HORIZON. It may be necessary to loosen the drive, by moving it slightly from side to side, before it slides forward.
- 

----->

**PREPARING THE DISK DRIVE CAVITY**  
(cont.)

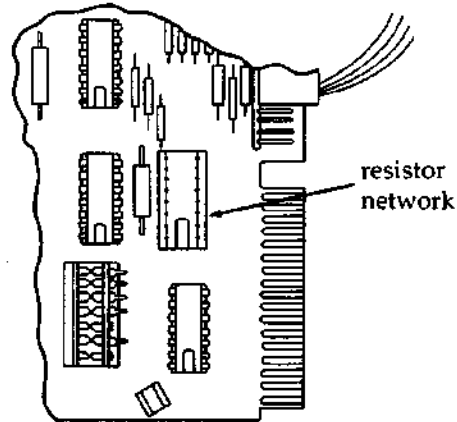
---

**Procedure:      Removing the HORIZON Disk Drives**

---

8. Remove the resistor network from the Drive #2 circuit board.

**Note:** The physical location shown in the diagram is a typical configuration and may be slightly different on your drive.

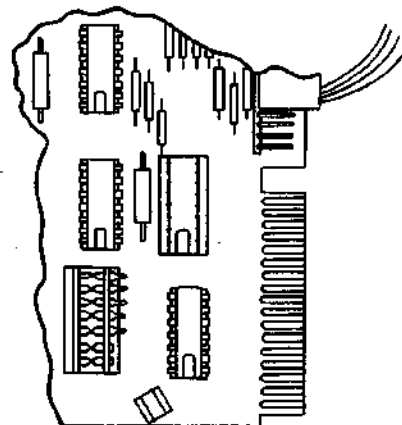


Drive #2

---

9. Set aside Drive #2. It may be used as a replacement for Drive #1 or as an auxiliary disk drive.
- 
10. Repeat steps 1, 2, 5, and 6 to remove Drive #1. Do not tie off the power cable to Drive #1.
- 

11. Install the resistor network from Drive #2 on Drive #1.



Drive #1 with  
Resistor Network installed

---



## MOUNTING THE NEW DISK DRIVE BRACKET

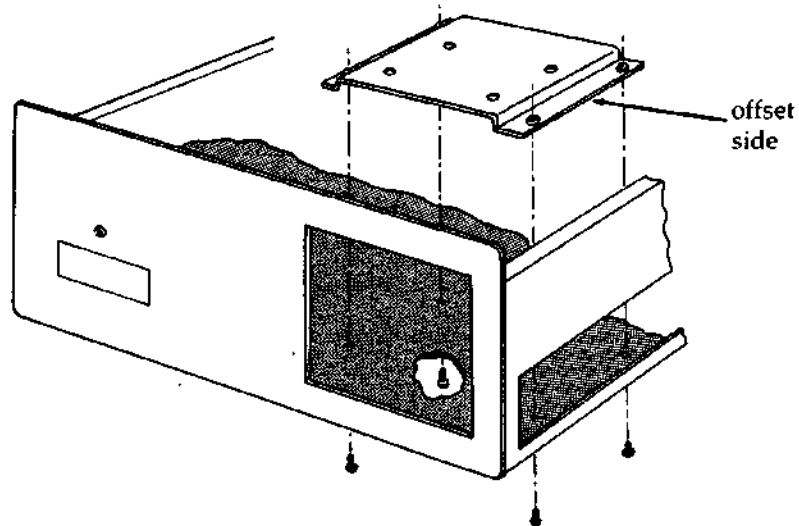
---

**Procedure:      Mounting the New Disk Drive Bracket**

You may skip this procedure if the serial number of your HORIZON computer is 40000 or higher or if a hard disk drive is already installed in your computer.

---

1. Remove the disk drive mounting bracket attached to the bottom of the HORIZON. Save the screws and use them to mount the new bracket that is included with the installation kit.
  2. Position the new disk drive bracket with the offset side facing the right side of the HORIZON cabinet. The new hard disk drive and Drive #1 screwholes should be centered over the access holes on the bottom of the HORIZON.
  3. Attach the new bracket to the HORIZON frame.
- 



## RE-INSTALLING DISK DRIVE #1

---

### Procedure: Re-Installing Disk Drive 1 in HORIZON

---

1. Slide Drive #1 half-way into the HORIZON.

---
2. Reconnect the signal cable to connector J1 at the bottom of the Drive #1 circuit board.

