



Solaris 2.5/2.5.1 x86 Driver Update 11 Guide

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Preface

This document provides information about x86 hardware devices that are now supported in the Solaris™ 2.5 and 2.5.1 computing environments. 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, disk interface, network adapters, 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 2.5/2.5.1 system with new drivers.

Note - Driver Updates are cumulative distributions. Although “New Device Functionality” on page 1 in Chapter 1 describes what’s been added since the last Driver Update, “Driver Update Contents” on page 3 in Chapter 1 provides a complete list of what will be installed. You only need to install the current Driver Update to get the support described in this document.

Before You Read This Book

The importance of configuring your hardware before Solaris installation is discussed in *x86 Device Configuration Guide*. This document assumes you have fully read and understood that guide; Appendix A in this document is an addendum to that guide and contains device configuration information for newly supported hardware. Likewise, the installation instructions in this Driver Update supplement the instructions in *x86: Installing Solaris Software*.

How This Book Is Organized

This book contains a brief description of the contents of the Driver Update diskettes, 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 before installing the new drivers. The hardware must be configured properly for the Solaris software to install and run correctly.

Chapter 1 provides information about what is new in this release and how to install it.

Appendix A contains Device Reference Pages that provide 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.

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 the Solaris software.

- *x86: Installing Solaris Software*

Describes how to install the Solaris software on x86 systems.

- *x86: Solaris 2.5 Installation Notes*

Describes late-breaking news about running Solaris 2.5/2.5.1 x86 software, including known problems with supported hardware or device drivers.

- *Solaris 2.5x x86 Hardware Compatibility List*

Contains a list of hardware supported in the Solaris 2.5/2.5.1 x86 computing environment.

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:

- The Web—For Driver Updates, open URL
`http://access1.sun.com/drivers.`

For updated Hardware Compatibility Lists, open URL
`http://access1.sun.com/certify/hcl.html.`
- FTP—Use anonymous FTP to access `ftp.uu.net` (or from your web browser, type `ftp://ftp.uu.net`), then go to
`/vendor/sun/solaris/x86/2.5.1.`
- CompuServe—Type `go sunsoft` and go to the Solaris x86 library.

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

Related Documentation Only

- Email Autoresponder—To obtain a Hardware Compatibility List or a Driver Update Announcement via email, write to `hcl-index@sun.com` for a list of autoresponse aliases that return hardware support information.
- ASK-IT¹—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, 1
(310) 348-6219 and choose option 1
 - Outside North America, call one of these numbers and choose option 1:

¹ Includes the current Hardware Compatibility List and document No. 51225, which summarizes the current Driver Update.

Australia	61-2-844-5374
Japan	03-5717-2560
Singapore	65-383-1971
United Kingdom	44-1494-510981

Ordering Sun Documents

The SunDocsSM program provides more than 250 manuals from Sun Microsystems, Inc. If you live in the United States, Canada, Europe, or Japan, you can purchase documentation sets or individual manuals using this program.

For a list of documents and how to order them, see the catalog section of the SunExpressTM Internet site at <http://www.sun.com/sunexpress>.

How to Obtain Technical Support

To obtain technical support:

- Contact your Sun Software Support Provider.
- In North America, you can also call 1-800-SUNSOFT and choose option 4.

Solaris 2.5/2.5.1 x86 Driver Update 11

Driver Update 11 provides additional driver support for Solaris 2.5/2.5.1 and must be used with this release.

New Device Functionality

Device Drivers

This table lists device drivers in Solaris 2.5/2.5.1 x86 Driver Update 11 that contain new functionality not included in previous Driver Updates. For a complete list of drivers included in this release, see Table 1-2.

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

SCSI HBA Driver

<code>cpqncr</code>	Fixed bugs and added support for the Compaq Dual Channel Wide Ultra SCSI-3 Controller
---------------------	---

SCSI Tape Driver

TABLE 1-1 New and Updated Drivers in This Driver Update *(continued)*

<code>st.conf</code>	Uncommented all previously unsupported entries so you can use older tape drives without having to modify <code>st.conf</code> ; added help text that explains how to submit new entries and where to find documentation about creating entries; consequently added support for these tape drives: Archive Python 28388, Conner CTD 8004H, Compaq DLT models 4000 and 7000, Sony SDT 7000 and SDT 9000, Wangtek 51000 and 52000, Tecmar TS-420, all shipping models of Sun DLT drives, Quantum DLT 4000 and 7000, Hewlett-Packard SureStore T4 and 1557A DDS3 autoloader (requires third-party control software), WangDAT models 3400DX and 3800, Exabyte 8900 Mammoth and 8705 Eliant, Tandberg TDC 4120
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Ethernet Network Drivers

<code>cnft</code>	Fixed bugs
<code>dnet</code>	Fixed bugs (in the media detection code) and added support for both Digital NIC 21142/21143 chips and media for T4 tape drives
<code>elx</code>	Added support for the embedded 3Com card in a Dell OptiPlex GXa 6266MT
<code>iprb</code>	Fixed a bug and added support for additional revisions of the 82557 chip

FDDI Network Driver

<code>sxp</code>	Fixed bugs
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Token Ring Network Driver

<code>mpre</code>	New driver to support the Madge PCI Presto card; the <code>mtok</code> driver continues to support all previous Madge cards
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Serial Ports Driver

<code>asy</code>	Fixed bugs
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Corrections to Known Problems

See “Driver Update 11 Release Notes” on page 11 for information about known problems that are fixed in this Driver Update.

Driver Update Contents

Solaris 2.5/2.5.1 x86 Driver Update 11 contains the following diskettes:

- Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 1
- Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 2
- Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 3
- Solaris 2.5/2.5.1 x86 Driver Update 11 DRIVER UPDATE Diskette 1
- Solaris 2.5/2.5.1 x86 Driver Update 11 DRIVER UPDATE Diskette 2
- Solaris 2.5/2.5.1 x86 Driver Update 11 DRIVER UPDATE Diskette 3

These diskettes are to be used with a Solaris 2.5/2.5.1 CD or net install image.

BOOT Diskettes

Solaris 2.5/2.5.1 x86 can be installed with the new BOOT diskettes. These diskettes contain scripts and configuration files that enable you to boot and install your system using one of the newly supported devices.

DRIVER UPDATE Diskettes

The DRIVER UPDATE diskettes are read when the Driver Update BOOT diskettes are used to install the Solaris software. Alternatively, the DRIVER UPDATE diskettes can be used without the BOOT diskettes to add new drivers to an existing x86 system running the Solaris 2.5 or 2.5.1 release.

The DRIVER UPDATE diskettes contain the drivers listed below. A new or updated Section 7D man page for each of the drivers that added new device support will also be installed in the appropriate man page directory during installation.

TABLE 1-2 Device Drivers in This Driver Update

Disk Interface Driver

<code>ata</code>	IDE device DDI compliance and other bug fixes, and support for NEC CDR-260R and CDR-273 CD-ROMs; added configurable flag to support suspend/resume on Compaq LTE Elite 4/40 notebooks; fixed conflict between this driver and <code>dpt</code> that caused systems with certain DPT SCSI HBAs to panic; added support for booting from CD-ROM in Compaq LTE 5000 series machines; added support for using suspend/resume functionality on Toshiba Tecra 500 CDT and 720 CDT laptops; added support for NEC 280 ATAPI CD-ROM; added support for multisession CD-ROMs
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SCSI HBA Drivers

<code>adp</code>	Updated driver to include support for the Adaptec AHA-2940U and AHA-2940UW and to fix a SCSI bus hang problem; updated to improve error detection and recovery in order to support Solstice DiskSuite; bug fixes; fixed a bug that would sometimes cause the driver to dereference a bad pointer and panic the system; fixed a bug which caused the driver to invalidly reset the Wide and Synchronous options the first time the <code>st</code> tape driver is opened; added improved flow control routines; fixed small mutex window which would sometimes cause spurious timeouts
<code>asc</code>	<p>New driver to support AdvanSys SCSI adapters, in three categories: 1) Connectivity Products, 2) Single Channel Products, 3) Dual Channel Products; see "AdvanSys SCSI Adapters" on page 41 for the SCSI adapters in each category</p> <p>Minor bug fix for reporting unknown bus when encountering Micro Channel bus</p>
<code>blogic</code>	Bug fixes
<code>cmdk, scdk, snlb</code>	Now supports Solstice DiskSuite (fixes bugs that could cause stale VTOC or FDISK Partition Table information to be read or written)
<code>corvette</code>	Updated IBM Micro Channel SCSI-2 Fast/Wide Adapter/A Device Reference Page to supply additional configuration information
<code>cpqncr</code>	New driver to support Compaq Fast Wide SCSI and Ultra SCSI Controllers (integrated and add-in adapters); fixed bugs and added support for the Compaq Dual Channel Wide Ultra SCSI-3 Controller

TABLE 1-2 Device Drivers in This Driver Update *(continued)*

dpt	Updated ISA bus DPT Device Reference Page to include PM-2041W; fixed several bugs that caused timeout messages to occur; improved robustness (by including the latest generic hard drive management routines), added support for SCSI devices on multiple adapter SCSI channels
esa	Probe conflict fixed
flashpt	New driver to support BusLogic FlashPoint LT Ultra SCSI, FlashPoint LW Ultra and Wide SCSI, FlashPoint DL Dual Channel Ultra SCSI, FlashPoint DW Dual Channel Ultra and Wide SCSI PCI HBAs
hxhn	New driver to support QLogic Fast!SCSI PCI IQ HBAs (QLA1000-PI, QLA1001-PI)
ncrs	Fixed synchronous negotiation problems; updated support for Compaq 32-Bit Fast-SCSI-2, Compaq Integrated 32-Bit Fast-SCSI-2; new support for Compaq Integrated 32-Bit Fast-SCSI-2, Compaq Integrated 32-Bit Fast-Wide SCSI-2, Compaq 32-Bit Fast-Wide SCSI-2/E, Compaq 32-Bit Fast-Wide SCSI-2/P; fixed a bug that sometimes prevented Solaris from booting if the Solaris partition extended past 1 Gbyte; removed support for 53C825-based controllers on Compaq systems—the new <code>cpqncr</code> driver includes support for these controllers on Compaq systems
pcscsi	Added support for the QLogic QLA510 SCSI adapter; fixed several minor bugs

SCSI Disk Arrays/RAID Controllers

chs	New IBM PC ServeRAID SCSI Array controller; fixed bugs; increased robustness of driver; added support for future RAID management features
dpt	Updated EISA bus DPT Device Reference Page to include PM-2042W, PM-2142W, PM-3222, PM-3332UW
dpt	PCI bus DPT Device Reference Page for the PM-2024 and PM-2124 PCI controllers, and the PM-3224 RAID controller for the PCI bus; updated Device Reference Page to include PM-2124W and PM-3224W; updated to improve error detection and recovery in order to support Solstice DiskSuite; updated Device Reference Page to include PM-2044W, PM-2044UW, PM-2144W, PM-2144UW, PM-3334W, PM-3334UW

TABLE 1-2 Device Drivers in This Driver Update *(continued)*

<code>mega</code>	New American Megatrends MegaRAID 428 SCSI RAID Controller
<code>mlx</code>	Updated driver to add support for the Mylex DAC960P PCI controller; updated <code>mlx</code> realmode driver to include new framework changes for MSCSI-based (multiple SCSI bus) drivers; added support for the Mylex DAC960PD-Ultra; added support for Mylex firmware version 3—see Mylex’s website at http://www.mylex.com for firmware update information
<code>smartii</code>	New Compaq SMART-2 EISA/PCI Array controller; added support for SMART-2SL controllers

SCSI Tape Driver

<code>st.conf</code>	Added support for more SCSI tape drives; uncommented all previously unsupported entries so you can use older tape drives without having to modify <code>st.conf</code> ; added help text that explains how to submit new entries and where to find documentation about creating entries; consequently added support for these tape drives: Archive Python 28388, Conner CTD 8004H, Compaq DLT models 4000 and 7000, Sony SDT 7000 and SDT 9000, Wangtek 51000 and 52000, Tecmar TS-420, all shipping models of Sun DLT drives, Quantum DLT 4000 and 7000, Hewlett-Packard SureStore T4 and 1557A DDS3 autoloader (requires third-party control software), WangDAT models 3400DX and 3800, Exabyte 8900 Mammoth and 8705 Eliant, Tandberg TDC 4120
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Ethernet Network Drivers

<code>cnft</code>	New driver to support Compaq NetFlex-3 and Netelligent controllers—see the Device Reference Page for those adapters that are currently supported; fixed bugs
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TABLE 1-2 Device Drivers in This Driver Update *(continued)*

dnet	<p>Added support for a number of new cards—see the Device Reference Page and Hardware Compatibility List for details</p> <p>Bug fixes: stress tests caused dnet to fall off the net; potential TX descriptor corruption and false busy loops; did not allow 10 Mb on Cogent EM110TX; performance of 100 Mbps cards was slow; automatic detection of AUI and BNC failed; only first port worked on multiport cards; non-portable code; problems with multiple cards and/or shared interrupts; Solaris 2.4 environment xpci support not implemented correctly; couldn't have both BNC/AUI and 10Base-T DNET cards in Solaris 2.5 environment; interrupts set up incorrectly under Solaris 2.4 environment; couldn't netboot off SMC9332BDT and Cogent EM440 cards with subvendor IDs; IRQs did not get assigned properly on multiport cards; driver panicked under Solaris 2.5 environment; added full-duplex and autonegotiation support; multiport cards now work correctly in MP machines; fixed bugs (in the media detection code) and added support for both Digital NIC 21142/21143 chips and media for T4 tape drives</p>
eeepro	Updated Device Reference Page to include Intel EtherExpress PRO/10+ (82595FX)
el	Fixed a number of probe conflicts that caused this driver to interfere with an elx or an smc card or with ata on a Compaq docking station; automatic port configuration should now work correctly
elink	Updated 3Com EtherLink 16 (3C507) Device Reference Page to supply additional configuration information; fixed a problem in which the realmode driver would not work in turbo mode
elx	Added support for 3Com EtherLink III 3C59x; updated to fix conflict with sbpro driver that prevented 3C509 ISA cards from working; added support for 3Com EtherLink XL (3C900 TPO) and Fast EtherLink XL (3C905); added support for the 3Com 3C900 COMBO card; fixed regression (in Driver Update 7) that broke support for 3C509/3C579; fixed most of the outstanding bugs; the 3C900 card now supports automedia detection; fixed problems that were introduced in Driver Update 8 on cards with a single network interface; added support for the embedded 3Com card in a Dell OptiPlex GXa 6266MT
fmvel	New Fujitsu FMV183; updated Device Reference Page to describe how to work around conflict with nei driver; bug fixes

TABLE 1-2 Device Drivers in This Driver Update *(continued)*

iee	Fixed a problem in which the driver failed to come up on the network on a P60, and one in which the driver hung the network after attempting to copy a large file; MCA support is now implemented correctly; the driver also supports automedia detection; updated realmode driver to fix a bug encountered on Compaq ProLiant systems
ieef	Updated Intel EtherExpress PRO/100 (82556) Device Reference Page to explain how to set 100-Mbps mode; implemented automedia/autospeed detection and fixed a number of other bugs: driver incorrectly handled RPL request packets; driver used old-style PCI support; driver generated CRC errors under stress; driver checked all 4 bytes of EISA ID
iprb	New Intel EtherExpress PRO/100B TX, Intel EtherExpress PRO/100B/T4, and Intel EtherExpress PRO/10+; fixed a number of bugs: network connection drops on the way up; board structures should be declared volatile; zero message block fix; this driver also contains several performance enhancements; fixed a number of bugs in which the driver would fall off the network when stressed; implements the "Receive Lockup Errata" solution as recommended by Intel; added support for the Intel EtherExpress PRO 100/B (82557) Rev. C card; bug fixes; added full-duplex and autonegotiation support; fixed a bug and added support for additional revisions of the 82557 chip No Device Reference Page is supplied for this driver as no special configuration procedures are required
nei	Change in enabling batch file; updated Device Reference Page to describe how to work around conflict with <code>fmvel</code> driver
nfe	Bug fixes; DB-15 connector now works with NetFlex-2 DualPort ENET
pcn	Corrected batch file name in Device Reference Page; updated to support HP PC LAN NC/16 TP J2405A Ethernet controller; updated to prevent Compaq XL systems from hanging after a soft reboot; fixed a bug in which <code>netinstall</code> would not work at IRQs above 7; added support for Allied Telesyn AT-1500 and Microdyne NE2500plus ISA cards
smc	Replaced existing driver with new driver based on the Standard Microsystems Corporation (SMC) UMAC/LMAC Driver Specification (<code>gld</code> -based driver fixes most known bugs; multiple <code>smc</code> cards in the same system can run in parallel, improving performance)

TABLE 1-2 Device Drivers in This Driver Update *(continued)*

smce	Replaced existing driver with new driver based on the Standard Microsystems Corporation (SMC) UMAC/LMAC Driver Specification (gld-based driver fixes all known bugs)
smceu	Fixed all known bugs; card can now be used as an RPL server
smcf	Updated SMC Ether 10/100 (9232) Device Reference Page to reflect correct product name; fixed most known bugs, but the driver still doesn't transfer data at rates expected of a 100-Mbps interface

FDDI Network Driver

sxp	New Rockwell RNS 2200 Series; netboot now works; fixed a number of bugs in which the driver would fall off the network when stressed; restructured driver for greater efficiency; removed the sys_core loadable module; fixed bugs
-----	--

Token Ring Network Drivers

mpre	New driver to support the Madge PCI Presto card; the mtok driver continues to support all previous Madge cards
mtok	New Madge Smart 16/4 family, including AT Ringnode/Bridgenode, AT Plus Ringnode, ISA Client Ringnode, ISA Client Plus Ringnode, EISA Ringnode/Bridgenode, MC Ringnode/Bridgenode, MC32 Ringnode/Bridgenode, PCI Ringnode/Bridgenode
tr	Added support for IBM Auto 16/4 and Turbo 16/4 Token Ring adapters

Keyboard Driver

kd	Updated to prevent the screen from going into unreadable white-on-white mode and to prevent a system panic during boot on systems that don't have a graphics card
----	---

Parallel Ports Driver

lp	Bug fix
----	---------

Serial Ports Driver

TABLE 1-2 Device Drivers in This Driver Update *(continued)*

<code>asy</code>	Serial driver bug fixes; enhanced the hardware flow control functionality, which works regardless of the <code>CLOCAL</code> flag bit; added support for 57.6 Kbps and 115.2 Kbps; updated to make it more robustly handle hardware failures from marginal serial port implementations; improved modem control status sensing; fixed bug that kept the FIFO on serial hardware from being discovered (the bug caused performance problems because the FIFO was not used); fixed bugs
------------------	--

Audio Drivers

<code>sbpro</code>	New Analog Devices AD1848, which also supports compatible devices; Creative Labs Sound Blaster Pro Device Reference Page updated; Creative Labs Sound Blaster 16/Sound Blaster AWE/32 Device Reference Page included for convenience
<code>sccd_audio</code>	Added support for multisession CD-ROMs

PC Card (PCMCIA) Hardware

<code>pcelx</code>	Added support for IBM ThinkPad 760E series systems and systems using the TI PCI1130 PCI-to-CardBus chip
<code>pcic</code>	Fixed bug that caused modem cards to be recognized as memory on many systems; modems should now be usable on all supported systems
<code>pcser</code>	Fixed a problem in which some PC card modems dropped a connection immediately after establishing it, or would not echo characters or dial

Configuration Drivers

<code>inetboot</code>	Modified to provide support for diskette file compression; now allows use of full capacity of IDE disks greater than 2 Gbytes; updated to support the <code>cpqncr</code> driver
<code>ufsboot</code>	Updated to enable more machines to boot Solaris properly; modified to provide support for diskette file compression; now allows use of full capacity of IDE disks greater than 2 Gbytes; updated to support the <code>cpqncr</code> driver

Note - The updated `kd` driver ensures that the screen display does not go into a unreadable white-on-white mode during installation on some notebooks and other machines. Although the `kd` driver supports graphics cards, it resides on the boot diskettes rather than on the VIDEO UPDATE diskettes.

