Device Reference Manual for Solaris 2.6 (Intel Platform Edition)

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Preface

This document provides information about x86 hardware devices that are supported in the Solaris™ 2.6 computing environment. Typically, as new drivers become available, they are bundled with a release in a separate Driver Update. You can use a Driver Update to install a new system for the first time or to update your installed Solaris 2.6 system with new and updated drivers.

Since Driver Updates are cumulative distributions for a given Solaris release, see *Driver Update 3 Guide for Solaris 2.6 (Intel Platform Edition)* for what's been added or changed since the release of Solaris 2.6 *Intel Platform Edition*. You only need to install the current Driver Update to get the support described in that document.

Note - The term "x86" refers to the Intel 8086 family of microprocessor chips, including the Pentium, Pentium Pro, and Pentium II processors and compatible microprocessor chips made by AMD and Cyrix. In this document the term "x86" refers to the overall platform architecture, whereas *"Intel Platform Edition"* appears in the product name.

Before You Read This Book

The importance of configuring your hardware before Solaris installation is discussed in the Configuring Devices module in *Information Library for Solaris 2.6 (Intel Platform Edition)* (part of Solaris 2.6 System Administrator Collection Vol 1 at `http://docs.sun.com`). This document assumes you have fully read and understood that module.

Any names of Device Reference Pages ending in "(DU *x*)" in this manual supersede those in the Configuring Devices module and contain device configuration information for hardware supported by new or updated drivers. The installation

instructions in this Driver Update supplement the instructions in *Information Library for Solaris 2.6 (Intel Platform Edition)* and *Solaris Advanced Installation Guide* in Solaris 2.6 System Administrator Collection Vol 1.

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CHAPTER 1

Device Reference Pages

This manual describes how to use Device Reference Pages to configure your x86 based system to run in the Solaris operating environment.

Third-Party Drivers

Note - Contact the manufacturer directly for information on these third-party device drivers.

Driver Name	Devices Supported
`flashpt`	BusLogic FlashPoint family SCSI host bus adapters (see Device Reference Page)
`mega`	American Megatrends SCSI RAID controllers (see Device Reference Page)
`mtok`	Madge token ring network adapters (see Device Reference Page)

Third-party drivers are provided for the convenience of Solaris customers and are tested to ensure that they meet acceptable standards of operability. SunSoft cannot be responsible for their inclusion in a given release or the timeliness of their availability.

Using Device Reference Pages

Only devices that require special configuration for running Solaris *Intel Platform Edition* have Device Reference Pages.

- Refer to the device manufacturer's documentation for procedures to change device settings.
- When removing adapters for inspection and configuration, note how cables are inserted in sockets. Some connectors are keyed to prevent incorrect insertion; others are not.
- 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

- If a device has selectable configuration parameters, you usually choose the default settings. The Device Reference Pages show settings the Solaris software supports and known conflicts.

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/rdsk/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 Solaris 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-1510A, 1520A, 1522A, 1530P, 1532P HBAs

Solaris Device Driver:	`aic`
Device Type:	SCSI
Adapters:	Adaptec AHA-1510A, AHA-1520A, AHA-1522A, AHA-1530P, AHA-1532P
Chip:	Adaptec AIC-6360
Bus Type:	ISA

Preconfiguration Information

The AHA-1522A and AHA-1532P provide diskette drive support in addition to being bus interfaces.

Supported Settings

• IRQ Level:	9, 10, 11, 12
• I/O Address:	0x140, 0x340

- AHA-1520A and AHA-1522A devices *only*:
  - The BIOS base address can be any available value. The default is DC000.
  - For booting, the I/O address can be set to 0x140 only if a special BIOS is obtained from Adaptec.

Known Problems and Limitations

The Adaptec AHA-1510A adapter cannot be a primary (boot) disk controller since it has no BIOS. Boot from a disk attached to another controller.

Configuration Procedure

- If necessary, enable support for disks greater than 1 Gbyte.
  - On the AHA-1530P and AHA-1532P, use the on-board utility (press Ctrl-A at boot time) to select this option from the Advanced Features menu.
  - On the AHA-1522A and AHA-1520A, set this option by adding a jumper to pin 0 (the rightmost pin) of jumper block J5.
- If necessary, make the following termination changes:
  - On the AHA-1510A, AHA-1520A, and AHA-1522A, remove the three terminating resistors from the controller.
  - On the AHA-1530P and AHA-1532P, set termination using the on-board utility.

Creative Labs Sound Blaster 16 SCSI-2 Interface

Solaris Device Driver:	`aic`
Device Type:	SCSI
Adapter:	Creative Labs Sound Blaster 16 SCSI-2
Bus Type:	ISA

Preconfiguration Information

Supported Settings

If your card supports Plug and Play, your device resources are configured automatically. Use the following settings for devices that *don't* support Plug and Play.

• IRQ Level:	9, 10, 11, 12
• I/O Address:	0x140, 0x340
• DMA Channel:	Disabled

Note - The SCSI subsystem of the Sound Blaster 16 SCSI-2 needs an I/O (port) address and an IRQ that are distinct from those of the audio subsystem. The resistors on the Sound Blaster 16 SCSI-2 cannot be removed. Set the jumpers for the SCSI interface, not for the audio.

Known Problems and Limitations

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

- The SCSI interface on the Sound Blaster 16 SCSI-2 audio card cannot be used as a primary (boot) disk controller since it has no BIOS. The system must be booted from a disk attached to another controller.

