Installation guide

Ultrastar 18LZX & 36ZX

Multimode SE/LVD

Models: DMVS-09V DMVS-09D
DMVS-18V DMVS-18D
DMVS-36V DMVS-36D

Table of contents

Introduction

This manual was written to assist you in the installation of your IBM Ultrastar 18LZX or ULtrastar 36ZX. The instructions are applicable to most computer systems. Contact a qualified installer for assistance if necessary.

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http://www.ibm.com/harddrive

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Hardware description

The Ultrastar 18LZX and 36ZX offers the following features:

- Capacities of 9GB, 18GB, or 36GB
- 68 or 80 pin connectors
- 68 pin SCSI connectors using the SCSI P connector
- 80 pin SCSI connectors using the SCA-2 connector

Capacity	Model	Connector Type	SCSI Electrical Signal Type
9.11GB	DMVS-09V	68 pin	Low Voltage Differential (Ultra2)
9.11GB	DMVS-09D	80 pin SCA-2	Low Voltage Differential (Ultra2)
18.35GB	DMVS-18V	68 pin	Low Voltage Differential (Ultra2)
18.35GB	DMVS-18D	80 pin SCA-2	Low Voltage Differential (Ultra2)
36.70GB	DMVS-36V	68 pin	Low Voltage Differential (Ultra2)
36.70GB	DMVS-36D	80 pin SCA-2	Low Voltage Differential (Ultra2)

These drives offer an advanced LVD interface that supports transfer rates of up to 80 MB/sec. To take advantage of the higher transfer rate of 80 MB/sec, your computer will need a controller that supports the LVD interface. If you have a SCSI controller that does not support this interface, the data transfer speeds will be lower than 80MB/sec due to the lower speed of the controller. If you have a slower controller, you may wish to purchase an LVD controller card to take advantage of the drive's 80 MB/sec data transfer rate. To determine if your current controller card is LVD, check the documentation that came with your controller or contact the controller manufacturer.

If you currently have single-ended wide SCSI drives and a non-LVD controller, the LVD model Ultrastar 18LZX or 36ZX may be attached to the existing cable. If you choose to replace your non-LVD controller with an LVD model single-ended wide SCSI drives can be attached to the same bus with an LVD drive. However, there are some LVD controllers that do not support single-ended wide SCSI drives. Check the documentation that came with your controller or contact the manufacturer to ensure that your LVD controller will support single-ended wide SCSI drives.

Before you begin installation, please read the *"Handling Precautions"* on the following page.

Handling precautions

CAUTION! Disk drives must be handled with caution! Drives can be easily damaged by shock from static electricity or by rough handling. It is very easy to unintentionally cause shocks which exceed specifications.

- To prevent damage from impact or vibration always set the drive down gently.
- Do not open the ESD bag containing the drive until required.
- Handle the drive carefully by the edges. Do not touch the exposed printed circuit board or any electronic components.
- Do not press on the top or bottom of the drive.
- Do not cover the drive's breather hole.
- Before handling the drive, discharge any static electricity from you and your clothing. With one hand, touch an unpainted metal surface on your computer chassis, then touch the ESD bag with the other hand. Remain in contact with the chassis and the bag for at least two seconds..

Installation Steps

Step 1: Installation checklist

Items needed for installation:

___ TheUltrastar drive, four mounting screws, jumpers, and installation instructions. Save the packaging including the ESD bag.

___ A small flat-blade screwdriver

___ Your computer or storage enclosure documentation

___ A bootable DOS or Windows diskette. See the section in the appendix entitled *Making a bootable diskette*.

___ Mounting brackets, if required for your computer

Step 2: Preparing for installation

- Back up the data on the drive currently in your system to data loss during installation.
- Turn the system off.
- Disconnect the power cord from the wall outlet.
- Remove the cover from your computer.
- Discharge any static electricity from you and your clothing. With one hand touch an unpainted metal surface on your computer chassis, then touch the ESD bag with the other hand. Remain in contact with the chassis and the bag for at least two seconds.
- Remove the drive from its package. Place it carefully on a static free surface.
- Record the following information:

Drive Model _____	Date of Purchase_____
Drive P/N _____	Place of Purchase_____
Serial # _____	

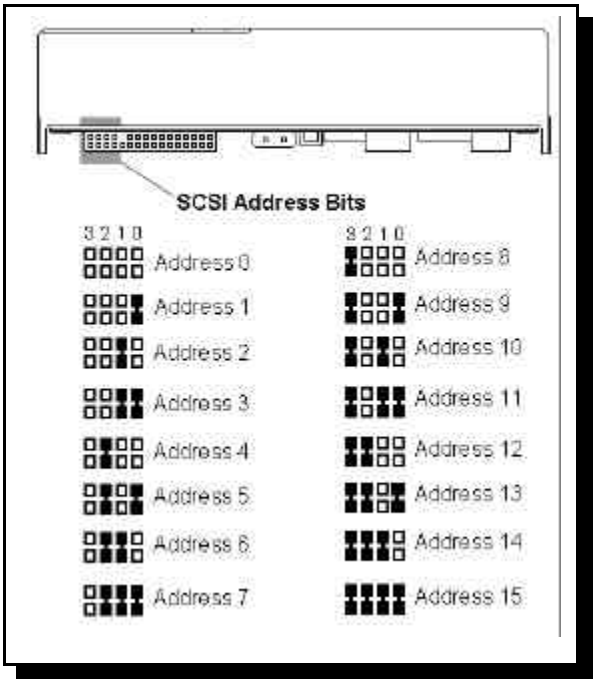
Step 3: Setting the jumpers

The installation of your drive may require the placement of certain jumpers on the jumper block. Jumpers are small electrical conductors covered with plastic and are used to connect pairs of pins on a jumper block. Each jumper enables a particular function in the drive. The jumpers are located on the opposite end of the interface connector (see diagrams below). All pins have a pin pitch of 2mm, with the exception of Termination Power pins. Jumpers can be purchased at any local computer store.

