HP I/O Libraries

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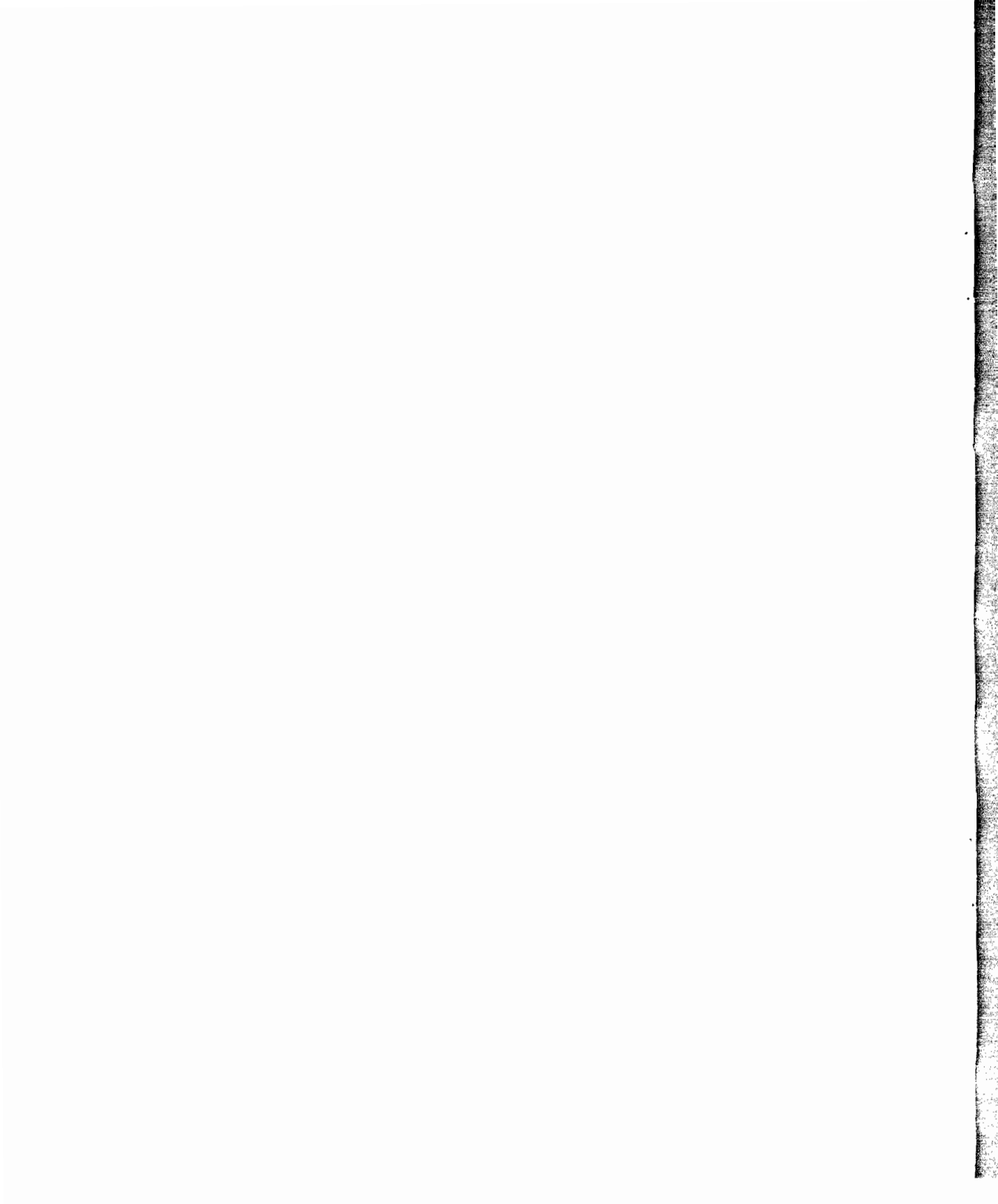# Installation and Configuration Guide for HP-UX

Printing History

This is the first edition of the *HP I/O Libraries 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 HP-UX. This guide also lists other documentation that can be used to develop I/O applications or instrument drivers with the HP I/O Libraries.

This *Installation and Configuration Guide* contains three chapters. This first chapter provides an overview of the HP I/O Libraries, describing both SICL and VTL. In addition:

- Chapter 2 - Installing and Configuring the HP I/O Libraries explains how to install and configure the SICL and VTL I/O libraries.

- Chapter 3 - Documentation for the HP I/O Libraries provides a list of the other manuals and online help you can use either to develop I/O applications with SICL, or to use or develop instrument drivers and I/O applications with VTL.

  This guide also contains the following appendices:

- Appendix A - Editing the hwconfig.cf File describes a manual process to configure the SICL interfaces.

- Appendix B - Removing Interfaces contains several procedures you can use when changing your interface.

- Appendix C - Removing the HP I/O Libraries Software provides a procedure for removing one or both of the I/O libraries from your system.

- Appendix D - Using RS-232 Cables and HP Instruments with HP SICL provides a summary of the RS-232 cables and how to use them with SICL and HP instruments.

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 VISA Transition Library (VTL)** is an I/O library that is a subset of the VISA (Virtual Instrument Software Architecture) library. Use VTL if you need to use or develop instrument drivers or I/O applications that are VXI*plug&play* compliant.

- **HP Standard Instrument Control Library (SICL)** is an I/O library developed by HP that is portable across many I/O interfaces and platforms. Use SICL if you want software currently implemented in SICL to remain compatible with SICL.

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

HP VTL

VTL (VISA Transition Library) can be used to create I/O applications and instrument drivers that comply with the VXI*plug&play* standards. Applications and instrument drivers developed with VTL can execute on VXI*plug&play* system frameworks that have the VTL I/O layer. Therefore, software from different vendors can be used together on the same platform. VTL is a subset of VISA and is interchangeable with native VISA calls. VTL is only supported on HP-UX 10.

HP VTL User

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

Software development using VTL 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 platforms. 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.

SICL can be installed on either HP-UX 9 or HP-UX 10. See the installation instructions in the next chapter.

HP SICL User

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 VTL 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."

