

TAMS 3020 LAN I/O Gateway

Installation and Configuration Guide

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How to Use This Guide

Use this guide to install and configure the TAMS 3020 LAN I/O Gateway for use with supported, network-equipped computer systems. You can also use this guide to administer the Gateway on your network and to troubleshoot any problems you might encounter while installing or configuring the Gateway. Network-equipped computer systems that are supported for use with the LAN I/O Gateway are:

- HP 9000 workstations running either HP-UX 10.20 or 11i.
- 32-bit personal computers (PC's) running Microsoft Windows 2000, or XP Professional.
- 32-bit personal computers (PC's) running RedHat Enterprise Linux

To use the Gateway for I/O applications, you must also have one or more of the following software products installed and configured on your network-equipped computer system(s):

- Agilent SICL and VISA for Microsoft Windows computers
- Agilent SICL and VISA for HP-UX 10.20 workstations
- TAMS SICL and VISA for HP-UX 11i workstations
- TAMS SICL for RedHat Enterprise Linux workstations
- HP Visual Engineering Environment (HP VEE)
- Agilent (HP) BASIC/UX for HP-UX 10.20 workstations
- TAMS BASIC for HP-UX 11i workstations
- TAMS BASIC for RedHat Enterprise Linux workstation

Note: Once you have used this guide to install and configure the Gateway, please refer to the appropriate documentation for your software product(s). See Appendix C, “Related Software Documentation,” for the software manuals you should use.

Who Should Use This Guide

This guide assumes that you are a Network Administrator who installs, configures, and maintains a local area network (LAN), including network related hardware like the TAMS 3020 LAN I/O Gateway. If you are not a Network Administrator, that person must be readily available to provide assistance. If you use HP-UX or Linux workstations with the Gateway, you must also have superuser (root) privileges on those systems. If you will use a Windows 2000 or XP Professional workstation with the Gateway, you must also have system administrator privileges on those workstations.

What Is in This Guide

This guide contains the following chapters and appendices:

- **Chapter 1 - Overview** provides a brief overview of the TAMS 3020 LAN I/O Gateway.
- **Chapter 2 - Installation** explains how to install the Gateway hardware on the LAN and HP-IB bus.
- **Chapter 3 - Configuration** explains how to configure the Gateway on your network.
- **Chapter 4 – Usage** shows how to remotely communicate to instruments connected to the Gateway
- **Chapter 5 - Administration** explains how to maintain the Gateway on the network.
- **Chapter 6- Troubleshooting** provides ways to fix problems you may encounter with the Gateway.
- **Appendix A - Technical Reference** provides specifications and conformity information for the Gateway.
- **Appendix B - Related Software Documentation** lists the software manuals you should reference to use the Gateway with your I/O application software.
- **Appendix C – Client Software Matrix**
- **Appendix D – Software License**
- **Appendix E – Glossary**
- **Warranty Information**
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1. Overview

This chapter provides a general overview of the TAMS 3020 LAN I/O Gateway, including:

- An explanation of the contents of your TAMS 3020 product package.
- A brief overview of the TAMS 3020 LAN I/O Gateway's functionality.

Figure 1-1. Components of the TAMS 3020 Product

TAMS 3020 Package Contents

Your TAMS 3020 product package contains the following items:

- TAMS 3020 LAN I/O Gateway
- Power cord
- Mounting rails
- CD containing this Manual and software for configuring the 3020 on your network

As shown in Figure 1-3, the back panel of the Gateway has the following (from right to left):

- AC power switch.
- AC power receptacle
- RS-232 connector
- One RJ-45 connector for 10BaseT or 100BaseTX, Ethertwist LAN
- Slots labeled "gpib1", and "gpib2". Card slots for use with supported PCI interface cards.

NOTE: the RS-232 port is NOT supported for connection to instruments, rather it is supported as a serial terminal port but is not needed at all in normal operation.

Mounting rails are included that allow the TAMS 3020 Gateway to be securely mounted with screws to a suitable base. Attach the rails to the bottom or side of the Gateway with 6-32 screws (supplied) and attach the rails to a base with customer-supplied hardware. Use of these rails is optional, and they will not be required in many situations.

Also included are four stick-on rubber feet to avoid damage to tables, if the unit is to be used on a table. The unit can be used vertically or horizontally, there is no restriction. After determining in which orientation the unit will be used, affix the rubber feet to the four corners of the bottom.

Product Overview

The TAMS 3020 LAN I/O Gateway combines hardware and firmware in a small box that provides a network gateway between network-equipped computer systems and instruments. The Gateway enables

users of I/O applications to obtain measurement data either locally or remotely from HP-IB instrumentation.

The Gateway connects the local area network (LAN) from the computer system to one or more local instrumentation busses. At this time, the available bus is HP-IB (also called GPIB or IEEE-488). HP-IB is a shared bus with up to fourteen external devices possible by daisy-chaining the bus. Each device, including the interface card in the TAMS LAN I/O Gateway, must have a unique address on a HP-IB bus. See the manuals that came with the HP-IB devices for information on setting the bus address. The bus address of the interface card is configurable with the Configuration Utility, with a default value of 21.

Because the Gateway communicates with workstations or PC's by LAN, there are few constraints on the distance between the computers and the instruments being communicated with. This eliminates the short distance constraints normally associated with HP-IB. A typical application for the Gateway would have it located at a rack of instruments, and provide access to those instruments to one or multiple workstations and PC's scattered throughout a facility, or even facilities at differing geographic locations.

SICL and VISA provide the ability to communicate with remote instruments in the same manner as if they were connected locally to a computer. Only the LAN address of the Gateway must be added to SICL or VISA commands in order to provide that functionality.

Software/Firmware Architecture

The TAMS 3020 LAN I/O Gateway is supported with the following I/O application software products:

- Agilent SICL and VISA for HP-UX 10.20
- TAMS SICL and VISA for HP-UX 11i
- Agilent SICL and VISA for Microsoft Windows 2000 or XP Professional
- TAMS SICL and VISA for RedHat Linux
- TAMS 3020 configuration utility for RedHat Linux
- TAMS 3020 configuration utility for Windows 2000 or XP Professional

VISA software is also available from other vendors. *VXIplug&play* drivers are available for many instruments to minimize programming required by the user.

Note: HP-IB interfaces installed in the LAN I/O Gateway support all I/O application operations provided by these software products except for parallel polling, SICL commander sessions and asynchronous aborting.

Note: There are two different LAN networking protocols used for communicating with instruments: SICL LAN Protocol and the newer VXI-11 Protocol (also known as the TCP/IP Instrument Protocol). The TAMS 3020 Gateway product supports use of either protocol. One or both must be configured on the client in order to communicate with the server (TAMS 3020 LAN I/O Gateway).

How I/O Application Software Works with the Gateway

This subsection briefly summarizes how the software on a client computer system works with the TAMS 3020 LAN I/O Gateway to complete I/O application operations on attached instruments. For more detailed information on how to use your software with the Gateway, please refer Chapter 3 Usage or to your software documentation as listed in Appendix C, "Related Software Documentation."

Before trying to perform an I/O application operation on a Gateway's interface, the LAN client software in the client computer system establishes a network connection to the LAN server (the Gateway). Once the client establishes a connection, the client can begin to send I/O requests to the Gateway.

The Gateway can have multiple clients connected and being serviced at any given time. The maximum number of concurrent client connections depends on memory usage in the Gateway, including the number of clients and the number of current sessions running on those clients. If the maximum number of client connections to the Gateway has not been exceeded, the connection is allowed to occur.

Although several instruments can be connected to the Gateway's HP-IB bus, only one I/O operation can occur on the HP-IB bus at any given time. Therefore, once a client's request begins to execute on the HP-IB, all other client requests for operations on the HP-IB must wait until the current client request completes. Client requests are serviced in a first come, first served manner, unless they are prohibited by interface or device locks. If a client has a sequence of I/O application operations to perform that should not be preempted, the client should obtain a lock on the Gateway's HP-IB interface or device. Once the client's sequence has completed, it should release its lock, allowing other clients access. When a client closes a connection, the Gateway frees up the resources allocated to that client, including any locks, pending I/O requests, memory usage, and so forth. Abnormal termination (for example, the network and/or client goes down) is discussed in Chapter 5, "Troubleshooting."

Basic Networking Concepts

Client/Server Model

Throughout this manual, the terms Client and Server will be used. In this context, the Server is the TAMS 3020 LAN I/O Gateway product, which receives requests from Clients (workstations or PC's running user applications) to perform various I/O operations on interfaces installed in the Gateway. Within each Client, there may be multiple processes requesting I/O, and there may be multiple Clients logically connected to the Gateway across LAN. The software to operate the Gateway is factory installed in the box. However, the Gateway can be remotely configured by using the TAMS **t3020conf** utility and/or the **telnet** command available on any workstation that has networking software installed. It is recommend to use the TAMS **t3020conf** (from a Linux or Windows client) for the initial network configuration of the TAMS 3020 LAN Gateway. This utility program is not required but makes the network configuration easier and also features network discovery of the Gateway's IP address as there is no other easy way to find on your network a "lost" 3020 Gateway.

None of these software programs(**telnet**, TAMS **t3020conf**) need to be run from the same machine as the intended client. Rather they just need to be run from a machine on the same subnet (or subnets linked by subnetting) as the TAMS 3020 LAN Gateway. For example, suppose you want to use an HP-UX client but you also have available a Linux client on the subnet that the TAMS 3020 LAN Gateway resides. Then you can use the Linux machine to run TAMS **t3020conf** for the initial network configuration of the TAMS 3020. Then you can move to the HP-UX client to run your SICL or VISA based user application.

SICL LAN vs. VXI-11

There are two different low-level protocols available to access devices remotely across LAN. SICL LAN was developed originally by HP and transferred to Agilent. VXI-11 is a newer protocol that is supported by a wider range of manufacturers, including Agilent and TAMS. The Gateway handles either protocol automatically, and generally no difference in operation would be visible to the user based on the selection.

Subnets

A subnet is a collection of Internet Protocol (IP) addresses. Devices contained in the same subnet generally communicate with each other without difficulty. If a client and the Gateway reside on different subnets, then the “subnet gateway” must be configured for both devices, which reside on their respective subnets. These “subnet gateways” have the ability to route information between subnets. The term “subnetting” refers to communication that crosses subnets.

Routing

The act of specifying how to route network packets from one machine to another. A client can set up routing to a limited number of devices, or a subnet gateway may be used to provide the routing to a large number of machines. Routing is not required when communicating between machines on the same subnet.

Firewalls

Some clients, such as Linux workstations, can be configured with firewalls. In many applications, the client will be shielded behind a larger firewall that provides adequate protection from the Internet. Firewalls configured on the client or between the client and the Gateway can sometimes cause problems in communicating with the Gateway.

