LAUTERBACH
DEVELOPMENT TOOLS

TRACE32 Installation Guide

Release 09.2023

TRACE32 Installation Guide

Version 10-Oct-2023

History

07-Jul-2023	PowerTrace Serial replaced by PowerTrace Serial 2, in chapter 'Tools with PowerTrace Serial'.
23-Jan-2023	Solaris was removed as supported host OS.
06-Dec-2022	Configuration pictures were updated with PowerDebug E40 and PowerDebug X50, in chapter 'Tool Configuration'.
30-Nov-2022	All outdated configurations were deleted.
05-Oct-2022	Installation for Linux and macOS was updated.
01-Dec-2021	POWER TRACE configuration pictures were updated. Recommended host interface is now USB 3.0.

Warning

WARNING:	To prevent debugger and target from damage it is recommended to connect or disconnect the Debug Cable only while the target power is OFF. Recommendation for the software start: 1. Disconnect the Debug Cable from the target while the target power is off. 2. Connect the host system, the TRACE32 hardware and the Debug Cable. 3. Power ON the TRACE32 hardware. 4. Start the TRACE32 software to load the debugger firmware. 5. Connect the Debug Cable to the target. 6. Switch the target power ON. 7. Configure your debugger e.g. via a start-up script. Power down: 1. Switch off the target power. 2. Disconnect the Debug Cable from the target. 3. Close the TRACE32 software. 4. Power OFF the TRACE32 hardware.

Important Information Concerning the Use of the TRACE32 Development System

Due to the special nature of the TRACE32 development system, the user is advised that it can generate higher than normal levels of electromagnetic radiation which can interfere with the operation of all kinds of radio and other equipment.

To comply with the European Approval Regulations therefore, the following restrictions must be observed:

1. The development system must be used only in an industrial (or comparable) area.
2. The system must not be operated within 20 metres of any equipment which may be affected by such emissions (radio receivers, TVs etc).

Introduction

This manual introduces the typical configurations for the TRACE32 hardware-based debug and trace tools and provides guidance on installing the TRACE32 software for this product group.

How This Manual is Organized

- **Brief Overview of Documents for New Users:** Informs new users about important architecture-independent and architecture-specific documents.
- **Tool Configuration:** Provides information about and illustrations of the TRACE32 debug and trace tools.
- **Software Installation:** Describes the default installation of TRACE32 under MS Windows and PC Linux, Mac OS and SunOS.

Contacting Support

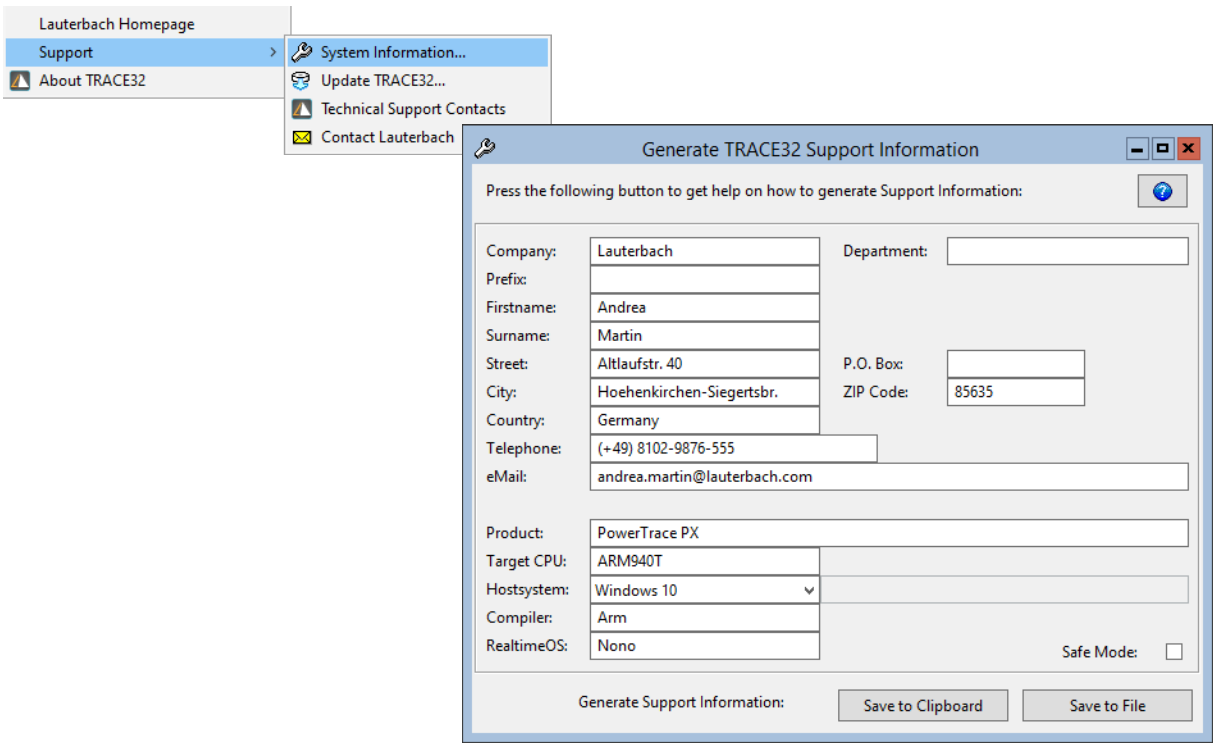
Use the Lauterbach Support Center: https://support.lauterbach.com

- To contact your local TRACE32 support team directly.
- To register and submit a support ticket to the TRACE32 global center.
- To log in and manage your support tickets.
- To benefit from the TRACE32 knowledgebase (FAQs, technical articles, tutorial videos) and our tips & tricks around debugging.

Or send an email in the traditional way to support@lauterbach.com.

Be sure to include detailed system information about your TRACE32 configuration.

1. To generate a system information report, choose **TRACE32** > **Help** > **Support** > **Systeminfo**.



Generate TRACE32 Support Information

Press the following button to get help on how to generate Support Information:

Company:	Lauterbach	Department:	
Prefix:			
Firstname:	Andrea		
Surname:	Martin		
Street:	Altlaufstr. 40	P.O. Box:	
City:	Hoehenkirchen-Siegertsbr.	ZIP Code:	85635
Country:	Germany		
Telephone:	(+49) 8102-9876-555		
eMail:	andrea.martin@lauterbach.com		
Product:	PowerTrace PX		
Target CPU:	ARM940T		
Hostsystem:	Windows 10		
Compiler:	Arm		
RealtimeOS:	Nono	Safe Mode:	☐

Generate Support Information:

NOTE:	Please help to speed up processing of your support request. By filling out the system information form completely and with correct data, you minimize the number of additional questions and clarification request e-mails we need to resolve your problem.

2. Preferred: click **Save to File**, and send the system information as an attachment to your e-mail.

3. Click **Save to Clipboard**, and then paste the system information into your e-mail.

Brief Overview of Documents for New Users

Architecture-independent information:

- **"Training Basic Debugging"** (training_debugger.pdf): Get familiar with the basic features of a TRACE32 debugger.
- **"T32Start"** (app_t32start.pdf): T32Start assists you in starting TRACE32 PowerView instances for different configurations of the debugger. T32Start is only available for Windows.
- **"General Commands"** (general_ref_*<x>*.pdf): Alphabetic list of debug commands.

Architecture-specific information:

- **"Processor Architecture Manuals"**: These manuals describe commands that are specific for the processor architecture supported by your debug cable. To access the manual for your processor architecture, proceed as follows:
  - Choose **Help** menu > **Processor Architecture Manual**.
- **"OS Awareness Manuals"** (rtos_*<os>*.pdf): TRACE32 PowerView can be extended for operating system-aware debugging. The appropriate OS Awareness manual informs you how to enable the OS-aware debugging.

Tool Configuration

This chapter gives a brief overview of typical TRACE32 tool configurations. Your final tool configuration can, of course, be more complex, especially if adapters or converters are needed.

Power Supply

When your TRACE32 hardware is delivered, you will receive one of the following power supplies:

- **Wall Mount Power Supply**

  The Wall Mount Power Supply is delivered with the PowerDebug Module with USB interface only and the µTrace (MicroTrace).

- **Desktop Power Supply**

  The Desktop Power Supply is delivered for all other configurations.

Please ONLY use the delivered power supplies. The following schematic drawings for the basic configuration always show the power supply to be used.

If you want to cascade several modules, please contact our support (https://support.lauterbach.com/kb) to find out which power supply must be used.

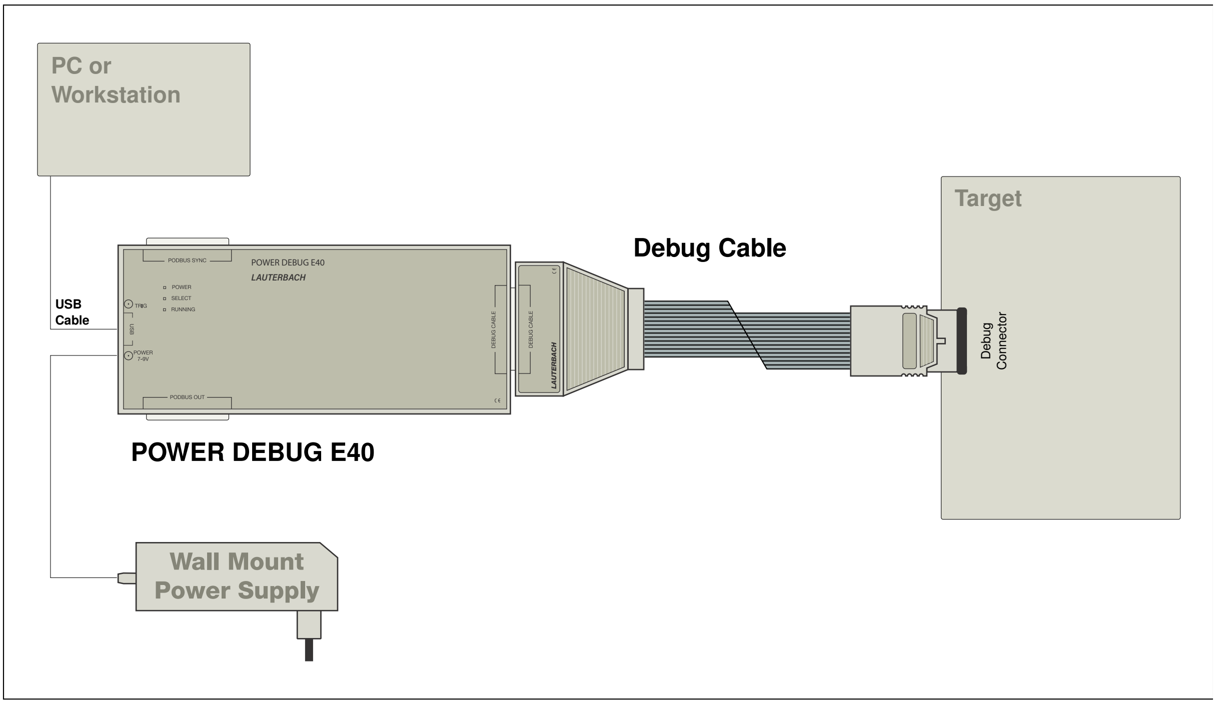
TRACE32 Debug Tools

A TRACE32 hardware-based debugger consists of:

- A universal debugger hardware
- A debug cable specific to the (main) processor architecture under debug;

  The debug cable can contain a multicore license or debug licenses for further processor architectures if a multicore chip should be debugged. It can also contain traces licenses mainly used to decode core trace information stored in an onchip trace RAM.

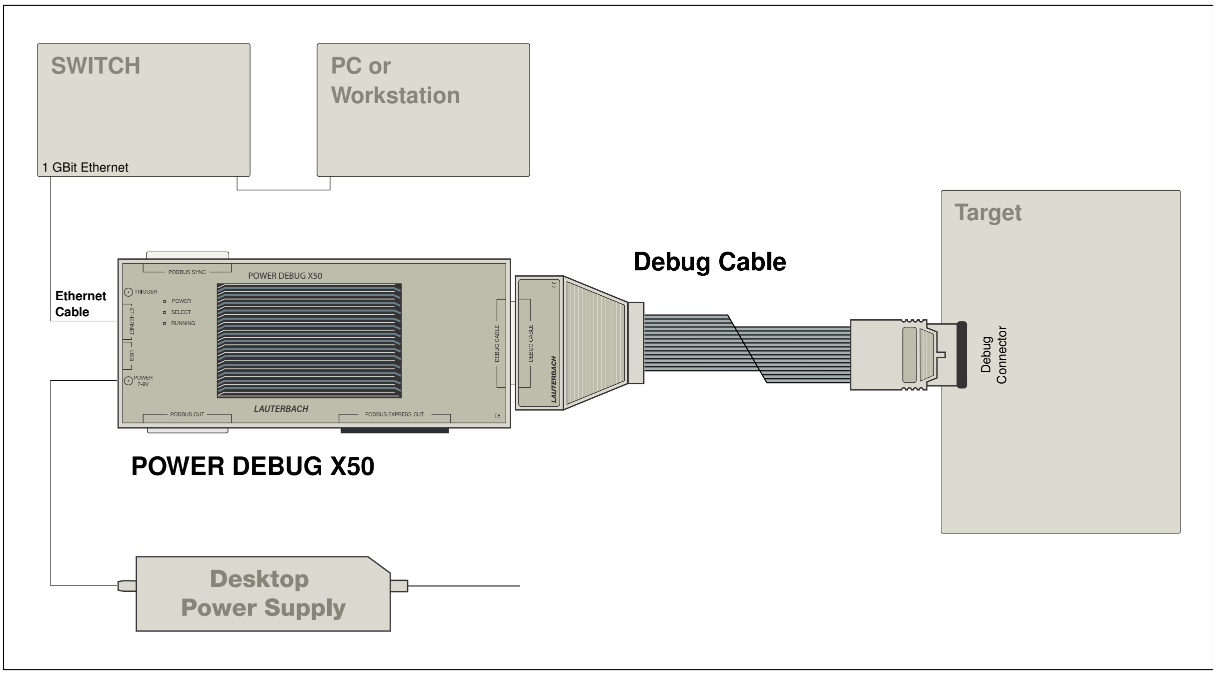
POWER DEBUG E40 provides a USB3 interface to the host computer.



