

*PRELIMINARY RELEASE*



**Hitachi Freedom Storage™  
Thunder 9500™ V Series**

**Novell® NetWare® Host Installation Guide**

***PRELIMINARY RELEASE***

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## Document Revision Level

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## Source Documents for this Revision

The following source documents were used to product this 9500V host installation guide:

- *Hitachi Freedom Storage™ Thunder 9500™ V Series Novell® NetWare® Host Installation Guide*, MK-90DF518.

## Preface

The *Hitachi Freedom Storage Thunder 9500™ V Series Novell® NetWare® Host Installation Guide* describes and provides instructions for configuring the devices on the Hitachi Thunder 9500™ array subsystem for operation with the Novell® NetWare® operating system. This document assumes that:

- the user has a background in data processing and understands direct-access storage device subsystems and their basic functions,
- the user is familiar with the Hitachi Thunder 9500™ array subsystem, and
- the user is familiar with the NetWare® operating system, the NetWare® server, and the fibre-channel adapters.

**Note:** The term “9500V” refers to the entire Hitachi Freedom Storage™ Thunder 9500™ V Series subsystem family, unless otherwise noted. Please refer to the *Hitachi Thunder 9500™ V Series User and Reference Guide* (MK-92DF601) for further information on the 9500V disk array subsystems.

**Note:** For further information on the Novell® NetWare® operating system, please consult the Novell® NetWare® online help and/or user documentation, or contact Novell® technical support.

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# Chapter 1 Overview of 9500V NetWare® Configuration

## 1.1 9500V Novell® NetWare® Configuration

This document describes the requirements and procedures for connecting the 9500V subsystem to a Novell® NetWare® system and configuring the new 9500V devices for operation with the NetWare® operating system.

Configuration of the 9500V disk devices for NetWare® operations includes:

- Verifying new device recognition (see section 3.1),
- Creating disk partitions (see section 3.2),
- Assigning the new devices to volumes (see section 3.3),
- Mounting the volumes (see section 3.4), and
- Verifying client operations (see section 3.5).

**Note on the term “SCSI disk”:** The 9500V logical devices are defined to the host as SCSI disk devices, whether the interface is SCSI or fibre-channel.

## 1.2 9500V Subsystem

The 9500V RAID subsystem supports concurrent attachment to multiple UNIX®-based and PC-server platforms. Please contact your Hitachi Data Systems account team for the latest information on platform support. The 9500 subsystem provides continuous data availability, high-speed response, scaleable connectivity, and expandable capacity for PC server and open-system storage. The 9500 subsystem can operate with multihost applications and host clusters, and is designed to handle very large databases as well as data warehousing and data mining applications that store and retrieve terabytes of data.

For further information on the 9500V subsystem, please refer to the *Hitachi Thunder 9500™ V Series User and Reference Guide* (MK-92DF601), or contact your Hitachi Data Systems account team.



## Chapter 2 Preparing for New Device Configuration

### 2.1 Configuration Requirements

The requirements for 9500V Novell® NetWare® configuration are:

- **Hitachi Thunder 9500™ subsystem.**
  - The Resource Manager 9500V software is required to configure the fibre-channel (FC) ports.

**Note:** The availability of 9500V features and functions depends on the level of microcode installed on the 9500V subsystem.

- Novell® NetWare® PC server. Please refer to the Novell® NetWare® user documentation for PC server hardware and configuration requirements.
- Novell® NetWare® server operating system versions 5.0E and 5.1. Version 5.0E requires NetWare5 Support Pack 3a, Client component: Novell® Client for Windows NT®. Version 5.1 requires Client component: Novell® Client for Windows NT®.

**Note:** For the latest information on NetWare® version support, please contact your Hitachi Data Systems account team.

**Note:** The NetWare® administrator password is required during 9500V device configuration.

- **High-availability (HA) software.** The 9500V currently supports various software products. Please contact your Hitachi Data Systems account team for the latest information on supported software products.
- **Fibre-channel adapters.** Make sure to install all utilities, tools, and drivers that come with the adapter(s).
  - The 9500V subsystem supports full-speed (1 and 2 Gb/s), shortwave, non-OFC (open fibre control) optical fibre-channel interface and multimode optical cables with SC and/or LC connectors. Do not connect any OFC-type fibre-channel interface to the 9500V subsystem.

## 2.2 Installing the 9500V Subsystem

The 9500V subsystem comes with all hardware and cabling required for installation. Installation of the 9500V subsystem involves the following activities:

**Hardware installation.** Perform hardware installation as specified in Hitachi Data Systems' documentation and Hitachi, Ltd. source documentation. Follow all precautions and procedures in this documentation. Check all specifications to ensure proper installation and configuration. Hardware installation includes:

- Assembling all hardware and cabling.
- Upgrading to the latest microcode level.
- Creating RAID groups and LUNs and formatting LUNs using the Resource Manager 9500V software. For information and instructions on using Resource Manager, please refer to the *Hitachi Thunder 9200™ Resource Manager User's Guide (MK-91DF552)*.
- Installing the fibre-channel adapters and cabling.

**9500V FC Port:** The fibre topology parameters for each 9500V fibre-channel port depend on the type of device to which the 9500V port is connected. Determine the topology parameters supported by the device, and set your topology accordingly (see section 2.6).

### 2.2.1 Setting the Host-Specific Parameters for the 9500V Ports

The 9500V ports must be configured for the connected operating system.

**Fibre Topology.** You need to configure the 9500V FC ports to define the fibre topology parameters and port addresses (see Table 2.1). The 9500V subsystem supports up to 64 LUs. You will select the appropriate settings for each 9500V FC port based on the device to which the port is connected. Determine the topology parameters supported by the device, and set your topology accordingly.

**Note:** If you plan to connect different types of servers to the 9500V via the same fabric switch, you must use either **zoning** on the switch or the Hitachi SANTinel™ (LUN security) on the Thunder 9500V.

**Port address.** In fabric environments, the port addresses are assigned automatically by fabric switch port number and are not controlled by the 9500V port settings. In FC arbitrated-loop (FCAL) environments, the port addresses are set by entering an AL-PA (arbitrated-loop physical address, or loop ID, or port address). The host communicates with the devices comprising the loop with 8-bit AL-PA. See Table 2.1.

Table 2.1 shows the available AL-PA values and the corresponding SCSI TID address. The number of available port addresses is 126. (There are 127 port addresses, but address 00H is reserved for fibre connection.) Fibre-channel protocol uses the AL-PAs to communicate on the fibre-channel link, but the software driver of the platform host adapter translates the AL-PA value assigned to the 9500V port to a SCSI TID.

Devices communicate with hosts using individual port addresses. However, hosts map SCSI protocol to fibre channel devices. The hosts access the device's LUs using the device files /dev/dsk/c\*t\*d\* and /dev/rdisk/c\*t\*d\*. SCSI and fibre-channel devices are accessed the same way; however, the device files for SCSI and fibre-channel devices are configured differently.

Table 2.1 Fibre Port Addressing

AL-PA	TID	AL-PA	TID	AL-PA	TID	AL-PA	TID	AL-PA	TID	AL-PA	TID	AL-PA	TID	AL-PA	TID
EF	0	CD	16	B2	32	98	48	72	64	55	80	3A	96	23	112
E8	1	CC	17	B1	33	97	49	71	65	54	81	39	97	23	113
E4	2	CB	18	AE	34	90	50	6E	66	53	82	36	98	1F	114
E2	3	CA	19	AD	35	8F	51	6D	67	52	83	35	99	1E	115
E1	4	C9	20	AC	36	88	52	6C	68	51	84	34	100	1D	116
E0	5	C7	21	AB	37	84	53	6B	69	4E	85	33	101	1B	117
DC	6	C6	22	AA	38	82	54	6A	70	4D	86	32	102	18	118
DA	7	C5	23	A9	39	81	55	69	71	4C	87	31	103	17	119
D9	8	C3	24	A7	40	80	56	67	72	4B	88	2E	104	10	120
D6	9	BC	25	A6	41	7C	57	66	73	4A	89	2D	105	0F	121
D5	10	BA	26	A5	42	7A	58	65	74	49	90	2C	106	08	122
D4	11	B9	27	A3	43	79	59	63	75	47	91	2B	107	04	123
D3	12	B6	28	9F	44	76	60	5C	76	46	92	2A	108	02	124
D2	13	B5	29	9E	45	75	61	5A	77	45	93	29	109	01	125
D1	14	B4	30	9D	46	74	62	59	78	43	94	27	110		
CE	15	B3	31	9B	47	73	63	56	79	3C	95	26	111		

## 2.2.2 Verifying the Host Fibre-Channel Adapter Installation

Before the 9500V is connected to the Novell® system, you must verify the FC adapter installation. To ensure that the host fibre configuration is correct, you will verify recognition of the FCA and the FCA driver.