---
3. Reconnect the DC power cable to connector J2 at the top of the Drive #1 circuit board.

---
4. Slide the drive completely into the HORIZON, positioning it over the access holes in the bottom of the HORIZON frame.

---
5. Insert the original screws removed from the drive and tighten them securely.

---
6. Set the HORIZON back on its base.

<b>CAUTION</b>
----------------

Retrieve any screws that are dropped into the HORIZON. A loose screw could slip under the motherboard and cause a short circuit.
--

---

## INSTALLING THE HARD DISK POWER BOOST MODULE

---

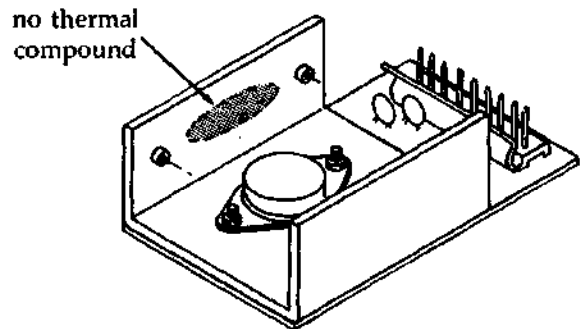
**Procedure:**      **Installing the Hard Disk Power Boost Module**

North Star recommends using a thin film of thermal compound between the mating surfaces of the power supply assembly and the rear panel of the HORIZON. The thermal compound serves to increase the efficiency of the heat sink.

**Note:** Use the thermal compound sparingly. A little goes a long way.

---

1. Remove the power boost module from the shipping kit, and coat the mating surface of the module with thermal compound. Leave the area which covers the serial connector hole free of compound.



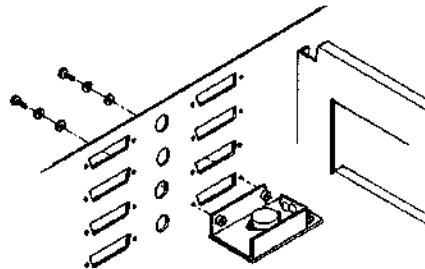
**INSTALLING THE HARD DISK POWER BOOST MODULE**  
(cont.)

---

**Procedure:      Installing the Hard Disk Power Boost Module**

---

2. Attach the power boost module to the bottom inboard serial connector hole on the inside of the HORIZON rear panel. Use two #4-40 screws, two #4 flat washers, and two #4 lock-washers supplied in the shipping kit. Tighten the screws down fully to maximize contact between the power boost module and the back panel of the HORIZON.



---

---->

**INSTALLING THE HARD DISK POWER BOOST MODULE**  
(cont.)

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**Procedure: Installing the Hard Disk Power Boost Module**

---

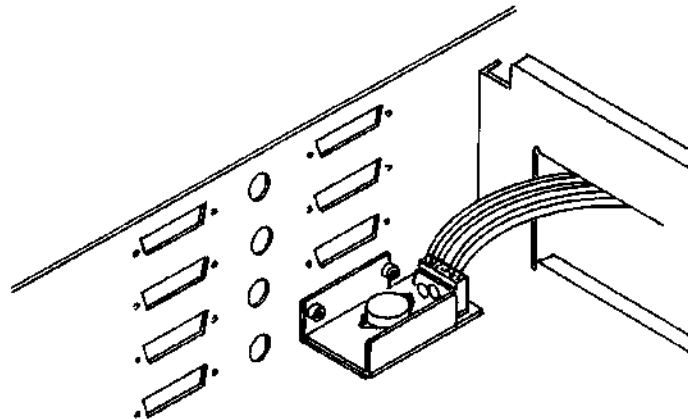
3. Remove excess grease with a paper towel.

---

4. Remove the seven-wire power boost module cable from the shipping kit, and plug the end with the nine pin female connector onto the male connector of the power boost module. These connectors are keyed to facilitate proper orientation.

