



***NeXT™ Hardware Service***

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# **Module 1**

## **Troubleshooting Preparation**

It is just a good idea to organize your workspace, your tools, and your thoughts before jumping into your troubleshooting problem. You may be able to save yourself time and trouble if you follow a few common sense guidelines. In this module you'll develop a set of procedures that you can use in any troubleshooting situation.

### **Objectives**

After completing this module, you'll be able to:

- Identify the proper tools needed to repair your computer.
- Perform troubleshooting procedures following proper safety guidelines.
- Plan a strategy for analyzing, identifying, and correcting the problem.

## Tools of the Trade

Crowbars and dynamite might do the trick, but you'll probably want to use more delicate, less messy tools. Here is a list of tools that we recommend you use to repair your computer, monitor, or printer.

1. Anti-static mat and wrist strap.
2. Nos. 1 & 2 Phillips or cross point screwdrivers
3. 12 inch No. 2 Phillips *for work on printer + monitor*
4. 3mm, & 4mm hex wrenches  
*& monitor to set tilt + tension*
5. Multipurpose scribe; preferably with a right angle point
6. DIP IC extractor *for ROM chip*
7. SIMM memory module puller
8. Digital Multimeter *Power supply*

The SIMM remover and the digital multimeter are not necessarily required, but can be very helpful.

### QUESTIONS

1. What size hex tool will you need to open the cube?
- 

2. Why must you wear an anti-static wrist strap when working on your computer?
- 
-

## **Blazing Trails Through the Hardware**

Troubleshooting flow charts are excellent tools for sequencing, or keeping track of events. Unfortunately, it seems that most of the time such troubleshooting charts are unavailable. However, you can jot down a simple flow chart of the things that you plan to do. This will give you a route to follow and help you keep track of your progress. A map can be invaluable when it comes to backtracking. You can easily get lost or create greater difficulty while troubleshooting. Maps can help you undo what you've done.

Here are some ideas about producing a troubleshooting map:

- Start by making a plan of attack. Try to define a line of inquiry. List a few initial steps of procedure. This will give you a good starting point. You can always amend it later.
- List any error messages created in the initial failure and the circumstances under which they were produced. If no error messages are produced, try to determine when the failure occurs.
- Try to reference error messages if possible. Look for clues in the message. Was the device producing the error listed by its special device driver file? Was a hardware device specifically "called out" in the message?
- Write down the results of each step. If you need to re-evaluate the course you've taken. You can always fall back to the beginning and try a different direction.
- Check off each step of your plan and write each event as it occurs.

Lastly, you might want to keep a log of maintenance and troubleshooting events. This will help provide a history that you can refer to at a later date.

**ACTIVITY**

- ◆ Produce a simple map to isolate the following problem.

System won't boot.

message:

```
Booting SCSI target 1, lun 0
Read: sdcmd bad state: 0
blk 0 boot: sd(1,0,0) sdmach
sdmach: not found
load failed
```

**EXERCISES**

1. Working as a group draft a plan of attack. Create a flow chart that will provide you with a troubleshooting strategy.

Identify the problem.

*sdmach is missing*

reboote mode, see diag, try boot from  
other mode, boot another device, f5ck

Verify the problem. List the steps you follow (or followed) to verify the problem.

---

---

List error messages. Were any specific pieces of hardware identified?

---

---

## Wrap-up

In this module you have identified and designed a plan-of-attack for your troubleshooting process. Use of flow charts and a sequence of steps helps you keep track of your progress and creates very specific information about how and when the failure occurred. You find these tools to be extremely valuable in every troubleshooting scenario.



## Module 2

# Hard Disk Diagnostics

Sometime, somewhere, a hard disk will fail and you may be the lucky victim. When a hard disk catastrophe strikes, you should be prepared to determine the condition of the disk drive. Can you rebuild it? Has a necessary file disappeared? Is it possible to read important user data on the disk? Some steps that you can take to answer those questions can keep the situation from being a total loss.

## Objectives

After completing this module, you'll be able to:

- Isolate a failure to a hard disk.
- Determine the readability of the hard disk.
- Repair a corrupted file system.
- Use the disk rebuilding tools in the NeXT Operating System.
- Compensate for minor media errors.

## References

Unix manual pages for: **ln**, **fsck**, **disk**, **mount**, **umount**, **reasb**

## Defining Symptoms

Software says, "I'm sure it's hardware." Hardware says, "Our stuff is fine. It's gotta be the software." So, where is the problem. Even when a symptom appears obvious, it isn't always. Sometimes you have to look a little deeper than the surface to define the symptom. By looking at error messages and performing some simple tests you solve a great many situations easily.

## Examining Messages

As with all things you need a place to start. A good place to start is to first document any initial error messages that might be present on start-up or during normal operation. Ask yourself a few questions. If the failure occurs during the boot process where, exactly, did it occur? Did the operating system post a message? One very good source of error information is the Console panel. You can select the Console panel from the Tools menu in the Workspace Main menu. Another good place to look is in the file `/usr/adm/messages`. Here you will find all of the messages logged by the system logger.

Here is an example from `/usr/adm/messages`.

```
Dec  7 07:15:39 arizona mach:      SCSI Block in
error = 64 (no valid label)
Dec  7 07:15:41 arizona mach: Target 1: MEDIA
ERROR; block 0H retry 1
Dec  7 07:15:42 arizona mach: Target 1: MEDIA
ERROR; block 0H retry 2
Dec  7 07:15:43 arizona mach: Target 1: MEDIA
ERROR; block 0H retry 3
Dec  7 07:15:44 arizona mach: Target 1: MEDIA
ERROR; block 0H retry 4
Dec  7 07:15:45 arizona mach: Target 1: MEDIA
ERROR; block 0H retry 5
Dec  7 07:15:51 arizona mach: sd0 (0,0): sense
key:0x3 additional sense code:0x1
```

**EXERCISE**

1. In the previous example determine which device failed.

When booting the computer in verbose mode from the ROM monitor you should see an entry for every device in the SCSI chain. If a disk drive does not appear in the list, the kernel is not recognizing the disk. Check the following:

- Power cable installed correctly
- Data Cable installed correctly
- Proper SCSI termination
- Proper SCSI address selection

Refer to Appendix C, **Setting the Hard Disk SCSI Address**, for selecting the SCSI address on your hard disk.

## **Hard Disk Tools**

It may be possible to repair or recover the hard disk without replacing it. Trying a few tests first may save you some time and trouble.

### **Recovering a Hard Disk**

If you can read the hard disk you can probably recover it without replacing it. The chances are also good that you may be able to recover important data from the disk even if you can't completely recover the disk itself. If you can read a hard disk chances are that it is rebuildable. At the very least you might be able to put things back to original condition.

### **Mounting a Disk Device**

If the disk has a Unix file system you can try to manually mount it using the Unix **mount** utility. To do this you must boot from a floppy or optical and mount the hard disk on a directory mount point somewhere convenient in the file system. From here you should be able to browse the hard disk for whatever ails it.

## EXERCISES

1. Login as **root** (or use the **su** utility in a shell window) and start **Terminal.app** in **/NextApps**.
2. For this exercise you will be mounting a floppy disk or an optical disk, but you could do this with a hard disk too. Find your disk below and type the appropriate command.

Optical Disk:	<code>mount /dev/od0a /mnt</code>
Internal Floppy:	<code>mount /dev/fd0a /mnt</code>
External Floppy:	<code>mount /dev/sd1a /mnt</code>

3. Insert the disk when prompted.

## QUESTION

1. Assume that you have booted from a floppy and mounted your hard disk on **/HardDisk**. You have discovered that the boot file **mach** on your hard disk has somehow been erased. Can you recover that file? If so, how?

---

---

2. Which special device file would you have used to mount the hard disk?

---

## Repairing a File System

If you suspect that the file system has been corrupted you can attempt to repair it. You can run the Unix utility **fsck** to correct any inconsistencies in the file system. If your system won't boot, it might be possible to use **fsck** with the **-b** option to specify an alternate superblock. You can use the **disk** utility to find the block number that you will use. Check the Unix manual pages for reference to these utilities.

## EXERCISES

1. Boot the system in single-user mode.
2. Run **fsck** on the root file system. Use the Unix manual page for **fsck** as your guide. When you have finished reboot your system.
3. (Optional) Boot your computer in a normal fashion. Log in and make some changes to a file. Without saving the file, pull the power plug. Then, boot in single-user mode and re-run **fsck**. What errors did **fsck** find?

**Tip:** Make sure that you respond to all **fsck** questions with **y**.

---

---

---

## QUESTIONS

1. What procedure would you use direct **fsck** to use an alternate superblock to repair a corrupted file system? (Hint: Use the Unix manual page for **fsck**.)
- 
- 

2. Where does **fsck** place orphaned files?
- 
-

## Circumventing Minor Media Errors

The following example shows a media error. You may see these in the console window from time to time. These are caused by spots on the physical disk drive media (oxide) cannot be recorded on or read from. In most cases you can compensate for media errors. Using the Unix utility `/usr/etc/reasb` will allow you to bypass media errors.

```
Oct 17 17:22:27 sanandreas mach:      SCSI Block
in error = 0 (no valid label)
Oct 17 17:22:28 sanandreas mach: Target 0: MEDIA
ERROR; block 40H retry 1
Oct 17 17:22:29 sanandreas mach: Target 0: MEDIA
ERROR; block 40H retry 2
Oct 17 17:22:30 sanandreas mach: Target 0: MEDIA
ERROR; block 40H retry 3
Oct 17 17:22:32 sanandreas mach: Target 0: MEDIA
ERROR; block 40H retry 4
Oct 17 17:22:33 sanandreas mach: Target 0: MEDIA
ERROR; block 40H retry 5
Oct 17 17:22:34 sanandreas mach: Target 0: MEDIA
ERROR; block 40H retry 6
Oct 17 17:22:35 sanandreas mach: Target 0: MEDIA
ERROR; block 40H retry 7
Oct 17 17:22:36 sanandreas mach: Target 0: MEDIA
ERROR; block 40H retry 8
Oct 17 17:22:38 sanandreas mach: Target 0: MEDIA
ERROR; block 40H retry 9
Oct 17 17:22:39 sanandreas mach: sd1 (4,0):
sense key:0x3 additional sense code:0x12
```

### EXERCISES

- ❖ Use the Unix manual page to list the syntax of `/usr/etc/reasb` to reassign block number 64 on your floppy disk.
- 

### QUESTIONS

- ❖ What is the potential problem listed in the Unix manual page for `/usr/etc/reasb`? (Hint: Bugs).
- 
-

## Using the *disk* Utility

The Unix utility `/usr/etc/disk` can be used to analyze your hard disk drive. The `disk` can be executed from the command line with the syntax: `/usr/etc/disk [ option flags ] [ action flags ] raw-device`

### ACTIVITY

1. Log in as root.
2. Execute the `disk` utility by typing the following:

```
/usr/etc/disk /dev/rsd0a
```

3. Type a “?” at the `disk>` prompt.

### QUESTIONS

1. Which command would be appropriate for performing a low-level format of the hard disk?

---

2. Which command(s) would be appropriate for writing a new disk label and installing a boot program?

---

## BuildDisk

You may find it impossible to read your hard disk. However, it does not mean that all is lost. It still may be possible to restore the disk to its factory state. To do this you have to run one of the disk building tools, `/NextAdmin/BuildDisk` or `/usr/etc/builddisk`. Refer to the *NeXTSTEP Network and System Administration Manual* and the Unix manual pages for details on running these programs.

### ACTIVITY

(Optional) Setup a NetBoot Cluster and run `/NextAdmin/BuildDisk` on the NetBoot client. Refer to Chapter 13: NetBooting, *NeXTSTEP Network and System Administration Manual*.

## **Replace It**

If the disk is unreadable, or otherwise unsalvageable, you must replace it. Call NeXT Service Operations to obtain a return material authorization number (RMA). Ensure that you properly package your disk drive before shipment.

### **EXERCISE**

1. Use the appropriate job aid in Appendix B to remove the hard disk from your computer.
2. Verify that the SCSI address is set properly using Appendix C, **Setting the Hard Disk SCSI Address**.
3. Reinstall the hard disk in accordance with the appropriate job aid in Appendix B.
4. Verify proper operation.

## **Wrap-up**

In this module you have used a few simple tests to help you define the problem with your disk drive. Testing readability of the hard disk by using these simple tests could possibly get up and running in short order. Rebuilding or repairing the filesystem of the hard disk could prevent you from having to order and install another hard disk.

## **Module 3**

# **A View of the LandScape**

Let's take a look around the various system boards that are found inside NeXT computers. The information here may come in handy when someone looking over your shoulder asks, "What is that big porcupine lookin' thing?" You might want to be able to tell them, especially if the onlooker is your boss. Besides, knowing a few individual parts helps us understand and appreciate the technology a little better.

### **Objectives**

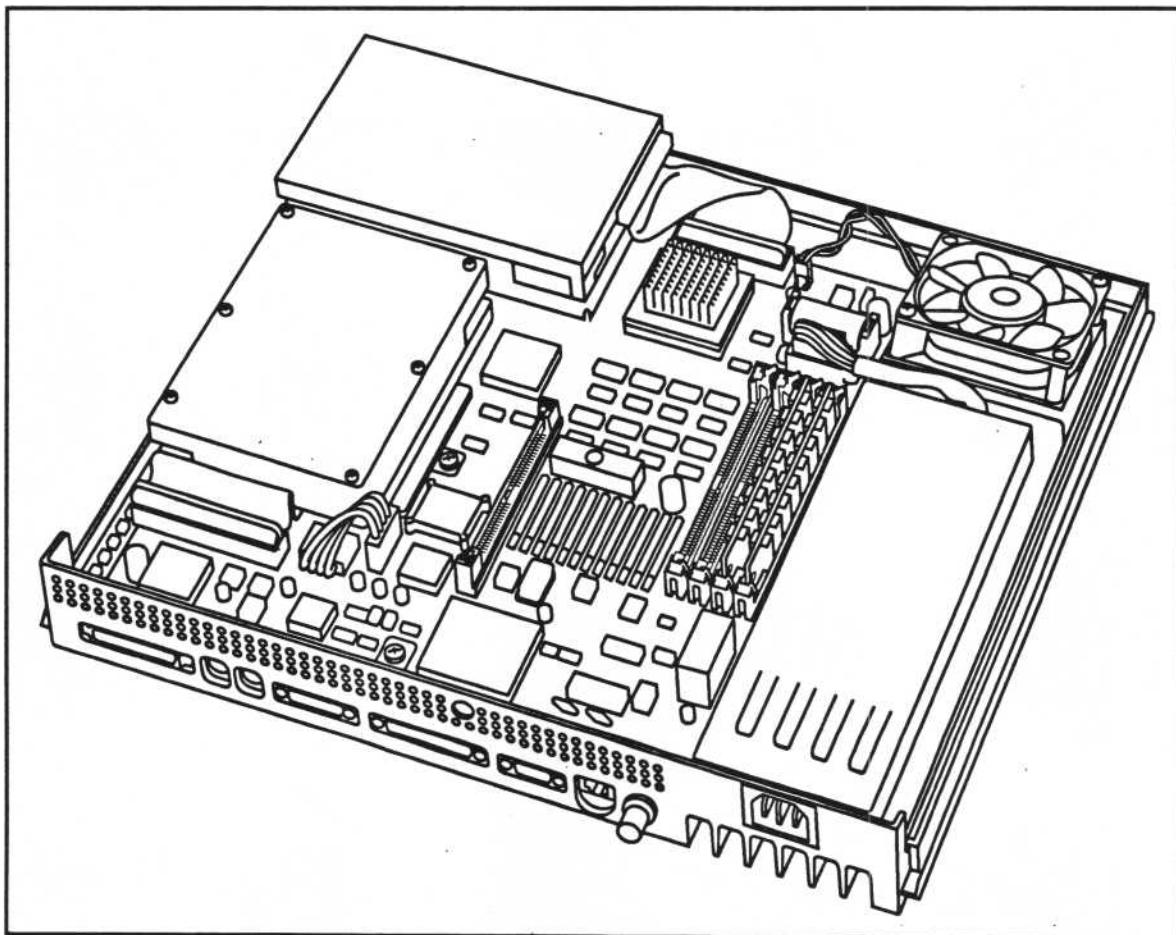
After completing this module, you'll be able to:

- Identify individual components and subassemblies of the NeXTstation™ and NeXTcube™ computers.

## Under the Hood

The NeXT computer's main unit consists of several tightly integrated subsystems. These include the CPU board, the hard disk, the floppy disk, and the power supply. All of these subsystems are housed in a black plastic covered, magnesium case. This case technology provides excellent shielding of radio frequency interference from within and without.

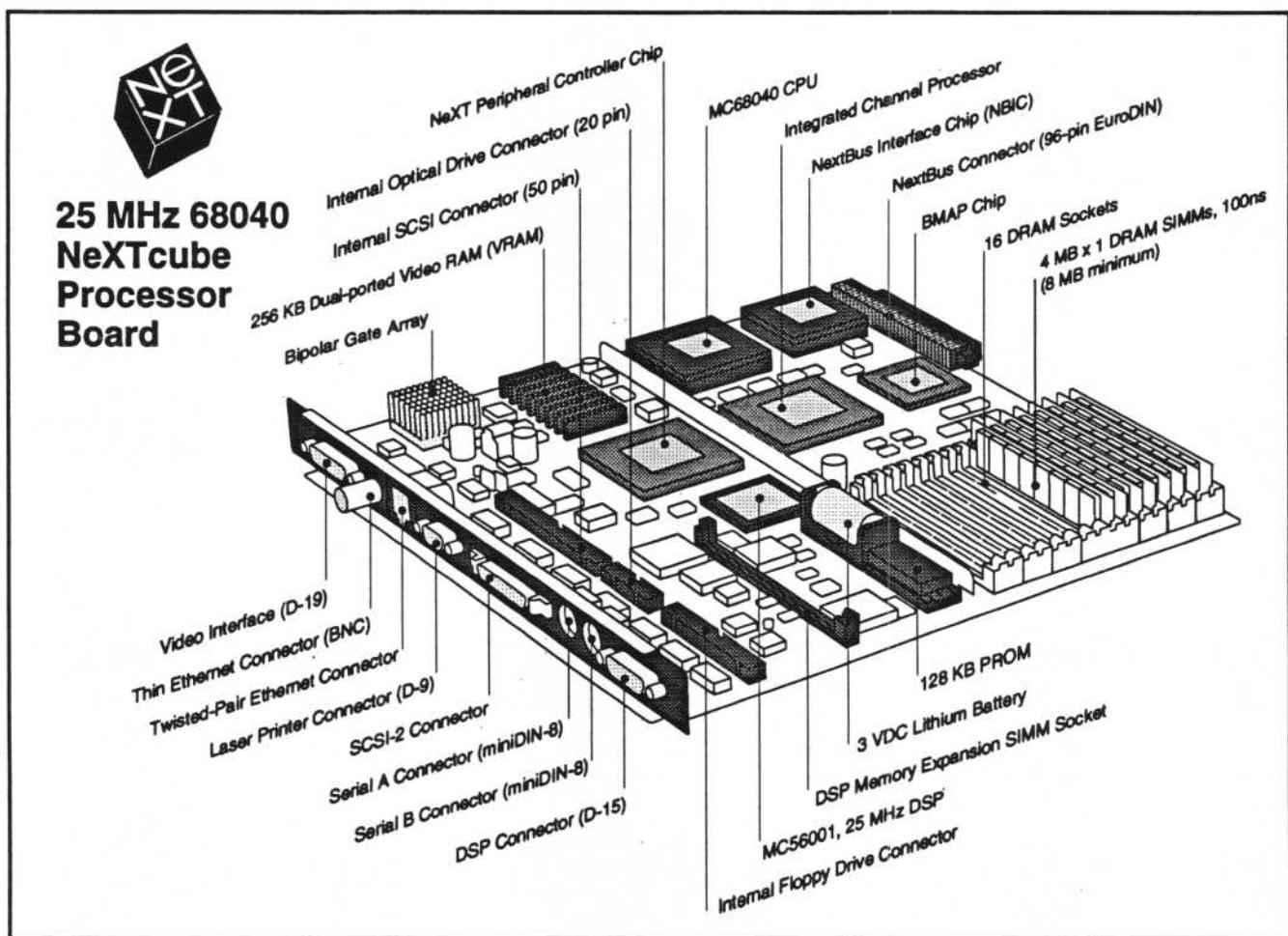
Each subassembly is designed for efficient serviceability. In most cases, the removal of just one screw is enough to remove the part. Structural integrity is maintained by aligning pins and guides in the case or by fastening one subassembly to another to form a rigid framework. All cubes and stations are identical in terms of removal and replacement. No matter which version of hardware you have purchased.