To verify the fibre-channel host configuration:

1. Log in to the Novell® system as **root**, and make sure that all existing devices are powered on and properly connected to the Novell® system.
2. Display the host configuration using the appropriate command. Make sure that the host recognizes the following four classes of fibre information: **fibre channel adapter**, **SCSI bus characteristics**, **worldwide name**, and **FCA driver**. If this information is not displayed or if error messages are displayed, the host environment may not be configured properly.

**Note:** For information on the HBA-specific text displayed on screen, please refer to the MAN pages and/or user documentation for the HBA.

## **2.3 Connecting the 9500V Subsystem to the Novell® System**

The 9500V subsystem comes with all the hardware and cabling required for connection to the host system(s). Connection of the 9500V subsystem involves the following activities:

1. Verify subsystem installation. Verify that the status of the fibre/SCSI adapters and LUNs is NORMAL.
2. Connect the 9500V to the Novell® system. Install the fibre-channel cables between the 9500V subsystem and the Novell® system.

After connecting the 9500V subsystem to the Novell® host, you need to perform the following tasks before rebooting the host:

- Modify `/etc/system` with appropriate time-out and max throttle values (see section 2.4),
- Modify `/kernel/drv.sd.conf` so LUs can be recognized (see section 2.5), and
- Configure the host fibre-channel adapters (see section 2.6).

## 2.4 Setting the Disk and Device Parameters

Once the 9500V is installed and connected, you must set the queue depth parameter (**sd\_max\_throttle**) and I/O time-out value (**sd\_io\_time**) for the 9500V devices. The required I/O time-out value (TOV) for 9500V devices is 60 seconds (0x3C), which is also the default TOV value. If the I/O TOV has been changed from the default, you must change it back to 60 seconds by editing the **sd\_io\_time** parameter in the **/etc/system** file.

To set the I/O TOV and queue depth for the 9500V devices:

1. Make a backup of **/etc/system**: **cp /etc/system /etc/system.bak**
2. Edit **/etc/system**
3. Add the following to **/etc/system**: **set sd:sd\_io\_time=0x3c**
4. Add the following to **/etc/system**: **set sd:sd\_max\_throttle = x**

**Note:**  $sd\_max\_throttle = 256 / (\text{number of LUNs on the 9500V port})$  [up to 32, or up to 8 if using VxVM DMP]

5. Save your changes and exit the text editor. You will reboot the system later to apply the above I/O TOV setting.

## 2.5 Setting and Recognizing the LUs

You must set and recognize the new LUs by adding the 9500V logical devices to the `sd.conf` file (`/kernel/drv/sd.conf`). The `sd.conf` file includes the SCSI TID and LUN for all LUs connected to the Novell® system.

To set and recognize the new LUs:

1. Log in as root, and make a backup copy of the `/kernel/drv/sd.conf` file:  
`cp -ip /kernel/drv/sd.conf /kernel/drv/sd.conf.bak`
2. Edit the `/kernel/drv/sd.conf` file as shown in Figure 2.1. Make sure to make an entry (SCSI TID and LUN) for each new device being added to the Novell® system.  
**Note:** If the LUs have already been added to the `sd.conf` file, please verify each new LU.  
**Note:** The setup in the `sd.conf` file is different for some adapters. Please refer to the MAN pages or user documentation for the adapter.
3. Exit the vi editor, and save your changes. You will reboot the system later to apply the new settings.

```
# cp -ip /kernel/drv/sd.conf /kernel/drv/sd/conf/standard      ← Make backup of file.
#
# vi /kernel/drv/sd.conf                                     ← Edit the file (vi shown).
#ident "@(#)sd.conf      1.8      93/05/03 SMI"
name="sd" class="scsi"
        target=0 lun=0;

name="sd" class="scsi"
        target=1 lun=0;

name="sd" class="scsi"
        target=2 lun=0;

name="sd" class="scsi"                                     ← Add this information for
        target=2 lun=1;                                   ← all new target IDs
                                                    and LUNs. (*See note.)

name="sd" class="scsi"
        target=3 lun=0;

name="sd" class="scsi"
        target=4 lun=0;
#
#
```

**Note:** The SCSI class type name is used because the SCSI driver is used for fibre channel.

Figure 2.1 Setting and Recognizing LUs

## **2.6 Configuring the Host Fibre-Channel Adapters**

After setting the disk and device parameters and setting and recognizing the LUs, you are ready to configure the FC adapter(s) connected to the 9500V. The host bus adapters (HBAs) have many configuration options.

Please make sure that you have read the MAN pages and user documentation for the adapter.

## **2.7 Rebooting the Novell® System**

After setting the disk and device parameters, setting and recognizing the LUs, and configuring the HBAs, you are ready to reboot the Novell® System.



## Chapter 3 Configuring the 9500V Devices

After 9500V installation has been completed and new device recognition has been verified, the devices on the newly installed 9500V subsystem are ready to be configured for use. Configuration of the 9500V devices is performed by the user and requires administrator access to the NetWare® system. The activities involved in configuring the 9500V devices are:

- Verifying new device recognition (see section 3.1),
- Creating the disk partitions (see section 3.2),
- Assigning the new devices to volumes (see section 3.3),
- Mounting the volumes (see section 3.4), and
- Verifying client operations (see section 3.5).

**Note on the term “SCSI disk”:** The 9500V logical devices are defined to the host as SCSI disk devices, even though the interface is fibre-channel.

### 3.1 Verifying New Device Recognition

The first step in configuring the newly installed 9500V devices is to verify that the NetWare® system recognizes the new devices. You will display the device information using the LIST DEVICES command and verify that the system recognizes the 9500V devices. You will also record the device number which is used during disk partitioning and volume creation.

To verify that the NetWare® system recognizes the new 9500V devices:

1. If you just finished loading the device driver, you are already at the server console. If not, go to the NetWare® directory, and enter SERVER to get to the server console.
2. At the server console, enter LIST DEVICES to display all disk devices (use the **Pause** key as needed). The device number and device type are displayed for each device.
3. Record the device number for each new. This information will be used during disk partitioning and volume creation.
4. Verify that all of the new 9500V devices are listed. If any devices are not listed, see section 4.1 for troubleshooting information.

## 3.2 Creating the Disk Partitions

After verifying new device recognition, the next step in configuring the new 9500V devices is to create disk partitions on these new devices. Figures 3.2 through 3.8 show the sequence of screens displayed on the NetWare® server during the disk partitioning process.

**Note:** Do not create a partition on a disk device that will be accessed as a raw device (e.g. some database applications use raw devices).

