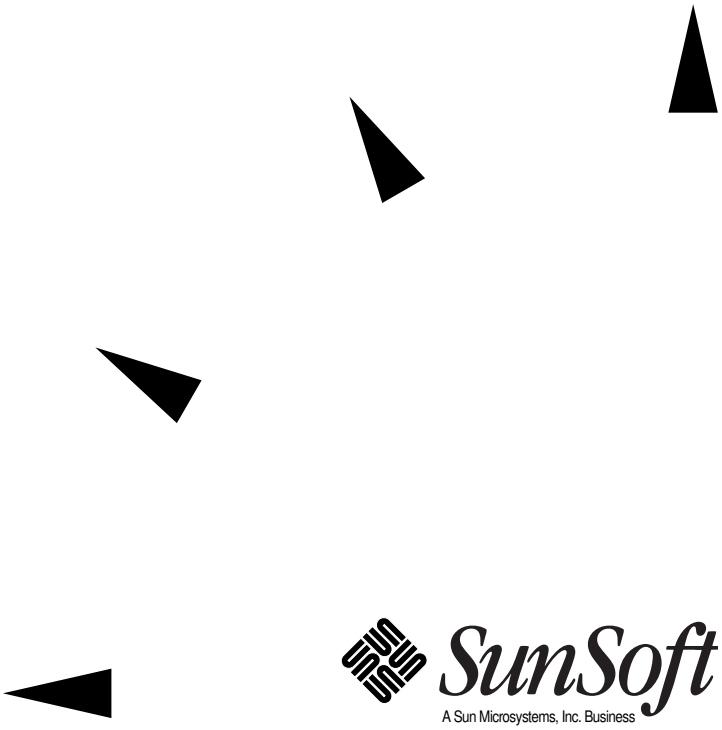
Solaris™ 2.4
x86 Driver Update 9 Guide



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Part No: 802-5287-10
Revision A, December 1995

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About This Book

This document provides information about x86 hardware devices that are now supported on the Solaris™ 2.4 computing environment. Typically, as new drivers become available, they will be bundled with releases on separate Driver Update diskettes. The drivers may support the following types of devices: SCSI Host Bus Adapters, IDE Interface, Network Adapters, Video, PC Card devices, and others, such as audio, SCSI tape devices, and serial ports. You can use the Driver Update diskettes to install a new system for the first time, or you can use them to update your installed Solaris 2.4 system with new drivers.

Note – Driver Updates are cumulative distributions. Although the "New Device Functionality" section in Chapter 1 describes what's been added since the last Driver Update, the "Driver Update Contents" section in Chapter 1, the "Driver Update Video Contents" section in Chapter 2, and the "PC Card Driver Update Contents" section in Chapter 3 provide a complete list of what will be installed. It is only necessary to install the current Driver Update to get the support described in this document.

Information regarding the availability of new drivers can be obtained by calling SunSoft's Automated Support System at 1-800-SUNSOFT (options 4,1,1) or by sending electronic mail to `support@cypress.West.Sun.COM`.

Before You Read This Book

This document contains additional device configuration information for newly supported hardware. The importance of properly configured hardware prior to installing Solaris is discussed in *x86 Device Configuration Guide*. This document assumes you have fully read and understood that guide; Appendix A, "Device Reference Pages," in this document is an addendum to that guide. Likewise, the installation instructions for this Driver Update are very brief and serve only to supplement the instructions found in *x86: Installing Solaris Software*.

How This Book Is Organized

A brief description of the contents of the Driver Update diskettes is followed by installation instructions for the new drivers, and detailed configuration instructions for the hardware devices that are supported by the new drivers.

Note – Even though the instructions for installing the new drivers are presented first, read and follow the appropriate hardware configuration instructions in Appendix A, "Device Reference Pages," before installing the new drivers. The hardware must be configured properly for the Solaris software to install and run correctly.

Chapter 1, "Solaris 2.4 x86 Driver Update 9," provides information about what is new in this release and how to install it.

Chapter 2, "Solaris 2.4 x86 Driver Update 9 Video," provides information about the contents, installation instructions, and known problems for the video support in this Driver Update.

Chapter 3, "Solaris 2.4 x86 Driver Update 9 PC Card (PCMCIA) Support," provides information about the contents, installation instructions, and known problems for the PC Card support in this Driver Update.

Appendix A, "Device Reference Pages," provides device configuration information for the hardware supported by the drivers in this Driver Update. This appendix should be read and the hardware configured *prior* to installing the Driver Update software.

Appendix B, "Supplementary Video Information," provides additional information about the video support in this release.

Related Books

You may need to refer to the following books when installing the Driver Update:

- *x86 Device Configuration Guide*
  Describes how to configure x86 devices before installing Solaris software.
- *x86: Installing Solaris Software*
  Describes how to install the Solaris software on x86 systems.
- *Solaris 2.4 Open Issues and Late-Breaking News*
  Describes late-breaking news about running Solaris software, including known problems with supported hardware or device drivers.
- *Solaris 2.4 x86 Hardware Compatibility List*
  Contains a list of supported hardware on Solaris 2.4 x86 systems.

How to Obtain Updated Hardware Compatibility Lists and Device Driver Information

Hardware Compatibility Lists and Driver Update releases (including related documentation) are produced periodically as support for new hardware becomes available. They are available from these sources:

- World Wide Web—Open URL `http://access1.Sun.COM` and then select:
  "x86 Hardware Compatibility List" or
  "download driver updates"
- FTP—Use anonymous FTP to access `ftp.uu.net`, then go to `/vendor/sun/sun-doc/x-86-driver/2.4`.
- CompuServe—Type `go sunsoft` and go to the Solaris x86 library.
- Email autoresponder
  - `x86-24hcl@Sun.COM` (Hardware Compatibility List, ASCII)
  - `x86-24hcl.ps@Sun.COM` (Hardware Compatibility List, PostScript™)
  - `x86-24du@Sun.COM` (Driver Update Announcement, ASCII)

- ASK-IT[1]—SunSoft's Automated Support Fax-on-Demand Service
  - In North America, call one of these numbers:
    1-800-SUNSOFT and choose options 4, 1, 1
    (310) 348-6219 and choose option 1
  - Outside North America, call one of these numbers and choose option 1:

Australia	61-2-844-5374
Japan	03-5717-2560
Taiwan	886-2-719-8069
United Kingdom	44-1494-510981

Note that the World Wide Web, CompuServe, and ASK-IT also point to Support-provided installation and configuration information as well as answers to frequently asked questions.

How to Obtain Technical Support

To obtain technical support:

- In North America, call 1-800-SUNSOFT and choose option 4.
- Outside North America, contact your local technical support provider.

1. Includes the current Hardware Compatibility List, document No. 51201, which summarizes the current Driver Update, and document No. 81234, which lists *x86 Device Configuration Guide* Device Reference Pages so you can request those not available in Driver Updates.

Solaris 2.4 x86 Driver Update 9 1

Solaris 2.4 x86 Driver Update 9 adds new support for SCSI host bus adapters, the IDE interface, network adapters, audio cards, video display adapters, and PC Card devices. This chapter provides a brief description of what's new in this Driver Update, followed by a complete list of the contents, installation instructions, and release notes for all the drivers included in this release except Video and PC Card devices.

Chapter 2, "Solaris 2.4 x86 Driver Update 9 Video," contains additional information and installation instructions for the video display support in this release. Chapter 3, "Solaris 2.4 x86 Driver Update 9 PC Card (PCMCIA) Support," contains additional information and installation instructions for the PC Card device support in this release.

Note – Before installing this Driver Update, the newly supported hardware devices should be installed and configured according to the instructions in Appendix A, "Device Reference Pages."

1

New Device Functionality

Device Drivers (SCSI HBA, IDE Interface, Network)

Table 1-1 lists device drivers in Solaris 2.4 x86 Driver Update 9 that contain new functionality not included in previous Driver Updates. For a complete list of drivers included in this release, see Table 1-4.

Table 1-1 New and Updated Drivers in This Driver Update

SCSI HBA Drivers	
`aha`	Updated Device Reference Page for enabling AHA-154*x*CP
`esa`	Probe conflicts fixed
IDE Interface Driver	
`ata`	IDE device DDI compliance bug fixes
Network Drivers	
`dnet`	Bug fixes, and support for AsanteFAST 10/100
Serial Port Drivers	
`asy`	Serial driver bug fixes

Note – AsanteFAST 10/100, SMC EtherPower (8432BT/8432BTA), Cogent EM960TP/EM960C (TP connector only), Cogent EM100, D-Link DE-530CT, and Znyx EtherAction ZX312 boards have been successfully tested with a generic driver for network adapters based on the DECchip 21040 Ethernet and DECchip 21140 Fast Ethernet controllers. Other adapters may work with this driver and additional boards will be tested in the future.

However, some boards have failed to work with the `dnet` driver (for example quad-port boards from Cogent and Znyx), and other boards have exhibited inconsistent behavior (SMC EtherPower 10/100). Support for these and other DECchip-based adapters will be included in future releases of this driver.

Corrections to Known Problems

For a list of the known problems that are fixed in this Driver Update, see the `README` files that get installed in the patch directories `/var/sadm/patch/`<*patch number*>, where <*patch number*> is one of the following for Driver Update 9: `101936-08`, `101937-08`, `101964-08`, `102061-03`, `102065-02`, `102308-06`, `102318-02`, `102321-02`, `102449-03`, `102565-02`, `102590-02`, and `102593-02`.

See "Driver Update Distribution Diskettes" later in this chapter for a complete list of the contents of this Driver Update.

MP Support

This Driver Update includes the following MP support:

Table 1-2 Updated MP Kernel Modules to Correct Known Problems

`compaq`	MP module to add support for the Compaq ProLiant (TriFlex) machines.
`tpf`	MP module to add support for Tricord ES4000 MP machines. A manual page for `tpf(7)` is installed.
`pcplusmp`	An updated MP module that fixes some problems on Intel MPSpec 1-1 compliant systems.
`syspro`	An updated MP module for Compaq Systempro that fixes some probe conflicts on Compaq ProLiant systems.

The `pcplusmp` and `syspro` kernel modules contain new fixes for Driver Update 9. For a complete list of the known problems, see the `README` files that get installed in the patch directories `/var/sadm/patch/101936-08`.

New Video Support

Table 1-3 contains a list of the new video display adapters supported in Solaris 2.4 x86 Driver Update 9 that were not supported in previous Driver Updates.

For a complete list of video display adapters supported in this release, see Chapter 2, "Solaris 2.4 x86 Driver Update 9 Video."

Table 1-3 New Video Display Adapters Supported in This Driver Update

Vendor	Model	Bus	Chipset	Resolution and Color Depth									
				800x600		1024x768		1152x900		1280x1024		1600x1200	
				8	24	8	24	8	24	8	24	8	24
ATI	Mach64CT Mach64CT Rev.2	PCI PCI	Mach64CT Mach64CT	✓ ✓	✓ ✓	✓ ✓		✓ ✓		✓ ✓			
Compaq	QVision 1280 chipset[1]	EISA	ORION	✓	✓	✓		✓		✓			
Diamond	Stealth64 Video 2000 Stealth64 Video 2001 Stealth64 Video 3000	PCI PCI PCI	S3Vision 868 S3Vision 765 S3Vision 968	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	 ✓	✓ ✓ ✓	 ✓	✓ ✓ ✓	 ✓	 ✓	
Oak Technology	OTI107	PCI	OTI107	✓	✓	✓		✓		✓			
S3	Trio64V+ chipset		S3 Vision 765	✓	✓	✓		✓		✓			

1. Used on Compaq QVision 1280/E Graphics Controller and in Compaq DeskPro 590.

New Monitor Support

Driver Update Video 9 also adds support for the NEC 5FGe and 6FGp monitors.

Modified Driver Update Video Distribution and Installation Instructions

The size of the Solaris 2.4 x86 Driver Update Video distribution requires two diskettes. To limit the problems with multivolume distributions, the image that gets distributed is now a compressed `cpio` file, instead of a diskette image. Consequently, the installation instructions will be slightly different depending on whether you obtained the Video Driver Update on diskette or from on-line sources. Those who are installing from diskettes will require a few more steps than those starting with the on-line `cpio` image file. In either case, the installation instructions have changed from previous Driver Updates. See Chapter 2 “Solaris 2.4 x86 Driver Update 9 Video,” for the new instructions.

PC Card Driver Support

The PC Card support in Solaris 2.4 x86 Driver Update 9 is identical to the contents of the previous Driver Update. If you have already installed the PC Card distribution from Solaris 2.4 x86 Driver Update 8, there is no reason to

install the PC Card portion of this Driver Update. For more information about the PC Card support in this release, see Chapter 3, “Solaris 2.4 x86 Driver Update 9 PC Card (PCMCIA) Support.” New information has been added to the PC Card Device Reference Pages in Appendix A.

Driver Update Contents

Solaris 2.4 x86 Driver Update 9 contains seven diskettes labeled:

- “Solaris 2.4 x86 Driver Update 9 Boot Diskette 1 of 2”
- “Solaris 2.4 x86 Driver Update 9 Boot Diskette 2 of 2”
- “Solaris 2.4 x86 Driver Update 9 Distribution Diskette 1 of 2”
- “Solaris 2.4 x86 Driver Update 9 Distribution Diskette 2 of 2”
- “Solaris 2.4 x86 Driver Update 9 Distribution (Video) 1 of 2”
- “Solaris 2.4 x86 Driver Update 9 Distribution (Video) 2 of 2”
- “Solaris 2.4 x86 Driver Update 9 Distribution (PC Card)”

The Boot and Distribution diskettes are intended to be used with a Solaris 2.4 x86 CD or a Solaris 2.4 net install image. The “Solaris 2.4 x86 Driver Update 9 Distribution (Video)” diskettes and the “Solaris 2.4 x86 Driver Update 9 Distribution (PC Card)” diskette can only be used on systems that already have the Solaris 2.4 operating environment installed.

The contents of the ”Solaris 2.4 x86 Driver Update 9 Distribution (Video)” diskettes are discussed in Chapter 2, “Solaris 2.4 x86 Driver Update 9 Video.”

The contents of the “Solaris 2.4 x86 Driver Update 9 Distribution (PC Card)” diskette is discussed in Chapter 3, “Solaris 2.4 x86 Driver Update 9 PC Card (PCMCIA) Support.”

Driver Update Boot Diskettes

The Solaris 2.4 operating environment can be installed on x86 systems with the two new boot diskettes labeled "Solaris 2.4 x86 Driver Update 9 Boot Diskette 1 of 2" and "Solaris 2.4 x86 Driver Update 9 Boot Diskette 2 of 2."

These diskettes contain scripts and configuration files that enable you to boot and install your system using one of the newly supported devices. During installation of the Solaris software, one or more of the Driver Update Distribution diskettes will be read.

Driver Update Distribution Diskettes

The Driver Update *Distribution* diskettes (labeled "Solaris 2.4 x86 Driver Update 9 Distribution Diskette 1 of 2" and "Solaris 2.4 x86 Driver Update 9 Distribution Diskette 2 of 2") are read when the Driver Update Boot diskettes are used to install Solaris. Alternatively, the Driver Update Distribution diskettes can be used without the boot diskettes to add new drivers to an existing x86 system running Solaris 2.4.

The Driver Update Distribution diskettes contain the drivers listed in Table 1-4. A new or updated Section 7 manual page for each of the drivers[1] that added new device support will also be installed in the appropriate `man` page directory during installation.

Table 1-4 Device Drivers in This Driver Update

SCSI HBA Drivers	
`adp`	Adaptec AIC-787*x* driver that supports the AHA-2940, AHA-2940W, AHA-3940, and AHA-3940W PCI-to-Fast SCSI host bus adapters, and motherboards that integrate multiple Adaptec AIC-787*x* controller chips, such as the DECpc XL 590 and the Samsung Magic Power SPC8500P (See Note following this table)
`aha`	Updated Device Reference Page for enabling AHA-154*x*CP
`aic`	Adaptec AIC-6360 driver that supports the AHA-1530P, AHA-1532P, AHA-1522A, AHA-1520A, AHA-1510A, and the 6360-based SCSI controller embedded on the Sound Blaster 16 SCSI-2

1. The manual page for the Solaris `ieef` driver (Intel EtherExpress Flash32) will also be installed with this Driver Update. This driver is included on the Solaris 2.4 x86 CD.

Table 1-4 Device Drivers in This Driver Update *(Continued)*

`blogic`	Updated to provide support for native mode PCI. BusLogic SCSI HBAs (BT-440C, BT-445C, BT-445S, BT-542B, BT-545C, BT-545S, BT-742A, BT-746C, BT-747C, BT-747S, BT-757S, BT-946C)
`corvette`	IBM SCSI-2 Fast/Wide Adapter/A
`eha`	Updated Adaptec AHA-174*x* EISA HBAs driver to correct some known problems
`esa`	Updated Adaptec AIC-7770/AHA-274*x*/AHA-284*x* driver to fix some known problems
`iss`	Tricord Systems Intelligent SCSI Subsystem Controllers
`mcis`	Updated IBM Micro Channel HBA driver to correct some known problems
`ncrs`	Updated driver to support the NCR 53C815 SCSI controller and the embedded NCR 53C710 SCSI host bus adapters on Siemens Nixdorf PCE-5S systems; also updated to support systems that use PCI Configuration Mechanism #1
`pcscsi`	AMD PCscsi (Am53C974), PCscsi II (Am53C974A), and PCnet-SCSI (Am79C974) PCI host bus adapters integrated on system motherboards such as the HP Vectra XU and the Compaq DeskPro XL systems
`trantor`	Trantor T348 MiniSCSI Plus Parallel HBA
SCSI Disk Arrays/RAID Controllers	
`csa`	Compaq SMART SCSI Array Controller integrated on the system motherboard of the Compaq family of ProSignia, ProLiant, and Systempro Servers
`dpt`	Updated driver to add support for DPT PM-2024 and PM-2124 PCI host bus adapters, and the PM-3222 and PM-3224 SCSI RAID adapters
`mlx`	Updated driver to add support for the Mylex DAC960P PCI adapter and the IBM DMC960 RAID controllers (IBM SCSI-2 RAID and IBM SCSI-2 Fast/Wide Streaming-RAID Adapter/A)
IDE Interface Driver	
`ata`	Updated IDE interface driver to support ATAPI-compliant CD-ROM drives and enhanced IDE disk drives; bug fixes

Table 1-4 Device Drivers in This Driver Update *(Continued)*

SCSI Tape Driver	
`st`	SCSI tape target driver
Diskette Driver	
`fd`	New support for medium density format on 3.5-inch high-density diskettes used by NEC-DOS
Keyboard Driver	
`kd`	Updated to prevent the screen from going into unreadable white-on-white mode.
Network Drivers	
`dnet`	Updated DEC21040/21140 Ethernet to include AsanteFAST; (Cogent EM100 Cogent EM960TP, D-Link DE-530CT, SMC EtherPower 8432BT, SMC EtherPower 8432BTA Znyx312)
`eepro`	Intel EtherExpress PRO Ethernet
`elink`	Updated 3Com EtherLink 16 (3C507) driver to correct some known problems
`iee`	Updated Intel EtherExpress 16 driver to fix some known problems
`ieef`	Intel EtherExpress PRO/100 (82556)
`nee`	Novell/Eagle Technology NE3200 Ethernet
`nei`	Novell/Eagle Technology NE2000, NE2000plus Ethernet
`nfe`	Compaq NetFlex-2 DualPort ENET and NetFlex-2 ENET-TR Controllers
`pcn`	AMD PCnet driver to support integrated motherboards based on the AMD PCnet-ISA and PCnet-PCI controller chips
`riles`	Racal InterLan ES3210/ES3210 TP Ethernet
`smc`	Updated driver to include support for the SMC EtherEZ Ethernet adapter and to fix some known problems
Network Drivers	
`smceu`	SMC Elite32 Ultra (8232)
`smcf`	SMC Ether100 (9232)

Table 1-4 Device Drivers in This Driver Update *(Continued)*

`smce`	Updated SMC Elite32 driver to correct some known problems
Audio Driver	
`sbpro`	Updated audio driver to fix some known problems and add support for the Sound Blaster AWE32 audio card
Serial Ports Driver	
`asy`	Updated to fix problems and enhance the hardware flow control functionality; the functionality works regardless of the CLOCAL flag bit

Driver Update Distribution (Video) Diskettes

See Chapter 2, "Solaris 2.4 x86 Driver Update 9 Video," for a complete list of the video display adapters supported in this release.

Driver Update Distribution (PC Card) Diskette

See Chapter 3, "Solaris 2.4 x86 Driver Update 9 PC Card (PCMCIA) Support," for PC Card devices supported in this release.

Release Notes

Note – The Adaptec AHA-3940 has been certified by Adaptec to run in specific system platforms. Our testing has shown that Solaris works properly in some of those systems and not in others. If you encounter problems running Solaris on an Adaptec-approved platform with the AHA-3940, contact your technical support provider.

For a complete list of the known problems that are fixed in this Driver Update, see the `README` files that get installed in the patch directories `/var/sadm/patch/`<*patch number*>, where <*patch number*> is one of the following for Solaris 2.4 x86 Driver Update 9: `101936-07`, `101937-07`, `102061-03`, `102065-02`, `102202-02`, `102266-04`, `102308-06`, `102318-02`, `102321-02`, `102324-03`, `102565-02`, `102449-03`, `102590-02`, and `102593-02`.

The video patches are `102058-09` and `102059-09`.

Note – If you are installing Solaris 2.4 on one the following Intergraph systems, you will need to modify the Driver Update 9 boot diskettes to workaround a known PCI/EISA I/O space overlap problem on systems that contain an NCR chip:

ISMP22 Server
TD-5 Personal Workstation
TD-4 Personal Workstation
100 MHz TD-3 Personal Workstation

This must be done prior to installing the Solaris 2.4 operating environment. See "Modifying the Solaris Driver Update Boot Diskettes" later in this chapter.

Note – The Novell NE2000 and NE2000plus are sensitive to autoprobing by other drivers and require autoprobe reset sequences that may disturb other cards. For this reason, the Solaris `nei` driver is disabled by default, and special steps must be taken to enable it. See "Modifying the Driver Update 9 Boot Diskettes" and "Enabling Support for Controllers After Installing Solaris x86"on the "Novell NE2000, NE2000plus Ethernet and Clones" Device Reference Page in Appendix A.

Note – Due to conflicts, the IBM SCSI-2 Fast/Wide Adapter/A should not be installed until the Solaris `mcis` driver is disabled. See "Modifying the Driver Update 9 Boot Diskettes" and "Enabling Support for Controllers After Installing Solaris x86" on the "IBM Micro Channel SCSI-2 Fast/Wide Adapter/A " Device Reference Page in Appendix A.

Note – Due to conflicts, probing for the AHA-284*x* VLB has been disabled. See "Adding Support for AHA-284x Devices " and "Modifying the Solaris Driver Update Boot Diskettes" on the "Adaptec AIC-7770/AHA-274*x*/AHA-284*x* HBAs" Device Reference Page in Appendix A.

Solaris 2.4 x86 Jumbo Kernel Patch

It is recommended that users of Driver Update 9 install the Solaris 2.4 x86 jumbo kernel patch ID `101946`, revision 12 or later. This patch resolves problems known to cause user-level programs to core dump. This patch is posted on:

- The WWW (`http://access1.sun.com/recpatches/2.4_x86.html`)
- The Internet server `sunsolve1.Sun.COM` in the directory `/pub/patches` via anonymous FTP

Install the most recent revision of patch `101946`. You can obtain this from the patches subdirectory of the Solaris 2.4 x86 installation CD, or from either of the sites mentioned above. A `README` file and `installpatch` script provide a description and instructions for installing the patch on your system.

Modifying the Solaris Driver Update Boot Diskettes

Before you install the Solaris operating environment on your system, it may be necessary to modify the Driver Update Boot diskettes to remove or enable certain drivers that conflict with each other. For example:

- There is a known PCI/EISA I/O space overlap problem on systems that contain an NCR chip. This affects the Intergraph ISMP22 Server and the TD-5, TD-4, and 100 MHz TD-3 Personal Workstations.
- The Novell NE2000/NE2000plus Ethernet adapters are sensitive to autoprobing by other drivers and require reset sequences that may disturb other network cards. For this reason, the `nei` driver is disabled by default. See the "Novell NE2000, NE2000plus Ethernet and Clones" Device Reference Page in Appendix A for instructions for enabling this device.
- The Solaris `mcis` driver interferes with the proper operation of the IBM SCSI-2 Fast/Wide Adapter/A. To avoid conflicts, the Solaris `mcis` driver must be disabled. See the "IBM Micro Channel SCSI-2 Fast/Wide Adapter/A" Device Reference Page before installing this adapter.
- The Solaris `elink` driver may interfere with the proper operation of PCnet-ISA adapters, such as those installed on the Intergraph TD-1, TD-2, and TD-3 Personal Workstations. If you are installing the Solaris software over a network that uses a PCnet-ISA adapter, and you experience problems with the network hanging, it may be necessary to exclude the `elink` driver from

the Driver Update Boot diskette before attempting to install again. See the "AMD PCnet Ethernet (PCnet-ISA, PCnet-PCI)" Device Reference Page in Appendix A for instructions.

- Probing for AHA-284*x* VLB cards has been disabled by default to avoid probing conflict with some PCI cards at certain I/O addresses. To enable such probing, see the "Adaptec AIC-7770/AHA-274x/AHA-284x HBAs" Device Reference Page in Appendix A for the steps to take.

There are scripts on the Driver Update Boot diskettes for driver modification. The diskettes must be modified using DOS. As a precaution, you should make a backup of the original Boot diskettes prior to invoking the special script.

1. **Boot DOS on your system.**
2. **Insert a blank 3.5-inch diskette into drive A: and format it:**
   `format a:`
3. **Insert "Solaris 2.4 x86 Driver Update 9 Boot Diskette 1 of 2" into drive A:, make a copy of it, and remove the diskette:**
   `diskcopy a: a:`
4. **Label the copy of the Boot diskette as "Modified."**
   For example:
   "Modified Solaris 2.4 x86 Driver Update 9 Boot Diskette 1 of 2 for Intergraph Systems."
5. **Insert another blank 3.5-inch diskette into drive A: and format it:**
   `format a:`
6. **Insert "Solaris 2.4 x86 Driver Update 9 Boot Diskette 2 of 2" into drive A:, make a copy of it, and remove the diskette:**
   `diskcopy a: a:`
7. **Label the copy of the Boot diskette as "Modified."**
   For example:
   "Modified Solaris 2.4 x86 Driver Update 9 Boot Diskette 2 of 2 for Intergraph Systems."
8. **Store your original Boot diskettes in a safe place.**
9. **Insert the copy of "Solaris 2.4 x86 Driver Update 9 Boot Diskette 2 of 2" (the second diskette) into drive A:.**

10. **Change to drive A: (remember DOS is still running):**
    `a:`

11. **Run the batch command file.**
    The batch files are run from the second diskette, but some of these files will ask you to reinsert "Solaris 2.4 x86 Driver Update 9 Boot Diskette 1 of 2" by prompting "Please switch to boot diskette #1."

- To support the Intergraph ISMP22, TD-5, TD-4, or 100 MHz TD-3, run the `intrgrph.bat` command file:
  `intrgrph`
- See Appendix A, "Device Reference Pages," for information on NE2000/NE2000plus support, IBM SCSI-2 Fast/Wide Adapter/A support, PCnet-ISA conflicts, and AHA-284*x* probing.

