adaptec

ASW-1440 Version 3
ASPI Manager
with Disk Module for
Novell NetWare 286/386

Installation Guide
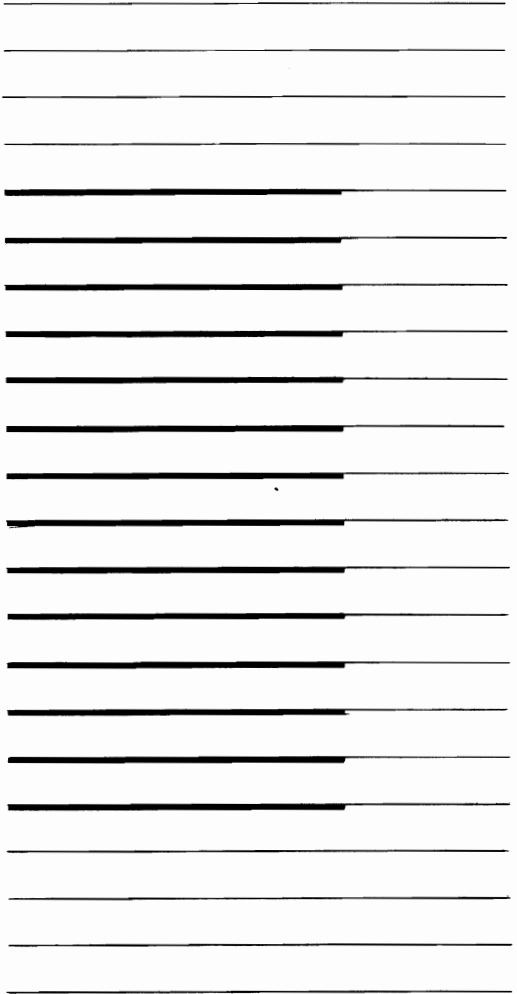
Preface

Additional information may be obtained from:

adaptec
Literature Department/MS-40
691 South Milpitas Blvd.
Milpitas, CA 95035

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This document provides installation information if you are installing Adaptec's AHA-1540A, AHA-1542A, AHA-1540B, AHA-1542B, AHA-1640, AHA-1740, or AHA-1744 SCSI host adapters into a Novell NetWare file server. The versions of NetWare supported are NetWare 286 2.15 (SFT or Advanced), NetWare 386 v3.0, and NetWare 386 v3.1.

(We will refer to the AHA-1540A, AHA-1542A, AHA-1540B and the AHA-1542B as the AHA-1540/1542 and the AHA-1740 and AHA-1744 as the AHA-1740/1744 in this document)

The files for the various types of NetWare are organized into subdirectories on the distribution diskette. The diskette subdirectory structure is:
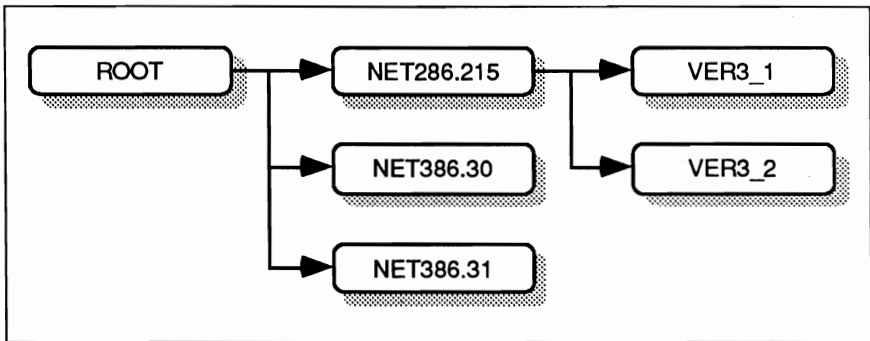
The files contained in each subdirectory are described below.

Files in: \NET286.215\VER3_1

File	Purpose
README.TXT	This is an ASCII text file describing the NetWare drivers for NetWare 286 v2.15.
ASWNOVL.OBJ ASWNOVL.DSK	These are v3.1 of Adaptec's NetWare 286 v2.15 driver for the AHA-1540/1542, AHA-1640, and the standard mode of the AHA-1740/1744. These are fully Novell certified.

Files in: \NET286.215\VER3_2

File	Purpose
README.TXT	This is an ASCII text file describing the NetWare drivers for NetWare 286 v2.15.
ASWNOVL.OBJ ASWNOVL.DSK	These are v3.2 of Adaptec's NetWare 286 v2.15 driver for the AHA-1540/1542, AHA-1640, and the standard mode of the AHA-1740/1744. These drivers allow the AHA-1640 to be configured to Arbitration Level 4. One of the configuration options has changed as well.

Files in: \NET286.30

File	Purpose
README.TXT	This is an ASCII text file describing the NetWare drivers for NetWare 386 v3.0.
ASW1440.DSK	This is v1.0 of Adaptec's NetWare 386 v3.0 driver for the AHA-1540/1542, AHA-1640, and the standard mode of the AHA-1740/1744. It is fully Novell certified.

Files in: \NET386.31

File	Purpose
README.TXT	This is an ASCII text file describing the NetWare drivers for NetWare 386 v3.1.
AHA1540.DSK	Version 2.0 of Adaptec's AHA-1540/1542 NetWare 386 v3.1 driver (also runs the standard mode of the AHA-1740/1744).
AHA1640.DSK	Version 2.0 of Adaptec's AHA-1640 NetWare 386 v3.1 driver.
AHA-1740.DSK	Version 1.0 of Adaptec's AHA-1740/1744 enhanced mode NetWare 386 v3.1·driver.
ASPITRAN.DSK	Version 1.0 of Adaptec's ASPI transport layer. All NetWare 386 v3.1 drivers are fully Novell certified while AHA1540.DSK and AHA1640.DSK are also fully "NetWare Ready" certified.

1.1 WHAT IS ASPI?

ASPI stands for Advanced SCSI Programming Interface. It is a programming interface which allows for multiple drivers to share the same SCSI host adapter. This allows for multiple types of SCSI devices (i.e., tape, disk, CD-ROM, etc.) to be placed on one SCSI host adapter. This keeps cost down while freeing up your internal slots.

An ASPI manager is included in both the NetWare 386 v3.0 and NetWare 386 v3.1 drivers. Below is a sample ASPI diagram:

```
┌─────────────────────────────────────────────────────────────┐
│                      A S P I                                  │
│  ┌──────────────┐   ┌──────────────┐   ┌──────────────────┐  │
│  │ Disk Driver  │   │ Tape Driver  │   │  CD-ROM Driver   │  │
│  └──────┬───────┘   └──────┬───────┘   └────────┬─────────┘  │
│         │                  │                    │            │
│         ▼                  ▼                    ▼            │
│  ┌──────────────────────────────────────────────────────┐   │
│  │       ASPI Transport Layer (ASPITRAN.DSK)            │   │
│  └──────┬───────────────────┬──────────────────┬────────┘   │
│         │                   │                  │            │
│         ▼                   ▼                  ▼            │
│  ┌──────────────┐   ┌──────────────┐   ┌──────────────┐     │
│  │ AHA1540.DSK  │   │ AHA1520.DSK  │   │ AHA1740.DSK  │     │
│  └──────────────┘   └──────────────┘   └──────────────┘     │
└─────────────────────────────────────────────────────────────┘
```
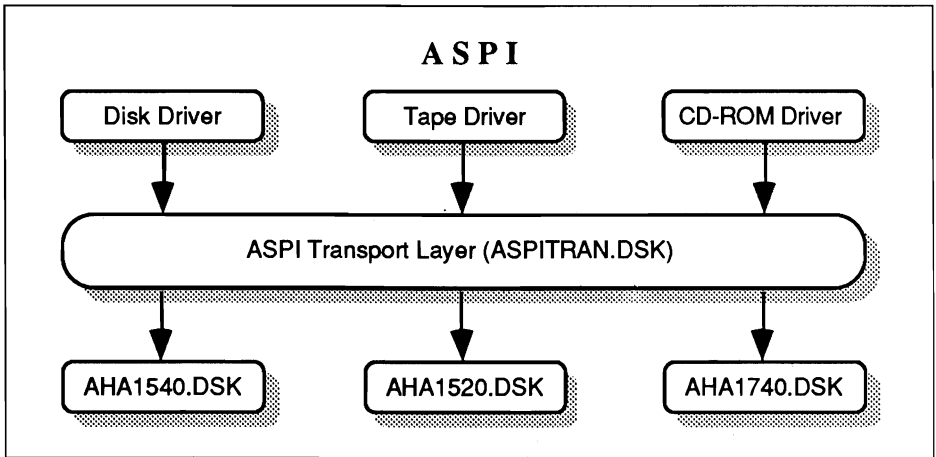
Given the flexibility of ASPI, several companies are currently providing server-based tape backup solutions through ASPI. There are other ASPI modules already developed or under development.

A programming specification is available from Adaptec if you are interested in writing your own NetWare 386 ASPI module.

1.2 WHAT YOU NEED TO GET STARTED

- IBM PC AT-compatible system, Micro Channel-compatible system, or EISA system
- Adaptec's AHA-1540/1542, AHA-1640, or AHA-1740/1744 host adapter
- Adaptec's ASW-1440 ver 3.0   ·
- Novell NetWare 286 v2.15, NetWare 386 v3.0, or NetWare 386 v3.1 (or later)
- One or more Local Area Network (LAN) cards
- This installation guide

1.3 OTHER DOCUMENTATION THAT MAY HELP

- Adaptec's AHA-1540/1542, AHA-1640, or AHA-1740/1744 User's Manual
- 286 or 386 Installation, SFT NetWare Manual (provided by Novell)

We recommend that you make backup copies of all Novell and Adaptec supplied diskettes using "DISKCOPY" and use those backup copies as your working diskettes.

Use the NetWare 386 v3.1 file SERVER.EXE to start the installation process. You will be prompted for a file server name and an IPX internal network number. Consult the NetWare 386 user's manual for this information.

Installing a disk driver into NetWare 386 requires use of the LOAD console command. The driver will need to be loaded for each host adapter into the system. For example, if you have three host adapters, you will need to load the driver three times. Note that if the driver is reentrant, only one image of the driver will remain in memory (AHA1540.DSK, AHA1640.DSK, and AHA1740.DSK are reentrant). The driver for the AHA-1540/1542 would be loaded:

```
:load [path] aha1540 [parameters] <Enter>
```

When you load the driver, you need to tell it which host adapter you are loading the driver for. For the AHA-1540/1542, you do this with the "port = xxx" command line (i.e., load AHA1540 port = 330). The driver will read the interrupt level and DMA channel from the host adapter and pass this information to the NetWare operating system.

For the AHA-1640 or AHA-1740/1744, you specify the host adapter with the "slot = x" command line option (i.e., load AHA1640 slot = 3). The driver will read necessary host adapter information and pass this information to NetWare.

If you do not specify the port or slot setting, you will be prompted for one.

Command line options can be separated by spaces or commas, and they're not white-space sensitive.

NetWare will determine if loading the driver will cause any conflicts (i.e., two host adapters at DMA 5). If there is a possibility for a conflict, the driver will not be loaded. The next section describes the valid command line options.

Note: If installing more than one host adapter, each host adapter should have its own SCSI bus. For example, no two AHA-1540s should be connected to the same SCSI cable.

The NetWare 386 prompt (":") will now be displayed. Use the LOAD command to install the driver. The correct syntax to load the AHA-1540/1542 driver is:

```
:load [path] aha1540 [options]
```

Note that this driver is used for the AHA-1740/1744 running in standard mode.

For the AHA-1640:

```
:load [path] aha1640 [options]
```

For the AHA-1740/1744:

```
:load [path] aha1740 [options]
```

Note that the AHA-1740 driver is required only when running the EISA AHA-1740/1744 in enhanced mode. In standard mode, use AHA1540.DSK.

The module "ASPITRAN.DSK" also needs to reside in the same "[path]."

For an AHA-1540/1542, assuming the ASW-1440 v3.0 diskette is in drive A:, the screen will look similar to:

```
:load a:\net386.31\aha1540    <ENTER>
Loading module AHA1540.DSK
  Auto-loading Module ASPITRAN.DSK
AHA-154x/1640 ASPI Manager & SCSI Disk Module For NetWare 386 v3.1
Version 2.0
Copyright 1990 Adaptec, Inc.

Supported I/O port values are 330, 334, 234, 230, 134, 130
I/O port: 330  <ENTER>
```

To automate this procedure, the user can type: "load a:\net386.31\aha1540 port=xxx" where 'xxx' is the host adapter's port location.

Note that those port values which would cause a conflict with another device will NOT be displayed.

For an AHA-1640, the screen will look similar to:

```
:load a:\net386.31\aha1640   <ENTER>
   Auto-loading Module ASPITRAN.DSK
AHA-154x/1640 ASPI Manager & SCSI Disk Module For NetWare 386 v3.1
Version 2.0
Copyright 1990 Adaptec, Inc.

Supported Slot values are 1, 2
Slot: 1  <ENTER>                .
```

To automate this procedure, the user can type: "load a:\net386.31\aha1540 slot=x" where 'x' is the host adapter's slot location.

Note that those slot values which already have a registered device will NOT be displayed. Also, only those slots which actually have an AHA-1640 installed will be displayed.

For an AHA-1740/1744, the screen will look similar to:

```
:load a:\net386.31\aha1740   <ENTER>
   Auto-loading Module ASPITRAN.DSK            .
AHA-174x ASPI Manager & SCSI Disk Module For NetWare 386
Version 1.0
Copyright 1990 Adaptec, Inc.

(NOTE:  Load ASPITRAN.DSK before AHA1740.DSK in your STARTUP.NCF)

Supported Slot values are 1, 2
Slot: 1  <ENTER>
```

To automate this procedure, the user can type: "load a:\net386.31\aha1740 slot=x" where 'x' is the host adapter's slot location.

Note that those slot values which already have a registered device will NOT be displayed. Also, only those slots which actually have an AHA-1740/1744 installed will be displayed.

If you have multiple host adapters in your server, you'll need to load the driver once for each host adapter. Consult the NetWare installation manual for information on installing other NetWare Loadable Modules (NLMs). If an error message appears when attempting to load the driver, consult the end of this section for a description of the error messages.

2.1   COMMAND LINE OPTIONS

There are several command line options that can be specified when the driver is loaded. These are described below.

