

SCSI-T-Bridge

for SPARCSTATION with SUNOS or
SOLARIS

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Documentation

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Contents

1	Introduction	5
2	Installation	7
2.1	Requirements	7
2.2	Hardware	9
2.2.1	Technical Data	9
2.2.2	Installing the Hardware	10
2.3	Installing and Configuring the Software	11
2.3.1	Installing the Basicsoftware (first step)	12
2.3.2	Designing of the SCSI-ids	17
2.3.3	Configuring your System and connecting the SCSI-T-Bridges	18
2.3.4	Configuring and Checking the SCSI-T-Bridges	23
2.3.5	Installation of the Basicsoftware (Step 2)	24
2.4	Checking the Installation	25

3	Basicsoftware Tools	29
3.1	links	29
3.2	getversion	30
3.3	ulti	30
3.4	burn_scsi	31
4	Public Interface Streammode	33
5	Troubleshooting	35
5.1	No Light on Front LEDs	35
5.2	Error Message: Failed to get existing sem_key	36
5.3	Errors while Reading the Config File	36
5.4	Errors within the Description of Your Hardware	37
5.5	Error Messages about Incorrect Parameters	38
5.6	A Link is Showed as 'in use' but Nobody Uses it	38
5.7	Error Message: Access to link hardware failed	39

Chapter 1

Introduction

This paper describes the hard- and software of the SCSI-T-Bridge. It explains how to install and to use the SCSI-T-Bridge and the appropriated Basicsoftware.

The purpose of the SCSI-T-Bridge is to connect any PARSYTEC parallel machine with transputer link interface like a GC_{Power+} or POWERXPLO-
RER to any host machine capable of using SCSI tape devices. The current version supports SUN host machines. Therefore, this paper deals especially with the connection to these machines.

The SCSI-T-Bridge consists of a hardware part containing in a box mainly a transputer, a SCSI-chip and cache memory, and a Basicsoftware packet providing you with some object files and tools for testing and using the SCSI-T-Bridge.

While using the widely provided SCSI standard you don't need an especially designed card for each architecture anymore. Using the standard SCSI bus guarantes you low costs and compatibility to all major companies computers. The intelligent SCSI-T-Bridge firmware uses a cache into both directions and supports the SCSI-2 standard to improve the transfer performance.

The upgradable firmware allows to implement different and new communication protocols on your transputer link interface. Currently it supports the PARIX standard communication protocols for T8-PARIX and PowerPC-PARIX as well as the Streammode standard, e.g. used with the Iserver of TOOLSET.

Chapter 2

Installation

2.1 Requirements

Before starting the SCSI-T-Bridge installation please check the following facts on the machine:

- a PARSYTEC parallel machine
- The host machine must be a SPARCSTATION or a SPARC SERVER running SUNOS 4.1.1 or or higher or SOLARIS 2.3 (check with `uname -a`).
- The tape driver on this machine must exist.
- The interprocess communication facilities (at least semaphores) must be installed (check with `ipcs -sb`).
- For each link you are intending to use an unused minor-device of the machine's tape driver must exist. SUNOS supports only 8 minor devices for the tape driver. If you want to use two SCSI-T-Bridges on your machine and you want to use all 8 links you

can't use a tape drive on this machine. If you use only one SCSI-T-Bridge you can still use up to four tape drives. Running SOLARIS you don't have this limit. The configuration of your machine for an appropriated number of minor devices of the tape driver is described in section 2.3.

We recommend not to use more than two SCSI-T-Bridges on one SUN (for performance reasons).

- You need a free connector of an SCSI-bus with an unused SCSI-id for each SCSI-T-Bridge on the chosen host machine. The connector should be a 50-pin high density standard connector (on the host adapter).

If you don't have SCSI support yet you can order a dedicated SCSI host adapter.

It is possible to use the SCSI-T-Bridge on every existing SCSI host adapter with a free SCSI-id. However, for achieving the best possible performance you should use a dedicated SCSI host adapter for the SCSI-T-Bridge. This host adapter must be a single ended SUN SCSI Adapter Fast-SCSI-2 (10 MByte/s).

- For each first SCSI-T-Bridge on one host you need a host adapter cable for SUN (high density 50 to Centronics 50, length: 1.5 meter) For each second SCSI-T-Bridge you need a SCSI device connection cable (Centronics 50 to Centronics 50, length: 0.5 meter). If your host adapter uses a different connector (not high density 50 pin) you need an appropriated cable but with a Centronics 50 connector on the other end.
- For each host you need an active terminator (Centronics 50).
- For each link you want to use you need a LNK-10 link adapter cable (normally 4 per SCSI-T-Bridge).
- For the installation, you need a QIC-150 1/4" cartridge tape device and some basic UNIX administration know-how.