Support for Medium Density Diskettes

Solaris x86 supports medium density, the 1.2-Mbyte, 77-cylinder, 1024-byte sector format on 3.5-inch high-density diskettes, used by NEC-DOS. This feature has two hardware requirements.

First, the diskette drive must be one of the supported, dual-speed, high-density drives. The currently supported diskette drives are: Teac FD-235HG, Teac FD-505, and Sony MPF420-6 (requires special cable to PC/AT diskette interface because drive is hardwired to DriveSelect0).

Second, the diskette controller must be one of the supported enhanced controllers that provide a programmable DENSEL output. The currently supported diskette controllers (or multi I/O chips) are: SMC FDC37C665GT and SMC FDC37C666GT; National Semiconductor PC87303VUL, PC87322VF, and PC87332VLJ (other National Semiconductor chips that use the PC8477 core: PC87306, PC87311, PC87312, PC87323, and PC87334).

This feature is enabled by editing the `fd.conf` file and assigning a nonzero value to the `mode_3D` property for the appropriate drive entry.

Note – An additional patch, `101924-02`, is required to access 1.2-Mbyte diskettes using the NEC-DOS file system. This patch updates the `pcfs` module.

Support for SCSI Tape Driver

The `st` driver is a SCSI tape device driver that replaces the old `sctp` tape driver supported in Solaris 2.4 x86. The `st` driver was developed on the SPARC™ platform and was previously supported only on Solaris 2.4 SPARC systems. It now replaces the `sctp` driver on x86 systems, providing the following features:

- Full compatibility between Solaris SPARC and Solaris x86 platforms
- Stability, robustness, and increased SCSI tape drive support
- Field extensiblity; support for new tape drives can be added by editing a configuration file (`st.conf`)
- Support for tape control features required by commercial backup software, such as Legato Networker
- Support for configurable write buffering (as an option)

In addition, significant interoperability testing was conducted to ensure that tapes written with the older `sctp` driver can still be read by the new `st` driver. For more information about configuring tape drives, see the "SCSI Tape Drives" Device Reference Page in Appendix A.

Support for More Than Four Serial Ports

If you want to use more than four serial ports, you need to update two system files. Both `/etc/iu.ap` and `/platform/i86pc/kernel/drv/asy.conf` need to be modified to reflect the number of devices supported by the Solaris `asy` driver. The necessary steps are described below:

1. **Edit the `/etc/iu.ap` file and replace the following two lines:**

```
asy          131072   131075   ldterm ttcompat
asy          0        3        ldterm ttcompat
```

with:

```
asy          131072   131083   ldterm  ttcompat
asy          0        11       ldterm ttcompat
```

These changes reflect the addition of eight new ports to the system.

2. **Edit the file** `/platform/i86pc/kernel/drv/asy.conf`**.**
   For each new serial port, add a line similar to the following, replacing *IRQ* and *IOADDR* with the appropriate IRQ and I/O address:

```
name="asy" class="sysbus" interrupts=12,IRQ reg=IOADDR,0,0 ioaddr=IOADDR;
```

   For example, if the 8-port version of the BocaBoard is configured to use addresses 100 through 140 for its eight serial ports, the following lines would be added:

```
name="asy" class="sysbus" interrupts=12,7 reg=0x100,0,0 ioaddr=0x100;
name="asy" class="sysbus" interrupts=12,7 reg=0x108,0,0 ioaddr=0x108;
name="asy" class="sysbus" interrupts=12,7 reg=0x110,0,0 ioaddr=0x110;
name="asy" class="sysbus" interrupts=12,7 reg=0x118,0,0 ioaddr=0x118;
name="asy" class="sysbus" interrupts=12,7 reg=0x120,0,0 ioaddr=0x120;
name="asy" class="sysbus" interrupts=12,7 reg=0x128,0,0 ioaddr=0x128;
name="asy" class="sysbus" interrupts=12,7 reg=0x130,0,0 ioaddr=0x130;
name="asy" class="sysbus" interrupts=12,7 reg=0x138,0,0 ioaddr=0x138;
```

3. **Perform a reconfiguration boot.**

```
# touch /reconfigure
# reboot
```

For more information, see `/platform/i86pc/kernel/drv/asy.conf`, `asy(7)`, and `autopush(1M)`.

Choosing the Hard Drive Your System Will Boot From After Installation

The choice of slot (PCI or EISA) or BIOS ROM base address may affect which hard drive your system chooses as the boot disk. Make sure you have configured your system so that the BIOS chooses the hard drive you want to boot from when your system powered on.

Known Problems

Caution – The installation program's default size for the `root` file system may not be large enough to produce a working system on some PCI-based systems with new or updated drivers. When installing this Driver Update, you should not accept the default file system partitioning. Instead, press F4 to Customize the file system partitions, then allocate at least 20 Mbytes for the file system.

- The BIOS on some systems is unable to "warm boot" Solaris when PCI devices have been in use. These systems must be reset, either by pressing a reset button or power cycling the system.
- **(1192152, 1184097)** The `vold` program may fail when it tries to access a non-audio CD-ROM with certain CD-ROM players. The symptoms may be a failure to mount the CD-ROM, or a system panic if the Solaris `mlx` or `dpt` driver is being used.
  Workaround: Disable the Solaris Volume Management software when one of the following CD-ROM drives is installed:
  - Chinon CDS 535
  - NEC MultiSpin 4X
  - Pioneer DRM-604X
- **(1203834)** Installing over a network using a 3Com EtherLink 16/16 TP adapter will not work if the card is set to TURBO mode.
  Workaround: Set the card to non-TURBO mode before the initial network install. Once installed, set it back to TURBO mode to take advantage of maximum performance during normal operation.

Installing Solaris Using the Driver Update Diskettes

To install Solaris 2.4 on an x86 system, follow the instructions in *x86: Installing Solaris Software* using the diskettes labeled "Solaris 2.4 x86 Driver Update 9 Boot Diskette 1 of 2"and "Solaris 2.4 x86 Driver Update 9 Boot Diskette 2 of 2."

The procedure for installing Solaris using the Driver Update Boot diskettes is almost the same as that described in *x86: Installing Solaris Software*. Early in the boot process you will be prompted to insert the second Driver Update 9 Boot diskette. There will be many times during the early booting process when the system will read data from the diskettes, but the sequence of interaction with

the user remains the same. Early in the boot process there will also be warning messages for each new driver whose device is not on the system being installed. The warning messages will look like the following:

```
Warning: forceload of drv/xxx failed.
```

Such warning messages are expected and can be ignored.

Before the installation program begins to install the Solaris software, you will be able to choose whether you want the system to reboot after installing the software.

Late in the install process, after all the standard packages have been installed, new driver packages will be installed from the Driver Update Distribution diskettes. At the start of that phase of the installation, one of the install scripts will ask you to insert the first and then the second of the Driver Update Distribution diskettes into the drive. After the new driver packages have all been added, the script will ask you to remove the diskette you are using from the drive. In each case, it will wait for you to perform the requested action and press Enter.

After this is accomplished, the system will reboot as usual (unless you chose the option not to reboot after installing the software). When it comes up, the new device drivers should be completely installed and functional.

Note – If you have a Sound Blaster card, there may be additional steps you need to take after the Solaris software is installed on your system. See the Appendix A "Sound Blaster Pro" or "Sound Blaster 16/Sound Blaster AWE32" Device Reference Pages for further instructions.

To install the new video display support, see Chapter 2, "Solaris 2.4 x86 Driver Update 9 Video," for instructions.

To install the PC Card support, see Chapter 3, "Solaris 2.4 x86 Driver Update 9 PC Card (PCMCIA) Support," for instructions.

1

Adding New Drivers After Solaris Is Installed

If you already have the Solaris 2.4 software installed, the simplest way to add a new drivers to your system is to obtain the Driver Update *Distribution* diskettes and install them as a patch on your Solaris 2.4 x86 system.

Note – Before adding new drivers, the newly supported hardware devices should be installed and configured according to the instructions in Appendix A, "Device Reference Pages."

Note – If you have an AHA-284*x* SCSI controller, you must edit the `/etc/system` file as described in step 6.

Follow these procedures to install the new drivers:

1. **Insert "Solaris 2.4 x86 Driver Update 9 Distribution Diskette 1 of 2" into drive 0.**

2. **Become root.**

3. **Use `cpio` to copy files off the diskette and run the installation script.**
   The following commands assume Volume Management is running on your system. If it isn't, `volcheck` should *not* be run and the device name of the diskette drive needs to be replaced with `/dev/diskette0`.

To see if Volume Management software is running, type:
`ps -e | fgrep vold`
For more information about managing diskettes and drives, see *Solaris 2.4 Open Issues and Late-Breaking News*.

```
# mkdir /tmp/Drivers
# cd /tmp/Drivers
# volcheck &
# cpio -iduBI /vol/dev/diskette0/unlabeled

End of Medium on "input"
Change to part 2 and press RETURN key [q]
```

4. **Insert "Solaris 2.4 x86 Driver Update 9 Distribution Diskette 2 of 2" into drive 0, and press Enter.**
   When the input is done, you will see following message:

```
Please remove the diskette from drive zero.
Press <ENTER> when ready.
```

5. **Remove the diskette from drive 0, and type the following:**

```
# ./installdu.sh
```

6. **Before rebooting, if you have a AHA-284*x* SCSI controller, use an editor to add the following line to the `/etc/system` file:**

```
# set esa:esa_vlb_probe = 0xffff
```

7. **Follow the instructions on the screen to shut down the system.**
   The instructions include how to restart the system.

8. **A second reboot may be required if you have installed new hardware that uses a new network driver. See "Replacing a Network Card."**

When the system comes up, the new device drivers should be completely installed and functional. However, there may be additional steps to take:

- If you want to support an NE2000 or NE2000plus Ethernet adapter, you must enable the driver before the card is installed and configured. See the "Novell NE2000, NE2000plus Ethernet and Clones" Device Reference Page in Appendix A for instructions for enabling this device.
- If you want to support an IBM SCSI-2 Fast/Wide Adapter/A, you must disable the Solaris `mcis` driver before the adapter is installed and configured. See the "IBM Micro Channel SCSI-2 Fast/Wide Adapter/A" Device Reference Page in Appendix A for instructions.
- If you have a PCnet-ISA adapter and you experience network problems, you may need to disable another driver so that it won't interfere with the operation of the PCnet-ISA adapter. See the "AMD PCnet Ethernet (PCnet-ISA, PCnet-PCI)" Device Reference Page in Appendix A for instructions.
- If you are replacing a network card see "Replacing a Network Card."
- If you have a Sound Blaster card, there may be additional steps to take after installing the Driver Update. See "Enabling Support for Sound Blaster Audio Cards After Installing Solaris or the Driver Update" for instructions.

To install the new video display support, see Chapter 2, "Solaris 2.4 x86 Driver Update 9 Video," for instructions.

To install PC Card support, see Chapter 3, "Solaris 2.4 x86 Driver Update 9 PC Card (PCMCIA) Support," for instructions.

Disabling Drivers After Installing the Driver Update

It is sometimes necessary to disable certain Solaris drivers so that they will not interfere with the proper operation of other hardware. For example:

- The Solaris `mcis` driver interferes with the proper operation of the IBM SCSI-2 Fast/Wide Adapter/A. Before you can install and configure this newly supported adapter, the `mcis` driver must be disabled. See the "IBM Micro Channel SCSI-2 Fast/Wide Adapter/A" Device Reference Page in Appendix A for instructions.
- The Solaris `elink` driver may interfere with the proper operation of PCnet-ISA adapters. If you already have Solaris installed on your system, and after installing this Driver Update you experience network problems with your PCnet-ISA adapter, try disabling the Solaris `elink` driver. See the "AMD PCnet Ethernet (PCnet-ISA, PCnet-PCI)" Device Reference Page in Appendix A for instructions.

Replacing a Network Card

If you are replacing a network card with one that uses a different device driver, rename the `/etc/hostname.`*`olddriver`*`0` file to `/etc/hostname.`*`newdriver`*`0` before rebooting a second time. For example, when replacing a 3Com EtherLink III card with an SMC EtherEZ card, do the following as root:

```
# mv /etc/hostname.elx0 /etc/hostname.smc0
```

Now perform a reconfiguration boot to make your changes take effect:

```
# touch /reconfigure
# reboot
```

Solaris 2.4 x86 Driver Update 9 Video

2

A brief description of the contents of the video support included in this Driver Update is followed by installation instructions and known problems. Appendix B, "Supplementary Video Information," provides additional information about the video support in this release.

Read through the entire chapter once before installing the Solaris 2.4 x86 Driver Update 9 Video.

Driver Update Video Contents

Solaris 2.4 x86 Driver Update 9 Video contains two diskettes labeled: "Solaris 2.4 x86 Driver Update 9 Distribution (Video)." The Distribution diskettes are intended to be used on Solaris 2.4 x86 systems only. Table 2-1 contains a list of video display adapters supported in this Video Driver Update. While this table includes the resolution and color depth capabilities of each adapter, it is important to note that the resolution and color depth you select are also dependent on the capabilities of your monitor and the amount of video memory on the card. See "Determining Resolution and Color Depth" in Appendix B for more information.

Note – In order to get support for the Diamond Viper VLB and Diamond Viper PCI cards, you must first install the Driver Update Distribution as described in Chapter 1, "Solaris 2.4 x86 Driver Update 9." This must be done prior to installing Driver Update Video.

Table 2-1 Video Display Adapters Supported in This Driver Update

Vendor	Model	Bus	Chipset	Resolution and Color Depth									
				800x600		1024x768		1152x900		1280x1024		1600x1200	
				8	24	8	24	8	24	8	24	8	24
Acer	ET4000/W32[1]	ISA	ET4000/W32	✓		✓							
AST	Manhattan 5090P[2]	—	Cirrus Logic 5424	✓									
ATI	Graphics Pro Turbo[3]	VLB	ATI Mach64	✓	✓	✓	✓	✓		✓			
	Graphics Pro Turbo[3]	PCI	ATI Mach64	✓	✓	✓	✓	✓		✓			
	GRAPHICS ULTRA+	ISA	ATI Mach32	✓		✓							
	GRAPHICS ULTRA PRO	ISA	ATI Mach32	✓		✓		✓		✓			
	GRAPHICS ULTRA PRO	PCI	ATI Mach32	✓		✓		✓		✓			
	GRAPHICS ULTRA PRO	VLB	ATI Mach32	✓		✓		✓		✓			
	GRAPHICS XPRESSION[3]	PCI	ATI Mach64	✓	✓	✓		✓		✓			
	GRAPHICS XPRESSION[3]	VLB	ATI Mach64	✓	✓	✓		✓		✓			
	WINTURBO[3, 4]	PCI	ATI Mach64	✓	✓	✓		✓		✓			
	Mach64 chipset[3]		ATI Mach64	✓		✓							
	Mach64CT chipset	PCI	Mach64CT	✓	✓	✓		✓		✓			
	Mach64CT chipset Rev.2	PCI	Mach64CT	✓	✓	✓		✓		✓			
Cirrus Logic	5420 chipset w/512Kbyte DRAM			✓									
	5424 chipset w/512Kbyte DRAM[2]			✓									
	5428 chipset w/512Kbyte VRAM			✓									
	5430 chipset			✓	✓	✓		✓		✓			
	5434 chipset			✓	✓	✓	✓	✓		✓			
Compaq	QVision 1024	EISA	TRITON			✓							
	QVision 1280 chipset[5]	EISA	ORION	✓	✓	✓		✓		✓			
	QVision 2000	PCI	Matrox MGA-2	✓	✓	✓		✓		✓			
	QVision 2000 (Rev. G)	PCI	Matrox MGA-3	✓	✓	✓		✓		✓			
	ProLiant	—	Cirrus Logic 5420	✓									
	ProSignia	—	Cirrus Logic 5420	✓									

Table 2-1 Video Display Adapters Supported in This Driver Update *(Continued)*

Vendor	Model	Bus	Chipset	Resolution and Color Depth									
				800x600		1024x768		1152x900		1280x1024		1600x1200	
				8	24	8	24	8	24	8	24	8	24
DEC	DECpc XL 590	—	Cirrus Logic 5428	✓									
Dell	OptiPlex DGX 590	—	ATI Mach64	✓	✓	✓		✓		✓			
	OptiPlex XMT 590	—	S3 864	✓	✓	✓		✓		✓			
	Poweredge SP5*xx*	—	ATI Mach32			✓							
Diamond	SpeedStar 64 ISA	ISA	Cirrus Logic 5434	✓	✓	✓		✓		✓			
	SpeedStar 64 PCI	PCI	Cirrus Logic 5434	✓	✓	✓		✓		✓			
	Stealth 32	VLB	Tseng Labs W32p	✓	✓	✓		✓		✓			
	Stealth 32	PCI	Tseng Labs W32p	✓	✓	✓		✓		✓			
	Stealth 64 DRAM	PCI	S3 Trio64	✓	✓	✓		✓		✓			
	Stealth 64 DRAM	VLB	S3 Vision 864	✓	✓	✓		✓		✓			
	Stealth 64 DRAM	PCI	S3 Vision 864	✓	✓	✓		✓		✓			
	Stealth 64 VRAM	VLB	S3 Vision 964	✓	✓	✓	✓	✓	✓	✓			
	Stealth 64 VRAM	PCI	S3 Vision 964	✓	✓	✓	✓	✓	✓	✓			
	Stealth Video DRAM	PCI	S3 Vision 868	✓	✓	✓		✓		✓		✓	
	Stealth Video VRAM	PCI	S3 Vision 968	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Stealth64 Video 2000	PCI	S3 Vision 868	✓	✓	✓		✓		✓			
	Stealth64 Video 2001	PCI	S3 Vision 765	✓	✓	✓		✓		✓			
	Stealth64 Video 3000	PCI	S3 Vision 968	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Viper Pro	PCI	Weitek Power 9100	✓	✓	✓	✓	✓		✓		✓	
	Viper Pro	VLB	Weitek Power 9100	✓	✓	✓	✓	✓		✓		✓	
	Viper SE[6]	PCI	Weitek Power 9100	✓		✓		✓		✓			
	Viper VLB	VLB	Weitek Power 9000	✓		✓		✓		✓			
	Viper PCI	PCI	Weitek Power 9000	✓		✓		✓		✓			
ELSA	Winner 1000	VLB	S3 928	✓		✓		✓					
	Winner 2000	VLB	S3 928	✓		✓		✓		✓			
	Winner 1000Pro-VL[7]	VLB	S3 Vision 864	✓	✓	✓		✓		✓			
	Winner 2000Pro-VL	VLB	S3 Vision 964	✓	✓	✓	✓	✓	✓	✓		✓	
	Winner 2000Pro-PCI	PCI	S3 Vision 964	✓	✓	✓	✓	✓	✓	✓		✓	
Everex	FIC 864P	PCI	S3 Vision 864	✓	✓	✓		✓		✓			

Table 2-1 Video Display Adapters Supported in This Driver Update *(Continued)*

Vendor	Model	Bus	Chipset	Resolution and Color Depth									
				800x600		1024x768		1152x900		1280x1024		1600x1200	
				8	24	8	24	8	24	8	24	8	24
Everex, cont.	VGA Trio 64P	PCI	S3 Trio64	✓	✓	✓		✓		✓			
	ViewPoint 64P	PCI	S3 Vision 864	✓	✓	✓		✓		✓			
Hewlett-Packard	HP NetServer LC/LE/LF	—	TVGA 9000i	✓									
	HP Vectra VL2	—	Cirrus Logic 5428	✓		✓							
	HP Vectra XM2i	—	S3 Vision 864	✓		✓		✓					
	HP Vectra XU[8]	—	S3 Vision 864	✓	✓	✓		✓		✓			
IBM	PC Series 300-486	—	Cirrus Logic 5430	✓		✓							
	PC Series 300	—	S3 Vision 864	✓	✓	✓		✓		✓			
	PC Series 700	—	S3 Vision 864	✓	✓	✓		✓		✓			
	PS/ValuePoint Performance Series	—	S3 Vision 864	✓	✓	✓		✓		✓			
Intel	Professional/GX High Resolution	—	ATI Mach32	✓	✓	✓		✓		✓			
Intergraph	TD-1[9]	—	S3 928	✓		✓		✓		✓			
	TD-2, TD-3; (G90)[10]	PCI	Weitek Power 9000	✓		✓		✓		✓			
	G91[11]	PCI	Weitek Power 9100	✓		✓		✓		✓		✓	
Matrox	MGA Impression	VLB	Matrox MGA-1	✓	✓	✓	✓	✓		✓			
	MGA Impression Plus	PCI	Matrox MGA-3	✓		✓		✓		✓			
	MGA Millenium	PCI	STORM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MGA Ultima	VLB	Matrox MGA-2	✓	✓	✓		✓		✓			
	MGA Ultima Plus	PCI	Matrox MGA-2	✓	✓	✓		✓		✓		✓	
	MGA Ultima Plus 200	PCI	Matrox MGA-2	✓	✓	✓	✓	✓	✓	✓		✓	
Micronics	Mpower 4 plus	—	ATI Mach64	✓		✓							
Miro	miroCRYSTAL 20SD	PCI	S3 864, S3 SDAC	✓	✓	✓		✓		✓			
	miroCRYSTAL 20SD	PCI	S3 Vision 864	✓	✓	✓		✓		✓			
	miroCRYSTAL 40SV	PCI	S3 Vision 964	✓	✓	✓	✓	✓	✓	✓			
Nanao	EizoAccel AA51	ISA	F82C480			✓				✓			
	Nanao HA50/HL50	ISA	S3 928			✓				✓		✓	
	Nanao HA60	ISA	S3 928			✓				✓		✓	

Table 2-1 Video Display Adapters Supported in This Driver Update *(Continued)*

Vendor	Model	Bus	Chipset	Resolution and Color Depth									
				800x600		1024x768		1152x900		1280x1024		1600x1200	
				8	24	8	24	8	24	8	24	8	24
Number Nine	9FX Motion 531	PCI	S3 868	✓	✓			✓		✓			
	9FX Motion 771	PCI	S3 968	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	#9GXE[12]	ISA	S3 928	✓		✓		✓		✓			
	#9GXE[12]	VLB	S3 928	✓		✓		✓		✓			
	#9GXE64	PCI	S3 Trio64	✓	✓	✓		✓		✓			
	#9GXE64	PCI	S3 Vision 864	✓	✓	✓		✓		✓		✓	
	#9GXE64 Pro	PCI	S3 Vision 964	✓	✓	✓	✓	✓	✓	✓		✓	
	Imagine 128	PCI	Imagine128	✓	✓	✓	✓	✓	✓	✓		✓	
Oak Technology	OTI107	PCI	OTI107	✓	✓	✓		✓		✓			
Orchid	Fahrenheit 1280 Plus VL	VLB	S3 801	✓		✓							
	Kelvin 64	PCI	Cirrus Logic 5434	✓	✓	✓		✓		✓			
	Kelvin 64[13]	VLB	Cirrus Logic 5434	✓	✓	✓		✓		✓			
S3	Trio64V+ chipset		S3 Vision 765	✓	✓	✓		✓		✓			
	Vision 864+SDAC chipset			✓	✓	✓		✓		✓			
SPEA	V7-Mirage P-64	PCI	S3 868	✓	✓	✓		✓		✓			
STB	LIGHTSPEED VL	VLB	Tseng Labs W32p	✓	✓	✓		✓		✓			
	NITRO PCI	PCI	Cirrus Logic 5434	✓	✓	✓	✓	✓		✓			
	POWERGRAPH 64	PCI	S3 Trio64	✓	✓	✓		✓		✓			
	POWERGRAPH PRO PCI	PCI	S3 Vision 864	✓	✓	✓		✓		✓			
	Velocity 64V	PCI	S3 968	✓	✓	✓	✓	✓	✓	✓		✓	
Toshiba	J3100	—	Western Digital 90C31A	✓		✓							
Trident	TVGA 9000i	—	TVGA 9000i	✓									

1. The ET4000/W32 video cards that are shipped with Acer machines are not all the same; if you encounter any display problems when the OpenWindows environment is running, try using a different add-on board that is compatible with the Solaris operating environment.
2. Video adapters based on the Cirrus Logic 5424 chipset with 512-Kbyte DRAM may not perform well in 800x600x256 mode, particularly if the selected monitor refresh rate is 60 Hz or higher. See "Driver Update Video Release Notes" later in this chapter.
3. Support is provided for ATI cards with Mach64 chips and the following RAMDACs: ATT68860, ATT20C408, ATT20C491, ATT20C498, and STG1702.
4. The ATI WINTURBO model is equivalent to the Gateway ATI GX Mach64 PCI video card.

5. Used on Compaq QVision 1280/E Graphics Controller and in Compaq DeskPro 590.
6. The Diamond Viper SE is currently only supported with a 64- kHz refresh rate in the 1280x1024 resolution. See " Known Problems "(1200858) later in this chapter.
7. The ELSA Winner 1000Pro with the ATT20C498 RAMDAC is supported.
8. Both the STG1702 and the ATT21C498 RAMDACs are supported.
9. To support 1152x900 or 1280x1024 resolution on the Intergraph TD-1 display adapter, you must select an interlaced monitor type when configuring the Solaris window system. Choose "Multifrequency 56KHz (up to 1280x1024 interlaced)" as the monitor type. See "Installing Driver Update Video" later in this chapter for information about configuring the window system.
10. The Intergraph G90 is synonymous with the Diamond Viper video card based on the Weitek Power 9000 (P9000) chipset. When configuring an Intergraph Personal Workstation with a G90, select one of the Diamond Viper entries listed by the `kdmconfig` program that includes the monitor type. Be sure to read the notes in this chapter that pertain to the P9000-based Diamond Viper video cards.
11. The Intergraph G91 also supports a resolution of 1600x1280 for 8-bit color.
12. The Number Nine #9GXE video display adapters (ISA and VESA local bus) support 24-bit color in 640x480 mode *only.*
13. Older versions of the Orchid Kelvin64 VLB card have memory addressing limitations that may cause problems if your system contains 32 Mbytes or more of RAM. See "Known Problems" for further information.

"— "Indicates on-board video controller.

Table 2-2 lists the additional notebook display support included in this Driver Update. Note that the resolution and color depth capabilities may depend on whether an external monitor is attached.

Table 2-2 Additional Video Support for Notebook Displays in This Driver Update

			Resolution and Color Depth E=With External Monitor I=With Internal Monitor					
			640x480		**800x600**		**1024x768**	
Vendor	**Model**	**Chipset**	**8**	**24**	**8**	**24**	**8**	**24**
Ergo	Power Brick	Western Digital 90C24	**I**					
NEC	Versa M75C	Chips&Technology 65540	**E,I**		**E**		**E**	
	Versa M75HC	Chips&Technology 65545	**E,I**		**E,I**		**E**	
Toshiba	4900CT	Chips&Technology 65545	**E,I**		**E**		**E**	

Caution – Even though many notebook computers are capable of supporting external monitors at a resolution higher than 640x480, you should not change the default video resolution on a notebook computer to be anything other than what the internal monitor can support. Higher resolution video modes do not work on the integrated LCD screen; if you happen to start up the window system without an external monitor, you may not be able to see anything on the LCD screen. In some cases, this may even damage your LCD screen. See "Configuring Secondary Displays" later in this chapter.

