TAMS

Test & Measurement Systems Inc.

TAMS 81488
HP-IB Card for Linux

Installation & Operation

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Table of Contents

Introduction

The TAMS HP-IB Interface is intended to add IEEE-488 capabilities to any computer with a PCI bus.

The TAMS card takes full advantage of the PCI bus performance and delivers the highest possible level of throughput.

The TAMS Interface supports both the 3.3v and 5v PCI specifications as a universal card.

Thanks to HP's software architecture and the design of the TAMS driver, once the driver is loaded (which is done once at installation) the TAMS card can be used in any application without requiring more computer overhead or any changes to code developed for HP's HP-IB cards.

Whether you are using HP-VEE, HPBASIC/UX, or programming in C with the TAMS I/O Libraries, your code will now run at full performance without modification.

Hardware Warranty

All TAMS products use the highest quality components and are assembled to the highest specifications. Should a defect exist, or a failure occur, we apologize. Any defective unit will be repaired or replaced immediately.

Please follow the instructions below for service response.

- In the US please return it to TAMS. Please call or fax for return instructions.

- Internationally, please contact the local distributor for return instructions.

Any customer may contact TAMS, or return products directly to TAMS, but for customers outside the US, this may cause a delay, which could be avoided by working with the local distributor.

The complete hardware warranty information is in Appendix C.

For software warranty information see the Software License in Appendix B.

Handling Interfaces- Some Words of Caution

You should note the following guidelines to avoid equipment damage when handling any interface cards.

- Make sure the computer's power is turned OFF and the power cord is removed from the AC power outlet, before removing or installing interfaces.

Caution Plugging or unplugging an interface with the power on can damage the interface and the computer.

- Most interfaces contain components that are sensitive to damage from electrostatic discharge. Use protective measures including anti-static workstation and personal grounding devices, if possible. When installing an interface, do not leave the interface exposed longer than necessary.

Caution Whenever you remove, install, or handle an interface, hold it by its support bracket and side edges only. Do not touch its electrical components or traces.

Configuring the Equivalent Loads

As shipped, there are two resistor packs installed in sockets J2 and J3. These provide 10 additional equivalent loads, as defined in the IEEE 488.1-1987 standard. For systems with few devices and long cable lengths, the additional loads provide increased signal integrity and better transfer rates on the cable. In most situations, they can be left installed, which gives a total of 11 loads for the card.

However, there is a maximum of 20 equivalent loads per bus system. Most devices have one equivalent load, so a maximum of nine additional devices can be used while the resistors are installed. If your bus system will have more than nine additional devices, carefully remove both of the resistor packs and store them.

If the resistors need to be reinstalled later on, be sure that the visual key aligns with pin 1 on the sockets. The two resistor packs are equivalent, and can be interchanged. Both resistor packs must be installed together.

For full details on the constraints in configuring a bus system, refer to section 5.2.3 in the IEEE 488.1-1987 specification. The TAMS card is capable of operation at 1,000,000 bytes per second, and therefore the constraints in that section apply. This requires 48 mA tri-state drivers be used in all devices, all devices must be powered on, and cabling must be a maximum of 15 meters total length with at least one equivalent load per meter of cabling.

Installing the HP-IB Interface

Before installing the HP-IB card note the setting of the rotary DIP switch setting on the card. Each 81488 (488-66511) card installed in the computer must have a unique switch setting. It is a good idea to write the switch setting on the metal support bracket with a felt tipped pen.

Refer to the Owner's Guide of your computer for instructions on opening your computer and installing PCI boards.

Follow the instructions being careful to handle the TAMS interface board only by its edges. After the board has been plugged in and the retaining screw installed, the computer should be reassembled.