The installation requires superuser permission.

2.2 Hardware

2.2.1 Technical Data

Dimensions: 244mm * 70mm * 265mm (w*h*d)

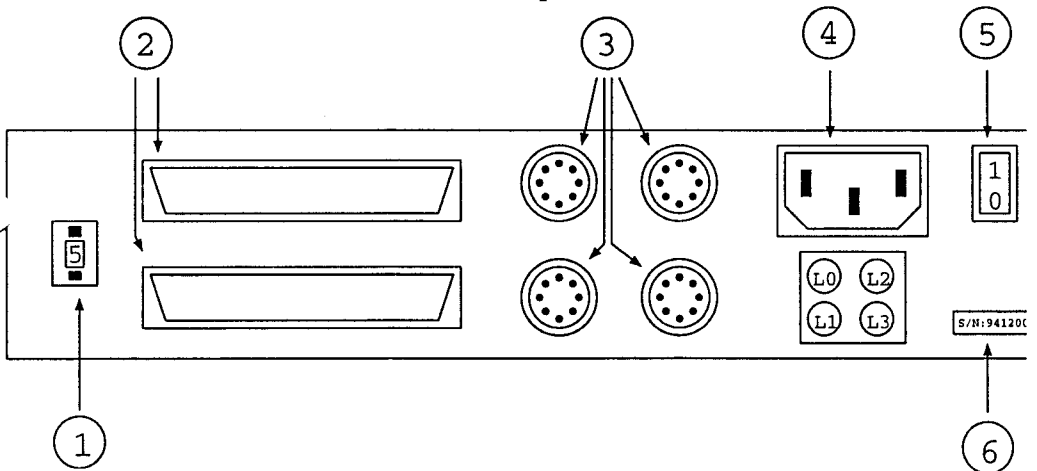
Power requirements

Voltage : 220 V +/- 20%

Consumption : 60 W

The maximum transfer rate for one link is: 1200 kByte/s.

Switches and connectors on the backplane:



- 1 : SCSI-id switch
- 2 : 50-pin centronics SCSI-bus connectors (in and out)
- 3 : 8-pin Lemos-connectors for the four links
- 4 : power line connector
- 5 : power switch
- 6 : serial number

Jumpers (inside):

number	position	description
1	1-2	boot from Flash-PROM (default)
	2-3	boot from link (service only)
2	1-2	default (don't change!)
3	1-2	default (don't change!)
4	1-2	default (don't change!)
5	2-3	default (don't change!)
6	1-2	default (don't change!)
7	open	default (don't change!)
8	open	disable link-in-reset (default)
	1-2	enable link-in-reset (service only)
9	open	disable link-in-reset (default)
	1-2	enable link-in-reset (service only)
10	open	disable link-in-reset (default)
	1-2	enable link-in-reset (service only)
11	open	disable link-in-reset (default)
	1-2	enable link-in-reset (service only)

2.2.2 Installing the Hardware

Attention! All changes and connections concerning your host machine and the SCSI-T-Bridge should be done after powering off the machines!

Installing the hardware of the SCSI-T-Bridge is easy. You connect the SCSI-T-Bridge with a standard 50-pin centronics or DB-50 cable to your machine. Pay attention for correctly installed SCSI terminators. Each end of the SCSI-bus needs to be terminated on the appropriated device. All other devices must not have a terminator.

Choose a free SCSI-id for your SCSI-T-Bridge and adjust the number on the SCSI-id switch on the backplane of the SCSI-T-Bridge accordingly. For choosing possible SCSI-id please refer also to section 2.3. For later changes of the id please note: a change takes only effect if you turn the SCSI-T-Bridge off and on.

Connect the link connectors 0-3 with the appropriated link connectors of your PARSYTEC system (e. g. GC_{Power+}). Finally connect the power line.

If you turn on the SCSI-T-Bridge the red and the green LED on the front pannel should light up for a short time. After that, the red LED should turn off, the green one should light up about three times a second. If your SCSI-T-Bridge doesn't show this behavior please conntact the service. Otherwise your SCSI-T-Bridge is now ready for using it.

2.3 Installing and Configuring the Software

The installation and configuration of the software consists of several steps:

1. Check the installation requirements (refer to section 2.1).
2. Do the first step of installing the **Basicsoftware**.
3. Design the spreading of your SCSI-ids¹ between your SCSI-devices.
4. Configure your system for using this spreading of the SCSI-ids and devices and connect your SCSI-T-Bridge (s).
5. With the delivered tools **links** and **getversion**, check the connection of the SCSI-T-Bridge (s) and the configuration of your system.
6. Do the second step of installing the **Basicsoftware**.

This steps are described in the following sections.

