

RealView[®] ICE and RealView Trace

Setting up the Hardware



RealView ICE and RealView Trace

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Release Information

The following changes have been made to this book.

				Change history
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May 2010	A	Non-confidential	First release.	

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This section contains conformance notices.

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This device is test equipment and consequently is exempt from part 15 of the FCC Rules under section 15.103 (c).

CE Declaration of Conformity



The system should be powered down when not in use.

It is recommended that ESD precautions be taken when handling RealView ICE and RealView Trace equipment.

The RealView ICE and RealView Trace modules generate, use, and can radiate radio frequency energy and may cause harmful interference to radio communications. There is no guarantee that interference will not occur in a particular installation. If this equipment causes harmful interference to radio or television reception, which can be determined by turning the equipment off or on, you are encouraged to try to correct the interference by one or more of the following measures:

- ensure attached cables do not lie across the target board
- reorient the receiving antenna
- increase the distance between the equipment and the receiver
- connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- consult the dealer or an experienced radio/TV technician for help

———— **Note** —————

It is recommended that wherever possible shielded interface cables be used.

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Chapter 1

Conventions and feedback

The following describes the typographical conventions and how to give feedback:

Typographical conventions

The following typographical conventions are used:

`monospace` Denotes text that can be entered at the keyboard, such as commands, file and program names, and source code.

monospace Denotes a permitted abbreviation for a command or option. The underlined text can be entered instead of the full command or option name.

monospace italic

Denotes arguments to commands and functions where the argument is to be replaced by a specific value.

`monospace bold`

Denotes language keywords when used outside example code.

italic Highlights important notes, introduces special terminology, denotes internal cross-references, and citations.

bold Highlights interface elements, such as menu names. Also used for emphasis in descriptive lists, where appropriate, and for ARM® processor signal names.

Feedback on this product

If you have any comments and suggestions about this product, contact your supplier and give:

- your name and company

- the serial number of the product
- details of the release you are using
- details of the platform you are using, such as the hardware platform, operating system type and version
- a small standalone sample of code that reproduces the problem
- a clear explanation of what you expected to happen, and what actually happened
- the commands you used, including any command-line options
- sample output illustrating the problem
- the version string of the tools, including the version number and build numbers.

Feedback on content

If you have comments on content then send an e-mail to errata@arm.com. Give:

- the title
- the number, ARM DUI 0515A
- if viewing online, the topic names to which your comments apply
- if viewing a PDF version of a document, the page numbers to which your comments apply
- a concise explanation of your comments.

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ARM periodically provides updates and corrections to its documentation on the ARM Information Center, together with knowledge articles and *Frequently Asked Questions* (FAQs).

Other information

- ARM Information Center, <http://infocenter.arm.com/help/index.jsp>
- ARM Technical Support Knowledge Articles, <http://infocenter.arm.com/help/topic/com.arm.doc.faqs/index.html>
- Keil Distributors, <http://www.keil.com/distis>.

Chapter 2

Introduction to RealView ICE and RealView Trace

The following topics introduce RealView® ICE and RealView Trace, and describe the software components:

- *About RealView ICE and RealView Trace* on page 2-2
- *RealView ICE product contents* on page 2-3
- *RealView Trace and RealView Trace 2 product contents* on page 2-4
- *Availability and compatibility* on page 2-5
- *Introduction to EmbeddedICE logic and debug extensions* on page 2-6
- *Debug extensions to the ARM processor* on page 2-7
- *EmbeddedICE debug architecture and debug monitor differences* on page 2-8
- *Introduction to the RealView ICE components* on page 2-9
- *The RealView ICE run control unit* on page 2-10
- *RealView ICE hardware variants - end panel elements* on page 2-12
- *RealView ICE hardware variants - v2 LVDS probe* on page 2-13
- *The RealView ICE firmware* on page 2-15
- *The RealView ICE host software* on page 2-16
- *RealView Trace front panel components* on page 2-17.

2.1 About RealView ICE and RealView Trace

RealView® ICE is an EmbeddedICE® logic debug solution from ARM®. It enables you to debug software running on ARM processors that include the EmbeddedICE logic.

RealView ICE provides the software and hardware interface between a debugger running on a Windows or Red Hat Linux host computer, and a *Joint Test Action Group (JTAG) IEEE Standard 1149.1-2001* port on the target hardware.

RealView ICE also supports a *Serial Wire Debug (SWD)* connection to the *Debug Access Port (DAP)*. SWD is an alternative protocol to JTAG for connecting to CoreSight™ processors, and has the advantage of requiring fewer pins than previous probes. It also supports higher data rates.

RealView Trace provides a data streaming capability that directly enables hardware platform profiling.

The RealView Trace unit works in conjunction with ARM RealView ICE to provide real-time trace functionality for software running on *System-on-Chip (SoC)* devices with deeply embedded processors that contain the *Embedded Trace Macrocell™ (ETM)* logic.

You can use RealView ICE and RealView Trace with systems that contain one or more ARM processors. RealView ICE also supports the *Embedded Trace Buffer™ (ETB)* for capturing small amounts of trace information at high processor clock speeds.

2.1.1 See also

Concepts

- *RealView ICE product contents* on page 2-3
- *RealView Trace and RealView Trace 2 product contents* on page 2-4
- *Availability and compatibility* on page 2-5
- *Introduction to EmbeddedICE logic and debug extensions* on page 2-6
- *Introduction to the RealView ICE components* on page 2-9.

Reference

Using the Debug Hardware Configuration Utilities:

- *Using Trace*, [../com.arm.doc.dui0498a/1999867.html](http://com.arm.doc.dui0498a/1999867.html)

2.2 RealView ICE product contents

The RealView® ICE product comprises:

- A run control unit that connects to your target board over a JTAG interface and to your PC using either USB or Ethernet.
 - Mains cables and a power supply that powers the run control unit.
 - An Ethernet cable.
 - A USB cable.
 - Two alternative cables that connect the RealView ICE run control unit to the target JTAG connector:
 - a short 20-way ribbon cable
 - a long 40-way ribbon cable and a *Low Voltage Differential Signaling (LVDS)* 40-way to 20-way probe.
 - A TI adaptor board.
 - A 20-way to 14-way adaptor, for targets that use a 14-way *Insulation Displacement Connector (IDC)* box header.
- Caution**
- Before using this adaptor, see *Using nonstandard connectors* on page 3-8.
-
- Software on CD-ROM that enables a debugger to communicate with the run control unit, and to configure and manage the run control unit.
 - Documentation, including:
 - online versions of this document in Eclipse browser and PDF formats
 - a packing list.

2.2.1 See also

Tasks

- *Connecting the RealView ICE hardware* on page 3-5.

Concepts

- *About RealView ICE and RealView Trace* on page 2-2
- *RealView Trace and RealView Trace 2 product contents* on page 2-4
- *Availability and compatibility* on page 2-5
- *Introduction to EmbeddedICE logic and debug extensions* on page 2-6
- *Introduction to the RealView ICE components* on page 2-9.

2.3 RealView Trace and RealView Trace 2 product contents

Unless specifically stated, RealView® Trace is used throughout to refer to both RealView Trace and RealView Trace 2.