Depending on the computer, is may be advisable to connect the small Cannon connector of the required HP-IB cable to the TAMS interface card prior to fully seating the PCI board. Ensure that the thumbscrews and the small connector are tight for a good connection.
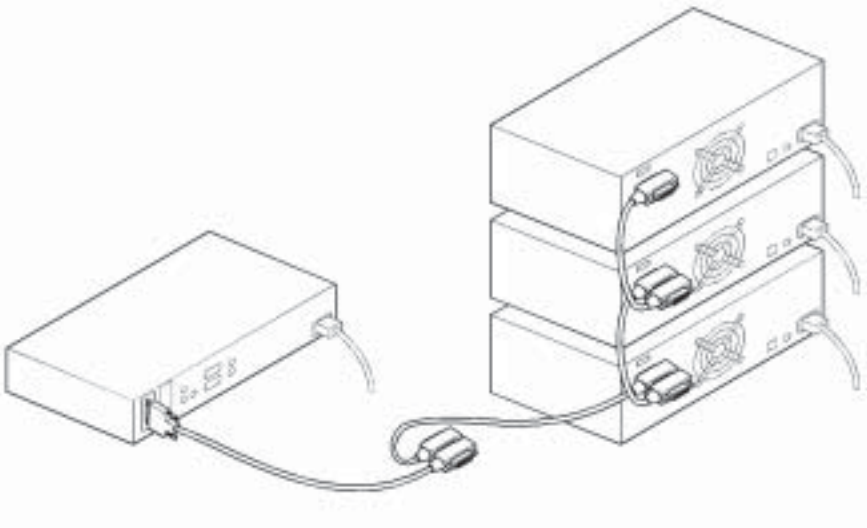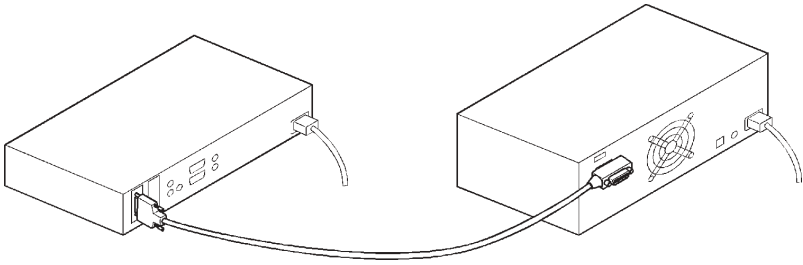

HP-IB cable required by the TAMS interface.

Connecting the HP-IB Cable

The IEEE 488 specification is for a daisy chain configuration, and so the standard connector on the cable supplied can be attached directly to any HP-IB device or to any device in a chain of HP-IB devices.

The following illustrations show correct connections.

You are now ready to install the software that came with the HP-IB card.

Installing the Software

1. Make sure that the I/O Libraries (82091) for Linux is installed.

        rpm -q T82091

2. Insert the installation media into the drive and wait for the busy light to remain off.

3. If your system does not automount the CD-ROM, mount the CD-ROM, for example:

        /bin/mount /dev/cdrom /mnt/cdrom

    /dev/cdrom is the device file for your CD-ROM drive and /mnt/cdrom is a directory used as a mount point.

4. Change to the directory where the driver is.

        cd /mnt/cdrom/81488

5. Use RPM to install the driver. Architecture-specific versions of the software have been provided for systems running the supported kernels; the whichrpm.sh program returns the name of the correct RPM for your system. (Note the use of backquotes (') rather than single quotes (').)

        /bin/rpm -Uvh './whichrpm.sh'

6. The T81488 RPM will automatically load the t81488 kernel module and create the necessary device files. Each time you start up your computer after this, the t81488 kernel module will be loaded and related device files will be created.

7. Once the installation is complete, unmount the CD.

        cd /
        /bin/umount /mnt/cdrom

8. Once the CD is unmounted, remove the media from the drive and store it in a safe place.

In general, the installation procedure places the files in the necessary directories by default. Appendix A is a reference for the Linux systems administrator, who might wish to know where these files are placed.

You will still need to configure the new TAMS HP-IB card as a SICL instrument card, as covered in the next section.