Option	Possible Values	Host Adapter	Description
port=	330 334 234 230 134 130	AHA-1540/1542	This option selects the host adapter's port address. This should correspond to the jumpered port address of the AHA-1540/1542. If none is given, the user will be prompted for one. Port 330H is the default value.
speed=	00-FF	AHA-1540/1542	This option sets the AT Bus Master transfer speed. The current pre-programmed speeds are: 0 = 5.0 MBytes/sec 1 = 6.7 MBytes/sec 2 = 8.0 MBytes/sec 3 = 10.0 MBytes/sec 4 = 5.7 MBytes/sec This option will override the jumper settings. Keep in mind that some computers may not be able to handle the higher transfer speeds. The default is 5.0 MBytes/sec.
bus_on=	2-15	AHA-1540/1542	This option sets the host adapter's bus-on time. The units are in microseconds. If this option is not chosen, the default value of 11 μsec will be used.
bus_off=	1-64	AHA-1540/1542	This option sets the host adapter's bus-off time. The units are in microseconds. If this option is not chosen, the default value of 4 μsec will be used.

Option	Possible Values	Host Adapter	Description
slot=	1-8	AHA-1640	This option selects the host adapter's slot location. If none is given, the user will be prompted for one.
verbose=	y	AHA-1540/1542 AHA-1640 AHA-1740/1744	With this option, the driver will display host adapter configuration information during load time.
removable=	off	AHA-1540/1542 AHA-1640 AHA-1740/1744	This option disables support for removable media. By default, removable media is supported. A user may want to disable "removable" disk support in order to load their own ASPI Removable Disk Module.
fixed_disk=	off	AHA-1540/1542 AHA-1640 AHA-1740/1744	This option disables support for fixed disk drives. By default, fixed disk drives are supported. A user may want to disable "fixed" disk support in order to load their own ASPI Fixed Disk Module.
dev_enable=	00-FF	AHA-1540/1542 AHA-1640 AHA-1740/1744	This option allows you to enable the driver's registration of SCSI devices on a per target basis. This enable mask is entered in hex. For example, the following command line: load AHA1540 port=330dev_enable=05 would enable the driver's registration of target #0 and target #2. By default, all SCSI targets are supported. A user may want to disable the registering of a specific target in order to load their own ASPI module.

The command line options are NOT case sensitive, and not white-space sensitive. Placing commas between command line options is optional.

Here is an example of the driver being loaded with command line options used.

```
:load aha1540 port=330 verbose=y speed=0 <ENTER>
Loading module AHA1540.DSK
  Auto-loading Module ASPITRAN.DSK
AHA-154x/1640 ASPI Manager & SCSI Disk Module For NetWare 386 v3.1
Version 2.0
Copyright 1990 Adaptec, Inc.


      Registered Device(s)
      --------------------------------------------------------
      SCSI ID 0 - LUN 0:      CONNER  CP3100 - 100MB
      SCSI ID 1 - LUN 0:      QUANTUM P105S 910-10-94X

      Port Address:           330
      Interrupt Level:        11
      DMA Channel:            5
      Host Adapter SCSI ID:   7

      AT Bus Master Speed:    5.0 MBytes/second
      Bus On Time (usec):     11
      Bus Off Time (usec):    4
      Optimization Mode:      2
```

Here is an example of AHA1740.DSK being loaded with command line options used.

```
:load aha1740 slot=1 verbose=y <ENTER>
Loading module AHA1740.DSK
  Auto-loading Module ASPITRAN.DSK
AHA-174x ASPI Manager & SCSI Disk Module For NetWare 386
Version 1.0
Copyright 1990 Adaptec, Inc.

(NOTE: Load ASPITRAN.DSK before AHA1740.DSK in your STARTUP.NCF)

      Target ID           TQ?       Registered Device
      --------------------------------------------------------
      SCSI ID 0:          No        NetWare Ready P40S 940-40-94xx
      SCSI ID 1:          No        SONY      SMO-C501-00
      SCSI ID 2:          Yes       IMPRIMIS  94601-15
      SCSI ID 3:          Yes       HP        97549T150

      EISA Slot #:                  4
      Interrupt Level:              11
      Host Adapter SCSI ID:         7

      Shared Interrupts:            Enabled
      Firmware Type:                ENHANCED
      Firmware Revision:            11-06-90 REV A
```

The "TQ" column indicates whether the driver will be sending tagged queuing requests to that device. Tagged Queuing is a new feature implemented by some SCSI-2 devices.

2.2   MULTIPLE DISK DRIVES WITH NETWARE 386 V3.1

The NetWare 386 v3.1 drivers support the installation of multiple SCSI hard disk drives in the file server. This might be desired for several reasons:

- to support disk mirroring (fault tolerance)
- to support disk duplexing (fault tolerance)
- to increase total storage capacity of the system
- to install multiple drives per NetWare volume.

Disk mirroring and disk duplexing are described below.

2.2.1   Mirroring

Disk mirroring refers to two or more hard disks which are installed on a single host adapter. These disk drives contain the same data. If one disk goes bad, the rest will continue to function without interruption to the end user, thus keeping network down time to an absolute minimum.
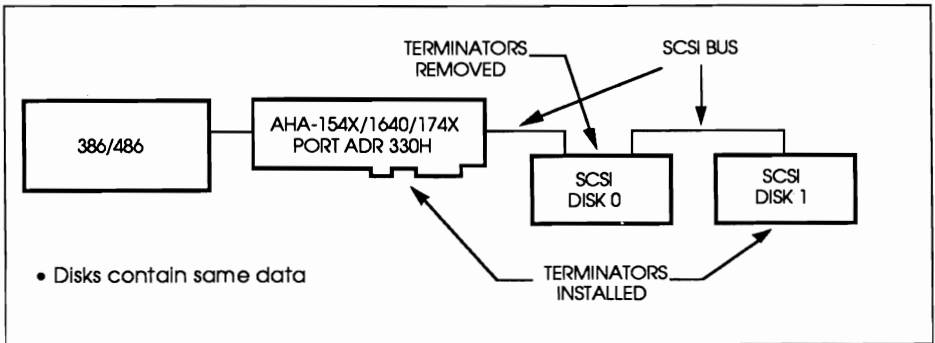
The following hardware considerations should be taken into account when preparing the AHA-1540/1542/1640/1740/1744 disk drives for mirroring.

- The NetWare partitions should be nearly the same size. NetWare will not allow partitions that vary greatly in size to be mirrored. Consult the NetWare Installation manual for the limitations.

- The drives must be connected to the same SCSI cable on the same AHA-1540/1542/1640/1740/1744.

- The SCSI ID of the drives must be different.

- The SCSI devices on the ends of the SCSI cable must have the terminators installed. All other SCSI devices on that SCSI cable should have the terminators removed. The AHA-1540/1542/1640/1740/1744 is considered a SCSI device and has on-board terminators that should be removed only if both the internal and external SCSI connectors are used at the same time.

The NetWare procedure for installing a mirrored pair of disk drives is similar to the standard installation. The INSTALL.NLM module should be loaded from the console. This should be done after the AHA1540.DSK, AHA1640.DSK, or AHA1740.DSK has been loaded. Type "LOAD INSTALL." The screen should look similar to:

```
NetWare 386 Installation v1.40                    NetWare 386 Loadable Module

    ┌─ Installation Options ──┐
    │ Disk Options            │
    │ Volume Options          │
    │ System Options          │
    │ Exit                    │
    └─────────────────────────┘




    ┌────────────────────────────────────────────────────────┐
    │ Use the arrow keys to highlight an option, then press <ENTER>. │
    └────────────────────────────────────────────────────────┘
```
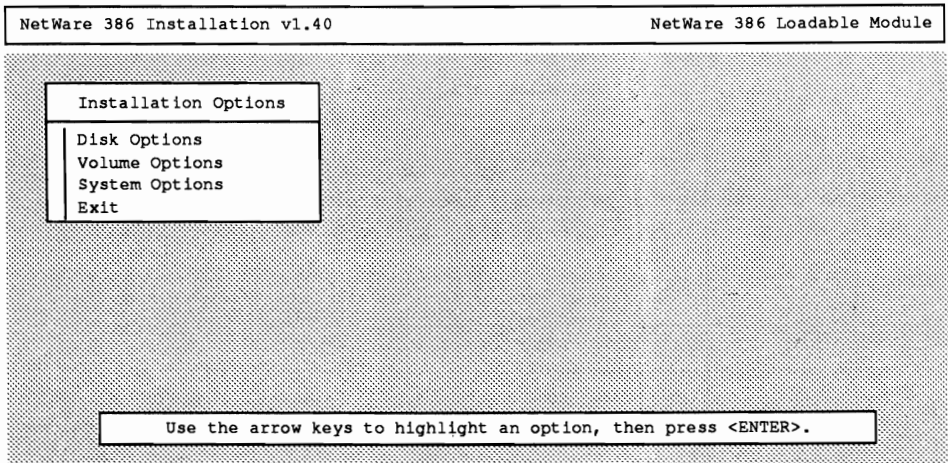
Select "Disk Options". The screen should look similar to:

```
NetWare 386 Installation v1.40                    NetWare 386 Loadable Module

    ┌─────────────────────────────────┐
    │    Installation Options          │
    ├─────────────────────────────────┤
    │  Disk Options                    │
    │  V┌──────────────────────────────────┐
    │  S│    Available Disk Options        │
    │  E├──────────────────────────────────┤
    │   │ Format (optional)                │
    │   │ Partition Tables                 │
    │   │ Mirroring                        │
    │   │ Surface Test (optional)          │
    │   │ Return to Main Menu              │
    │   └──────────────────────────────────┘

        ┌──────────────────────────────────────────────────────────┐
        │ Use the arrow keys to highlight an option, then press <ENTER>. │
        └──────────────────────────────────────────────────────────┘
```
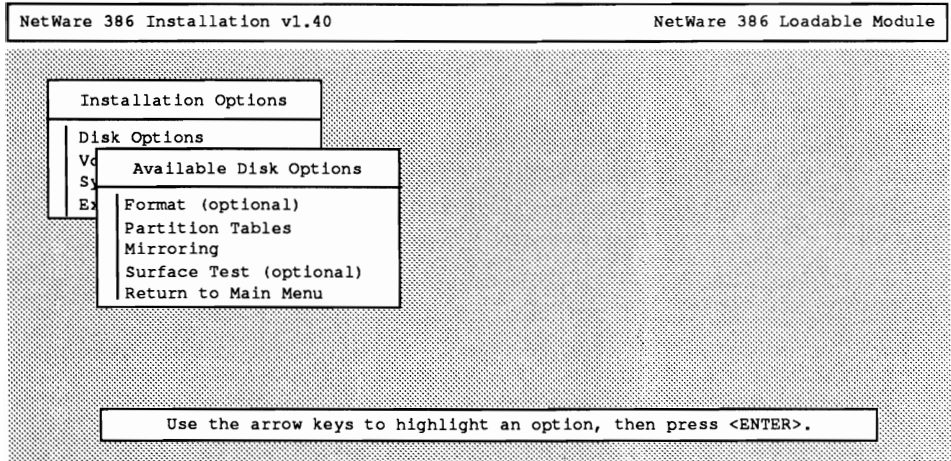
Select "Partition Tables". The screen will look similar to:

```
NetWare 386 Installation v1.40                    NetWare 386 Loadable Module

    ┌─────────────────────────────────┐
    │    Installation Options          │
    ├─────────────────────────────────┤
    │  Disk Options                    │
    │  V┌──────────────────────────────────┐
    │  S│    Available Disk Options        │
    │  E├──────────────────────────────────┤
    │   │ Format                           │
    │   │ Partiti┌──────────────────────────────────────────┐
    │   │ Mirrori│        Available Disk Drives             │
    │   │ Surface├──────────────────────────────────────────┤
    │   │ Return │ Device #0 (5D000) CONNER   CP31000-100MB-3.5 │
    │           │ Device #1 (5D010) QUANTUM  P105S 910-10-94X │
    │           └──────────────────────────────────────────┘

            ┌──────────────────────────────────────────────────┐
            │ Highlight a disk drive and press <ENTER>.        │
            │ Press <ESCAPE> to return to previous menu.       │
            └──────────────────────────────────────────────────┘
```
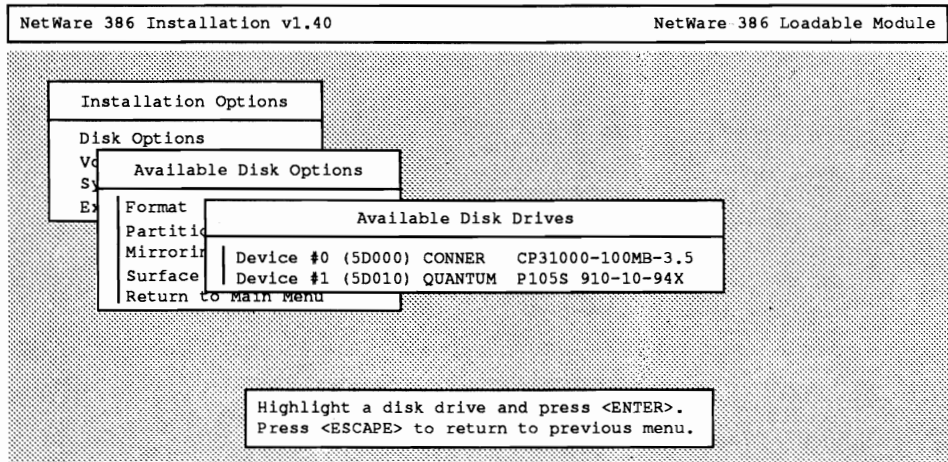
The screen should display the installed disk drives. Consult the NetWare 386 Installation manual on how to create partitions on each drive. After each drive has a NetWare partition on it, return to the "Available Disk Options" menu and select "Mirroring". The screen should look similar to:

```
NetWare 386 Installation v1.40                    NetWare 386 Loadable Module

   ┌─────────────────────────────┐
   │ Installation Options        │
   │ Disk Options                │
   │ V┌──────────────────────────────┐
   │ S│  Available Disk Options      │
   │ E│F ┌───────────────────────────────────────────┐
        │P │      Partitioning Mirroring Status        │
        │M │ Not Mirrorred: Logical Partition #1       │
        │S │ Not Mirrorred: Logical Partition #2       │
        │Return to Main Menu────────────────────────┘

      ┌────────────────────────────────────────────────┐
      │ Highlight a partition and press <ENTER> to view/modify the    │
      │ associated mirror set.  Press <MODIFY> (F3) to restore an "Out of│
      │ Sync" partition.  Press <ESCAPE> to return to previous menu.   │
      └────────────────────────────────────────────────┘
```

Select "Not Mirrored: Logical Partition #1", which is in this case the Quantum Pro 105S.

