

**Installation and
Configuration
Guide for HP-UX**

HP I/O Libraries

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Installation and
Configuration Guide
for HP-UX

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Introduction

Introduction

Welcome to the *HP I/O Libraries Installation and Configuration Guide for HP-UX*. This guide provides an overview of the HP I/O Libraries and explains how to install and configure the libraries on the HP-UX version 10.20 (or later) operating system. This guide also lists other documentation you can follow either to use or develop I/O applications and instrument drivers with the HP I/O Libraries.

This first chapter provides an overview of the HP I/O Libraries. In addition, this guide contains the following chapters:

- **Chapter 2 - Installing and Configuring the HP I/O Libraries** explains how to install and configure the libraries on HP-UX.
- **Chapter 3 - Documentation for the HP I/O Libraries** provides a list of the other manuals and online help you can follow either to use or develop I/O applications and instrument drivers with the libraries.

This guide also contains the following appendices:

- **Appendix A - Using RS-232 Cables and HP Instruments** lists and explains RS-232 cables you can use to connect HP instruments to your system for use with SICL.
- **Appendix B - Editing the hwconfig.cf File** describes a manual process to configure HP SICL interfaces.
- **Appendix C - Distributing HP SICL Executable Files** explains how to distribute HP SICL executable files to other users.
- **Appendix D - Removing Interface Cards** explains how to remove an interface card from your system.
- **Appendix E - Removing HP I/O Libraries Software** explains how to remove one or both of the libraries from your system, and how to remove the HP SICL LAN server capability.

This guide also contains an **Index**.

Overview of the HP I/O Libraries

The HP I/O Libraries consist of the following two libraries:

- **HP Virtual Instrument Software Architecture (VISA)** is an I/O library designed according to the *VXIplug&play* System Alliance that allows software developed from different vendors to run on the same system.

Use VISA if you wish to use *VXIplug&play* instrument drivers in your applications, or if you want the I/O applications or instrument drivers that you develop to be compliant with *VXIplug&play* standards. If you are using new instruments or are developing new I/O applications or instrument drivers, HP recommends that you use VISA.

- **HP Standard Instrument Control Library (SICL)** is an I/O library developed by HP that is portable across many I/O interfaces and systems.

Use SICL if you have been using SICL and want to remain compatible with software currently implemented in SICL.

NOTE

Since VISA and SICL are different libraries, you *cannot* use VISA functions and SICL functions in the same I/O applications.

The following subsections provide a more detailed description of each of these libraries.

HP VISA

VISA (Virtual Instrument Software Architecture) is an I/O library that can be used to develop I/O applications and instrument drivers that comply with the *VXIplug&play* standards. Applications and instrument drivers developed with VISA can execute on *VXIplug&play* system frameworks that have the VISA I/O layer. Therefore, software from different vendors can be used together on the same system.

Support

VISA is supported on HP-UX version 10.20 with the following interfaces: GPIB, VXI, GPIB-VXI, and LAN. Note that LAN support from within VISA occurs via an address translation such that a GPIB interface can be accessed remotely over a computer network.

Users

VISA has two specific users. The first user is the instrumentation end user who wants to use *VXIplug&play* instrument drivers in his or her applications. The second user is the instrument driver or I/O application developer who wants to be compliant with *VXIplug&play* standards.

Software development using VISA is intended for instrument I/O and C/C++ programmers who are familiar with the HP-UX operating system.

HP SICL

SICL (Standard Instrument Control Library) is an I/O library developed by HP that is portable across many I/O interfaces and systems. I/O applications written in C/C++ using this library can be ported at the source code level from one system to another without, or with very few, changes.

Support

SICL is supported on HP-UX version 10.20 with the following interfaces: HP-IB, VXI, RS-232, GPIO, and LAN.

Users

SICL is intended for instrument I/O and C/C++ programmers who are familiar with the HP-UX operating system.

Where to Go Next

Now that you have a better understanding of the VISA and SICL libraries, you are ready to install the HP I/O Libraries. Please go on to the next chapter, "Installing and Configuring the HP I/O Libraries."

**Installing and Configuring
the HP I/O Libraries**

Installing and Configuring the HP I/O Libraries

This chapter explains how to install and configure the HP I/O Libraries, including VISA and SICL, on your HP-UX system. The main sections of this chapter are:

- Preparing to Install the HP I/O Libraries
- Installing the HP I/O Libraries
- Configuring the HP I/O Libraries

Preparing to Install the HP I/O Libraries

Before installing the HP I/O Libraries, you must verify the following:

- Product package
- Hardware requirements
- Software requirements

Verifying the Product Package

Ensure you have received the following with your HP I/O Libraries purchase:

- HP I/O Libraries installation software, which is supplied on one CD-ROM
- HP SICL manual set, including:
 - *HP SICL User's Guide for HP-UX*
 - *HP SICL Reference Manual*
 - *HP SICL Quick Reference Guide for C Programmers*
 - *RS-232 Cables Addendum*
- HP VISA manual set, including:
 - *HP VISA User's Guide*
 - *HP VISA Quick Reference Guide for C Programmers*

Verifying the Hardware Requirements

You need to have one of the following computers to use the HP I/O Libraries:

- HP 9000 Series 700 Computer
- HP Model V743 VXI Controller

VISA and SICL support the following I/O interfaces on HP-UX 10.20:

- HP E2070 HP-IB Interface for Series 700 Computers
- HP E2071 High-Speed HP-IB Interface for Series 700 Computers
- HP Model 745i or V743 Built-in HP-IB Interface
- HP Model V743 VXIbus
- HP E1489 MXI Interface for Series 700 Computers
- HP Series 700 Built-in LAN Interface or Add-on LAN Card

In addition, SICL supports the following interfaces on HP-UX 10.20:

- HP Interpreted SCPI (I-SCPI) Interface for Series 700 Computers
- HP Series 700 Built-in RS-232 Interface
- HP Model V743 Built-in RS-232 Interface
- HP E2074 GPIO Interface for Series 700 Computers

NOTE

VISA on HP-UX 10.20 does *not* support the I-SCPI, RS-232, or GPIO interface.

Contact your local HP sales office for a complete (or updated) list of interfaces supported with VISA and SICL.

Verifying the Software Requirements

The HP I/O Libraries for HP-UX have the following software requirements:

- HP-UX version 10.20 or later.
- If installing the entire product (for all supported interfaces), you will need at least 20 Mbytes of free disk space. Not all of this will be occupied by SICL and VISA, but it will be used in the installation process. If you only install a subset of the product, take note of the Mbytes required by each fileset when running the HP-UX Software Distributor installation program.
- Supported compilers for VISA:
 - ANSI C
 - C++
- Supported compilers for SICL:
 - C
 - ANSI C
 - C++

Installing the HP I/O Libraries

This section explains how to install the HP I/O Libraries, including SICL and VISA, on your HP-UX system. This installation uses the HP-UX Software Distributor tools and should take 20 to 30 minutes to complete. Verify that your system meets all the hardware and software requirements, as described in the previous two sections, before continuing with this installation.

The HP-UX Software Distributor (SD) installation program (**swinstall**) is an interactive program that will install software either from a CD-ROM depot, or from a special SD-UX directory on your local host system or on some other host. The SD cluster program (**swcluster**) uses **swinstall** to install the software onto your cluster nodes. If you are not familiar with the SD tools, see the *Managing HP-UX Software with SD-UX* manual, or the man page for **sd** for additional instructions. If you have any questions while using the SD tools, use the online help for more information.

To install the HP I/O Libraries, do the following.

NOTE

If this is the first time you are installing the HP I/O Libraries for HP-UX, then additional software will be installed, and the **swinstall** program will reboot your system.

1. Become the **root** user on the server for a diskless cluster or on a stand-alone system.
2. Insert your HP I/O Libraries CD-ROM and mount it. See the **mount(1m)** man page for information on the **mount** command.

3. Run the interactive HP-UX software distributor program:
 - On a stand-alone system, or on the server of a diskless cluster (installing on server, but not on clients):

```
/usr/sbin/swinstall
```

- On a diskless cluster server (installing on server and clients):

```
/usr/sbin/swcluster -i -vvv
```

The `-i` indicates interactive mode, and the `-vvv` indicates the level of verbosity.

4. If you used the `swcluster` program, the program will prompt for you to select the alternate root path. On Series 700 computers, the path is usually `/export/shared_roots/OS_700`.
5. The program lists the following fields:

Source Host Name	Lists the host from which you are installing. If you would like to install from a different host, be sure to include the server IP address.
Source Depot Path	Specifies the source depot you wish to install from. If you are installing from the CD-ROM depot, list the directory the CD-ROM depot is mounted on (for example, <code>/cdrom</code>). If you are installing from a hard disk, list the directory path to the filesets (usually <code>/var/spool/sw</code>).
Change Software View	Specify All Bundles for the HP I/O Libraries software.

Change the fields above to reflect your installation and then click on the **OK** button.

6. The `swinstall` program reads the bundles available from the source depot. The HP I/O Libraries software will be displayed as follows:

```
E2091E E.01.xx
```

Installing the HP I/O Libraries

7. To install the entire HP I/O Libraries bundle, click on the bundle in the edit window and then click on the **Actions** menubar. Select **Mark for Install** to select the HP I/O Libraries bundle for installation. Note that additional software will be installed if you are installing for the first time.

If you wish to install individual products or filesets instead of the complete bundle, follow the instructions below. Otherwise, continue with the next step.

- To select an individual product, double-click on the HP I/O Libraries bundle until the products (SICL and VISA) are displayed. Note that the Bristol Technology HyperHelp Viewer will also be displayed as a product. This viewer is required to use SICL or VISA online help. Now you can select a specific product for installation by clicking on the desired product and selecting **Mark for Install** from the **Actions** menubar.

NOTE

If you will use VISA, be sure to select *both* SICL and VISA to install. This is because you must install and configure SICL in order to use VISA.

- To select individual filesets, double-click on the bundle, then on the product until the individual filesets are displayed. Now you can select a specific fileset by clicking on the desired fileset and selecting **Mark for Install** from the **Actions** menubar. Mark all the filesets you wish to install.