---

5. Dress the seven wires of the power boost module cable under the central metal partition of the HORIZON.



- 
6. If you do not have male terminals attached to your filter capacitors, remove the screw attaching the thick red wires to the top of the largest capacitor. Save the lockwasher.
- 

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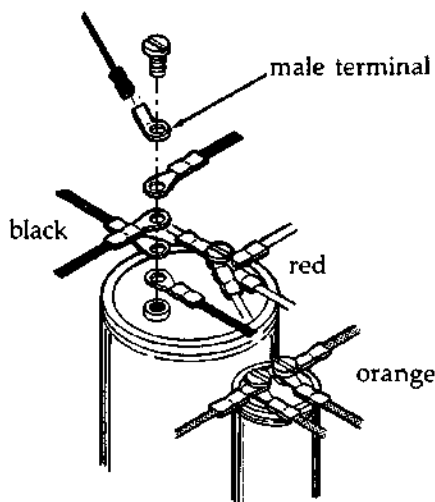
## INSTALLING THE HARD DISK POWER BOOST MODULE (cont.)

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### Procedure: Installing the Hard Disk Power Boost Module

---

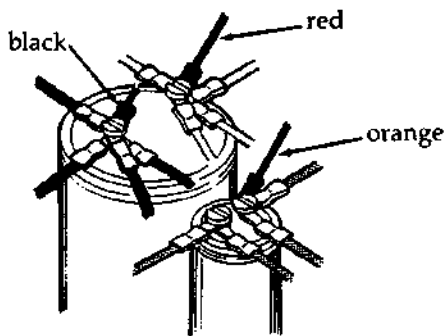
7. Position the male terminal over the screw hole, and insert a #10-32 slot head screw and the original lock-washer through the male terminal and the terminal lugs on the ends of the red wires. Do not overtighten the screw.



8. Repeat step 7 to attach a male terminal to the capacitor terminal containing black wires (same capacitor).

9. Repeat the step 7 to install a third male terminal to the orange wire terminal of the middle filter capacitor.

10. Push the thin red wire connector from the power boost module cable on the male terminal attached to the group of red wires on the large filter capacitor.



----->

**INSTALLING THE HARD DISK POWER BOOST MODULE**  
**(cont.)**

---

**Procedure:        Installing the Hard Disk Power Boost Module**

---

11. Repeat this procedure to connect the short black wire from the power boost module cable to the heavy black wires attached to the same filter capacitor.

---

12. Use the same method to connect the short orange wire from the power boost module cable to the heavier orange wires attached to the medium sized capacitor.

---

## MOUNTING THE HARD DISK CONTROLLER BOARD

---

**Procedure:**      **Mounting the Hard Disk Controller Board**

**CAUTION**

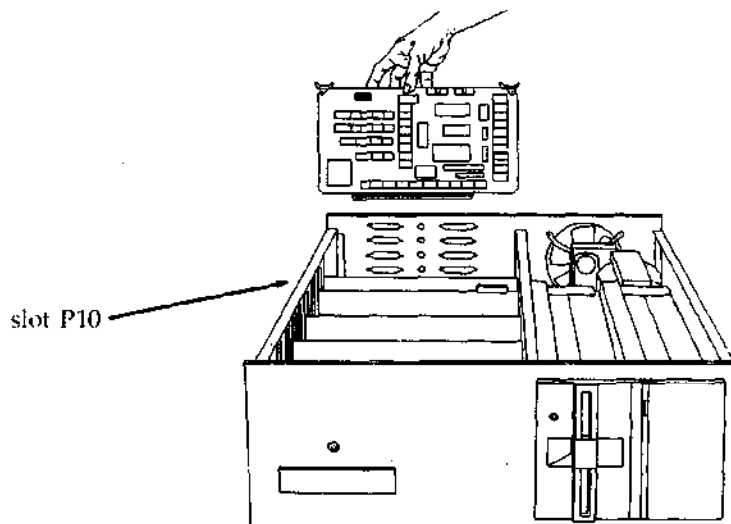
To prevent damage to the components on the controller board, discharge static electricity from your body by touching a grounded metal object before you remove the controller board from the shipping kit.

To prevent damage to components on the controller board, only insert and remove the circuit board by using the plastic tabs located on the upper corners.

---

1. If you are installing a hard disk drive for the first time, or if you are upgrading a pre-existing hard disk drive, use the hard disk controller board that was shipped with your installation kit.
- 

2. Insert the hard disk controller board in slot P10 with the component side of the board facing the front of the HORIZON.