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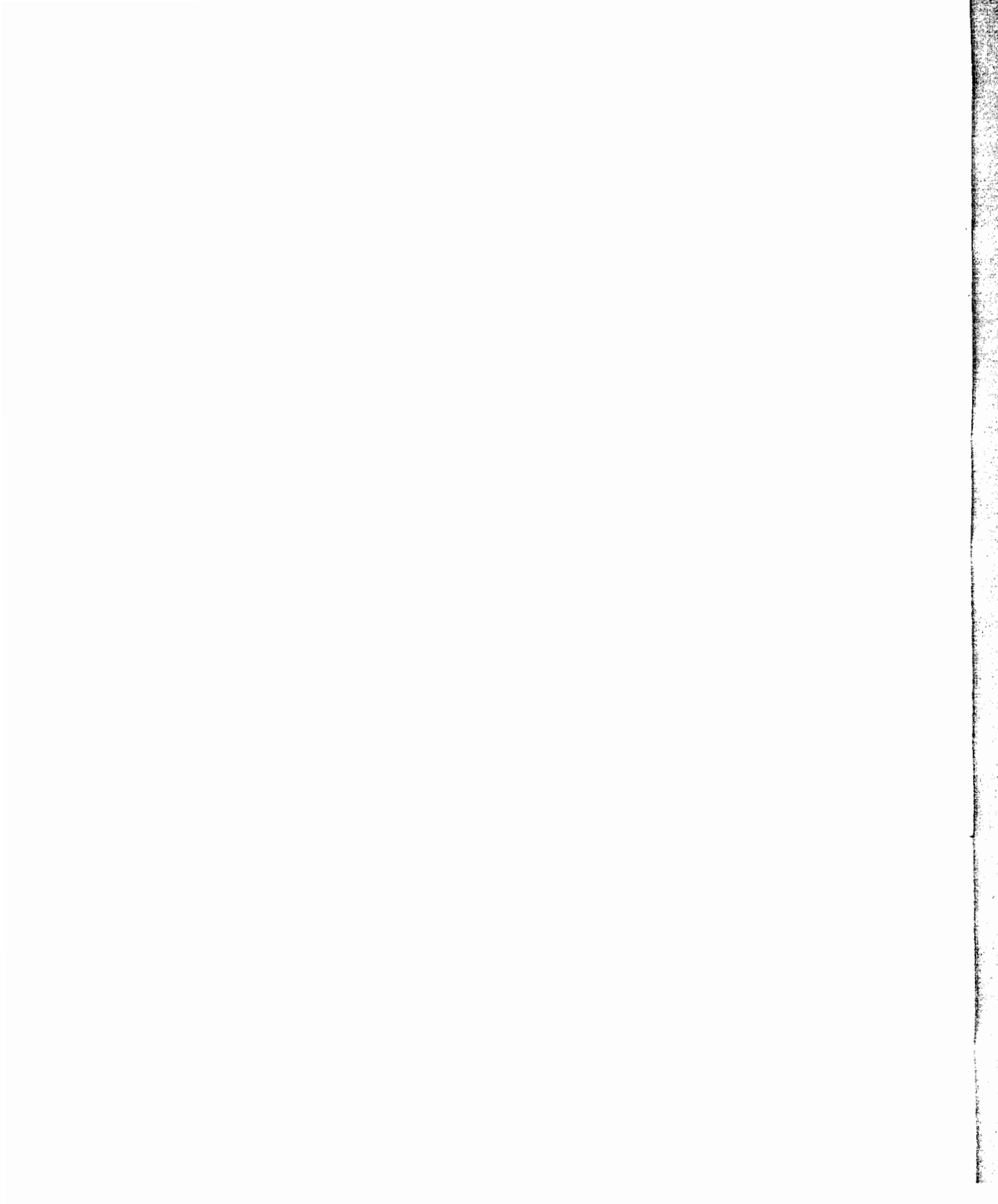
Installing and Configuring the HP I/O Libraries

Installing and Configuring the HP I/O Libraries

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

- Preparing to Install the HP I/O Libraries
- Installing HP SICL and VTL on HP-UX 10
- Installing HP SICL on HP-UX 9
- Configuring the HP I/O Libraries
- Distributing HP SICL Executable Files
- Where to Go Next

Preparing to Install the HP I/O Libraries

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

- Product Package
- System Hardware Requirements
- System Software Requirements

Verifying the Product Package

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

- HP I/O Libraries Installation Media

  □ CD-ROM (includes HP I/O Libraries for HP-UX 9 and HP-UX 10)
  □ DDS Tape (for HP-UX 9 only, if you ordered the tape option)

- HP I/O Libraries Manuals

  □ HP SICL
    - *HP SICL Reference Manual*
    - *HP SICL User's Guide for HP-UX*
    - *HP SICL Quick Reference Guide for C Programmers*
    - *RS-232 Cables Addendum*
  □ HP VTL
    - *HP VTL User's Guide*
    - *HP VTL Quick Reference Guide*

Verifying the System 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

HP VTL Interfaces

HP VTL supports the following interfaces on HP-UX 10:

- HP E2070 HP-IB Interface for Series 700 Computers
- HP E2071 High Speed HP-IB Interface for Series 700 Computers
- HP Model 745i, 747i, or V743 Built-in HP-IB Port
- HP Model V743 VXIbus
- HP E1489 MXI Interface for the Series 700 Computers
- HP Series 700 Built-in LAN interface or add-on LAN card

NOTE

HP VTL does *not* support the GPIO or RS-232 interfaces.

Contact your local HP sales office for a complete (or updated) list of supported VTL interfaces.

HP SICL Interfaces   HP SICL supports the following interfaces:

- HP E2070 HP-IB Interface for Series 700 Computers
- HP E2071 High Speed HP-IB Interface for Series 700 Computers
- HP Model 745i, 747i, or V743 Built-in HP-IB Port
- HP E2074 GPIO Interface for Series 700 Computers
- HP Model V743 VXIbus
- HP E1489 MXI Interface for the Series 700 Computers
- HP Series 700 Built-in RS-232 Interface
- HP Interpreted SCPI (**iscpi**) Interface for Series 700
- HP Series 700 Built-in LAN interface or add-on LAN card

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

Verifying the System Software Requirements

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

HP SICL and VTL for
HP-UX 10

- HP-UX 10.01.

- 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 VTL, 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 install program.

- Supported compilers for VTL :

  - □ ANSI C
  - □ C++

- Supported compilers for SICL:

  - □ C
  - □ ANSI C
  - □ C++

HP SICL for HP-UX 9

- HP-UX 9.0 or above.

- If installing the entire product (for all supported interfaces), you will need at least 15 Mbytes of free disk space. Not all of this will be occupied by SICL, 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 **update** program.

- A C, ANSI C, or C++ Compiler for developing applications.

Installing HP SICL and VTL on HP-UX 10

This section provides details on installing HP SICL and VTL on a system running the HP-UX 10 operating system. This installation uses the HP-UX Software Distributor (SD) tools and should take 20 to 30 minutes to complete. Verify that your system meets all the hardware and software requirements (as described earlier in this chapter) before continuing with this installation.

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

NOTE

If this is the first time you are installing the HP I/O Libraries for HP-UX 10, then additional software will be installed and the **swinstall** program will reboot your machine.

