DAC960 Software Kit v1.06

Installation Guide and User Manual

Part Number 771976-D01

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About This Manual

This installation guide covers the steps involved to install and use both the software drivers and the administration utilities of the Mylex DAC960 Software Kit, Release 1.06

In addition, this document covers installation and use of the Global Array Manager 2 Server Agent software, and SNMP and TCP/IP installation notes.

For information on defining and setting RAID (Redundant Array of Independent Disks) levels as well as configuration of the array, consult the Global Array Manager 2.10 Client manual.

Notice for Users of Global Array Manager 2 Server Agents on Digital Prioris Servers

Mylex Global Array Manager 2 Server Agents have been customized for integration with Digital's ServerWorks Manager. If you are installing GAM2 Server Agents from diskettes, follow the instructions contained within this manual. If installing GAM2 Server Agents from ServerWorks Manager, the following changes apply:

- The floppies for GAM2 Server Agents for the various supported operating systems are now located on the CD-ROM. They can be found in e:\Mylex\Agents\ under the name of the appropriate environment.
- DAC960 drivers mentioned in this document are supplied with the controller and are not included in this kit. The documentation refers to GAM2 Server Agent kits for OS/2 and UnixWare. These operating systems are not supported by ServerWORKS and are also not included on the CD-ROM.

Conventions

Throughout the manual, the following conventions are used to describe user interaction with the product:

`bold`	The user must enter the bold text exactly as shown
↵	Press the Enter key
Enter	Press the key labeled “Enter” (or “Delete”, etc.)
File, Run	Select the Run option from the pull-down menu activated when the File menu pad is selected

☞ **Note**

Supplementary information that can have an effect on system performance

⚠ ***Caution***

Notification that a proscribed action has the *potential* to adversely affect equipment operation, system performance, or data integrity

STOP **WARNING**

Notification that a proscribed action will *definitely* result in equipment damage, data loss, or personal injury

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Chapter 1
Introduction

Overview

This manual provides information on the following:

- How to install and use the DAC960 Software Kit operating system software drivers and utilities for Mylex DAC960 Disk Array Controllers
- How to install the Global Array Manager 2 Server Agent software for several supported operating systems.

DAC960 Operating System Driver and Utility Installation Diskettes

DAC960 Operating System Drivers and Utilities in the DAC960 Software Kit v1.06 are delivered on four diskettes. Each diskette is used to install DAC960 drivers and utilities to support one or more network operating systems. The table on the next page summarizes the contents of the installation diskettes (Table 1-1):

Table 1-1. DAC960 Operating System Driver/Utility Diskettes

Diskette Format	Supported Operating Systems and Versions	File list
DOS	NetWare 3.1x NetWare 4.1x Windows NT 3.51 Windows NT 4.x OS/2 3.x Warp OS/2 4.x Warp	\ README.SCO README.TXT TXTSETUP.OEM (NT Setup text file) \NT DAC960NT.SYS DACADM.EXE DACMON.EXE DACMSG.DLL OEMSETUP.INF README.NT SRVCCFG.EXE \NW_3x ASPIDAC3.DSK DAC960.DSK DACADM.NLM DACMON.NLM \NW_4x ASPIDAC4.DDI ASPIDAC4.DSK DACADM.NLM DACMON.NLM DACNET4.DDI DACNET4.DSK \OS2 DAC960.ADD DAC960.DDP DACADM.EXE DACADM.HLP DACPRES.EXE README.OS2
UNIX	SCO UNIX ODT 3.x	mdac driver and utilities (see README.SCO on DOS diskette.
UNIX	SCO OpenServer 5.x	mdac driver and utilities (see README.SCO on DOS diskette.
UNIX	UnixWare 2.x	dak driver and utilities

Global Array Manager 2 Server Agent Installation Diskettes

Global Array Manager 2 Server Agent software is delivered on several diskettes. Each diskette is used to install GAM2 Server Agent software on a server running a particular network operating system. The table on the following two pages summarizes the contents of the installation diskettes (Table 1-2):

Table 1-2. Global Array Manager 2 Server Agent Diskettes

Network Operating System Diskette	Supported OS Version(s)	File list
NetWare	3.12 4.1x	\ BUDISTUB.NLM DACSTUB.NLM FILEDATA GAMAGENT.NLM GAMDRV3X.NLM GAMDRV4X.NLM GAMEVENT.NLM GAMEVLOG.NLM GAMSERV.NLM GAMSTUBS.NLM INSTALL.NCF INSTALLN.MSG INSTALLN.NLM MDAC.MIF MDACCI.NLM MLXRAID.MIB RAIDBLD.NLM

Table 1-2. Global Array Manager 2 Server Agent Diskettes

Network Operating System Diskette	Supported OS Version(s)	File list
Windows NT	3.51 4.x	\ _INST32I.EX_ _ISDEL.EXE _SETUP.DLL _SETUP.LIB DISK1.ID GAMSERV.Z SETUP.EXE SETUP.INI SETUP.INS SETUP.PKG TXTSETUP.OEM \DMI MDAC.MIF MDACCI.EXE \NT GAMDRV.SYS OEMSETUP.INF
OS/2 Warp	3.x Warp 4.x Warp	\ GAMAGENT.EXE GAMDRVR.DDP GAMDRVR.DOC GAMDRVR.SYM GAMDRVR.SYS GAMEVENT.EXE GAMEVLOG.EXE GAMSERV.EXE GAMSRVC.CNF GAMSRVC.EXE MLXRAID.MIB RAIDBLD.EXE
SCO	UNIX ODT 3.x OpenServer 5.x	The diskette contains data in UNIX pkgadd format.[a]
UnixWare	2.x	The diskette contains data in UNIX pkgadd format.[b]

a. To see diskette contents for SCO, type: **`pkgadd -d /dev/rfd0`**
b. To see diskette contents for UnixWare, type: **`pkgadd -d diskette1`**

Global Array Manager 2 Server Agent Overview

Global Array Manager 2 Server Agent software v2.1 (GAM2 Server Agent v2.1) is an enhancement of the popular server application used to manage disk array subsystems attached to a Mylex disk array controller.

Monitoring Functions

The Global Array Manager 2 Server Agent software collects and disseminates information on disk array status and resource utilization. The Global Array Manager 2 Client software, an optional component available from Mylex, organizes this information through an intuitive graphical display. In addition, the GAM2 Server Agent now monitors the characteristics and performance of supported SCSI Host Bus Adapters.

SNMP/DMI Support

The Global Array Manager 2 Server Agent software includes SNMP and DMI support, allowing stand-alone monitoring of performance and fault information. This is useful if a management package is already in use. Support for these protocols includes “read only” functions. Write functions are only available through use of the optional Global Array Manager 2 Client software.

Management Functions

The Global Array Manager 2 Server Agent software executes the management instructions specified by the optional Global Array Manager 2 Client. GAM2 Server Agent software offers fault management, reliable messaging, and superior operating system support. Global Array Manager 2 Client software manages or performs maintenance on individual disk arrays and drives (with the appropriate authentication), again by means of the graphical user interface.

Configuration Functions

Disk array configuration and remote TCP/IP support functions are provided through use of the Global Array Manager 2 Client software (sold separately as an option by Mylex). If your goal is monitoring and simple maintenance or messaging, the Global Array Manager 2 Server Agent is sufficient for these tasks.

Requirements

Requirements for DAC960 Operating System Drivers and Utilities

It is assumed that the hardware installation, the system configuration, and the disk array controller configuration are properly completed. If they are not, please refer to the appropriate *DAC960 Installation Guide* and to the *Disk Array Controller Configuration Utilities (DACCF) User Guide*. Complete the required procedures described in those manuals before proceeding with installation of drivers and utilities discussed herein.

It is necessary that the person who will be performing the installation must have SUPERVISOR or ADMINISTRATOR rights for the system onto which the DAC960 Software Kit will be installed.

It may also be necessary to prepare a DOS bootable floppy disk in order to be able to perform certain procedures described in this manual. Before starting, be sure to read through all applicable instructions to determine the specific requirements for each operating system to be supported.

Requirements for Global Array Manager 2 Server Agent Software

In order for the Global Array Manager 2 Server Agent software to work properly, the correct environment must be present on the server. The environment is a combination of hardware and software which meets the following requirements:

Server Hardware and Software - NetWare

- A server running Novell NetWare 3.12 or 4.1x
- 1 MB of free system memory after all volumes are mounted
- 2 MB of free hard disk space on the SYS: volume
- Properly installed and configured DAC960 Series controller with the appropriate NetWare drivers
- CLIB.NLM version 3.12 dated May 19, 1993 or later
- (Optional) If SNMP participation is desired, SNMP support (available from third parties) should be installed.

Server Hardware and Software - Windows NT

- A server running Microsoft Windows NT 3.51 or 4.x
- 2 MB of free hard disk space
- Properly installed and configured DAC960 Series controller with the appropriate Windows NT drivers
- (Optional) If SNMP participation is desired, system should be configured with SNMP services.

Server Hardware and Software - OS/2

- A server running IBM OS/2 Warp 3.x or 4.x.
- LAN Server 2.1 or above installed and running under OS/2.
- 2 MB of free hard disk space
- Properly installed and configured DAC960 Series controller with the appropriate OS/2 drivers
- (Optional) If SNMP participation is desired, system should be configured with SNMP services.

Server Hardware and Software - SCO UNIX

- A server running SCO UNIX (version 3.0 or 5.0)
- 2 MB of free hard disk space
- Properly installed and configured DAC960 Series controller with the appropriate SCO UNIX drivers
- (Optional) If SNMP participation is desired, SNMP support should be installed.

Server Hardware and Software - UnixWare

- A server running SCO UnixWare (version 2.01 or higher)
- 2 MB of free hard disk space
- Properly installed and configured DAC960 Series controller with the appropriate UnixWare drivers
- (Optional) If SNMP participation is desired, SNMP support should be installed.

Chapter 2
NetWare

Overview

This chapter provides information about the following:

- Installation procedures and the functionality of the DAC960 drivers and utilities for Novell NetWare 3.1x and NetWare 4.1x. The software is provided on the appropriate DAC960 Software Kit distribution diskette.
- Installation, verification, and startup of the Global Array Manager 2 Server Agent software for Novell NetWare 3.1x and NetWare 4.1x. The software is provided on the appropriate GAM2 Server Agent distribution diskette.

DAC960 Driver and Utility Files for NetWare

All hardware installation, system configuration, and disk array controller configuration must be properly completed before proceeding with the NetWare driver and utilities installation. These basic installation procedures follow the Novell Installation manual, with only the few minor differences that are described in this chapter.

The subdirectories *\NW_3X* and *\NW_4X* on DAC960 Software Kit distribution diskette 1 both contain the following:

DACMON.NLM: A monitor utility to log and report controller activities. A separate screen appears for each controller detected. Screens are identified as Dacmon1, Dacmon2, etc.

DACADM.NLM: Administrative utilities, consisting of various tools for managing and maintaining a disk array.

⚠ ***Caution***

These utilities can change the state of the disk array system and are for use only by experienced system administrators. Improper use of these utilities may result in system malfunction or data loss.

Subdirectory \NW_3X Files

ASPIDAC3.DSK: A driver to allow use of a SCSI CD-ROM or tape drive with NetWare 3.1x.

DAC960.DSK: The driver to support Mylex DAC960 Controllers with NetWare 3.1x.

Subdirectory \NW_4X Files

ASPIDAC4.DSK: A driver to allow use of a SCSI CD-ROM or tape drive with NetWare 4.1x.

DACNET4.DSK: The driver to support Mylex DAC960 Controllers with NetWare 4.1x.

ASPIDAC4.DDI: DiskDupe Image file for ASPIDAC4.DSK.

DACNET4.DDI: DiskDupe Image file for DACNET4.DSK.

Tape and CD-ROM Support

Tape drive support is available to the DAC960 under NetWare by means of the ASPIDAC driver module that provides ASPI compatibility. Most NetWare applications that communicate through ASPI on the server will work with the DAC960 controller.

Similar to tape drive support, CD-ROM is also supported by the DAC960 for use under NetWare. The ASPIDAC driver module must first be loaded to provide ASPI support to the CD-ROM application running on the server. An ASPICD driver and a CD-ROM driver will also have to be loaded. These are included with the Novell NetWare releases.

DAC960 Drivers for NetWare 3.1x

Installing the DAC960 driver for NetWare 3.11 or 3.12 involves installing the NetWare 3.1x file server and the DAC960 driver at the same time.

Installing NetWare 3.1x Drivers from Floppy Disk

Follow the instructions in the Novell Installation Manual to install NetWare on the server. In addition, complete the following steps to install and load the DAC960 controller's NetWare driver.

1. Copy the driver file DAC960.DSK from the \NW_3X subdirectory on the DAC960 Software Kit diskette 1 to the directory from which the program SERVER.EXE will be run.

   Assuming that SERVER.EXE will be executed from the *NetWare* directory on drive C, and the driver diskette is inserted in drive A, execute the following commands on the server from DOS:

   `C:\>` **`cd netware (or appropriate directory name)`**

   `C:\NETWARE>` **`copy a:\nw_3x\dac960.dsk`**

2. Run the NetWare server and load the DAC960 controller's NetWare driver by specifying the appropriate path at the console prompt as shown below.

   `:` **`load c:\netware\dac960`**

Installing Peripherals on NetWare 3.1x

Non-disk peripheral devices, such as tape or CD-ROM drives, can be installed on any channel of a DAC960 controller. Each non-disk device however, will require a unique SCSI ID, different from any other non-disk device on the controller, regardless of the channel.

1. The NetWare 3.1x DAC960 ASPI driver is installed by loading the file ASPIDAC3.DSK. For example:

   `:` **`load a:\nw_3x\aspidac3`**

2. After the *aspidac3* driver is installed, other appropriate drivers should be loaded before trying to access any non-disk devices. For example, NetWare's *Sbackup* can be loaded as follows:

: **`load dac960`**

: **`load aspidac3`**

: **`load tsa`*`xxx`*** **(where *xxx* is the NetWare version; 311, 312, etc.)**

: **`load tapedai`**

: **`scan for new devices`**

: **`load sbackup`**

Except for *dac960* and *aspidac3* .DSK drivers, all other .DSK or .NLM files are supplied by Novell. Refer to the Novell documentation for instructions on running *Sbackup*.

3. Load the following drivers to use a CD-ROM under NetWare 3.1x (the NLMs *aspicd* and *cdrom* are supplied by Novell):

   : **`load dac960`**

   : **`load aspidac3`**

   : **`load cdnaspi`** ***`or`*** **`aspicd`**

   : **`load cdrom`**

   : **`cd mount [volume name]`**

   After the CD-ROM is mounted, the volume on the CD-ROM can be mapped and accessed from any workstation.

4. To unload the ASPI module, at the server console, type:

   : **`unload aspidac3`**

Installing NetWare 3.12 Drivers from CD-ROM

NetWare version 3.12 is available on CD-ROM. Drivers provided in the \DOS subdirectory of the DAC960 Distribution diskette (packaged with the DAC960 controller and DACCF manual) are required to install NetWare 3.12 from a CD-ROM drive connected to a DAC960 controller.

The procedure below assumes the CD-ROM drivers are available.

1. Boot the system from a newly-created DOS boot drive, and then create (or edit) the CONFIG.SYS and AUTOEXEC.BAT files to add the drivers required for accessing the CD-ROM as a logical drive under DOS. CONFIG.SYS should contain the following statements:

```
device = [pathname]\dacdrvr.sys
device = [pathname]\aspidac.sys
device = [pathname]\dafcda.sys /D: [devicename]
```

AUTOEXEC.BAT should contain the following statement to assign the CD-ROM as drive D: under MS-DOS 6.00 or above:

```
[pathname]\mscdex /v /m:10 /D:[devicename]
```

Enter the devicename for the specific CD-ROM drive (e.g., MSCD001)

2. Boot the system with the new CONFIG.SYS and AUTOEXEC.BAT files (be sure that the NetWare CD-ROM files are accessible under DOS).
3. Copy the files in the \NW_3X subdirectory of DAC960 Software Kit diskette 1 to the DOS partition.

```
copy a:\nw_3x\*.* C:
```

4. Follow the standard NetWare 3.1x upgrade or installation procedure, as described in the NetWare documentation.
5. After the NetWare 3.1x installation is complete, copy all the files in the \NW_3X subdirectory of DAC960 Software Kit diskette 1 to SYS:SYSTEM of the NetWare 3.1x server.

DAC960 Drivers for NetWare 4.1x

Installing NetWare 4.1x Drivers

NetWare versions 4.0 and above are available on CD-ROM. Drivers provided in the \DOS subdirectory of the DAC960 Distribution diskette (packaged with the DAC960 controller and DACCF manual) are required to install NetWare 4.1x from a CD-ROM drive connected to a DAC960 controller.

The procedure below assumes that the CD-ROM drivers are available.

1. Boot the system once more from the newly created DOS boot drive, and then create (or edit) the CONFIG.SYS and AUTOEXEC.BAT files to include the drivers required for accessing the CD-ROM as a logical drive under DOS. The following example assigns the CD-ROM as drive D: under MS-DOS 6.00 or above. CONFIG.SYS contains the statements:

   ```
   device = [pathname]\dacdrvr.sys
   device = [pathname]\aspidac.sys
   device = [pathname]\dafcda.sys  /D:[devicename]
   ```

   AUTOEXEC.BAT contains the statement:

   ```
   [pathname]\mscdex /v /m:10  /D:[devicename]
   ```

   The device name is that of the specific CD-ROM drive (e.g., MSCD001).

2. Boot the system with the new CONFIG.SYS and AUTOEXEC.BAT, and make sure the NetWare CD-ROM files are accessible under DOS.

3. Follow the standard NetWare 4.1x upgrade or installation procedure, as described in the NetWare 4.1x documentation.

4. Insert DAC960 Software Kit diskette 1 into the floppy disk drive when the installation program prompts you to insert the vendor-supplied disk. The installation program will scan the diskette for all available drivers. Select the NetWare 4.1x driver from the list.

   DACNET4.DSK

5. After the NetWare 4.1x installation is complete, copy all the files in the \NW_4X subdirectory of DAC960 Software Kit diskette 1 to SYS:SYSTEM of the NetWare 4.1x server.

Installing Peripherals on NetWare 4.1x

Non-disk peripheral devices, such as tape or CD-ROM drives, can be installed on any channel of the DAC960 controller. Each non-disk device will require a unique SCSI ID, different from any other non-disk device connected to the controller regardless of the channel.

1. The NetWare 4.1x DAC960 ASPI driver is installed by loading the ASPIDAC4.DSK. For example:

   : **`load a:\nw_4x\aspidac4`**

2. After the *aspidac4* driver is installed, other appropriate drivers should be loaded before trying to access the non-disk devices. For example, to use NetWare's *Sbackup* utility, do the following:

   : **`load dacnet4`**

   : **`load aspidac4`**

   : **`load tsaxxx`** **(where *xxx* is the NetWare version; 400, 401, etc.)**

   : **`load tapedai`**

   : **`scan for new devices`**

   : **`load sbackup`**

   Except for the *dacnet4* and *aspidac4* drivers, all other .DSK or .NLM files are supplied by Novell. Refer to the Novell documentation for instructions on running *Sbackup*.

3. Load the following drivers (.DSK or NLM) to use a CD-ROM under NetWare 4.1x (the NLMs *aspicd* and *cdrom* are supplied by Novell):

   : **`load dacnet4`**

   : **`load aspidac4`**

   : **`load cdnaspi`** ***or*** **`aspicd`**

   : **`load cdrom`**

   : **`cd mount [volume name]`**

After the CD-ROM is mounted, the volume on the CD-ROM can be mapped from any workstation and accessed.