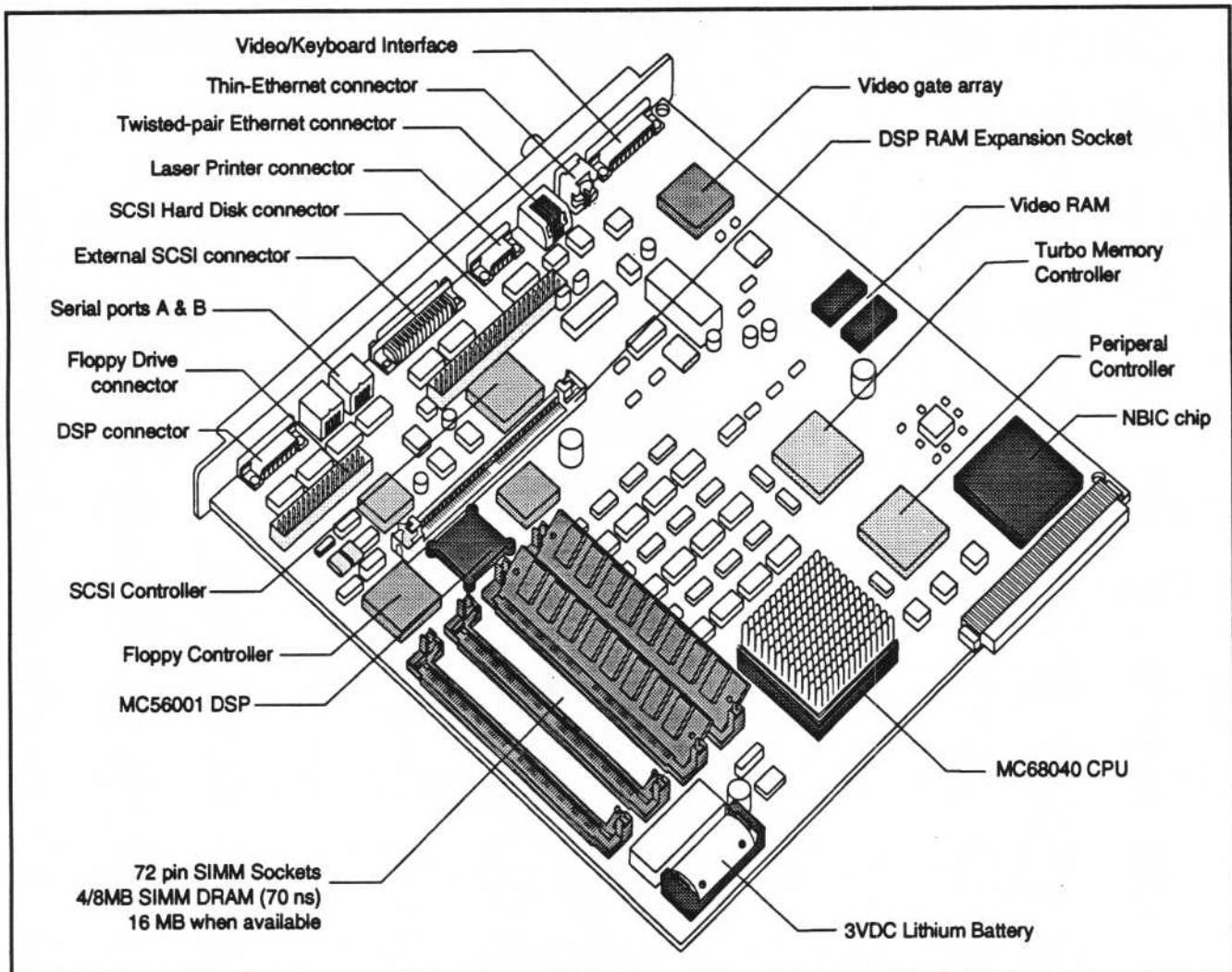
## The NeXT CPU board

NeXT CPU boards are technically excellent. They are fine examples of high quality engineering and manufacturing. Large numbers of circuits have been integrated into custom Each CPU is produced in our robotic factory in Fremont, California. The production robotics include: surface mount solder mask stenciling; optically aligned, surface mount component pick and place, through-hole component pick and place, surface mount soldering oven, and through-hole soldering wave. Each robot is monitored by NeXT manufacturing employees to ensure precision and quality.

25MHz NeXTcube CPU Diagram



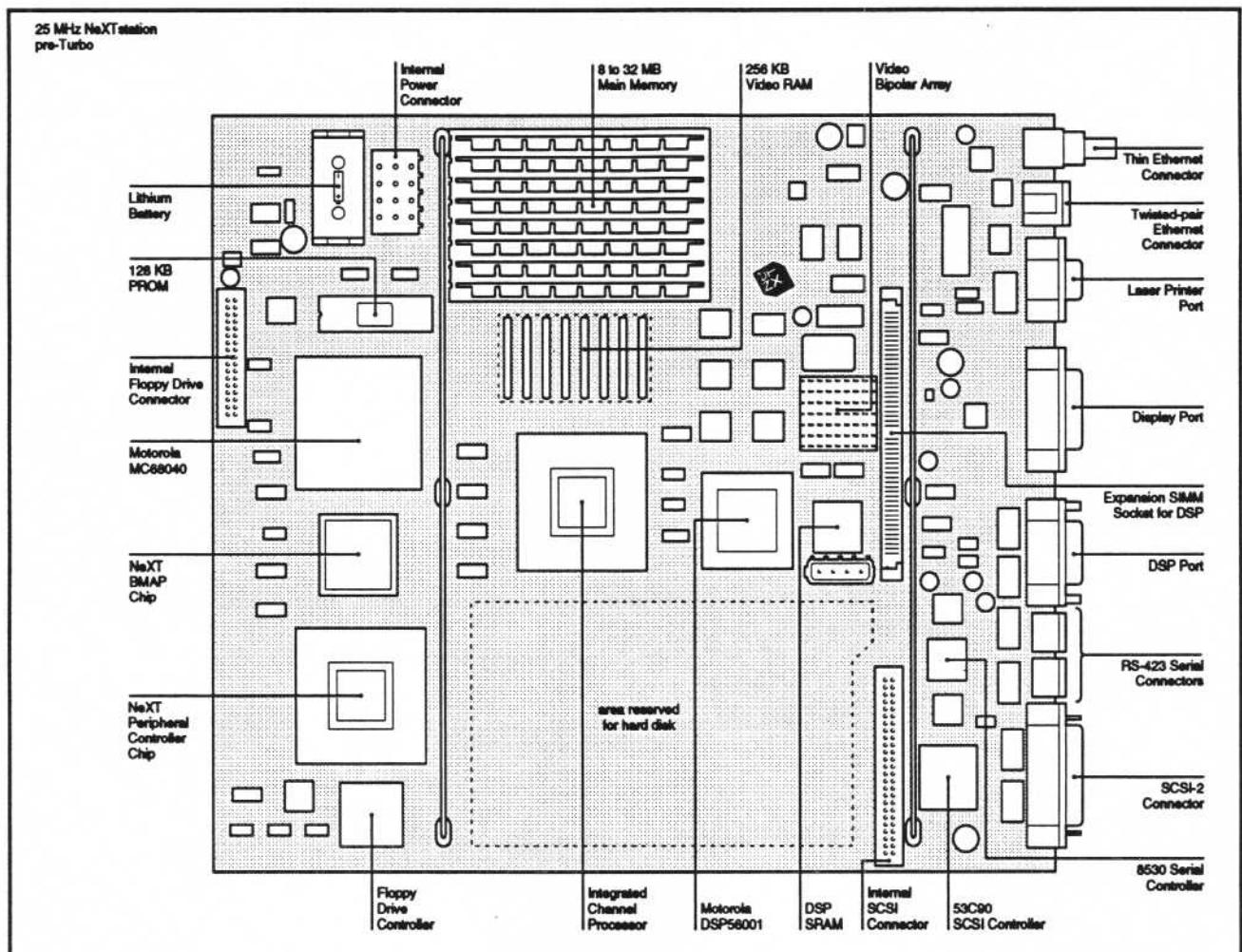
## 25 & 33 Mhz NeXTcube Turbo CPU Diagram



### Features of the NeXTcube Turbo

- 25 or 33 MHz CPU clock rate
- Compatible with 8, 16, or 32 MB SIMMs; interleaved memory architecture; 8-128MB memory capacity
- Significant reduction in linear IC population

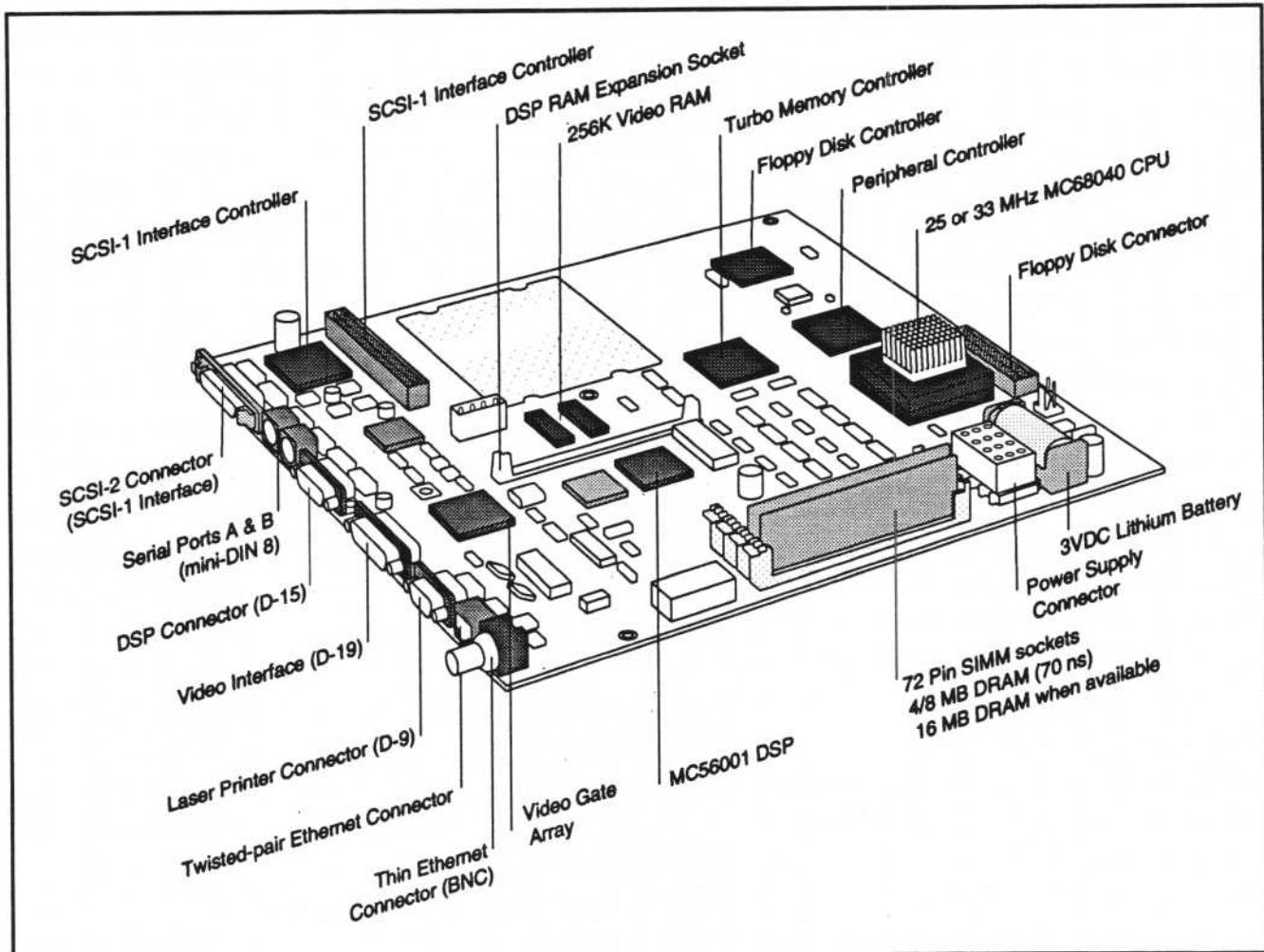
## 25 MHz NeXTstation



### Features of the first generation NeXTstation

- 25 MHz clock rate
- 1 or 4 MB SIMMs compatibility; non-interleaved memory; 8-32 MB capacity
- First NeXT “pizza box”

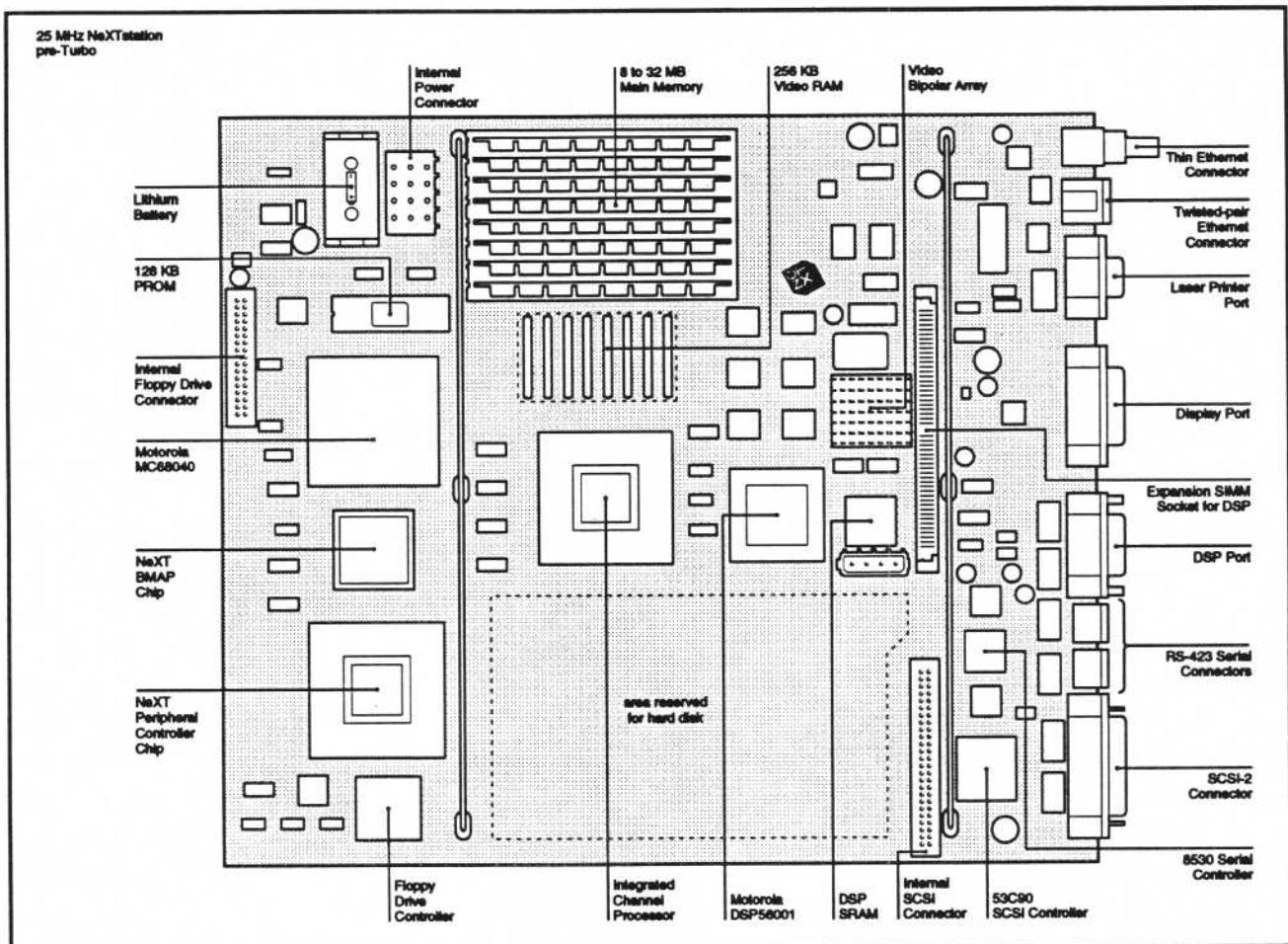
## 25 MHz & 33MHz NeXTstation Turbo



### Features of the NeXTstation Turbo

- 25 or 33 MHz CPU clock speed
- 4, 8, 16 or 32 MB SIMM compatibility; 8-128 MB capacity; interleaved memory architecture
- Greater throughput; 25 MHz Turbo is 15% faster than 1st generation 25 MHz NeXTstation
- Significant reduction in IC population

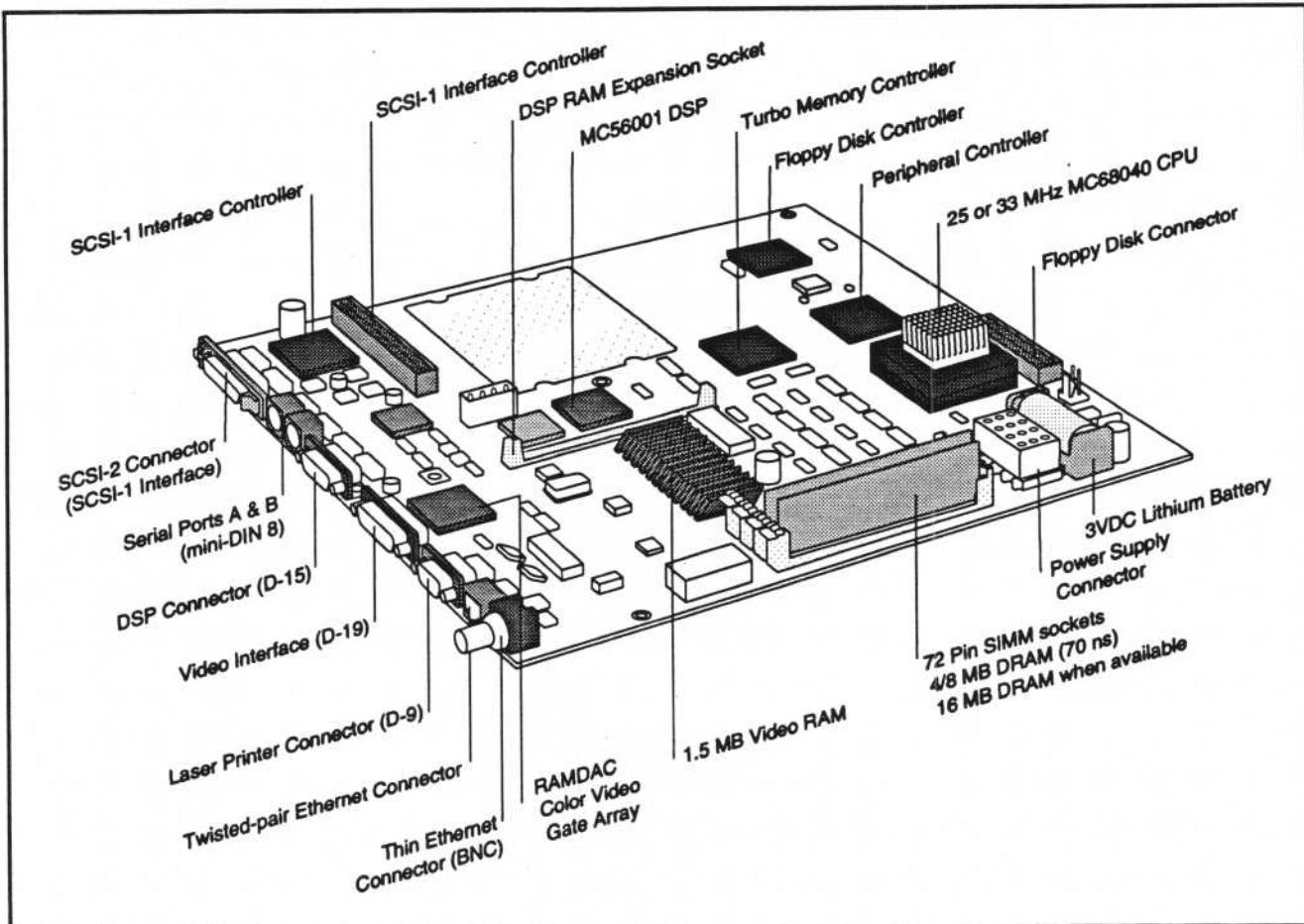
## 25MHz NeXTstation Color



### Features of the 1st generation NeXTstation Color

- 25 MHz CPU clock rate
- 1.5 MB of static RAM memory for 12 bit color video (4096 colors)
- 12-32 MB interleaved memory
- Brooktree RAMDAC for multilevel color output

## 25 MHz & 33 MHz NeXTstation Turbo Color



### Features of the NeXTstation Turbo Color

- 25 or 33 MHz CPU clock speed
- 4, 8, 16 or 32 MB SIMM compatibility; 16-128 MB capacity; interleaved memory architecture
- Greater throughput; 25 MHz Turbo Color is 15% faster than 1st generation 25 MHz NeXTstation Color
- Significant reduction in IC population

**ACTIVITY**

1. Follow the instructions given in the appropriate job aid in Appendix B for removing the CPU board in your system.
2. Compare a NeXTcube CPU with a NeXTstation CPU.
3. Compare your CPU with the diagrams in the preceding pages.
4. Follow the instructions in the appropriate job aid to reinstall the CPU board.