¹SCSI-id: each device attached to a SCSI-bus must have an unique id for this SCSI-bus. You can choose this id by setting some jumpers or setting a switch. Refer to the description of your SCSI-devices. The SCSI-T-Bridge has a switch on the backplane (refer to section 2.2.1).

2.3.1 Installing the Basicsoftware (first step)

The Basicsoftware is delivered on a 1/4" streamer tape readable on a QIC-150 tape device. Besides the Basicsoftware it may contain other PARSYTEC products you have ordered. For installation of these products, refer to the appropriated documents. This paper describes the installation of the Basicsoftware (BTSS).

For installation, do the following steps:

1. Login as the superuser.

```
login: root
```

```
password:
```

or

```
% su root
```

```
password:
```

2. Check the existence of a group *vmebus*.

For compatibility with older PARSYTEC products like BBK-S4 the installation requires the existence of the group **vmebus** on each machine connected to a SCSI-T-Bridge. Thats why, check wether on these machines this group with the suggested group id 25 exist. Use

```
more /etc/group
```

or

```
ypcat group | grep vmebus
```

(if you have this group entered into the NIS database) to look for the line

```
vmebus*:25:
```

If this line is not included in your `pathII/etcgroup` file or your NIS database you must add this line to the file `/etc/group` on all machines which shall become connected to SCSI-T-Bridges.

3. Search a temporary location for the tape contents:

For the tape contents, locate a disc partition containing enough free space, create a temporary directory (let's assume this directory is named `tempdir`):

```
mkdir tempdir
```

and change the current directory to this location:

```
cd tempdir
```

This directory will only be used to read in the tar files from the tape and to start the installation.

The temporary directory has to be empty and must be different from the directory where you actually want to install the Basicsoftware.

The temporary directory must not be a subdirectory of the directory where you actually want to install the Basicsoftware.

4. Insert the delivered 1/4" streamer tape into your QIC-150 tape device, usually named `/dev/rst0` (for SUNOS) or `/dev/rmt/0` (for SOLARIS). The tape rewinds automatically. You may list the tape contents by

```
tar tvf /dev/rst0
```

or for SOLARIS:

```
tar tvf /dev/rmt/0
```

5. In order to read the tape, supply the following command:

```
tar xvpf /dev/rst0
```

or for SOLARIS:

```
tar xvpf /dev/rmt/0
```

This copies a set of tar files (one for each software product) and the files necessary for the installation to your disc. The directories where the product trees will be installed can be specified later on. They must not be the same directory where you read the tape contents.

6. Check the delivery.

Within any software delivery a set of installation tools is delivered on the same tape. Each software product on the tape consists of at least one tar file (extension `.tar`) and—in most cases—of an additional product description file (extension `.descr`).

The delivery tape may contain one or more of the following products:

- Basic Transputer System Software (BTSS) (the product we talk about)
- PARIX
- MOTOROLA compiler for SunOS 4.1.1 or higher
- MOTOROLA compiler for Solaris 2.3
- Network Resource Manager
- Control Net Software
- further products
- Patches of one of the above products
- additional tar files for the above products
- other tar files

All products on the delivered tape may be installed in a single step. For an installation on a host network, some installation steps have to be done on the other hosts as well (installation of D-Servers).

To check your delivery, call `make install` ((do not use GNU `make`) inside of the directory where you read the tape and wait until the menu

Available software components for installation :

appears. By typing `'? <product number>'` you can get a short product description and informations about installation requirements for the product. (This works only if an associated `.descr` file exists.)

Note: if you have installed SOLARIS 2.3 you may get the message `'make: Command not found.'` This may happen because there is no `/bin/make` for the normal installation of SOLARIS 2.3. You should add `/usr/ccs/bin` to your path variable typing:

```
set path=($path /usr/ccs/bin)
```

You can interrupt the installation by typing `'q'` for quit and do the required preparations for the desired product. For the Basicsoftware you did this already in step 2. In this case you can go ahead immediately.

`make` first starts a program which asks questions about the system configuration.

Two types of questions are asked: the first can be answered with `'y'` or `'n'`. The second type requires text input. The default settings are chosen by hitting `<RETURN>`. You can stop the installation procedure if you answer any question with `'q'`.

Note: the exact sequence of questions depends on the answers you give. Therefore this document only describes the general approach taken.

7. The installation procedure then has checked for the products available. These products are listed in the menu `'Available software`

components for installation'. You can choose the desired products for installation by typing the product numbers separated by ','. The order of installation is not dependent on your input but on the product dependencies.

After your input, a list with the chosen products appears and you are asked to confirm this list.

8. After accepting the product list, your host system is checked for the requirements:

- the host operating system,
- the host operating system release,
- the host machine (hardware) type,
- the host processor type

If your system has a component which is not recommended you will see a warning, but you can continue the installation if you want to.

