



# **Intel<sup>®</sup> AC450NX MP Server System Hardware/Operating Systems Test Cross-Reference List**



**Revision 1.0**

**January, 1999**

**Enterprise Server Group**

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## Revision History

Date	Rev.	Modifications
January, 1999	1.0	Initial release.

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# Table of Contents

<b>1. Overview.....</b>	<b>1</b>
<b>2. SCSI Hard Disk Drives.....</b>	<b>1</b>
2.1 Purpose .....	1
2.2 Test Software .....	1
2.3 Test Equipment .....	1
2.4 Test Method.....	1
2.5 Test Conditions.....	2
2.6 Pass/Fail Criteria .....	2
2.7 Test Results.....	2
<b>3. Rotational Vibration.....</b>	<b>3</b>
3.1 Purpose .....	3
3.2 Test Equipment .....	3
3.3 Test Software .....	4
3.4 Test Method.....	4
3.5 Test Conditions.....	4
3.6 Pass/Fail Criteria .....	4
3.7 Test Results.....	4
<b>4. RAID Controllers/SCSI Hot-swap Compatibility.....</b>	<b>5</b>
4.1 Purpose .....	5
4.2 Test Equipment .....	6
4.3 Test Software .....	6
4.4 Test Method.....	6
4.5 Test Conditions.....	6
4.6 Pass/Fail Criteria .....	6
4.7 Test Results.....	7

<b>5. CD-ROM Drives .....</b>	<b>7</b>
5.1 Purpose .....	7
5.2 Test Equipment .....	7
5.3 Test Software .....	8
5.4 Test Method.....	8
5.5 Test Conditions.....	8
5.6 Pass/Fail Criteria .....	8
5.7 Test Results.....	8
<b>6. Floppy Drives .....</b>	<b>9</b>
6.1 Purpose .....	9
6.2 Test Equipment .....	9
6.3 Test Software .....	9
6.4 Test Method.....	9
6.5 Test Conditions.....	10
6.6 Pass/Fail Criteria .....	10
6.7 Test Results.....	10
<b>7. AC450NX PCI Hot-plug Validation .....</b>	<b>11</b>
7.1 Purpose .....	11
7.2 Test Equipment .....	11
7.3 Test Software .....	11
7.4 Test Method.....	11
7.5 Test Conditions.....	12
7.6 Pass/Fail Criteria .....	12
7.7 Test Results.....	12

# 1. Overview

The products tested by Intel are subject to the disclaimer at the beginning of this document. **The customer is responsible for running appropriate tests on its products before shipment to computer end-users or installation in its facilities.**

## 2. SCSI Hard Disk Drives

### 2.1 Purpose

The purpose of this test was to validate compatibility and functionality of SCSI hard disk drives in the AC450NX server platform. Selected drives represent current technology in the 4.5 to 18 GB capacity range from five vendors.

### 2.2 Test Software

MS-DOS\* 6.22, Windows NT\* 4.0, SCO UnixWare\* 7, Novell NetWare\* 4.11, WinMTA, Iometer, and a Unix\* based test program called Grind\*.

### 2.3 Test Equipment

The AC450NX server platform was configured with four Pentium® II Xeon™ processors with 512K cache, 128 MB of RAM, IDE and SCSI CD-ROM, AMI MegaRAID\* model 438 and Mylex Extreme\* 1100 LVDs RAID controllers, on-board Symbios\* Sym896 SCSI controller, and hard disk drive samples. No other special test equipment was required.

### 2.4 Test Method

1. Two SCA SCSI hard drives were installed in the hot swap bay. One wide SCSI hard drive and one Ultra DMA33 IDE hard drive was installed in the peripheral drive bay. SCSI hard drive capacities were mixed when necessary, but vendors were not.
2. One of the two SCSI channels of the onboard Sym896 SCSI controller was attached to the hot swap backplane of the peripheral bay where the drives reside, and the second channel was attached to an external drive or drives.
3. Each Operating System (OS) was installed from floppy disk and/or CD-ROM distribution media to a boot drive attached to each interface port (2 total) through the course of the testing. The remaining drives were configured as data drives in each case.
4. WinMTA (Windows NT 4.0) read/write/compare test was run for a minimum of 15 hours on each of the drives.
5. Grind read/write/compare test for UnixWare was run for a minimum of 24 hours on each of the drives.