POWER DEBUG X50 plus Debug Cable

POWER DEBUG X50 provides:

- USB3 and Gigabit Ethernet interface to the host computer
- PODBUS EXPRESS interface to connect a **TRACE32 POWERTRACE**.

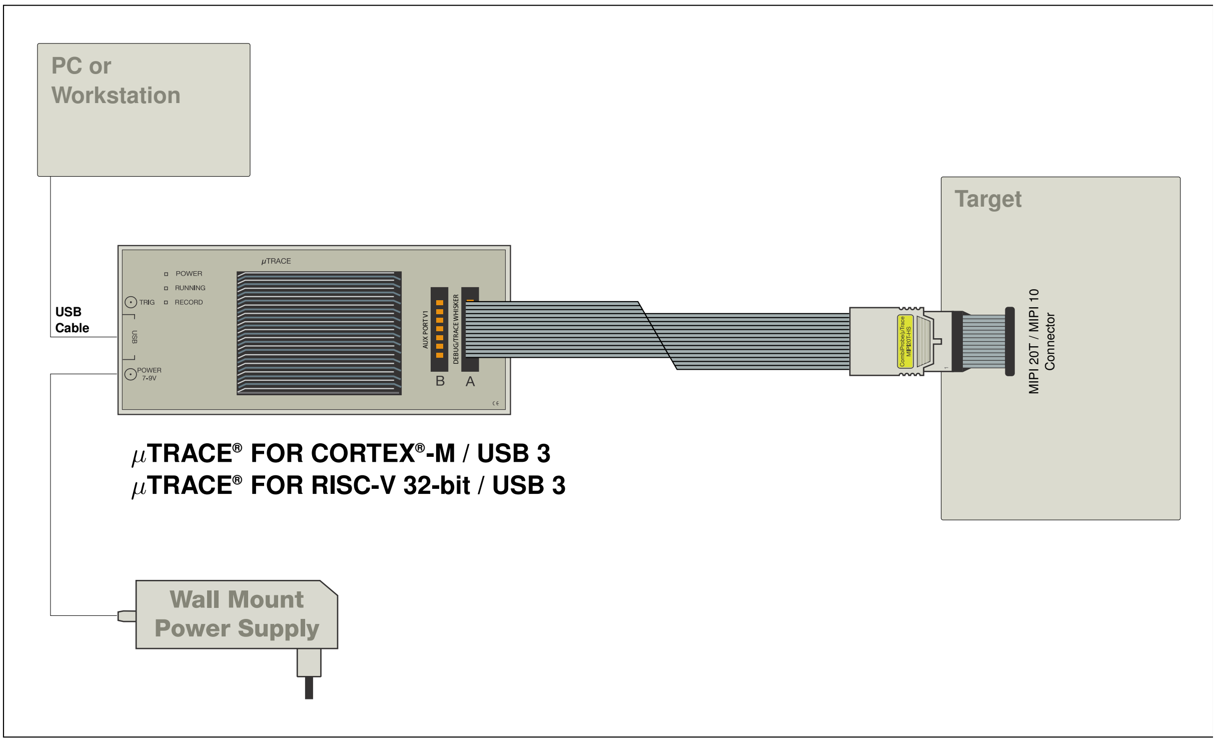


µTrace (MicroTrace)

µTrace (MicroTrace) is an all-in-one debug and trace tool especially designed for Cortex-M and RISC-V 32-bit processors. It consists of:

- A µTrace (MicroTrace) module, that also provides 256 MByte of trace memory
- A Whisker MIPI20T-HS

The µTrace (MicroTrace) module can contain a multicore license, if a chip containing several identical cores should be debugged.



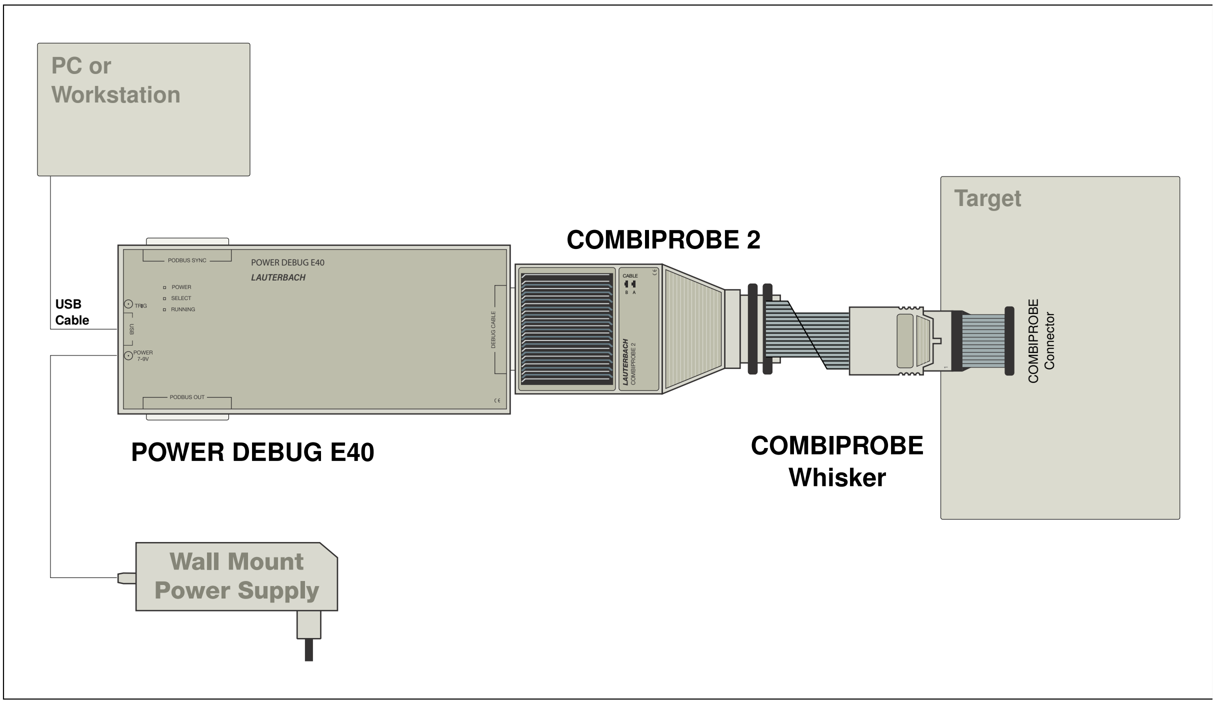
POWER DEBUG E40 plus COMBIPROBE 2

A TRACE32 CombiProbe debugger configuration consists of:

- A universal POWER DEBUG module.
- A COMBIPROBE 2 hardware, which is a debug and trace tool providing 512 MByte of trace memory.

  The COMBIPROBE 2 is licensed for the core under debug, but it can also contain a multicore license or debug licenses for further processor architectures if a multicore chip should be debugged.

  It can also contain traces licenses mainly used to decode core trace information stored in the CombiProbe trace memory.
- A core architecture specific CombiProbe Whisker.



Debugger and Parallel/Serial Preprocessors

A TRACE32 hardware-based debug and trace tool can consist of:

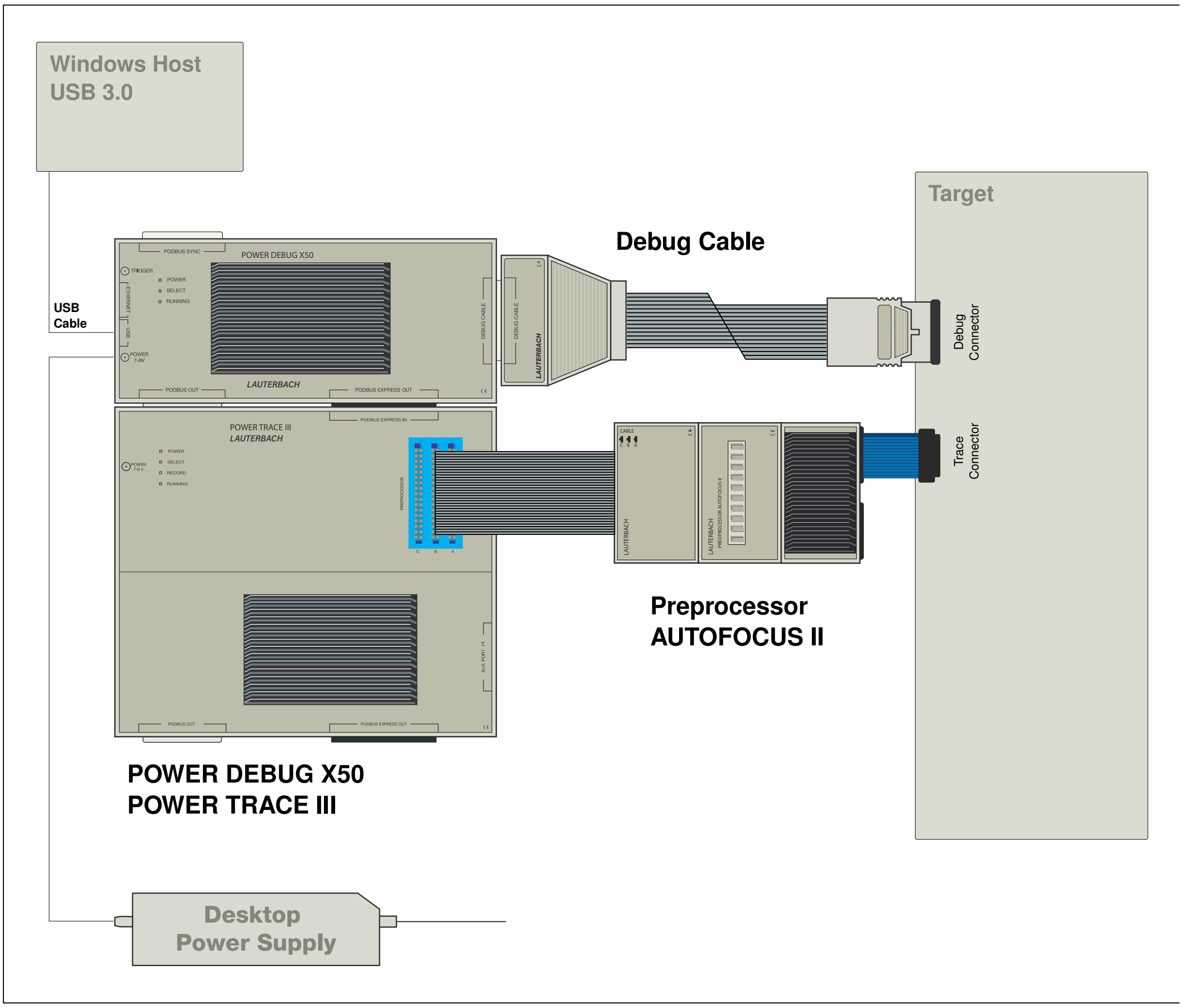
- The universal debugger hardware.
- A debug cable specific to the (main) processor architecture under debug;

  The debug cable can contain a multicore license or debug licenses for further processor architectures if a multicore chip should be debugged.
- A universal trace module:
  - POWER TRACE III with 4 GByte or 8 GByte of trace memory

  or

  - POWER TRACE II LITE with 512 MByte of trace memory and reduced characteristics.
- A parallel or serial preprocessor specific to the processor architecture and its trace protocol

  The preprocessor can contain trace licenses for further processor architectures if a multicore chip exports trace information in various trace protocols.