9. The installation process will go on asking product specific questions for each product to be installed. The questions and their meaning come with an describing comment. The specific Documentations of the products may contain more detailed descriptions in the parts 'Specific questions, their meanings and consequences'. For this product, there are no difficult questions not explained during the installation procedure. We only recommend to answer the question 'Give access rights to others for BTSS ? (y/n) :' with 'y' if you want to make the BTSS usable for users not included in the group vmebus.

There are 4 subproducts in this package: BTSS for 24 bit VME-Bus, for 32 bit VME-Bus, for S-Bus and for SCSI. If you install SCSI only, you should only answer the question for SCSI with yes.

The following questions will be asked for each product:

- the location to install the product

- the owner and group the product should belong to
- the product's access permissions for others

For the Basicsoftware, you will get one question you should answer for the first run with 'no' ('...do you want to burn in the SCSI-T devices with the actual firmware? ...'). This question should be answered positive first after working the next sections until section 2.3.5.

10. After all questions for all products have been answered, the installation proceeds with: 'Would you like to do the above parts of the installation ?'

If you answered all questions correctly, you can start the installation process by 'yes'. If you type 'no', the installation is not done (although the product directories may already have been created) and you may start from beginning without removing any done installation.

11. Now the installation starts to unpack and install all products ². The installation prints a 'succeeded' message for each product.
12. After this, you should proceed with the next step of the installation of every product you have installed. For the Basicsoftware, proceed with the next section of this paper.

2.3.2 Designing of the SCSI-ids

As described in section 2.1 you need to configure your SCSI-devices in a manner that you have as many free SCSI-ids on the desired SCSI-bus as many SCSI-T-Bridges you want to use. The following suggestion for a partition of your SCSI-id's is based on the common manner to use SCSI-id 4 and 5 for tape devices. The id 7 is reserved for the SCSI

²From the configuration information a makefile `install.mk` is generated and started. This makefile copies the product files to the specified locations, calls product specific targets and changes owner, group and permissions as desired.

hostadapter. Note: if you have more than one SCSI-busses, you can use the same ids but on different SCSI-busses.

example configuration with no tape drives and one SCSI-T-Bridge:

SCSI-id	used for
0-3	SCSI hard discs, other devices or free
4	SCSI-T-Bridge 0
5.6	SCSI hard discs, cdroms, other devices or free
7	SCSI host adapter

example configuration with one tape drive and one SCSI-T-Bridge:

SCSI-id	used for
0-3	SCSI hard discs, other devices or free
4	SCSI tape drive
5	SCSI-T-Bridge 0
6	SCSI hard discs, cdroms, other devices or free
7	SCSI host adapter

example configuration with no tape drives and two SCSI-T-Bridge:

SCSI-id	used for
0-3	SCSI hard discs, other devices or free
4	SCSI-T-Bridge 0
5	SCSI-T-Bridge 1
6	SCSI hard discs, cdroms, other devices or free
7	SCSI host adapter

After you made sure about the partitioning of the SCSI-id's and checking for conflicts with already used SCSI devices you can go ahead with configuring your system.

2.3.3 Configuring your System and connecting the SCSI-T-Bridges

As described in section 2.1 you need to configure your *operating system* in order to have as many free minor numbers of the systems tape-driver

as many links via the SCSI-T-Bridges you want to use (usually 4 times number of SCSI-T-Bridges per machine). In order to fulfill this requirement, you need to change the configuration of your host in one of the following ways, depending if your host runs SUNOS or SOLARIS. In both cases, this requires a reboot of your machine, so ensure yourself if this is possible!

2.3.3.1 Configuration for hosts running SunOS

- Become superuser.
- Change the working directory to the machine's configuration description directory. For SUN machines this is usually a directory `/usr/kvm/sys/sun4?/conf`, there ? is a letter accordingly to your current used operating system (usually c or m).
- If you entered the right directory you should find a file named `GENERIC`, which contains besides other data the machine's configuration for the SCSI-id's. If you are already use a different configuration you should start from the most recently used copy of the configuration file. Make a copy of this file with the name `PARSYTEC`. With any character editor you need now to edit the section of the SCSI device units. This section is headlined by:

The following section describes SCSI device unit assignments.

Choose the section with the appropriated SCSI host adapter connected to your SCSI-T-Bridge. The different busses are called `scsibus0`, `scsibus1` and so on. For the second SCSI-bus it would be headlined as follows:

```
scsibus1 at esp                                # declare second scsi bus
```

You need to add lines like the following:

```
tape st0 at scsibus1 target 4 lun 0 # Parsytec SCSI-T8-Bridge
tape st1 at scsibus1 target 4 lun 1 # Parsytec SCSI-T8-Bridge
tape st2 at scsibus1 target 4 lun 2 # Parsytec SCSI-T8-Bridge
tape st3 at scsibus1 target 4 lun 3 # Parsytec SCSI-T8-Bridge
```

where is the number after target the SCSI-id and the number after lun an indicator for link 0 to 3. Of course, you also could use scsibus0 or scsibus2 and so on.