The RealView Trace product comprises:

- The RealView Trace data capture unit.
- Eight plastic spacers (four 16mm and four 8mm), supplied with the RealView Trace data capture unit.
- The 60-way interface cable (a flat ribbon cable with a square *Insulation Displacement Connector* (IDC) socket at each end).
- The trace probe. This is a small PCB that contains the interface circuits that buffer the signals between the target board and the interface cable.
- A power supply unit is not supplied, because the RealView Trace unit is powered by the unit.
- For 32-bit trace using RealView Trace 2, you also require a 32-bit dual-Mictor trace probe (Part Number RT200-BD-00032).

When considering your system requirements, you must also provide some target hardware containing a device supported by RealView Trace.

2.3.1 See also

Tasks

- *Connecting the RealView Trace hardware* on page 3-10.

Concepts

- *About RealView ICE and RealView Trace* on page 2-2
- *RealView ICE product contents* on page 2-3
- *Availability and compatibility* on page 2-5
- *Introduction to EmbeddedICE logic and debug extensions* on page 2-6
- *Introduction to the RealView ICE components* on page 2-9.

2.4 Availability and compatibility

RealView® ICE and RealView Trace are available from ARM® and its resellers.

Contact ARM directly regarding OEM licenses.

The RealView ICE software for the host computer is compatible with 32-bit versions of the following operating systems:

- Windows XP Professional (Service Pack 2, or later)
- Windows Vista Business Edition and Windows Vista Enterprise Edition
- Red Hat Enterprise Linux 4 and Red Hat Enterprise Linux 5

RealView ICE provides:

- The ability to access the target hardware.
- Tools to configure your debugger so that it can connect to the target through RealView ICE. Your debugger provides the user interface items, such as register windows and disassemblers, that make it possible to debug your application.

For more information on compatibility with target hardware, see the documentation supplied with your hardware.

2.4.1 See also

Concepts

- *About RealView ICE and RealView Trace* on page 2-2
- *Introduction to EmbeddedICE logic and debug extensions* on page 2-6
- *Introduction to the RealView ICE components* on page 2-9.

Other information

- Patch downloads , <http://www.arm.com/support>

2.5 Introduction to EmbeddedICE logic and debug extensions

The EmbeddedICE[®] logic and the ARM[®] processor debug extensions enable RealView[®] ICE to debug software running on an ARM processor. The basic principles of this operation are described in the following:

- *Debug extensions to the ARM processor* on page 2-7
- *EmbeddedICE debug architecture and debug monitor differences* on page 2-8.

———— **Note** —————

To determine whether a specific ARM processor has support for JTAG debugging, see its datasheet or technical reference manual.

2.5.1 See also

Concepts

- *About RealView ICE and RealView Trace* on page 2-2
- *Availability and compatibility* on page 2-5
- *Debug extensions to the ARM processor* on page 2-7
- *EmbeddedICE debug architecture and debug monitor differences* on page 2-8
- *Introduction to the RealView ICE components* on page 2-9.

Reference

Using the Debug Hardware Configuration Utilities:

- *Using Trace*, [../com.arm.doc.dui0498a/I999867.html](http://com.arm.doc.dui0498a/I999867.html)

2.6 Debug extensions to the ARM processor

The debug extensions consist of several scan chains around the processor, and some additional signals that are used to control the behavior of the processor for debug purposes. The most significant of these additional signals are:

- BREAKPT** This processor signal enables external hardware to halt processor execution for debug purposes. When HIGH during an instruction fetch, the instruction is tagged as breakpointed, and the processor stops if this instruction reaches the execute stage of the pipeline.
- DBGRRQ** This processor signal is a level-sensitive input that causes the processor to enter debug state when the current instruction has completed.
- DBGACK** This processor signal is an output from the processor that goes HIGH when the processor is in debug state so that external devices can determine the current state of the processor.

RealView[®] ICE uses these, and other signals, through the debug interface of the processor, for example by writing to the control register of the EmbeddedICE[®] logic. For more details, see the topic that describes the debug interface support of the ARM[®] datasheet or technical reference manual for your processor (for example, the *ARM7TDMI (Rev 4) Technical Reference Manual*).

2.6.1 See also

Concepts

- *EmbeddedICE debug architecture and debug monitor differences* on page 2-8.

2.7 EmbeddedICE debug architecture and debug monitor differences

A debug monitor is an application that runs on your target hardware in conjunction with your application, and requires target resources (for example, memory, access to exception vectors, and timers) to be available.

The EmbeddedICE® debug architecture requires almost no resources. Rather than being an application on the board, it works by using:

- additional debug hardware within the processor, to enable the host to communicate with the target
- an external run control unit that buffers and translates the processor signals into something that is usable by a host computer.

The EmbeddedICE debug architecture enables debugging to be as non-intrusive as possible:

- the target being debugged requires very little special hardware to support debugging
- in most cases you do not have to set aside memory for debugging in the system being debugged and you do not have to incorporate special software into the application
- execution of the system being debugged is only halted when a breakpoint unit is triggered, or you request that execution is halted.

2.7.1 See also

Concepts

- *Debug extensions to the ARM processor* on page 2-7.

2.8 Introduction to the RealView ICE components

The following topics introduce the components of the RealView[®] ICE product, and describe how they fit together:

- *The RealView ICE run control unit* on page 2-10
- *The RealView ICE firmware* on page 2-15
- *The RealView ICE host software* on page 2-16.

2.8.1 See also

Concepts

- *About RealView ICE and RealView Trace* on page 2-2
- *Availability and compatibility* on page 2-5
- *Introduction to EmbeddedICE logic and debug extensions* on page 2-6.

Reference

Using the Debug Hardware Configuration Utilities:

- *Using Trace*, [../com.arm.doc.dui0498a/I999867.html](http://com.arm.doc.dui0498a/I999867.html)

2.9 The RealView ICE run control unit

The RealView[®] ICE run control unit provides the hardware to enable a computer to control multiple JTAG capable devices. The unit has ports at one end for connecting to the host computer and to a power source. These ports are shown in the following figure:

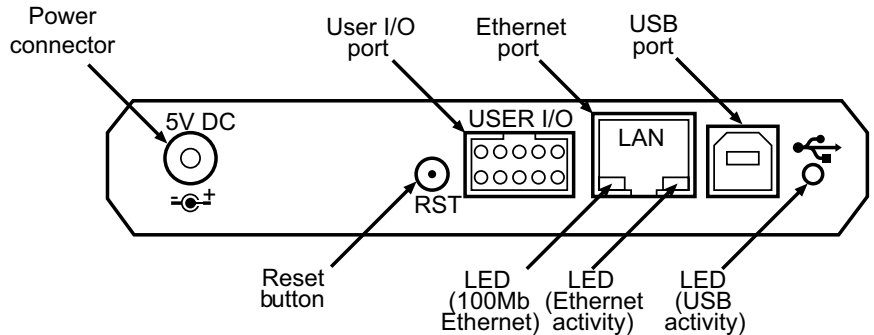


Figure 2-1 Ports for connecting to the host computer

The RST button is used to reset the RealView ICE unit when required, and returns RealView ICE to its power-up state. Using the RST button in this way does not reset the target. This button must not be confused with the Reset button that might be implemented on your target, located on the target board itself.

———— **Note** ————

When using v3.0 or later RVI hardware in conjunction with a v2 *Low Voltage Differential Signaling* (LVDS) probe, resetting RVI or power-cycling RVI does not cause a target reset. Any other hardware combination, however, might cause a target reset.