Windows Host
USB 3.0
Target
Debug Cable
USB
Cable
POWER DEBUG X50
LAUTERBACH
Debug
Connector
Trace
Connector
POWER TRACE III
LAUTERBACH
Preprocessor
AUTOFOCUS II
POWER DEBUG X50
POWER TRACE III
Desktop
Power Supply

Tools with PowerTrace Serial

A TRACE32 hardware-based debug and trace tool can consist of:

- The universal debugger hardware.
- A debug cable specific to the (main) processor architecture under debug;

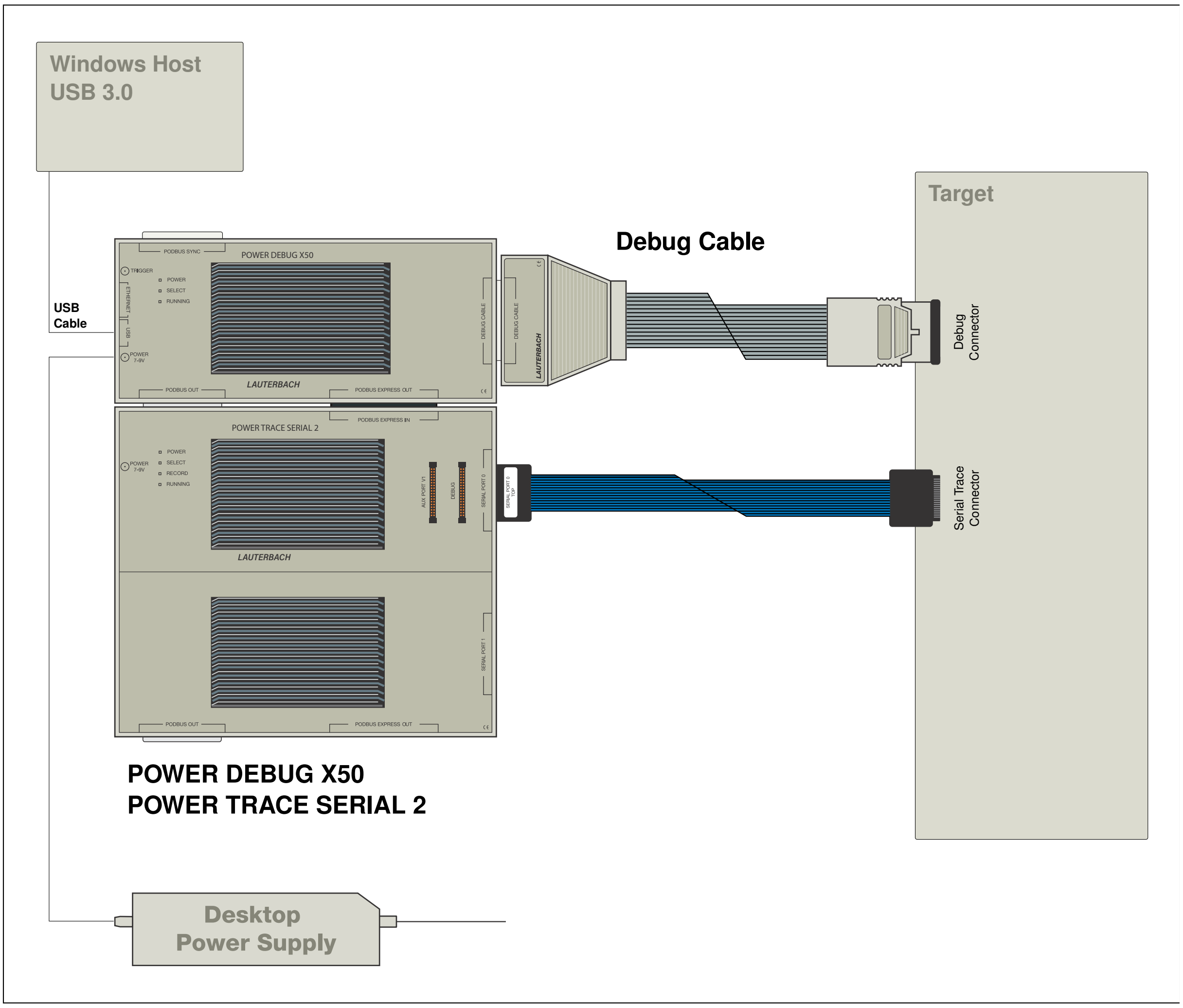
  The debug cable can contain a multicore license or debug licenses for further processor architectures if a multicore chip should be debugged.
- A universal trace hardware POWER TRACE SERIAL 2 with up to 8 GByte of trace memory licensed for a processor architecture and its trace protocol

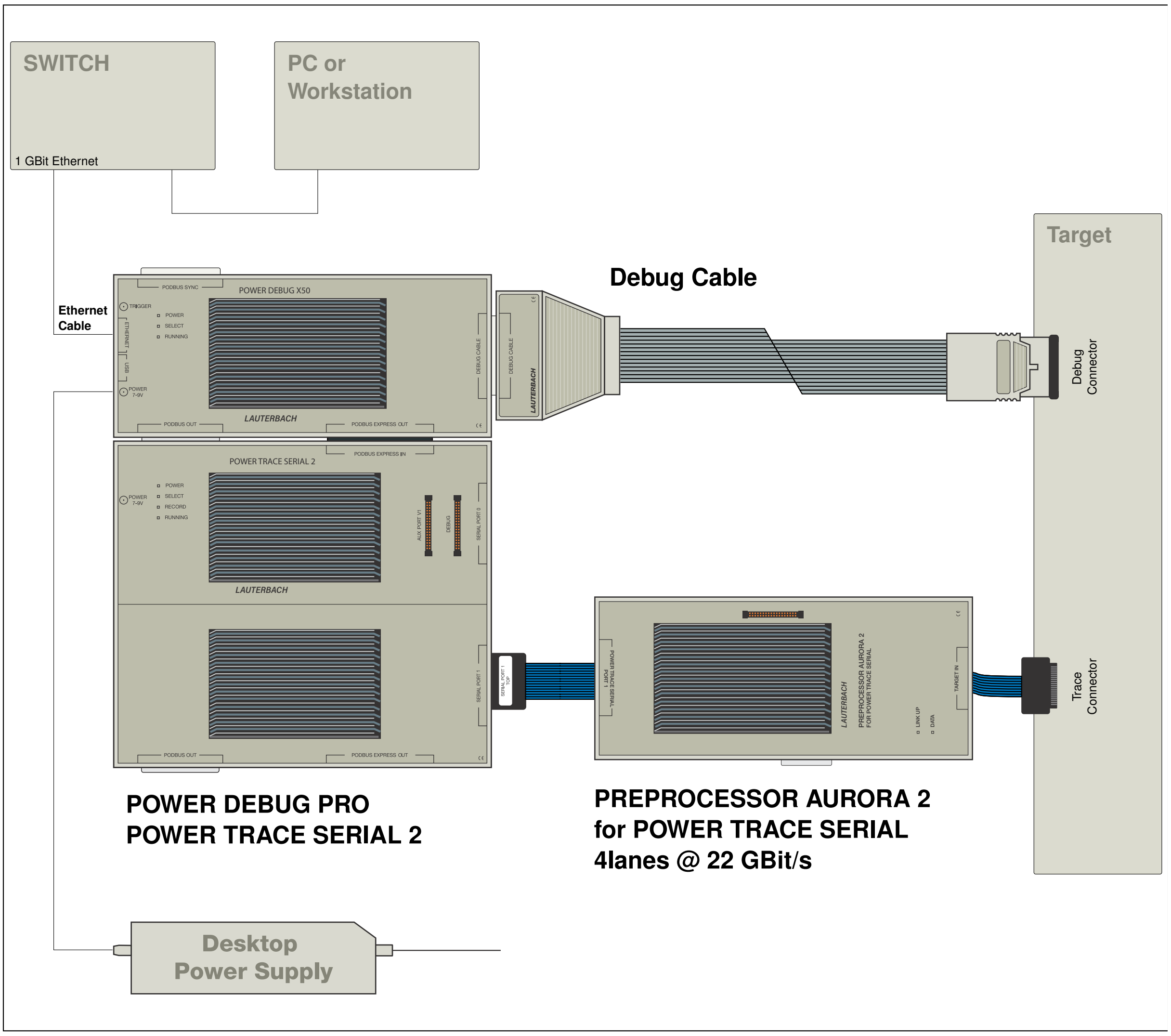
  POWER TRACE SERIAL 2 can contain trace licenses for further processor architectures if a multicore chip exports trace information in various trace protocols

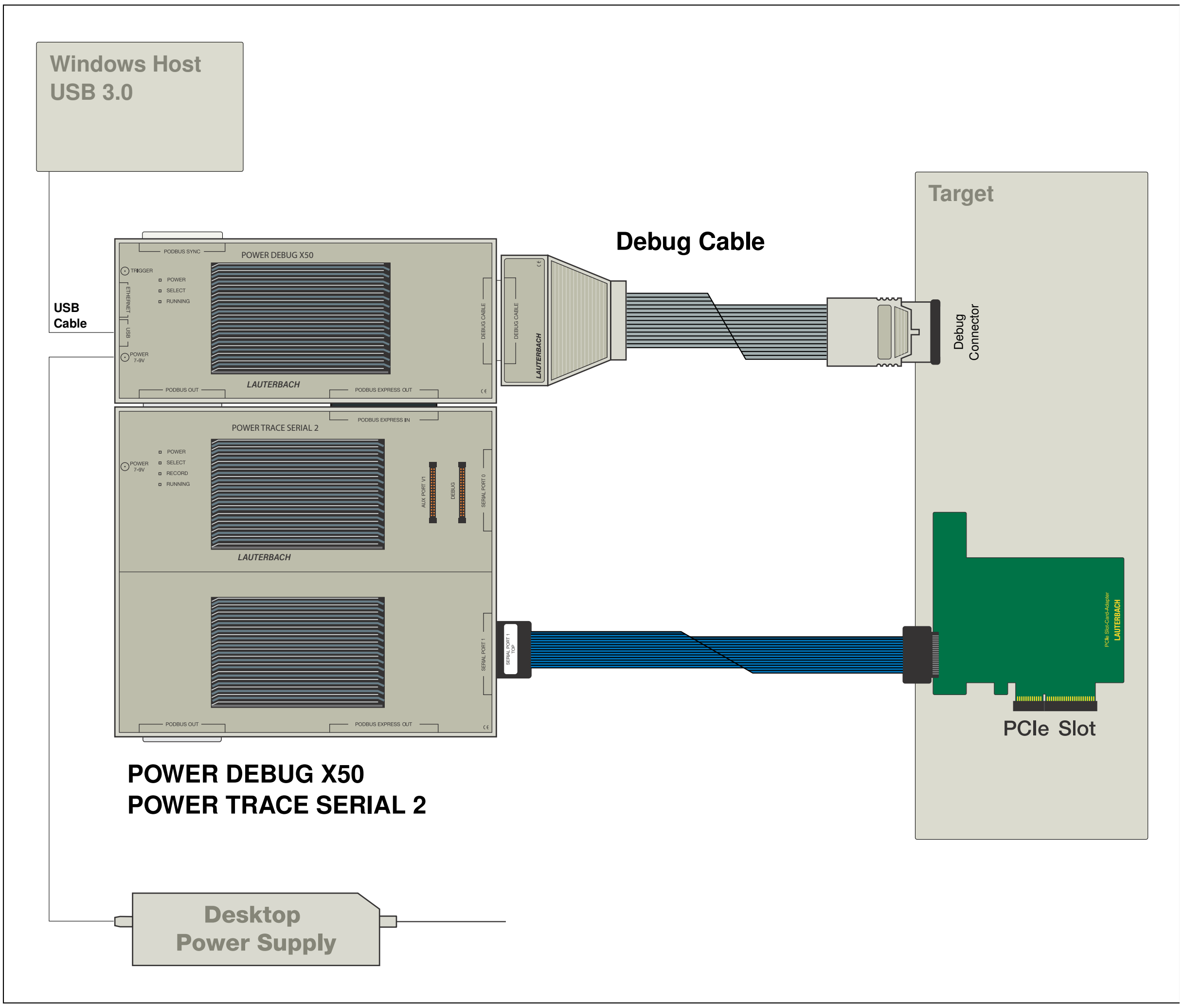
POWER TRACE SERIAL 2 was designed for two use cases:

- Recording trace information from high-speed Aurora-based trace ports
- Recording trace information from PCIe-based trace ports

  Tracing from a PCIe-based trace port requires a *License for PCI Express* programmed to POWER TRACE SERIAL 2


Windows Host
USB 3.0
Target
Debug Cable
USB Cable
Debug Connector
Serial Trace Connector
POWER DEBUG X50
POWER TRACE SERIAL 2
LAUTERBACH
Desktop Power Supply


SWITCH
1 GBit Ethernet
PC or Workstation
Target
Debug Cable
Ethernet Cable
POWER DEBUG X50
LAUTERBACH
Debug Connector
POWER TRACE SERIAL 2
Trace Connector
PREPROCESSOR AURORA 2 FOR POWER TRACE SERIAL
POWER DEBUG PRO
POWER TRACE SERIAL 2
PREPROCESSOR AURORA 2
for POWER TRACE SERIAL
4lanes @ 22 GBit/s
Desktop Power Supply


Windows Host
USB 3.0
USB Cable
Target
Debug Cable
Debug Connector
POWER DEBUG X50
POWER TRACE SERIAL 2
LAUTERBACH
PCIe Slot
POWER DEBUG X50
POWER TRACE SERIAL 2
Desktop Power Supply

Software Installation

This chapter describes the installation of TRACE32 under:

- MS Windows
  - Quick Installation
  - Ethernet
  - USB
- PC_Linux
  - Ethernet
  - USB
- Mac OS

MS Windows

Quick Installation

1. Install TRACE32 by double-clicking “setup.bat” or “files\bin\setup64\setup.exe”
2. Follow the on-screen instructions.
3. Upon completion of the installation, start TRACE32 via the Windows **Start** button as described in **“Debugger Tutorial”** (debugger_tutorial.pdf).

In multicore/multiprocessor debug environments, it is recommended that Windows users start TRACE32 via the **T32Start** application.

1. Start **T32Start** via the Windows **Start** button.
2. Configure **T32Start** according to your requirements. See chapter **“Quick Start”** in T32Start, page 7 (app_t32start.pdf).
3. Configure the TRACE32 help system with a few mouse-clicks to display the PDF help files in your favorite PDF viewer; see **“Configure the Help System”** in PowerView User’s Guide, page 90 (ide_user.pdf).

Ethernet

First a new node must be created for TRACE32. The Ethernet address of the debugger is on a sticker located on the reverse side of the system. The administrator must add an entry containing the IP address and node name to the name server, or the following line must be added to the file HOSTS:

```
192.9.200.5    t32
```

Note, the above used IP address is an example only.

The IP address is per default requested by a DHCP/RARP protocol by TRACE32. If no DHCP/RARP server is running, the address for the first connect must be set in the host table. After the first successful connection, the IP address is stored in the non-volatile memory within TRACE32. The following command sets the host translation table:

```
arp -s t32 0-c0-8a-0-0-0
```

NOTE:	**On Windows the ARP command is only available if you are logged in as an administrator.**

If the ARP command is not available, the IP address must be set by connecting the system via USB.

To use the network access, the net driver must be activated. The node name can be changed, when not identical to 't32'.

Configuration Command:

PBI= NET	Used for controller-based debugging
NODE=<*node_name*>	(default: t32)
PACKLEN=1024	Limits the size of the UDP packages to 1024

USB Interface

The USB driver must be selected.