**Wrap Up**

NeXT hardware engineering philosophy continues to lead the computer industry in terms of integration, reliability, and serviceability. Performance enhancements have not sacrificed serviceability. Each NeXT computer has been thoughtfully designed to provide minimum downtime and maximum upgradeability.



## **Module 4**

# **Memory Diagnostics**

Wow! Things are looking bright. The boss just sprung from those badly needed memory upgrades. Now people trying to run FormRaker and Annihilistrator at the same time will most certainly be pleased. Unfortunately, after installing the new memory you encounter a "System Test Failed" on the display of one of the systems. Now it is time to figure out which SIMM has failed.

The NeXT system, through the ROM monitor, gives you all of the information that you will need to find the offending gismo. In this module you will use the data in the ROM monitor display to isolate a failed SIMM module. You will also learn proper technique for removing and replacing SIMMs.

### **Objectives**

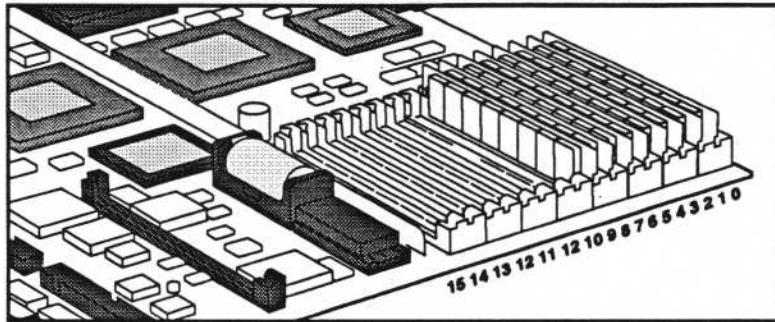
After completing this module, you'll be able to:

- Isolate a memory failure to an individual SIMM.
- Repair the damaged memory system using proper removal and installation techniques.

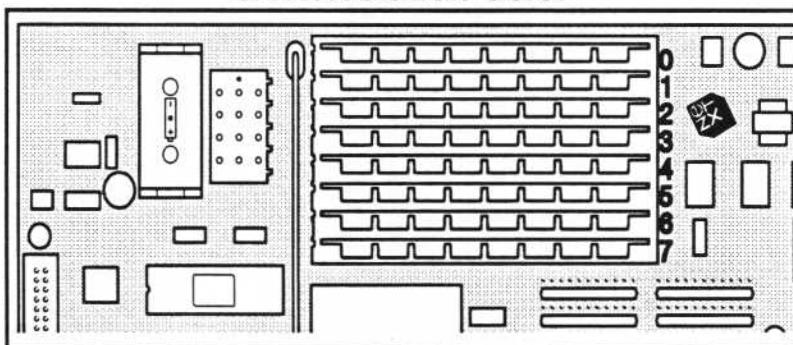
## Physical Layout

Here are a few diagrams showing the physical location and slot numbering of the SIMMs in NeXT computers. Use the edge of the CPU board to help you orient the SIMM sockets.

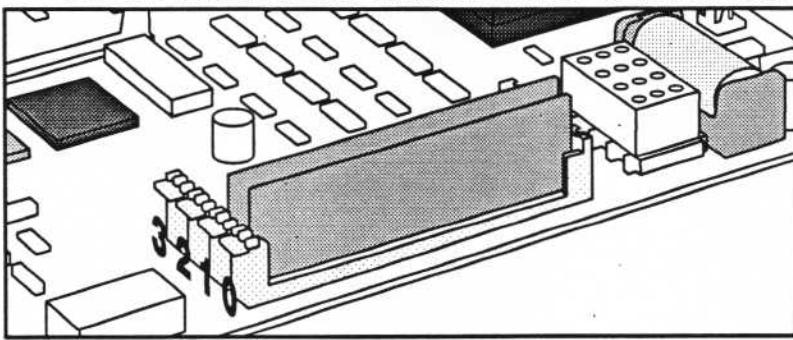
**1st Generation 25 MHz NeXTcube**



**1st Generation 25 MHz NeXTstation & NeXTstation Color**

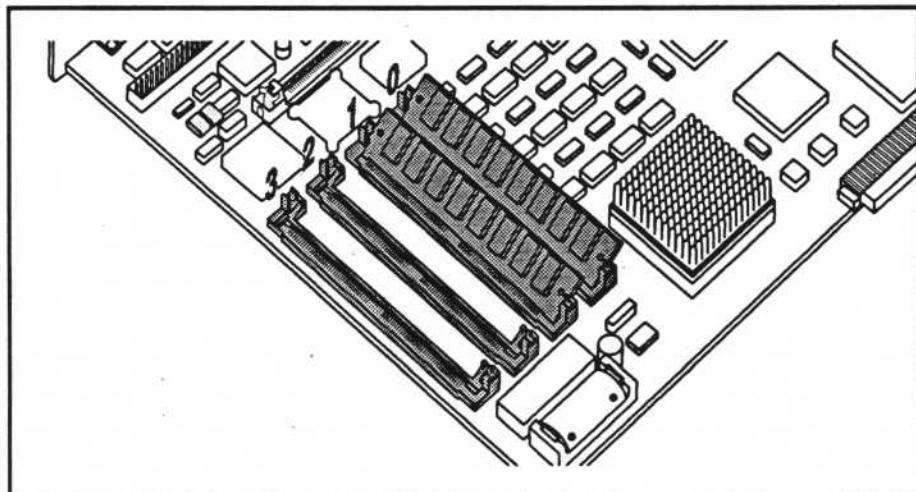


**25 & 33 MHz NeXTstation Turbo & Turbo Color**



## Physical Layout (cont'd)

25 & 33 MHz NeXTcube Turbo



## Memory Arrangement

In the 1st generation NeXT computers memory is arranged in sets of 2 or 4 SIMM slots. The NeXTcube, monochrome NeXTstation, and the NeXTdimension all have SIMMs arranged in groups of 4. In these computers a bank of memory will not operate with less than 4 SIMMs. The original NeXTstation Color operates an interleaved memory system that has its SIMMs arranged in sets of 2 SIMMs. All of the Turbo systems have their SIMMs arranged in pairs.

SIMMs in a particular bank must be identical in speed, capacity, and electrical characteristics. However, each bank may be different than the others. If, for example, you were upgrading an 8 MB system to 20 MB, you could install 4, one megabyte SIMMs in one bank and 4, four megabyte SIMMs in another. It is possible, though not recommended, to mix speeds between banks as well.

Below is a table that correlates memory address assignments and SIMM slots.

### Memory Arrangement

<b>Computer</b>	<b>Slot #s</b>	<b>Bank #</b>	<b>Memory Address Range</b>	<b>Max. Amount of Memory</b>
NeXTcube	0-3	0	4000000H - 4fa0000H	16 MB
	4-7	1	5000000H - 5fa0000H	16 MB
	8-11	2	6000000H - 6fa0000H	16 MB
	12-15	3	7000000H - 7fa0000H	16 MB
NeXTstation	0-3	0	4000000H - 4fa0000H	16 MB
	4-7	1	5000000H - 5fa0000H	16 MB
NeXTstation Color	0-1	0	4000000H - 47effffH	8 MB
	2-3		47d0000H - 4fa0000H	8 MB
	4-5	1	5000000H - 57effffH	8 MB
	6-7		57d0000H - 5fa0000H	8 MB
All Turbo Systems	0	0, 1, 2, 3	4000000H - 7fffffH	32 MB
	1			32 MB
	2	4, 5, 6, 7	8000000H - bfffffH	32 MB
	3			32 MB

### Verbosity of POST (Power On Self Test)

You won't have to go far to find where the memory problem exists. When the system first powers up it runs a series of tests to verify that the hardware works in, at least, some basic form. If the ROM monitor is set to "verbose mode," the computer will report what it is testing and will display any error output. Verbose mode can be a great deal more useful than the "icon animation" mode.

When you have "icon animation" mode set a "System Failed" banner will replace the "Testing System" banner if there is a problem during POST.

In "icon animation mode" the presentation of the "System Failed" message gives way to the ROM monitor display. You may see an error message like the one below.

```
Coupling dependant memory fault!
Error at memory location: 64404e8
Value at the time of failure: aaabaaaa
One or more SIMMs in bank 2 is bad
```

This message contains everything that you need to figure out which SIMM has failed.

### **What's in the Message**

The interpolation of the error message differs between the 1st generation NeXT computers and the Turbo systems. This is due to changes in the memory architecture in the Turbo computer. The Turbo uses an interleaved memory system as opposed to the page mode memory system of the 1st generation system.

### **1st Generation NeXTstation and NeXTcube**

Finding exactly which SIMM has failed takes a little detective work. The error location posted in the ROM monitor display indicates which bank holds the failed SIMM and the "value" is used to identify which SIMM has failed.

In the 1st generation 68040 CPU the ROM monitor displays a line in the error message lets you know what bank has the failed SIMM. You might see the following.

```
One or more SIMMs in bank 2 is bad.
```

If you really want to impress your friends you can use the failure address to figure out which memory bank holds the bad SIMM.

```
Error at memory location: 64404be8
```

Banks are significant in older monochrome systems because memory slots are grouped in banks. Use the following table to identify the indicated bank. Find the range in which the bad memory location falls.

Bank #	Address Range	Slot #s
Bank 0	4000000 - 4fffffff	0 - 3
Bank 1	5000000 - 5fffffff	4 - 7
Bank 2	6000000 - 6fffffff	8 - 11
Bank 3	7000000 - 7fffffff	12 - 15

The table shows that 64404e8 is in bank 2. This bank is comprised of SIMM slots 8, 9, 10, & 11. So, one of these SIMMs is bad.

### So, Which SIMM is Bad?

Once you have narrowed down the possible slots you need the “value at the time of error” to show which SIMM actually failed.

The Power On Self Test will attempt to write one of several repeating patterns and then verify the results. First, start by grouping the value into four pairs of letters (bytes).

aa | ab | aa | aa

Then focus on the bad byte. In this case the third byte from the right that is bad. Each byte of this test pattern is stored in a different SIMM within the bank. The value on the right corresponds to the lowest number SIMM; the value on the left, the highest. For example:

11      10      9      8  
aa | ab | aa | aa

The bad third byte indicates that the SIMM in slot 10 is bad.

## Examples of Test Patterns

Here are some of the test patterns that POST will try to write.

00000000  
ffffffffff  
12345678  
87654321  
55555555  
aaaaaaaa  
db6db6db  
b6db6db6

Each of these can be represented by a series of 32 ones and/or zeros.

For example:

0	1	5	6	a	b	d	f
0000	0001	0101	0110	1010	1011	1101	1111

## **NeXTstation Color and NeXT Turbo Systems**

The only significant piece of the error message for the old Color or the Turbos is the error location.

Error at memory location: 5404be8

These computers use an interleaved memory system such that SIMMs are grouped in pairs. One SIMM stores the odd memory addresses the other stores the even addresses.

The least significant nibble (last digit) tells you whether the odd or even SIMM failed.

**If the nibble is:**

0 - 3                      Even

4 - 7                      Odd

8 - ~~b~~                      Even

~~6~~ - f                      Odd

The tables on the following page tell you which SIMM is odd and which one is even.

5404be8 tells us that one the SIMMs in slots 4 or 5 of the NeXTstation Color is bad. If this computer is a NeXTstation Turbo then one of the SIMMs in slots 0 or 1 is bad.

The least significant nibble is "8," so, an even SIMM is the one that failed. In the NeXTstation Color the failed SIMM is in slot 4. In a Turbo system the failed SIMM is in slot 1.

## NeXTstation Color

Slot #	Failure Address Range	Odd or Even
0	4000000 - 4e7ffffH	Even
1	4000000 - 4e7ffffH	Odd
2	47D0000 - 4fa0000H	Even
3	47D0000 - 4fa0000H	Odd
4	5000000 - 5e7ffffH	Even
5	5000000 - 5e7ffffH	Odd
6	57D0000 - 5fa0000H	Even
7	57D0000 - 5fa0000H	Odd

## All NeXT Turbo Systems

Slot #	Failure Address Range	Odd or Even
0	4000000 - 7fffffffH	Odd
1	4000000 - 7fffffffH	Even
2	8000000 - bfffffffH	Odd
3	8000000 - bfffffffH	Even

## Test Yourself

### QUESTIONS

1. A NeXTcube Turbo fails its POST and displays the following message. Which SIMM should be replaced?

Coupling dependant memory fault!  
Error at memory location: 9d505e5  
Value at the time of failure: db90db90

odd

*Slot 2*

2. Which slot numbers in a 1st generation NeXTstation constitute bank 1?

*4-7*

3. Use the following error message to determine which SIMM is bad in a 1st generation NeXTcube. Which slot number has the bad SIMM?

Coupling dependant memory fault!  
Error at memory location: 7c403e9  
Value at the time of failure: b6|b6db6

3 ban

*14 15 19 13 12*

## Just Do It

### ACTIVITY

Generate your own memory error so that you can get actual output from the computer. You will be removing and replacing memory, so be sure to use your ant-static mat and wrist strap.

1. Remove the cover from the computer.
2. Select any group of SIMMs. Make sure to remove all SIMMs in a bank or group. *Be very careful not to break or damage the*

*SIMMs or sockets. See your instructor if you are unsure of how to use the “SIMM removal tool.”*

3. Select one SIMM from the group and place a very narrow piece of scotch tape on pin 10. Make sure that the sliver of tape only touches pin 10 and covers the contacts on both sides of the printed circuit board.

4. Shuffle the SIMMs and reinstall them.

**QUESTIONS**

- ◆ What error message did you receive when you powered up.

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5. Move the “failed” SIMM to a new location. What new message did you receive?

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**ACTIVITY**

6. Remove the tape from the “bad” SIMM and reinstall all of your memory.
7. Replace the cover and test the system to ensure that it still works.

## **Compatibility and Interchangeability**

Memory is not necessarily interchangeable between systems. For example the NeXTstation Color and the Turbo systems have compatible memory, but their SIMMs will not fit in the older Cubes and monochrome NeXTstations. Even though SIMMs in NeXTstation Color are physically compatible with the Turbos, the new computers are likely to have performance problems if the slower memory from an older color computer is installed.

Also, you should only use memory from manufacturers that are specifically qualified by NeXT. Using "off-brand" memory is very likely to bring you grief.

Refer to Appendix D, **SIMM Compatibility Chart**, to determine which SIMMs to use.

## **Wrap-up**

In this module you have discovered how to use the ROM monitor error message display to troubleshoot memory failures. With the information in this display you can determine exactly which SIMM has failed and replace it using proper anti-static safety precautions.

## **Module 5**

# **NeXT Monitors**

There are a few things that you can check before you send that dim monitor back for repair. It may be possible to adjust the brightness or the contrast; or correct the focus. There are other adjustments that you can do, as well. In addition to adjustments, there are some parts that can be replaced in the field. Careful and thorough procedure might save you time and money.

In this module you will learn how to perform these adjustments and how to replace all replaceable parts. Plus all of the proper safety precautions to take.

### **Objectives**

After completing this module, you'll be able to:

- Perform all available monitor adjustments.
- Remove and replace field replaceable parts.
- Analyze problems associated with NeXT monitors.

## Adjust It

All of the adjustments that can be performed are accessible on the back of the MegaPixel Display™. The adjusters behind the bucket of the display.

### EXERCISE

In this exercise you will open the back of the display and perform all field adjustments available to the service engineer.

**Note:** These adjustments only apply to the NeXT MegaPixel Display™. There are no internal field adjustments possible on the NeXT 17" and 21" color displays.

Here is a list of what the controls adjust.

Cutoff	Adjusts black level
White Level	Adjusts white level
Focus	Sets primary focus
Width	Adjusts horizontal size
V Height	Adjusts vertical size
H Cent	Sets horizontal display position
V Cent	Sets vertical display position
V Lin	Adjusts the aspect ratio

**Warning:** Fatally high voltages are present. Use extreme caution when working on open display systems. Remove any anti-static wrist straps or jewelry before attempting to work on computer displays.

1. Disconnect all cables from the rear of the monitor.
2. Remove the four hex screws that attach the bucket and remove the bucket.
3. Reattach the cables and power the system on.

4. Load USMonitor\_Adjust.tiff. If you don't have access to this file see your instructor.

**Note:** USMonitor\_Adjust.tiff is a picture file that is the size of an 11 by 8.5 inch landscape page with some 12 point text and concentric squares. You can use any style of display to adjust brightness and focus. The standard size page display of the monitor adjustment file assists in adjusting proper display size.

5. Use the lower corner drag handles to increase the TIFF window until the scroll bars disappear.
6. Adjust the Cutoff control by turning it counter clockwise until the black margin of the display turns gray. Adjust Cutoff clockwise until the gray disappears. Turn Cutoff clockwise again 1/8 - 1/4 of a turn. If the display darkens too much, readjust Cutoff to desired threshold.
7. Adjust White Level for desired brightness.
8. Use H Cent and V Cent to set the position for the center of the display.
9. Place a sheet of 8.5 x 11 inch paper on the display face, such that it covers the image. The sheet of paper should exactly align with the TIFF image.
10. Use the Width and V Height adjustors if the image does not align with the sheet of paper.
11. Remove the sheet of paper and use the Focus control to adjust the focus of the text in all quadrants of the display.

## Repairing Monitors

If the adjustments are not enough to produce satisfactory output, there may be more serious damage. Other than sending the whole monitor in to the factory, the only other replaceable component is the L-board.

There are no test points that can be used to measure voltages, currents, etc. The best way to verify the condition of the L-board is to swap it with a known working one.

### EXERCISE

- ◆ In this exercise you will remove and replace the L-board.

**Warning:** Extremely dangerous voltages may be present even when power is not. Be sure to remove all jewelry. Follow all safety precautions carefully.

There have been three versions of the MegaPixel Display™. Maintenance-wise they only differ slightly. You instructor will point out the differences.

1. Power off the computer and remove all cables from the monitor.
2. Follow the procedure in the MegaPixel Display Job Aid in Appendix B for bleeding the anode voltage and removing the L-board.
3. Reassemble the monitor.

**Warning:** When reassembling the monitor make absolutely certain that anode cap is installed properly with both prongs inserted into the hole. The bleeder resistor that normally bleeds the anode voltage will not be in the circuit if the anode is not installed correctly. If the monitor is powered with the anode cap incorrectly installed, you will have to manually bleed the anode before handling the monitor.

### QUESTION

- ◆ What system functions, other than video, could be affected by the L-board?

## Wrap Up

In this module you learned how to adjust the MegaPixel Display™ crisp, precise output. You also learned how to remove and replace subassemblies of the MegaPixel display.



## **Module 6**

# **NeXT 400 DPI Printers**

In this module we will investigate some common printer malfunctions and remove and replace printer subassemblies.