The screen will look similar to:

```
NetWare 386 Installation v1.40                    NetWare 386 Loadable Module

   ┌─────────────────────────────┐
   │ Installation Options        │
   │ Disk Options                │
   │ V┌──────────────────────────────┐
   │ S│  Available Disk Options      │
   │ E│Format                         │
        │Partiti┌──────────────────────────────────────────┐
        │Mirrorir│No   Partitioning Mirroring Status        │
        │Surface │No┌───────────────────────────────────────┐
        │Return to │    Mirrored NetWare Partitions        │
              │ In Sync-NetWare 386 parition 1 on Device #0 (5D000) │

      ┌────────────────────────────────────────────────┐
      │ Press <INSERT> to add a partition to the set.                 │
      │ Press <DELETE> to remove a partition from the set             │
      │ Press <ESCAPE> to return to the previous list.                │
      └────────────────────────────────────────────────┘
```
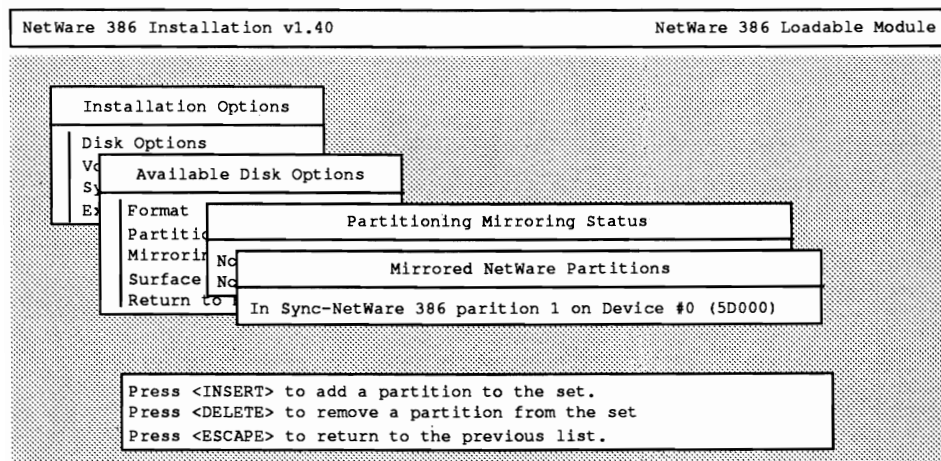
Press <INSERT>, and the screen will look similar to:

```
NetWare 386 Installation v1.40                    NetWare 386 Loadable Module

     Installation Options
    Disk Options
    Vc     Available Disk Options
    Sy
    E)   Format
         Partitic       Partitioning Mirroring Status
         Mirrorir  Nc
         Surface  Nc     Mirrored NetWare Partitions
         Return to     Ir
                               Available Partitions

                     NetWare 386 Partition 2 on Device #1 (5D010)

           Highlight a disk drive and press <ENTER> to add to the set.
           Press <ESCAPE> to return to previous menu.
```

Press <ENTER>, then <ESC>.

The screen will look similar to:

```
NetWare 386 Installation v1.40                    NetWare 386 Loadable Module

     Installation Options
    Disk Options
    Vc     Available Disk Options
    Sy
    E)   Format
         Partitic            Drive Mirroring Status
         Mirrorir  Mirrored: Logical Parition #1
         Surface
         Return to Main Menu

           Highlight a disk drive and press <ENTER> to view/modify the
           associated mirror set. Press <MODIFY> (F3) to restore an "Out of
           Sync" partition.  Press <ESCAPE> to return to previous menu.
```
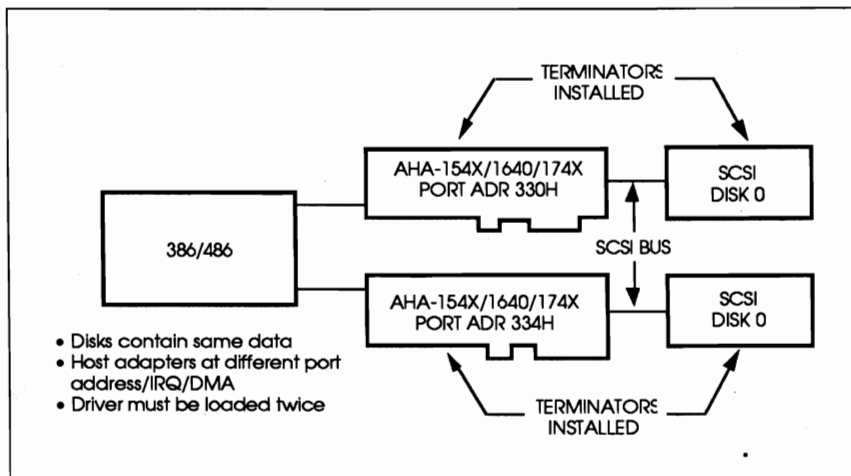
The drives are now mirrored. Press <ESC> several times to exit the INSTALL program.

2.2.2   Duplexing

Disk duplexing is when two host adapters are installed in a single file server, each with its own disk mirrored together. These disk drives contain the same data. This ensures that if either one disk or one host adapter fails, the server will continue to operate.

```
                              TERMINATORS
                               INSTALLED
                         ┌──────────────────┐
                  ┌──────────────────┐   ┌──────────┐
                  │ AHA-154X/1640/174X│   │  SCSI    │
                  │  PORT ADR 330H    │↑  │  DISK 0  │
                  └──────────────────┘│  └──────────┘
  ┌──────────────┐                    │
  │              │        SCSI BUS    │
  │   386/486    │                    │
  │              │  ┌──────────────────┐   ┌──────────┐
  └──────────────┘  │ AHA-154X/1640/174X│↓ │  SCSI    │
  • Disks contain same data  │  PORT ADR 334H    │  │  DISK 0  │
  • Host adapters at different port └──────────────────┘  └──────────┘
    address/IRQ/DMA
  • Driver must be loaded twice      TERMINATORS
                                      INSTALLED
```

Mirroring and duplexing are both referred to as "mirroring" in the NetWare operating system. During the "Installation" part of NetWare, the drive mirroring status will either display "Not Mirrored" or "Mirrored". These drives may be on the same host adapter (mirroring) or on separate host adapters (duplexing). Therefore, the procedure to mirror or duplex is exactly the same as far as NetWare is concerned. The only difference is the hardware setup (one vs. two host adapters).

The following hardware considerations should be taken into account when preparing the AHA-1540/1542/1640/1740/1744 disk drives for duplexing.

- The NetWare partitions should be nearly the same size. NetWare will not allow partitions that vary greatly in size to be mirrored. Consult the NetWare Installation manual for the limitations.

- Each drive should be connected to its own host adapter. Each host adapter should have its own SCSI cable.

- If both of the host adapters are AHA-1542s (e.g., both have floppy controllers), one of the floppy controllers should be disabled by removing the floppy enable jumper.

- The Interrupt Channels (referred to as Interrupt Level with the AHA-1640) must be different on the two host adapters. The Interrupt channel can be changed by changing jumpers on the AHA-1540/1542. With the AHA-1640/1740/1744, configuration options are selected via software, thus eliminating the need to set jumpers. The AHA-1640 is configured using the microchannel reference diskette. The AHA-1740/1744 are configured using the EISA configuration software. Both of these software configuration programs are designed to eliminate conflicts. When configuring the AHA-1640/1740/1744 host adapters, the default Interrupt Channel will be assumed by the configuration software. The configuration software will also list the available alternatives, any of which can be selected for the first or second host adapter.

- The DMA Channels (referred to as Arbitration level with the AHA-1640) must be different on the two host adapters. Jumpers must be changed on the AHA-1540/1542. The appropriate configuration software must be run for the AHA-1640/1740/1744. When configuring the AHA-1640/1740/1744 host adapters, the default DMA channel will be assumed by the configuration software. The configuration software will also list the available alternatives, any of which can be selected for the first or second host adapter.

- For the AHA-1540/42/1640, only one host adapter should have its BIOS enabled. If booting from a SCSI drive is desired, the boot drive must reside at SCSI ID 0 on the host adapter with the BIOS enabled. If you are not booting from SCSI, you should disable the BIOS ROMs on all adapters in the system. Note: AHA-1540s with BIOS enabled must be jumpered to port ID 340H.

- For the AHA-1740/1744, all BIOS ROMs should be enabled. If booting from a SCSI device is desired, the boot drive should reside at the lowest SCSI ID on the AHA-1740/1744 with the lowest BIOS address. The BIOS address for the AHA-1740/1744 can be selected using the appropriate EISA configuration software. If the AHA-1740/1744 BIOS is disabled, the default values for the SCSI configuration will be used, and not the values selected in the EISA setup activity.

The procedure for duplexing requires that the NetWare 386 driver be loaded twice. The screen will look similar to:

```
:load AHA1540 port=330  <ENTER>
Loading module AHA1540.DSK
  Auto-loading Module ASPITRAN.DSK
AHA-154x/1640 ASPI Manager & SCSI Disk Driver For NetWare 386 v3.1
Version 2.0
Copyright 1990 Adaptec, Inc.

:load AHA1540 port=334  <ENTER>
Loading module AHA1540.DSK
AHA-154x/1640 ASPI Manager & SCSI Disk Driver For NetWare 386 v3.1
Version 2.0
Copyright 1990 Adaptec, Inc.
```

The NetWare procedure for installing a duplexed pair of disk drives is the same as the mirrored installation. Follow the directions described under Mirroring for NetWare 386 v3.1.

2.3   SPECIAL CONSIDERATIONS

This section discusses such various topics as how to boot a NetWare 386 server from SCSI, how to format media, how to use removable media, the 16 MByte limitation, and how "NetWare Ready" drives affect the driver.

2.3.1   Booting From SCSI

If you have an AHA-1540/1542 and you wish to boot from SCSI, you should have your BIOS enabled on the host adapter at port 330h. If you have an AHA-1640, you should have your BIOS enabled on a single host adapter at port 330h, 230h, or 130h. If you have other host adapters installed, you should disable their BIOS. If you have an AHA-1740/1744 in enhanced mode, use the configuration diskette to configure the boards. For the AHA-1540/1542 and the AHA-1640, the SCSI drive at ID #0 will be your boot device. For the AHA-1740/1744 in enhanced mode, the boot device is configurable. You should use DOS FDISK to create a small DOS partition (about 3-6 MBytes). Format the drive using DOS FORMAT (i.e., format c:/s) and boot to it. Copy these files to the root directory:

```
(SYSTEM-1 DISK):      SERVER.EXE        INSTALL.NLM
(ASW-1440 v3.0):      AHA1540.DSK       AHA1640.DSK
                      AHA1740.DSK       ASPITRAN.DSK
```

Modify your DOS AUTOEXEC.BAT to run SERVER.

Reboot your server. NetWare 386 v3.1 should boot up at this point. Enter your file server name and internal IPX number. Load AHA1540.DSK, AHA1640.DSK, or AHA1740.DSK for each host adapter in your system. Load INSTALL.NLM and create your STARTUP.NCF and AUTOEXEC.NCF. The next section will help you create these two files.

2.3.2   STARTUP.NCF and AUTOEXEC.NCF

STARTUP.NCF and AUTOEXEC.NCF are two files that can be created so that when the NetWare 386 v3.1 file server is booted, drivers are automatically loaded, volumes are mounted, and the server is ready to service the workstations. These files are created or modified from the NetWare INSTALL.NLM program. Load INSTALL.NLM. Select "System Options." Next, select "Available System Options." The AUTOEXEC.NCF and STARTUP.NCF files can be created or modified by selecting the appropriate menu choice.

A sample AUTOEXEC.NCF will look similar to:

```
file server name MYFILESERVER
ipx internal net 2
mount all
```

Replace MYFILESERVER with the desired file server name. Consult the NetWare installation guide for an appropriate ipx internal net number.

The STARTUP.NCF should look similar to:

```
load aspitran
load aha1540 port=330
```

IMPORTANT: In order for STARTUP.NCF to properly execute, the module ASPITRAN.DSK **must** be loaded before AHA1540.DSK, AHA1640.DSK, or AHA1740.DSK.

2.3.3   Formatting Media

NetWare 386's "INSTALL.NLM" program lets you optionally format a disk drive. When using SCSI, it allows you to low-level format several SCSI drives simultaneously. When you select a drive to format, INSTALL prompts you for an interleave from one to nine. What it doesn't say is that you can also enter an interleave value of zero. This option was previously unavailable in NetWare 386 v3.0. When formatting SCSI disk drives or removable drives on the AHA-1540/1542, AHA-1640, or AHA-1740/1744, we recommend that you use an interleave value of zero. This value instructs the drive to use its optimal interleave value.

2.3.4   Removable Media

AHA1540.DSK v2.0, AHA1640.DSK v2.0, and AHA1740.DSK v1.0, have full support for removable media disk drives including magneto-optical drives. Removable media is treated as a standard SCSI hard disk, with some exceptions. The driver will only recognize and register media with 512 bytes/sector.

NetWare 386 v3.1 allows you to mount/dismount the media, and to lock/unlock the media. These options are supported in the NetWare MONITOR.NLM program. Load this program to display the various options. Select "Disk Information." All "System Disk Drives" will be displayed. Select the removable media device. The following drive status items will be displayed:

Menu Choice	Default Value
1. Volume Segments On Drive:	(select for list)
2. Read After Write Verify:	Hardware Level
3. Drive Light Status:	Not Supported
4. Driver Operating Status:	Active
5. Removable Drive Mount Status:	Mounted
6. Removable Drive Lock Status:	Not Locked

Menu choices 1-4 are valid for both removable and nonremovable types of SCSI disk drives. Menu choices 5 and 6 are for removable media only.

Before you eject your current media, to insert new media, you should first dismount it (Option #5). NetWare will not allow you to dismount if the media is locked. When the media status is dismounted, you can eject the media. Insert your new media. You should wait for the drive to spin up, and then select the mount option.

If your removable media device supports the lock/unlock feature, you can lock the media (Option #6). If the media is locked, the user can press the eject button, but the media will not be ejected. The media must be in the "Not Locked" state before you can eject it.