- Set the following jumpers as needed:

  Termination Power jumper (68 pin drives only)
  Place a jumper on External Termination Power if your host adapter or another device does not supply termination power. These pins require a 2.54mm jumper.

  SCSI ID - pins 1 through 8
  Assign a unique SCSI ID to your drive and place the jumper(s) accordingly. You can use ID 0 through ID 15; ID 7 is generally reserved for the controller card. The diagram below gives the jumper positions for each ID.



  Auto Start and Auto Start Delay - pins 11 & 12, 21 & 22
  The Auto Start and Auto Start Delay pins control when and how the drive can spin up and come ready. With Auto Start enabled, the motor spins up after power is applied without the need for a SCSI Start Unit command. With Auto Start disabled, a SCSI Start Unit command is required to make the drive spin and be ready for media access operations. With Auto Start Delay mode enabled, drive spin up is delayed by a period of time determined by the Auto Start jumper multiplied by the drive's SCSI address.

  External Activity (LED) - pins 17 & 18
  The LED pins can be used to drive an external Light Emitting Diode. Up to 33mA (5%) of TTL level LED drive current is provided. The LED Anode may be tied to the +5V source provided on pin 18 of the front option jumper block, pin 11 of the Auxiliary connector on the 68 pin unitized connector, or the 5V power source on the 80 pin SCA model. The LED Cathode is then connected to the External

Activity pin to complete the circuit. *Note: The Ultrastar has two sets of pins, one on the front and one on the back, which are connected to the same LED driver circuit. The combined current capability is stated above.*

Write Protect - pins 19 & 20
When the Write Protect pin is jumpered, SCSI commands that alter the customer data area portion of the media will not be performed. The state of this pin is monitored on a per command basis.

Disable Target Initiated Synchronous Negotiation - pins 25 & 26
When the Disable Target Initiated Synchronous Negotiation pin is jumpered, an Initiator is required to start a negotiation handshake if Synchronous and/or Wide (double byte) SCSI transfers are desired.

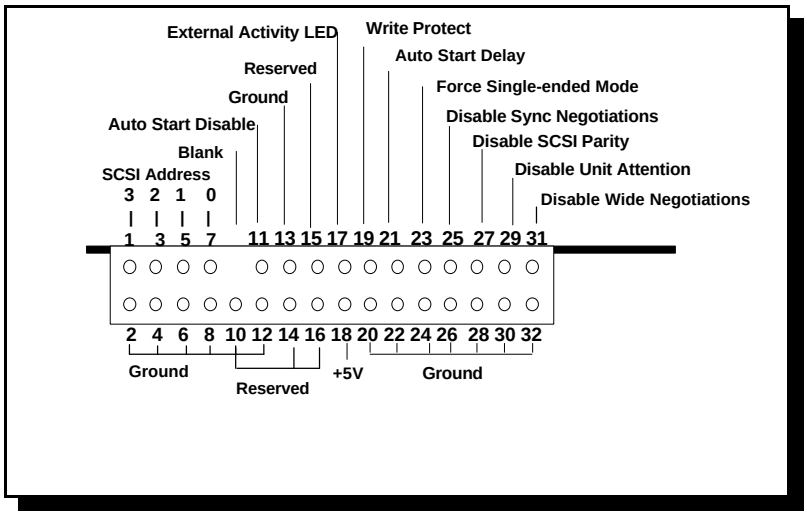
Disable SCSI Parity - pins 27 & 28
Jumpering these pins disables SCSI Parity Checking.

Disable Unit Attention - pins 29 & 30
Jumpering these pins disables the drive from building Unit Attention Sense information for commands immediately following a Power On Reset (POR) or SCSI Bus Reset. Any pending Unit Attention conditions will also be cleared at POR or SCSI Reset times.

Disable Wide Negotiations **-** *pins 31 & 32*
Jumpering these pins causes the drive to operate in a single byte mode. The drive will not negotiate for wide (double byte) operation.

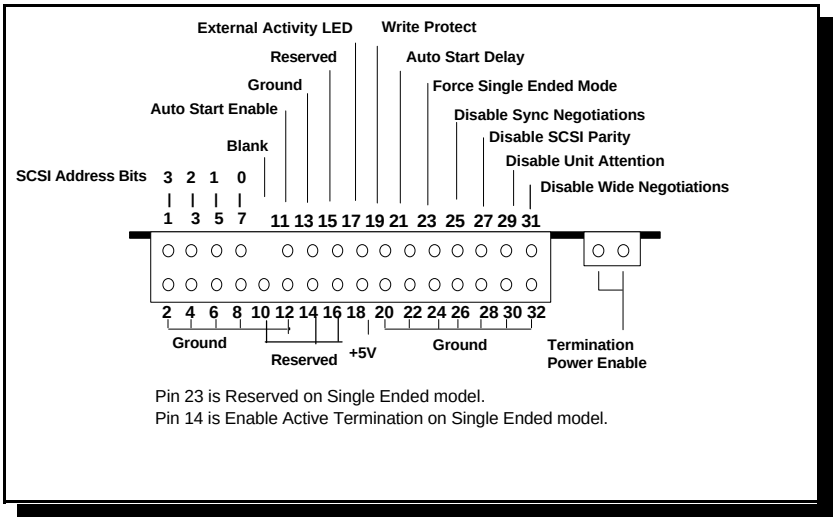
Force Single-Ended Mode - pins 23 & 24
Jumpering these pins on LVD models causes all models to operate in Single-Ended mode only.