The LEDs at the bottom of the Ethernet port display information about Ethernet speed and activity:

- The green LED shows the Ethernet speed. When Off, it indicates a speed of 10Mbps, and when On indicates a speed of 100Mbps.
- The yellow LED indicates that activity is taking place.

The ports at the other end of the unit connect to the target hardware, and are shown in the following figure:

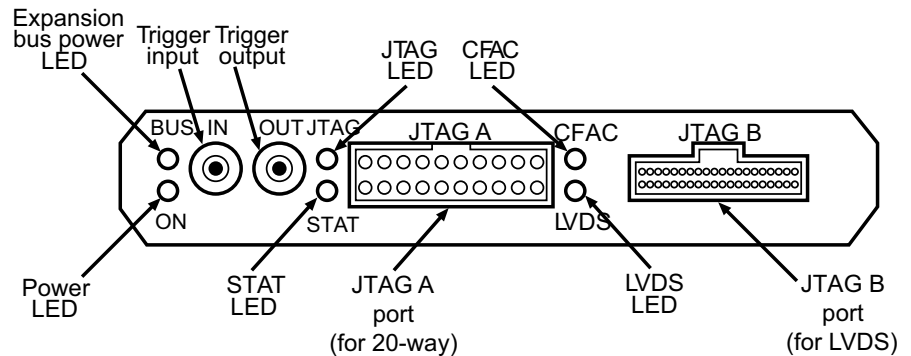


Figure 2-2 Ports for connecting to the target hardware

Cables are supplied to connect the run control unit to the host computer, and to the target hardware.

Note

RealView ICE does not currently support the Trigger input and Trigger output signals.

If the RealView ICE unit detects an internal hardware or software failure from which it cannot recover, the four LEDs JTAG, STAT, CFAC and LVDS flash continuously. You must reboot RealView ICE before you can continue using it. To do this, press the RST button.

During installation of an update or a patch, the CFAC LED lights up, denoting that *Compact Flash Activity* (CFAC) is taking place. While this is happening, you must not disconnect power from the run control unit, and must wait until this LED has extinguished. The CFAC LED also lights up when a debugger connects, and during *Dynamic Host Configuration Protocol* (DHCP) lease renewal.

The RealView ICE run control unit contains an internal cooling fan that operates to control the internal temperature when necessary. The ventilation panels on the top and bottom of the RealView ICE run control unit and the RealView Trace data capture unit must not be obscured.

2.9.1 See also**Tasks**

Using the Debug Hardware Configuration Utilities:

- *Installing a firmware update or patch, ../com.arm.doc.dui0498a/Ciaihbfg.html*

Concepts

- *RealView ICE hardware variants - end panel elements* on page 2-12
- *RealView ICE hardware variants - v2 LVDS probe* on page 2-13
- *The RealView ICE firmware* on page 2-15
- *The RealView ICE host software* on page 2-16.

Reference

Using the Debug Hardware Configuration Utilities:

- *Debugging with a target reset, ../com.arm.doc.dui0498a/CHDBIEFI.html*

2.10 RealView ICE hardware variants - end panel elements

Depending on the hardware unit that you are using, it is possible that the features of your unit might be different in appearance or functionality from those generally referred to. In units used with pre-RealView[®] ICE v3.0 software, the end panel elements of the unit for the host computer port connections are arranged as shown in the following figure:

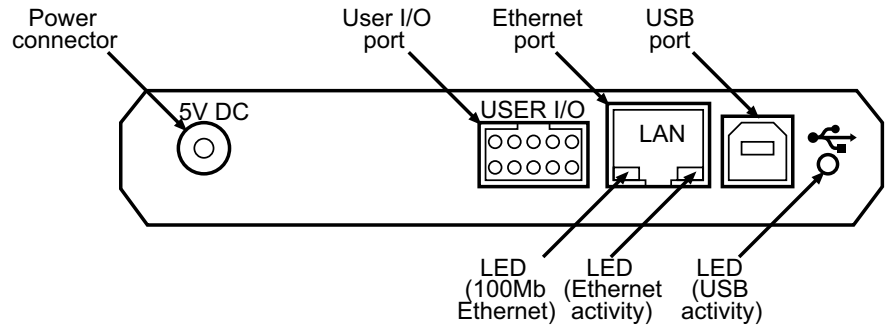


Figure 2-3 Pre-v3.0 host computer ports end panel

An example of the target hardware ports of the end panel of the unit is shown in the following figure:

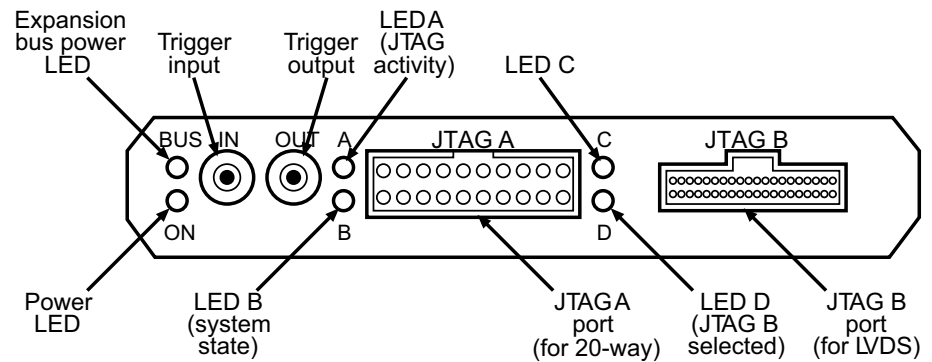


Figure 2-4 Target hardware ports end panel

2.10.1 See also

Concepts

- *The RealView ICE run control unit* on page 2-10.

2.11 RealView ICE hardware variants - v2 LVDS probe

The RealView[®] ICE hardware unit comprises a v2 *Low Voltage Differential Signaling* (LVDS) probe. The probe is visibly different by the presence of two colored LEDs that signify the status of the activity taking place.

The functionality of the v3.1 probe enables you to make a *Serial Wire Debug* (SWD) connection to the *Debug Access Port* (DAP).

The following figure shows the dimensions of the LVDS probe and its LED locations:

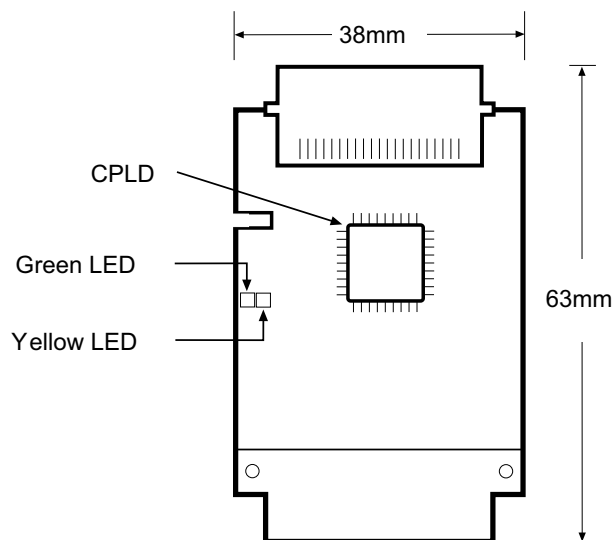


Figure 2-5 LVDS probe LEDs and dimensions

The following table provides a diagnostic means to determine the type of activity taking place, according to the permutations of the green and yellow LEDs:

Table 2-1 Diagnostic table

Green	Yellow	Power	CPLD OK	JTAG mode	SW Mode	JTAG Activity	SW Activity
Off	Off	No	N/A	N/A	N/A	N/A	N/A
Dim	Dim	Yes	No	N/A	N/A	N/A	N/A
On	On	Yes	Yes	N/A	N/A	N/A	N/A
Off	On	Yes	Yes	Yes	No	No	N/A
Flicker	On	Yes	Yes	Yes	No	Yes	N/A
On	Off	Yes	Yes	No	Yes	N/A	No
On	Flicker	Yes	Yes	No	Yes	N/A	Yes

RVI v4.0 supports the SWD debugging protocol as an alternative to JTAG. SWD can only be used with the LVDS probe, and without using the JTAG ribbon cable. The probe must be a v2 type as described, and you might have to upgrade its firmware.