Take care that no other entries define the same devices (tape st0 - tape st3 in this case). If they do uncomment these lines. Make sure that all other entries in this file refer to the current configuration of your machine.

- Run the program `/etc/config` with the parameter `PARSYTEC` as following:

```
/etc/config PARSYTEC
```

- Change the current directory to the new generated directory `../PARSYTEC` typing the following line:

```
cd ../PARSYTEC
```

and run make by typing

```
make
```

- Make a security copy of your old *operating system* by typing

```
cp /vmunix /vmunix.old
```

- Copy the new *operating system* into the root directory with

```
cp vmunix /vmunix
```

- Bring the machine down. For example, use the following command:

```
shutdown -h +5
```

- This is the perfect moment to turn your machine off and to connect your SCSI-T-Bridges to your host. Use the high density/Centronics cable to connect the first SCSI-T-Bridge to your host adapter and the Centronics/Centronics cable to connect a further SCSI-T-Bridge. The last SCSI-T-Bridge must be terminated with the required active Centronics SCSI-terminator (except there are following some other devices).
- Check the connection of your SCSI-T-Bridges and turn them on. Reboot the machine to put the changes into effect.

```
boot
```

If your SCSI-T-Bridge was turned on and all changes made correctly you should see outputs as follows (besides others):

```
st0 at esp1 target 4 lun 0
st0: <Vendor 'Parsytec' Product 'SCSI-T8-BRIDGE  '>
st1 at esp1 target 4 lun 1
st1: <Vendor 'Parsytec' Product 'SCSI-T8-BRIDGE  '>
st2 at esp1 target 4 lun 2
st2: <Vendor 'Parsytec' Product 'SCSI-T8-BRIDGE  '>
st3 at esp1 target 4 lun 3
st3: <Vendor 'Parsytec' Product 'SCSI-T8-BRIDGE  '>
```

The *operating system* of your machine is now configured for using the SCSI-T-Bridge.

2.3.3.2 Configuration for hosts running Solaris

- Become superuser.

- Change the working directory to the machine's built-in configuration table directory (`/kernel/drv/`). The file `'st.conf'` contains all possible tape devices. Usually, this description file contains only one logical unit (lun) per target. For configuring the system for the SCSI-T-Bridge you need to declare four logical units per target.
- We consider to extend at least target 4 and 5 for using SCSI-T-Bridges. You can change both targets even if you want to use only one SCSI-T-Bridge at first. A change for other targets does not harm your system. You will find a section like this:

```
name="st" class="scsi"
target=4 lun=0;
```

You need to add the following lines:

```
name="st" class="scsi"
    target=4 lun=1;
```

```
name="st" class="scsi"
    target=4 lun=2;
```

```
name="st" class="scsi"
    target=4 lun=3;
```

For target 5 please do the appropriated changes.

- Change to the directory `'/dev/rmt'` and remove all links pointing to the target on the SCSI-bus you want to use for the SCSI-T-Bridge inside of this directory. For target 4, for example, they point to device nodes like `st@4,0`, `st@4,1` and so on. The internal SCSI-bus is located in a directory like `esp@0,80000`, an additional SCSI-bus is located in a directory like `esp@f,800000`.

The easiest and most secure case would be, if you remove all links inside of this directory. For this case, during the following reboot

you need to connect and power on all tape drives you want to use further. This ensures a correct installation.

- Bring your machine down. For example, use the following command:

```
shutdown -y -i0 -g300
```

- This is the perfect moment to turn your machine off and to connect your SCSI-T-Bridges to your host. Use the high density/Centronics cable to connect the first SCSI-T-Bridge to your host adapter and the Centronics/Centronics cable to connect a further SCSI-T-Bridge. The last SCSI-T-Bridge must be terminated with the required active Centronics SCSI-terminator (except there are following some other devices).
- Check the connection of your SCSI-T-Bridges and turn them on. Boot your machine with the 'reconfigure'-flag.

```
boot -r
```

The machine will now determine the new devices and create the necessary device nodes.

The *operating system* of your machine is now configured for using the SCSI-T-Bridge.

2.3.4 Configuring and Checking the SCSI-T-Bridges

To be able to access the SCSI-T-Bridge you need now to set up one configuration file. This file describes the hardware of your SUN used to get the connection to the parallel machine. This is in this case the SCSI-T-Bridge.