A list of the HP I/O Libraries filesets follows.

NOTE

The SICL filesets must be installed if you will use VISA. Always install the **SICL-RUN** fileset. Install the **SICL-PRG** fileset if you will be doing any SICL development, and install the **SICL-PRG** and **VISA-PRG** filesets if you will be doing any VISA development. Also install interface-specific filesets as needed.

To use the SICL LAN server capability, you must install the **SICL-LANSVR** and **SICL-RUN** filesets, as well as another interface-specific fileset, such as **SICL-HPIB** or **SICL-VXI**.

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HP SICL Filesets

Fileset	When to Load	Description
SICL-DIAG	Optional	Miscellaneous diagnostic tools and utilities.
SICL-GPIO	GPIO Interface	The GPIO extensions to SICL.
SICL-HPIB	HP-IB Interface	The HP-IB extensions to SICL and VISA.
SICL-LAN	LAN Client	The LAN client extensions to SICL and VISA.
SICL-LANSVR	LAN Server	The LAN server software which enables a host to act as a LAN-to-instrument_interface gateway.
SICL-MAN	Optional	The online man pages and documentation.
SICL-MAN-GPIO	Optional	The online man pages for SICL's GPIO functions.
SICL-MAN-HPIB	Optional	The online man pages for SICL's HP-IB functions.
SICL-MAN-LAN	Optional	The online man pages for SICL's LAN functions.
SICL-MAN-LANSVR	Optional	The online man pages for the LAN server functionality.
SICL-MAN-RS232	Optional	The online man pages for SICL's RS-232 functions.
SICL-MAN-VXI	Optional	The online man pages for SICL's VXI/MXI functions.
SICL-PRG	SICL or VISA Development	The programmer's development environment. Load this fileset if you plan to develop C/C++ I/O applications using the HP I/O Libraries. This fileset need not be loaded if you simply plan to use SICL with other products such as HP VEE, or if the system will serve only as a LAN server.
SICL-RS232	RS-232 Interface	The RS-232 extensions to SICL.
SICL-RUN	Always Load	The SICL run-time environment.
SICL-VXI	VXI Interface	The VXI extensions to SICL and VISA, including the VXI/MXI drivers, the VXI/MXI resource manager, and the configuration tools.
SICL-VXI-ISCPI	I-SCPI Interface	The Interpreted SCPI (I-SCPI) extensions to SICL which provide interpretation of SCPI commands for register-based instruments.

HP VISA Filesets

Fileset	When to Load	Description
VISA-MAN	Optional	The online man pages and documentation.
VISA-PRG	VISA Development	The programmer's development environment. Load this fileset if you plan to develop C/C++ I/O applications using the VISA I/O library. If you load this fileset, you must also load the associated SICL filesets.

8. Once you have marked the HP I/O Libraries bundle, an individual product, or the individual filesets for installation, select **Actions** from the menubar. Then select **Install** to begin the analysis process.
9. The program now performs an analysis to ensure the installation process will be successful. When the analysis status reads **Ready**, click on the **OK** button to begin the installation. If the analysis fails, click on the **Logfile** button for information on why the analysis failed.
 - If you used the **swcluster** program, the program will prompt asking if you would like to exit **swinstall**. The **swcluster** program calls **swinstall** to install the software onto the cluster nodes. Once you exit **swinstall**, the software will be installed on the cluster nodes, and the program will exit. Note that if this is the first time the software is installed, the cluster clients will be halted. Now continue with step number 12.
 - If you used the **swinstall** program, the program will prompt to ensure you want to install the selected software. After selecting **YES**, the program may also prompt that your system will be rebooted once the software is installed. Click on **YES** and the installation will begin.
10. Once the software is installed the program prompts if you have any **NOTES**, **ERRORS**, or **WARNINGS**. If you do have any of these, click on the **Logfile** button to determine any necessary action. See the next subsection for information on **NOTES**, **ERRORS**, or **WARNINGS**.
11. When the status reads **Ready**, click on the **Done** button. If extra software was installed, the program will prompt stating that your system will reboot. Click on **YES** to continue.

Installing the HP I/O Libraries

NOTE

The first time the system (stand-alone, server, or cluster client workstation) is rebooted after installation, it may take several minutes longer than usual due to additional software configuration steps.

12. When the loading process is complete and the system(s) have rebooted, unmount your CD-ROM, remove the installation media, and store it in a safe place. See the `umount(1m)` man page for information on the `umount` command. The HP I/O Libraries software is now installed on your system.

NOTE

You can run the `swverify` command to ensure that the HP I/O Libraries filesets were installed on your system. See the *Managing HP-UX Software with SD-UX* manual for information on running this command. The following is an example of verifying the HP I/O Libraries bundle:

```
swverify -d E2091E
```


The Logfile

You can now check for errors or warnings that might have occurred during the HP I/O Libraries installation. Review the log file generated by the **swinstall** program by selecting **Logfile** from the menu.

If you used the **swcluster** program, you can view the logfile by doing the following:

```
tail -50 /var/adm/sw/swcluster.log | more
```

- **NOTE** is generally an information message, and action on your part is probably not needed.
- **WARNING** messages tell you that the installation did not complete with the expected results, but action on your part may not be needed.
- **ERROR** messages tell you that the **swinstall** program was unable to successfully complete a function, and action on your part is required to complete the installation process successfully.

Where to Go Next

Once you have completed installing the HP I/O Libraries on HP-UX, continue with the next section, “Configuring the HP I/O Libraries.”

Configuring the HP I/O Libraries

Before you can begin programming with either SICL or VISA, you need to configure each of your systems to operate with an I/O interface or interfaces. This configuration involves the following:

- Running the I/O setup utility
- Running the VISA configuration utility
- Customizing the SICL LAN server

Each of these steps is described in detail in the following subsections.

Running the I/O Setup Utility

The I/O setup utility updates the `hwconfig.cf` file to reflect your interface configuration. If you wish to manually configure the interfaces by editing this file, see Appendix B, “Editing the `hwconfig.cf` File.” (However, if you have a Plug and Play HP E2071D HP-IB interface, please see the following NOTE.)

NOTE

If you have a Plug and Play HP E2071D HP-IB interface, you *must* use the I/O setup utility as described in this section to configure the E2071D interface (rather than manually editing the `hwconfig.cf` file). This is because the I/O setup utility is able to automatically detect and set the correct configuration values for the E2071D for you. (Manually setting these values in the `hwconfig.cf` file yourself is extremely difficult and is not documented in this manual.)

NOTE

The following procedure must be performed on each node of a diskless cluster that will use SICL and/or VISA. You need to configure the server of a diskless cluster if you plan to run your applications on the server.

NOTE

This procedure also assumes previous installation of all I/O interface cards. For installation procedures, see the installation guide that was shipped with the interface.

If you will use an RS-232 interface with SICL, refer to Appendix A, "Using RS-232 Cables and HP Instruments," in this manual, as well as the *RS-232 Cables Addendum* included in your HP I/O Libraries product package for more information on cabling.

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To run the I/O setup utility, do the following:

1. Login as **root** on the system to be configured.

If you are executing on a diskless cluster, note that the `/etc/opt/sicl` directory will be NFS diskless client private, and all files in it will be client-specific.

2. Run the I/O setup utility, as explained below, to configure your I/O interfaces for SICL and VISA.

NOTE

The `iosetup` utility can only be run from a writable directory. Therefore, if you are running on an NFS diskless cluster client in the `/opt` directory, you must change your directory to a writable directory such as `/tmp`.

The following command will invoke the I/O setup utility:

```
/opt/sicl/bin/iosetup
```

The following options are available:

- `-enumber` Allows you to specify the number of EISA slots to be configured. See the following note.
- `-mmodel` Allows you to specify the system type.

NOTE

If you are operating on a system with an EISA expander (such as the HP S2399A), use the `-enumber` option to specify the number of EISA slots available. For example:

```
/opt/sicl/bin/iosetup -e7
```

3. The available interfaces will be listed on the left side of the I/O setup utility's window. Click on the interface you wish to configure and then click on the **Configure** button. The I/O setup utility will display information about that interface.

Edit the fields displayed to match your setup and then click on the **OK** button. The defaults provided are usually sufficient. However, if you need more information, click on the **Help** button for detailed information about the field content, or see the "HP I/O Libraries Interfaces" section at the end of this chapter for a summary of each interface type.

Repeat this step for each interface you wish to configure. If you plan to use two interfaces of the same type, then you must configure each interface separately.

NOTE

You must ensure that each address and interrupt line (IRQ) is unique and does not conflict with an address or IRQ line used by any other card in the system.

4. Once you have added all desired interfaces, click on **Done** in the main window. The I/O setup utility will edit the `hwconfig.cf` file and rebuild the kernel. (If you only add a LAN interface, the kernel is not rebuilt.) Status messages will scroll by very quickly. To review the messages, see the `/var/opt/sicl/kernbld.log` file.
5. Reboot your system in order for the kernel changes to take effect (this step is not required if you only configure a LAN interface).
6. If you are configuring a cnode or a root server of a diskless cluster to act as a LAN-to-instrument_interface gateway (a SICL LAN server), then you must run the `lanconf` utility by typing the following:

```
/opt/sicl/bin/lanconf
```

If you are configuring a stand-alone system to act as a SICL LAN server, then this utility was already run for you as part of the installation process.

Configuring the HP I/O Libraries

See the `lanconf` man page for details as to what steps this utility performs. Also, be sure to read the “Customizing the HP SICL LAN Server” section later in this chapter for more information about configuring the SICL LAN server.

You have now finished configuring SICL. If you wish to use VISA, follow the procedures in the next subsection to configure your system for VISA devices. Otherwise, continue with the section “Customizing the HP SICL LAN Server” later in this chapter, or continue with the next chapter, “Documentation for the HP I/O Libraries.”

Running the HP VISA Configuration Utility

If you plan to use VISA, you must also run the VISA configuration utility. The VISA configuration utility configures your system for VISA devices. In order to build VISA applications, all VISA devices must be identified beforehand. Use the following procedure to configure VISA devices.