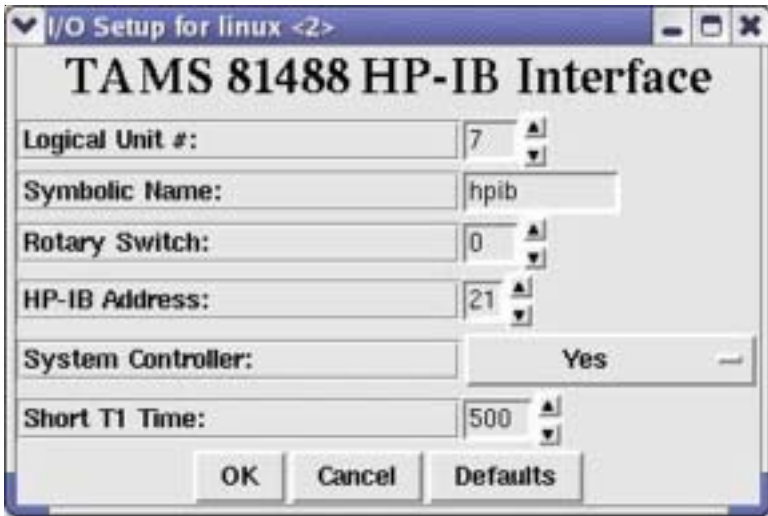# Configuring the Card

Configuring the Card Using iosetup

After installation of the driver software and loading of the t81488 kernel module (handled automatically by the RPM package), the SICL iosetup command must be executed to configure the TAMS card as a SICL instrument card. See the man page on iosetup (1M).

The t81488 driver is implemented as a custom TULIP driver. Therefore, the system does NOT need to be rebooted after changing the configuration using iosetup. However, the SICL iclear command should be used after making changes to ensure that the configuration changes have taken effect. See the man page on iclear (1).

The following information must be supplied by the user during the iosetup process:

1. Logical Unit #: the user must supply a logical unit number for the TAMS card that is distinct from all other logical unit numbers currently configured under SICL.

2. Symbolic Name: the user must supply a symbolic name for the TAMS card that is distinct from all other symbolic names currently configured under SICL.

3. Rotary Switch: the user must specify the setting of the rotary DIP switch on the card.

4. HP-IB Address: the user must specify the HP-IB bus address that the TAMS card is to use on the HP-IB bus. This value must not be the same as any other device connected to the HP-IB cable. It may be the same as other HP-IB interface cards in the computer, so long as those other cards are not attached to the card via the HP-IB cables. If the TAMS card is set up as a system controller, it is traditional to give it HP-IB bus address 21. This is not required, but does serve to reduce confusion.

5. System Controller: the user must specify "Yes" if the TAMS card is to be used as the system controller. The value "No" will cause the card to function as a non-system controller.

6. Short T1 Time: the user must specify the IEEE-488.1 T1 delay value for data transactions in nanoseconds. Reasonable values are an integer between 350 and 1100. For maximum data throughput a value of 350 can be used provided the system meets the following constraints specified in section 5.2.3 of the IEEE-488-1987 standard:
    a) All devices expected to talk at higher rates should use a minimum T1 value of 350ns.

b) All devices expected to operate at highrer rates should use 48 mA three-state drivers.
c) The device capacitance on each lead (REN and IFC excdpted) should be less than 50pF per device. In a system configuration the total device capacitance should be no more than 50pF for each equivalent resistive load in the system.
d) All devices in the system should be powered on.
e) Interconnecting cable links should be as short as possible up to a maximum of 15 m total length per system with at least one equivalent load for each meter of cable.

t81488 Driver Configuration

Configuring the Card Manually

Alternatively one can edit `/etc/opt/sicl/hwconfig.cf` directly.

In `/etc/opt/sicl/hwconfig.cf` the configuration lines have the form:

> <lu> <name> t81488 <location> <hpib_addr> <syscon> <short T1>

The fields are defined as:

1. Logical Unit (lu): the user must supply a logical unit number for the TAMS card that is distinct from all other logical unit numbers currently configured under SICL. A good choice for this, if your system only has one HP-IB card, is 7.

2. Symbolic Name (name): the user must supply a symbolic name for the TAMS card that is distinct from all other symbolic names currently configured under SICL. A good choice for this, if your system only has one HP-IB card, is "hpib" (without the quotes).