4. To unload the ASPI module, at the server console, type:

```
: unload aspidac4
```

DAC960 Disk Array Monitor Utility for NetWare 3.1x and 4.1x

Copying the Disk Array Monitor Utility File to the Server

If you plan to use the DACMON utility for NetWare, the DACMON.NLM file needs to be copied to the SYS:SYSTEM directory on the NetWare server. To do this, perform the following procedure:

1. Log-in as Supervisor from any workstation connected to the server and type the following:

```
F> CD Sys:\
F> CD \System
```

2. Insert DAC960 Software Kit diskette 1 into floppy drive A: and type one of the following commands.

   For NetWare 3.1x

```
F> copy A:\nw_3x\dacmon.nlm
```

   For NetWare 4.1x

```
F> copy A:\nw_4x\dacmon.nlm
```

Loading the Disk Array Monitor

The *Dacmon* utility monitors and reports the activities of the DAC960 controllers in the disk array. It also records the controller activities into a log file named *dac01log* in the SYS:PUBLIC directory.

The monitor utility is named using the following convention:

```
dacmon.nlm
```

> ☞ **Note**
>
> It is recommended that the monitoring utility always be loaded from the system administrator's console. For a system with multiple controllers, Dacmon will show a separate numbered screen for each controller (indicated as: DACMON1, DACMON2, etc.).

1. To load the monitor utility, at the server console, type:

   : **`load dacmon`**

   The loading process begins and messages are shown on the console.

2. A monitor information screen is displayed, consisting of four major parts: a Title bar, a Message Log window, a Device Status window, and a System Information area. These are described below.

3. To unload the monitor utility, at the server console, type:

   : **`unload dacmon`**

Monitor Information Screen Description

The monitor information screen presents data on the DAC960 controller and attached disk array subsystem(s). Data are detailed in the following sections.

Title Bar

Shows the name, controller number, firmware version, type of controller, release date and version number of this utility.

Message Log

An area, shown in red on a color monitor, that displays the DAC960 activities with time of an event (such as a standby replacement or a rebuild state). The message is also be logged into a reference file named *dac01log*.

Device Status

Displays the status of all the possible SCSI devices in the system by means of a letter or symbol code:

- **–** hyphen indicates that no SCSI device is configured at that address
- **D** letter D indicates a Dead device
- ★ a steady star symbol indicates that a device has encountered no errors since the beginning of the session
- ✪ a blinking star indicates drive errors are encountered
- **S** letter S represents a standby device
- **C** letter C represents a CD-ROM drive
- **T** letter T represents a tape drive
- **O** letter O represents other types of devices

The monitor utility keeps track of four types of errors: parity errors, hard errors, soft errors, and miscellaneous errors.

☞ **Note**

To view the type and number of errors on a particular device, use the Drive Information option from the Main Menu of the Dacadm utility.

System Information

An area that contains four information scales for Rebuild Status, Command Queue status, Controller I/O rate, and controller throughput in Kilobytes per Second, as described below.

Rebuild Status. Scale that displays the progress of any rebuild process for all the involved system drives, one by one. When any rebuild is in progress, the ID of the system drive being rebuilt will be shown to the left of the scale. The yellow bar on the scale represents the rebuild completed portion of a given system drive.

Command Queue. Scale that shows the number of commands sent to the controller, pending response.

Controller I/Os per second. Scale that displays the approximate number of I/O operations per second the controller is performing. This gives a rough indication of system performance. The lighter portion of the scale represents the reads, and the darker portion represents the writes.

KBs per second. Scale that shows the controller throughput in kilobytes per second (Kbs). The lighter portion of the scale represents the reads, and the darker portion represents the writes.

DAC960 System Administration Utility for NetWare 3.1x and 4.1x

Copying the System Administration Utility File to the Server

If you plan to use the DACADM utility for NetWare, the DACADM.NLM file needs to be copied to the SYS:SYSTEM directory on the NetWare server. To do this, perform the following procedure:

1. Log-in as Supervisor from any workstation connected to the server and type the following:

   F> **CD Sys:**

   F> **CD \System**

2. Insert DAC960 Software Kit diskette 1 into floppy drive A: and type one of the following commands.

   For NetWare 3.1x

   F> **copy A:\nw_3x\dacadm.nlm**

   For NetWare 4.1x

   F> **copy A:\nw_4x\dacadm.nlm**

Loading the System Administration Utility

1. To load the main DAC System Administration utility, at the server console, type:

   : **load dacadm**

   When loading, module loading messages will be shown on the console.

   A screen containing the main Selection Menu of the System Administration utility will be displayed when loading is complete.

The main menu of the DAC System Administration utility has a title bar at the top of the window that shows the name of the utility. The currently selected DAC960 controller is highlighted in a small rectangle, (pink on a color monitor) at the upper right of the window below the title bar. A selection menu with various options is also displayed in a smaller window.

After the System Administration utility is loaded on the file server, the F1 key can be used at anytime to invoke on-line help for an overall description of the utility, or for individual options.

Selection Menu Description

The selection menu contains a list of options for performing the various administrative tasks on the DAC960 controller and the attached disk array subsystem(s). The individual options are detailed in the following descriptions.

Select Adapter

In a system with only one DAC960 controller, this selection can be ignored. If there is more than one DAC960 controller in the system (up to four are supported), use this command to select the appropriate controller on which to perform an action. All actions or commands will be performed only on the currently selected controller.

Use the Up/Down arrow keys to move the cursor, press Enter to select.

The selected controller will be shown in a pink rectangle in the upper window below the title bar.

Drive Information

This selection is used to identify a device, its manufacturer, its model number and its capacity. It also is used to identify the state of the device, as well as the type and number of errors on a disk drive.

Use the arrow keys to move the cursor block over each connected device. A sub-window will show specific information on the device.

The Drive Information window displays the states of all devices as follows:

ONL:	device online
DED:	device killed
SBY:	device is a standby (hot spare)
- - - - :	device not present
< >:	device newly-added
XXXX:	device in some other state, such as rebuild

The Drive Information selection also contains a feature that is highly useful when configuring or troubleshooting an array.

To identify a specific drive, use the arrow keys to position the cursor block on one of the drives in the Select Device menu., then, press the Insert key. This will suspend all disk activity and will start flashing the selected drive's in-use LED. Also, the selected drive will flash on the screen. Pressing any key at this point will resume normal activity.

Similarly, pressing the Delete key after selecting a drive through the arrow keys, will flash all but the selected drive's in-use LED. Again, pressing any key at this point will resume normal activity.

> ☞ **Note**
>
> All other disk activity is suspended while identifying devices.

View Drive Error Counters. A blinking star in the Device Status window in the monitor utility screen indicates errors on the device. Use the Drive Information selection to view the type and number of errors. The error counters are for information only. The controller takes necessary actions to recover from errors and to kill a device with too many errors.

Display Error Counter. Display the error counter window for a device by pressing the Enter key. The error window displays error data only for SCSI hard drives connected to the controller channel being monitored, and does not display information for other types of SCSI devices.

The DAC960 automatically recovers from the following errors:

Parity error:	SCSI bus parity errors during transfer.
Soft error:	Check condition/data errors from the disk.
Hard error:	Channel hardware related errors.
Miscellaneous:	Time out errors.

Use the cursor keys to select any of the drives and press the Enter key. The *Drive Error Counters* window opens and displays the accumulated count of all the different errors mentioned above. Press the spacebar key to clear the error statistics for the selected device. This will start the device in its current state. A warning message will display if there is a failure in clearing the error counters.

After a power cycle (power off, then power on), all errors in the error counter will be reset to zero.

Broadcast

This selection allows the broadcast of a short message to all of the on-line users. When this option is selected, a dialogue box opens to allow a message to be entered. Type the message in the box and press the Enter key to send it. After the message is sent, the dialog box disappears and the main selection menu returns.

Rebuild Drive

This selection allows a manual rebuild on a SCSI drive while the server remains on line. Rebuild is a process in which data is reconstructed and written to a replacement SCSI disk. A *Rebuild Drive* is done after a failed drive has been replaced or after a *Change Device* operation.

Rebuild is only possible if the failed drive was part of a Drive Group which was configured to support data redundancy (such as RAID 1, 5, or 0+1).

> ☞ **Note**
>
> Rebuilding a drive may impact controller performance. Use the Rebuild Rate selection to change the priority that the controller allocates to the rebuild process.

To rebuild a device, perform the following steps:

1. Select the Rebuild option from the main Selection Menu and press Enter. A window labeled Rebuild Device is shown.
2. Use the arrow keys to highlight the *Dead* device (the one to be rebuilt) from the Rebuild Device window and press Enter to activate it.
   If a wrong device is selected (such as an Online device or a device not present), a pop-up window is displayed with the warning message: "Illegal device, press a key." When a correct device is selected, a dialog box for the format option is shown.
3. Select **No Format** or **Format** from the dialogue box.

> STOP **WARNING**
>
> **Formatting a drive will result in loss of data on that drive. Make sure that the correct drives are selected before starting the Rebuild with Format function.**

4. Press Enter to start the rebuild process. A low-level format is also performed during the process if the Format option was selected. In either case, a window is displayed to show the rebuild progress. The server continues to run during the rebuild process. However, its performance may degrade to some extent until the rebuild is finished. During the rebuild, each one of the system drives that is dependent on the replaced SCSI disk will be rebuilt one by one.

Note

Four outcomes are possible from a Rebuild:

a. Rebuild completed successfully. All dependent system drives are Online.

b. Some bad blocks were encountered on the source drives. Rebuild aborts. The blocks are logged in a file. All dependent system drives remain Critical.

c. The replacement drive failed during rebuild. Rebuild aborts. All dependent system drives remain Critical.

d. One of the other disks in the drive group failed during rebuild. All dependent system drives are Offline.

Format Drive

This selection allows a low-level format to be performed on a selected SCSI drive.

WARNING

Formatting a drive will result in loss of data on that drive. Make sure that the correct drives are selected before starting the Format drives function.

To format a newly-added SCSI drive, do the following:

1. Select Format Drive from the main Selection Menu. The controller automatically checks the state of all the drives connected to it and displays their status on the *Format Device* window (ONLN, DEAD, STBY, ----, or < > indicates a drive is Online, Killed, Standby, Not found, or Newly-added). Only drives that are Online, Dead, Standby or Newly-added can be formatted.
2. Use the arrow keys to select the drive that has been newly-added (indicated by < >) and press the Enter key.
3. A small window pops up to confirm that the format operation is the desired function. Select *Yes*, to format the selected drive.

   WARNING

   Selecting YES immediately starts the Format Drives process. ALL DATA WILL BE LOST on the drive(s) being formatted.

4. While formatting is taking place, the abbreviation FRMT is displayed on the drive's position in the format device window. This keeps blinking until the formatting is complete. The format screen is displayed until all format operations are complete.

Make Standby

This selection is used to set any newly-added drive as a standby drive. Use this option to make a Dead drive a Standby drive after an automatic rebuild has occurred.

To make a Dead SCSI drive a Standby drive, do the following:

1. Select Make Standby from the main selection menu. The controller automatically checks the state of all the drives connected to it and displays their status on the *Make Standby* window. (ONLN, DEAD, STBY, ----, or < > indicates a drive is Online, Killed, Standby, Not found, or Newly-added).
2. Use the arrow keys to select a DEAD drive and press the Enter key. A pop up window opens to confirm the Make Standby option.
3. Select *Yes* to make the selected device a hot-spare or standby drive.

Parity Check

This selection is used to check the parity of the system drives on the DAC960 that are part of a redundant array. A parity check may take from a few minutes to up to an hour, depending on the array size.

To perform a parity check, do the following:

1. Select Parity Check from the Main Selection menu. After this option is selected, a RAID Parity Check window is displayed that shows all the system drives present on the controller.
2. Use the arrow keys to select a system drive whose parity is to be checked.
3. Press Enter to start the parity check. A message “Illegal choice” is displayed if a non-redundant system drive is selected.

Rebuild Rate

This selection controls the amount of background activity that the DAC960 controller allocates to the Rebuild operation. The lowest priority setting is 0 (zero) and the highest priority setting is 50 (default).

Use the Left or Right arrow keys to change the Rebuild Rate number and press Enter to set the rate or Esc to exit the selection with no changes.

System Drive Mapping

This selection shows how the physical drives are mapped to system drives. Drives are identified by SCSI Channel ID and SCSI Device ID. Use the Up/Down arrow keys to move the cursor block through the list of configured system drives.

System Drive Status

This selection shows the status of configured system drives by SCSI Channel ID number, as well as information on the size (in Mbytes), RAID level, controller cache write policy, and operational state (Online, Dead, Standby).

Kill Drive

This selection is used to set any configured device to a *Dead* or killed state.

WARNING

Killing an Online drive will change the state of the configured system drive to either Critical or Offline. Changing the state of a drive can result in data loss.

To change a drive state to Dead (kill a drive), do the following:

1. Select Kill Drive from the main selection menu. The controller automatically checks the state of all the drives connected to it and displays their status on the *Kill Drive* window. (ONLN, DEAD, STBY, ----, or < > indicates a drive is Online, Killed, Standby, Not found, or Newly-added).
2. Use the arrow keys to select a drive and press the Enter key. A pop-up window opens to confirm the *Kill Drive* option.
3. Select *Yes* to change the state of the selected device to *Dead.*

Make Online

This option is used to set a Dead drive to an Online state.

WARNING

Making a Dead device Online can result in loss of some or all data. Use this function only as a last resort in an attempt to recover data.

To change a drive state to Online, do the following:

1. Select Make Online from the main selection menu. The controller automatically checks the state of all the drives connected to it and displays their status on the *Make Online* window. (ONLN, DEAD, STBY, ----, or < > indicates a drive is Online, Killed, Standby, Not found, or Newly-added).
2. Use the arrow keys to select a drive and press the Enter key. A pop up window opens to confirm the Make Online option.
3. Select *Yes* to change the state of the selected device to Online.

Change Device

This selection is used to replace a Dead drive if drives are cabled internally and Fault Management is disabled.

WARNING

This function stops all disk activity for 30 seconds. NetWare can become unstable in this condition. Use this function only if the drive enclosure does not have *hot swap* capability.

The Change Device function broadcasts a warning message to all users and then stops all drive activity. The replacement drive may then be installed without the threat of data loss.

Note

Be sure to set the replacement drive's SCSI ID to the same SCSI ID as the Dead drive that it will replace.

To use the Change Device function, do the following:

1. Select Change Device from the Main Selection menu. The controller automatically checks the state of all the drives connected to it and displays their status on the *Change Device* window. (ONLN, DEAD, STBY, ----, or < > indicates a drive is Online, Killed, Standby, Not found, or Newly-added).
2. Use the arrow keys to select a drive and press the Enter key. A pop-up window opens to confirm the Change Device option with the message "Stop Channel?"
3. Select *Yes* to invoke the Change Device function. The controller will broadcast a warning message to all users on that SCSI channel and then it will stop all drive activity for the selected channel. The system is now ready for administrative functions.
4. Connect the SCSI cable to the replacement drive, power-on the drive, and allow the drive to spin-up.
5. Press any key to resume I/O activities to the channel.
6. Run the Rebuild Drive function.

Add System Drive

This selection is used to add and configure new system drives. The configuration changes are stored in the DAC960 controller's non-volatile memory.

> ☞ **Note**
>
> The configuration changes are stored only in the controller. Use the DACCF utility to save the configuration data to a file.

Adding a system drive is done using two different procedures:

1. Define Packs (Drive Groups)

   Press the following Keys to invoke the identified function:

Spacebar:	Inserts a drive into a drive group (pack)
Delete:	Deletes a drive group from a new pack
Insert:	Displays device information
Enter:	Closes the pack definition process
Esc:	Exits pack definition without saving changes

2. Define System Drives

   Use the keyboard arrow keys to define the system drive START, capacity, RAID level, and the controller's cache write policy.

Be sure to initialize the system drive(s) using the *Surface Test* option under Novell *Install.nlm* after the drive groups and the system drives have been defined.

> STOP **WARNING**
>
> **Failure to initialize an array can result in loss of data.**

Global Array Manager 2 Server Agent Software for NetWare 3.1x and 4.1x

Installing Global Array Manager 2 Server Agent Software

The Global Array Manager 2 Server Agent software for NetWare has an automated installation utility which is run from the NetWare *server console*. This utility places the Global Array Manager 2 Server Agent application in the correct server directory and modifies the NetWare startup file, AUTOEXEC.NCF, to launch the application when the server is started.

> ☞ **Note**
>
> These instructions assume that the installation diskette is in drive A: of the computer. If a different drive is used, substitute that drive letter for “A” in the instructions below.

1. To install the Server Agent software, insert the GAM2 Server Agent installation diskette for NetWare in the file server’s diskette drive.
2. Type the command to load the install utility at the server console prompt (**:**).

   `A:\install` ↵
3. The Global Array Manager 2 Server Agent software installation screen appears. To install the software, select Install. To cancel the installation, select Exit.

   As the software is installed, the server’s AUTOEXEC.NCF file is updated to start the Global Array Manager Server Agent application whenever the server runs this file. The GAM driver file is installed automatically.
4. Press the Enter key at the AUTOEXEC.NCF message.
5. Press any key at the message stating that GAMEVENT -h must be modified to add the IP address(es) of the client system(s) that will communicate with this server.
6. Press the Enter key at the message indicating that installation has been completed.

7. Select Exit from the Select menu, then confirm that you wish to exit from the installation module.
8. You must modify GAMEVENT.NLM manually. Do this by opening the AUTOEXEC.NCF file and changing the GAMEVENT line to include IP addresses of the client systems you will use with this server.

> ☞ **Note**
>
> If you wish to enable RAID Fault Management (RAIDBLD) and optionally change its parameters, you need to modify the `#raidbld` command line installed in AUTOEXEC.NCF. See Appendix C: "RAID Fault Management" for instructions before proceeding.

9. Save the modified AUTOEXEC.NCF and exit.
10. Restart the server. See "Running Global Array Manager 2 Server Agent" on page 2-23 after verifying correct Server Agent software installation.

Verifying Correct Server Agent Software Installation

In Case of Problems...

Problem: The message "Error in connecting selected server" is displayed or an error is encountered when trying to connect to a server.

Check: Is the IP address correct?

Check: Is the Server Agent software, GAMSERV.NLM, installed and loaded on the server(s)? Use the following NetWare console command to verify that the GAMSERV module is loaded:

```
modules ↵
```

Check: Is the Ethernet connection good?

Check: Is TCP/IP set up correctly? Try Ping to find the server.

Problem: Global Array Manager 2 Server Agent will not load.

Check: Is the installation complete? The files GAMSERV.NLM, GAMDRV.NLM, and GAMEVENT.NLM should be contained in the SYS:SYSTEM directory of the server. Ensure CLIB.NLM (v3.12, dated May 19, 1993 or later) is loaded via the MODULES command. If necessary, install (or reinstall) the Global Array Manager 2 Server Agent software.

Running Global Array Manager 2 Server Agent

The Global Array Manager 2 Server Agent runs on the server and performs the following functions:

- Monitors the controller(s) and disks in the server.
- Manages the controller(s) and associated disk subsystems in the server.
- Sends information to Global Array Manager 2 Clients (if used).