2.3.5 16-Megabyte Limitation

Due to a hardware limitation of the AT bus, the AHA-1540/1542/1640 can only access up to 16 MBytes of memory in your server. If you have more than 16 MBytes, you should set this flag at the NetWare console in your STARTUP.NCF:

```
:set Auto Register Memory Above 16 Megabytes = OFF
```

If you have an EISA machine with more than 16 MBytes, you should use the Adaptec AHA-1740/1744, running in enhanced mode, to access up to 4 GigaBytes. Use AHA1740.DSK when using the AHA-1740/1744 in enhanced mode.

2.3.6 NetWare Ready

In order for a drive and host adapter to be fully certified as "NetWare Ready," they must both pass a qualification process that takes place before the user sees the product. "NetWare Ready's" goals were to simplify installation and provide the highest quality disk subsystem.

Adaptec's AHA-1540/1542 and AHA-1640 host adapters are fully "NetWare Ready" certified as are their respective drivers, AHA1540.DSK and AHA1640.DSK. This means that you can purchase a "NetWare Ready" drive from a vendor, connect it to your host adapter, partition it, and create a volume without any incompatibility concerns.

The AHA1540.DSK and AHA1640.DSK drivers are flexible enough to allow the user to place "NetWare Ready" SCSI drives as well as standard SCSI drives on a single host adapter. The drivers will register each drive accordingly. This is done transparently to the end user. You can determine whether the driver has detected the drive as being "NetWare Ready" by the drive description string that is displayed from within MONITOR.NLM (Select Disk Options). The message "NetWare Ready" will be embedded in the drive description string.

AHA1740.DSK is currently "NetWare Ready" certified and fully supports "NetWare Ready" drives as well as standard SCSI drives.

2.4   ERROR MESSAGES UNDER NETWARE 386 V3.1

Any error which occurs, during initialization, will cause the driver NOT to be loaded. If an error does occur, the driver will first "beep" the computer and then display a numbered error message in the following format:

```
ERR xxx:message
```

The "xxx" indicates the error code. The error codes are broken up into these sections:

000-099: Non-host adapter specific error

100-199: Adaptec AHA-1540/1542/1640 specific error

200-299: Adaptec AHA-1740/1744 specific error

300-399: Adaptec AHA-1520/1522/1510/AIC-6260 specific error

400-999: Reserved

The "message" is a descriptive line describing the error.

2.4.1   Non-Host Adapter Specific Error Codes

Code	Message

```
000        Failed ParseDriverParameters call
```

A call to NetWare 386's "ParseDriverParameters" routine has failed for some unknown reason. The command line most likely contains some errors or the user pressed <ESC> at the 'port' or 'slot' prompt.

```
001        Unable to reserve hardware, possible conflict
```

The driver failed in its attempt to reserve the host adapter's hardware settings (i.e. DMA and IRQ settings). There may be another card in your system which would cause a conflict with the host adapter.

```
002        NetWare rejected card - Failed AddDiskSystem call
```

The driver failed in its attempt to register the host adapter with NetWare 386. You may not have enough memory in your file server.

| 003 | Invalid command line option entered -> *option* |

An invalid option was entered on the command line. The *'option'* field displays the invalid option which was entered.

| 004 | Invalid command line, please enter correctly |

The driver was unable to understand the command line options which were entered by the user. Please be sure you enter them correctly.

| 005 | Unable to load driver - not enough memory? |

The driver was unable to load itself. This was probably due to lack of memory.

2.4.2   AHA-1540/1542/1640 Specific Error Codes

Code   *Message*

| 100 | Invalid 'port' setting (enter in hex, ie. 330) |

You have entered an invalid 'port' setting on the command line. There are six valid port settings: 334, 330, 234, 230, 134, 130 (i.e., "port = 330"). This option is only valid for the AHA-1540/1542.

| 101 | Invalid 'slot' setting, use 1-8 |

You have entered an invalid 'slot' setting on the command line. You can only enter slot numbers 1-8 (i.e., "slot = 3"). This option is only valid for the AHA-1640.

| 102 | Invalid 'speed' setting, use 00-FF |

You have entered an invalid 'speed' setting on the command line. You can only enter hex numbers 00-FF (i.e., "speed = 2"). This option is only valid for the AHA-1540/1542.

103	Invalid 'bus_on' setting, use 2-15

You have entered an invalid 'bus_on' setting on the command line. You can only enter decimal numbers 2-15 (i.e., "bus_on = 9"). This option is only valid for the AHA-1540/1542.

104	Invalid 'bus_off' setting, use 1-64

You have entered an invalid 'bus_off' setting on the command line. You can only enter decimal numbers 1-64 (i.e., "bus_off = 10"). This option is only valid for the AHA-1540/1542.

105	Invalid 'verbose' setting, use 'y'

You can only enter 'y' for this option (i.e., "verbose = y").

106	'speed' option not valid for this host adapter

You have attempted to set the Bus Master DMA transfer rate on the AHA-1640. The 'speed' option is only valid for the AHA-1540/1542.

107	'port' option not valid for this host adapter

You have used the 'port' option on the command line. You cannot use this option with your AHA-1640. It is only valid for the AHA-1540/1542.

108	'slot' option not valid for this host adapter

You have used the 'slot' option on the command line. You cannot use this option with the AHA-1540/1542. It is only valid for the AHA-1640.

109	'bus_on' option not valid for this host adapter
110	'bus_off' option not valid for this host adapter

You have used the 'bus_on' or 'bus_off' option on the command line. You cannot use this option with your AHA-1640. It is only valid for the AHA-1540/1542.

111	No host adapter found

The driver failed in its attempt to find a host adapter in your system. Please be sure the host adapter is properly inserted.

112	Host adapter not found at given port location

The driver failed in its attempt to find a host adapter at the user-entered location. Please be sure you have entered the correct port address.

113	Unable to read host adapter configuration

The driver failed in its attempt to get the host adapter's configuration settings (Adapter Inquiry command). This error will only occur with the AHA-1540/1542. Make sure there are no hardware conflicts within your PC and that the host adapter is securely inserted.

114	Unable to set host adapter bus master transfer rate

The driver failed in its attempt to set the host adapter's Bus Master DMA transfer rate. This error will only occur with the AHA-1540/1542. Make sure there are no hardware conflicts within you PC and that the host adapter is securely inserted.

115	Unable to set host adapter bus-on time

The driver failed in its attempt to set the host adapter's bus-on time. This error will only occur with the AHA-1540/1542. Make sure there are no hardware conflicts within your PC and that the host adapter is securely inserted.

116	Unable to set host adapter bus-off time

The driver failed in its attempt to set the host adapters bus-off time. This error will only occur with the AHA-1540/1542. Make sure there are no hardware conflicts within your PC and that the host adapter is securely inserted.

117	Unable to initialize host adapter's mailbox location

The driver failed in its attempt to initialize the host adapter's mailbox base address. Make sure there are no hardware conflicts within your PC and that the host adapter is securely inserted.

118	Invalid 'removable' setting, use 'off'

You can only enter 'off' for this option (i.e., "removable = off").

119	Invalid 'fixed_disk' setting, use 'off'

You can only enter 'off' for this option (i.e., "fixed_disk = off").

2.4.3   AHA-1740/1744 Specific Error Codes

Code   *Message*

200	No host adapter found for this driver to register

No Adaptec AHA-1740/1744 was found in your system for the driver to register. Please make sure the host adapter is properly inserted, and configured.

201	Host adapter not configured for enhanced mode

The driver found an AHA-1740/1744 but it is not configured for enhanced mode. Rather, it is set for AHA-1540/1542 emulation mode. Please run your EISA configuration utility to set the host adapter into enhanced mode to use this driver.

202	Unable to read host adapter configuration

The driver failed to read the host adapter configuration data. Please make sure your host adapter is properly inserted.

203	Invalid 'slot' setting, use 1-15.

You have entered an invalid 'slot' setting on the command line. You can only enter slot numbers 1-15 (i.e., "slot = 3").

204	Invalid 'verbose' setting, use 'y'

You can only enter 'y' for this option (i.e., "verbose = y").

205	Invalid 'removable' setting, use 'off'

You can only enter 'off' for this option (i.e., "removable = off").

206	Invalid 'fixed_disk' setting, use 'off'

You can only enter 'off' for this option (i.e., fixed_disk = off').

We recommend that you make backup copies of all Novell and Adaptec supplied diskettes using "DISKCOPY" and use those backup copies as your working diskettes.

Use the NetWare 386 v3.0 file SERVER.EXE to start the installation process. You will be prompted for a file server name and an IPX internal network number. Consult the NetWare 386 Installation manual for this information.

The NetWare 386 prompt (":") will now be displayed. Use the LOAD command to install the driver. The correct syntax to load the driver for either the AHA-1540/1542, AHA-1640, or AHA-1740/1744 in standard mode is:

```
:load [path] asw1440 [options]
```

For an AHA-1540/1542, assuming the ASW-1440 v3.0 diskette is in drive A:, the screen will look similar to:

```
:load a:\net386.30\asw1440    <ENTER>
Loading module ASW1440.DSK
ASW-1440:  AHA-154x/1640 ASPI Manager & SCSI Disk Driver For NetWare 386
Version 1.0
Copyright 1990 Adaptec, Inc.

Supported I/O port values are 330, 334, 234, 230, 134, 130
I/O port: 330  <ENTER>
```

To automate this procedure, the user can type: "load a:\net386.30\asw1440 port=xxx" where 'xxx' is the host adapter's port location.

Note that those port values which would cause a conflict with another device will NOT be displayed.

For an AHA-1640, the screen will look similar to:

```
:load a:\net386.30\asw1440   <ENTER>
Loading module asw1440.DSK

ASW-1440:  AHA-154x/1640 ASPI Manager & SCSI Disk Driver For NetWare 386
Version 1.0
Copyright 1990 Adaptec, Inc.

Supported Slot values are 1, 2, 3, 4, 5, 6, 7, 8
Slot: 1  <ENTER>
```

To automate this procedure, the user can type: "load a:\net386.31\aha1640 slot=x" where 'x' is the host adapter's slot location.

Note that those slot values which already have a registered device will NOT be displayed.

If you have multiple host adapters in your server, you'll need to load the driver once for each host adapter. Consult the NetWare installation manual for information on installing other NetWare Loadable Modules (NLMs). If an error message appears when attempting to load the driver, consult the end of this section for an explanation of the error messages.

3.1   COMMAND LINE OPTIONS

There are several command line options that can be specified when the driver is loaded. These are described below.

Option	Possible Values	Host Adapter	Description
port=	330 334 234 230 134 130	AHA-1540/1542	This option selects the host adapter's port address. This should correspond to the jumpered port address of the AHA-1540/1542. If none is given, the user will be prompted for one.
speed=	0-4	AHA-1540/1542	This option sets the AT Bus Master transfer speed. The current pre-programmed speeds are: 0 = 5.0 MBytes/sec 1 = 6.7 MBytes/sec 2 = 8.0 MBytes/sec 3 = 10.0 MBytes/sec 4 = 5.7 MBytes/sec This option will override the jumper settings. Keep in mind that some computers may not be able to handle the higher transfer speeds. The default is 5.0 MBytes/sec.
bus_on=	2-15	AHA-1540/1542	This option sets the host adapter's bus-on time. The units are in microseconds. If this option is not chosen, the default value of 11 μsec will be used.
bus_off=	1-64	AHA-1540/1542	This option sets the host adapter's bus-off time. The units are in microseconds. If this option is not chosen, the default value of 4 μsec will be used.
slot=	1-8	AHA-1640	This option selects the host adapter's slot location. If none is given, the user will be prompted for one.
verbose=	y	AHA-1540/1542 AHA-1640	With this option, the driver will display host adapter configuration information during load time.

Option	Possible Values	Host Adapter	Description
removable=	off	AHA-1540/1542 AHA-1640	This option disables support for removable media. By default, removable media is supported. A user may want to disable "removable" disk support in order to load their own ASPI Removable Disk Module.*
fixed_disk=	off	AHA-1540/1542 AHA-1640	This option disables support for fixed disk drives. By default, fixed disk drives are supported. A user may want to disable "fixed" disk support in order to load their own ASPI Fixed Disk Module.

The command line options are NOT case sensitive, and not white-space sensitive. Placing commas between command line options is optional.

* Under NetWare 386 v3.0, the driver treats removable media as if it were a fixed disk drive and will only recognize media with 512 bytes/sector. Removing one media and installing a different media can cause unexpected results. You should use NetWare 386 v3.1 if you need removable media support.

Here is an example of the driver being loaded with command line options used.

```
:load asw1440 port=330 verbose=y speed=0 <ENTER>
Loading module ASW1440.DSK

ASW-1440:  AHA-154x/1640 ASPI Manager & SCSI Disk Driver For NetWare 386
Version 1.0
Copyright 1990 Adaptec, Inc.

     Port Address:          330
     Interrupt Level:       11
     DMA Channel:           5
     Host Adapter SCSI ID:  7

     AT Bus Master Speed:   5.0 MBytes/second
     Bus-On Time (usec):    11
     Bus-Off Time (usec):   4
```

3.2   MIRRORING AND DUPLEXING

Mirroring and duplexing SCSI drives is similar under NetWare 386 v3.0 as it is under NetWare 386 v3.1. Please consult the section on mirroring and duplexing found in the NetWare 386 v3.1 installation section for more information.

3.3   SPECIAL CONSIDERATIONS

This section discusses such various topics as how to boot a NetWare 386 server from SCSI, and the 16 MByte limitation.

3.3.1   Booting From SCSI

To boot from SCSI, you should have your BIOS enabled on the board at port 330h. If you have other host adapters installed, you should have their BIOS disabled. The SCSI drive at ID #0 will be your boot device. You should use DOS FDISK to create a small DOS partition (about 3-6 MBytes). Format the drive using DOS FORMAT (i.e.,. format c: /s) and boot to it. Copy these files to the root directory:

```
(SYSTEM DISK):        SERVER.EXE        INSTALL.NLM
(ASW-1440 v3.0):      ASW1440.DSK
```

Modify your DOS AUTOEXEC.BAT to run SERVER.

Reboot your server. NetWare 386 v3.0 should boot up at this point. Enter your file server name and internal IPX number. Load ASW1440.DSK for each host adapter in your system. Load INSTALL.NLM and create your STARTUP.NCF and AUTOEXEC.NCF. The next section will help you create these two files.