### **Objectives**

After completing this module, you'll be able to:

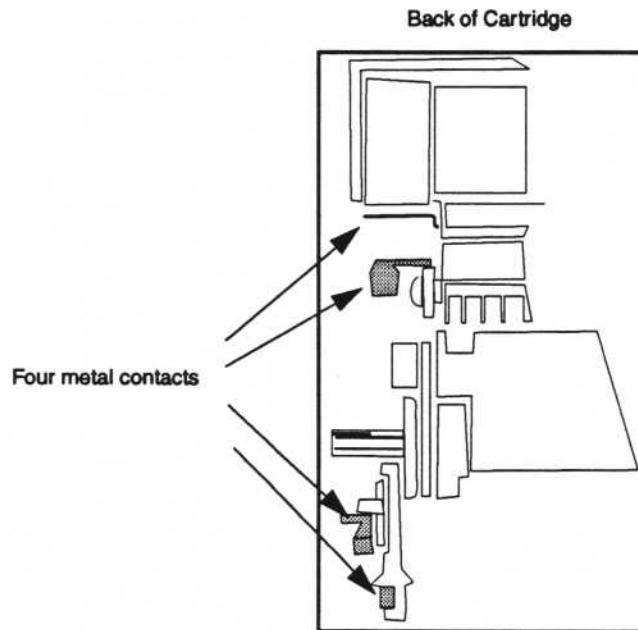
- Follow procedures listed in the Laser Printer Service manual for troubleshooting common printer malfunctions.
- Remove and replace field replaceable parts in accordance with the Laser Printer Service Manual.

## Output Quality Problems

A substantial number of image defects occur with the toner cartridge. It is quite common, these days, to buy replacement toner cartridges from remanufacturers. If this is the case where you work, make sure to get a full replacement warranty in writing. Though, refurbished cartridges usually work well, every-now-and-then you might get one that doesn't work so well. If that happens be sure and get your money back.

### ACTIVITY

- ◆ Remove the toner cartridge from the printer. Turn the cartridge upside down. Notice the four metal contacts along one side. Place a piece of scotch tape on each contact, one at a time and describe the output below. Locate the bad output in the service manual.



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## Paper Jams

Paper jams can be caused by problems ranging from fault sensors to environmental factors. Make sure that you follow the troubleshooting table in the Laser Printer Service manual for paper jams.

### QUESTIONS

1. What are the three major sections for paper transport?

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2. Which printed circuit boards, if faulty, are likely to cause paper jams?

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3. Which roller assembly might be a problem if the printer doesn't pick up paper?

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## Repairing the Printer

It's time to remove and replace some parts.

### ACTIVITY

- ◆ Using the Laser Printer Service Manual remove all assemblies necessary for removal of the DC Drive Motor. Show your instructor when you have removed all parts.
- ◆ Replace all parts and test printer.

**Note:** You will lose points if there is any spare hardware or if the printer doesn't work.

## Wrap Up

In this module you investigated several output quality problems and paper jam symptoms. You also got a chance to remove and replace several parts. Hopefully, reassembly went smoothly, the printer still works, and there are no spare parts. Of course.

Now you have a firm grasp of how to use the Laser Printer Service Manual. It will be invaluable in helping you to troubleshoot and maintain your NeXT Laser Printer.

## **Appendix A Answers**

This appendix contains answers to selected questions and exercises from the modules. Only those questions and exercises having a specific answer are dealt with here.

### **Module 1: Troubleshooting Preparation**

#### **Tools of the Trade**

#### **QUESTIONS**

1. 3 mm
2. To protect the equipment from the effects of electrostatic discharge.

## **Module 2: Hard Disk Diagnostics**

### **Defining Symptoms**

- 1.** The SCSI disk "sd0." The last line of the message shows that "sd0 (0,0) is the failed device.

### **Mounting a Disk Device**

- 1.** The mach is actually a link file. Once the hard disk has been mounted you can recreate any needed files on it.
- 2.** /dev/sd0a

### **Repairing a File System**

- 1.** Use newfs or disk to find a valid alternate superblock. Use fsck -b to repair the file system with the alternate superblock.
- 2.** In the /lost+found.

### **Circumventing Minor Media Errors**

- 1.** Some SCSI drives will fail because they do not implement the reassign block function. Also, the disk may run out of spare blocks if blocks in a particular area are reassigned too many times.

## **Using the disk Utility**

- 1. init**
  
- 2. label, boot**

## **Module 4: Memory Diagnostics**

### **Test Yourself**

- 1.** The SIMM in slot 2.
- 2.** Slots 2 & 3.
- 3.** The SIMM in slot 14

## **Module 6: NeXT 400 DPI Laser Printers**

### **Paper Jams**

- 1. Pickup section, Separation and feeder section, Fixing and delivery section**
- 2. Driver Sensor PCB, DC Controller PCB**
- 3. Pickup roller**



# **Replacing a NeXTstation™ and NeXTstation Turbo™ Processor Board**

**April 1992**



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NeXT Computer, Inc., 900 Chesapeake Drive, Redwood City, CA 94063.

Manual written by Robin Goodwin

Illustrations by Nancy Serpiello

Revised by Terry Williams

Replacing the processor in a NeXTstation™ or a NeXTstation Turbo™ computer takes about 20 minutes and consists of the following steps:

1. Opening the computer
2. Removing the disk drives
3. Replacing the processor board
4. Reinstalling the disk drives
5. Closing the computer
6. Verifying system operation

**Warning:** The processor board, disk drives, and other components in the NeXTstation and the NeXTstation Turbo computer can be damaged by static electricity. Always wear a grounded static wrist strap and practice appropriate static-safe procedures when working inside the computer.

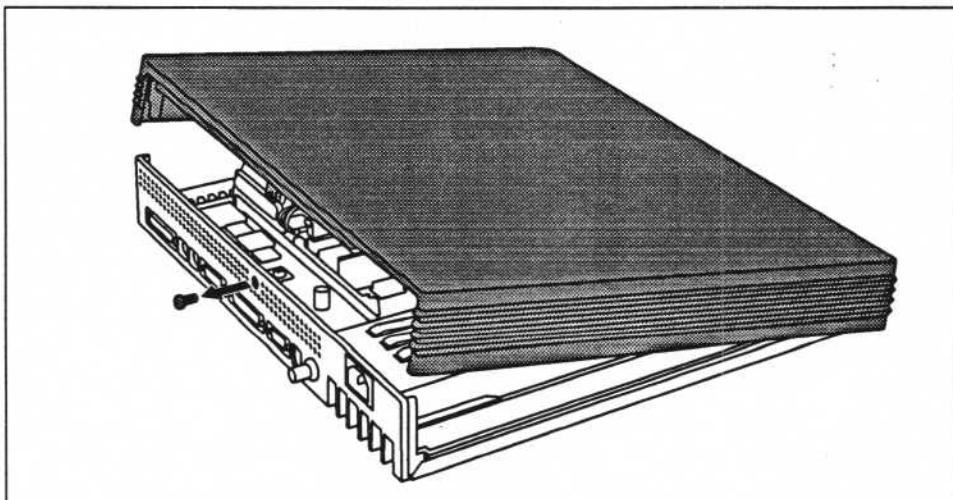
## Opening the Computer

1. If the computer isn't turned off, press the Power key and follow the directions that appear on the screen.

If you can't turn off the computer with the Power key, the computer may be set to disable this function, or the computer has run into a snag and you'll have to turn it off another way. See "Turning Off the Computer" in Chapter 1, "Starting and Ending a Work Session," in the *NeXT User's Reference* manual for details.

2. If a printer is connected to the computer, unplug the printer's power cord.
3. Unplug the computer's power cord and detach the cables connected to the rear of the computer.
4. If the MegaPixel Display™ is on top of the computer, lift it off and set it out of the way.
5. Put the computer on the worktable.
6. Attach your wrist grounding strap and connect it to a suitable electrical ground.
7. Using a No. 2 Phillips screwdriver, remove the single screw from the center of the rear panel.

8. Grasp the top cover by the sides and pull it up and toward the front of the computer. Put the cover and its screw aside, taking care not to nick or scratch the cover.

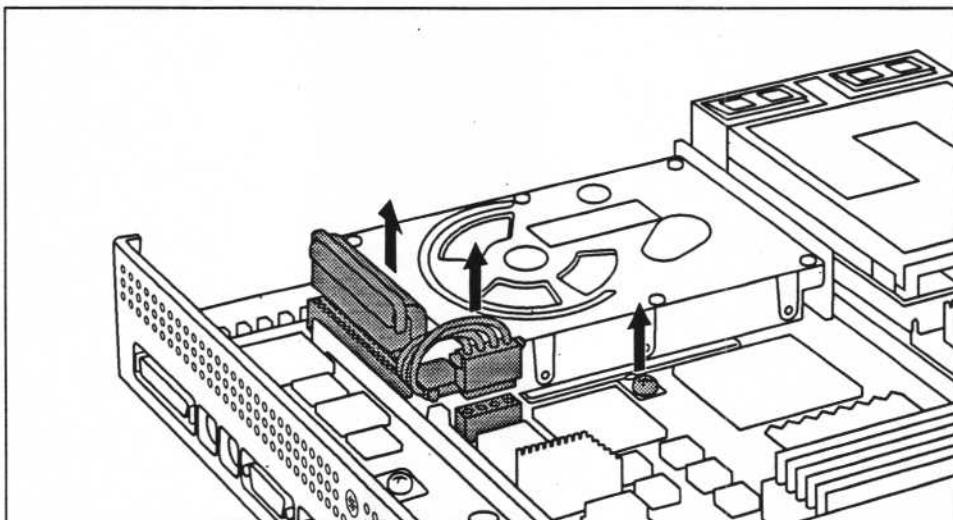


## Removing the Disk Drives

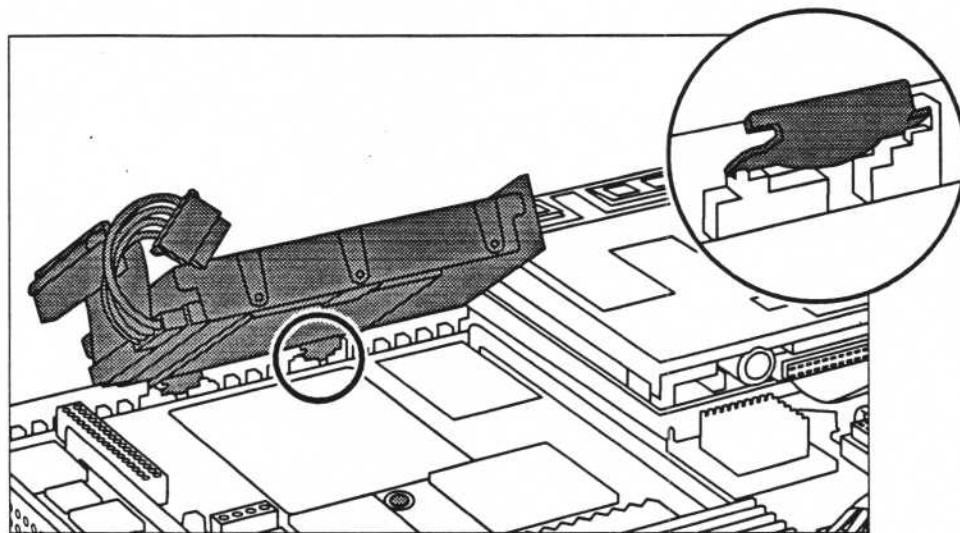
1. The hard disk drive is attached to a flat, ribbon-like data cable that connects to the processor board. Disconnect the cable where it plugs into the processor board.

Some ribbon cables have small straps attached to the connectors to assist in removing the cables from their sockets. Tug on the strap to remove the connector. If the connector is hard to remove, loosen it by rocking the strap up and down and side to side.

2. Unplug the drive's nylon power connector from the processor board. Grasp the plug firmly and rock it gently to loosen it, then pull straight up to disconnect it.



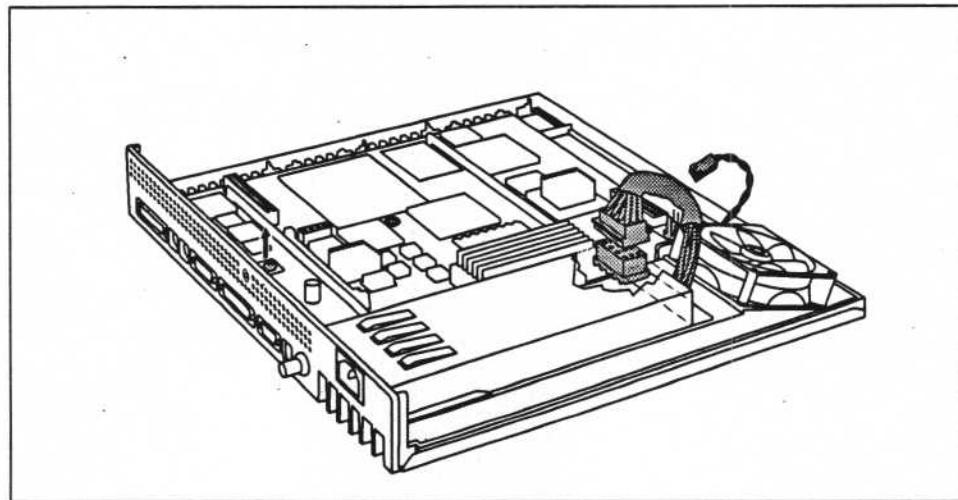
3. Using the No. 2 Phillips screwdriver, remove the single screw from the bracket attached to the hard disk drive.
4. Lift the hard disk drive from the computer base assembly by allowing it to pivot up from the two tabs that rest in slots in the base assembly. When the drive is at an angle of about 45 degrees, it will pull free from the computer. Carefully set the drive aside.



5. The floppy disk drive is attached to a flat, ribbon-like data cable that connects to the processor board. Disconnect the cable where it plugs into the processor board.
6. Using the No. 2 Phillips screwdriver, remove the single screw from the drive's bracket. If the screw is partially hidden by the ribbon cable, lift the cable to make removal easier.
7. Lift the floppy disk drive from the computer base assembly just as you did when removing the hard disk drive. When the drive is at an angle of about 45 degrees, it will pull free from the computer. Carefully set the drive aside.

## Replacing the Processor Board

1. Unplug the small fan connector from the processor board. Grasp the plug firmly and pull straight up to disconnect it from the socket.
2. Unplug the nylon power supply connector from the processor board. Grasp the plug firmly and rock it gently to loosen it, then pull straight up to disconnect it.
3. Remove the remaining screw from the processor board with the Phillips screwdriver.



4. Lift the front of the processor board slightly and slide it away from the back panel. Place the board, with the side bearing the components face up, on the table or antistatic mat.
5. Carefully remove the RAM memory SIMMs from the old processor board and install them on the new board. Several types of SIMMs are used in NeXTstation and NeXTstation Turbo computers. To avoid problems, install the modules in the same positions on the new board as they occupied on the old one. Make sure the SIMMs are firmly seated in their sockets.

**Note:** Memory used in the NeXTstation is incompatible with NeXTstation Color, NeXTstation Turbo, or NeXTstation Turbo Color. Do not attempt to interchange memory between these types of systems.

6. Tilt the processor board slightly, aligning the connectors on the edge of the board with the corresponding openings in the rear of the computer base assembly.
7. Carefully pivot the processor board into position, making sure the alignment pins enter the holes on the board. Press the board securely in place.
8. Secure the board to the base assembly with a Phillips screw through the hole in the board near the connectors.

9. Plug the nylon power supply connector into the processor board. Grasp the plug on its sides and firmly push it straight into the socket. The connector is keyed to assure proper polarity.
10. Plug the fan's cable into the processor board. Use care to observe the direction of the notch on the connector.

## Reinstalling the Disk Drives

1. Hold the floppy disk drive at about a 45-degree angle with the mounting tab side down. Guide the tabs into the corresponding slots on the base assembly. Pivot the drive into position and align the hole in the bracket with the screw hole in the processor board and base assembly.
2. Secure the drive to the base assembly with a Phillips screw through the hole in the bracket.

**Warning:** All cable connectors and sockets described in the steps below have matching notches or alignment keys to insure proper polarity. If a connector does not mate easily, make sure it is positioned correctly.

3. Orient the drive's ribbon cable connector over the mating connector on the processor board. Push the connector straight in, being careful not to bend the pins.
4. Hold the hard disk drive at about a 45-degree angle with the mounting tab side down. Guide the tabs into the corresponding slots on the base assembly. Pivot the drive into position and align the hole in the bracket with the screw hole in the processor board and base assembly.
5. Secure the drive to the base assembly with a Phillips screw through the hole in the bracket.
6. Position the drive's ribbon cable connector over the mating connector on the processor board. Push the connector straight in, being careful not to bend the pins.
7. Connect the drive's power cable to the mating connector on the processor board.

## Closing the Computer

In the last steps of the disassembly and reassembly process, you must check your work, close the computer, and reattach the MegaPixel Display and other cables to the system.

**Warning:** Check your work before closing the NeXTstation or NeXTstation Turbo. Make sure:

- The fan cable is properly connected.

- The disk drives' cables are plugged in.
  - All components are properly secured to the base assembly.
  - All cables are out of the way of the cover.
  - There are no loose screws, tools, or other foreign objects inside the computer.
1. Grasp the top cover by the sides and hold it at a slight angle with the front edge lower than the back.
  2. Align the slots inside the front of the cover with the tabs that protrude from the base assembly, and lower the cover into place.
  3. Secure the cover to the base assembly with the black Phillips screw.
  4. Remove the wrist grounding strap.
  5. Reattach the cables (except for the Ethernet network cable) that were connected to the computer, and plug the computer's power cord into its supply. If a printer is connected to the computer, also plug in the printer's power cord. If the system is part of a network, you will need to involve the system administrator prior to reconnecting it to the Ethernet cables.

## Verifying System Operation

No repair is complete until you verify the system's operation. You accomplish this by performing some simple activities to verify that everything is working properly. Involve the customer in this activity whenever possible.

Perform the following steps with the system in stand-alone mode (disconnected from the network). If the system is to be attached to an Ethernet network, the system administrator will have to change the network configuration database so the new processor board is recognized by the network. Inform the customer that the system's parameters have been reset to factory defaults; any changes will have to be repeated with the new board installed.

1. Turn on the computer by pressing the Power key on the keyboard. When the login window appears, log in using any valid *local* account. A local account is one like *me*, which is a default local account on all systems and can be accessed when the machine is not on the network. Some systems go directly to the workspace without need for logging in—that's fine.
2. Browse through the files using the File Viewer. You should be able to see and access all the files normally shipped with the system.
3. Insert a floppy disk. Verify that the disk mounts properly and its icon is displayed in the File Viewer. Click its icon to inspect its contents. Eject the disk by clicking Eject under Disk in the Workspace Manager™ menu.

4. Have the customer try to re-create the situation that caused the original request for service. If the customer experienced difficulty when using a particular device or feature, verify that the fault has been corrected.
5. Log out and press the Power key on the keyboard. When the panel appears, click Power Off to turn off the computer.



# **Upgrading a NeXTstation™ to a NeXTstation Turbo™**

**April 1992**



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NeXT Computer, Inc., 900 Chesapeake Drive, Redwood City, CA 94063.

Manual written by Robin Goodwin, Terry Williams  
Illustrations by Nancy Serpiello

Upgrading a NeXTstation™ to a NeXTstation Turbo™ computer takes about 25 minutes and consists of the following steps:

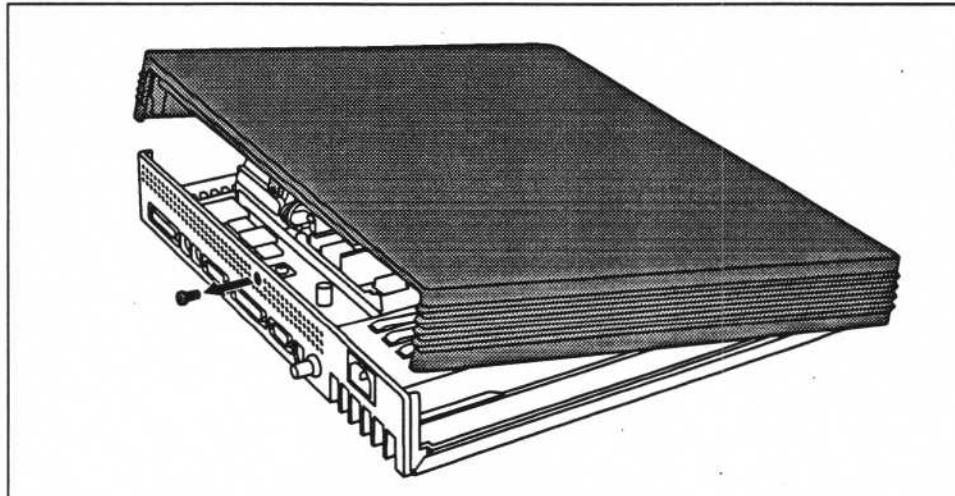
1. Opening the computer
2. Removing the disk drives
3. Replacing the processor board
4. Replace the old memory with new
5. Install a new fan
6. Reinstalling the disk drives
7. Closing the computer
8. Verifying system operation

**Warning:** The processor board, disk drives, and other components in the NeXTstation and the NeXTstation Turbo computer can be damaged by static electricity. Always wear a grounded static wrist strap and practice appropriate static-safe procedures when working inside the computer.