As shown in the previous figure, compatible probes have two LEDs on their front left-hand side. At power-up, both LEDs are lit. If only the yellow LED is lit, you must upgrade the probe to make it SWD-capable.

In addition, if your probe does not appear to have a CPLD located as shown in the previous figure, it means that your probe is of the v1.5 type, and must be replaced if SWD-compatibility is required. To upgrade your probe to the v2 type, contact ARM® for more information.

SWD supports only a single DAP and not a chain of devices. The graphical representation of the target system changes to represent this when SWD is selected.

———— **Note** —————

The v2 LVDS probe is supplied as standard with RealView ICE v3.1 and later units. The probe can also be used with a RealView ICE v3.0 unit, if you update it with a firmware patch that provides support for the v3.1 probe.

2.11.1 See also

Reference

RealView ICE System and Interface Design Reference:

- *Serial Wire Debug*, ../com.arm.doc.dui0517a/yCHDBDBHI.html.

Using the Debug Hardware Configuration Utilities:

- *Installing a firmware update or patch*, ../com.arm.doc.dui0498a/Ciaihbfg.html
- *Upgrading an LVDS probe*, ../com.arm.doc.dui0498a/BABBHIAC.html

2.12 The RealView ICE firmware

The RealView® ICE firmware is located in the RealView ICE run control unit. It receives commands from the RealView ICE host software and translates them into JTAG accesses. The RealView ICE firmware contains specific sections of code for each ARM® processor. These are called templates.

You can update the RealView ICE firmware using the RealView ICE Update application in the following ways:

- for firmware fixes, you can obtain firmware patches from the ARM web site
- for firmware updates that add new functionality, such as additional templates, you must obtain a new CD that also contains updates to the host software

2.12.1 See also

Concepts

- *The RealView ICE run control unit* on page 2-10
- *The RealView ICE host software* on page 2-16.

Using the Debug Hardware Configuration Utilities:

- *Managing the firmware on your debug hardware unit,*
../com.arm.doc.dui0498a/Ciadfiba.html

Other information

- ARM patch downloads , <http://www.arm.com/support>

2.13 The RealView ICE host software

The RealView[®] ICE host software provides the interface between your debugger and the RealView ICE hardware that controls the JTAG devices. It translates debugger commands, such as start, stop, and download, into JTAG control sequences for a particular processor. The RealView ICE software provides support for debugging on a wide range of ARM[®] processors. To see a list of supported processors, open the RealView ICE Update application and expand the **JTAG Templates** and **ARM** trees. A list of templates for all supported processors is displayed.

The RealView ICE software can address each JTAG device individually, without affecting other devices on the board. It uses this ability to create virtual connections for each of the JTAG devices on the board. Your debugger can attach to one of these virtual connections, and perform debugging operations with no knowledge of the other devices on the board.

The RealView ICE software enables multiple concurrent connections. You can debug multiprocessor systems, and for more information see the documentation that accompanies your debugger. The software can also perform a synchronized start or stop of processors, for debugging multiprocessor systems where the processors interact with each other.

The RealView ICE software also supports connections across a network, so that you can run the debugging software on several different computers.

2.13.1 See also

Concepts

- *The RealView ICE run control unit* on page 2-10
- *The RealView ICE firmware* on page 2-15.

Using the Debug Hardware Configuration Utilities:

- *Managing the firmware on your debug hardware unit,*
[../com.arm.doc.dui0498a/Ciadfiba.html](http://com.arm.doc.dui0498a/Ciadfiba.html)

2.14 RealView Trace front panel components

In RealView® Trace, the layout of the RealView Trace front panel is as shown in the following figure:

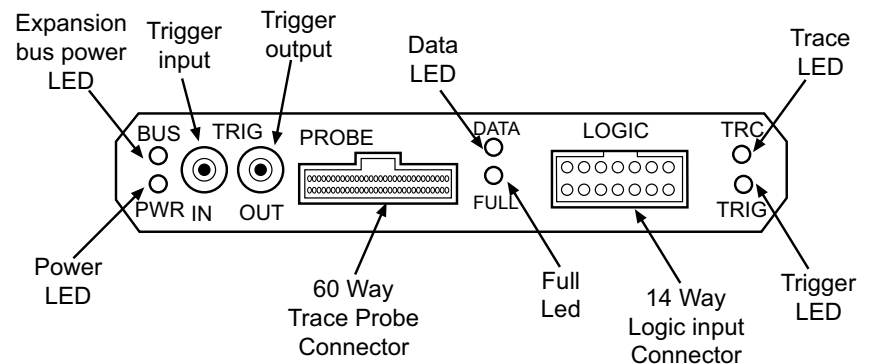


Figure 2-6 RealView Trace front panel layout for RVT

The components comprise LEDs and trace probe connectors.

———— **Note** ————

The Trigger input, Trigger output and Logic connectors are not currently supported by RealView ICE.

The LEDs on the front panel of the RealView Trace unit have the following functions:

- PWR** The PWR LED indicates that the RealView Trace unit is powered up. This is always lit when the unit is powered from its own external power supply. When RealView Trace is powered by RealView ICE, the Power LED is lit only when RealView ICE is initializing the RealView Trace unit.
- BUS** The BUS LED indicates module initialization and RealView ICE expansion bus power. It lights up when RealView ICE is initializing the RealView Trace unit, and remains lit while the RealView ICE expansion bus is powered. The BUS LED flashes on a module connected to RealView ICE through the expansion bus if an error is detected in trying either to identify the module or to provide power to it. Modules might require more power than RealView ICE can provide, in which case the module must be separately powered. If the module is separately powered and this LED flashes, it indicates a problem in identifying the module.
- DATA** The DATA LED indicates that the RealView Trace module has data in its buffer
- FULL** The FULL LED indicates that the RealView Trace module data buffer is full.
- TRC** The TRC LED indicates that the RealView Trace module has enabled the buffer for capture.
- TRIG** The TRIG LED indicates that the RealView Trace module has triggered.

2.14.1 See also

Reference

System and Interface Design Reference:

- *Trace signals* on page 5-2.