This file is situated in the directory where you have installed the Basicsoftware to. It is usually the directory `/usr/etc/transp`. For using

SCSI-T-Bridges as well as any other hardware like BBK-S4 or BBK-V1 you need to adapt the file `trans_conf` inside of this directory. For each SCSI-T-Bridge it needs to contain an entry as follows:

```
0      SCSI-T  /dev/rst0      SCSI-T device for SunOS 4 (uses rst0 to rst3)
1      SCSI-T  /dev/rst4      SCSI-T device for SunOS 4 (uses rst4 to rst7)
```

for SUNOS or

```
0      SCSI-T  /dev/rmt/0      SCSI-T device for Solaris (uses ../0 to ../3)
1      SCSI-T  /dev/rmt/4      SCSI-T device for Solaris (uses ../4 to ../7)
```

for SOLARIS.

The first entry describes the unique board number for this host. The second entry describes the type of the hardware, in this case a SCSI-T-Bridge. The third entry needs to correlate with the device node for the first logical unit of the target which represents the SCSI-T-Bridge. The examples showed above are valid for configurations without any other tape devices. If you use tapes additional to the SCSI-T-Bridge the names of the device nodes may differ.

If you have made this entries, you should check if your SCSI-T-Bridges are working. If you have the right entries in your file `trans_conf`, the tool `links` should show you all links (with the Status available) (call simply `links` without any arguments). With the tool `getversion` you can proof, if your configuration is working and your SCSI-T-Bridges are accessible. This tool should give you an information about the firmware version inside of the SCSI-T-Bridge (call `getversion` with the devicename (s) you have entered into the file `trans_conf`).

Please, refer to the sections 3.1 and 3.2 to get more information about this tools. **Do not use the tool `ulti` at this time during the installation!** If you get some error messages, refer to chapter 5.

2.3.5 Installation of the Basicsoftware (Step 2)

With performing the second step of the installation of the Basicsoftware you will finish the installation of the SCSI-T-Bridge.

Start the installation procedure again. Therefore, change to the directory where you have installed the Basicsoftware to and type again

```
make install
```

Choose the Basicsoftware as product to install (there will be only this). Follow the same steps as given in section 2.3. Each question has a comment which tells you how you should answer it for the second installation step.

The installation script will perform all necessary actions automatically if the appropriated questions are answered positive.

The installation of hard- and software of your SCSI-T-Bridge is now completed.

2.4 Checking the Installation

The installation of the Basicsoftware should have created the following files (besides others):

file name	description
burn_scsi	tool for burning the flash PROM
getversion	tool for getting version information about SCSI-T-Bridge
link.h	Basicsoftware include file
link.o	Basicsoftware object file
links	tool for checking the link status
makefile	for installation
libmsg.a	library needed for installation of PARIX-DServers
message1.o	object to support PARIX-DServers
trans.conf	configuration file
ulti	tool for testing SCSI-T-Bridge and connected transputers

Now you can check the installation by typing the command

```
ulti -v
```

and the correct output should look like the following:

```
Hi there! Welcome to the ultimate transputer board test-utility.
```

```
The config file tells me the following configuration  
is available on your workstation.
```

Id	Status	Link-Name	Device
0	available	scsi-t b0 10	/dev/rst0
0	available	scsi-t b0 11	/dev/rst1
0	available	scsi-t b0 12	/dev/rst2
0	available	scsi-t b0 13	/dev/rst3
1	available	scsi-t b1 10	/dev/rst4
1	available	scsi-t b1 11	/dev/rst5
1	available	scsi-t b1 12	/dev/rst6
1	available	scsi-t b1 13	/dev/rst7

```
number of used links: 0
```

```
Testing link "0" ... FAILED!
```

```
Link not connected to a transputer ( board not configured )
```

```
Testing link "1" ... FAILED!
```

```
Link not connected to a transputer ( board not configured )
```

```
Testing link "2" ... FAILED!
```

```
Link not connected to a transputer ( board not configured )
```

```
Testing link "3" ... FAILED!
```

```
Link not connected to a transputer ( board not configured )
```

```
Testing link "4" ... FAILED!
```

```
Link not connected to a transputer ( board not configured )
```

```
Testing link "5" ... FAILED!
```

```
Link not connected to a transputer ( board not configured )
```

```
Testing link "6" ... FAILED!
```

```
Link not connected to a transputer ( board not configured )
```

Testing link "7" ... FAILED!

Link not connected to a transputer (board not configured)

Have tested 0 of 8 transputers successfully

or, if all links are connected to transputers:

Testing link "0" ... OK

Testing link "1" ... OK

Testing link "2" ... OK

Testing link "3" ... OK

Testing link "4" ... OK

Testing link "5" ... OK

Testing link "6" ... OK

Testing link "7" ... OK

Have tested 8 of 8 transputers successfully

If you get some errors, check at first all steps from section 2.3 once more and than read the next section to check the correct configuration of your SCSI-T-Bridge.