Adaptec AHA-1540B, 1542B, 1542C, 1542CF, 1542CP HBAs

Solaris Device Driver:	`aha`
Device Type:	SCSI
Adapters:	Adaptec AHA-1540, AHA-1542B, AHA-1542C, AHA-1542CF, AHA-1542CP
Bus Type:	ISA

Preconfiguration Information

- Adaptec AHA-1542C and AHA-154CP *only*: If only one adapter is installed, use default configuration parameters in both basic and advanced modes.
- Adaptec AHA-1540CF *only*: The DMA transfer rate should be left at the default unless your motherboard supports higher rates.
- If installing more than one adapter, enable the BIOS on both. If Plug and Play is disabled on the host system and a mix of Plug and Play and non-Plug and Play adapters is installed, ensure that the non-Plug and Play adapters do not use default values for the I/O base address, DMA channel, and IRQ level.

Supported Settings

• IRQ Level:	9, 10, 11, 12, 13, 14, 15
• I/O Address:	0x330
• DMA Channel:	6

AHA-1542C, AHA-1542CF, and AHA-1542CP *only*:

• Synchronous Negotiation:	Disabled for each CD-ROM drive target
• Support for More Than Two DOS Drives:	Disabled
• Dynamically Scan SCSI Bus for BIOS Devices:	Disabled

For two non-Plug and Play cards:

• I/O Base Address:	230 and 330 only

Known Problems and Limitations

- Because the Adaptec AHA-1542CP and the Solaris `fdisk` program may be incompatible, use the DOS version of `FDISK` (or equivalent utility) to create an entry in the `FDISK` partition table before installing the Solaris software. Create at least a 1-cylinder DOS partition starting at cylinder 0. If the DOS partition is not created, the system won't reboot after Solaris installation.
- If more than one adapter is installed, the system can only be rebooted with the boot diskette.
- Two Plug and Play cards are not supported in a non-Plug and Play host system.

Adaptec AHA-1640, 1642 HBAs

Solaris Device Driver:	`aha`
Device Type:	SCSI
Adapters:	Adaptec AHA-1640, AHA-1642
Bus Type:	Micro Channel

Preconfiguration Information

Supported Settings

• IRQ Level:	7, 10, 11, 12, 14, 15
• I/O Address:	0x330, 0x230
• DMA Channel:	6

Known Problems and Limitations

- Only one AHA-1640 host bus adapter can be configured on each machine.
- Disable "Sync after started by AHA-1640."

Adaptec AHA-1740, 1742A HBAs

Solaris Device Driver:	`eha`
Device Type:	SCSI
Adapters:	Adaptec AHA-1740, AHA-1742A
Bus Type:	EISA

Preconfiguration Information

Supported Settings

• IRQ Level:	Any legal value between 9 and 15
• I/O Address:	*z*000 (where *z* is a slot number from 1 to 8)
• DMA Channel:	6

- The board must be in slot 1 through 8; otherwise the Solaris software will not boot.
- Set the following parameters to Enhanced Mode:
  - Host Adapter Interface Mode
  - Standard Mode Resource Selection I/O Port Definition
  - Standard Mode Resource Selection DMA Channel Definition
- Enable Synchronous Negotiation for all targets *unless* you are running the Adaptec AHA-1740 in Enhanced Mode; in that case, you must use the EISA configuration utility to disable Synchronous Negotiation for the NEC Intersect CD-ROM 74 or 84.

Known Problems and Limitations

Operating these boards in 154*x* emulation mode may cause data corruption.

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

Preconfiguration Information

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

Known Problems and Limitations

- The AHA-274*x* is not compatible with the Wyse MP system.
- Motherboards that support level-triggered interrupts, such as an EISA motherboard, will support multiple AHA-274*x* 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-274*x* 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-274*x* SCSI ID to 6 using the ECU. (Use the configuration BIOS accessed by Ctrl-A at boot to change the setting on the AHA-284*x*.)
- 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.
- 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/cmtp@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

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-274*x* controller, the address is 0x1C00, and if the adjacent slot also has an AHA-274*x* 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, 2940W, 2940U, 2940U Dual, 2940UW, 2940UW Dual, 2944W, 2944UW, 3940, 3940W, 3940U, 3940UW, 3940AU, 3940AUW, 3940AUWD, 3944AUWD HBAs (DU 3)

Solaris Device Driver:	`adp`
Release/Version:	DU 3/2.4
Device Types:	SCSI-2, SCSI-3, Ultra SCSI
Adapters:	Adaptec AHA-2940, AHA-2940W, AHA-2940U, AHA-2940U Dual, AHA-2940UW, AHA-2940UW Dual, AHA-2944W, AHA-2944UW, AHA-3940, AHA-3940W, AHA-3940U, AHA-3940UW, AHA-3940AU, AHA-3940AUW, AHA-3940AUWD, AHA-3944AUWD
Chips:	Adaptec AIC-7860, AIC-7870, AIC-7880, AIC-7895
Bus Type:	PCI

Preconfiguration Information

The Plug N Play SCAM Support option is not supported.

Known Problems and Limitations

- Some motherboards have problems supporting channel B with boards based on the Adaptec AIC-7895 chip, such as the AHA-2940U Dual, AHA-2940UW Dual, and the AHA-3940 series. The problem arises because the BIOS doesn't properly assign two interrupts for PCI interrupts INTA and INTB on the slot containing the AIC-7895 chip. This causes devices connected to channel B to fail, and messages about timeouts and resets on those devices to appear on the console.