When the device is first connected to the system, the hardware assistant detects a new USB device and asks for a driver directory.

If the TRACE32 software is already installed, the required file (t32usb.inf) can be found in the TRACE32 installation directory (e.g. c:\t32\). Otherwise please insert the TRACE32 installation DVD and navigate to the directory `~~/bin/windows/drivers` or let the system search for it.

Configuration Command:

PBI= USB	Select PODBUS interface via USB connection
PBI= USB NODE=T32-ARM	Select PODBUS interface via named USB connection The PODBUS interface is identified by a name (**IFCONFIG**). A name is required if several debug modules are connected via USB and used simultaneously. The manufacturing default device name is the serial number of the debug module. e.g. `NODE=E18110012345`

PC_LINUX

The TRACE32 PowerView GUI for Linux is available in two versions:

- **Qt** GUI (MWI and MDI)
- **Motif** GUI (MWI)

Without further settings, TRACE32 will select the best available screen driver in the following order:

1. Qt5
2. Motif

Quick Installation

Common steps

TRACE32 is installed with the script **setup_linux.sh**. It is in the root directory of the installation source (DVD, downloaded full installation package).

```
<INSTALLSOURCE>/setup_linux.sh [<INSTALLDIR>]
```

`<INSTALLSOURCE>`	Directory of the installation source
`<INSTALLDIR>`	Installation directory (default ~/t32)

The installation script creates the following example configurations:

`config.t32`	General configuration file
`config_sim.t32`	Configuration file for simulator
`config_usb.t32`	Configuration file for USB debugger
`config_eth.t32`	Configuration file for ETH debugger
`config_hostmci.t32`	Configuration file for TRACE32 as a back-end using the Lauterbach debug driver library hostmci

The following environment variables must be set (e.g. in .bashrc for the BASH-shell):

```
export T32SYS=<INSTALLDIR>     Set T32SYS to the installation directory
export T32TMP=/tmp
export T32ID=T32
```

The **TRACE32 online help system** uses an external PDF viewer for displaying the information in PDF format.

Please execute the TRACE32 command **SETUP.PDFViewer.state** inside the TRACE32 PowerView GUI once.
If the auto-detection fails, a manual setting will be necessary.

Legacy information for Acrobat Reader usage:

Download Acrobat Reader from http://www.adobe.com and install it if not already installed on the system. Usually, you have to be root for the installation!

```
tar -xvzf linux-508.tar.gz                    # or similar filename
./INSTALL                                     # run the install script
```

Set the environment variable “ACROBAT_PATH” to the Acrobat installation path::

```
export ADOBE_PATH=/opt/Adobe/Reader8          # added in ~/.bashrc for BASH
or
export ACROBAT_PATH=/opt/Acrobat5             # added in ~/.bashrc for BASH
```

Copy the TRACE32 plug-in into the Acrobat plug_ins folder (without new line):

```
cp /mnt/cdrom/files/bin/pc_linux/trace32.api
                                 $ADOBE_PATH/Reader/intellinux/plug_ins
or
cp /mnt/cdrom/files/bin/pc_linux/trace32.api
                                 $ACROBAT_PATH/Reader/intellinux/plug_ins
```

Verify that you have write permission to the system directory and prepare the configuration file **`config.t32`**:

```
cd /opt/t32/bin/pc_linux64   # depends on the location of the actual used
#  or                        # configuration file
cd /opt/t32                  # default file location is /opt/t32 ($T32SYS)

vi config.t32                # define interface type, …
```

```
…
                              # e.g. when using ethernet interface
PBI=                          #
NET                           # please replace t32 with the actual assigned
NODE=t32                      # network node name for the ICD module

                              # e.g. when using USB interface
PBI=
USB
```

Uncompress the executable files before usage (not necessary when filecvt was used before):

```
cd /opt/t32/bin/pc_linux64
gzip -d t32m*.gz              # or   gunzip t32m*.gz
```

Include the executable file in the PATH variable:

```
export PATH=$PATH:/opt/t32/bin/pc_linux64  # added in ~/.bashrc for BASH
                                           # preferred solution
```

Starting the TRACE32 executable file could be done in several ways:

```
                                      # preferred solutions
export PATH=$PATH:/opt/t32/bin/pc_linux64  # added in ~/.bashrc for BASH
./t32marm -c /opt/t32/bin/pc_linux64/config.t32
                                      # TRACE32 executable is called with
                                      # configuration filename parameter


                                      # starting executable with a
                                      # PRACTICE startup script file
./t32marm -c /opt/t32/bin/pc_linux64/config.t32
```

Configure the TRACE32 help system with a few mouse-clicks to display the PDF help files in your favorite PDF viewer; see **“Configure the Help System”** in PowerView User’s Guide, page 90 (ide_user.pdf).

The minimum requirements for the Qt GUI are:

- Kernel: 3.12
- libc: 2.18
- Qt libs: 5.5

Minimum versions of some popular Linux distributions:

Distribution	minimum release	required packages
Ubuntu	14.04	libqtcore5, libqtgui5
Debian	9.0	libqtcore5, libqtgui5
Mint	18.3	libqtcore5, libqtgui5
RedHat	RHEL 7	qt, qt-x11
CentOS	7.0	qt, qt-x11
Fedora	24	qt, qt-x11
SUSE	12	libqt5
openSUSE	15	libqt5

Font settings in the configuration file config.t32:

No special font settings are required. Each installed fixed width font can be used. The default font is Monospace..

```
SCREEN=
FONT=Liberation Mono      ; Selects font Liberation Mono for data output
FONT=NOANTIALIAS          ; disables font aliasing (default: ANTIALIAS)
```

GUI Configuration in the configuration file config.t32:

The GUI can be configured with STYLE options in the **SCREEN=** section of the configuration file **`config.t32`**. The following STYLE options can be set:

STYLE=STATUSBAR ON	Enables the status bar of the main window (default)
STYLE=STATUSBAR OFF	Disables the status bar of the main window
STYLE=TOOLBAR ON	Enables the tool bar of the main window (default)
STYLE=TOOLBAR OFF	Disables the tool bar of the main window
STYLE=TOOLBAR TOP	Places the tool bar on the top edge of the main window (default)

STYLE=TOOLBAR RIGHT	Places the tool bar on the right edge of the main window
STYLE=TOOLBAR BOTTOM	Places the tool bar on the bottom edge of the main window
STYLE=TOOLBAR LEFT	Places the tool bar on the left edge of the main window
STYLE=COMMANDLINE TOP	Places the command line and the soft keys to the top edge of the main window (default)
STYLE=COMMANDLINE BOTTOM	Places the command line and the soft keys to the bottom edge of the main window
STYLE=MDISCROLL OFF	disables MDI area scroll bars (default)
STYLE=MDISCROLL ON	enables MDI area scroll bars
STYLE=SMALLSIZE	Reduces the size of dialog elements (e.g. buttons, check boxes, ...) on some systems (Ubuntu Unity, ...)
STYLE=NORMALSIZE	Selects normal size of dialog elements (e.g. buttons, check boxes, ...) on some systems (Ubuntu Unity, ...) (default)
STYLE=FUSION[1]	Selects Qt predefined theme Fusion
STYLE=CDE[1]	Selects Qt predefined CDE theme
STYLE=MOTIF[1]	Selects Qt predefined Motif theme
DPI=AUTO (default**)** Linux only	TRACE32 uses the OS DPI rate for font scaling.
DPI=*<value>* Linux only	User-defined DPI rate for font scaling. Range: `48` to `448`
DPI=NONE Linux only	No DPI scaling.
PALETTE <*n*> = <*red*><*green*><*blue*>[2]	Change color value. Specify the colors as 8 bit per color channel, from 0 (darkest) to 255 (lightest). all numbers must be provided as decimals. **For CDE/Motif only**: Input in 16 bit per color channel allowed for backwards compatibility. See also: **SETUP.COLOR**.

1: If no predefined theme is set, the theme of the current desktop is used.

2: If no special color is set, the TRACE32 default is used.

Prepare and install the fonts:

Since TRACE32 software release April 2010 the font installation is simplified.
It's necessary to place a subdirectory named fonts (e.g. /opt/t32/fonts) under the TRACE32 system directory (e.g. /opt/t32). The TRACE32 PowerView software automatically searches for the required TRACE32 fonts in this directory if the fonts are not provided by the host operating system.

When bitmap fonts are blocked/locked from the host operating system, a usage overwrite can be activated by adding the following lines inside the actual used TRACE configuration file e.g. config.t32.

```
SCREEN=                       ; bitcoded values (0..3 allowed)
FONTMODE=3                    ; bit0: bitmap system fonts activated
                              ; bit1: bitmap TRACE32 client fonts activated
```

Font installation for TRACE32 software releases older than April 2010:

```
cd /opt/t32/fonts
mkfontdir ./
                                    # must be done under the original
xset +fp /opt/t32/fonts             # Xserver user (normally not as root)
xset fp rehash                      # only temporary adding of TRACE32
                                    # font directory or

chkfontpath -a /opt/t32/fonts       # permanent adding of the fontdirectory
                                    # not available under SUSE distribution

ln -s /opt/t32/fonts                # permanent adding of the fontdirectory
/etc/X11/fontpath.d/t32-fonts       # available under FEDORA distribution
```

The xset commands add the TRACE32 fonts only temporary. After the next booting or logout the setting will be lost. A solution could be adding the xset commands into the login script of the actual shell from the actual user e.g. ~/.bashrc for BASH shell or just in the batch script for starting TRACE32.

The TRACE32 fonts can be added alternatively to an existing font server configuration.
e.g. add path /opt/t32/fonts to the catalog entry inside the font server configuration file /etc/X11/fs/config.

Or add the TRACE32 fonts permanent with an administration tool.
e.g. under **SUSE**: N -> Control Center -> System Administration -> Font Installer

When the 'TRACE32 menu or softkey text are displayed as graphic characters under **Fedora Core Linux** versions, some fonts are missing. Install them with:

```
yum install xorg-x11-fonts-ISO8859-1-75dpi
```

Before the installation a new node must be created. The Ethernet address of the system is placed on the bottom side of the system. The following line must be added to the file
/etc/hosts:

```
192.168.0.5    t32
```

Note that the IP address given here is an example only.

The Ethernet address of the system must be entered in the file /etc/ethers (not common - only when using a RARP server):

```
0:c0:8a:0:0:0   t32
```

The IP address is requested by a RARP protocol by TRACE32. If no RARP server is running, the address for the first connect must be set in the host table. After the first successful connect the IP address is stored in nonvolatile memory within TRACE32. The following command sets the host translation table:

```
arp -s t32 0:c0:8a:0:0:0
```

This command must be executed **immediately before** the first startup of the debugger. It is not required for future startups because the IP address is stored in the debugger. The arp cache table should be checked just before the first startup with the command
'arp -a'.

NOTE: A ping will only work after the TRACE32 software was booted once and the new IP address was stored automatically during boot phase into the flash of the TRACE32 module.

The net driver must be activated. The node name can be changed, when not identical to 't32'.

Configuration Command:	
PBI= NET	
NODE=<*node_name*>	Node name of TRACE32 (default: t32)
POOL=<*node_name*>, …	Define a set of nodes, which are scanned for connection.

In addition to the generic requirements, USB needs:

kernel >= 2.4 for FullSpeed USB support (12 MBit/s)

kernel >= 2.4.22 for HighSpeed USB support (480 MBit/s)

udev filesystem requires kernel >= 2.6
or
usbdevfs mounted on /proc/bus/usb and hotplug package

UDEV method (kernel >= 2.6):

The newer udev file system support needs a special rule file for TRACE32 USB devices inside the directory /etc/udev/rules.d/.

```
su
cp bin/pc_linux64/udev.conf/kernel_starting_2.6.32/10-lauterbach.rules /etc/udev/rules.d
```

Legacy support of hotplug method (devfs):

The hotplug package is no strict requirement, but highly recommended, if you want to avoid running the TRACE32 executables as root all the time.

To enable proper TRACE32 hotplugging, change to the directory on the DVD (or with an extracted update) with the Linux executables and issue the following commands in a shell:

```
su
grep -iq trace32 /etc/hotplug/usb.usermap || cat usb.usermap.trace32
                                              >>/etc/hotplug/usb.usermap
install -m 0755 trace32 /etc/hotplug/usb/
exit
```

You can verify proper operation with the t32usbchecker tool coming with the CD or update.

The USB driver must be activated.

Configuration Command:

PBI= USB	Select PODBUS interface via USB connection
PBI= USB NODE=T32-ARM	Select PODBUS interface via named USB connection The PODBUS interface is identified by a name (**`IFCONFIG`**). A name is required if several debug modules are connected via USB and used simultaneously. The manufacturing default device name is the serial number of the debug module. e.g. `NODE=E18110012345`

Mac OS

Prerequisites

The TRACE32 debug software for the Mac requires OS X 10.7 or newer.

Installation of the TRACE32 Software

TRACE32 is installed with the script **setup_macos.sh**. It is in the root directory of the installation source (DVD, downloaded full installation package).

```
<INSTALLSOURCE>/setup_macos.sh [<INSTALLDIR>]
```

`<INSTALLSOURCE>`	Directory of the installation source (DVD,
`<INSTALLDIR>`	Installation directory (default ~/t32)

The installation script creates the following example configurations:

`config.t32`	General configuration file
`config_sim.t32`	Configuration file for simulator
`config_usb.t32`	Configuration file for USB debugger
`config_eth.t32`	Configuration file for ETH debugger
`config_hostmci.t32`	Configuration file for TRACE32 as a back-end using the Lauterbach debug driver library hostmci

The following environment variables must be set (e.g. in .bashrc for the BASH-shell):

```
export T32SYS=<INSTALLDIR>     Set T32SYS to the installation directory
export T32TMP=/tmp             # or similar
export T32ID=T32
```

Include the executable file in the PATH variable:

```
export PATH=$PATH:~/t32/bin/macosx64  # added in ~/.bashrc for BASH
```

Configure TRACE32

Verify that you have write permission to the system directory (set with environment variable T32SYS) and edit the configuration file `config.t32`.