Loading Global Array Manager 2 Manually

The Global Array Manager 2 Server Agent can be loaded manually from the NetWare server console prompt (:). Type the following two commands in sequence:

```
load gamserv ↵
load gamevent -h <IP Address of Client> (repeat...)
```

Loading Global Array Manager 2 Automatically

The Global Array Manager 2 Server Agent can be made to start up automatically on a NetWare server, when the NetWare server is restarted after installation of Global Array Manager 2. To set up this capability, add two lines to the end of your AUTOEXEC.NCF file in the order shown:

```
load gamserv
load gamevent -h <IP Address of Client> (repeat...)
```

Chapter 3
Windows NT

Overview

This chapter provides information about the following:

- Installation procedures and the functionality of the DAC960 drivers and utilities for Microsoft Windows NT 3.51 and Windows NT 4.x. The software is provided on the appropriate DAC960 Software Kit distribution diskette.
- Installation, verification, and startup of the Global Array Manager 2 Server Agent software for Microsoft Windows NT 3.51 and Windows NT 4.x. The software is provided on the appropriate GAM2 Server Agent distribution diskette.

DAC960 Driver and Utility Files for Windows NT

All hardware installation, system configuration, and disk array controller configuration must be properly completed before proceeding with the Windows NT driver and utilities installation. These basic installation procedures follow the Windows NT Installation manual, with the differences that are described in this chapter.

The following drivers and utilities are provided on DAC960 Software Kit distribution diskette 1:

DACMON.EXE: System service for monitoring the DAC960.

DACADM.EXE: The DAC960 administration utility.

DACMSG.DLL Support file for DACMON events.

> ⚠ ***Caution***
>
> These utilities can change the state of the disk array system and are for use only by experienced system administrators. Improper use of these utilities may result in system malfunction or data loss.

DAC960NT.SYS Main DAC960 driver file for Windows NT.

SRVCCFG.EXE Utility for installing the DACMON service.

TXTSETUP.OEM	Setup text file (required in root directory) needed for installation.
OEMSETUP.INF	Setup file required for installation.
README.NT	Last minute information on Windows NT Installation.

DAC960 Drivers for Windows NT

Installing Windows NT 3.51 Drivers for the First Time

Note

If you are running Windows NT 4.x, skip ahead to the next section called “Installing Windows NT 4.x Drivers for the First Time” on page 3-3.

To install the DAC960 Windows NT 3.51 drivers for the first time:

1. Follow the instructions in the DAC960 manual to set up the hardware, install the controller, connect the disk drives and CD-ROM drive, run the EISA configuration (if required), and run the DAC configuration utility (DACCF) to create Drive Groups (packs) and System Drives.
2. Initialize all of the system drives using the DACCF utility.

WARNING

Failure to initialize an array can cause data loss.

3. Boot the system with the Windows NT 3.51 Setup diskette. Select **Custom Setup** in the Windows NT Setup screen.
4. At this point, the installation procedure scans for a disk controller installed in the system. Choose **S** to skip the detection scan.
5. Choose **S** to specify an additional device.
6. Choose **Other** in the list of supported adapters displayed.
7. Insert the Windows NT 3.51 CD-ROM into the CD-ROM drive, and DAC960 Software Kit diskette 1 into the floppy disk drive when prompted.
8. Proceed with normal installation as described in the Windows NT 3.51 documentation.

9. After the two stages of installation are over, boot the system, log in as administrator, and copy the following files from the \NT subdirectory on DAC960 Software Kit diskette 1:

```
C\> copy a:\nt\dacadm.exe c:\winnt\system32
C\> copy a:\nt\dacmon.exe c:\winnt\system32
C\> copy a:\nt\srvccfg.exe c:\winnt\system32
C\> copy a:\nt\dac960nt.sys c:\winnt\system32
C\> copy a:\nt\dacmsg.dll c:\winnt\system32
```

   It is assumed that the Windows NT files are copied to \WINNT.

   ☞ **Note**

   All abnormal activities are recorded by DACMON in the EVENT VIEWER, under Application.

Skip ahead to “Installation Tips” on page 3-4.

Installing Windows NT 4.x Drivers for the First Time

To install the DAC960 Windows NT 4.x drivers for the first time:

1. Follow the instructions in the DAC960 manual to setup the hardware, install the controller, connect the disk drives and CD-ROM drive, run the EISA configuration (if required), and run the DAC configuration utility (DACCF) to create Drive Groups (packs) and System Drives.
2. Initialize all of the system drives using the DACCF utility.

   STOP **WARNING**

   Failure to initialize an array can cause data loss.

3. Boot the system with the Windows NT 4.x Setup Boot diskette (#1). Insert the Windows NT 4.x Setup diskette (#2) when asked and press Enter.
4. Press Enter to continue setup when asked.
5. At this point, the installation procedure can automatically scan for storage media installed in the system. Choose **S** to skip the detection scan.
6. Choose **S** to specify an additional device.

7. Choose **Other** in the list of supported adapters displayed.
8. Insert the DAC960 Software Kit diskette 1 into the floppy disk drive when prompted for the “Manufacturer-supplied hardware support disk.” Press Enter.
9. Proceed with the installation, following the instructions as described on the screen, or in the Windows NT 4.x documentation.
10. After the two stages of installation are over, boot the system, log in as administrator, and copy the following files from the \NT subdirectory on DAC960 Software Kit diskette 1:

```
C\> copy a:\nt\dacadm.exe c:\winnt\system32
C\> copy a:\nt\dacmon.exe c:\winnt\system32
C\> copy a:\nt\srvccfg.exe c:\winnt\system32
C\> copy a:\nt\dac960nt.sys c:\winnt\system32
C\> copy a:\nt\dacmsg.dll c:\winnt\system32
```

It is assumed that the Windows NT files are copied in the directory named \WINNT if no previous version of Windows NT remains in your system. However, if you elected to maintain a previous installation of Windows NT 3.51, the directory into which you should copy the files will probably have a different name, such as \WINNT40.

☞ **Note**

All abnormal activities are recorded by DACMON in the EVENT VIEWER, under Application.

Installation Tips

- Access all of the logical drives before running *Perfmon.exe*.
- When using Windows NT Setup to add an Adaptec controller as a second controller in a DAC960-based system, add the driver for the Adaptec card; then, edit the c:\boot.ini file (this is a hidden, readonly file) to change all occurrences of SCSI (0) to SCSI (1). This will make the system boot from the disk connected to the DAC960.

DAC960 Disk Array Monitor Utility for Windows NT

DACMON Utility

The Disk Array Monitor (DACMON) utility is available for the DAC960 running under Windows NT. DACMON is the Windows NT system service for monitoring the status of the DAC960 controller.

This utility displays the status of the DAC960 controller, its disk drives, and the progress of any rebuild operations that the controller may be performing. The utility will fail to run if the appropriate DAC960 controller is not present.

The utility can be configured to load automatically as a Windows NT service upon system startup (the default mode). Also, it can be started or stopped on demand through the Control Panel *Services* applet.

DACMON starts in a minimized icon state, with the icon placed in the lower corner of the window. If an abnormal condition is detected, the EVENT VIEWER will be updated, and the monitor window will automatically pop up to display the event information.

Use the SRVCCFG.EXE utility to install or remove the DACMON service.

SRVCCFG Utility

Syntax

```
srvccfg <Service Name> <Service Label> <Path>
```

<Service Name>	Identifies DACMON to the Windows NT Service Control Manager
<Service Label>	The DACMON service display name that appears in the Control Panel *Services* applet
<Path>	The complete path to the DACMON.EXE file

The SRVCCFG.EXE utility is used to install or remove the DACMON utility as a Windows NT service.

The SRVCCFG.EXE utility must be run from the DOS prompt. An example of how to install the service, is:

```
c: srvccfg DacMon DAC960Monitor
      \winnt35\system32\dacmon.exe
```

To remove the service, type:

```
c: srvccfg DacMon remove
```

The Windows NT Service Control Manager may display the following error message on an attempt to start service:

```
The <Service Label> service returned service
specific error 1.
```

Possible causes for this error message are:

1. The system failed to find any DAC960 controllers
2. The DAC960 driver failed to load for some reason

DAC960 System Administration Utility for Windows NT

DACADM Utility

The System Administration (DACADM) utility is a user-friendly, menu-driven utility consisting of several commonly used tools for system administrators.

The DAC960 administration utility is launched from the **File Manager, Run** selection (Windows NT 3.51), or from **Start-->Run** (Windows NT 4.x). To display the main menu, type:

```
[drive:\path] DACADM ↵
```

DACADM Main Menu

The system will display the menu screen. A window with a title bar and a menu bar below it appears on the screen. The title bar at the top of the window displays the name of the utility. The menu bar includes all of the menu items currently being supported. A small rectangular box pull-downs to list all the options for this utility.

Use the mouse to open the pull down menus. Click the mouse on an option title to display the various functions available.

Options Menus

Selecting an option function may be done by either using the mouse to click on the command or by typing the speed key sequence on the keyboard.

Management Menu

The various selections available from the Management pull-down options menu are described in the following sections.

Select Controller. Select this item, and a popup window appears on the screen showing all of the DAC960 controllers currently attached to the host system. This dialog window allows the user to select any of the DAC960 controllers for administration. The available DAC960 controllers on the system are displayed as Controller 1, Controller 2, etc. in the small boxes. If a DAC960 controller is not found, the message "Not Installed" is displayed in the box. Use the mouse to click on the DAC960 controller to be administered.

Rebuild Rate. Use this option to view or change the rebuild rate. This selection controls the amount of background activity that the DAC960 controller allocates to the Rebuild operation. The lowest priority setting is 0 (zero) and the highest priority setting is 50 (default). Click on the arrows on the horizontal bar to change the rate.

Rebuild Drive. This selection is used to rebuild a drive that was marked as DED (on the drive matrix area) by the DAC960 Controller. Before this option is invoked, the Dead drive has to be replaced with a properly working drive of the same (or larger) size, and set to the same SCSI ID number as the dead drive.

Click on the Rebuild Drive selection, and a screen appears providing information about the drives connected to the selected DAC960 controller.

Move the cursor to a dead drive box and click on the *Dead Drive* button to start the rebuild. After the rebuild starts, the progress of the rebuild for every dependent system drive is reported in another window that is opened by the rebuild process. When Rebuild completes successfully, the status of the drive is changed to ONL (Online). Click OK to exit the screen.

Consistency Check. Use this option to check the consistency of data across a system drive (logical drive). When invoked, the screen shows all the system drives as boxes. The system drive that is present and redundant is highlighted. Click on the system drive to be checked to start the function.

The progress of the check is displayed on a horizontal bar. To change the rate of the checking process, click on the arrows or on the bottom horizontal bar. Stop the consistency check process by clicking on the Cancel button.

Kill Drive. Use this option to stop a working drive; that is, a drive with a status other than DED. The drive graphic shows the drives that are connected to the selected DAC960 Controller. Each box represents a drive and the status of the drive is indicated by its label: SBY for Standby, DED for dead drives, ONL for working drives, and --- for drives being rebuilt. Move the cursor to the box that represents the drive you want to stop and click on it.

Make Online. Use this option to set a drive state to Online. The drive must be configured and should have a status other than ONLN. Drives with status WRITE_ONLY (---) will be made online only if no Rebuild is in progress. Care should be taken because changing the drive state to ONL may result in data inconsistency.

Configuration Menu

The various selections available from the Configuration pull-down options menu are described in the following sections.

Select Controller. Click on Select Controller and a dialog window opens. This allows the user to select any of the DAC960 controllers for configuration. The available DAC960 controllers on the system are displayed as Controller 1, Controller 2, etc. in the small boxes. If a DAC960 controller is not found, the message “Not Installed” is displayed in the box. Use the mouse to click on the DAC960 controller to be configured.

System Drive Information. The System Drive option is used to display complete information about the System drives on the DAC960. The information displayed is: the system drive number, its RAID level, write policy, size and status. The status of system drives that are Online, Offline or in a Critical state is displayed.

System Drive Mapping. This selection shows how the physical drives are mapped to system drives. Drives are identified by their SCSI channel ID and their SCSI target ID.

Drive Information. Use this option to get information about the drives connected to the selected DAC960 Controller. The horizontal bar represents the SCSI channel and each box represents a drive. The label in the box indicates the status of the drive: SBY for the Standby, DED for dead drives, ONL for working drives, and --- for drives being rebuilt. Move the cursor to a drive box and click on the left button to view the information on soft error, hard error, parity error, miscellaneous errors, and drive description. Click OK to exit the screen.

Make Standby. The Make Standby selection is used to make a drive that has replaced a dead drive a hot-spare or standby drive. Use this option to designate a drive as the one to be used for automatic rebuilds.

> ☞ **Note**
>
> Only drives that are not part of any Drive Group (pack) can be made standby drives.

The drive graphic shows the drives that are connected to the selected DAC960 Controller. Each box represents a drive and the status of the drive is indicated by its label: SBY for Standby, DED for dead drives, ONL for working drives, and --- for drives being rebuilt.

Click on the Make Standby selection and a screen appears providing information about the drives connected to the selected DAC960 controller. Move the cursor to a dead drive box and click on the left button to make the dead drive a standby drive. The controller will automatically try to start the drive. If it is successful in starting the drive, it will make the drive a standby drive. Click OK to exit the screen.

Global Array Manager 2 Server Agent Software for Windows NT

Installing Global Array Manager 2 Server Agent Software for Windows NT

Install the Global Array Manager 2 Server Agent software from within Windows NT.

> ☞ **Note**
>
> The installation procedure requires administrator rights.

> ⚠ ***Caution***
>
> Files for the Server Agent are decompressed by the installation procedure. Simply copying the files to a hard disk will NOT result in a successful installation.

Adding the GAM2 Driver to Windows NT 3.51

> ☞ **Note**
>
> If you are running Windows NT 4.x, skip ahead to the section called “Adding the GAM2 Driver to Windows NT 4.x” on page 3-11.

Load the Mylex GAM2 driver for Windows NT 3.51 as follows:

1. Go to the Main Program Group.
2. Run Windows NT Setup.
3. Choose Add/Remove SCSI Adapters from the Options menu.
4. Click Add, then click OK at the Setup Message.
5. In the Adapter drop-down list box, select Other.
6. Insert the GAM2 Server Agent distribution diskette for Windows NT into your floppy diskette drive.
7. Type:

   a:\NT ↵

8. Click OK (with Mylex DAC960 GAM Driver selected).
9. Click Install.
10. Click Continue.
11. Click Close when you see “Mylex DAC960 GAM Driver” in the installed drivers list.
12. Reboot the server.
13. Proceed to the section called “Installing the Server Agent Software” on page 3-12.

Adding the GAM2 Driver to Windows NT 4.x

Load the Mylex GAM2 driver for Windows NT 4.x as follows:

1. From the Windows NT 4.x Desktop, select: **Start-->Settings-->Control Panel**.
2. In the Control Panel, double-click SCSI Adapters.
3. Select the Drivers tab.
4. Click Add.
5. Click Have Disk.
6. Insert the GAM2 Server Agent distribution diskette for Windows NT into your floppy diskette drive.
7. Type:

   `a:\NT` ↵
8. Click OK (with Mylex DAC960 GAM Driver selected).
9. Again, type:

   `a:\NT` ↵
10. Click Continue.
11. Click Yes to restart the server.

Installing the Server Agent Software

Note

Screens in this section are taken from a Windows NT 3.51 installation. If you are running Windows NT 4.x, your screens may look different, but the Global Array Manager 2 Server Agent installation is essentially the same.

1. Insert the GAM2 Server Agent for Windows NT installation diskette in drive A: (or B: as appropriate).
2. For Windows NT 3.51, select **File**, **Run** from the Program Manager. For Windows NT 4.x, select **Start-->Run** at the Desktop. The Run dialog box appears (Figure 3-1).

Figure 3-1. Starting the Installation Program

3. Enter the following command line:

   `a:\setup` ↵

Note

If this is a first time installation, the Global Array Manager 2 Server Agent installation program will give a warning that the Mylex GAM driver is not installed. If this an upgrade or reinstallation, the installation program will update the Mylex GAM driver automatically.

4. If the warning screen displays, click OK to continue.
5. The Welcome dialog box appears (Figure 3-2). Click Next to proceed, or click Cancel to end installation and return to Windows NT.

Figure 3-2. Welcome Dialog Box

6. During installation, files are decompressed and copied from the installation diskette to the destination directory (Figure 3-3).

Figure 3-3. Installation Progress Display

To cancel the installation/file copy process, click Cancel.

7. After files are copied, the Modify Configuration File message box appears (Figure 3-4).

Figure 3-4. Modify Configuration File Message Box

You must modify GAMEVENT manually by editing the GAMSCM.CNF file to include the IP addresses of your client systems.

8. Click Yes in the Modify Configuration File message box. Notepad opens with GAMSCM.CNF (Figure 3-5).

Figure 3-5. GAMSCM.CNF Under Notepad

9. Change the GAMEVENT and GAMEVLOG lines according to your requirements. After each `-h`, replace the `gamclient1, gamclient2,` etc. with the IP address of a valid client system that will communicate with this server. Remove any `-h gamclient[#]` statements that are not needed. Remove the comment markers (#).

☞ Note

If you wish to enable RAID Fault Management (RAIDBUILD) and optionally change its parameters, you need to modify the `# raidbld` command line installed in GAMSCM.CNF. See Appendix C: "RAID Fault Management" for instructions before proceeding.

10. Save your changes and close Notepad when you are finished.
11. After a successful installation, the Setup Complete dialog box of the installation program is displayed (Figure 3-6).

Figure 3-6. After Installation...

- To restart the computer now, click the Yes... radio button. Remove diskettes from their drives, then click Finish.
- To continue without restarting the computer now, click the No... radio button. Remove diskettes from their drives, then click Finish. GAM2 Server Agent for Windows NT will not be active until you restart the server.

Verifying Correct Server Agent Software Installation

In Case of Problems...

Problem: **The message "Error in connecting selected server" is displayed or an error is encountered when trying to connect to a server.**

Check: Is the IP address of the Server correct?

Check: Is the Ethernet connection good?

Check: Is TCP/IP set up correctly? Try Ping to find the server.

Problem: **Global Array Manager Server Agent does not load.**

Check: Did all of the Server Agent files load to the destination directories? Do you have sufficient disk space for the installation? A list of files needed for operation is given in Chapter 1. If necessary, reinstall the software.

Running Global Array Manager Server Agent

The Global Array Manager Server Agent runs on the server and performs the following functions:

- Monitors the controller(s) and disks in the server.
- Manages the controller(s) and associated disk subsystems in the server.
- Sends information to Global Array Manager Clients (if used).

The automatic installation procedure for Windows NT's Global Array Manager 2 Server Agent loads the GAM2 Server Agent component as a "service." This service will load automatically at system startup. No special procedure is required to run the GAM2 Windows NT Server Agent.

Chapter 4
OS/2 & Warp

Overview

This chapter provides information about the following:

- Installation procedures and the functionality of the DAC960 drivers and utilities for IBM OS/2 Warp 3.x and 4.x. The software is provided on the appropriate DAC960 Software Kit distribution diskette.
- Installation, verification, and startup of the Global Array Manager 2 Server Agent software for IBM OS/2 Warp 3.x and 4.x. The software is provided on the appropriate GAM2 Server Agent distribution diskette.

DAC960 Driver and Utility Files for OS/2

All hardware installation, system configuration, and disk array controller configuration must be properly completed before proceeding with the OS/2 driver and utilities installation. These basic installation procedures follow the OS/2 Installation manual, with the differences that are described in this chapter.

The DAC960 driver for OS/2 that is provided in the DAC960 Software Kit supports OS/2 Warp versions 3.x and 4.x. The following files are included in the \OS2 subdirectory on DAC960 Software Kit distribution diskette 1:

DACADM.EXE: The DAC960 administration utility.

> ⚠ ***Caution***
>
> This utility can change the state of the disk array system and is for use only by experienced system administrators. Improper use of this utility may result in system malfunction or data loss.

DAC960.ADD This is the DAC960 driver for OS/2 3.x and 4.x.