80 pin models - ***option jumper block***



80 pin SCA-2 front option jumper block

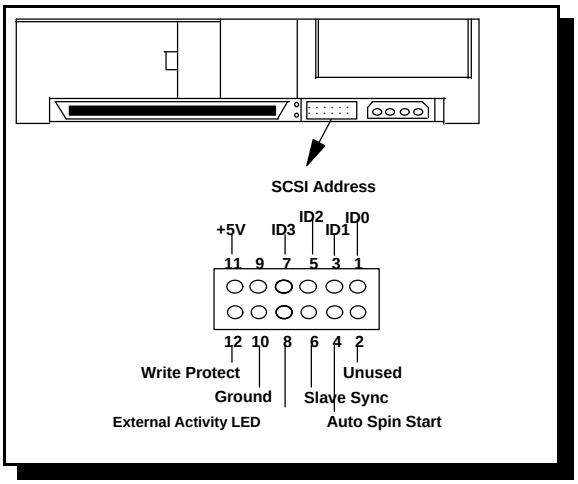
68 pin models - option jumper block



Pin 23 is Reserved on Single Ended model.
Pin 14 is Enable Active Termination on Single Ended model.

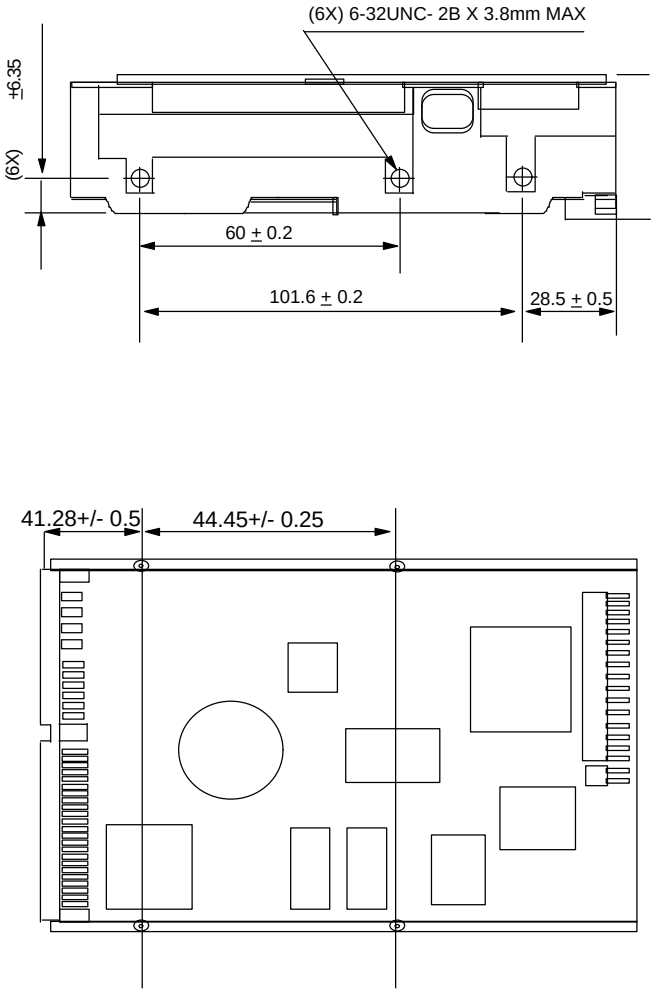
68 pin model - auxiliary option jumper block

The 68 pin models contain an auxiliary connector that duplicates some of the functions of the front option jumper block. The auxiliary connector conforms to SFF 8009 Rev 3.0 and is typically used with a unitized connector found on external drive enclosures.



Step 4: Mounting the drive

- After setting the jumpers, mount the hard drive in your system. The Ultrastar drive can be mounted with any of its six surfaces facing down. See the diagrams below for mounting hole locations.



Mounting hole locations

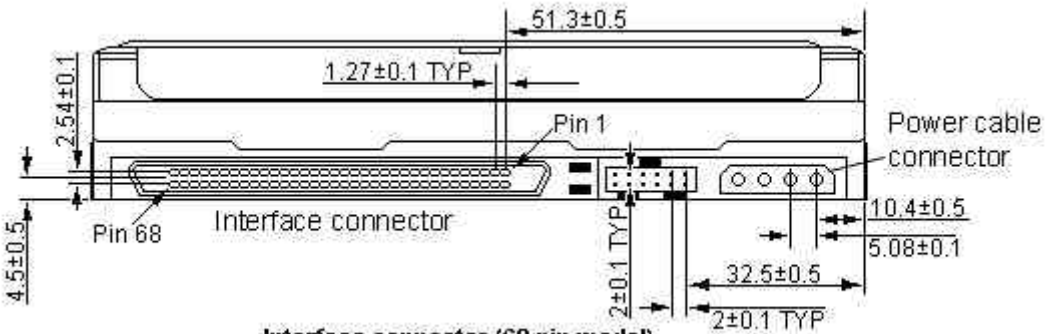
You must ensure that the drive has sufficient air flow. Mount the drive in the system using four 6-32 UNC screws. The maximum screw length is 3.5 mm for the side holes and 6 mm for the bottom holes. Mount the drive securely enough to prevent excessive motion or vibration.