---

1. Become the **root** user on the server for a diskless cluster or a stand-alone system.

2. If installing from CD-ROM, 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:

   a. On a standalone machine, or on the server of a diskless cluster (installed on server, but not on clients):

      `/usr/sbin/swinstall`

   b. On a diskless cluster server (installed 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 the following:

   `/export/shared_roots/OS_700`

5. The program lists the following fields:

Source Host Name	Lists the host you are installing from. 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 CD-ROM depot, list the directory the CD-ROM depot is mounted on (for example, **/cdrom**). If you are installing from a hard disk, list the directory path to the filesets (usually, **/var/spool/sw**).
Change Software View	Specify **All Bundles** for HP I/O Libraries software.

   Change the fields above to reflect your installation and 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:

   `E2091D   D.01.xx`

7. To install the entire HP I/O Libraries bundle, click on the bundle in the edit window and 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 VTL) are displayed. Note that the Bristol Technology HyperHelp Viewer will also be displayed as a product. This viewer is required to use SICL or VTL online help. Now you can select a specific product for install by clicking on the desired product and selecting **Mark for Install** from the **Actions** menubar.

   - 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 HP I/O Libraries filesets follows.

NOTE

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

To use the 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**.

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 VTL.
SICL-LAN	LAN Client	The LAN client extensions to SICL and VTL.
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 GPIB 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 VTL development	The programmer's development environment. Load this fileset if you plan to develop C/C++ -based I/O applications using the 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 VTL, including the VXI/MXI drivers, the VXI/MXI resource manager, and the configuration tools.
SICL-VXI-ISCPI	I-SCPI Interface	The Interpreted SCPI extensions to SICL which provide interpretation of SCPI commands for register-based instruments.

HP VTL Fileset

Fileset	When to Load	Description
VTL-MAN	Optional	The online man pages and documentation.
VTL-PRG	VTL development	The programmer's development environment. Load this fileset if you plan to develop C/C++ -based I/O applications using the VTL 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. Select **Install** to begin the analysis process.

9. The program will then perform an analysis to ensure the 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.

   a. 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.

   b. 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 machine 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 machine will reboot. Click on (YES) to continue.

NOTE

The first time the machine (standalone, server, or cluster client workstation) is rebooted after installation, it may take several minutes longer that usual due to additional software configuration steps.

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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 **HPIOLIBS** bundle:

    swverify -d E2091D

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/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 10,
continue with the "Configuring the HP I/O Libraries" section later in this
chapter.

Installing HP SICL on HP-UX 9

This section provides details on installing the SICL software on a system running HP-UX 9. If you have a system running HP-UX 10, see the previous section for installation instructions. This installation uses the HP-UX **update** program, and should take 20 to 30 minutes to complete. Verify that your system meets all the hardware and software requirements (see the "Preparing to Install the HP I/O Libraries" section earlier in this chapter) before continuing with this installation.

> **NOTE**
>
> HP VTL is *not* supported on HP-UX 9.

The HP-UX **update** program is used. If you are not familiar with the HP-UX **update** program, see the *Installing and Updating HP-UX* manual for additional instructions. Follow the steps listed below to install SICL.

1. Become the **root** user on the server for a diskless cluster or a stand-alone system.

2. Insert the SICL installation media (CD-ROM or DAT tape).

3. If installing from CD-ROM, mount the CD-ROM.

4. Run the interactive HP-UX **update** program:

   `/etc/update`

5. Select **Change Source or Destination** and *ALWAYS* select the following (even with CD-ROM):

   `From Tape Device to Local System`

6. Make sure that **Source** is set to the proper source for your system (for example, `/dev/update.src` for DAT tapes, or `/cdrom/pil.e2091.upd` for CD-ROM). Also verify that **Destination Directory** is set to `/`.

7. Select **DONE** when all fields are correct.

8. Choose Select all filesets to install all SICL filesets, or
Select/view partitions and filesets to determine which filesets
will be installed. Note that in the latter case, you must select the **view**
filesets softkey to get a list of SICL filesets. See the following table for
a list of the SICL filesets:

NOTE

You must install the **PIL-RUN** fileset. Install the **PIL-PRG** fileset if you will be doing SICL
development. Also install interface specific filesets as needed. All other filesets are optional.

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

HP SICL Filesets

Fileset	When to Load	Description
PIL-DIAG	Optional	Miscellaneous diagnostic tools and utilities.
PIL-GPIO	GPIO Interface	The GPIO extensions to SICL.
PIL-HPIB	HP-IB Interface	The HP-IB extensions to SICL.
PIL-LAN	LAN Client	The LAN client extensions to SICL.
PIL-LANSVR	LAN Server	The LAN server software which enables a host to act as a LAN-to-instrument_interface gateway.
PIL-MAN	Optional	The online man pages and documentation.
PIL-MAN-GPIO	Optional	The online man pages for SICL's GPIO functions.
PIL-MAN-HPIB	Optional	The online man pages for SICL's GPIB functions.

HP SICL Filesets Continued

Fileset	When to Load	Description
PIL-MAN-LAN	Optional	The online man pages for SICL's LAN functions.
PIL-MAN-LANSVR	Optional	The online man pages for the LAN server functionality.
PIL-MAN-RS232	Optional	The online man pages for SICL's RS-232 functions.
PIL-MAN-VXI	Optional	The online man pages for SICL's VXI/MXI functions.
PIL-PRG	SICL development	The programmer's development environment. Load this fileset if you plan to develop C/C++ -based I/O applications using the SICL I/O Library. 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.
PIL-RS232	RS-232 Interface	The RS-232 extensions to SICL.
PIL-RUN	Always Load	The SICL run-time environment.
PIL-RUN-DIST	Package the product	The run-time environment and extensions for interfaces that are prepackaged into an **update** file. This is for users who want to distribute the SICL run-time software with their own applications.
PIL-VXI	VXI Interface	The VXI extensions to SICL, including the VXI/MXI drivers, the VXI/MXI resource manager, and the configuration tools.
PIL-VXI-ISCPI	I-SCPI Interface	The Interpreted SCPI extensions to SICL which provide interpretation of SCPI commands for register-based instruments.

9. Press the **Start Loading** softkey to install the selected filesets.

10. When the loading process is complete, remove the installation media from the drive. The SICL software is now loaded on your system.

Verifying the HP SICL Installation on HP-UX 9

You can now check for errors or warnings that might have occurred during
the HP-UX update process. Review the end of the log file generated by the
update program by typing the following:

```
tail -50 /tmp/update.log | more
```

Find the correct date and time headings and look for any new messages that
begin with NOTE, ERROR, or WARNING:

- 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 update program was unable to
  successfully complete a function, and action on your part is required to
  complete the update process successfully.

You can also review the SICL file structure to ensure that all the filesets were
installed correctly. See Appendix A, "HP SICL File Structure," in the *HP SICL
User's Guide for HP-UX*.

Where to Go Next

Once you have completed installing the HP I/O Libraries on HP-UX 9,
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 VTL, 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 VTL configuration utility
- Customizing the HP SICL LAN Server

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

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 A, "Editing the **hwconfig.cf** File."