With one LAN interface, a firewall at the client may need to be disabled to avoid problems. If this is not feasible due to security concerns, an additional LAN interface not shielded by the firewall may be added to the client to communicate with the Gateway.

SICL vs. VISA

SICL (Standard Instrument Control Library) was developed by HP and transferred to Agilent. It is a client-side programming library that allows applications to be written to allow remote access to instruments across LAN (as well as locally). It also includes command-line utilities that have that capability. SICL is supported today by Agilent for Windows clients, and by TAMS for HP-UX and RedHat Linux clients. It is recommended that new applications be written with VISA when feasible, due to the larger number of vendors who support that standard.

VISA (Virtual Instrument Software Architecture) is standardized by the *VXIplug&play* Systems Alliance to provide similar capabilities as SICL, but with wider industry support. The Agilent and TAMS offerings of VISA do not include command-line utilities, although others may.

For instruments connected to the Gateway, *VXIplug&play* drivers are frequently available to minimize the programming required under VISA. Contact the maker of the instrument for information. These are more commonly available for Windows clients rather than Linux/HP-UX.

The TAMS 3020 Gateway can handle application programs written in SICL and VISA simultaneously. Different instruments on a bus can use the two different libraries, but any one instrument must use the same library when being accessed. See the www.tamsinc.com website for further details on supported configurations.

Where to Go Now

Now that you understand how the TAMS 3020 LAN I/O Gateway works, you are ready to install and configure the Gateway. Please continue on to the next chapter, "Installation."

2. Installation

This chapter explains how to install the TAMS 3020 LAN I/O Gateway on the LAN and local busses for use with network-equipped computer systems. To complete the installation, you will do the following:

1. Ensure that you have the hardware and software required.
2. Install the Gateway hardware by connecting it to the LAN, HP-IB busses and AC power.

The following sections explain how to complete these installation steps.

Prerequisites

This section lists the hardware and software you need to install the TAMS 3020 LAN I/O Gateway.

Hardware Requirements

To install the Gateway, you must have the following hardware. The selection of HP-IB instruments and cables, of course, is installation-specific. At a minimum, one peripheral device is required.

- One or more of the following, network-equipped computer systems to act as the LAN client system(s) and/or the network configuration system:
 - HP workstation running HP-UX 10.20 or 11i.
 - 32-bit personal computer (PC) running RedHat Linux, Windows 2000 or Windows XP Professional
- A local area network (LAN) to which the client system(s) and the TAMS 3020 LAN I/O Gateway can connect via the appropriate LAN cables.
- The TAMS 3020 LAN I/O Gateway.
- Power cord that will provide power to the Gateway.
- HP-IB instrument(s), including the HP-IB cable(s) needed to connect the Gateway to the instrument(s).

Software Requirements

Each client computer system that will access the Gateway must be running one of the following operating systems.

- HP-UX version 10.20 or 11i for HP workstations
- RedHat Enterprise Linux (for 32 bit PC's)
- Microsoft Windows 98, 2000, or XP Professional

You must also have one or more of the following I/O application products configured on each client workstation that you wish to use with the Gateway.

- Agilent SICL and VISA for HP-UX 10.20
- TAMS SICL and VISA for HP-UX 11i
- Agilent SICL and VISA for Microsoft Windows 98, 2000 or XP Professional
- TAMS SICL and VISA for RedHat Linux

- TAMS t3020conf utility for Microsoft Windows or for Redhat Linux on at least one client; this is not required but very useful software

To learn how to install and configure these software products for use with the Gateway, please refer to Appendix C, “Related Software Documentation.”

Installing the Hardware

This section explains how to install the LAN I/O Gateway hardware by connecting it to the LAN and peripheral interface busses.

1. Make sure the HP-IB instruments you will connect to the Gateway are working properly.
2. Connect the Gateway to the network, as shown on the following pages. Connect the LAN cable to the RJ-45 connector on the back panel of the Gateway. For a 10BaseT network, use Cat-3 or Cat-5 cabling. For a 100BaseTX network, use only Cat-5 cabling.
3. Connect the HP-IB cable(s) from the HP-IB instrument(s) to the HP-IB connector(s) on the back panel of the Gateway. Tighten the small screws on the smaller HP-IB connector gently with a small flat-blade screwdriver. Each connector on the back of the Gateway is connected to a separate bus. Within each bus, insure that unique bus addresses are used. Linear topologies are recommended.
4. Set the AC power switch to off (“0” depressed), connect the power cord to a power outlet and to the power receptacle. Then, turn the power switch to on. The red power light should come on.
5. The Gateway box takes about 2 to 3 minutes to boot and be ready for operation. If you can successfully telnet to the Gateway then it is ready for operation. Alternatively, if the t3020 configuration utility can successfully discover the 3020 on your subnet then the 3020 has fully booted. It is recommended to use the t3020conf utility as it takes care of any routing issues whereas telnet requires the routing table on your system be correct which may not be the case.

Where to Go Now

You have now finished installing the Gateway hardware. Please continue on to the next chapter to configure the Gateway on your network.

3. Network Configuration

This chapter explains how to configure the TAMS 3020 LAN I/O Gateway on your network. You can use this chapter if you are configuring the Gateway for the first time on your network, or if you need to change the Gateway's configuration in the future.

To configure the LAN I/O Gateway on a network any of these three methods may be used:

1. Use the **t3020conf** configuration utility from a remote client. This utility is easy to use to setup the networking values needed to get the 3020 LAN Gateway ready to communicate with client machines on your network. This utility is also very useful if you don't know the network values (hostname, IP address, etc.) of your 3020 LAN Gateway. The **t3020conf** is limited to configuring the 3020 network values and cannot be used to configure other 3020 values (e.g the number of connections allowed to the 3020, etc). See the section "Default Network Configuration Settings" to see exactly which values can be configured with this method. The utility is supported on Windows 98, Windows 2000, Windows XP or RedHat Linux operating systems. If you only have HP-UX machines available on your network you will not be able to use this utility.
2. Use the standard operating system **telnet** facility from a remote client. With this method all the configurable parameters provided by the 3020 LAN Gateway can be changed. With this method the hostname or IP address of the 3020 must be know; otherwise **t3020conf** should be used to find these values. If you are familiar with using 'telnet' and setting up the routing table ('route' command) on your client this method will be easy to do, otherwise you may find it difficult.
3. Access the reset switch inside the 3020 box. If this switch is engaged while powering up the 3020 box, the box will boot into the factory default network configuration. In the rare case where the 3020 LAN Gateway network values have been incorrectly set such that the 3020 is unreachable on your network, this method can be used to restore the default 3020 LAN Gateway values. You will then have to use one of the methods above for final configuration on your local subnet.

Remote Configuration via t3020conf Utility

This utility is designed to ease getting the initial setup of the 3020 LAN Gateway on your network completed. It is also designed to help discover the current 3020 LAN Gateway network values in case they are unknown/forgotten.

The **t3020conf** finds your 3020 Gateway on your subnet, displays its networking parameters, and then allows you to reconfigure the networking values to something compatible with your network. This is all done from a remote client machine.

Installing t3020conf Utility

Insert the CD that came with your 3020 into your CD drive of your client machine (RedHat Linux or Windows).

The 3020 Gateway must be on the same subnet (or accesible via subnetting) as this client machine. The client need not be the same machine as the intended client machine for running your SICL or VISA based applications.

RedHat Linux installation:

- Open a terminal window on your system; all commands below are typed into this window.
- Ensure you are the root user, if not:
`su – root`
Password:
- Find the mount point of your CD drive containing the TAMS disc. One way to do this is as follows
`cat /proc/mounts | grep iso9660`
look at the results to see the CD drive mount point, example results are as follows:
`/dev/hdc /media/cdrecorder iso9660 ro 0 0`
the mount point is the second field, in this case /media/cdrecorder
- `rpm –U /media/cdrecorder/linux/t3020conf*.noarch.rpm`
This command will vary depending upon where your CD drive mount point is.

NOTE: For Linux the t3020conf requires Python to be installed. Python is by default included with RedHat Linux distributions. The GUI version of t3020conf requires wxPython to be installed. Appropriate versions of wxPython are automatically installed from the TAMS CD if needed by the above steps. If wxPython is not installed the t3020conf will still be useable in a command line mode rather than GUI mode. If Python is not installed on your Linux machine the t3020conf will not work in either mode; go to www.python.org to download Python to your Linux machine.

Windows installation:

A installation wizard should automatically start once you insert your CD into the CD drive and close the door. If not use the windows explorer to browse to your CD folder. Double click on windows/Setup.exe. Follow the instructions in the 3020conf installation wizard. No additional software is needed.

Running t3020conf Utility

Note: The most important configuration value is the Internet Protocol (IP) address of the 3020 LAN Gateway. Without a proper IP address, the Gateway may appear “dead” or operate unexpectedly.

IP addresses for network devices are assigned by a designated Network Administrator in your workplace. If you are not the Network Administrator, you will need to contact the designated Network (or System) Administrator who can assign the TAMS 3020 Gateway’s IP address for you. The LAN Gateway product does not support DHCP addressing, so a fixed IP address must be assigned to it.

Please refer to the appropriate sections of “LAN Configuration Values”, which is later in this chapter, for detailed descriptions of IP address, hostname and other networking terms.

Launching this utility under RedHat Linux:

For RedHat Linux the t3020conf can execute in one of two modes, GUI or comand line (CLI).

- Open a terminal window on your system.
- Change to the root user if you are not already:
`su – root`
Password:
- To execute in GUI mode:
`/opt/t3020/bin/t3020conf gui`

- To execute in command line mode:
`/opt/t3020/bin/t3020conf cli`

Note: if wxPython is not installed under your default version of Python on your machine, only the CLI mode will be used, regardless of how the program is started.

Launching this utility under Windows:

For Windows machines, the installation created shortcuts to the t302conf program which always runs in GUI mode:

- On your desktop double click on the **TAMS 3020conf** icon;
OR
- Click on **Start->Programs->TAMS 3020-> TAMS 3020conf**;
OR
- Use windows explorer to browse to and double click: **C:\Program Files\TAMS\3020conf\t3020conf**;

Running in GUI mode (Windows or Linux)

There are four windows (plus some popup message windows) which are displayed by the t3020conf GUI.

A) Main Window:

This is the first page and simply consists of a start and exit button along with a status gauge used to show the progress of some lengthy tasks (several seconds to a few minutes).

B) Devices Page:

This window has a box showing all the active network interface devices on your machine and the routing table for each interface device. Typically only one device is shown in which case just click on the “next” button. If more than one device is shown select the network interface device that is on the same subnet as your 3020 LAN Gateway. The routing table for each device is also shown as these routing IP addresses may help you decide which device is communicating to the subnet where you placed your 3020 Gateway. Once you click “next” button your subnet will be probed for 3020 Gateway machines. Since this takes a few seconds, the gauge on the Main Window will show the progress of the LAN probe.