Driver Update Video Release Notes

- Updated `kd` driver ensures that the screen display does not go into an unreadable white-on-white mode during installation on some notebooks and other machines. Although the `kd` driver supports video cards, it resides on the boot diskettes rather than on the video distribution diskettes.
- Support for LCD monochrome, LCD VGA, and LCD Super VGA notebook monitor types has been added.
- Support for NEC 5FGe and NEC 6FGp monitors has been added.
- Support for 85-kHz refresh rate has been added; before Driver Update 7, 80 kHz was the maximum refresh rate supported.
- Support for panning has been added on the NEC Versa M75C, NEC Versa M75HC, and Toshiba 4900CT notebook computers in 8-bit mode. Before Driver Update 7, this was only supported in 4-bit mode.
- Video adapters based on the Cirrus Logic 5424 chipset with 512-Kbyte DRAM may not perform well in 800x600x256 mode under the Solaris OpenWindows™ environment, particularly if the selected monitor refresh

rate is 60 Hz or higher. This is a hardware limitation. To obtain the best performance in 800x600x256 mode, choose the "Multifrequency—38kHz" monitor type when configuring the window system.

- If your video adapter contains the S3 Vision 864 chip, but is not in the above list of supported adapters, it may work with one of the "S3 Vision864" entries listed by the `kdmconfig` program.
- If your video adapter contains the S3 Vision 864 video chip with S3 SDAC, but is not in the list of supported adapters, it may work with one of the "S3 Vision864 with S3 SDAC" entries listed by the `kdmconfig` program.
- If your video adapter contains the Trident TVGA 9000i chip, it may work with the "Trident TVGA9000i(512k)" entry listed by the `kdmconfig` program.
- New software in this Driver Update replaces the support for the Number Nine #9GXE ISA and VLB display adapters included in the Solaris 2.4 release. If you have one of these video boards, you will need to reconfigure your window system as described in "Installing Driver Update Video."
- This Driver Update adds new software support for the following display adapters that were supported in the Solaris 2.4 release:

  ATI GRAPHICS ULTRA+ ISA
  ATI GRAPHICS ULTRA PRO (ISA, PCI, and VLB)

  If you have one of these video boards, and you want to use the new software support, reconfigure your window system as described in "Installing Driver Update Video." The `kdmconfig` program now has specific entries for these cards that you can select. (Prior to this Driver Update, you had to select one of the "ATI 68800" entries in order to use one of these cards.)
- This Driver Update also includes software fixes to some known problems. For a list of the known problems fixed in Driver Update 9 (Video), see the `README` files in the directories: `/var/sadm/patch/102058-09` and `/var/sadm/patch/102059-09`.

Solaris 2.4 x86 Jumbo Kernel Patch

To avoid user-level program core dumps after installing the Solaris 2.4 x86 Driver Update 9 Video, it is recommended that you install the latest revision of the Solaris 2.4 x86 jumbo kernel patch ID `101946`. See "Solaris 2.4 x86 Jumbo Kernel Patch" in Chapter 1 for information on how to obtain this patch.

Installing Driver Update Video

Note – In order to get support for the Diamond Viper VLB and Diamond Viper PCI cards, you must first install the Driver Update Distribution as described in Chapter 1, "Solaris 2.4 x86 Driver Update 9." This must be done prior to installing Driver Update Video.

The contents of the Driver Update Video diskettes are installed as patches on your Solaris 2.4 x86 system. To do this, you must already have Solaris 2.4 installed and running on your x86 system.

Note – When installing the Solaris 2.4 software on a system that contains one of the newly supported video cards listed in Table 2-1, if you choose to configure the window system, your card will not be included yet in the list of supported display adapters. However, you can still use a graphics-based interface to the Solaris installation program by choosing the standard 16 colors, 640x480 VGA. Alternatively, you can use a character-based interface by choosing not to configure the window system when asked.

After installing the Driver Update Video software, the installation script will give you the option of configuring the window system by running the `kdmconfig` program. If you choose to do this, you will be asked to configure your keyboard, mouse, and video card again; however, this time you will be able to select from a list that includes the newly supported video cards.

1. **Become root.**

Note – The Driver Update Video is now released as a compressed `cpio` image file. Consequently, if you are installing from diskettes, there are a few extra steps that need to be taken to retrieve the files. If you have obtained the Driver Update Video image file from on-line sources and you are not installing the Driver Update Video from diskettes, you can proceed directly to step 5.

See "How to Obtain Updated Hardware Compatibility Lists and Device Driver Information" in "About This Book" for information on obtaining Driver Updates from on-line sources.

2. **Insert the first "Solaris 2.4 x86 Driver Update 9 Distribution (Video)" diskette into drive 0.**

To see if Volume Management software is running, type:
`ps -e | fgrep vold`
For more information about managing diskettes and drives, see *Solaris 2.4 Open Issues and Late-Breaking News*.

3. **First use `cpio` to copy the compressed `cpio` image file off the diskettes.**
   The following commands assume Volume Management is running on your system. If it isn't, `volcheck` should *not* be run and the device name of the diskette drive needs to be replaced with `/dev/diskette0`.

```
# mkdir /tmp/Drivers
# cd /tmp/Drivers
# volcheck &
# cpio -iduBI /vol/dev/diskette0/unlabeled

  End of Medium on "input"
  Change to part 2 and press RETURN key [q]
```

4. **Insert the second Driver Update Video diskette into the drive and press Enter.**
   `cpio` will report the number of blocks copied.

5. **Now use `zcat` and `cpio` to copy the files from the compressed `cpio` image file, and run the install script.**

The name of the compressed `cpio` image file is `vdu?image.Z`, where *?* represents the Driver Update number.

```
# zcat vdu* | cpio -icudB
# ./installdu.sh
```

6. **Configure the window system.**
   After the Driver Update Video software has been installed, the installation script asks if you want to configure the window system. If you do not want to configure the window system at this time, you must run the following commands after the installation script ends *and* before you start the OpenWindows software:

```
# kdmconfig -u
# kdmconfig -cf
```

Note – If you have one of the Number Nine #9GXE video cards installed and running on your Solaris 2.4 system, and you want to use the new software included in this Driver Update to support them, it is necessary to configure the window system at this time. If, for some reason you do not want to use the new Number Nine #9GXE video support in this Driver Update, you must back out the Driver Update Video patches. See the `README` files in `/var/sadm/patch/102058-09` and `/var/sadm/patch/102059-09` for instructions on how to back out these patches.

If you want to configure the window system at this time, the `kdmconfig` program will be started for you. The `kdmconfig` program will ask you to configure your keyboard, mouse, and display adapter. The list of display adapters will appear alphabetically by vendor. To quickly scroll through the list, type the first letter of the vendor name. For example, type "M" to get to the first Matrox MGA entry. Some of the names of display adapters on the list may be followed by the amount of video memory on the card. For example, "Diamond Stealth 64 (2MB)" indicates 2 Mbytes of memory on the Diamond Stealth 64 card. Be sure to select an entry that matches your configuration.

Note – To choose one of the Diamond Viper video card entries displayed by `kdmconfig`, you will need to select an entry that matches your monitor. For a complete list of supported monitors, see "Supported Diamond Viper (P9000) Monitor Configurations" in Appendix B.

Note – To choose the Intergraph G91 entry displayed by `kdmconfig`, you will need to select an entry that matches your monitor. For a list of supported monitors, see "Supported Intergraph G91 Monitor Configurations" in Appendix B.

After you have selected your display adapter, you may be asked additional questions about screen size, color depth, display resolution, and monitor type.

7. **Select the Correct Screen Size, Color Depth, Resolution, and Monitor from the list displayed by** `kdmconfig`**.**
   Selecting '8' for color depth means your adapter is capable of 8-bit color (256 colors), whereas '24' means 24-bit color (2^{24} or 16,777,216 colors). After choosing the monitor's screen size, color depth, and resolution, you will be shown a list of supported monitors (unless you have already chosen one of

the Diamond Viper card entries). If you have a multisync/multifrequency monitor, check the manufacturer's documentation to find out the maximum horizontal synchronization rate supported by the monitor. For example, if you have a ViewSonic 17 monitor, which has a maximum horizontal sync rate of 82 kHz, select "MultiFrequency-80kHz (up to 1600x1200@60 Hz)" as the monitor type.

Note – In order to support 1152x900 or 1280x1024 resolution on the Intergraph TD-1 display adapter, you must select an interlaced monitor type when configuring the Solaris window system or it will not function properly. Choose "Multifrequency 56kHz (up to 1280x1024 interlaced)" as the monitor type.

8. **Remove the diskette from drive 0.**

9. **Clean up the temporary workspace.**

```
# cd /
# rm -fr /tmp/Drivers
```

- If your system contains a Diamond Viper Pro VLB card, there may be an additional step you must take if the system hangs after staring the OpenWindows software. See problem number 1192967 under "Known Problems."
- If your system does not have one of these Diamond Viper display adapters, the installation of the Driver Update 9 Video is complete and you can now run the `openwin` command to start the window system.

Note – Be sure to read "Known Problems" at the end of this chapter, if you have not already done so.

Configuring Secondary Displays

Caution – Even though many notebook computers are capable of supporting external monitors at a resolution higher than 640x480, you should not change the default video resolution on a notebook computer to be anything other than what the internal monitor can support. Higher resolution video modes do not work on the integrated LCD screen; if you happen to start up the window system without an external monitor, you may not be able to see anything on the LCD screen. In some cases, this may even damage your LCD screen.

These instructions allow you to configure a secondary display for notebook computers that have an external monitor without changing the default video resolution.

The configuration that will be installed will define display 0 as the internal monitor, and display 1 as the external monitor. The external monitor will be configured for 1024x768, 256 colors.

1. **Become root.**

2. **Change to the** `/etc/openwin/server/etc` **directory.**

```
# cd /etc/openwin/server/etc
```

3. **Copy the appropriate OpenWindows configuration file for your notebook to the file** `OWconfig`**.**

   a. **If you have a Toshiba 4900CT notebook computer, type:**

```
# cp /usr/openwin/server/etc/OWconfig.4900ct OWconfig
```

   b. **If you have an NEC Versa M75C, type:**

```
# cp /usr/openwin/server/etc/OWconfig.vm75c OWconfig
```

c. If you have an NEC Versa M75HC, type:

```
# cp /usr/openwin/server/etc/OWconfig.vm75hc OWconfig
```

To perform a reconfiguration boot, type the commands:
`touch /reconfigure`
`reboot`

Note – The OpenWindows configuration file that is being installed assumes you are using a built-in PS/2-style mouse. If you connect a PS/2-style mouse to the external mouse/keyboard port, you will need to perform a reconfiguration boot before bringing up OpenWindows environment.

4. **Exit from superuser status.**

5. **Start the OpenWindows software, indicating which display to use.**

   a. **To use the internal display, type:**
   `openwin -display :0`

   b. **To use the external display, type:**
   `openwin -display :1`

For more information about notebook computer configuration, see *Solaris 2.4 Notebook Supplement Guide* (part number 801-6619-14).

Known Problems

Caution – (1161494) Under the Solaris operating environment, the Diamond Viper video card based on the P9000 chipset is not compatible with a motherboard that has a Symphony chipset. This combination may cause the system to panic or reboot. If the Symphony chipset is present on the motherboard, do not use the Diamond Viper video card.

Note that the VLB version of the Diamond Viper SE adapter is not supported in this release.

- The VLB versions of the Diamond Viper and Diamond Viper Pro adapters do not work on some systems that have both PCI and VESA local bus support on the motherboard. The OpenWindows software will fail with an error message when you attempt to start it. The Solaris software expects a PCI version of the Diamond Viper boards if the system supports PCI. *Workaround*: Use a PCI version of the Diamond Viper adapters on those systems that support both bus types.

- **(1211889, 1210704)** The Matrox Millenium card may exhibit problems with some high resolutions, color depths, and refresh rates.
- **(1210745)** The Matrox MGA Impression (VLB) video card does not support 1600x1200 resolution in the current release.
- **(1211083)** Iconifying and deiconifying windows sometimes leaves extended lines on the screen when a Number Nine Imagine 128 video card is installed.
  Workaround: Refresh the screen when this happens.
- **(1192967)** Due to hardware conflicts on some VESA local bus (VLB) systems, the Diamond Viper Pro VLB card may not function when configured at the default memory address (`0xa0000000`). If your system appears hung with a blank screen after starting the OpenWindows software, you will need to do the following:

  a. **Reboot your system.**

  b. **Edit the file** `/etc/openwin/server/etc/OWconfig` **using a text editor such as** `vi`**.**

  c. **Change the address on the line that contains "XSCREENCONFIG" from** `0xa0000000` **to** `0xc0000000`**. Here is a sample line:**

Look for this line →

```
class="XSCREENCONFIG" name="p9100-vlb" device="SUNWp9100"
res="1024x768" defdepth="8" size="15-inch" addr="0xa0000000"
board="diamond2/p9100-vlb.xqa" monitor="mfreq/mfreq64.vda"
dpix="85" dpiy="85";
```

Change this field

  d. **Save your changes and exit the editor.**

  e. **Restart the OpenWindows software.**

  In future releases, changes of this kind will be handled by the `kdmconfig` program.

- **(1200858)** The Diamond Viper SE adapter will not run with a refresh rate above 75 kHz in 1280x1024 resolution. (See the manufacturer's manual to verify the maximum horizontal sync rates.) In the current release, however, it also does not work with a refresh rate of 56 kHz in 1280x1024 resolution.
  Workaround: Use a refresh rate of 64 kHz with 1280x1024 resolution.

- Some VESA local bus motherboards do not properly support the default address range used by the Diamond Viper VLB adapter. To find a workable address for a particular system may require some experimentation.
- **(1193138)** On systems with the QVision 1024/E video card installed, black lines may appear along a client's title bar every time it gets input focus. The symptoms occur if `olwm` is the window manager, and the `OpenWindows.SetInput` resource is set to "followmouse" in either the `.Xdefaults` or `.OWdefaults` file. Performing a refresh operation only temporarily causes the black bars to disappear.
  Workaround: Set the input focus to be "Click to Type" so that the `OpenWindows.SetInput` resource is changed from "followmouse" to "select." This can be done through the Workspace Properties menu under Miscellaneous options. Change the Set Active Window property to "Click Mouse" instead of "Move Pointer."
- **(1179339)** The ATI GRAPHICS ULTRA PRO VLB video card with a Mach32 graphics chip, a TI68875 BFN RAMDAC, and 2 Mbytes of DRAM may not work properly if the "ATI Graphic Ultra Pro (2MB)" entry is selected when configuring the window system. Vertical bars get displayed on the screen.
  Workaround: If you have this version of the card, choose the "ATI Graphic Ultra Pro (1MB)" entry when configuring the window system but note that you will not be able to use a resolution of 1280x1024. Note also that the ATI GRAPHICS ULTRA PRO VLB video card with VRAM does not have this problem.
- **(1179340)** Using the Intel® Professional GX High Resolution system in 1280x1024 with 256 colors mode and an 80-kHz monitor causes problems when returning to text mode after exiting the OpenWindows environment. The foreground color is set to purple, and the background color is set to blue.
  Workaround: Select either a different resolution or a different monitor frequency when configuring the window system.
- **(1178899)** On systems with video cards that use a hardware cursor, only one icon is shown when selecting multiple icons to drag and drop. This problem may be seen on video cards that contain the following chipsets: Imagine128, S3 864, S3 964, ATI Mach64, ATI Mach32, Matrox MGA-1, and Matrox MGA-2. (See Table 2-1 for the make and models of video cards associated with these chipsets.) Even though the multiple icons are not shown while being dragged and dropped, they are being selected and will be copied correctly.

- **(1176285)** Programs that use the Solaris™ PEX™ extension may fail if a user's `XGLHOME` variable is set incorrectly. If the `XGLHOME` shell environment variable points to a nonexistent path (or one that doesn't contain the XGL™ runtime binaries), then any program that uses the Solaris PEX extension (including XGL programs on most display adapters), will cause the server to abort.
  Workaround: Users should be careful when setting `XGLHOME` prior to starting the OpenWindows environment. Prior to running the `openwin` command, make sure your `XGLHOME` environment variable is either not set or points to a valid path for the system you are using.
- Some versions of the Orchid Kelvin 64 VLB video card have memory addressing limitations that may cause problems if your system contains 32 Mbytes or more of RAM. A newer revision of this board addresses these problems. Unfortunately, there is no distinction made between revisions of this card. If your system has 32 Mbytes or more of RAM and you observe symptoms such as a fuzzy display or random vertical lines in the OpenWindows environment, contact Orchid Technology to request a newer revision of this card.
- The Number Nine Imagine 128, the #9GXE64, and #9GXE64 Pro video cards do not support interlaced mode. Configuring the window system using a monitor type of "MultiFrequency-38kHz (up to 1024x768 interlaced)" or "MultiFrequency-56kHz (up to 1280x1024 interlaced)" will cause the window system to fail.
  Workaround: Use a monitor that can support 1024x768 or 1280x1024 in non-interlaced mode.
- **(1173773)** After running `xlock`, there may be a white border around the screen on systems with video cards that use the Tseng Labs W32p chipset (see Table 2-1). This border disappears after the screen is unlocked.
- **(1200644)** When using an LCD screen at a resolution of 800x600, in 256 color mode, sometimes the image in the upper left portion of the screen will expand to fill the entire screen.
  Workaround: Use the keys Fn-LCD/CRT three times to adjust the size and position of the screen.

The following problems apply only to 24-bit depth color:

- **(1172443)** Applications that use XIL™ display the wrong colors when used with a 24-bit display adapter. Image Tool is an example of such an application. The problem is that XIL does not handle the byte ordering of

24-bit displays correctly; thus the colors are wrong in the displayed image.
Workaround: Use an application that does not use XIL but that can display 24-bit images correctly. `xv` is an example of a shareware application that is available over the Internet.

Note – 8-bit displays are not affected by this problem, and Image Tool works correctly with PostScript files on any display depth.

- **(1173985)** Icon Editor dies when saving a 24-bit image to a file.
- **(1174561)** The STB LIGHTSPEED VL video card used in 800x600 resolution, 24-bit color mode does not work properly with the Sony CPD 1604S monitor.
  Workaround: Do not use this particular monitor type at that resolution and color depth.
- Wabi™ will not run under 24-bit depth mode.
- The IslandPaint application does not work properly under 24-bit mode. All of the button icons on the left side of the window are either missing images or have incorrect ones displayed.

Solaris 2.4 x86 Driver Update 9 PC Card (PCMCIA) Support 3

Note – If you have installed Driver Update 8, you don't need to refer to this chapter.

A description of the contents of the PC Card (PCMCIA) support included in this Driver Update is followed by a brief overview of PCMCIA hardware, installation instructions, release notes, and troubleshooting information. Appendix A, "Device Reference Pages," provides additional information about the PC Card device configuration in this release.

Read through the entire chapter once before installing the PC Card support in Solaris 2.4 x86 Driver Update 9.

PC Card Driver Update Contents

Solaris 2.4 x86 Driver Update 9 contains one diskette labeled: "Solaris 2.4 x86 Driver Update 9 Distribution (PC Card)." The PC Card Driver Update Distribution diskette is intended to be used on Solaris 2.4 x86 systems only and contains the drivers listed in Table 3-1. A new Section 7 manual page for each of the drivers will also be installed in the appropriate manual page directory during installation.

Note – Support for a specific adapter chip does not guarantee that PC Card support will work on a platform, though it will increase the likelihood. Check *Solaris 2.4 x86 Hardware Compatibility List* to be certain.

Table 3-1 PC Card Drivers Supported in This Driver Update

PC Card Drivers	
`pcic`	Intel i82365SL PC Interface adapter driver that supports adapters based on the following chips: Intel 82365SL, Vadem VG365/VG465/VG468/VG469, Cirrus Logic PD6710/PD6720, Ricoh RF5C366, and Toshiba
`pcelx`	3Com EtherLink III (3C589) Ethernet PC Card driver
`pcram`	PC Card memory card driver that supports PC Card SRAM and DRAM devices
`pcser`	PC Card serial card device driver that supports PC Card modem and serial devices based on the 16550 UART and its variants

Appendix A contains Device Reference Pages that explain the configuration for each of the types of PC Card devices listed above.

The PC Card Driver Update also includes:

- `pcmcia`, the PC Card nexus driver that provides card and socket services for PC Card device drivers (such as `pcic`)
- `pcmem`, the PC Card memory card nexus driver that supports PC Card memory card client drivers (such as `pcram`)
- `pcmciad`, the PC Card user daemon that provides user-level services for `pcmcia` and PC Card client drivers

See `pcmcia(4)`, `pcmem(7)`, and `pcmciad(1M)`.

Other manual pages have been updated for PC Card support and will be installed in the appropriate manual page directory. See `fdformat(1)`, `add_drv(1M)`, `drvconfig(1M)`, `dkio(7)`, and `pcfs(7)`.

For a complete list of the contents of the PC Card Driver Update diskette, see the `README` files that are installed in the patch directories `/var/sadm/patch/`<*patch number*>, where <*patch number*> is one of the following for Solaris 2.4 x86 Driver Update 9 PC Card support: `101908-05`, `101924-02`, and `101938-01`.

Understanding PC Card Devices

A PC Card adapter may be built into your computer (as on most notebooks) or it may be an add-on card. Most have either one or two sockets, and the PC Card adapter is, itself, a device on another bus (usually ISA). The PC Card adapter manages the PC Card bus and maps PC Card devices onto the main bus (for example, ISA).

The PC Card bus was originally developed for memory cards and notebook computers. It is now used for a wide variety of devices (including modems, network interfaces, disk drives, SCSI HBAs, audio cards, and graphics cards) on machines of all sizes and architectures. See "Using PCMCIA Cards" in Appendix G of *Solaris User's Guide* for further information.

In the Solaris operating environment, sockets are numbered, starting with zero; whether they are numbered top-to-bottom or bottom-to-top is platform-dependent. Though sometimes marked as "1/2" or "A/B," usually sockets are not marked. To find out how sockets are numbered, either consult the hardware documentation or insert a card and see which device was created.

Three types of PC Card device are supported by Solaris device drivers. They are about the size of credit cards, but have different thicknesses:

- Type I: 3.3 mm
- Type II: 5 mm
- Type III: 10.5 mm

Lower-type cards can be used in higher-type sockets. For example, an adapter with Type-III PC Card sockets should be able to support Type-III, Type-II, and Type-I cards. But an adapter with Type-I sockets will only support Type-I devices.

PC Card devices are autoconfigured; that is, I/O ports and IRQs are assigned automatically by the Solaris system when each device is plugged in.

PC Card devices are hot-pluggable—they can be safely inserted and removed while a machine is running.

Configuring PC Card Devices

The PC Card software should automatically recognize any supported PC Card device when it is plugged in and then load the appropriate device driver. If you have a device that is compatible with a supported device, but it is not included in the supported devices database, `/etc/driver_aliases`, you can manually add your new card to the list.

This manual process applies to modem cards and is described in "Identifying an Unrecognized Device" in the "Modem and Serial PC Card Devices" Device Reference Page in Appendix A. You may also have to define aliases for a small percentage of SRAM cards that have "Attribute Memory."

Configuring the PC Card Adapter

While PC Card devices are autoconfigured, it may be necessary to perform some configuration for the PC Card adapter itself. The `pcmcia` nexus driver must know which resources are already allocated in order to assign IRQs and ports to PC Card devices. During the installation process, a script attempts to automatically determine which resources are already allocated on the system. Some systems may require that resource allocation information be provided manually. See "PC Card Adapters" in Appendix A.

Hot-Plugging PC Card Devices

Hot-plugging a PC Card device means that a PC card can be inserted or removed at any time, even while the machine is powered on and the Solaris software is running. Since this isn't the usual procedure for adding and removing devices, the following sections explain hot-plugging procedures.

Inserting Cards

A PC Card device can be inserted at any time into any empty PC Card socket. If there is driver support for the card, the card is recognized and a device node is created. When the `/usr/lib/pcmciad` daemon is running (which is by default), the driver is also loaded and the `/dev` entries for the device are created as appropriate.

The name of the /dev entry is often based on the name of the device driver and usually encodes the socket number where the card was inserted. For example, the entry for the 3Com 3C589 inserted in socket 0 will be /dev/pcelx0. The Device Reference Pages in Appendix A and the PC Card driver manual pages describe the /dev entries for each device driver.

Recognizing Cards

A PC Card device is "recognized" when it is inserted and the appropriate /devices and /dev entries are created. If you are not sure if your card has been recognized, perform the following checks:

- Run the prtconf command; the output should list the pcmcia, pcic, and the driver name for the card you inserted.
- Check to see that the/devices/pcmcia directory includes devices in one of these forms: driver@socket or driver@socket:driver. Since these are specific to each device driver, consult the Device Reference Pages in Appendix A.
- Check that the /dev directory includes the pcmcia device entry. Entries for the network device are also under /dev. Other entries appear in subdirectories of /dev; see the Device Reference Pages in Appendix A for each driver.

Identifying Unrecognized Cards

A PC Card device is "unrecognized" if the prtconf command doesn't show a correct entry for the device and if /devices and /dev entries don't exist. Two symptoms you might see for an unrecognized card are:

- An entry under pcmcia in the prtconf output is not a device driver name and says "(driver not attached)."
- An erroneous pcmem device is detected when the card inserted is a non-memory card.

A card is not recognized if it doesn't implement the full Card Information Structure (CIS) or there is a memory conflict.

- If you see "(`driver not attached`)", you can add a new alias to `/etc/driver_aliases` by using the `/add_drv` command. See the instructions in "Modem and Serial PC Card Devices" in Appendix A, only if the "model" property is also defined.
- If you see an erroneous `pcmem` entry appear, follow the instructions under "Correcting Possible Conflicts" in the "PC Card Adapters" Device Reference Page in Appendix A, or see "Troubleshooting PC Card Devices" later in this chapter.

Removing Cards

PC Card devices can be removed at any time. The framework notifies the PC Card device driver that the card has been removed. Each driver will then deal with the unplugged card in its own way. See "3Com EtherLink III (3C589) PC Card," "Modem and Serial PC Card Devices," and "SRAM and DRAM PC Card Devices" in Appendix A, "Device Reference Pages."

Installing the PC Card Driver Update

Note – Before installing this PC Card Driver Update, read the information in the PC Card Device Reference Pages in Appendix A. Also be sure that you have filled out the Device Configuration Worksheet and check that all hardware resources for your system are accounted for. Then if you have trouble identifying PC Card devices, you can consult the worksheet to see what possible device conflicts exist.

The contents of the "Solaris 2.4 x86 Driver Update 9 Distribution (PC Card)" diskette is installed as a combination of patches and packages on your Solaris 2.4 x86 system.

Note – If you have an add-on PC Card adapter, be sure to install it before installing the PC Card Driver Update.

Note – If you are using a notebook computer with a docking bay, be sure the notebook is in the docking bay before you install the PC Card Driver Update. This is necessary so that the system can identify the resources used by cards in the docking bay.

1. **Insert the "Solaris 2.4 x86 Driver Update 9 Distribution (PC Card)" diskette into drive 0.**

2. **Become root.**

3. **Use `cpio` to copy files off the diskette, and run the installation script.**
   The following commands assume the Solaris Volume Management software is running on your system. If it isn't, `volcheck` should *not* be run, and the device name of the diskette drive must be replaced with `/dev/diskette0`.