NOTE

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

NOTE

This procedure assumes previous installation of all I/O interface cards. For I/O interface installation procedures, see the *Installation Guide* or *User's Guide* for the I/O interface.

---

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

   If you are executing on a diskless cluster, then the **/etc/opt/sicl** directory will be NFS diskless client private and all files in it will be client-specific on HP-UX 10. On HP-UX 9, the **/usr/pil/etc** directory will be a CDF and all files in it will be cnode-specific.

2. Run the I/O setup utility to configure your I/O interfaces to run with SICL and VTL. The following commands will invoke the I/O setup utility:

   On HP-UX 10:

   /opt/sicl/bin/iosetup

   On HP-UX 9:

   /usr/pil/bin/iosetup

NOTE

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

The following options are available:

-e*number*	Allows you to specify the number of EISA slots to be configured. See the following note.
-m*model*	Allows you to specify the machine type.

NOTE

If you are operating on a system with an EISA expander (such as the HP S2399A), use the **-e** *number* **of slots** 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 window. Click on the interface you wish to configure and 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 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 later in this chapter for a summary on 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 all addresses and interrupt lines (IRQs) are unique and do not conflict with an address or IRQ line used by any other card in the system.

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4. Once you have added all desired interfaces, click on the (Done) key from the main menu. 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 **/usr/pil/etc/kernbld.log** file on HP-UX 9, or the **/var/opt/sicl/kernbld.log** file on HP-UX 10.

5. Reboot your system in order for the kernel changes to take affect (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, then you must run the **lanconf** utility by typing the following:

On HP-UX 10:

    /opt/sicl/bin/lanconf

On HP-UX 9:

    /usr/pil/bin/lanconf

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

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 for more information about configuring the SICL LAN server.

Running the VTL Configuration Utility

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

NOTE

VTL is *only* supported on HP-UX 10. Skip this section if you are running on HP-UX 9.

The `iosetup` utility *must* be run prior to running the VTL configuration utility.

- Login as **root** on the system to be configured.
- Run the VTL configuration utility to configure your VTL devices. The following command will invoke the VTL configuration utility:

    /opt/vxipnp/hpux/hpvisa/vtlcfg

- The available interfaces will be listed on the left side of the window. Click on the interface you wish to configure and click on the (Configure) button. The VTL 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 later in this chapter for a summary on each interface type.

Note that the default is for all VTL 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 turned on and in working condition. This selection will check for VTL devices when (Continue) is selected.

□ **Manually configure devices on this interface** - Click on the (Add) button and enter the device address. Repeat for each device you want to manually add. Click on (Done) to exit.

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

• Once you have added all the desired VTL devices, click on the (Done) button from the main menu.

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

Customizing the HP SICL LAN Server

If you followed the steps in the I/O setup utility, including the final configuration step, 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.

Optional HP SICL LAN Server Configuration

The SICL LAN server, **/opt/sicl/bin/siclland** on HP-UX 10, or **/usr/pil/bin/siclland** on HP-UX 9, 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 file **/etc/inetd.conf** and modify the parameters in the
   siclland entry, as desired. The syntax of the **siclland** entry is as
   follows: (Note that the directory path shown is for HP-UX 10. Use
   /usr/pil/bin/siclland for HP-UX 9):

   ```
   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:

   -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** on HP-UX 10, or
   /usr/pil/etc/siclland_log on HP-UX 9. Within a
   diskless cluster, this directory is a NFS diskless client
   private directory on HP-UX 10, or cnode specific CDF
   on HP-UX 9, 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.

-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`, as
well as the information provided in this appendix for configuring the SICL
LAN interface (client).

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:

On HP-UX 10:

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

On HP-UX 9:

```
/etc/inetd -c
```

Optional 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` on HP-UX 10, or `/usr/adm/inetd.sec` on HP-UX 9.
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)`.

Deleting 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: (Note that the directory path shown is for HP-UX 10. Use
   /usr/pil/bin/siclland for HP-UX 9):

   ```
   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:

   On HP-UX 10:

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

   On HP-UX 9:

   ```
   /etc/inetd -c
   ```

HP I/O Libraries Interfaces

This subsection contains a summary on each field for each interface type. If
you need more information on a specific field, see the online help in the I/O
setup utility.

VTL 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

HP-IB Interfaces

Field	Interfaces	Default	Description
Logical Unit #	All	7	Identifies the interface. Each interface must have a unique logical unit number. Subsequent cards would default to 8, 9, 10, etc.
Symbolic Name	All	hpib	Identifies the interface. Each interface type must have a unique symbolic name. **hpib**x is used for additional cards, with x 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 E2071	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).
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.
HPIB Bus Addr	All	21	HP-IB bus address of the computer or controller on this interface.

VTL and SICL support the following VXI interfaces:

- HP Model V743 Controller
- HP E1489 MXI/VXI
- HP Interpreted SCPI

V743 and E1489 VXI Interfaces

Field	Interfaces	Default	Description
Logical Unit #	V743 E1489	16 16 64	Identifies the interface. Each interface must have a unique logical unit number.
Symbolic Name	V743 E1489	vxi vxi iscpi	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).
Slot	V743 E1489	0 1	VXI slot number. EISA slot number.
Logical Address	V743	0	Logical address of the VXI interface.
IRQ line	E1489 V743	3 1	Interrupt request line. If IRQ line 3 is taken by another known card, then the next available line is used.
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.

Interpreted SCPI (I-SCPI) VXI Interfaces

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	**/usr/pil /lib/iscpi** or **/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 Interfaces   VTL and SICL support the following LAN client interfaces:

- 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.
Sever 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 timout 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.

GPIO Interfaces   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. gpiox 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 DDUT 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.

Distributing HP SICL Executable Files

If you distribute SICL executable files to other users, you will need to provide the **SICL-RUN** fileset on HP-UX 10, or the **PIL-RUN** fileset on HP-UX 9. The interface specific filesets used by your SICL application must also be distributed. Interface specific filesets include the following:

On HP-UX 10:

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

On HP-UX 9:

- PIL-VXI
- PIL-VXI-ISCPI
- PIL-HPIB
- PIL-GPIO
- PIL-RS232
- PIL-LAN

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

Distributing on HP-UX 10

To repackage and distribute SICL filesets on HP-UX 10, you must use the 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 go through the installation and configuration procedure provided in this chapter.

Distributing on HP-UX 9

If you installed the PIL-RUN-DIST fileset, then the PIL-RUN and the interface specific filesets listed in the previous section are bundled and installed on your system in the pil.e2091.run.upd file located in the /usr/pil directory. You can package your application with the pil.e2091.run.upd file for distribution to the end user. Or, if you are only using a selected interface, you can package only the needed filesets. See the HP-UX *Systems Administrations Tasks Manual* for information on packaging your application.