3.3.2   STARTUP.NCF and AUTOEXEC.NCF

STARTUP.NCF and AUTOEXEC.NCF are two files that can be created so that when the NetWare 386 v3.0 file server is booted, drivers are automatically loaded, volumes are mounted, and the server is ready to service the workstations. These files are created or modified from the NetWare INSTALL.NLM program. Load INSTALL.NLM. Select "System Options." Next, select "Available System Options." The AUTOEXEC.NCF and STARTUP.NCF files can be created or modified by selecting the appropriate menu choice.

A sample AUTOEXEC.NCF will look similar to:

```
file server name MYFILESERVER
ipx internal net 2
mount all
```

Replace MYFILESERVER with the desired file server name. Consult the NetWare installation guide for an appropriate ipx internal net number.

The STARTUP.NCF should look similar to:

```
load asw1440 port=330
```

3.3.3   16-Megabyte Limitation

Due to a hardware limitation of the AT bus, the AHA-1540/1542/1640 can only access up to 16 MBytes of memory in your server. If you have more than 16 MBytes, you should configure it to only have 16 MBytes.

3.4 ERROR MESSAGES

Any error which occurs, during initialization, will cause the driver NOT to be loaded. If an error does occur, the driver will first "beep" the computer and then display a numbered error message in the following format:

```
ERR xxx:message
```

The "xxx" indicates the error code. The error codes are broken up into three sections.

000-099: Non-host adapter specific error
100-199: Adaptec AHA-1540/1542/1640 specific error
200-299: Adaptec AHA-1740/1744 specific error
300-399: Adaptec AHA-1520/1522/1510/AIC-6260 specific error
400-999: Reserved

The "message" is a descriptive line describing the error.

3.4.1 Non-Host Adapter Specific Error Codes

Code	Message
000	Failed ParseIOParameters call

A call to NetWare 386's "ParseIOParameters" routine has failed for some unknown reason. The command line most likely contains some errors or the user pressed <ESC> at the 'port' or 'slot' prompt.

001	Unable to reserve hardware, possible conflict

The driver failed in its attempt to reserve the host adapter's hardware settings (i.e. DMA and IRQ settings). There may be another card in your system which would cause a conflict with the host adapter.

002	NetWare rejected card - Failed AddDiskCard call

The driver failed in its attempt to register the host adapter with NetWare 386. You may not have enough memory in your file server.

003	Invalid command line option entered -> option

An invalid option was entered on the command line. The "option" field displays the invalid option which was entered.

004	Invalid command line, please enter correctly

The driver was unable to understand the command line options which were entered by the user. Please be sure you enter them correctly.

3.4.2   AHA-1540/1542/1640 Specific Error Codes

Code   Message

100	Invalid 'port' setting (enter in hex, ie. 330)

You have entered an invalid 'port' setting on the command line. There are six valid port settings: 334, 330, 234, 230, 134, 130 (i.e., "port = 330"). This option is only valid for the AHA-1540/1542.

101	Invalid 'slot' setting, use 1-8

You have entered an invalid 'slot' setting on the command line. You can only enter slot number 1-8 (i.e., "slot = 3"). This option is only valid for the AHA-1640.

102	Invalid 'speed' setting, use 0, 1, 2, 3, or 4

You have entered an invalid 'speed' setting on the command line. You can only enter hex numbers 0-4 (i.e., "speed = 2"). This option is only valid for the AHA-1540/1542.

103	Invalid 'bus_on' setting, use 2-15

You have entered an invalid 'bus_on' setting on the command line. You can only enter decimal numbers 2-15 (i.e., "bus_on = 9"). This option is only valid for the AHA-1540/1542.

104	Invalid 'bus_off' setting, use 1-64

You have entered an invalid 'bus_off' setting on the command line. You can only enter decimal number 1-64 (i.e., "bus_off = 10"). This option is only valid for the AHA-1540/1542.

105	Invalid 'verbose' setting, use 'y'

You can only enter 'y' for this option (i.e., "verbose = y").

106	'speed' option only valid for a 154x host adapter

You have attempted to set the Bus Master DMA transfer rate on the AHA-1640. The 'speed' option is only valid for the AHA-1540/1542.

107	'port' option only valid for a 154x host adapter

You have used the 'port' option on the command line. You cannot use this option with your AHA-1640. It is only valid for the AHA-1540/1542.

108	'slot' option only valid for a 1640 host adapter

You have used the 'slot' option on the command line. You cannot use this option with the AHA-1540/1542. It is only valid for the AHA-1640.

109	'bus_on' option only valid for a 154x host adapter
110	'bus_off' option only valid for a 154x host adapter

You have used the 'bus_on' or 'bus_off' option on the command line. You cannot use this option with your AHA-1640. It is only valid for the AHA-1540/1542.

111	Host adapter not found at given port, slot #

The driver failed in its attempt to find a host adapter at the user-entered location. Please be sure that you have entered the correct slot number.

112	Host adapter not found at given port location

The driver failed in its attempt to find a host adapter at the user-entered location. Please be sure you have entered the correct port address.

113	Unable to read configuration from 154x host adapter

The driver failed in its attempt to get the host adapter's configuration settings (Adapter Inquiry command). This error will only occur with the AHA-1540/1542. Make sure there are no hardware conflicts within your PC and that the host adapter is securely inserted.

114	Unable to set 154x bus master transfer rate

The driver failed in its attempt to set the host adapter's Bus Master DMA transfer rate. This error will only occur with the AHA-1540/1542. Make sure there are no hardware conflicts within you PC and that the host adapter is securely inserted.

115	Unable to set 154x bus-on time

The driver failed in its attempt to set the host adapter's bus-on time. This error will only occur with the AHA-1540/1542. Make sure there are no hardware conflicts within your PC and that the host adapter is securely inserted.

116	Unable to set 154x bus-off time

The driver failed in its attempt to set the host adapters bus-off time. This error will only occur with the AHA-1540/1542. Make sure there are no hardware conflicts within your PC and that the host adapter is securely inserted.

117	Unable to initialize host adapter's mailbox location

The driver failed in its attempt to initialize the host adapter's mailbox base address. Make sure there are no hardware conflicts within your PC and that the host adapter is securely inserted.

118	Invalid 'removable' setting, use 'off'

You can only enter 'off' for this option (i.e., "removable = off").

119	Invalid 'fixed_disk' setting, use 'off'

You can only enter 'off' for this option (i.e., "fixed_disk = off").

We recommend that you make backup copies of all Novell and Adaptec supplied diskettes using "DISKCOPY" and use those backup copies as your working diskettes.

NETGEN.EXE is the NetWare program used to create a file server. Described below are several methods of installing NetWare. Complete installation instructions can be obtained from the Novell NetWare user's manual.

The drivers for NetWare 286 only support the AHA-1740/1744 when running in standard mode. No NetWare 286 drivers are available for running the AHA-1740/1744 in enhanced mode.

There are four NETGEN Run Options:
• Standard (floppy disks)
• RAM Disk
• Hard Disk
• Network Drive

The Standard method involves installing NetWare from the Novell supplied diskettes. The RAM Disk, Hard Disk, and Network Drive methods involve copying the files from the NetWare diskettes into the appropriate subdirectories. The subdirectory name should match the name of the diskette. The Hard Disk Method is described below in STEP-BY-STEP INSTALLATION.

If using the Standard method from floppy disks, you will be prompted when to insert the diskette with the Adaptec driver when you are running NETGEN. Use the "Load and Select Item" option under the "Select Disk Drivers" menu to load the AHA-1540/1542/1640 driver. Copy the desired driver (v3.1 or v3.2) from its subdirectory on the ASW-1440 v3.0 distribution diskette to the root directory of a diskette. The volume label of that diskette should be DSK_DRV_209.

If using the RAM Disk, Hard Disk, or Network Drive method, create a subdirectory on the RAM Disk, Hard Disk, or Network Drive named "DSK_DRV_.209". Copy the files from the ASW-1440 v3.0 distribution diskette, to that subdirectory. Use either v3.1 or v3.2 of the Adaptec NetWare 286 drivers, as desired. Use the "Load and Select Item" option under the "Select Disk Drivers" menu to load the Adaptec AHA-1540/1542/1640/1740/1744 driver.

4.1   STEP-BY-STEP INSTALLATION

Described below is a recommended step-by-step installation using the Hard Disk method (the Network drive method is similar). Other methods of installation are available and are described in the NetWare installation manual.

Type NETGEN -N at the DOS prompt. The display will look similar to:

```
NetWare Generation And Installation  V4.00
```

```
System Configuration Level

Default Configuration
Custom Configuration
```

```
Use the arrow keys to highlight an option, then press the SELECT key.
```
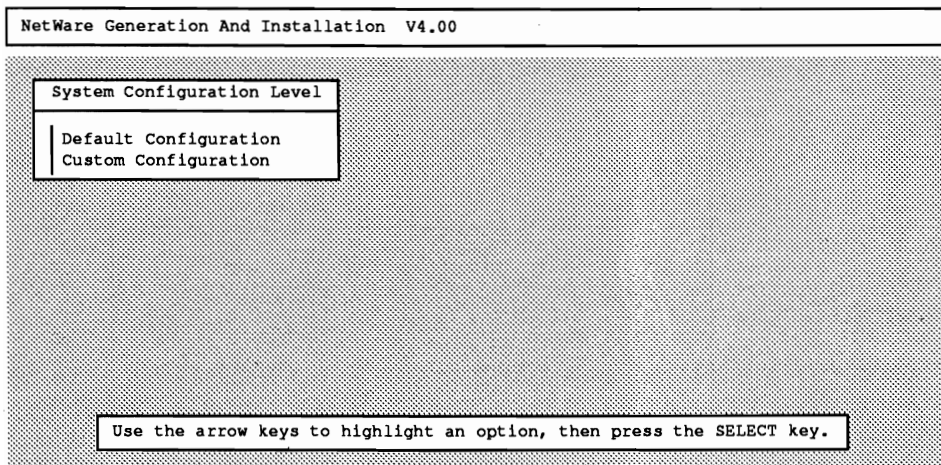
Move the cursor to "Custom Configuration" and select it by hitting enter.

The following screen will appear:

```
NetWare Generation And Installation  V4.00
```

```
       NETGEN Run Options

   Standard (floppy disks)
   RAM Disk
   Hard Disk
   Network Drive
```

```
   Use the arrow keys to highlight an option, then press the SELECT key.
```
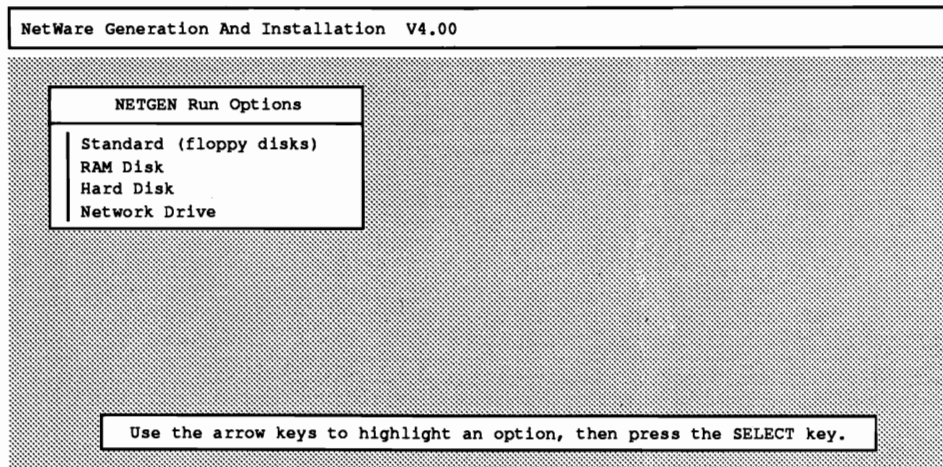
Select "Hard Disk". You will be prompted for the logical drive letter that contains the NetWare subdirectories previously created.

The following screen will appear:

```
NetWare Generation And Installation  V4.00
```

```
      Network Generation Options

   Select Network Configuration
   Exit NETGEN
```

```
   Use the arrow keys to highlight an option, then press the SELECT key.
```
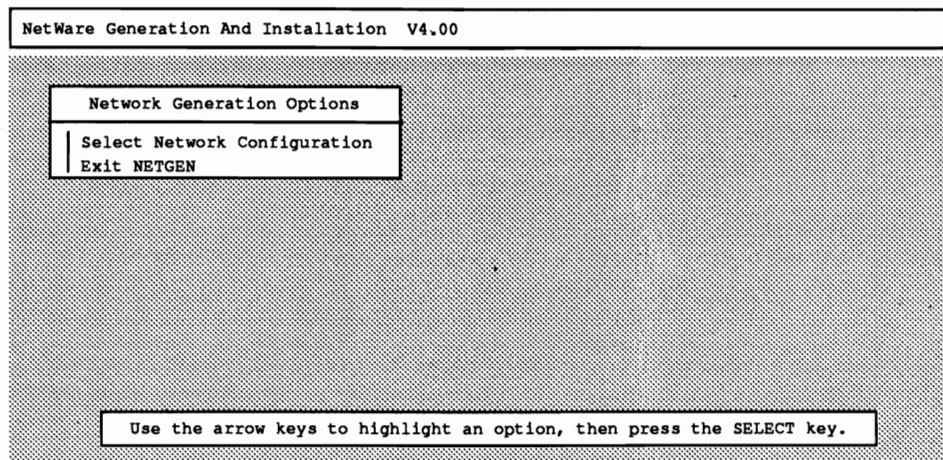
Select the "Select Network Configuration" option.