To create disk partitions on the new SCSI disk devices:

1. At the server console, enter **LOAD NWCONFIG** to load the Configuration Options module (see Figure 3.1).
2. On the Configuration Options screen, select **Standard disk options**, and press **Enter** to access the NetWare® disk options (see Figure 3.2).
3. On the Available Disk Options screen, select **Modify disk partitions and Hot Fix** and press **Enter**.
4. The Available Devices screen (see Figure 3.3) lists the devices by device number. The device numbers should be recorded. On the Available Disk Drives screen, select the device to be partitioned and press **Enter**.
5. If the partition table has already been initialized, skip this step. If the partition table has not yet been initialized, the partition table message is displayed (see Figure 3.4). Press **Enter** to confirm the message. When the **Initialize the partition table?** message appears, select **Yes** and press **Enter** to initialize the partition table.
6. On the Disk Options screen (see Figure 3.5), select **Create NetWare disk partition**, and press **Enter**.
7. You are now prompted to create the partition either automatically or manually. Select the desired option, and press **Enter**. If you select automatic partitioning, the NetWare® system will create the disk partition and hot fix area using the available disk space (the hot fix area will be approximately two percent of the partition size). If you select manual partitioning, you must enter the desired partition size and hot fix area.
8. On the Disk Partition Information screen (see Figure 3.6), verify (or enter) the partition size and hot fix data area size, and press **F10** to save the changes. You are returned to the Disk Options screen.
9. Select **Create NetWare disk partition** again, and press **Enter**.
10. When the **Create NetWare Partition?** message appears (see Figure 3.7), select **Yes** and press **Enter** to create the specified disk partition on the selected device.
11. Press **Esc** until you are returned to the Available Devices screen (refer to Figure 3.3). Repeat steps (4) through (10) to create the disk partition on each new SCSI disk device.
12. When you are finished creating disk partitions, return to the Available Disk Options screen (refer to Figure 3.2).