If you are mounting your drive in a 5.25 inch bay, you may need to purchase mounting brackets from your computer manufacturer to mount the drive securely.

Step 5: Attaching the cables

- ***Drives with 68 pin connector***s

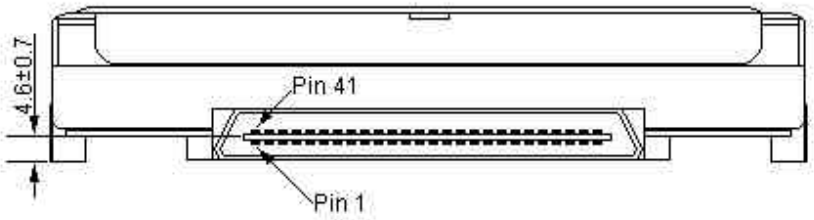
After the drive has been carefully mounted, connect the SCSI cable and the power cable to the drive. The SCSI connector and power connector are keyed for proper insertion.



Interface connector (68 pin model)

- ***Drives with 80 pin connectors***

80 pin drives are plugged into backplanes of servers and require no cables. If you want to connect an 80 pin drive to a 68 pin SCSI cable, a converter is needed. Not all SCA converters support LVD mode.



Interface connector (80 pin model)

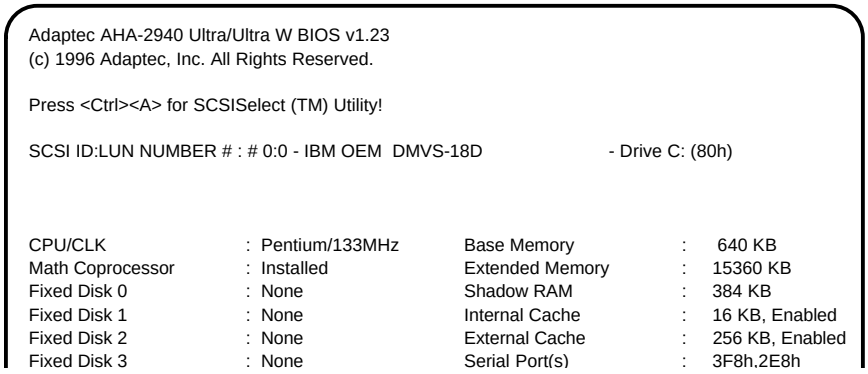
Step 6: Completing physical installation

- The SCSI bus must be terminated at both ends of the bus since Ultra2 SCSI (LVD) models do not have onboard active termination. You must supply an external Ultra2 compatible terminator.
- Verify that the cable is properly connected to the SCSI controller.
- Replace the cover on the computer.
- Connect all cables.
- Plug the power cord into the wall.

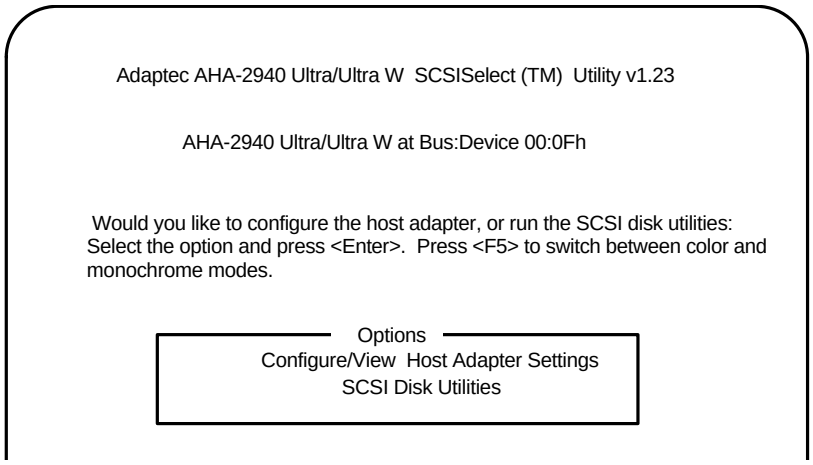
Step 7: Verifying host adapter settings

Note: The example below uses the Adaptec 2940U2W controller and the Model DMVS-18D drive.

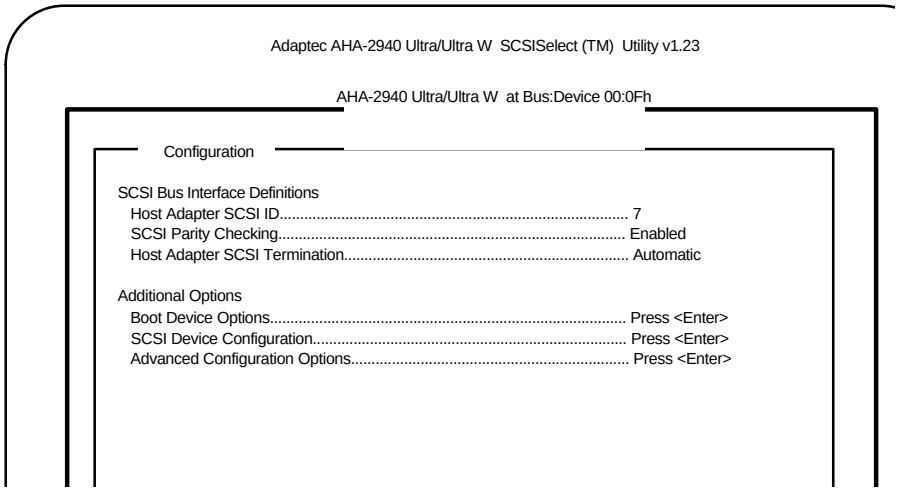
- Insert a bootable diskette into the diskette drive.
- Turn the computer on. You should see the drive model displayed when the system is booting.
- Verify the adapter settings.