6. Novell NetWare 4.11 was installed on an AC450NX server with two Windows NT 4.0 clients attached. Drives in the server were mapped to the clients and IOMeter was used to exercise the server drives from the clients. Minimum test time of 20 hours for each set of drives. IOMeter set up for TPC-C simulation, 2K transfers, 67% reads, and 100% random access.
7. The Mylex ExtremeRAID 1100 or AMI MegaRAID 438 RAID controllers were installed in place of the onboard Sym896 controller and attached to the SCSI channels of the hot swap backplane. Windows NT 4.0 was loaded with drives configured in a RAID 1.

## 2.5 Test Conditions

Lab environment: Temperature—room ambient approximately 20°C. Voltages—nominal.

## 2.6 Pass/Fail Criteria

The SCSI hard disk drives must support loading of the operating systems listed in the table below, and operate as a boot device for operating systems. The drives must also read and write data without error for each operating system. All hot swap drive slots plus CD-ROM and floppy are to be populated and active during each set of tests.

## 2.7 Test Results

Table 1 lists SCSI drives tested and the test results for each test. A check mark indicates the drive passed the test.

The QM118200TD-SCA 18 GB drive listed on the test plan was not available at the time of the test.

No drive problems were noted in this testing phase.

*Table 1: SCSI Hard Disk Drives*

Vendor Model	Size (GB)	Test Quantity	Windows NT* 4.0 Install	WinMTA R/W/C Test	Mylex Extreme RAID* 1100	AMI 438 RAID	UnixWare* Install	Grind* R/W/C Test	NetWare* Install	IOMeter
Seagate* 7200RPM										
ST34573LC	4.5	2	✓	✓	✓	✓	✓	✓	✓	✓
ST39173LC	9.1	2	✓	✓	✓	✓	✓	✓	✓	✓
ST118273LC	18.2	2	✓	✓	✓	✓	✓	✓	✓	✓
ST39173LW	9.1	1	✓	✓	Not tested	Not tested	Not tested	Not tested	Not tested	✓
Seagate 10KRPM										
ST39102LC	9.1	2	✓	✓	✓	✓	✓	✓	✓	✓
ST118202LC	18.2	2	✓	✓	✓	✓	✓	✓	✓	✓

Vendor Model	Size (GB)	Test Quantity	Windows NT* 4.0 Install	WinMTA R/W/C Test	Mylex Extreme RAID* 1100	AMI 438 RAID	UnixWare* Install	Grind* R/W/C Test	NetWare* Install	IOmeter
Quantum* Atlas III										
QM309100TD-SCA	9.1	2	✓	✓	✓	✓	✓	✓	✓	✓
QM118200TD-SCA	18.2	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Quantum Viking II										
QM34550PX-SCA	4.5	2	✓	✓	✓	✓	✓	✓	✓	✓
QM309100PX-SCA	9.1	2	✓	✓	✓	✓	✓	✓	✓	✓
WD*										
WDE4360-AV1208	4.5	2	✓	✓	✓	✓	✓	✓	✓	✓
WDE9100-AV1217	9.1	2	✓	✓	✓	✓	✓	✓	✓	✓
WDE9100-1225	9.1	2	✓	✓	✓	✓	✓	✓	✓	✓
WDE9100-1224	9.1	1	✓	✓	✓	Not tested	Not tested	Not tested	Not tested	Not tested
IBM* 10KRPM										
DGVS39110	9.1	2	✓	✓	✓	✓	✓	✓	✓	✓
IBM 7200 RPM										
DGHS39110	9.1	2	✓	✓	✓	✓	✓	✓	✓	✓
DGHS318220	18.2	2	✓	✓	✓	✓	✓	✓	✓	✓
Fujitsu*										
MAB3091SC	9.1	2	✓	✓	✓	✓	✓	✓	✓	✓
MAA3182SC	18.2	2	✓	✓	✓	✓	✓	✓	✓	✓

## 3. Rotational Vibration

### 3.1 Purpose

The purpose of this test was to validate that the SCSI disk drive mounting design provides adequate support to control effects of rotational vibration on SCSI hard disk drives in the AC450NX hot swap drive bays. The selected drives represent current technology in the 4.5 to 18 GB capacity range from five vendors.

### 3.2 Test Equipment

The AC450NX server platform was configured with four Pentium II Xeon processors with 512K cache, 128 MB of RAM, IDE CD-ROM, onboard Symbios Sym896 SCSI controller and hard disk drive test samples. Special test equipment: HP\* 35670A Analyzer, two charge amplifiers, two accelerometers, and proprietary software from Seagate\* for testing Seagate drives.

## 3.3 Test Software

MS-DOS, Windows NT 4.0 and Iometer.