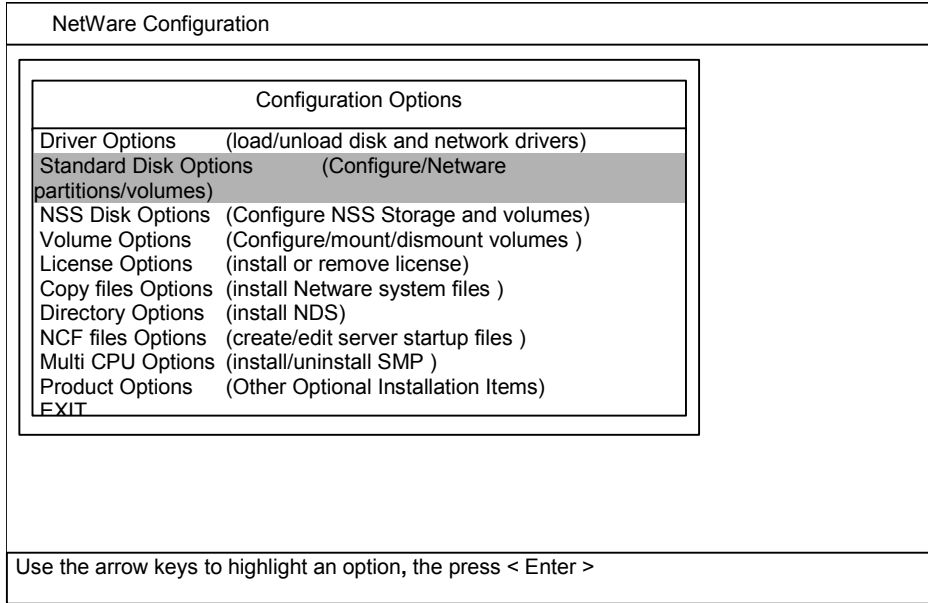


Figure 3.1 Loading the NetWare® Configuration Options Module

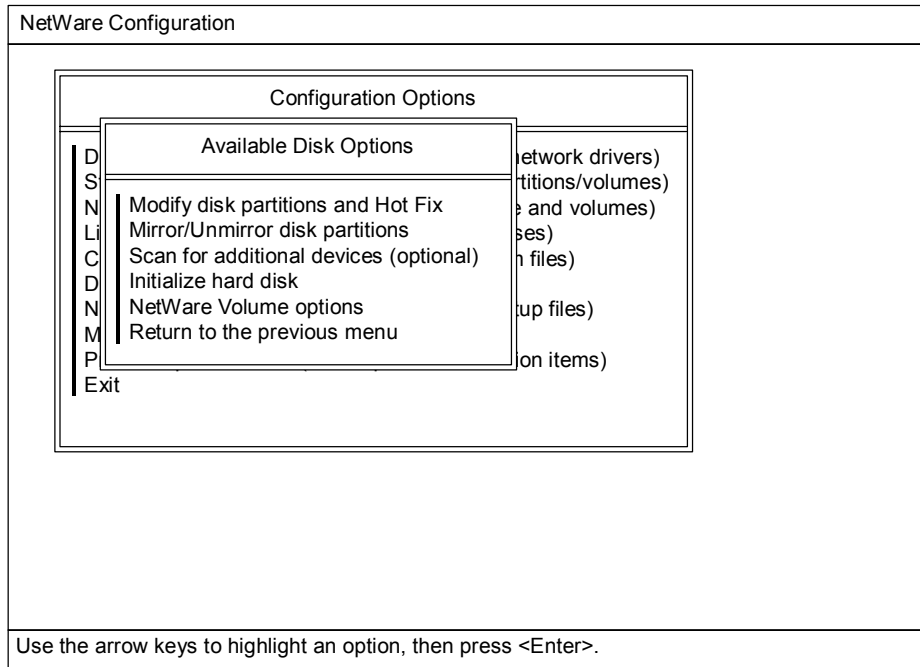


Figure 3.2 Accessing the NetWare® Disk Options

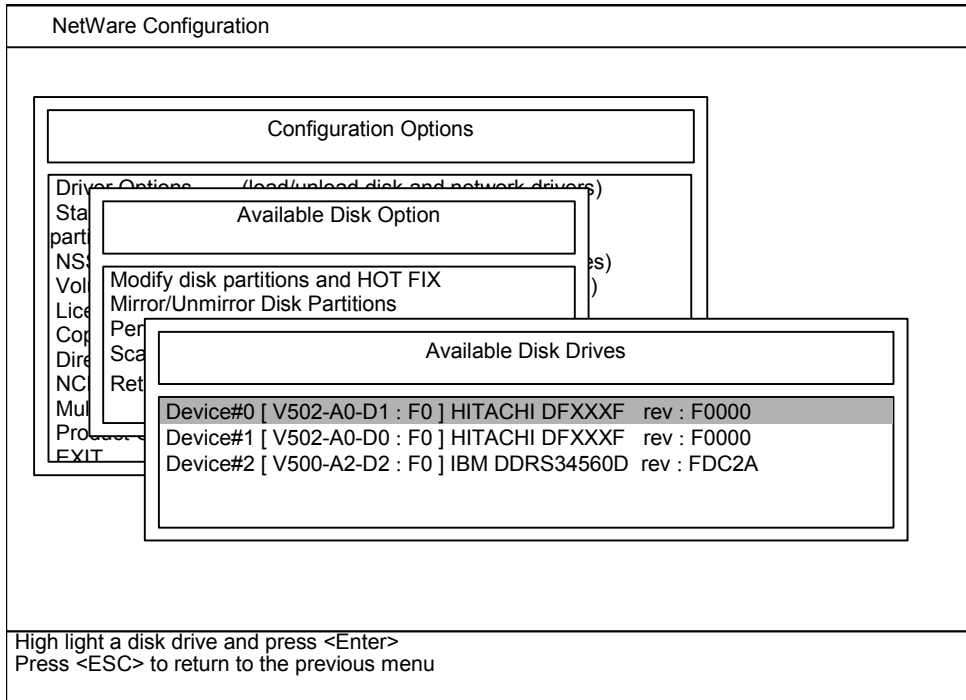


Figure 3.3 Selecting the Device to be Partitioned

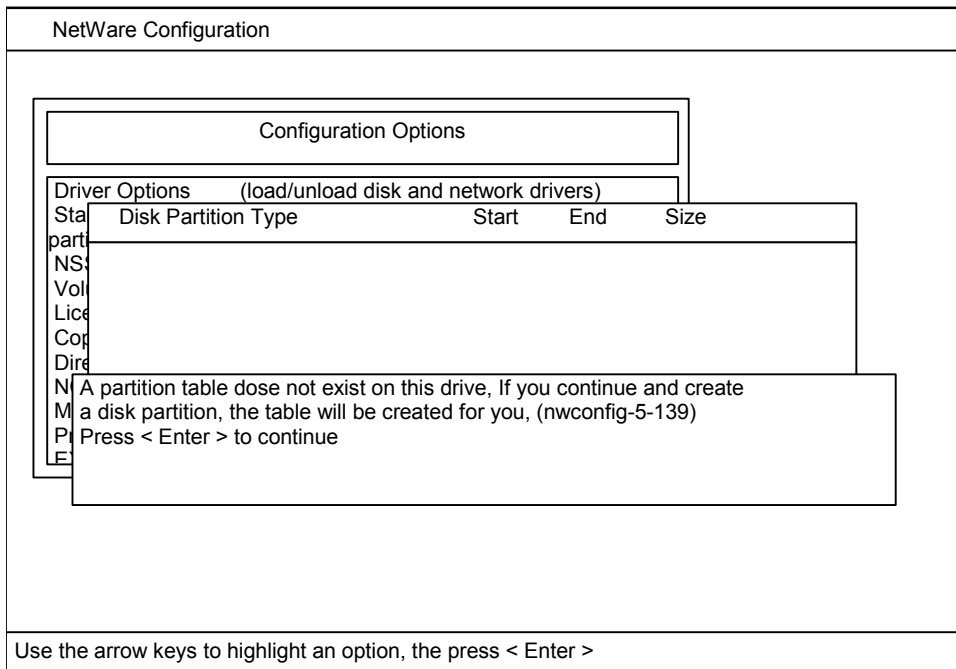


Figure 3.4 Confirming the Partition Table Message

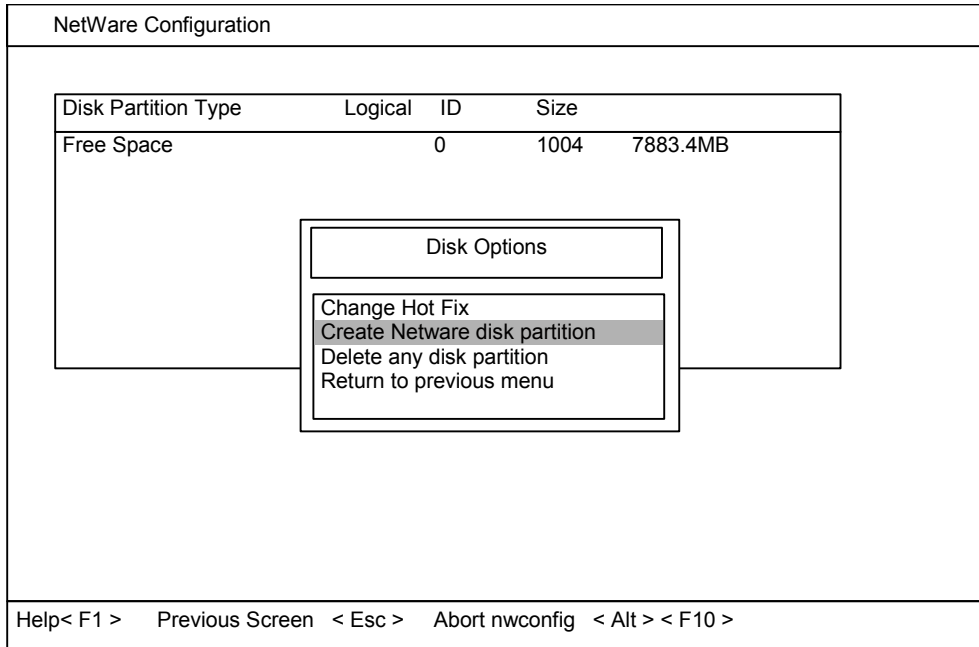


Figure 3.5 Starting to Create a Disk Partition

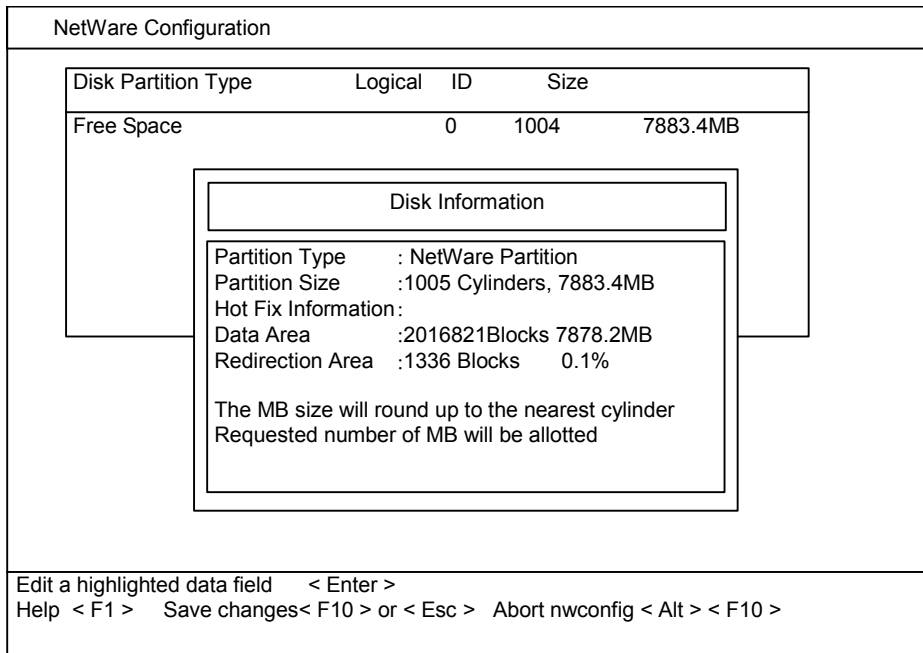


Figure 3.6 Entering the Disk Partition Information

NetWare Configuration

Disk Partition Type	Start	End	Size
Free Space	0	1004	7883.4MB

Disk Partition Information

Partition Type : NetWare Partition  
Partition Size : 1005 Cylinders, 7883.4MB  
Hot Fix Information:  
Data Area  
Redirection Area

Create Netware Partition?

NO  
YES

Edit a highlighted data field < Enter >  
Help < F1 > Save Changes < F10 > or < Esc > Abort nwconfig < Alt > < F10 >

The screenshot shows the NetWare Configuration utility. At the top, it says "NetWare Configuration". Below that is a table with columns "Disk Partition Type", "Start", "End", and "Size". The table contains one row: "Free Space", "0", "1004", "7883.4MB". Below the table is a "Disk Partition Information" box containing: "Partition Type : NetWare Partition", "Partition Size : 1005 Cylinders, 7883.4MB", "Hot Fix Information:", "Data Area", and "Redirection Area". Overlaid on this is a "Create Netware Partition?" dialog box with "NO" and "YES" options, where "YES" is highlighted. At the bottom, there are instructions: "Edit a highlighted data field < Enter >", "Help < F1 > Save Changes < F10 > or < Esc > Abort nwconfig < Alt > < F10 >".

Figure 3.7 Creating the NetWare® Partition

### 3.3 Assigning the New Devices to Volumes

After you have created the disk partitions on the new devices, you are ready to assign the new SCSI disk devices to volumes, so that the NetWare® system can start writing to the new devices. Figures 3.9 through 3.15 show the sequence of screens displayed on the NetWare® server during the volume assignment process. **Reminder:** A volume can span as many as 32 devices, so you can assign more than one device to a volume.

With NetWare 6.x, you must create a pool before you can create a Novell Storage Services (NSS) volume.

**Note:** The addition of new volumes to the NetWare® server may require a memory upgrade. Please consult the NetWare® user documentation and/or contact Novell® technical support.