> **NOTE**
>
> If you are expecting the end user to install the SICL filesets, then this user needs to go through the installation and configuration procedure provided in this chapter.

Where to Go Next

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

3
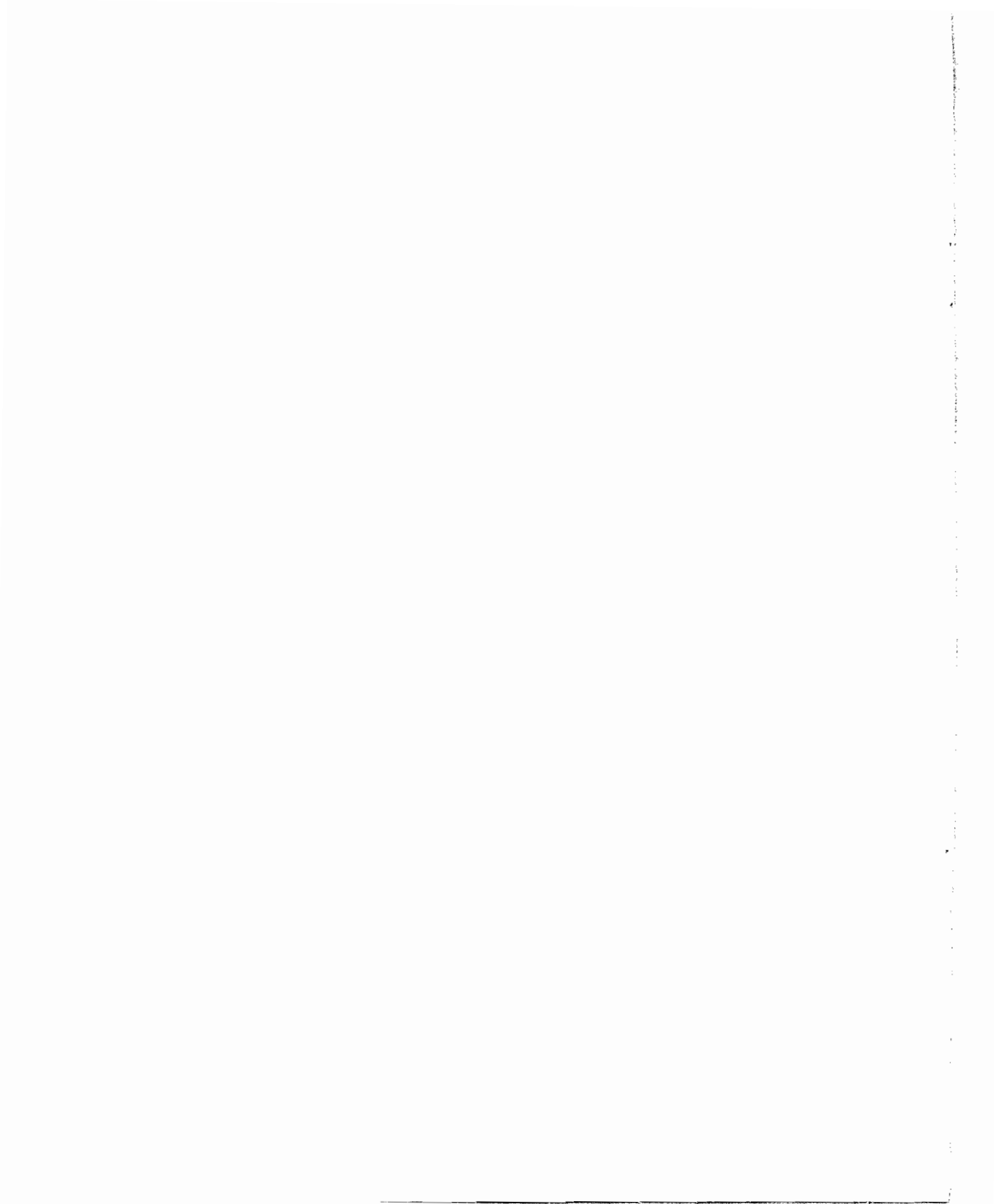
Documentation for the
HP I/O Libraries

Documentation for the HP I/O Libraries

After you have completed installing and configuring the HP I/O Libraries by following the instructions in Chapter 2 of this *Installation and Configuration Guide*, you can begin to program with SICL or VTL.

This chapter lists the manuals and online help that you should follow next to use SICL or VTL. If you need help determining which I/O library to use, see Chapter 1 for an overview of each HP I/O Library for HP-UX.

HP VTL Documentation

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

The following documentation is also helpful when using VTL:

- *HP VTL Online Help* is provided in the form of HyperHelp.

- *HP VTL Quick Reference Guide* helps you find VTL function syntax information quickly.

- *HP VTL Example Programs* are provided in the subdirectory **/opt/vxipnp/hpux/hpvisa/share/examples**. These examples are designed to help you develop VTL applications more easily.

The following documents may also be helpful when using VTL:

- VXI*plug&play* System Alliance VISA Transition Library Specification 3.0.

- *IEEE Standard Codes, Formats, Protocols, and Common Commands* - ANSI/IEEE Standard 488.2-1992.

HP SICL Documentation

To use SICL, you should now go on to Chapter 1, "Introduction," in 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 in the subdirectory **/opt/sicl/share/examples** on HP-UX 10, or **/usr/pil/examples** on HP-UX 9. These examples are designed to help you develop SICL applications more easily.

A

Editing the `hwconfig.cf`
File

Editing the `hwconfig.cf` File

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 in Chapter 2). We recommend 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.

> **NOTE**
>
> This procedure does *not* make any changes to the VTL devices configuration. You must run the VTL configuration utility described in Chapter 2 to make any changes to VTL configuration.

The Procedure

This configuration involves editing the **hwconfig.cf** file to specify your I/O interfaces, building the kernel, and rebooting the system. If you are using only the LAN client interface (**SICL-LAN** on HP-UX 10, or **PIL-LAN** on HP-UX 9), you only need to edit the **hwconfig.cf** file. Building the kernel and rebooting your system are not necessary.

However, if you are using the LAN server (**SICL-LANSVR** on HP-UX 10, or **PIL-LANSVR** on HP-UX 9), you must edit the **hwconfig.cf** file to specify one or more instrument interfaces (HP-IB, VXI/MXI, and/or RS-232) you will use with the LAN server. To configure the instrument interface, you will then need to run the configuration program (**pilconf** or **siclconf**) on the Series 700 which will act as a LAN server, and reboot the system.

NOTE

This 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. Copy the default **hwconfig.cf** file if running on HP-UX 9:

   On HP-UX 9:

   ```
   cp /usr/pil/defaults/hwconfig.cf /usr/pil/etc/hwconfig.cf
   ```

   If you are executing on a diskless cluster, then the **/etc/opt/sicl** directory will be NFS diskless client private and all files in it will be client-specific on HP-UX 10. On HP-UX 9, the **/usr/pil/etc** directory will be a CDF and all files in it will be cnode-specific.