This table lists the MP kernel modules included in this Driver Update.

TABLE 1-3 MP Kernel Modules in This Driver Update

<code>compaq</code>	An updated MP module for Compaq ProLiant that enhances performance
<code>corollary</code>	Fixes a hang problem on Corollary Cbus II systems, like the IBM Server 720
<code>pcplusmp</code>	An updated MP module that fixes some problems on Intel MultiProcessor Specification Version 1.1 (Intel MP Spec. 1.1) compliant systems; fixed a problem that caused a Micron Magnum Pro 200 with an Adaptec AHA-2940U PCI SCSI controller to panic during installation; fixed a bug on some Pentium Pro systems with the Intel PCIset 440FX (Natoma) chipset, such as IBM PC 300 Pentium Pro and Dell OptiPlex GXPro 200
<code>syspro</code>	An updated MP module for Compaq Systempro that fixes some probe conflicts on Compaq ProLiant systems

Driver Update 11 Release Notes

Note - The Adaptec AHA-3940 has been certified by Adaptec to run on specific system platforms. Our testing has shown that the Solaris software works properly on some of those systems and not on others. If you encounter problems running Solaris x86 on an Adaptec-approved platform with the AHA-3940, contact your Sun Software 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`.

- The following notes apply to the `mlx` driver:
 - Due to Mylex firmware limitations, tape and CD-ROM devices must be attached on a separate channel from logical devices (see the `mlx` (7D) man page for details).
 - Access to Ready drives as SCSI devices has been restricted to lessen the chance of configuration errors. See the `mlx` (7D) man page for information on how to re-enable this feature, which is not recommended.
 - (1226577) The `mlx` driver has been updated to provide PCI support in Solaris 2.5/2.5.1. If you're using any one of the controllers supported by `mlx`, whether it is PCI or not, upgrading from 2.4 to 2.5 may fail, especially if `mlx` is the boot driver.

Workaround: Don't upgrade; reinstall if your system uses the `mlx` driver.

- If you are installing Solaris 2.5/2.5.1 x86 on one the following Intergraph systems, you will need to modify the Driver Update 11 BOOT diskettes to work around 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 2.5/2.5.1 x86 software. See "Modifying the Solaris Driver Update Boot Diskettes" on page 18.

- The Novell NE2000 and NE2000plus are sensitive to autoprobeing 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 "Novell NE2000, NE2000plus Ethernet, and Compatibles" on page 90 in Appendix A.
- Due to conflicts, the IBM Micro Channel SCSI-2 Fast/Wide Adapter/A should not be installed until the Solaris Micro Channel `mcis` driver is disabled. See "IBM Micro Channel SCSI-2 Fast/Wide Adapter/A" on page 54 in Appendix A.
- Due to conflicts, probing for the AHA-284x VLB has been disabled. See "Adaptec AHA-2740, AHA-2742, AHA-2740A, AHA-2742A, AHA-2740T, AHA-2742T, AHA-2740AT, AHA-2742AT, AHA-2740W, AHA-2742W, AHA-2840VL, AHA-2842VL HBAs" on page 34 in Appendix A.
- To prevent conflicts with the `tr` driver, the `mtok` driver is disabled by default, and special steps must be taken to enable it. See "Madge Smart 16/4 Token Ring" on page 108 in Appendix A.

- Due to conflicts, the Fujitsu FMV183 should not be installed until the Solaris `el` and `nei` drivers are disabled. See “Fujitsu FMV183 Ethernet” on page 83 in Appendix A.
- Early during Solaris 2.5.1 installation using the Driver Update diskettes, after the drivers have been loaded and the message “Configuring /devices directory” is displayed, the message “Segmentation Fault (coredump)” may appear. This message can be ignored.
- (1263053) When installing Driver Update 11, the following message may appear repeatedly, and it can be ignored:

```
dpt_intr(7304): null ptr
```

- (4055365) Some users of `dpt` ISA bus controllers may experience timeout error messages and failures because of a possible probe conflict with the `ata` driver. To correct this problem, perform the following steps:

1. Mount the first boot diskette, and rename the Realmode driver

`ata.bef` to `ata.xxx`:

```
# volcheck
# mv /floppy/floppy0/ata.bef /floppy/floppy0/ata.xxx
# eject
```

2. Mount the third boot diskette, and append a line excluding the `ata` Solaris driver:

```
# volcheck
# echo 'exclude: ata' >> /floppy/floppy0/solaris/system.add
# eject
```

3. Exclude the `ata` Solaris driver on the installed disk and manually reboot:

```
# echo 'exclude: ata' >> /a/etc/system
# reboot
```

Upgrading Compaq Systems

- If you installed your system using Driver Update 6 or before (including any instance you installed with the boot diskette supplied with the Solaris CD) and you have one of the following Compaq adapters, your Compaq system must be running in order to apply Driver Update 11:

- Compaq Integrated 32-Bit Fast-Wide SCSI-2/E
- Compaq 32-Bit Fast-Wide SCSI-2/E Controller
- Compaq Integrated 32-Bit Fast-Wide SCSI-2/P
- Compaq 32-Bit Fast-Wide SCSI-2/P Controller

You cannot, for example, directly apply Driver Update 11 to a diskless/dataless client server and expect the file system for the client to be correctly updated. You must apply Driver Update 11 to the diskless/dataless client system on the server while it is running.

- Due to the previously mentioned limitation, if your Solaris 2.5 or 2.5.1 system was initially installed using Driver Update 6 or before (including those installed with the boot diskette supplied with the Solaris CD), the `cpqncr` driver CAN NOT be backed out (that is, by running `backoutpatch patch number`) in the event that you want to return your system to a pre-Driver Update 11 state.
- Upgrades are not supported and you cannot apply Driver Update 11 if you have a non-Compaq PCI SCSI adapter that uses the `ncr53C825` chip installed in your Compaq machine.

You must use Driver Update 11 to reinstall the Solaris software.

- If your Solaris 2.5 or 2.5.1 x86 netinstall client is a Compaq machine that contains one or more of the Compaq SCSI adapters listed below, you must update the `inetboot` images on the server to which the client connects:
 - Compaq Integrated 32-Bit Fast-Wide SCSI-2/E
 - Compaq 32-Bit Fast-Wide SCSI-2/E Controller
 - Compaq Integrated 32-Bit Fast-Wide SCSI-2/P
 - Compaq 32-Bit Fast-Wide SCSI-2/P Controller

“Boot Programs Modified to Support Compressed Files” on page 14 contains instructions about using the script `inetcp.sh` to update the correct instances of `inetboot`.

Boot Programs Modified to Support Compressed Files

A compression feature is being used on files included on the Solaris 2.5/2.5.1 x86 Driver Update 4 (and later) diskettes. Solaris x86 boot programs (`ufsboot` and `inetboot`) have been modified to support this feature.

If a server has or will have Solaris 2.5 or 2.5.1 x86 netinstall or diskless clients, the appropriate copies of `inetboot` in the server's `/rplboot` directory and boot images *must* be updated to enable net booting from the

compressed-format Driver Update diskettes. If the system is not updated, you'll see the following message when attempting to install this Driver Update during network boot:

```
SunOS Release 5.5 Version Generic [UNIX(R) System V Release 4.0]
Copyright (c) 1983-1995, Sun Microsystems, Inc.
Can't load KD
Type any key to continue
```



Caution - If a server has 2.5 or 2.5.1 x86 boot images that are mounted directly from CD-ROM (that is, neither `setup_install_server` or `setup_install_server -b` was run), then the version of `inetboot` in the boot image cannot be updated. This means that the `inetcp.sh` script (in `inetfix.dir` on Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 1) *must* be rerun any time new x86 install clients are added for this boot image via `add_install_client`. Due to a problem in `add_install_client`, this will result in multiple physical copies of the `inetboot` program in the server's `/rplboot` directory.

Use the following procedure to update the `inetboot` images on your `netinstall` or `netboot` server.

1. **Become root on the server.**
2. **Insert Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 1 into drive 0.**
3. **Mount the diskette.**
 - If Volume Management is running, type:

```
# volcheck
```
 - If Volume Management is not running, manually mount the diskette:

```
# mount -F pcfs /dev/diskette /mnt
```
4. **Run `inetcp.sh` (included in `inetfix.dir` on Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 1).**
 - If Volume Management is running, type:

```
# cd /floppy/floppy0/inetfix.dir
# ./inetcp.sh inetboot
```

- If Volume Management is not running, type:

```
# cd /mnt/inetfix.dir
# ./inetcp.sh inetboot
```

Boot Programs Now Handle IDE Disks Greater Than 2 Gigabytes

On systems installed with Driver Update 3, the Solaris x86 boot programs (ufsboot and inetboot) artificially limited the usable capacity of IDE disks that are greater than 2 Gbytes. The usable capacity would appear to be half or less than the capacity of the disk (for example, a 2.5-Gbyte disk would look like a 1.2-Gbyte disk). Driver Update 7 and later fix this problem. Releases prior to Driver Update 3 did not exhibit the problem.

If you have a system that has this problem, you can reinstall your system, using Driver Update 11 to reclaim the lost capacity. If you do not want to reinstall, you should be able to use your system as is, but the extra disk capacity will not be available to the Solaris environment. It is best to reinstall your system to avoid any future problems with upgrading your system.

If you aren't sure if your system has this problem, on the system in question, install the Driver Update 11 driver patches and reboot the system. Type the following lines into a file named `disktest`:

```
#!/bin/sh
if [ ! -h /dev/rdisk/${1}p0 ] ; then
    echo "$1: invalid disk name";
    exit 1;
fi

fdisk -W /tmp/fdisk.$$ /dev/rdisk/${1}p0
prtvtoc /dev/rdisk/${1}s2 >/tmp/prtvtoc.$$
grep tracks/cyl /tmp/fdisk.$$ /tmp/prtvtoc.$$
rm /tmp/fdisk.$$ /tmp/prtvtoc.$$
```

As root, use the `chmod` command to make the script executable:

```
# chmod +x ./disktest
```

and run the script with the name of the disk you'd like to check. If you have one IDE disk, the name will be `c0d0`; for different names, examine the directory `/dev/dsk` to determine the names of the disks installed. The following is sample output from the program:

```
# ./disktest c0d0
/tmp/fdisk:*      128 tracks/cylinder
/tmp/prtvtoc:*    64 tracks/cylinder
```

The script prints out two interpretations of how many tracks per cylinder the system thinks there are for the given disk. If the values differ, your disk has the problem; reinstall your system with Driver Update 11. If the values are the same, you don't need to reinstall your system, and installing Driver Update 11 will have no effect on your disk capacity.

Make Sure You Install on the Correct Boot Drive

On machines with more than one disk controller, the Solaris installation program may identify the wrong disk as the boot drive. Before installing, you must identify the boot drive; consult your system documentation to determine what it is. (The Solaris boot drive will be the same as the DOS boot drive.) During the installation, put the root file system on what you know to be the boot drive—even if it differs from what the installation program says is the boot drive.

If you do not choose the correct boot drive during installation, your machine will fail to boot. If this happens, you can access the Solaris environment by booting with the Solaris Driver Update boot diskettes and selecting the drive that contains the root (`/`) file system. Otherwise, to permanently set the correct boot drive, you will have to reinstall the Solaris software.



Known Problems

Caution - (1233584) The Solaris installation program's default size for the root (/) file system may not be large enough to produce a working system with new or updated drivers. If your root file system is too small, `cpio` will complain of a lack of space when installing the DRIVER UPDATE diskettes. If this happens, the Solaris software will have to be reinstalled in order to add the Driver Update.

Workaround: When installing the Solaris software, press F4 to Customize the file system partitions, and increase the size of the root file 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 `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
-
- Multiple PCI devices that share interrupts can cause a panic on a reconfiguration reboot. If this happens, perform a second reboot without doing a reconfiguration.

Modifying the Solaris Driver Update Boot Diskettes

Before you install the Solaris software on your system, you may have to modify the Driver Update BOOT diskettes to remove or enable certain drivers that conflict with each other. See "Driver Update 11 Release Notes" on page 11 for examples.

There are scripts on the Driver Update BOOT diskettes for driver modification. The diskettes must be modified using DOS. As a precaution, make a backup of the original Driver Update BOOT diskettes before running 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 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 1 into drive A:, make a copy of it, and remove the diskette:**

```
diskcopy a: a:
```

4. **Label the copy of the Driver Update boot diskette as "Modified."**

For example: "Modified Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 1 for Intergraph Systems."

5. **Insert another blank 3.5-inch diskette into drive A: and format it:**

```
format a:
```

6. **Insert Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 2 into drive A:, make a copy of it, and remove the diskette:**

```
diskcopy a: a:
```

7. **Label the copy of the Driver Update boot diskette as "Modified."**

For example: "Modified Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 2 for Intergraph Systems."

8. **Insert another blank 3.5-inch diskette into drive A: and format it:**

```
format a:
```

9. **Insert Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 3 into drive A:, make a copy of it, and remove the diskette:**

```
diskcopy a: a:
```

10. **Label the copy of the Driver Update boot diskette as "Modified."**

For example: "Modified Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 3 for Intergraph Systems."

11. **Store your original Driver Update BOOT diskettes in a safe place.**

12. **Insert the copy of Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 3 (the third diskette) into drive A:.**

Make sure the diskette is writable because the contents will be modified.

13. **Change to drive A: (remember DOS is still running):**

```
a:
```

14. **Run the batch command file.**

The batch files are run from Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 3, but some of them will ask you to reinsert the other boot diskettes.

- 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:
 - AHA-284x probing

- NE2000/NE2000plus
- IBM Micro Channel SCSI-2 Fast/Wide Adapter/A
- Madge Smart 16/4

Installing Solaris Using the Driver Update Diskettes

To install Solaris 2.5/2.5.1 on an x86 system, follow the instructions in *x86: Installing Solaris Software* using the diskettes labeled Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 1, Diskette 2, and Diskette 3.

The procedure for installing the Solaris software using the Driver Update BOOT diskettes is almost the same as that described in *x86: Installing Solaris Software*. Boot using Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 1 instead of the boot diskette that came with your Solaris 2.5 or 2.5.1 product. During the installation process, you'll be prompted to insert Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 2 and Diskette 3. 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: forcload 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 diskettes. At the start of that phase of the installation, one of the install scripts will ask you to insert Solaris 2.5/2.5.1 x86 Driver Update 11 DRIVER UPDATE Diskette 1 into the drive. During the installation, you'll be prompted to insert the other DRIVER UPDATE diskettes. After the new driver packages have all been added, the script will ask you to remove the diskette from the drive. In each case, it will wait for you to perform the requested action and press Enter.

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

Note - If you have a Sound Blaster card or AD1848 device or compatible, there may be additional steps you need to take after the Solaris software is installed on your system. See the three Device Reference Pages for the sbpro driver in Appendix A.

Adding New Drivers to an Existing Solaris System

Note - Before adding new drivers, the newly supported hardware devices should be installed and configured according to the instructions in Appendix A.

When the Solaris 2.5 or 2.5.1 x86 software is already installed, the simplest way to add new drivers is to install the DRIVER UPDATE diskettes as a patch on your system.

Follow these procedures to install the new drivers.

1. **Insert Solaris 2.5/2.5.1 x86 Driver Update 11 DRIVER UPDATE Diskette 1 into drive 0.**
 2. **Become root.**
-

Note - To see if Volume Management software is running, type:

```
ps -e | fgrep vold
```

For more information about managing diskettes and drives, see *System Administration Guide, Volume I*.

3. **Stop Volume Management if it is running.**

Typing this command is safe if Volume Management isn't running.

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

4. **Use cpio to copy files off the diskette.**

```
# mkdir /tmp/Drivers
# cd /tmp/Drivers
# cpio -iduBI /dev/rdiskette0
```

After some time, the following message is printed:

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

5. Insert Solaris 2.5/2.5.1 x86 Driver Update 11 DRIVER UPDATE Diskette 2 and press Enter.

After some time, the following message is printed:

```
End of medium on "input".  
Change to part 3 and press RETURN key. [q]
```

6. Insert Solaris 2.5/2.5.1 x86 Driver Update 11 DRIVER UPDATE Diskette 3 and press Enter.

After some time, a message with the number of blocks read is printed.

7. Verify the extracted cpio image:

```
# /usr/bin/sum cpioimage.Z | /usr/bin/cut -f1 -d' '
```

If the output from this command is not 13622, delete cpioimage.Z and repeat Steps 4-6.

8. Remove the diskette from drive 0. If you want to restart Volume Management, type:

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

9. Type the following to run the installation script:

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

10. Follow the instructions on the screen to shut down the system.

The instructions include how to restart the system.