## 3.4 Test Method

1. Two SCA SCSI hard drives were installed in the hot swap slots. One SCSI hard drive was attached to Channel B of the Sym896 onboard controller as a boot device.
2. Channel A of the Sym896 has the hot swap backplane attached to it.
3. The Seagate drives were tested using a drive self-seeking feature.
4. The other vendor drives were tested using Iometer to compare performance of drives, first on a seismic mount then mounted in the system.
5. Windows NT 4.0 and Iometer were installed on the SCSI drive attached to Channel B of the onboard controller. Iometer was set up for a 2K-block size, 100% writes, and 100% random access.

## 3.5 Test Conditions

Lab environment: Temperature—room ambient approximately 20° C. Voltages—nominal.

## 3.6 Pass/Fail Criteria

The Seagate drives were tested to the Seagate RVI recommended values.

The other vendor drives were tested for performance comparing a drive performance on a seismic block to its performance in the system. The goal was less than 1% performance loss.

## 3.7 Test Results

Table 2 lists SCSI drives tested and the test results. A check mark indicates the drive passed the test. A blank box indicates the drive did not undergo that test.

The QM118200TD-SCA 18 GB drive was not available at the time of the test.

*Table 2. SCSI Disk Drive – Rotational Vibration*

Vendor Model	Size (GB)	Seagate* RVI Test	Iometer Performance Test
Seagate* 7200RPM			
ST39173LC	9.1	✓	
ST118273LC	18.2	✓	



Vendor Model	Size (GB)	Seagate* RVI Test	IOmeter Performance Test
Seagate 10KRPM			
ST39102LC	9.1	✓	
ST118202LC	18.2	✓	
Quantum*			
Atlas III			
QM309100TD-SCA	9.1		✓
QM118200TD-SCA	18.2		N/A
Quantum			
Viking II			
QM34550PX-SCA	4.5		✓
QM309100PX-SCA	9.1		✓
WD*			
WDE4360-AV1208	4.5		✓
WDE9100-AV1217	9.1		✓
WDE9100-1225	9.1		✓
IBM* 10KRPM			
DGVS39110	9.1		✓
IBM 7200 RPM			
DGHS39110	9.1		✓
DGHS318220	18.2		✓
Fujitsu*			
MAB3091SC	9.1		✓
MAA3182SC	18.2		✓
Fujitsu			
MAB3091SC	9.1		✓
MAA3182SC	18.2		✓

## 4. RAID Controllers/SCSI Hot-swap Compatibility

### 4.1 Purpose

Validate compatibility and functionality of the SCSI Hot-Swap Backplane (HSBP) in the AC450NX server platform with the Mylex ExtremeRAID 1164P and AMI MegaRAID 438 controller.

## 4.2 Test Equipment

The AC450NX server platform configured with four Pentium II Xeon processors, with 512K of cache, 128 MB of RAM, IDE and SCSI CD-ROM, Mylex ExtremeRAID 1164P and AMI MegaRAID 438, onboard Symbios Sym896 SCSI controller, SCSI hard disk drives, and a SCSI bus analyzer.

## 4.3 Test Software

Windows NT 4.0, and WinMTA.

## 4.4 Test Method

1. Install RAID controller board in AC450NX system and attach Channel A of the RAID controller to the HSBP. Install two SCSI drives in the hot swap drive slot.
2. Attach a SCSI bus analyzer to one or both SCSI channels for debug where required.
3. Power up the system.
4. Verify HSBP powers up each drive slot.
5. Observe the order and timing of drives being spun-up by the RAID controller.
6. Demonstrate error free hot-swap of drives by removing and replacing a non-active drive while other devices on the bus are actively passing data.
7. Remove an active drive from the bus and replace it. Verify no data corruption.
8. Verify detection of drive removal and replacement with SCSI bus analyzer, GUI (RAID management utility) and/or auto fail-over when a hot spare is present.
9. Verify auto rebuild if supported by the controller, auto fail-over to a hot spare, and manual rebuild.

## 4.5 Test Conditions

Lab environment: Temperature—room ambient approximately 20° C. Voltages—nominal.

## 4.6 Pass/Fail Criteria

HSBP must correctly identify itself during power-on self test (POST) in response to an inquiry command.

Drives must not spin up until commanded by controller. Controller must sequence spin up of drives one at a time.

HSBP must communicate current status of each drive slot via SAF-TE protocol when polled such that the RAID controller can detect when a drive is removed and/or replaced.

HSBP must control drive slot status indicator lights in response to SAF-TE commands from the SCSI controller.

HSBP must support drive removal and replacement on an active SCSI bus without causing data corruption in any SCSI device on the bus.

## 4.7 Test Results

Table 3 lists the test results. A check mark indicates the controller passed the test.