  For example, this problem occurs on the Intel PR440FX (Providence) dual Pentium Pro motherboard, with BIOS revisions up to and including 1.00.08.DI0. For that motherboard, a workaround is to set the "Advanced/PCI IRQ Mapping" feature

to "To ISA Legacy IRQs". A similar workaround may apply to other motherboards with problems supporting channel B.

Another possible workaround is noted on Adaptec's Web site at `http://www.adaptec.com/support/faqs/aha394x.html`.

- 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-2940*x* 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 operating 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 slots with your host bus adapters, 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.

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

Solaris Device Driver:	`pcscsi`
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, PCnet-PCI II, PCnet-Fast), Allied Telesyn AT-1500, Microdyne NE2500plus, Cabletron E-2210 (DU 1)" on page 60 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-742A, BT-746C, BT-747C, BT-747S, BT-757C, BT-757S, BT-542B, BT-545C, BT-545S, BT-440C, BT-445C, BT-445S HBAs

Solaris Device Driver:	`blogic`
Device Type:	SCSI
Adapters:	BusLogic BT-742A, BT-746C, BT-747C, BT-747S, BT-757C, BT-757S, BT-542B, BT-545C, BT-545S, BT-440C, BT-445C, BT-445S
Bus Types:	ISA, EISA, VLB

Preconfiguration Information

Supported Settings

• IRQ Level:	9, 10, 11, 12, 14, 15
• I/O Address:	0x334, 0x234, 0x130, 0x134

Note - Do not use the default I/O address setting, 0x330.

Known Problems and Limitations

- These cards have not been tested in Adaptec AHA-1540 mode.
- BusLogic EISA cards may cause data overrun errors under high stress when your system is configured with multiple disks.

Configuration Procedure

- Model names ending in "C" *only*: Run the BusLogic AutoSCSI configuration utility and check the termination and that the Advanced option "BIOS Support for > 2 Drives (DOS 5.0 or above)" is set to No.
- BT-757C *only*: If the system has a narrow target, turn off the "wide negotiation option" when configuring devices.

Special Cases

Configuring Multiple Devices

- Select an adapter model ending in "C" as the primary controller.
- Choose an I/O address for the primary controller that precedes the secondary controller in "Supported Settings"; for example, use an I/O address of 0x234 for the primary controller, and make sure the secondary controller uses either 0x130 or 0x134.
- Disable the BIOS on the secondary controller.
- Wide-mode EISA adapters can support targets greater than 7 if the proper entries are added to the system configuration files: `/kernel/drv/sd` (for disk) and `/kernel/drv/st.conf` (for tape).

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/sd` (for disk), and `/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:	`flashpt`
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 (DU 3)

Solaris Device Driver:	`cpqncr`
Release/Version:	DU 3/3.0
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 (at least ECU version 2.34) so the system recognizes the Compaq 825, 875, or 876 controllers.

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

- `alrm_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 if present.

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 46 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.

DPT PM-2012B HBA

Solaris Device Driver:	`dpt`
Device Type:	SCSI
Adapter:	DPT PM-2012B
Bus Type:	EISA

Preconfiguration Information

Supported Settings

• IRQ Level:	Any legal value between 9 and 15 (edge-triggered interrupts)
• I/O Address:	*z*C88 (where *z* is a slot number from 1 to 7)
• Option ROM Address:	Default
• WD1003:	Emulation off for drives 0 and 1

Known Problems and Limitations

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

Configuration Procedure

1. **Boot DOS from the diskette drive.**
2. **Insert a copy of the DPT Utility diskette in the diskette drive.**
   a. **Type `DPTFMT` and press Enter.**

b. Press Enter to begin, and again to continue.

c. Press <F3> to enter SCSI ID 0 and LUN 0, and press <F3> to continue.

d. Use the down arrow to select MS-DOS and PC DOS.

e. Press Enter to write out the drive geometry, and press Enter to reboot.

3. Insert the user copy diskette of the ECU (`CF.EXE`) containing the `!DPTxxx.CFG` files.

a. At the A:> prompt, type `CFG` and press Enter.

b. At the Viewer Edit Details screen, press Enter.

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

- Bus: Enabled
- IDE Boot Address: Primary
- Option ROM Address: Default
- SCSI ID HBA: Default 7
- WD1003: Emulation off for both drive 0 and 1

d. Press <F10> to save your changes.

4. Insert a copy of the boot diskette.

5. Press Enter to reboot DOS.

IBM Micro Channel HBA

Solaris Device Driver:	`mcis`
Device Type:	SCSI
Adapter:	IBM Micro Channel
Bus Type:	Micro Channel

Preconfiguration Information

The controller board must be installed in any slot between 1 and 7. Slots 8 and above are not supported.

Supported Settings

- IRQ Level: 14
- I/O Address: 0x3540, 0x3548

Known Problems and Limitations

No more than seven devices can be attached to the IBM Micro Channel SCSI adapter because only devices with a logical unit number of 0 are recognized by the Solaris software.

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.

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.