To assign the new SCSI disk devices to volumes:

1. After creating the disk partitions, you should have returned to the Available Disk Options screen. Select **NetWare Volume options**, and press **Enter** to display the volume options.
2. The existing volumes are listed by volume name, and the volume options are displayed at the bottom of the screen (see Figure 3.8). Execute the **Add/View/Modify volume segments** command by pressing the **Ins** or **F3** key.
3. The Volume Disk Segment List screen (see Figure 3.9) displays the existing devices by device number. The device numbers should be recorded on your SCSI Path Worksheet (step (3) in section 3.1). The **Volume assignment** column displays (**free space**) for each device which is not yet assigned to a volume.
4. Execute the **Make a volume assignment** command as follows: move the cursor to the line containing the desired device, then move the cursor over onto (**free space**) in the **Volume assignment** column, and press **Enter**.
5. When the **What would you like to do with this free segment?** message appears (see Figure 3.10), select the desired option, and press **Enter**. If you selected **Make this segment part of another volume**, select the volume you want to add this segment to, and press **Enter**.
6. On the Disk Segment Parameters screen, enter the new volume name (or verify the selected volume), and enter the disk segment size (see Figure 3.11). The segment size is the same as the partition size entered during disk partitioning (see step (8) in section 3.2).
7. Press **F10** to save the new volume information and return to the Volume Disk Segment List screen (see Figure 3.12).
8. On the Volume Disk Segment List screen, press **F10** to save the new volume information and return to the volume list (see Figure 3.13).
9. Repeat steps (2) through (8) until you have assigned all new 9500V devices to volumes.
10. When you are finished assigning new devices to volumes, press **Esc** to save your volume changes. When the confirmation message appears (see Figure 3.14), select **Yes** and then press **Enter** to save all changes and return to the Available Disk Options screen.