Other information

- ETMv1 and ETMv3 architecture pinouts,
<http://infocenter.arm.com/help/topic/com.arm.doc.ih0014->

2.15 RealView Trace 2 front panel components

In RealView® Trace 2, the layout of the RealView Trace 2 front panel is as shown in the following figure:

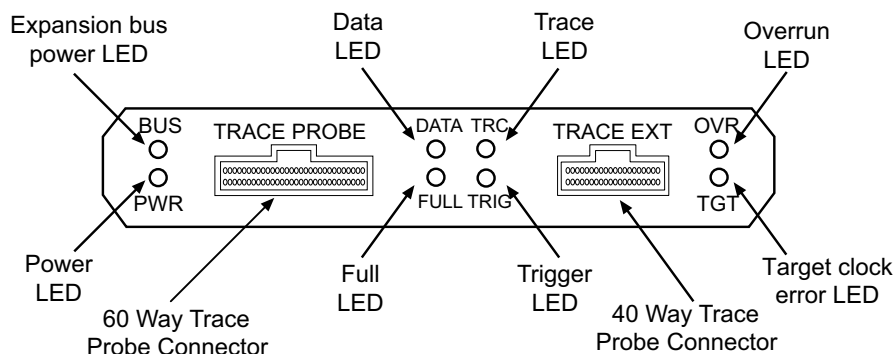


Figure 2-7 RealView Trace front panel layout for RVT 2

The components comprise LEDs and trace probe connectors.

The LEDs on the front panel of the RealView Trace 2 unit have the following functions:

- PWR** The PWR LED indicates that the RealView Trace 2 unit is powered up. This is always lit when the unit is powered from its own external power supply. When RealView Trace 2 is powered by RealView ICE, the Power LED is lit only when RealView ICE is initializing the RealView Trace 2 unit.
- BUS** The BUS LED indicates module initialization and RealView ICE expansion bus power. It lights up when RealView ICE is initializing the RealView Trace unit, and remains lit while the RealView ICE expansion bus is powered. The BUS LED flashes on a module connected to RealView ICE through the expansion bus if an error is detected in trying either to identify the module or to provide power to it. Modules might require more power than RealView ICE can provide, in which case the module must be separately powered. If the module is separately powered and this LED flashes, it indicates a problem in identifying the module.
- DATA** The DATA LED indicates that the RealView Trace 2 module has data in its buffer.
- FULL** The FULL LED indicates that the RealView Trace 2 module data buffer is full.
- TRC** The TRC LED indicates that the RealView Trace 2 module has enabled the buffer for capture.
- TRIG** The TRIG LED indicates that the RealView Trace 2 module has triggered.
- OVR** The OVR LED indicates that the streaming trace has overrun the available USB bandwidth. When this occurs, this LED flashes.
- TGT** The TGT LED indicates if there is a problem with the target. If the target present line is low, or if there is no clock, this LED flashes.

2.15.1 See also

Reference

System and Interface Design Reference:

- *Trace signals* on page 5-2.

Other information

- ETMv1 and ETMv3 architecture pinouts,
<http://infocenter.arm.com/help/topic/com.arm.doc.ih0014->

Chapter 3

System requirements for using RealView ICE and RealView Trace

The following topics describe the system requirements for RealView[®] ICE, and how to connect the RealView ICE hardware to your host computer and target system. The topics also describe how to use some common parts of the RealView ICE software:

- *Host software requirements* on page 3-2
- *Host hardware requirements* on page 3-3
- *Target hardware requirements* on page 3-4
- *Connecting the RealView ICE hardware* on page 3-5
- *Using nonstandard connectors* on page 3-8
- *Hot-plugging and unplugging the JTAG cable* on page 3-9
- *Connecting the RealView Trace hardware* on page 3-10
- *Using RealView ICE and RealView Trace* on page 3-14.

3.1 Host software requirements

RealView® ICE software for the host computer runs under the following operating systems:

- Windows XP Professional (Service Pack 2, or later)
- Windows Vista Business Edition and Windows Vista Enterprise Edition
- Red Hat Enterprise Linux 4 and Red Hat Enterprise Linux 5.

3.1.1 See also

Tasks

- *Connecting the RealView ICE hardware* on page 3-5.

Concepts

- *Host hardware requirements* on page 3-3
- *Target hardware requirements* on page 3-4
- *Using nonstandard connectors* on page 3-8
- *Hot-plugging and unplugging the JTAG cable* on page 3-9
- *Using RealView ICE and RealView Trace* on page 3-14.

3.2 Host hardware requirements

The minimum recommended hardware requirements for installing and running the RealView® ICE software on a host computer are defined here.

If you carry out a full installation of the software, you require up to 100MB of hard disk space.

To use the RealView ICE software on Windows, you require the following:

- a minimum specification PC with a 1GHz Pentium III class processor and 512MB of memory. The recommended specification is a Pentium 4 class machine with 1GB of memory.
- DVD-ROM drive (this can be a networked CD-ROM drive)
- an unused USB port, if direct connection to the run control unit is required
- a TCP/IP connection, if remote connection to the run control unit is required.

To use the RealView ICE software on Red Hat Linux, you require the following:

- a minimum specification PC with a 1GHz Pentium III class processor and 512MB of memory. The recommended specification is a Pentium 4 class machine with 1GB of memory.
- DVD-ROM drive (this can be a networked CD-ROM drive)
- an unused USB port, if direct connection to the run control unit is required
- a TCP/IP connection, if remote connection to the run control unit is required.

3.2.1 See also

Tasks

- *Connecting the RealView ICE hardware* on page 3-5.

Concepts

- *Host software requirements* on page 3-2
- *Target hardware requirements* on page 3-4
- *Using nonstandard connectors* on page 3-8
- *Hot-plugging and unplugging the JTAG cable* on page 3-9
- *Using RealView ICE and RealView Trace* on page 3-14.

3.3 Target hardware requirements

RealView® ICE has the following target hardware requirements:

- A device interface conforming to the IEEE Std. 1149.1-2001 (JTAG) specification.
- Electronic signals available to the interface, and within the limits of design-specific current and voltage ranges.
- One of the following *Insulation Displacement Connector* (IDC) box headers on the target hardware:
 - a 20-way header that conforms to the current ARM® JTAG connection standard
 - a 14-way header that conforms to the previous ARM JTAG connection standard (as used by the ARM EmbeddedICE® run control unit)
 - a 14-way TI adaptor.

To use any other connectors, you must construct an appropriate adaptor or cable yourself.
- A maximum cable length between the target hardware and the RealView ICE unit of:
 - 30cm if you are using a 20-way ribbon cable
 - 3m if you are using a 40-way ribbon cable with the supplied *Low Voltage Differential Signaling* (LVDS) probe.
- One or more ARM architecture CPUs that has supporting debug logic linked into a scan chain or behind a *Debug Access Port* (DAP). This includes most ARM7, ARM9, ARM10 and ARM11 processor families. It does not include the StrongARM® and XScale processors.

You can use the RealView ICE Update application to find out which processors are supported by the version of RealView ICE that you are using. To do this, start the RealView ICE Update application and select **Version Info...** from the **RVI** menu.

3.3.1 See also

Tasks

- *Connecting the RealView ICE hardware* on page 3-5.

Concepts

- *Host software requirements* on page 3-2
- *Host hardware requirements* on page 3-3
- *Using nonstandard connectors* on page 3-8
- *Hot-plugging and unplugging the JTAG cable* on page 3-9
- *Using RealView ICE and RealView Trace* on page 3-14.

Reference

RealView ICE and RealView Trace System and Interface Design Reference:

- Chapter 2 *System Design Guidelines*
- Chapter 3 *JTAG Interface Connections*.