## Opening the Computer

1. If the computer is powered on, press the Power key and follow the directions that appear on the screen to turn the computer off.  
If you can't turn off the computer with the Power key, the computer may be set to disable this function, or the computer has run into a snag and you'll have to turn it off another way. See "Turning Off the Computer" in Chapter 1, "Starting and Ending a Work Session," in the *NeXT User's Reference* manual for details.
2. If a printer is connected to the computer, unplug the printer's power cord.
3. Unplug the computer's power cord and detach the cables connected to the rear of the computer.
4. If the MegaPixel Display™ is on top of the computer, lift it off and set it out of the way.
5. Put the computer on the worktable.
6. Attach your wrist grounding strap and connect it to a suitable electrical ground.
7. Using a No. 2 Phillips screwdriver, remove the single screw from the center of the rear panel.

8. Grasp the top cover by the sides and pull it up and toward the front of the computer. Put the cover and its screw aside, taking care not to nick or scratch the cover.

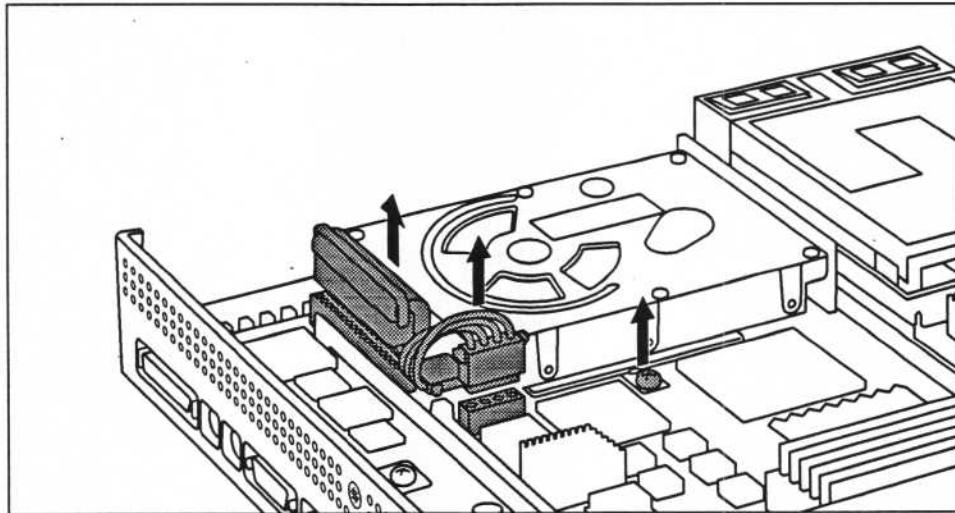


## Removing the Disk Drives

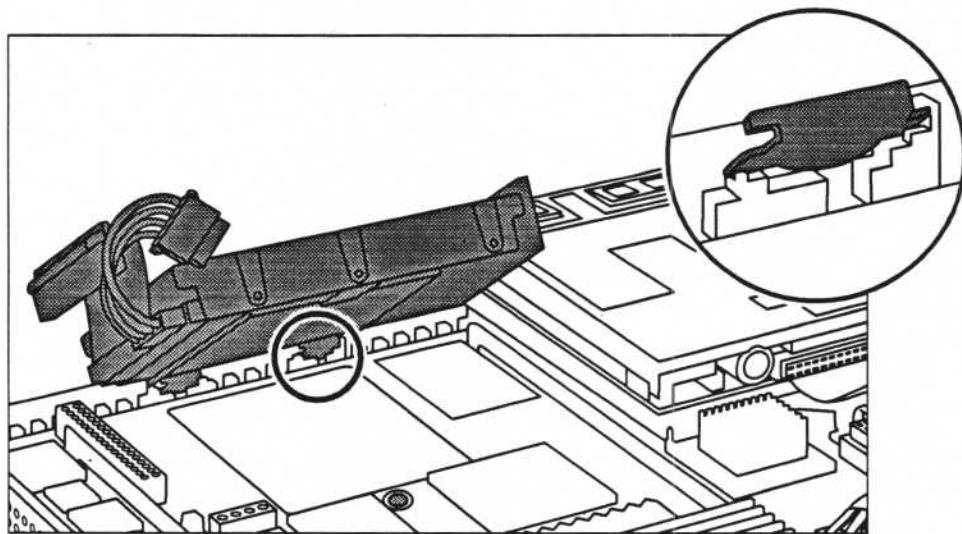
1. The hard disk drive is attached to a flat, ribbon-like data cable that connects to the processor board. Disconnect the cable where it plugs into the processor board.

Some ribbon cables have small straps attached to the connectors to assist in removing the cables from their sockets. Tug on the strap to remove the connector. If the connector is hard to remove, loosen it by rocking the strap up and down and side to side.

2. Unplug the drive's nylon power connector from the processor board. Grasp the plug firmly and rock it gently to loosen it, then pull straight up to disconnect it.



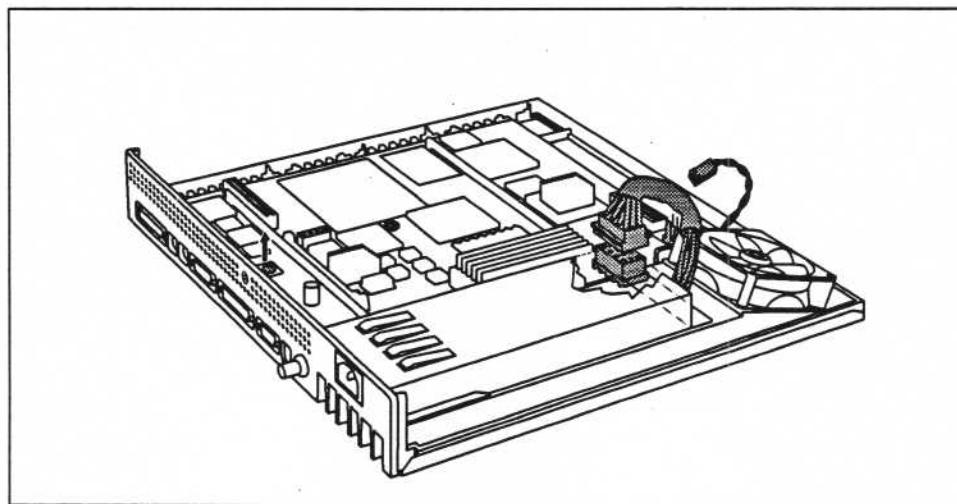
3. Using the No. 2 Phillips screwdriver, remove the single screw from the bracket attached to the hard disk drive.
4. Lift the hard disk drive from the computer base assembly by allowing it to pivot up from the two tabs that rest in slots in the base assembly. When the drive is at an angle of about 45 degrees, it will pull free from the computer. Carefully set the drive aside.



5. The floppy disk drive is attached to a flat, ribbon-like data cable that connects to the processor board. Disconnect the cable where it plugs into the processor board.
6. Using the No. 2 Phillips screwdriver, remove the single screw from the drive's bracket. If the screw is partially hidden by the ribbon cable, lift the cable to make removal easier.
7. Lift the floppy disk drive from the computer base assembly just as you did when removing the hard disk drive. When the drive is at an angle of about 45 degrees, it will pull free from the computer. Carefully set the drive aside.

## Replacing the Processor Board

1. Unplug the small fan connector from the processor board. Grasp the plug firmly and pull straight up to disconnect it from the socket.
2. Unplug the nylon power supply connector from the processor board. Grasp the plug firmly and rock it gently to loosen it, then pull straight up to disconnect it.
3. Remove the remaining screw from the processor board with the Phillips screwdriver.



4. Lift the front of the processor board slightly and slide it away from the back panel. Place the board, with the side bearing the components face up, on the table or antistatic mat.
5. Exchange SIMMs if necessary. It may not be possible to exchange memory between CPUs. See the note below.

**Warning:** The 72 pin SIMM sockets in the NeXTstation Color, NeXTstation Turbo, and NeXTstation Turbo Color can be easily broken. Use special care when removing and installing SIMMs in these style sockets. A broken SIMM socket will render that portion of memory inoperative. The CPU must be repaired at the factory.

**Note:** SIMMs in a NeXTstation are incompatible with NeXTstation Color, NeXTstation Turbo, or NeXTstation Turbo Color. Do not attempt to interchange memory between these systems. Refer to the following table to determine which SIMMs are compatible with your system.

**SIMM Compatibility Table**

Service Catalog #	SIMM Description	NeXTstation	NeXTstation Color	NeXTstation Turbo	NeXTstation Turbo Color
S7001	1MB non-parity; 36 pins	X			
S7002	4MB non-parity; 36 pins	X			
S7003	4MB parity; 36 pins	X			
S7004	1MB non-parity; 72 pins		X		
S7015	4MB non-parity; 72 pins		X	X	X
S7016	4MB parity; 72 pins		X	X	X
S7018	8MB non-parity; 72 pins			X	X
S7019	8MB parity; 72 pins			X	X

6. Tilt the processor board slightly, aligning the connectors on the edge of the board with the corresponding openings in the rear of the computer base assembly.
7. Carefully pivot the processor board into position, making sure the alignment pins enter the holes on the board. Press the board securely in place.
8. Secure the board to the base assembly with a Phillips screw through the hole in the board near the connectors.
9. Plug the nylon power supply connector into the processor board. Grasp the plug on its sides and firmly push it straight into the socket. The connector is keyed to assure proper polarity.
10. Replace the original fan with the new fan provided in the upgrade kit. Use the No. 2 Phillips screwdriver to remove the original fan's screws. Remove the fan and set it aside.
11. Install the new fan over its air channel. Ensure that the fan airflow exhausts air out through the air channel. A small arrow on the side of the fan will indicate the direction of airflow.
12. Replace the fan screws.
13. Plug the fan's cable into the processor board. Use care to observe the direction of the notch on the connector.

## Reinstalling the Disk Drives

1. Hold the floppy disk drive at about a 45-degree angle with the mounting tab side down. Guide the tabs into the corresponding slots on the base assembly. Pivot the drive into position and align the hole in the bracket with the screw hole in the processor board and base assembly.
2. Secure the drive to the base assembly with a Phillips screw through the hole in the bracket.

**Warning:** All cable connectors and sockets described in the steps below have matching notches or alignment keys to insure proper polarity. If a connector does not mate easily, make sure it is positioned correctly.

3. Orient the drive's ribbon cable connector over the mating connector on the processor board. Push the connector straight in, being careful not to bend the pins.
4. Hold the hard disk drive at about a 45-degree angle with the mounting tab side down. Guide the tabs into the corresponding slots on the base assembly. Pivot the drive into position and align the hole in the bracket with the screw hole in the processor board and base assembly.
5. Secure the drive to the base assembly with a Phillips screw through the hole in the bracket.
6. Position the drive's ribbon cable connector over the mating connector on the processor board. Push the connector straight in, being careful not to bend the pins.
7. Connect the drive's power cable to the mating connector on the processor board.

## Closing the Computer

In the last steps of the disassembly and reassembly process, you must check your work, close the computer, and reattach the MegaPixel Display and other cables to the system.

**Warning:** Check your work before closing the NeXTstation or NeXTstation Turbo. Make sure:

- The fan cable is properly connected.
  - The disk drives' cables are plugged in.
  - All components are properly secured to the base assembly.
  - All cables are out of the way of the cover.
  - There are no loose screws, tools, or other foreign objects inside the computer.
1. Grasp the top cover by the sides and hold it at a slight angle with the front edge lower than the back.

2. Align the slots inside the front of the cover with the tabs that protrude from the base assembly, and lower the cover into place.
3. Secure the cover to the base assembly with the black Phillips screw.
4. Remove the wrist grounding strap.
5. Reattach the cables (except for the Ethernet network cable) that were connected to the computer, and plug the computer's power cord into its supply. If a printer is connected to the computer, also plug in the printer's power cord. If the system is part of a network, you will need to involve the system administrator prior to reconnecting it to the Ethernet cables.

## Verifying System Operation

No repair is complete until you verify the system's operation. You accomplish this by performing some simple activities to verify that everything is working properly. Involve the customer in this activity whenever possible.

Perform the following steps with the system in stand-alone mode (disconnected from the network). If the system is to be attached to an Ethernet network, the system administrator will have to change the network configuration database so the new processor board is recognized by the network. Inform the customer that the system's parameters have been reset to factory defaults; any changes will have to be repeated with the new board installed.

1. Turn on the computer by pressing the Power key on the keyboard. When the login window appears, log in using any valid *local* account. A local account is one like *me*, which is a default local account on all systems and can be accessed when the machine is not on the network. Some systems go directly to the workspace without need for logging in—that's fine.
2. Browse through the files using the File Viewer. You should be able to see and access all the files normally shipped with the system.
3. Insert a floppy disk. Verify that the disk mounts properly and its icon is displayed in the File Viewer. Click its icon to inspect its contents. Eject the disk by clicking Eject under Disk in the Workspace Manager™ menu.
4. Have the customer try to re-create the situation that caused the original request for service. If the customer experienced difficulty when using a particular device or feature, verify that the fault has been corrected.
5. Log out and press the Power key on the keyboard. When the panel appears, click Power Off to turn off the computer.



# **Replacing a NeXTstation™ and a NeXTstation Turbo™ Disk Drive**

**April 1992**



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NeXT Computer, Inc., 900 Chesapeake Drive, Redwood City, CA 94063.

Manual written by Robin Goodwin  
Illustrations by Nancy Serpiello  
Revised by Terry Williams

Replacing the hard disk drive or floppy disk drive in a NeXTstation™ or a NeXTstation Turbo™ computer takes about 15 minutes and consists of the following steps:

1. Opening the computer
2. Replacing the floppy or hard disk drive
3. Closing the computer
4. Verifying system operation

**Warning:** User files stored on the computer's hard disk will be lost when the hard disk drive is replaced. If you are replacing the computer's hard disk drive and the existing drive is usable, have the user or system administrator save any user files to either the network or floppy disks prior to replacing the hard disk. They can be copied to the new disk after installation.

**Warning:** The processor board, disk drives, and other components in a NeXTstation computer can be damaged by static electricity. Always wear a grounded static wrist strap and practice appropriate static-safe procedures when working inside the computer.

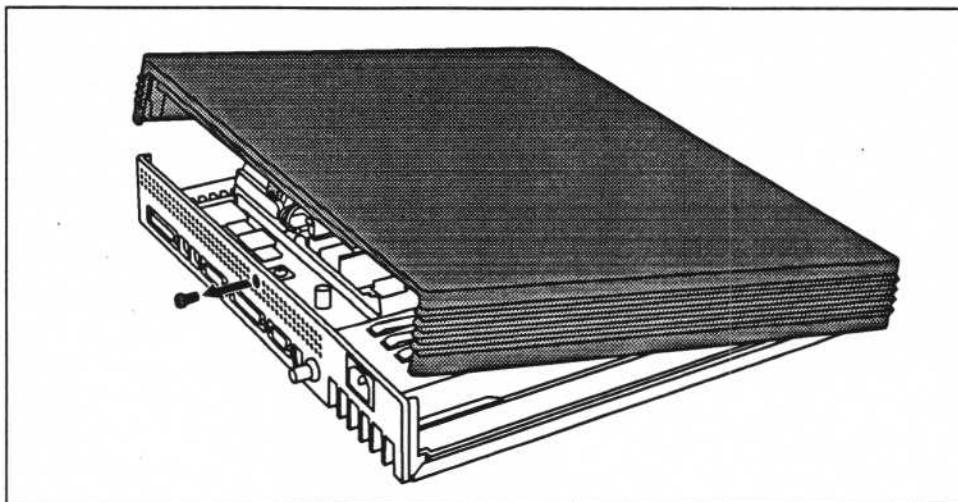
## Opening the Computer

1. If the computer isn't turned off, press the Power key and follow the directions that appear on the screen.

If you can't turn off the computer with the Power key, the computer may be set to disable this function, or the computer has run into a snag and you'll have to turn it off another way. See "Turning Off the Computer" in Chapter 1, "Starting and Ending a Work Session," in the *NeXT User's Reference* manual for details.

2. If a printer is connected to the computer, unplug the printer's power cord.
3. Unplug the computer's power cord and detach the cables connected to the rear of the computer.
4. If the MegaPixel Display™ is on top of the computer, lift it off and set it out of the way.
5. Put the computer on the worktable.
6. Attach your wrist grounding strap and connect it to a suitable electrical ground.
7. Using a No. 2 Phillips screwdriver, remove the single screw from the center of the rear panel.

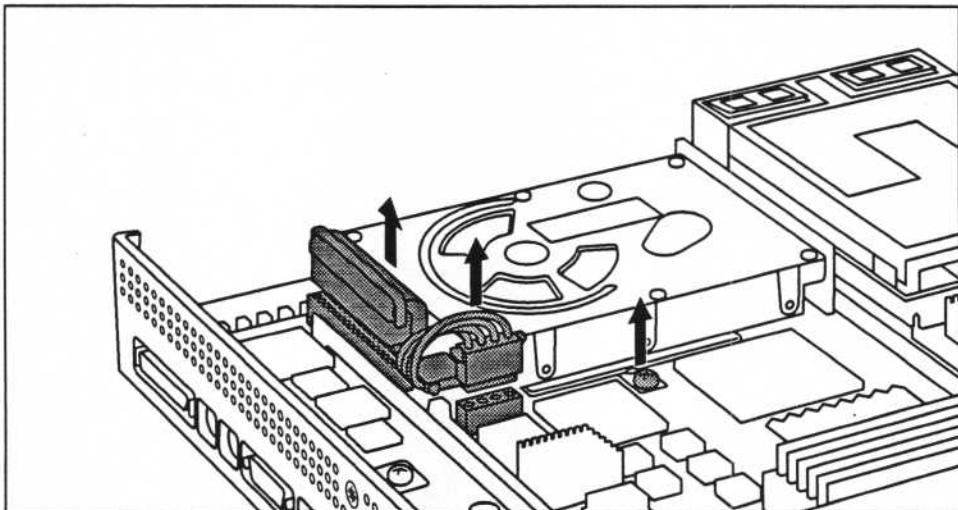
8. Grasp the top cover by the sides and pull it up and toward the front of the computer. Put the cover and its screw aside, taking care not to nick or scratch the cover.



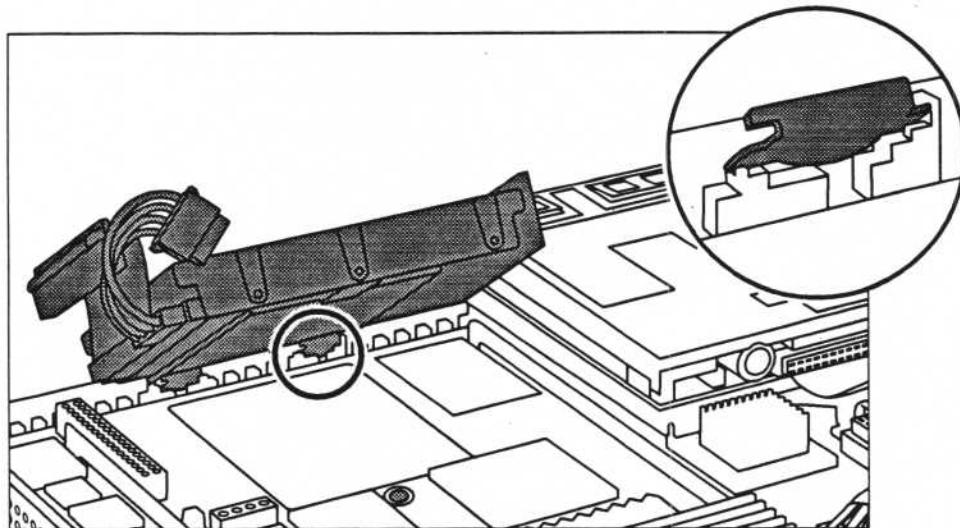
Procedures are given below for replacing the hard disk drive and floppy disk drive. Go directly to the procedure that applies to the activity you are performing.