To see if Volume Management software is running, type:
`ps -e | fgrep vold`
For more information about managing diskettes and drives, see *Solaris 2.4 Open Issues and Late-Breaking News*.

```
# mkdir /tmp/Drivers
# cd /tmp/Drivers
# volcheck &
# cpio -iduBI /vol/dev/aliases/dev/diskette0

End of Medium on "input"
Change to part 2 and press RETURN key [q]
```

4. **Insert "Solaris 2.4 x86 Driver Update 9 Distribution Diskette 2 of 2" into drive 0, and press Enter.**
   When the input is done, you will see following message:

```
Please remove the diskette from drive zero.
Press <ENTER> when ready.
```

5. **Remove the diskette from drive 0, and type the following:**

```
# ./installdu.sh
```

6. **Perform a reconfiguration boot to enable the new PC Card support.**

```
# touch /reconfigure
# reboot
```

I/O ports, IRQs, and memory addresses available for use by PC Card devices should be configured automatically. For information about manual configuration of PC Card devices, see "PC Card Adapters" in Appendix A, "Device Reference Pages."

If you insert a PC Card device into your system, it should be automatically recognized and configured. For more information, see the "Hot-Plugging" sections on the individual PC Card Device Reference Pages in Appendix A.

If you have a 3Com Ethernet PC Card, follow the additional installation instructions in the next section to enable the new network interface.

Note – Reconfigure boots or use of the `drvconfig` command should not be necessary with PC Card devices. Any use of these features will cause the `/kernel/drv/pcic.conf` file to be overwritten, so changes to the `smi` property will be lost (`#exclude:` lines will remain intact). These features should only be used when non-PC Card devices are added or removed.

PC Card Release Notes

Using PC Card Memory Cards

PC Card memory cards can be used like diskettes. They can be used to store data, or they can have file systems containing files and directories.

PC Card memory devices don't need to have file systems on them, though typically, before using a new PC Card memory card, you will want to create a file system on it. DOS `pcfs` is a good format to use. Although you can use virtually any file system format on a PC Card memory card, most other file system formats are platform-dependent, making them unsuitable for moving data between different types of machines.

Note – If you want to redirect the output of a `tar` command (or `dd` or `cpio`) to a PC Card memory device, you *must* first create a file system on the card, using the `fdformat` command without arguments. The card will need to be reformatted before it can be written on again.

The method for creating a file system is different depending on whether or not the Solaris Volume Management software is used. Both methods are described below.

Using PC Card Devices Without Volume Manager

1. **Become root.**
2. **If you do not want to use `vold` to manage your PC Card memory cards, comment out the `use pcmem` line in the `/etc/vold.conf` file.**
   To comment out a line in `/etc/vold.conf`, add a # character to the beginning of the line using a text editor. The line would then look similar to the following:

```
# use pcmem drive /dev/rdsk/c*s2 dev_pcmem.so pcmem%d forceload=true
```

3. **Stop and restart Volume Manager so the change will take effect.**

```
# /etc/init.d/volmgt stop
# /etc/init.d/volmgt start
```

4. **Use the `fdformat` command to create a `pcfs` file system on the PC Card memory card.**

Note – `fdformat` will destroy all existing data on the memory card.

Device naming for PC Card memory cards is discussed in `pcram(7)`, `fdformat(1)`, and "SRAM and DRAM PC Card Devices" in Appendix A, "Device Reference Pages."

For example, a DOS `pcfs` file system can be created on a PC Card memory card in socket 0 by typing:

```
# fdformat -t dos /dev/dsk/c1t6d0s2
```

5. **Use the `mount` command to mount the device.**
   For example, to mount the `pcfs` file system created in the previous step, on to the mount point `/mnt`, type:

```
# /etc/mount -F pcfs /dev/dsk/c1t6d0s2 /mnt
```

Using the Volume Management Software to Manage PC Card Memory Cards

Since the Solaris Volume Management software recognizes PC Card memory cards, no special `vold` configuration is required.

1. **Become root.**
2. **Use the `fdformat` command to create a `pcfs` file system on the PC Card memory card. See `fdformat(1)`.**
   For example, a DOS `pcfs` file system can be created on a PC Card memory card in socket 0 by typing:

```
# fdformat -t dos /vol/dev/aliases/pcmem0
```

3. **After formatting is complete, Volume Manager will automatically mount the device only *after* the card is physically removed and reinserted. To check this, run the `mount` command after reinserting the card.**

Troubleshooting PC Card Devices

When a PC Card device doesn't work, you must isolate the problem.

First, determine that the nexus and adapter drivers have loaded successfully:

- Use the `prtconf` command to see if the device nodes for both `pcic` and `pcmcia` exist.
  - If they do, the software has loaded and successfully identified a PC Card adapter. Any card that is inserted should be identified as an entry under the `pcmcia` node. If it is a supported card, then it should be usable when inserted and the `prtconf` output identifies the card. It should not say "`(driver not attached)`" or be falsely identified as a `pcmem` card. See "Identifying Unrecognized Cards" earlier in this chapter.

- If neither device driver is recognized, your system does not have a supported PC Card adapter.

If a PC Card device is recognized as present when the card is in the socket before the system is booted, but is not recognized as present when the card is hot-plugged, do the following:

- If you have an AST PowerExec notebook computer:
  - Remove IRQ 15 from the list of usable interrupts.
  - Define the `smi` property to be 9.

  See "PC Card Resource Configuration Information" in the Device Reference Page for "PC Card Adapters" in Appendix A for instructions.
- If your notebook computer is not an AST PowerExec, try overriding the default interrupt by using the `smi` property as described in "PC Card Adapters" in Appendix A. If that does not work, try several different IRQ levels.

If a PC Card device is not identified when inserted prior to booting the system, do the following:

- Make sure that the I/O, memory, and interrupt resources listed in the `/kernel/drv/pcic.conf` file are correct. These properties are described in the "PC Card Adapters" Device Reference Page under "PC Card Resource Configuration Information." If the information there is accurate, contact your technical support provider.

The Intergraph TD-30 and TD-40 machines exhibit PC Card memory conflicts which can be corrected by adding one set of the following two lines to the `/kernel/drv/pcic.conf` file and then rebooting the system.

```
#exclude:td30 res-memory c0000 10000
#exclude:td30 res-memory d0000 40000
or
#exclude:td40 res-memory c0000 10000
#exclude:td40 res-memory d0000 40000
```

3

Device Reference Pages A

This appendix supplements Appendix B, "Device Reference Pages," in *x86 Device Configuration Guide*. It includes necessary device configuration information for hardware supported by the new or updated drivers.

Use the following table to locate information about your hardware and proceed directly to those pages.

IDE Interface	**Solaris Driver**	
IDE Disk Drive and Enhanced IDE Controller (Including IDE CD-ROM ATAPI)	`ata`	*page 55*
SCSI Host Bus Adapters	**Solaris Driver**	
Adaptec AHA-154x ISA HBAs	`aha`	*page 59*
Adaptec AIC-6360/AHA-1522A/AHA-1520A/AHA-1510A/ AHA-1530P/1532P	`aic`	*page 61*
Adaptec AIC-7770/AHA-274x/AHA-284x HBAs	`esa`	*page 66*
Adaptec AIC-7870/AIC-7871/AIC-7872/AHA-2940/AHA-3940/ AHA-3940W PCI HBAs	`adp`	*page 71*
AMD PCscsi, PCscsi II, PCnet-SCSI PCI HBAs	`pcscsi`	*page 73*
BusLogic SCSI HBAs	`blogic`	*page 74*
DPT PM-2011/PM-2021 ISA HBAs	`dpt`	*page 80*
DPT PM-2012B EISA HBA	`dpt`	*page 82*
DPT PM-2022/PM-2122/PM-3222 EISA HBAs	`dpt`	*page 84*
IBM Micro Channel SCSI-2 Fast/Wide Adapter/A	`corvette`	*page 87*

SCSI Host Bus Adapters (*Continued*)	**Solaris Driver**	
NCR 53C710 HBAs (Siemens Nixdorf PCE-5S SCSI)	`ncrs`	*page 91*
Sound Blaster 16 SCSI-2 (SCSI)	`aic`	*page 61*
NCR 53C8xx PCI SCSI HBAs (53C810, 53C815, 53C820, 53C825)	`ncrs`	*page 92*
Trantor T348 MiniSCSI Plus Parallel HBA	`trantor`	*page 94*
Tricord Systems Intelligent SCSI Subsystem (ISS) HBAs	`iss`	*page 96*
SCSI Disk Arrays/RAID Controllers	**Solaris Driver**	
Compaq SMART SCSI Array Controller	`csa`	*page 98*
DPT PM-2024/PM-2124/PM-2124W/PM-3224/PM-3224W PCI HBAs	`dpt`	*page 99*
IBM DMC960 RAID Micro Channel HBAs (IBM SCSI-2 RAID, IBM SCSI-2 Fast/Wide Streaming-RAID Adapter/A)	`mlx`	*page 101*
Mylex DAC960P PCI Controller	`mlx`	*page 103*
Other SCSI Devices	**Solaris Driver**	
SCSI Tape Drives	`st`	*page 106*
Network Adapters	**Solaris Driver**	
3Com EtherLink III (3C5x9, 3C509B)	`elx`	*page 109*
AMD PCnet Ethernet (PCnet-ISA, PCnet-PCI)	`pcn`	*page 110*
Compaq NetFlex-2 DualPort ENET, NetFlex-2 ENET-TR EISA Controllers	`nfe`	*page 113*
DEC 21040/21140 Ethernet (AsanteFAST, Cogent EM960TP, Cogent EM100, D-Link DE-530CT, SMC EtherPower 8432BT, SMC EtherPower 8432BTA, Znyx312)	`dnet`	*page 115*
Intel EtherExpress 16, 16C, 16TP, MCA, MCA TP	`iee`	*page 118*
Intel EtherExpress PRO	`eepro`	*page 120*
Intel EtherExpress PRO/100 (82556)	`ieef`	*page 121*
Novell NE2000, NE2000plus Ethernet and Clones	`nei`	*page 123*
Novell NE3200 EISA Ethernet	`nee`	*page 129*
Racal InterLan ES3210/ES3210 TP EISA Ethernet	`riles`	*page 131*
SMC Elite32 Ultra (8232)	`smceu`	*page 133*
SMC Ether100 (9232)	`smcf`	*page 135*
SMC EtherEZ, EtherCard Elite16 Ultra, EtherCard PLUS Elite16, EtherCard PLUS (8416, 8216, 8013, 8003)	`smc`	*page 136*

Audio Cards	Solaris Driver	
Sound Blaster Pro	`sbpro`	*page 140*
Sound Blaster 16/Sound Blaster AWE32	`sbpro`	*page 143*
PC Card Hardware	**Solaris Driver**	
PC Card Adapters	`pcic`	*page 148*
3Com EtherLink III (3C589) PC Card	`pcelx`	*page 155*
Modem and Serial PC Card Devices	`pcser`	*page 158*
SRAM and DRAM PC Card Devices	`pcram`	*page 161*

Part 1 — IDE Interface

IDE Disk Drive and Enhanced IDE Controller (Including IDE CD-ROM ATAPI)

Description

An IDE disk drive contains a disk controller and drive electronics. An IDE controller supports two devices per controller up to a maximum of four IDE drives when both primary and secondary interfaces are available. This includes hard disk drives and CD-ROM drives.

Device Configuration

Preparing for Configuration

If you have two IDE drives on the same adapter, one must be set to "master" and the other to "slave." Typically, if you have both an IDE hard disk drive and an IDE CD-ROM drive, the CD-ROM drive is the slave, and the hard disk drive is the master, but this is not required. If you only have one drive on an adapter, it must be set to master.

Configuring the Device

1. **If you have an IDE CD-ROM drive installed, the system BIOS "Drive Type" parameters should be set to "`not installed`" for that device, since they only apply to IDE hard disks.**
2. **Enable BIOS support for enhanced IDE drives, if your system supports it.** Typically, this capability is referred to as Logical Block Addressing (LBA).

Note – If the BIOS supports autoconfiguration, use this facility to set the number of heads, cylinders, and sectors for the IDE hard disk drive. If this capability is not supported by the BIOS, then use the settings provided by the disk manufacturer.

---

3. **Verify that the configuration recorded on your Device Configuration Worksheet for your IDE adapter is set within the parameters listed under "Valid Configurations" below.**

Valid Configurations

Following are the IDE adapter parameter ranges:

Primary controller:

- IRQ 14
- I/O Address 0x1F0

Secondary controller:

- IRQ 15
- I/O Address 0x170

Known Problems and Limitations

- **(1191272)** Several vendors ship PCI-equipped machines with IDE interfaces attached to the system board directly. A number of these machines use the PCI to IDE chip set designed by the CMD (part number 06040.) This chip provides two IDE interfaces. The primary IDE controller is at I/O address 0x1f0 and the secondary controller at 0x170. However this chip can not handle simultanous I/O on both IDE controllers. This defect causes Solaris to hang if both interfaces are used. The workaround for this problem is to use only the primary IDE controller at address 0x1f0. Machines known to use this chip include DELL XPS/90, HP XU/590C and American Megatrends Atlas boards.
- **(1191294)** In this release, it is not possible to boot from the third or fourth IDE disk drives, although you can install Solaris software on them.
- The Solaris Volume Management software does not fully support the IDE CD-ROM interface if the drive is configured as the slave. For example, the `vold` program does not always automatically mount CDs that are installed in the slave drive after booting (as it does for SCSI drives), and the '`eject cdrom`' command will not work.
  Workaround: The Solaris Volume Management software supports CD-ROM interface if the drive is configured as the master. You can still access the IDE CD-ROM drive that is configured as the slave manually by specifying the device name when invoking commands as user root. For example:

```
# mount -F hsfs -r /dev/dsk/c0d1p0 /mnt
```

- **(1192383)** The Solaris Volume Management software does not work with the Sony CDU-55E CD-ROM drive regardless of how it is configured (as the master or the slave). This problem can be fixed by installing `vold` patch `101908-07`.
- **(1189664)** The Panasonic LK_MC579B IDE CD-ROM drive cannot be used to install the Solaris operating environment and is not supported.
- The following ATAPI CD-ROM drives may fail during installation on some configurations:
  - NEC CDR-260
  - NEC CDR-260R
  - NEC CDR-273
  - AZT CDR 268-031SE
  - Media Vision 6X
  - Sony CDU-55E

Part 2 — SCSI Host Bus Adapters

Adaptec AHA-154*x* ISA HBAs

Description

The Adaptec AHA-154*x* family of 16-bit SCSI host bus adapters is used with ISA or EISA buses.

Device Configuration

Preparing for Configuration

- Use default configuration parameters in both basic and advanced modes for the Adaptec AHA-1540C, AHA-1542C, and AHA-154*x*CP.
- To access the AHA-154*x* C/CF or AHA-1540*x*CP BIOS setup utility Configuration screen, press ctrl+A.
- Select SCSI Device Configuration and disable Synchronous Negotiation for each CD-ROM drives target.
- Return to the Configuration screen and select Advanced Configuration Options and do the following:
  - Disable the option that supports greater than 1 Gbyte (1024 cylinders) on the disk (Extended BIOS Translation for DOS Drives > 1 Gbyte).
  - Disable the option that supports more than two DOS drives.
  - Disable the Dynamically Scan SCSI Bus for BIOS Devices option. (For the AHA-1540C/CF, this option is disabled by default. When configuring an AHA-154*x*CP, you must disable this option.)
- The DMA transfer rate for the AHA-1540CF should be left at the default unless your motherboard supports higher rates.

Configuring the Device

1. **Consult your Device Configuration Worksheet to see if the Adaptec AHA-154*x* settings need to be changed.**
2. **Refer to the Adaptec manual for how to set the jumpers or DIP switches to the parameters that appear on your worksheet.**
   Note that the AHA-1540C, AHA-1542CF, and AHA-154*x*CP contain a built-in, menu-driven program for configuring HBA options. (A DIP switch replaces many of the jumpers found on the B version.) Use of the built-in

configuration program and DIP switch assignments are documented in the installation guide that comes with the Adaptec AHA-154*x*C or AHA-154*x*CP board.

3. **If necessary, modify the parameter values.**

Valid Configurations

Following are the parameters for Adaptec AHA-154*x* host bus adapters:

- IRQ — Any legal value between 9 and 15
- DMA Channel — 6
- I/O Address — 0x330

Alternative Custom Configuration

The DMA speed, bus on time, and bus off time may be set for optimum performance with each ISA motherboard. Refer to *Adaptec AHA-1540/1542 User's Manual* for instructions.

Adaptec AIC-6360/AHA-1522A/AHA-1520A/AHA-1510A/ AHA-1530P/1532P

Sound Blaster 16 SCSI-2 (SCSI)

Description

The Adaptec AHA-1522A, AHA-1520A, AHA-1510A, and AHA-1530P/1532P SCSI host bus adapters are used with an ISA bus. The AHA-1510A, AHA-1520A, and AHA-1530P provide an interface between the computer's system bus and a SCSI bus. The AHA-1522A and AHA-1532P provide diskette drive support as well. All are based on the Adaptec AIC-6360 SCSI controller chip.

The SCSI-2 interface of this audio card uses the AIC-6360 chip. The Sound Blaster 16 SCSI-2 adapter is a 16-bit ISA card that provides audio functions and a SCSI-2 interface.

Note – Neither the Adaptec AHA-1510A adapter nor the SCSI interface on the Sound Blaster 16 SCSI-2 audio card can be used as a primary (boot) disk controller since they have no BIOS. The system must be booted from a disk attached to another controller.

Device Configuration

Preparing for Configuration

Note – The `aic` device driver is used to drive *only* the SCSI controller on these cards. The audio portion of the Sound Blaster 16 SCSI-2 requires a separate Solaris device driver (`sbpro`) for operation.

- The SCSI subsystem of the Sound Blaster 16 SCSI-2 needs its own I/O (port) address and an IRQ, distinct from those of the audio subsystem.
- To use the AHA-1520A and AHA-1522A, you must configure the BIOS base address, the I/O (port) address, and the IRQ on the controller. The AHA-1510A only needs an I/O (port) address and an IRQ.

- To use the AHA-1530P and AHA-1532P, you must configure the BIOS base address, the I/O (port) address, and the IRQ on the controller using the on-board utility. (Press Ctrl-A to enter the on-board utility at boot time.)
- Refer to the documentation that comes with the Adaptec adapter or Sound Blaster 16 SCSI-2 adapter to find out what settings each device supports.
- See "Valid Configurations" for address and IRQ settings that the Solaris `aic` driver supports.
- Configure and terminate the SCSI bus correctly to prevent problems.

Note – The Sound Blaster 16 SCSI-2 will never need to have its terminating resistors removed (and they are not removable).

- The AHA-1522A, AHA-1520A, AHA-1530P, and the AHA-1532P support booting from disks with over 1 gigabyte. On the AHA-1530P and AHA-1532P, use the on-board utility (entered via Ctrl-A at boot time) to enable this option under the "Advanced Features" menu. On the AHA-1522A and AHA-1520A, add a jumper to pin 0 (rightmost pin) of jumper block J5.

Avoiding Possible Conflicts

- ISA cards can be used in EISA slots but not vice versa. If you are using the device in an EISA slot, obtain the appropriate EISA configuration file from the device manufacturer. Using the EISA configuration utility, select settings for the device. Be sure to "lock" the settings in the EISA configuration utility so the software does not try to *change* the device settings. The EISA configuration program needs to know about the ISA device, so it doesn't set up an EISA card using the ISA card settings.
- The Adaptec AHA-1510A host bus adapter and the Sound Blaster 16 SCSI-2 SCSI interface can be run *only* on IRQ 11. Because of this requirement, only one AHA-1510A or Sound Blaster 16 SCSI-2 controller can be installed in a system.

Configuring the Device

Note – Set the jumpers for the SCSI interface and not for the audio.

1. **Set the I/O address jumper to select the desired value.**

2. **For 1520A, 1522A, 1530P, and 1532P *only*: Set the IRQ jumper to select the desired value.**

3. **For 1520A, 1522A, 1530P, and 1532P *only*: Set the BIOS base memory address jumpers to select the desired value.**

4. **For AHA-1520A, AHA-1522A, AHA-1530P, and AHA-1532P *only*: If necessary, enable support for disks greater than 1 Gbyte.**
   On the AHA-1530P and AHA-1532P, use the on-board utility (press Ctrl-A at boot time) to select this option under the Advanced Features menu. On the AHA-1522A and AHA-1520A, this option is set by adding a jumper to pin 0 (the rightmost pin) of jumper block J5.

5. **For AHA-1510A, AHA-1520A, and AHA-1522A *only*: If necessary for your SCSI configuration, remove the three terminating resistors from the controller.**

6. **For the AHA-1530P and AHA-1532P *only*: Termination is set using the on-board utility.**

7. **For the Sound Blaster 16 SCSI-2 *only*: Disable any DMA channel that may be selected.**

Valid Configurations

Following are the parameters for these SCSI-2 interfaces:

Adaptec AIC-6360:

- IRQ 9, 10, 11, 12
- I/O Address 0x140, 0x340

Adaptec AHA-1510A:

- IRQ 11
- I/O Address 0x140, 0x340

Note – For booting, the I/O address on the AHA-1520A and AHA-1522A can be set to 0x140 only with a special BIOS available from Adaptec.

Adaptec AHA-1520A, 1522A:

- IRQ 9, 10, 11, 12
- I/O Address 0x140, 0x340
- BIOS Base Address 0xDC000, 0xD8000, 0xCC000, 0xC8000

Adaptec AHA-1530P, 1532P:

- IRQ — 9, 10, 11, 12
- I/O Address — 0x140, 0x340
- BIOS Base Address — 0xDC000, 0xD8000, 0xD4000, 0xD0000, 0xCC000, 0xC8000

Sound Blaster 16 SCSI-2:

- IRQ — 11
- I/O Address — 0x140, 0x340
- DMA Channel — (Not used)

- Adaptec 152*x* devices *only*: The BIOS base address can be any available value. The default is 0xDC000.
- Sound Blaster 16 SCSI-2 *only*: No DMA channel should be selected. The driver does not support DMA.
- All other settings should be set to the default factory settings (unless changes are necessary to avoid conflicts).

Note – Neither the Adaptec AHA-1510A adapter nor the SCSI interface on the Sound Blaster 16 SCSI-2 audio card can be used as a primary (boot) disk controller (as they have no BIOS). Thus, the system will have to boot from a disk attached to another controller.

Alternative Custom Configuration

- If you have a second SCSI controller, ensure that the two devices are not configured to the same IRQ, I/O address, or memory (BIOS) address.
- If a system has two or more disk controllers and hard disks on both controllers, be sure you understand which disk you have selected for installation, and ensure that the disk you select is the one your computer will boot from when you reset the system. See Chapter 5, "Common Problems," in *x86 Device Configuration Guide* for information on how Solaris assigns controllers during initial installation.

Known Problems and Limitations

Long cables, multiple external devices, or both can cause random bus hangs under heavy loads in configurations with Adaptec devices. The SCSI specification defines the maximum length of the SCSI bus, including all cables, to be 6 meters (19.6 feet). Use shorter cables or fewer external devices to avoid problems.

Adaptec AIC-7770/AHA-274*x*/AHA-284*x* HBAs

Description

These configuration notes apply to the Adaptec AHA-2740/2742, AHA-2740A/2742A, AHA-2740T/2742T, AHA-2740W, and AHA-2740AT/2742AT EISA host bus adapters, AHA-2840VL and AHA-2842VL VESA local bus host bus adapters, and motherboards that integrate the Adaptec AIC-7770 chip such as the Intel Xpress and the Unisys U6000 server systems.

Caution – Probing for AHA-284*x* VLB cards has been disabled to avoid conflicts with some PCI devices. To enable your AHA-284*x* adapter, see "Adding Support for AHA-284x Devices" later on this Device Reference Page.

Device Configuration

Preparing for Configuration

- Ensure that the SCSI bus is properly terminated.
- Make sure that the CD-ROM drive with the Solaris CD is on channel A of the boot controller and that the boot disk is target 0 on channel A of the same controller.
- Configure AHA-2740 boards with up-to-date configuration files to make sure they are properly recognized. Use Version 2.1 or later of the AHA-2740 series configuration utilities.
- On a motherboard with an AMI BIOS, use Version 2.01 or later of the AMI EISA configuration utility when configuring the AHA-2740 EISA.
- For disks larger than 1 Gbyte, enable BIOS support for large disks. The HBA geometry for large disks is 255 heads and 63 sectors per track; for smaller disks it is 64 heads, 32 sectors per track.
- For a slow CD-ROM device, such as the Sun™ Sony CD-ROM or the Unisys system CD-ROM, disable the Bus Reset option on channel A of the boot controller. Use the EISA configuration utility on the AHA-274*x*, or use the configuration utility for the AHA-284*x* by pressing Ctrl-A at boot time. After installation, enable the Bus Reset option again.

Avoiding Possible Device Conflicts

- Probing for AHA-284*x* VLB cards has been disabled to avoid conficts with some PCI cards at certain I/O addresses.
- Motherboards that support level-triggered interrupts, such as an EISA motherboard, will support multiple 2740 adapters sharing the same IRQ (although there may be minor performance degradation).
- The AHA-2840VL adapter cannot share IRQ vectors because it supports only Edge-triggered interrupts.

Note – The AHA-2740 is not compatible with Wyse MP systems.

Adding Support for AHA-284x Devices

- If you are installing Solaris using Driver Update 9 on a system with an AHA-284*x* controller, you need to modify the Driver Update 9 Boot diskettes before installation. See "Modifying the Driver Update 9 Boot Diskettes."
- If you are adding Driver Update 9 on a system with a AHA-284*x* controller that already has Solaris installed, you must modify the `/etc/system` file so that the AHA-284*x* controller is recognized. This should be done after installing Driver Update 9, but before rebooting. Add the following line to the `/etc/system` file:

```
# set esa:esa_vlb_probe = 0xffff
```

- If you are adding an AHA-284*x* controller to a system that has Solaris x86 and Driver Update 9 installed, you must do the following before installing the controller:

  a. **Add the following line to the `/etc/system` file.**

```
# set esa:esa_vlb_probe = 0xffff
```

b. Do the following:.

```
# touch/reconfigure
# halt
```

c. Power down the system, install the controller, and power up the system.

Modifying the Driver Update 9 Boot Diskettes

Since probing for AHA-284*x* VLB cards has been disabled by default, special command files on the boot diskettes are used to enable probing. The diskettes must be modified using DOS. As a precaution, you should make a copy of the original Boot diskettes prior to running the special command files.