Chapter 3

Basicsoftware Tools

The Basicsoftware includes two tools for testing and diagnosing the SCSI-T-Bridge: `links`, `getversion` and `ulti`. Furthermore, the tool `burn.scsi` allows you to install new firmware versions into the SCSI-T-Bridge. The commands are described in the following sections.

3.1 links

The command `links` may be used to print status information about all hardware links to transputers and may result into the following output:

Display status about all hardware links to transputers

Id	Status	Link-Name	Device
0	available	scsi-t b0 10	/dev/rmt/0
1	available	scsi-t b0 11	/dev/rmt/1
2	IN USE	scsi-t b0 12	/dev/rmt/2
3	available	scsi-t b0 13	/dev/rmt/3

You get the information, that one SCSI-T-Bridge with four links is available and that link 2 is currently in use.

3.2 getversion

The command `getversion` is used to get information about the current used firmware inside the SCSI-T-Bridge. It takes the devicename assigned to one of the links of the SCSI-T-Bridge as an argument. Usually this is the devicename entered into the `trans.conf` configuration file. You can use it as follows:

```
getversion /dev/rmt/4
```

The output should look as follows (you may get different version numbers and other information):

```
@(#) 1.13 Module: scsi, Part: SCSI-bridge.  
@(#) Host: SunOS aphrodite 4.1.3 7 sun4c, Target: T425 SCSI-T bridge  
@(#) Date: Tue Nov 22 09:38:12 1994
```

3.3 ulti

The command `ulti` may be used to test the link hardware and the connected transputers of a SCSI-T-Bridge.

If you call

```
ulti -v
```

you will get the output

Hi there! Welcome to the ultimate transputer board test-utility.

The config file tells me the following configuration is available on your workstation.

Id	Status	Link-Name	Device
0	available	scsi-t b0 10	/dev/rmt/0
1	available	scsi-t b0 11	/dev/rmt/1
2	available	scsi-t b0 12	/dev/rmt/2
3	available	scsi-t b0 13	/dev/rmt/3

number of used links: 0

Testing link "0" ... OK

Testing link "1" ... OK

Testing link "2" ... OK

Testing link "3" ... OK

Have tested 4 of 4 transputers successfully

That means, your SCSI-T-Bridge works correctly and all four links are connected to a 'living' transputer.

If one link is currently in use, the `ulti` output is (e.g. for link0):

Transputer link "0" currently in use

If one link is not connected to a transputer or the transputer is not switched, on you will get the output:

Testing link "0" ... FAILED!

Link not connected to a transputer (board not configured)

3.4 burn_scsi

The tool `burn_scsi` may be used to install a new SCSI-T-Bridge firmware version. The firmware of the SCSI-T-Bridge is contained in a repro-

programmable Flash-PROM. Therefore an update of it is easy possible without any hardware changes. The program `burn_scsi`, taking a special formatted file with a valid software version and the name of a device node connected to the SCSI-T-Bridge as arguments, realizes the installation of a new software version. It reports possible errors during the process of burning the software. The Flash-PROMs are guaranteed to process a reburning 1000 times. If any error occurs during the phase of reburning you need to send in your SCSI-T-Bridge to our support team for replacing the finished Flash-PROMS. A possible example for using `burn_scsi` is:

```
burn_scsi scsi_firmware.v1.5 /dev/rmt/0
```

The change of the firmware takes effect first after turning the SCSI-T-Bridge off and on.

Chapter 4

Public Interface Streammode

This interface provides you with all necessary functions to use the SCSI-T-Bridge in your own applications with the Streammode.

The functionality is similar to a device driver, but the implementation is an object file. This must be linked together with your application.

The procedures offered by the link-interface completely fulfill the specifications of the definitions given by Inmos together with some useful extensions.

The functions listed below are available:

int OpenLink() ;	Open the specified link returning a LinkId
int ReadLink() ;	Read a number of bytes from the link LinkId
int WriteLink() ;	Write bytes to link LinkId
int CloseLink() ;	Close down the link LinkId
int ResetLink() ;	Cause a reset on the LinkId
int TestRead() ;	Check for input ready on LinkId
int TestWrite() ;	Check LinkId weather ready for output
int InfoLink() ;	Optain informations about links

A configuration text file (by default `/usr/etc/transp/trans.conf`) is used to describe the bus bridge boards and their specification (driver name). A set of semaphores is used to guarantee exclusive access to each link. The semaphores used by a process are returned automatically on termination of the process even if it is killed by signal SIGKILL.

Some development products, e.g. Toolset, access the bridge hardware through this link-interface. This is the reason for completely independent usage of all available links by different users and this development products. User written applications share this feature as well when using the link-interface. Additionally, a single process may open several links at the same time and operate independent from each other.