C) Hosts Page:

This page lists all potential 3020 Gateway machines found by the probe of your subnet. The hostname and IP address of each discovered machine is shown in a list box. Any machine on your subnet (hooked to the device selected on the previous page) that is configured to respond to VXI-11 or SICL LAN protocols will be shown. Select the 3020 Gateway and then click on “next” to change the network values for the 3020 or “cancel” to quit.

If multiple machines are listed and you do not know which one is the 3020 Gateway here are some tips:

- a) The default IP address for the 3020 Gateway from the factory is 192.0.0.192.
- b) Record the list of IP addresses., click “back”, power down your 3020, click “next”, compare this new list with the old list of IP addresses. The missing IP address will be the 3020 Gateway.

D) New IP address Page:

This page shows the IP address of the 3020 Gateway you selected on the previous page and lets you enter a new IP address for the 3020. Notice that the hostname, subnet mask and subnet gateway IP address are not asked for. These values are all looked up by t3020conf program based on the IP address you enter. Click on “finish” to reconfigure and reboot the 3020. This takes about 3 minutes so the gauge on the Main Window will show the progress. Otherwise, click on “cancel” or “back” if you don’t want to reconfigure the 3020.

Running in CLI mode (Linux only):

The following shows a typical CLI session. In this example there are two machines the t3020conf finds (192.0.0.192 and goofy.mycompany.com) on the subnet. The user selects machine 1) at 192.0.0.192 as the 3020 and then gives a new IP address of 206.543.63.188 for the 3020:

Searching on your LAN subnetwork for configured machines (takes 6 seconds)

Found these computer(s) configured as SICL/VXI11 LAN servers:

NOTE: Any computers with the T3020 default IP address are highlighted

1) 192.0.0.192 192.0.0. HPLAN VXI11

2) 206.543.62.5 goofy.mycompany.com HPLAN VXI11

Enter the number which corresponds to the T3020 host? [1 to 2 | exit] (exit) **2**

Change the IP address of T3020 LAN server from 192.0.0.192? [y or n] (n) **y**

Enter the new IP address (in form xxx.xxx.xxx.xxx)? **206.543.62.188**

The T3020 has been reconfigured and is rebooting (takes about 3 minutes)

Further configuration of T3020 can be done by running: telnet 206.543.62.188

Note: if multiple network interface devices were active on the machine then more messages would have been displayed to show a choose a interface device.

Default Network Configuration Settings

The TAMS 3020 LAN Gateway is shipped from the factory with default settings for the configuration values listed in Table 3-1. You can use the methods described in the next section to change any of the configuration values, as needed. The TAMS 3020 LAN Gateway uses these default configuration values until you explicitly change any of these values and set any other configuration values. The Gateway also reloads these values when the “reset” action/method, described later, is done.

Parameter	Default Value	t3020conf configurable
Hostname	T3020	Yes
IP address	192.0.0.192	Yes
Subnet Gateway Address	0.0.0.0	Yes
Subnet Mask	0.0.0.0	Yes
LAN timeout	0	No
I/O timeout	120	No
Maxconnections	0	No

Table 3-1 – Default Configuration Table

List of Configuration Values

This section provides a brief description of the configuration values that are used to configure the TAMS 3020 LAN I/O Gateway on a network. Later sections describe advanced methods to configure these values. The t3020conf basic configuration method has previously been described.

The following pages list the configuration values that are used to configure the LAN I/O Gateway on a network. The configuration values for interfaces other than LAN is also deferred until Chapter 4.

Hostname

This value configures the Internet domain name for the LAN I/O Gateway. This name is used in some error and status messages, but is not a required configuration setting. The t3020conf utility displays hostnames after probing for machines on your subnet. This can be a simple hostname or may be a fully qualified domain name. Each period (.) delimited field may be a maximum of 63 alphanumeric characters, with a total of 254 characters.

Hardware Address

This value is the unique address of the LAN interface in the TAMS 3020 LAN I/O Gateway. (Note that this is also often called the link-level address, the Ethernet station address, the MAC Address or the LANIC ID.) This address is uniquely programmed during manufacture, and cannot be changed. It can be read through the Configuration Utility, but is not normally used during configuration. You Network Administrator may want to be informed of this address for troubleshooting or security purposes.

IP Address

This value is the Internet Protocol (IP) address of the LAN I/O Gateway. The IP address is a required value and is used for all IP and TCP/IP communications with the LAN I/O Gateway. The IP address is represented in dotted decimal notation (for example, **15.1.222.201**). This number is not assigned by TAMS; rather, it is assigned by your designated Network Administrator. The LAN I/O Gateway uses the default IP address of **192.0.0.192** as a temporary IP address until you configure a real IP address. The t3020conf utility uses the IP address extensively.

Subnet Gateway Address

This value is the IP address of the subnet gateway that allows the TAMS 3020 LAN I/O Gateway to communicate with systems that are not on the local subnet. Thus, this is the subnet gateway where packets are sent which are destined for a device not on the local subnet, as determined by the subnet mask setting. (See the explanation for the subnet mask configuration value.)

Only one subnet gateway can be configured. A value of **0.0.0.0** indicates that no subnetting is to be done, which is the equivalent of setting the subnet gateway address to the IP address of the LAN I/O Gateway. A device on the network does not need a gateway, if all communication with it will occur on its subnet.

Subnet Mask

This value is used to enable the LAN I/O Gateway to determine if an IP address is on the same local subnet as the LAN I/O Gateway itself. When an address is on a different subnet, all packets must be sent to a subnet gateway. The subnet mask is sometimes not needed with today's smart subnet gateways, which automatically know when to forward packets between subnets. A value of **0.0.0.0** indicates no subnetting is to be done. That is, no packets will be forwarded between subnets, and the LAN I/O Gateway must be used with clients that reside on the same subnet.

LAN Timeout

This has a value specified in seconds. When set to '0', there is no limit on how long the system will wait for a LAN transaction to complete. No keepalive probes are sent.

If set to a non-zero value, then the system waits that number of seconds for an inactive connection. If no activity occurs during that amount of time, then keepalive probes are sent periodically to the client for approximately 11 minutes to see if it is still alive. If that time limit is also exceeded with no response, then the connection will be marked as down ("dropped"), and the Gateway will release any resources which were allocated to the associated client. The second time limit is fixed, not configurable by the user.

I/O Timeout

This value sets the server I/O timeout in seconds. This configures the Gateway to use an I/O timeout of the specified amount of seconds, if the client requests a timeout of infinity. If 0 is specified for this value and the client requests infinity, then the Gateway will use a timeout of infinity as requested. This timeout value may be used to ensure that the Gateway does not wait indefinitely for an I/O operation. This also allows the Gateway to detect certain network events, such as a client connection being dropped, which may otherwise go undetected. If the Gateway detects such a condition, it will release any resources, such as locks, associated with the client.

Maximum Connections

This specifies the maximum number of client connections that can have open sessions. This may be useful when troubleshooting or to control resource usage of client processes. Anywhere from 1 to 40 connections can be specified, in order to bound resource usage. The default value of '0' is a special case, which does not limit the number of connections. Due to overhead required internally to check this parameter, using the default value is generally preferred for normal operation.

Remote Configuration via Telnet

Remote Configuration can be from:

- From a RedHat Linux workstation
- From an HP-UX Unix workstation
- From a Windows workstation

Remote Configuration via telnet is the normal method of configuration if the t3020conf utility doesn't suffice. Default Configuration must be used if the networking configuration is put in such a state that the 3020 Gateway can no longer be accessed through the network.

The following examples of Remote Configuration assume that the workstation being used for configuration and the Gateway reside on the same subnet.

Remote Configuration

The Gateway box can be remotely configured from a RedHat Linux machine, an HP-UX Unix machine, or a Windows machine running Windows 98, 2000 or XP Professional. Jump down to the appropriate section based on what workstation will be used to set the configuration of the Gateway.

Remote Configuration from a RedHat Linux Workstation

The Gateway is initially configured with an IP address of 192.0.0.192, and subnetting disabled. Since this address will most likely not be in your local subnet, routing from a RedHat workstation must be set up to allow initial communication with the Gateway, until such time as the Gateway IP address can be changed.

Log in as root user on the workstation. Determine what the device name of the Ethernet connection to be used to communicate with the Gateway is. This is frequently eth0.

Confirm that with a **route** command. The last column of output is labeled Iface, and shows what interfaces are being used for the various routes. Generally, "eth0" and "lo" will be the only two shown. The "eth0" interface is the physical interface to the LAN.

The command needed to add the routing with eth0 is:

```
route add -host 192.0.0.192 dev eth0
```

Consult the manual pages for 'route' and 'netstat', if trouble is encountered in adding the proper route. Now jump ahead to the section "Remote Configuration Continued".

Remote Configuration from an HP-UX Workstation

The Gateway is initially configured with an IP address of 192.0.0.192, and subnetting disabled. Since this address will most likely not be in your local subnet, routing from an HP-UX workstation must be set up to allow initial communication with the Gateway, until such time as the Gateway IP address can be changed.

Log in as root user on the workstation. Determine what the hostname of the HP-UX workstation is with the **uname -n** command.

The command needed to add the routing with eth0 is:

```
route add host 192.0.0.192 hostname
```

Consult the manual pages for 'route' and 'netstat', if trouble is encountered in adding the proper route. Now jump ahead to the section "Remote Configuration Continued".

Remote Configuration from a Windows Workstation

The Gateway is initially configured with an IP address of 192.0.0.192, and subnetting disabled. Since this address will most likely not be in your local subnet, routing from a Windows workstation must be set up to allow initial communication with the Gateway, until such a time as the Gateway IP address can be changed.

Log in as a user with administrative privileges. An example command to add the routing to the Gateway is:

```
route add 192.0.0.192 hostname
```

or

```
route -p add 192.0.0.192 hostname
```

The 'hostname' parameter is the name or IP address of the Windows workstation being used. The first command adds a route that does not survive a reboot, while the second command adds one that does survive.

Additional help can be obtained by doing **netstat /help** and **route /help** commands.

After successfully performing the **route add** command as above, a new entry should appear in **netstat -r** output, similar to:

```
=====
Active Routes:
Network Destination  Netmask          Gateway          Interface        Metric
192.0.0.192          255.255.255.255  aaa.bbb.ccc.ddd  aaa.bbb.ccc.ddd  1
=====
```

This will allow the local machine at address aaa.bbb.ccc.ddd to communicate with the Gateway box at 192.0.0.192. The **route -p add** command would add a similar line under "Persistent Routes".