NOTE

You *must* run the `iosetup` utility (as explained in the previous subsection) prior to running the VISA configuration utility.

1. Login as `root` on the system to be configured.
2. Run the VISA configuration utility to configure your VISA devices. The following command will invoke the VISA configuration utility:

```
/opt/vxipnp/hpux/hpvisa/visacfg
```

3. The available interfaces will be listed on the left side of the VISA configuration utility's window. Click on the interface you wish to configure and then click on the **Configure** button. The VISA configuration utility will display information about that interface.

Edit the fields displayed to match your setup. The defaults provided are usually sufficient. However, if you need more information, click on the **Help** button for detailed information about the field content, or see the "HP I/O Libraries Interfaces" section at the end of this chapter for a summary on each interface type.

Note that the default is for all VISA devices to be identified at run-time. If you wish to change this default, click on one of the following:

- **Identify all known devices now** - The program will prompt for you to ensure that all instruments on the interface are powered on and are in working condition. This selection will check for VISA devices when you click on **Continue**.
- **Manually configure devices on this interface** - Click on the **Add** button and enter the device address. Repeat for each device you want to add manually. Click on **Done** to exit.

Repeat this step for each VISA device you wish to configure. If you plan to use two interfaces of the same type, then you must configure each interface separately.

4. Once you have added all the desired VISA devices, click on **Done** in the main window.

You have now finished configuring the HP I/O Libraries, including SICL and VISA. If you wish to customize a SICL LAN server, see the next section. Otherwise, continue with the next chapter, "Documentation for the HP I/O Libraries."

Customizing the HP SICL LAN Server

If you followed the final configuration step in the I/O setup utility, your host system should now be acting as a SICL LAN server. This section describes additional configuration parameters you can customize for the SICL LAN server if you do not wish to use the default parameters.

NOTE

If you ever wish to remove the SICL LAN server capability from a computer node, please refer to Appendix E, "Removing HP I/O Libraries Software," for instructions.

Optional HP SICL LAN Server Configuration

The SICL LAN server, `/opt/sicl/bin/siclland`, is a network daemon which accepts SICL I/O requests from SICL LAN clients on the network and performs the requested I/O operations. The `siclland` daemon is started by `inetd`.

To customize the `siclland` daemon configuration, do the following.

1. Login as `root` on the host system.
2. Edit the `/etc/inetd.conf` file and modify the parameters in the `siclland` entry, as desired. The syntax of the `siclland` entry is as follows:

```
rpc stream tcp nowait root /opt/sicl/bin/siclland 395180 1
siclland [-l logfile] [-s] [-k] [-t timeout]
rpc stream tcp nowait root /opt/sicl/bin/siclland 395183 1
siclland [-l logfile] [-s] [-k] [-t timeout]
```

The parameters you can modify are as follows.

-l logfile

Configures **siclland** to log errors to the specified file, *logfile*. If the file does not exist, **siclland** will create it. Also, if multiple clients are accessing the same host, all SICL LAN log messages go to the same log file.

By default, only the **-l logfile** parameter is specified in */etc/inetd.conf*. The default path to the log file is */var/opt/sicl/siclland_log*. Within a diskless cluster, this directory is an NFS diskless client private directory which allows more than one system in the cluster to act as a SICL LAN server, each logging messages to its own log file.

Also note that the error messages are constantly appended to the log file (that is, the log file is not overwritten). Therefore, the log file may grow rather large over time, and will need to be truncated or removed occasionally to regain disk space.

-s

Configures **siclland** to log client connections and locking activity in addition to errors. The logged information goes to the file specified with the **-l logfile** parameter. The **-s** parameter can only be used if the **-l logfile** parameter is also used.

Note that significantly more data is logged to the log file with the **-s** option than if only the **-l** option is used. Therefore, the log file will grow rather large over time, and will need to be truncated or removed occasionally to regain disk space.

Configuring the HP I/O Libraries

- k** Configures **siclland** to use keepalive transmissions to determine if it can still communicate with its client. To accomplish this, the server is configured to use the TCP keepalive timer of the host's TCP/IP protocol stack to determine if a client is still reachable. By specifying this parameter, the **siclland** daemon will turn on the keepalive timer when connecting to the client. If after the system-specified amount of time there has been no activity on the connection, the server will send keepalive probes to the client to determine if it is still alive. After a system-specified amount of time, the connection will be marked as down ("dropped"), and the server will release any resources which were allocated to the associated client.

Note that, in HP-UX, the system's keepalive timer may not start sending keepalive transmissions for two hours, and may retry the transmissions for ten minutes before marking the connection as dropped. See **getsockopt(2)**.

- t *timeout*** Configures **siclland** to use an I/O timeout value of *timeout* seconds if the client requests a timeout of infinity (0). If zero (0) is specified and the client requests infinity, then **siclland** will use a timeout of infinity as requested. The default is 120 seconds.

This timeout parameter may be used to ensure that the server does not wait indefinitely for an I/O operation. This also allows the server to detect certain network events, such as when a client connection is dropped, which may otherwise go undetected. If the server detects such a condition, it will release any resources, such as SICL locks, associated with the client.

For more information, see the man pages for **inetd** and **inetd.conf** for configuring the SICL LAN server.

3. Once you have finished editing the **siclland** entry in **/etc/inetd.conf**, save and exit the file.

4. Type the following, which makes `inetd` reread its configuration file:

```
/usr/sbin/inetd -c
```

Optional HP SICL LAN
Server Security

The SICL LAN server can be configured to only accept connections from certain clients. This is accomplished via the optional `inetd` security file, `/var/adm/inetd.sec`. For example, the following entry in the `inetd.sec` file will allow only the host named `siclclient` to access the SICL LAN server:

```
siclland allow siclclient
```

A list of networks or hosts can be specified. It is also possible to list networks or hosts which should be denied access. For more information, see the man page for `inetd.sec(4)`.

HP I/O Libraries Interfaces

This subsection summarizes each field in the configuration utilities for each interface type supported by SICL and/or VISA. If you need more information on a specific field, see the online help in the configuration utility.

HP-IB Interfaces

VISA and SICL support the following HP-IB interfaces:

- HP E2070
- HP E2071
- HP Model 745i Built-in HP-IB
- HP Model V743 Built-in HP-IB

NOTE

To use the HP Model V743 built-in HP-IB, you must also configure the VXI interface in the V743.

Installing and Configuring
the HP I/O Libraries
Configuring the HP I/O Libraries

HP-IB Interfaces

Field	Interfaces	Default	Description
PNP #	E2071D	(None)	Identifies this as a Plug and Play (PNP) interface. Each interface is assigned a unique PNP number, which is printed on a sticker on the exterior connector plate of the interface card.
Logical Unit #	All	7	Identifies the interface. Each interface must have a unique logical unit number. Subsequent cards will default to 8, 9, 10, etc.
Symbolic Name	All	hpib	Identifies the interface. Each interface type must have a unique symbolic name. hpibx is used for additional cards, with <i>x</i> being the card number (hpib2 , for example).
Slot	E2070 E2071	1	EISA/ISA slot number. If another card has been configured to slot 1, the next available slot is used.
DIP switches	E2070 E2071A-C	01110000 0000	Must reflect the dip switch setting on the interface card. If the DIP switch value is changed here, it must also be changed on the interface card (prior to rebooting with a new kernel).
Base Address	E2071D	250	Sets the I/O base address (hexadecimal) for the interface.
IRQ line	E2071	3	Interrupt request line. If IRQ line 3 is taken by another known card, then the next available line is used.
System Controller	All	Yes	Specifies that the HP-IB interface is system controller.
HP-IB Bus Addr	All	21	HP-IB bus address of the computer or controller on this interface.

VXI Interfaces

VISA and SICL support the following VXI interfaces:

- HP Model V743 VXIbus
- HP E1489 MXI

SICL also supports:

- HP Interpreted SCPI (I-SCPI)

V743 and E1489 VXI Interfaces

Field	Interfaces	Default	Description
Logical Unit #	V743	16	Identifies the interface. Each interface must have a unique logical unit number.
	E1489	16	
		64	
Symbolic Name	V743	vxi	Identifies the interface. Each interface type must have a unique symbolic name. vxix is used for additional cards, with x being the card number (vxi2 , for example).
	E1489	vxi	
		iscpi	
Slot	V743	0	VXI slot number.
	E1489	1	EISA slot number.
Logical Address	V743	0	Logical address of the VXI interface.
IRQ line	E1489	3	Interrupt request line. If IRQ line 3 is taken by another known card, then the next available line is used.
	V743	1	
Num 64K Windows	E1489	16	Maximum number of 64K windows that can be allocated. If more than one window is declared, the total must not exceed 16.
64K base addr	E1489	0x500000	Base address for 64K window allocation.
Num 1M Windows	E1489	10	Maximum number of 1M windows that can be allocated. If more than one window is declared, the total must not exceed 10.
1M base addr	E1489	0x600000	Base address for 1M window allocation.

Installing and Configuring
the HP I/O Libraries
Configuring the HP I/O Libraries

Interpreted SCPI (I-SCPI) VXI Interface

Field	Interfaces	Default	Description
Logical Unit #	I-SCPI	64	Identifies the interface. Each interface must have a unique logical unit number.
Symbolic Name	I-SCPI	iscpi	Identifies the interface. Each interface type must have a unique symbolic name.
SCPI Drivers	I-SCPI	/opt/sicl /lib/iscpi	Directory location of the I-SCPI drivers.
Backplane	I-SCPI	vxi	The symbolic name of the VXI backplane, usually vxi .

RS-232 Interfaces

SICL supports the following RS-232 interfaces:

- HP Series 700 Built-in RS-232
- HP Model V743 Built-in RS-232

RS-232 Interfaces

Field	Interfaces	Default	Description
Logical Unit #	All	9 for the first 10 for the second	Identifies the interface. Each interface must have a unique logical unit number.
Symbolic Name	All	COM1 for first COM2 for second	Identifies the interface. Each interface type must have a unique symbolic name.
Port	All	A	Identifies the port in which the interface is installed.
Baud Rate	All	9600	Baud rate of the RS-232 interface.
Parity Bit	All	None	Can be none, odd, even, zero, or one.
Character Bits	All	8	Bits per character.
Stop Bits	All	1	Number of stop bits.
Flow	All	None	Flow.
Service Request	All	RI	Service Request type.