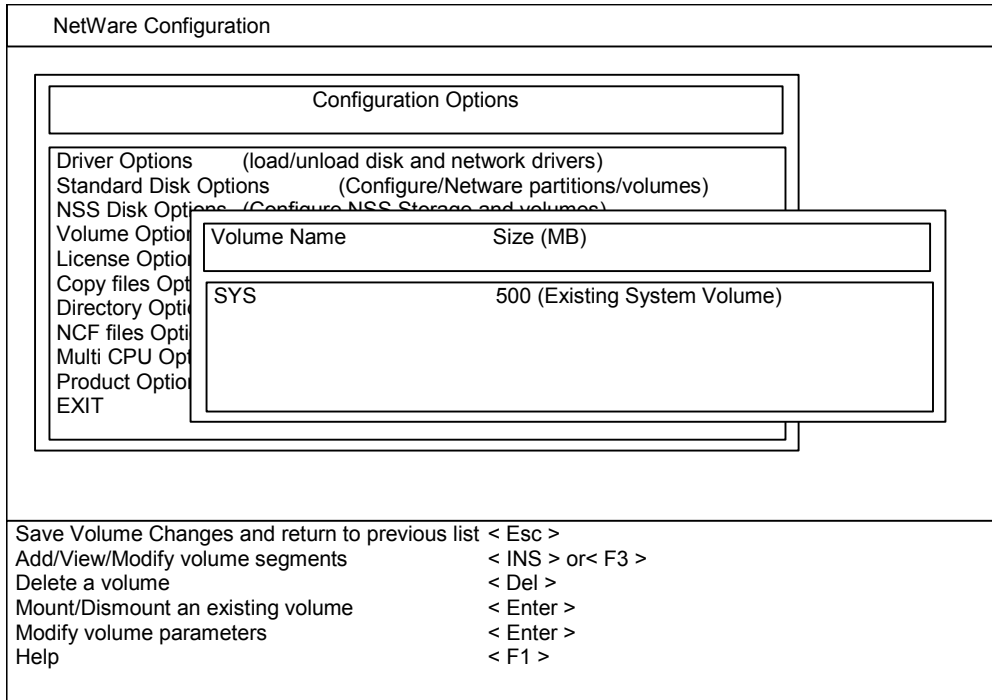


Figure 3.8 Displaying the Existing Volumes and Volume Options

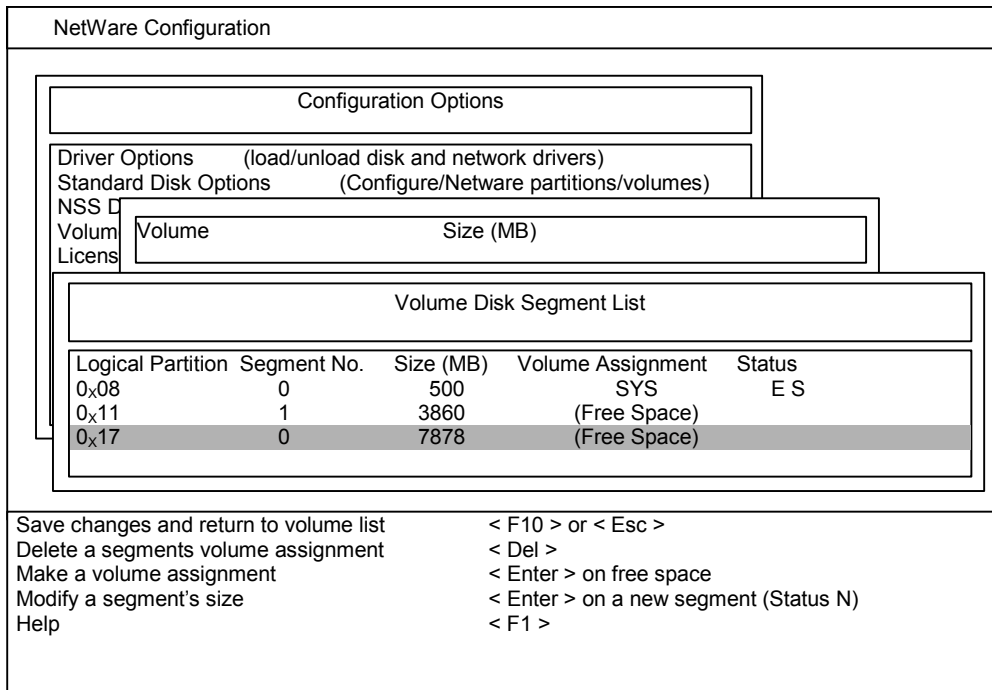


Figure 3.9 Displaying the Existing Devices and Selecting the Device

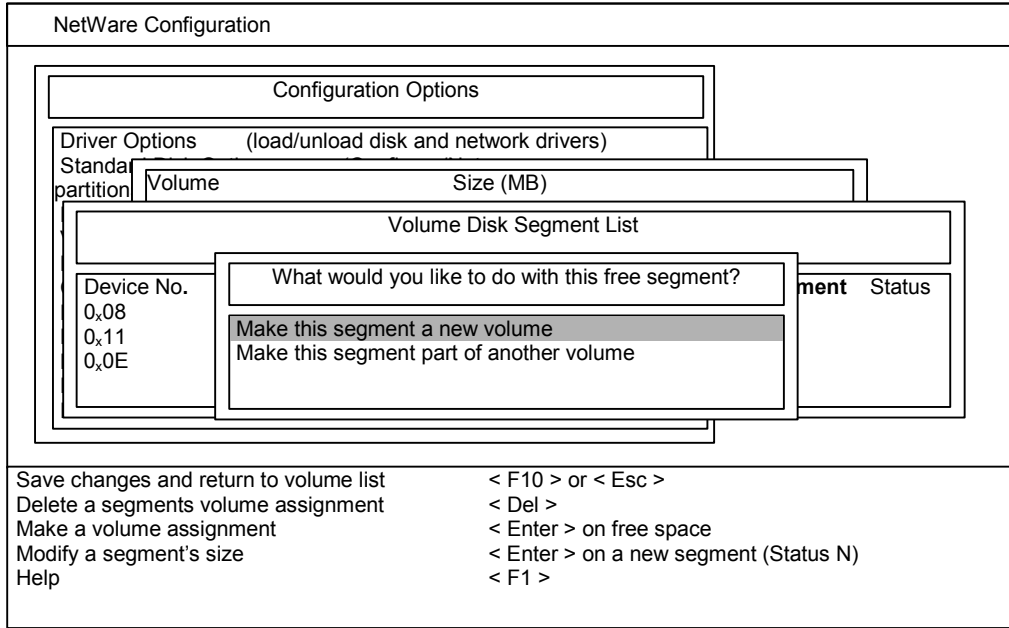


Figure 3.10 Creating a New Volume on the Selected Device

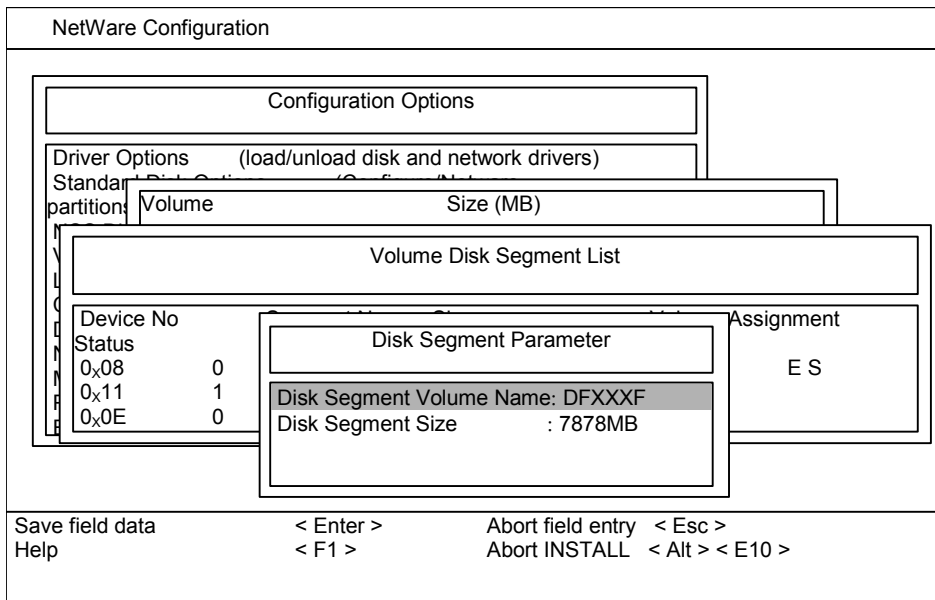


Figure 3.11 Entering the Disk Segment Parameters

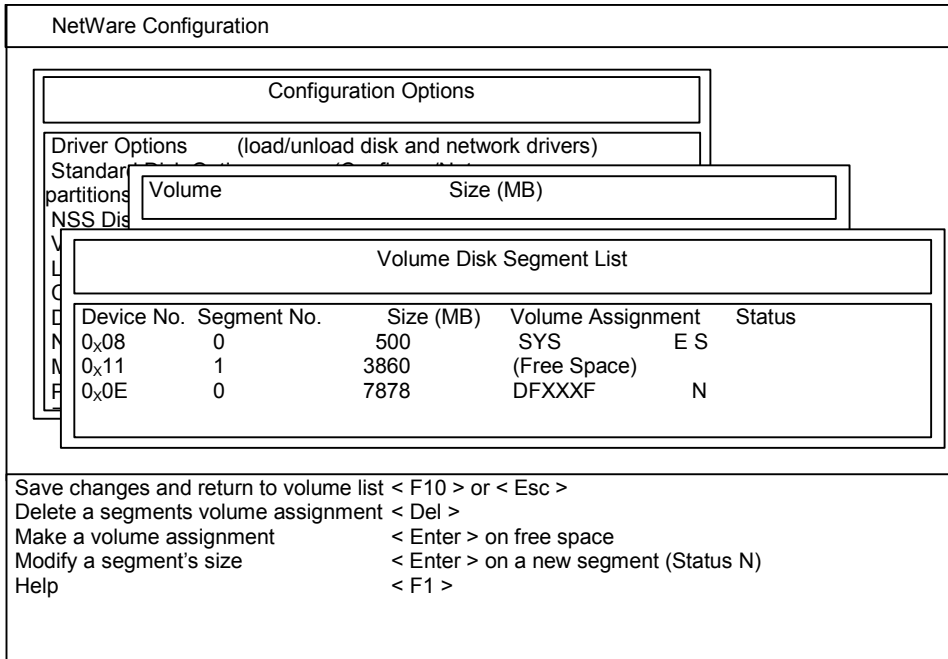


Figure 3.12 Saving the Disk Segment Parameters

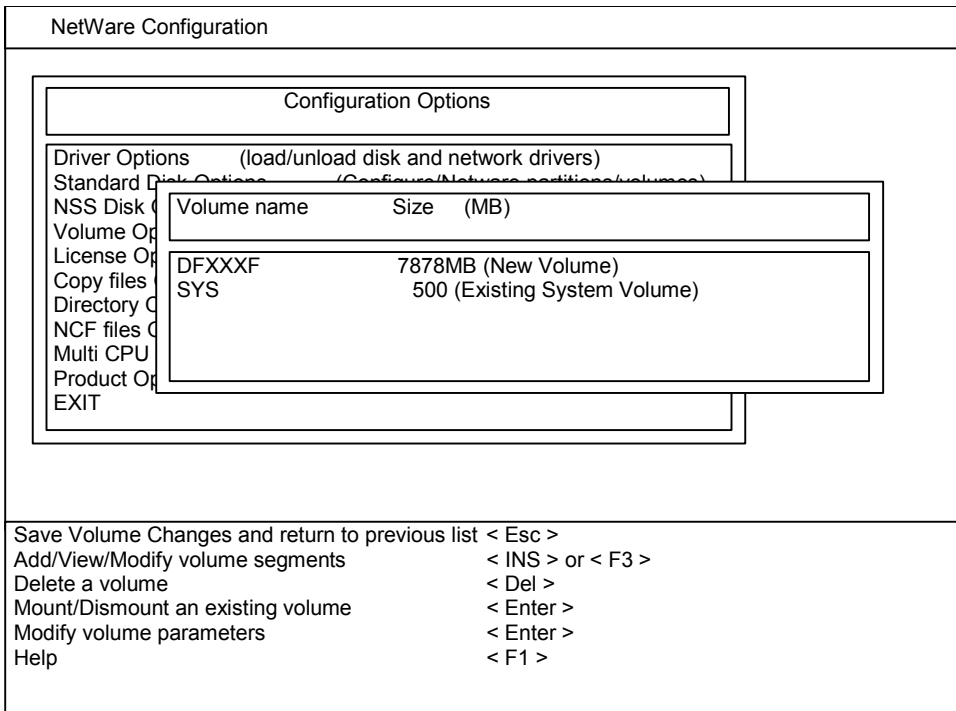


Figure 3.13 Saving the Specified New Volume

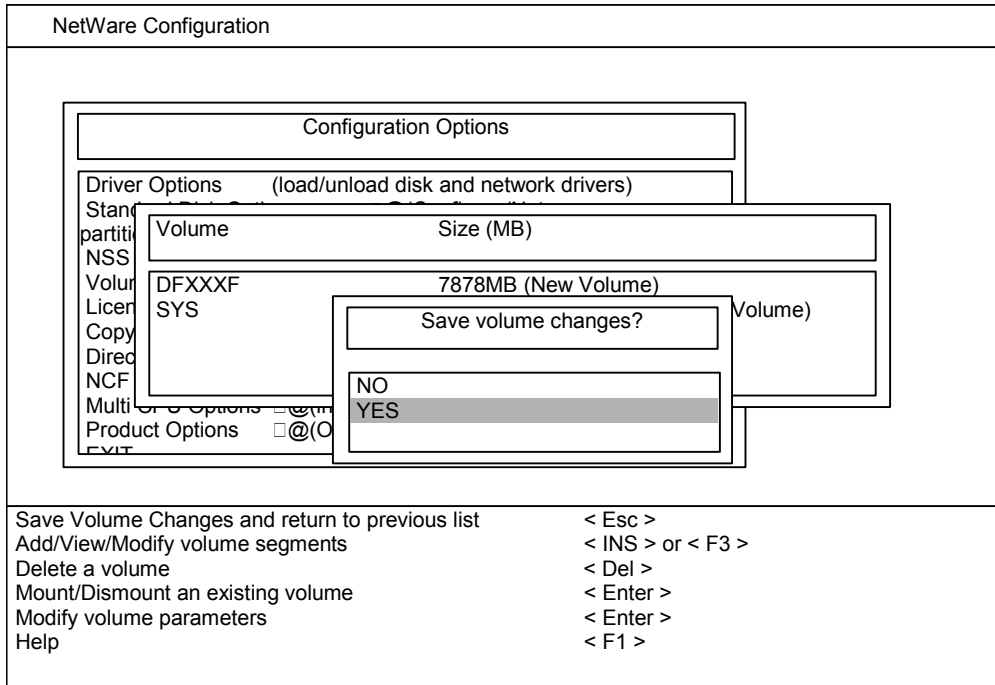


Figure 3.14 Saving All New Volumes

### 3.4 Mounting the New Volumes

After you have assigned the new 9500V devices to volumes, you are ready to mount the new volumes to verify that the NetWare® system can access the new devices. Figures 3.16 through 3.20 show the sequence of screens displayed on the NetWare® server during the volume mounting process. You should mount all new volumes.