Remote Configuration Continued

At this point, the required routing from the local workstation to the Gateway box should be in place. Confirm this with the **ping** command from the local workstation:

```
ping 192.0.0.192
```

Output similar to the following should be obtained:

```
Reply from 192.0.0.192: bytes=32 time<10ms TTL=255
```

```
Ping statistics for 192.0.0.192:
```

```
    Packets: Sent = 4, Received = 4, Lost = 0(0% loss),
```

```
    Approximate round trip time in milli-seconds:
```

```
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

This shows four replies from the Gateway box. On some platforms, it may be necessary to type **<Ctrl-C>** to terminate the **ping** command. If the **ping** command cannot communicate successfully with the Gateway, review the routing that should be in place, the physical LAN cabling, and make sure the Gateway is powered up. Consult with your local System Administrator for assistance in dealing with

network problems. It may be necessary to use the Default Configuration method of configuring the Gateway box, although difficulties in communicating with it at the default address of 192.0.0.192 suggest that the same problems will occur when it is reconfigured to reside at a local subnet address.

Now, communications with the Gateway box have been successfully demonstrated, and we're ready to configure network parameters and interface card parameters to suit the local environment.

The utility used for communication with the Gateway is the common command **telnet**. From the command line:

```
telnet 192.0.0.192
```

The response from the Gateway should be:

```
Gateway Configuration version 1.2.0  
Copyright 2002, Test & Measurement Systems Inc.
```

```
Type help by itself to get a list of valid commands.  
>
```

The version number is subject to change. The ">" symbol is the prompt for the command-line interface.

Enter **help** in order to show the supported commands. Enter **help <command>** to get a short description of what each command does. If the commands are not being shown as they are typed, then enter '**echo yes**' in order to turn on the terminal echo.

The **config** command displays a summary of the network parameter settings, plus shows which interfaces are currently configured in the system:

```
>config  
hostname:      T3020  
hwaddress:    00:02:B6:15:36:49  
ip:           192.0.0.192  
gateway:      0.0.0.0  
subnetmask:   0.0.0.0  
lantimeout    0  
iotimeout:    120  
maxconnections: 0  
HP-IB Interface (0): gpib1  
  
>
```

In this sample output, all parameters are set to factory-default values, and one interface is configured in the system.

The IP address of the Gateway must be changed to an address assigned by a local System Administrator for its use. This should be an address within the local subnet in which the Gateway will be used.

To change the IP address from 192.0.0.192 to aaa.bbb.ccc.ddd, simply type:

```
>ip aaa.bbb.ccc.ddd
```

A host name was likely assigned by the System Administrator along with the IP address. Enter it as follows:

```
>hostname new_host_name
```

The line that says:

```
gateway:      0.0.0.0
```

must also be changed, if subnetting is to be enabled. In the usage, "gateway" refers to the "subnet gateway", a machine that routes packets into and out of the local subnet when required. This is a different use of the term than Gateway, which is used as shorthand for the TAMS 3020 LAN I/O Gateway in this document.

If there is a computer designated as the gateway for the subnet on which the 3020 Gateway box resides, then its IP address is appropriate here. Simply type in its address:

```
>gateway www.xxx.yyy.zzz
```

The default value of 0.0.0.0 is acceptable if no communication across subnets (i.e. subnetting) is to be done.

If subnetting is to be used, then the subnetmask should also be configured at this time. In most situations, 255.255.255.0 is appropriate, but check with your local System Administrator for confirmation. Set the chosen subnetmask as follows:

```
>subnetmask 255.255.255.0
```

The default value of 0.0.0.0 is acceptable if no communication across subnets (i.e. subnetting) is to be done.

None of these networking parameters have actually been changed yet in non-volatile memory. Do a **config** command to allow verification of the parameters and if they are satisfactory, then enter the **save** command. This is necessary to save the changed values in memory. A reboot is also needed to allow the networking to be restarted with the new values. This is done automatically by the **save** command when required. After the reboot, the IP address of the Gateway is changed and further remote accesses to it via **ping**, **telnet**, or application programs must be done to the new address.

If the network parameters were successfully modified, you may want to jump to the "Testing Network Configuration" section at the end of this chapter to verify proper operation. If trouble was experienced in setting network parameters, you may need to continue on with the "Default Configuration" section following. The default values for all parameters are listed in the "Default Values" section of the chapter to allow you to decide if any further parameter value changes are needed for your system.

Default Configuration

This method can only be used to reset the 3020 Gateway configuration to the factory set defaults. The main reason that this method is used is to recover from a situation when the box was programmed with an improper IP address, subnet mask, etc. and can no longer respond on your network via **telnet** or **t3020conf** as described earlier in this chapter.

3020 Gateway reset configuration procedure:

- Power off your 3020 Gateway, and make sure it is sitting on its bottom such that the power switch is near the upper right corner of the box.
- Locate the small round hole in the back plate of the 3020. This is on the left edge of the backplate near the RS-232 connector. The hole is to the left of the connector and the nut used to screw in the RS-232 cable.
- Find a small, straight, rigid probe that can be inserted in the hole at least 1 inch. Possible items include a paper clip bent straight, a toothpick, a twist tie bent straight. You will need an item roughly at least 2 inches long to make room for your fingers holding one end of it and still be able to insert it the proper depth.
- Insert the probe in the hole until it stops. It should go in straight but downward at about a 30 degree angle. The insert should stop at roughly 1 inch deep and you might hear the switch click as it is engaged if you listen closely. If the probe keeps going it is inserted at an incorrect angle, try again.
- While holding the probe in place with the internal switch engaged, power on the 3020 Gateway. **KEEP HOLDING THE PROBE IN PLACE FOR AT LEAST 7 SECONDS AFTER POWER UP.** The switch must be engaged during the first 7 seconds after power up or the 3020 Gateway will not change its configuration.
- Wait 3 minutes for the 3020 Gateway to fully boot. It will now be set to use the default network configuration as documented previously in this chapter (IP address 192.0.0.192)

After the above procedure, the 3020 Gateway will be set to its default configuration as documented previously, in this chapter. You may now use the **t3020conf** utility or **telnet** to remotely configure the 3020 Gateway on your network.

If you have trouble with the probe procedure documented above, another option is to use a screwdriver to take the sheet metal off the top of the box and then the internal switch is easily accessible.

Testing Network Configuration

At this point, the network parameters should have been customized and the Gateway box accessible on the network. Confirm this by executing a **ping** command from a remote workstation directed to the Gateway box.

```
C:\>ping new_host_name
```

```
Pinging new_host_name with 32 bytes of data:
```

```
Reply from 192.168.0.1: bytes=32 time<10ms TTL=225
```

```
Reply from 192.168.0.1: bytes=32 time<10ms TTL=225
```

Reply from 192.168.0.1: bytes=32 time<10ms TTL=225
Reply from 192.168.0.1: bytes=32 time<10ms TTL=225

Ping statistics for 192.168.0.1:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 0ms, Average = 0ms

If reliable communication cannot be established, review the appropriate section on network configuration. Try pinging to 192.0.0.192 to see if the IP address did not get changed as expected. As a last resort, use the "Default Configuration" method above.

Default Parameter Values (All Interfaces)

During configuration, the default values for networking must be modified, in order to give the Gateway box an IP address on a local subnet. Installed HP-IB interfaces may be usable with their default values. The factory default values for networking parameters, as well as the other possible interfaces are shown in the following table. See Chapter 4 for additional information on what values are appropriate for various parameters.

Network Parameters:

hostname:	T3020
ip:	192.0.0.192
gateway:	0.0.0.0
subnetmask:	0.0.0.0
lantimeout:	0
iotimeout:	120
maxconnections:	0

HP-IB Parameters:

Symname:	gpib1, gpib2
LU:	8,9
HP-IB Address:	21

Note: Where multiple entries are shown, they're for the first and second installed interfaces.

The hardware address value for networking is programmed at the factory and cannot be changed. It is unique for each Gateway box.

Where to Go Now

You have now finished configuring the network parameters of the TAMS 3020 LAN I/O Gateway. Continue on to Chapter 4 for an overview of communicating with instruments connected to your 3020 Gateway, or go to Chapter 5 to learn to use all the commands provided by the Configuration Utility in the Gateway box.

Likewise, if you ever encounter problems with the Gateway, please refer to Chapter 6, “Troubleshooting”.

4. Usage with SICL/VISA Applications

This chapter shows how to use the TAMS 3020 LAN I/O Gateway to remotely access an instrument via the gateway. This chapter is only meant as an overview of the steps needed to get a SICL or VISA application to work remotely with the 3020 Gateway rather than a local instrument. The examples, assume the client is either Red Hat Linux or HP-UX. For complete details refer to the SICL and VISA documentation listed in Appendix B.

After you have finished network configuration of the Gateway as outlined in the previous chapter, the next step is to connection your instrument to the 3020 Gateway HP-IP connector and then configure a virtual LAN device under your I/O library (SICL or VISA) on your client machine. Then you can run your SICL/VISA application using this virtual LAN device on your client machine.

Connecting your instrument to the 3020 Gateway

The 3020 supports up to 2 HP-IB busses. Your 3020 Gateway comes with either 1 or 2 HP-IB interface cards, if only one then obviously, only one HP-IB bus is available. Plug your HP-IB cable into the desired HP-IB connector on the back of the 3020 box. Notice the labels “gpib1” and “gpib2” as these are the symbolic HP-IB device names used by the 3020 for the two HP-IB interface cards that can be plugged into the 3020.

Choosing a LAN protocol

As previously mentioned there are two low level LAN protocols which are supported by the 3020 Gateway SICL LAN and VXI-11 LAN (aka TCP/IP instrument protocol). SICL LAN was developed by Hewlett-Packard (transferred to Agilent Technologies) and is the default choice when configuring a virtual LAN device on your system using TAMS iosetup. VXI-11 LAN was developed by the VXIbus Consortium and permits the interoperability of LAN software from different vendors. If your client application uses TAMS or Agilent VISA or SICL I/O libraries, then SICL LAN should be chosen as the widest range of SICL operations will be permitted. If your client application uses other vendors I/O libraries then the VXI-11 LAN protocol should be chosen.

Configuration for SICL

Use **iosetup** to add two virtual LAN devices (one for SICL LAN and one for VXI-11 LAN).

su – root

Password:

/opt/sicl/bin/iosetup

in the Available interfaces list box select “VXI-11 LAN client”

click “configure”

A menu will pop up for our example change the symbolic name to “vxilan”

click “ok” in menu

In the Available interfaces list box select “SICL-LAN client”

click “configure”

A menu will pop up for our example change the symbolic name to “sicllan”

click “ok” in menu

click “ok” in main menu

Now we have two virtual LAN devices configured on our client machine named “sicllan” and “vxilan” which can be used to run SICL based applications on our client machine to a remote instrument connected to the 3020 Gateway.

Running a SICL application

To run a SICL application the following information needs to be specified as the device address:
1) virtual LAN device symbolic name configured by **iosetup**, 2) hostname or IP address of 3020 Gateway, 3) HP-IB interface symbolic name and bus address.

This information is specified with syntax as follows:

```
<virtual LAN name>[<IP address | hostname>]:<HP-IB symbolic name>,<HP-IB address>
```

An example would be:

```
sicllan[T3020]:gpib1,22
```

“sicllan” is the virtual SICL LAN name as specified to **iosetup** as the symbolic name

“T3020” is the host name for the 3020 (fully qualified domain names or IP addresses are also acceptable)

“gpib1” is the 3020 interface symbolic name

“22” is the HP-IB bus address of the instrument

A second example would be:

```
vxilan[213.166.109.8]:gpib2,20
```

Here communication will be with VXI11 LAN protocol to a Gateway with IP address 213.166.109.8 and gpib2 interface card and onto HP-IB bus address 20.

Refer to your application documentation to see how a device address is specified to the application.

Configuration for VISA

Make sure to first do the steps under “Configuration with SICL” which generates two LAN virtual devices named “sicllan” and “vxilan”

Use **iosetup** to add two virtual LAN devices (one for SICL LAN and one for VXI-11 LAN).