11. A second reboot may be required if you have installed a new network card that uses a new network driver.

See *x86 Device Configuration Guide* for information about what to do when replacing a network card.

When the system comes up, the new device drivers should be completely installed and functional. However, additional steps may be necessary. See "Driver Update 11 Release Notes" on page 11.

Note - If you have a Sound Blaster card or AD1848 device or compatible, there may be additional steps you need to take after the Solaris software is installed on your system. See the three Device Reference Pages for the `sbpro` driver in Appendix A.

Disabling Drivers After Installing the Driver Update

It is sometimes necessary to disable certain Solaris drivers so they won't interfere with the proper operation of other hardware. See "Driver Update 11 Release Notes" on page 11 for more information about disabling device drivers.

Configuring Cards for Your System

Plug and Play Not Supported

The Solaris 2.5/2.5.1 operating environment does not support Plug and Play. If a card supports Plug and Play, disable this feature.

Choosing IRQs

Do not use IRQ 9 because some systems use it for the graphics card. IRQ 3 is typically used by COM2, and IRQ 6 is typically used by the diskette controller.

Allocating IRQs for PCI or ISA Devices

On some PCI systems, you can assign IRQs to ISA or PCI devices. If you are installing a PCI device, ensure that an IRQ is enabled for use by the PCI bus in the chipset configuration of your particular system. 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

Toggle your choices from ISA to PCI, or from PCI to ISA, depending on your hardware configuration. Assign as many available IRQs to PCI devices as possible, to give the PCI bus additional choices to resolve conflicts.

Shared Memory Restrictions

- When configuring cards that use shared memory, note that the range from C0000 to C3FFF is used by the VGA BIOS, if present. Don't configure other cards in that range.
- There is a problem with the design of the ISA bus when using cards that use shared RAM addresses. You cannot put an 8-bit card in the same 128K address range with a 16-bit card. There are three 128K ranges into which cards can be placed: A0000–BFFFF, C0000–DFFFF, and E0000–FFFFF. 8-bit and 16-bit devices cannot coexist in any of these ranges, though they can exist in different ranges on the same system.
- If applicable, disable the motherboard cache in the region where shared memory is mapped.

Network Connectors and Supported Media

The Device Reference Pages specify the supported connector type where appropriate. All network devices are assumed to work at 10 Mbps only, unless otherwise specified in the Device Reference Pages. Following are network connectors and the media they support.

Connector	Supported Media	Comments	Speed
RJ-45	10BASE-T	Category-3 Twisted Pair cable	10 Mbps
RJ-45	100BASE-TX	Category-5 Twisted Pair cable	100 Mbps
BNC	10BASE2	Coax cable ("Thin" Ethernet cable)	10 Mbps
AUI	10BASE5	Shielded Twisted Pair ("Thick" Ethernet cable)	10 Mbps

100-Mbps Ethernet Performance Problem on Some Intel Motherboard Chipsets

Some PCI motherboards contain slow DMA chipsets that are unable to support 100-Mbps Fast Ethernet. Because of this problem, the Solaris operating environment does not support 100-Mbps PCI network operation on systems containing the slow chipsets. This problem affects PCI cards only. Other buses are not affected.

The following chipsets are known to exhibit this problem:

- 82450GX (Orion)
- 82430LX (Mercury)

The following chipsets do *not* exhibit this problem:

- 82430NX (Neptune)
- 82430FX (Triton)
- 82430HX (Triton II)
- 82440FX (Natoma)

Some slow PCI motherboard chipsets do not support long data burst DMA transfers and are unable to transfer data from PCI cards to system memory sufficiently fast to sustain 100-Mbps throughput. When systems with these chipsets are connected to a 100-Mbps network, data can arrive at a PCI Ethernet card faster than DMA can transfer it from the card to system memory. When this happens, the card's FIFO begins to fill. If this condition persists long enough, the card's FIFO will overflow, causing loss of incoming network data.

When incoming data is lost, higher-level protocols such as TCP or NFS™ will time out and retransmit the lost data. These protocols ensure that all data is transferred, but performance is lowered. If only a few packets are lost, the performance impact may be small or moderate, but if many packets are lost, a very substantial and severe performance loss can arise.

In some cases, a drop in network FTP performance of two orders of magnitude has been seen when using such chipsets, rendering the network unusable. This case occurs when using 100-Mbps cards containing relatively small FIFOs. The cards are designed to be able to hold only a couple of packets, and they depend on the DMA mechanism to transfer data out of the FIFO in a timely way.

In other cases, cards with larger FIFOs are not as severely impacted by the problem, and under normal conditions perform as well on machines with slow chipsets as they do on speedy ones. However, under sustained 100-Mbps operation, this cannot continue indefinitely.

Because of this problem, the Solaris environment does not support 100-Mbps PCI network operation on systems containing the slow chipsets.

In particular, the PCI cards supported by the `dnet`, `iprb`, and `elx` drivers will not provide good performance on machines with the problem chipsets. If 100-Mbps operation is required on such a machine, it is best to use a non-PCI Ethernet controller. It is also possible that the PCI cards supported by the `ieef` driver, which have larger FIFOs, may function adequately. You must decide whether the performance on a particular machine is adequate for the intended purpose.

Device Reference Pages

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.

Solaris Driver	Disk Interface
ata	“IDE/Enhanced IDE Disk Controller (Including ATAPI CD-ROM)” on page 31
Solaris Driver	SCSI Host Bus Adapters
esa	“Adaptec AHA-2740, AHA-2742, AHA-2740A, AHA-2742A, AHA-2740T, AHA-2742T, AHA-2740AT, AHA-2742AT, AHA-2740W, AHA-2742W, AHA-2840VL, AHA-2842VL HBAs” on page 34
adp	“Adaptec AHA-2940, AHA-2940W, AHA-2940U, AHA-2940UW, AHA-3940, AHA-3940W HBAs” on page 39
asc	“AdvanSys SCSI Adapters” on page 41
pcscsi	“AMD PCscsi, PCscsi II, PCnet-SCSI and QLogic QLA510 HBAs” on page 44
blogic	“BusLogic BT-946C, BT-956C HBAs” on page 45
flashpt	“BusLogic FlashPoint LT Ultra SCSI, FlashPoint LW Ultra and Wide SCSI, FlashPoint DL Dual Channel Ultra SCSI, FlashPoint DW Dual Channel Ultra and Wide SCSI HBAs” on page 48
ncrs	“Compaq 32-Bit Fast SCSI-2 Controllers” on page 49

cpqncr	"Compaq 32-Bit Fast Wide SCSI-2, Wide Ultra SCSI, and Dual Channel Wide Ultra SCSI-3 Controllers" on page 50
dpt	"DPT PM-2011, PM-2021, PM-2041W, PM-3021 HBAs" on page 52
dpt	"DPT PM-2022, PM-2042W, PM-2122, PM-2142W SCSI and PM-3222, PM-3332UW SCSI RAID HBAs" on page 62
dpt	"DPT PM-2024, PM-2044W, PM-2044UW, PM-2124, PM-2124W, PM-2144W, PM-2144UW SCSI and PM-3224, PM-3224W, PM-3334W, PM-3334UW SCSI RAID HBAs" on page 64
corvette	"IBM Micro Channel SCSI-2 Fast/Wide Adapter/A" on page 54
hxhn	"QLogic Fast!SCSI IQ QLA1000-PI, QLA1001-PI HBAs" on page 58
Solaris Driver	SCSI Disk Arrays/RAID Controllers
mega	"American Megatrends MegaRAID 428 SCSI RAID Controller" on page 59
smartii	"Compaq SMART-2, SMART-2SL Array Controllers" on page 61
dpt	"DPT PM-2022, PM-2042W, PM-2122, PM-2142W SCSI and PM-3222, PM-3332UW SCSI RAID HBAs" on page 62
dpt	"DPT PM-2024, PM-2044W, PM-2044UW, PM-2124, PM-2124W, PM-2144W, PM-2144UW SCSI and PM-3224, PM-3224W, PM-3334W, PM-3334UW SCSI RAID HBAs" on page 64
chs	"IBM PC ServeRAID SCSI HBA" on page 66
mlx	"IBM SCSI-2 RAID Controller, SCSI-2 Fast/Wide Streaming-RAID Adapter/A and Mylex DAC960PD-Ultra, DAC960PD/DAC960P, DAC960PL, DAC960E Controllers " on page 67
Solaris Driver	Ethernet Network Adapters
elink	"3Com EtherLink 16 (3C507)" on page 69
el	"3Com EtherLink II (3C503), EtherLink II/16 (3C503-16)" on page 70
elx	"3Com EtherLink III (3C5x9, 3C509B, 3C59x), EtherLink XL (3C900 TPO, 3C900 COMBO), Fast EtherLink XL (3C905)" on page 71
pcn	"AMD PCnet Ethernet (PCnet-ISA, PCnet-PCI), Allied Telesyn AT-1500, Microdyne NE2500plus" on page 72
nfe	"Compaq NetFlex-2 DualPort ENET, NetFlex-2 ENET-TR Controllers" on page 73

cnft	"Compaq NetFlex-3, Netelligent Controllers" on page 75
dnet	"DEC 21040, 21041, 21140, 21142, 21143 Ethernet" on page 79
fmvel	"Fujitsu FMV183 Ethernet" on page 83
iee	"Intel EtherExpress 16, 16C, 16TP, MCA, MCA TP (82586)" on page 86
ieef	"Intel EtherExpress Flash32 (82596)" on page 87
eeepro	"Intel EtherExpress PRO (82595), EtherExpress PRO/10+ (82595FX)" on page 88
ieef	"Intel EtherExpress PRO/100 (82556)" on page 89
nei	"Novell NE2000, NE2000plus Ethernet, and Compatibles" on page 90
smce	"SMC Elite32 (8033)" on page 96
smceu	"SMC Elite32C Ultra (8232)" on page 97
smcf	"SMC Ether 10/100 (9232)" on page 98
smc	"SMC EtherEZ (8416), EtherCard Elite16 Ultra (8216), EtherCard PLUS Elite (8013), EtherCard PLUS Elite 16 (8013), EtherCard PLUS (8003), EtherCard Elite 32T (8033)" on page 99
Solaris Driver	FDDI Network Adapters
sxp	"Rockwell Network Systems 2200 Series FDDI Adapters" on page 102
Solaris Driver	Token Ring Network Adapters
tr	"IBM 16/4, Auto 16/4, Turbo 16/4 Token Ring and Compatible Adapters" on page 104
mpre	"Madge PCI Presto Token Ring" on page 107
mtok	"Madge Smart 16/4 Token Ring" on page 108
Solaris Driver	Audio Cards
sbpro	"Analog Devices AD1848 and Compatible Devices" on page 114
sbpro	"Creative Labs Sound Blaster Pro, Sound Blaster Pro-2" on page 120
sbpro	"Creative Labs Sound Blaster 16, Sound Blaster AWE32, Sound Blaster Vibra 16" on page 122

Solaris Driver	PC Card (PCMCIA) Hardware
pcelx	"3Com EtherLink III (3C589) PC Cards" on page 126
pcser	"Modem and Serial PC Card Devices" on page 129

Disk Interface

IDE/Enhanced IDE Disk Controller (Including ATAPI CD-ROM)

Solaris Device Driver:	ata
Device Type:	Hard disk or CD-ROM controller
Supported Configuration:	Two drives per controller, up to four IDE drives if both primary and secondary interfaces are available

Preconfiguration Information

If there are two IDE drives on the same controller, one must be set to “master” and the other to “slave.” Typically, if there is both an IDE hard disk drive and an IDE CD-ROM drive, the hard disk drive is the master, and the CD-ROM drive is the slave, but this isn’t mandatory. If there is only one drive on a controller, it must be set to master.

Supported Settings

Primary controller:

- IRQ Level: 14
- I/O Address: 0x1F0

Secondary controller:

- IRQ Level: 15
- I/O Address: 0x170

If an IDE CD-ROM drive is installed, the system BIOS parameter for that device should be:

- Drive Type: Not installed

If an enhanced IDE drive is installed, set the system BIOS as follows:

- Enhanced IDE Drive: Enabled

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, use the settings provided by the disk manufacturer.

Known Problems and Limitations

- The Panasonic LK_MC579B IDE CD-ROM drive cannot be used to install the Solaris operating environment and is not supported.
- Several vendors ship PCI-equipped machines with IDE interfaces on the motherboard. A number of these machines use the CMD-604 PCI-IDE controller. This chip provides two IDE interfaces. The primary IDE interface is at I/O address 0x1F0 and the secondary interface at 0x170. However, this chip cannot handle simultaneous I/O on both IDE interfaces. This defect causes the Solaris software to hang if both interfaces are used.

Use only the primary IDE interface at address 0x1F0. Machines using this chip include DELL XPS/90, HP XU/590C, and American Megatrends Atlas boards.
- You cannot boot from the third or fourth IDE disk drives, although you can install Solaris software on them.
- The Solaris Volume Management software does not work with the Sony CDU-55E CD-ROM drive no matter how it is configured (as the master or the slave). Comment out the following line in the file `/etc/vold.conf` to prevent `vold` from hanging the controller:

```
# use cdrom drive /dev/rdisk/c*s2 dev_cdrom.so cdrom%d
```

- NEC CDR-260/CDR-260R/CDR-273, AZT CDR 268-031SE, Media Vision 6X, and Sony CDU-55E ATAPI CD-ROM drives may fail during installation.
- Some systems may have problems booting from IDE drives that are larger than 512 Mbytes, even though the install to the drive succeeds. Disable logical block addressing, and reduce the CMOS geometry information for the drive to be less than 1024 cylinders.
- If you are using a Compaq LTE Elite 4/40 notebook, the system may hang when changing from suspend mode to resume. To keep the ata driver from hanging after being resumed, use any text editor to change the default value of the `timing_flags` property (in the `/platform/i86pc/kernel/drv/ata.conf` file) from 0x0 to 0x1 (that is, `timing_flags=0x1`). Then save the file and reboot the system.

Note that the file contains an entry for the `timing_flags` property for both the primary and secondary controllers. For the Compaq LTE Elite 4/40, you only have to change the property for the primary controller.

- The Compaq Professional Workstation 5000 includes a Compaq/Sanyo CRD-168PCH ATAPI CD-ROM drive that is not recognized by the Driver Update software when you first turn the machine on.

To work around this problem, *before* you attempt to install the Solaris software, turn the machine on and press Control-Alt-Delete to reboot.

SCSI Host Bus Adapters

Adaptec AHA-2740, AHA-2742,
AHA-2740A, AHA-2742A,
AHA-2740T, AHA-2742T,
AHA-2740AT, AHA-2742AT,
AHA-2740W, AHA-2742W,
AHA-2840VL, AHA-2842VL HBAs

Solaris Device Driver:	esa
Device Type:	SCSI
Adapters:	Adaptec AHA-2740, AHA-2742, AHA-2740A, AHA-2742A, AHA-2740T, AHA-2742T, AHA-2740AT, AHA-2742AT, AHA-2740W, AHA-2742W, AHA-2840VL, AHA-2842VL
Chip:	Adaptec AIC-7770
Bus Types:	EISA, VLB



Caution - Probing for AHA-2840 and AHA-2842 VLB cards has been disabled to avoid conflicts with some PCI devices. To enable your AHA-2840 or AHA-2842 adapter, see “Adding Support for AHA-284x Devices” in this Device Reference Page.

Preconfiguration Information

- Don't use a version of the AHA-274x series configuration utilities before version 2.1.
- Don't use a version of the AMI ECU before version 2.01 when configuring the AHA-274x on a motherboard with an AMI BIOS.

Known Problems and Limitations

- The AHA-274x is not compatible with the Wyse MP system.
- Motherboards that support level-triggered interrupts, such as an EISA motherboard, will support multiple AHA-274x 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.
- When the AHA-274x host bus adapter runs under heavy load, the tape device loses arbitration contests to faster devices with higher priorities and produces "Media Error" messages. To avoid this problem, change the SCSI ID of the adapter so that it is lower than the tape device setting.
- For example, set the tape drive's SCSI ID to 7 using jumpers or an external switch. Then set the AHA-274x SCSI ID to 6 using the ECU. (Use the configuration BIOS accessed by Ctrl-A at boot to change the setting on the AHA-284x.)
- A large disk used with the Solaris operating environment on an AIC-7770 controller cannot be mounted on a controller with a different geometry; the DPT PM-2022 controller, for example.
- Some VESA local bus motherboards do not support more than one bus master controller, like the AHA-2840VL host bus adapter.
- On the Unisys U6000/DT2, run the UNISYS.BAT file in a DOS environment before installation. Refer to *x86: Solaris 2.5 Installation Notes*.
- When using AHA-2742T and AHA-2842VL adapters with slow tape devices, under heavy loads error messages like this are displayed:

```
Warning: /eisa/esa@2c00/cmtmp@4,0 (Tape4):  
0.25 inch cartridge  
Tape 11: Fixed record length (512 byte blocks) I/O
```

Set the SCSI ID of the tape drive higher than the host bus adapter.

For example, set the tape SCSI ID to 6 and the host bus adapter SCSI ID to 5 or less by doing the following:

- Log in as root and shut down the Solaris operating environment.

- Boot DOS and change the target ID of the host bus adapter to 5 using the ECU supplied by the motherboard manufacturer.
- Turn off the computer and power down the tape.
- Jumper the tape device to SCSI ID 6.
- Boot the Solaris operating environment and run the `drvconfig` and `tapes` utilities.

Configuration Procedure

Adding Support for AHA-284x Devices

If you are adding an AHA-284x controller to a system that has the Solaris operating environment installed, you must do the following as root before installing the controller:

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

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

2. **Type:**

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

3. **Turn the computer off, install the controller, and turn on the computer.**

Modifying the Driver Update Boot Diskettes

Since probing for AHA-2840 and AHA-2842 VLB cards has been disabled by default, special command files on the Driver Update BOOT diskettes are used to enable probing. The diskettes must be modified using DOS. As a precaution, make a copy of the original Driver Update boot diskettes prior to running 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 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 1 into drive A:, make a copy of it, and remove the diskette:**


```
diskcopy a: a:
```

4. **Label the copy of the first Driver Update boot diskette as “Modified.”**

For example: “Modified Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 1 for AHA-284x SCSI controller.”