3. Location: this number should match the rotary DIP switch setting on the card.

4. HP-IB Address: the user must specify the HP-IB bus address that the TAMS card is to use on the HP-IB bus. This value must not be the same as any other device connected to the HP-IB cable. It may be the same as other HP-IB interface cards in the computer, so long as those other cards are not attached to the card via the HP-IB cables.

   If the TAMS card is set up as a system controller, it is traditional to give it HP-IB bus address 21. This is not required, but does serve to reduce confusion.

5. System Controller: the user must specify "1" if the TAMS card is to be used as the system controller. The value "0" will cause the card to function as a non system controller.

6. Short T1 Delay Time: the user must specify the IEEE-488.1 T1 delay value for data transactions in nanoseconds. Reasonable values are an integer between 350 and 1100. For maximum data throughput a value of 350 can be used provided the system meets the following constraints specified in section 5.2.3 of the IEEE-488-1987 standard:
   - a) All devices expected to talk at higher rates should use a minimum T1 value of 350ns.
   - b) All devices expected to operate at highrer rates should use 48 mA three-state drivers.

c) The device capacitance on each lead (REN and IFC excdpted) should be less than 50pF per device. In a system configuration the total device capacitance should be no more than 50pF for each equivalent resistive load in the system.
d) All devices in the system should be powered on.
e) Interconnecting cable links should be as short as possible up to a maximum of 15 m total length per system with at least one equivalent load for each meter of cable.

The system does not need to reboot after editing the `hwconfig.cf` file.

Appendix A: Systems Administration Reference

The installation procedure places files in the following directories:

File	Location	Description
t81488.so	/opt/sicl/lib	t81488 shared library for SICL
t81488.o	/lib/modules/<kernel version>/ kernel/drivers/char	kernel driver module
t81488	/etc/init.d	start/stop scripts for (un)loading the kernel module and (un)creating the device files
S95t81488 K05t81488	/etc/rc.d/rc[345].d	Links to /etc/init.d/t81488
t81488.0[0-9]	/dev	t81488 device files
t81488.ctl	/dev	Special device file for driver
t81488.readme	/usr/share/doc/T81488-<version>	Readme for the driver package

Appendix B: Software License Agreement

Software License Agreement

Please carefully read this License Agreement before installing the software. Rights in the software are offered only on the condition that the Customer agrees to all terms and conditions of the License Agreement. If you do not agree to the terms of the License Agreement, you may return the unopened software package and hardware for a full refund.

In return for the payment of fee TAMS grants the Customer a license to use the software, until terminated subject to the following

Customer may use software on any one computer.
Customer may not reverse assemble or decompile the software.
Customer may make copies for archival purposes.
Customer has no other rights to copy.
All copies of the software must bear the copyright notice(s) contained on the original.

OWNERSHIP: Customer agrees that they do not have any title or ownership of the software, other than ownership of the physical media. Customer acknowledges and agrees that the software is copyrighted and protected under copyright laws.

Customer acknowledges and agrees that the software may have been developed by a third party software supplier named in the copyright notice(s) included with the software, who shall be authorized to hold Customer responsible for any copyright infringement or violation of this License Agreement.

TRANSFER OF RIGHTS IN SOFTWARE: Customer may transfer rights in the software to a third party only as part of the transfer of all their rights and only if Customer obtains the prior agreement of the third party to be bound buy the terms of this License Agreement.

Upon such transfer, Customer agrees that their rights in the software are terminated and that they will either destroy their copies and adaptations or they will deliver them to the third party.

Transfer to a US government department or agency or to a prime or lower tier contractor in connection with a US government contract shall be made only upon their prior written agreement to terms required by TAMS.

SUBLICENSING AND DISTRIBUTION: Customer may not sublicense the software or distribute copies or adaptations of the software to the public in physical media or by telecommunications without the prior written consent of TAMS

TERMINATION: TAMS May terminate this software license for failure to comply with any of these terms provided TAMS has requested Customer to cure the failure and Customer has failed to do so within thirty (30) days of such notice.

UPDATES AND UPGRADES: Customer agrees that the software does not include updates and upgrades which may be available from TAMS under a separate support agreement.