The following are the Available Options available during Network Configuration:

```
Network Configuration  V4.02

            Available Options
    Set Operating System Options
    Select Resource Sets
    Select LAN Drivers
    Select Disk Drivers
    Select "Other" Drivers
    Configure Drivers / Resources
    Edit Resource List
    Edit Resource Sets
    Save Selections and Continue



    Use the arrow keys to highlight an option, then press the SELECT key.
```
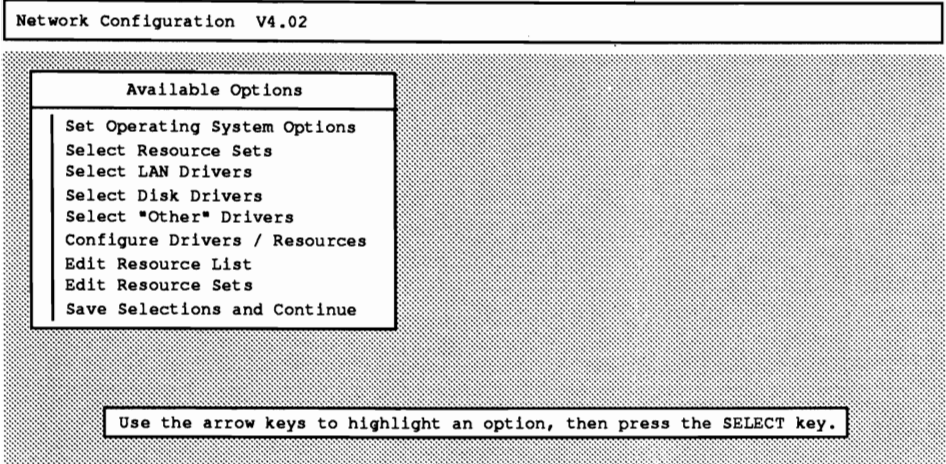
In general, at least the following options should be selected:

Options	Purpose
Set Operating System Options	This option is used to set the mode of operation of NetWare 286. Consult the NetWare installation guide for the appropriate selection.
Select LAN Drivers	This option is used to select the type(s) of LAN card(s) to be installed into the file server.
Select Disk Drivers	This option is used to select the type of controllers and host adapters that will be installed into the file server. This is the option that is selected to install the NetWare 286 drivers included with ASW-1440 v3.0.
Configure Drivers / Resources	This option is used to configure the LAN drivers, disk drivers, and any other drivers that were previously selected. This option will only appear if a driver has been previously selected (e.g., LAN drivers or disk drivers).

Consult your NetWare user's manual for information on "Set Operating System Options" and "Select LAN Drivers".

Select the "Select Disk Drivers" option. The following will describe the Disk Driver installation. The display will look similar to:

```
Network Configuration  V4.02
```

```
                        Selected Disk Drivers
   Se  0
   Se  1
   Se  2
   Se  3
   Se  4
   Co
   Edit Resource List        Disk Driver Options
   Edit Resource Sets
   Save Selections and C    Select Loaded Item
                            Load and Select Item


      Use the arrow keys to highlight an option, then press the SELECT
      (Enter) key.  Press ESCAPE to save selections and continue.
```
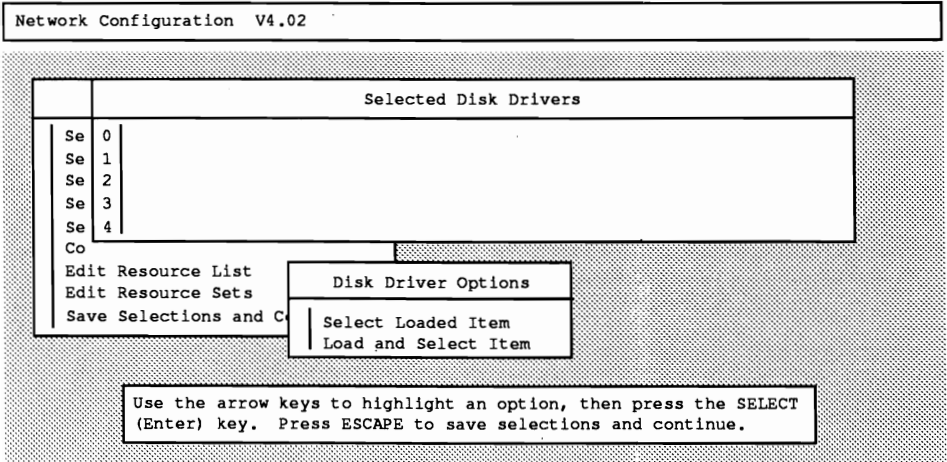
There are five channels available for installing disk drivers. There are two Disk Driver Options available:

• Select Loaded Item
• Load and Select Item

Choose the "Load and Select Item" Option. The ASW-1440 v3.0 drivers will be read from
all DSK_DRV_.xxx subdirectories, including the DSK_DRV_.209 subdirectory, which
you created at the beginning of the installation. The following screen will appear:

```
Network Configuration  V4.02

                        The "Adaptec AHA-154x/1640 Host Adapter
       Se  0            v 3.1" file was read successfully.
       Se  1            Press ESCAPE to continue.
       Se  2
       Se  3
       Se  4
       Co
       Edit Resource List        Disk Driver Options
       Edit Resource Sets
       Save Selections and C    Select Loaded Item
                                 Load and Select Item
```
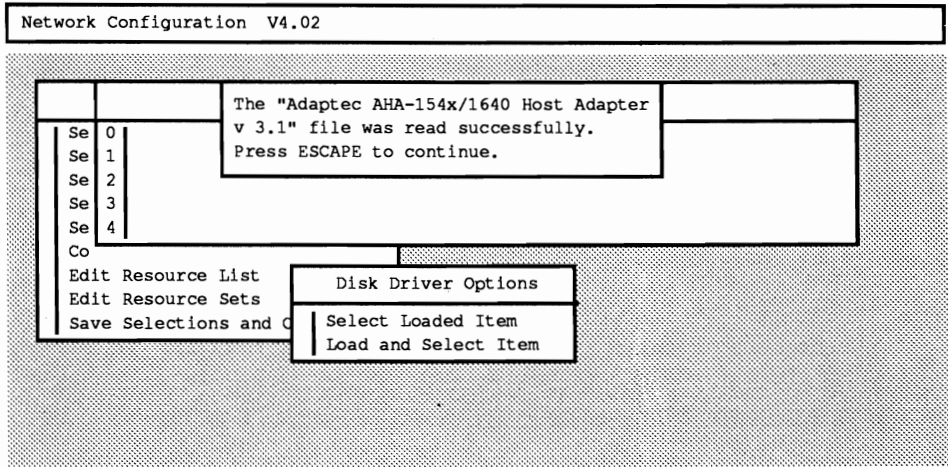
You will then be prompted for a Channel number (see following diagram). Valid channel
numbers are between 0 and 4. A list of available disk drivers will be displayed.

```
Network Configuration  V4.02

                          Selected Disk Drivers
       Se  0
       Se  1
       Se  2
       Se  3
       Se
       Co                      Select Disk Driver Type
       Edit   Adaptec AHA-154x/1640 Host Adapter ver 3.1
       Edit   IBM PS/2 Model 30 286 MFM disk controller V1.01 (881028)
       Save   Industry standard ISA or AT Comp. Disk Cont. V2.01 (890810)


                Highlight a list entry, then pess the SELECT key.
```
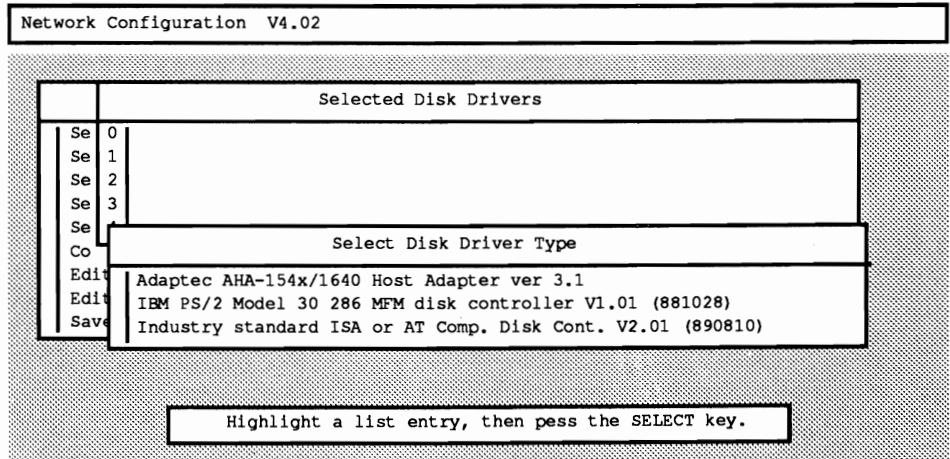
Select the Adaptec driver.

After selecting all of the desired drivers, select "Configure Drivers / Resources" from the Available Options menu. The "Configure Drivers / Resources" menu will appear and look similar to:

```
Network Configuration  V4.02


        ┌──────────────────────────────┐
        │    Selected Disk Drivers     │
        ├──────────────────────────────┤
        │ Set Operating System Options │
        │ Select REsource Sets         │
        │ Select LAN Drivers           │
        └──────────────────────────────┘
      ┌──────────────────────────────────┐
      │  Configure Drivers / Resources   │
      ├──────────────────────────────────┤
      │ Choose LAN Configuration         │
      │ Choose Disk Driver Configuration │
      │ Enter Server Information          │
      └──────────────────────────────────┘

          ┌──────────────────────────────────────────────────────────────┐
          │ Use the arrow keys to highlight an option, then press the SELECT │
          │   (ENTER) key.  Press ESCAPE to save selections and continue   │
          └──────────────────────────────────────────────────────────────┘
```

Only "Choose Disk Driver Configuration" is described here. Consult the NetWare installation manual for information on "Choose LAN Configuration" and "Enter Server Information".

Select "Choose Disk Driver Configuration". All unconfigured disk drivers will be displayed. Select the unconfigured Adaptec driver. The following list of Available Disk Configurations will appear:

```
Network Configuration   V4.02

                     Unconfigured Disk Drivers

                    Available Disk Configurations
      1:   I/O port = 330h,   IRQ = 11, DMA = 5
      2:   I/O port = 330h,   IRQ = 12, DMA = 5
      3:   I/O port = 330h,   IRQ = 11, DMA = 6
      4:   I/O port = 330h,   IRQ = 12, DMA = 0
      5:   I/O port = 334h,   IRQ = 10, DMA = 7
      6:   I/O port = 334h,   IRQ = 15, DMA = 7
      7:   I/O port = 334h,   IRQ = 10, DMA = 0
   ▼  8:   I/O port = 334h,   IRQ = 15, DMA = 0


           Highlight a list entry, then press the SELECT key.
```
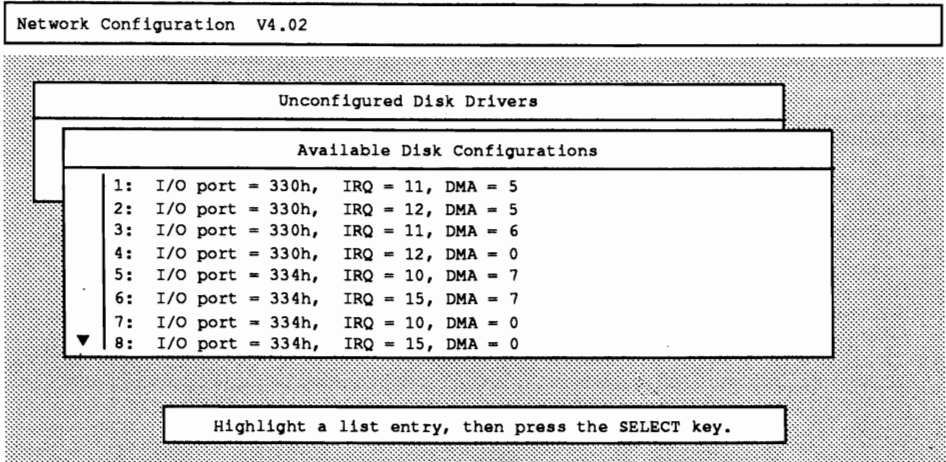
*NOTE: This is only a partial list of options. Consult Section 4.5 of this document for a complete list of available options. Use arrow keys to scroll down the complete list on your screen.**

Select the option that corresponds to the jumpered settings of the AHA-1540/1542/1640.

After the driver is configured, hit <ESC> to return to the main menu. Choose "Save Selections and Continue" to complete the NetWare installation. To finish the installation from this point, consult the NetWare installation manual on how to Link/Configure NetWare Operating System, Link/Configure File Server Utilities, and NetWare Installation.

* The AHA-1540/1542/1640 BIOS only operates at port address 330H. If the alternate address of 330H is used, the BIOS should be disabled and booting from any SCSI hard disk on that host adapter is not possible.

## 4.2   MULTIPLE DISK DRIVES WITH NETWARE 286 V2.15

The NetWare 286 drivers in ASW-1440 v3.0 supports the installation of multiple SCSI hard disk drives in the file server. This might be desired for four reasons:

- to support disk mirroring (fault tolerance)
- to support disk duplexing (fault tolerance)
- to take advantage of the multitasking capability of the host adapter (performance)
- to add total storage capacity to the system

NOTE: Disk mirroring and disk duplexing are only supported on SFT versions of NetWare. Disk mirroring, duplexing, and multitasking are described below

4.2.1   Mirroring

Disk mirroring is when two hard disks are installed on a single host adapter. These disk drives contain the same data. If one disk goes bad, the second will continue functioning.
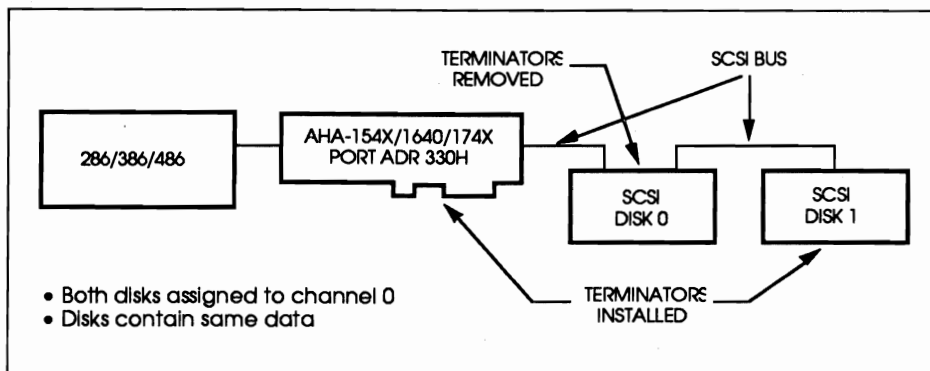
The following hardware considerations should be taken into account when preparing the AHA-1540/1542/1640/1740/1744 disk drives for mirroring.

- The two disk drives must be near the same capacity. NetWare will not allow drives that vary greatly in capacity to be mirrored. Consult the NetWare installation manual for the limitations.

- The drives must be connected on the same SCSI cable on the same AHA-1540/1542/1640/1740/1744.

- The SCSI ID of the drives must be different *(Note: If booting is desired from one of the SCSI drives, its SCSI ID must be jumpered to 0 and the port address of the host adapter should be set to 330H).*

- The SCSI devices on the ends of the SCSI cable must have the terminators installed. All other SCSI devices on that SCSI cable should have the terminators removed. The AHA-1540/1542/1640/1740/1744 is considered a SCSI device and has on-board terminators that can be removed if both the internal and external SCSI connectors are used.