5. **Insert another blank 3.5-inch diskette into drive A: and format it:**

```
format a:
```

6. **Insert Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 2 into drive A:, make a copy of it, and remove the diskette:**

```
diskcopy a: a:
```

7. **Label the copy of the second Driver Update boot diskette as “Modified.”**

For example: “Modified Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 2 for AHA-284x SCSI controller.”

8. **Insert another blank 3.5-inch diskette into drive A: and format it:**

```
format a:
```

9. **Insert Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 3 into drive A:, make a copy of it, and remove the diskette:**

```
diskcopy a: a:
```

10. **Label the copy of the third Driver Update boot diskette as “Modified.”**

For example: “Modified Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 3 for AHA-284x SCSI controller.”

11. **Store your original Driver Update BOOT diskettes in a safe place.**

12. **Insert the copy of Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 3 into drive A:.**

Make sure the diskette is writable because the contents will be modified.

13. **Change to drive A: (remember DOS is still running):**

```
a:
```

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

```
esavlb
```

Configuring Devices

1. **Select channel A as the Primary Channel.**
2. **Run the BIOS configuration and verify that BIOS support for more than two drives is disabled.**
3. **If there are multiple AIC-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 an AHA-274x controller, the address is 0x1C00, and if the adjacent slot also has an AHA-274x controller, the address is 0x2C00. Motherboard manufacturers 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 AIC-7770 address is 0x4C00.

The BIOS base address is selected from a range of choices on the manufacturer-supplied configuration utility. Common addresses for the AIC-7770 controller are: 0xCC00, 0xD400, 0xD800, and 0xDC00. The controller with the lowest BIOS base address will become the boot or primary controller.

Adaptec AHA-2940, AHA-2940W, AHA-2940U, AHA-2940UW, AHA-3940, AHA-3940W HBAs

Solaris Device Driver:	adp
Device Types:	SCSI, SCSI with Ultra SCSI option
Adapters:	Adaptec AHA-2940, AHA-2940W, AHA-2940U, AHA-2940UW, AHA-3940, AHA-3940W
Chips:	Adaptec AIC-7560, AIC-7850, AIC-7855, AIC-7860, AIC-7861, AIC-7862, AIC-7870, AIC-7871, AIC-7872, AIC-7874 AIC-7875, AIC-7880, AIC-7881, AIC-7882, AIC-7884, AIC-7885
Bus Type:	PCI

Preconfiguration Information

The Plug N Play SCAM Support option is not supported.

Known Problems and Limitations

- To use the AHA-3940 or AHA-3940W adapters, the motherboard must have a BIOS that supports the DEC PCI-to-PCI Bridge chip on the host bus adapter.
- User-level programs have exhibited problems on some PCI systems with an Adaptec AHA-2940x card, including the following motherboard models:
 - PCI motherboards with a 60-MHz Pentium chip, with PCI chipset numbers S82433LX Z852 and S82434LX Z850. The part numbers of the Intel motherboards are AA616393-007 and AA615988-009.
 - 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. (Some Gateway 2000 systems use this motherboard.)

- The AA-619772-002 motherboard with 82433LX Z852 and 82434LX Z882 chips causes random memory inconsistencies. Return the motherboard to the vendor for a replacement.

If problems with user-level programs occur, use the BIOS setup to turn off write-back CPU caching (or all caching if there is no control over the caching algorithm).

- If the AHA-2940 SCSI adapter does not recognize the Quantum Empire 1080S HP 3323 SE or other SCSI disk drive, reduce the Synchronous Transfer rate on the Adaptec controller to 8 Mbps.
- The AHA-3940 has been certified by Adaptec to work on specific systems. Our testing has shown that the Solaris operating environment works properly in some of those systems and not in others. If you encounter problems running the Solaris environment on an Adaptec-approved system with the AHA-3940, contact your technical support provider.

Configuration Procedure

Using the Adaptec configuration utility:

- Configure each SCSI device to have a unique SCSI ID, and on the adapter's Advanced Configuration Options setup menu, set the Plug N Play SCAM Support option to Disabled.
- If there is more than one controller (or an embedded controller), try to use one IRQ per controller.
- Enable bus mastering for the slot(s) with your host bus adapter(s), when the choice is given.
- For older disk drives, tape drives, and most CD-ROM devices, make sure the maximum SCSI data transfer speed is set to 5.0 Mbps.
- Enable support for disks larger than 1 Gbyte if applicable.

AdvanSys SCSI Adapters

Solaris Device Driver:	asc
Device Type:	SCSI
Adapters:	See table below
Bus Types:	EISA, ISA, PCI, VLB

Preconfiguration Information

The Command Descriptor Block (CDB) counts below indicate the number of SCSI CDB requests that can be stored in the RISC chip cache and board LRAM. A CDB is a single SCSI command. The CDB value can be lowered in the BIOS by changing the Host Queue Size adapter setting.

The AdvanSys Solaris Universal Driver, asc, supports all AdvanSys SCSI adapters listed below.

Connectivity Products	CDB
ABP510/5150—Bus-Master ISA ¹	240
ABP5140—Bus-Master ISA PnP ¹	16
ABP5142—Bus-Master ISA PnP with floppy	16
ABP920—Bus-Master PCI	16
ABP930—Bus-Master PCI	16
ABP930U—Bus-Master PCI Ultra	16
ABP960—Bus-Master PCI MAC/PC ²	16
ABP960U—Bus-Master PCI MAC/PC Ultra	16
Single Channel Products	CDB
ABP542—Bus-Master ISA with floppy	240

ABP742—Bus-Master EISA	240
ABP842—Bus-Master VL	240
ABP940—Bus-Master PCI	240
ABP940U—Bus-Master PCI Ultra	240
ABP970—Bus-Master PCI MAC/PC	240
ABP970U—Bus-Master PCI MAC/PC Ultra	240
Dual Channel Products	CDB
ABP752—Dual Channel Bus-Master EISA	240 per channel
ABP852—Dual Channel Bus-Master VL	240 per channel
ABP950—Dual Channel Bus-Master PCI	240 per channel

-
1. These boards have been shipped by HP with the 4020i CD-ROM drive. Since they have no BIOS, they cannot control a boot device, but they can control secondary devices.
 2. This board has been shipped by Iomega with the Jaz Jet drive.

AdvanSys Contact Information

Updates to the AdvanSys Solaris driver and technical support for the AdvanSys Solaris driver and AdvanSys adapters can be obtained by contacting AdvanSys.

Mail:	Advanced System Products, Inc. 1150 Ringwood Court San Jose, CA 95131
Operator:	1-408-383-9400
FAX:	1-408-383-9612
Tech Support:	1-800-525-7440
BBS:	1-408-383-9540 (14400,N,8,1)
Interactive FAX:	1-408-383-9753
Customer Direct Sales:	1-800-883-1099/1-408-383-5777
Tech Support Email:	support@advansys.com

FTP Site: <ftp.advansys.com> (login: anonymous)

Web Site: <http://www.advansys.com>

AMD PCscsi, PCscsi II, PCnet-SCSI and QLogic QLA510 HBAs

Solaris Device Driver:	<code>pcscsi</code>
Device Type:	SCSI
Adapter:	QLogic QLA510
Chips:	AMD 53C974 (PCscsi), 53C974A (PCscsi II), Am79C974 (PCnet-SCSI) (SCSI device only) QLogic FAS974
Bus Type:	PCI
Systems Supported:	PCnet-SCSI chip is integrated in the HP Vectra XU 5/90 and Compaq Deskpro XL systems

Preconfiguration Information

Only the SCSI portion of the PCnet-SCSI host bus adapter is discussed here; the net portion requires a separate Solaris driver (`pcn`). See “AMD PCnet Ethernet (PCnet-ISA, PCnet-PCI), Allied Telesyn AT-1500, Microdyne NE2500plus” on page 72 for configuration information about Ethernet capabilities.

Known Problems and Limitations

- Occasional data corruption has occurred when `pcn` and `pcscsi` drivers in HP Vectra XU 5/90 and Compaq Deskpro XL systems are used under high network and SCSI loads. These drivers do not perform well in a production server.

A possible workaround is to disable the `pcn` device with the system BIOS and use a separate add-in network interface.

- The SCSI Tagged Queuing option is not supported.

BusLogic BT-946C, BT-956C HBAs

Solaris Device Driver:	blogic
Device Type:	SCSI
Adapters:	BusLogic BT-946C, BT-956C
Bus Type:	PCI

Preconfiguration Information

- If your BT-946C PCI card is labeled Rev. A or B, it needs to be supported in ISA emulation mode; use I/O address 0x334.

Note - To find the revision level of a BusLogic PCI card, look at the card itself. The revision of the card is not provided in the manufacturer's documentation.

- If your BT-946C 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, it can also be supported in native PCI mode. To do this, disable the "Set ISA Compatible I/O Port (PCI Only)" option.
- Since your BusLogic board model ends in "C", you must enter the AutoSCSI configuration utility and check the termination.

Supported Settings

- IRQ Level: 5, 6, 7, 8, 9, 10, 11, 12, 14, 15
- I/O Address: 0x334, 0x230, 0x234, 0x130, 0x134

Note - I/O addresses are dynamically configured for BT-946C Rev. C PCI adapters.

Known Problems and Limitations

- Using an I/O address of 0x330 causes the Solaris `aha` driver to be selected instead of `blogic` native mode drivers. These cards have not been tested in Adaptec AHA-1540 mode.
- Do not run the `drvconfig` utility during heavy I/O involving disks and tapes because doing so can cause data overrun errors.
- Data overrun errors may occur under high stress when your system is configured with multiple disks.
- If problems occur during Solaris installation, 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 sections “Configuration for Non-Conforming PCI Motherboards” and “Handling Motherboard Variations” in the documentation that comes with your PCI BusLogic board.

- Early versions of Rev. A, B, and C of the BT-946C may not work with the Solaris operating environment.

Upgrade to at least Firmware 4.25J, BIOS 4.92E, and AutoSCSI 1.06E, if you have BT946C Rev. B. Upgrade the controller to at least BT946C Rev. E.

Configuration Procedure

BT-946C, Rev. A and B Only

Insert the board into the bus master slot, and using the AutoSCSI utility:

- Set the “Adapter BIOS Supports Space > 1 GB (DOS) only” option to Yes if the boot disk is larger than 1 Gbyte.
- Put the adapter in ISA-compatible mode by setting the value for “Set Host Bus Adapter I/O Port Address as Default” to No.
- Ensure the Advanced option “BIOS Support for > 2 Drives (DOS 5.0 or above)” is set to No.

- Configure the IRQ and BIOS address values manually if your PCI motherboard is not fully PCI-specification compliant. If the system hangs while installing the Solaris software, do the following:
 - Check the IRQ jumpers on the motherboard, if any.
 - Run the CMOS utility to set the IRQ and BIOS addresses, if any.
 - Run the BusLogic AutoSCSI utility.

All the settings should match each other. If you need to manually configure the BIOS address, you may have to check jumpers JP4 and JP5.

BT-946C (Rev. C) and BT-956C

Insert the board into the bus master slot, and using the AutoSCSI utility:

- Set the “Adapter BIOS Supports Space > 1 GB (DOS only)” option to Yes if the boot disk is larger than 1 Gbyte.
- Choose the defaults, except set the 5.1 “BIOS Support for > 2 Drives (DOS 5.0 or above)” to No.

Special Cases

Configuring Multiple Devices

Follow these guidelines when adding a second BusLogic PCI controller to a system.

- The already installed PCI board must be the primary controller.
- The primary controller must have an I/O address that precedes the secondary controller in “Supported Settings” (as listed from left to right). For example, the primary controller can use an I/O address of 0x234, as long as the secondary controller uses either 0x130 or 0x134. The I/O address of each board is determined by its slot. Try different slots until the first card works as the primary controller.
- Disable the BIOS on the secondary controller.
- Wide-mode 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).

BusLogic FlashPoint LT Ultra SCSI, FlashPoint LW Ultra and Wide SCSI, FlashPoint DL Dual Channel Ultra SCSI, FlashPoint DW Dual Channel Ultra and Wide SCSI HBAs

Solaris Device Driver:	<code>flashpt</code>
Device Type:	SCSI
Adapters:	BusLogic FlashPoint LT Ultra SCSI, FlashPoint LW Ultra and Wide SCSI, FlashPoint DL Dual Channel Ultra SCSI, FlashPoint DW Dual Channel Ultra and Wide SCSI
Bus Type:	PCI

Mylex Corporation provides direct support for the `flashpt` device driver. Refer to the product menu and related documents for detailed information. Technical support is available through telephone and email:

- (408) 654-0760
- techsup@buslogic.com

Preconfiguration Information

Since the FlashPoint family is PCI compliant, no special hardware setup is required. To display information and set up the adapters, run the on-board AutoSCSI utility by booting the system and pressing Control-b when "FlashPoint" appears on the screen.

Compaq 32-Bit Fast SCSI-2 Controllers

Solaris Device Driver: `ncrs`

Device Type: SCSI-2

Compaq Controller	Chip	Available On
Compaq 32-Bit Fast-SCSI-2	53C710	EISA add-in card
Compaq Integrated 32-Bit Fast-SCSI-2	53C710	ProLiant 2000-EISA, 4000-EISA
Compaq Integrated 32-Bit Fast-SCSI-2/P	53C810	ProSignia 300-PCI, 500-PCI

Preconfiguration Information

Don't use a version of the Compaq EISA configuration utility before version 2.20 revision B.

Supported Settings

- BIOS Hard Drive Geometry: <=1 GB: 64 Heads, 32 Sectors
> 1GB: 255 Heads, 63 Sectors

Known Problems and Limitations

- The SCSI Tagged Queuing option is not supported.
- The Wide SCSI option is not supported. Some cards include connectors for both narrow cables (8-bit SCSI A cables) and wide cables (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.

Compaq 32-Bit Fast Wide SCSI-2, Wide Ultra SCSI, and Dual Channel Wide Ultra SCSI-3 Controllers

Solaris Device Driver:	<code>cpqncr</code>
Device Type:	SCSI
Adapters:	Compaq 32-Bit Fast Wide SCSI-2, Wide Ultra SCSI, and Dual Channel Wide Ultra SCSI-3 Controllers in Compaq Servers: 825 Add-on PCI, 825 Add-on EISA, Integrated 825 PCI/EISA, 875 Add-on PCI, Integrated 875 PCI, Integrated 876 PCI
Bus Types:	EISA, PCI

Preconfiguration Information

- Ensure that the Compaq 825 EISA controller is properly installed in one of the EISA slots or that the Compaq 825, 875, or 876 PCI controller is in one of the PCI slots in the server.
- EISA systems *only*: Configure the system using the Compaq EISA configuration utility (ECU version 2.34 and later) so the system recognizes the Compaq 825, 875, or 876 controller(s).

Configuration Procedure

1. **Install the Solaris software.**
2. **Modify the driver configuration file** `/kernel/drv/cpqncr.conf`.

This file specifies the valid configurable parameters for the driver:

- `tag_enable`: This property enables or disables tagged queuing support by the driver and can be set to the following values:
 - 0 - Disabled (Default)

- 1 - Enabled
 - `alarm_msg_enable`: This property enables or disables Alarm messages due to faults in the Compaq Storage system connected to the 825, 875, or 876 controller. The valid values are:
 - 0 - Disabled
 - 1 - Enabled (Default)
 - `debug_flag`: This property enables or disables debug messages from the driver. The valid values are:
 - 0 - Disabled (Default)
 - 1 - Enabled
 - `queue_depth`: This property specifies the number of active requests the driver can handle for a controller. The maximum and default value for this property is 37; the minimal value is 13. You can reduce the value to support multiple controllers if you cannot allocate enough memory while trying to load the driver.
 - `board_id`: This property specifies additional controller IDs the driver has to support. The driver currently supports Compaq 825, 875, and 876 controllers. It recognizes the board ID for Compaq 825 Fast Wide SCSI-2, Compaq 875 Wide Ultra SCSI, and Compaq Dual Channel Wide Ultra SCSI-3 controllers by default.
 - `ignore-hardware-nodes`: Set this property to 0.
- 3. To activate the configuration changes, as root type:**

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

DPT PM-2011, PM-2021, PM-2041W, PM-3021 HBAs

Solaris Device Driver:	dpt
Device Type:	SCSI
Adapters:	DPT PM-2011, PM-2021, PM-2041W, PM-3021
Bus Type:	ISA

Preconfiguration Information

- The EPROM should not be earlier than version 5E, and the SmartROM should not be earlier than version 2.C.
- Only two DPT adapters can be used per system.
 - If two adapters are installed, do not install an IDE controller.
 - If an IDE controller is installed, only one DPT adapter will be supported.

Supported Settings

You must use the settings in **this typeface** for the DPT adapter if an IDE controller is installed:

- I/O Address: 0x1F0, **0x230**
- IRQ Level: 12, 14, 15
- DMA Channel: 5, 6
- Emulation: **Disabled**

- Follow the instructions in “DPT PM-2022, PM-2042W, PM-2122, PM-2142W SCSI and PM-3222, PM-3332UW SCSI RAID HBAs” on page 62 to disable WD1003 emulation using the DPT SCSI Storage Manager Utility diskette.

Emulation mode for drives 0 and 1 should be set to 0 indicating “no drives present,” or there will be missing drives when the system boots.

- Use edge-triggered interrupts on the PM-2011.
- The PM-2041W adapter's SmartROM must be upgraded to at least version 3DL in place of 3D0. The BIOS on adapters with version 3D0 does not detect any devices connected to it.

Known Problems and Limitations

- The DPT adapter may cause the Solaris installation to fail due to loss of interrupts, depending on the setting of jumper Y34. If the installation fails, try changing the setting of jumper Y34 (even if the on-board diskettes have already been disabled by removing jumper Y20).
- The `dpt` driver only detects the PM-2041W adapter at address 0x230; therefore, dual card mode does not work.

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

Solaris Device Driver:	corvette
Device Type:	SCSI
Adapter:	IBM Micro Channel SCSI-2 Fast/Wide Adapter/A
Bus Type:	Micro Channel

Preconfiguration Information

Supported Settings

- **IRQ Level:** 14
 - **I/O Address:** 0x3540, 0x3548, 0x3550, 0x3558, 0x3560,
0x3568, 0x3570, 0x3578
- Ensure that the controller board is properly installed in any slot between 1 and 8. Slots 9 and above are not supported.
 - This adapter is only supported on systems with at least 32 Mbytes of memory installed.