3. Edit the `hwconfig.cf` file to reflect the I/O hardware you want to use. You need to have one entry for each I/O interface in the system. The default `hwconfig.cf` file should contain entries (commented out) for each I/O interface already installed in your system. Therefore, edit the file and un-comment the entries that you want to use in your system. Edit `/etc/opt/sicl/hwconfig.cf` on HP-UX 10 and `/usr/pil/etc/hwconfig.cf` on HP-UX 9.

The following are some example I/O interface configuration entries.

NOTE

You must ensure that all addresses and interrupt lines (IRQs) are unique and do not conflict with an address or IRQ line used by any other card in the system.

If you need more information about the contents of the `hwconfig.cf` file, see the section, "The Hardware Configuration File," at the end of this appendix.

- 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 E2071 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), HPIB 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 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 is ilan, unused 0 and 0, SICL timeout 120 seconds, Client timeout delta 25 seconds, chain SIGPIPE signals enabled, and error logging enabled:

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

4. Run the SICL configuration program. 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 interface (client). (Type **man siclconf** or **man pilconf** for a list of options.)

NOTE

You must execute these utilities from a writable directory such as **/tmp**.

On HP-UX 10:

/opt/sicl/bin/siclconf

On HP-UX 9:

/usr/pil/bin/pilconf

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:

- **OK to use....**

  If you are using HP-UX 10, the program will display **/stand/system**. If using HP-UX 9, the program will display **/etc/conf/dfile**. 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. If you are using HP-UX 10, the **/stand/vmunix.prev** file will be displayed. If using HP-UX 9, the **/SYSPILBCKUP** file will be displayed. On HP-UX 9, if you use the default name, the file will be overwritten with the latest cnode in a cluster upgrade. 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?**

5. When the SICL configuration program finishes, it will ask if you want to reboot your system. Type **y** to reboot at this time. If you want to manually reboot, type **n** and manually reboot by typing the following:

   On HP-UX 10:

   > **/sbin/reboot**

   On HP-UX 9:

   > **/etc/reboot**

   Note that this step is not necessary if you are using only the LAN interface (client).

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:

On HP-UX 10:

> **/opt/sicl/bin/siclconf -e**

On HP-UX 9:

> **/usr/pil/bin/pilconf -e**

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

---

6. If you are configuring a cluster node or a root server of a diskless cluster to act as a LAN-to-instrument_interface gateway, then you must run the **lanconf** utility by typing the following:

On HP-UX 10:

   /opt/sicl/bin/lanconf

On HP-UX 9:

   /usr/pil/bin/lanconf

If you are configuring a standalone system to act as a LAN-to-instrument_interface gateway, 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 are using VTL, you must also run the VISA Configuration utility every time you make changes to the hardware configuration. See chapter 2 for information on running the VISA Configuration utility.

The Hardware Configuration File

Each line in the **hwconfig.cf** file corresponds to an interface card that will be used for instrument I/O. There is only one line for each interface card in the system. This file only needs to be edited if you are not running the I/O setup utility.

The format of each line is as follows:

lu symname cardname location   [*card specific values*]

Where:

lu   Logical unit number of the card ($0 < lu < 10000$). Each interface card must have a unique logical unit number. The actual value used is not important, but you must remember this number, or the *sysname*, in order to address the card in your application properly.

symname   A symbolic name for your card. Each card 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.

cardname   The specific name of the card. 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 for LAN and I-SCPI.

Card-specific information is described below for each possible card. 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

HP E2070 HP-IB Interface:

> $lu\ symname$ **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 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 1 2 3 4 5 6 7 8	Memory Address Range	Interrupt Line
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 E2070 HP-IB Interface:

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

If you have more than one interface card, the following lines can be used for the 2nd through 4th 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 E2071 HP-IB Hardware Configuration

HP E2071 High Speed HP-IB Interface:

lu $symname$ **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 E2071 interface card. See the table below and the *HP E2071 and E2070 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 E2071 Switch Settings

Switches 1 2 3 4	I/O Base Address (Hexadecimal)	I/O Address Range Used (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 E2071 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 2nd through 4th 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

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

    lu symname **s745 0xf0835000** *hpib_busaddr sysctrl*

Where:

hpib_busaddr   HP-IB Bus address of this card.

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

Default 745i Built-in HP-IB Interface:

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

HP Model V743 Built-in HP-IB Hardware Configuration

HP Model V743 Built-in HP-IB Interface:

    lu symname **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 V743 HP-IB Interface:

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

HP E2074 GPIO Hardware   HP E2074 GPIO (General Purpose Input Output) Interface:
Configuration

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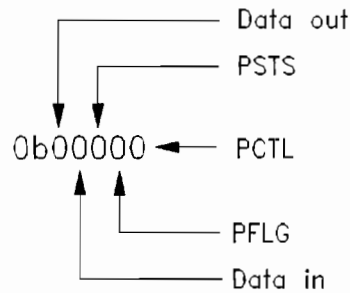
The default polarity (0 in the associated bit) is shown in the following table. Putting a 1 in the associated bit inverts the polarity shown in this table.

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 μs
4	2 μs
5	5 μs
6	10 μs
7	50 μs

Default 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

HP Model V743 VXI Interface:

> *lu symname* **v743** *vxi_slot vxi_laddr*

Where:

vxi_slot   VXI slot number (usually 0).

vxi_laddr   VXI Logical Address (must be 0).

Default for Model V743 VXI Interface:

```
16   vxi  v743 0 0
```

HP Interpreted SCPI (iscpi) Interface Configuration

HP Interpreted SCPI Interface:

> *lu symname* **iscpi** 0 0 *scpidrvrs backplane*

Where:

scpidrvrs   Directory location of the register-based VXI instrument drivers to be used with I-SCPI (default **/usr/pil/lib/iscpi** on HP-UX 9, or **/opt/sicl/lib/iscpi** on HP-UX 10).

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

Default for Interpreted SCPI (**iscpi**) Interface on HP-UX 10:

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

HP E1489 MXI/VXI
Hardware Configuration

HP E1489 MXI/VXI Interface:

lu symname **e1489** *slot_number vxi_laddr port_address   irq_line*
64K_window_addr num_64K_windows   1M_window_addr num_1M_windows

Where:

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

Default 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

NOTE

If you are running on HP-UX 9 and you require one RS-232 port to be configured with the asio0 driver (TTY driver), and one to be configured with SICL, then the SICL port *must* be configured on **COM1**. Using SICL to control **COM2** with the asio0 driver also configured is not supported on HP-UX 9.