DAC960.DDP This is a driver auxiliary file used by DAC960.ADD.

DACADM.HLP This is the DAC960 administration utility help file.

README.OS2 Last minute information on OS/2 installation.

DACPRES.EXE This is a utility that detects whether the DAC960 is present in the system.

DAC960 Driver for OS/2

Installation procedures for the DAC960 driver for OS/2 vary slightly depending on whether the operating system is being installed from floppy disk or from CD-ROM. In either situation, however, installing the DAC960 driver for OS/2 is simple and straightforward. Just a few basic steps comprise the installation procedures.

- Copy the DAC960 driver to the OS/2 directory
- Copy the array administration utility to the OS/2 directory
- Copy the utility's help files to the OS/2 Help directory
- Modify the CONFIG.SYS file

The detailed procedures for installing the DAC960 OS/2 driver from either floppy disk or from CD-ROM are described in the following sections of this chapter.

Installing the OS/2 Driver from Floppy Disk

1. Follow the DAC960 installation manual to set up and install the controller, connect the hard drives (run the EISA configuration utility, if required), and run the DACCF configuration utility to create the drive groups (packs) and system drives.
2. Initialize the system drives using DACCF.

   WARNING

   Failure to initialize an array can result in data loss.

3. Install OS/2 using floppy diskettes by following the normal installation procedure as documented in the OS/2 Installation Guide.

   Note

   Do not define an OS/2 partition of more than 2046MB.

4. When asked to reboot from the disk drive after the OS/2 installation is complete, copy the DAC960 driver file DAC960.ADD from the \OS2 subdirectory on DAC960 Software Kit diskette 1 to the \OS2 subdirectory of the bootable drive (e.g., C:\OS2).

   C> **COPY A:\OS2\DAC960.ADD C:\OS2**

5. Use a text editor to comment out the following line in the file CONFIG.SYS in the root directory of OS/2 boot drive:

   BASEDEV=IBMINT13.I13

   (This can be done by typing REM <space> at the beginning of the line).

6. Use the text editor to add the following line into the CONFIG.SYS file:

   BASEDEV=DAC960.ADD

   The two lines in the CONFIG.SYS file should now read as follows:

   ```
   REM BASEDEV=IBMINT13.I13
   BASEDEV=DAC960.ADD
   ```

7. Copy the DACADM.EXE program from the \OS2 subdirectory on DAC960 Software Kit diskette 1 to the \OS2 subdirectory on the bootable drive (e.g., C:\OS2).

   C> **COPY A:\OS2\DACADM.EXE C:\OS2**

8. Copy the file DACADM.HLP from the \OS2 subdirectory on DAC960 Software Kit diskette 1 to the \OS2\HELP subdirectory on the bootable drive (e.g., C:\OS2\HELP).

   C> **COPY A:\OS2\DACADM.HLP C:\OS2\HELP**

9. Make sure the DAC960.ADD driver is NOT PRESENT in the Root directory of the OS/2 disk. Shutdown and reboot the OS/2 system. The system is now ready for installation of the applications and other software.

Installing the OS/2 Driver from CD-ROM

The following procedure assumes that a CD-ROM drive is present in the system and operating properly.

1. Follow the DAC960 installation manual to set up and install the controller, connect the hard drives, run the EISA configuration utility (if required), and run the DACCF configuration utility to create the drive groups (packs) and system drives.
2. Initialize all the system drives using the DAC configuration utility.

   WARNING

   Failure to initialize an array can result in data loss.

3. Prepare an OS/2 *Disk 1* work disk as follows:
   - Make working copies of the OS/2 *Install* and *DISK1* diskettes as described in the OS/2 documentation.
   - Copy the DAC960 driver *DAC960.ADD* from the \OS2 subdirectory on DAC960 Software Kit diskette 1 to the working copy of *Disk 1*.

   Assuming that drive A contains the DAC960 driver diskette and drive B has the working *Disk 1* diskette, the command would look like this:

   ```
   C> COPY  A:\OS2\DAC960.ADD   B:\
   ```

   - Modify the CONFIG.SYS file on *Disk 1* by using a text editor to comment out the line:

   ```
   BASEDEV=IBMINT13.I13
   ```

   (This can be done by typing **REM** <space> at the beginning of the line).

   - Use the text editor to add the following line to the *Disk 1* CONFIG.SYS file:

   ```
   BASEDEV=DAC960.ADD
   ```

   The two lines in the CONFIG.SYS file should now read as follows:

   ```
   REM BASEDEV=IBMINT13.I13
   BASEDEV=DAC960.ADD
   ```

4. Use the work diskettes *Install* and *Disk 1* to install the OS/2 operating system. Follow the OS/2 CD-ROM installation procedure specified in the OS/2 documentation.

☞ **Note**

Do not define an OS/2 partition of more than 2046MB.

5. Reboot the system after the OS/2 installation is complete.

The system is now ready for the installation of applications and other software.

Troubleshooting the CD-ROM Installation

If the system does not reboot or if it displays an error message, do the following:

1. Reboot the system using the *Install* and *Disk 1* work disks. When the OS/2 welcome screen is displayed, press the Esc key to abort the normal installation. The OS/2 command prompt should now be displayed.
2. Copy the CONFIG.SYS file from the bootable drive (e.g., C:\) to a floppy diskette. Use a text editor on another DOS or OS/2 system to check if the following lines read properly:

   ```
   REM BASEDEV=IBMINT13.I13
   BASEDEV=DAC960.ADD
   ```

3. Check the OS/2 system to make sure that the file DAC960.ADD exists on the OS/2 subdirectory of the bootable drive, (e.g., C:\OS2). Also, make sure DAC960.ADD is NOT PRESENT in the root directory of the bootable drive.
4. Copy DACADM.EXE from the `\OS2` subdirectory on DAC960 Software Kit diskette 1 to the \OS2 subdirectory of your bootable drive.

   `COPY A:\OS2\DACADM.EXE  C:\OS2`

5. Copy DACADM.HLP from the OS/2 subdirectory on DAC960 Software Kit diskette 1 to the \OS2\HELP subdirectory of your bootable drive (e.g., C:\OS2\HELP).

   `COPY A:\OS2\DACADM.HLP C:\OS2\HELP`

6. Reboot the system from your bootable OS/2 drive.

Driver Upgrade

A previously installed DAC960 controller running in an OS/2-based system can be upgraded with a more current driver. Before upgrading the DAC960 OS/2 driver, it is important that several key functions be performed.

- Remove the system from the network
- Back up all drives connected to the controller
- Stop all drive activity

These procedures assume they are being performed by someone with system administrator rights.

1. Copy the driver file DAC960.ADD from the DAC960 Software Kit diskette \OS2 subdirectory to the bootable system's drive's OS/2 directory. For example:

   C> **COPY A:\OS2\DAC960.ADD C:\OS2**

   A message prompt will appear notifying you that the file already exists and asking you to confirm that you want to overwrite the old file. Select **Yes**.

2. Copy DACADM.EXE from the \OS2 subdirectory to the \OS2 subdirectory of the bootable drive.

   C> **COPY A:\OS2\DACADM.EXE C:\OS2**

3. Copy the DACADM.HLP from the \OS2 subdirectory of the DAC960 Software Kit diskette to the \OS2\HELP subdirectory of the OS/2 bootable drive (e.g., C:\OS2\HELP).

   C> **COPY A:\OS2\DACADM.HLP C:\OS2\HELP**

4. Reboot the system from the boot drive containing the newly installed driver, administration utility, and help file.

DAC960 System Administration Utility for OS/2 Warp 3.x and 4.x

The DACADM utility is the main administrative utility for the DAC960 controller and its attached disk arrays under OS/2. The DAC960 administration utility is run from the OS/2 command prompt on either a full-screen display or an OS/2 window. Invoke the utility by typing DACADM at the command prompt, and press Enter; the utility main screen will be displayed.

Main Screen

The top line of the screen displays the name and release level of the utility, followed by the DAC960 controller number (1, 2, etc.). All operations performed from this screen are for the controller number specified here.

The small rectangular box (gray) lists the two pull down options for this utility; namely, **Option** and **Help**. The pull down options are explained later in this text.

The message log area (yellow) is where information about drive failures, status of standby drives, manual rebuilds, etc. are displayed for the selected controller.

The drive status area (blue) shows a matrix of the drives connected to the various channels of the selected controller. The left most column corresponds to SCSI ID 0. The SCSI ID is incremented by one number for every column. The letters ONL, SBY and DDD indicate an Online, Standby or Dead disk drive. A blank box indicates that no disk drive was found for that channel location and SCSI ID.

Use the mouse to open one of the pull down menus. Click the mouse cursor on **Option** or **Help** to display the various options available and their accelerator command (speed key) keyboard prompts.

Option Menu

The various selections available under the **Option** button are described in the following sections. Selecting an option function may be done by either using the mouse to click on the command or by typing the speed key sequence on the keyboard.

Information displayed on the option submenu screens is usually presented in the following format. Each horizontal bar represents one SCSI channel on the controller, and the boxes connected to it represent the drives on that channel. The left most column of boxes are for SCSI ID 0. The SCSI ID number is incremented by one for every column of boxes. A yellow rectangular block displays information specific to a selected device. The status of a drive is indicated within the box. A symbol (SB, DD, OL) indicates that a device is either Standby, Dead, or Online.

Select Adapter (^S)

In a system with only one DAC960 adapter, this option is ignored. If there is more than one DAC960 controller in the system, use this command to select the controller on which you want to get information or perform an action. Commands are executed only on the selected controller.

Get Device Error (^G)

This screen provides information about the drives connected to the selected DAC960 controller.

Move the cursor to a drive box and click on the left button to view information on soft error, hard error, parity error, miscellaneous error, and drive information. Move the cursor to a drive box and click on the right button to display only the device information. Click OK to exit the screen.

Change/Add Device (^C)

This screen is used to quiet a SCSI channel on the DAC960 controller. Use this function when replacing or rebuilding a dead drive on the selected SCSI channel.

Move the cursor to a drive box and click on the left button to stop the channel to which the drive is connected. Move the cursor to the drive box and click on the right button to display only the device information for that drive. Click OK to exit the screen.

After the SCSI channel is stopped, disconnect the power and SCSI cables from the dead drive and remove the drive. Install a new (known-good) drive that is set to the same SCSI ID as the drive that was removed. Connect the SCSI and the power cables to the new drive.

> ☞ **Note**
>
> SCSI channel activities automatically restart 30 seconds after the channel is stopped (without updating the screen). Drive removal and replacement needs to be done in less than 30 seconds, or done in two stages – that is, stop the channel before removing the dead drive, then stop the channel again before installing the new drive.

Make Standby (^M)

This option is used to make a drive (i.e., one that has replaced a dead drive) a standby drive.

Move the cursor to a dead drive box and click on the left button to make the dead drive a standby drive. The controller will automatically try to start the drive. If it is successful in starting the drive, it will make the drive a standby drive. Click OK to exit the screen.

> ☞ **Note**
>
> Only drives that are not part of any Drive Group (pack) can be made standby drives.

Rebuild Device (^R)

This option is used to rebuild a drive that was killed (shown as DD in the drive matrix area) by the DAC960. Before this option is invoked, the killed drive has to be replaced with a properly working drive set to the same SCSI ID number as the killed drive.

Move the cursor to a dead drive box and click on the left button to start the rebuild. After the rebuild starts, the progress of the rebuild for every dependent system drive is reported in another window that is opened by the rebuild process. Click OK to exit the screen.

Reset Alarm (^A)

This option is used to stop the audio alarm that indicates a drive failure on the DAC960 system. The alarm sounds every 150 seconds until it is reset. Click this option to reset the audio alarm.

Global Array Manager 2 Server Agent Software for OS/2 Warp 3.x and 4.x

Installing Global Array Manager 2 Server Agent Software

Use the following procedure to install Global Array Manager 2 Server Agent software to run under OS/2 Warp 3.x or 4.x:

1. Return to the OS/2 boot screen, or shut down OS/2 and restart.
2. From the boot screen, double-click the System icon.
3. Double-click the System Setup icon.
4. (For OS/2 Warp 4.x only): Double-click the Install/Remove icon.
5. Double-click the Device Driver Install icon.

   In the dialog box to follow, Source Directory should be set to your default floppy drive (A:\)
6. Insert the GAM2 Server Agent distribution diskette for OS/2 in your floppy drive.
7. In the dialog box, Destination Directory will be set by default to the partition which contains the OS/2 operating system (usually C:\). Accept the default and click the Install button.
8. In the driver selection box that follows, select the “Mylex GAM Driver and GAM Service Program for DAC960 Controller” option.

   The GAM Server Agent files will be installed automatically from the floppy diskette to the \OS2 directory on your hard drive.
9. Click the Exit button to quit the driver selection box.

10. Before restarting the server, you should modify the GAMEVENT and GAMEVLOG command lines manually. Do this by opening the GAMSRVC.CNF file and changing the GAMEVENT line to include (after each `-h` parameter) the IP addresses of the client systems you will use with this server. Modify the pathname and filename in the GAMEVLOG command line if you wish to.

    Remember to remove the comment marker (#) from each line.

    ☞ **Note**

    If you wish to enable RAID Fault Management (RAIDBUILD) and optionally change its parameters, you need to modify the `# raidbld` command line installed in GAMSRVC.CNF. See Appendix C: "RAID Fault Management" for instructions before proceeding.

11. Save the modified GAMSRVC.CNF file and exit.
12. Restart the system.

Verifying Correct Server Agent Software Installation

In Case of Problems...

Problem:	**An error is encountered when trying to connect to a server.**
Check:	Is the IP address of the Server correct?
Check:	Is the Ethernet connection good?
Check:	Is TCP/IP set up correctly? Try Ping to find the server.
Problem:	**Global Array Manager Server Agent does not load.**
Check:	Have you installed LAN Server for OS/2?
Check:	Did all of the Server Agent files load to the destination directories? Do you have sufficient disk space for the installation? A list of files needed for operation is given in Chapter 1. If necessary, reinstall the software.

Running Global Array Manager 2 Server Agent

The Global Array Manager 2 Server Agent runs on the server and performs the following functions:

- Monitors the controller(s) and disks in the server.
- Manages the controller(s) and associated disk subsystems in the server.
- Sends information to Global Array Manager Clients (if used).

Running Global Array Manager 2 Manually

The Global Array Manager 2 Server Agent can be run manually from an OS/2 prompt or session. Type the following command:

```
C:\OS2\gamsrvc start ↵
```

Running Global Array Manager 2 Automatically

The Global Array Manager 2 Server Agent can be made to start up automatically on an OS/2 server whenever the OS/2 server is restarted. To set up this capability, open STARTUP.CMD with a text editor, such as:

```
C:\OS2\e startup.cmd ↵
```

Add the following line to the end of the STARTUP.CMD file:

```
gamsrvc start
```

Chapter 5
SCO UNIX

Overview

This chapter provides information about the following:

- Installation procedures and the functionality of the DAC960 drivers and utilities for SCO OpenServer Release 5.0 and SCO UNIX ODT version 3.2.4.2. The software is provided on the appropriate DAC960 Software Kit distribution diskettes.
- Installation, verification, and startup of the Global Array Manager 2 Server Agent software for SCO OpenServer Release 5.0 and SCO UNIX ODT version 3.2.4.2. The software is provided on the appropriate GAM2 Server Agent distribution diskette.

When using the SCO OpenDeskTop (ODT), there are some issues to consider, such as the following:

- ODT 3.0 uses the basic SCO UNIX version 3.2.4.2 kernel and therefore, uses the same driver.
- The ODT 3.0 and SCO UNIX 3.2.4.2 installations are similar. If you are installing ODT version 3.0, follow the instructions for SCO UNIX 3.2.4.2. The same steps can be followed, although the responses may be slightly different.

DAC960 MDAC Driver and Utilities for SCO UNIX

This chapter assumes that the user has properly completed the hardware installation, PCI configuration, and the Drive Array Configuration. If you have not done so, please refer to the corresponding chapters and complete the configuration before proceeding with the driver installation.

Installing SCO UNIX with the DAC960 mdac driver follows the standard SCO UNIX installation with the addition that during the installation, you need to insert the appropriate DAC960 SCO UNIX driver diskette when prompted.

⚠ ***Caution***

There are separate DAC960 Driver Diskettes for SCO version 3.2.4.2 and SCO OpenServer 5.0. Be sure to use the correct diskette for the specific operating system. Using the wrong driver will cause the operating system to behave erratically.

DAC960 Drivers for SCO UNIX

Installing DAC960 as the Primary Controller

This section provides guidelines for the system administrator to follow during the installation of SCO UNIX to prepare it for using the DAC960 as the primary controller. The following guidelines will focus mainly on the important steps for installing the DAC960 SCO UNIX drivers. For detailed information about the operating system installation, consult the SCO UNIX documentation.

If a tape drive connected to the DAC960 is being used for installation, make sure that the tape drive is set to SCSI ID 2, that the configuration utility has been run with the tape drive installed, and that the configuration has been saved. The same is also true when using a CD-ROM, except the CD-ROM needs to be set to SCSI ID 5.

Prepare the system to receive the DAC960 SCO UNIX driver by performing one of the following procedures, whichever is appropriate.

SCO OpenServer 5.0

1. Insert the *OpenServer Boot Disk* into the primary floppy and boot the system. The following prompt will be displayed:

   ```
   Boot
   :
   ```

2. Type *ahslink* at the colon(:) and press Enter.

   `: ahslink ↵`

   ☞ **Note**

   When running SCO 5.0 on a system with an on-board SCSI controller, to install the DAC960 at the boot prompt, enter:

   `Boot: defbootstr ahslink=mdac Sdsk=mdac(0,0,0,1)`

3. Go to Step 3 in the procedure described next, *SCO UNIX v3.2.4.2 (ODT 3.0)*

SCO UNIX v3.2.4.2 (ODT 3.0)

1. Insert the SCO UNIX v3.2.4 2 volume N1 (boot diskette) into the primary floppy drive and boot the system. The following prompt will be displayed:

   ```
   Boot
   :
   ```

2. Type *link* at the colon(:) and press Enter.

   `: link ↵`

3. The system will display the following message

   ```
   What packages do you need linked in the system,
   or q to quit?:
   ```

   Type *mdac* and press Enter.

   `: mdac ↵`

4. The system then displays standard UNIX messages, such as loading Kernel fd(64) UNIX.text, UNIX.data, UNIX.bss, etc.

   The system will then provide the following message prompt:

```
Please insert the fd(60)mdac volume and press
<Return>
or 'q' to quit
```

5. Select the appropriate mountable DAC960 SCO Driver diskette for the operating system being used into the primary floppy drive and press Enter:

- Select the *DAC960 SCO UNIX ODT Driver* diskette if you are installing SCO UNIX v3.2.4.2 (ODT 3.0), or
- Select the *DAC960 SCO Open Server Driver* diskette if you are installing OpenServer 5.0.

☞ **Note**

If installing SCO OpenServer 5.0, you will be asked if you would like to try a replacement of the existing mdac package. Type '**r**' for try replacement.

6. Follow the standard SCO UNIX installation procedures (such as insert volume N2, create partitions, make file systems, and insert volume N1 again, etc.), until you see the following message:

For SCO ODT 3.2.4.2:

```
The BTLD packages will now be extracted:
Please insert the floppy for BTLD package: mdac
and press <Enter>
```

For SCO OpenServer 5.0:

```
Please insert (mdac) package BTLD disk into the
floppy drive so that it can be extracted onto the
hard disk for incorporation into the link-kit.
```

This is where the driver package diskette is inserted a second time.