## Replacing the Hard Disk Drive

1. The hard disk drive is attached to a flat, ribbon-like data cable that connects to the processor board. Tug on the strap to remove the connector. Grasp it firmly and rock it gently to loosen it. Disconnect the cable where it plugs into the processor board.
2. Unplug the drive's nylon power connector from the processor board. Grasp the plug firmly and rock it gently to loosen it, then pull straight up to disconnect it.



3. Using the No. 2 Phillips screwdriver, remove the single screw from the bracket attached to the hard disk drive.
4. Lift the hard disk drive from the computer base assembly by allowing it to pivot up from the two tabs that rest in slots in the base assembly. When the drive is at an angle of about 45 degrees, it will pull free from the computer.



5. Remove the ribbon and power cables from the old drive for use on the new one. Grasp the plug on each cable firmly and rock it gently to loosen it, then pull straight up to disconnect it.
6. Remove the bracket from the old drive and attach it to the new one. Use the antistatic bag and protective packaging from the new drive to pack the removed drive for return to NeXT.

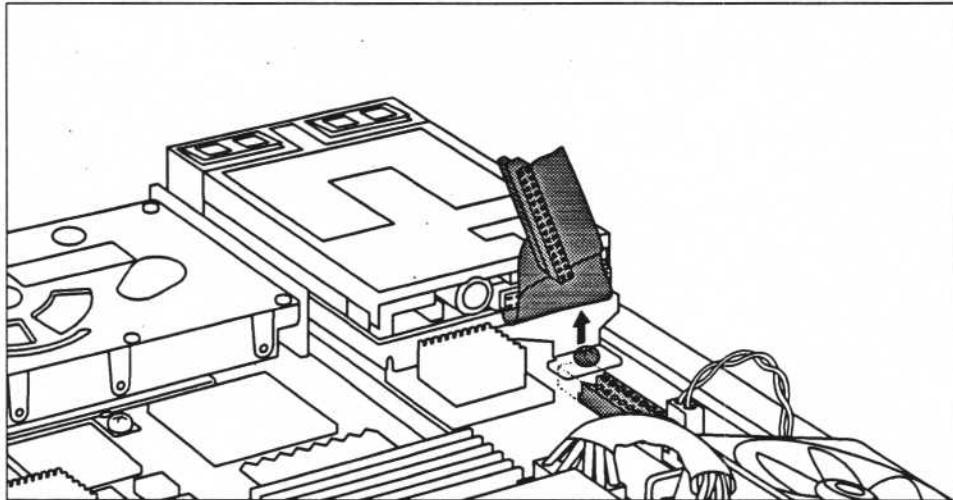
**Warning:** All cable connectors and sockets described in the steps below have matching notches or alignment keys to insure proper polarity. If a connector does not mate easily, make sure it is positioned correctly.

7. Attach the ribbon and power cables to the new drive. The ribbon cable connector without the handle plugs into the drive. Push the connectors straight in, being careful not to bend the pins.
8. Hold the hard disk drive at about a 45-degree angle with the mounting tab side down. Guide the tabs into the corresponding slots on the base assembly. Pivot the drive into position and align the hole in the bracket with the screw hole in the processor board and base assembly.
9. Secure the drive to the base assembly with a Phillips screw through the hole in the bracket.
10. Position the drive's ribbon cable connector over the mating connector on the processor board. Push the connector straight in, being careful not to bend the pins.

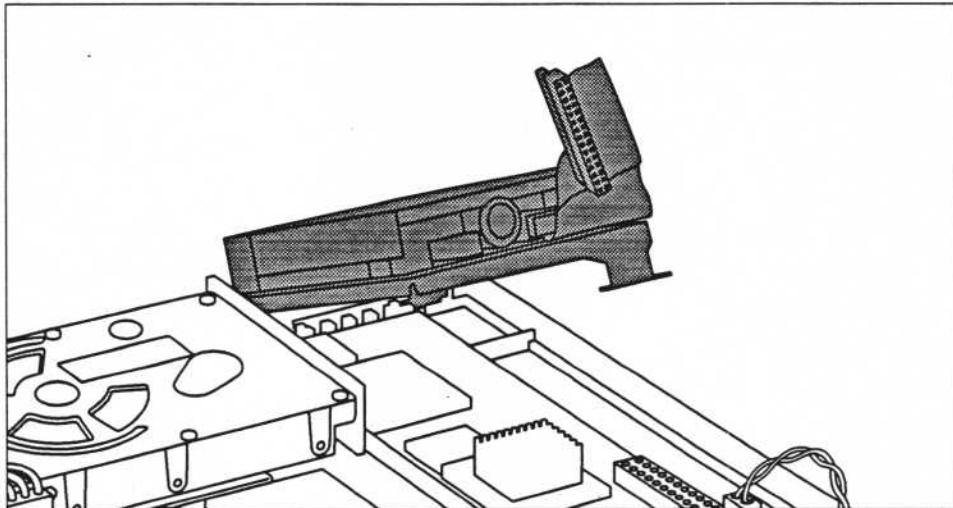
11. Connect the drive's power cable to the mating connector on the processor board.

## Replacing the Floppy Disk Drive

1. The floppy disk drive is attached to a flat, ribbon-like data cable that connects to the processor board. Disconnect the cable where it plugs into the processor board.



2. Using the No. 2 Phillips screwdriver, remove the single screw from the drive's bracket. If the screw is partially hidden by the ribbon cable, lift the cable to make removal easier.
3. Lift the floppy disk drive from the computer base assembly by allowing it to pivot up from the two tabs that rest in slots in the base assembly. When the drive is at an angle of about 45 degrees, it will pull free from the computer.



4. Remove the ribbon cable from the old drive for use on the new one. Grasp the plug on the cable firmly and rock it gently to loosen it, then pull straight up to disconnect it.
5. Remove the bracket from the old drive and attach it to the new one. Use the antistatic bag and protective packaging from the new drive to pack the removed drive for return to NeXT.

**Warning:** All cable connectors and sockets described in the steps below have matching notches or alignment keys to insure proper polarity. If a connector does not mate easily, make sure it is positioned correctly.

6. Attach the ribbon cable to the new drive. The ribbon cable connector without the handle plugs into the drive. Push the connector straight in, being careful not to bend the pins.
7. Hold the floppy disk drive at about a 45-degree angle with the mounting tab side down. Guide the tabs into the corresponding slots on the base assembly. Pivot the drive into position and align the hole in the bracket with the screw hole in the processor board and base assembly.
8. Secure the drive to the base assembly with a Phillips screw through the hole in the bracket.
9. Position the drive's ribbon cable connector over the mating connector on the processor board. Push the connector straight in, being careful not to bend the pins.

## Closing the Computer

In the last steps of the disassembly and reassembly process, you must check your work, close the computer, and reattach the MegaPixel Display and other cables to the system.

**Warning:** Check your work before closing the NeXTstation. Make sure:

- The fan cable is properly connected.
  - The disk drives' cables are plugged in.
  - All components are properly secured to the base assembly.
  - All cables are out of the way of the cover.
  - There are no loose screws, tools, or other foreign objects inside the computer.
1. Grasp the top cover by the sides and hold it at a slight angle with the front edge lower than the back.
  2. Align the slots inside the front of the cover with the tabs that protrude from the base assembly, and lower the cover into place.
  3. Secure the cover to the base assembly with the black Phillips screw.
  4. Remove the wrist grounding strap.

5. Reattach the cables that were connected to the NeXTstation, and plug the computer's power cord into its supply. If a printer is connected to the computer, plug in the printer's cord.

## Verifying System Operation

No repair is complete until you verify the system's operation. You accomplish this by performing some simple activities to verify that everything is working properly. Involve the customer in this activity whenever possible.

1. Turn on the computer by pressing the Power key on the keyboard. When the login window appears, log in using any valid account. Some systems go directly to the workspace without need for logging in—that's fine.
2. Browse through the files using the File Viewer. You should be able to see and access all the files normally shipped with the system.
3. Insert a floppy disk. Verify that the disk mounts properly and its icon is displayed in the File Viewer. Click its icon to inspect its contents. Eject the disk by clicking Eject under Disk in the Workspace Manager™ menu.
4. Have the customer try to re-create the situation that caused the original request for service. If the customer experienced difficulty when using a particular device or feature, verify that the fault has been corrected.

If something still isn't working properly, you'll need to open the computer and check your work. If the problem persists or if the system fails, you'll have to return to the beginning of the troubleshooting process.

5. Log out and press the Power key on the keyboard. When the panel appears, click Power Off to turn off the computer.



# **Replacing a NeXTstation™ and a NeXTstation Turbo™ Power Supply**

**April 1992**



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NeXT Computer, Inc., 900 Chesapeake Drive, Redwood City, CA 94063.

Manual written by Robin Goodwin  
Illustrations by Nancy Serpiello  
Revised by Terry Williams

Replacing the power supply in a NeXTstation™ or a NeXTstation Turbo™ computer takes about 10 minutes and consists of the following steps:

1. Opening the computer
2. Replacing the power supply
3. Closing the computer
4. Verifying system operation

**Warning:** The processor board, disk drives, and other components in a NeXTstation computer can be damaged by static electricity. Always wear a grounded static wrist strap and practice appropriate static-safe procedures when working inside the computer.

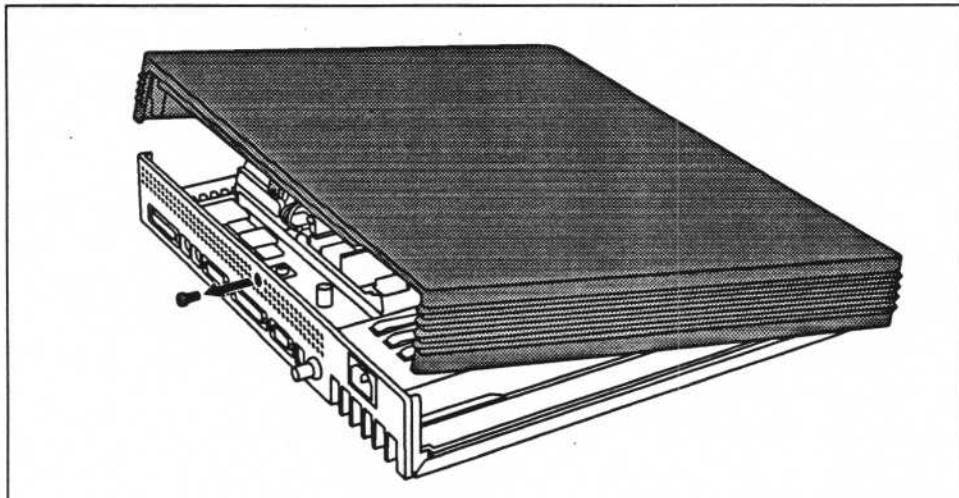
## Opening the Computer

1. If the computer isn't turned off, press the Power key and follow the directions that appear on the screen.

If you can't turn off the computer with the Power key, the computer may be set to disable this function, or the computer has run into a snag and you'll have to turn it off another way. See "Turning Off the Computer" in Chapter 1, "Starting and Ending a Work Session," in the *NeXT User's Reference* manual for details.

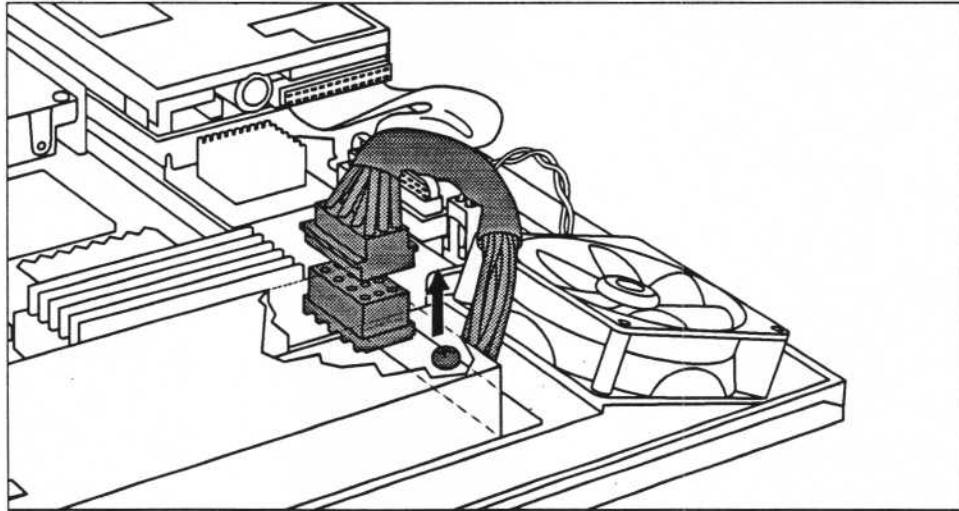
2. If a printer is connected to the computer, unplug the printer's power cord.
3. Unplug the computer's power cord and detach the cables connected to the rear of the computer.
4. If the MegaPixel Display™ is on top of the computer, lift it off and set it out of the way.
5. Put the computer on the worktable.
6. Attach your wrist grounding strap and connect it to a suitable electrical ground.
7. Using a No. 2 Phillips screwdriver, remove the single screw from the center of the rear panel.

8. Grasp the top cover by the sides and pull it up and toward the front of the computer. Put the cover and its screw aside, taking care not to nick or scratch the cover.



## Replacing the Power Supply

1. Unplug the nylon power supply connector from the processor board. Grasp the plug firmly and rock it gently to loosen it, then pull straight up to disconnect it.
2. Hold the cable back against the power supply to provide easy access to the screw below. Remove the screw with a Phillips screwdriver.



3. Slide the power supply toward the front of the computer to release it from the clips that hold it. As the supply comes free, lift it from the base assembly and set it aside.

4. Slide the new power supply toward the rear of the computer, aligning the clips on the bottom bracket of the supply with the slots in the base assembly.
5. Hold the cable back against the power supply and replace the screw that you removed in step 2.
6. Plug the nylon power supply connector into the processor board. Grasp the plug on its sides and firmly push it straight into the socket. The connector is keyed to assure proper polarity.
7. Carefully pack the old power supply in the foam material the new power supply was packed in, so it is not damaged during transit back to NeXT.

## Closing the Computer

In the last steps of the disassembly and reassembly process, you must check your work, close the computer, and reattach the MegaPixel Display™ and other cables to the system.

**Warning:** Check your work before closing the NeXTstation or NeXTstation Turbo. Make sure:

- The fan cable is properly connected.
  - The disk drives' cables are plugged in.
  - All components are properly secured to the base assembly.
  - All cables are out of the way of the cover.
  - There are no loose screws, tools, or other foreign objects inside the computer.
1. Grasp the top cover by the sides and hold it at a slight angle with the front edge lower than the back.
  2. Align the slots inside the front of the cover with the tabs that protrude from the base assembly, and lower the cover into place.
  3. Secure the cover to the base assembly with the black Phillips screw.
  4. Remove the wrist grounding strap.
  5. Reattach the cables that were connected to the NeXTstation or NeXTstation Turbo, and plug the computer's power cord into its supply. If a printer is connected to the computer, plug in the printer's cord.

## Verifying System Operation

No repair is complete until you verify the system's operation. You accomplish this by performing some simple activities to verify that everything is working properly. Involve the customer in this activity whenever possible.

1. Turn on the computer by pressing the Power key on the keyboard. When the login window appears, log in using any valid account. Some systems go directly to the workspace without need for logging in—that's fine.
2. Browse through the files using the File Viewer. You should be able to see and access all the files normally shipped with the system.
3. Insert a floppy disk. Verify that the disk mounts properly and its icon is displayed in the File Viewer. Click its icon to inspect its contents. Eject the disk by clicking Eject under Disk in the Workspace Manager™ menu.
4. Have the customer try to re-create the situation that caused the original request for service. If the customer experienced difficulty when using a particular device or feature, verify that the fault has been corrected.

If something still isn't working properly, you'll need to open the computer and check your work. If the problem persists or if the system fails, you'll have to return to the beginning of the troubleshooting process.

5. Log out and press the Power key on the keyboard. When the panel appears, click Power Off to turn off the computer.



# **Replacing a NeXTdimension™ Board**

**June 1992**



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Manual written by Robin Goodwin  
Illustrations by Nancy Serpiello

Revised by Terry Williams

Replacing the NeXTdimension™ board in a NeXTcube computer takes about 20 minutes and consists of the following steps:

1. Opening the computer
2. Replacing the NeXTdimension board
3. Closing the computer
4. Verifying system operation

**Warning:** The NeXTdimension board, processor board, disk drives, and other components in the NeXTcube or NeXTcube Turbo computer can be damaged by static electricity. Always wear a grounded static wrist strap and practice appropriate static-safe procedures when working inside the computer.

## Opening the Computer

1. If the computer isn't turned off, save any open documents, press the Power key, and follow the directions that appear on the screen.

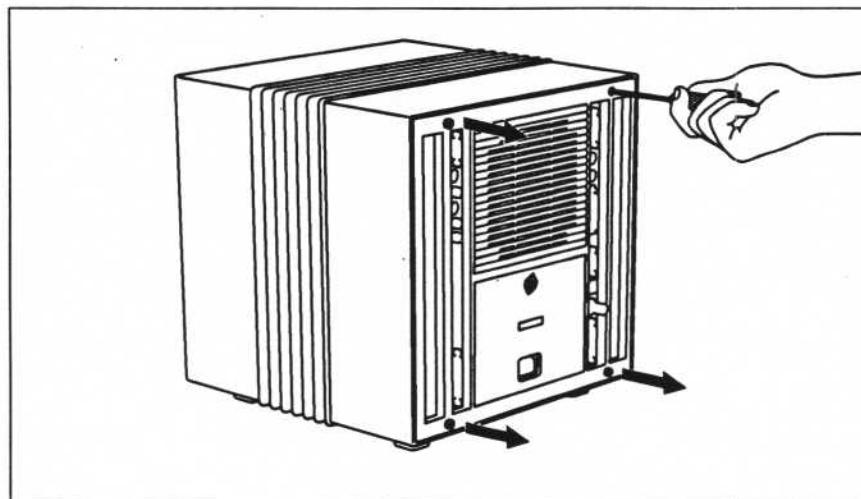
If you can't turn off the computer with the Power key, the computer may be set to disable this function, or the computer has run into a snag and you'll have to turn it off another way. See "Turning Off the Computer" in Chapter 1, "Starting and Ending a Work Session," in the *NeXT User's Reference* manual for details.

2. If a printer is connected to the computer, unplug the printer's power cord.
3. Unplug the computer's power cord and detach the cables connected to the rear of the computer.
4. Put the computer on the worktable.

**Warning:** Always handle the computer and the other parts of the NeXT™ system with care so you don't nick or scratch them. For the same reason, don't rest the computer on its front, rear, or sides, but always keep it standing on its rubber feet.

5. Attach your wrist grounding strap and connect it to a suitable electrical ground.

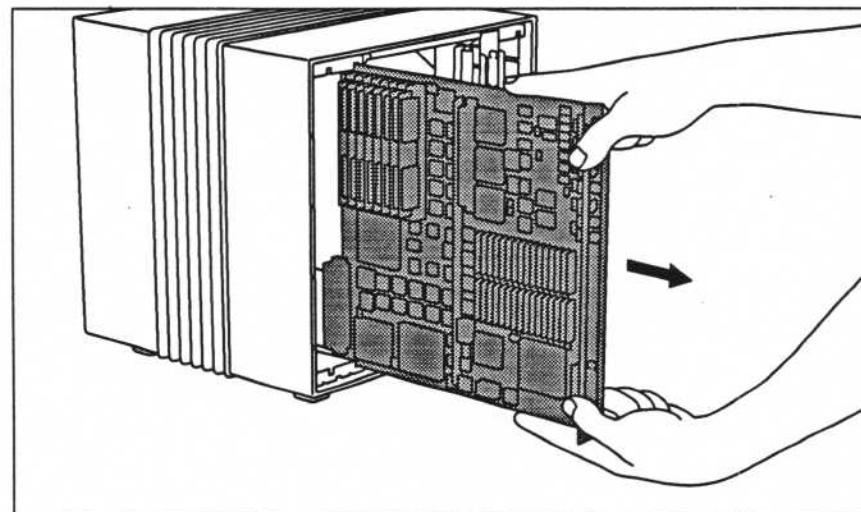
6. Using the hex wrench, unscrew the four screws that attach the rear panel. The screws are designed to stay in the panel after they are loosened.