The NetWare procedure for installing a mirrored pair of disk drives is similar to the standard installation. The only difference is in the "NetWare Installation" section of the installation. This step follows the step in which the NetWare Operating System and the File Server Utilities are linked and configured. Select "NetWare Installation" and the screen will look similar to:

```
SFT Netware + TTS Install  V4.00
                        Press F1 For Help


    Drive Name              Channel      Controller    Drive      Status

    CONNER  CP3100-100mb        0            0           0
    QUANTUM P105S 910-10        0            1           0




                 Verify that the drives and information displayed are
                 correct.  If necessary use the arrow keys to view all
                 drives.  Then press the ESCAPE key to continue.
```

Menu	Meaning
Drive Name	This is the Inquiry data from the SCSI disk drive.
Channel	This is the NetWare channel that the drive was assigned to.
Controller	This is the SCSI I.D. of the disk drive.
Drive	This is the logical unit number (LUN) of the Controller.
Status	This provides information when drives are mirrored or duplexed.

The drives listed should match the drives that are installed on the AHA-1540/1542/1640. Verify that the drives listed match the actual drives installed and press <ESC>. The screen should look similar to:

```
SFT Netware + TTS Install  V4.00
                          Press F1 For Help


      Drive Name              Channel      Controller    Drive      Status

     CONNER  CP3100-1                                      0
     QUANTUM P105S 91    Confirm Attached Drives           0

                        Drive List is Correct
                        Re-examine Drive List
                        Drive List Is Not Correct




                    Use the arrow keys to highlight the desired
                    option, then press the SELECT (enter) key.
```

Select "Drive List is Correct" to continue.

The following "Installation Options" will appear:

```
SFT Netware + TTS Install  V4.00
                                 Press F1 For Help
```

```
          Installation Options

  Select Default Installation Options
  Select Custom Installation Options
  Continue Installation
```

```
  Use the arrow keys to highlight the desired option, then press the SELECT
  key.  Choose "Continue Installation" to install using the selected options.
```

Choose "Select Default Installation Options".

The screen will display mirroring options. By default, the drives will not be mirrored and the screen will look similar to:

```
SFT Netware + TTS Install  V4.00                 Monday August 20, 1990  5:44 pm
                                 Press F1 For Help
```

Mirrored Drives	Channel	Controller	Drive	Ref	Status Mirror
CONNER CP3100-100MB	0	0	0	0	
QUANTUM P105S 910-10	1	0	0	1	

```
              Mirror Options

  Establish Mirror Pair
  Done, Continue Installation
```

```
  Use the arrow keys to highlight the desired
  option, then press the SELECT (enter) key.
```

To mirror them select "Establish Mirror Pair". The screen will then look like:

```
SFT Netware + TTS Install  V4.00                Monday August 20, 1990  5:44 pm
                          Press F1 For Help
```

Mirrored Drives	Channel	Controller	Drive	Ref	Status	Mirror
CONNER CP3100-100MB	0	0	0	0	P	1
QUANTUM P105S 910-10	1	0	0	1	S	0

```
                         Mirror Options

              Un-mirror Existing Mirror Pair
              Done, Continue Installation


          Use the arrow keys to highlight the desired
          option, then press the SELECT (enter) key.
```

To unmirror the drives again, select "Un-mirror Existing Mirror Pair". When mirroring is enabled or disabled, as desired, select "Done, Continue Installation" to continue. Follow NetWare installation manual for naming the file server, installing the files, and other instructions.

4.2.2   Duplexing

Disk duplexing is when two host adapters are installed in a single file server, each with its own disk. These disk drives contain the same data. This ensures that if either one disk or one host adapter fails, the system will continue.
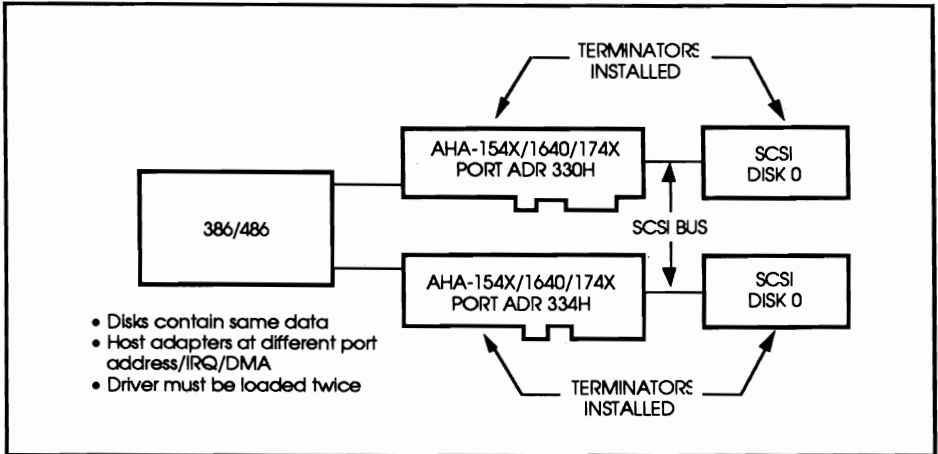
Mirroring and duplexing are both referred to as "mirroring" in the NetWare operating system. During the "Installation" part of NetWare, the user will be prompted whether or not to "Establish Mirror Pair" if two hard disk drives are detected that are of nearly the same capacity. These drives may be on the same host adapter (mirroring) or on separate host adapters (duplexing). Therefore, the procedure to mirror or to duplex is exactly the same as far as NetWare is concerned. The only difference is the hardware setup (one vs. two host adapters).

The following hardware considerations should be taken into account when preparing the AHA-1540/1542/1640/1740/1744 disk drives for duplexing.

- The NetWare partitions should be nearly the same size. NetWare will not allow partitions that vary greatly in size to be mirrored. Consult the NetWare Installation manual for the limitations.

- Each drive should be connected to its own host adapter. Each host adapter should have its own SCSI cable.

- If both of the host adapters are AHA-1542s (e.g., both have floppy controllers), one of the floppy controllers should be disabled by removing the floppy enable jumper.

- The Interrupt Channels (referred to as Interrupt Level with the AHA-1640) must be different on the two host adapters. The Interrupt channel can be changed by changing jumpers on the AHA-1540/1542. With the AHA-1640/1740/1744, configuration options are selected via software, thus eliminating the need to set jumpers. The AHA-1640 is configured using the microchannel reference diskette. The AHA-1740/1744 are configured using the EISA configuration software. Both of these software configuration programs are designed to eliminate conflicts. When configuring the AHA-1640/1740/1744 host adapters, the default Interrupt channel will be assumed by the configuration software. The configuration software will also list the available alternatives, any of which can be selected for the first or second host adapter.

- The DMA Channels (referred to as Arbitration level with the AHA-1640) must be different on the two host adapters. Jumpers must be changed on the AHA-1540/1542. The appropriate configuration software must be run for the AHA-1640/1740/1744. When configuring the AHA-1640/1740/1744 host adapters, the default DMA channel will be assumed by the configuration software. The configuration software will also list the available alternatives, any of which can be selected for the first or second host adapters.

- The BIOS on at least one of the AHA-1540/1542/1640 host adapters should be disabled. With the AHA-1540/1542/1640 host adapters, only one host adapter in the system should have its BIOS enabled. The BIOS on every AHA-1740/1744 in the system should always remain enabled. The BIOS address for the AHA-1740/1744 is selected using the appropriate EISA configuration software. If booting is desired from the SCSI disk drive, the drive SCSI ID must be 0 and the BIOS must be enabled on its AHA-1540/1542/1640/1740/1744 host adapter. The port address of the host adapter with the booting SCSI drive should be set to 330H. If you're not booting from SCSI, you can disable the BIOS on all your AHA-1540/1542/1640 host adapters. Again, don't disable the BIOS on the AHA-1740/1744, even if not booting from a SCSI disk drive.

- The SCSI devices on the ends of the SCSI cable must have the terminators installed. All other SCSI devices on that SCSI cable should have the terminators removed. The AHA-1540/1542/1640/1740/1744 is considered a SCSI device and has on-board terminators that can be removed if both the internal and external SCSI connectors are used at the same time.

The procedure for duplexing requires that the NetWare 286 driver be loaded twice. This is done in the "Select Disk Drivers" menu. Follow the procedure under standard installation to load the driver.

If the following message appears, go to the "Configure Drivers / Resources" menu and configure any drivers. Then return to the "Select Disk Drivers" menu and load the NetWare 286 driver into channel 1.

```
Network Configuration   V4.02
```

```
                          Selected Disk Drivers

    Se │ 0 │ Adaptec AHA-154x/1640 Host Adapter ver3.1
    Se │ 1 │
    Se │ 2 │
    Se │ 3 │
    Se │ 4 │  There is not enough memory available to select
    Co │      "Adaptec AHA-154x/1640 Host Adapter ver 3.1" at this
    Edit Re time.   Please configure a driver first; this will open
    Edit Re up some memory space so the item can be selected.
    Save Se            (Press ESCAPE to continue)

                        │ Load and Select Item
                        │ Deselect an Item

                          Press the ESCAPE key to continue
```

After both drivers are successfully selected, the screen should look similar to:

```
Network Configuration  V4.02
```

```
                        Selected Disk Drivers
Se  0  Adaptec AHA-154x/1640 Host Adapter ver 3.1
Se  1  Adaptec AHA-154x/1640 Host Adapter ver 3.1
Se  2
Se  3
Se  4
Co
Edit Resource List         Disk Driver Options
Edit Resource Sets
Save Selections and C    Select Loaded Item
                         Load and Select Item

      Use the arrow keys to highlight an option, then press the SELECT
      (Enter) key.  Press ESCAPE to save selections and continue.
```

Configure the NetWare 286 driver with the option that corresponds to the settings of the AHA-1540/1542/1640/1740/1744. When the NetWare 286 driver at channel 1 is configured from the "Configure Drivers / Resources" menu only a subset of the total number of configurations will be displayed. NetWare will not display any configuration that will conflict with the driver at channel 0. Select the configuration that matches the settings of the AHA-1540/1542/1640/1740/1744.

Select "Save Selections and Continue". After linking and configuring the NetWare Operating System and File Server Utilities, select "NetWare installation" (consult the NetWare installation guide on running COMPSURF, which is located in the "Analyze Disk Surface" option).

The screen will look similar to:

```
SFT Netware + TTS Install  V4.00
                        Press F1 For Help
```

Drive Name	Channel	Controller	Drive	Status
CONNER CP3100-100mb	0	0	0	
QUANTUM P105S 910-10	1	0	0	

```
            Verify that the drives and information displayed are
            correct.  If necessary use the arrow keys to view all
            drives.  Then press the ESCAPE key to continue.
```

The drives listed should match the drives that are installed on the AHA-1540/1542/1640/1740/1744. Verify that the drives listed match the actual drives installed and press <ESC>.

The screen should look similar to:

```
SFT Netware + TTS Install  V4.00
                        Press F1 For Help
```

Drive Name	Channel	Controller	Drive	Status
CONNER CP3100-1	Confirm Attached Drives		0	
QUANTUM P105S 91			0	

```
            Drive List is Correct
            Re-examine Drive List
            Drive List Is Not Correct
```

```
            Verify that the drives and information displayed are
            correct.  If necessary use the arrow keys to view all
            drives.  Then press the ESCAPE key to continue.
```

Select "Drive List is Correct" to continue. The following "Installation Options" will appear:

```
SFT Netware + TTS Install  V4.00
                                    Press F1 For Help


            ┌─────────────────────────────────────┐
            │        Installation Options          │
            ├─────────────────────────────────────┤
            │ Select Default Installation Options  │
            │ Select Custom Installation Options   │
            │ Continue Installation                │
            └─────────────────────────────────────┘




     ┌──────────────────────────────────────────────────────────┐
     │ Use the arrow keys to highlight the desired option, then press the SELECT │
     │ key.  Choose "Continue Installation" to install using the selected options. │
     └──────────────────────────────────────────────────────────┘
```

Choose "Select Default Installation Options".

The screen will display mirroring options. By default the drives will not be duplexed (mirrored), and the screen will look similar to:

```
SFT Netware + TTS Install  V4.00                    Monday August 20, 1990  5:44 pm
                                    Press F1 For Help


  ┌────────────────────────────────────────────────────────────────────────
  │   Mirrored Drives        Channel    Controller   Drive   Ref   Status  Mirror
  │ ┌──────────────────────────────────────────────────────────────────────
  │ │ CONNER   CP3100-100mb      0           0          0       0
  │ │ QUANTUM P105S 910-10       1           0          0       1
  └─┴────────────────────────────────────
                   ┌─────────────────────────────────┐
                   │          Mirror Options          │
                   ├─────────────────────────────────┤
                   │ Establish Mirror Pair            │
                   │ Done, Continue Installation      │
                   └─────────────────────────────────┘
            ┌──────────────────────────────────────────────┐
            │ Use the arrow keys to highlight the desired  │
            │ option, then press the SELECT (enter) key.   │
            └──────────────────────────────────────────────┘
```

To duplex the drives select "Establish Mirror Pair".

The screen will then look like:

```
SFT Netware + TTS Install  V4.00                    Monday August 20, 1990  5:44 pm
                            Press F1 For Help
```

| Mirrored Drives	Channel	Controller	Drive	Ref	Status	Mirror
CONNER CP3100-100mb	0	0	0	0	P	1
QUANTUM P105S 910-10	1	0	0	1	S	0

```
                     Mirror Options

         Un-mirror Existing Mirror Pair
         Done, Continue Installation


      Use the arrow keys to highlight the desired
      option, then press the SELECT (enter) key.
```

To unduplex the drives again, select "Un-mirror Existing Mirror Pair". When duplexing is enabled or disabled, as desired, select "Done, Continue Installation" to continue. Follow NetWare installation manual for naming the file server, installing the files, and other instructions.