7. Insert the appropriate DAC960 SCO UNIX Driver diskette and press Enter. The system will respond with the following message:

```
Extracting BTLD distribution for mdac...
```

8. From this point forward, follow the standard procedure for SCO UNIX installation. Make sure the entire Extended Utilities of SCO UNIX are installed. Near the end of the installation, the following description is displayed:

```
The following packages are on this disk:

NAME     DESCRIPTION

mdac   Mylex DAC960-P/DAC960-E/DAC960-M RAID
       controller driver

Please enter the names of the packages you wish to
install, or 'q' to quit
[default: mdac]:
```

9. Press the Enter key to continue. The system displays several messages. After the system has completed its installation, you will see the following message:

```
NOTICE: Flushing DAC960[x] 0 cache... done

** Safe to Power Off **

- or -

** Press any Key to Reboot **
```

   where *[x]* is the base model of the DAC960 controller (P, E, or M).

10. This concludes the installation of SCO UNIX and the DAC960 driver. Reboot the operating system from the System Drive that was just installed.

Installing Additional DAC960 Controllers

The driver for both the primary DAC960 controller and any secondary DAC960 controllers are installed simultaneously as a part of the previous SCO UNIX installation. No further procedures are required in order to use additional DAC960 controllers as secondary controllers in the installation.

Adding System Drives

The recommended method for creating UNIX file systems on DAC960 System Drives is through the SCO UNIX *mkdev hd* command. Follow the instructions in the SCO UNIX documentation for adding a hard disk.

DAC960 controllers are mapped differently under SCO UNIX than under the DOS-based DACCF utility. It is necessary to use the target ID and the LUN number to identify each system drive being created for SCO UNIX.

The following table shows the relationships of SCO UNIX target IDs and LUNs to System Drive numbers as defined under *DACCF*. For example, for System Drive number 20, enter 4 for the target ID and 3 as the LUN (shaded areas in Table 5-1).

Table 5-1. System Drive Mapping Addresses

SCO Target ID	DACCF System Drive Number			
0	0	8	16	24
1	1	9	17	25
2	2	10	18	26
3	3	11	19	27
4	4	12	20	28
5	5	13	21	29
6	6	14	22	30
7	7	15	23	31
	SCO LUN 1	SCO LUN 2	SCO **LUN 3**	SCO LUN 4

☞ **Note**

The bus number is always zero.

Installing Peripheral Device Drivers

DAC960 Tape Drivers

The driver that provides support for tape drives also gets installed as a part of the standard DAC960 SCO UNIX driver installation. It is recommended that a tape drive installed on any DAC960 channel be set to SCSI ID 2. Use the View/Update Configuration option of the DACCF configuration utility to configure the tape drive.

To install UNIX from a tape drive, follow the standard SCO UNIX/ODT installation for tape as described in the SCO UNIX documentation.

After SCO UNIX 3.2.4 is installed, the tape drive is configured as a standard tape device, and can be accessed by using the device */dev/rStp0*. Also, any tape control operation can be done using the *tape* command. Refer to the SCO UNIX manuals for more details on using a tape drive.

If the installation of UNIX was not done from tape, use the *mkdev tape* command to configure the tape drive. When prompted for the LUN of the device, make sure to specify a LUN of 0.

The tape drive may be placed on any channel. However, if another device with the same SCSI ID is present on a lower channel, the tape may not function properly.

DAC960 CD-ROM Drivers

The driver that provides support for CD-ROM devices also gets installed as a part of the standard DAC960 SCO UNIX driver installation. It is recommended that a CD-ROM drive installed on any DAC960 channel be set to SCSI ID 5.

Use the View/Update Configuration option of the DACCF configuration utility to configure the CD-ROM. Save the new configuration before trying to use the CD-ROM under SCO UNIX.

To install UNIX from a CD-ROM drive, follow the standard SCO UNIX/ ODT installation instructions for CD-ROM. A screen will prompt you for the type of installation being performed. You can choose either TAPE (default), or CD-ROM, etc. From here you can select the SCSI option as described in the SCO UNIX documentation.

If UNIX was not installed from CD-ROM, then a CD-ROM drive may be configured using the *mkdev cdrom* command. The LUN of this device should always be set to 0.

A CD-ROM drive may be placed on any channel. However, if another non-disk device with the same ID is present on a lower channel, only the non-disk device on the lower channel will be accessible.

Installing DAC960 as a Secondary Controller

This section provides guidelines for the system administrator to follow during the installation of SCO UNIX to prepare it for using the DAC960 as a secondary controller. The following guidelines will focus mainly on the important steps for installing the Mylex DAC960 SCO UNIX drivers. For detailed information about the operating system installation, consult the SCO UNIX documentation.

If a tape drive connected to the DAC960 is being used for installation, make sure that the tape drive is set to SCSI ID 2, that the configuration utility has been run with the tape drive installed, and that the configuration has been saved. The same is also true when using a CD-ROM, except the CD-ROM needs to be set to SCSI ID 5.

Secondary Controller Installation Procedure

The procedure for installing the DAC960 as a secondary controller under SCO UNIX using Mylex drivers varies slightly depending on the type of device that is installed as the primary controller.

- If the primary controller is IDE or EIDE, start at Step 1
- If the primary controller is SCSI, start at Step 6

1. Make sure the following SCO SCSI modules are enabled before attempting to install the Mylex DAC960 SCO *mdac* drivers into an existing SCO system.

   Sdsk : SCSI disk
   Stp : SCSI tape
   Srom : SCSI CD-ROM

2. Change to the *sdevice.d* subdirectory

   ```
   # cd  /etc/conf/sdevice.d
   ```

3. Enable the SCO UNIX SCSI modules by editing the files: *Sdsk*, *Stp*, and *Srom*. Change the second field on all three files from N to Y.

   Example of *Sdsk* file before edit (where *x* could be any digit):

   `Sdsk N x x x x x x x x`

   After edit:

   `Sdsk Y x x x x x x x x`

4. Relink the kernel:

   #cd /etc/conf/cf.d

   # ./link_unix

5. Reboot the system.
6. Make sure you are in single-user mode (init 1), then install the Mylex DAC960 *mdac* drivers by running the *installpkg* utility.

   # init 1

   # installpkg

7. When the message prompt asks for a package name, type *mdac*.

   `Please enter the names of the packages you wish to install, or q to quit:` **mdac**

8. Rebuild SCO UNIX kernel.

   # cd /etc/conf/cf.d

   # ./link_unix

9. Reboot the system to invoke the new kernel.
10. Run *mkdev hd* to configure the hard disks (system drives) on the DAC960.
    - Enter **mdac** for package name
    - Select the target IDs and LUN numbers until all controllers and system drives are configured (refer to Table 5-1).
    - Select **Y** to relink kernel
11. Reboot the system to invoke the new kernel. Run *mkdev hd* again to prepare storage space for the UNIX filesystem. Be sure to enter the same numbers entered in Step 10 above for each system drive. A partition table will be displayed and you will be prompted to enter the filesystem size in cylinders. For DAC960 drive mapping, 1 cyl = 2MB.

Updating a Previously Installed Driver

To install the DAC960 into an existing system to replace an older version of the driver, perform the following procedure:

1. Make sure you are in single-user mode (init 1), then install the Mylex DAC960 *mdac* drivers by running the *installpkg* utility.

   ```
   # init 1
   ```

   ```
   # installpkg
   ```

2. When the message prompt asks for a package name, type *mdac*.

   ```
   Please enter the names of the packages you
   wish to install, or q to quit: mdac
   ```

3. A message prompt will advise you that a *mdac* is already installed and will ask you to confirm that you want to replace it. Type *y* for yes.

   ```
   There is already a mdac installed.
   Do you want to replace it with the version
   in madac? (y/n/q): y
   ```

4. Rebuild SCO UNIX kernel.

   ```
   # cd /etc/conf/cf.d
   ```

   ```
   # ./link_unix
   ```

5. Reboot the system to invoke the new kernel.

Tuning SCO for Maximum Performance

Best system performance can be achieved when using the DAC960 SCO UNIX *mdac* driver by fine-tuning certain UNIX parameters.

To perform this system tune-up, use the *idtune* command, which resides in the */etc/conf/bin* directory. Refer to the SCO UNIX on-line documentation for information on the *idtune* command.

Tune the following parameters:

SDSKOUT – Set this value to a number equal to 64 divided by the number of system drives being used. If required, round down the result to the next lower value so that its multiple does not exceed 64.

NMPBUF – Set this parameter for DAC960 driver version 4.x or above.

NMPHEADBUF – Set this parameter for DAC960 driver version 3.x

Use the *sar -h* command to find the Scatter/Gather Buffer utilization and the *Out of scatter/Gather buffers* condition to set the buffer parameters.

Since the system configuration and the test suites differ significantly, the best way to tune either of these parameters is to evaluate the system activity report data. Refer to the SCO UNIX documentation for more information on methods and procedures that relate to acquiring and interpreting *sar* data.

DAC960 Disk Array Monitor Utility for SCO UNIX

DAC960MON is a utility used to monitor the activities of DAC960 controllers under SCO UNIX.

This utility will normally be run from the UNIX system console. It may not work properly if run from any of the SCO ODT windows.

> ⚠ ***Caution***
>
> This utility can change the state of the disk array system and is for use only by experienced computer technicians and system administrators. Improper use of this utility may result in system malfunction or data loss.

Installing DAC960MON

The installation of this utility is automatic when you install the BTLD drivers during the initial SCO UNIX installation.

DAC960MON

Syntax:

```
# dac960mon
```

It is recommended that this utility be run on the console in the background, so that the system administrator can monitor the DAC960 system.

When the system is brought up in multi-user mode, the monitoring utility is automatically loaded. If you wish to load it manually at other times, use the above syntax.

This utility reports the status of the controller on the screen. It also writes the controller's activities, including the time they happened, into the file */usr/adm/dac960mon.log*. The recorded activities include status change, rebuild, standby replacement, etc.

DAC960TK (Toolkit)

Syntax:

```
# dac960tk
```

The Toolkit contains several different utilities for controlling the DAC960 or for acquiring information. You can also access the toolkit through the DAC960 Shell utility described later.

After you read the message and hit a key, you will see the toolkit main menu.

Commands Supported in Toolkit

Inquire. Reports the age of the flash EEPROM, the firmware version number, the state of the System Drives, and other similar information.

Get Device State. Displays the current state of a selected device.

Start Device. Starts a selected device.

Make Standby. Changes the state of a Dead drive to Standby.

Make Online. Changes the state of a device from Dead to Online.

Kill Device. Changes the state of a selected drive to Dead.

Rebuild Status. Reports the progress of a rebuild operation.

Get Bad-blk-table. Reports the data in either the Write-back Bad Block Table or the Rebuild Bad Block Table.

Get SCSI Device Info. Reports information on a selected device: e.g., device type, vendor and product ID, product revision, or error information.

Get Remap List. Displays the Standby Rebuild Remap Table.

Flush. Writes the data from the DAC960 cache to the disk.

DAC960 Shell Utility for SCO UNIX

DAC960SH is a menu driven, user-friendly shell program that contains *dac960tk* (a toolkit for identifying, setting, and changing the status of the disk array system), and *rbldsh* (for rebuilding failed drives).

This utility will normally be run from the UNIX system console. It may not work properly if run from any of the SCO ODT windows.

> ⚠ ***Caution***
>
> This utility can change the state of the disk array system and is for use only by experienced computer technicians and system administrators. Improper use of this utility may result in system malfunction or data loss.

Installing DAC960SH

The installation of this utility is automatic when you install the BTLD drivers during the initial SCO UNIX installation.

DAC960SH

Syntax:

```
# dac960sh
```

The DAC960 Shell Utility is a menu-driven, user-friendly environment, similar to the UNIX *sysadmsh* or *scoadmin* shell. It contains commands such as Select DAC, Rebuild, etc., as well as access to the DAC960 Toolkit utilities. The following section, *Using DAC Utilities in Shell Mode*, provides more information on the DAC960 shell commands.

Using DAC960 Utilities in Shell Mode

To invoke the shell at the UNIX prompt, type:

```
# dac960sh
```

The system will display the menu screen. A window with a title bar and a menu bar above it appears on the screen. The title bar indicates the name of the utility. The menu bar includes all of the menu items currently being supported by the shell. The left-most item, **Select DAC**, is highlighted when the shell first appears. The currently selected DAC960 is displayed at the upper right corner of the screen.

Use the arrow keys to highlight any menu item, press the F1 function key for help, or press the Enter key to select a highlighted item.

The shell menu items and their subsequent screens are described below.

Select DAC. Select this item, and a popup window appears on the screen showing all of the DAC960 controllers currently attached to the host system. The controllers are shown in a horizontal bar in the middle of the window.

Use the arrow keys to highlight any DAC960 controller and press Enter to select it. The rectangle at the upper right corner of the screen will reflect the DAC960 controller that is currently selected.

Rebuild. Rebuild is a process whereby data on a failed SCSI drive is regenerated for all dependent critical system drives and written onto a replacement drive. A rebuild operation is only possible if a failed drive was part of a Drive Group (physical pack) that was configured to provide data redundancy (RAID 1, 3, 5, or 0+1).

There are two types of rebuilds for the DAC960, a *standby rebuild* and a *manual rebuild*. A standby rebuild happens automatically when a SCSI drive fails and an identical SCSI drive is available as a standby (hot-spare) drive. A manual rebuild is usually invoked manually (thus the name) by a system administrator when a SCSI disk drive has failed and no standby drive is available. The system administrator performs a manual rebuild on a new SCSI drive that is replacing the failed one. This discussion will focus only on the manual rebuild.

Select Rebuild from the menu bar, and the center of the screen shows the status of all drives on all channels. The symbols ONL, DED, WOL, RDY, SBY, and ---- are used to indicate on-line drives, dead drives, write only drives, ready drives, standby drives, and drives not present. The top row corresponds to channel 0, and the left most column is for SCSI ID 0.

To perform a manual rebuild, identify the drive channel and SCSI ID of the dead drive. Use the arrow keys to highlight the drive to be rebuilt, then press the Enter key to start the rebuild process. The rebuild is complete when all the dependent System Drives are rebuilt.

At the end of a successful rebuild operation, all System Drives dependent upon this SCSI drive are brought back to consistency, and the state of the SCSI drive is set to ON-LINE.

If bad sectors are found on any of the System Drives, those sectors cannot be rebuilt. The rebuild utility will, nevertheless, bring the new disk ON-LINE anyway.

DAC960 Toolkit. Select Toolkit, and you will see the same message and menu as you did using *dac960tk* in the command mode. Refer to the section *Toolkit* described earlier in this chapter for details of its commands.

Quit. Select this item to exit from the DAC960 shell and return to the normal SCO UNIX prompt.

Global Array Manager 2 Server Agent Software for SCO UNIX

Installing Global Array Manager 2 Server Agent Software

Use *pkgadd* to install the Global Array Manager 2 Server Agent software for SCO UNIX. Complete the following procedure.

> ☞ **Note**
>
> These instructions assume the installation diskette is in the first diskette drive. If a different source is used, substitute the location for "/dev/rfd0" below.

1. Log in as root.
2. Insert the GAM2 Server Agent installation diskette for SCO UNIX in the file server's diskette drive.
3. Type the following (match case exactly as shown):

   `pkgadd -d /dev/rfd0 GAM` ↵

4. A prompt to insert the diskette and confirm installation is shown:

   ```
   Insert fd0135ds18 into 3.5 inch 1.44 Mbyte (High Density)
   Type [go] when ready.
     or [q] to quit:
   ```

   To begin installation, type:

   `go` ↵

   The files are copied. The operating system and the Kernel are rebuilt.

   > ☞ **Note**
   >
   > This prompt will only appear if you are using SCO UNIX version 3.x, not 5.x.

5. A prompt to boot this Kernel by default is shown:

   ```
   Do you want this kernel to boot by default? (y/n)
   ```

   Select "y" to boot from this Kernel.

6. You are prompted to rebuild the Kernel environment as shown:

   ```
   Do you want the kernel environment rebuilt? (y/n)
   ```

   Select “y”.

7. Installation is complete. You must modify the GAMEVENT and GAMEVLOG lines manually. Do this by editing the S99GAM file found in the directory /etc/rc2.d, changing the GAMEVENT line to include (after each `-h` parameter) the IP addresses of the client systems you will use with this server. Modify the pathname and filename in the GAMEVLOG command line if you wish to.

   Remember to remove the comment marker (#) from each line.

   ☛ **Note**

   If you wish to enable RAID Fault Management (RAIDBUILD) and optionally change its parameters, you need to modify the RAIDBLD command line installed in S99GAM. See Appendix C: “RAID Fault Management” for instructions before proceeding.

8. Save the modified S99GAM and exit.

9. Reboot the system using the following command from the root directory (match case exactly as shown):

   `shutdown -y -i6 -g0 ↵`

Uninstalling the Server Agent Software

To remove the Global Array Manager 2 Server Agent software, complete the following procedure.

1. Type the following command (match case exactly as shown):

   `pkgrm GAM ↵`

2. You are prompted for confirmation as shown:

   ```
   Do you want to remove this package? [y,n,?,q]
   ```

   Select “y”. The files are removed. The Kernel is rebuilt.

3. You are prompted to boot this Kernel by default:

   ```
   Do you want this kernel to boot by default? (y/n)
   ```

   To boot this kernel by default, select “y”.

4. You are prompted to rebuild the Kernel environment:

   ```
   Do you want the kernel environment rebuilt? (y/n)
   ```

   Select “y” to rebuild the Kernel environment.

5. Removal is complete. Reboot the system, using the following command from the root directory (match case exactly as shown):

   `shutdown -y -i6 -g0` ↵

Verifying Correct Server Agent Software Installation

In Case of Problems...

Problem:	**An error is encountered when trying to connect to a server.**
Check:	Is the IP address of the Server correct?
Check:	Is the installation complete? Was the software successfully loaded on the server?
Check:	Is the Ethernet connection good?
Check:	Is TCP/IP set up correctly? Try Ping to find the server.
Problem:	**Global Array Manager Server Agent does not load.**
Check:	Do you have login rights to the root?
Check:	Did all of the Server Agent files load to the destination directory? Do you have sufficient disk space for the installation? If necessary, reinstall the software.

Running Global Array Manager Server Agent

The Global Array Manager Server Agent runs on the server and performs the following functions:

- Monitors the controller(s) and disks in the server.
- Manages the controller(s) and associated disk subsystems in the server.
- Sends information to Global Array Manager Clients (if used).

The installation of Global Array Manager 2 Server Agent for SCO UNIX causes the appropriate drivers to load automatically at system startup. No additional actions are required to start GAM2 Server Agent beyond a system boot.

Chapter 6
UnixWare

Overview

This chapter provides information about the following:

- Installation procedures and the functionality of the DAC960 drivers and utilities for UnixWare 2.01 and above. The software is provided on the appropriate DAC960 Software Kit distribution diskette.
- Installation, verification, and startup of the Global Array Manager 2 Server Agent software for UnixWare 2.01 and above. The software is provided on the appropriate GAM2 Server Agent distribution diskette.

The UnixWare driver for the DAC960 controller supports disk drives, tape drives and CD-ROM drives under UnixWare 2.01 and above. The driver and the utilities support up to four DAC960 controllers. Also, the driver supports secondary system drives larger than 8GB.

Requirements

- PCI bus DAC960 controllers (except for DAC960PG) use firmware version 1.99 or above and BIOS version 1.01 or above. A PCI bus DAC960PG controller uses firmware version 4.0 or above and BIOS version of x.xx or above.
- In order for UnixWare 2.1 to detect a DAC960PG controller, UnixWare 2.1 must have a “multifunction PCI Driver” loaded.
- EISA bus DAC960 controllers use firmware version 1.99 or above and BIOS version of 1.16 or above.