3. Press down firmly on the controller board to seat it in the motherboard.
-



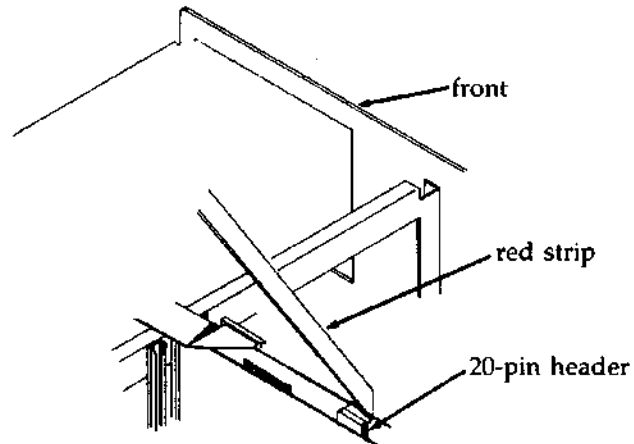
## MOUNTING AND CONNECTING THE HARD DISK DRIVE

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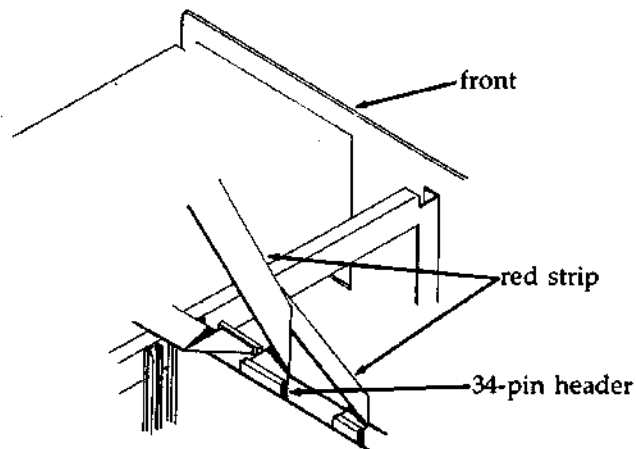
### Procedure: Mounting and Connecting the Hard Disk Drive

---

1. Remove the pre-folded 20-conductor ribbon cable from the shipping kit. If the folds on the ribbon cable are not crisp and flat, run your finger over the folds several times.
  2. Position the cable connector over the 20-pin header at the top of the controller board, and press it into place.
- 



3. Position the pre-folded 34-conductor ribbon cable over the 34-pin header at the top of the controller board and press it into place.



----->

**MOUNTING AND CONNECTING THE HARD DISK DRIVE**  
(cont.)

---

**Procedure:      Mounting and Connecting the Hard Disk Drive**

---

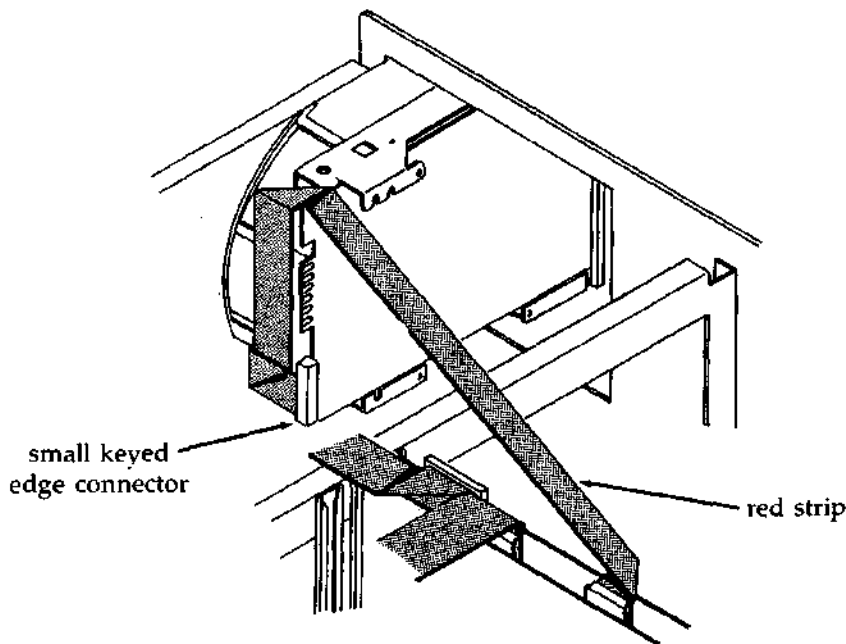
4. Remove the hard disk drive from its shipping container, and copy the information from the Hard Disk Information label on the side of the hard disk to the similar label supplied in the shipping kit. Attach the label to the rear panel of the HORIZON.