Interface setting:

Ethernet interface

For the adaptation to ethernet a new node must be created. The following line must be added to the file /etc/hosts:

```
192.168.0.5    t32
```

Note that the IP address given here is an example only. Add the following lines to your `config.t32` file:

```
PBI=
NET                            # please replace t32 with the actual
NODE=t32                       # assigned nodename for the ICD module
```

USB interface

Add the following lines to your `config.t32` file

```
PBI=
USB
```

Fontsettings :

No special font settings are required. Each installed fixed width font can be used. The default font is Menlo..

```
SCREEN=
FONT=Liberation Mono     ; Selects font Liberation Mono for data output
FONT=NOANTIALIAS         ; disables font aliasing (default: ANTIALIAS)
```

GUI Configuration:

The GUI can be configured with STYLE options in the SCREEN section of the configuration file. The following STYLE options can be set:

STYLE=STATUSBAR ON	Enables the status bar of the main window (default)
STYLE=STATUSBAR OFF	Disables the status bar of the main window
STYLE=TOOLBAR ON	Enables the tool bar of the main window (default)
STYLE=TOOLBAR OFF	Disables the tool bar of the main window
STYLE=TOOLBAR TOP	Places the tool bar on the top edge of the main window (default)
STYLE=TOOLBAR RIGHT	Places the tool bar on the right edge of the main window
STYLE=TOOLBAR BOTTOM	Places the tool bar on the bottom edge of the main window
STYLE=TOOLBAR LEFT	Places the tool bar on the left edge of the main window
STYLE=COMMANDLINE TOP	Places the command line and the soft keys to the top edge of the main window (default)
STYLE=COMMANDLINE BOTTOM	Places the command line and the soft keys to the bottom edge of the main window
STYLE=MDISCROLL OFF	disables MDI area scroll bars (default)
STYLE=MDISCROLL ON	enables MDI area scroll bars

Configuration File

The configuration file for the system defines the drivers to be installed in the host. By default the software running on the host, assumes that the configuration file is in the system directory and named 'config.t32'. But this can be overruled by specifying the configuration file in the environment variable `T32CONFIG`. The configuration file can be defined by a command line option (-c).

> Configuration files are space sensitive and sensitive to empty lines!

The configuration file is split into sections. Each section is started by the first line following an empty line. A section ends with an empty line. So a section is a block of contiguous lines, which are not interrupted by an empty line. The first line of a section defines what kind of section it is. The first line is the section header and should look like this:

```
<Section Name>=[<Variation>]
```

The section “Variation” is optional and only needed for specific use cases. It is often left out.

Example: section header for the `OS` section:

```
OS=
```

Example: section header for the `PBI` section, setting up an instruction set simulator:

```
PBI=SIM
```

The section header is followed by a list of key-value pairs. Each key-value pair looks like this:

```
<key name>[=<key value>]
```

Note that the “key value” might be left out for specific key names; so there are key names which do not expect a following key value.

Example: section `SCREEN` to give TRACE32 PowerView a custom title:

```
SCREEN=
TITLE=My own title for TRACE32 PowerView
```

The configuration file can contain comments. Comments are line based. A comment is started with a ';' as the first character in a line. Comment lines do not count as empty lines, so a comment line does not end a section.

Example: section `SCREEN` to give TRACE32 PowerView a custom title:

```
SCREEN=
; give the window a different title:
TITLE=My own title for TRACE32 PowerView
```

The configuration file might be parametrized by using environment variables and command line parameters. To refer to an operation system environment variable, you can use:

```
${<environment variable name>}
```

Example: use the environment variable `T32NODE` as the definition of the Ethernet node, and the first command line argument will be used as the window title:

```
; Use node name from environment variable, title from command line
PBI=
NET
NODE=${T32NODE}

SCREEN=
TITLE=${1}
```

You can also generate 'hierarchical' configuration files by using include files:

```
$INCLUDE /usr/t32/config.all

SCREEN=
PALETTE 0 = 12 34 56

;…
```

This allows to keep some configuration information local (e.g. in the home directory of the user by using the environment variable `T32CONFIG`), and share the rest of the configuration with other systems.

Section “OS”

This optional section is mainly used to specify TRACE32 paths. If this section is missing, TRACE32 tries to detect the paths based on the location of the TRACE32 executable. The section header does not expect a “Variation” value.

```
OS=
ID=T32
TMP=C:\temp
SYS=C:\T32
HELP=C:\T32\pdf
COREFCC=C:\T32\crashfiles
```

Key/value	**Description**
ID=*<id>*	Prefix for all files that are saved by the TRACE32 PowerView instance into the TMP directory.
HELP=*<path>*	Directory where the pdf-files for the TRACE32 online help are located.
SYS=*<path>*	This key specifies the installation directory of TRACE32. If this directory is not specified explicitly, TRACE32 will try to guess the installation directory by analyzing the path of the executable.
TMP=*<path>*	Path to the temporary directory. If this path is not specified, TRACE32 will use a default path.
COREFCC=*<path>*	Defines a crashfile directory.

Section LICENSE

If a setup without hardware is used, then the location of the license server can be specified with this section.

Key/value	Description

RLM_LICENSE=*<port@server>*	The value of this key specifies how to contact a floating license server. Example:
	
	`LICENSE=`
	`RLM_LICENSE=5055@licserver.mycompany.com`

TIMEOUT=*<time>*	Allows to automatically return checked out but unused licenses. The value of this parameter holds the minutes of inactivity before licenses are returned. A minimum of 15 minutes is defined. Setting the optional parameter to zero (`TIMEOUT=0)` is the same as no such line and will result in never automatically returning unused floating licenses. Inactivity in the context of this parameter is time spent in down state.
POOLPORT=*<number>*	TCP/IP port for license pool. Refer to the chapter **“Floating License Pools”** in Floating Licenses, page 19 (floatinglicenses.pdf) for more information.

Section SCREEN

This optional section specifies various settings for the graphical user interface. If the `SCREEN` section is used with the Variation `OFF`, TRACE32 is started without a graphical user interface. For details, see **below**.

Key/value	Description
TITLE=<title>	Specifies the title of the TRACE32 PowerView user interface.
HEADER=<title>	Same as TITLE
MDI	MDI Multiple Document Interface (default) All child windows appear inside the TRACE32 main window.
FDI	Floating Document Interface All child windows can be placed on any position on the desktop independently form the main window. Minimizing the main window, minimizes also the child windows. Only the main window appears in the task bar.
MTI	Multiple Top-level window Interface All child windows can be placed on any position on the desktop independently form the main window. Minimizing the main window, minimizes none of the child windows. Both the main and all child windows appear in the task bar.

Key/value	Description
MWI	Multiple Window Interface (obsolete alias for FDI). See FDI
INVISIBLE	The main window of TRACE32 remains hidden. However, dialogs and other windows of TRACE32 can still be opened. For details, see **below**.
PALETTE <*n*> = <*red*><*green*><*blue*>	Change color value, the intensities will vary from 0 to 255.
FONT=SMALL	Use small fonts (13x7 instead of 16x8). Alternatively, you can use MEDIUM or LARGE.
TEXTFONT=<*font_name*>	Use the specified font for text windows. The specified font must either match the size of the regular TRACE32 fonts, or must be a TrueType fixed pitch font. Examples for such fonts are "Courier New" or "Lucida Console".
CHARSET=<*number*>	Text windows and menus use the specified character set.
MINCHO	Use MS-Mincho character set (Japanese)
DPI=AUTO (default) Linux only	TRACE32 uses the OS DPI rate for font scaling.
DPI=<*value*> Linux only	User-defined DPI rate for font scaling. Range: `48` to `448`
DPI=NONE Linux only	No DPI scaling.
VLINES=<*lines*>	Startup size lines (default 35)
VCOLUMNS=<*col*>	Startup size columns (default 81)
VICON	Startup iconized (minimized). For details, see **below**.
VFULL	Startup full screen (maximized)
HEADER=<*name*>	Header text for the TRACE32 main window
LINES=<*lines*>	Max. number of lines (default 55)
COLUMNS=<*col*>	Max. number of columns (default 144)
other	Other commands are available for special purposes, they are not used in standard environments.

TRACE32 as a Hidden Instance

There are three ways to configure TRACE32 to start as a hidden instance. Choose one of the configuration options:

Option 1:

The main window of TRACE32 remains hidden. However, dialogs and other window of TRACE32 can still be opened. This is useful, for example, if an error occurs during a regression test.

```
SCREEN=
INVISIBLE
```

NOTE:	• INVISIBLE must be written below SCREEN= in the config.t32 file. • On UNIX machines, the configuration option 1 requires a running X server.

Option 2:
The main window of TRACE32 and all other dialogs and windows of TRACE32 remain hidden - even if an error occurs.

```
SCREEN=OFF
```

NOTE:	• OFF must be written in the same line as SCREEN= in the config.t32 file. • On Unix machines, the configuration option 2 does NOT require a running X server. • However, the X libraries must be installed.

Option 3:

The main window of TRACE32 is added to the toolbar of the host computer. It can be fully displayed in case of an error.

```
SCREEN=
VICON
```

Japanese Font

The following example uses a Japanese font for text display.

```
SCREEN=
TEXTFONT=@MSxxxx      ; the Japanese font name cannot be reproduced here
CHARSET=128
```

You can also define the window position and size of TRACE32 using the **FramePOS** command or the **CmdPOS** command.

Configuration Command:

PRINTER=<*type*>	printer type (**RAW**,**NEC**,**LJ**,**PS**,**WINDOWS**) RAW: simple printer without graphics NEC: NEC compatible printer LJ: Laserjet compatible printer PS: Postscript printer WINDOWS: Windows native printer

Commands:

DEV=<*path*>	device name or file name
SPOOL=<*cmd*>	command is executed after printing
IBMSET	use PC-8 character set for HP-Laserjet II
NOR	Don't use reverse feed (e.g. CANON LJ-600) Only for NEC printer driver.

Section PBI

The `PBI` (PodBus Interface) section specifies the basic functionality of the TRACE32 debugger.

Section PBI= (without variation)

If no explicit “Variation” is specified, the default “Variation” `ICD` is used, which connects to a PowerDebug device.

Key/value	Description
USB	Connect to the PowerDebug device via a USB connection. This key does not have a key value.
NET	Connect to the PowerDebug device via a network connection. This key does not have a key value.
NETTCP	Only for PowerDebug X50. When NET is used, a handshake is performed over UDP between TRACE32 PowerView and the PowerDebug module then the communication is switched to TCP. This initial UDP handshake is skipped if NETTCP is used instead of NET.
NODE=*<node_name>*	The key value specifies the node name of the PowerDebug device to connect to. If a network connection is used, this should be either a DNS name or an IP address. If an USB connection is used, the node name is checked against the PowerDebug devices connected via USB. Each PowerDebug device has a node name, which is stored in the hardware. This node name might be changed via the TRACE32 software using the command **IFCONFIG**. If the specified node name matches to the node name found in the PowerDebug device then the connection is made to this PowerDebug device. For USB this is useful if you have more than one PowerDebug device connected via USB. If only one PowerDebug device is connected to your PC, you might leave out the node name. In this case TRACE32 will connect to the first found PowerDebug device connected via USB.

Examples:

```
PBI=                        ; PowerDebug is connected to the PC via USB
USB
```

```
PBI=                        ; PowerDebug is connected to the PC via USB
USB
NODE=T32-ARM                ; the TRACE32 development tool is identified by
                            ; a device name, which is required if several
                            ; PowerDebug modules are connected via USB to the
                            ; PC. The manufacturing default device name is
                            ; the serial number of the debug module
```

```
PBI=                        ; PowerDebug is connected to the host via
NET                         ; Ethernet
NODE=T32-ARM
```

NOTE:	**PBI=NET** starts TRACE32 PowerView as a monitor program for connection over Ethernet (Serial Monitor). To connect to the PowerDebug device via a network connection, the keyword **NET** needs to be added to the next line as shown in the example above.

Connection Modes

The connection modes are not applicable for multi-core debugging.

Key/value	Description
CONNECTIONMODE=AUTOABORT	If PowerDebug device is already in use, the TRACE32 executable will be closed automatically without any user interaction.
CONNECTIONMODE=AUTOCONNECT	The TRACE32 executable will automatically take over control over the PowerDebug device, even if the debugger is already in use.
CONNECTIONMODE=AUTORETRY	If PowerDebug device is already in use, the TRACE32 executable will wait until the current TRACE32 session ends.
CONNECTIONMODE=NORMAL	If PowerDebug device is already in use, warn user and close application after confirmation.
CONNECTIONMODE=QUERYCONNECT	If PowerDebug device is already in use, ask user if connection shall be forced.