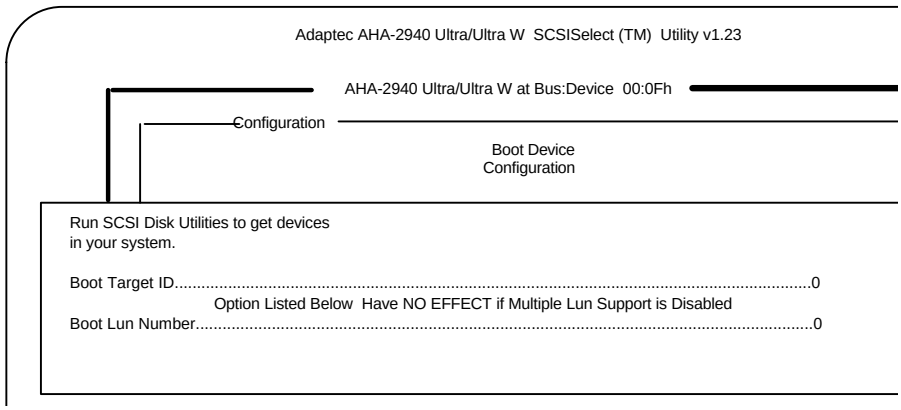
- Press [CTRL] [A] to enter the Adaptec SCSI setup utility. The following screen appears.



- Select*Configure/View Host Adapter Settings.* The following screen appears.

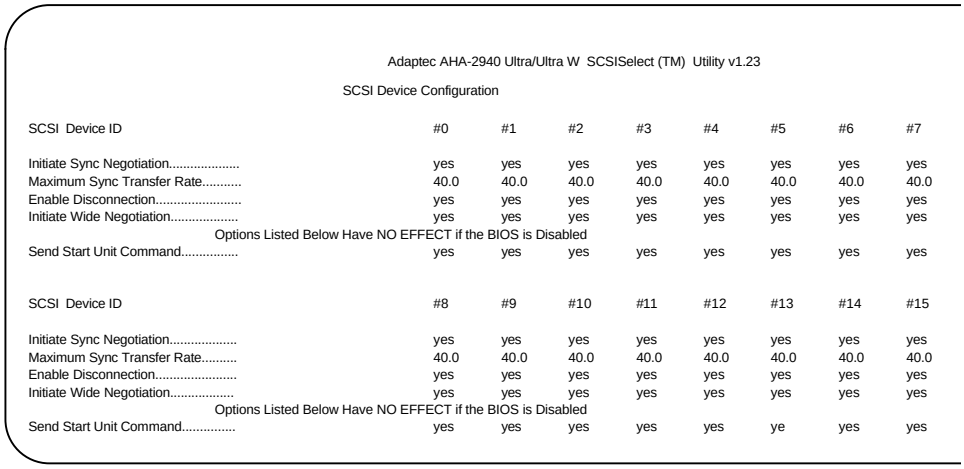


- Select *Boot Device Options*. The screen below appears.



  - Verify or set *Boot Target ID*.
  - Press *ESC* to return to the previous screen.

- Select *SCSI Device Configuration*. The following screen appears.
- Verify that the Maximum Sync Transfer Rate is the highest possible and that configurations settings are enabled (set to *yes*).



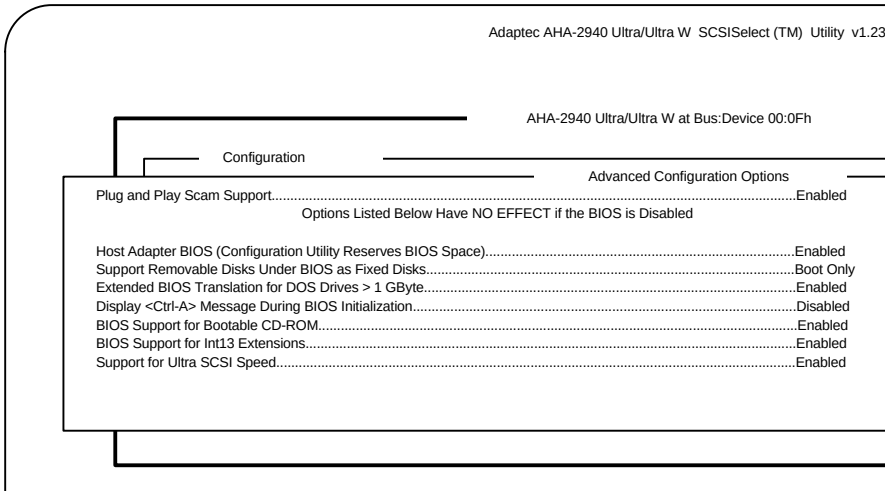
Adaptec AHA-2940 Ultra/Ultra W SCSISelect (TM) Utility v1.23