HP Series 700 Built-in RS-232 Interface:

lu symname **serial700** *location irq baud parity cbits sbits flow SRQ*

Where:

location The *location* value corresponds to which port is being used. *location* should be 0x00000001 for COM1, or 0x00000002 for COM2..

irq The *irq* is system-dependent and should be as follows:

RS-232 *irq* Values

Port	Model	irq
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, and 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 Series 700 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
Hardware Configuration

HP Series 700 LAN Interface (client):

> *lu symname* **ilan** 0 0   *server_timeout client_timeout_delta*
> *chain_sigpipe log_errors*

Where:

server_timeout   Timeout value (in seconds) used by the LAN server when applications either use the default timeout value or set the timeout to 0 (infinity).

client_timeout_delta   Value (in seconds) added to the server timeout value to determine the LAN client timeout value.

chain_sigpipe   If a non-zero value is specified, the library will call a previously installed SIGPIPE handler, if one existed.

log_errors   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 Series 700 LAN Interface (client):

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

B

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.

Removing Cards

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

1. Log in as **root** on the system.

2. Run the I/O setup utility to edit your configured I/O interfaces. The following commands will invoke the I/O setup utility:

   On HP-UX 10:

   `/opt/sicl/bin/iosetup`

   On HP-UX 9:

   `/usr/pil/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 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 before rebooting your system. Otherwise, skip to step 6.

   On HP-UX 10:

   /sbin/eisa_config

   On HP-UX 9:

   /etc/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.

C

Removing the HP I/O
Libraries Software

Removing the HP I/O Libraries Software

This appendix describes the process to remove one or both of the HP I/O Libraries on HP-UX 9 or HP-UX 10.

Removing HP VTL and SICL on HP-UX 10

This procedure describes how to remove the HP I/O Libraries using the HP-UX Software Distributor (SD) tools. This procedure is only supported on HP-UX 10. The HP-UX software distributor remove program (**swremove**) is an interactive program that will remove software from your system. If you are not familiar with the SD-UX software distributor 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 the steps listed below to remove one or both of the HP I/O Libraries.

1. Become the **root** user on the server for a diskless cluster or on a stand-alone system.

2. Run the interactive HP-UX software distributor remove program:

   a. On a standalone machine:

      /usr/sbin/swremove

   b. On a diskless cluster (removed on 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 the following:

   /export/shared_roots/OS_700

4. From the software displayed, select the **E2091D** bundle by clicking on the bundle in the edit window and 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 VTL) are displayed. Note that the Bristol Technology HyperHelp Viewer will also be displayed as a product if you installed it to use SICL or VTL online help. Now you can select a

specific product for removal by clicking on desired product and selecting
Mark for Remove from the **Actions** menubar.