To mount the new volumes:

1. After assigning the new devices to volumes, you should have returned to the Available Disk Options screen. Select **NetWare Volume options** to display the volume list and volume options, and then select **Mount/Dismount an existing volume** and press **Enter**.
2. The mount/dismount volume function requires the NetWare® administrator password. Enter the administrator password on the Directory Services Login screen, and then press **Enter** (see Figure 3.15).
3. An informational message displays the number of new volumes just added (see Figure 3.16). Press **Enter** to confirm this message.
4. You are now prompted to select the desired mount action (see Figure 3.17). Select either **Mount all volumes** or **Mount volumes selectively** as desired.
5. The mount status for all volumes is now displayed.
  - a) If you chose to mount volumes selectively (see Figure 3.18), select the desired volume, press **Enter** to mount the volume, and then confirm that the volume's status changed to **MOUNTED**. Repeat this step for each new volume to confirm that all new volumes can be mounted successfully.
  - a) If you chose to mount all volumes, the system mounts all volumes and then displays the mount status for all volumes (see Figure 3.19). Confirm that the status for all new volumes is **MOUNTED**.
6. When you have confirmed that all new volumes/devices were mounted successfully, you are finished with 9500V device configuration on the Novell® NetWare® PC server. Leave the new volumes mounted for now, so that you can verify that the NetWare® clients can access the new volumes.