SCSI Device Configuration

SCSI Device ID	#0	#1	#2	#3	#4	#5	#6	#7
Initiate Sync Negotiation.....	yes	yes	yes	yes	yes	yes	yes	yes
Maximum Sync Transfer Rate.....	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Enable Disconnection.....	yes	yes	yes	yes	yes	yes	yes	yes
Initiate Wide Negotiation.....	yes	yes	yes	yes	yes	yes	yes	yes
Options Listed Below Have NO EFFECT if the BIOS is Disabled								
Send Start Unit Command.....	yes	yes	yes	yes	yes	yes	yes	yes

SCSI Device ID	#8	#9	#10	#11	#12	#13	#14	#15
Initiate Sync Negotiation.....	yes	yes	yes	yes	yes	yes	yes	yes
Maximum Sync Transfer Rate.....	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Enable Disconnection.....	yes	yes	yes	yes	yes	yes	yes	yes
Initiate Wide Negotiation.....	yes	yes	yes	yes	yes	yes	yes	yes
Options Listed Below Have NO EFFECT if the BIOS is Disabled								
Send Start Unit Command.....	yes	yes	yes	yes	yes	ye	yes	yes

- Press *ESC* to return to previous screen.
- Select Advanced Configuration Options. The screen below appears.



Adaptec AHA-2940 Ultra/Ultra W SCSISelect (TM) Utility v1.23

AHA-2940 Ultra/Ultra W at Bus:Device 00:0Fh

Configuration

Advanced Configuration Options

Plug and Play Scam Support.....Enabled

Options Listed Below Have NO EFFECT if the BIOS is Disabled

Host Adapter BIOS (Configuration Utility Reserves BIOS Space).....Enabled
Support Removable Disks Under BIOS as Fixed Disks.....Boot Only
Extended BIOS Translation for DOS Drives > 1 GByte.....Enabled
Display <Ctrl-A> Message During BIOS Initialization.....Disabled
BIOS Support for Bootable CD-ROM.....Enabled
BIOS Support for Int13 Extensions.....Enabled
Support for Ultra SCSI Speed.....Enabled

- Verify that *Extended BIOS Translation for DOS Drives > 1 GByte* and *BIOS Support for int13 Extensions* is enabled.
- Press *ESC* to return to the previous screen.
- Exit from Adaptec settings and save any changes.

Step 8: Partitioning the drive

Note: This example uses FDISK to partition your drive. You may use a diferent partitioning program available on your operating system.

- Boot to a bootable diskette and type FDISK at the A:\ prompt. If Windows® 95 SR2 or Windows® 98 is used, the following screen will be displayed.

```
Your computer has a disk larger than 512 MB. This version of Windows
includes improved support for large disks, resulting in more efficient use of
disk space on large drives, and allowing disks over 2 GB to be formatted as
a single drive.

IMPORTANT: If you enable large disk support and create any new drives on
this disk, you will not be able to access the new drive(s) using other operating
systems, including some versions of Windows 95 and Windows NT, as well as
earlier versions of Windows and MS-DOS. In addition, disk utilities that were
not designed explicitly for the FAT32 file system will not be able to work with
this disk. If you need to access this disk with other
operating systems or older disk utilities, do not enable large drive support.

Do you wish to enable large disk support (Y/N).....? [N]
```

- Type *Y* to select the FAT 32 file system. Type *N* to select the FAT 16 file system. *Note: Select FAT 32 or FAT 16 if you are using Windows 95 SR2 or Windows 98. FAT 32 partitions utilize disk space more efficiently and may be greater than 2GB in size. If you are using DOS, Windows 3.1x, or an earlier version of Windows 95, select FAT 16.* The following screen is displayed. [If you have more than one drive, a fifth option will appear which allows you to select the drive to be partitioned.]

```
                PC DOS Version 7.0
              Fixed Disk Setup Program
          Copyright IBM Corporation 1983-1994

                     FDISK Options

Current fixed disk drive:                1

Choose one of the following:

1. Create DOS partition or Logical DOS Drive
2. Set active partition
3. Delete partition or Logical DOS Drive
4. Display partition information
5. Change current fixed disk drive

Enter choice:[1]


Press ESC to exit FDISK
```

- Select option 1 to create a DOS partition. The screen below is displayed.

```
Create DOS Partition or Logical DOS Drive

Choose one of the following:

1. Create Primary DOS Partition
2. Create Extended DOS Partition
3. Create Logical DOS Drive(s) in the Extended DOS partition.


Enter choice: [3]


Press ESC to return to FDISK Options
```

- Select option 1 to *Create a Primary DOS Partition*.
- You will be asked if you want the full capacity of the drive and if you want to make the partition active. If yes, exit from FDISK. Restart the system and procede to the next step.
- If no, enter the logical drive size in MBs or percent of disk space. Return to the main menu.
- Select option 2 to make the partition active.
- Press *ESC* to return to the FDISK options.
- Create an *Extended DOS Partition* by selecting option 1 from the main menu and option 2 from the second menu. [Both menus are shown above.]