DAC960 DAK Driver and Utilities for UnixWare

The following UnixWare utilities are available.

DACMOND Utility used to monitor activities of the DAC960 controllers in UnixWare systems.

DAC960SH Menu driven, user-friendly shell program that contains *dac960tk* (a toolkit for identifying, setting, and changing the status of the disk array system), and *rbldsh* (for rebuilding failed drives).

These utilities will run normally from the UnixWare system console, however some may not work properly if run from any of the virtual terminals. These utilities may work properly only if run by a super user.

The DAC960 UnixWare utilities should only be used one at a time.

⚠ ***Caution***

DAC960 UnixWare utilities can change the state of the disk array system and are for use only by experienced computer technicians and system administrators. Improper use of these utilities may result in system malfunction or data loss.

DAC960 Driver for UnixWare

Installing the UnixWare Driver

To install the UnixWare driver for the DAC960:

1. Follow the instructions in the appropriate DAC960 manuals to set up the hardware, install the controller, connect the disk, tape, and/or CD-ROM drives, run the EISA configuration (if required), and run the DAC Configuration Utility (DACCF.EXE) to create Drive Groups (packs) and System Drives.

   ☞ **Note**

   CD-ROM or tape drives may be connected to any channel on the first DAC960. Do not set the SCSI ID of either CD-ROM drives or tape drives to ID 0.

2. Make sure the DAC960 interrupt request is set to either IRQ 11 or IRQ 15 for UnixWare installation. After the installation, the IRQ may be changed, if required. Refer to the section, *Changing the DAC960 Configuration*, later in this chapter, for more information.
3. Initialize all the System drives using the DAC Configuration Utility. Make sure the first System drive is less than 2GB.
4. Boot the system from the UnixWare Installation Diskette.
5. Follow the instructions provided in the *UnixWare 2.x Installation Handbook*. The DAC960 driver is included on the UnixWare DAC960 Software Kit diskette. During the installation, you will be prompted to either *Install Host Bus Adapter Drivers* or *Continue Installation*. Select *Install Host Bus Adapter Drivers*, insert the `dak` driver diskette as instructed, and continue with the instructions provided in the *Installation Handbook*. The DAC960 controller should be detected automatically during the install process.
6. After the installation of boot files, the system is automatically shut down.

⚠ ***Caution***

DO NOT power-off or reset the system immediately after the shutdown if the DAC960 controller has been configured for Write Back cache mode. Wait at least 20 seconds for the controller to write all of its cache buffers to disk before powering-off the system.

☞ **Note**

On EISA bus systems, make sure the configured IRQ for all DAC960s match the IRQ specified at the end of UnixWare installation. Otherwise, the system will not boot.

Use */dev/rct0* and */dev/cdrom/c0b0txl0* (*x* is the CD-ROM SCSI ID number) to access tape and CD-ROM devices after installation.

Adding a Secondary DAC960 Controller

Use the command */sbin/pdiadd* to add another DAC960 controller to the UnixWare system. Boot the system with the newly generated kernel. If the IRQ defined in an EISA configuration is different from the one defined, the system reboots and reconfigures automatically.

Adding System Drives

Use the UnixWare *diskadd* command to add System Drives to the primary DAC960 controller and to any secondary DAC960 controllers. For more information, refer to the UnixWare documentation on the *diskadd* utility.

☞ **Note**

No UnixWare *Slice* (UNIX file system) can be greater than 2GB.

To Primary Controller

For the second and third System Drive of the primary DAC960 controller, specify the diskadd command as shown below (assuming the DAC960 is the first or only disk controller):

`# diskadd c0b0t0d1 ##` (for the second System Drive)

`# diskadd c0b0t0d2 ##` (for the third System Drive)

To Secondary Controller(s)

For the first and second System Drives of a secondary DAC960 controller, specify the diskadd command as shown below (assuming there is no other disk controller):

`# diskadd c1b0t0d0 ##` (for first System Drive of the second DAC960)

`# diskadd c1b0t0d1 ##` (for second System Drive of the second DAC960)

Changing the DAC960 Configuration

If there is a need to change the IRQ of the DAC960 at any time, refer to the UnixWare manual under *DCU*. If a DAC960 is the primary controller, and a second, third or fourth DAC960 controller is to be added, set the interrupt for the secondary controller, then power-cycle the system (power off, then power on).

> ☛ **Note**
>
> For EISA installations, remember to use the EISA configuration utility to disable the BIOS for the additional EISA DAC960 controller(s).

When the system restarts, UnixWare identifies the controller and displays the message “New hardware instance mapped to static driver...” The DAC960 controller should be detected automatically during the start up sequence. Use DCU to verify the interrupts after logging-on the system.

DAC960 Disk Array Monitor Utility for UnixWare

DACMOND is a utility used to monitor the activities of DAC960 controllers under UnixWare.

Installing DACMOND

The installation of this utility is automatic when you install the *dak* drivers during UnixWare installation.

DACMOND

Syntax:

```
# dacmond
```

It is recommended that this utility be run on the console in the background, so that the system administrator can monitor the DAC960 system.

When the system is brought up in multi-user mode, the monitoring utility is automatically loaded. If you wish to load it manually at other times, use the above syntax.

This utility reports the status of the controller on the screen. It also writes the controller's activities, including the time they happened, into the file */usr/adm/dac960mon.log*. The recorded activities include status change, rebuild, standby replacement, etc.

DAC960TK (Toolkit)

Syntax:

```
# dac960tk
```

The Toolkit contains several different utilities for controlling the DAC960 or for acquiring information. You can also access the toolkit through the DAC960 Shell utility described later.

Commands Supported in Toolkit

Inquire. Reports the age of the flash EEPROM, the firmware version number, the state of the System Drives, and other similar information.

Get Device State. Displays the current state of a selected device.

Start Device. Starts a selected device.

Make Standby. Changes the state of a Dead drive to Standby.

Make Online. Changes the state of a device from Dead to Online.

Kill Device. Changes the state of a selected drive to Dead.

Rebuild Status. Reports the progress of a rebuild operation.

Get Bad-blk-table. Reports the data in either the Write-back Bad Block Table or the Rebuild Bad Block Table.

Get SCSI Device Info. Reports information on a selected device: e.g., device type, vendor and product ID, product revision, or error information.

Get Remap List. Displays the Standby Rebuild Remap Table.

Flush. Writes the data from the DAC960 cache to the disk.

System drive info. Reports the mapping of each system drive to the physical drive.

DAC960 Shell Utility for UnixWare

DAC960SH is a menu driven, user-friendly shell program that contains *dac960tk* (a toolkit for identifying, setting, and changing the status of the disk array system), and *rbldsh* (for rebuilding failed drives).

> ⚠ ***Caution***
>
> This utility can change the state of the disk array system and is for use only by experienced computer technicians and system administrators. Improper use of this utility may result in system malfunction or data loss.

Installing DAC960SH

The installation of this utility is automatic when you install the *dak* drivers during UnixWare installation.

DAC960SH

Syntax:

```
# dac960sh
```

The DAC960 Shell Utility is a menu-driven, user-friendly environment. It contains commands such as Select DAC, Rebuild, etc., as well as access to the DAC960 Toolkit utilities. The following section, *Using DAC960 Utilities in Shell Mode*, provides more information on the DAC960 shell commands.

Using DAC960 Utilities in Shell Mode

To invoke the shell at the UNIX prompt, type:

```
# dac960sh
```

The system will display the menu screen. A window with a title bar and a menu bar above it appears on the screen. The title bar indicates the name of the utility. The menu bar includes all of the menu items currently being supported by the shell. The left-most item, **Select DAC**, is highlighted when the shell first appears. The currently selected DAC960 is displayed at the upper right corner of the screen.

Use the arrow keys to highlight any menu item, press the F1 function key for help, or press the Enter key to select a highlighted item.

The shell menu items and their subsequent screens are described below.

Select DAC. Select this item, and a popup window appears on the screen showing all of the DAC960 controllers currently attached to the host system. The controllers are shown in a horizontal bar in the middle of the window.

Use the arrow keys to highlight any DAC960 adapter and press Enter to select it. The rectangle at the upper right corner of the screen will reflect the DAC960 controller that is currently selected.

The system will display the menu screen. A window with a title bar and a menu bar above it appears on the screen. The title bar indicates the name of the utility. The menu bar includes all of the menu items currently being supported by the shell. The left most item, **Select DAC**, is highlighted when the shell first appears. The currently selected DAC960 is displayed at the upper right corner of the screen.

Use the arrow keys to highlight any menu item or press the Enter key to select a highlighted item.

Rebuild. Rebuild is a process whereby data on a failed SCSI drive is regenerated for all dependent *critical* system drives and written onto a replacement drive. A rebuild operation is only possible if a failed drive was part of a Drive Group (physical pack) that was configured to provide data redundancy (RAID 1, 3, 5, or 6).

There are two types of rebuilds for the DAC960, a *standby rebuild* and a *manual rebuild*. A standby rebuild happens automatically when a SCSI drive fails and an identical SCSI drive is available as a standby (hot-spare) drive. A manual rebuild is usually invoked manually (thus the name) by a system administrator when a SCSI disk drive has failed and no standby drive is available. The system administrator performs a manual rebuild on a new SCSI drive that is replacing the failed one. This discussion will focus only on the manual rebuild.

Select Rebuild from the menu bar, and the center of the screen shows the status of all drives on all channels. The symbols ONL, DED, WOL, RDY, SBY, and ---- are used to indicate on-line drives, dead drives, write only drives, ready drives, standby drives, and drives not present. The top row corresponds to channel 0, and the left most column is for SCSI ID 0.

To perform a manual rebuild, identify the drive channel and SCSI ID of the dead drive. Use the arrow keys to highlight the drive to be rebuilt, then press the Enter key to start the rebuild process. The rebuild is complete when all the dependent System Drives are rebuilt.

At the end of a successful rebuild operation, all System Drives dependent upon this SCSI drive are brought back to consistency, and the state of the SCSI drive is set to ON-LINE. If bad sectors are found on any of the System Drives, those sectors cannot be rebuilt. The rebuild utility will, nevertheless, bring the new disk ON-LINE anyway.

DAC960 Toolkit. Select Toolkit, for the same message and menu as if using *dac960tk* in the command mode (described earlier in this chapter).

Quit. Select this item to exit from the DAC960 shell and return to the normal UnixWare prompt.

Global Array Manager 2 Server Agent Software for UnixWare

Installing Global Array Manager 2 Server Agent Software

Use *pkgadd* to install the Global Array Manager Server Agent software for UnixWare. Complete the following procedure.

> ☞ **Note**
>
> These instructions assume the installation diskette is in disk drive 1. If a different source is used, substitute the location for “diskette1” below.

1. Log in as root.
2. Insert the GAM2 Server Agent installation diskette for UnixWare in the file server’s diskette drive.
3. Type the following (match case exactly as shown):

   pkgadd -d diskette1 GAM ↵

4. You are prompted to insert the diskette and confirm installation as shown:

   ```
   Insert diskette into Floppy Drive 1.
   Type [go] when ready.
     or [q] to quit: (default: go)
   ```

   To begin installation, type:

   go ↵

   The files are copied and the Kernel is rebuilt.

5. Installation is complete. You must modify the GAMEVENT and GAMEVLOG lines manually. Do this by editing the S99GAM file found in the directory /etc/rc2.d, changing the GAMEVENT line to include (after each `-h` parameter) the IP addresses of the client systems you will use with this server. Modify the pathname and filename in the GAMEVLOG command line if you wish to.

   Remember to remove the comment marker (#) from each line.

> ☞ **Note**
>
> If you wish to enable RAID Fault Management (RAIDBUILD) and optionally change its parameters, you need to modify the RAIDBLD command line installed in S99GAM. See Appendix C: “RAID Fault Management” for instructions before proceeding.

6. Save the modified S99GAM and exit.
7. Reboot the system using the following command from the root directory (match case exactly as shown):

   shutdown -y -i6 -g0 ↵

Uninstalling the Server Agent Software

To remove the Global Array Manager 2 Server Agent software, complete the following procedure.

1. Type the following command (match case exactly as shown):

   pkgrm GAM ↵

2. You are prompted for confirmation as shown:

   ```
   Do you want to remove this package [yes,no,?,quit]
   ```

   At the prompt, type:

   y ↵

   The files are removed. The Kernel is rebuilt.

3. When you see the following message, removal is complete.

   ```
   Removal of <GAM> was successful.
   ```

4. Reboot the system using the following command from the root directory (match case exactly as shown):

   shutdown -y -i6 -g0 ↵

Verifying Correct Server Agent Software Installation

In Case of Problems...

Problem:	**An error is encountered when trying to connect to a server.**
Check:	Is the IP address of the Server correct?
Check:	Is the installation complete? Was the software successfully loaded on the server?
Check:	Is the Ethernet connection good?
Check:	Is TCP/IP installed?
Check:	Is TCP/IP set up correctly? Try Ping to find the server.
Problem:	**Global Array Manager Server Agent does not load.**
Check:	Do you have login rights to the root?
Check:	Did all of the Server Agent files load to the destination directory? Do you have sufficient disk space for the installation? If necessary, reinstall the software.

Running Global Array Manager Server Agent

The Global Array Manager Server Agent runs on the server and performs the following functions:

- Monitors the controller(s) and disks in the server.
- Manages the controller(s) and associated disk subsystems in the server.
- Sends information to Global Array Manager Clients (if used).

The installation of Global Array Manager 2 Server Agent for UnixWare causes the appropriate drivers to load automatically at system startup. No additional actions are required to start GAM2 Server Agent beyond a system boot.

Appendix A
SNMP Installation, Operation & Definition

Introduction

The Global Array Manager includes a Simple Network Management Protocol (SNMP) agent for the RAID controller and connected arrays. An SNMP–based management application (also known as an SNMP manager) can monitor and manage the disk arrays. An example of an SNMP management application is Hewlett-Packard's Open View. The SNMP agent can be used to augment the Global Array Manager 2 Client if you are already running an SNMP management application at your site.

SNMP Installation Overview

The installation of the SNMP agent is accomplished in several phases:

- Installing the agent software on the server
- Placing a copy of the management information base (MIB) in a directory which is accessible to the management application
- Compiling the MIB description file with the management application

SNMP Installation for NetWare

During installation of the Global Array Manager 2 Server Agent, the SNMP file was copied to its appropriate directory as shown in the table below. The file can also be copied to the server directory from a workstation's floppy disk drive (with the appropriate NetWare access rights to the server directory.)

Table A-1. NetWare SNMP File

Operating system	Agent filename	Server directory
NetWare	GAMAGENT.NLM	SYS:SYSTEM

Depending upon the SNMP management application used, the MIB (an ASCII text file named MLXRAID.MIB) must be placed in a specific directory on the network management station running the management application. The MLXRAID.MIB file must be manually copied to this directory. For example:

Table A-2. Location for MIB

SNMP Application	MIB location
OpenView	\OV\MIBS
NetWare NMS	\NMS\SNMPMIBS\CURRENT

☞ **Note**

Your management application may have a different target directory. Consult the management application's user guide for the correct location.

Starting the NetWare Agent

To start the agent, enter the appropriate command from the system console:

```
LOAD GAMAGENT ↵
```

About the NetWare Agent

The GAMAGENT NLM assumes that SNMP support for NetWare servers (SNMP.NLM) is already installed on the server.

The GAMAGENT NLM will attempt to autoload the SNMP.NLM. If the SNMP.NLM file is not present, the agent will not load.

The command to load the agent can be incorporated into the AUTOEXEC.NCF or other operating system startup files as well.

SNMP Installation for Windows NT

To enable the SNMP agent for Windows NT, configure Windows NT for TCP/IP and SNMP services. The Mylex SNMP Extension Agent file is GAMAGENT.DLL.

Install the SNMP Agent

The Global Array Manager 2 Server Agent installation will copy the necessary files for the Mylex SNMP Extension Agent DLL to be added to the Windows NT registry. If the SNMP agent is required, you should make sure that TCP/IP and Windows NT SNMP services are configured correctly.

SNMP Installation for OS/2

To enable the SNMP subagent for OS/2, you must configure IBM TCP/IP v2.x for OS/2 (required), as well as SNMP services. The Mylex SNMP subagent file is GAMAGENT.EXE.

Install the SNMP Agent

The Global Array Manager 2 Server Agent installation will copy the necessary files for the Mylex SNMP subagent. Make sure that IBM TCP/IP and OS/2 SNMP services are configured correctly.

SNMP Installation for UnixWare

To enable the SNMP agent for UnixWare, configure UnixWare for TCP/IP and SNMP services.

Install the SNMP Agent

The Global Array Manager 2 Server Agent installation will copy the necessary files for the Mylex SNMP Peer Daemon. If the SNMP agent is required, you should make sure that TCP/IP and UnixWare SNMP services are configured correctly.

Installation Notes

The following files must be edited in order for the SNMP SMUX Peer daemon (gamagent) to work:

- /etc/netmgt/snmpd.peers - SMUX Peers file
- /etc/netmgt/snmpd.trap - TRAP file

The **`snmpd.peers`** file contains information which the SNMP agent/server daemon, `snmpd(1M)`, uses to authenticate requests from SMUX Peers to register subtrees (MIB Subtrees) with the SNMP agent/server.

The format of each entry in this file is:

```
name        object-id       password        [priority]
```

The SNMP SMUX Peer daemon for the Mylex SNMP agent has the following entry:

```
gamagent            1.3.6.1.4.1.1608         "nopassword"
```

The **`snmpd.trap`** file contains the definitions for the hosts to which a TRAP PDU will be sent by the SNMP agent/server daemon snmpd. The file contains lines which consist of four items: protocol, a session or community name, an IP Address in dot notation, and the IP Port Number to which to send the TRAP PDU.

Example:

```
ip          public        192.192.192.100          162
ip          test2         192.192.192.200          162
```

For more information, refer to manual entries for `snmpd.trap` and `snmpd.peers`:

```
# man snmpd.peers
# man snmpd.trap
```

SNMP Installation for SCO UNIX

To enable the SNMP agent for SCO UNIX, configure SCO for TCP/IP and SNMP services.

Install the SNMP Agent

The Global Array Manager 2 Server Agent installation will copy the necessary files for the Mylex SNMP Peer Daemon. If the SNMP agent is required, you should make sure that TCP/IP and SCO UNIX SNMP services are configured correctly.

Installation Notes

The following files must be edited in order for the SNMP SMUX Peer daemon (gamagent) to work:

- /etc/snmpd.peers - SMUX Peers file
- /etc/snmpd.trap - TRAP file

The **`snmpd.peers`** file contains information which the SNMP agent/server daemon snmpd uses to authenticate requests from SMUX Peers to register subtrees (MIB Subtrees) with the SNMP agent or the server.

The format of each entry in this file is:

```
name        object-id       password        [priority]
```

The SNMP SMUX Peer daemon for the Mylex SNMP agent has the following entry:

```
gamagent            1.3.6.1.4.1.1608         "aintNothing"
```

The **`snmpd.trap`** file contains the definitions for the hosts to which a TRAP PDU will be sent by the SNMP agent/server daemon snmpd (e.g., gamagent). The file contains lines which consist of three items: a session or community name, an IP Address in dot notation, and the IP Port Number to which to send the TRAP PDU.

Example:

```
public      192.192.192.100      162
test2       192.192.192.200      162
```

For more information, refer to manual entries for `snmpd.trap` and `snmpd.peers`:

```
# man snmpd.peers
# man snmpd.trap
```

MIB Compilation and Definition File Creation

The next step in the installation involves the integration of the MIB into the management application's database of events and status indicator codes. This process is known as *compiling* the MIB into the application. This process is highly vendor-specific and should be well-covered in the User's Guide of your SNMP application. Ensure that the compilation process successfully integrates the contents of the MLXRAID.MIB file, (known as the MYLEXRAID_MIB object when viewed from within the SNMP application) into the traps database.