- 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
  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 the 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 onto 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 **NOTE**s,
   ERRORs, or **WARNING**s. 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
   ```

Removing HP SICL on HP-UX 9

This procedure describes how to remove HP SICL from an HP-UX 9 system. This procedure is only supported on HP-UX 9.

1. Become **root** user on the server for a diskless cluster or a stand-alone system.

2. Run the following utility and mark **Y** for yes for all filesets beginning with **PIL**.

   /etc/rmfn

3. Select the **Start Removing** function key to remove the marked filesets.

4. Exit the **rmfn** utility.

5. Remove the following lines from **/etc/rc**:

   #Perform PIL Initialization
   /usr/pil/bin/iproc -x

6. Execute the following command to remove PIL device directories:

   rm -r /dev/pil

7. Execute the following command to remove residual files from directories:

   rm -r /usr/pil

D

RS-232 Cables and
HP Instruments
with HP SICL

RS-232 Cables and HP Instruments with HP SICL

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. 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 HP 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.

General Purpose Cables and Connectors

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

Transmit Data →

Receive Data ←

Request to Send →

Clear to Send ←

Data Set Ready ←

Signal GND

Data Terminal Ready →

Data Carrier Detect ←

Ring Indicator ←

DB 9
Connector

DB 25
Connector
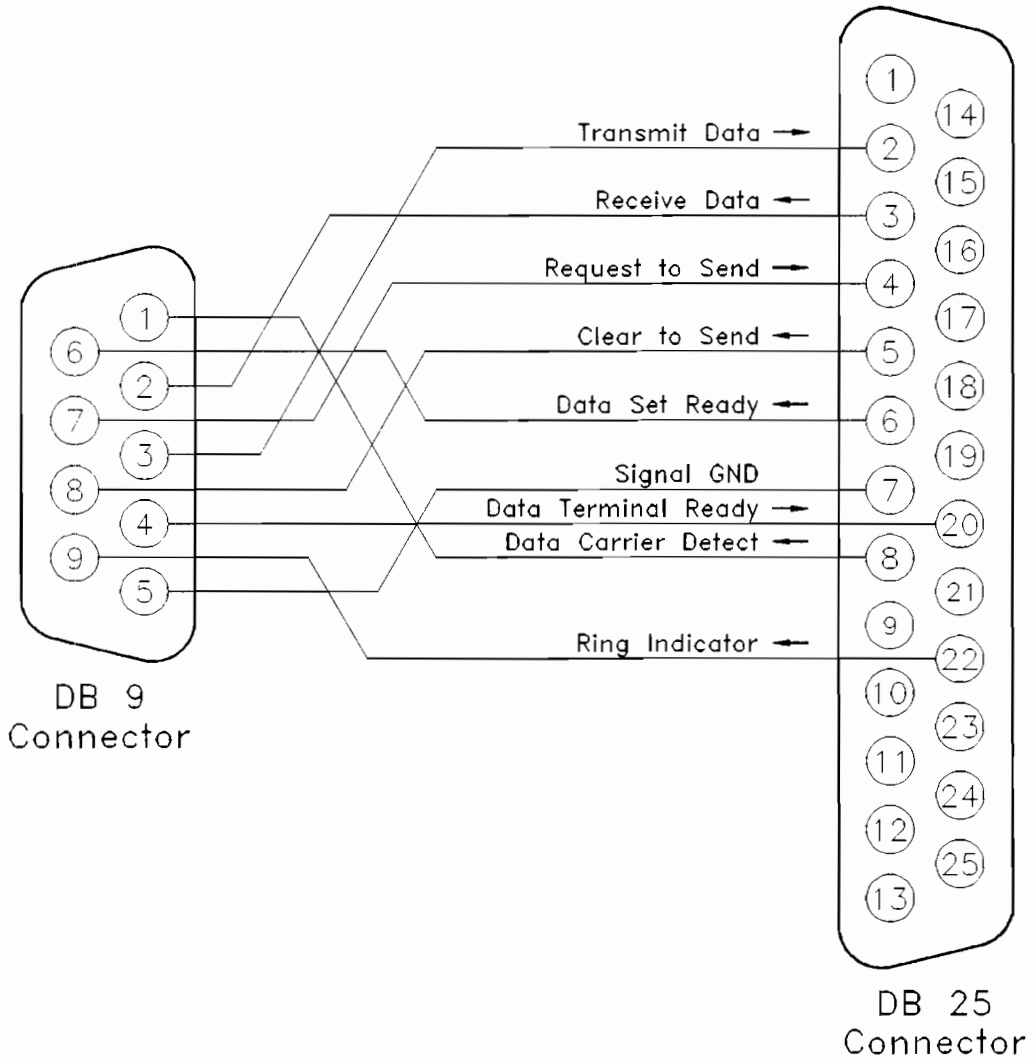
9-Pin to 25-Pin RS-232 Adapter

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.
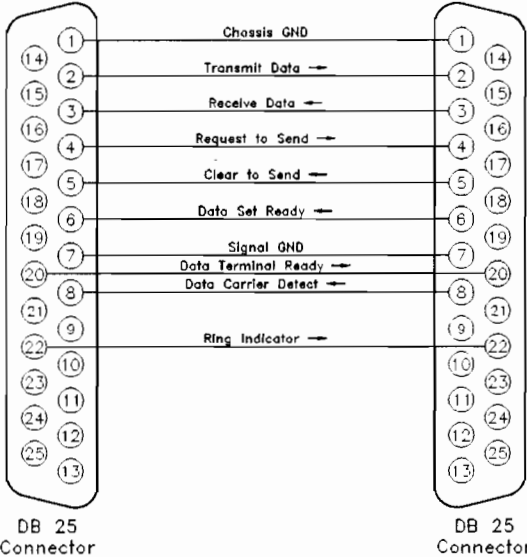
Standard Null Modem Cable (Typically Used for Printers)
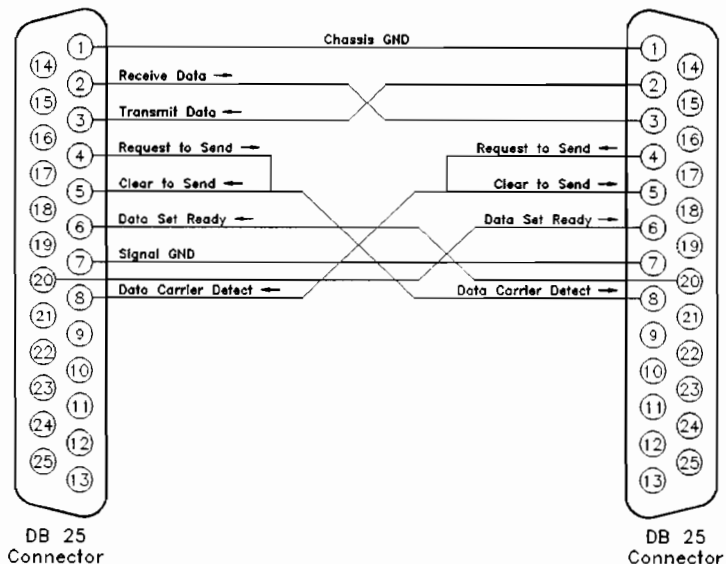
Standard Computer to Modem Cable

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.

General Purpose Cables and Connectors
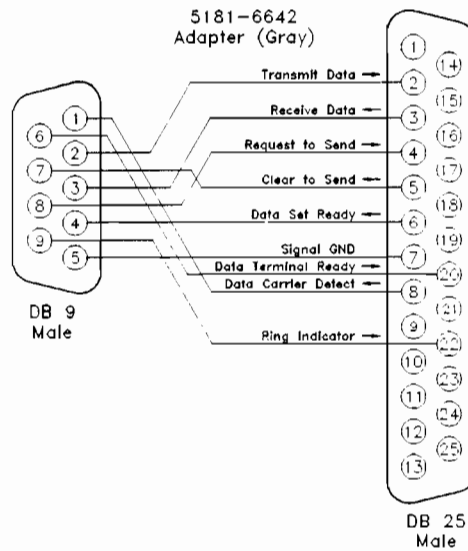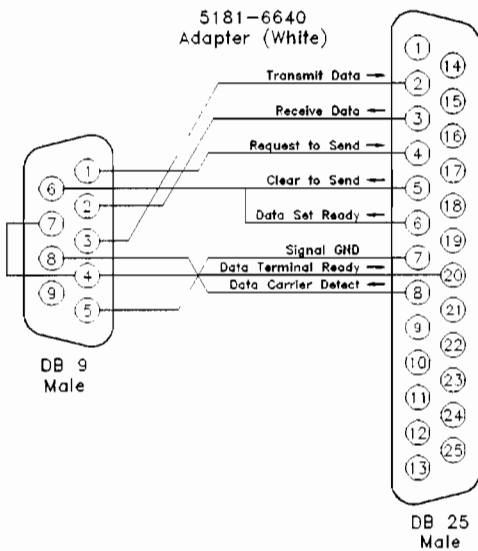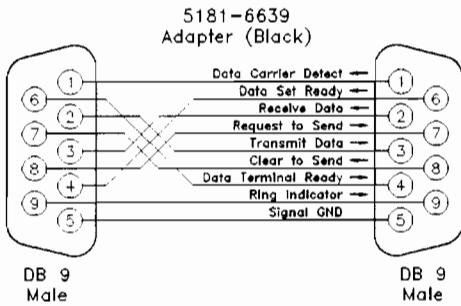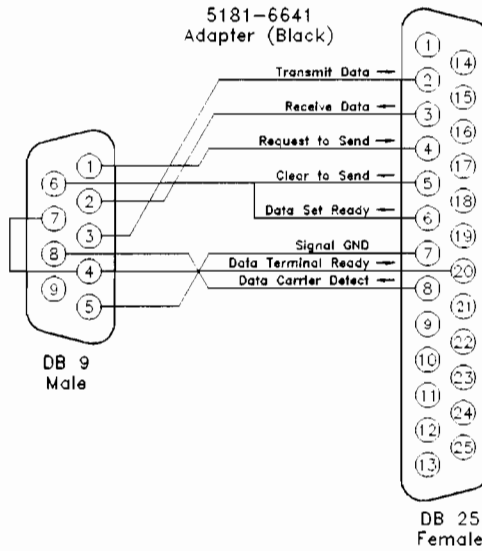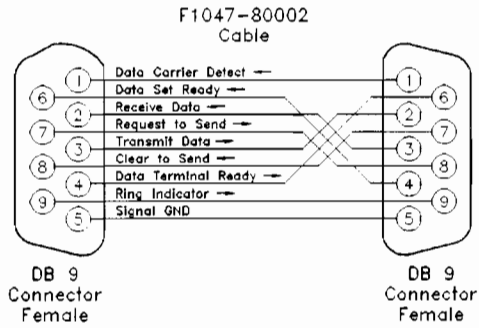
HP F1047-80002 Cable with Adapters

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 HP SICL application. The list is based on current availability and on the existing literature and catalogs.

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