3.4 Connecting the RealView ICE hardware

The procedures described in this topic provide information on how to set up the hardware for the RealView[®] ICE unit.

3.4.1 Prerequisites

Before setting up the RealView ICE hardware, ensure that you have all the relevant items that comprise the RealView ICE product kit.

You must also provide the following items:

- a host computer that conforms to the host software and hardware requirements.
- some target hardware containing a JTAG-capable device supported by RealView ICE.

3.4.2 Procedure

To connect the RealView ICE run control unit to your host computer and to the target hardware:

1. Ensure the RealView ICE software is installed on the host computer.
2. Connect the host computer to the RealView ICE run control unit, using either the USB port or an Ethernet connection, as required. The following figure shows connections using both the USB and Ethernet cables, and the JTAG 20-way ribbon cable:

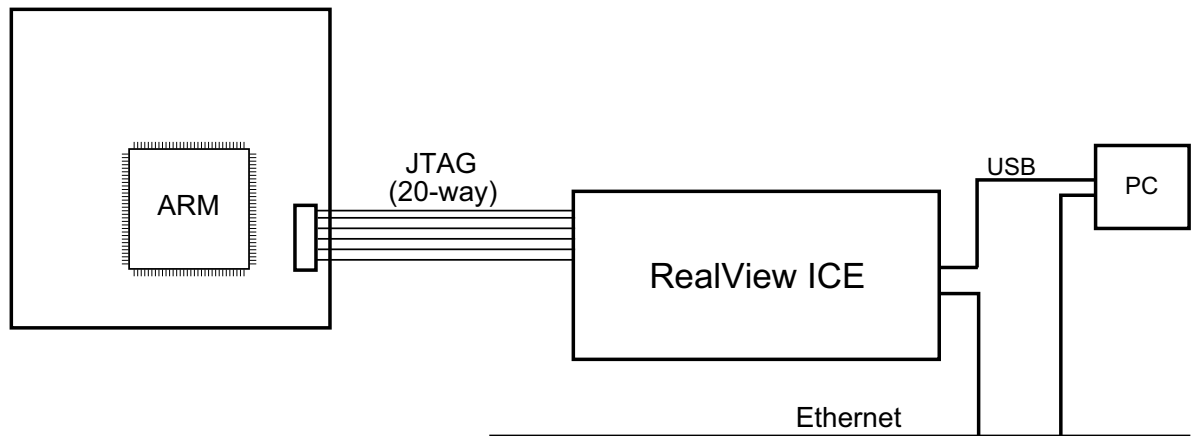


Figure 3-1 Connecting the RealView ICE hardware

Connect the host computer to the RealView ICE run control unit as shown in the figure above, using either the USB port or an Ethernet connection, as required:

- If you are connecting using the USB port, connect one end of the supplied USB cable to a USB port on the host computer, and the other end of the cable to the USB port on the run control unit.

———— **Note** ————

The USB drivers are installed with the RealView ICE host software.

- If you are connecting across an Ethernet network, connect the Ethernet port of the run control unit to a socket for the Ethernet network using the supplied RJ-45 Ethernet cable.
- If you are using the cross-over cable, connect one end of the cross-over cable to the Ethernet port of the host computer, and the other end to the Ethernet port of the run control unit.

3. Connect the RealView ICE run control unit to the target hardware, using the appropriate cable:
 - If you want to use the highest JTAG clock speeds, or if you cannot position the run control unit close to the target hardware, use the *Low Voltage Differential Signaling* (LVDS) cable and probe:
 - connect one end of the supplied LVDS cable to the 40-way connector on the probe
 - connect the other end of the LVDS cable to the 40-way *JTAG B* socket on the RealView ICE run control unit.
 - plug the supplied LVDS probe into the 20-way JTAG header on the target hardware

———— **Note** ————

Cable selection is performed when the RealView ICE run control unit boots. If you change the cable, you must reboot the unit.

- Otherwise, use the JTAG cable:
 - connect one end of the supplied JTAG cable to the 20-way JTAG header on the target hardware
 - connect the other end of the cable to the 20-way *JTAG A* socket on the RealView ICE run control unit.

The *Insulation Displacement Connector* (IDC) connectors used for these cables are keyed using a small protrusion that must be matched up with a slot in the header or socket.

4. Power up the target hardware.
5. Connect the external power supply to the RealView ICE run control unit, and to the mains electricity.
6. Switch on the power supply. The power LED and the expansion bus power LED both switch on.
7. The RealView ICE run control unit firmware is based on an embedded Linux kernel. Therefore, the unit takes a short time to boot up and establish either a network or USB connection. When the unit is booting:
 - The *Compact Flash Activity* (CFAC) LED lights up, and the STAT LED flashes. As the RealView ICE run control unit boots, the STAT LED flash rate increases.
 - The unit detects which JTAG socket has a cable attached:
 - If RealView ICE detects that the LVDS cable and probe are connected to JTAG B socket, it uses them. It also switches on the LVDS LED.
 - If RealView ICE detects that a JTAG cable is connected to the JTAG A socket, the LVDS LED remains unlit.
 - When the STAT LED is permanently On, the RealView ICE run control unit has finished booting, and is ready to use.
8. If your RealView ICE unit is connected to a network, you must now run the RVI Config IP application to configure the network settings.

———— **Note** ————

You have only to do the network configuration once.

If the RealView ICE unit is powered up with only a USB connection, it uses an IP address of 127.0.0.0. However, if a network cable is also attached, the IP address associated with the USB connection is the IP address that you have assigned to the RealView ICE unit, or that it obtains from a *Dynamic Host Configuration Protocol* (DHCP) server.

———— **Warning** ————

Do not obstruct the ventilation grills on the top and bottom of the RealView ICE unit, because doing so causes the unit to overheat.

3.4.3 See also

Concepts

- *RealView ICE product contents* on page 2-3
- *Host software requirements* on page 3-2
- *Host hardware requirements* on page 3-3
- *Target hardware requirements* on page 3-4
- *Using nonstandard connectors* on page 3-8
- *Hot-plugging and unplugging the JTAG cable* on page 3-9
- *Using RealView ICE and RealView Trace* on page 3-14.

3.5 Using nonstandard connectors

RealView[®] ICE is supplied with cables that each terminate in a 20-way *Insulation Displacement Connector* (IDC) connector, wired to the current ARM[®] JTAG connection standard. Box headers suitable for this connector are fitted on all current ARM target hardware, and on several third-party targets.

Some target hardware is fitted instead with a 14-way IDC box header:

- Older ARM target hardware uses the previous ARM JTAG connection standard (as used by EmbeddedICE[®]). This is signal-compatible with the current ARM standard. Use the supplied adaptor card to connect to these targets.
- Some other targets instead use the *Texas Instruments* (TI) JTAG connection standard, which has a different signal assignment to the ARM standards. This adaptor enables RealView ICE to connect to these targets, and is provided.

Caution

If you use the wrong 20-way to 14-way adaptor, you might damage the target hardware.

If you are not certain of the connection standard that your target hardware uses, you *must* check the reference manual for the target *before* you connect it to the RealView ICE run control unit. This is especially important if you are using a target that has a 14-way IDC box header, or that is not manufactured by ARM.

If the target that you are using does not use an ARM style connector, or if you are designing target hardware, contact ARM for more information.