```
su – root
```

```
Password:
```

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

```
click “configure VISA”
```

```
in the “Unconfigured interfaces list box” select “sicllan“
```

```
click on “configure”
```

```
For the interface name any of the choices will work, let’s assume “GPIB1” is chosen
```

```
For Remote Hostname enter the TAMS 3020 Gateway hostname
```

```
For Remote SICL interface name enter “gpib1” or “gpib2”
```

```
Click on “Automatically identify all devices at runtime”
```

Click on “ok”
Click on “ok” on the main menu
in the “Unconfigured interfaces list box” select “vxlan”
click on “configure”
For the interface name any of the choices will work, let’s assume “GPIB2” is chosen
For Remote Hostname enter the TAMS 3020 Gateway hostname
For Remote SICL interface name enter “gpib1” or “gpib2”
Click on “Automatically identify all devices at runtime”
Click on “ok”
Click on “ok” in the VISA configuration window

Now we have two virtual LAN devices configured on our client machine named “GPIB1” and “GPIB2” which can be used to run VISA based applications on our client machine to a remote instrument connected to the 3020 Gateway.

Running a VISA application

There is no difference in running your VISA application to a 3020 Gateway as to a local HP-IB interface except the virtual device name is given (e.g. “GPIB1” or “GPIB2” using the above configuration) rather than a local device name.

5. Administration

This chapter explains in more detail how to administer the TAMS 3020 LAN I/O Gateway. To administer the Gateway, you will use the Configuration Utility provided in the LAN I/O Gateway. The Configuration Utility provides a command line interface for accomplishing administration tasks, including configuration of the Gateway and querying the status of the Gateway.

The first section in this chapter, “Accessing the Configuration Utility,” explains how to access and exit the Configuration Utility, and summarizes the various commands you can use to administer the Gateway. The subsequent sections then cover the commands in-depth, explaining how you can use the commands to accomplish the following administration tasks:

- Querying the Gateway’s Current Configuration
- Modifying the Gateway’s Configuration
- Querying the Status of the Gateway and Client Connections
- Terminating All Client Connections to the Gateway
- Determining the Version of the Gateway’s Firmware

Accessing the Configuration Utility

Any time you need to use the Configuration commands, follow this procedure to access the Configuration Utility:

1. If you're using a Windows system, login if required and open an MS-DOS window. For Windows 98, select **Start | Programs | MS-DOS Prompt**. For Windows 2000, select **Start | Programs | Accessories | Command Prompt**. For Windows XP Professional, select **Start | Command Prompt**.

If you're using an HP-UX or RedHat Linux client system, login. If a graphical user interface (GUI) is in use, open a window with a command-line interface.

2. Type the command: **telnet *IP_address* (or) *hostname* <Return>**

Where:

- *IP_address* is the IP address of the TAMS 3020 LAN I/O Gateway. (The IP address is a required configuration value that was previously set for the Gateway via one of the configuration methods discussed in Chapter 3, "Configuration.")
- *hostname* is the hostname (Internet domain name) of the TAMS 3020 LAN I/O Gateway. (The hostname is an optional configuration value that may have been previously set for the Gateway via one of the configuration methods discussed in Chapter 3, "Configuration."). The network administrator must have added this name to the DNS/NIS/local hosts file for this to work.

If you do not know the IP address or hostname of the Gateway, return to Chapter 3 and follow the directions for running **t3020conf** to discover the Gateway IP address and hostname.

When using the Configuration Utility, on some workstations it may not be possible to use a 'backspace' key in order to correct typing mistakes. This may cause commands that appear to be correct to be rejected by the utility. It could cause unintended parameter values to be entered. Rather than trying to backspace, re-enter the command without the mistakes.

Following is an example screen for a TAMS 3020 LAN I/O Gateway. Note that it may be necessary to enter an **echo Yes** command in order to have the information you type echoed back on the screen. The information shown is a list of commands, followed by a summary of the configuration of the Gateway box.

```
I/O Configuration version 1.0
Copyright 2002, Test & Measurement Systems Inc.
```

```
Type help by itself to get a list of valid commands
```

```
>help
```

Documented commands (type help <topic>):

```
=====
cancel  echo  gateway  hwaddress  lantimeout  quit  save  version
clear   edit  help      iotimeout  list         reboot status
config  exit  hostname  ip         maxconnections  reset  subnetmask
```

```
>config
hostname:      T3020
hwaddress:     00.02.B6:15:36:49
ip:            192.0.0.192
gateway:       0.0.0.0
subnetmask:    0.0.0.0
lantimeout:    0
iotimeout:     120
maxconnections: 0
HP-IB Interface (0): gpib1
>
```

Exiting the Configuration Utility

cancel, exit, quit

To exit the Configuration Utility there are several different commands available. To exit without saving any changes you may have entered type one of the following commands:

```
>cancel
>exit
>quit
```

These commands simply exit the utility, discarding any changes you may have specified. If you simply close the window from which you are running the Configuration Utility, changes entered will also be discarded.

save

If you made any changes that you wish to retain, type in:

```
>save
```

If there are changes to save, the save command will clear any client operations in progress, along with all client connections. If the network parameters have been edited, the system will also automatically reboot. If no changes have been made to parameters, the **save** command will notify you of that and not exit the Configuration Utility.

Global Commands

The following commands affect the operation of all interfaces installed in the Gateway, including the LAN interface.

config

The configured interfaces can be listed in several ways. The **config** command shows a summary of the interfaces. Note that the LAN interface is always configured, and is not explicitly listed by the **config** command, although its parameters are:

```
>config
hostname:      new_host_name
hwaddress:     00:02:B6:15:51:29
ip:            192.0.0.192
gateway:       0.0.0.0
subnetmask:    0.0.0.0
lantimeout:    0,
iotimeout:     120
maxconnections: 0
HP-IB Interface (0): gpib1
```

reset

To restore all configuration parameters back to the factory default values enter:

```
>reset
```

Note that the IP address and other network parameters will return to default values, so it may be necessary to use methods in Chapter 3 to re-establish communication with the Gateway after using the **reset** command.

reboot

To reboot the box after saving any parameters you may have changed, enter:

```
>reboot
```

The **reboot** command will of course clear client operations in progress, along with client connections. It is not generally used in normal operation. Several minutes are required for a reboot operation.

LAN Configuration Commands

There are several commands used for configuring the LAN connection. These display or change LAN parameters. The **config** command can be used to display the current value of these parameters conveniently.

hostname

The **hostname** command displays or changes the machine name of the Gateway box. This may be entered as the machine name or the machine name plus domain. There is no difference in functionality.

```
>hostname T3020
>hostname
hostname:      T3020
>hostname T3020.mydomain
>hostname
hostname:      T3020.mydomain
```

hwaddress

The **hwaddress** command displays the value of the MAC address. This is an address that is permanently assigned to the physical interface in the Gateway box. It is for information only, and may be requested by the System Administrator for the subnet where the Gateway box resides.

```
>hwaddress
hwaddress:     00:02:B6:15:51:29
```

The number represents a 48 bit address that is unique to the LAN interface contained in the Gateway box.

ip

The **ip** command displays or changes the Internet Protocol address of the Gateway box. To change, simply enter the desired address in standard notation, four decimal numbers separated by three dots:

```
>ip 192.128.12.2
```

gateway

The **gateway** command displays or changes the address of the subnet gateway. This is a different use of the word than Gateway, which is used in this document as an abbreviation for the product, TAMS 3020 LAN I/O Gateway.

On a subnet, there usually is a machine with capabilities of routing traffic to other subnets. The IP address of that machine should be used as a parameter for the **gateway** command. Contact a System Administrator for that information if necessary.

Alternately, the address 0.0.0.0 can be used to disable subnetting, if there is no need to route traffic off the local subnet. If all workstations are located on the same subnet as the 3020, then this situation applies.

subnetmask

The **subnetmask** command is used to set the subnetmask to be used. This is frequently 255.255.255.0, but check with your System Administrator to see if this is appropriate. The same notation as is used for IP addresses is used, but with different meanings. If the numbers are considered binary digits, then a 0 represents a wildcard.

```
>subnetmask 255.255.255.0
```

If subnetting is disabled, then the default value of 0.0.0.0 is useable for the subnetmask. If the gateway IP address is set to that of an external gateway, then a subnetmask appropriate for your network must be used.

lantimeout

The **lantimeout** command displays or sets the timeout used with LAN connections, specified with a value of seconds. The value must be between 0 and 2^{31} . The value of 0 is a special case that represents an infinite value (i.e. no timeout). Activity must be shown for each LAN connection within the specified amount of time, or that connection will be closed by the Gateway and the associated resources freed. A timeout is generally used to clear connections with clients that have died, or to close connections opened by faulty application programs.

The actual timeout is substantially longer than that specified in the **lantimeout** command. After the specified amount of time, the system starts sending periodic keepalive probes to the client for approximately 11 minutes. If no response is received at the end of that time, then the connection is closed.

```
>lantimeout 60
```

This example sets the lantimeout to 1 minute, but the actual amount of time before the connection is closed is approximately 12 minutes.

maxconnections

The **maxconnections** command displays or sets the maximum number of LAN connections allowed at any given time. The value of 0 represents no limit enforced, although the finite resources of the Gateway product will create some practical limit. Specifying a parameter of 1 through 40 inclusive allows you to limit the number of simultaneous connections to that number.