4.2.3 Multiple Channels Per Host Adapter (Multitasking)

When a host adapter has more than one disk drive connected, a performance increase can be realized by assigning each drive to its own channel. This allows for multitasking on the SCSI bus (because NetWare 286 can only do one I/O per channel at a time).
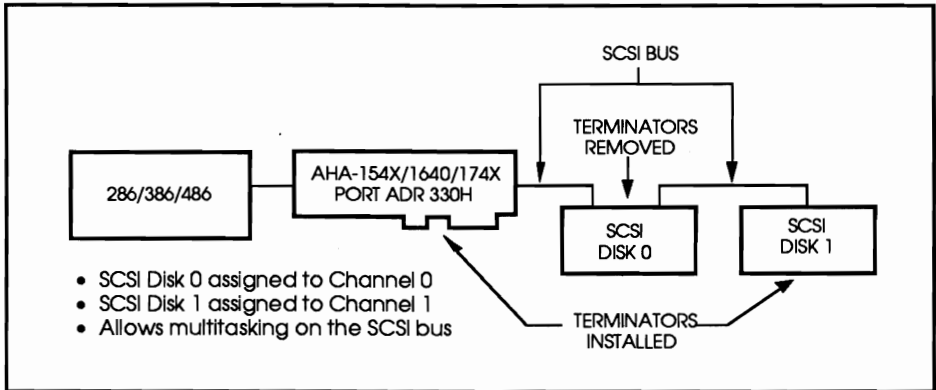
The NetWare 286 drivers of ASW-1440 v3.0 allow you to configure multiple channels per host adapter, thus allowing multitasking on the SCSI bus. This is done by allowing the user to map a channel to a drive rather than a channel to a host adapter. NetWare 286 can do only one I/O per channel at a time.

The following hardware considerations should be taken into account when preparing the AHA-1540/1542/1640/1740/1744 disk drives for multitasking.

–   The drives must be connected on the same SCSI cable on the same AHA-1540/1542/1640/1740/1744.

–   The SCSI ID of the drives must be different if on the same SCSI bus (*Note: If booting is desired from one of the SCSI drives, its SCSI ID must be jumpered to 0 and the port address of the host adapter should be set to 330H*)

- The SCSI devices on the ends of the SCSI cable must have the terminators installed. All other SCSI devices on that SCSI cable should have the terminators removed. The AHA-1540/1542/1640/1740/1744 is considered a SCSI device and has on-board terminators that can be removed if both the internal and external SCSI connectors are used.

The NetWare procedure for assigning multiple channels per host adapter is similar to the standard installation. The only difference is in the "Select Disk Drivers" section of the installation. The AHA-1540/1542/1640/1740/1744 driver should be loaded once for each hard disk drive to map those disk drives to a channel. Not all the hard disk drives on the AHA-1540/1542/1640/1740/1744 need to be assigned a channel (e.g., some drives on the host adapter may be assigned a separate channel, others may not be).

When the driver is loaded twice, the screen in the "Select Disk Drivers" section will look similar to:

```
Network Configuration  V4.02



                              Selected Disk Drivers

     Se │ 0 │ Adaptec AHA-154x/1640 Host Adapter ver 3.1
     Se │ 1 │ Adaptec AHA-154x/1640 Host Adapter ver 3.1
     Se │ 2 │
     Se │ 3 │
     Se │ 4 │
     Co
     Edit Resource List      ┌─────────────────────────┐
     Edit Resource Sets      │   Disk Driver Options   │
     Save Selections and C   ├─────────────────────────┤
                             │ Select Loaded Item
                             │ Load and Select Item



           ┌──────────────────────────────────────────────────────────┐
           │ Use the arrow keys to highlight an option, then press the SELECT │
           │ (Enter) key.  Press ESCAPE to save selections and continue.      │
           └──────────────────────────────────────────────────────────┘
```

Configure the driver at channel 0 to the correct I/O port, DMA channel, and Interrupt channel. When configuring the driver at channel 1, only a subset of the total number of configuration options will appear. Use the down arrow key to scroll to options 19 through 31. The screen will look something like:

```
Network Configuration  V4.02
```

```
                    Unconfigured Disk Drivers

                   Available Disk Configurations

  ▲  │ 19: For SCSI disk(s) attached to CH 0 AHA-154x/1640 only
     │ 20: For SCSI disk(s) attached to CH 1 AHA-154x/1640 only
     │ 21: For SCSI disk(s) attached to CH 2 AHA-154x/1640 only
     │ 22: For SCSI disk(s) attached to CH 3 AHA-154x/1640 only
     │ 23: For SCSI disk(s) attached to CH 4 AHA-154x/1640 only
     │ 29: I/O port = 334h,  IRQ = 10, DMA = 7 WRITE VERIFY
     │ 30: I/O port = 334h,  IRQ = 15, DMA = 7 WRITE VERIFY
  ▼  │ 31: I/O port = 334h,  IRQ = 10, DMA = 0 WRITE VERIFY


            Highlight a list entry, then press the SELECT key.
```

Select the option that corresponds to the channel that was used to configure the correct DMA channel and Interrupt channel. In this case, option 19, "For SCSI disk(s) attached to CH 0 AHA-1540/1542/1640/1740/1744 Only" would be chosen, since channel 0 was used to configure the DMA channel and Interrupt channel for the AHA-1540/1542/1640/1740/1744. After configuring all of the drivers in the "Configure Drivers/Resources" menu, the current configuration can be viewed. It should appear similar to:

```
┌─────────────────────────────────────────────────────────────────────────┐
│ Network Configuration  V4.02                                              │
└─────────────────────────────────────────────────────────────────────────┘

              ┌─────────────────────────────────────────────────────────┐
              │                Selected Configurations                  │
         ▲    │      Option 0: IRQ = 3, I/O Base = 300h, no DMA or ROM  │
              │      Network Address:  3                                │
              │                                                         │
              │  OS Type:  SFT NetWare 286 with TTS                     │
              │                                                         │
              │  Communication Buffers:  40                             │
              │                                                         │
              │  Disk Chan. 0: Adaptec AHA-154x/1640 Host Adapter ver 3.1│
              │              Option 1:  I/O port = 330h, IRQ = 11, DMA = 5│
              │  Disk Chan. 1: Adaptec AHA-154x/1640 Host Adapter ver 3.1│
              │              Option 19: For SCSI disk(s) attached to CH 0 AHA-1540/1640 only│
              └─────────────────────────────────────────────────────────┘
                     ┌───────────────────────────────────────────┐
                     │ Use the arrow keys to scroll the display. │
                     │ Press ESCAPE to leave this window and continue.│
                     └───────────────────────────────────────────┘
```

After the driver is configured, press <ESC> to return to the main menu. Choose "Save Selections and Continue" to complete the NetWare installation. To finish the installation from this point, consult the NetWare installation manual on how to Link/Configure NetWare Operating System, Link/Configure File Server Utilities, and NetWare Installation.

4.3 COMMONLY ASKED QUESTIONS ON NETWARE 286

Q.   Do I need ASW-1440 v2.0 if I'm using my AHA-1540/1542/1640 in a Novell NetWare workstation?

A.   No, the driver is only required if the AHA-1540/1542/1640 is to used in a *file server*. It is not required when using the AHA-1540/1542/1640 in a *workstation*.

Q.   Does ASW-1440 also work with Adaptec's single user AHA-1520/1522 host adapter?

A.   No. Adaptec's AHA-1520/1522 has its own driver, the ASW-1040, which is available wherever Adaptec products are sold.

Q.   Is ASW-1440 Certified by Novell?

A.   ASW-1440 v3.0 contains fully Novell certified drivers for NetWare 286 v2.15, NetWare 386 v3.0, and NetWare 386 v3.1.

Q.   Can I run a SCSI tape backup device from my AHA-1540/1542/1640 with the ASW-210, SY-TOS tape utility, while my system is configured as a file server in Novell NetWare 286, ver.2.15?

A.   No, you cannot. The ASW-210 only supports tape backup from workstations, not from the file server.

Q.   Is it important which channel the host adapter is assigned to?

A.   In general, the host adapter that is used to boot (only at Port 330H) should be assigned to channel 0.

If a host adapter is installed along with a standard MFM/RLL/ESDI controller, the following guidelines should be used:

Booting should be done from the standard disk.

Disable the host adapter BIOS.

Assign the standard disk driver to channel 0.

Assign the host adapter driver (ASW-1440) to channel 1, 2, 3, or 4.

Q.   What is the "Write Verify" configuration option?

A.   Each configuration option (I/O base address / REQ / DMA) can be configured to
      "Write" or "Write Verify". For example, for a host adapter at port 330H, IRQ 11,
      and DMA channel 5, option 1 should be used for "Write" only or option 25 for
      "Write Verify". Standard "Write" will use the SCSI write command when writing
      data to the hard disk. "Write Verify" will use the SCSI "WriteVerify" command
      when writing to the disk drive. If the SCSI "WriteVerify" command is not
      supported by a particular drive, then the SCSI "Write" command followed by the
      SCSI "Verify" command will be used.

      The "Write Verify" option will decrease overall system performance, but offers a
      higher degree of reliability. In general the "Write" only option is usually
      sufficient.

Q.   Will my AHA-1540/1542 work in every AT compatible system?

A.   The AHA-1540/1542 is a bus master DMA device, and requires that the host
      system support bus master DMA. If a particular host system does not support bus
      master DMA, the AHA-1540/1542 (or any other bus master board) cannot be used
      in that system.

      A test is built into the AHA-1540/1542 BIOS that can be used to determine if the
      host system supports bus master DMA. It can be invoked by using DOS
      DEBUG.COM. At the DEGUB "-" prompt, type G=DC00:9. The instruction
      will be printed on the screen. This assumes your AHA-1540/1542 BIOS is
      configured for DC00.

Q.   Can I use my AHA-1740 or AHA-1744 with NetWare 286 using the ASW-1440
      v3.0?

A.   The AHA-1740 and AHA-1744 have two operating modes; standard and enhanced.
      Standard Mode emulates the AHA-1540/1542, so the NetWare 286 drivers can
      be used when the AHA-1740/1744 is in standard mode. *Enhanced Mode* uses an
      advanced host interface and allows greater than 16 MBytes of host RAM to be
      accessed. However, no driver for enhanced mode for NetWare 286 is provided with
      the ASW-1440 v3.0.

4.4   NETWARE 286 ERROR MESSAGES

Error messages in NetWare 286 drivers can only be displayed when a fatal error has
occurred. Once this message is displayed, the server will "abend". This will terminate
server activity. NetWare 286 driver error messages are only displayed during installation.

The following are the possible error messages:

```
AHA154x/1640 Host Adapter is not idle while trying to reset interrupt.
AHA154x/1640 Can't send a byte due to Command/Data port still FULL.
AHA154x/1640 Can't get a byte due to Data port not FULL.
AHA154x/1640 configuration data contains no DMA channel.
AHA154x/1640 configuration data contains no interrupt channel.
AHA154x/1640 INQUIRY command Completed with Error or Time Out.
AHA154x/1640 Test Unit Ready command Completed with Error or Time Out.
AHA154x/1640 READ CAPACITY command Completed with Error or Time Out.
AHA154x/1640 Host Adapter Not Configured to proper IO port address.
AHA154x/1640 Host Adapter Not Configured to proper IO interrupt channel.
AHA154x/1640 Host Adapter Not Configured to proper IO DMA channel.
```

The following are the reasons that these errors may occur:

1.   The AHA-1540/1542/1640/1740/1744 hardware settings do not match the configuration option selected during NETGEN. Check the jumpers on the AHA-1540/1542 or the POS setting of the AHA-1640.

2.   There is a hardware conflict between the host adapter and another card in the system. Check the port address, DMA channel and interrupt channel of other I/O cards in the system. Some VGA cards and some LAN cards use port address 330H, the default port address of the AHA-1540/1542/1640/1740/1744.

3.   The SCSI bus isn't properly terminated. Only the devices on the end of the SCSI bus should be terminated. The host adapter is considered a SCSI device and has on-board terminators that can be removed if both the internal and external connectors are used.

4.   There is a SCSI ID conflict on the SCSI bus. Each device on the SCSI bus should be assigned a unique SCSI ID. SCSI IDs range between 0 and 7. The default host adapter SCSI ID is 7. Check the SCSI IDs of every device on the SCSI bus to ensure that each has a unique SCSI ID.

5.   The AHA-1540/1542 is malfunctioning. One quick way to check this is to boot DOS under it. If it runs DOS, it probably isn't a hardware failure.

6.   The drive does not work with this host adapter. Again, check this under DOS. If it works with DOS, it should work with NetWare 286.

4.5 HOST ADAPTER OPTIONS

The following configurations are supported options of the AHA-1540/1542.

OPTION #	Write Verify Option #	PORT	IRQ	DMA
1	25	330H	11	5
2	26	330H	12	5
3	27	330H	11	6
4	28	330H	14	6
5	29	334H	10	7
6	30	334H	15	7
7	31	334H	10	0
8	32	334H	15	0
9	33	230H	14	5
10	34	230H	9	5
11	35	230H	14	6
12	36	230H	9	6
13	37	234H	10	7
14	38	234H	15	7
15	39	234H	10	0
16	40	234H	15	0
19	43	(For SCSI disk (s) attached to Ch 0 AHA-1540/1542/1640 only)		
20	44	(For SCSI disk (s) attached to Ch 1 AHA-1540/1542/1640 only)		
21	45	(For SCSI disk (s) attached to Ch 2 AHA-1540/1542/1640 only)		
22	46	(For SCSI disk (s) attached to Ch 3 AHA-1540/1542/1640 only)		
23	47	(For SCSI disk (s) attached to Ch 4 AHA-1540/1542/1640 only)		

Whichever hardware configuration option you do select you must make sure that this is reflected on the actual AHA-1540/1542 host adapter via the jumper blocks.

The following configurations are supported options of the AHA-1640.

OPTION #	Write Verify Option #	PORT	IRQ	DMA
0	24	330H	15	5
1	25	330H	11	5
2	26	330H	12	5
3	27	330H	11	6
5	29	334H	10	7
6	30	334H	15	7
9	33	230H	14	5
10	34	230H	9	5
11	35	230H	14	6
12	36	230H	9	6
13	37	234H	10	7
14	38	234H	15	7
17	41	234H	11	4
18	42	234H	12	4
19	43	(For SCSI disk (s) attached to Ch 0 AHA-1540/1542/1640 only)		
20	44	(For SCSI disk (s) attached to Ch 1 AHA-1540/1542/1640 only)		
21	45	(For SCSI disk (s) attached to Ch 2 AHA-1540/1542/1640 only)		
22	46	(For SCSI disk (s) attached to Ch 3 AHA-1540/1542/1640 only)		
23	47	(For SCSI disk (s) attached to Ch 4 AHA-1540/1542/1640 only)		

Whichever hardware configuration option you do select, you must make sure that this is reflected in the POS registers of the AHA-1640.