A detailed description of each link-interface function may be found inside *link.c/link.doc* of the Basicsoftware installation directory.

There are some parameters which are not likely to be changed. In order to give maximum flexibility they are defined inside the file *link.c/lconf.c*.

Chapter 5

Troubleshooting

If you have any problems while using the SCSI-T-Bridge please refer to this chapter first and try to find an appropriated section. If you can't find a description of your specific problem or you can't solve it please contact the service. In this case, please be prepared to give a detailed description of your problem. You may contact the service via:

email : support@parsytec.de
phone : +49 241 8889-0 (ask for the support people)
fax : +49 241 8889-50 (indicate support)

5.1 No Light on Front LEDs

description: there is no light on front LEDs

possible reasons:

- The SCSI-T-Bridge has no power supply.

Please check the connections of the power line, the position of your power switch an the backplane and the power supply of your outlet.

- The SCSI-T-Bridge has not the right firmware inside it's Flash PROMS or the Flash PROMS are defect.

Try to install a new firmware using the command *burn_scsi* described in section 3.4. If the result is unsatisfactory or you don't have an up-to-date firmware version please contact the service for help.

5.2 Error Message: Failed to get existing sem_key

description: any tool using the SCSI-T-Bridge brings the message: Failed to get existing sem_key.

possible reasons:

- the semaphore with the key: 0x42424242 does not have permissions for read and write for you. Please check first if the semaphore with this key is created by the group **vmebus**. If not, ask your administrator to erase this semaphore. If it is owned by the group **vmebus** please check if you are member in the group **vmebus**. If not, please ask your administrator to enter you into this group.
- the semaphore with the key: 0x42424242 is used by other programs. Ask your administrator how to avoid this problem.

5.3 Errors while Reading the Config File

description: There are problems while reading your config file. This file should be in the directory `/usr/etc/transp` and is named `trans.conf`. It describes the hardware configuration of your host. You get error messages like:

Cannot read config file

Link adaptor name incorrect
Cannot find (stat) config file
Cannot get group-id for vmebus/SBus group
The config file is not member of the vmebus/SBus group
The config file must not have write permission for other
Cannot open config file for reading

possible reasons:

- Probably, the installation of your SCSI-T-Bridge did not work correctly. Try to repeat the installation procedure or contact the service for support.

5.4 Errors within the Description of Your Hardware

description: There are problems while processing your config file. You get error messages like:

Syntax error in config file
Board number defined multiple in config file
The board-type name is not correct
This link adaptor does not exist

possible reasons:

- The installation of your SCSI-T-Bridge did not work correctly or changes made in the config file have a wrong syntax. Check the entries of your `trans_conf`-file in the directory `/usr/etc/transp` and compare them with the examples given in the first section of this file.

5.5 Error Messages about Incorrect Parameters

description: You get error messages about incorrect parameters. They look like:

The board-number is out of range

The link-number on this board is out of range

possible reasons:

- You have started your program with parameters pointing to hardware (boards or links) which are not described in the file `trans_conf`. If the hardware exists, add the appropriated entries inside of this file accordingly to the examples on top of this file and section 2.3.4. If the hardware does not exist, use parameters which are in the valid range.

5.6 A Link is Showed as 'in use' but Nobody Uses it

description: The tools `ulti` and `links` show a link as 'in use' but you can't find someone using this link.

possible reasons:

- One application using this link has crashed. Sometimes it may happen, that it does not release the link. To clean up this situation, you must kill all processes which still use this link. If you use `PARIX` this is usually a `dserver`. Do a `ps -aef | grep dserver` (`SUNOS`), `ps -aux | grep dserver` (`SOLARIS`), respectively, and send the signal `TERM` to this processes by typing `kill pid` where `pid` is the process id gotten by the `ps`. If there are working more

users please take care that you kill only processes from your links! (You can figure out the link by the argument `-l link_number` given to the `dserver` and showed by `ps`.)

If you can't clean up the link by using this command, try to repeat it after turning the SCSI-T-Bridge off and on. If you still get a result send the signal `INT` to the processes by typing `kill -INT pid`.

Please notice that it may take a while until the process reacts on your signal if it is running inside of the system via the device driver!

5.7 Error Message: Access to link hardware failed

description: Any tool using the SCSI-T-Bridge brings you the message: Access to link hardware failed.

possible reasons:

- Your bridge is turned off. Please turn it on and try again.
- The system is not configured for the requested link or a SCSI-id is not entered correctly. Refer to section 2.3 to set up your system correctly.
- Your machine was booted without connected SCSI-T-Bridges or with turned off SCSI-T-Bridges. You should boot your machine with turned on and connected SCSI-T-Bridges.