1. **Boot DOS on your system.**
2. **Insert a blank 3.5-inch diskette into drive A: and format it:**
   `format a:`
3. **Insert "Solaris 2.4 x86 Driver Update 9 Boot Diskette 1 of 2" into drive A:, make a copy of it, and remove the diskette:**
   `diskcopy a: a:`
4. **Label the copy of the first Boot diskette as "Modified**."
   For example:
   "Modified Solaris 2.4 x86 Driver Update 9 Boot Diskette 1 of 2 for AHA-284*x* SCSI controller."
5. **Insert another blank 3.5-inch diskette into drive A: and format it:**
   `format a:`
6. **Insert "Solaris 2.4 x86 Driver Update 9 Boot Diskette 2 of 2" into drive A:, make a copy of it, and remove the diskette:**
   `diskcopy a: a:`
7. **Label the copy of the second Boot diskette as "Modified."**
   For example:
   "Modified Solaris 2.4 x86 Driver Update 9 Boot Diskette 2 of 2 for AHA-284*x* SCSI controller."
8. **Store your original Boot diskettes in a safe place.**

9. **Insert the copy of "Solaris 2.4 x86 Driver Update 9 Boot Diskette 2 of 2" into drive A:.**

10. **Change to drive A: (remember DOS is still running):**
    `a:`

11. **To enable AHA-284*x* probing, run the `esavlb.bat` command:**
    `esavlb`

Configuring the Device

1. **Run the configuration utility supplied by the vendor, and load the configuration file for the Adaptec controller.**

2. **Choose any valid IRQ that does not conflict with other devices in the system.**

3. **Select channel A as the Primary Channel.**

4. **Run the BIOS configuration and verify that BIOS support for more than two drives is disabled.**

5. **If there are multiple 7770 controllers on one system, the order of the I/O base addresses must match the order of the BIOS base addresses.**
   On an EISA motherboard, the I/O base address corresponds to the EISA slot number times 0x1000 plus 0xc00 for controller boards. For example, if the first slot has a 2740 controller, the address is 0x1c00, and if the adjacent slot also has a 2740 controller, the address is 0x2c00. Motherboard vendors usually map the controller chip on the motherboard at the highest EISA slot plus 1. Thus in an EISA motherboard with three EISA slots, the motherboard 7770 address is 0x4c00.

   The BIOS base address is selected from a range of possible choices on the vendor-supplied configuration utility. Common addresses for the 2740 controller are: 0xcc00, 0xd400, 0xd800, and 0xdc00. The controller with the lowest BIOS base address will become the boot or primary controller.

   Solaris numbers controllers using the I/O base address. To ensure that the boot controller for the BIOS is identified as the boot controller by Solaris, order the BIOS base addresses in the same manner as I/O base addresses.

Known Problems and Limitations

- A large disk used with Solaris on a 7770 controller cannot be mounted on a controller with a different geometry, such as the DPT PM-2022 controller.
- Some VESA local bus motherboards do not support more than one bus master controller like the AHA-2840 VESA local host bus adapter.
- Disks larger than 1 Gbyte are supported with two different geometries depending on whether the disk is on a controller with the BIOS enabled or disabled at run time.

  The boot controller must always have the BIOS enabled. After two disks have been located on one or two controllers, the BIOS is automatically disabled on all subsequent 2740 controllers.

  The geometry for a disk with BIOS enabled in the EISA configuration utility at run time where the system has not disabled the BIOS is 255 heads and 63 sectors per track.

  For all other disks, the geometry is 64 heads and 32 sectors per track.

  A disk on a 2740 controller configured with the BIOS enabled cannot be moved to a controller with the BIOS disabled and still have 255 heads and 63 sectors per track.
- On the Unisys U6000/DT2, run the UNISYS.BAT file in a DOS environment before installation. Refer to *Solaris 2.4 Open Issues and Late-Breaking News* for more information.

Adaptec AIC-7870/AIC-7871/AIC-7872/AHA-2940/AHA-3940/ AHA-3940W PCI HBAs

Description

The Adaptec AHA-2940, AHA-2940W, AHA-3940, and AHA-3940W cards are PCI-to-Fast SCSI controllers based on the Adaptec AIC-7870, AIC-7871, or AIC-7872 chips.

Device Configuration

Preparing for Configuration

- To avoid user-level program core dumps on heavily loaded systems, install patch ID 101946. See "Solaris 2.4 x86 Jumbo Kernel Patch" in Chapter 1 for information on how to obtain this patch.
- To use the AHA-3940 or AHA-3940W adapters, the motherboard must have a BIOS that supports the DEC PCI bridge chips on the host bus adapter.

Configuring the Device

1. **Ensure that the SCSI bus is properly terminated.**
2. **Set up the IRQ for the controller by using the CMOS setup utility supplied with the motherboard (if this feature is available for your computer).**
   If you have more than one controller (or an embedded controller), use one IRQ per controller. Enable bus mastering for the slot(s) with your host bus adapter(s), when the choice is given.
3. **Run the Adaptec configuration utility by pressing Ctrl-A at boot time.**
4. **Ensure that support for more than two DOS drives is disabled.**
5. **For older drives, tapes, and most CD-ROM devices, make sure the maximum SCSI data transfer speed is set to 5.0 Mbytes per second.**
6. **Enable support for disks larger than 1 Gbyte if applicable.**
7. **Make sure there are no IRQ conflicts between ISA cards on your system and PCI controllers.**

Known Problems and Limitations

- The Adaptec AHA-3940 has been certified by Adaptec to run in specific system platforms. Our testing has shown that Solaris works properly in some of those systems and not in others. If you encounter problems running Solaris on an Adaptec-approved platform with the AHA-3940, contact your technical support provider.
- On some PCI systems with an Adaptec 294*x* card installed, user-level programs may core dump under heavy system load (such as during installation). The problem is *not* with the Adaptec hardware. However, if you have installed patch ID 101946, and you continue to see user-level programs dumping core, turn off write-back CPU caching (or all caching if there is no control over the caching algorithm) using the BIOS setup facility. This problem has been observed on a number of PCI motherboards, including the following:
  - PCI motherboards with a 60 MHz Pentium™ chip, with PCI chipset numbers S82433LX Z852 and S82434LX Z850. The part number of the Intel motherboard is AA616393-007.
  - PCI motherboards with a 90 MHz Pentium chip, with PCI chipset numbers S82433NX Z895, S82434NX Z895, and S82434NX Z896. The part number of the Intel motherboard is 541286-005. (Gateway 2000 uses this motherboard.)
  - PCI motherboards with a 66Mz Pentium chip, with PCI chipset numbers 433LX Z852 and 434LX Z882, also exhibit the problem. The motherboard part number is AA-619772-002. (Gateway 2000 uses this motherboard.)
- The Adaptec 2940 SCSI adapter does not recognize the Quantum Empire 1080S SCSI disk drive or the HP 3323 SE SCSI disk drive.
  Workaround: Reduce the Synchronous Transfer rate on the Adaptec controller to 8 Mbytes per second.

AMD PCscsi, PCscsi II, PCnet-SCSI PCI HBAs

Description

The Solaris `pcscsi` driver supports the AMD PCscsi (Am53C974), PCscsi II (Am53C974A), and PCnet-SCSI (Am79C974) host bus adapters. These are all PCI devices. The PCnet-SCSI chip is currently embedded in the HP Vectra XU 5/90 and Compaq DeskPro XL 560 systems.

Only the SCSI portion of the PCnet-SCSI host bus adapter is discussed here. The net portion of the AMD PCnet-SCSI chip requires a separate Solaris driver (`pcnet`) for operation. See the "AMD PCnet Ethernet (PCnet-ISA, PCnet-PCI)" Device Reference Page for specific configuration information about the Ethernet capabilities.

Device Configuration

Preparing for Configuration

- See the manufacturer's documentation for setup and cabling requirements.
- Ensure the SCSI bus is properly terminated.

Configuring the Device

Use the motherboard CMOS or EISA setup utility to ensure that the controller is enabled, that the SCSI BIOS is enabled and does not conflict with locations used by another device, and that the IRQ settings do not conflict with another device.

Known Problems and Limitations

The SCSI Tagged Queuing option is not supported.

BusLogic SCSI HBAs

Description

The BusLogic SCSI host bus adapters are controllers for common disk, tape, and I/O subsystems.

The following models are supported:

Model	Bus
BT-742A, BT-746C, BT-747C, BT-747S, BT-757C, BT-757S	EISA
BT-542B, BT-545C, BT-545S	ISA
BT-440C, BT-445C, BT-445S	VESA
BT-946C, BT-956C	PCI

Device Configuration

Preparing for Configuration

- **For EISA, ISA, and VESA local bus models:** Set the I/O address to any valid BusLogic host bus adapter I/O address except 0x330 and 0x230. (The factory default is 0x330, so it must be changed.)
- **For PCI models:**
  - If your PCI card is model BT-946C *and* it is labeled Rev. A or B, it needs to be supported in ISA emulation mode; use I/O address 0x334.

Note – In order to determine the revision level of a BusLogic PCI card, you must look at the card itself. The revision of the card is not referenced in the documentation that comes with the card.

  - If your PCI card is model BT-946C *and* it is labeled Rev. C, it can be supported in native PCI mode. To do this, select "Advanced option," and choose "NO" for the "Host Adapter I/O Port Address as default" option.

- If your PCI card is model BT-956C, or model BT-946C, Rev. E or later, it can also be supported in native PCI mode. To do this, disable the "Set ISA Compatible I/O Port (PCI Only)" option.

- If your BusLogic board model ends in "C", you must enter the AutoSCSI configuration utility and check the termination.

Configuring the Device

For EISA Models:

1. **Run the EISA configuration utility and change the factory-set I/O port address.**
   Do *not* use the default 0x330 I/O address.

2. **If a board has a model name ending with a "C", such as the BT-746C and the BT-747C, run the BusLogic AutoSCSI configuration utility.**
   To run the AutoSCSI utility, type Ctrl-B after you see the `BusLogic Utility Banner` on your screen.

   a. **Check termination.**

   b. **The Advanced option "`BIOS Support for > 2 Drives (DOS 5.0 or above)`" should be set to No.**

3. *For model BT-757C only:* **If the system has a narrow target, turn off the "wide negotiation option" when configuring devices.**

For ISA and VESA Local Bus Models:

1. **Set the I/O address and BIOS address with the dip switches.**
   Do *not* set the I/O address to 0x330.

2. **If a board has a model name ending with a "C", such as the BT-545C and the BT-445C, run the BusLogic AutoSCSI configuration utility to set the IRQ and check termination.**
   To run the AutoSCSI utility, type Ctrl-B after you see the `BusLogic Utility Banner`" on your screen.

   a. **Set the IRQ.**

   b. **Check termination.**

   c. **The Advanced option "`BIOS Support for > 2 Drives (DOS 5.0 or above)`" should be set to No.**

3. **Older ISA and VESA Local Bus models of BusLogic boards, such as the BT-545S, BT-542B, and BT-445S, must have their IRQ set in two places—with switches and jumpers.**
   The Host Interrupt Request switch and the Host Interrupt Channel jumper must have settings that match, or the board will not work.

For PCI Model BT-946C, Rev. A and B only:

This card must be updated in Set Compatible mode by doing the following:

1. **The BusLogic BT-946C (Rev. A or B) board should be put into the Bus Master slot.**
2. **Enter the AutoSCSI utility.**
3. **Select "Advanced option."**
4. **Set termination as needed.**
5. **If the boot disk is larger than 1 Gbyte, set the "**`Adapter BIOS Supports Space > 1 GB (DOS) only`**" option to Yes.**
6. **Set the adapter to ISA-compatible mode.**
   Set the value for "`Set Host Bus Adapter IO Port Address as Default`" to No.
7. **The Advanced option "**`BIOS Support for > 2 Drives (DOS 5.0 or above)`**" should be set to No.**
8. **Save the changes.**
9. **Reboot the system.**
10. **If your PCI motherboard is not fully PCI-specification compliant, you may have to manually configure the IRQ and BIOS address values. If the system hangs while installing the Solaris operating environment, do the following:**
    - Check the IRQ jumpers on the motherboard, if any.
    - Run the CMOS utility to set IRQ and BIOS address, if any.
    - Run the BusLogic AutoSCSI utility.

All the settings should match each other. On the BT-946C revision A or B adapter, the jumpers JP4 and JP5 are for configuring the BIOS address. If you need to manually configure the BIOS address, you may have to check these jumpers.

11. **If you still experience problems while installing the Solaris software, set the Interrupt Pin number of the "configure Adapter" option in the BusLogic AutoSCSI utility as follows:**

Slot	Interrupt Pin
0	A
1	B
2	C

For more information, see the "Configuration for Non-Conforming PCI Motherboards" and the "Handling Motherboard Variations" sections of the documentation that comes with your PCI BusLogic board.

For All Other PCI Models (Except BT-946C, Rev. A and B):

The Rev. C and above revision cards should be configured to operate in native PCI mode, not in ISA-compatible mode.

1. **The BusLogic PCI board should be put into the Bus Master slot.**
2. **Enter the AutoSCSI utility.**
3. **Set SCSI termination as needed.**
4. **Select "Advanced option."**
5. **If the boot disk is larger than 1 Gigabyte, set the** `Adapter BIOS supports space > 1 GB (DOS only)` **" option to Yes.**
6. **Choose the defaults except set the 5.1 "BIOS Support for > 2 Drives (DOS 5.0 or above)" to NO.**
7. **Save the changes.**
8. **Reboot the system.**

9. **If you experience problems while installing the Solaris software, set the Interrupt Pin number of the "configure Adapter" option in the BusLogic AutoSCSI utility as follows:**

Slot	Interrupt Pin
0	A
1	B
2	C

For more information, see the "Configuration for Non-Conforming PCI Motherboards" and the "Handling Motherboard Variations" sections of the documentation that comes with your PCI BusLogic board.

Valid Configurations

- ISA, EISA, and VLB adapters:
  - IRQ 9, 10, 11, 12, 14, 15
  - I/O Address 0x334, 0x230, 0x234, 0x130, 0x134
- PCI adapters:
  - IRQ 5, 6, 7, 8, 9, 10, 11, 12, 14, 15
  - I/O Address (Rev. A and B *only*) 0x334, 0x230, 0x234, 0x130, 0x134

Note – I/O addresses are dynamically configured for PCI adapters, Rev. C or later.

Multiple Controller Configuration

If you have multiple BusLogic boards in the system, follow these general rules to configure multiple BusLogic controllers:

- If one of the installed boards is a "C" model, it must be the primary controller.
- If one of the installed boards is a PCI bus model, it must be the primary controller.

- The primary controller must have an I/O address that precedes the secondary controller in the above list of Valid Configurations (as listed from left to right). For example, the primary controller may use an I/O address of 0x234, as long as the secondary controller uses either 0x130 or 0x134.
- The BIOS must be disabled on the secondary controller.
- Wide mode EISA and PCI adapters will support targets greater than 7 if the proper entries are added to the system configuration files, `/kernel/drv/cmdk.conf` (for disk), and `/kernel/drv/cmtp.conf` or `/kernel/drv/st.conf` (for tape).

Known Problems and Limitations

- Using an I/O address of 0x330 will cause the Solaris `aha` driver to be selected instead of the `blogic` native mode driver. These cards have not been tested in Adaptec AHA-1540 mode.
- This release of the `blogic` driver fixes bug 1188122: blogic_chkerr panic while running stress test. This bug caused a panic when running heavy I/O in the presence of intermittent tape accesses.
- If you have BT-946C (Rev. C.), request updated firmware from BusLogic, and install Rev. E or later because that system will be more reliable.
- Do not run the `drvconfig` utility during heavy I/O involving disks and tapes with BusLogic PCI cards since it can cause data overrun errors on disks or tape. This is documented in bug 1217378: blogic data_ovr errors while stress testing (+drvconfig) on BT946C-Rev E.
- BusLogic EISA/PCI cards may cause data overrun errors under high stress when your system is configured with multiple disks. This is documented in bug 1218624: blogic data_ovr errors while stress testing BT-747C Rev. A.

DPT PM-2011/PM-2021 ISA HBAs

Description

The DPT PM-2011 and PM-2021 host bus adapters are 16-bit SCSI controllers for an ISA or EISA bus.

Device Configuration

Preparing for Configuration

- The EPROM revisions on the board need to be checked. The EPROM should be version 5E or later. The SmartROM should be version 2.C or later.
- The Solaris operating environment supports only two DPT adapters per system.
  - If two DPT PM-2011 or 2021 or 3021 adapters are installed, do not install an IDE controller.
  - If you have an IDE adapter installed, only one DPT adapter will be supported.

Avoiding Possible Device Conflicts

- Since the IDE adapters are configured in the same I/O address range, ensure there is no address conflict with any IDE controller.
- If you have an IDE adapter installed, IRQ 14 should not be used by the DPT adapter.

Configuring the Device

1. **Consult your Device Configuration Worksheet to see if the DPT PM-2011/PM-2021 SCSI HBA settings need to be changed.**
2. **See the DPT manual for a description of the board's jumper settings.**
3. **Follow the instructions in the "DPT PM-2022/PM-2122/PM-3222 EISA HBAs" Device Reference Page to disable WD1003 emulation using the DPT SCSI Storage Manager Utility diskette.**
   Emulation mode for both drives should be set to 0 for drives zero and one, indicating "no drives present."

Note – Failure to disable the emulation modes for drives 0 and 1 will result in missing drives during the system boot process.

Valid Configurations

The parameters for DPT PM-2011/PM-2021 host bus adapters are different for first and secondary adapters:

- First Adapter:
  - I/O Address 0x1F0
  - IRQ 15
  - DMA 5
- Second Adapter:
  - I/O Address 0x230
  - IRQ 14 or 12
  - DMA 6

If you have an IDE adapter installed, the valid parameters for the first (and only) DPT adapter are as follows:

- I/O Address 0x230
- IRQ 12
- DMA 6

Note – Be sure to use Edge-triggered interrupts on the PM-2011.

Known Problems and Limitations

The DPT controller may cause the installation of the Solaris operating environment to fail due to loss of interrupts, depending on the setting of Jumper Y34.
Workaround: If the software installation fails, try changing the setting of Jumper Y34 (even if the onboard floppy has already been disabled by removing Jumper Y20). Toggling this setting appears to enable the controller to function correctly.

DPT PM-2012B EISA HBA

Description

The DPT PM-2012B host bus adapter is a SCSI controller for an EISA bus.

Device Configuration

Configuring the Device

1. **Consult your Device Configuration Worksheet to see if your DPT PM-2012B SCSI HBA settings have to be changed.**
2. **See** *DPT SmartCache Plus User's Manual* **for a description of its configuration program.**
3. **Boot DOS from the diskette drive.**
4. **Insert a copy of the DPT Utility diskette in the diskette drive.**
   a. **Type** `DPTFMT` **and press Enter.**
   b. **Press Enter to begin.**
   c. **Press Enter to continue.**
   d. **Press <F3> to enter SCSI ID 0 and LUN 0.**
   e. **Press <F3> to continue.**
   f. **Use the down arrow to select MS-DOS and PC DOS.**
   g. **Press Enter to write out the drive geometry.**
   h. **Press Enter to reboot.**
5. **Insert the user copy diskette of the EISA configuration utility (CF.EXE) containing the !DPTxxx.CFG files.**
   a. **At the A:> prompt, type** `CFG` **and press Enter.**
   b. **At the Viewer Edit Details screen, press Enter.**

c. Press the down arrow to the DPT SCSI HBA to select parameters and set them as follows:

- Bus — Enabled
- IDE Boot Address — Primary
- IRQ — Entry noted on your worksheet
- Option ROM Address — Default
- SCSI ID HBA — Default 7
- WD1003 — Emulation off for both drive 0 and 1
- Use Edge-triggered interrupts.

d. Press F10 to save your changes.

6. **Insert a copy of the boot diskette.**
7. **Press Enter to reboot DOS.**

Valid Configurations

Following are the DPT PM-2012B SCSI HBA parameters:

- IRQ — Any legal value between 9 and 15

Note – Make sure you use Edge-triggered interrupts.

- WD1003 — Emulation off
- Option ROM Address — Default
- I/O Address — *z*C88 (where *z* is a slot number from 1 to 7)

Known Problems and Limitations

- If you have used the DPTFMT utility correctly, and the board is properly seated in your machine, failure to display disk geometry may indicate a defective board.
- In order to prevent system hangs caused by improper IDE emulation, the version number of the EISA !DPTA401.CFG file should be 6B3 or later. If it is not, obtain a newer version from your vendor and rerun the EISA configuration utility.

DPT PM-2022/PM-2122/PM-3222 EISA HBAs

Description

The DPT PM-2022, PM-2122, and PM-3222 host bus adapters are SCSI controllers for an EISA bus. The PM-3222 is a SCSI RAID adapter.

Device Configuration

Preparing for Configuration

Check the EPROM revisions on the board.

- The DPT PM-3222 adapter should have EPROM version 7A or later and SmartROM version 3.B or later.
- The DPT PM-2022 and PM-2122 adapters should have EPROM version 5E or later and SmartROM version 2.D1 or later.

Configuring the Device

1. **Consult your Device Configuration Worksheet to see if the DPT PM-2022/PM-2122/PM-3222 SCSI HBA settings need to be changed.**
2. **See** *DPT SmartCache III User's Manual* **for a description of its EISA configuration program.**
3. **Boot DOS from the diskette drive.**
4. **Insert the user copy diskette of the EISA configuration utility (CF.EXE) containing the !DPTxxxCFG files.**
5. **Make sure the parameters are set as shown under "Valid Configurations."**
6. **Run the DPT SCSI Storage Manager Utility, DPTMGR, under DOS and select Solaris as the operating environment.**
   See Chapter 4 of *DPT SmartCache III User's Manual* for instructions.

Note – An error message similar to the following will be displayed while DPTMGR is running:

```
Unable to find any drivers in the DRIVERS Directory......
```

This message can be ignored.

Valid Configurations

The following are the DPT PM-2022, PM-2122, and PM-3222 SCSI HBA parameters:

- WD1003 Boot Address Disabled (Secondary)
- IRQ Any legal value between 11 and 15, except 14

Note – Make sure you use Edge-triggered interrupts.

- IDE Boot Address Disabled
- SCSI BIOS ROM Address Default
- HBA SCSI ID Default 7

Alternative Custom Configuration

When using the EISA configuration utility supplied by DPT in conjunction with a configuration file, you enter emulation information as part of the configuration process. When you configure two drives, both should be "disabled." When asked for drive types for drives zero and one, type 0. This indicates "no drives present" and disables the WD1003 emulation mode of the adapter, allowing correct operation of the native mode driver.

Known Problems and Limitations

- In order to prevent system hangs caused by improper IDE emulation, the version number of the EISA !DPTA410.CFG file should be 6E5 or later. If it is not, obtain a newer version from your vendor and rerun the EISA configuration utility.
- The Solaris software installation may initially fail when trying to set up the `fdisk` partition table on one or more disks. The failures have been observed on systems with a disk RAID configuration, where at least one disk is

new or has had its partition table zeroed out. The error messages displayed are:

```
ERROR: Could not create Fdisk partition table on disk
ERROR: Could not label the disks
```

Workaround: If the Solaris software installation fails with these error messages, restart the installation. It will most likely succeed.

IBM Micro Channel SCSI-2 Fast/Wide Adapter/A

Description

The IBM SCSI-2 Fast/Wide Adapter/A is a SCSI controller used with a Micro Channel bus.

Caution – The Solaris `mcis` driver, which supports the IBM Micro Channel SCSI adapter, conflicts with the IBM SCSI-2 Fast/Wide Adapter/A. If your system has an IBM SCSI-2 Fast/Wide Adapter/A installed, you must disable the `mcis` driver before installing Solaris x86. This is done by modifying the Driver Update 9 Boot diskettes using the `corvette.bat` file under DOS; see "Modifying the Driver Update 9 Boot Diskettes" below.

If you already have the Solaris operating environment running on your system and you want to add support for the IBM SCSI-2 Fast/Wide Adapter/A, you should *not* install the adapter until steps have been taken to disable the `mcis` driver; see "Disabling the mcis Driver After Installing Solaris x86" below.

Device Configuration

Preparing for Configuration

Ensure that the controller board is properly installed in any slot between 1 and 8. Slots 9 and above are not supported in this release.

Avoiding Possible Device Conflicts

The IBM SCSI-2 Fast/Wide Adapter/A cannot be installed on a system with the IBM Micro Channel SCSI adapter.

Configuring the Device

The Solaris `mcis` device driver interferes with the proper operation of the IBM SCSI-2 Fast/Wide Adapter/A. To avoid conflicts, the Solaris `mcis` driver must be disabled before the IBM SCSI-2 Fast/Wide Adapter/A and the Solaris software can be installed. You must first modify the Driver Update 9 Boot diskettes and then disable the `mcis` device driver.

Modifying the Driver Update 9 Boot Diskettes

The diskettes must be modified using DOS. As a precaution, you should make a copy of the original Boot diskettes prior to running the special command files.

1. **Boot DOS on your system.**
2. **Insert a blank 3.5-inch diskette into drive A: and format it:**
   `format a:`
3. **Insert "Solaris 2.4 x86 Driver Update 9 Boot Diskette 1 of 2" into drive A:, make a copy of it, and remove the diskette:**
   `diskcopy a: a:`
4. **Label the copy of the Boot diskette as "Modified."**
   For example:
   "Modified Solaris 2.4 x86 Driver Update 9 Boot Diskette 1 of 2 for IBM SCSI-2 Fast/Wide Adapter/A."
5. **Insert another blank 3.5-inch diskette into drive A: and format it:**
   `format a:`
6. **Insert "Solaris 2.4 x86 Driver Update 9 Boot Diskette 2 of 2" into drive A:, make a copy of it, and remove the diskette:**
   `diskcopy a: a:`
7. **Label the copy of the Boot diskette as "Modified."**
   For example:
   "Modified Solaris 2.4 x86 Driver Update 9 Boot Diskette 2 of 2 for IBM SCSI-2 Fast/Wide Adapter/A."
8. **Store your original Boot diskettes in a safe place.**
9. **Insert the copy of "Solaris 2.4 x86 Driver Update 9 Boot Diskette 2 of 2" into diskette into drive A:.**
10. **Change to drive A: (remember DOS is still running):**
    `a:`
11. **Run the `corvette.bat` command:**
    `corvette.bat`

Disabling the `mcis` *Driver After Installing Solaris x86*

Before you can add and configure IBM SCSI-2 Fast/Wide Adapter/A after installing Solaris x86 and before adding Driver Update 9, you must disable the `mcis` driver by modifying a system file and rebooting.

1. **Become root.**
2. **Use a text editor (such as `vi`) to edit the `/etc/system` file and add the following line:**
   `exclude: mcis`

To comment out a line in the `/etc/system` file, place an asterisk * at the beginning of the line.

3. **Remove or comment out the following line, if present:**
   `forceload: drv/mcis`
4. **Save your changes and exit the editor.**
5. **Shut down the system and power it off.**
6. **Now perform a reconfiguration boot to make your changes take effect:**

```
# touch /reconfigure
# halt
```

7. **Install your hardware.**
   Use the configuration information in "Valid Configurations" below.
8. **Reboot the system.**

Note – Upon reboot, the IBM Micro Channel SCSI adapter will no longer be recognized by the Solaris software, and it cannot be used in a system with the IBM Micro Channel SCSI-2 Fast/Wide Adapter/A.

Valid Configurations

The following parameters are supported for the IBM SCSI-2 Fast/Wide Adapter/A:

- IRQ — 14
- I/O Address — 0x3540, 0x3548, 0x3550, 0x3558, 0x3560, 0x3568, 0x3570, 0x3578

Known Problems and Limitations

- The microcode version of the SCSI-2 Fast/Wide Adapter/A board should be 0x71 or later. Boards with older versions, such as version 0x58, may cause the Solaris system to hang when using certain tape drives. The Solaris `corvette` driver displays a warning message if it detects an older, unsupported version of the adapter.
- The IBM SCSI-2 Fast/Wide Adapter/A is currently only supported on systems with at least 32 Mbytes of memory installed.

NCR 53C710 HBAs (Siemens Nixdorf PCE-5S SCSI)

Description

Two NCR 53C710 SCSI host bus adapters are embedded on Siemens Nixdorf PCE-5S systems.