Caution - The Solaris `mcis` driver, which supports the IBM Micro Channel SCSI adapter, conflicts with this IBM Micro Channel SCSI-2 Fast/Wide Adapter/A. If your system has an IBM SCSI-2 Fast/Wide Adapter/A installed, disable the `mcis` driver before installing the Solaris software. See “Modifying the Driver Update Boot Diskettes” on page 55 in this Device Reference Page. If the Solaris operating environment is already running on your system and you want to add support for this IBM SCSI-2 Fast/Wide Adapter/A, do *not* install the adapter until the `mcis` driver is disabled; see “Disabling the `mcis` Driver After Solaris Installation.”

Known Problems and Limitations

The microcode version of the SCSI-2 Fast/Wide Adapter/A board should be 0x71. Boards with older versions, such as version 0x58, may cause the Solaris environment 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.

Configuration Procedure

Modifying the Driver Update Boot Diskettes

The Solaris `mcis` driver interferes with the proper operation of this 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.

There is a script on the Driver Update boot diskettes for this purpose. The diskettes must be modified using DOS. As a precaution, make a copy of the original Driver Update boot diskettes prior to running 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 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 1 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 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 1 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 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 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 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 2 for IBM SCSI-2 Fast/Wide Adapter/A.”
- 8. Insert another blank 3.5-inch diskette into drive A: and format it:**

```
format a:
```

- 9. Insert Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 3 into drive A:, make a copy of it, and remove the diskette:**

```
diskcopy a: a:
```

- 10. Label the copy of the third boot diskette as “Modified.”**

For example: “Modified Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 3 for IBM SCSI-2 Fast/Wide Adapter/A.”

- 11. Store your original DU BOOT diskettes in a safe place.**

- 12. Insert the copy of Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 3 into diskette into drive A:.**

Make sure the diskette is writable because the contents will be modified.

- 13. Change to drive A: (remember DOS is still running):**

```
a:
```

- 14. Run the `corvette.bat` command:**

```
corvette.bat
```

Disabling the `mcis` Driver After Solaris Installation

You must disable the `mcis` driver before you can add and configure IBM SCSI-2 Fast/Wide Adapter/A after Solaris installation.

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

```
exclude: mcis
```

Note - 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. Type the following commands to set up a reconfiguration boot and to shut down your system:**

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

- 6. After the system shuts down, turn the system off.**

7. Install your hardware.

Use the configuration information in “Supported Settings” on page 54.

8. Reboot the system, or turn the system on if it is off.

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.

QLogic Fast!SCSI IQ QLA1000-PI, QLA1001-PI HBAs

Solaris Device Driver:	hxhn
Device Type:	SCSI
Adapters:	QLogic Fast!SCSI IQ QLA1000-PI, QLA1001-PI
Bus Type:	PCI

Preconfiguration Information

See the vendor's documentation for setup and cabling requirements.

Supported Settings

- | | |
|------------------------------|---------------------------------|
| • PCI Slot Type: | Bus master |
| • PCI Slot Interrupt Line A: | Any available IRQ level |
| • SCSI ID: | Default 7 |
| • Triggering: | Level triggering (if available) |

SCSI Disk Arrays/RAID Controllers

American Megatrends MegaRAID 428 SCSI RAID Controller

Solaris Device Driver:	mega
Device Type:	SCSI RAID
Adapter:	American Megatrends MegaRAID 428 SCSI RAID
Bus Type:	PCI

Configuration Procedure

- Contact American Megatrends to get the optional `megamgr` configuration utility.
 - MegaRAID controllers cannot be configured by editing the `/kernel/drv/mega.conf` file.
 - Follow this procedure to configure and use more than one logical drive. If the `/kernel/drv/cmdk.conf` file is not carefully edited, the system may panic upon reboot.
1. **Press Control-m while the system is starting up to configure the controller and all logical drives.**
 2. **Install the Solaris software and reboot.**
You will only see a single logical drive available during installation.
 3. **Open `/kernel/drv/cmdk.conf` and add additional drives by duplicating the existing entry for `target=0` and incrementing the `lun` field by one for each of the additional logical drives you want the Solaris software to recognize.**
For example, if you have a total of three logical drives configured on your adapter, you would add the following lines:

```
name="cmdk" class="scsi" target=0 lun=1
    scsi_audio="sccd_sony", "sccd_std";
name="cmdk" class="scsi" target=0 lun=2
    scsi_audio="sccd_sony", "sccd_std";
```

4. Reboot.

After the system reboots, you can use additional drives.

Compaq SMART-2, SMART-2SL Array Controllers

Solaris Device Driver:	smartii
Device Type:	Disk Array
Adapters:	Compaq SMART-2, SMART-2SL Array Controllers
Bus Types:	EISA, PCI
Systems Supported:	Internal and external SCSI drives on Compaq servers

Preconfiguration Information

- The SMART-2 and SMART-2SL controllers only support SCSI 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 the primary controller, it will only let you boot from logical drive 0 on that controller.
- EISA systems *only*: Configure the system using the Compaq EISA configuration utility (ECU version 2.30 and later) so the system recognizes the SMART-2 controller.

Known Problems and Limitations

- If disks on a *failed* drive are replaced by hotplugging during I/O, the system panics.
- Firmware version 1.26 of the SMART-2 PCI controller is slow. For best results, use firmware version 1.36.

DPT PM-2022, PM-2042W, PM-2122, PM-2142W SCSI and PM-3222, PM-3332UW SCSI RAID HBAs

Solaris Device Driver:	dpt
Device Types:	SCSI, SCSI RAID
Adapters:	DPT PM-2022, PM-2042W, PM-2122, PM-2142W SCSI DPT PM-3222, PM-3332UW SCSI RAID
Bus Type:	EISA

Preconfiguration Information

- DPT PM-3222 *only*: The EPROM should not be earlier than version 7A, and the SmartROM not earlier than version 3.B.
- DPT PM-2022 and PM-2122 *only*: The EPROM should not be earlier than version 5E, and the SmartROM not earlier than version 2.D1.

Supported Settings

- WD1003 Boot Address: Disabled (Secondary)
- IRQ Level: 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

Known Problems and Limitations

- To prevent system hangs caused by improper IDE emulation, the EISA !DPTA410.CFG file should be at least version 6E5. If it isn't, obtain a newer version from your vendor and rerun the EISA configuration utility.
- Solaris installation may fail when setting up the fdisk partition table on one or more disks. On systems with a disk RAID configuration where at least one disk is new or has had its partition table zeroed out, these error messages may be displayed. If the Solaris installation fails and you see the following error messages, restart the installation. It should succeed.

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

- Use the original install diskette when adding a PM-3222 to your system.

Configuration Procedure

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. An error message similar to this may be displayed while DPTMGR is running.

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

This message can be ignored.

Special Cases

When using the ECU 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 0 and 1, type 0. This indicates "no drives present" and disables the WD1003 emulation mode of the adapter, allowing correct operation of the native mode driver.

DPT PM-2024, PM-2044W, PM-2044UW, PM-2124, PM-2124W, PM-2144W, PM-2144UW SCSI and PM-3224, PM-3224W, PM-3334W, PM-3334UW SCSI RAID HBAs

Solaris Device Driver:	dpt
Device Type:	SCSI, SCSI RAID
Adapters:	DPT PM-2024, PM-2044W, PM-2044UW, PM-2124, PM-2124W, PM-2144W, PM-2144UW SCSI DPT PM-3224, PM-3224W, PM-3334W, PM-3334UW SCSI RAID
Bus Type:	PCI

Preconfiguration Information

- DPT PM-3224 *only*: The EPROM should not be earlier than version 7A.
- DPT PM-2024 and PM-2124 *only*: The EPROM should not be earlier than version 6D4.
- Don't use an adapter with a SmartROM earlier than version 3.B.
- Ensure that the controller board is installed in a PCI bus-mastering slot.
- If the firmware version of the controller is earlier than 7A, or if your computer memory is ECC or does not check parity, disable PCI parity checking.

Known Problems and Limitations

During the system boot, if you see a message that 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.

Supported Settings

- I/O Address: Auto

IBM PC ServeRAID SCSI HBA

Solaris Device Driver:	chs
Device Type:	SCSI RAID
Adapter:	IBM PC ServeRAID
Bus Type:	PCI

Preconfiguration Information

Known Problems and Limitations

To prevent data loss, a SCSI disk drive that is not defined to be part of any physical pack within a logical drive won't be accessible through the Solaris operating environment.

IBM SCSI-2 RAID Controller, SCSI-2 Fast/Wide Streaming-RAID Adapter/A and Mylex DAC960PD-Ultra, DAC960PD/DAC960P, DAC960PL, DAC960E Controllers

Solaris Device Driver:	mlx
Device Type:	SCSI-2 RAID
Adapters:	IBM SCSI-2 RAID, SCSI-2 Fast/Wide Streaming-RAID Adapter/A (IBM DMC960) Mylex DAC960PD-Ultra (PCI-to-UltraSCSI), DAC960PD/DAC960P (PCI-to-SCSI), DAC960PL (PCI-to-SCSI), DAC960E (EISA-to-SCSI)
Bus Types:	Micro Channel, EISA, PCI

Preconfiguration Information

- The choice of SCSI target ID numbers is limited. Assuming the maximum number of targets per channel on the particular controller 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 1: The 5-channel models support a maximum of four targets per channel, that is, MAX_TGT = 4. Therefore, the SCSI target IDs on a given channel should range from 0 to 3.

Example 2: The 3-channel models support 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.

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 replacement 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.

Therefore, even though a standby drive is physically connected, the system denies access to it so no data can be accidentally lost.

- Other than the standby rebuild of disk drives, which is described in the manufacturer's user's guide, these controllers do not support "hot-plugging" (adding or removing devices while the system is running).

To add or remove devices, shut down the system, add or remove the devices, reconfigure the HBA using the vendor's configuration utility, and reconfigure-reboot (`b -r`) your system.

- The driver does not support variable-length tape drives or multivolume backup or restore for tape drives connected to the controller.
- Due to Mylex firmware limitations, SCSI devices such as tape and CD-ROM will not function reliably when attached on a channel with SCSI hard drives. Also, a tape block size greater than 32 Kbytes cannot be used. To be certain of correct SCSI device operation, use SCSI devices only on an otherwise unused channel, and with a fixed block size of 32 Kbytes or less.
- Long tape commands (erasing a large tape) may fail because the Mylex controllers have a one-hour timeout maximum for the command.
- Enable tag queuing only for SCSI disk drives that are officially tested and approved by Mylex Corporation for the DAC960 controller family and by IBM for the DMC960. Otherwise, disable tag queuing to avoid problems.
- The command `mt erase` works but may report the following error message when it gets to the end of the tape:

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

This message can be ignored.

Ethernet Network Adapters

3Com EtherLink 16 (3C507)

Solaris Device Driver:	elink
Device Type:	Network (Ethernet)
Adapter:	3Com EtherLink 16 (3C507)
Bus Type:	ISA

Preconfiguration Information

Supported Settings

- **Data Mode:** Turbo

Known Problems and Limitations

- The Solaris software does not support the F0000, F4000, F8000, and FC000 addresses.
- The 3Com EtherLink 16 Ethernet adapter can be configured to use the full 64 Kbyte on-board buffer or a smaller amount, but if the adapter is configured for less than 64 Kbytes of memory, the adapter may fail.

Using the manufacturer's configuration utility, configure the adapter to use 64 Kbytes of memory even when the full 64-Kbyte memory range is unavailable. After reconfiguring it to the desired memory size, the system can usually access the network.

3Com EtherLink II (3C503), EtherLink II/16 (3C503-16)

Solaris Device Driver:	e1
Device Type:	Network (Ethernet)
Adapters:	3Com EtherLink II (3C503), EtherLink II/16 (3C503-16)
Bus Type:	ISA
Connectors:	One adapter port has an RJ-45 and an AUI connector. A second adapter port has a BNC (coax) and an AUI connector.

Preconfiguration Information

- The 3C503 adapter uses the BNC or RJ-45 port (the non-AUI connector) as the default if it cannot detect a device connected to the AUI connector.
- Due to conflicts, don't configure either card at I/O address 0x2A0 or 0x280.

Supported Settings

I/O Address	IRQ
0x250-0x2E0	3
0x300-0x350	2

Known Problems and Limitations

- The IRQ depends on the I/O address set using the jumpers. For example, if you configure the 3C503 or 3C503-16 at I/O address 0x250, no other devices should use IRQ 3.
- The 3C503 board has limited on-board memory, causing poor NFS performance. To avoid this, use a 4-Kbyte read and write buffer size to mount the NFS software over the 3C503 interface (see , `mount_nfs` (1M)).

3Com EtherLink III (3C5x9, 3C509B, 3C59x), EtherLink XL (3C900 TPO, 3C900 COMBO), Fast EtherLink XL (3C905)

Solaris Device Driver:	elx
Device Type:	Network (Ethernet)
Adapters:	3Com EtherLink III (3C5x9, 3C509B, 3C59x), EtherLink XL (3C900 TPO, 3C900 COMBO), Fast EtherLink XL (3C905)
Bus Types:	ISA, EISA, Micro Channel, PCI

Preconfiguration Information

Configure the 3C5x9 (ISA bus) adapter for EISA addressing when installed in an EISA bus system.

Supported Settings

EtherLink III 3C59x and 3C509B adapters *only*:

- Media Type: Auto Select

EtherLink III 3C509B *only*:

- Plug and Play: Disabled

Known Problems and Limitations

3C509B cards with the following information printed on the card won't work with the Solaris operating environment: ASSY 03-0021-000, REV A.

AMD PCnet Ethernet (PCnet-ISA, PCnet-PCI), Allied Telesyn AT-1500, Microdyne NE2500plus

Solaris Device Driver:	pcn
Device Type:	Network (Ethernet)
Adapter:	PCnet
Chips:	AMD PCnet-ISA, PCnet-PCI Allied Telesyn AT-1500 Microdyne NE2500plus
Bus Types:	ISA, PCI

Preconfiguration Information

Supported Settings

PCnet-ISA adapters *only*:

- IRQ Level: 3, 5, 9, 10, 11, 15
- I/O Address: 0x300, 0x320, 0x340, 0x360
- Plug and Play: Disabled

Known Problems and Limitations

- 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 adapter to use another interrupt. PCnet-PCI adapters aren't affected.

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

Solaris Device Driver:	nfe
Device Type:	Network (Ethernet and token ring)
Adapters:	Compaq NetFlex-2 DualPort ENET, NetFlex-2 ENET-TR
Bus Type:	EISA

Preconfiguration Information

Supported Settings

- **IRQ Level:** 3, 5, 9, 10, 11

Both ports on the Compaq NetFlex-2 DualPort ENET card share the same IRQ.

Known Problems and Limitations

- Although the NetFlex-2 ENET-TR controller can be configured for Ethernet or token ring, Solaris software only supports the Ethernet functionality.
- Check for IRQ conflicts with ISA devices not defined for the EISA configuration software. The default IRQ is 10, which can be used for many ISA cards, including SMC Ethernet cards, for example.
- Promiscuous mode is not supported by the firmware for this card.

Configuration Procedure

1. **Set the connector type; use DB-15 or 10BASE-T RJ-45.**
 - Use the splitter cable (shipped with the DualPort ENET controller) with DB-15 connectors.

- If the DualPort ENET card is used to install the Solaris software over a network, connect the RJ-45 connector to the *first* network port (Port 1).
 - The default setting (DB-9) on the NetFlex-2 ENET-TR needs to be changed.
2. **Compaq NetFlex-2 ENET-TR card *only*: Configure this card to use a 10-Mbps data rate, not the default (16 Mbps).**

Compaq NetFlex-3, Netelligent Controllers

Solaris Device Driver:

cnft

Device Type:

Network (Ethernet)

Adapters:

- Compaq NetFlex-3/E, NetFlex-3/P and:
 - 10BASE-T UTP Module (included)
 - 10/100BASE-TX UTP Module (optional)
 - 100VG-AnyLAN UTP Module (optional)
 - 100BASE-FX Module (optional)
- Compaq Netelligent 10T PCI UTP with TLAN 2.3 or TLAN 3.03
- Compaq Netelligent 10/100 TX PCI UTP with TLAN 2.3 or TLAN 3.03
- Compaq NetFlex-3 EISA and PCI with TLAN 2.3 and:
 - 10BASE-T UTP Module (included)
 - 10/100BASE-TX UTP Module (optional)
 - 100VG-AnyLAN UTP Module (optional)
 - 100BASE-FX Module (optional)
- Compaq NetFlex-3 DualPort 10/100TX PCI UTP
- Compaq Integrated NetFlex-3 10/100 T PCI with AUI on ProLiant 2500
- Compaq Integrated NetFlex-3 10/100 T PCI UTP/BNC on Deskpro 4000/6000, Professional Workstation 5000, and ProLiant 800
- Compaq Netelligent 10T PCI UTP Version 2 with TLAN 3.03
- Compaq Netelligent 10/100 T PCI UTP Version 2 with TLAN 3.03

Bus Types:

EISA, PCI

Preconfiguration Information

- Insert a 10BASE-T UTP, 10/100BASE-TX UTP, 100BASE-FX, or 100VG-AnyLAN UTP module into the NetFlex-3 PCI or EISA controller base unit. For Netelligent and DualPort controllers, this step is not required.
- Use the Compaq EISA configuration utility (not before ECU version 2.30) so the system recognizes the NetFlex-3 controller(s).

Supported Settings

NetFlex-3/E controllers:

- IRQ Level: 5, 9, 10, 11

NetFlex-3/P controllers:

- IRQ Level: 2(9), 3, 4, 5, 6, 7, 10, 11

Netelligent controllers:

- IRQ Level: 2(9), 3, 4, 5, 6, 7, 10, 11, 12, 14, 15

Known Problems and Limitations

- Trying to remove NetFlex-3 controllers configured at the same IRQ produces the error message: "Couldn't remove function . . . from *ipl*, *irq*".
- Configuring a NetFlex-3 controller and a NetFlex-2 controller on the same IRQ line on the same server could result in one of the controllers not being available. Configure the two cards to different IRQ lines.
- To get good performance for 100BASE, full duplex operation, the media speed and duplex mode have to be forced to 100 and 2, respectively.
- Both the UTP and AUI interfaces are supported by the Integrated NetFlex-3 controller on the ProLiant 2500. However, net booting is supported only using the UTP interface.
- Netbooting is supported only using the UTP interface on the ProLiant 800, Deskpro 4000/6000, and Professional Workstation 5000.