7. Grasp the panel and pull it away from the computer.
8. Lay the panel on the table and unplug the coiled fan cable from the fan by grasping the cable's plug and pulling it away from the fan.
9. Put the panel aside, taking care not to nick or scratch it.

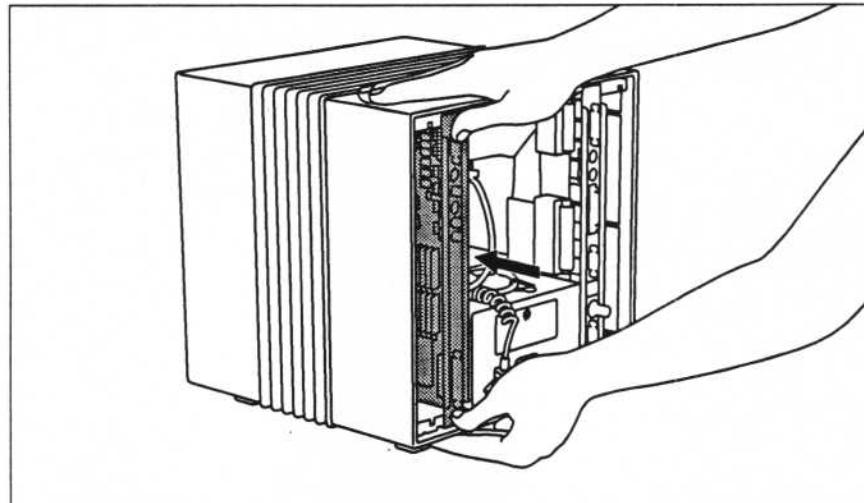
## Replacing the NeXTdimension Board

1. Slide the NeXTdimension board out of the computer. Hook your fingers around the plate at the top and bottom of the board to pull it free from its socket at the front of the computer.



2. Place the NeXTdimension board, with the side bearing the components face up, on the table or antistatic mat.
3. Carefully remove the RAM memory SIMMs from the old NeXTdimension board and install them on the new board. Several types of SIMMs are used in NeXTdimension systems. To avoid problems, install the modules in the same positions on the new board as they occupied on the old one. Make sure the SIMMs are firmly seated in their sockets.
4. Slide the NeXTdimension board all the way into the computer.

The board will slide in easily most of the way, and then stop when it reaches the front of the computer where there's a connector that links it to the circuits in the computer. Push the board to reattach it to the connector. Press firmly on the top and bottom of the metal plate (but don't press on the connectors in the plate) and slide the board in as far as it will go.



## Closing the Computer

In the last steps of the disassembly and reassembly process, you must check your work, close the computer, and reattach the MegaPixel Display™ and other cables to the system.

1. Place the computer's rear panel face down on the table in front of the open computer, and reconnect the coiled fan cable. You may see a small + and - on both the cable connector and the fan. Be sure to observe these markings when reconnecting the cable, or the fan will not operate.

**Warning:** Check your work before closing the computer. Make sure:

- All circuit boards are fully seated in their slots.
  - The fan cable is properly connected.
  - The disk drive's power and data cables are plugged in.
  - Cable clips are properly attached to the assembly wall.
  - There are no loose screws, tools, or other foreign objects inside the computer.
2. Put the rear panel back on the computer, slipping the little metal tab at the bottom of the panel into its notch at the base of the computer.

If the panel doesn't slide in easily, the NeXTdimension board might not be inserted all the way into its slot, or the fan cable or a disk drive data cable might be in the way.

3. Screw on the panel, tightening the screws in diagonal order. Tighten the screws until they fit snugly. Don't screw them in too tightly or they'll be difficult to remove.
4. Remove the wrist grounding strap.
5. Reattach the cables that were connected to the computer, and plug the computer's power cord into its supply. If a printer is connected to the computer, also plug in the printer's power cord.

## Verifying System Operation

No repair is complete until you verify the system's operation. You accomplish this by performing some simple activities to verify that everything is working properly. Involve the customer in this activity whenever possible.

1. Turn on the computer by pressing the Power key on the keyboard. When the login window appears, log in using any valid account. Some systems go directly to the workspace without need for logging in—that's fine.
2. Browse through the files using the File Viewer. You should be able to see and access all the files normally shipped with the system.
3. Insert a floppy disk or optical disk (or both, if the system is so equipped). Verify that the disk mounts properly and its icon is displayed in the File Viewer. Click its icon to inspect its contents. Eject the disk by clicking Eject under Disk in the Workspace Manager™ menu.
4. Have the customer try to re-create the situation that caused the original request for service. If the customer experienced difficulty when using a particular device or feature, verify that the fault has been corrected.
5. Log out and press the Power key on the keyboard. When the panel appears, click Power Off to turn off the computer.



# **Repairing and Adjusting a MegaPixel Display**

**February 1992**



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Illustrations by Terry Williams, Eric Domejean, Nancy Serpiello

Replacing an L-board in a MegaPixel Display takes about 20 minutes and consists of the following steps:

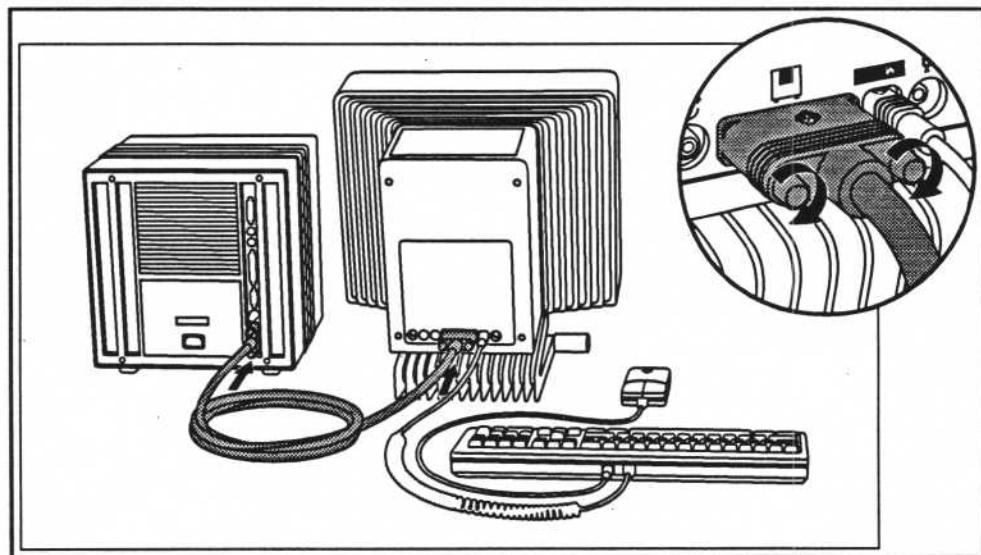
1. Removing the cover of the display.
2. Replacing the L-board.
3. Performing video adjustments.
4. Closing the monitor.
5. Verifying proper operation.

**Warning:** *Extremely hazardous voltages are present in the MegaPixel Display. Follow these procedures carefully to reduce the risk of injury due to electric shock. The Cathode Ray Tube (CRT) may implode if mishandled. Safety goggles should be worn to protect your eyes. Jewelry should be removed to reduce the possibility of electric shock. Adjustments should be made with an insulated or plastic adjustment tool.*

## Opening the MegaPixel Display

1. If the computer isn't turned off, save any open documents, press the Power key, and follow the directions that appear on the screen.

If you can't turn off the computer with the Power key, the computer may be set to disable this function, or the computer has run into a snag and you'll have to turn it off another way. See "Turning Off the Computer" in Chapter 1, "Starting and Ending a Work Session," in the *NeXT User's Reference* manual for details.



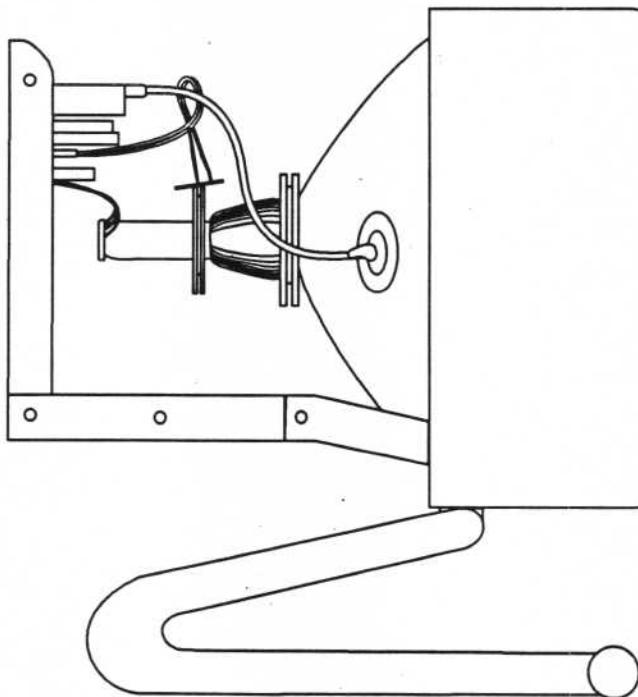
2. Unplug the computer's power cord and detach the computer and mouse cables connected to the rear of the monitor. Detach any other cables connected to the back of the monitor.
3. Place the monitor on your workspace and give yourself plenty of room to maneuver the monitor.
4. Place the computer and other equipment aside.

**Warning:** *Always handle the computer and the other parts of the NeXT™ system with care, so you don't nick or scratch them. For the same reason, don't rest the computer on its front, rear, or sides, but always keep it standing on its rubber feet.*

5. Use a 3mm hex wrench to remove the four screws securing the back cover to the monitor. The screws are not captive and can be easily misplaced or lost if dropped.
6. Remove the back cover by pulling it straight back.

## Removing the L-board

The L-board contains all of the video driver electronics that make the MegaPixel display so wonderful. Removal of the L-board is a relatively easy process, however, care must be taken not to damage the CRT. NeXT has taken great care to ensure that harmful voltages will be bled off when system is powered down. So, no special voltage/current bleeding devices are necessary. As a precaution, or in case of failure of the bleeder network, you may want to ground the anode to ensure the anode voltage has been removed.

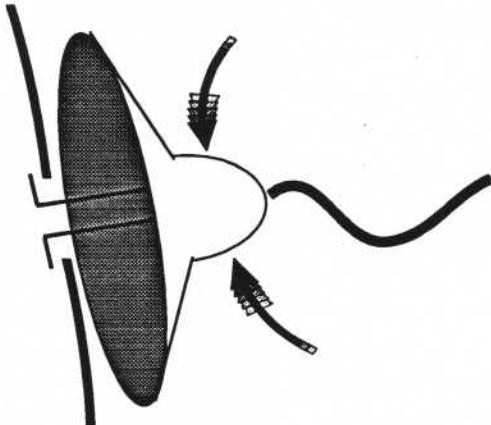


## Removing the Anode Voltage from the N4000

**Warning:** *This procedure is potentially dangerous if not followed properly. Very high voltages may be present. You should not attempt this procedure unless absolutely necessary.*

Removing the anode voltage can be accomplished by grounding the anode. Ensure that you are properly insulated before attempting this procedure.

1. Remove the side access panel on the left side of the monitor and locate the anode cap.
2. Remove the anode cap by squeezing firmly on the cap to compress the wire clip inside the cap.



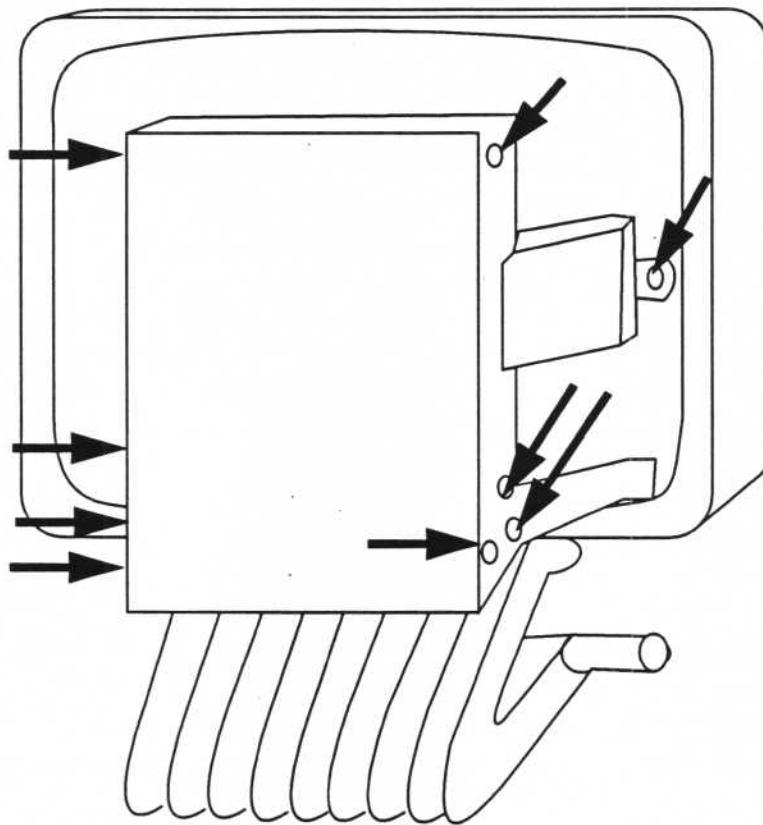
3. Connect a medium guage (20 AWG) jumper wire to a good ground source. Connect the other end to the unpainted metal chassis of the monitor.
4. Holding only the plastic or rubber handle, insert the tip of a long phillips screwdriver (8 inches or longer) into the hole in the side of the CRT. Then touch the shaft of the screwdriver to the grounded metal chassis of the monitor.

Then anode voltage should now be bled from the anode and the monitor will be safe for removing the L-board.

## Removing the L-board from an N4000A MegaPixel Display

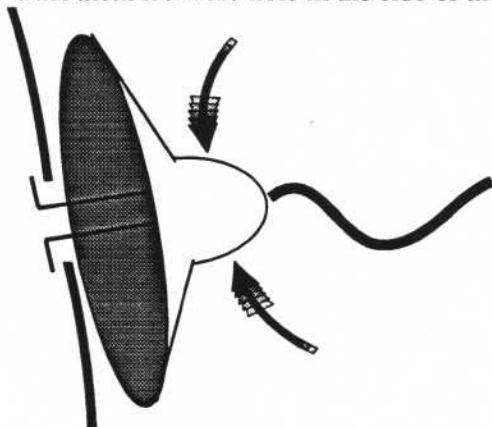
**Warning:** *The CRT will be exposed and can be damaged or broken if mishandled. You may be injured if the CRT implodes. An implosion will send glass shards and debris in all directions. You should wear safety goggles to prevent eye injury. In most cases careful handling and adherence to the instructions will yield perfectly safe results.*

1. Use a No. 2 Phillips screwdriver to remove the screws along the sides of the L-board shroud. You will find a Phillips screw in the anode cap cover on the right side of the monitor that must be removed also.

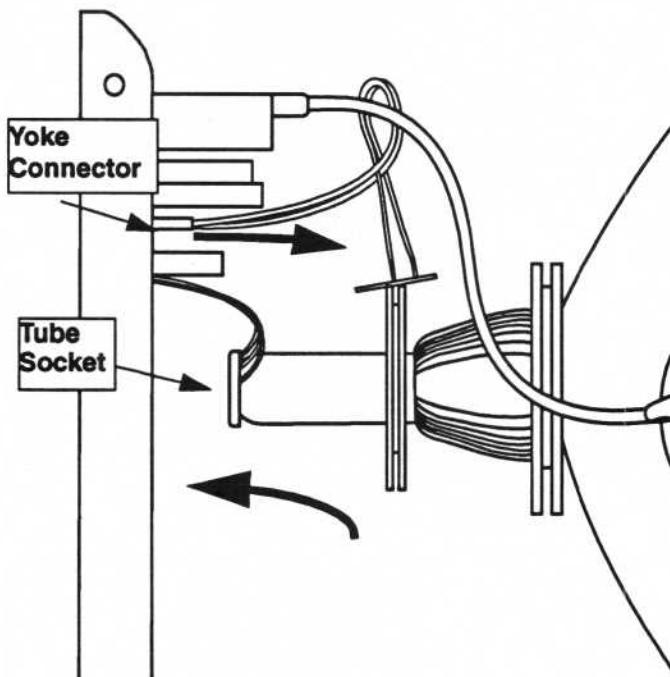


2. Remove the shroud by firmly sliding it up. You may find it necessary to slightly rock the shroud.

3. Remove the anode cap from the right side of the monitor. The anode cap is a red, rubber suction cup that contains a wire clip. Firmly squeeze the anode cap to depress the wire clip leads and extract them from the hole in the side of the CRT.



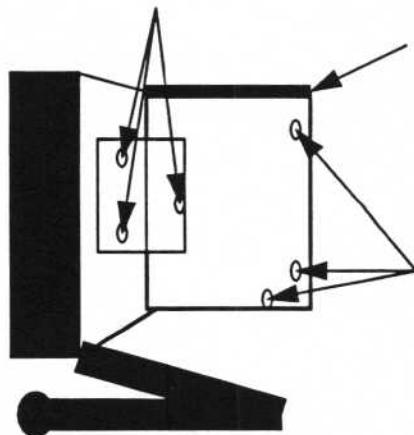
4. Detach the nylon retaining strap connected to the anode cap wire.
5. Disconnect the tube socket by pulling straight back on the connector at the back of the CRT. The connector is a ring and is keyed for proper removal and installation.



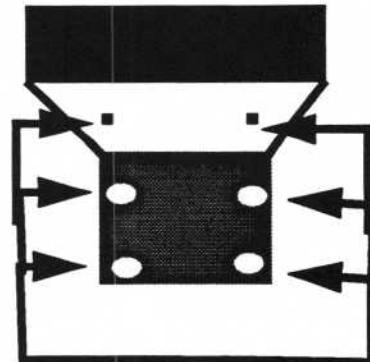
6. Disconnect the yoke connector by removing the flat plastic connector attached to the upper portion of the L-board.
7. Disconnect the microphone connector from the sound board.
8. Remove the two screws in the underside of the CRT housing and slide the L-board straight back freeing it from its rails.

## Removing the L-board from the N4000 MegaPixel Display

1. Use a N. 2 Phillips screwdriver to remove the screws from each access panel on the left and right sides of the display.
2. Remove the 4 screws that attach the black painted area of the top cover.