EXPORT CLAUSE: Customer agrees not to export or re-export the software or any copy or adaptation in violation of the US Export Administration regulations or other applicable regulations.

LIMITED WARRANTY

TAMS warrants for a period of 90 days from the date of purchase that the software product will execute it's programming instructions when properly installed on the computer or workstation with a supported version of the Operating System. TAMS does not warrant that the operation of the software will be uninterrupted or error free. In the event that this software product fails to execute it's programming instructions during this warranty period , Customer's remedy shall be to return the CD media to TAMS for replacement. Should TAMS be unable to replace the media within a reasonable amount of time, Customer's alternate remedy shall be a refund of the purchase price upon return of the entire product and all copies.

TAMS warrants the media upon which the product is recorded top be free from defects in materials and workmanship under normal use for a period of 90 days from the date of purchase. In the event any media prove to be defective during the warranty period, Customer's remedy shall be to return the media to TAMS for replacement. Should Tams be unable to replace the media within a reasonable amount of time, Customer's alternate remedy shall be a refund of the purchase price upon return of the entire product and all copies.

NOTICE OF WARRANTY CLAIMS Customer must notify TAMS in writing of any warranty claim within the warranty period.

LIMITATION OF WARRANTY: TAMS makes no other express warranty, whether written or oral , with respect to this product. Any implied warranty of merchantability or fitness is limited to the 90-day duration of this written warranty. Some sates or provinces do not allow limitations on how long an implied warranty lasts, so the above limitation or exclusion may not apply to you.

This warranty gives specific legal rights, and you may also have other rights which vary from state to state, province to province or country to country.

EXCLUSIVE REMEDIES : The remedies provided above are Customer's sole and exclusive remedies. In no event shall TAMS be liable for any direct, indirect special, incidental, or consequential damages (including lost profit) whether based on warranty, contract, tort or any other legal theory. Some states provinces or countries do not allow the exclusion or limitation of incidental or consequential damages, so the limitation or exclusion may not apply to you.

WARRANTY SERVICE: Warranty service may be obtained directly from TAMS or from any of it's Distributors.

Warranty Information

ONE YEAR LIMITED WARRANTY

Test & Measurement Systems, Inc. warrants to the purchaser that the Interface card will be free of all defects in material and/or workmanship for one year from the date of shipment to the customer.

In the event of malfunction or failure attributable directly to faulty material and/or workmanship, TAMS will at it's option, repair or replace the defective product or components, to whatever extent it shall deem necessary to restore the product or component, to proper operating condition. TAMS may at its option repair or replace, a defective unit with a new or refurbished unit.

The customer shall be solely responsible for the failure of any TAMS product, resulting from accident abuse, or misapplication of the product, and TAMS assumes no liability as a consequence of such events under the terms of this warranty.

While TAMS has made every effort to provide clear and accurate technical information about the application of this product, TAMS assumes no liability for any events arising out of the use of this technical information.

This Warranty gives you specific legal rights and you may also have other rights which vary from state to state, and from country to country.

This Warranty is in Lieu of all other express warranties which now or hereafter might otherwise arise with respect to this product. ANY AND ALL IMPLIED WARRANTIES OF MERCHANT ABILITY AND FITNESS FOR PARTICULAR USE, SHALL HAVE NO GREATER DURATION THAN THE PERIOD FOR THE EXPRESS WRITTEN WARRANTY APPLICABLE TO THIS PRODUCT AS SHOWN ABOVE, AND SHALL TERMINATE AUTOMATICALLY AT THE EXPIRATION OF SUCH PERIOD.

(Some states and countries do not allow limitations on how long an implied warranty lasts, so this limitation may not apply to you) No action shall be brought for breach of any implied or express warranty after one year subsequent to the expiration of the period of the express written warranty.

Incidental and consequential damages caused by malfunction, defect, or otherwise and with respect to breach of any express or implied warranty, are not the responsibility of TAMS, and to the extent permitted by law, are hereby excluded both for property and to the extent not unconscionable, for personal injury damage. (Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.)

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TAMS 81488 HP-IB Card for Red Hat Linux