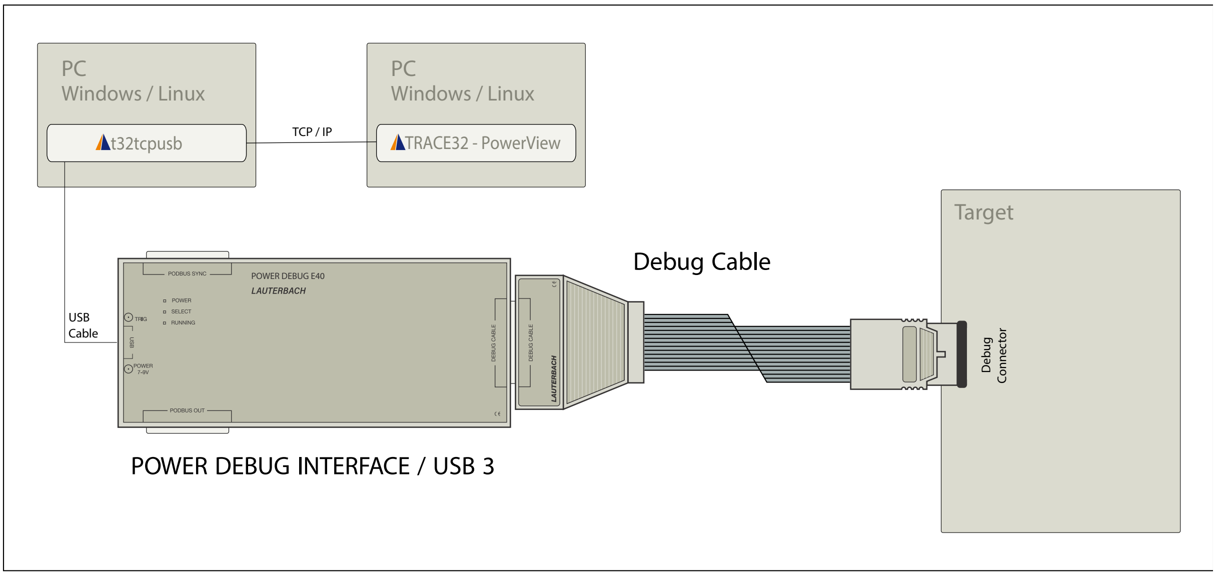
Key/value	Description
AUTOABORT AUTOCONNECT AUTORETRY	obsolete - please use CONNECTIONMODE=*<mode>* instead
CORE=*<number>*	If you intend to debug with an AMP (Asymmetric Multi-Processing) session, you need to start several TRACE32 PowerView instances, which all use the same PowerDebug device. In this case, each started executable needs a unique number, called here "core number". This number is used as an index, which identifies the executable on the PowerDebug device. `CORE=0` means the TRACE32 executable that uses this setting in a config file has exclusive access to a particular PowerDebug module. No other TRACE32 executable can connect to this particular PowerDebug module. You can return the value of CORE with the **SYStem.USECORE()** function.
INSTANCE=*<number>*	Defines the internal communication channel between TRACE32 executable and debug interface. Set to 0 for single-core debugging (default if not specified). For multi-core debugging (several instances of TRACE32 connect to the same debugger module), use a unique number between 1..16 for each instance. You can return the value of INSTANCE with the **SYStem.INSTANCE()** function.
HOSTPORT=*<port>*	Defines the UDP communication port from the debugger module to the PC (default is PORT+n)
PORT=*<port>*	Sets the UDP communication port from the PC to the debugger module (default is 20000). For AMP, all instances must use the same port number.
SMALLBLOCKS	It restricts the default communication block size to 4.5 KBytes instead of 16KB. This may avoid problems with network equipment which have resource restrictions (e.g. internal buffer overflows)
USE=*<bits>*	The USEMASK selects the Lauterbach device, when several devices are connected to each other via PODBUS IN/OUT. For a description and an example, see **SYStem.USEMASK()** function.

Key/value	Description

PROXYNAME=*<ip_address>*
PROXYPORT=*<port_number>*
	TRACE32 allows to communicate with a POWER DEBUG INTERFACE USB from a remote PC.
	For an example, see **“Example: Remote Control for POWER DEBUG INTERFACE / USB”**, page 46.

CONNDELAY=*<value>*	Delays the connection with the given time. Only applicable for network connections.
DNSRETRIES=*<n>*	Default: `DNSRETRIES=0` Sets the number of retries when trying to resolve a DNS name of a TRACE32 device on start-up of the host software. Before each retry there is a 1 second wait time. Only applicable for network connections.

TRACE32 allows to communicate with a POWER DEBUG INTERFACE USB from a remote PC.



In order to implement this communication, the command line tool **t32tcpusb** has to be started on the PC to which the POWER DEBUG INTERFACE USB is connected. **t32tcpusb** can be found in the `bin/<target_os>` directory of your TRACE32 installation (e.g. `bin/windows64`).

t32tcpusb *<port_number>*	The default port number is 8455

```
t32tcpusb 8866
```

On the remote host computer the configuration file for USB has to be extended as follows:

Parameter	Syntax	Description

Host interface	PBI=
	USB
	PROXYNAME=*<ip_address>*
	PROXYPORT=*<port_number>*
		
		<ip_address> of PC that runs t32tcpusb
		<port_number> that was specified when t32tcpusb was started

```
; Host interface
PBI=
USB
PROXYNAME=10.2.20.142
PROXYPORT=8866

; Environment variables
OS=
ID=T32
TMP=C:\temp                     ; temporary directory for TRACE32
SYS=C:\t32                      ; system directory for TRACE32
HELP=C:\t32\pdf                 ; help directory for TRACE32

; Printer settings
PRINTER=WINDOWS                 ; all standard windows printer can be
                                ; used from the TRACE32 user interface
```

In case of several PowerDebug modules connected via USB and used simultaneously, it is required to identify each of them by a name using the command **IFCONFIG**. If the node name specified in the configuration matches the node name found in the PowerDebug device, the connection is made to this PowerDebug device.

```
; Host interface
PBI=
USB
NODE=T32-Arm
PROXYNAME=10.2.20.142
PROXYPORT=8866
...
```

TRACE32 PowerView GUI is used without a LAUTERBACH.

PBI=*<driver>*	**Description**
PBI=SIM	start a TRACE32 Instruction Set Simulator.
PBI=*SIM USB	start a TRACE32 Instruction Set Simulator which is licensed using a hardware-based TRACE32 debugger connected to the host computer via USB.

PBI=*SIM
NET
NODE=*<node_name>*
	start a TRACE32 Instruction Set Simulator which is licensed using a hardware-based TRACE32 debugger connected to the host computer via Ethernet.

PBI=*<driver>*	**Description**
PBI=GDB	start a TRACE32 GDB Front-End. Refer to **“TRACE32 as GDB Front-End”** (frontend_gdb.pdf) for more information.
PBI=MDI	start TRACE32 to debug via MDI (MIPS Debug Interface) simulator. Refer to **“Virtual Targets User’s Guide”** (virtual_targets.pdf) for more information.
PBI=SCS	start TRACE32 to debug via the SCS StarCore simulator
PBI=SIMTSI	start TRACE32 to debug via the Target Server from Texas Instruments. Refer to **“Virtual Targets User’s Guide”** (virtual_targets.pdf) for more information.
PBI=IRIS [*<library_file>*]	start TRACE32 to debug via Iris Interface primarily Arm’s Fast Models. Refer to **“Virtual Targets User’s Guide”** (virtual_targets.pdf) for more information.
PBI=CADI [*<library_file>*]	start TRACE32 to debug via the Arm Cycle Accurate Debug Interface CADI. Refer to **“Virtual Targets User’s Guide”** (virtual_targets.pdf) for more information.
PBI=GDI [*<library_file>*]	start TRACE32 to debug via the Generic Debug Instrument Interface GDI. Refer to **“Virtual Targets User’s Guide”** (virtual_targets.pdf) for more information.
PBI=HOST	start TRACE32 as host process debugger. Refer to **“Native Process Debugger”** (windows_debugger.pdf) for more information.
PBI=NET	start TRACE32 as monitor program for connection over Ethernet (Serial Monitor).

PBI=*<driver>*	**Description**
PBI=MCD [*<library_file>*]	start TRACE32 to debug via the MultiCore Debug interface MCD. Refer to **"Virtual Targets User's Guide"** (virtual_targets.pdf) for more information.
PBI=DLL *<dll>*	start TRACE32 for debugging via a monitor program on the target. Communication is performed with a user-defined DLL.
PBI=ARCINT	start TRACE32 for debugging using the ARCINT interface. Refer to **"Simulator for ARC"** (simulator_arc.pdf) for more information.

PBI=*<driver>*	**Description**
PBI=MCISERVER	start a TRACE32 as a back-end using an MCI server (t32mciserver). Refer to **"Section PBI=MCISERVER"**, page 49 for details about key/value pairs specific to this section.
PBI=MCILIB	start a TRACE32 as a back-end using the Lauterbach debug driver library hostmci.

Section PBI=MCISERVER

The TRACE32 PowerView GUI can be used without any LAUTERBACH hardware as debug back-end. This section describes the configuration file options for debug back-ends.

Key/value	**Description**
AUTOSTART	starts an instance of t32mciserver when the server has not started yet at local host and the option DEDICATED is also set. Do use this option wen t32mciserver must be started at a certain point in time or special parameters.

Key/value	Description
DEDICATED	Prohibits to start the integrated MCI-server when there is no response from an already started MCI-server at localhost. Use this option when t32mciserver shall be started explicitly at localhost.
NODE	IP address or hostname of MCI-Server. In ideal case this must be a machine with very low latency (<100us) to the target. The localhost is used as hostname when NODE is left out. An integrated MCI-server is started when NODE is localhost and the option DEDICATED is left out. The integrated MCI-server runs in the first started GUI. An instance of t32mciserver as dedicated MCI-server is started when NODE is localhost and the options DEDICATED and AUTOSTART are used. A dedicated MCI-server should be used when interaction with the console is required or to keep the latency small by running it at the simulation/emulation host.
PORT	TCP-port number of MCI-Server. All started PowerView GUIs that belong to one target system must use the same PORT and NODE in order to connect to the same MCI-server. The used port of the dedicated MCI-Server is passed by a command line parameter of t32mciserver[.exe]. The port number 30000 is used as TCP-port when the PORT option is left out.

Section RCL=NETASSIST

If such a section is present, TRACE32 opens up a Remote API UDP port, by which TRACE32 can be remote controlled via an external application. Refer to **“API for Remote Control and JTAG Access in C”** (api_remote_c.pdf) for more information.

If you want to connect with more than one external application to TRACE32 via UDP, you need several `RCL=NETASSIST` sections. Each section opens up one Remote API UDP port on the specified port number.

Key/value	Description
PORT=*<port_number>*	Specifies which UDP port number is used. If this key is missing, the UDP port number 20000 is used per default.
PACKLEN=*<value>*	Specifies the maximum data package length used for UDP.

Section RCL=NETTCP

If such a section is present, TRACE32 opens up a Remote API TCP port, by which TRACE32 can be remote controlled via an external application. Refer to **“API for Remote Control and JTAG Access in C”** (api_remote_c.pdf) for more information.

You only need one RCL=NETTCP section, because TRACE32 already handles multiple connections to remote applications via TCP.

Key/value	**Description**
PORT=*<port_number>*	Specifies which TCP port number is used. If this key is missing, the TCP port number 20000 is used per default.

Section IC=NETASSIST

If you have several TRACE32 PowerView instances running, these instances can talk to each other via the "InterCom" mechanism.

You can only talk to a TRACE32 PowerView instance via this mechanism, if the corresponding configuration file contains a `IC=NETASSIST` section.

An alternative to setting up such an InterCom port via the configuration file is to use the PRACTICE command **TargetSystem.NewInstance**.

Key/value	**Description**
PORT=*<port_number>*	Specifies which UDP port number by which this TRACE32 PowerView instance is reachable. If this key is missing, the UDP port number 10000 is used per default.
PACKLEN=*<value>*	Specifies the maximum data package length used for UDP.

Section GDB=NETASSIST

If this section is used in the configuration file, TRACE32 PowerView is configured as GDB Back-End. Refer to **"TRACE32 as GDB Back-End"** (backend_gdb.pdf) for more information.

Key/value	**Description**
PORT=*<port_number>*	Specifies which UDP port number by which this TRACE32 PowerView instance is reachable. If this key is missing, the UDP port number 30000 is used per default.
PACKLEN=*<value>*	This specifies the maximum package length in bytes for the socket communication.
PROTOCOL=<TCP | UDP>	This specifies the used protocol (`TCP` or `UDP`); Optional: the default protocol is `TCP`.

Section TCF=

If this section is used in the configuration file, TRACE32 PowerView is configured as TCF agent. Refer to **“TRACE32 as TCF Agent”** (app_tcf_setup.pdf) for more information.

Key/value	**Description**
PORT=*<port_number>*	Use a fixed port number. If a port number is specified, TCF discovery mechanism is disabled.

Section SIMULINK=NETASSIST

This section enables the port for code-to-model navigation when the TRACE32 integration for Simulink is used. Refer to **“Integration for Simulink”** (int_simulink.pdf) for more information.

Key/value	**Description**
PORT=*<port_number>*	Port for code to model navigation.

Command Line Arguments for Starting TRACE32

TRACE32 can be started with and without command line arguments. If you do not pass any command line arguments, the following default will be used:

- For the configuration file, the first available file from the following locations will be used:
    - The file specified by the environment variable `T32CONFIG`
    - The file **config.t32** from the working directory (from where TRACE32 was started).
    - The file **config.t32** from the TRACE32 system directory (usually C:\t32)
- After the start of a TRACE32 instance, the PRACTICE script **autostart.cmm** from the TRACE32 system directory will be executed, which then calls the following scripts:
    - **system-settings.cmm** (from the TRACE32 system directory, usually C:\t32)
    - **user-settings.cmm** (from the user settings directory, on Windows `%APPDATA%\TRACE32` or `~/.trace32` otherwise)
    - **work-settings.cmm** (from the current working directory)

If you pass command line arguments, you can adapt the start and the environment of TRACE32 to your project-specific needs. You can define a user-specific name and location for the configuration file and your own PRACTICE start-up script. In addition, you can pass user-defined parameters to your configuration file and to your start-up script.