*Table 3. RAID Controllers/SCSI Hot-swap Compatibility*

Test Criteria	Mylex ExtremeRAID* 1164P	AMI MegaRAID* 438
Drive spin-up sequencing	✓	✓
Remove passive drive with no data corruption	✓	✓
Replace drive with no data corruption	✓	✓
Remove active drive with no data corruption	✓	✓
Replace drive with no data corruption	✓	✓
RAID support for auto rebuild	✓	✓
RAID support for auto fail-over to hot spare	✓	✓
Manual rebuild	✓	✓
Verify proper drive slot indicator light operation	✓	✓
Verify RAID 0 mode of operation	✓	✓
Verify RAID 1 mode of operation	✓	✓
Verify Windows NT* 4.0 loaded	✓	✓
Verify Novell NetWare* 4.11 loaded	✓	✓
Verify UnixWare* 7 loaded	✓	✓

## 5. CD-ROM Drives

This section lists CD-ROM drives that were tested for compatibility with the AC450NX system.

### 5.1 Purpose

Validate compatibility and functionality of SCSI and IDE CD-ROM drives in the AC450NX server platform. Selected IDE drives are 16X, 24X and 32X technology from TEAC\*, Hitachi\*, and Toshiba\* plus a SCSI 8X drive from Sony\*.

### 5.2 Test Equipment

The AC450NX server platform configured with four Pentium II Xeon processors, with 512K of cache, 128 MB of RAM, IDE and SCSI CD-ROM, Mylex ExtremeRAID 1100 and AMI MegaRAID model 438, onboard Symbios Sym896 SCSI controller and SCSI hard disk drives. No other special test equipment required.

## 5.3 Test Software

MS-DOS, Windows NT 4.0, SCO UnixWare 7, Novell NetWare 4.11, and CD certify test program.

## 5.4 Test Method

1. CD-ROM drives were installed singularly and tested in conjunction with SCSI hard disk drive validation tests.
2. IDE CD-ROM drives were attached to and tested on the IDE port one drive at a time. The SCSI CD-ROM drive was attached to the onboard SCSI port of the AC450NX system HSBP.
3. Each OS was installed from CD-ROM distribution media to hard disk drives attached to the SCSI onboard port and RAID add-in card in turn.
4. The CD Certify Test program was run for a minimum of 96 hours on each model of drive under test.

## 5.5 Test Conditions

Lab environment: Temperature—room ambient approximately 20° C. Voltages—nominal.

## 5.6 Pass/Fail Criteria

CD-ROM drives must support loading operating systems.

The system must boot from a CD-ROM, if the CD-ROM drive and operating system supports bootable CD-ROMs.

Drives shipped with AC450NX platforms must be Intel qualified components.

## 5.7 Test Results

All five models of CD-ROMs tested have passed system validation testing. No errors were noted during the test phase.

The Hitachi CDR8330 and CDR8335 drives have an Intel device level qualification.

Hitachi CDR8330 and Sony CDU76S support booting Windows NT 4.0 from CD-ROM. All five models tested support installation of OSs from CD-ROM.

*Table 4: CD-ROM Drive Validation*

Vendor Model	Speed	Test Qty.	Windows NT* 4.0 Install	CD Certify	UnixWare* Install	NetWare* Install	Boot Device On Windows NT
Hitachi*							
CDR8330	24X	5	✓	✓	✓	✓	✓

Vendor Model	Speed	Test Qty.	Windows NT* 4.0 Install	CD Certify	UnixWare* Install	NetWare* Install	Boot Device On Windows NT
CDR8335	24X	5	✓	✓	✓	✓	
Toshiba* CF508B	16X	1	✓	✓	✓	✓	
TEAC* CD-532E	32X	1	✓	✓	✓	✓	✓
Sony* CDU76S	8X	1	✓	✓	✓	✓	✓

## 6. Floppy Drives

This section lists floppy drives that were tested for compatibility with the AC450NX system.

### 6.1 Purpose

The purpose of this test is to validate compatibility and functionality of floppy disk drives in the AC450NX server system.

### 6.2 Test Equipment

The AC450NX server system was configured with four Pentium II Xeon processors, 512 MB of memory, IDE CD-ROM, Mylex ExtremeRAID 1100 and AMI MegaRAID model 438, onboard Symbios Sym896 SCSI controller, and SCSI hard disk drives. No other special test equipment required.

### 6.3 Test Software

MS-DOS, Windows NT 4.0, SCO UnixWare 7, Novell NetWare 4.11, and WinMTA.