LAN Client Interface

VISA and SICL support the following LAN client interface:

- HP Series 700 LAN Client

LAN Client Interface

Field	Interfaces	Default	Description
Logical Unit #	LAN Client	30	Identifies the interface. Each interface must have a unique logical unit number.
Symbolic Name	LAN Client	lan	Identifies the interface. Each interface must have a unique symbolic name.
Server Timeout	LAN Client	120	Timeout value in seconds used by the LAN server when applications either use the default timeout value or set the timeout to 0.
Client Timeout Delta	LAN Client	25	Value in seconds added to the server timeout value to determine the LAN Client timeout value.
Chain SIGPIPE	LAN Client	YES	Determines if the library will call a previously installed SIGPIPE handler.
Log Errors	LAN Client	YES	Determines if the library will log errors to standard out.

Installing and Configuring
the HP I/O Libraries
Configuring the HP I/O Libraries

GPIO Interface

SICL supports the following GPIO interface:

- HP E2074 GPIO

GPIO Interface

Field	Interfaces	Default	Description
Logical Unit #	E2074	12	Identifies the interface. Each interface must have a unique logical unit number. Subsequent cards would default to 13, 14, 15, etc.
Symbolic Name	E2074	gpio	Identifies the interface. Each interface must have a unique symbolic name. gpio_x is used for additional cards, with x being the card number (gpio₂ , for example).
Slot	E2074	1	EISA/ISA slot number.
DIP Switches	E2074	0000	Must reflect the dip switch setting on the interface card.
IRQ line	E2074	3	Interrupt request line. If IRQ line 3 is taken by another known card, then the next available line is used.
DMA Channel	E2074	1 for 8-bit 5 for 16-bit	Specifies the number of ISA DMA channels to be used by the interface.
DataOut	E2074	Lo=1	Specifies polarity is set to low-true.
PSTS	E2074	Lo=NotOK	Specifies peripheral status line is set to low-true.
PFLG	E2074	Lo=Ready	Specifies peripheral flag is set to low-true.
DataIn	E2074	Lo=1	Specifies polarity is set to low-true.
PCTL	E2074	Lo=Set	Specifies peripheral control line is set to low-true.
PCTL Delay	E2074	400ns	Specifies peripheral control line delay.
Data Port	E2074	98622 Comp	Configures the data port mode.
Clear DOUT at Reset	E2074	NO	Determines if DOUT is cleared at reset.
Handshake modes	E2074	Full Write/Full Read	Determines handshaking mode.
Data-in clocking	E2074	MSB:Read CLK LSB:Read CLK	Determines when the data input registers are latched.

Where to Go Next

Once you have completed all the HP I/O Libraries installation and configuration procedures, continue with the next chapter, "Documentation for the HP I/O Libraries."

Documentation for the
HP I/O Libraries

Documentation for the HP I/O Libraries

After you have followed the instructions in Chapter 2 of this guide to install and configure the HP I/O Libraries, you can begin to use VISA or SICL.

This chapter lists the manuals and online help you should follow next to use VISA or SICL.

HP VISA Documentation

To use VISA, you should now go on to Chapter 1, "Introduction," of the *HP VISA User's Guide*.

The following documentation is also helpful when using VISA:

- *HP VISA Quick Reference Guide for C Programmers* helps you find VISA function syntax information quickly.
- *HP VISA Online Help* is provided in the form of HyperHelp.
- *HP VISA Example Programs* are provided online to help you develop VISA applications more easily.

The following documents may also be helpful when using VISA:

- *VXIplug&play System Alliance VISA Library Specification 4.3*
- *IEEE Standard Codes, Formats, Protocols, and Common Commands* - ANSI/IEEE Standard 488.2-1992

The following VXIbus Consortium specifications may also be helpful when using VISA over LAN:

- *TCP/IP Instrument Protocol Specification* - VXI-11, Rev. 1.0
- *TCP/IP-VXIbus Interface Specification* - VXI-11.1, Rev. 1.0
- *TCP/IP-IEEE 488.1 Interface Specification* - VXI-11.2, Rev. 1.0
- *TCP/IP-IEEE 488.2 Instrument Interface Specification* - VXI-11.3, Rev. 1.0

HP SICL Documentation

To use SICL, you should now go on to Chapter 1, "Introduction," of the *HP SICL User's Guide for HP-UX*.

The following documentation is also helpful when using SICL:

- *HP SICL Reference Manual* provides the function syntax and description of each SICL function.
- *HP SICL Quick Reference Guide for C Programmers* helps you find SICL function syntax information quickly.
- *HP SICL Online Help* is provided in the form of HyperHelp.
- *HP SICL Example Programs* are provided online to help you develop SICL applications more easily.

The following VXIbus Consortium specifications may also be helpful when using SICL over LAN:

- *TCP/IP Instrument Protocol Specification* - VXI-11, Rev. 1.0
- *TCP/IP-VXIbus Interface Specification* - VXI-11.1, Rev. 1.0
- *TCP/IP-IEEE 488.1 Interface Specification* - VXI-11.2, Rev. 1.0
- *TCP/IP-IEEE 488.2 Instrument Interface Specification* - VXI-11.3, Rev. 1.0

A

Using RS-232 Cables and
HP Instruments

Using RS-232 Cables and HP Instruments

Several RS-232 cables are available to use with HP instruments. Many will work, even though the actual connector pin-outs are different. There is also a choice of four connectors for RS-232: a male and a female DB25, and a male and a female DB9.

This appendix discusses some of the RS-232 cables and connectors that you may use to connect instruments to computers, printers, and modems for use with SICL. You should also refer to the *RS-232 Cables Addendum* insert included in your HP I/O Libraries product package. Together, this appendix and the insert should help you decide which RS-232 cabling to use with SICL for your particular situation.

Your instrument's manufacturer should also provide information on which control and handshaking lines are used. Having that information will give you a better understanding of the actual needs of your computer program and the cable needed. If you do not have that information, however, the cables listed in the *RS-232 Cables Addendum* will allow your instrument to work, but perhaps not optimally.

The *RS-232 Cables Addendum* insert lists alternate RS-232 cables. Although the cables that are known to work are listed in the insert, you still may have questions. The insert provides pin-out diagrams for the cables as a reference to help you resolve cabling problems.

General Purpose Cables and Connectors

Although the RS-232 standard defines 22 data and status/control lines, only 9 or fewer are commonly used. The following table shows the definitions for those lines. Only three lines (TX, RX, and signal ground) are required for bi-directional communication between Data Terminal Equipment (DTE, such as terminals or computers) and Data Communications Equipment (DCE, such as modems). The other lines serve as status/control lines between the DTE and DCE devices and help establish and maintain communication. DTE devices typically use male connectors (HP is the exception), and DCE devices use female connectors.

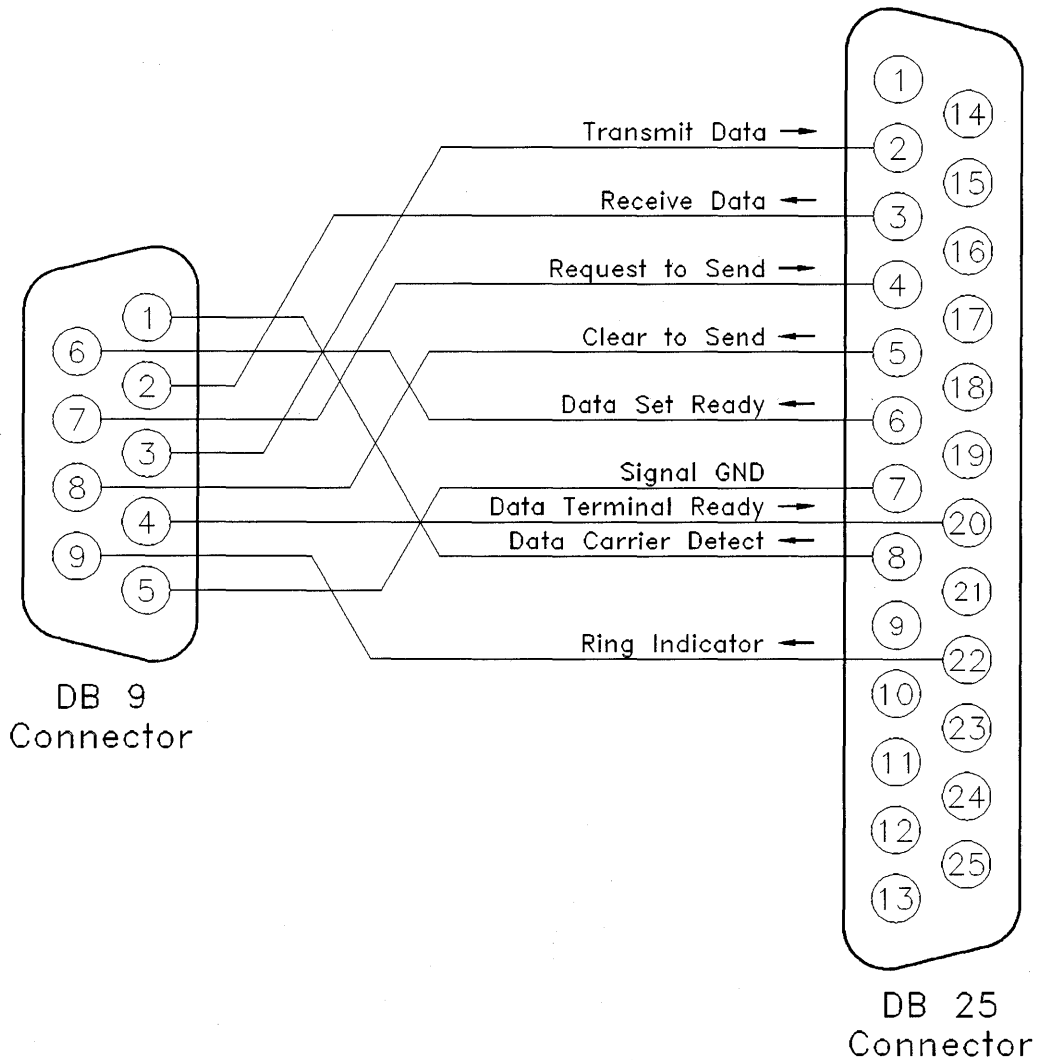
NOTE

All signal names in the RS-232 standard are from the perspective of the DTE device. The DTE *transmits* data on pin 2 and *receives* on pin 3 (25-pin connectors). The DCE transmits on pin 3 and receives on pin 2. This appendix follows this convention.