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

Solaris Device Driver:	`ncrs`
Device Type:	SCSI
Adapters:	NCR 53C710 (two embedded)
Bus Type:	EISA

Preconfiguration Information

Known Problems and Limitations

- Because the NCR BIOS and the Solaris `fdisk` program may be incompatible, use the DOS version of `FDISK` (or equivalent utility) to create an entry in the `FDISK` partition table before installing the Solaris software. Create at least a 1-cylinder DOS partition starting at cylinder 0. If the DOS partition isn't created, the system won't reboot after Solaris installation.
- The SCSI Tagged Queuing option is not supported.

Symbios Logic (also NCR) 53C810, 53C810A, 53C815, 53C820, 53C825, 53C825A HBAs (DU 1)

Solaris Device Driver:	`ncrs`
Release/Version:	DU 1/2.1
Device Type:	SCSI
Adapters:	Symbios Logic (also NCR) 53C810, 53C810A, 53C815, 53C820, 53C825, 53C825A (multiple adapters can be configured)
Bus Type:	PCI

Preconfiguration Information

Known Problems and Limitations

- Because the NCR BIOS and the Solaris `fdisk` program may be incompatible, use the DOS version of `FDISK` (or equivalent utility) to create an entry in the `FDISK` partition table before installing the Solaris software. Create at least a 1-cylinder DOS partition starting at cylinder 0. If the DOS partition isn't created, the system won't reboot after Solaris installation.
- An add-in card with the 53C815, 53C820, 53C825, or 53C825A controller can only be used in a bus-mastering PCI slot. On motherboards with only two PCI slots, both of the PCI slots are usually bus-master capable. On motherboards with three or more PCI slots, and on motherboards with several embedded PCI controllers, some of the PCI slots may not be bus-master capable.
- Some PCI motherboards with the NCR SDMS BIOS and an embedded 53C810 or 53C810A controller do not work correctly with 53C82*x* add-in cards that also have an NCR SDMS BIOS. Upgrading the motherboard BIOS, the add-in card, or both may prevent these conflicts.
- The SCSI Tagged Queuing option is not supported.
- On some early PCI systems with the 53C810 or 53C810A chip on the motherboard, the interrupt pin on the chip is not connected. Such a system cannot be used with Solaris software.

- The Solaris `ncrs` driver does not support the Wide SCSI option. Some add-in 53C8*xx* 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.
- If your adapter supports the Symbios Logic SCSI Configuration utility, which can be accessed by pressing Control-C, do not alter the value of the Host SCSI ID (an option under the Adapter Setup menu) to anything but 7.

Trantor T348 MiniSCSI Plus Parallel HBAs

Solaris Device Driver:	`trantor`
Device Type:	SCSI
Adapter:	Trantor T348

Preconfiguration Information

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

Known Problems and Limitations

- The Trantor MiniSCSI Plus adapter uses electrical power from the TERMPWR signal on the SCSI cable. The adapter will not work unless the first (or only) device connected to it supplies TERMPWR. If you have difficulty using the adapter with the Solaris operating environment, see the "Troubleshooting Notes" section of MiniSCSI Plus User Guide or consult your Trantor dealer.
- Because of low data transfer rates, do not use simultaneous multiple SCSI devices or tape blocks longer than 512 bytes.
- The T348 and attached devices must be plugged in and powered on at boot time to be available during that session.
- If the SCSI devices attached to the T348 fail to respond after a reconfiguration boot and the parallel port had previously been used for a different device, do a second reconfiguration boot.
- The Trantor T338 and T358 are not supported.
- The Exabyte EXB-8500 and EXB-8200 tape drives do not work in the Solaris operating environment when connected to the Trantor T348.
- The Solaris operating environment does not support concurrent use of other parallel devices on the same port as the Trantor T348 or on the T348 pass-through port. To switch between the T348 and another parallel port device, such as a

printer or Ethernet adapter, shut down the Solaris operating environment and turn off the computer and any SCSI devices attached to the T348.

With the power turned off, disconnect the old device and connect the new one. If switching to the T348, turn on any SCSI devices you intend to use. Turn on the computer and do a reconfiguration boot.

- When reconfiguring the system to add other devices, make sure the T348 and all its devices are plugged in and turned on; otherwise they will be removed from the configuration. If you accidentally reconfigure without the T348 plugged in, plug it in and repeat the reconfiguration process.

Configuration Procedure

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

Tricord Systems Intelligent SCSI Subsystem HBAs

Solaris Device Driver:	`iss`
Device Type:	SCSI
Bus Type:	EISA

Preconfiguration Information

- Don't use a version of the system BIOS before version 4.03 to boot the Solaris software.
- The special files that are created on an Intelligent SCSI Subsystem (ISS) are described in the **`iss`**(7D) man page.

Known Problems and Limitations

Regardless of the number of devices on the ISS controller, a maximum of eight disk devices (physical or logical) are shown by the realmode driver when installing the Solaris software, which limits the number of drives that can be used for booting.

SCSI Disk Arrays/RAID Controllers

American Megatrends MegaRAID 428 SCSI RAID Controller (DU 2)

Solaris Device Driver:	`mega`
Release/Version:	DU 2/1.04
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.
- The MegaRAID controller 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 additional logical drive 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 Array Controller

Solaris Device Driver:	`csa`
Device Type:	Disk Array
Adapter:	Compaq SMART Array Controller
Bus Type:	EISA
Systems Supported:	Internal and external SCSI drives on the Compaq family of ProSignia, and ProLiant, and Systempro servers

Preconfiguration Information

- The SMART controller only supports 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.