### 6.4 Test Method

1. Install each OS to hard disk drives utilizing the test floppy drives provided. They must load OSs through all of the controllers in the system: ATA, Mylex ExtremeRAID 1100 and AMI MegaRAID 438, and onboard Symbios Sym896 controller.
2. Installation requires that each OS being installed must load without a retry and/or a restart.
3. Test the floppy drive with an Intel approved program such as WinMTA. Run WinMTA read/write/compare test for a minimum of four hours in the standard 1.44 MB mode. Copy files to and from the floppy drive after installing each OS.

4. Test the floppy drive with an Intel approved program such as WinMTA. Run WinMTA read/write/compare test for a minimum of four hours in 720 KB mode.

## 6.5 Test Conditions

Lab environment: Temperature—room ambient approximately 22° C. Voltages—nominal.

## 6.6 Pass/Fail Criteria

All floppy drives used in this test are required to have been qualified at the device level by Intel.

All floppy drives are required to: support all three modes of operation, support loading operating systems, operate as a boot device for operating systems, read and write data without error for all operating systems.

## 6.7 Test Results

The floppy disk drives tested were TEAC model 8000 and Mitsubishi\* model MF35F3450MGC.

The floppy disk drives selected for validation in the AC450NX system were previously approved for Intel use by Intel device level qualification.

No errors or load failures were reported for any of the floppy disk drives under test while loading OSs and running file transfer tests.

No data mis-compares or other failures were reported during the WinMTA read/write/compare testing.

The TEAC and Mitsubishi floppy drives have passed peripheral validation testing in the AD450NX system.

Five samples from each vendor were tested.

*Table 5. Floppy Drives*

Vendor and Model	Quantity	Microsoft Windows NT* 4.0	WinMTA	Total Hours	SCO UnixWare* 2.1.2/2.1.3/7	Novell NetWare* 4.11
TEAC*						
8000	5	✓	✓	6	✓	✓
Mitsubishi*						
MF35F3450MGC	5	✓	✓	6	✓	✓

## 7. AC450NX PCI Hot-plug Validation

### 7.1 Purpose

The purpose of this test is to validate compatibility and functionality of the PCI Hot-plug (PHP) slots in the AC450NX server system.

### 7.2 Test Equipment

The AC450NX server system was configured with four Pentium II Xeon processors, 512 MB of memory, IDE CD-ROM, two Intel® EtherExpress™ PRO/100 B+ LAN cards, two Adaptec\* 2940U2WD SCSI controller, two Qlogic\* 2100 Fibre Channel controller, a Clariion\* RAID controller with subsystems, a Symbios RAID controller with subsystems, onboard Symbios Sym896 SCSI controller, and SCSI hard disk drives. No other special test equipment required.

### 7.3 Test Software

Windows NT 4.0, PCI Hot-plug Utility and drivers, and WinMTA.

### 7.4 Test Method

The following is a procedure to test the fitness of the driver without a load on the PHP slot. Once the PHP Utility and the drivers are loaded, Windows NT is rebooted. Start the PHP Utility to check that all PHP slots and cards in the slots are started and identified. Once this is all running, do the following:

1. Right-click the slot you wish to fail, and select Fail.
  - The message “Are you sure that you want to fail this slot” will be displayed.
  - Click Yes.
  - The utility will report that the slot is “Not ready.”
  - The utility will report “Users failed the slot.”
2. Right-click to bring up the Failed Card. Select Clear Failure And Re-Test.
  - The Utility will report that the card has been tested and is back online.
  - If the card is bad it will report failure.
3. Right-click and select Power.
  - The message “Are you sure that you want to power off this slot” will be displayed.
  - Click Yes.
  - The Utility will report that the slot is “Not ready.”

4. Right-click to bring up the Power On, and select Power.
  - The Utility will report that the card has been tested and is back online.
  - The Utility will ask for confirmation to turn the slot on again.
  - If the card is bad it will report failure.

The above is a test of the PHP before there is a load placed on the slots. Once the card and slots have been tested, a load is placed on the card by running WinMTA and/or IOmeter and/or Reaper. The test is repeated.

## 7.5 Test Conditions

Lab environment: Temperature—room ambient approximately 22° C. Voltages—nominal.

## 7.6 Pass/Fail Criteria

PHP supported cards must be able to failover without data corruption.

PHP supported cards must be able to fail and recover through the use of the PHP Utility without data corruption.

PHP supported cards must be able to power off and on through the use of the PHP Utility without data corruption.

## 7.7 Test Results

All tested cards passed.

*Table 6: PCI Hot-plug Validation*

Vendor	Intel® EtherExpress™ PRO/100B+	Adaptec* 2944U2W	Qlogic* Q2100
Failover	✓	✓	✓
Fail and recovery with Utility	✓	✓	✓
Power on and off with Utility	✓	✓	✓