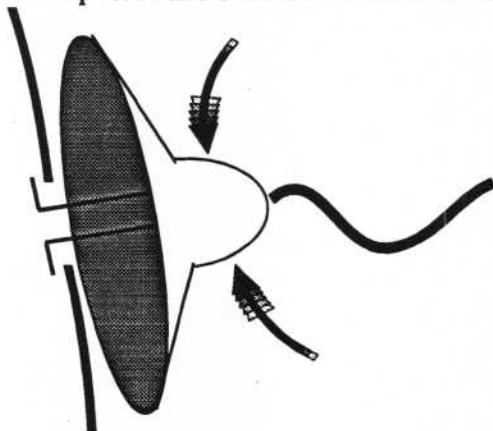


Side view of monitor



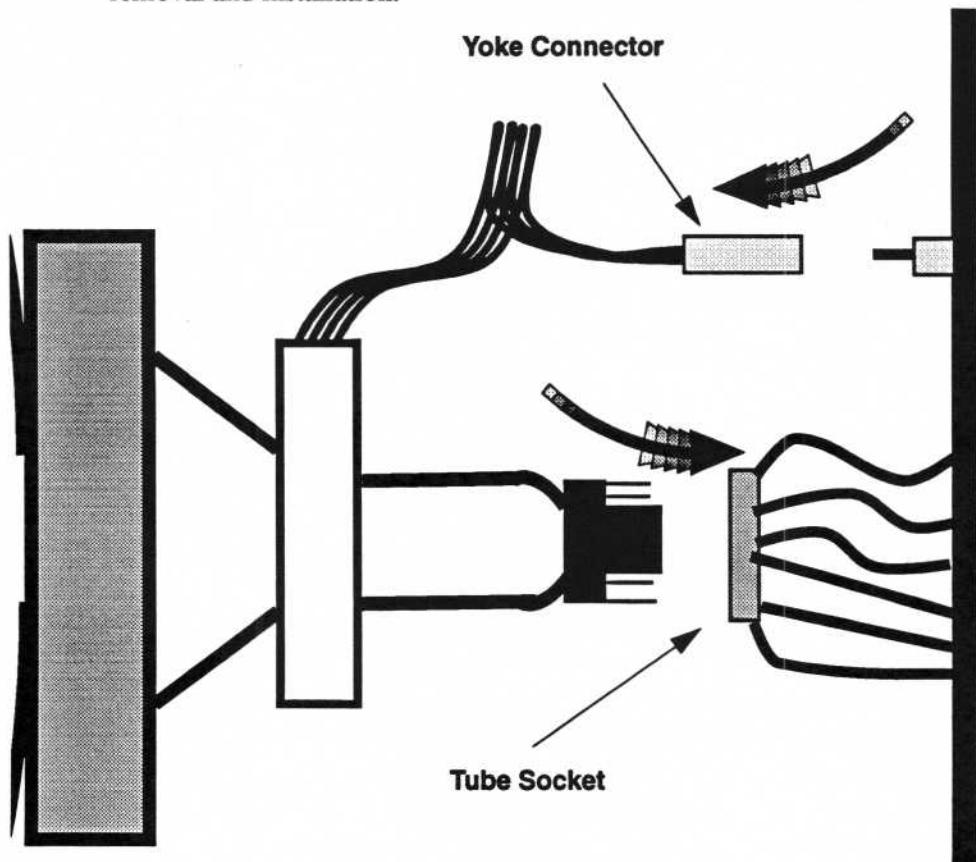
Top View of monitor

3. Remove the anode cap inside the access hole on the right side of the monitor. The anode cap is a red, rubber suction cup that contains a wire clip. Firmly squeeze the anode cap to depress the wire clip leads and extract them from the hole in the side of the CRT.



4. Detach the nylon retaining strap connect to the anode cap wire.

5. Reach inside the access hole to disconnect the tube socket. Pull straight back on the connector at the back of the CRT. The connector is a ring and is keyed for proper removal and installation.



6. Disconnect the yoke connector by removing the flat plastic connector attached to the upper portion of the L-board.
7. Lift slightly on the top cover and hinge the L-board down.
8. Rock the L-board up and down gently to release it from the metal tabs that grasp the L-board mount.

## Replacing the L-board

The procedure for replacing the L-board is essentially the reverse of the installation procedure.

## Installing the L-board on the N4000A MegaPixel Display

1. Slide the L-board into the rails underneath the CRT. Replace the two screws in the bottom of the chassis.
2. Connect the microphone cord to the sound board.
3. Connect the yoke connector.
4. Connect the tube socket.
5. Connect the anode cap. Both prongs of the anode cap clip must be inserted into the hole in the CRT. Squeeze firmly on the rubber cap to get the clip in place. The cap must be firmly seated. If you can easily wiggle the anode cap it is incorrectly installed and the display will not operate properly.

**Warning:** *Be sure to manually bleed off the anode voltage if step 4 is performed incorrectly. Very high voltages are associated with the anode. If the display is powered on and the anode cap is incorrectly installed the anode bleeder resistor will be ineffective. A shock hazard exists when the CRT is in this state.*

6. Replace the metal shield.

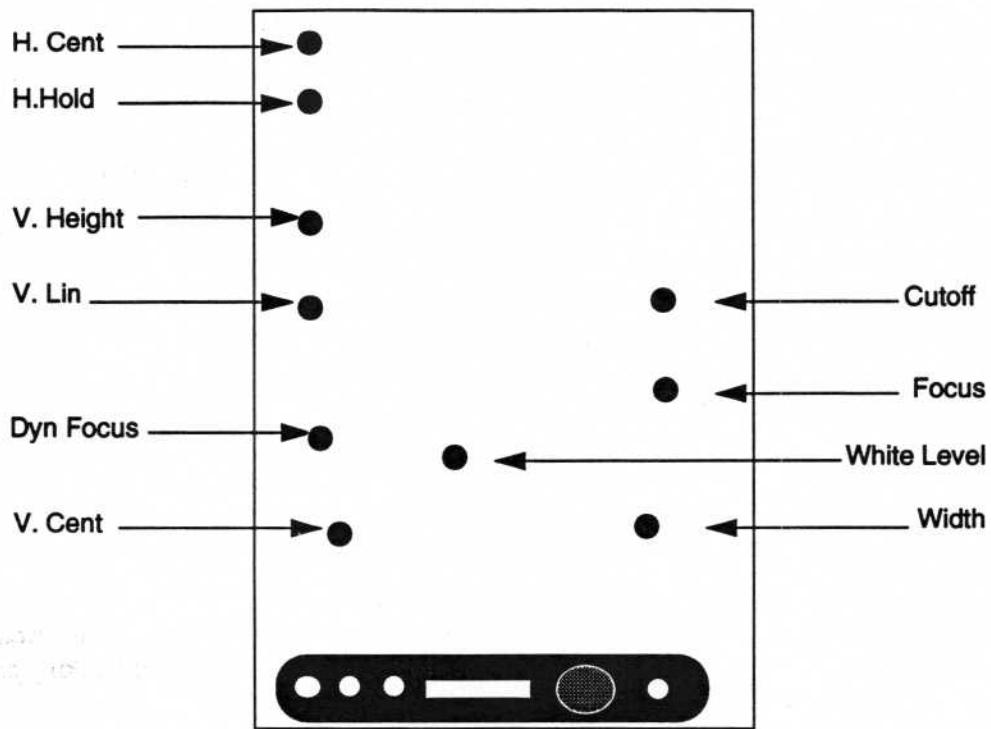
## Installing the L-board on the N4000 MegaPixel Display

1. Guide the leading edge of the L-board inside the metal tab on the monitor chassis.
2. Press the L-board into place ensuring that the metal clips engage the L-board mounting bracket. Lift the top cover slightly to ensure that the top edge of the L-board rests underneath the top cover.
3. Replace the screws that hold the L-board assembly in place.

## Adjusting the Monitor

Some adjustment of the monitor may be necessary after the new L-board is installed. Before you re-install the bucket, plug in the monitor and keyboard cables and power on the system. **Let the monitor warm up for about 20 minutes before performing any adjustments.**

The adjustment procedures and adjustment controls are identical in both versions of the NeXT MegaPixel monitor.



1. Adjust the Cutoff control by turning it counter clockwise until the black margin of the display turns gray. Adjust Cutoff clockwise until the gray disappears. Turn Cutoff clockwise again 1/8 - 1/4 of a turn. If the display darkens too much, readjust Cutoff to desired threshold.
2. Adjust White Level for desired brightness.
3. Adjust V. Height and Width so that the display area is approximately 23 cm vertically and 31 cm horizontally.
4. Use H. Cent and V. Cent to set the position for the center of the display.
5. Use the Focus control to adjust the focus of the text in all quadrants of the display.
6. Use Dyn Focus if the focus cannot be adjusted by the Focus control.
7. If necessary, adjust V. Lin so icon and text size are consistent throughout the display. Use a measuring stick to verify consistency.

## Closing the Monitor

In the last steps of the disassembly and reassembly process, you must check your work, replace the bucket and reattach all cabling.

1. Ensure that all internal monitor cables are correctly installed.
2. Slide bucket L-board onto the rear of the monitor. Make sure that the bucket is fully seated before fastening it down.
3. Replace the 4 screws that attach the bucket..
4. Reattach the cables and power.

## Verifying System Operation

No repair is complete until you verify the system's operation. You accomplish this by performing some simple activities to verify that everything is working properly. Involve the customer in this activity whenever possible.

## Closing the MegaPixel Display

Closing the Megapixel Display is essentially the opposite of opening one. You will find the process to be relatively simple.

1. Reinstall the back cover and ensure that it is properly seated.
2. Replace the 4 3mm hex screws. Be careful not to over tighten the screws.
3. Replace the monitor cable and the keyboard cable.

## **Appendix C**

# **Setting the Hard Disk SCSI Address**

This document can help configure the SCSI interface target address on your hard disk. The recommended addresses are just that, "recommended." You can use any SCSI address, but we recommend that you set things up in the following way.

### **Recommended SCSI Addresses**

Target ID 0 : Customer External SCSI Bootable SCSI device

Target ID 1 : NeXT internal system bootable SCSI drive

Target ID 2 : Customer's SCSI data disk drive

Target ID 3 : SCSI CD-ROM drive

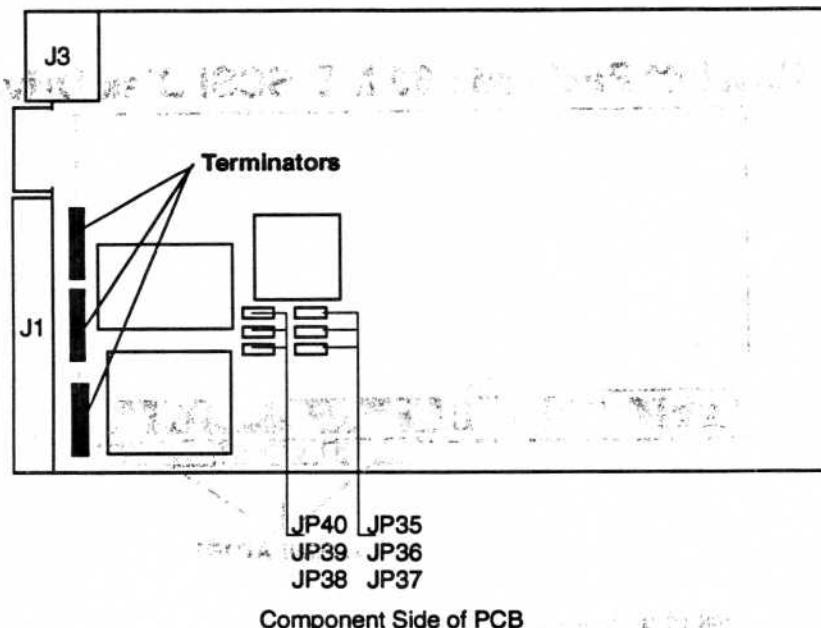
Target ID 4 : PLI external SCSI floppy drive

Target ID 5 : Undetermined (maybe internal SCSI floppy disk drive)

Target ID 6 : Swap space SCSI disk drive

## S3001 Maxtor 330 MB SCSI Disk Drive

Maxtor XT-8000S Series Drives  
NeXT Service Part numbers  
330 MB S3001  
660 MB S3002



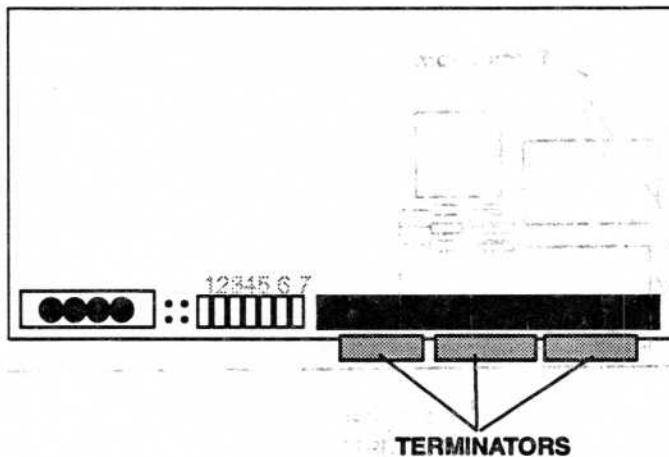
### Jumper settings

SCSI ID	JP37	JP36	JP35
0	out	out	out
1	out	out	in
2	out	in	out
3	out	in	in
4	in	out	out
5	in	out	in
6	in	in	out
7	in	in	in

## S3002 Maxtor 660MB SCSI Disk Drive

See S3001

## S3003 Hewlett Packard 660 MB SCSI Disk Drive



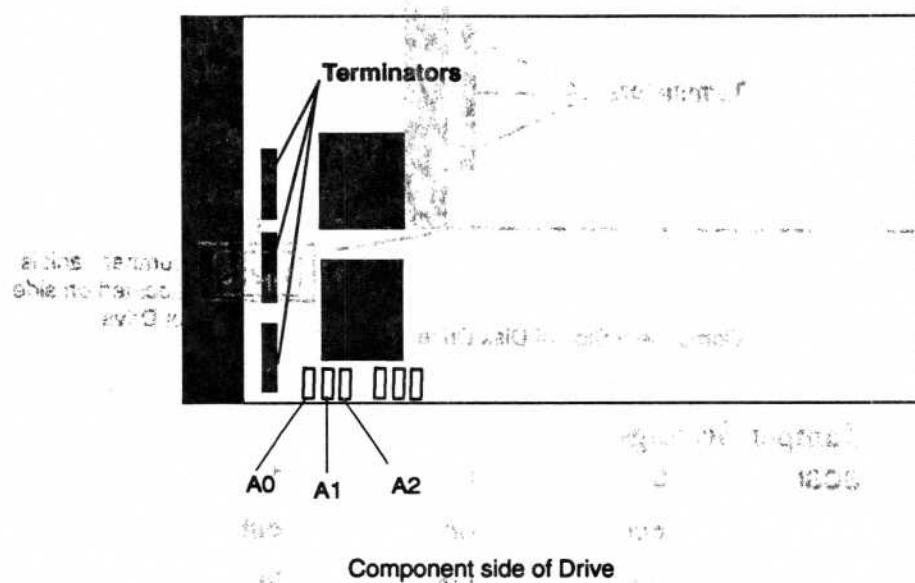
Back of disk drive

### Jumper settings

SCSI ID	J5	J6	J7
0	out	out	out
1	out	out	in
2	out	in	out
3	out	in	in
4	in	out	out
5	in	out	in
6	in	in	out
7	in	in	in

# S3004 Quantum 105 MB SCSI

Quantum ProDrive Series  
NeXT Service Part numbers  
105 MB S3004  
210 MB S3008

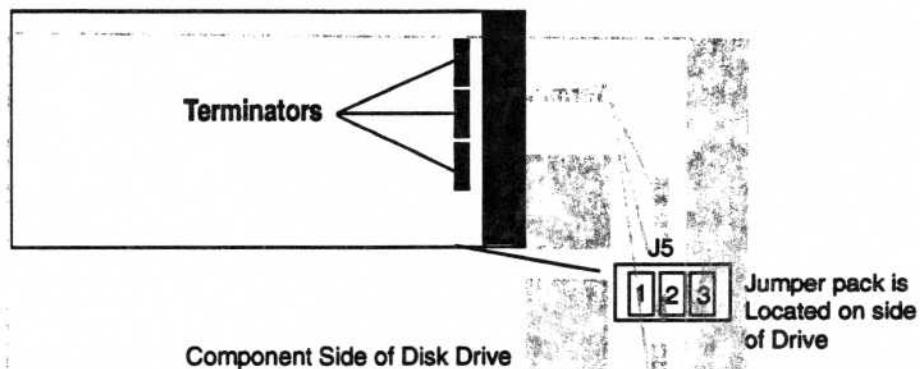


## Jumper Settings

SCSI ID	A2	A1	A0
0	out	out	out
1	out	out	in
2	out	in	out
3	out	in	in
4	in	out	out
5	in	out	in
6	in	in	out
7	in	in	in

## S3005 Seagate Technology 425 MB SCSI Disk Drive

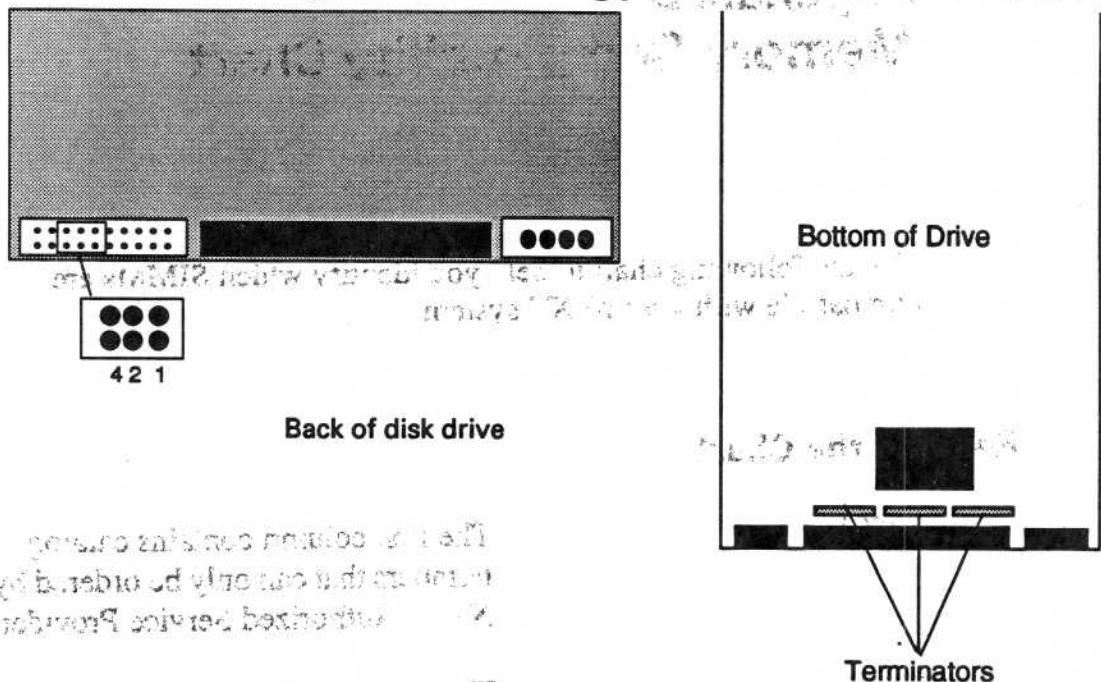
Seagate Tech.  
NeXT Service Part numbers  
425 MB S3005



### Jumper Settings

SCSI	3	2	1
0	out	out	out
1	out	out	in
2	out	in	out
3	out	in	in
4	in	out	out
5	in	out	in
6	in	in	out
7	in	in	in
bus			
4	40	40	40
5	50	50	50
6	60	60	60

## S3006 Seagate Technology 1.4 GB SCSI Disk Drive



Two relative ground wires are also  
available and may be used in addition  
to the standard shielded backplane.

### Jumper Settings

SCSI ID	Parity	2	1
0	out	out	out
1	out	out	in
2	in	in	out
3	out	in	in
4	in	out	out
5	in	out	in
6	in	in	out
7	in	in	in

## S3008 Quantum 200 MB SCSI Disk Drive

See S3004

## Appendix D Memory Compatibility Chart

symc to symc

Use the following chart to help you identify which SIMMs are compatible with your NeXT system.



symc to symc

### Reading the Chart

S7001

The first column contains catalog numbers that can only be ordered by a NeXT Authorized Service Provider.

N7037

The second column contains part numbers that can be ordered by anyone through NeXT Order Processing.

**1 MB non-parity; 30 pins**

The next column is a basic description indicating total memory, parity, no. of connecting pins.

**NeXTstation Turbo**

The last column shows the compatible NeXT computer.

## SIMM Compatibility Chart

Service Catalog number	NeXT Catalog number	SIMM description	NeXTstation	NeXTstation Color	NeXTcube	NeXTdimension	NeXTstation Turbo	NeXTstation Turbo Color	NeXTcube Turbo
S7001	n/a	1 MB non-parity; 30 pins	X		X				
S7002	N7009	4 MB non-parity; 30 pins	X		X				
S7003	N7010	4 MB parity; 30 pins	X		X				
S7004	n/a	1 MB non-parity; 72 pins		X		X			
S7015	N7011	4 MB non-parity; 72 pins		X		X	X	X	X
S7016	n/a	4 MB parity; 72 pins		X		X	X	X	X
S7018	N7034	8 MB non-parity; 72 pins				X	X	X	X
S7019	N7035	8 MB parity; 72 pins				X	X	X	X
n/a	†N7037	32 MB non-parity; 72 pins					x	x	x
n/a	n/a	32 MB parity; 72 pins					x	x	x

†N7037 is not available at the time of printing

Service Catalog parts are available in single unit quantities.

NeXT Catalog parts are sold as upgrade kits of 8 MB and 16 MB total memory.