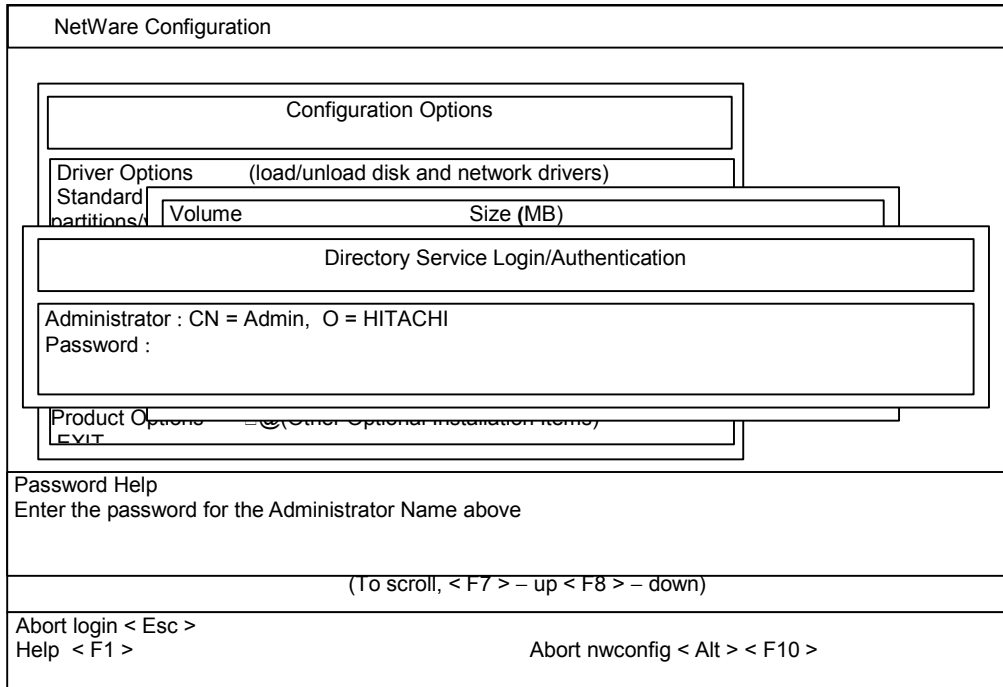


Figure 3.15 Entering the Administrator Password to Perform Mount Operations

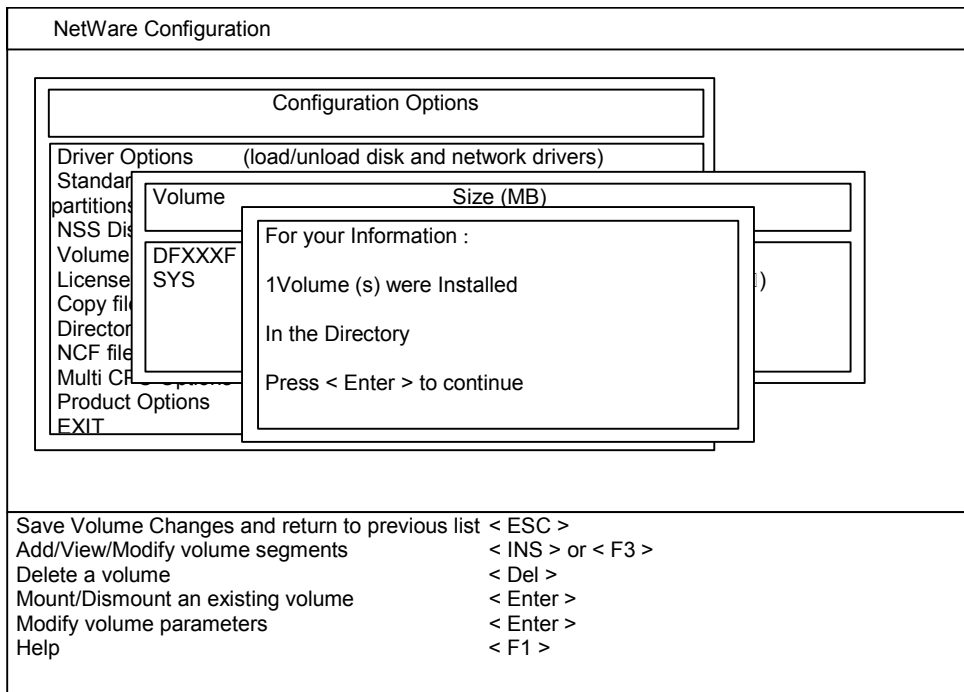


Figure 3.16 Confirming the New Volume Message

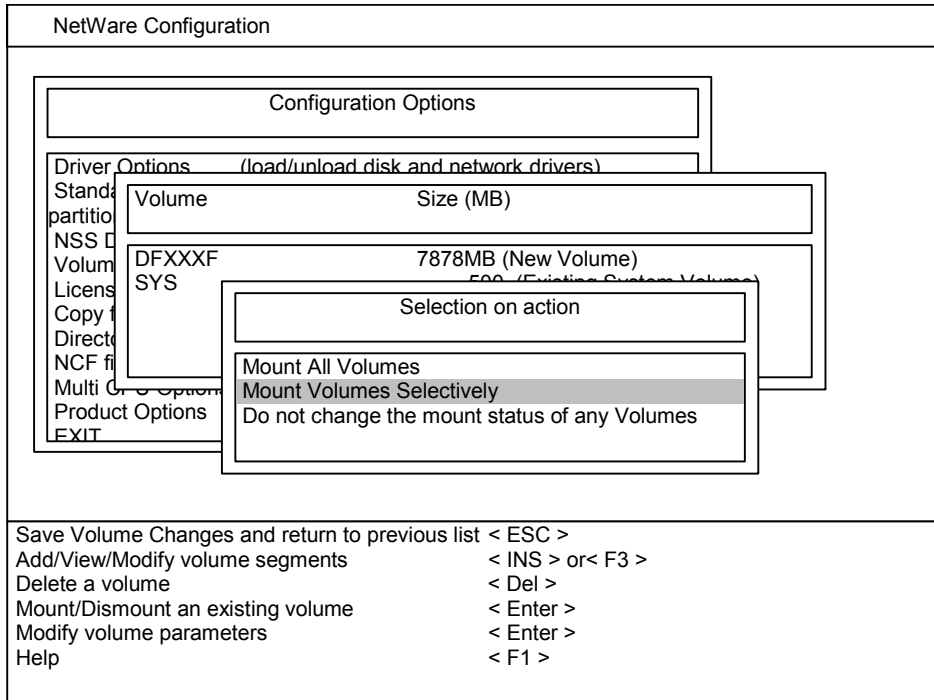


Figure 3.17 Selecting the Desired Mount Action

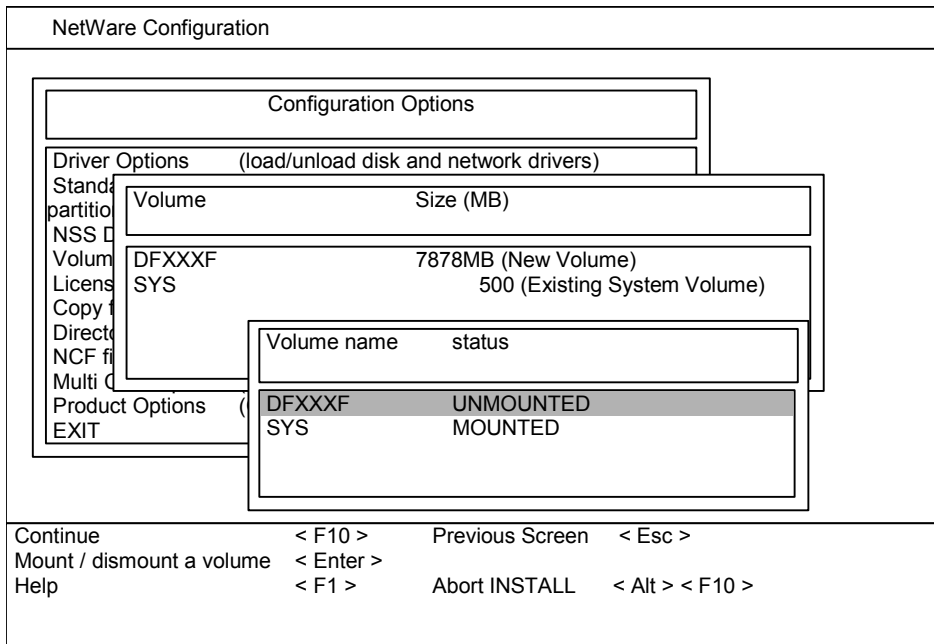


Figure 3.18 Selecting and Mounting the Volume

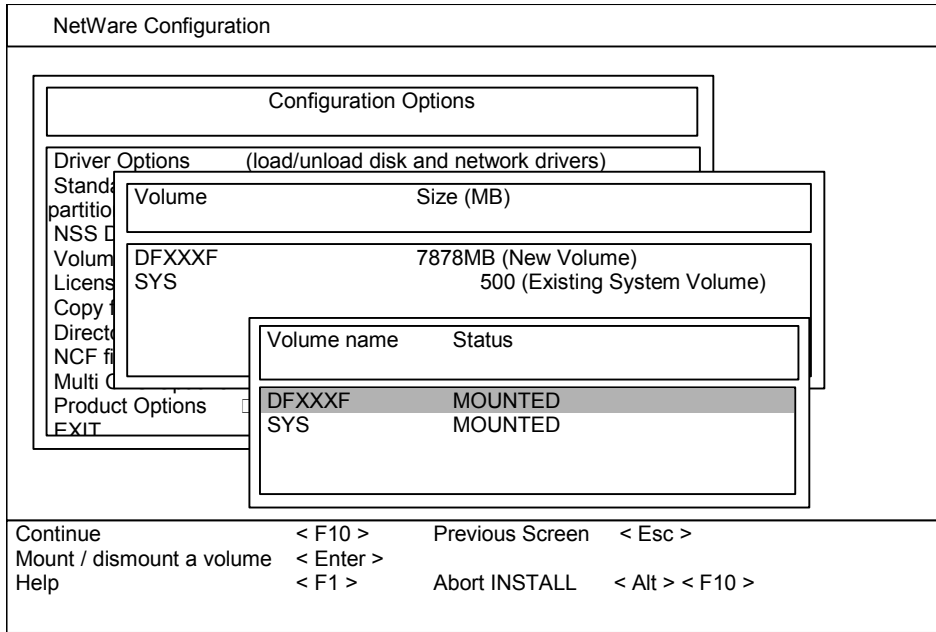


Figure 3.19 Confirming the MOUNTED Status of the New Volume(s)

### **3.5 Verifying Client Access**

The last step in new device configuration is to verify that the NetWare® clients can access the new volumes. To verify access:

1. Copy an existing file onto each new volume.

**Note:** This document does not provide instructions for copying a file to a mounted volume.

2. Verify that the file was copied successfully. If not, see section 4.1 for troubleshooting instructions.

## Chapter 4 Troubleshooting

### 4.1 Troubleshooting

The Hitachi Thunder 9500™ disk array subsystems provide continuous data availability.

Table 4.1 lists potential error conditions during 9500V Novell® NetWare® configuration and provides instructions for resolving each condition. If you are unable to resolve an error condition, please contact your Hitachi Data Systems representative or VAR for help, or call the Hitachi Data Systems Support Center for assistance.

**Table 4.1 Troubleshooting**

Error Condition	Recommended Action
The devices are not recognized by the system.	<p>Make sure that the READY indicator lights on the 9500V subsystem are ON.</p> <p>Make sure that the fibre-channel cables are correctly installed and firmly connected.</p> <p>Make sure that the fibre-channel adapter board(s) and driver(s) are properly installed.</p>
The system hangs.	<p>Verify the hardware configuration of the NetWare® server. For example, you may need to install the Ethernet network card into slot 9 in order for NetWare® to function properly on the HP® Netserver platform. Check your hardware platform for similar restrictions.</p> <p>Avoid sharing interrupts between cards (shared interrupts can be problematic). If interrupt sharing is required, then it should be done between cards of similar type (e.g., between several fibre host adapter cards).</p> <p>If problems persist, the user can also try:</p> <p>(1) Simplifying the firmware settings (e.g., disable disconnects) and/or the driver LOAD command parameters (e.g., disable multiple LUN support or tagged queuing), or</p> <p>(2) Loading a different version of the driver.</p>

### 4.2 Calling the Support Center

If you need to call the Hitachi Data Systems Support Center, make sure to provide as much information about the problem as possible, including the circumstances surrounding the error or failure and the exact content of any error messages displayed on the host system (s).

The worldwide Hitachi Data Systems Support Centers are:

- Hitachi Data Systems North America/Latin America  
San Diego, California, USA  
1-800-348-4357
- Hitachi Data Systems Europe  
Contact Hitachi Data Systems Local Support
- Hitachi Data Systems Asia Pacific  
North Ryde, Australia  
011-61-2-9325-3300



## Appendix A Acronyms and Abbreviations

AL	arbitrated loop
AL-PA	arbitrated loop physical address
bd	board
blk	block
CU	control unit
FC	fibre-channel
FCA	fibre-channel adapter
FCP	fibre-channel protocol
HBA	host bus adapter
LU	logical unit
LUN	logical unit, logical unit number
NSS	Novell Storage Services
OFC	open fibre control
PA	physical address
PC	personal computer system
RAID	redundant array of independent disks
SCSI	small computer system interface
TID	target ID