Device Configuration

Note – Because the Siemens Nixdorf BIOS and the Solaris `fdisk` program are not compatible, use the DOS version of FDISK (or equivalent utility) to create an entry in the FDISK partition table before installing the Solaris software. Create at least a 1-cylinder DOS partition starting at cylinder 0. If the DOS partition is not created, the system will fail to reboot after Solaris installation.

Preparing for Configuration

See the hardware manufacturer's documentation for setup and cabling requirements.

Configuring the Device

Use the motherboard CMOS setup utility to make sure that the controllers are enabled and that the IRQ settings do not conflict with another system device.

Known Problems and Limitations

The SCSI Tagged Queuing option is not supported.

NCR 53C8*xx* PCI SCSI HBAs (53C810, 53C815, 53C820, 53C825)

Description

These configuration notes are for the NCR 53C810, 53C815, 53C820, and 53C825 PCI SCSI controllers, which are found on add-in adapters or integrated on a system motherboard. Systems may be configured with multiple controllers.

Device Configuration

Note – Because the NCR BIOS and the Solaris `fdisk` program are not compatible, use the DOS version of FDISK (or equivalent utility) to create an entry in the FDISK partition table before installing the Solaris software. Create at least a 1 cylinder DOS partition starting at cylinder 0. If the DOS partition is not created, the system will fail to reboot after Solaris installation.

Preparing for Configuration

An add-in card with the 53C815, 53C820, or 53C825 controller can only be used in a bus-mastering PCI slot. On motherboards with only two PCI slots usually both of the PCI slots are bus-master capable. On motherboards with three or more PCI slots, and on motherboards with several embedded PCI controllers, some of the PCI slots may not be bus-master capable. Refer to the motherboard or system documentation to determine how to set up or configure which PCI slots are bus-master capable.

Avoiding Possible Device Conflicts

Some PCI motherboards with the NCR SDMS BIOS and an embedded 53C810 controller do not work correctly with 53C815 or 53C82*x* add-in cards which also have an NCR SDMS BIOS. Some PCI motherboards with NCR SDMS BIOS but without the 53C810 controller also may not work correctly with 53C815 or 53C82*x* add-in cards which do not have an NCR SDMS BIOS. If you have a combination that does not work correctly, you may be able to work around these conflicts by upgrading the motherboard BIOS or the add-in card BIOS or both.

Configuring the Device

Run the motherboard CMOS setup or the EISA configuration utility to make sure that the controller and the bus master options are enabled and that the IRQ setting does not conflict with another system device.

Known Problems and Limitations

- The SCSI Tagged Queuing option is not supported.
- Some very early PCI systems with the 53C810 chip on the motherboard do not have the interrupt pin on the chip connected. Such a system cannot be used with the Solaris software. The Solaris `ncrs` driver requires a correctly functioning interrupt line for the 53C810 chip.
- The Wide SCSI option is not supported under the Solaris Operating environment. Some add-in 53C8*xx* cards include connectors for both narrow cables (in other words, 8-bit SCSI A cables) and wide cables (that is 16-bit SCSI P cables.) You can connect devices to the SCSI Wide connectors using SCSI P cables, but the Solaris `ncrs` driver will not initiate or accept the Wide Data Transfer option. The attached devices will function in 8-bit narrow mode.

Trantor T348 MiniSCSI Plus Parallel HBA

Description

The Trantor T348 Parallel SCSI HBA is easy to install—it has no switches or software-settable options, and does not require any manual configuration. However, the MiniSCSI Plus adapter may require special cabling to obtain electrical power and to connect to certain devices.

Device Configuration

Preparing for Configuration

Note – The Trantor MiniSCSI Plus adapter uses electrical power from the TERMPWR signal on the SCSI cable. The adapter will not work unless the first (or only) device connected to it supplies TERMPWR. If you have difficulty using the adapter with Solaris, see the "Troubleshooting Notes" section of *MiniSCSI Plus User Guide* or consult your Trantor dealer.

The T348 ends in a male SCSI-1 connector, for plugging in to a SCSI-1 device. To connect the T348 to a SCSI-2 device, use a SCSI-1 to SCSI-2 cable (which has a male SCSI-1 connector on one end and a male SCSI-2 connector on the other end) and a SCSI-1 female-to-female adapter (to connect the male end of the T348 to the male end of the SCSI-1 to SCSI-2 cable).

Configuring the Device

1. **Install Solaris x86.**
2. **Shut down the Solaris operating environment and turn off the computer.**
3. **Plug the T348 adapter into the selected (or only) parallel port.**
4. **Attach all required SCSI devices to the T348.**
5. **Turn on the power to all the SCSI devices.**
6. **Turn on the computer.**

Alternative Custom Configuration

- When reconfiguring the system to add other devices, make sure the T348 and all its devices are plugged in and powered up; otherwise they will be removed from the configuration. If you accidentally reconfigure without the T348 plugged in, plug it in and repeat the reconfiguration process.
- The Solaris operating environment does not support concurrent use of other parallel devices on the same port as the Trantor T348 or on the T348 pass-through port. To switch between the T348 and another parallel port device, such as a printer or Ethernet adapter, shut down the Solaris operating environment and power off the computer and any SCSI devices attached to the T348. With the power turned off, disconnect the old device and connect the new one. If switching to the T348, power up any SCSI devices you intend to use. Turn on the power to the computer and do a reconfiguration boot using the following commands:

```
# touch /reconfigure
# reboot
```

Known Problems and Limitations

- The Solaris `trantor` driver is intended primarily to support the use of SCSI CD-ROM drives for software installation. The driver also supports limited use of SCSI tape drives for backup and file transfer. Because of low data transfer rates, simultaneous use of multiple SCSI devices or the use of tape blocks longer than 512 bytes is not recommended.
- Do not use simultaneous multiple SCSI devices due to low data transfer rates.
- The T348 and attached devices must be plugged in and powered on at boot time to be available during that session.
- If the SCSI devices attached to the T348 fail to respond after a reconfiguration boot, and the parallel port had previously been used for a different device, do a second reconfiguration boot.
- The Trantor T338 andT358 are not supported.
- The Exabyte EXB-8500 and EXB-8200 tape drives do not work under the Solaris operating environment when connected to the Trantor T348 MiniSCSI Plus Parallel host bus adapter.

Tricord Systems Intelligent SCSI Subsystem (ISS) HBAs

Description

The Tricord Systems Intelligent SCSI Subsystem (ISS) controllers are multi-channel SCSI controllers supported only on the Tricord Systems Enterprise Server Models. The ISS family of controllers supports standard SCSI devices, such as disk, tape, and CD-ROM, as well as RAID groupings of SCSI disk drives.

Device Configuration

Preparing for Configuration

Version 4.03 or later of the system BIOS is required to be able to boot the Solaris operating environment.

Device Naming Convention

The special files that get created on an ISS system are described in the `iss(7)` manual page.

Known Problems and Limitations

Regardless of the number of devices on the ISS controller, a maximum of eight disk devices (physical or logical) will be shown by the realmode driver when installing the Solaris operating environment. This also limits the number of drives that can be used to boot Solaris.

Part 3 — SCSI Disk Arrays/RAID Controllers

Compaq SMART SCSI Array Controller

Description

The Compaq SMART SCSI Array controller supports internal and external SCSI drives on the Compaq family of ProSignia, ProLiant, and Systempro servers. It is used on an EISA bus.

Device Configuration

Preparing for Configuration

Be sure to read the documentation that comes with your hardware. Note the following:

- The SMART controller only supports disk drives. SCSI tape drives and CD-ROM drives are not supported.
- The Boot device *must* be logical drive 0 on the *primary* controller. Even though the BIOS lets you configure any controller as your primary controller, it will only let you boot from logical drive 0 on that controller.

Configuring the Device

1. **Consult your Device Configuration Worksheet to see if the Compaq SMART SCSI Array Controller settings need to be changed.**
2. **Run the EISA configuration utility (ECU) to configure your drives.**

Known Problems and Limitations

If you want to change your RAID configuration, first delete the old configuration information using the ECU. If you physically move the disks prior to deleting the RAID configuration (or the partition information on the logical drives), you may not be able to boot your system.

DPT PM-2024/PM-2124/PM-2124W/PM-3224/PM-3224W PCI HBAs

Description

The DPT PM-2024, PM-2124, and PM-3224 are SCSI controllers for a PCI bus. The PM-3224 is a SCSI RAID adapter.

Device Configuration

Preparing for Configuration

- Check the EPROM revisions on the board.
  - The DPT PM-3224 should have EPROM version 7A or later.
  - The DPT PM-2024 and PM-2124 adapters should have EPROM version 6D4 or later.
  - All the PCI boards should have SmartROM version 3.B or later.
- Ensure that the controller board is properly installed in any PCI slot capable of bus–mastering.

Configuring the Device

1. **Use the CMOS configuration utility supplied by the computer vendor to enable the DPT PCI controller.**
   a. **Enable the DPT PCI controller.**
   b. **Enable the PCI slot.**
   c. **Enable bus mastering.**
   d. **Choose an unused IRQ between 9 and 15.**

Note – If IRQ 12 does not respond, try another unused IRQ.

2. **Enter the DPT Configuration Utility by typing Ctrl-D at controller boot time.**
   a. **Set I/O address to "`Auto`."**
   b. **If the firmware version of the controller is less than 7A, or if your computer memory is ECC or does not check parity, disable PCI parity checking.**

Known Problems and Limitations

If the boot diskette reports a DPT controller driver cannot be installed, the motherboard installed in your system probably has ECC memory or does not check parity; disable PCI parity checking.

IBM DMC960 RAID Micro Channel HBAs (IBM SCSI-2 RAID, IBM SCSI-2 Fast/Wide Streaming-RAID Adapter/A)

Description

The IBM DMC960 RAID Micro Channel bus controllers include the IBM SCSI-2 RAID and the IBM SCSI-2 Fast/Wide Streaming-RAID Adapter/A.

Device Configuration

Preparing for Configuration

- The choice of SCSI target ID numbers is limited. Assuming the maximum number of targets per channel on the particular model IBM host bus adapter is MAX_TGT, the SCSI target IDs on a given channel should range from 0 to (MAX_TGT – 1). See the vendor documentation for more information.
- SCSI target IDs on one channel can be repeated on other channels.

  Example:
  The IBM DMC960 model supports a maximum of seven targets per channel, that is, MAX_TGT = 7. Therefore, the SCSI target IDs on a given channel should range from 0 to 6.

Configuring the Device

1. **Consult your Device Configuration Worksheet to see if the IBM DMC960 settings need to be changed.**
2. **Follow the configuration instructions in the vendor's manual.**

Known Problems and Limitations

- If a SCSI disk drive is not defined to be part of any physical pack within a system drive, it is automatically labeled as a *standby* drive. If any SCSI disk drive within a system drive fails, data on a standby drive *may be lost* due to the standby replacement procedure. This procedure will overwrite the standby drive if the failed disk drive is configured with any level of redundancy (RAID levels 1, 5, and 6) *and* its size is identical to the size of the available standby drive.

- Other than the “hot replacement” of disk drives, which is described in the manufacturer’s user’s guide, the IBM DMC960 series does not currently support “hot-plugging” (adding or removing devices while the system is running). To add or remove devices you must shut down the system, add or remove devices, reconfigure the host bus adapter using the configuration utility provided by the manufacturer, and then reboot your system.
- **(1210290)** Some tape drives may prematurely report "tape full" when writing to tape under heavy system load. This has been seen with the Archive Viper 150 tape drive, for example.
- **(1212018)** The command `mt erase` works but reports the following error message when it gets to the end of the tape:

```
/dev/rmt/0 erase failed: I/O error
```

Mylex DAC960P PCI Controller

Description

The Mylex DAC960P is a SCSI controller used with a PCI bus.

Device Configuration

Preparing for Configuration

- The choice of SCSI target ID numbers is limited. Assuming the maximum number of targets per channel on the particular model of Mylex host bus adapter is MAX_TGT, the SCSI target IDs on a given channel should range from 0 to (MAX_TGT – 1). See the vendor documentation for more information.
- SCSI target IDs on one channel can be repeated on other channels.

  Example:
  The Mylex DAC960P model supports a maximum of seven targets per channel, that is, MAX_TGT = 7. Therefore, the SCSI target IDs on a given channel should range from 0 to 6.

Configuring the Device

Consult your Device Configuration Worksheet to see if the Mylex DAC960P settings need to be changed.

Valid Configurations

Follow the configuration information in the manufacturer's installation manual.

Known Problems and Limitations

- If a SCSI disk drive is not defined to be part of any physical pack within a system drive, it is automatically labeled as a *standby* drive. If any SCSI disk drive within a system drive fails, data on a standby drive *may be lost* due to the standby replacement procedure. This procedure will overwrite the standby drive if the failed disk drive is configured with any level of redundancy (RAID levels 1, 5, and 6) *and* its size is identical to the size of the available standby drive.

- Other than the “hot replacement” of disk drives, which is described in the manufacturer’s user’s guide, the Mylex DAC960P series does not currently support “hot-plugging” (adding or removing devices while the system is running). To add or remove devices you must shut down the system, add or remove devices, reconfigure the host bus adapter using the configuration utility provided by the manufacturer, and then reboot your system.
- **(1212018)** The command `mt erase` works but reports the following error message when it gets to the end of the tape:

```
/dev/rmt/0 erase failed: I/O error
```

Part 4 — Other SCSI Devices

SCSI Tape Drives

Description

The SCSI tape drive support on x86 platforms offers the following features:

- Full compatibility between Solaris SPARC™ and Solaris x86 platforms
- Stability, robustness, and increased SCSI tape drive support
- Field extensibility; support for new tape drives can be added by editing a configuration file (`st.conf`)
- Tape control; required by commercial backup software, such as Legato Networker
- Configurable write buffering (as an option)

In addition, significant interoperability testing ensures that tapes written with the `sctp` driver can be read by the `st` driver. For a list of supported SCSI tape drives, see the latest Solaris x86 Hardware Compatibility List.

Device Configuration

Preparing for Configuration

- If you have a supported SCSI tape drive, no configuration is necessary.
- If your tape drive is not supported, find the SCSI tape control commands in the manufacturer's SCSI command manual (sometimes called an OEM technical manual) so you can update the `/kernel/drv/st.conf` file and add support for your tape drive.

Configuring the Device

The information that is needed in the `/kernel/drv/st.conf` file is described in the `st(7D)` manual page.

1. **Install Solaris x86.**
2. **Become root.**

3. **Edit the file** `/kernel/drv/st.conf` **and add the appropriate lines that describe your tape drive.**
   For example, to add an entry for the Hewlett-Packard HP35470A tape drive, the following two lines would be needed:

```
"HP        HP35470A", "HP35470A 4mm DAT", "HP70",

HP70   =     1,0x34,0,0x1679,1,0x0,0;
```

Note – The format of these lines is described in `st(7D)`; the placement of each line is shown in the file `/kernel/drv/st.conf`.

   After adding these lines, the `/kernel/drv/st.conf` file will look similar to this:

```
tape-config-list=
    "HP      HP35470A",     "HP35470A 4mm DAT", "HP70",
    "WANGTEK 5525ES SCSI", "Wangtek 525MB QIC","WT_5525ES_QIC",
    "TANDBERG 4100",      "Tandberg 4100 QIC",    "TANDBERG_4100_QIC",
    "TANDBERG 4200",       "Tandberg 4200 QIC","TANDBERG_4200_QIC";

HP70          = 1,0x34,0,0x1679,1,0x0,0;
WT_5525ES_QIC = 1,0x32,512,0x467a,1,0x00,0;
TANDBERG_4100_QIC = 1,0x32,512,0x463a,1,0x00,0;
TANDBERG_4200_QIC = 1,0x32,512,0x463a,1,0x00,0;
```

4. **Perform a reconfiguration boot to have your changes take effect:**

```
# touch /reconfigure
# reboot
```

Part 5 — Network Adapters

3Com EtherLink III (3C5*x*9, 3C509B)

Description

The 3Com EtherLink III 3C5*x*9 and 3C509B controllers are Ethernet network adapters.

Device Configuration

Preparing for Configuration

- Configure the 3C509 (ISA bus) adapter for EISA addressing when installed in an EISA bus system.
- The 3C509B model is configured differently than the other models. Check the packaging material that comes with your adapter to verify that the "3C509B" designation is on the outside of the box and that the network card is labeled "Rev.B."

Configuring the Device

1. **Consult your Device Configuration Worksheet to see if your 3Com EtherLink III controller needs to be reconfigured.**
   The EtherLink III 3C509B must always be reconfigured.
2. **Follow the 3Com documentation and use the 3Com setup software to configure the card.**

EtherLink III 3C509B Configuration

1. **Configure the card to use a specific network interface using the 3Com setup software. Do *not* use the Auto Select option.**
   Since Auto Select is the default, you must always reconfigure the card.
2. **Disable the Plug and Play option.**
   This is particularly important on Plug and Play–capable systems.

AMD PCnet Ethernet (PCnet-ISA, PCnet-PCI)

Description

The PCnet family of Ethernet controllers are based on the AMD PCnet-ISA and PCnet-PCI controller chips. These include PCnet controllers embedded on motherboards found in systems from Intergraph and Hewlett-Packard, and a variety of add-in NICs.

Device Configuration

Avoiding Possible Device Conflicts

The Solaris `elink` driver may interfere with the proper operation of PCnet-ISA adapters installed on the Intergraph TD-1, TD-2, and TD-3 Personal Workstations.

Modifying the Driver Update 9 Boot Diskettes

If you are installing the Solaris software over a network that uses a PCnet-ISA adapter, and you experience problems with the network hanging, it may be necessary to exclude the `elink` driver from the boot diskettes before attempting to install again.

There are special command files on the boot diskettes for these purposes. The diskette must be modified using DOS. As a precaution, you should make a copy of the original Boot diskettes prior to running the special command files.

1. **Boot DOS on your system.**
2. **Insert a blank 3.5-inch diskette into drive A: and format it:**
   `format a:`
3. **Insert "Solaris 2.4 x86 Driver Update 9 Boot Diskette 1 of 2" into drive A:, make a copy of it, and remove the diskette:**
   `diskcopy a: a:`
4. **Label the copy of the Boot diskette as "Modified."**
   For example:
   "Modified Solaris 2.4 x86 Driver Update 9 Boot Diskette 1 of 2 for AMD PCnet Ethernet."

5. **Insert another blank 3.5-inch diskette into drive A: and format it:**
   `format a:`
6. **Insert "Solaris 2.4 x86 Driver Update 9 Boot Diskette 2 of 2" into drive A:, make a copy of it, and remove the diskette:**
   `diskcopy a: a:`
7. **Store your original Boot diskettes in a safe place.**
8. **Label the copy of the Boot diskette as "Modified."**
   For example:
   "Modified Solaris 2.4 x86 Driver Update 9 Boot Diskette 2 of 2 for AMD PCnet Ethernet."
9. **Insert the copy of "Solaris 2.4 x86 Driver Update 9 Boot Diskette 2 of 2" into drive A:.**
10. **Change to drive A: (remember DOS is still running):**
    `a:`
11. **Run the `pcn.bat` command file:**
    `pcn`

Configuring the Device

PCnet-ISA

Be sure that your PCnet-ISA adapter does not conflict with other adapters configured in the system. The valid parameter settings for PCnet-ISA are listed under "Valid Configurations."

PCnet-PCI

PCI devices are autoconfigured by the system BIOS. No configuration is necessary.

Valid Configurations

The following parameters are supported for PCnet-ISA adapters:

- IRQ 3, 5, 9, 10, 11
- I/O Address 0x300, 0x320, 0x340, 0x360

Known Problems and Limitations

- In some cases, IRQ 4 may be offered as a configuration option for the PCnet-ISA adapters; the Solaris `pcn` driver does not support IRQ 4.
- On some systems, particularly those with PCI controllers, IRQ 9 may not be usable by a PCnet-ISA adapter; configure the PCnet-ISA adapter to use another interrupt. PCnet-PCI adapters are not affected.
- Some versions of the PCnet-PCI chip have known problems that result in unreliable network operation. These chip problems can also cause the system to completely "freeze." Unfortunately, there are no known software workarounds. If you encounter these symptoms while using an adapter based on a PCnet-PCI chip, contact the adapter vendor to see if the adapter contains the version of the chip known to exhibit these problems.
- **(1192044)** PCnet doesn't serve `rpl` requests until `snoop` is started. Any adapter supported by the Solaris `pcn` driver will not function as a network installation server unless the `snoop` command is also run using that adapter. This will be fixed in a future Driver Update.

Compaq NetFlex-2 DualPort ENET, NetFlex-2 ENET-TR EISA Controllers

Description

The Compaq NetFlex-2 DualPort ENET controller provides two Ethernet interfaces under the Solaris operating environment. The Compaq NetFlex-2 ENET-TR controller can be configured for either Ethernet or Token Ring, but only the Ethernet functionality is supported under the Solaris operating environment.

Both the NetFlex-2 DualPort ENET and the NetFlex-2 ENET-TR are EISA bus controllers.

Device Configuration

Preparing for Configuration

Compaq NetFlex-2 DualPort ENET *only*: If the dual-ported Ethernet card will be used to install Solaris over a network, the RJ-45 connector for the network must be connected to the *first* network port (Port 1). See the documentation that comes with the dual-ported card to locate Port 1.

Avoiding Possible Device Conflicts

- Check for IRQ conflicts with ISA devices not defined in the EISA configuration software.
- The default IRQ is 10, which can be a usable IRQ for many ISA cards, including SMC Ethernet cards, for example.

Note – The Compaq NetFlex-2 DualPort ENET card shares the same IRQ for both ports.

Configuring the Device

Use the EISA configuration utility to tell the system about the card.

1. **Set the connector type.**

- For the NetFlex-2 DualPort ENET, use RJ-45.

- For the NetFlex-2 ENET-TR, use DB-15 or 10BaseT RJ-45.
  Note that the default setting (DB-9) on the NetFlex-2 ENET-TR needs to be changed.

2. **Compaq Netflex-2 ENET-TR card *only*: Configure the Netflex-2 ENET-TR card to use a 10 Mb/sec data rate.**
   Note that the default (16 Mb/sec) on the NetFlex-2 ENET-TR needs to be changed.

Valid Configurations

The following IRQs are valid for this card:

- IRQ 3, 5, 9, 10, 11

Known Problems and Limitations

Promiscuous mode is not supported by the current release of the firmware for this card.

DEC 21040/21140 Ethernet (AsanteFAST, Cogent EM960TP, Cogent EM100, D-Link DE-530CT, SMC EtherPower 8432BT, SMC EtherPower 8432BTA, Znyx312)

Description

The Solaris `dnet` driver supports a large family of Ethernet controllers based on the DEC 21040 and 21140 controller chips.

Note – The `dnet` driver supports cards based on the DEC 21040 and 21140 chips including the SMC EtherPower 8432BT and SMC EtherPower 8432BTA cards. Since the release of this driver, SunSoft has discovered SMC has released a new version of these cards using the DEC 21041 chip. The `dnet` driver does not currently support the newer SMC cards, and it will be released again in a future driver update to add this support.

Device Configuration

Avoiding Possible Device Conflicts

The following paragraphs describe several properties that can be set in the `dnet.conf` file. In each case the property must be placed within the entry that corresponds to your controller. That entry can be determined by looking at the device file that is created. For example, if the `ls -l` command returns the following:

```
# ls -l /dev/dnet0
# lrwxrwx   1   root   root   <date> dnet0 -> ../devices/isa/dnet@78,0:dnet0
```

the “78” in the entry corresponds to the “reg=0x000078,0,0” entry in the `dnet.conf` file. For example, if the entry is the following:

```
name=”dnet” class=”sysbys” intr=1 reg=0x000078,0,0 parent-type=”pci”
```

change it to:

```
name=”dnet” class=”sysbys” intr=1 reg=0x000078,0,0 bncaui=1 parent-type=”pci”
```

- The Solaris `dnet` driver is configured for optimal performance on today's 10-Mb networks, running in half-duplex mode. When used with a modern 100-Mb hub, running the driver in full-duplex mode will increase performance. To configure a controller to run in full-duplex mode, set the `fulldup=1` property in the `dnet.conf` driver configuration file.
- This driver does not support autoconfiguration of the network media. The RJ-45 connector is used by default. If you use another network media (BNC/AUI), you will not be able to install from the network. After installation you can force configuration of the BNC/AUI connector. Set the `bncaui=1` property in the `dnet.conf` driver configuration file.
- Future versions of controllers based on the DEC 21140 chip will offer a choice between 100-Mb and 10-Mb operation. By default, the `dnet` driver will operate the controller at 100 Mb. To force 10-Mb operation on one of these controllers, set the `mode=10` property in the `dnet.conf` driver configuration file.

Note – It is not necessary to change the configuration file for the AsanteFAST device.

Valid Configurations

The PCI configuration process varies from system to system. Follow the instructions provided by the vendor.

Known Problems and Limitations

- The controller will not autoconfigure the network media connector properly. Use the `bncaui=1` property in the `dnet.conf` file to force use of the BNC/AUI connector in this case.
- The `dnet` driver does not support netbooting from BNC or AUI network media. You must install from a CD and then make changes to `dnet.conf` as described in "Avoiding Possible Device Conflicts."
- Cogent EM960TP/EM960C (TP connector only), Cogent EM100, D-Link DE-530CT, and Znyx EtherAction ZX312 boards have been successfully tested with the `dnet` driver for network adapters based on the DECchip 21040 Ethernet and DECchip 21140 Fast Ethernet Controllers. Other adapters may work with the `dnet` driver, and additional boards will be tested in the future. However, some boards have failed to work with this driver (for example quad-port boards from Cogent and Znyx), and other boards have

exhibited inconsistent behavior (SMC EtherPower 10/100). Support for these and other DECchip-based adapters will be included in future releases of this driver.

- The current release of this driver provides 100-Mb Ethernet support; however, the driver will not be able to transfer the data at rates expected of a 100-Mb interface. The performance of the driver is under study, and a future release of this driver will enhance and address the performance characteristics of this driver.

Intel EtherExpress 16, 16C, 16TP, MCA, MCA TP

Description

The Intel EtherExpress™ 16 is an Ethernet controller for the connectionless Data Link Provider Interface providing multithreaded, loadable STREAMS functionality that can be cloned.

Device Configuration

Preparing for Configuration

When using any version of the EtherExpress 16 adapter, you must use the SOFTSET configuration utility to manually configure the appropriate connector. This DOS program is supplied by the network card manufacturer and is contained on a diskette that comes with the board.

Avoiding Possible Device Conflicts

The Intel EtherExpress 16 conflicts with the SMC 8013 card. If both the SMC 8013 and Intel EtherExpress 16 cards are installed in your system, data to and from the Intel EtherExpress 16 card will be randomly corrupted.

Configuring the Device

The Micro Channel versions of this adapter (Intel EtherExpress MCA and Intel EtherExpress MCA TP) can be configured to use IRQs 12 and 15, but these IRQs are *not* supported by the Solaris `iee` driver. Run the SOFTSET configuration utility in manual mode to make certain a valid IRQ is selected.

Known Problems and Limitations

- Autodetect is not supported.
- On some fast systems, the Solaris `iee` driver occasionally does not correctly initialize when the system reboots. If this occurs, the network connection will not be usable.
  Workaround: If this situation occurs, there are two options to get around this problem: 1) reboot the system, or 2) activate the network manually by

stopping and then starting the affected `iee` interface using the `ifconfig` command. For example, if the `iee0` interface fails to start up, log in as the superuser and type the following commands:

```
# ifconfig iee0 down
# ifconfig iee0 up
```

Intel EtherExpress PRO

Description

The Intel EtherExpress PRO is an Ethernet controller for the connectionless Data Link Provider Interface and is used with an ISA bus.