MYLEXRAIDMIB Object Definitions

Traps

All traps are defined under this object according to the following table:

Table A-3. Traps and Trap Numbers

Trap	Trap number
Traps 1-127 are physical device traps	
physicalDeviceOnline	1
physicalDeviceHotspare	2
physicalDeviceHardError	3
physicalDevicePFA	4
physicalDeviceAutoRebuildStarted	5
physicalDeviceManualRebuildStarted	6
physicalDeviceRebuildDone	7
physicalDeviceRebuildCanceled	8
physicalDeviceRebuildError	9
physicalDeviceRebuildNewDeviceFailed	10
physicalDeviceRebuildSystemDeviceFailed	11
physicalDeviceDead	12
physicalDeviceFound	13
physicalDeviceGone	14
physicalDeviceUnconfigured	15
physicalDeviceExpandCapacityStarted	16
physicalDeviceExpandCapacityDone	17

Table A-3. Traps and Trap Numbers

Trap	Trap number
physicalDeviceExpandCapacityError	18
physicalDeviceCommandTimeout	19
physicalDeviceCommandAborted	20
physicalDeviceCommandRetried	21
physicalDeviceParityError	22
physicalDeviceSoftError	23
physicalDeviceMiscellaneousError	24
physicalDeviceReset	25
physicalDeviceActivespare	26
physicalDeviceWarmspare	27
physicalDeviceRequestSense	28
[RESERVED]	29-127
Traps 128-255 are logical drive (system device) traps	
systemDeviceCheckStarted	128
systemDeviceCheckDone	129
systemDeviceCheckCanceled	130
systemDeviceCheckError	131
systemDeviceCheckSystemDeviceFailed	132
systemDeviceCheckPhysicalDeviceFailed	133
systemDeviceOffline	134
systemDeviceCritical	135
systemDeviceOnline	136
systemDeviceAutoRebuildStarted	137
systemDeviceManualRebuildStarted	138
systemDeviceRebuildDone	139
systemDeviceRebuildCanceled	140
systemDeviceRebuildError	141
systemDeviceRebuildNewDeviceFailed	142
systemDeviceRebuildSystemDeviceFailed	143
systemDeviceInitializationStarted	144
systemDeviceInitializationDone	145
systemDeviceInitializationCanceled	146
systemDeviceInitializationFailed	147
systemDeviceFound	148
systemDeviceGone	149
systemDeviceExpandCapacityStarted	150
systemDeviceExpandCapacityDone	151
systemDeviceExpandCapacityError	152
systemDeviceBadblock	153
systemDeviceSizeChanged	154
systemDeviceTypeChanged	155
[RESERVED]	156-255

Table A-3. Traps and Trap Numbers

Trap	Trap number
Traps 256-271 are FMT fan traps	
fmtFanFailed	256
fmtFanOK	257
aemiFanFailed	258
fmtFanNotPresent	259
[RESERVED]	260-271
Traps 272-287 are FMT power traps	
fmtPowerFailed	272
fmtPowerOK	273
aemiPowerSupplyFailed	274
fmtPowerNotPresent	275
[RESERVED]	276-287
Traps 288-303 are FMT temperature traps	
fmtHeatBad	288
fmtHeatCritical	289
fmtHeatOK	290
aemiOverTemperature	291
fmtHeatNotPresent	292
[RESERVED]	293-303
Traps 304-383 are reserved for future FMT	
[RESERVED]	304-383
Traps 384-511 are miscellaneous traps	
systemStarted	384
writebackError	385
stateChangeTableFull	386
[NOT USED]	387
adapterDead	388
adapterReset	389
adapterFound	390
adapterGone	391
batteryBackupUnitFound	392
batteryBackupUnitPowerLow	393
batteryBackupUnitPowerOK	394
[RESERVED]	395-511
Reserved Traps	512-(16^7)

Controller Information Group

This object is used to find information about any or all of the controllers present in the system.

Table A-4. Controller Information Group

Table object	Data Type	Description
a2ControllerNumber 1.3.6.1.4.1.1608.1.1.1.2.1.1	Integer	References a particular controller by its controller number
a2OperationalState 1.3.6.1.4.1.1608.1.1.1.2.1.2	Integer	Operational state of the controller: Value — Meaning 1 — Functional 2 — Non-Functional 15 — Not Present
a2FirmwareRevision 1.3.6.1.4.1.1608.1.1.1.2.1.3	Display String	A displayable ASCII string containing the firmware version of the controller
a2ConfiguredChannels 1.3.6.1.4.1.1608.1.1.1.2.1.4	Integer	The maximum number of SCSI channels that can be configured on the controller
a2ActualChannels 1.3.6.1.4.1.1608.1.1.1.2.1.5	Integer	Actual number of SCSI channels present
a2MaximumLogicalDrives 1.3.6.1.4.1.1608.1.1.1.2.1.6	Integer	Maximum number of logical drives supported by the controller
a2MaximumTargetsPerChannel 1.3.6.1.4.1.1608.1.1.1.2.1.7	Integer	The maximum number of targets (SCSI IDs) supported per channel
a2MaximumTaggedRequests 1.3.6.1.4.1.1608.1.1.1.2.1.8	Integer	The maximum number of tagged requests per target
a2MaximumDataTransferSizePerIo RequestInK 1.3.6.1.4.1.1608.1.1.1.2.1.9	Integer	The maximum data transfer size supported (in KB)
a2MaximumConcurrentCommands 1.3.6.1.4.1.1608.1.1.1.2.1.10	Integer	The maximum number of concurrent commands that are supported.
a2RebuildRate 1.3.6.1.4.1.1608.1.1.1.2.1.11	Integer	The priority of rebuild versus system I/Os; Value is 0 to 50; 0 = lowest rebuild priority, 50 = highest rebuild priority

Table A-4. Controller Information Group

Table object	Data Type	Description	
a2LogicalSectorSizeInBytes 1.3.6.1.4.1.1608.1,1,1,2,1,12	Integer	The logical sector (block) size in bytes	
a2PhysicalSectorSizeInBytes 1.3.6.1.4.1.1608.1.1.1.2.1.13	Integer	The physical sector (block) size in bytes	
a2CacheLineSizeInBytes 1.3.6.1.4.1.1608.1.1.1.2.1.14	Integer	The cache line size in bytes	
a2CacheSizeInMb 1.3.6.1.4.1.1608.1.1.1.2.1.15	Integer	The memory size of the controller cache	
a2CacheMemoryType 1.3.6.1.4.1.1608.1.1.1.2.1.16	Integer	Numerical identification of the controller cache memory type:	
		Value	Meaning
		1	DRAM
		2	EDRAM
		3	EDO
		41	DRAM with parity protection
		42	EDRAM with parity protection
		81	DRAM with ECC protection
		82	EDRAM with ECC protection
a2EpromSizeInKb 1.3.6.1.4.1.1608.1.1.1.2.1.17	Integer	The flash EPROM size in KB	
a2BusType 1.3.6.1.4.1.1608.1.1.1.2.1.18	Integer	Numerical identification of the controller's bus type:	
		Value	Meaning
		1	EISA
		2	MCA
		3	PCI
		4	VESA
		5	ISA
		6	Unknown
a2ControllerClassType 1.3.6.1.4.1.1608.1.1.1.2.1.19	Integer	The class of the controller:	
		Value	Meaning
		1	RAID controller
		2	HBA controller
		3	Unknown

Table A-4. Controller Information Group

Table object	Data Type	Description	
a2ControllerModel 1.3.6.1.4.1.1608.1.1.1.2.1.20	Integer	Numerical identification of the controller model:	
		Value	Meaning
		1	DAC960E
		8	DAC960M
		16	DAC960PD
		17	DAC960PL
		18	DAC960PDU
		20	DAC960PG
		36	Unknown
a2SystemBusNumber 1.3.6.1.4.1.1608.1.1.1.2.1.21	Integer	The system bus number for the controller	
a2SlotNumber 1.3.6.1.4.1.1608.1.1.1.2.1.22	Integer	The slot number where the controller resides	
a2InterruptVectorNumber 1.3.6.1.4.1.1608.1.1.1.2.1.23	Integer	The interrupt number configured on the controller	
a2InterruptMode 1.3.6.1.4.1.1608.1.1.1.2.1.24	Integer	Numerical identification of the interrupt mode (edge/level):	
		Value	Meaning
		1	EDGE
		2	LEVEL
a2NumberOfPhysicalDevices 1.3.6.1.4.1.1608.1.1.1.2.1.25	Integer	The number of SCSI devices detected	
a2NumberOfPhysicalDevicesOffline 1.3.6.1.4.1.1608.1.1.1.2.1.26	Integer	The number of SCSI devices with an operational state of DEAD	
a2NumberOfLogicalDevices 1.3.6.1.4.1.1608.1.1.1.2.1.27	Integer	The number of logical drives configured	
a2NumberOfLogicalDevicesCritical 1.3.6.1.4.1.1608.1.1.1.2.1.28	Integer	The number of logical drives in a “critical” state	
a2NumberOfLogicalDevicesOffline 1.3.6.1.4.1.1608.1.1.1.2.1.29	Integer	The number of OFFLINE logical drives	
a2FaultManagementType 1.3.6.1.4.1.1608.1.1.1.2.1.30	Integer	The controller’s fault management type:	
		Value	Meaning
		1	AEMI
		16	CONNER
		32	SAFTE

Table A-4. Controller Information Group

Table object	Data Type	Description
a2ArrayInformation 1.3.6.1.4.1.1608.1.1.1.2.1.31	Display String	A displayable ASCII string containing the array information. The information is of the form: A(ch-targ ch-targ) B(ch-targ), where A,B = Array List, ch = channel number, targ = SCSI target number
a2LogicalDriveReadRequestsCount 1.3.6.1.4.1.1608.1.1.1.2.1.32	Integer	The total number of read requests to all logical drives
a2AmountOfDataReadFromLogical DrivesInMb 1.3.6.1.4.1.1608.1.1.1.2.1.33	Integer	The amount of data that was read from all logical drives in MB
a2LogicalDriveWriteRequestsCount 1.3.6.1.4.1.1608.1.1.1.2.1.34	Integer	The total number of write requests to all logical drives
a2AmountOfDataWrittenToLogical DrivesInMb 1.3.6.1.4.1.1608.1.1.1.2.1.35	Integer	The amount of data that was written to all logical drives in MB
a2LogicalDrivesReadCacheHit Percentage 1.3.6.1.4.1.1608.1.1.1.2.1.36	Integer	The percentage rate of read cache hits for all logical drives
a2PhysicalDriveReadRequestsCount 1.3.6.1.4.1.1608.1.1.1.2.1.37	Integer	The total number of read requests to all physical drives
a2AmountOfDataReadFromPhysical DrivesInMb 1.3.6.1.4.1.1608.1.1.1.2.1.38	Integer	The amount of data that was read from all physical drives in MB
a2PhysicalWriteRequestsCount 1.3.6.1.4.1.1608.1.1.1.2.1.39	Integer	The total number of write requests to all physical drives
a2AmountOfDataWrittenToPhysical DrivesInMb 1.3.6.1.4.1.1608.1.1.1.2.1.40	Integer	The amount of data that was written to all physical drives in MB

Notes:

- *a2ControllerNumber* is the index for any search operations against this object.
- This is a READ-ONLY object. No SET operations are allowed.
- A GET operation returns information about the object whose MIB ID is in the query.
- A GETNEXT operation returns the object's information which is next to the MIB ID given in the query.
- Controller numbers start at 0.

Logical Drive Information Group

This object is used to determine information about any or all the logical drives present in the system.

Table A-5. Logical Drive Information Group

Table object	Data Type	Description
a3ControllerNumber 1.3.6.1.4.1.1608.1.1.1.3.1.1	Integer	References a particular controller by its controller number
a3LogicalDriveNumber 1.3.6.1.4.1.1608.1.1.1.3.1.2	Integer	The logical drive number
a3OperationalState 1.3.6.1.4.1.1608.1.1.1.3.1.3	Integer	Numerical identification of the logical drive state: Value — Meaning 3 — ONLINE 4 — CRITICAL 255 — OFFLINE
a3RaidLevel 1.3.6.1.4.1.1608.1.1.1.3.1.4	Integer	The RAID level selected for the logical drive
a3WritePolicy 1.3.6.1.4.1.1608.1.1.1.3.1.5	Integer	Numerical identification of the write policy setting for the logical drive: Value — Meaning 1 — WRITE THRU 2 — WRITE BACK 3 — Unknown
a3SizeInMb 1.3.6.1.4.1.1608.1.1.1.3.1.6	Integer	The logical drive capacity in MB
a3PhysicalSizeInMb 1.3.6.1.4.1.1608.1.1.1.3.1.7	Integer	The total physical capacity used by this logical drive in MB
a3StripeSizeInBytes 1.3.6.1.4.1.1608.1.1.1.3.1.8	Integer	The value of the stripe size in bytes
a3PhysicalDriveMap 1.3.6.1.4.1.1608.1.1.1.3.1.9	Display String	A displayable ASCII string containing the list of all physical drives that make up the logical drive. For example, (0-1 0-2 1-3 1-11)
a3ArrayList 1.3.6.1.4.1.1608.1.1.1.3.1.10	Display String	The list of arrays across which this logical drive spans. For example, A B, etc.

Notes:

- *a3ControllerNumber* and *a3LogicalDriveNumber* compose the Index for a search operation.
- This is a READ-ONLY object. No SET operations are allowed.
- A GET operation returns information about the object at the address (a3ControllerNumber/a3LogicalDriveNumber) specified in the argument.
- A GETNEXT operation returns information about the next object at the smallest address greater than the address specified in the argument.
- The lowest address of a drive (a3ControllerNumber/ a3LogicalDriveNumber) is defined as 0/0, followed by 0,1.... 1/0, 1/1 and so on.
- Controller numbers start at 0. Logical drive numbers start at 0.

Physical Device Information Group

This object is used to find information about any or all of the physical devices present in the system.

Table A-6. Physical Device Information Group

Table object	Data Type	Description
a4ControllerNumber 1.3.6.1.4.1.1608.1.1.1.4.1.1	Integer	References a particular controller by its controller number
a4ScsiBusId 1.3.6.1.4.1.1608.1.1.1.4.1.2	Integer	SCSI channel number
a4ScsiTargetId 1.3.6.1.4.1.1608.1.1.1.4.1.3	Integer	SCSI target number
a4ScsiLunId 1.3.6.1.4.1.1608.1.1.1.4.1.4	Integer	SCSI logical unit number (LUN) of the SCSI device
a4OperationalState 1.3.6.1.4.1.1608.1.1.1.4.1.5	Integer	Numerical identification of the physical device state: Value — Meaning 0 — DEAD 2 — REBUILDING 3 — ONLINE 5 — PRESENT 6 — Not Present 7 — Unknown 16 — HOT SPARE 130 — REBUILD CANCELLED
a4VendorId 1.3.6.1.4.1.1608.1.1.1.4.1.6	Display String	The SCSI device vendor ID. This is the vendor ID from the SCSI INQUIRY data.
a4ProductId 1.3.6.1.4.1.1608.1.1.1.4.1.7	Display String	The SCSI device product ID. This is the product ID from the SCSI INQUIRY data.
a4ProductRevisionLevel 1.3.6.1.4.1.1608.1.1.1.4.1.8	Display String	The SCSI device product revision level. This is the revision level from the SCSI INQUIRY data.
a4SizeInMb 1.3.6.1.4.1.1608.1.1.1.4.1.9	Integer	The physical device capacity in MB

Table A-6. Physical Device Information Group

Table object	Data Type	Description	
a4DeviceType 1.3.6.1.4.1.1608.1.1.1.4.1.10	Integer	Numerical identification of the SCSI device type. The value matches the device type value of the SCSI INQUIRY data:	
		Value	Meaning
		0	FIXED DISK
		1	TAPE
		2	PRINTER
		3	PROCESSOR
		4	WORM
		5	CDROM
		6	SCANNER
		7	MO
		8	CHANGER
		9	COMMUNICATION DEVICE
		10	GRAPHICS-0
		11	GRAPHICS-1
		12-30	Reserved
		31	Unknown
		199	SCSI HOST
a4SoftErrorsCount 1.3.6.1.4.1.1608.1.1.1.4.1.11	Integer	The number of soft errors that occurred	
a4HardErrorsCount 1.3.6.1.4.1.1608.1.1.1.4.1.12	Integer	The number of hard errors that occurred	
a4ParityErrorsCount 1.3.6.1.4.1.1608.1.1.1.4.1.13	Integer	The number of parity errors that occurred	
a4MiscErrorsCount 1.3.6.1.4.1.1608.1.1.1.4.1.14	Integer	The number of miscellaneous errors that occurred	
a4ArrayList 1.3.6.1.4.1.1608.1.1.1.4.1.15	Display String	The list of arrays to which this physical drive belongs. For example, A, B, etc.	
a4LogicalDriveList 1.3.6.1.4.1.1608.1.1.1.4.1.16	Integer	The list of logical drives that depend on this physical drive. For example, 0, 1, etc.	

Notes:

- *a4ControllerNumber*, *a4ScsiBusId*, and *a4ScsiTargetId* comprise the Index for the search operation.
- This is a READ-ONLY object. No SET operations are allowed.
- A GET operation returns information about the object at the address (a4ControllerNumber/a4ScsiBusId/a4ScsiTargetId) specified in the argument.
- A GETNEXT operation returns information about the next object at the smallest address greater than the address specified in the argument.
- The lowest address of a device (a4ControllerNumber/a4ScsiBusId/ a4ScsiTargetId) is defined as 0/0/0, followed by 0/0/1, ... 0/1/0, 0/1/ 1,... 1/0/0,1/0/1 and so on.
- Controller numbers start at 0. Channel numbers start at 0. Target IDs start at 0.

RAID Management Software Group

This object contains the build date and version number for the Global Array Manager driver, DAC960 device driver, and SNMP agent.

Table A-7. RAID Management Software Group

Table object	Data Type	Description
a5ManagementSoftwareRevision 1.3.6.1.4.1.1608.1.1.1.5.1.1	Display String	A displayable string that shows the revision level of the SNMP agent
a5ManagementSoftwareBuildDate 1.3.6.1.4.1.1608.1.1.1.5.1.2	Display String	A displayable string that shows the build date for the SNMP agent
a5Dac960DeviceDriverVersion 1.3.6.1.4.1.1608.1.1.1.5.1.3	Display String	A displayable string that shows the revision level of the DAC960 device driver
a5Dac960DeviceDriverBuildDate 1.3.6.1.4.1.1608.1.1.1.5.1.4	Display String	A displayable string that shows the build date for the DAC960 device driver
a5GamDriverRevision 1.3.6.1.4.1.1608.1.1.1.5.1.5	Display String	A displayable string that shows the revision level of the Global Array Manager (GAM) driver
a5GamDriverBuildDate 1.3.6.1.4.1.1608.1.1.1.5.1.6	Display String	A displayable string that shows the build date for the Global Array Manager (GAM) driver

Notes:

- This is a READ-ONLY object. No SET operations are allowed.
- A GET operation returns information about the object at the address specified in the argument.
- A GETNEXT operation returns information about the next object at the smallest address greater than the address specified in the argument.

Logical Drive Statistics Group

This object is used to determine statistics about all logical drives configured on a controller.