Known Problems and Limitations

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

Compaq SMART-2, SMART-2SL, SMART-2DH Array Controllers

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

Preconfiguration Information

- These 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 (at least ECU version 2.30) 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, DAC960PG, DAC960PJ, DAC960PL, DAC960E Controllers (DU 3)

Solaris Device Driver:	`mlx`
Release/Version:	DU 3/2.1
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), DAC960PG (PCI-to-SCSI), DAC960PJ (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 a Mylex firmware limitation, on older cards, SCSI tape and CD-ROM devices will not function reliably when attached on a channel that also contains SCSI hard disk drives. However, on newer PCI SCSI cards such as the DAC960PG and DAC960PJ, this limitation has not been observed. The latest firmware for any Mylex card can be obtained from their website.

  A tape block size greater than 32 Kbytes cannot be used. To be certain of correct SCSI device operation on all cards, use SCSI tape and CR-ROM 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.

Graphics Cards

Diamond Viper VLB, PCI, SE, Pro and Intergraph G91

Solaris Device Drivers:	`p9000, p9100`
Device Type:	Graphics accelerator cards
Chips:	Weitek P9000 (VLB, PCI) Weitek P9100 SE, Pro (VLB, PCI) Intergraph G91 (PCI only)
Bus Types:	VLB, PCI

Preconfiguration Information

- Resolutions at which graphics operations are accelerated with Diamond Viper cards range from 800x600 to 1280x1024, all with an 8-bit color depth (256 colors). These cards can also emulate a standard VGA at 640x480, although in this configuration, they don't accelerate graphics operations. The Diamond Viper Pro and SE also support resolutions with 24-bit color depth (16 million colors).
- It is *not* necessary to run the manufacturer's configuration program `VPRMODE` under DOS.

Monitor Configurations With the Diamond Viper (P9000)

The following table lists monitors that can be used with the Diamond Viper graphics cards based on the Weitek Power 9000 (P9000) chipset. When configuring your graphics card using the `kdmconfig` command, select only resolutions and frequencies that are supported by your monitor. If your monitor isn't listed, you may be able to select a supported one that has the same resolution and synchronization rates as yours.

Only the maximum resolution and horizontal and vertical frequencies supported by the monitor are listed below. The `kdmconfig` program will display the lower resolutions supported by the monitor.

Monitor	Maximum Resolution	Hfreq (kHz)	Vfreq (Hz)
CS1024	800x600	35.4	56.1
CS1024ni	1024x768	48.4	60.0
CS1572 FS	1280x1024	64.4	60.2
CTX 5468NI	1024x768	48.4	60.0
Fixed Frequency	800x600	35.4	56.1
HL 6955 SETK	1280x1024	64.4	60.2
IBM 8514	800x600	35.4	56.1
IBM 9515	1024x768	61.2	75.8
IBM 9517	1024x768	58.1	72.1
InterVue 20	1280x1024	81.2	76.0
MAG 17F	1152x900	56.8	60.3
NCR 3298-0240/0241	1024x768	48.4	60.0
NCR 3298-0261	1024x768	56.5	70.1
NCR 3298-0271/0272	1024x768	56.5	70.1
NEC 3FG	1024x768	48.4	60.0
NEC 3FGe	1024x768	48.4	60.0
NEC 3FGx	1024x768	48.4	60.0
NEC 4FG	1152x900	56.8	60.3
NEC 4FGe/5FGe	1152x900	56.8	60.3
NEC 5FG	1280x1024	64.4	60.2
NEC 6FG	1280x1024	78.9	74.0

Monitor	Maximum Resolution	Hfreq (kHz)	Vfreq (Hz)
Nanao 9070u	1024x768	48.4	60.0
Nanao 9080i	1152x900	56.8	60.3
Nanao 9500	1152x900	56.8	60.3
Nanao T550i	1280x1024	64.4	60.2
Nanao T560i	1152x900	56.8	60.3
PS/V 2414-A04	1024x768	56.5	70.1
PS/V 2414-A07	1024x768	58.1	72.1
SONY 1304	1024x768	48.4	60.0
SONY 1304S	1152x900	56.8	60.3
SONY 1604S	1152x900	56.8	60.3
ViewSonic 6	1024x768	48.4	60.0
ViewSonic 7	1152x900	56.8	60.3

Monitor Configurations With the Intergraph G91

The following table lists Intergraph monitors that have been tested with the Intergraph G91 (Weitek P9100) graphics card. The table below lists maximum resolutions and horizontal and vertical frequencies supported by the monitors. You should select more monitors using `kdmconfig` only if your monitor and video card are capable of such high resolutions and frequencies.

Monitor	Maximum Resolution	Hfreq (kHz)	Vfreq (Hz)
InterVue 20	1280x1024	81.25	76.00
InterVue 21	1600x1280	100.96	76.020
InterVue 27	1600x1280	80.07	60.25

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:	`el`
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.

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 (3C509, 3C509B, 3C59*x*)

Solaris Device Driver:	`elx`
Device Type:	Network (Ethernet)
Adapters:	3Com EtherLink III (3C509, 3C509B, 3C59*x*)
Bus Types:	ISA, EISA, Micro Channel, PCI

Preconfiguration Information

Configure the 3C509 (ISA bus) adapter for EISA addressing when installed in an EISA bus system.

Supported Settings

EtherLink III 3C59*x* and 3C509B adapters *only*:

• Media Type:	Auto Select

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.