Configuration Procedure

1. **Install the Solaris software.**

2. Modify the driver configuration file

/platform/i86pc/kernel/drv/cnft.conf.

This file specifies the valid configurable parameters for the driver:

- **duplex_mode:** This property forces the duplex mode for the controller. It can be set to:
 - 0 - Autoconfigure (Default)
 - 1 - Half duplex
 - 2 - Full duplex
- **media_speed:** This property sets the media speed for the controller. This option can be used to force the 10/100BASE-TX to 10- or 100-Mbps operation. The media speed is autoconfigured by default. The valid values are:
 - 0 - Autoconfigure (Default)
 - 10 - Force 10-Mbps media speed
 - 100 - Force 100-Mbps media speed
- **max_tx_lsts, max_rx_lsts, tx_threshold:** These properties tune driver performance. The valid values are:

Property	Valid Values	Default Value
max_tx_lsts	4 to 16	16
max_rx_lsts	4 to 16	16
tx_threshold	2 to 16	16

- **debug_flag:** Set this property to 1 or 0 to enable or disable debug messages from the driver. Debug messages are disabled by default.
- **mediaconnector:** Set to 1 to enable the AUI interface for the Integrated NetFlex-3 controller on ProLiant 2500 systems or to enable the BNC interface on the Integrated NetFlex-3 controller on the ProLiant 800, Deskpro 4000/6000, and Professional Workstation 5000. The UTP interface is the default (0).
- **board_id:** Set this property to support additional EISA/PCI controllers. The format of the `board_id` is `0xVVVVDDDD`, where `VVVV` means vendor ID and `DDDD`, device ID. More than one ID can be specified, if required.

3. To activate the configuration changes, as root type:

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

DEC 21040, 21041, 21140, 21142, 21143 Ethernet

Solaris Device Driver:	dnet
Device Type:	Network (Ethernet)
Adapters:	DEC 21040, 21041, 21140, 21142, 21143
Bus Type:	PCI

Preconfiguration Information

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

Supported Settings

These successfully tested 21040/21041/21140/21142/21143-based adapters are supported.

Name/Model	Part/Version	Chip 21xxx	10MB Media	100MB Media	Notes
Adaptec ANA-6911A/TX	–	143PA	T	X	
Adaptec ANA-6911A/C	–	143PA	T B	X	
AsanteFAST	09-00087-11 D	140AA	T	X	B
CNet PowerNIC CN935E	A	041AA	T B		
Cogent EM100	100001-01 02	140		X	
Cogent EM100TX	110001-02 02	140AB		X	
Cogent EM110 T4	110101-01	140	T B	4	
Cogent EM110TX	110001-02 06	140AB	T	X	

Name/Model	Part/Version	Chip 21xxx	10MB Media	100MB Media	Notes
Cogent EM110TX	110001-03 01	140AB	T	X	
Cogent EM110TX	110001-03 14	140AC	T	X	
Cogent EM400 QUAD	400001-00 01	140		X	
Cogent EM400 QUAD	400001-00 01	140AB		X	
Cogent EM440 QUAD	440001-01 01	140AC	T	X	B
Cogent EM960C	960001-03 06	040AA	T B A		
Cogent EM960C	960001-04 02	040AA	T B A		1
Cogent EM960TP	960001-03 07	040AA	T		
Cogent EM960TP	960001-04 01	040AA	T		
Cogent EM964 QUAD	964001-00 01	040AA	T		
Compex ReadyLINK ENET32	B2	040AA	T B A		
D-Link DE530CT	A2	040AA	T B		
D-Link DE530CT	D2	041AA	T B		
D-Link DE530CT+	A1	040AA	T B		
DEC EtherWORKS 10/100	DE500 RevD01	140AC	T	X	6, C
DEC EtherWORKS PCI 10/100	DE500-XA RevC01	140AB	T	X	6, C
Diversified Tech	651205025 1.2	140AC	T	X	A
Kingston KNE40BT	2001585 A00	041AA	T B		
Kingston KNE100TX	2001837-000.A00	140AC	T	X	B
Kingston KNE100TX	2001837-000.B00	140AC	T	X	D
Kingston KNE100TX	9920219-001.B00	140AB	T	X	B
Kingston KNE100TX	9920219-002.B00	140AC	T	X	D

Name/Model	Part/Version	Chip 21xxx	10MB Media	100MB Media	Notes
Linksys LNE100TX	8EFPCI01..B1-1	140AB	T	X	7
Linksys LNE100TX	8EFPCI01..B1-3	140AC	T	X	7
Rockwell RNS2300	320109-02	140AB	T	X	
Rockwell RNS2340 QUAD	320112-00	140AB	T	X	2
SMC 8432 BT	60-600510-003 A	040AA	T B		
SMC 8432 BT	60-600528-001 A	041AA	T B		
SMC 8432 BT	61-600510-010 B	040AA	T B		
SMC 8432 BTA	60-600510-003 A	040AA	T B A		
SMC 8432 BTA	61-600510-000	040AA	T B A		
SMC 8432 T	60-600528-001 A	041AA	T		
SMC 9332BDT	60-600542-000 A	140AC	T	X	B
SMC 9332DST	60-600518-002 A	140	T	X	3
SMC 9332DST	61-600518-000 B	140	T	X	3
SMC 9334BDT DUAL	–	140AC	T	X	
Znyx ZX311	SA0027 01	041AA	T B A		
Znyx ZX312	SA0011 04	040AA	T B A		1
Znyx ZX314 QUAD	PC0009-05	040AA	T		
Znyx ZX314 QUAD	SA0014-05	040AA	T		
Znyx ZX315 DUAL	SA0015 X2	040AA	T B		
Znyx ZX342	PC0012 X2	140	T	X	4
Znyx ZX344 QUAD	SA0019 X2	140AA		X	
Znyx ZX345	SA0025 X1	140AB	T	X	B

Name/Model	Part/Version	Chip 21xxx	10MB Media	100MB Media	Notes
Znyx ZX346 QUAD	SA0026 X1	140AC	T	X	A
Znyx ZX348 DUAL	SA0028 X2	140AC	T	X	B

10MB Media Codes:

- T—Twisted Pair (10BASE-T)
- B—BNC (10BASE2)
- A—AUI (10BASE5)

100MB Media Codes:

- X—100BASE-TX (Category 5 Unshielded Twisted Pair)
- 4—100BASE-T4

Notes:

- 1—BNC/AUI jumper on board must be set to select between those two media.
- 2—First port is the bottom one (closest to board edge connector).
- 3—STP (Shielded Twisted Pair) medium is not supported.
- 4—Board has separate jacks for 10 Mbytes and 100 Mbytes.
- 5—The DEC chip on this card is a prototype 21041 chip, labeled “proto.”
- 6—Only tested on 10BASE-T network.
- 7—Only works on 100TX network.
- A—ICS 1890Y PHY chip.
- B—National Semiconductor DP83840 PHY chip.
- C—National Semiconductor DP83223V PHY chip.
- D—National Semiconductor DP83840VCE PHY chip.

Known Problems and Limitations

- The adapters and configurations listed above are supported by the `dnet` driver, and additional boards will be supported in the future.
- On multiport cards, the first port is the top port, *except* on the Rockwell RNS2340, the first port is the bottom port.

Fujitsu FMV183 Ethernet

Solaris Device Driver:	fmvel
Device Type:	Network (Ethernet)
Adapter:	Fujitsu FMV183
Bus Type:	ISA



Caution - The FMV183 card is sensitive to autoprobing by other drivers and requires autoprobe reset sequences that may disturb other cards.

Preconfiguration Information

Supported Settings

- **IRQ Level:** 3, 7, 10, 15
- **I/O Address:** 0x220, 0x240, 0x260, 0x280, 0x2A0, 0x2C0, 0x300, 0x340
- **Plug and Play:** Disabled

Known Problems or Limitations

- The `fmvel` driver does not support netbooting. Install the Solaris software from the CD, and see “Enabling Support After Installation.”
- Because the default IRQ (10) is used by many ISA cards (SMC cards, for example), make sure it doesn’t conflict with other ISA devices on your system.
- FMV183 cards cannot be installed on a system with the Solaris `e1` driver, which supports the 3Com EtherLink II (3C503) and EtherLink II/16 (3C503-16), or the `nei` driver, which supports the Novell NE2000, NE2000plus, and compatibles.

If the Solaris operating environment is running on your system and you want to add support for the FMV183 card, do *not* install the adapter until you disable conflicting drivers as described in the next section.

Configuration Procedure

Enabling Support After Installation

1. Become root.
2. Use a text editor (such as `vi` or `emacs`) to edit the `/etc/system` file, and add the following lines, for example:

```
exclude: el
exclude: nei
```

3. In the `/etc/system` file, remove or use an asterisk (*) to comment out the following lines:

```
exclude: fmvel
forceload: drv/el
forceload: drv/nei
```

4. Save your changes and exit the editor.
5. Type the following commands to set up a reconfiguration boot and to shut down your system:

```
# touch /reconfigure
# init 0
```

6. After the system shuts down, turn the system off.
7. Install the FMV183 card and configure it following manufacturer's documentation.
8. Reboot the system, or turn the system on if it is off.

Note - The incompatible Ethernet cards will no longer be recognized by the Solaris software and cannot be used in the system with the FMV183.

9. Perform a normal reboot to bring your network into operation:

```
# reboot
```

Intel EtherExpress 16, 16C, 16TP, MCA, MCA TP (82586)

Solaris Device Driver:	iee
Device Type:	Network (Ethernet)
Adapters:	Intel EtherExpress 16, 16C, 16TP, MCA, MCA TP (82586)
Bus Types:	ISA, Micro Channel

Preconfiguration Information

Known Problems and Limitations

- Each type of Intel EtherExpress 16 conflicts with the SMC 8013 card. If the SMC 8013 card and an Intel EtherExpress 16 are both installed in your system, data to and from the IEE 16 card will be randomly corrupted.
- Interrupt sharing is not supported.

Intel EtherExpress Flash32 (82596)

Solaris Device Driver:	ieef
Device Type:	Network (Ethernet)
Adapter:	Intel EtherExpress Flash32 (82596)
Bus Type:	EISA
Connector:	Any

Preconfiguration Information

Supported Settings

- Flash Memory: Disabled

Known Problems and Limitations

- The EtherExpress Flash32 (82596) card may “hard-hang” under heavy load. This is a hardware problem and cannot be fixed in software. The only way to recover from this is to reboot the machine.
- There are performance problems with versions earlier than version E of 82596 EISA cards containing PLX9032 chips. These performance problems will be resolved in a future release of this driver.

Intel EtherExpress PRO (82595), EtherExpress PRO/10+ (82595FX)

Solaris Device Driver:	eeepro
Device Type:	Network (Ethernet)
Adapters:	Intel EtherExpress PRO (82595), EtherExpress PRO/10+ (82595FX)
Bus Type:	ISA

Preconfiguration Information

Supported Settings

- **IRQ Level:** 3, 5, 9, 10, 11 (10 is recommended)
- **I/O Address:** 0x300 is recommended

EtherExpress PRO/10+ *only*:

- **Plug and Play:** Disabled

Intel EtherExpress PRO/100 (82556)

Solaris Device Driver:	ieef
Device Type:	Network (Ethernet)
Adapter:	Intel EtherExpress PRO/100 (82556)
Bus Types:	EISA, PCI
Connector:	RJ-45

Preconfiguration Information

Supported Settings

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

- IRQ Level: 3, 5, 7, 9, 10, 11, 12, 14, 15
- Flash Memory: Disabled
- Speed: 10 Mbps and 100 Mbps

Known Problems and Limitations

- Due to hardware restrictions, don't install the EISA model of the Intel EtherExpress PRO/100 card on systems with a PCI bus.
- This driver provides 100-Mbps Ethernet support; however, the driver does not currently transfer the data at rates expected of a 100-Mbps interface.

Novell NE2000, NE2000plus Ethernet, and Compatibles

Solaris Device Driver:	nei
Device Type:	Network (Ethernet)
Adapters:	Novell NE2000, NE2000plus, Compatibles
Bus Type:	ISA

The NE2000plus card is software configurable; the NE2000 card must be manually configured with dip switches and jumpers.



Caution - The NE2000 and NE2000plus adapters are sensitive to autoprobing by other drivers and require autoprobe reset sequences that may disturb other cards. To avoid conflicts, the NE2000 and NE2000plus cards cannot be installed on a system with the Solaris drivers listed below. Also, the Solaris `nei` driver is disabled by default. Enable it using a script (`nov2000.bat`) on the diskette that disables the other drivers and enables the `nei` driver; see “Modifying the Driver Update Boot Diskettes” on page 93. If the Solaris operating environment is already 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 Installation.”

This supported hardware *cannot* be used with NE2000 and NE2000plus cards.

Solaris Driver	Supported Hardware
<code>eeepro</code>	“Intel EtherExpress PRO (82595), EtherExpress PRO/10+ (82595FX)” on page 88
<code>el</code>	“3Com EtherLink II (3C503), EtherLink II/16 (3C503-16)” on page 70
<code>elink</code>	“3Com EtherLink 16 (3C507)” on page 69
<code>fmvel</code>	“Fujitsu FMV183 Ethernet” on page 83

Solaris Driver	Supported Hardware
iee	"Intel EtherExpress 16, 16C, 16TP, MCA, MCA TP (82586)" on page 86
pcn	"AMD PCnet Ethernet (PCnet-ISA, PCnet-PCI), Allied Telesyn AT-1500, Microdyne NE2500plus" on page 72
smc	"SMC EtherEZ (8416), EtherCard Elite16 Ultra (8216), EtherCard PLUS Elite (8013), EtherCard PLUS Elite 16 (8013), EtherCard PLUS (8003), EtherCard Elite 32T (8033)" on page 99
tiqmouse	Texas Instruments TravelMate 4000E QuickPort Ball Point Mouse

Preconfiguration Information

- The Solaris `nei` driver expects the NE2000 or NE2000plus card to be in a 16-bit ISA slot and jumpered for 16-bit operations.
- Some NE2000 and NE2000plus compatibles allow you to configure the bus speed; the bus speed on the card should match that of the system.
- The Solaris operating environment does not support I/O base addresses 0x320, 0x340, and 0x360 because of conflicts with other drivers.
- The NE2000 card is configured with dip switches before installing the card. The NE2000plus is configured with the manufacturer's `PLUSDIAG` utility.

Supported Settings

Note that some NE2000 compatibles may further restrict these choices.

NE2000:

- IRQ Level: 2, 3, 4, 5, 10, 11, 12, 15
- I/O Address: 0x240, 0x280, 0x2C0, 0x300, 0x320, 0x340, 0x360

NE2000plus:

- IRQ Level: 2, 3, 4, 5, 10, 11, 12, 15
- I/O Address: 0x240, 0x280, 0x2C0, 0x300, 0x320, 0x340, 0x360
- Shared Memory: Start at 0xD0000
Increase by 0x4000 for each additional card

Known Problems and Limitations

- Some early versions and some compatible models may hang the system when probed. The large I/O space required (0x20 bytes) increases device conflicts.
- If data corruption errors occur while an NE2000 or NE2000plus card is installed, check the bus speed that is set on the card. (This is a configurable option on some compatible cards.) Some cards may not run reliably at 16 MHz and must be configured to run at 8 MHz.
- Some NE2000 and NE2000plus compatibles may misidentify slot width or may not work with all mode or jumper settings. For example, some NE2000plus compatibles may only work in both data modes (I/O and shared memory), depending on the system configuration. Try a different bus slot if the card misdetects a 16-bit slot for an 8-bit slot. For NE2000plus compatibles, try both data modes by setting the jumpers or using the DOS configuration program.
- If the NE2000 card is not recognized by the Solaris operating environment, it's possible the compatible does not sufficiently resemble the NE2000 hardware. Improper configuration setup may also cause this failure.
- If the system hangs or the NE2000 card is not recognized by the Solaris software, it may be necessary to reset the bus speed or I/O recovery time (which may be settable in the system BIOS). General bus noise may also affect the behavior of certain NE2000 compatibles; try swapping devices into different slots until the card functions satisfactorily.
- If the system hangs after booting with an NE2000 or NE2000plus card installed but it doesn't hang if you remove the card, check that:
 - The NE2000 or NE2000plus card has been jumpered for 16-bit operation and has been placed in a 16-bit slot. Some cards misdetect slot type.
 - The NE2000 or NE2000plus compatible is recognized. If it isn't, replace the card.
- For NE2000 compatibles that do not operate at all combinations of I/O address and IRQ settings, use the default values of IRQ 3 and I/O address 0x300.



Caution - *Never* use an IRQ or I/O base address not listed under "Supported Settings," even if they are supported by the NE2000 or NE2000plus card. Due to conflicts with other Solaris drivers, the I/O base addresses 0x320, 0x340, and 0x360 are specifically disallowed in the Solaris `nei.conf` file.

- 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. 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, the vendor-supplied DOS program PLUSDIAG must be used.)

Configuration Procedure

Modifying the Driver Update Boot Diskettes

Because the Novell NE2000 and NE2000plus Ethernet adapters are disabled by default, there are command files on the Driver Update BOOT diskettes to enable the `nei` device driver. The Driver Update BOOT diskettes must be modified using DOS. As a precaution, make a copy of the original Driver Update BOOT diskettes prior to running 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 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 1 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 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 1 for NE2000/NE2000plus.”

5. Insert another blank 3.5-inch diskette into drive A: and format it:

```
format a:
```

6. Insert Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 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 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 2 for NE2000/NE2000plus.”

8. Insert another blank 3.5-inch diskette into drive A: and format it:

```
format a:
```

9. Insert Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 3 into drive A:, make a copy of it, and remove the diskette:

```
diskcopy a: a:
```

10. Label the copy of the third boot diskette as “Modified.”

For example: “Modified Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 3 for NE2000/NE2000plus.”

11. Store your original Driver Update BOOT diskettes in a safe place.
12. Insert the copy of Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 3 into drive A:
Make sure the diskette is writable because the contents will be modified.
13. Change to drive A: (remember DOS is still running):
a:
14. Run the `nov2000.bat` command file:
`nov2000`
Now the Driver Update BOOT diskettes are prepared to install the Solaris software on your system.