The status/control lines control the flow of data. Usually this is either the RTS/CTS or DTR/DSR pair. Cables used with the HP 34401A, 33102A, 53131A and 54600 series instruments should have four signals wired: the data pair RX/TX and the status line pair DTR/DSR. Each pair should be crossed from the instrument to the computer. Signal Ground (SG, GND) must be wired straight through. These HP instruments use the DTR/DSR pair for data flow control.

9-Pin to 25-Pin RS-232 Conversion

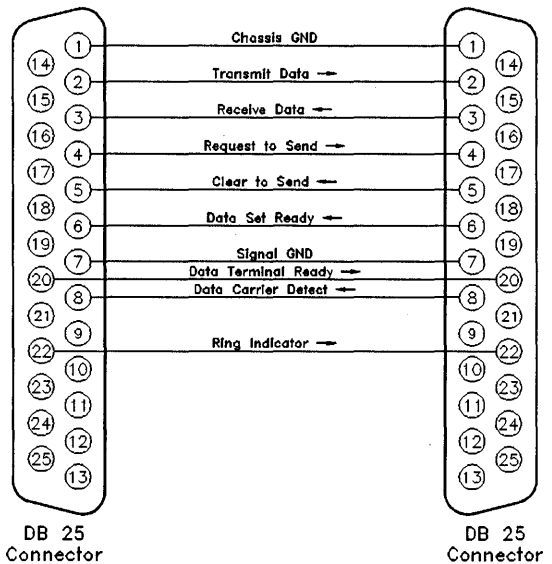
Signal Type	Pin Out		Name	Direction	Abbreviation
	9-pin	25-Pin			
Data	2	3	Received Data	In	RD, RX
Data	3	2	Transmitted Data	Out	TD, TX
Control	4	20	Data Terminal Ready	Out	DTR
Modem Status	6	6	Data Set Ready	In	DSR
Control	7	4	Request to Send	Out	RTS
Modem Status	8	5	Clear to Send	In	CTS
Modem Status	1	8	Carrier Detect	In	RLSD, CD
Modem Status	9	22	Ring Indicator	In	RI
Electrical	5	7	Signal Ground		GND, SG



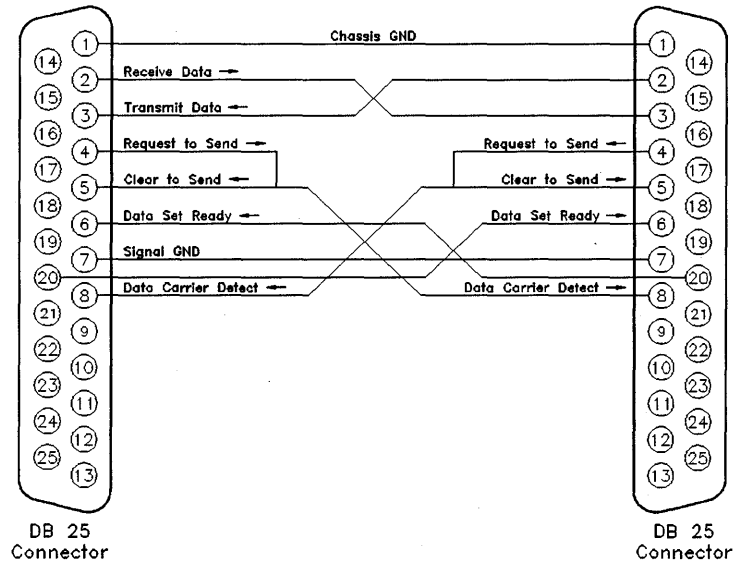
9-Pin to 25-Pin RS-232 Adapter

General Purpose Cables and Connectors

The following three figures show the wiring and pin-outs of three common, industry-standard cables. These three are not the only cables available. For additional information, refer to the the *RS-232 Cables Addendum* insert included in your HP I/O Libraries product package.



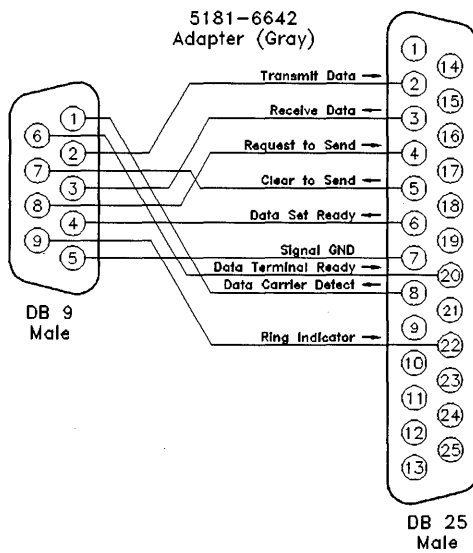
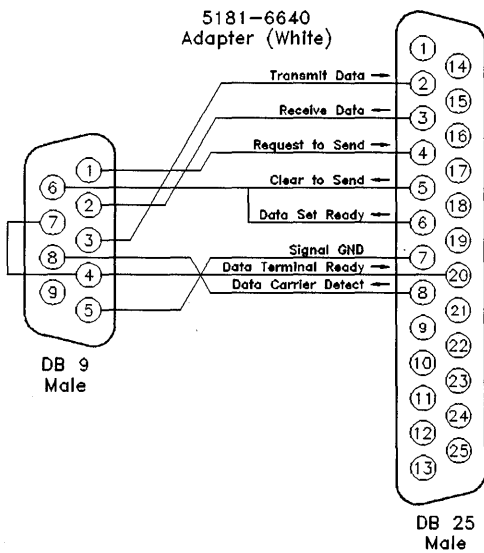
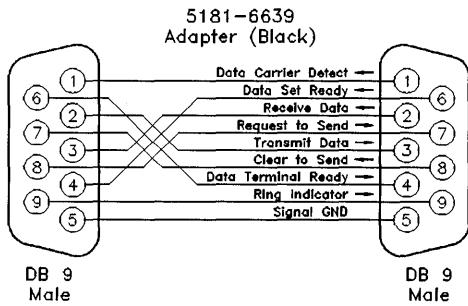
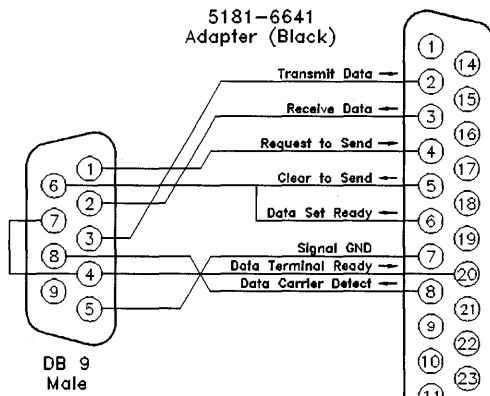
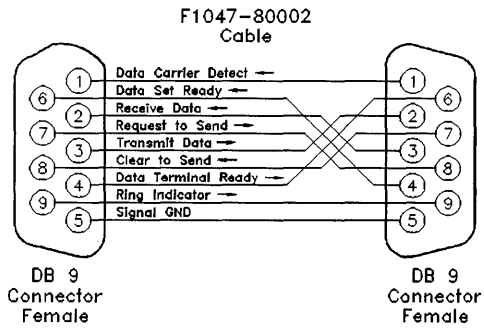
Standard Null Modem Cable (Typically Used for Printers)



Standard Computer to Modem Cable

One of HP's general purpose cables is the HP F1047-80002. It is a 9-pin female to 9-pin female wired as a null modem/printer cable. Four adapters are available for it that will accommodate almost any pin configuration, including modems. The following figure shows this cable and the four adapters. The HP 24542U cable also has the 9-pin female to 9-pin female connections. The adapters also work for this cable where only the two lines DSR/DTR are used.

Using RS-232C Cables and HP Instruments
General Purpose Cables and Connectors



HP F1047-80002 Cable with Adapters

Recommendations

The recommended cables for RS-232 are shown in the *RS-232 Cables Addendum* insert included in your HP I/O Libraries product package. The cables listed as alternatives may be more readily available, or work better in your specific SICL application. The list is based on current availability and on the existing literature and catalogs.

B

Editing the
hwconfig.cf File

Editing the `hwconfig.cf` File

NOTE

If you have a Plug and Play HP E2071D HP-IB interface, you *must* use the I/O setup utility as described in Chapter 2 to configure the E2071D interface (rather than manually editing the `hwconfig.cf` file). This is because the I/O setup utility is able to automatically detect and set the correct configuration values for the E2071D for you. (Manually setting these values in the `hwconfig.cf` file yourself is extremely difficult and is not documented in this manual.)

This appendix explains how to manually edit the `hwconfig.cf` file. The `hwconfig.cf` file contains the configuration details for SICL interfaces. This file is automatically updated when you run the I/O setup utility during the system configuration (described in the “Configuring the HP I/O Libraries” section of Chapter 2).

It is recommended that you use the I/O setup utility to update this file. If needed, however, you can change the configured SICL interfaces by manually editing the `hwconfig.cf` file, rebuilding the kernel, and then rebooting the system, as explained in this appendix.

NOTE

The procedure in this appendix does *not* make any changes to the VISA devices configuration. You must run the VISA configuration utility described in Chapter 2 to configure VISA devices or to make any changes to the VISA configuration.