Device Configuration

Configuring the Device

1. **The Intel EtherExpress PRO can be configured to any I/O address that does not conflict with another device.**
2. **Choose one of the valid IRQ values listed below.**
3. **For all other settings, use the defaults.**

Valid Configurations

The following parameters are valid for the Intel EtherExpress PRO controller:

- IRQ — 3, 5, 9, 10, 11 (10 is recommended)
- I/O Address — Any I/O address that does not conflict with another device; 0x300 is recommended

Intel EtherExpress PRO/100 (82556)

Description

The Intel EtherExpress PRO/100 is an Ethernet controller. Both the EISA and PCI bus controllers are supported.

Device Configuration

Preparing for Configuration *(PCI Only)*

On some PCI systems, the user has control over assignments of IRQs to ISA and PCI devices. In the chipset configuration of your particular system, verify that an IRQ is enabled for use by the PCI bus. For example, your PCI CMOS setup screen may show the following:

```
IRQ 9     Enabled for ISA card
IRQ 10    Enabled for ISA card
IRQ 14    Enabled for PCI card
IRQ 15    Enabled for PCI card
```

Use this opportunity to toggle your choices from ISA to PCI, or from PCI to ISA, depending on your hardware configuration. It is preferable to assign as many IRQs to PCI devices as possible. By configuring more *available* IRQs for PCI devices, you give the PCI bus additional choices to resolve conflicts.

Avoiding Possible Device Conflicts

Avoid using IRQ 9 because it is often used for the video card in some systems.

Configuring the Device

Intel EtherExpress PRO/100 EISA

1. **Consult your Device Configuration Worksheet to see if your Intel EtherExpress PRO/100 controller needs to be reconfigured.**
2. **Using the EISA configuration utility, set the following parameters:**
   a. **Disable Flash Memory.**
   b. **Set your Connector Type to TPE.**

c. **If necessary, reconfigure using the software setup program or the diagnostic tools provided by Intel.**

Intel EtherExpress PRO/100 PCI

1. **Consult your Device Configuration Worksheet to see if your Intel EtherExpress PRO/100 controller needs to be reconfigured.**
2. **If necessary, reconfigure using the software setup program or the diagnostic tools provided by Intel.**

Valid Configurations

Intel EtherExpress PRO/100 (*EISA only*):

- IRQ 3, 7, 12, 15

Known Problems and Limitations

- Due to hardware restrictions, avoid installing the EISA model of the Intel EtherExpress PRO/100 card on systems with a PCI bus.
- The Intel EtherExpress PRO/100 card cannot be used as a net install boot server.
- The Intel EtherExpress PRO/100 card cannot net install at 100 Mb.
- Some revisions of `ieef`-supported PCI network cards may exhibit an intermittent error under heavy stress, where the interface suddenly drops off the network (and carrier sense-lights go off on the card). The bug, under investigation, appears to be a PCI bus starvation problem. Use `ifconfig` to reinitialize the card. For example, as root, type:

```
# ifconfig ieef0 down
# ifconfig ieef0 unplumb
# modunload -i 0
# ifconfig ieef0 plumb
# ifconfig ieef0 <IP_Address> netmask + broadcast + -trailers up
```

- The current release of this driver provides 100-Mb Ethernet support; however the driver will not be able to transfer the data at rates expected of a 100-Mb interface. The performance of the driver is under study and a future release of this driver will enhance and address the performance characteristics of this driver.

Novell NE2000, NE2000plus Ethernet and Clones

Description

The Novell NE2000 and NE2000plus are ISA bus Ethernet controllers. The NE2000plus card is software configurable; the NE2000 card must be manually configured with dip switches and jumpers.

Caution – The NE2000/NE2000plus adapters are sensitive to autoprobing by other drivers, and require autoprobe reset sequences that may disturb other cards. To avoid conflicts, the NE2000/NE2000plus cards cannot be installed on a system with the Solaris drivers listed below.
In addition, the Solaris `nei` driver is disabled by default. You enable it using a script (`nov2000.bat`) on the boot diskettes that will disable the other drivers and enable the `nei` driver; see "Modifying the Driver Update 9 Boot Diskettes" below.
If you already have the Solaris operating environment running on your system and you want to add support for the NE2000 or NE2000plus adapter, do *not* install the adapter until you disable other drivers; see "Enabling Support for Controllers After Installing Solaris x86" below.

The following supported hardware cannot be used with NE2000 and NE2000plus cards.

Solaris Driver	Supported Hardware
`eepro`	Intel EtherExpress PRO
`el`	3Com EtherLink II (3C503), EtherLink II/16 (3C503-16)
`elink`	3Com EtherLink 16 (3C507)
`iee`	Intel EtherExpress 16, 16C, 16TP, MCA, MCA TP
`pcn`	AMD PCnet Ethernet (PCnet-ISA, PCnet-PCI)
`smc`	SMC EtherEZ, EtherCard Elite16 Ultra, EtherCard PLUS Elite16, EtherCard PLUS (8416, 8216, 8013, 8003)
`tiqmouse`	Texas Instruments TravelMate 4000E QuickPort Ball Point Mouse

Device Configuration

Preparing for Configuration

The NE2000/NE2000plus Ethernet cards present special problems for configuration. Various early versions and some clones of these models may hang the system when probed. The large I/O space used by the card (0x20 bytes) also increases the chance of conflicts with other devices. To avoid these problems, read and follow the advice on the next few pages.

- The Solaris `nei` driver expects the NE2000/NE2000plus card to be in a 16-bit ISA slot. Ensure that the card is in a 16-bit slot and is jumpered for 16-bit operations.
- Some NE2000/NE2000plus clones allow you to configure the bus speed; the bus speed on the card should match that of the system.
- Certain I/O base addresses (0x320, 0x340, and 0x360) are not supported under the Solaris operating environment. These are described in the next section.

Avoiding Possible Device Conflicts

- Due to the large I/O space (0x20 bytes) used by the NE2000/NE2000plus cards, the I/O base addresses of 0x320, 0x340, and 0x360 are not supported by default because of conflicts with other drivers. This leaves only 0x300 for the NE2000, and 0x240, 0x280, 0x2C0, and 0x300 for the NE2000plus.
- Unfortunately, some NE2000 clones will not operate at all combinations of I/O base address and IRQ settings, so configuration may be further restricted to the default values of IRQ 3 and I/O base address 0x300. Be sure to read the configuration information in the manual provided by the manufacturer of the card.

Caution – *Never* use an IRQ or I/O base address other than the ones listed under "Valid Configurations," even if they are supported by the NE2000/NE2000plus card. Due to conflicts with other Solaris drivers, for example, the I/O base addresses of 0x320, 0x340 and 0x360 are specifically disallowed in the Solaris `nei.conf` file.

- **For NE2000plus cards *only*:** If the card has been configured to run in SHARED MEMORY mode, it will use 0x4000 bytes of shared memory in the range 0xD0000-0xDFFFF. Be sure to check that the BIOS setup allocates this

range of memory to the adapter and that other cards in the system do not conflict. If a conflict is unavoidable, configure the NE2000plus in I/O mode so that it will not use shared memory. (To configure the NE2000plus card, a vendor-supplied DOS program PLUSDIAG must be used.)

Modifying the Driver Update 9 Boot Diskettes

Because the Novell NE2000/NE2000plus Ethernet adapters are disabled by default, there are command files on the Boot diskettes to enable the `nei` device driver. The Boot Diskettes must be modified using DOS. As a precaution, make a copy of the original Boot diskettes prior to running the special command file.

1. **Boot DOS on your system.**
2. **Insert a blank 3.5-inch diskette into drive A: and format it:**
   `format a:`
3. **Insert "Solaris 2.4 x86 Driver Update 9 Boot Diskette 1 of 2" into drive A:, make a copy of it, and remove the diskette:**
   `diskcopy a: a:`
4. **Label the copy of the Boot diskette as "Modified."**
   For example:
   "Modified Solaris 2.4 x86 Driver Update 9 Boot Diskette 1 of 2 for NE2000/NE2000plus adapter."
5. **Insert another blank 3.5-inch diskette into drive A: and format it:**
   `format a:`
6. **Insert "Solaris 2.4 x86 Driver Update 9 Boot Diskette 2 of 2" into drive A:, make a copy of it, and remove the diskette:**
   `diskcopy a: a:`
7. **Label the copy of the Boot diskette as "Modified."**
   For example:
   "Modified Solaris 2.4 x86 Driver Update 9 Boot Diskette 2 of 2 for NE2000/NE2000plus adapter."
8. **Store your original Boot diskettes in a safe place.**
9. **Insert the copy of "Solaris 2.4 x86 Driver Update 9 Boot Diskette 2 of 2" into drive A:.**
10. **Change to drive A: (remember DOS is still running):**
    `a:`

11. **Run the `nov2000.bat` command file:**
    `nov2000`

Now the Driver Update 9 Boot diskettes are prepared to install the Solaris software on your system.

Enabling Support for Controllers After Installing Solaris x86

If you already have the Solaris x86 operating environment running on your system and you want to add an NE2000 or NE2000plus Ethernet card, disable the conflicting drivers that are already installed on your system *prior* to installing the NE2000/NE2000plus card but *after* installing the Solaris software.

1. **Become root.**
2. **Use a text editor (such as `vi`) to edit the `/etc/system` file, and add the following lines:**
```
exclude: eepro
exclude: el
exclude: elink
exclude: iee
exclude: pcn
exclude: smc
exclude: tiqmouse
```
3. **In the `/etc/system` file, remove or use an asterisk (*) to comment out the following lines:**
```
exclude: nei
forceload: drv/eepro
forceload: drv/el
forceload: drv/elink
forceload: drv/iee
forceload: drv/pcn
forceload: drv/smc
```
4. **Add or uncomment the following line:**
```
set nei:nei_forceload=1
```
5. **Save your changes and exit the editor.**
6. **Shut down the system and power it off.**
7. **Install the NE2000 or NE2000plus card and configure it according to the information "Valid Configurations."**

8. **Reboot the system.**

Note – Upon reboot, the Ethernet cards listed on this device page will no longer be recognized by the Solaris software and cannot be used in the system with the NE2000/NE2000plus.

---

9. **If the newly installed NE2000/NE2000plus Ethernet card is replacing another network card that uses a different network driver, you need to rename the** `/etc/hostname.`*olddriver*`0` **file to** `/etc/hostname.`*newdriver*`0` **before rebooting the second time.**
   For example, if you have replaced a 3Com EtherLink III card with a NE2000 or NE2000 plus card, you need to run the following command as root:

```
#  mv /etc/hostname.elx0 /etc/hostname.nei0
```

10. **Now perform a reconfiguration boot to make your changes take effect:**

```
# touch /reconfigure
# reboot
```

Configuring the Device

The NE2000 card is configured using dip switches. These must be set prior to installing the card. The NE2000plus card is configured using the vendor-supplied DOS program PLUSDIAG. To use it, the NE2000plus card must first be installed in your system.

1. **Set the IRQ to one of the interrupts listed under "Valid Configurations."**
2. **Set the I/O base address to one of the values listed under "Valid Configurations."**
3. **Set the bus speed and bus width to match that of the system.**
4. **For NE2000plus cards *only*: The SHARED MEMORY address should be set starting from 0xD0000, increasing by 0x4000 for each additional card.**
5. **See "Known Problems and Limitations" for other potential problems.**

Valid Configurations

Note that some NE2000 clones may further restrict these choices.

NE2000:

- IRQ 2, 3, 4, 5
- I/O Base Address 0x300

NE2000plus:

- IRQ 2, 3, 4, 5, 10, 11, 12, 15
- I/O Base Address 0x300, 0x240, 0x280, 0x2C0
- SHARED MEMORY 0xD0000-0xDC000

Known Problems and Limitations

- If error messages such as “no such device” are displayed when attempting to access the Ethernet card, the device is probably not configured in the EISA configuration.
- **(1204642)** Some NE3200 clones do not work with level-triggered interrupts. If you install an NE3200 card and your system hangs while trying to configure devices after reboot, it may not work with level-triggered interrupts.
  Workaround: Use the EISA configuration utility to select an interrupt type of EDGE TRIGGERED instead of LEVEL TRIGGERED.

Novell NE3200 EISA Ethernet

Description

Novell NE3200 EISA Ethernet controller.

Device Configuration

Preparing for Configuration

- The Novell NE3200 Ethernet card must be installed in an EISA slot.
- The media type must be decided before the device is configured. For example, the media type may be BNC (thin wire) or DIX (thick wire).

Avoiding Possible Device Conflicts

Proper EISA device configuration ensures no conflicts with other devices.

Configuring the Device

1. **Use the EISA configuration utility on your system to configure the controller.**
2. **Set the media type to either BNC or DIX.**
3. **Set the interrupt type to LEVEL TRIGGERED.**
4. **Choose an IRQ that is not taken by another device.**
   Note that IRQs for ISA devices are not usually displayed in the EISA configuration utility.

Valid Configurations

All of the EISA configurable parameters are also valid under the Solaris operating environment. As with any device, be wary of interrupt sharing.

Known Problems and Limitations

- If error messages such as “no such device” are displayed when attempting to access the Ethernet card, the device is probably not configured in the EISA configuration.

- Some NE3200 clones do not work with level-triggered interrupts.
  If you install an NE3200 card and your system hangs while trying to configure devices after reboot, it may not work with level-triggered interrupts.
  Workaround: Use the EISA configuration utility to select an interrupt type of EDGE TRIGGERED instead of LEVEL TRIGGERED.

Racal InterLan ES3210/ES3210 TP EISA Ethernet

Description

The Racal InterLan ES3210 is a 32-bit Ethernet adapter compatible with an EISA bus. The card comes in two versions:

- ES3210 supports standard Ethernet (10Base5) and thin Ethernet (10Base2).
- ES3210 TP supports standard Ethernet (10Base5) and unshielded twisted-pair (10BaseT).

The ES3210 cards are based on the National 8390 network interface controller.

Note – Only the latest revision of the ES3210 is supported—it uses surface-mount technology; the earlier revision does not. The older boards have a white sticker on the back bearing the number 625-0136-00; the newer cards have the number 625-0367-00 or higher.

Device Configuration

Preparing for Configuration

- The Solaris driver for the ES3210/ES3210 TP does not support I/O-mapped I/O. Since this is the default setting for each card ("Shared memory disabled"), it must be changed. An explicit address for the memory area on the board must be configured as described under "Configuring the Device."
- The driver currently does not use DMA channels 0-3 since 32-bit burst mode DMA transfers cannot be accomplished on these channels. The driver forcibly uses memory-mapped I/O even when one of these DMA channels is configured.

Avoiding Possible Device Conflicts

- Check the IRQ levels used by devices on your system. The default setting for the IRQ on this Ethernet adapter is 3, which is typically used by `COM2`. IRQ 6 is typically used by the diskette controller.
- The choices for shared memory on the Racal InterLan ES3210 are C0000, C4000, C8000, CC000, D0000, D4000, D8000, and DC000; however, note that C0000-C3FFF is used by the VGA BIOS, if present.

Configuring the Device

Use the EISA configuration utility for your system to make the following settings for the ES3210 card:

1. **Select the interrupt (IRQ) the card will use.**
   This is done at the "Interrupt Level Select" prompt. Be sure to check this.

2. **Set the base address of the ES3210 memory to any available (unused) location.**
   This is done at the "Memory Base Address Selection" prompt.

Note – The default setting is "Memory Mapped Disable." The Solaris driver will not work with this setting; you must change it.

   Be sure that the address you choose is not being used by some other adapter, particularly an ISA adapter. Note that the EISA configuration utility cannot accurately detect conflicts with ISA cards; it relies on information you enter about these devices to determine if conflicts exist.

3. **Choose a DMA channel.**
   This is done at the "DMA Channel Select" prompt. If you choose DMA channel 0, 1, 2, or 3, DMA will *not* be used.

Valid Configurations

The following parameters are valid for the Racal InterLan ES3210:

- IRQ — 3, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15
- Memory Base Address — 0xC0000, 0xC4000, 0xC8000, 0xCC000, 0xD0000, 0xD4000, 0xD8000, 0xDC000
- DMA Channel — Disable, 0, 1, 2, 3, 5, 6, 7

Known Problems and Limitations

The current release of the Solaris `riles` driver causes the network performance to degrade considerably when the Ethernet adapter is configured to use a DMA channel of 5, 6, or 7. Even though these values are valid, it is best not to use them.

SMC Elite32 Ultra (8232)

Description

The SMC Elite32 Ultra (8232) board is an EISA based Ethernet controller supporting 10Base-T, AUI, and BNC networks.

Although the hardware supports a Bus Master DMA mode of operation, the Solaris drivers do not make use of it.

The SMC Elite32 Ultra board is supported by the Solaris `smceu` driver.

Device Configuration

Preparing for Configuration

- The board is software configured using the EISA configuration utility along with an EISA configuration file supplied with the board by SMC. There are no jumpers on the board.
- The configuration utility allows the enabling or disabling of Bus Master Mode. The Solaris drivers do not operate the card in Bus Master Mode even if the mode is enabled. It does not matter which setting is selected by the configuration utility.
- You may use the configuration utility to select which Network Connection (Media) Type to use. 10Base-T is always enabled. If your network is AUI or BNC, you must use the configuration utility to ensure that the correct Network Connection Type is selected.
- The configuration utility also allows selection of the IRQ and base RAM address used by the board. You must choose values for these settings that do not conflict with other boards in the system. IRQ settings should be edge-triggered.

The optional ROM is not used by the Solaris drivers and should be disabled.

Configuring the Device

Use the EISA configuration utility to select the desired IRQ and memory base address. Ensure that the Network Connection Type is correct for your network. Set the ROM base address to Disabled.

Valid Configurations

The following parameters are valid for the SMC Elite32 Ultra (8232):

- Network Type AUI or BNC; 10Base-T
- IRQ 3, 5, 7, 9, 10, 11, 15; Edge
- RAM address 0xc0000 to 0xee000, 8K increments
- ROM address Disabled

The board's I/O address is determined by slot number.

Known Problems and Limitations

- SMC's own EZStart diagnostic hangs when testing the board in a Dell Omniplex 466. The card does work in a Dell Omniplex 590 machine. If in doubt, run the diagnostic provided by SMC.
- **(1219282)** The SMC Elite32C Ultra fails to handle RPL request packets as a netboot server.

SMC Ether100 (9232)

Description

The SMC Ether100 (9232) board is an EISA-based Ethernet controller supporting both 10Base-T and 100Base-T networks. Although the hardware supports a DMA mode of operation, the Solaris drivers do not make use of it.

The SMC Ether100 board is supported by the Solaris `smcf` driver.

Device Configuration

Preparing for Configuration

- The board is software configured using the EISA configuration utility along with the file supplied by SMC. There are no jumpers on the board.
- The board can be configured for either 10 MBPS or 100 MBPS. Operation at the higher speed using the UTP (Unshielded Twisted Pair) RJ-45 connector requires use of a Category 5 cable.
- The configuration utility also allows setting of the IRQ and DMA channels. The Solaris drivers do not make use of the DMA capabilities of the board, and do not require the selection of any particular DMA channel. The optional ROM is not used by the Solaris drivers and should be disabled.

Configuring the Device

Use the EISA configuration utility to select the desired network speed and IRQ. Set the ROM base address and DMA channel to Disabled.

Valid Configurations

The following configuratiions are valid for the SMC Ether100:

- Speed 10 MBPS or 100 MBPS
- IRQ 3, 5, 7, 9, 10, 11, 15
- DMA Channel Disabled
- ROM Address Disabled

The SMC Ether100 I/O address is determined by slot number. The DMA channel and ROM are not used.

SMC EtherEZ, EtherCard Elite16 Ultra, EtherCard PLUS Elite16, EtherCard PLUS (8416, 8216, 8013, 8003)

Description

The SMC 8416, 8216, and 80*x*3 family of cards are Ethernet adapters for ISA and Micro Channel bus architectures. An updated Solaris `smc` driver is provided to support the SMC EtherEZ (8416) Ethernet adapter. This updated driver supersedes the existing `smc` driver and will continue to support the SMC EtherCard Elite16 Ultra (8216) family of ISA bus Ethernet adapters and all the previous SMC/WD 8013 EtherCard PLUS Elite16 and EtherCard PLUS Elite/A families of ISA and Micro Channel architecture Ethernet adapters, and the EtherCard PLUS (8003) family of Ethernet adapters. The same device configuration information supplied for the SMC 8216 and 80*x*3 network adapters in the *x86 Device Configuration Guide* is repeated here for your convenience. The one exception is that the SMC EtherEZ (8416) adapter must have the Plug and Play setting disabled using the software setup program.

Device Configuration

Preparing for Configuration

Since memory is shared, it is necessary to disable the motherboard cache in the region where the Ethernet shared memory is mapped.

Avoiding Possible Device Conflicts

- AST systems that have DPT boards with the AST BIOS installed are known to conflict with SMC cards set to I/O port 0x300. For these system configurations, set the SMC card to a valid setup that does not use I/O port 0x300.
- Wyse Decision systems are known to conflict with SMC cards set to I/O port 0x300. For these system configurations, set the SMC card to a valid setup that does not use I/O port 0x300.
- The EtherCard PLUS (8003) board has a limited amount of on-board memory, which causes very poor NFS™ system performance. To avoid this problem, it is essential that NFS system mounts over the 8003 interface use a 4-Kbyte read/write buffer size. See the `mount_nfs(1M)` manual page for

more details on configuring NFS. This problem can also impact installation of Solaris for x86 over the network, causing occasional NFS complaints (which can be ignored).

- Since Solaris for SPARC has 8-Kbyte defaults, SPARC NFS file servers will interact poorly with 8003 adapters until the buffer sizes are reduced.

Configuring the Device

Software Procedure

1. **Consult your Device Configuration Work Sheet to see if your SMC network adapter needs to be reconfigured.**
2. **If necessary, reconfigure using the software setup program provided by SMC.**
3. **If using the SMC EtherEZ (8416), make sure the Plug and Play mode is disabled using the supplied software setup program.**

Hardware Procedure

1. **Consult your Device Configuration Work Sheet to verify that your SMC network adapter does not need to be configured.**
2. **If you must set jumpers, refer to the SMC documentation for the procedure.**

Valid Configurations

SMC EtherCard Elite16 Ultra (8216*xxx)* and SMC EtherEZ (8416*xxx*) network adapters use software procedures to configure the following:

Shared Memory Address Between 0xC0000 and 0xDE000

The information in the following table is only used for EtherCard PLUS (WD/SMC 8003*xxx)* cards that use jumpers to set the configuration:

IRQ	I/O Address	Base Memory Address (Board RAM)
3	0x280	0xD0000
5	0x2A0	0xD4000
5	0x300	0xD4000

Known Problems and Limitations

- The SMC EtherCard Elite16 Ultra cards (8216*xxx*) should be installed in a 16-bit slot. Data corruption may occur if an 8-bit slot is used.
- A client desktop computer with an SMC EtherCard PLUS (8003) cannot be booted from a network.

Part 6 — Audio Cards

Sound Blaster Pro

Description

The Creative Labs Sound Blaster Pro audio cards are DMA-capable ISA bus plug-in cards. They provide 8-bit mono and stereo digitized sound recording and playback over a wide range of sampling rates. Each card also includes a digital sound processor and mixing capability.

Note – The features and interfaces that are supported by the Solaris `sbpro` device driver are described in the `audio(7)` and `sbpro(7)` manual pages.

Device Configuration

Preparing for Configuration

- If you have a Sound Blaster Pro card with a nonstandard DMA setting, you must install Solaris x86 first, and then edit the `sbpro.conf` file.
- You must know the hardware jumper settings for the I/O address, interrupt request (IRQ), and DMA channel.
- Device configuration information is stored in the `sbpro.conf` file, usually in the `/platform/i86pc/kernel/drv` directory. The `sbpro.conf` file supports Sound Blaster Pro cards with factory default DMA settings.

Avoiding Possible Device Conflicts

- Be sure the I/O address jumper setting on your Sound Blaster card does not conflict with any other card in your system. If it conflicts, reconfigure the setting.
- The Sound Blaster Pro card cannot share IRQ settings with any other card installed in your system. If the hardware-jumpered IRQ setting conflicts with any other device, change the IRQ jumper setting on the Sound Blaster card to one listed under “Valid Configurations.” The most common conflicts occur with the `LPT1` parallel port, a serial port, or network card.

Configuring the Device

Hardware Configuration

1. **Consult your Device Configuration Worksheet to see if your Sound Blaster card needs to be reconfigured.**
2. **If the card's I/O address conflicts with another device, remove the card and change the I/O address using the manufacturer's instructions.**
3. **If the card's jumpered IRQ conflicts with another device, change the IRQ parameter using the manufacturer's instructions.**
4. **If the jumpered DMA channel conflicts with another device, change the DMA parameter using the manufacturer's instructions.**
5. **Record any changes in I/O address, DMA channel, or IRQ setting of the board on your Device Configuration Worksheet.**

Enabling Support for Sound Blaster Pro

1. **Install Solaris x86.**
2. **Become root.**
3. **If you changed the card's DMA channel to a value other than 1, update the `sbpro.conf` file:**
   a. **Change directories to the location of the kernel configuration files:**

```
# cd /platform/i86pc/kernel/drv
```

   b. **Edit the `sbpro.conf` kernel configuration file.**
   This is an ASCII file that can be edited using any text editor, such as `vi`. Change the `dma-channels` property for the SBPRO entry whose I/O address and IRQ setting match the hardware setting of your card.
   c. **Save your changes and exit the editor.**
4. **Remove the boot diskette from the drive if you have not already done so.**

5. **Perform a reconfiguration boot to make your changes take effect:**

```
# touch /reconfigure
# reboot
```

Valid Configurations

The possible settings for the Sound Blaster Pro card are listed here. Defaults are underlined.

- I/O Address 0x220, 0x240
- IRQ 2, 5, 7, 10
- DMA Channel 0, 1, 3

Known Problems and Limitations

- Output volume is controlled by software. Be sure the volume thumbwheel on the back of the card is turned all the way up to the maximum volume setting; otherwise you may not hear any sound.
- Microphone input is treated as a mono source; however, all the jacks on the back of the Sound Blaster card are stereo jacks. If your microphone has a mono plug, convert it to stereo using an appropriate adapter.

Sound Blaster 16/Sound Blaster AWE32

Description

The Creative Labs Sound Blaster 16 and Sound Blaster AWE32 audio cards are DMA-capable ISA bus plug-in cards. They provide 8- and 16- bit mono and stereo digitized sound recording and playback over a wide range of sampling rates, and each includes a digital sound processor and mixing capability.

Note – Some of the cards also support more advanced audio features, such as FM synthesis, advanced signal processing, advanced wave effects, and MIDI capability; however, the `sbpro` driver does not currently support these advanced features. The features and interfaces that are supported by the Solaris `sbpro` driver are described in the `audio`(7) and `sbpro`(7) manual pages.

Note – Some Sound Blaster cards support optional non-audio capabilities such as SCSI interfaces and CD-ROM interfaces. These interfaces are not supported by the `sbpro` driver. The Sound Blaster 16 optional SCSI-2 interface is supported by the Solaris `aic` driver. See the "Adaptec AIC-6360/ AHA-1522A/AHA-1520A/AHA-1510A/AHA-1530P/1532P HBAs/Sound Blaster 16 SCSI-2 (SCSI)" Device Reference Page for configuration information for the SCSI controller on this card.