  Note: The Maximum Capacity may be smaller than the stated capacity of the drive. This is because the BIOS of some systems recognizes a Megabyte as 1,048,576 bytes (binary). Drive manufacturers recognize a Megabyte as 1,000,000 bytes (decimal). The capacities are the same in actual number of bytes.
- After creating the *Extended DOS Partition*, press ESC to return to the FDISK main menu.
- Select option 1 from the main menu,
- Then select option 3 to create a *Logical DOS Drive in an Extended Partition*. The following screen appears.

```
Create Logical DOS Drive(s) in the Extended
                        DOS Partition

No logical drives defined

Total Extended DOS Partition size is 1047 Mbytes
          (1 MByte = 1048576 bytes)

Maximum space available for logical drive is 1047Mbytes (100%)

Enter logical drive size in Mbytes or percent of disk space (%).....[1047]

Press ESC to return to FDISK Options
```

- Press *ESC* to return to FDISK and press ESC again to FDISK.
- Restart the system for the partitions to be recognized.

Step 9: Formatting the drive

The drive must be formatted before an operating system can be loaded. Format the Primary partition and any Extended partitions that have been made by following the steps below: .

- After booting from a bootable diskette, run FDISK, option 4 to verify the partition information from the previous step. Note the drive letters to ensure proper formatting.
- Press *ESC* to return to the main menu *and ESC* again to exit FDISK. At the A:\ prompt type *format x: /s* (where x is the drive letter). The /s option makes your hard drive bootable by copying the system files to the hard drive. If you do not want this drive to be bootable, do not use the */s* switch. The following warning is displayed:

  WARNING: ALL DATA ON NON-REMOVABLE DISK
  DRIVE C: WILL BE LOST!
  Proceed with Format (Y/N)?

- Type *Y* for yes. The time needed to format the drive depends upon the size of the drive.
- When the formatting is complete, format the next logical drive by typing

  format x: (where x is the logical drive letter)

- Repeat the above step for each logical drive to be formatted.

Step 10: Installing an operating system

- After the drive has been formatted, install an operating system. Follow your operating system installation instructions.

Note: Some controllers, systems, or operating systems may recognize only ANSI SCSI-2 devices. The Ultrastar reports itself as a SCSI-3 device. Contact the IBM Hard Disk Drive Technical Support Center for a fix if you encounter this issue.

APPENDIX

Making a bootable diskette

If you do not have a bootable diskette, you may want to make one. This may be necessary for installing your new hard disk drive and in case of system failure.

If you have a bootable Windows operating system, follow the steps below to create a Windows 95 or 98 startup diskette:

- Insert a blank floppy disk into drive A.
- From Windows 95 or 98, double click *My Computer*.
- Double click *Control Panel*.
- Double click *Add/Remove Programs*.
- Select *Startup Disk tab*.
- Click *Create Disk*. Follow the prompts.

If you have a bootable DOS operating system, follow the steps below to create a DOS startup diskette:

- Insert a blank floppy disk into drive A.
- At the *C:*\ prompt, type FORMAT A:/S and press *ENTER.*
- Follow the instructions displayed.

Controller information

The examples in this guide use an Adaptec controller. If you have a chipset embedded into your motherboard, plug the cable into the port on the motherboard instead of the controller.

If you are purchasing an add-on controller card, you will need to install the controller in one of the empty slots in your computer. Remove the screw holding the metal plate in place and insert the controller into the appropriate PCI, EISA or ISA slot on the motherboard, making sure the metal plate from the controller fits into the grooves on the computer frame. Replace the screw and connect the SCSI cables to the controller and then the hard drive. If you have any questions, refer to the installation manual enclosed with your controller.

Compatibility

The IBM SIT Lab tests Ultrastar drives for compatibility with a wide variety of systems, controller cards, and operating systems. Testing was done to demonstrate compatibility with the following hardware and software. Other combinations of hardware and software may function with this drive, but were not tested.

Systems
Acer AP53A
Apple Performa 6400/180
AS400 9406 520
Compaq Deskpro 6000
Compaq Deskpro 2000
Compaq Professional Workstation 6000
Compaq Proliant 1500
Data General
Dell Dimension XPS D300
Dell OptiPlex Gxa 266MTbr
Dell Power Edge 4100
Digital Alpha Server 800 5/333
Digital Alpha Server 4100
Digital VAX 4000
EMC
Gateway 2000 P6-200
Gateway G6-200
HP Netserver LXPro
HP Kayak GM
HP 9000/712
IBM RS6000 E20
IBM RS6000 F50
IBM Intellistation Z-Pro
Micron ClientPro XLU
Micron Millenia MME
Micron Powerdign XSU
NEC Direction SPL 266
NEC Power mate Enterprise
SNI Primergy 460
SGI Octane
SGI Onyx2
SGI 02
Sun Sparc Station 20
Tyan P5-166 Motherboard

SCSI Controllers
Adaptec AAA-131
Adaptec AAA-133
Adaptec AIC-7880
Adaptec ARO
Adaptec 2940UW
Adaptec 2940U2W
Adaptec Power Domain 2940U2W
Adaptec 3940W
Adaptec 3950U2BAdaptec 7880
Adaptec AHA-7890
Adaptec AIC-7880
Adaptec Power Domain AHA-3940UW v3
AMI MegaRaid 428
AMI MegaRaid 438
Buslogic BT-956
Compaq Wide-Ultra SCSI-2
Compaq Wide-Ultra SCSI-3
DG Proprietary
Diamond Fireport 40
DPT 2144UW
DPT 3334UW
EMC 80 Pin Ultra
IBM ServeRAID
IBM ServeRAID II
Mylex AcceleRAID 250
Mylex DAC 960
Mylex DAC1164P
Qlogic QLA1040B
Symbios Logic SYM8951U