The Procedure

This SICL configuration procedure involves editing the `hwconfig.cf` file to specify your SICL I/O interfaces, rebuilding the kernel, and rebooting the system.

If you are using only the LAN client interface (SICL-LAN), you only need to edit the `hwconfig.cf` file — rebuilding the kernel and rebooting your system are not necessary.

However, if you are using the LAN server (SICL-LANSVR), you must edit the `hwconfig.cf` file to specify one or more instrument interfaces (HP-IB, VXI/MXI, and/or RS-232) that you will use with the LAN server. To configure the instrument interface, you will then need to run the configuration program `siclconf` on the Series 700 system which will act as a LAN server, and then reboot the system.

NOTE

The following procedure must be performed on each node of a diskless cluster that will be using SICL. You only need to configure the server of a diskless cluster if you plan to run applications on the server.

1. Login as `root` on the system to be configured.
2. Edit the `/etc/opt/sicl/hwconfig.cf` file. If you are executing on a diskless cluster, note that the `/etc/opt/sicl` directory will be NFS diskless client private, and all files in it will be client-specific.

You need to have one entry for each I/O interface in the system. The default `hwconfig.cf` file should contain entries (which are commented out) for the I/O interfaces already installed in your system. Therefore, un-comment and edit the entries that you want to use in your system.

The following are some example I/O interface configuration entries. If you need more information about the contents of the `hwconfig.cf` file, see “The Hardware Configuration File” section at the end of this appendix.

The Procedure

NOTE

You must ensure that each address and interrupt line (IRQ) is unique and does not conflict with an address or IRQ line used by any other interface in the system.

- **Model V743 with the VXI Interface** - logical unit number 16, symbolic name vxi, VXI slot number 0, VXI logical address 0:

```
16 vxi v743 0 0
```

- **Series 700 with an HP E2071A-C High-Speed HP-IB Interface** - logical unit number 7, symbolic name hpib, EISA slot number 1, HP-IB bus address 21, DIP switch on card 0000, system controller 1, IRQ line 3:

```
7 hpib e2071 1 21 0b0000 1 3
```

- **Model V743 with a Built-in HP-IB Interface** - logical unit number 7, symbolic name hpib, slot number 99 (must always be 99), HP-IB bus address 21, card location 0000 (must always be 0000), system controller 1, IRQ line 9 (must always be 9):

```
7 hpib s743 99 21 0b0000 1 9
```

- **Model 745i with a Built-in HP-IB Interface** - logical unit number 7, symbolic name hpib, card location 0xf0835000 (this number should not be changed), HP-IB bus address 21, system controller 1:

```
7 hpib s745 0xf0835000 21 1
```

- **Series 700 with an HP E2074 GPIO Interface** - logical unit number 12, symbolic name gpio, EISA slot number 1, DMA channels 1 - 5, DIP switch on card 0000, IRQ line 10, polarity value 00000, data port and handshake mode 00, read clock timing 00, delay value 1:

```
12 gpio e2074 1 0x15 0b0000 10 0b00000 0x00 0x00 1
```

- Series 700 with an HP E1489 MXI Interface - logical unit number 16, symbolic name `vxi`, slot number 1, logical address 0 (must be 0), base port address 0, IRQ line 9, base address for 64K windows, number of 64K windows, base address for 1M windows, number of 1M windows:

```
16 vxi e1489 1 0 0 9 0x500000 16 0x600000 10
```

- Series 700 with a Built-in RS-232 Interface - logical unit number 9, symbolic name `COM1`, card location `0x00000001`, IRQ 26 (this number should not be changed), baud rate 9600, parity none (`0x00`), cbits equal to 8 (`0x03`), sbits equal to 1 (`0x00`), flow equal to NONE (`0x00`), and SRQ equal to RI (`0x00`):

```
9 COM1 serial700 0x00000001 26 9600 0x00  
0x03 0x00 0x00 0x00
```

- Series 700 with LAN Client - logical unit number 30, symbolic name `lan`, card name `ilan`, unused 0 and 0, SICL timeout 120 seconds, client timeout delta 25 seconds, chain SIGPIPE signals enabled 1, and error logging enabled 1:

```
30 lan ilan 0 0 120 25 1 1
```

3. Run the SICL configuration program, as follows. If you are executing on a diskless cluster, then run this program on all network clients or cnodes that will use this software. Note that this step is not necessary if you are using only the LAN client interface. Type `man siclconf` for a list of options.

NOTE

You must execute this configuration program from a writable directory, such as `/tmp`.

```
/opt/sicl/bin/siclconf
```

This program will configure your system, including building a new kernel and running the `eisa_config(1m)` program, if necessary. While the program runs, it prompts with the following.

The Procedure

- **OK to use ...**

The program will display `/stand/system`. You may use other file names if you have customized this file. Note, however, that many applications expect to find the current kernel description in the location specified.

- **Save backup of ...**

This is the name for the kernel backup file. The `/stand/vmunix.prev` file will be displayed. Use a unique name if you wish to have a specific file for a particular cnode. The program copies your old kernel file to this new file.

- **Would you like to see the log file?**

4. When the SICL configuration program finishes, it will ask if you want to reboot your system. Note that this step is not necessary if you are using only the LAN client interface.

Type `y` to reboot at this time. If you want to manually reboot, type `n` and manually reboot by typing:

```
/sbin/reboot
```

NOTE

With some current kernel configurations, the SICL configuration will be unable to complete until after the system has rebooted. If this happens, you will be informed of an unsuccessful completion, and you will be asked to reboot your system. After you reboot, login as `root` and type the following:

```
/opt/sicl/bin/siclconf -e
```

The `-e` option runs only `eisa_config`.

5. If you are configuring a cluster node or a root server of a diskless cluster to act as a LAN-to-instrument_interface gateway (a SICL LAN server), then you must run the `lanconf` utility by typing:

```
/opt/sicl/bin/lanconf
```

If you are configuring a standalone system to act as a SICL LAN server, then this utility was already run for you as part of the installation customization process.

See the `lanconf` man page for details as to what steps this utility performs.

Also, be sure to read the section, “Customizing the HP SICL LAN Server,” in Chapter 2 for more information about configuring the SICL LAN server.

NOTE

If you will use VISA, then you must also run the VISA configuration utility every time you make changes to the hardware configuration. See Chapter 2 for information on running this utility.

The Hardware Configuration File

Each entry in the `hwconfig.cf` file corresponds to an interface that will be used for instrument I/O. There is only one line for each interface in the system. You only need to edit this file if you are not running the I/O setup utility.

The format of each line is as follows:

```
lu sym_name interface_name location [interface specific values]
```

Where:

- lu* Logical unit number of the interface ($0 < lu < 10000$). Each interface must have a unique logical unit number. The actual value used is not important, but you must remember this number, or the *sym_name*, in order to address the interface properly in your application.
- sym_name* A symbolic name for your interface. Each interface must have a unique symbolic name. This name may be used instead of the logical unit number to address an interface. The default symbolic name for your first HP-IB card should be `hpib`. Possible values for additional HP-IB cards include (but are not limited to) `hpib2`, `xhpib`, etc.
- interface_name* The specific name of the interface. This is used to determine which driver to use.
- location* The location of the card. For EISA/ISA cards, this is the slot number. For Series 700 built-in RS-232 cards, this field is the port number (for example, 1 or 2). This field is 0 (zero) for LAN and I-SCPI.

The following subsections describe interface-specific information for each possible interface. In each case, the values specified are numbers and may be represented in either hexadecimal (using `0x ...`), octal (using `0 ...`), binary (using `0b ...`), or decimal (default).

HP E2070 HP-IB Hardware Configuration

lu sym_name e2070 slot_num hpib_busaddr dip_switch sys_ctl

Where:

slot_num EISA/ISA slot number.

hpib_busaddr HP-IB bus address of this card.

dip_switch The value of the DIP switch setting for this E2070 interface card. See the table below and the *HP E2071 and E2070 HP-IB Interface Installation Guide* for information on how to code this value.

Switch positions one through four set the memory address of the card, and switches five and six set the IRQ line. Note the following:

HP E2070 Switch Settings

EISA Slot	Switches								Memory Address Range	Interrupt Line
	1	2	3	4	5	6	7	8		
1	0	1	1	1	0	0	0	0	DC000-DFFFF	3
2	0	1	1	0	0	1	0	0	D8000-DBFFF	4
3	0	1	0	1	1	0	0	0	D4000-D7FFF	5
4	0	1	0	0	1	1	0	0	D0000-D3FFF	7

sys_ctl 1 for system controller, or 0 for non-system controller.

Default HP E2070 HP-IB Interface:

7 hpib e2070 1 21 0b01110000 1 # Card in first slot (Slot #1)

Editing the `hwconfig.cf` File
The Hardware Configuration File

If you have more than one interface card, the following lines can be used for the second through fourth interface cards. Note, however, only slots (1,3) or (1,4) or (2,4) are allowed combinations, since two HP-IB cards cannot sit in two consecutive slots because of the connector's width (the HP-IB connectors will not fit on consecutive cards).

```
8 hpib2 e2070 2 21 0b01100100 1 # Card in second slot (Slot #2)
9 hpib3 e2070 3 21 0b01011000 1 # Card in third slot (Slot #3)
10 hpib4 e2070 4 21 0b01001100 1 # Card in fourth slot (Slot #4)
```

HP E2071A-C High-Speed HP-IB Hardware Configuration

```
lu sym_name e2071 slot_num hpib_busaddr dip sysctl irq
```

Where:

slot_num EISA/ISA slot number.

hpib_busaddr HP-IB Bus address of this card.

dip The value of the DIP switch setting on the E2071A-C interface card. See the table below and the *HP E2071 and E2070 HP-IB Interface Installation Guide* for information on how to code this value.