Enabling Support for Controllers After Installation

If the Solaris operating environment is already running on your system and you want to add an NE2000 or NE2000plus Ethernet card, disable the conflicting drivers installed on your system *prior* to installing the NE2000 or 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: eeepro
exclude: el
exclude: elink
exclude: fmvel
exclude: iee
exclude: pcn
exclude: smc
exclude: tigmouse
forceload: drv/nei
```

3. In the `/etc/system` file, remove or use an asterisk (*) to comment out the following lines:

```
exclude: nei
forceload: drv/eeepro
forceload: drv/el
forceload: drv/elink
forceload: drv/fmvel
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. Type the following to set up a reconfiguration boot and to shut down your system:

```
# touch /reconfigure  
# init 0
```

7. After the system shuts down, turn the system off.
8. Install the NE2000 or NE2000plus card and configure it according to the information in “Supported Settings.”
9. Reboot the system, or turn the system on if it is off.

Note - Upon reboot, the Ethernet cards listed on this Device Reference Page will no longer be recognized by the Solaris software and cannot be used in the system with the NE2000 or NE2000plus.

10. If the newly installed NE2000 or NE2000plus Ethernet card is replacing another network card that uses a different network driver, you need to rename the `/etc/hostname.olddriver0` file to `/etc/hostname.newdriver0` before rebooting a second time.

For example, if you have replaced a 3Com EtherLink III card with a NE2000 or NE2000 plus card, run the following command as root:

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

11. Perform a normal reboot to bring your network into operation:

```
# reboot
```

SMC Elite32 (8033)

Solaris Device Driver:	smce
Device Type:	Network (Ethernet)
Adapter:	SMC Elite32 (8033)
Bus Type:	EISA
Connectors:	<p>One board type has an AUI connector and two BNC connectors.</p> <p>Another board type has an AUI connector and two RJ-45 connectors.</p> <p>Channel 0 can use any of the connectors.</p>

Configuration Procedure

1. **Use the EISA configuration utility (ECU) to select the connector for channel 0.**

Note - If a transceiver is connected to the AUI connector, the board uses the AUI connection even if another connector type is selected in the ECU.

2. **Set the IRQ level if needed.**

In the Elite 32 ECU, the system usually determines the IRQ value automatically by using the first available IRQ level the ECU finds. If there are also ISA adapters not identified in the ECU, the automatically chosen IRQ may conflict with an ISA adapter IRQ. System performance or network adapter communication may be affected. You can override the automatic assignment of the IRQ by manually selecting an unused IRQ level for the Elite32 adapter.

SMC Elite32C Ultra (8232)

Solaris Device Driver:	smceu
Device Type:	Network (Ethernet)
Adapter:	SMC Elite32C Ultra (8232)
Bus Type:	EISA
Connectors:	RJ-45, AUI, BNC

Preconfiguration Information

Supported Settings

• IRQ Level:	3, 5, 7, 9, 10, 11, 15; Edge-triggered
• I/O Address:	Determined by slot number
• RAM Address:	0xC0000–0xEE000, 8K increments
• DMA Channel:	Disabled
• ROM Address:	Disabled
• Optional ROM:	Disabled

Known Problems and Limitations

The `smceu` driver will not work with the default shared RAM address (0xC0000). This address conflicts with that used by the VGA BIOS (0xC0000–0xC3FFF), if present.

SMC Ether 10/100 (9232)

Solaris Device Driver:	<code>smcf</code>
Device Type:	Network (Ethernet)
Adapter:	SMC Ether 10/100 (9232)
Bus Type:	EISA
Connector:	RJ-45

Preconfiguration Information

Supported Settings

• IRQ Level:	3, 5, 7, 9, 10, 11, 15
• I/O Address:	Determined by slot number
• ROM Address:	Disabled
• DMA Channel:	Disabled
• Speed:	10 Mbps or 100 Mbps (operation at the higher speed using the RJ-45 connector requires a Category 5 UTP cable)
• Optional ROM:	Disabled

Known Problems and Limitations

The `smcf` device driver provides 100-Mbps Ethernet support; however, the driver cannot transfer the data at rates expected of a 100-Mbps interface. The performance of the driver is under study.

SMC EtherEZ (8416), EtherCard Elite16 Ultra (8216), EtherCard PLUS Elite (8013), EtherCard PLUS Elite 16 (8013), EtherCard PLUS (8003), EtherCard Elite 32T (8033)

Solaris Device Driver:	smc
Device Type:	Network (Ethernet)
Adapters:	SMC EtherEZ (8416), EtherCard Elite16 Ultra (8216), EtherCard PLUS Elite (8013), EtherCard PLUS Elite 16 (8013), EtherCard PLUS (8003), EtherCard Elite 32T (8033)
Bus Types:	ISA, Micro Channel

Preconfiguration Information

Supported Settings

- Use the manufacturer's configuration utility to configure SMC EtherCard Elite16 Ultra (8216) and SMC EtherEZ (8416) network adapters:

- Shared Memory Address: 0xC0000–0xEE000

- The information in the following table is only used for EtherCard PLUS (WD/SMC 8003 and 8013EBT) cards that use jumpers to set the configuration.

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

I/O Address	IRQ	Base Memory Address (Board RAM)
0x300	5	0xD4000
0x260	5	0xE0000
0x380	7	0xD4000

Known Problems and Limitations

- The boards will only work in memory-mapped mode; use the manufacturer's utility to configure the device. Ideally, the board should be in Plug and Play mode.
- The EtherCard PLUS (8003) board has a limited amount of on-board memory, which causes poor NFS system performance. To avoid this problem, NFS system mounts over the 8003 interface must use a 4-Kbyte read/write buffer size.
- There is a problem with the design of the ISA bus when using cards that use shared RAM addresses: you *cannot* successfully put an 8-bit card in the same 128K address range with a 16-bit card. There are three 128K ranges into which cards can be placed: A0000-BFFFF, C0000-DFFFF, and E0000-FFFFF. 8-bit and 16-bit devices cannot coexist in any of these ranges, though they can exist in different ranges on the same system.

SMC 8003 cards are 8-bit cards. The SMC 8013, 8216 and 8416 cards are 16-bit cards. If your system contains any 8-bit cards (such as the SMC 8003) that use shared memory, be sure they are configured into a 128K address range that does not contain any 16-bit cards.

- Wyse Decision systems and 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 configurations, set the SMC card to a valid setup that does not use I/O port 0x300.
- Some versions of SMC's EZSTART utility can restrict the system media types to 10BASE-T or AUJ connection even if BNC connection is actually being used. Disable Automatic Media Detection, and select the Custom and Setup options to set the Network Interface to BNC or another connector type.

Configuration Procedure

Software Configuration Procedure for SMC EtherEZ (8416)

Note - The SMC EISA configuration utilities don't properly configure the SMC EtherEZ (8416). Instead, use the EZSETUP program below.

1. Install EZSETUP program with SMC's EZSTART utility.

Choose Custom Install and install the EZSETUP program, which is listed under Miscellaneous Utilities.

2. Run the EZSETUP program with the disable Plug and Play option:

```
C:> ezsetup -nopnp
```

3. Then run EZSETUP again with no options.

4. Answer the configuration questions, being sure to disable Plug and Play.

FDDI Network Adapters

Rockwell Network Systems 2200 Series FDDI Adapters

Solaris Device Driver:	sxp
Device Type:	Network (FDDI)
Adapter:	RNS 2200
Bus Type:	PCI
Supported Network Configurations:	Fiber dual-attached station (DAS), dual-ring FDDI network, one optical transceiver per ring Fiber single-attached station (SAS), single-ring FDDI network Unshielded twisted pair (UTP) SAS

The following Rockwell Network Systems (RNS) 2200 adapter models are available:

Model	Workstation	Connector	Media
2200-FD	DAS	SC	Fiber optic; optional optical bypass relay
2200-FSS	SAS	SC	Fiber optic
2200-FSM	SAS	MIC	Fiber optic

Model	Workstation	Connector	Media
2200-CS	SAS	RJ-45	Category 5 copper UTP
2200-CD	DAS	RJ-45	Category 5 copper UTP

The RNS 2200 supports extended FDDI address detection and matching, and provides host-programmable control of an external optical bypass relay (OBR) for dual-attached station configurations.

Preconfiguration Information

Known Problems and Limitations

- No more than four 2200 adapters are supported per system.
- 2200 adapter diagnostics only run in DOS.

Token Ring Network Adapters

IBM 16/4, Auto 16/4, Turbo 16/4 Token Ring and Compatible Adapters

Solaris Device Driver:	tr
Device Type:	Network (Token Ring)
Adapters:	IBM 16/4, Auto 16/4, Turbo 16/4, Compatible Adapters
Bus Types:	ISA, EISA, Micro Channel

Preconfiguration Information

Supported Settings

- The ROM location address (ISA and EISA) must be set to one of these values: 0xC2000, 0xC6000, 0xCA000, 0xCE000, 0xD2000, 0xD6000, 0xDA000.
- The shared RAM size should be set to 16 Kbytes (when configuring the card), but the Token Ring board will actually use 24 Kbytes. Keep this in mind when determining address space conflicts with other boards.

All cards that support Plug and Play:

- Plug and Play Disabled

16/4 Token Ring adapters (Micro Channel) and Auto 16/4, Turbo 16/4 Token Ring adapters (ISA, Micro Channel):

- IRQ Level: 2, 3, 10, 11

16/4 Token Ring adapters (ISA):

- IRQ Level: 2, 3, 6, 7
- I/O Address: 0xA20, 0xA24
If there are multiple adapters installed, do not overlap them.

Turbo 16/4 Token Ring adapters (ISA):

- Adapter Mode: Auto 16 Mode, ISA 16 Mode
(Auto 16 Mode has better performance)

Known Problems and Limitations

- If you set the ROM location to 0xCE000, the Token Ring board will use 24 Kbytes starting at that location, so it will use all addresses in the range 0xCE000–D3FFF.

Note - In most systems, memory from C0000 to CB000 is used as video RAM.

- Do not configure any device at I/O address 0x220–0x227 if there is a Token Ring in the system. For example, because the default address for a Sound Blaster card is 0x220, either move it to port address 0x240 or remove it from the system.
- If the Token Ring board is not connected to a hub on startup or netboot, an error message is displayed. In the case of a netboot, the boot process panics. Make sure that the Token Ring board is connected to a hub and that the hub is active.
- Two interfaces working together are not supported in the Micro Channel Architecture.
- The adapter's receive speed is directly related to the amount of RAM the adapter is using. If your adapter performs poorly, use 32 Kbytes of memory instead of the more usual 8 Kbytes. Use the manufacturer's configuration program to set the card's RAM.

Configuration Procedure

1. Follow the manufacturer's documentation and use the manufacturer's setup software to configure the card.

- Auto 16/4 and Turbo 16/4 Token Ring adapters in ISA systems *only*: Run the LANAID program that comes with the adapter.
 - Auto 16/4 Token Ring adapter in MCA systems *only*: Install the configuration files from the adapter reference diskette, following the adapter's instructions.
Use the Standard Install Option if you need to configure the following:
 - An Auto 16/4 ISA adapter for another computer to use
 - The Autosense parameter setting
- 2. Set up the Token Ring so that:**
- The first station has autosense DISABLED.
 - All other stations can have autosense ENABLED.
- 3. When the “Ring speed listening” feature is tested, make sure the Autosense parameter is turned on.**

Madge PCI Presto Token Ring

Solaris Device Driver:	<code>mpre</code>
Device Type:	Network (Token ring)
Adapter:	PCI Presto
Bus Type:	PCI

Madge Networks Ltd. provides direct support for its third-party `mpre` device driver that runs in the Solaris operating environment. See the documentation accompanying your Madge PCI Presto card for details on how to contact Madge for technical support.

Preconfiguration Information

Known Problems and Limitations

The following problems and limitations have been found with the Madge `mpre` driver. Contact Madge for technical support on these issues, as required.

- Cards supported by the `mtok` driver and those supported by the `mpre` driver will not work if installed together in the same system.
- There is no realmode support for this card.

Madge Smart 16/4 Token Ring

Solaris Device Driver:	mtok
Device Type:	Network (Token ring)
Adapters:	Madge Smart 16/4 AT Ringnode/Bridgenode, Smart 16/4 AT Plus Ringnode, Smart 16/4 ISA Client Ringnode, Smart 16/4 ISA Client Plus Ringnode, Smart 16/4 EISA Ringnode/Bridgenode, Smart 16/4 MC Ringnode/Bridgenode, Smart 16/4 MC32 Ringnode/Bridgenode, Smart 16/4 PCI Ringnode/Bridgenode
Bus Types:	EISA, ISA, MCA, PCI

Madge Networks Ltd. provides direct support for its third-party `mtok` device driver that runs in the Solaris operating environment. See the documentation accompanying your Madge Ringnode/Bridgenode for details on how to contact Madge for technical support.

Preconfiguration Information

Known Problems and Limitations

- Cards supported by the `mtok` driver and those supported by the `mpre` driver will not work if installed together in the same system.
- The Adaptec AHA-154x adapter (`aha` driver) expects to use DMA channel 6, which the `mtok TRCFG.EXE` program also assumes the Madge Smart 16/4 adapter will use. To avoid a conflict, insert the Madge Ringnode into the system first, and configure it to use another unused DMA channel. Then install the Adaptec AHA-154x adapter.

The following problems and limitations have been found with the Madge `mtok` driver. Contact Madge for technical support on these issues, as required.

- When the `mtok` driver is enabled, the following messages appear when the system startup scripts run `ifconfig`:


```
configuring network interfaces: ip_rput: DL_ERROR_ACK for 29
errno 1, unix0
ip: joining multicasts failed on mtok0
will use link layer broadcasts for multicast
```

These messages can be ignored.

- Very heavy network stress may result in Madge adapter hangs or panics. This is more likely to occur with Micro Channel systems. To avoid this problem, restrict network access to one service (such as NFS, RCP, TCP) at a time if possible.
- Disconnected adapters may fail to open into the ring, and thus fail to `ifconfig` properly under the Solaris operating environment. To avoid this problem, keep Madge token ring adapters connected to a properly configured ring at all times.
- Using the dynamic module loading and unloading features of the Solaris kernel with the `mtok` driver may lead to error messages and possibly panics. Do not configure the `mtok` driver manually; instead, perform a reconfiguration boot as needed to reconfigure the device:

```
# touch /reconfigure
# init 0
```

- The Solaris 2.5/2.5.1 `mtok` driver does not support `rplboot`. Thus, netbooting is not fully supported.
- The Solaris 2.5/2.5.1 `mtok` driver uses a nonstandard PCI framework for consistency with the Solaris 2.4 `mtok` driver, and thus has the potential to confuse the Solaris 2.5 kernel.

Though no such problems have been observed, if one does occur, a possible workaround is to limit the number of PCI devices in use on a machine with Madge 16/4 PCI adapters.

- The Madge `mtok` driver is disabled by default to avoid possible device conflicts with other devices. To use the `mtok` driver, you'll need to enable it and disable the `tr` driver (IBM 16/4, Auto16/4, Turbo 16/4 Token Ring and compatible adapters). Use one of the following methods:

Note - It is possible to use the `mtok` and `tr` drivers together by commenting out any entries having the `reg` property of `0xA20`.

- If you are using a Driver Update to install the Solaris software on a system with a Madge Smart 16/4 controller, modify the Driver Update BOOT diskettes before installation and run the `madge.bat` script. Modifying Driver Update BOOT diskettes is described later in this Device Reference Page.

- If you are adding a Madge Smart 16/4 controller to a system that has the Solaris operating environment and a Driver Update installed, see “Enabling Support After Installation” later in this Device Reference Page.

Configuration Procedure

Modifying the Driver Update Boot Diskettes

You must modify the Driver Update boot diskettes using DOS if you plan to use a Driver Update to install the Solaris software on a system that includes a Madge Smart 16/4 controller. As a precaution, make a copy of the original Driver Update 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 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 1 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 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 1 for Madge Smart 16/4.”

5. Insert another blank 3.5-inch diskette into drive A: and format it:

```
format a:
```

6. Insert Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 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 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 2 for Madge Smart 16/4.”

8. Insert another blank 3.5-inch diskette into drive A: and format it:

```
format a:
```

9. Insert Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 3 into drive A:, make a copy of it, and remove the diskette:

```
diskcopy a: a:
```

10. Label the copy of the third boot diskette as “Modified.”

For example: “Modified Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 3 for Madge Smart 16/4.”

11. Store your original Driver Update BOOT diskettes in a safe place.
12. Insert the copy of Solaris 2.5/2.5.1 x86 Driver Update 11 BOOT Diskette 3 into drive A:
Make sure the diskette is writable because the contents will be modified.
13. Change to drive A: (remember DOS is still running):
a:
14. Run the `madge.bat` command file:
madge
Now the Driver Update BOOT diskettes are prepared to install the Solaris software on your system.

Enabling Support After Installation

If the Solaris operating environment and a Driver Update are already running on your system and you want to add a Madge Smart 16/4 card:

1. Become root.
2. Use a text editor (such as `vi` or `emacs`) to edit the `/etc/system` file, and add the following lines:

```
exclude: tr
set mtok:mtok_forceload = 1
```

3. In the `/etc/system` file, remove or use an asterisk (*) to comment out the following lines:

```
exclude: mtok
```

4. Save your changes and exit the editor.
5. Type the following to set up a reconfiguration boot and to shut down your system:

```
# touch /reconfigure
# init 0
```

6. After the system shuts down, turn the system off.
7. Install the Madge Smart 16/4 card and configure it according to the information in “Configuring the Device.”
8. Reboot the system, or turn the system on if it is off.

9. If the newly installed Madge Smart 16/4 card is replacing another network card that uses a different network driver, you need to rename the `/etc/hostname.olddriver0` file to `/etc/hostname.newdriver0` before rebooting a second time.

For example, if you have replaced a 3Com EtherLink III card with a Madge Smart 16/4 card, you need to run the following command as root:

```
# mv /etc/hostname.elx0 /etc/hostname.mtok0
```

10. Perform a normal reboot to bring your network into operation:

```
# reboot
```

Configuring the Device

Various hardware settings on the adapter, such as the ring speed and DMA channel, can be set with switches on the adapter or using a configuration utility supplied on the MDGBOOT diskette shipped with your Ringnode. Refer to the documentation supplied with the Ringnode for detailed instructions.