3.5.1 See also

Tasks

- *Connecting the RealView ICE hardware* on page 3-5.

Concepts

- *Host software requirements* on page 3-2
- *Host hardware requirements* on page 3-3
- *Target hardware requirements* on page 3-4
- *Hot-plugging and unplugging the JTAG cable* on page 3-9
- *Using RealView ICE and RealView Trace* on page 3-14.

Reference

RealView ICE and RealView Trace System and Interface Design Reference:

- Chapter 3 *JTAG Interface Connections*.

Using the Debug Hardware Configuration Utilities:

- *Debugging with a target reset*, ../com.arm.doc.dui0498a/CHDBIEFI.html

3.6 Hot-plugging and unplugging the JTAG cable

You can plug and unplug the JTAG cable without affecting the target. This is because the RealView® ICE run control unit includes power conditioning and switching circuitry.

You might want to do this if you have a target that is operating without a RealView ICE run control unit connected and you want to examine the target to find out why it is behaving in a particular way. To do this, you must power up the RealView ICE run control unit and configure the connection without disturbing the state of the target. This requires that the RealView ICE run control unit is powered before it is connected to the target.

When unplugging the JTAG connector, you must be aware of the following:

- If you are using an RTCK system, make sure that no communication is taking place between the system and the RealView ICE run control unit. Otherwise, if the RealView ICE unit is waiting for a return clock, it might lock up. In this case, you must power down the RealView ICE unit, and power it back up again.
- If you are not using an RTCK system, the RealView ICE software can handle this situation. However, you must arrange to do a TAP reset using the debugger when you next plug the RealView ICE unit into a target.

3.6.1 See also

Tasks

- *Connecting the RealView ICE hardware* on page 3-5.

Concepts

- *Host software requirements* on page 3-2
- *Host hardware requirements* on page 3-3
- *Target hardware requirements* on page 3-4
- *Using nonstandard connectors* on page 3-8
- *Using RealView ICE and RealView Trace* on page 3-14.

Reference

Using the Debug Hardware Configuration Utilities:

- *Using Trace*, ../com.arm.doc.dui0498a/I999867.html
- *Advanced configuration*, ../com.arm.doc.dui0498a/CIHGABDH.html

3.7 Connecting the RealView Trace hardware

The procedures described in this topic provide information on how to set up the hardware for RealView® Trace.

3.7.1 Prerequisites

To set up the hardware, ensure that you are in possession of all the relevant items from the RealView Trace product kit.

When considering your system requirements, you must also provide some target hardware containing a device supported by RealView Trace.

3.7.2 Connection instructions

Before updating the software, you must connect up the RealView ICE and RealView Trace hardware. To do this:

1. Ensure that the RealView ICE unit is disconnected from the power supply and from the target board.

———— **Warning** ————

Failure to remove the power from the RealView ICE unit before connecting it to the RealView Trace unit can cause damage to the hardware and/or personal injury.

2. Remove the plastic ventilation grill from the top of the RealView ICE unit by unclipping it.
3. Screw the four 16mm plastic spacers onto the four 8mm plastic spacers exposed inside the RealView ICE unit, as shown in the following figure.

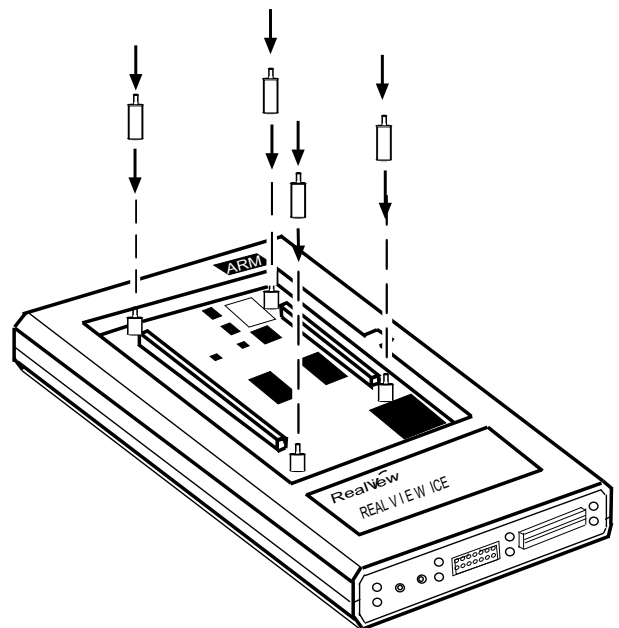


Figure 3-2 Positioning of 16mm plastic spacers

4. Using the four lengthened threaded inserts as guides, plug the RealView Trace unit into the RealView ICE unit. Apply downward pressure directly above the two connectors to ensure a positive fit.

5. Screw the four 8mm plastic spacers onto the four threaded inserts exposed through the PCB inside the RealView Trace unit. This fastens the two units together, making the assembly safe for transportation. The following figure shows a profile view of the connected units.

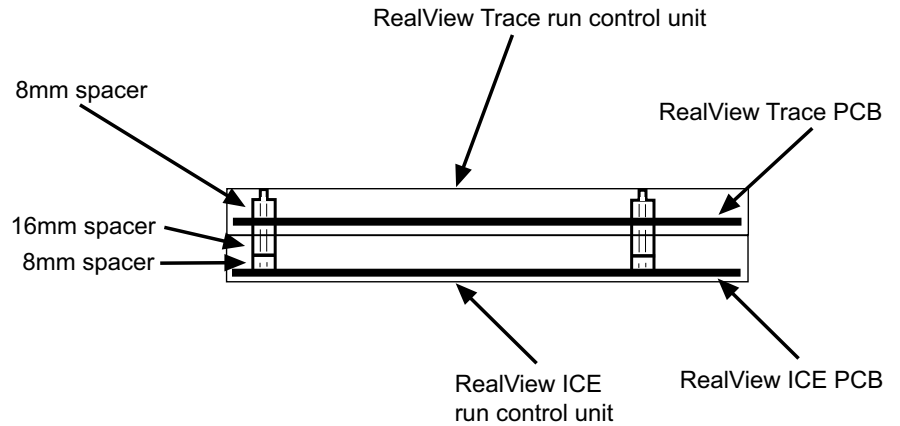


Figure 3-3 Profile view of connected units

6. Clip the plastic ventilation grill that you removed from the RealView ICE unit onto the top of the RealView Trace unit.
7. For up to 16-bit trace port widths, connect one end of the interface cable to the 60-way trace probe connector of the RealView Trace unit, and the other end of the cable to the trace probe.

Connect one end of the JTAG cable or *Low Voltage Differential Signaling* (LVDS) probe to the respective JTAG socket on the RealView ICE run control unit. Connect the other end to the 20-way JTAG header on the target hardware. The following figure shows a typical system for RealView Trace.