Switch positions one, two, and three set the base I/O address. Switch four is not used. Note the following:

HP E2071A-C Switch Settings

Switches	I/O Base Address	I/O Address Range Used
1 2 3 4	(Hexadecimal)	(Hexadecimal)
0 0 1 0	220	220-227
0 0 0 0	250	250-257
1 0 0 0	270	270-277
1 0 1 0	280	280-287
0 1 0 0	350	350-357
1 1 0 0	370	370-377
1 1 1 0	380	380-387
0 1 1 0	390	390-397

sysctl 1 for system controller, or 0 for non-system controller.

irq Interrupt request line.

Default HP E2071A-C High-Speed HP-IB Interface:

```
7 hpib e2071 1 21 0b0000 1 3
```

If you have more than one interface card, the following lines can be used for the second through fourth interface cards. Note, however, only slots (1,3) or (1,4) or (2,4) are allowed combinations, since two HP-IB cards cannot sit in two consecutive slots because of the connector's width (the HP-IB connectors will not fit on consecutive cards).

```
8 hpib2 e2071 2 21 0b0100 1 4 # Card in second slot
9 hpib3 e2071 3 21 0b1000 1 5 # Card in third slot
10 hpib4 e2071 4 21 0b1100 1 7 # Card in fourth slot
```

HP Model 745i Built-in HP-IB Hardware Configuration

```
lu sym_name s745 0xf0835000 hpib_busaddr sysctl
```

Where:

hpib_busaddr HP-IB bus address of this card.

sysctl 1 for system controller, or 0 for non-system controller.

Default HP Model 745i Built-in HP-IB Interface:

```
7 hpib s745 0xf0835000 21 1
```

HP Model V743 Built-in HP-IB Hardware Configuration

```
lu sym_name s743 99 hpib_busaddr 0b0000 sysctl 9
```

Where:

hpib_busaddr HP-IB Bus address of this card.

sysctl 1 for system controller, or 0 for non-system controller.

Default HP Model V743 Built-in HP-IB Interface:

```
7 hpib s743 99 21 0b0000 1 9
```

NOTE

To use the built-in HP-IB, you must also configure the VXI interface. See the "HP Model V743 VXI Hardware Configuration" section later in this appendix.

HP E2074 GPIO Hardware Configuration

lu sym_name e2074 slot_num dma dip irq polarity mode read_clk delay

Where:

slot_num EISA/ISA slot number.

dma The number of the ISA DMA channel to be used by the interface. This field has two independent hexadecimal digits. The first (most-significant) digit selects the DMA channel which will be used for 8-bit transactions (see `igpiosetWidth`). The choices are 1 or 2. The second digit selects the DMA channel which will be used for 16-bit transactions. The choices are 5, 6, or 7. A 0 (zero) in either digit prevents DMA from being used for transactions of that width.

There should not be any other card (HP SICL or otherwise) assigned to the DMA channel chosen. However, multiple SICL E2074 cards can cooperate on the same DMA channel. (The exact nature of that cooperation depends upon the `ihint` selected.) Note that the E2074 does not allocate two DMA channels. Assuming that the card's data width remains constant in a given application, only the one channel corresponding to that width will be used.

dip

The value of the DIP switch setting on the E2074 interface card. See the following table and the “Installation” chapter of the *HP E2074 GPIO Interface Installation Guide* for more information about this value.

Switch positions one, two, and three set the base I/O address. Switch four is not used. The mappings are:

HP E2074 Switch Settings

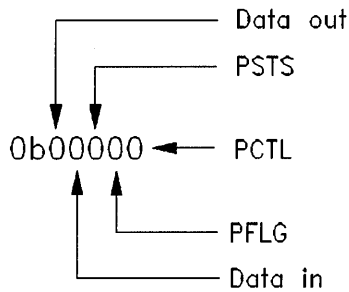
Switches 1 2 3 4	I/O Base Address (Hexadecimal)	I/O Address Range Used (Hexadecimal)
0 0 0 0	228	228-22F, 628-62F
1 0 0 0	238	238-23F, 638-63F
0 1 0 0	258	258-25F, 658-65F
1 1 0 0	288	288-28F, 688-68F
0 0 1 0	328	328-32F, 728-72F
1 0 1 0	348	348-34F, 748-74F
0 1 1 0	388	388-38F, 788-78F
1 1 1 0	398	398-39F, 798-79F

irq

Interrupt request line. The E2074 can use one of the following lines: 3, 5, 7, 9, 10, 11, 12, or 15. However, there must not be any other card (SICL or otherwise) assigned to that IRQ line.

polarity The default hardware polarity of all E2074 lines is low-true. The polarity of some lines cannot be altered, including: STI0, STI1, CTL0, CTL1, I/O, P_RESET, and EIR. The polarity of the remaining lines can be altered by the *polarity* mask in the `hwconfig.cf` file.

Each bit of this mask corresponds to a particular line (or set of lines). A 0 in that bit selects low-true (the default). A 1 in that bit selects high-true. The bits are assigned as follows:



The default polarity (0 in the associated bit) is shown in the following table. Putting a 1 in the associated bit inverts the polarity shown in this table.

Default Logical Polarity

Line	Default Polarity
Data Out	Low = 1
Data In	Low = 1
PSTS	Low = Not OK
PFLG	Low = Ready
PCTL	Low = Set

mode

Configures the data port and handshake mode. For a more detailed description, refer to the “Configuration Information” chapter of the *HP E2074 GPIO Interface Installation Guide*. This field has two independent hexadecimal digits. The first (most-significant) digit establishes the data port configuration. The choices are:

HP E2074 Data Port Configuration

Digit	Data Port	Clear DOUT at Reset
0	98622 Compatible	No
1	98622 Compatible	Yes
2	Enhanced Mode	No
3	Enhanced Mode	Yes

The second (least-significant) digit selects the PCTL/PFLG handshake mode. The choices follow. Note that Async mode applies to output operations only.

HP E2074 Handshake Modes

Digit	Write Handshake	Read Handshake
0	Full	Full
1	Pulse	Pulse
2	Async	Pulse

For example, a *mode* value of `0x20` configures the interface in Enhanced mode, with no DOUT clear at reset, and Full Handshake.

read_clk Determines when the data input registers are latched. For a more detailed description, refer to the “Configuration Information” chapter of the *HP E2074 GPIO Interface Installation Guide*. This field is a 2-digit hexadecimal number. The first (most-significant) digit establishes the read clock for the most-significant data byte. The second digit establishes the read clock for the least-significant data byte. The choices are:

HP E2074 Read Clock Choices

Digit	Read Clock Timing
0	When register is read
1	At Busy edge of PFLG
2	At Ready edge of PFLG

delay Sets the delay (settling time) from a data write to PCTL set in Auto-Handshake mode. In Standard-Handshake mode with `I_HINT_USEPOLL`, the actual delay is approximately 500 ns longer than the value shown. In a program that implements its own explicit handshake, this delay shown occurs after the `I_GPIO_SET_PCTL` request. The value is interpreted as follows:

HP E2074 PCTL Delay Choices

Value	Actual Delay
0	200 ns
1	400 ns
2	700 ns
3	1.2 μ s
4	2 μ s
5	5 μ s
6	10 μ s
7	50 μ s

Default HP E2074 GPIO Interface:

```
12 gpio e2074 1 0x15 0b0000 10 0b00000 0x00 0x00 1
```

If you have more than one interface card, the following lines can be used for the second through fourth interface cards.

```
13 gpio2 e2074 2 0x26 0b1000 11 0b00000 0x00 0x00 1 # Card in slot #2
14 gpio3 e2074 3 0x17 0b0100 12 0b00000 0x00 0x00 1 # Card in slot #3
15 gpio4 e2074 4 0x25 0b1100 15 0b00000 0x00 0x00 1 # Card in slot #4
```

HP Model V743 VXI Hardware Configuration

```
lu sym_name v743 vxi_slot vxi_laddr
```

Where:

vxi_slot VXI slot number (usually 0).

vxi_laddr VXI Logical Address (must be 0).

Default for HP Model V743 VXI Interface:

```
16 vxi v743 0 0
```

HP Interpreted SCPI (I-SCPI) Interface Configuration

```
lu sym_name iscpi 0 0 scpidrvrs backplane
```

Where:

scpidrvrs Directory location of the register-based VXI instrument drivers to be used with I-SCPI (default is `/opt/sicl/lib/iscpi`).

backplane The *sym_name* of the VXI backplane SICL driver, usually `vxi`.

Default for I-SCPI Interface:

```
64 iscpi iscpi 0 0 /opt/sicl/lib/iscpi vxi
```

HP E1489 MXI/VXI Hardware Configuration

```
lu sym_name e1489 slot_number vxi_laddr port_address irq_line  
64K_window_addr num_64K_windows 1M_window_addr num_1M_windows
```

Where:

<i>slot_number</i>	EISA slot number in which card is installed.
<i>vxi_laddr</i>	Logical address (must be 0).
<i>port_address</i>	Base port address (0 for EISA).
<i>irq_line</i>	EISA/ISA interrupt line.
<i>64K_window_addr</i>	Base address for 64K window allocation.
<i>num_64K_windows</i>	Maximum number of 64K windows that can be allocated for this card (max 16/min 1).
<i>1M_window_addr</i>	Base address for 1M window allocation.
<i>num_1M_windows</i>	Maximum number of 1M windows that can be allocated for this card (max 10/min 0).