The command line syntax for Windows, Linux, and Unix is as follows:

Format:	**t32m***<arch>*[**.***<x>*] [*<options>*] [**-c** *<config_file>* [*<c_args>*]] [**-s** *<startup_script>* [*<s_args>*]]

-c *<config_file>*	By default, TRACE32 expects to find the configuration file config.t32 in the same folder as the TRACE32 executable. An error message is displayed if the configuration file config.t32 does not exist. **-c** *<config_file>* allows you to define a user-specific name and location for the TRACE32 configuration file. For information about the configuration options in the configuration file, type at the TRACE32 command line: `HELP.Index "config.t32"` **NOTE**: • **-c** is case sensitive, i.e. **-C** results in an error. • The name of the *<config_file>* must **not** start with a hyphen and must **not** contain any commas.

-s *<startup_ script>*	When a TRACE32 instance starts, the PRACTICE script **autostart.cmm** is executed, which then calls the following scripts: • **system-settings.cmm** (from the TRACE32 system directory, usually C:\t32) • **user-settings.cmm** (from the user settings directory: on Windows %APPDATA%\TRACE32 or ~/.trace32 otherwise) • **work-settings.cmm** (from the current working directory) With the command line option **-s** *<startup_script>* you can specify an additional PRACTICE script (*.cmm) which is automatically started afterwards. **NOTE**: If you use command line option **-s** *<startup_script>* but don't have the file **autostart.cmm** in your TRACE32 system directory, only the file specified by the command line option **-s** will be executed. If you don't use the command line option **-s** *<startup_script>* and don't have the file **autostart.cmm** either, TRACE32 will fall back to a legacy mode and execute the script **t32.cmm** from the working directory or from the TRACE32 system directory if the **t32.cmm** does not exist in the working directory.
<arch>	Architecture, e.g. ARM in `t32marm.exe` stands for the ARM architecture.
<c_args>	Sequence of white-space separated arguments passed to the configuration file. The individual command line arguments are assigned to the configuration options in the configuration file using `${n}` where `n` is the number of the command line argument. The numbering starts at `1` **Example**: `HEADER=${2}` means that the second *<c_arg>* is assigned to the configuration option `HEADER=` **NOTE**: The *<c_args>* must **not** start with a hyphen and must **not** contain any commas.

<options>	The following command line options are available for all architectures: • **--t32-help** Lists all available command line options and suppresses the automatic execution of any PRACTICE script after starting TRACE32. • **--t32-help-diag** Prints all found unknown command line options into the message **AREA** window. • **--t32-cmdline-quote-all** Passes all parameters to the start-up script enclosed in double quotes. • **--t32-cmdline-quote-esc** Passes all parameters to start-up script enclosed in double quotes. Additionally the command line option escapes already included double quotes in parameters, so that you get the same character sequence when accessed with **PRACTICE.ARG()**. • **--t32-area-size-lines=***<lines>* Sets the initial number of lines in the message **AREA** window. • **--t32-safestart** Suppresses the automatic execution of any PRACTICE script after starting TRACE32. • **--t32-logautostart** Internally executes the **LOG.DO** command to generate an autostart log in the temporary directory of TRACE32. The resulting autostart log file lists all PRACTICE scripts which were called during start-up of TRACE32. For an example and a description of the file name convention, see below. • **--t32-screen=***<screendriver>* Set the screen driver used to display all PowerView windows. Possible values area: auto, cde, qt, qt4, qt5
<s_args>	Sequence of white-space separated arguments passed to the PRACTICE start-up script (*.cmm). All characters are permissible. However, if an *<s_arg>* is enclosed in quotation marks (e.g. `"Hello"`), then the *<s_arg>* must not be interrupted by another quotation mark. An *<s_arg>* that contains one or more blanks must be enclosed in quotation marks (e.g. `"Hello World"`).
<x>	The file name extension of the executable is optional on Windows. (no extension for Linux and Unix)

Examples

Example 1: Logging PRACTICE script calls during start-up of TRACE32 with --t32-logautostart

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In this example, a Windows batch file (*.bat) sets the folder **C:\T32\project_c** as the working directory for TRACE32. The next script line starts the TRACE32 executable for ARMv8 by using the configuration file **config.t32** file and the PRACTICE start-up script **sieve.cmm** from the working directory.

The command line option **--t32-logautostart** causes the autostart log file to be generated.

```
C:
cd C:\T32\project_c
start C:\T32\bin\windows64\t32marm.exe    --t32-logautostart  ^
                                          -c config.t32       ^
                                          -s sieve.cmm
```

The caret sign ^ serves as a line continuation character in Windows batch files (*.bat). White space characters after ^ are NOT permissible.

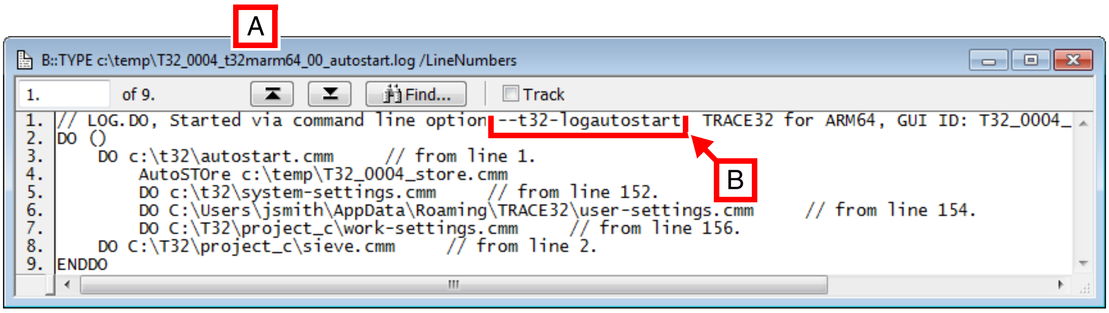
To access the autostart log file in TRACE32:

1. Execute your *.bat file to start TRACE32.

   The autostart log file is generated automatically.

2. Choose **File** menu > **Automatic Scripts on Start** > **View Autostart log**.

   The file opens in the **TYPE** window. The screenshot shows an example of an autostart log file:



```
B::TYPE c:\temp\T32_0004_t32marm64_00_autostart.log /LineNumbers
```

```
// LOG.DO, Started via command line option --t32-logautostart  TRACE32 for ARM64, GUI ID: T32_0004_
DO ()
    DO c:\t32\autostart.cmm     // from line 1.
        AutoSTOre c:\temp\T32_0004_store.cmm
        DO c:\t32\system-settings.cmm     // from line 152.
        DO C:\Users\jsmith\AppData\Roaming\TRACE32\user-settings.cmm     // from line 154.
        DO C:\T32\project_c\work-settings.cmm     // from line 156.
    DO C:\T32\project_c\sieve.cmm     // from line 2.
ENDDO
```

A The file name convention of the autostart log is described below.

B The log file header tells you how the autostart log was generated. For alternatives, see **"Logging the Call Hierarchy of PRACTICE Scripts"** in PRACTICE Script Language User's Guide, page 17 (practice_user.pdf).

File name convention of the autostart log file: ~~~/*<id>*_t32m*<arch>*_*<xx>*_autostart.log

~~	Path prefix of the temporary directory of TRACE32. See also **OS.PresentTemporaryDirectory()**.
<id>	ID of the PowerView GUI that was started. See also **OS.ID()**.
t32m*<arch>*	Name of the PowerView executable (without file extension), e.g. "t32marm"
<xx>	The instance number of the PowerView executable.

Example 2: Passing command line arguments via a Windows shortcut to TRACE32

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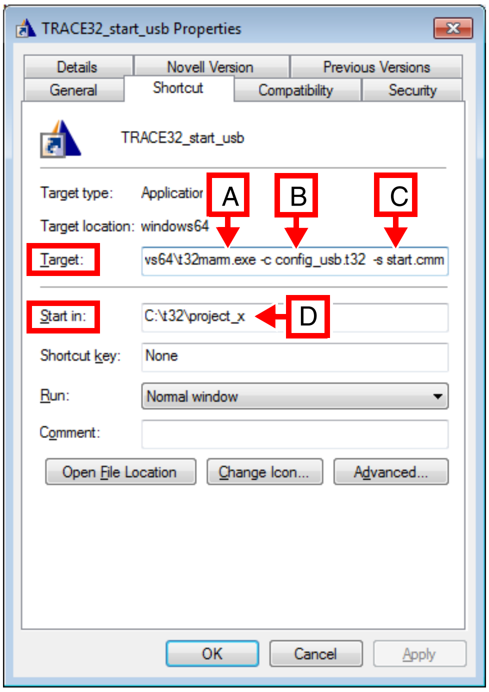
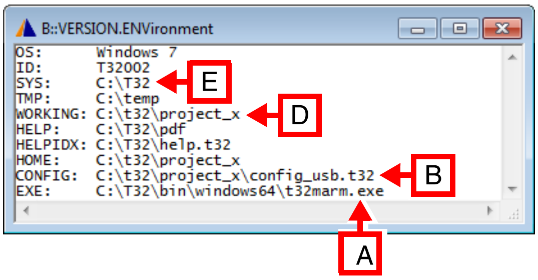
This example shows how to pass TRACE32 command line arguments via a Windows shortcut to TRACE32. The command line arguments are:

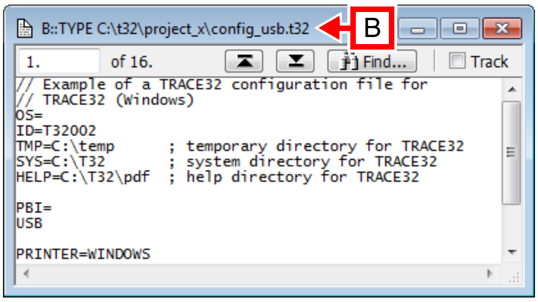
- A user-defined configuration file called `config_usb.t32`
- A user-defined PRACTICE start-up script called `start.cmm`

Operating System side | **TRACE32 side**





```
OS:      Windows 7
ID:      T32002
SYS:     C:\T32
TMP:     C:\temp
WORKING: C:\t32\project_x
HELP:    C:\T32\pdf
HELPIDX: C:\T32\help.t32
HOME:    C:\t32\project_x
CONFIG:  C:\t32\project_x\config_usb.t32
EXE:     C:\T32\bin\windows64\t32marm.exe
```



```
// Example of a TRACE32 configuration file for
// TRACE32 (Windows)
OS=
ID=T32002
TMP=C:\temp       ; temporary directory for TRACE32
SYS=C:\T32        ; system directory for TRACE32
HELP=C:\T32\pdf   ; help directory for TRACE32

PBI=
USB

PRINTER=WINDOWS
```

A Path and name of a TRACE32 executable.
In a default installation, all TRACE32 executables are located in C:\t32\bin\<*os*>\

B The option **-c** <*config_file*> allows you to define a user-specific name and location for the TRACE32 configuration file (*.t32).

C The option **-s** <*startup_script*> allows you to define a user-specific name and location for your PRACTICE start-up script (*.cmm).

D User-defined working directory.
In the above **Properties** dialog box, the **Start in** text box sets the path for the **Target** text box - unless different paths are specified in the **Target** text box.
This means for our example that the `t32m`**`arm`**`.exe` searches for the files `config_usb.t32` and `start.cmm` in `C:\t32\project_x`.

E TRACE32 system directory (by default `c:\t32`). It is specified during the installation of TRACE32. Normally, you do not need to change anything here.

Example 3: Passing command line arguments to a TRACE32 configuration file (*.t32)

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The following example shows how to pass TRACE32 command line arguments from a batch file (*.bat) to the configuration file (*.t32). The command line arguments are:

- *<c_arg1>*: A user-defined window title for TRACE32
- *<c_arg2>*: A network folder path containing the pdf files of the TRACE32 online help

Batch file start2_usb.bat:

```
rem                                                <c_arg1>       <c_arg2>
start C:\T32\t32marm.exe -c config2_usb.t32 " Project X" "g:\TRACE32_pdf"
```

TRACE32 configuration file config2_usb.t32:

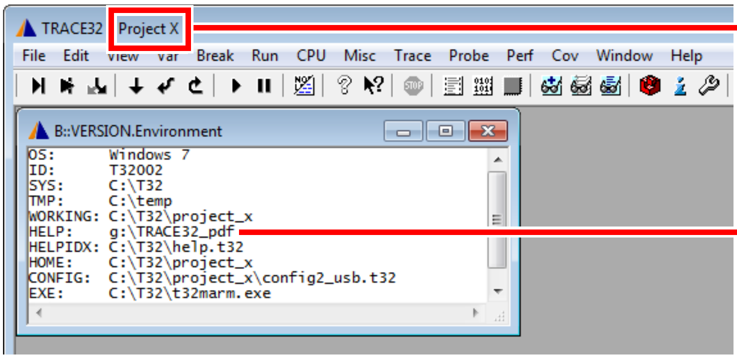
```
// Example of a TRACE32 configuration file
OS=
ID=T32002
TMP=C:\temp         ; temporary directory for TRACE32
SYS=C:\T32          ; system directory for TRACE32
HELP=${2}           ; help directory for TRACE32

PBI=
USB

PRINTER=WINDOWS

SCREEN=
HEADER=TRACE32 ${1}
```

The values passed as command line arguments to the user-defined configuration file are now used by TRACE32:


TRACE32 Project X
File Edit View Var Break Run CPU Misc Trace Probe Perf Cov Window Help
B::VERSION.Environment

```
OS:       Windows 7
ID:       T32002
SYS:      C:\T32
TMP:      C:\temp
WORKING: C:\T32\project_x
HELP:     g:\TRACE32_pdf
HELPIDX: C:\T32\help.t32
HOME:     C:\T32\project_x
CONFIG:   C:\T32\project_x\config2_usb.t32
EXE:      C:\T32\t32marm.exe
```

Value of argument `${1}`

Value of argument `${2}`
TRACE32 now retrieves the pdfs of the help system from this network folder.