When choosing hardware settings:

- Ensure that your Ringnode does not use the same IRQ as other adapters in your PC—and for AT Ringnodes, not the same DMA channel and I/O address.
- Make sure the selected ring speed matches that of the ring you want to connect to.

Note that a configuration utility must almost always be used to select features of the adapter (for example, ring speed). If the adapter isn't functioning properly, try alternate features, such as PIO instead of DMA, different I/O addresses, and so on.

Diagnostics

The driver may print out an error message containing two numbers on start-up. The following are the two most common error codes and their (possible) causes.

- Type = 0x08 Value = 0x01

The adapter has failed to open onto the ring. This could be caused by one of the following:

- The lobe cable is not securely attached to the adapter card or cabling unit.

- The ring speed setting on the card does not match the actual ring speed.
- Insertion onto the ring has been prevented by ring management software.
- The ring is beaconing.
- A ring parameter server on the ring has crashed.

- Type = 0x07 Value = 0x10

The adapter test DMA/PIO transfer has failed. This usually means that the adapter is in PIO mode and there is some interrupt clash.

If other errors are encountered, try running the Madge-supplied DOS diagnostics program to further isolate the problem.

Audio Cards

Analog Devices AD1848 and Compatible Devices

Solaris Device Driver:	<code>sbpro</code>
Device Type:	Audio
Chips:	Analog Devices AD1848, Compatible Devices (on computer motherboard or add-in card)
Bus Types:	ISA, EISA

Note - The features and interfaces that are supported by the Solaris `sbpro` driver are described in the , `audio` (7D) and , `sbpro` (7D) man pages.

Compatible Device Information

Selected AD1848-based devices are supported by the `sbpro` device driver. Some audio devices based on other compatible chips are also supported.

Although many audio devices claim to be compatible with other audio devices, they are not always compatible at the hardware level and are not supported by the Solaris software. “Tested Compatible Devices” on page 115 shows which devices have been tested with the Solaris operating environment.

Some cards based on the AD1848 or compatible chips also support advanced audio features that the `sbpro` driver does not currently support.

Tested Compatible Devices

The following AD1848 and compatible devices have been tested:

- Compaq Deskpro XL Business Audio with built-in AD1847 chip
- Turtle Beach Tropez card with CS4231 chip

Some other 100 percent hardware-compatible devices may also function using the `sbpro` driver; however, they have not been tested or certified with the Solaris operating environment.

The Turtle Beach Tropez card may interfere with the operation of other ISA devices in the system, such as the 3Com 3C509 and SMC Elite 16 Ethernet adapters. If installing a Tropez card in the system causes such devices to fail, run the configuration program that came with the device to select a different I/O base address for the card.

Preconfiguration Information

Note - Many audio devices come with a software utility that allows you to select the IRQ and DMA settings. Often, this utility does not record parameters in nonvolatile memory but in a configuration file used by DOS to set the card's configuration at each reboot. This type of configuration file is not used by the Solaris software and does not affect the operation of the card with the Solaris operating environment.

- If your device has no IRQ or DMA jumpers and no nonvolatile memory for storing those parameters, choose a suitable IRQ and DMA channel for the audio device that don't conflict with other devices.
- Device configuration information is stored in the `sbpro.conf` file, usually in the `/platform/i86pc/kernel/drv` directory. To use any of the audio devices in "Tested Compatible Devices" on page 115, you must first install the Solaris software 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 of the device.
- If your system or device has nonvolatile memory where a configuration utility stores the device's I/O address, IRQ, and DMA channel, you must know what settings you have chosen for those parameters.
- Output volume is controlled by software. Turn the volume thumbwheel to the maximum volume setting if you don't hear any sound.
- Consult the manufacturer's documentation to determine if the microphone jack for your device is a mono jack or a stereo jack. Be sure your microphone plug matches; if it doesn't, use a suitable adapter.

- Line-in and aux jacks typically require line level voltages, such as output from a tape or CD player line-out jack or from a powered (battery-operated) microphone. Mic jacks typically require lower voltages. Consult the manufacturer's documentation for your device's requirements.

Supported Settings

Defaults are shown in **this typeface**.

Compaq Deskpro XL Business Audio With Built-in AD1847 Chip

- I/O Address: **0x530**, 0x604, 0xE80, 0xF40
- IRQ: 7, 9, 10, 11
- DMA Channel: 0, 1, 3
- Type: MWSS_AD184x

Note - The `sbpro` support for the AD1848 and compatibles uses one DMA channel for both play and record; simultaneous play/record is not supported. The `sbpro.conf` file entries should specify only one DMA channel.

- Set the I/O address and the DMA channel using the Compaq Deskpro XL EISA configuration utility (ECU). Although the DMA channel values in the `sbpro.conf` file supersede the ECU selection, using the ECU helps avoid DMA channel device conflicts.

This is a sample `sbpro.conf` entry for a Compaq Deskpro XL Business Audio device configured to I/O address 0xE80, IRQ 9, DMA channel 3:

```
name="sbpro" class="sysbus" type="MWSS_AD184x"
reg=-1,27,0,1,0xe80,8 interrupts=5,9 dma-channels=3;
```


Turtle Beach Tropez Card With CS4231 Chip

- I/O Address: 0x530
- IRQ: 7, 9, 10, 11
- DMA Channel: 0, 1, 3
- Type: MWSS_AD184x

- There are no default values for the IRQ and DMA channel; they must be specified in the `sbpro.conf` file.
- The MWSS I/O address on the Tropez card is 0x530 at power-up. It can only be changed by software after the system is booted, and the Solaris operating environment does not do that. Therefore, the Tropez card is only supported at I/O address 0x530.

Note - The Tropez card comes with a software utility for selecting the IRQ, DMA, and MWSS compatibility I/O address settings used by the card. However, that utility does not record those parameters in nonvolatile memory, but in a configuration file used by DOS to set the card's configuration at each reboot. This type of configuration file is not used by the Solaris software and does not affect the operation of the card under the Solaris operating environment.

This is a sample `sbpro.conf` entry for a Turtle Beach Tropez card configured to IRQ 10, DMA channel 1:

```
name="sbpro" class="sysbus" type="MWSS_AD184x"
    reg=-1,25,0,1,0x530,8 interrupts=5,10 dma-channels=1;
```

Known Problems and Limitations

- The audio device cannot share IRQ settings with any other card installed in your system. If the hardware-jumpered or software-configured IRQ setting conflicts with another device, change the setting for the audio device to one listed under "Supported Settings" on page 116.
- Any Crystal Semiconductor CS4231-based devices supported by this driver are programmed in AD1848-compatibility mode. This driver does not include support for advanced CS4231 features; in particular, simultaneous play/record.
- Some devices can detect that the IRQ you specified is "in use" by another device in the system. If this occurs, the driver prints an error message like the following, and you must change the IRQ setting of either the audio device or the conflicting device.

```
sbpro: MWSS_AD184x IRQ 7 is 'in use.'
```

Some devices are not able to detect such a conflict. The driver will try to use the card, but that will likely result in the system hanging when the card is first used. Thus, it is important to choose an IRQ that does not conflict with another device.

- Although the `sbpro` driver supports A-law encoding on AD1848 and compatible devices, `audiotool` (1) does not and produces an error message if you select A-law encoding. Use `audioplay` (1) to play A-law encoded audio files, or use `audioconvert` (1) to convert the A-law sample into a format that `audiotool` will accept, such as 16-bit linear. User-written applications can select A-law format using the `sbpro` driver on AD1848 and compatible devices.

Compaq Deskpro XL Business Audio With Built-in AD184x Chip

- Some system units have the headphone jack wired with its Left and Right channels reversed, so you hear Left output in your right ear and vice versa. The line-out jack at the back of the unit works as expected.
- To find the active audio input jack on the back of your system, plug in a sound source. Run `audiocontrol` (1) and select Record. On the Record panel, turn the Record Volume and Monitor Volume sliders up so you can hear the output. Then select Line In and, secondly, the Internal CD to find which audio input port produces sound. If the Internal CD button does not appear on the `audiocontrol` Record panel, use the Line In selection for the audio input. Use the Microphone button to select the microphone jack on the keyboard.
- The quality of sound is better when using an external microphone and speakers, not the ones built into the keyboard.

Configuration Procedure

1. **Install the Solaris software.**
2. **Become root.**
3. **Update the `sbpro.conf` file:**
 - a. **Change directories to the location of the kernel configuration files; for example, `/platform/i86pc/kernel/drv`.**
 - b. **Edit the `sbpro.conf` file.**

Find the commented entries for the `MWSS_AD184x` device type. Uncomment the entry of your audio device, and modify the

`interrupts` and `dma-channels` properties to reflect the settings of your device. Find the I/O address in the `reg` property. See “Supported Settings” to choose appropriate values for your device.

c. Save your changes and exit the editor.

4. Remove the 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
```

Creative Labs Sound Blaster Pro, Sound Blaster Pro-2

Solaris Device Driver:	<code>sbpro</code>
Device Type:	Audio
Adapters:	Creative Labs Sound Blaster Pro, Sound Blaster Pro-2
Bus Type:	ISA

Note - The features and interfaces that are supported by the Solaris `sbpro` driver are described in the , `audio` (7D) and , `sbpro` (7D) man pages.

Preconfiguration Information

- If your Sound Blaster Pro card has a nonstandard DMA setting, install the Solaris software first, and then edit the `sbpro.conf` file as described in "Configuration Procedure." Device configuration information is stored in the `sbpro.conf` file, usually in the `/platform/i86pc/kernel/drv` directory.
- You must know the hardware jumper settings for the I/O address, interrupt request (IRQ), and DMA channel.
- 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 on the Sound Blaster card to one listed under "Supported Settings." The most common conflicts occur with the LPT1 parallel port or a network card.
- 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.
- The microphone jack on the back of the Sound Blaster Pro card is a mono jack. If your microphone has a stereo plug, convert it to mono using an appropriate adapter.

Supported Settings

Defaults are shown in **this typeface**.

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

Known Problems and Limitations

The ISA version IBM Token Ring and compatible adapters will not work in a system that contains a Sound Blaster card configured at the default I/O port address (0x220). If possible, move the Sound Blaster card to port address 0x240; otherwise, remove the Sound Blaster device from the system.

1. **Install the Solaris software.**
2. **Become root.**
3. **If you changed the card's DMA channel to a value other than 1, update the `sbpro.conf` kernel configuration file:**
 - a. **Change directories to the location of the kernel configuration files; for example, `/platform/i86pc/kernel/drv`.**
 - b. **Edit the `sbpro.conf` file.**

Using a text editor, change the `dma-channels` property for the `SBPRO` entry that matches the I/O address and IRQ setting of your card.
 - c. **Save your changes and exit the editor.**
4. **Remove the 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
```

Creative Labs Sound Blaster 16, Sound Blaster AWE32, Sound Blaster Vibra 16

Solaris Device Driver:	<code>sbpro</code>
Device Type:	Audio
Adapters:	Creative Labs Sound Blaster 16, Sound Blaster AWE32, Sound Blaster Vibra 16
Bus Type:	ISA

Note - The features and interfaces that are supported by the Solaris `sbpro` driver are described in the `, audio (7D)` and `, sbpro (7D)` man pages.

Note - The Sound Blaster 16 optional SCSI-2 interface is supported by the Solaris `aic` driver. See the “Creative Labs Sound Blaster 16 SCSI-2 Interface” Device Reference Page for configuration information on the SCSI controller.

Preconfiguration Information

- If your Sound Blaster 16 card has IRQ and DMA jumpers, the jumper settings on the card determine the IRQ and DMA channels to be used.

However, if your Sound Blaster 16 card doesn't have audio IRQ and DMA jumpers or if you have a Sound Blaster AWE32 or Vibra 16 card, install the Solaris software first and then edit the `sbpro.conf` file as described in “Enabling Support for the Sound Blaster 16, AWE32, and Vibra 16.” You must know the I/O address jumper setting of the card and what IRQ level and DMA channels you plan to use.
- For Sound Blaster 16 cards that have an on-board SCSI subsystem, the audio subsystem needs its own I/O (port) address and an IRQ, distinct from those of the SCSI subsystem.
- 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.

Supported Settings

Defaults are shown in **this typeface**.

- IRQ Level: 2, 5, 7, 10
- I/O Address: **0x220**, 0x240, 0x260, 0x280
- 8-bit DMA Channel: 0, **1**, 3
- 16-bit DMA Channel: 5, 6, 7

Known Problems and Limitations

- Plug and Play versions of these adapters are not supported in this release.
- 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 or a network card.
 - If a hardware-jumpered IRQ setting conflicts with another device, change the IRQ jumper setting on the Sound Blaster card to one listed under “Supported Settings.”
 - If your Sound Blaster card does not have an audio IRQ jumper, edit the IRQ level in the `sbpro.conf` file as described in “Enabling Support for the Sound Blaster 16, AWE32, and Vibra 16.” Choose an IRQ level that does not conflict with any other system device.
- Sound Blaster 16, Sound Blaster Vibra 16, and Sound Blaster AWE32 cards are all recognized as Sound Blaster 16 cards.
- The ISA version IBM Token Ring and compatible adapters will not work in a system that contains a Sound Blaster card that is configured at the default I/O port address (0x220). If possible, move the Sound Blaster card to port address 0x240; otherwise, remove the Sound Blaster device from the system.

Configuration Procedure

Hardware Configuration

Note - Make sure you set the jumpers for the audio interface and *not* for the SCSI interface, if your Sound Blaster 16 card has an on-board SCSI controller.

Note - If your Sound Blaster 16 card doesn't have audio IRQ and DMA jumpers or if you have a Sound Blaster AWE32 or Vibra 16 card, you must edit the `sbpro.conf` file after the Solaris software is installed. See "Enabling Support for the Sound Blaster 16, AWE32, and Vibra 16."

- ♦ **If you have a Sound Blaster 16 card and you intend to use the SCSI interface, you may have to set the jumpers that control the SCSI I/O address.**

See the "Creative Labs Sound Blaster 16 SCSI-2 Interface" Device Reference Page for information on setting the Sound Blaster 16 SCSI-2 jumpers, and make a note of any changes.

Enabling Support for the Sound Blaster 16, AWE32, and Vibra 16

1. **Install the Solaris software.**
2. **Become root.**
3. **If your card is a Sound Blaster AWE32 or Vibra 16 or a Sound Blaster 16 without audio IRQ and DMA jumpers, you must change the IRQ and DMA channel settings in the `sbpro.conf` kernel configuration file. Follow these steps:**
 - a. **Change directories to the location of the kernel configuration files; for example `/platform/i86pc/kernel/drv`.**
 - b. **Edit the `sbpro.conf` file.**

The `sbpro.conf` file contains detailed instructions and examples.
 - 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.**

Note - If your Sound Blaster 16, AWE32, or Vibra 16 card has audio DMA jumpers, the driver uses the DMA channels specified by those jumper settings. Do *not* change the `dma-channels` property in the `sbpro.conf` file.

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

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

PC Card (PCMCIA) Hardware

3Com EtherLink III (3C589) PC Cards

Solaris Device Driver:	<code>pcelx</code>
Device Type:	Network (Ethernet)
Adapter:	EtherLink III 3C589 (network)
Bus Type:	PC Card

Preconfiguration Information

- IBM ThinkPad 760E series systems and systems using the TI PCI1130 PCI-to-CardBus chip (such as the Dell Latitude XPi CD) *only: Before* bringing the system onto the network, put the PC Card into 8-bit mode by creating a file called `/kernel/drv/pcelx.conf` containing `force-8bit=1;`.
- It is not possible to boot or install the Solaris software using a 3Com EtherLink III PC Card device.
- If the 3Com PC Card device is recognized, the `pcelx` driver is automatically loaded, ports and IRQs allocated, and special files created (if they don't already exist). No manual configuration of the hardware is necessary or possible.

Known Problems and Limitations

Network services are automatically started when the system is booted. These services are not started when a network interface is added or shut down after the system has been brought up.

Configuration Procedure

Initial Installation and Configuration

1. **Install the Solaris software, including the PCMCIA packages in the SUNWpcmc cluster.**
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. **Become root.**
2. **Run the `prtconf` command to see if your 3C589 card is recognized.**
A recognized device will appear in the `prtconf` output. For example:

```
# prtconf
. . .
pcic, instance #0 (driver name: pcic)
. . .
network, instance #0 (driver name: pcelx)
```

3. **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.**

Configuring Two or More Cards

Because the 3C589 card is not supported during Solaris installation, you must update network configuration files before one 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 and Data Communications 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 the , **pcelx** (7D) man page.

To find information on devices created for multifunction cards such as 3C562, see the , **pcser** (7D) man page.

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.

Modem and Serial PC Card Devices

Solaris Device Driver:	<code>pcser</code>
Device Type:	Modem and serial PC Card devices based on the 8250, 16550, or compatible UART at speeds up to 115 Kbps
Bus Type:	PC Card

Preconfiguration Information

If a PC Card modem or serial device is recognized, the `pcser` device driver is automatically loaded, ports and IRQs allocated, and special files created (if they don't already exist).

Configuration Procedure

Initial Installation and Configuration

1. **Install the Solaris software, including the PCMCIA packages in the `SUNWpcmc` cluster.**
2. **Boot the system.**
3. **Insert the modem or serial device.**

Identifying an Unrecognized Device

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

1. **Become root.**
2. **Run the `prtconf` command to see if your modem or serial device is recognized.**

An unrecognized device will appear at the end of the `prtconf` output. For example:

```
# prtconf
. . .
pcic, instance #0 (driver name: pcic)
. . .
pccard111.222 (driver not attached)
```

3. 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 "pccard111.222" 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. Use the entire string in the `add_drv` command. See , `add_drv` (1M)

Misidentifying a Recognized Device

1. Run the `prtconf` command to see if your modem or serial device is erroneously recognized as a memory card.

If the device is *incorrectly* recognized as a memory card, for example, the output of the `prtconf` command could show:

```
# prtconf
. . .
pcic, instance #0 (driver name: pcic)
. . .
memory, instance #0 (driver name: pcmem)
pcram, instance #0 (driver name: pcram)
```

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 and Data Communications Administration Guide*.

Special Files

The serial devices 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** (7D).

Hot-Plugging

If a PC Card modem or serial device is unplugged while in use, the device 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.