Default HP E1489 VXI/MXI Interface:

```
MXI Slot 1 (all windows)  
16 vxi e1489 1 0 0 9 0x500000 16 0x600000 10
```

The following lines can be used for multiple E1489 cards. Note that the 64K and 1M windows have to be divided up among the interface cards.

```
MXI Slot 1 (partial windows)  
16 vxi e1489 1 0 0 9 0x500000 4 0x600000 4
```

```
MXI Slot 2 (partial windows)  
18 vxi2 e1489 2 0 0 10 0x540000 4 0xa00000 2
```

```
MXI Slot 3 (partial windows)  
20 vxi3 e1489 3 0 0 11 0x580000 4 0xc00000 2
```

```
MXI Slot 4 (partial windows)  
22 vxi4 e1489 4 0 0 12 0x5c0000 4 0xe00000 2
```

HP Series 700 Built-in RS-232 Hardware Configuration

lu sym_name serial700 location irq baud parity
cbits sbits flow SRQ

Where:

location Corresponds to which port is being used: should be 0x00000001 for COM1, or 0x00000002 for COM2.

irq Interrupt line, which is system-dependent and should be as follows:

RS-232 *irq* Values

Port	Model	<i>irq</i>
COM1	All Series 700s	26
COM2	All except Model 712	25
Add on COM2	Model 712	26

baud Baud rate. Can be 50, 75, 110, 134, 150, 200, 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600, 14400, 19200, 38400, or 57600.

parity Parity bit. Can be: 0x00 for NONE, 0x08 for ODD, 0x18 for even, 0x38 for zero, or 0x28 for one.

cbits Bit per character (width). Use 0x02 for 7, or 0x03 for 8.

sbits Number of stop bits. Use 0x00 for 1, or 0x04 for 2.

flow Flow. Can be: 0x00 for none, 0x01 for XON_XOFF, 0x02 for RTS/CTS, or 0x03 for DTR/DSR.

SRQ Service Request. Use 0x00 for RI, or 0x01 for DSR.

Default HP Series 700 Built-in RS-232 Interface:

```
9 COM1 serial700 0x00000001 26 9600 0x00 0x03 0x00 0x00 0x00
```

The following can be used for port B (excluding the Model 712 computer):

```
10 COM2 serial700 0x00000002 25 9600 0x00 0x03 0x00 0x00 0x00
```

NOTE

An RS-232 port which is configured for use by SICL is not available for use by HP-UX `termio` functions, and vice versa.

HP Series 700 LAN Client Hardware Configuration

```
lu sym_name ilan 0 0 server_timeout client_timeout_delta  
chain_sigpipe log_errors
```

Where:

- | | |
|-----------------------------|---|
| <i>server_timeout</i> | Timeout value (in seconds) used by the LAN server when applications either use the default timeout value, or set the timeout to 0 (infinity). |
| <i>client_timeout_delta</i> | Value (in seconds) added to the server timeout value to determine the LAN client timeout value. |
| <i>chain_sigpipe</i> | If a non-zero value is specified, the library will call a previously installed SIGPIPE handler, if one existed. |
| <i>log_errors</i> | If a non-zero value is specified, the library will log errors. |

NOTE

The previous timeout values are only used by the LAN software if the application has *not* called `ilantimeout` to manually set the LAN client timeout value. See the *HP SICL User's Guide for HP-UX* for more information about these timeout values.

Default HP Series 700 LAN Client Interface:

```
30 lan ilan 0 0 120 25 1 1
```

C

**Distributing HP SICL
Executable Files**

Distributing HP SICL Executable Files

If you distribute SICL executable files to other users, you will need to provide the **SICL-RUN** fileset. The interface-specific filesets used by your SICL application must also be distributed. Interface-specific filesets include the following:

- **SICL-VXI**
- **SICL-VXI-ISCPI**
- **SICL-HPIB**
- **SICL-GPIO**
- **SICL-RS232**
- **SICL-LAN**

No additional license or payment to Hewlett-Packard Company is necessary to copy or distribute copies of the **SICL-RUN** fileset or the interface-specific filesets listed above with your SICL applications. However, the SICL programming environment (**SICL-PRG**) and the SICL LAN server (**SICL-LANSVR**) may *not* be redistributed without prior written consent from Hewlett-Packard Company.

To repackage and distribute SICL filesets on HP-UX 10.20, you must use the HP-UX Software Distributor (SD) tools and utilities. The following steps describe the process. See the *Managing HP-UX Software with SD-UX* manual for more information.

1. Create a Software Distributor depot for your product.
2. Create the necessary prerequisites and co-requisites on SICL within your product's **.psf** file.

3. Run the **swcopy** utility to copy the distributable SICL filesets to your product's depot.
4. Run the **swpackage** utility to build your product's fileset information into the depot.
5. If necessary, run the **swpackage** utility again to repackage the entire depot onto a tape or other media.

NOTE

If you are expecting the end user to install the SICL filesets, then this user needs to follow the installation and configuration procedures provided in Chapter 2 of this manual.

D

Removing Interface Cards

Removing Interface Cards

This appendix describes how to remove an interface card from your system, or to have the HP I/O Libraries ignore the interface card.

To remove one or more interface cards from your system, do the following:

1. Login as **root** on the system.
2. Run the I/O setup utility to edit your configured I/O interfaces:

```
/opt/sicl/bin/iosetup
```

3. The configured I/O interfaces will be listed on the right side of the window. Click on the interface you wish to remove and then click on the **Remove** button. The I/O setup utility will ask if you really want to remove the interface. Click on **OK**, and the interface will be removed. Repeat this step for each interface you wish to remove.
4. Once you have removed the desired interfaces, exit the utility by clicking on the **Done** button. The I/O setup utility will edit the **hwconfig.cf** file and rebuild the kernel.

NOTE

If you remove all interface cards, the I/O setup utility will also remove SICL from the kernel.

5. If you have removed any EISA or ISA I/O cards, you need to run the `eisa_config` program, as follows, before rebooting your system. Otherwise, skip to step 6.

```
/sbin/eisa_config
```

When prompted perform the following commands:

- a. `remove slot_number`

Where `slot_number` corresponds to the EISA bus slot number for each card that you will remove. Note that you must repeat this command for *each* card that you will be removing.

- b. Enter `save` to save the changes.
- c. Enter `quit` to exit the `eisa_config` program.

6. Reboot your system.

E

**Removing HP I/O Libraries
Software**

Removing HP I/O Libraries Software

This appendix describes the process to remove one or both of the HP I/O Libraries (SICL and/or VISA) from a system. It also explains how to remove the HP SICL LAN server capability from a computer node.

Removing the HP SICL and/or HP VISA Software

This procedure describes how to remove one or both of the HP I/O Libraries (SICL and/or VISA) from a system using the HP-UX Software Distributor (SD) tools. The remove program (**swremove**) is an interactive program that will remove software from your system. If you are not familiar with the SD tools, see the *Managing HP-UX Software with SD-UX* manual for additional instructions. If you have any questions while using the tool, use the online help for more information.

Follow these steps to remove one or both of the HP I/O Libraries from a system:

1. Become the **root** user on the server for a diskless cluster, or on a stand-alone system.
2. Run the interactive HP-UX SD remove program:
 - a. On a stand-alone system:

```
/usr/sbin/swremove
```

- b. On a diskless cluster (removing software from server and clients):

```
/usr/sbin/swcluster -r -i -vvv
```

The **-r** indicates remove, **-i** indicates interactive mode, and the **-vvv** indicates the level of verbosity.

3. If you used the **swcluster** program, the program will prompt for you to select the alternate root path. On Series 700 computers, the path is usually **/export/shared_roots/OS_700**.

Removing the HP SICL and/or HP VISA Software

4. From the software displayed, select the **E2091E** bundle by clicking on the bundle in the edit window, and then click on the **Actions** menubar. Select **Mark for Remove** to select the HP I/O Libraries bundle for removal.

If you wish to remove individual products or filesets instead of the complete bundle, follow the instructions below. Otherwise, continue with the next step.

- To select an individual product, double-click on the HP I/O Libraries bundle until the products (SICL and VISA) are displayed. Note that the Bristol Technology HyperHelp Viewer will also be displayed as a product if you installed it to use SICL or VISA online help. Now you can select a specific product for removal by clicking on the desired product and selecting **Mark for Remove** from the **Actions** menubar.

NOTE

Remember that you must have SICL installed and configured in order to use VISA. Therefore, do *not* remove SICL if you wish to use VISA.

- To select individual filesets, double-click on the bundle, then on the product until the individual filesets are displayed. Now you can select a specific fileset by clicking on the desired fileset and then selecting **Mark for Remove** from the **Actions** menubar. Mark all the filesets you wish to remove.
5. Once you have marked the HP I/O Libraries bundle, a specific I/O library, or individual filesets for removal, select **Actions** from the menubar. Select **Remove** to begin the removal process.

6. The program will then perform an analysis to ensure the process will be successful. When the analysis reads **Ready**, click on the **OK** button to begin the removal. If the analysis fails, look at the **Logfile** for information on why the analysis failed.
 - a. If you used the **swcluster** program, the program will prompt asking if you would like to exit **swremove**. The **swcluster** program calls **swremove** to remove the software from the cluster nodes. Once you exit **swremove**, the software will be removed from the cluster nodes, and the program will exit. Now continue with step number 9.
 - b. If you used the **swremove** program, the program will prompt to ensure you want to remove the selected software. Click on **YES**, and the removal will begin.
7. Once the software is removed, the program prompts if you have any **NOTES**, **ERRORS**, or **WARNINGS**. If you do have any of these, press the **Logfile** button to determine any necessary action.
8. When the status reads **Ready**, click on the **Done** button.
9. Execute the following command to remove the SICL device directories:

```
rm -r /dev/sicl
```
10. Rebuild the kernel using SAM, as follows.
 - a. Run SAM:

```
# sam
```
 - b. Double-click on **Kernel Configuration**.
 - c. Double-click on **Configurable Parameters**.
 - d. Click on **Actions** and select **Create a New Kernel**.

Removing the HP SICL LAN Server Capability

If you no longer wish to have a node act as a SICL LAN server, do the following in addition to removing the SICL-LANSVR fileset:

1. Login as **root** on the node.
2. Edit the `/etc/rpc` file and remove the lines that look like the following:

```
    siclland          395180
    tcpinst           895183
```

3. Save and exit the `/etc/rpc` file.
4. Edit the `/etc/inetd.conf` file and remove the lines that are similar to the following:

```
rpc stream tcp nowait root /opt/sicl/bin/siclland 395180 1
siclland -l /etc/opt/sicl/siclland_log
rpc stream tcp nowait root /opt/sicl/bin/siclland 395183 1
siclland -l /etc/opt/sicl/siclland_log
```

5. Save and exit the `/etc/inetd.conf` file.
6. Type the following, which makes `inetd` reread its configuration file:

```
    /usr/sbin/inetd -c
```

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