```
>maxconnections 8
```

I/O Interface Commands

The following commands concern the installed I/O interfaces in the Gateway.

list

The **list** command shows all the configured interfaces except LAN, along with all the current settings of the parameters. Depending on the number of interfaces and the height of the window on the workstation, some information may scroll off the top:

```
>list
Configured interfaces:
HP-IB Interface
LU: 7
Symname: gpib1
Location: 0
Address: 21
```

The “Location” parameter shown for HP-IB indicates where the interfaces reside.

edit

The **edit** command allows the parameters of one interface to be edited. Specify either the symbolic name or the logical unit number (LU) of the interface:

```
>edit gpib1
LU: (8)
Symname: (gpib1)
HP-IB Address: (21)
```

The **edit** command displays the current setting of each parameter, and allows a new value to be entered. If the current value is acceptable, simply hit the Enter or Return key. Where a limited number of parameter values are allowed, they are listed inside square brackets.

Edit is used to modify parameters of all interfaces except for LAN. Those parameters are listed below.

HP-IB Parameters

LU: Logical unit number. Must be a unique number for each interface in the Gateway box.

Symname: Symbolic Name. A name that uniquely identifies each interface in the Gateway box.

HP-IB Address: The address on the HP-IB bus of the interface itself. Each device on a bus must have a unique address. Must be an integer between 0 and 30 inclusive.

iotimeout

The **iotimeout** command displays or sets a timeout in seconds for all interfaces on the Gateway except the LAN interface. The parameter must be an integer between 0 and 2^{31} . An I/O operation must be complete within the specified amount of time, or else it will be cleared by the system. The value of "0" is a special case that represents no timeout set.

```
>iotimeout 40
```

Miscellaneous Commands

Other Configuration Utility commands not covered elsewhere include **help**, **echo** and **version** .

help

The help command lists all commands available in the Configuration Utility.

echo

The **echo** command is used to control echoing of characters that are typed to the Configuration Utility. If your typing is not showing on the screen as it is typed, then enter **echo Yes**. If characters are being shown twice, try **echo No**.

version

The **version** command displays the revision number of the software contained in the Gateway box. It cannot be changed without a firmware upgrade. Two lines are output, the first is the version of the Configuration Utility included and the second is the version of the overall system release:

```
>version
Gateway Configuration version 1.0
```

You should have this information available if it is necessary to contact TAMS for product support.

Client Connection Management

This section explains how to query the status of the Gateway and its client connections (that is, the LAN client computer systems that are connected to the Gateway to perform I/O operations via the Gateway).

status

To query the status of the Gateway and client connections via the Configuration Utility, type:

```
>status
```

You now see the status screen, which lists all current clients that are connected to this Gateway. The following is an example status screen of clients connected to a TAMS 3020 LAN I/O Gateway.

The meaning of the various fields listed on the status screen are:

Server ID	Client IP Addr	Client ID	Sess	Operation	Lock	Device/Intf
0x2008f624	15.1.4.247	4139	117		DEV	gpib1,1
0x2008f624	15.1.4.247	4139	5	WRITE	DEV	gpib2,21
0x2008f624	15.1.4.247	4139	66			gpib2
0x2008f40c	190.2.49.138	27598	21	LOCK		7,21
0x2008f40c	190.2.49.138	27598	3		DEV	7,9,1
0x2008f40c	190.2.49.138	27598	14		DEV	7,9,2
0x2008f40c	190.2.49.138	27598	129			7,1
0x2008f1f4	15.1.4.249	739	36			gpib2,1
0x2008f1f4	15.1.4.249	739	8	READ		gpib1,9,2

Server ID A unique process identification (ID) number for the client connection on this server (this TAMS 3020 LAN I/O Gateway).

Client IP Addr The IP address of the client computer system that is connected to this server.

Client ID A unique identification (ID) number for the client computer system's process. (Always **0** for a Windows 95 or Windows NT client.)

Sess The unique session number of a client's communication channel with a device, which can be any number **1** through **256**.

Operation The client's I/O operation that is currently being performed on the associated device or interface. A blank field indicates that no I/O operation is currently executing. The complete list of operations is provided later in this section.

Lock Indicates if the client has a lock on the associated device (**DEV**) or interface (**INTF**). A blank field indicates no lock.

Device/Intf The device or interface on which the session is currently performing, or will perform, its I/O operation. Note that for SICL I/O operations, this relates to the device or interface specified in the **iopen** statement.

Also note the following:

- The **Client IP Addr** and **Client ID** are both needed to uniquely identify a client connection. In the previous example, clients 1 and 3 are separate processes on the same machine (that is, they have the same **Client IP Addr**).
- If an **Operation** is specified for a given session and the session does not have a **Lock**, then the operation for the session may be waiting for another client to complete an I/O operation or to unlock a device or the interface. In the previous example, client 2 is waiting to get a lock on device 21 after client 1 completes the **WRITE** operation and unlocks device 21. Also, client 3 is waiting for client 2 to unlock device 9,2 (primary,secondary) before it can perform the **READ** operation.
- If an **Operation** is specified for a given session and the session does have a **Lock**, the operation is likely to be in progress and not waiting on another client to complete an operation. For more information, consult the documentation for your I/O application software on how interface locks and device locks work in your software. (See Appendix C, "Related Software Documentation.")

The following is a list of **Operation** field values and the SICL functions that correspond to them. If you wish to terminate the client connections, see the next section, "Terminating All Client Connections to the Gateway."

Operation	SICL Function
CLEAR	iclear
CLOSE	iclose
GETDEV	igetdevaddr
GETINTF	igetintftype
GETLU	igetlu

GETSESS	igetssesstype
HINT	ihint
LOCAL	ilocal
LOCK	ilock
ONINTR	ionintr
ONSRQ	ionsrq
OPEN	iopen
READ	iread
READSTB	ireadstb
REMOTE	iremote
SETINTR	isetintr
TRIGGER	itrigger, ixtrig
UNLOCK	iunlock
VERSION	iversion
WRITE	iwrite

HP-IB specific SICL Functions:

ATNCTL	igpibantctl
BUSADDR	igpibbusaddr
BUSSTAT	igpibbusstatus
GETT1	igpibgett1delay
LLO	igpibllo
PASSCTL	igpibpassctl
RENCTL	igpibrenctl
SENDCMD	igpibsendcmd
SETT1	igpibsett1delay

RS-232 specific SICL Functions:

BREAK	iserialbreak
CTRL	iserialctrl
MCLCTRL	iserialmclctrl
MCLSTAT	iserialmclstat
STAT	iserialstat

GPIO specific SICL Functions:

CTRL	igpioctrl
GETWIDTH	igpiogetwidth
SETWIDTH	igpiosetWidth
STAT	igpiostat

If after querying the status of the Gateway and client connections (as explained in the previous section), you determine that the Gateway or a client's I/O operation is "hung," or there is a deadlock situation between clients that are connected to the Gateway, you can clear the Gateway to terminate all client connections. However, before clearing the Gateway, you may want to forewarn users that any I/O operations they have in progress and their client connections to the Gateway will be terminated. The users will then need to re-open new sessions on the Gateway after the clear has occurred.

clear

To terminate all client connections to the Gateway, type the following:

```
>clear
```

Caution Any client operations in progress and client connections will be terminated by the **clear** command.

Once the clear occurs, users who previously had open sessions on the Gateway will likely get either an **I_ERR_TIMEOUT** or **I_ERR_NOCONN** error message. Again, since the clear terminates all client connections, those users will need to re-open new sessions on the Gateway after the clear occurs.

6. Troubleshooting

This chapter explains how to troubleshoot problems you may encounter with the TAMS 3020 LAN I/O Gateway. This chapter includes information for:

- HP SICL LAN Error Codes and Messages
- Network Connection Problems
- Configuration Problems
- Client Connection Problems
- Client Run-time Errors

Note: Throughout the troubleshooting information in this chapter, reference is often made to Configuration commands you can use to troubleshoot problems. The Configuration Utility commands for the TAMS 3020 LAN I/O Gateway are fully explained in Chapter 5, “Administration.”

Also, reference is often made to various configuration values. See Chapter 3, “Configuration,” for descriptions of the configuration values used with the LAN I/O Gateway, as well as the methods used to configure the Gateway.

HP SICL LAN Error Codes and Messages

The following table lists the more common SICL LAN error codes and messages that a client application might encounter when using the TAMS 3020 LAN I/O Gateway. The final column in the table (Troubleshooting Explanation) explains the error and suggests possible troubleshooting procedures to try.

Error Code	Error Message	Troubleshooting Explanation
I_ERR_BADADDR	Bad address	The device/interface address passed to iopen doesn't exist. Use the Configuration Utility to verify that the symname and LU for the desired interface are correct.
I_ERR_NOCONN	No connection	The communication session with the Gateway was never established, or the connection to a remote Gateway was dropped. Use the Configuration Utility status command to get more information.
I_ERR_NORSRC	Out of resources	No more resources are available. Use the Configuration Utility status command to get more information.
I_ERR_SYMNAME	Invalid Symbolic Name	The symbolic name passed to iopen was not recognized. Use the Configuration Utility config or list command to verify the symname or LU is configured. Verify using iosetup on the client that the LAN interface is configured.
I_ERR_TIMEOUT	Timeout occurred	A timeout occurred while performing an operation. The device may be busy, in a bad state, or a longer timeout value may be needed for the operation of the device. Verify the correct address was used in iopen . Use the Configuration Utility status command to get more information.

Table 5-1 Common SICL LAN Errors

Network Connection Problems

Before attempting to communicate with the TAMS 3020 LAN I/O Gateway, you may want to verify that the network connection and cabling are correct. Do the following:

- Verify proper connections and network terminations visually. (Refer to the installation instructions in Chapter 2.)
- Power on the LAN I/O Gateway; Make sure it is fully booted by waiting 3 minutes.
- Make sure network packets are being transmitted on the same local subnet that is connected to the Gateway. The packets do not need to be addressed to go to the Gateway. You could use the **ping** command to generate network traffic.
- Use the **t3020conf** utility to see if it can find the 3020 Gateway on you LAN

Configuration Problems

This section covers possible problems you may encounter when configuring the IP address and other network parameters for the TAMS 3020 LAN I/O Gateway.

If you wish to return the Gateway to its default configuration values, return to Chapter 3 and follow the instructions under the "Default Configuration" section.

Troubleshooting Remote Configuration via t3020conf

If you having trouble configuring the LAN I/O Gateway using **t3020conf**, do the following:

1. Make sure you have selected the correct 3020 host from the list if more than one appears.
2. Make sure you have selected the correct LAN interface device from the list if more than one appears.
3. If you are not finding your 3020 Gateway in the list of hosts, make sure the 3020 Gateway is fully booted by allowing at least 3 minutes prior to running the LAN probe portion of **t3020conf**.
4. Verify that any firewalls are disabled on the system where **t3020conf** is being run.
5. Verify that the LAN cable is fully connect to the 3020 and the LED next to the connector is flashing green.
6. Verify that the Gateway is on the same local subnet as the client system from which you are running **t3020conf**. If not, consult your Network Administrator to determine if the default IP address will work from a separate subnet, or to find a client system on the same local subnet that you can use.

7. Verify that the IP address you are trying to change to is a valid IP address for the subnet the 3020 resides on. Also make sure no other machine is using that IP address. Use **ping** to see if another machine responds to that IP address.
8. As a last resort, use the default configuration method to reset the 3020 configuration (default IP is 192.0.0.192)

Troubleshooting Remote Configuration via telnet

If you are having trouble configuring the LAN I/O Gateway using **telnet** with the default IP address of **192.0.0.192**, do the following:

1. Use the **t3020conf** utility if possible to configure the Gateway rather than the telnet method!
2. Verify that the **route** command was performed properly. Use the following command to display the network routing tables:

```
>netstat -r
```

3. Verify that the Gateway is on the same local subnet as the client system from which you are Telnetting. If not, consult your Network Administrator to determine if the default IP address will work from a separate subnet, or to find a client system on the same local subnet that you can use.
4. Make sure no other device with an IP address of 192.0.0.192 exists on the local subnet, including another 3020 Gateway. Try a **ping** command with your 3020 Gateway powered off.
5. Verify that the LAN cable is fully connect to the 3020 and the LED next to the connector is flashing green.

Troubleshooting Network Configuration

If some of the network configuration values for the TAMS 3020 LAN I/O Gateway are improperly configured, one or more client systems may not be able to make a connection to the Gateway. The problem may be improper configuration value(s) for the subnet gateway and/or the subnet mask. If this is the case, the Gateway may be receiving requests from the client, but routing the replies to the wrong place.

To fix network configuration values when using the remote configuration method, do one of the following actions:

- If a client can successfully **telnet** to the Gateway, use the Configuration Utility commands to fix the values. Then reboot using the **save** command.
- Use the **t3020conf** utility, if it can find the 3020 box, to fix the values.

Caution: Any client operations in progress and client connections will be terminated by the **save** command

Client Connection Problems

Once the TAMS 3020 LAN I/O Gateway has been successfully configured and the configuration has been verified, individual clients might still have problems getting a connection to the Gateway.

The first step is to verify that the client system has network access to the Gateway:

1. Use the **ping** command, as follows.

- On an HP-UX or Linux client system, enter:
>ping hostname (or) **IP_address**

For example:

```
>ping new_host_name  
PING new_host_name: 64 byte packets  
64 bytes from 128.10.0.3: icmp_seq=0. time=8. ms  
64 bytes from 128.10.0.3: icmp_seq=1. time=3. ms  
64 bytes from 128.10.0.3: icmp_seq=2. time=3. ms  
64 bytes from 128.10.0.3: icmp_seq=3. time=3. ms
```

Each line after the **PING** line is an example of a packet successfully reaching the Gateway. If after several seconds **ping** does not print any lines, use **<Ctrl-C>** to kill **ping**. The **ping** command will then report on what it found. For example:

```
----new_host_name PING Statistics----  
7 packets transmitted, 0 packets received, 100% packet loss
```

This indicates that the client was unable to contact the Gateway. It could be that the Gateway is on a different subnet than the client (see your Network Administrator), or the Gateway could have incorrect network configuration values (see the previous information on “Troubleshooting Network Configuration”).

- On a Windows client system, enter:
>ping hostname (or) **IP_address**

For example:

```
>ping new_host_name  
Pinging new_host_name[128.10.0.3] with 32 bytes of data:  
Reply from 128.10.0.3:bytes=32 time=10ms TTL=255  
Reply from 128.10.0.3:bytes=32 time=10ms TTL=255  
Reply from 128.10.0.3:bytes=32 time=10ms TTL=255  
Reply from 128.10.0.3:bytes=32 time=10ms TTL=225
```

Each line after the “Pinging” line is an example of a packet successfully reaching the Gateway from the client system. However, if **ping** is unable to reach the host, you will see a message similar to the following:

```
Pinging new_host_name[128.10.0.3] with 32 bytes of data:  
Request timed out.  
Request timed out.  
Request timed out.
```

This indicates that the client was unable to contact the Gateway. It could be that the Gateway is on a different subnet than the client and subnetting is not properly configured (see your Network Administrator), or the Gateway could have incorrect network configuration values (see the previous information on “Troubleshooting Network Configuration”).

2. Once **ping** works, you can try the following **rpcinfo** commands from an HP-UX or Linux client system, using the Gateway IP name or IP address to verify proper operation of the SICL LAN and VXI-11 servers inside the Gateway:

```
>rpcinfo -p hostname (or) IP_address
```

This command should give the following response:

program	vers	proto	port	
100000	2	tcp	111	portmapper
100000	2	udp	111	portmapper
395180	1	tcp	1024	
395183	1	tcp	1024	

The port numbers for programs 395180 and 395183 may vary from the 1024 shown.

You can try the following two commands to verify operation of two servers inside the Gateway box:

```
>rpcinfo -t hostname (or) IP_address 395180
```

```
program 395180 version 1 is ready and waiting
```

```
and
```

```
>rpcinfo -t hostname (or) IP_address 395183
```

```
program 395183 version 1 ready and waiting
```

The first command and response indicates the SICL LAN server in the Gateway box is operational, while the second shows the VXI-11 server to be operational. If either command fails to provide the indicated response, try rebooting the Gateway box to recover. If the problem persists, contact TAMS for support. These two servers should always be running to handle the SICL LAN and VXI-11 protocols respectively.

Note: If the **rpcinfo -p** command executes properly, but **rpcinfo -t** commands hang without completing, this is generally caused by a firewall on the client, or between the client and Gateway blocking access. If this is seen on a RedHat Linux machine, review the firewall configuration to see if it is active.

3. The **telnet** command can be used from any supported workstation to verify if a client has network access to the Gateway as well. If the **telnet** command returns the message:

```
connection refused
```

then connectivity on the network has been shown, but there may be an internal error in the Gateway.

If one client has the Configuration Utility open, and another client attempts to use the utility, then an error is generated for that other client. For Windows clients, other than XP Professional, the error is:

Connection to host lost

For Windows XP Professional clients, there generally will be no error message visible.

For a Linux or HP-UX client, the error is:

Connection closed by foreign host.

If a client opens the Configuration Utility and leaves it open due to a crash or network failure, it may be necessary to power-cycle the Gateway box to recover from that situation.

4. The **iclear** command can be used to verify connectivity from the client to the server:

```
iclear lan[T3020]:hpiib
```

An error message of “Bad address” or “Invalid address” returned generally indicates that **lan** is not set up properly on the client machine. Use the **iosetup** utility on the client to correct the problem.

Client Run-time Errors

When debugging problems involving application programs, it may be useful to use SICL commands from the command line in order to verify basic connectivity. See the "Command Line Examples" section at the end of this chapter, if help is needed in diagnosing some of the problems indicated by the following error messages.

The following are common run-time errors that may occur on a client that is using a TAMS 3020 LAN I/O Gateway.

- **iopen** fails: Invalid address errors, “Error 3, lan_connect failed”, or “Bad Address”
Use the Configuration Utility commands to verify that the interface address, name, and/or logical unit configuration values are correct. Also, use **iosetup** on the client machine to verify that the LAN client is correctly configured.
- **iopen** fails: No connection, “Error 6, lan_core_createSync() failed”
The connection to the LAN I/O Gateway failed for one of these reasons:
 - A TCP/IP network timeout occurred because the network connection is down or the Gateway is down.
 - The Gateway has reached its maximum concurrent client connections and this new connection was refused. Use the Configuration Utility **status** command to determine the current Gateway client connection status. You may need to have a client close its connection, or you may need to use the **clear** command in the Configuration Utility.

- **iopen** fails: Timeout
The client has timed out. The Gateway has not responded within the appropriate timeout time because:
 - A Linux firewall on the client is blocking the operation.
 - The network connection is down or the Gateway is down.
 - The server is busy performing an operation for a different client. Use the Configuration Utility **status** command to verify the Gateway status. You may need to increase the Client Timeout Delta configuration value on the LAN client, using **iosetup**.

- **iopen** fails or I/O operation fails: Out of resources
The Gateway was unable to open another session or perform the operation because it is out of resources. Use the Configuration Utility **status** to determine the current Gateway status. You may need to have a client terminate its connection, or you may need to use the **clear** command to reclaim resources.

- **iopen** fails: “Error 2, bad hostname, gethostbyname() failed”
The **iopen** failed because the IP address of the hostname could not be determined. Likely causes would be the hostname of the 3020 machine not being available via DNS or NIS due to improper configuration of those services at the client or at the name servers.

- I/O operation fails: No connection
The connection to the Gateway failed because:
 - The network connection is down or the Gateway is down and a TCP/IP network timeout occurred.
 - The Gateway was powered off and then powered on, or a Configuration Utility **reboot** or **clear** command was executed, either of which terminates any open client connections.
 - Sporadic failures may be caused by DNS or NIS lookup failures. Try putting the name and IP address of the Gateway box in `/etc/hosts` for Linux or HP-UX clients to avoid the need for DNS or NIS services across the network.

- I/O operation fails: Timeout
There are several possible causes:
 - The client may be attempting a transaction to a non-existent or powered-off device. Check the address used, as well as the status of the device.
 - The network connection or Gateway has gone down since the previous I/O operation.
 - The I/O timeout specified is not long enough for the transaction to complete. You may need to verify that the Gateway I/O timeout configuration value is long enough if the client specified a timeout value of infinity.
 - The Gateway is busy performing an I/O operation for another client, or another client has the device/interface locked. Use the Configuration Utility **status** command to determine

if another client is currently executing an operation, or if the required device/interface is locked. See the following discussion, “Gateway appears to be hung,” for more information.

- Gateway appears to be hung. There are several possible causes. Note that, for all of the following, use of client timeouts and/or Gateway timeouts (the I/O timeout and LAN timeout configuration values) can be used to ensure that the Gateway will not “hang” indefinitely.
- The network connection has gone down or the Gateway has gone down.
- The Gateway may be attempting a transaction to a non-existent or powered-off device. Check the address used, as well as the status of the device.
- The Gateway is busy performing a very long transaction to a (slow) device, or it is waiting for input from a device.
- A client may be waiting for access to a device/interface locked by another client. Use the Configuration Utility **status** command to determine which clients have which devices or interface locked, and which clients are waiting for those locks to be freed before they can proceed. Check for possible deadlock situations and, if possible, make sure the clients owning locks and the connections to those clients are still up and functioning.

If you determine that the Gateway is truly hung, you may be able to free it by terminating a particular client connection at the client, thus freeing up the resources to allow the Gateway to proceed. Otherwise, you may have to use the Configuration Utility **clear** or **reboot** commands, or power-cycle the 3020.

Caution Any client operations in progress and client connections will be terminated by the **clear** or **reboot** commands, or by power-cycling.

Command Line Examples

From a Windows workstation, read 34 characters from an HP-IB clock at address 22 on interface 'hpib', with Gateway hostname of T3020:

```
>\Program Files\Agilent\IO Libraries\bin\iread -c 34 lan [T3020]:hpib,22  
01:01:21:00:22  
01:01:21:00:22
```

From a Linux workstation, write a string of characters without terminating characters to interface 'gpio', with Gateway hostname of T3020:

```
echo -n "helpme" | /opt/sicl/bin/iwrite lan[T3020]:gpio
```

Note that installing SICL on Windows workstation does not automatically set the execution path to include SICL commands, so using the full path is necessary for the **iread** command to be found, unless the path is manually added and the system rebooted. Also, the **echo** command works somewhat differently on Windows vs. Linux/HP-UX, so that example would operate differently on Windows.

Of course, for the first example to work, an instrument capable of outputting data without first receiving a command must exist at bus address 22. For the second example to work, some appropriate circuitry must be connected to the GPIO interface, and the polarity of the handshake lines configured appropriately. If no circuitry is attached, any reads or writes will simply hang until timeouts are reached.

Aborting Pending Transactions

If an I/O operation is failing to complete due to a configuration problem, the command usually can be aborted by a <Ctrl-C> from the keyboard. However, this does not clear the I/O operation being attempted at the Gateway box. For example, if an attempt is made to do an **iread** command from a non-existent hpib device, aborting the **iread** command leaves the interface in use until a timeout occurs, or a **clear** command is done from the Configuration Utility. Attempts to **iread** from an actual device will be blocked by the first I/O operation. This memory of uncompleted transactions can cause unexpected results if you are not aware of the issue. Liberal use of the **status** and **clear** commands may be needed until programs and scripts are debugged and hardware issues resolved.

Using the **clear** command in the Configuration Utility with operations pending can in some situations cause segmentation faults, application errors, or other serious errors to be reported by client-side software. For this reason, it is preferable to abort the operation at the client first, and then use the **clear** command to clean up pending operations in the Gateway box.

A Technical Reference

This appendix provides a technical reference of the following topics for the TAMS 3020 LAN I/O Gateway:

- Specifications
- HP-IB Characteristics
- Serial terminal communication specifications

Specifications

Power Supply:

- Maximum Output : 40Watts
- Output Voltage and Current Rating : +5V@3A, +12V@2A, -5V@0.3A, -12V@0.3A to 264VAC@0.3A
- Input Voltage : 90VAC to 264VAC
- Input Frequency : 47 to 63Hz
- Efficiency : 70% typical
- Safety Standards : Meets UL, CSA, VDE standards
- EMI Standards : Meets FCC standards

Environmental Specifications:

- Operating Temp. : 0 to 50 celsius degree
- Storage Temp. : -20 to 85 celsius degree
- Relative Humidity : 5% to 95% non-condensing
- Altitude : 0 to 10,000ft
- Vibration (operating) : Passed MIL-STD-810F basic transportation vibration test

Physical Specifications:

90(w) x 195(h) x 217(d) mm

HP-IB Characteristics

The HP-IB connection conforms to IEEE 488.1 - 1987 specifications. Per this specification, the following constraints exist:

Total Bus length: Less than 2 meters x number of devices, and no more than 20 meters total length.
Linear bus topology recommended.

Length between devices: Less than 2 meters between each device or equivalent standard load.

Total number of devices: 15 devices or less (includes TAMS 3020 LAN I/O Gateway).

Address restrictions: Address 31 is a reserved IEEE 488 address. The TAMS 3020 LAN I/O Gateway normally uses address 21, unless changed in the configuration table.

Drivers: The TAMS 3020 LAN I/O Gateway uses 48mA three-state drivers (E2).

RS-232 Serial Terminal

Refer to your serial terminal documentation and/or PC hardware/software documentation to setup a serial terminal to the 3020 Gateway. The 3020 Gateway is expecting the following communication parameters to be used in your serial terminal software configuration:

Baud rate	38400
Parity	Odd
Data bits	8
Stop Bits	1

A serial terminal is not needed for this product. It can be used to see the boot sequence and also once the 3020 is fully booted the current configuration values are displayed.

B Related Software Documentation

This appendix explains what software manuals you should follow to use the TAMS 3020 LAN I/O Gateway with these I/O application software products:

- TAMS SICL and VISA for HP-UX 11i
- TAMS SICL for RedHat Linux
- HP SICL
- HP VISA
- HP VEE
- HP BASIC/UX 700
- TAMS BASIC/LX

Note: The TAMS 3020 LAN I/O Gateway supports all I/O application operations by these software products except for parallel polling, SICL commander sessions, and asynchronous aborting.

The HP SICL and VISA products were originally developed by HP, and then transferred to Agilent as part of the corporate restructuring. Contact Agilent Technologies for purchase and support of those products.

TAMS SICL and VISA for HP-UX 11i Documentation

To use the LAN I/O Gateway with TAMS SICL on a client computer, you must configure the software first. Documentation is provided as .pdf and .ps files on the software disk. See *Installation and Configuration Guide for HP-UX I/O Libraries* (installation.xx) for installation, then *Standard Instrument Control Libraries User's Guide* (siclug.xx) for information on using SICL.

TAMS SICL for RedHat Linux Documentation

To use the LAN I/O Gateway with TAMS SICL on a client computer, you must configure the software first. See *Installation and Configuration Guide for Linux I/O Libraries* (installation.xx) for the installation, then *Standard Instrument Control Libraries User's Guide* (siclug.xx) for information on using SICL.

HP SICL Documentation

To use the LAN I/O Gateway, you must configure the LAN client software provided with HP SICL. See the “Installing and Configuring the HP I/O Libraries” chapter of the *HP I/O Libraries Installation and Configuration Guide* for configuration procedures.

To develop and use HP SICL I/O applications for the Gateway, see the “Using HP SICL with LAN” chapter of the *HP SICL User’s Guide*. HP SICL functions, including those that are LAN-specific, are fully defined in the *HP SICL Reference Manual*.

HP VISA

To use the LAN I/O Gateway, you must configure the LAN client software provided with HP SICL and HP VISA. See the “Installing and Configuring the HP I/O Libraries” chapter of the *HP I/O Libraries Installation and Configuration Guide* for configuration procedures. To develop and use HP VISA I/O applications for the Gateway, see the “Programming over LAN” chapter of the *HP VISA User’s Guide*.

HP VEE Documentation

To use the LAN I/O Gateway, you must configure the HP SICL LAN client software provided with HP VEE. See the *Installing the HP I/O Libraries for HP VEE* manual for configuration procedures. To develop and use HP VEE I/O applications for the Gateway, see the “Using Instruments” chapter of the *HP VEE Advanced Programming Techniques* manual.

HP BASIC/UX 700 Documentation

Version 8.x

To use the LAN I/O Gateway, you must configure the HP SICL LAN client software provided with HP BASIC/UX 700 Version 8.x. See the “Installing and Configuring SICL for BASIC/UX 8.x” chapter of the *Installing and Using HP BASIC/UX 8.x* manual for configuration procedures.

To develop and use HP BASIC/UX 700 Version 8.x I/O applications for the Gateway, see “The HP SICL/LAN Interface” chapter of the *HP BASIC Interface Reference* manual.

Version 7.1

To use the LAN I/O Gateway, you must configure the HP SICL LAN client software provided with HP BASIC/UX 700 Version 7.1. See the “Configuring HP SICL for Series 700” chapter of the *Installing and Maintaining HP BASIC/UX* manual for configuration procedures. To develop and use HP BASIC/UX 700 Version 7.1 I/O applications for the Gateway, see the “HP SICL/LAN Interface” chapter of the *HP BASIC Interface Reference* manual.

TAMS BASIC/LX Documentation

In order to use the LAN I/O Gateway, you must configure the TAMS SICL LAN client software provided with TAMS BASIC/LX Version 11.0. See the “Basic for Linux Documentation”, TAMS PN 2047K, for configuration procedures. To develop and use TAMS BASIC/LX applications for the Gateway, see the siclug.pdf or siclug.ps file shipped in the iolibs directory of the installation disks.

C Client Software Matrix

	SICL	VISA
Windows 98, 2000, XP	E2094x	E2094x
RedHat Enterprise Linux	82091	82091
HP-UX 10.20	E2091x	E2091x
HP-UX 11i	72091	72091

E2094x and E2091x products are available from Agilent Technologies. The "x" denotes a revision letter. Consult Agilent documentation for recommended version numbers for specific hardware configurations.

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E Glossary

address

A string uniquely identifying a particular interface or a device on that interface which is interpreted at the TAMS 3020 LAN I/O Gateway to identify the interface or device.

client

Part of the client/server model used in distributed computing. A client is a computer system that requests services from a server computer system, such as I/O application requests, networking requests, and so forth.

controller

A computer used to communicate with a remote device such as an instrument. In the communications between the controller and the device, the controller is in charge of and controls the flow of communication (that is, it does the addressing and/or other bus management).

device

A unit that receives commands from a controller. Typically a device is an instrument but could also be a computer acting in a non-controller role, or another peripheral such as a printer or plotter.

gateway

A device that permits a network connection between the LAN that your computer understands, and the instrument specific interface that your device understands.

instrument

A device that accepts commands and performs a test or measurement function.

interface

A connection and communication media between devices and controllers, including mechanical, electrical, and protocol connections.

LAN

Local Area Network.

lock

A state that prohibits other users from accessing a resource, such as a device or interface.

logical unit

A logical unit is a number associated with an interface. In SICL, a logical unit uniquely identifies an interface. Each interface on the controller must have a unique logical unit.

server

Part of the client/server model used in distributed computing. The server is a computer system designated to act as a main servicer of requests from other client computer systems, such as I/O application requests, networking requests, and so forth.

SICL

The Standard Instrument Control Library, which is client-side software used for I/O application programming.

SRQ

Service Request. An asynchronous request (an interrupt) from a remote device indicating that the device requires servicing.

symbolic name

A name corresponding to a single interface. This name uniquely identifies the interface on a controller or gateway. If there is more than one interface on the controller or gateway, each interface must have a unique symbolic name.

VEE

The HP Visual Engineering Environment, which is software used for I/O application programming.

VISA

The Virtual Instrument Software Architecture library, which is client-side software used for I/O application programming. Available from multiple vendors.

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