3Com EtherLink XL (3C90*x*, 3C90*x*B) (DU 3)

Solaris Device Driver:	`elxl`
Release/Version:	DU 3/2.1
Device Type:	Network (Ethernet)
Adapters:	3Com EtherLink XL (3C90*x*, 3C90*x*B)
Bus Type:	PCI

Preconfiguration Information

Supported Settings

• Media Type:	Auto Select

AMD PCnet Ethernet (PCnet-ISA, PCnet-PCI, PCnet-PCI II, PCnet-Fast), Allied Telesyn AT-1500, Microdyne NE2500plus, Cabletron E-2210 (DU 1)

Solaris Device Driver:	`pcn`
Release/Version:	DU 1/2.1
Device Type:	Network (Ethernet)
Adapter:	PCnet
Chips:	AMD PCnet-ISA, PCnet-PCI, PCnet-PCI II, PCnet-Fast Allied Telesyn AT-1500 Microdyne NE2500plus Cabletron E-2210
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

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.
- 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 0x*VVVVDDDD*, 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 (DU 3)

Solaris Device Driver: `dnet`

Release/Version: DU 3/2.1

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 21*xxx*	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	

Name/Model	Part/Version	Chip 21*xxx*	10MB Media	100MB Media	Notes
Cogent EM110TX	110001-02 06	140AB	T	X	
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

Name/Model	Part/Version	Chip 21*xxx*	10MB Media	100MB Media	Notes
Kingston KNE100TX	9920219-002.B00	140AC	T	X	D
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 21*xxx*	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.
- Secondary ports on multiport cards may not work.

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

Solaris Device Driver:	`iee`
Device Type:	Network (Ethernet)
Adapters:	Intel EtherExpress 16, 16C, 16TP (82586), MCA, MCA TP
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.

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

Solaris Device Driver:	`eepro`
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

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

Note - Intel EtherExpress PRO/100B (82557) and Intel EtherExpress PRO/100+ (82558) adapters are PCI devices supported by the `iprb` device driver. PCI devices are configured automatically and do not require manual configuration.

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

Caution - If you have an NE2000 or NE2000plus adapter in your machine, selectively scan for it first before scanning for other legacy devices.

Caution - Configure NE2000 or NE2000plus adapters for I/O mode if they are in a machine with devices supported by the Solaris `smc` driver.

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 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: 3, 4, 5, 9, 10, 11, 12, 14, 15
- I/O Address: 0x200, 0x220, 0x240, 0x260, 0x280, 0x2C0, 0x300, 0x320, 0x340, 0x360

NE2000plus:

- IRQ Level: 3, 4, 5, 9, 10, 11, 12, 14, 15
- I/O Address: 0x200, 0x220, 0x240, 0x260, 0x280, 0x2C0, 0x300, 0x320, 0x340, 0x360
- Shared Memory: Start at 0xD0000

  Increase by 0x4000 for each additional card

Known Problems and Limitations

- 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.
- 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.)

Novell NE3200 Ethernet

Solaris Device Driver:	`nee`
Device Type:	Network (Ethernet)
Adapter:	Novell NE3200
Bus Type:	EISA
Connectors:	RJ-45, BNC, AUI

Preconfiguration Information

Supported Settings

• Interrupt Type:	Edge-triggered
• Flash Memory:	Disabled

Known Problems and Limitations

- If error messages such as “no such device” are displayed when attempting to access the Ethernet card, the device is probably not configured in the EISA configuration.
- If you install an NE3200 card and the system hangs while trying to configure devices after reboot, check that the card is configured for edge-triggered interrupts.

Racal InterLan ES3210, ES3210 TP Ethernet

Solaris Device Driver:	`riles`
Device Type:	Network (Ethernet)
Adapters:	Racal InterLan ES3210, ES3210 TP
Chip:	National 8390
Bus Type:	EISA
Connectors:	RJ-45, BNC, AUI

Preconfiguration Information

Only the latest revision of the ES3210 is supported—it uses surface-mount technology. The older boards have a white sticker on the back bearing the number 625-0136-00; the newer cards have the number 625-0367-00 or higher.

Supported Settings

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

The default setting for the IRQ on this Ethernet adapter is 3, which is typically used by COM2. IRQ 6 is typically used by the diskette controller.

- Memory Base Address: 0xC0000, 0xC4000, 0xC8000, 0xCC000, 0xD0000, 0xD4000, 0xD8000, 0xDC000

The `riles` driver will not work with the default setting (Memory Mapped Disable). When changing the setting, be aware that C0000–C3FFF is used by the VGA BIOS, if present.

- DMA Channel: Disabled, 5, 6, 7

If you choose DMA channel 5, 6, or 7, network performance will degrade.

- Change the default Shared Memory Disabled setting and provide an explicit address for the memory area on the ES3210 or ES3210 TP since the `riles` driver does not support I/O-mapped I/O.

SMC Elite32 (8033)

Solaris Device Driver:	`smce`
Device Type:	Network (Ethernet)
Adapter:	SMC Elite32 (8033)
Bus Type:	EISA
Connectors:	One board type has an AUI connector and two BNC connectors. Another board type has an AUI connector and two RJ-45 connectors. Channel 0 can use any of the connectors. Channel 1 can use *only* a BNC or an RJ-45 connector, *not* an AUI connector.

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 Elite32 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:	`smcf`
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
0x300	5	0xD4000

I/O Address	IRQ	Base Memory Address (Board RAM)
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.
- Some versions of SMC's `EZSTART` utility can restrict the system media types to 10BASE-T or AUI 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.