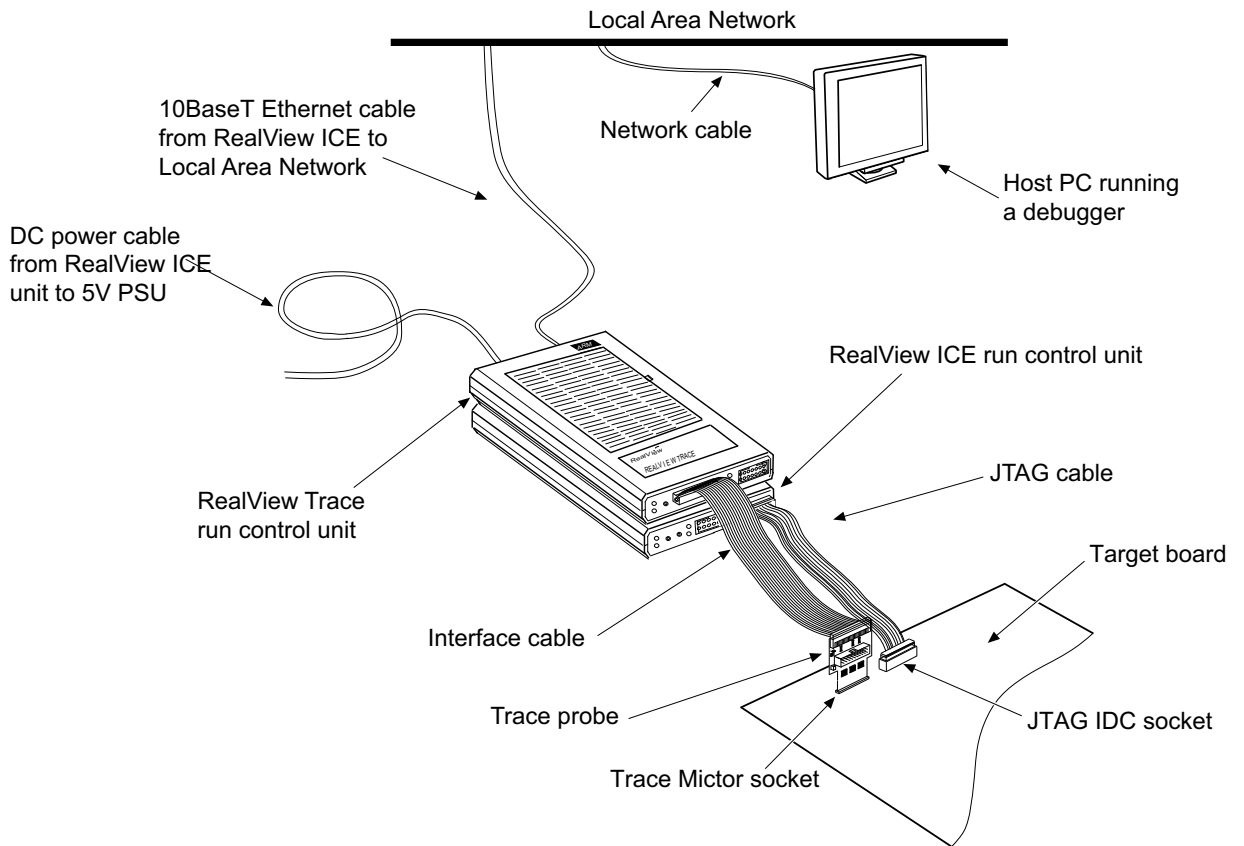


Figure 3-4 RealView Trace connections using an Ethernet cable

If your target board does not have separate trace and RealView ICE sockets, use the RealView ICE socket on the trace probe as shown in the following figure.

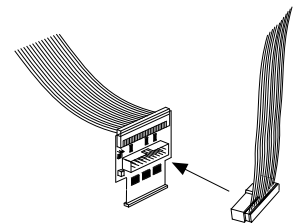


Figure 3-5 RealView ICE connector on probe

Plug the trace probe into the trace connector on the target board.

32-bit trace port widths are supported by RealView Trace 2. Connect the split-ribbon cable to the 40- and 60-way trace probe connectors on the RealView Trace unit, and connect the other end of the cable to the 32-bit dual-Mictor probe.

Plug the dual-Mictor probe into the vertical plug-in trace connector on the target board. See the following figure.

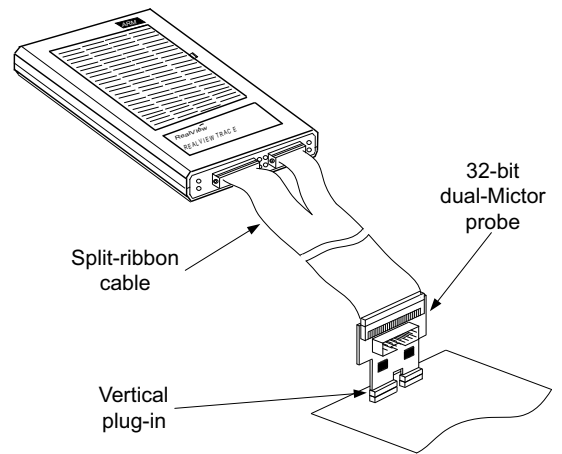


Figure 3-6 RealView Trace 2 run control unit connections

Extender cables can be used if necessary, for example when using dual-Mictor trace probes.

8. Connect the RealView ICE unit to a network shared by a PC running a debugger.
9. Power up the RealView ICE unit and the target board. The RealView Trace unit is powered from the RealView ICE unit, and does not require a separate power supply.

———— **Warning** ————

Do not obstruct the ventilation grills on the top of the RealView Trace unit or the bottom of the RealView ICE unit, because doing so causes the units to overheat.

———— **Note** ————

You can also use the following alternative connections:

- use a USB cable to connect the RealView ICE run control unit directly to your host workstation
- connect one end of the JTAG cable or LVDS probe to the trace probe JTAG socket.

3.7.3 See also

Concepts

- *RealView Trace and RealView Trace 2 product contents* on page 2-4

Reference

RealView ICE and RealView Trace System and Interface Design Reference:

- *Dual-Mictor trace probe for RealView Trace 2* on page 6-9
- *Dual-Mictor trace probe characteristics* on page 6-11.

Using the Debug Hardware Configuration Utilities:

- *Using Trace*, [../com.arm.doc.dui0498a/1999867.html](http://com.arm.doc.dui0498a/1999867.html)

3.8 Using RealView ICE and RealView Trace

After connecting RealView[®] ICE to your host computer, you are ready to begin using RealView ICE (and RealView Trace if present) with your debugger. See the documentation that accompanies your debugger for information.

When you install the RealView ICE software, it adds capabilities to your debugger to enable you to configure a RealView ICE connection using the RVConfig utility.

If you have to update the RealView ICE firmware at a later date, for example to extend the capabilities of the RealView ICE unit, you must use the RVI Update utility.

3.8.1 See also

Tasks

- *Connecting the RealView ICE hardware* on page 3-5
- *Connecting the RealView Trace hardware* on page 3-10.

Concepts

- *Host software requirements* on page 3-2
- *Host hardware requirements* on page 3-3
- *Target hardware requirements* on page 3-4
- *Using nonstandard connectors* on page 3-8
- *Hot-plugging and unplugging the JTAG cable* on page 3-9.

Reference

Using the Debug Hardware Configuration Utilities:

- *Managing the firmware on your debug hardware unit*, [../com.arm.doc.dui0498a/Ciadfiba.html](http://com.arm.doc.dui0498a/Ciadfiba.html)
- *Creating debug hardware target configurations*, [../com.arm.doc.dui0498a/Cegfeehb.html](http://com.arm.doc.dui0498a/Cegfeehb.html)
- *Using Trace*, [../com.arm.doc.dui0498a/I999867.html](http://com.arm.doc.dui0498a/I999867.html)

Other information

- Patch downloads , <http://www.arm.com/support>