---

5. Insert the hard disk drive into the HORIZON with its circuit board facing the circuit board of Drive #1. Only insert the drive half-way at this time.

---

6. Plug the 20-connector ribbon cable onto the small keyed edge connector at the bottom of the hard disk circuit board. Make sure they are aligned properly before pressing them together. The connectors should snap into place.



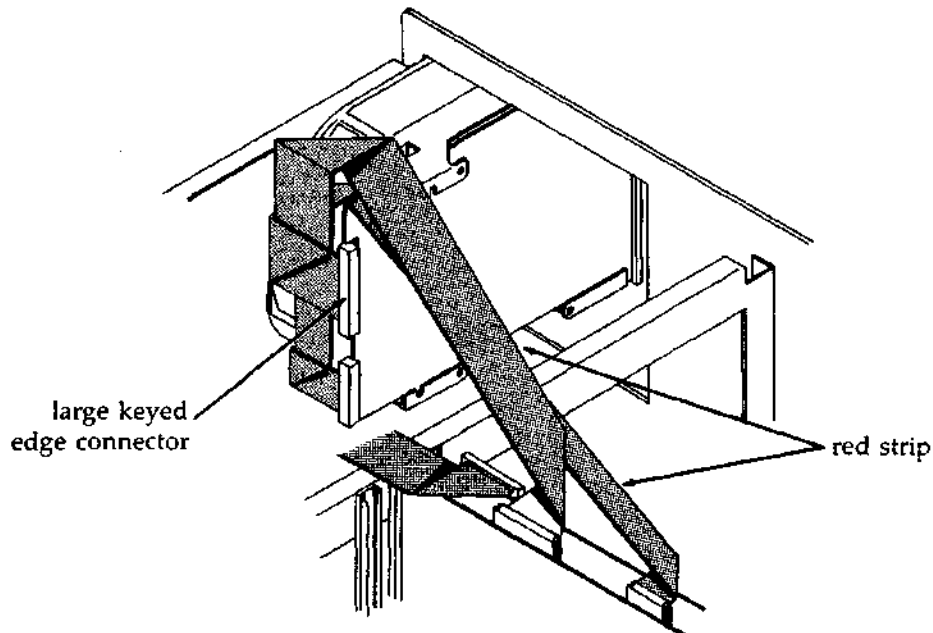
## MOUNTING AND CONNECTING THE HARD DISK DRIVE (cont.)

---

### Procedure: Mounting and Connecting the Hard Disk Drive

---

7. Plug the 34-connector cable onto the large keyed edge connector at the top of the hard disk circuit board. Align the connectors properly before pressing the cable connector into place.



- 
8. Check that the pre-folded ribbon cables lie flat, without twists. Check that the DC power supply cable runs under the central metal partition of the HORIZON.
  9. Plug the power supply cable into the white connector on the top rear of the hard disk circuit board.
  10. Fold the signal cable that was attached to Drive #2 back out of the way of the hard disk drive.
  11. Push the hard disk drive the rest of the way into the HORIZON cabinet.
- 

---->

**MOUNTING AND CONNECTING THE HARD DISK DRIVE**  
(cont.)

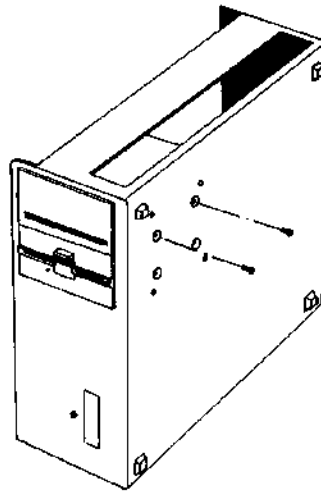
---

**Procedure:      Mounting and Connecting the Hard Disk Drive**

---

12. Turn the HORIZON on its side, so the hard disk is positioned on top. Hold the hard disk firmly in place against the front and top of the HORIZON cabinet.
- 

13. Use two #6-32 x 1/4" screws from the shipping kit to attach the hard disk to the base of the HORIZON as shown in the illustration. Tighten the screws fully.



**Note:** Do not re-use the two screws that held drive #2 to the original disk drive mounting bracket. They are 1/8" too long.