SMC EtherPower II 10/100 (9432) (DU 3)

Solaris Device Driver:	`spwr`
Release/Version:	DU 3/2.1
Device Type:	Network (Ethernet)
Adapter:	SMC EtherPower II 10/100 (9432)
Bus Type:	PCI
Connector:	RJ-45

Xircom Pocket Ethernet (PE3 and PE2)

Solaris Device Driver:	`pe`
Device Type:	Network (Ethernet)
Adapters:	Xircom Pocket Ethernet (PE2 and PE3)
Port:	Attach to a parallel port

Preconfiguration Information

Ensure that the adapter is turned on before the Solaris operating environment starts its networking services.

Known Problems and Limitations

Network booting is supported only for model PE3, not PE2.

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 — Enabled

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

- IRQ Level: — 3, 9, 10, 11

16/4 Token Ring adapters (ISA):

- IRQ Level: 3, 6, 7, 9
- 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.
- 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 Smart 16/4 Token Ring (DU 1)

Solaris Device Driver:	`mtok`
Release/Version:	DU 1/3.00.02
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, Smart 16/4 PCI Presto
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

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.

- This release of the `mtok` driver does not support netbooting on Smart 16/4 Presto adapters.
- The adapter may fail to open on the ring if not connected to a properly configured network. Run the `diag` utility, which is supplied with the adapter, before using the adapter with the Solaris 2.6 operating environment.

Configuration Procedure

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.

Audio Cards

Analog Devices AD1848 and Compatible Devices

Solaris Device Driver:	`sbpro`
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 93 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.

- 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

If your card supports Plug and Play, your device resources are configured automatically. Use the following settings for devices that *don't* support Plug and Play. Defaults are shown in **this typeface**.

Compaq Deskpro XL Business Audio With Built-in AD1847 Chip

- I/O Address: **0x530**, 0x604, 0xE80, 0xF40

- The `sbpro` driver automatically chooses an unused DMA channel and IRQ line for the device.

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

Turtle Beach Tropez Card With CS4231 Chip

- I/O Address:

  0x530

  The MWSS I/O address on the Turtle Beach 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.

- The `sbpro` driver automatically chooses an unused DMA channel and IRQ line for the device.

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 with the Solaris operating environment.

Known Problems and Limitations

- 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 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 check that the 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.

Creative Labs Sound Blaster Pro, Sound Blaster Pro-2

Solaris Device Driver:	`sbpro`
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

- 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

If your card supports Plug and Play, your device resources are configured automatically. Use the following settings for devices that *don't* support Plug and Play.

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.

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

Solaris Device Driver:	`sbpro`
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

- 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

If your card supports Plug and Play, your device resources are configured automatically. Use the following settings for devices that *don't* support Plug and Play.

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

- 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 your device is not a Plug and Play device and 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."
- Non-Plug and Play 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.

♦ **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.

PC Card (PCMCIA) Hardware

PC Card Adapters

Solaris Device Driver:	`pcic`
Adapters:	Intel i82365SL Vadem VG365, VG465, VG468, VG469 Cirrus Logic PD6710, PD6720 Ricoh RF5C366 Toshiba
Bus Type:	PC Card
Connectors:	Up to eight Type I, II, or III sockets

Caution - The Intergraph TD-30/TD-40 machine may lock up. To avoid this, ground yourself by touching some metal on the computer case while inserting and removing the PC Card devices. The `prtconf` command output may mistakenly indicate that the device is in two sockets. If inserting and removing the card is not detected and the machine hangs, reset the machine.

Preconfiguration Information

- Install your add-in PC Card adapter prior to Solaris installation.
- Some notebook computers have their built-in PC Card adapter disabled by default. Enable it prior to Solaris installation.
- Requirements for a system depend on the combination of devices to be used. A typical two-socket notebook computer needs at least 8 Kbytes of address space, 16 bytes of I/O space, and three free IRQs. Following are general guidelines:

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

Configuration Procedure

Initial Installation and Configuration

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

Adding PC Card Support to a Previously Installed System

1. **Become root.**
2. **Use the `pkgadd` command and select PCMCIA Support from the Customize Software screen.**
3. **Do a reconfiguration reboot to reallocate resources:**

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

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

3Com EtherLink III (3C562, 3C589) PC Cards

Solaris Device Driver:	`pcelx`
Device Type:	Network (Ethernet)
Adapter:	3Com EtherLink III 3C562 (network, modem), 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 3C562 or 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 -D` command to see if your 3C562 or 3C589 card is recognized.**

   A recognized device will appear in the `prtconf` output. For example:

```
# prtconf -D
. . .
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 3C562 and 3C589 cards are 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 3C562 or 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:	`pcser`
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 -D` 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 -D
. . .
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 -D` **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 -D
. . .
pcic, instance #0 (driver name: pcic)
 . . .
 memory, instance #0 (driver name: pcmem)
  pcram, instance #0 (driver name: pcram)
```

2. **Use the Configuration Assistant to identify the memory resource conflict, and add correct information for the device on the View/Edit Devices menu.**

   The problem is typically a resource conflict between device memory settings. See "Using the Configuration Assistant to Identify and Correct Problems" in the Configuring Devices module in *Information Library for Solaris 2.6 (Intel Platform Edition)*.

3. **To work properly with the Solaris operating environment, all devices must be accounted for, even those the Solaris environment does not support. The Configuration Assistant software accounts for all devices in your system.**

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.