Table A-8. Logical Drive Statistics Group

Table object	Data Type	Description
a6ControllerNumber 1.3.6.1.4.1.1608.1.1.1.6.1.1	Integer	References a particular controller by its controller number
a6LogicalDriveNumber 1.3.6.1.4.1.1608.1.1.1.6.1.2	Integer	The logical drive number
a6ReadRequestsCount 1.3.6.1.4.1.1608.1.1.1.6.1.3	Integer	The total number of read requests
a6AmountOfDataReadInMb 1.3.6.1.4.1.1608.1.1.1.6.1.4	Integer	The total amount of data that was read in MB
a6WriteRequestsCount 1.3.6.1.4.1.1608.1.1.1.6.1.5	Integer	The total number of write requests
a6AmountOfDataWrittenInMb 1.3.6.1.4.1.1608.1.1.1.6.1.6	Integer	The total amount of data that was written in MB
a6ReadCacheHitPercentage 1.3.6.1.4.1.1608.1.1.1.6.1.7	Integer	The percentage rate of read cache hits

Notes:

- *a6ControllerNumber* and *a6LogicalDriveNumber* compose the Index for a search operation.
- This is a READ-ONLY object. No SET operations are allowed.
- A GET operation returns information about the object at the address (a6ControllerNumber/a6LogicalDriveNumber) specified in the argument.
- A GETNEXT operation returns information about the next object at the smallest address greater than the address specified in the argument.
- The lowest address of a drive (a6ControllerNumber/ a6LogicalDriveNumber) is defined as 0/0, followed by 0,1.... 1/0, 1/1 and so on.
- Controller numbers start at 0. Logical drive numbers start at 0.

Physical Drive Statistics Group

This object is used to determine statistics about all physical drives configured on a controller.

Table A-9. Physical Drive Statistics Group

Table object	Data Type	Description
a7ControllerNumber 1.3.6.1.4.1.1608.1.1.1.7.1.1	Integer	References a particular controller by its controller number
a7ScsiBusID 1.3.6.1.4.1.1608.1.1.1.7.1.2	Integer	SCSI channel number
a7ScsiTargetId 1.3.6.1.4.1.1608.1.1.1.7.1.3	Integer	SCSI target number
a7ScsiLun 1.3.6.1.4.1.1608.1.1.1.7.1.4	Integer	SCSI logical unit number (LUN) of the SCSI device
a7ReadRequestsCount 1.3.6.1.4.1.1608.1.1.1.7.1.5	Integer	The total number of read requests
a7AmountOfDataReadInMb 1.3.6.1.4.1.1608.1.1.1.7.1.6	Integer	The total amount of data that was read in MB
a7WriteRequestsCount 1.3.6.1.4.1.1608.1.1.1.7.1.7	Integer	The total number of write requests
a7AmountOfDataWrittenInMb 1.3.6.1.4.1.1608.1.1.1.7.1.8	Integer	The total amount of data that was written in MB

Notes:

- *a7ControllerNumber*, *a7ScsiBusId,* and *a7ScsiTargetId* comprise the Index for the search operation.
- This is a READ-ONLY object. No SET operations are allowed.
- A GET operation returns information about the object at the address (a7ControllerNumber/a7ScsiBusId/a7ScsiTargetId) specified in the argument.
- A GETNEXT operation returns information about the next object at the smallest address greater than the address specified in the argument.
- The lowest address of a device (a7ControllerNumber/a7ScsiBusId/ a7ScsiTargetId) is defined as 0/0/0, followed by 0/0/1, ... 0/1/0, 0/1/ 1,... 1/0/0,1/0/1 and so on.
- Controller numbers start at 0. Channel numbers start at 0. Target IDs start at 0.

Fault Management Cabinet Information Group

This object is used to obtain information about the fault management cabinet that is in use.

Table A-10. Fault Management Cabinet Information Group

Table object	Data Type	Description
a8ControllerNumber 1.3.6.1.4.1.1608.1.1.1.8.1.1	Integer	References a particular controller by its controller number
a8ScsiBusId 1.3.6.1.4.1.1608.1.1.1.8.1.2	Integer	SCSI channel number
a8ScsiTargetId 1.3.6.1.4.1.1608.1.1.1.8.1.3	Integer	SCSI target number
a8ScsiLun 1.3.6.1.4.1.1608.1.1.1.8.1.4	Integer	SCSI logical unit number (LUN) of the SCSI device
a8CabinetType 1.3.6.1.4.1.1608.1.1.1.8.1.5	Integer	Numerical identification of fault management cabinet type: Value — Meaning 1 — CONNER CR6 2 — CONNER Smart Cabinet 3 — SAFTE
a8CabinetNo 1.3.6.1.4.1.1608.1.1.1.8.1.6	Integer	The cabinet number
a8NumberOfFans 1.3.6.1.4.1.1608.1.1.1.8.1.7	Integer	The number of fans housed in the cabinet
a8NumberOfPowerSupplyUnits 1.3.6.1.4.1.1608.1.1.1.8.1.8	Integer	The number of power supply units installed
a8NumberOfHeatSensors 1.3.6.1.4.1.1608.1.1.1.8.1.9	Integer	The number of heat sensors
a8NumberOfDriveSlots 1.3.6.1.4.1.1608.1.1.1.8.1.10	Integer	The number of drive slots
a8NumberOfDoorLocks 1.3.6.1.4.1.1608.1.1.1.8.1.11	Integer	The number of door locks
a8NumberOfSpeakers 1.3.6.1.4.1.1608.1.1.1.8.1.12	Integer	The number of speakers
a8NumberOfFansCritical 1.3.6.1.4.1.1608.1.1.1.8.1.13	Integer	The number of fans in a “critical” state
a8NumberOfPowerSupplyUnitsCritical 1.3.6.1.4.1.1608.1.1.1.8.1.14	Integer	The number of power supply units in a “critical” state
a8NumberOfHeatSensorsCritical 1.3.6.1.4.1.1608.1.1.1.8.1.15	Integer	The number of heat sensors in a “critical” state

Table A-10. Fault Management Cabinet Information Group

Table object	Data Type	Description
a8NumberOfFansFailed 1.3.6.1.4.1.1608.1.1.1.8.1.16	Integer	The number of fans in the “failed” state
a8NumberOfPowerSupplyUnitsFailed 1.3.6.1.4.1.1608.1.1.1.8.1.17	Integer	The number of power supply units in the “failed” state
a8NumberOfHeatSensorsFailed 1.3.6.1.4.1.1608.1.1.1.8.1.18	Integer	The number of heat sensors in the “failed” state

Notes:

- *a8ControllerNumber*, *a8ScsiBusId*, and *a8ScsiTargetId* comprise the Index for the search operation.
- This is a READ-ONLY object. No SET operations are allowed.
- A GET operation returns information about the object at the address (a8ControllerNumber/a8ScsiBusId/a8ScsiTargetId) specified in the argument.
- A GETNEXT operation returns information about the next object at the smallest address greater than the address specified in the argument.
- The lowest address of a device (a8ControllerNumber/a8ScsiBusId/ a8ScsiTargetId) is defined as 0/0/0, followed by 0/0/1, ... 0/1/0, 0/1/ 1,... 1/0/0,1/0/1 and so on.
- Controller numbers start at 0. Channel numbers start at 0. Target IDs start at 0.

RAID Event Information Group

This object is used to obtain information on events that occur for any or all of the controllers. This group's information is used to send SNMP traps to the SNMP Manager workstation.

Table A-11. RAID Event Information Group

Table object	Data Type	Description
a9EventTableIndex 1.3.6.1.4.1.1608.1.1.1.9.1.1	Integer	The index to the Event Table
a9EventCode 1.3.6.1.4.1.1608.1.1.1.9.1.2	Integer	Numerical identification of the event codes for events. (For event codes, see "Traps" beginning on page A-6)
a9EventTimeStamp 1.3.6.1.4.1.1608.1.1.1.9.1.3	Integer	The time associated with the event. This is provided as the number of seconds since midnight, January 1, 1970.
a9ControllerNumber 1.3.6.1.4.1.1608.1.1.1.9.1.4	Integer	References a particular controller by its controller number
a9ChannelNumber 1.3.6.1.4.1.1608.1.1.1.9.1.5	Integer	SCSI channel number; valid for physical drive events and fault management events
a9TargetNumber 1.3.6.1.4.1.1608.1.1.1.9.1.6	Integer	SCSI target ID; valid for physical drive events
a9LunNumber 1.3.6.1.4.1.1608.1.1.1.9.1.7	Integer	SCSI logical unit number (LUN) of the physical device; valid for physical drive events
a9LogicalDriveNumber 1.3.6.1.4.1.1608.1.1.1.9.1.8	Integer	The logical drive number; valid for logical drive events
a9FmtCabinetNumber 1.3.6.1.4.1.1608.1.1.1.9.1.9	Integer	The fault management cabinet number; valid for fault management events
a9FanUnitNumber 1.3.6.1.4.1.1608.1.1.1.9.1.10	Integer	The fan unit number in the fault management cabinet; valid for fault management events
a9PowerSupplyUnitNumber 1.3.6.1.4.1.1608.1.1.1.9.1.11	Integer	The power supply unit number in the fault management cabinet; valid for fault management events
a9HeatSensorUnitNumber 1.3.6.1.4.1.1608.1.1.1.9.1.12	Integer	The heat sensor unit number

Notes:

- The value -1 in any of the object fields signifies that the field is not valid for the event being considered.
- This is a READ-ONLY object. No SET operations are allowed.
- A GET operation returns information about the object whose MIB ID is in the query.
- A GETNEXT operation returns the object's information which is next to the MIB ID given in the query.

Appendix B
Installing TCP/IP

Overview

This chapter explains how to configure TCP/IP for Novell NetWare and Microsoft Windows NT 3.51 and above.

> ☞ **Note**
>
> The information presented in this chapter is a basic explanation of TCP/IP installation procedures. While the TCP/IP protocols are highly standardized, vendor specific characterizations and enhancements may exist. Refer to the documentation which came with your operating system for detailed information.

The connection between the Client and the Server is based on the TCP/IP protocol. In order for TCP/IP to function properly, the protocol stack must be installed and unique IP addresses must be configured on both the Server and the Client.

The IP address format in Global Array Manager follows the standard 12-digit format of decimal numbers separated by dots, e.g, 111.222.333.444. Often, the leading zeroes in an address may not be shown. An address displayed as 1.2.3.4 represents an actual IP address of 001.002.003.004.

Orderly administration of proper IP addresses assures correct packet routing. Duplicate network addresses are not allowed.

The IP addresses may be arbitrary only if the network will not be part of the Internet. Otherwise, registered Internet addresses may be obtained from the Internet Network Information Systems Center in Herndon, Virginia, USA (*hostmaster@internic.net*).

Installing TCP/IP - NetWare

TCP/IP is included with NetWare 4.1x. To install TCP/IP, complete the following procedure.

1. Type the following command from the server console prompt:

   `LOAD INETCFG.NLM ↵`

   The system asks you if it should be loaded in AUTOEXEC.NCF. Type YES. The Internetworking Configuration screen appears.

2. Highlight Protocols with the arrow keys and press **Enter**. The Protocol Configuration menu appears.
3. Highlight TCP/IP and press **Enter**. The TCP/IP Protocol Configuration menu appears.
4. Highlight TCP/IP Status and press **Enter**.
5. Move the status arrow to TCP/IP Enabled and press **Enter**.
6. Press the **Esc** key. The system prompts you to save the settings. Select YES.
7. Press the **Esc** key until the Internetworking Configuration screen is shown.
8. Highlight Bindings and press **Enter**. The Configured Protocol to Network Interface Bindings menu appears.
9. Press **Insert** to add the new Binding.
10. Select TCP/IP from the list of protocols. The Binding TCP/IP to LAN Interface menu appears.
11. Enter the Local IP Address. Be sure to follow the rules that exist for IP addressing (see “IP Addressing” in the NetWare documentation).
12. Enter the Subnet mask (default is FF.FF.FF.0).
13. Press the **Esc** key. The system prompts you to save the settings. Select YES.
14. Save settings and restart the NetWare server
15. Test the Server using the “Ping” command from a workstation. If the systems are correctly configured, a reply is received.

Installing TCP/IP - Windows NT

TCP/IP is included with Windows NT. To install TCP/IP, complete the following procedure.

1. Select Control Panel from the Main program group.
2. Double-click the Network icon.
3. Select Add Software.
4. Highlight TCP/IP Protocol and Related Components and click the Load Software button.

Configuring the IP Address

1. After loading the software, click the Configure button.
2. Enter an IP Address for the network card. Be sure to follow the rules that exist for IP addressing.

   The Subnet Mask is generally set for 255.255.255.0.

   For information on IP addressing, refer to the Windows NT documentation.
3. Save all settings.
4. Shut down and restart the server.
5. Test the Server using the “Ping” command from a workstation. If the systems are correctly configured, a reply is received.

Appendix C
RAID Fault Management

RAIDBUILD Utility Overview

The RAIDBUILD (RAIDBLD) utility, available for all GAM 2.1 Server Agent supported operating system platforms, offers more user control over the following RAID fault management activities:

- Scanning for failed hot spare drives and/or inactive online physical devices, and defining the interval between scans
- Changing the path and filename of the file which will hold all RAIDBLD message log information
- Setting the device name of a console which will display all RAIDBLD message log information with an audible tone as each message is displayed.
- Performing an “automatic rebuild,” which starts a drive rebuild process as soon as a failed drive is replaced
- Performing background “consistency checks,” specifying the start time, interval between consistency checks, and whether or not to fix errors on-the-fly.

RAIDBLD Command Line

The RAIDBLD utility file is installed during normal GAM 2.1 Server Agent installation under all supported operating systems. During installation of GAM 2.1 Server Agent, there is an instruction to modify the GAMEVENT and GAMEVLOG command lines in the system startup file to specify the IP addresses of client systems and the path and name of the message log file. Within this same startup file, the RAIDBLD command line (disabled by default) must be enabled if you wish to achieve any RAID fault management.

The following RAIDBLD command line is installed during GAM 2.1 Server Agent installation:

```
#[path]raidbld -s 7 -S 1 -r -R 1 -t 24 -T 0 -l [path]raidbld.log [bk]
```

where:

: signifies that the following text line is a disabled command line or is a comment;

[path] : is the directory path to the raidbld utility file or the raidbld.log file;

[bk] : is an operating system-specific parameter which runs RAIDBLD in the background.

☞ **Note**

Individual command line parameters will be discussed in a later section. The correct background run parameter [bk] will already be present in the RAIDBLD command line after GAM 2.1 Server Agent installation.

Enabling and Running RAID Fault Management (RAIDBLD)

To enable RAID fault management using the RAIDBLD utility, simply remove the “#” (comment line indicator) from the beginning of the RAIDBLD command line.

Once you have removed the “#” you may wish to change one or more of the command line parameter default settings (the information after raidbld on the command line). The next section introduces the command line parameters, identifies the installed defaults, and indicates other options, if available.

RAIDBLD Command Line Parameters

For a list of available parameters while online, type:

raidbld -? ↵

The basic structure of the RAIDBLD command line is as follows:

```
raidbld -[param] [value, (if required)] -[param] [value]..., etc.
```

Each parameter must be preceded by a dash “-“. Several parameters require a value which directly follows the parameter. Parameters and values are separated by a space.

Table C-1 beginning on the next page displays the following information for each RAIDBLD parameter:

- The parameter switch (such as -s, -R, etc.)
- Valid parameter values, as well as the default value
- An example of the use of the parameter [value]
- A description of what the parameter’s function is.

Table C-1. Command Line Parameters and Their Functions

Param	Value(s) / Default / Example	Description
-s	Values = 1,2,3,4, etc. Default = -s 7 Example = raidbld -s 10	**Define Scan Interval**: Sets the number of seconds between each scan for failed devices, device state changes, controller errors, etc. The number must be an integer.
-S	Values = 0 = no scan 1 = scan for failed hot spares 2 = scan for inactive online physical devices 3 = both 1 and 2 Default = -S 1 Example = raidbld -S 3	**Scan For Failed Devices**: Allows scanning for failed hot spares, inactive online physical devices, or both. A value of 0 (or the absence of the -S parameter in the command line) will disable this automatic scanning.
-l	Value = [path][filename] Default = -l [path]raidbld.log Example = raidbld -l c:\myfile.log	**Log All RAIDBLD Information to a File**: If you choose, you may change the default log file name, or remove the -l (lowercase L) parameter to disable logging to a file.
-c	Value = [path][devicename] Default = OFF (param not set) Example = raidbld -c /dev/tty07	**Display All RAIDBLD Information on a Console**: If you choose, you may add the path and name of a console device on which the log messages will be displayed.
-r	Value = none Default = -r Example = raidbld -r	**Perform Automatic Rebuild**: Initiates a rebuild automatically if a failed drive is replaced with an unconfigured, valid drive.
-R	Values = 0 = fix errors 1 = do not fix errors Default = -R 1 Example = raidbld -R 0	**Specify Whether or Not Errors Will Be Fixed Automatically During Consistency Check**: You can specify whether automatic consistency check should fix consistency errors as it finds them, or leave errors as they are. This parameter is required in order to activate background consistency checking. Set start time and interval with the parameters below.

Table C-1. Command Line Parameters and Their Functions

Param	Value(s) / Default / Example	Description
-T	Values = 0 = 12:00 A.M. ...to... 23 = 11:00 P.M. Default = -T 0 Example = raidbld -T 19	**Set Start Time For Background Consistency Check**: If you wish to run automatic consistency checks, use this parameter to specify the time of day (on the hour only) to begin the first consistency check. To turn OFF the automatic consistency check function, remove the -R parameter and its value.
-t	Values = 1,2,3,4, etc. Default = -t 24 Example = raidbld -t 12	**Set Interval Between Background Consistency Checks**: If you wish to run multiple, ongoing consistency checks, specify the time interval (in hours) between the end of one consistency check and the start of the next one. To turn OFF the automatic consistency check function, remove the -R parameter and its value.

Running RAIDBLD

The default RAIDBLD command line is set to do the following when RAIDBLD runs:

- Use a scan interval of seven (7) seconds [-s 7];
- Scan for failed hot spares only [-S 1]
- Perform automatic rebuilds when failed drives are replaced [-r];
- Perform automatic consistency checks beginning tonight at midnight [-T 0], every midnight [-t 24], but do not automatically fix consistency errors [-R 1];
- Log RAIDBLD messages to a specified log file, [-l [pathname] raidbld.log];
- Do NOT specify a console device to display RAIDBLD messages (-c parameter not set).

If you accept these settings and require no changes, simply save the file and reboot the server. RAIDBLD will run automatically at system startup with the default settings.

If you wish to change one or more settings, do the following:

1. Refer to the RAIDBLD Command Line Parameter Table above and note which parameters and or values you wish to change.
2. Modify the raidbld command line to specify your options.

   Modifying the RAIDBLD command line involves doing one or more of the following:

   - Adding a parameter and value to the command line to turn ON a new RAIDBLD function (e.g.: Adding -c /dev/tty07 to define a display console)
   - Deleting a parameter (and value, if present) to turn OFF a particular RAIDBLD function (e.g.: Removing -r to disable automatic rebuild; removing -R [value] to turn off background consistency checks; removing -l [value] to turn off RAIDBLD message logging to a file, etc.)
   - Changing a parameter's value to alter a time interval or select a different setting (e.g.: -R 1 becomes -R 0 to allow consistency errors to be fixed; -s 7 becomes -s 60 to increase the scan interval to 60 seconds; -S 1 becomes -S 3 to scan for both failed hot spares AND inactive online physical devices, etc.)
3. After modifying the RAIDBLD command line, save the file.
4. If the file was edited during GAM 2.1 Server Agent installation, complete the installation process according to instructions. If the file was edited outside of GAM installation, close the file.
5. Reboot your server. RAIDBLD will run automatically with the settings you selected.