SCSI Operating systems
AIX 4.3.2
DEC VMS 6.2
DEC VMS 7.1
HP-UX 10.10
Irix 6.3
Irix 6.4
Irix 64 Rel 6.5
MacOS 7.5.3
MacOS 7.6
MacOS 8.5
MS DOS 6.20
Novell Netware 4.11
OS2/Warp V.4.20
RedHat Linux 5.2
SCO Unix 3.2.4.2
SCO OpenServer 5.0.2
SCO Unixware 2.1.1
SCO Unixware 2.1.2
Sun OS 5.5.1
Sun Solaris 2.6
Windows 95
Windows 95 OSR2
Windows 98
Windows NT 4.0

BIOSs
AlphaBios 5.64 971212.1414
AMI 1.00.02.DT05
AMI 1.00.11.CD0L
AMI 1.00.13.CD0
AMI 1.00.04.CS1T
AMI 1.00.08CSIT
AMI Ver 2 24/8/95
Award 4.51PG
Compaq 686V 9/28/97
Compaq 586M 11/18/97
Compaq Professional Workstation 6000 BIOS 5/5/97
Compaq E12 4/5/96
Galaxy
IBM Sure Path 1/24/97
Phoenix 1.10 A04
Phoenix 4.0, Release 5.12
Phoenix 4.0, Release 6
Pheonix 4.04
Phoenix 4.05 1.01.92
Phoenix 4.05 A03
Phoenix 4.05 A06
SGI 6.4 2/5/97

Technical support

Contact technical support via

Web	www.ibm.com/harddrive
Voice	888.426.5214 or 507.286.5825
Fax	507.253.4111
e-mail	drive@us.ibm.com

Support is also available in Singapore at:

Voice	1800.418.9595 or 65.6.418.9595
e-mail	drive@sg.ibm.com

When calling the Technical Support Center be prepared to give the technical support representative the drive part number, its serial number, and the system information.

Automated Fax Back Service

U.S.A.	408.256.5218
Singapore	800.418.9696
England	0800.96.6948
Germany	0130.82.6089
France	0800.902229
Italy	167.875148

Glossary

ANSI (American National Standards Institute)
ANSI is the lead organization for encouraging and developing technological standards. ANSI represents the United States in the IEC (International Electrotechnical Commission) and the ISO (International Standards Organization).

Backup
Storing information from a hard drive to another storage area in order to prevent data loss.

BIOS (Basic Input/Output System)
The BIOS is the first level of software contained in a computer. It provides basic, low level control for keyboards, video, hard disk drives, and floppy drives. It also provides the initial intelligence that allows the computer system to find an operating system to run.

Boot/Boot-up
To prepare a computer for operation by loading an operating system.

Capacity
The amount of information, expressed in bytes, that can be stored on a hard drive. Also known as *storage capacity*.

Compatibility
The capability of a hardware or software component to conform with the interface requirements of a given data processing system without adversely affecting its functions.

Disk drive
The primary data storage device used by computers. Disk drives are used to record, store and retrieve digital information.

Electrostatic discharge
The rapid change in electrical energy caused by static electricity. This can damage or destroy electronic equipment or hardware. Electrostatic discharge can be prevented by grounding oneself before handling any electronic equipment.

FAT16 & FAT32 (File Allocation Table)
The file allocation table is a group of sectors in a hard drive that contains address chains for the different files on a hard disk drive. There are usually two FATs (kept in different locations) on a hard drive. FAT32 is available in the Windows® 95 & Windows® 98 operating systems. FAT32 receives its designation because it allows 32 bits of addressing as opposed to 16 bits in the FAT16 file system.

FDISK
FDISK is a program run in DOS that allows a user to partition a hard disk drive. Partitioning your hard disk drive is essential for it to work properly.

Format
To prepare a hard drive so that it can store data. In the DOS formatting process, the computer verifies the clusters within a partition.

Hard disk drive (HDD)
A stand alone disk drive that reads and writes data onto rigid disks and can be attached to a port on the system unit. Synonymous with *fixed disk drive* and *hard drive*.

Interface
A hardware or software protocol, contained in the electronics of the disk controller and drive, that manages the exchange of data between the hard disk drive and the computer. The most common interfaces for small computer systems are ATA (IDE) and SCSI.

Jumpers
A small piece of metal covered with plastic that enables a particular function in a hard drive when it connects two pins on a jumper block.

Jumper settings
Different modes which are achieved by placing the jumper on particular pins on a device. These modes determine the behavior of the device. Settings are changeable by the user, but remain constant during operation. See *Jumpers.*

LVD (Low Voltage Differential)
A highly compatible computer disk drive interface that is faster and more reliable than SCSI. Also known as *Ultra2SCSI*.

Motherboard
Holds the computer's main processors and circuitry, and also contains thememory, BIOS, interconnection circuitry and expansion slots.

Multimode
A drive that can operate on an LVD bus or a Single-ended bus.

Operating system
Software that controls the execution of programs and may provide functions such as resource allocation, scheduling, input/output control, and data management. Although operating systems are predominantly software, partial hardware implementations are possible.

Partition
A portion of a hard drive dedicated to a particular operating system or application and accessed as a single logical volume.

SCSI (Small Computer System Interface)
An intelligent parallel peripheral interface characterized by its use of high level communication between devices. Pronounced “scuzzy”.

Termination
The signals on a SCSI bus must be terminated at both ends of the bus. This is generally done by the controller automatically and requires an “external” terminator on the last connector of the bus.

www.ibm.com/harddrive

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