Device Configuration

Preparing for Configuration

- If you have a Sound Blaster 16 card with IRQ and DMA jumpers, the jumper settings on the card will determine the IRQ and DMA channels to be used. However, if you have a SoundBlaster 16 card without audio IRQ and DMA jumpers or a Sound Blaster AWE32 card, you must install Solaris x86 first and then edit the `sbpro.conf` file. To do this, you must know the I/O address jumper setting of the card and what IRQ and DMA channels you plan to use.
- The audio subsystem of the Sound Blaster 16 needs its own I/O (port) address and an IRQ, distinct from those of the optional SCSI subsystem.

Avoiding Possible Device Conflicts

- Be sure the I/O address jumper setting on your Sound Blaster card does not conflict with any other card in your system; if it does, reconfigure the jumper setting.
- If your Sound Blaster card has both an audio and a SCSI-2 interface, select an I/O address for each interface to prevent conflicts with other configured devices.
- The Sound Blaster card cannot share IRQ settings with any other card installed in your system. The most common conflicts occur with the `LPT1` parallel port, a serial port, or network card.
  - If a hardware-jumpered IRQ setting conflicts with any other device, change the IRQ jumper setting on the Sound Blaster card to one listed under "Valid Configurations."
  - If your Sound Blaster card does not have an audio IRQ jumper, the IRQ used is determined by the entry you edit in the `sbpro.conf` file. In this case, choose an IRQ that does not conflict with any other device in the system.

Configuring the Device

Hardware Configuration

Note – Make sure you set the jumpers for the audio interface and *not* for the SCSI, if your Sound Blaster card has both an audio and a SCSI-2 interface.

---

1. **Consult your Device Configuration Worksheet to see if your Sound Blaster card needs to be reconfigured.**
2. **If the card's I/O address conflicts with another device, remove the card and change the I/O address according to the manufacturer's instructions.**

Note – If you have a Sound Blaster 16 card without audio IRQ and DMA jumpers or you have a Sound Blaster AWE32 card, you must specify the `dma-channels` property in the `sbpro.conf` file after Solaris is installed. See "Enabling Support for Sound Blaster 16 and AWE32."

---

3. **If you have a Sound Blaster 16 SCSI-2 and you intend to use the SCSI interface, you may have to set the jumpers that control the SCSI I/O address.**
   See the "Adaptec AIC-6360/Sound Blaster 16 SCSI-2 (SCSI)" Device Reference Page for information on setting the Sound Blaster 16 SCSI-2 card.

4. **Record any changes on your Device Configuration Worksheet.**

Enabling Support for Sound Blaster 16 and AWE32

1. **Install Solaris x86.**

2. **Become root.**

Note – If your Sound Blaster 16 card has audio DMA jumpers, the driver uses the DMA channels specified by those jumper settings, and you should not specify the `dma-channels` property in the `sbpro.conf` file. Instead go to step 4.

---

3. **If you have a Sound Blaster AWE32, or a Sound Blaster 16 card that has no audio IRQ and DMA jumpers, you must change the IRQ setting in the `sbpro.conf` kernel configuration file. Follow these steps:**

   a. **Change directories to the location of the kernel configuration file:**

```
# cd /platform/i86pc/kernel/drv
```

   b. **Edit the `sbpro.conf` kernel configuration file.**
      This file is in ASCII text that can be edited using any text editor, such as `vi`. The `sbpro.conf` file that is installed with Solaris contains detailed instructions and examples. Be sure that the specified IRQ and DMA settings do not conflict with other devices on the system.

   c. **Find the `SB16` entry that corresponds to your card's jumpered I/O address, and that contains the "interrupts" value that corresponds to the IRQ you want to use.**

   d. **Specify two DMA channels in the `dma-channels` property.**
      The first is for an 8-bit DMA channel, the second for a 16-bit DMA channel.

   e. **Save your changes and exit the editor.**

4. **Remove the diskette from the drive if you have not already done so.**

5. **Reboot the system as shown here:**

```
# touch /reconfigure
# reboot
```

Valid Configurations

The settings for the Sound Blaster cards are listed with the defaults underlined.

Sound Blaster 16/Sound Blaster AWE32:

- I/O address 0x220, 0x240, 0x260, 0x280
- IRQ 2, 5, 7, 10
- 8–bit DMA channel 0, 1, 3
- 16–bit DMA channel 5, 6, 7

Sound Blaster 16 SCSI-2:

- I/O address 0x140, 0x340
- IRQ 11
- DMA channel (not used) 0, 5, 6, 7

Known Problems and Limitations

- Output volume is controlled by software. Be sure the volume thumbwheel on the back of the card is turned all the way up to the maximum volume setting; otherwise you may not hear any sound.
- Microphone input is treated as a mono source; however, all the jacks on the back of the Sound Blaster cards are stereo jacks. If your microphone has a mono plug, convert it to stereo using an appropriate adapter.
- Sound Blaster 16 and Sound Blaster AWE32 cards are both recognized as Sound Blaster 16 cards.
- The Sound Blaster 16 optional SCSI-2 interface cannot be used as the primary disk controller because it has no BIOS. The system must be booted from a disk attached to another controller.

Part 7 — PC Card Hardware

PC Card Adapters

Description

PC Card (PCMCIA) adapters, such as the Intel i82365SL, Vadem VG365/VG465/VG468/VG469, Cirrus Logic PD6710/PD6720, Ricoh RF5C366, and Toshiba support up to eight Type I, II, or III sockets.

Device Configuration

Preparing for Configuration

- Other adapters that use chips based on the Intel i82365SL design may also be supported. See *Solaris 2.4 x86 Hardware Compatibility List* for supported systems.
- If you have an add-on PC Card adapter, install it on your system prior to Solaris installation.
- Some notebook computers have their built-in PC Card adapter disabled by default. Enable it prior to Solaris installation.
- If your system has a supported PC Card adapter configured at a known address, it should be recognized automatically. No manual configuration should be necessary.
- Requirements for a system depend on the combination of devices to be used. A typical two-socket notebook computer needs at least 8 Kbytes of address space, 16 bytes of I/O space, and three free IRQs. Following are general guidelines:

Address space	At least 8 Kbytes are required with 4 Kbytes per socket in the 640K-1MB range (not necessarily contiguous); if you have three sockets, at least 12 Kbytes are needed
I/O space	At least 8 and preferably 16 bytes per socket
IRQs	One per socket, plus an IRQ for the `pcic` device driver, itself

Configuring the Device

Initial Installation and Configuration

1. **Consult your Device Configuration Worksheet for address space, I/O space, and IRQs already used by system devices.**
2. **Insert the PC Card adapter.**
3. **Install Solaris x86, including the PCMCIA packages in the `SUNWpcmc` cluster.**
   - If you choose to install the Entire Distribution, the PCMCIA packages are automatically included. After installation, the next reboot will automatically perform the necessary reconfiguration.
   - If you choose any other distribution, such as the End User Distribution, select Customize from the choices at the bottom of the Software Selection screen. Then choose PCMCIA Support from the scrolling list on the Customize Software screen. After installation, the next reboot will automatically perform the necessary reconfiguration.
4. **Reboot the system.**

Adding PC Card Support to a Previously Installed System

If you are adding PC Card support via a Driver Update, refer to "Installing the PC Card Driver Update" in Chapter 3.

To add PC Card support to a previously installed system, do the following:

1. **Become root.**
2. **Use the `pkgadd` command and select PCMCIA Support from the Customize Software screen.**
3. **Do a reconfiguration reboot so that the `pcmcia` software automatically allocates resources:**

```
# touch /reconfigure
# reboot
```

4. **Insert the PC Card adapter and turn on the machine.**
5. **Do a second reboot so that the PC Card device driver begins running with the new resources allocated.**

Configuring PC Card Adapters

The Solaris PC Card nexus driver automatically allocates address space, I/O ports, and IRQs to new cards when they are inserted. To do this, the nexus driver must have sufficient free resources and recognize what resources are already used by other drivers.

- During installation of the PC Card software, a system initialization script maps out the resources used by all the other devices in the system. Resources not known to be used by another driver are assumed free for use by PC Card drivers.

Note – If you are using a notebook with a docking bay, keep the notebook in the docking bay during the installation of the PC Card software. This ensures that the system can identify the resources used by cards in the docking bay.

- Reconfiguration usually works automatically, but some machines may require that you provide information about resources already allocated. Three cases have been encountered:
  - *Case 1:* Some device drivers do not export properties describing the resources they use, so an automatic scan cannot determine what resources are allocated to those drivers. This situation is detected automatically by the scan, and the script prints out a warning message and request for manual assistance. See “Correcting Possible Conflicts” later in this Device Reference Page.
  - *Case 2:* Some machines may have devices for which no Solaris driver exists, and this can’t be detected automatically. You will have to enter the descriptions of their resource requirements manually.
  - *Case 3:* Some machines may have reserved additional ports, memory, or IRQs that are not detected by the automatic scan. In cases like these, the PC Card software may appear to configure properly, but some PC Card devices may simply not work (because they are sharing resources with other hardware). For example, some notebooks reserve an IRQ for power management use. In a case like this, read through the hardware documentation that accompanies the machine.

PC Card Resource Configuration Information

The resources available for PC Card devices are defined by three properties in the `pcic.conf` file:

`res-irq`

This property should be a complete list of the IRQ levels available for use by the `pcic` driver. For example, if IRQ levels 3, 9, and 15 are available, they are listed as:

```
res-irq=3,9,15
```

Each PC Card I/O device that needs an interrupt is assigned a different IRQ, and the PC Card adapter uses one IRQ level. In this example, only two I/O PC Card devices can be used at the same time.

`res-memory`

This property is a list of memory base and length pairs. The length is in number of 4-Kbyte pages available. For example, if there are two blocks of memory available, one starting at `0xcc000` with 8 pages available and another at `0xd0000` with 4 pages available, the property is set up as:

```
res-memory=0xcc000,0x8,0xd0000,0x4
```

Many notebook computers have all the memory between `0xcc000` and `0xeffff` available:

```
res-memory=0xcc000,0x14
```

If the notebook computer is to be used in a docking bay, be sure that the configuration also accounts for any devices installed in it.

`res-ioaddr`

This property, like the `res-memory` property, is a list in bytes, and the base address refers to I/O space. For example, if 32 bytes of I/O space are available at `0x200` and 16 bytes are available at `0x300`, the property is listed as:

```
res-ioaddr=0x200,0x32,0x300,0x16
```

If the available resources recorded by the PC Card software in the `/kernel/drv/pcic.conf` file include a resource that is actually in use by other devices in the system, you must manually edit the file to remove them. See "Correcting Possible Conflicts" below.

Note – Anytime the `pcic.conf` file is modified, you must reboot the system for the changes to take effect.

Correcting Possible Conflicts

When the PC Card software cannot automatically determine which resources are available, information must be added to the `/kernel/drv/pcic.conf` file to identify the unavailable resources. The resources available for PC Card devices are defined by the `res-irq`, `res-memory`, and `res-ioaddr` properties.

1. **To include information about unavailable resources, edit the `/kernel/drv/pcic.conf` file and add `#exclude:` lines.**

   a. **Each line that describes a set of reserved resources must begin with `#exclude:`.**

   b. **Non-blank characters after the colon are treated as a comment and ignored.**
   For example, the string "`pm`" in the example below shows that you are disabling IRQ 15 because of a conflict with the Power Management resource.

   c. **The next field should specify the `res-irq`, `res-memory`, or `res-ioaddr` property. See `pcic(7)`.**

   d. **For `res-irq` lines, the following field should be a decimal IRQ number.**
   For example, if a notebook computer uses IRQ 15 for Power Management, you can exclude IRQ 15 by adding the following line:

```
#exclude:pm res-irq 15
```

   The PC Card software would then know that IRQ 15 is not available for use by PC Card devices.

e. **For `res-memory` and `res-ioaddr` lines, the next two fields should be a hexadecimal base and byte count. The leading `0x` should not be used.** For example, if the `smc` device driver does not identify allocated resources automatically, add the following lines to the `pcic.conf` file:

```
#exclude:smc res-irq 3
#exclude:smc res-ioaddr 280 10
#exclude:smc res-memory dc000 2000
```

The `#exclude:` lines identify IRQ 3, ports `0x280-28F`, and addresses `0xDC000-0xDDFFF` as unavailable for PC Card device use.

2. **Reboot the system.**

```
# reboot
```

Note – This example shows `#exclude:` lines identifying resources that are *unavailable* to PC Card devices.

Changing the Default IRQ

The optional (`smi`) property can be defined in the `/kernel/drv/pcic.conf` file. If specified, the `smi` property overrides the default IRQ level, used by the `pcic` driver. By default, the second to the last IRQ in the `res-irq` list is used. If that value is unusable, specify the IRQ level in the `smi` property.

1. **Become root.**

2. **To override the default IRQ level for the `pcic` driver, edit the `/kernel/drv/pcic.conf` file and add a line that contains '`smi=`'.** (Be sure to add this line before the `;` character in the file.) For example, to change to IRQ 9, add the following line to `pcic.conf`:

```
smi=9
```

3. **Reboot the system.**

```
# reboot
```

Note – This example shows a resource being made available to the PC Card devices.

Known Problems and Limitations

Warning – The following problem has occurred on machines using the Vadem VG469 PC Card adapter chip. To avoid the problem, ground yourself by touching some metal on the computer case while inserting and removing the PC Card devices.

Sometimes the PC Card adapter will cause the machine to lock up. The `prtconf` command output may indicate that the device is in two sockets after a card is inserted in one socket. Subsequent card insertion and removal may not be detected, and the machine locks up. The machine must then be reset or power cycled.

3Com EtherLink III (3C589) PC Card

Description

The 3Com EtherLink III (3C589) PC Card device is a credit-card-like form factor Ethernet adapter.

Device Configuration

Preparing for Configuration

- It is not possible to boot or install the Solaris operating environment using a 3Com EtherLink III PC Card device.
- If the 3Com PC Card device is recognized, the `pcelx` driver will be automatically loaded, ports and IRQs will be automatically allocated, and the special files will be automatically created (if they don't already exist).
- No manual configuration of the hardware is necessary or possible.

Configuring the Device

Initial Installation and Configuration

1. **Install Solaris x86, including the PCMCIA packages in the `SUNWpcmc` cluster or from a PC Card Driver Update.**
2. **Boot the system.**
3. **Insert the 3Com EtherLink III PC Card device.**

Identifying an Unrecognized Card

If you insert a 3C589 card and it isn't recognized (no special files created), use the `prtconf` command to try to identify the problem.

1. **Run the `prtconf` command to see if your 3C589 card is recognized.**
   A recognized device will appear at the end of the `prtconf` output.
   For example:

```
# prtconf
.  .  .
pcmcia, instance #0
    pcelx, instance #0
```

2. **If `pcelx` does not appear in the `prtconf` output, there is a problem with the PC Card adapter configuration or with the hardware. Check to see whether the problem is with the card or the adapter by trying to use the card on another machine and by seeing if it works on the same machine using DOS.**

Installing and Configuring Additional Network Cards

Because the 3C589 card is not supported during Solaris installation, you must update network configuration files before it can be used as a network interface.

1. **Create a `/etc/hostname.pcelx#` file (where `#` is a socket number) to specify the host name to be associated with this interface.**
2. **Add an IP address for the new host name to the file `/etc/inet/hosts`.**
3. **Ensure that the associated network is listed in `/etc/inet/netmasks`.**
4. **Ensure that the Name Service Switch `/etc/nsswitch.conf` configuration file includes the network and local services you need.**
5. **Reboot the system.**

Note – This process is described in *TCP/IP Network Administration Guide*.

Special Files

Device naming in `/dev` follows standard LAN device naming except that the PPA (Physical Point of Attachment) unit number is the socket where the card resides, not the instance. That is, for the `pcelx` driver, `/dev/pcelx0` (or PPA 0 of `/dev/pcelx`) is the card in socket 0, while a card in socket 1 is `/dev/pcelx1` (or PPA 1 of `/dev/pcelx`). See `pcelx(7)`.

Hot-Plugging

If you remove the 3C589 card, any information you send is discarded, and no error messages are given.

When you reinsert the card in the *same* socket, the device operates normally. The behavior is similar to temporarily disconnecting the device from the network.

Known Problems and Limitations

- Network services are automatically started when a system is booted. These services are not started when a network interface is added or shut down after the system has been brought up.
- On some systems, a 3Com EtherLink III PC Card Ethernet adapter can only be used in socket 0 and will not work if removed and plugged into another socket. This problem can be avoided by always plugging in your PC Card Ethernet adapter into socket 0.

Modem and Serial PC Card Devices

Description

A wide range of supported modem and serial PC Card devices are based on the 8250, 16550, or compatible UART at speeds up to 115 Kbps.

Device Configuration

Preparing for Configuration

- If a modem or serial PC Card device is recognized, the `pcser` device driver is automatically loaded, ports and IRQs allocated, and special files created (if they do not already exist).
- No manual device configuration is necessary or possible.

Configuring the Device

Initial Installation and Configuration

1. **Install Solaris x86, including the PCMCIA packages in the `SUNWpcmc` cluster or from a PC Card Driver Update.**
2. **Boot the system.**
3. **Insert the modem device or the serial device.**

Identifying an Unrecognized Device

If you insert a PC Card modem or serial device and it isn't recognized (no special files created under `/dev/cua` or `/dev/term`), use the `prtconf` command to try to find the problem.

1. **Run the `prtconf` command to see if your modem or serial card is recognized.**
   An unrecognized device will appear at the end of the `prtconf` output. For example:

```
# prtconf
.  .  .
pcmcia, instance #0
    PC,111.222/Data Masher (driver not attached)
```

2. **If your device is not recognized "`(driver not attached)`", use the `add_drv` command to add the name of your device as another known alias for `pcser` devices.**
   For example, type the following at the command line:

```
# add_drv -i '"PC,111.222/Data Masher"' pcser
```

Note – Include the double quotes in single quotes to keep the shell from stripping out the double quotes. Use the identification string listed in the `prtconf` output. The part of the string after the slash can be treated as a comment, so use the entire string in the `add_drv` command. See `add_drv(1M)`.

Identifying an Incorrectly Recognized Device

1. **Run the `prtconf` command to see if your modem or serial card is erroneously recognized.**
   If the device is incorrectly recognized as a memory card, for example, the output of the `prtconf` command could show:

```
pcmcia, instance #0
   pcmem, instance #0
      pcram, instance #0
```

2. **Determine why this is happening and manually update the `pcic.conf` file.**

Additional Configuration

When adding a new serial port or modem to the system, you often need to edit configuration files so that applications can use the new communications port. For example, the `/etc/uucp/devices` file needs to be updated to use UUCP and PPP. See "UUCP Databases and Programs" in *TCP/IP Network Administration Guide*.

Special Files

The serial devices located in `/dev/term` and `/dev/cua` are named by socket number. A card inserted in socket 0 is `pc0`, and socket 1 is `pc1`. See `pcser(7)`.

Hot-Plugging

If a modem or serial PC Card device is unplugged while it's in use, the driver returns errors until the card is replaced in the socket.

The device must be closed and reopened with the card reinserted before the device begins working again. The restart process depends on the application. For example, a `tip` session automatically exits when a card in use is unplugged. To restart the system, you must restart the `tip` session.

Known Problems and Limitations

Because manufacturers interpret the PC Card specifications in different ways, some devices do not work, or work poorly. Consult *Solaris 2.4 x86 Hardware Compatibility List* for supported modems.

SRAM and DRAM PC Card Devices

Description

A wide range of PC Card (PCMCIA) SRAM (Static RAM) and DRAM (Dynamic RAM) devices is supported. Flash RAM devices are not supported.

Device Configuration

Preparing for Configuration

- If a PC Card memory device is recognized, the `pcram` device driver is automatically loaded, the physical address allocated, and special files created (if they do not already exist).
- No manual configuration is necessary or possible.

Configuring the Device

Initial Installation and Configuration

1. **Install Solaris x86, including the PCMCIA packages in the `SUNWpcmc` cluster or from a PC Card Driver Update.**
2. **Boot the system.**
3. **Insert the card.**

Identifying an Unrecognized Device

If you insert a memory device and it isn't recognized (no special files created), use the `prtconf` command.

1. **Run the `prtconf` command to display the configuration recognized by the system.**
   A recognized device will appear at the end of the `prtconf` output.
   For example:

```
# prtconf
.  .  .
pcmcia, instance #0
    pcmem, instance #0
          pcram, instance #0
```

2. **If your memory device does not appear in the `prtconf` output, it is not supported and cannot be used with the `pcram` device driver.**

Special Files

The special files created for PC Card memory devices act like disks and have names in the form `/dev/dsk/c#t#d#p#` or `/dev/dsk/c#t#d#s#` (See `pcram(7)`). These are described below:

`c#`	controller #
`t#`	card technology type #, defined as follows: `0` Null—no device `1` ROM `2` OTPROM (One Time PROM) `3` UV EPROM `4` EEPROM `5` Flash EPROM `6` SRAM `7` DRAM
`d#`	device region of type #, usually zero
`p#`	`fdisk` partition #
`s#`	Solaris slice #

Note – A device name can be specified either by a partition name (`p#`) or a slice name (`s#`), but not both.

Using PC Card Memory Devices

Since the Solaris Volume Management software recognizes PC Card memory devices, no special `vold` configuration is required.

♦ **If you do not want to use `vold` to manage your PC Card memory devices, comment out the "`use pcmem`" line in the `/etc/vold.conf` file.**
To comment out a line in `/etc/vold.conf`, add a # character to the beginning of the line.

PC Card memory devices don't need to have file systems on them, though typically, before using a new PC Card memory card, you will want to create a file system on it. DOS PCFS is the best format to use. Although you can use virtually any file system format on a PC Card memory card, most other file system formats are platform-dependent, making them unsuitable for moving data between different types of machines. See "Using PCMCIA Cards" in Appendix G of *Solaris User's Guide*.

Note – If you want to redirect the output of a `tar` command (or `dd` or `cpio`) to a PC Card memory device, you *must* first create a file system on the card, using the `fdformat` command without arguments. The card will need to be reformatted before it can be written on again.

Hot-Plugging

If a memory card is removed while in use, the device driver returns errors until a memory card is inserted into the appropriate socket.

The device needs to be closed and then reopened with the card reinserted in order to get it working again. If you removed the card while it was in use as a file system, unmount the file system with the `umount` command. Then reinsert the card and remount the file system with the `mount` command.

If you interrupt a `tar` or `cpio` process by removing the card, you must stop the process, reinsert the card in the socket, and then restart the process.

Known Problems and Limitations

- The Solaris `pcmem` driver in this release is not capable of handling "combo" memory cards with multiple types of memory on them (for example, combined SRAM and nonvolatile FLASH). Inserting such a card into a system running the Solaris software may cause a system panic. Fortunately, most PC Card RAM adapters do not contain multiple memory technologies.
- Because the PC Card memory device is designed as a pseudo-floppy diskette type, the only utility that can be used for formatting is `fdformat(1)`.

Supplementary Video Information B

This appendix includes supplementary information about the video support provided in this Driver Update.

Determining Resolution and Color Depth

The resolution and pixel color depth supported by video display adapters is dependent on the amount of video memory on the card. Table B-1 shows the minimum amount of video memory that is needed to support the resolutions and pixel color depth shown. This should only be used as a general reference, however, as the modes supported by your card may differ. Check the documentation that comes with your video card and monitor for the specific modes supported.

Table B-1 Minimum Memory Requirements to Support 8-Bit and 24-Bit Color Depth

	Color Depth	
Resolution	**8-Bit**	**24-Bit**
640x480	1 Mbyte	2 Mbytes
800x600	1 Mbyte	2 Mbytes
1024x768	1 Mbyte	3 Mbytes
1152x900	1 Mbyte	4 Mbytes
1280x1024	2 Mbytes	5 Mbytes
1600x1200	2 Mbytes	8 Mbytes

B

Supported Diamond Viper (P9000) Monitor Configurations

Table B-2 lists the monitors that can be used with the Diamond Viper graphics cards based on the Weitek Power 9000 (P9000) chipset supported in this Driver Update. When configuring the video adapter (`kdmconfig`), select only resolutions and frequencies that are supported by your monitor. If your monitor is not listed, you may be able to select a supported one that has the same resolution and synchronization rates as yours. In the following table, only the maximum resolution and horizontal and vertical frequencies supported by the monitor are listed.The `kdmconfig` program will display the lower resolutions supported by the monitor.

Table B-2 Supported Monitors With the P9000-Based Diamond Viper Graphics Card

Monitor	Maximum Resolution	Hfreq (kHz)	Vfreq (Hz)
CS1024	800x600	35.4	56.1
CS1024ni	1024x768	48.4	60.0
CS1572 FS	1280x1024	64.4	60.2
CTX 5468NI	1024x768	48.4	60.0
Fixed Frequency	800x600	35.4	56.1
HL 6955 SETK	1280x1024	64.4	60.2
IBM 8514	800x600	35.4	56.1
IBM 9515	1024x768	61.2	75.8
IBM 9517	1024x768	58.1	72.1
InterVue 20	1280x1024	81.2	76.0
MAG 17F	1152x900	56.8	60.3
NCR 3298-0240/0241	1024x768	48.4	60.0
NCR 3298-0261	1024x768	56.5	70.1
NCR 3298-0271/0272	1024x768	56.5	70.1
NEC 3FG	1024x768	48.4	60.0
NEC 3FGe	1024x768	48.4	60.0
NEC 3FGx	1024x768	48.4	60.0
NEC 4FG	1152x900	56.8	60.3
NEC 4FGe/5FGe	1152x900	56.8	60.3
NEC 5FG	1280x1024	64.4	60.2
NEC 6FG	1280x1024	78.9	74.0

Table B-2 Supported Monitors With the P9000-Based Diamond Viper Graphics Card

Monitor	Maximum Resolution	Hfreq (kHz)	Vfreq (Hz)
Nanao 9070u	1024x768	48.4	60.0
Nanao 9080i	1152x900	56.8	60.3
Nanao 9500	1152x900	56.8	60.3
Nanao T550i	1280x1024	64.4	60.2
Nanao T560i	1152x900	56.8	60.3
PS/V 2414-A04	1024x768	56.5	70.1
PS/V 2414-A07	1024x768	58.1	72.1
SONY 1304	1024x768	48.4	60.0
SONY 1304S	1152x900	56.8	60.3
SONY 1604S	1152x900	56.8	60.3
ViewSonic 6	1024x768	48.4	60.0
ViewSonic 7	1152x900	56.8	60.3

Supported Intergraph G91 Monitor Configurations

Table B-3 lists the supported Intergraph G91 monitor configurations in this Driver Update. When configuring the video adapter (`kdmconfig`), select only resolutions and frequencies that are supported by your monitor. In the following table, only the maximum resolution and horizontal and vertical frequencies supported by the monitor are listed. The `kdmconfig` program will display the lower resolutions supported by the monitor.

Table B-3 Supported Intergraph G91 Monitor Configurations

Monitor	Maximum Resolution	Hfreq (kHz)	Vfreq (Hz)
InterVue 20	1280x1024	81.25	76.00
InterVue 21	1600x1280	100.96	76.02
InterVue 27	1600x1280	80.07	60.25

B

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