NOTE:	The `help.t32` file of the online help must reside in the TRACE32 system directory (by default `C:\t32`).

Example 4: Passing command line arguments to a PRACTICE start-up script (*.cmm)

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The following example shows how to pass TRACE32 command line arguments from an MS batch file (*.bat) to a PRACTICE start-up script (*.cmm). The command line arguments are:

- *<startup_script>*: A user-defined PRACTICE start-up script (*.cmm)
- *<s_args>*: The arguments passed to the PRACTICE start-up script are `0x1` and `0x2` and a string with a blank `"Hello World!"`

Batch file start3.bat:

```
rem                                        <startup_script> <s_args>
start C:\T32\t32marm.exe  -c config3_usb.t32   -s start3.cmm     0x1  ^
                                                                 0x2  ^
                                                         "Hello World!"
```

The caret sign ^ serves as a line continuation character in Windows batch files (*.bat). White space characters after ^ are NOT permissible.

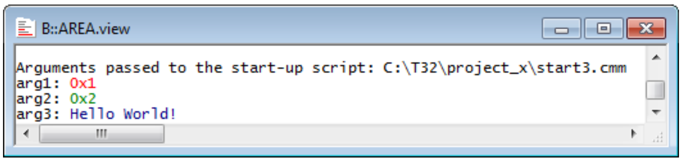
PRACTICE start-up script start3.cmm:

```
LOCAL &arg1 &arg2 &arg3      ;Declare local PRACTICE macros

&arg1=PRACTICE.ARG(0)        ;Assign the values of the command line
&arg2=PRACTICE.ARG(1)        ;arguments to the PRACTICE macros
&arg3=PRACTICE.ARG(2)

AREA.view                    ;Open an AREA.view window
PRINT "Arguments passed to the start-up script: "
OS.PresentPracticeFile()
PRINT "arg1: " %COLOR.RED   "&arg1"
PRINT "arg2: " %COLOR.GREEN "&arg2"
PRINT "arg3: " %COLOR.NAVY  "&arg3"
```

The values passed as command line arguments to the PRACTICE start-up script are printed to the **AREA.view** window.



```
Arguments passed to the start-up script: C:\T32\project_x\start3.cmm
arg1: 0x1
arg2: 0x2
arg3: Hello World!
```

Example 5: Returning environment variables in a PRACTICE start-up script (*.cmm)

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The first two tables show how to create the user-defined environment variable `T32P1` and start TRACE32 under Windows and Linux. After starting TRACE32, the parameter of `T32P1` is returned in the PRACTICE start-up script start4.cmm with the **OS.ENV()** function and printed to the TRACE32 message line, see 3rd table.

Windows: start4.bat

```
SET T32P1=C:\ain't this\a complicated\path\myprog.elf
START t32marm.exe   -c config4_sim.t32   -s start4.cmm
```

Linux: dash/bash script

```
T32P1="/ain't this/a complicated/path/myprog.elf"
START t32marm.exe   -c config4_sim.t32   -s start4.cmm
```

TRAE32: PRACTICE start-up script start4.cmm

```
;<your_code>

PRINT OS.ENV(T32P1)  ;prints C:\ain't this\a complicated\path\myprog.elf

;...
```

Uninstall TRACE32

Microsoft Windows

1. Run the uninstaller from Windows Settings or Control Panel
2. Delete the TRAC32 system directory (e.g. C:\T32) manually

LINUX and Mac OS

Delete the TRAC32 system directory (e.g. C:\T32) manually.

Troubleshooting

If you can not solve your problem with the following hints contact our support line:

telephone: ++49 8102/9876-555
facsimile: ++49 8102/9876-999
e-mail: support@lauterbach.com

System doesn't response to ping on Ethernet

IP address already set up in system, or arp used?

When arp is used, it must be used on the same workstation short before.

Ethernet address correct?

System on the correct subnet?

Cables and transceiver o.k.?

Ethernet software in host (PC) configured correctly?

xset +fp fontpath gives error 'bad value …'

Does the font directory exist?

Does the fonts.dir file exist (created by mkfontdir)?

Is the directory seen under the same name by the X-server?

Have all directories that lead to the font directory read and execute
permissions for everybody?

Executable program does not start or gives fatal error

When transferring between different OS-systems, files copied in binary mode?

Access rights to file in directory o.k.?

Configuration file contents o.k.?

Executable program displays 'FATAL ERROR selecting device-driver …

Using configuration file for MS-DOS for the WINDOWS-Driver?

WINDOWS and workstation drivers cannot load new drivers.

Environment variable 'T32CONFIG' and/or 'T32SYS' correctly set?

Executable program displays 'error reading config.t32:'

Configuration file contents o.k.?

Commands in file in uppercase?

Blanks inserted/not inserted?

Device specific commands placed after device header?

Device configuration blocks separated by empty lines?

Environment variable 'T32CONFIG' and/or 'T32SYS' correctly set?

Executable program stops without message, but with window opened

Access rights to directory o.k.?

On UNIX host, try with 'NOLOCK' feature.

When using the RS232 interface: Is a login process active on the tty?

Program stops with message 'font xxxx not found'

Do fonts appear in the 'xlsfonts' command?

Can one font (e.g. t32-lsys-16) be displayed by 'xfd -fn t32-lsys-16'?

Fonts added to X-Windows FONTPATH?

Fonts converted, when required, and .bdf files removed?

Command to generate font directory executed with correct parameters?

Fonts installed on the X-Windows server, not client?

If using an X-Terminal, use the conversion programs for the X-Terminal?

USB debugger not detected at all by LINUX

There are a few reasons why this can happen:

- the running kernel does not support USB yet
- USB not enabled during kernel configuration
- USB enabled as modules in the kernel configuration, but module autoload did fail or isn't configured
- usbdevfs is not mounted
- usbdevfs is mounted, but not at /proc/bus/usb
- bad USB cable, use the original one or make sure it is at max. 3 meters long
  cable type lettering: 28AWG/1PR 24AWG/2C
- old debugger firmware - version V6.5 or later needed

Menu or softkey text is displayed wrong under LINUX

On systems which use a mixed set of 8bit and 16bit menu fonts, and have only *-iso10646-* system fonts installed, no meaningful glyphs are rendered in the menu or softkeys of TRACE32 main window.

If this happens, please install the additional iso8859 system font package(s).

```
e.g.  yum install xorg-x11-fonts-ISO8859-1-75dpi
```

Fixed width font t32sys not found under WINDOWS

When you start the TRACE32 executable the fonts are loaded. If a SW update will be done, which replaces the TRACE32 font file named t32font.fon, the new fonts will not be activated as long as the old fonts are loaded.

This happens even if both font files are identical.

Please reboot your Windows PC to solve this issue.

FAQ

Please refer to https://support.lauterbach.com/kb.

Debugger Licenses

For debugging it is necessary to obtain the licenses for the particular processors. Depending on the used setup, the debug license is saved within the debug cable, µTrace (MicroTrace) or CombiProbe.

The debug cable and the CombiProbe allow to save more than one license. Those licenses are available as so-called extension licenses (X-licenses, in case of processors belonging to the same family e.g. LA-7844X) or additional licenses (A-licenses. e.g. LA-7844A). An X-license has always the same serial number as the base license and is covered by the same software maintenance contract. An A-license has instead an own serial number and software maintenance contract.

The licenses located in the currently used debug cable can be viewed by typing the **VERSION** command at the TRACE32 command line or by choosing **Help** menu > **About TRACE32**:

X-Licenses are possible for processors of the same family as the base license or associated A-License. To learn which license combinations are possible please contact LAUTERBACH sales department or distributor.

Multicore License

For multicore debugging, it is necessary to obtain the licenses for the particular cores. In case you are debugging several cores covered by the same debug license (e.g. Cortex-M4 and Cortex.-M7), a multicore license has to be added to the base license. Please note that multicore debugging is explicitly licenses within some core licenses and in case two or more core licenses are available in one debug cable.

Please contact LAUTERBACH sales department or distributor for more information.

Software Maintenance

When purchasing a Lauterbach product it includes a software guarantee, which allows you to install free software updates for one year. After the first year a new software maintenance license is required to run the latest software version.

The most current TRACE32 software version can only be installed if at least one of the following requirements is fulfilled:

- The original one year software guarantee is still valid.
- A new software maintenance license has been purchased and is still valid.

You can check the status of your maintenance contracts in the **VERSION** window which can be opened from the menu **Help > About TRACE32** or by typing the command **LICENSE.state** in the TRACE32 command line.

LEDs on TRACE32 Hardware Modules

Within the PowerTools family we distinguish three types of hardware modules:

1. **Hardware modules with host interface which must be connected to the host (PODBUS SYNCH):**

   POWER DEBUG E40

   POWER DEBUG X50

   POWER DEBUG INTERFACE / USB 3

   POWER DEBUG PRO

   POWER DEBUG II

2. **Hardware modules with host interface which may be connected to the host (PODBUS IN):**

   POWER DEBUG INTERFACE / USB 2

   POWER DEBUG / ETHERNET

   POWER TRACE / ETHERNET

3. **Hardware modules without host interface**

   POWER TRACE PX

   POWER TRACE II

   POWER TRACE II LITE

   POWER TRACE III

   POWER TRACE SERIAL

   POWER TRACE SERIAL 2

   POWER PROBE / LOGIC ANALYZER

   POWER INTEGRATOR

   POWER INTEGRATOR II

4. **Stand-alone hardware module with host interface**

   µTrace (MicroTrace)

POWER LED

If the POWER LED is on, this indicates that a power supply is connected. This applies to all hardware modules except POWER TRACE II / POWER TRACE II LITE / POWER TRACE III and POWER INTEGRATOR II.

POWER TRACE II/II-LITE/III / POWER INTEGRATOR II

POWER TRACE II / POWER TRACE II LITE / POWER TRACE III / POWER INTEGRATOR II are only partially powered when a power supply is connected but the TRACE32 software is not started. This avoids unnecessary noise. The POWER LED is flashing to indicate this partly powered state.

POWER TRACE II / POWER TRACE II LITE / POWER TRACE III / POWER INTEGRATOR II are completely powered when the TRACE32 software is started.

In the standard configuration (one POWER TRACE II / POWER TRACE II LITE / POWER TRACE III / POWER INTEGRATOR II is assembled with a POWER DEBUG module) the power supply connected to POWER DEBUG module is sufficient to supply both units. Any further module needs an extra power supply (more the 7 A).

A POWER LED that is still flashing after the TRACE32 software is started indicates that the current power supply is not sufficient. POWER TRACE II / POWER TRACE II LITE / POWER TRACE III / POWER INTEGRATOR II provide their own POWER 7-9 V connector. This connector can be used to connect an additional power supply.

TRACE32 Software not Started

The following applies only to the hardware module that is connected to the host:

The SELECT LED flashes regularly when the self-test of the hardware module was successfully completed.

If the self test failed, the following error codes are flashed:

- Three flashes, then a pause: memory test failed
- Six flashes, then a pause: buffer overflow
- Nine flashes, then a pause: failed to load firmware
- Twelve flashes, then a pause: checksum error.

In any case, please contact your local Lauterbach support.

NOTE:	The µTrace (MicroTrace) does not have a SELECT LED, because it is a stand-alone hardware module. The RECORD LED is used here to indicate that a self-test failed.

TRACE32 Software Started

The SELECT LED is on when the TRACE32 software in communication with the hardware module.

RUNNING/EMULATE LED

NOTE:	The state of this LED has no meaning as long as the TRACE32 software is not started.

The following applies to all hardware modules except POWER TRACE II / POWER TRACE II LITE / POWER TRACE III and POWER INTEGRATOR II:

- If a single-core processor is debugged, the RUNNING/EMULATE LED is ON, when the program execution is running. The RUNNING/EMULATE LED corresponds with running indicated in the Debug field of the **TRACE32 PowerView state line**.
- If a multi-core chip is debugged, the RUNNING/EMULATE LED is ON, when the program execution is running on the core that is the master of the debug communication (**SYStem.CONFIG Slave OFF**).

The following applied for POWER TRACE II / POWER TRACE II LITE / POWER TRACE III:

- If the on-chip trace generation logic generates Nexus 5001™ compliant trace messages the RUNNING is ON, when the program execution is running. This is realizable because the trace generation logic generates Debug Status Messages at the start and the stop of the program execution.
- For all other trace protocols the RUNNING LED is on, if the POWER TRACE II / POWER TRACE II LITE / POWER TRACE III hardware is ready to record trace information (see also RECORD LED description) and valid trace information is received.

The following applied for POWER INTEGRATOR II:

- The RUNNING LED is on, if the POWER INTEGRATOR II hardware is ready to record trace information (record-counter is counting-up) and valid signal-data is detected.

RECORD/RECORDING/TRACE LED

NOTE:	The state of this LED has no meaning as long as the TRACE32 software is not started.

The RECORD LED is on when the logic analyzer/ trace recording is armed. Armed means incoming trace data are recorded. The RECORD LED corresponds with ARM indicated in the Trace field of the **TRACE32 PowerView state line**.

TRIGGER LED

NOTE:	The state of this LED has no meaning as long as the TRACE32 software is not started.

The TRIGGER LED is on when the logic analyzer encountered a trigger event. The TRIGGER LED corresponds with TRIGger indicated in the Trace field of the **TRACE32 PowerView state line**.

ERROR LED

The ERROR LED on the POWER INTEGRATOR has no function.

Ethernet LEDs

LEDs on POWER DEBUG II	
LINK	Physical link established.
ACTIVITY	Ethernet packets received respectively sent.

LEDs on POWER DEBUG / ETHERNET and POWER TRACE / ETHERNET	
CONNECT ERROR	Ethernet connection error occurred.
TRANSMIT	Ethernet packets sent.
RECEIVE	Ethernet packets received.
COLLISION	Ethernet collision occurred.