SRAM and DRAM PC Card Devices

Solaris Device Driver:	`pcram`
Device Types:	Static RAM (SRAM), Dynamic RAM (DRAM)
Bus Type:	PC Card

Note - Flash RAM devices are not supported.

Preconfiguration Information

If a PC Card memory device is recognized, the `pcram` device driver is automatically loaded, the physical address allocated, and special files created (if they don't already exist).

Known Problems and Limitations

- The Solaris `pcmem` driver is not capable of handling "combo" memory cards with multiple types of memory on them (for example, combined SRAM and nonvolatile FLASH). Inserting such a card into a system running the Solaris software may cause a system panic.
- Because the PC Card memory device is designed as a pseudo-floppy diskette type, the only utility that can be used for formatting is **`fdformat`**(1).

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 card.**

Identifying an Unrecognized Device

If you insert a memory device and it isn't recognized (no special files created), use the `prtconf` command.

1. **Become root.**
2. **Run the `prtconf -D` command to display the configuration recognized by the system.**

   A recognized device will appear in the `prtconf` output. For example:

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

3. **If your memory device does not appear at the end of the `prtconf` output, it is not supported and cannot be used with the `pcram` device driver.**

Special Files

The special files created for PC Card memory devices act like disks and have names in the form `/dev/dsk/c#t#d#p#` or `/dev/dsk/c#t#d#s#` (see **pcram**(7D)). Abbreviations used in the names are:

`c#` Controller #

`t#` Card technology type #, defined as follows:

`0` Null—no device

`1` ROM

`2` OTPROM (One Time PROM)

`3` UV EPROM

`4` EEPROM

`5` Flash EPROM

`6` SRAM

`7` DRAM

`d#` Device region of type #, usually zero

`p#` `fdisk` partition #

`s#` Solaris slice #

Note - A device name can be specified either by a partition name (`p#`) or a slice name (`s#`), but not both.

Using PC Card Memory Devices

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

- **If you don't want to use `vold` to manage your PC Card memory devices, comment out the "`use pcmem`" line in the `/etc/vold.conf` file.**

To comment out a line, insert a # character at the beginning of the line.

PC Card memory devices don't need to have file systems on them, though typically, before using a new PC Card memory card, you will want to create a file system on it. DOS PCFS is the best format to use. (You can use virtually any file system format on a PC Card memory card, but most other file system formats are platform-dependent, making them unsuitable for moving data between different types of machines. See "Using PCMCIA Cards" in Appendix G of *Solaris User's Guide*.)

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

Hot-Plugging

If a memory card is removed while in use, the device driver returns errors until the memory card is inserted into the appropriate socket. Close and reopen the device with the card reinserted, and the memory card will work.

- If you remove the card while in use as a file system, unmount the file system using the `umount` command. Then reinsert the card and remount the file system using the `mount` command.
- If you remove the card and interrupt a `tar` or `cpio` process, stop the process, reinsert the card, and restart the process.

Viper 8260pA, SanDisk Flash, or Any PC Card ATA Devices

Solaris Device Driver:	`pcata`
Device Type:	ATA PC Card
Adapters:	Viper 8260pA SanDisk Flash Or any PC Card ATA device
Bus Type:	PC Card

Preconfiguration Information

If a PC Card ATA device is recognized, the `pcata` device driver is automatically loaded, IRQs allocated, devices nodes created, and special files created (if they don't already exist).

Known Problems and Limitations

- `vold` does not support `pcata`. The `ufs` file system needs to be mounted manually.
- In the Solaris operating environment there is no command to create a `pcfs` file system; you must use DOS to create it. Note that most of the flash disks come with the `pcfs` file system on them.
- You need to `umount` the file system before removing the disk.
- The `ufs` file systems on removable media (PC Card ATA) should have one of the `'onerror={repair, lock, umount}'` mount options set.

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 PC Card ATA device.**

Identifying an Unrecognized Card

If you insert a PC Card ATA device and it isn't recognized (no special files are created), use the `prtconf` command to try to identify the problem.

1. **Run the `prtconf -D` command to see if your `pcata` card is recognized.**

   A recognized device will appear at the end of the `prtconf` output. For example:

```
# prtconf -D
. . .
pcic, instance #0 (driver name: pcic)
  . . .
  disk, instance #0
```

2. **If `pcata` 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.

Special Files

For PC Card devices, nodes are created in `/devices` that include the socket number as one component of a device name that the node refers to. However, the `/prtc/dev` names and the names in `/dev/dsk` and `/dev/rdsk` do follow the current convention for ATA devices, which do not encode the socket number in any part of the name. See the **`pcata`**(7D) man page.

Hot-Plugging

- If you want to remove the disk, you must unmount the file system.
- If you want to create a `pcfs` file system, use a DOS machine. To mount a `pcfs` file system, type:

```
# mount -F pcfs /dev/dsk/c#d#p0:c /mnt
```

For more information, see the **`pcfs`**(7FS) and **`mount`**(1M) man pages.

- If you want to create a `ufs` file system, use the `newfs` command and type:

```
# newfs /dev/rdsk/c#d#s#
```

To mount a `ufs` file system, type:

```
# mount -F ufs /dev/dsk/c#d#s# /mnt
```

For more information, see the **newfs**(1M) and **mount**(1M) man pages.

- To create a Solaris partition, run the `format` command and go to the Partition menu. For more information, see the **format**(1M) man page.