---

14. Set the HORIZON on its base, and recheck all cable connections for a snug fit.
- 
15. Recheck the arrangement of wires on the filter capacitors to make sure that wires of the same color are grouped together and all screws are firmly in place.
- 
16. Remove the ADC brace (2" X 7" flat piece of metal) from the installation kit, and position it with the four slots facing the front of the HORIZON across Drive #1 and the hard disk drive. The screw holes in the ADC brace should be positioned over the front screw holes on Drive #1 and the hard disk drive.
- 

----->

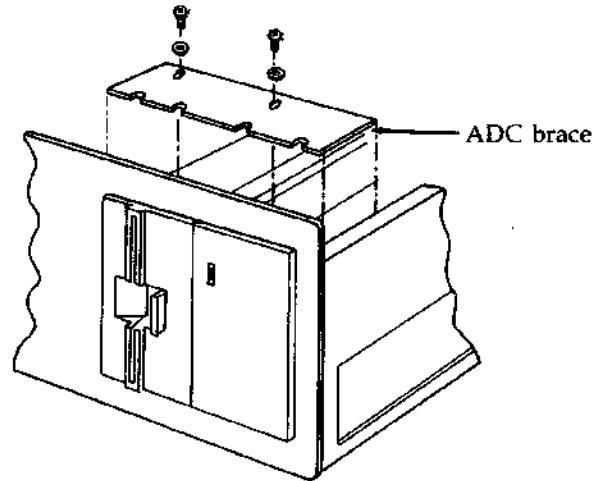
**MOUNTING AND CONNECTING THE HARD DISK DRIVE**  
(cont.)

---

**Procedure:        Mounting and Connecting the Hard Disk Drive**

---

17. Screw the ADC  
brace in place with  
two #6-32 x 1/4"  
screws from the  
installation kit.



---

This completes the procedure for mounting and connecting the hard disk drive.

## FINAL CHECKOUT

---

### Procedure: Final Checkout of the Hard Disk Drive Installation

---

1. Replace the cover on the HORIZON. Make certain that no cables are being pinched as you lower the cover into position.

---
2. Replace the screws and lockwashers that hold the cover in place.

---
3. Plug the power cord into the power receptacle on the back of the HORIZON, and connect the cord to a 3-wire, grounded outlet.

---
4. Reconnect any cables which you earlier disconnected from the back panel of the HORIZON.

---
5. Turn the main power switch ON.

---
6. When the power is turned on, the hard disk drive motor begins to operate. The noise of the hard disk motor is somewhat higher pitched than the sound of the floppy disk drive motor. The light on the front of the hard disk should turn on and stay on.

**Note:** The HD-5 and HD-15 hard disk drives come up to operating speed more quickly than the HD-30. If your HORIZON has an HD-30, you must wait until both lights on the front of the drive stop blinking. Then you can reset your HORIZON. If you reset before the lights stop blinking, booting occurs before the drive is ready and this causes an error message.

---

---->

**FINAL CHECKOUT**  
(cont.)

---

**Procedure: Final Checkout of the Hard Disk Drive Installation**

---

7. If the hard disk does not respond properly when power is applied, take the following steps:
  - o Check the power cord. Make certain that it is connected to a 115V/AC wall outlet, and that it is firmly plugged into the back of the HORIZON.
  - o Check all cable connections inside the HORIZON.

**WARNING**

BEFORE YOU REMOVE THE HORIZON COVER, TURN OFF THE MAIN POWER SWITCH, UNPLUG THE POWER CORD FROM THE WALL OUTLET, AND DETACH THE CORD FROM THE POWER RECEPTACLE ON THE BACK OF THE HORIZON.

8. Remove the HORIZON cover and check the alignment and connections of the power cable and the two ribbon cables. Make sure all the cables are firmly seated.
  9. Reassemble the HORIZON, and turn on the main power switch after the cover is back in place. If the hard disk drive still does not function properly, contact your North Star dealer for assistance.
-

## ADDITIONAL INSTALLATION INFORMATION

---

### **Software Installation**

You are now ready to use your HORIZON. The first thing you should do is format the hard disk and install the operating system software. Specific information about hard disk operating systems (such as HDOS or TurboDOS -- the operating systems available for your HORIZON) may be found in separate manuals.

### **Technical Information**

For detailed technical information refer to the HORIZON Hard Disk Technical Manual, available separately through your North Star dealer.







# Reader Comments

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Please use this postpaid mailer to make us aware of the strengths and weaknesses of this North Star manual. Specific errors or deficiencies should be referenced by page numbers and paragraph headings. Attach additional sheets if you require more space for your comments.

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