Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

ARM® DSTREAM™

Setting up the Hardware

ARM DSTREAM
Setting up the Hardware

Copyright © 2010 ARM. All rights reserved.

Release Information

The following changes have been made to this book.

Change history

Date	Issue	Confidentiality	Change
May 2010	A	Non-Confidential	First release.
November 2010	B	Non-Confidential	Second release.

Proprietary Notice

Words and logos marked with ® or ™ are registered trademarks or trademarks of ARM® in the EU and other countries, except as otherwise stated below in this proprietary notice. Other brands and names mentioned herein may be the trademarks of their respective owners.

Neither the whole nor any part of the information contained in, or the product described in, this document may be adapted or reproduced in any material form except with the prior written permission of the copyright holder.

The product described in this document is subject to continuous developments and improvements. All particulars of the product and its use contained in this document are given by ARM in good faith. However, all warranties implied or expressed, including but not limited to implied warranties of merchantability, or fitness for purpose, are excluded.

This document is intended only to assist the reader in the use of the product. ARM shall not be liable for any loss or damage arising from the use of any information in this document, or any error or omission in such information, or any incorrect use of the product.

Where the term ARM is used it means "ARM or any of its subsidiaries as appropriate".

This product includes software developed by the Apache Software Foundation (see `http://www.apache.org`).

Confidentiality Status

This document is Non-Confidential. The right to use, copy and disclose this document may be subject to license restrictions in accordance with the terms of the agreement entered into by ARM and the party that ARM delivered this document to.

Product Status

The information in this document is final, that is for a developed product.

Web Address

`http://www.arm.com`

Conformance Notices

This section contains conformance notices.

Federal Communications Commission Notice

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

Class A

Important: This is a Class A device. In residential areas, this device may cause radio interference. The user should take the necessary precautions, if appropriate.

CE Declaration of Conformity

$\mathsf{C}\,\mathsf{E}$

The system should be powered down when not in use.

It is recommended that ESD precautions be taken when handling DSTREAM, RVI, and RVT equipment.

The DSTREAM, RVI, and RVT 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.

Contents
ARM DSTREAM Setting up the Hardware

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.

<u>mono</u>space 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 0481B

- 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.

ARM also welcomes general suggestions for additions and improvements.

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`

- ARM Support and Maintenance, `http://www.arm.com/support/services/support-maintenance.php`.

Chapter 2
Introduction to ARM DSTREAM

The following topics introduce ARM® DSTREAM™, and describe the software components:

2.1 About DSTREAM

DSTREAM is a debug and trace hardware unit that enables powerful software debug and optimization on any ARM processor-based hardware target. It enables you to connect a software debugger to an ARM processor-based target using a hardware interface such as JTAG or *Serial Wire Debug* (SWD). It also enables the collection of trace from the device for non-intrusive debug and code optimization.

——— **Note** ———

Some debuggers are unable to capture trace from the external trace port of a *System-on-Chip* (SoC) device. See the documentation that accompanies your debugger for details of the trace capabilities of your debugger.

2.1.1 See also

Concepts
- *DSTREAM product contents* on page 2-3
- *DSTREAM availability and compatibility* on page 2-4
- *The DSTREAM unit* on page 2-5
- *The DSTREAM probe* on page 2-8
- *The DSTREAM firmware* on page 2-10
- *The debug host software* on page 2-11.

Reference

ARM® DSTREAM™ and RVT™ Using the Debug Hardware Configuration Utilities:
- *Using Trace*, `../com.arm.doc.dui0498b/I999867.html`.

2.2 DSTREAM product contents

The DSTREAM product consists of:

- A DSTREAM unit.
- A DSTREAM probe.
- Mains cables and a power supply that powers the DSTREAM unit.
- An Ethernet cable.
- A USB cable.
- Probe cables:
  - a 100-way probe cable
  - an ARM/TI JTAG 14-way ribbon cable
  - an ARM JTAG 20-way ribbon cable
  - a Mictor 38 cable
  - a MIPI 34-way ribbon cable
  - a CoreSight 10-way ribbon cable
  - a CoreSight 20-way ribbon cable.
- Documentation, including a Quick Start Guide.

2.2.1 See also

Concepts
- *About DSTREAM* on page 2-2
- *DSTREAM availability and compatibility* on page 2-4
- *The DSTREAM unit* on page 2-5
- *The DSTREAM probe* on page 2-8
- *The DSTREAM firmware* on page 2-10
- *The debug host software* on page 2-11.

2.3 DSTREAM availability and compatibility

DSTREAM is available from ARM and its resellers.

Contact ARM directly regarding OEM licenses.

See the documentation for your ARM debug tools to determine the compatibility with DSTREAM.

DSTREAM provides:

- The ability to access the target.

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

2.3.1 See also

Concepts
- *About DSTREAM* on page 2-2.

2.4 The DSTREAM unit

The DSTREAM unit provides the hardware interface to enable a software debugger to control and trace multiple devices. The unit has ports at the rear for connecting to the host computer and to a power source. These ports are shown in the following figure.
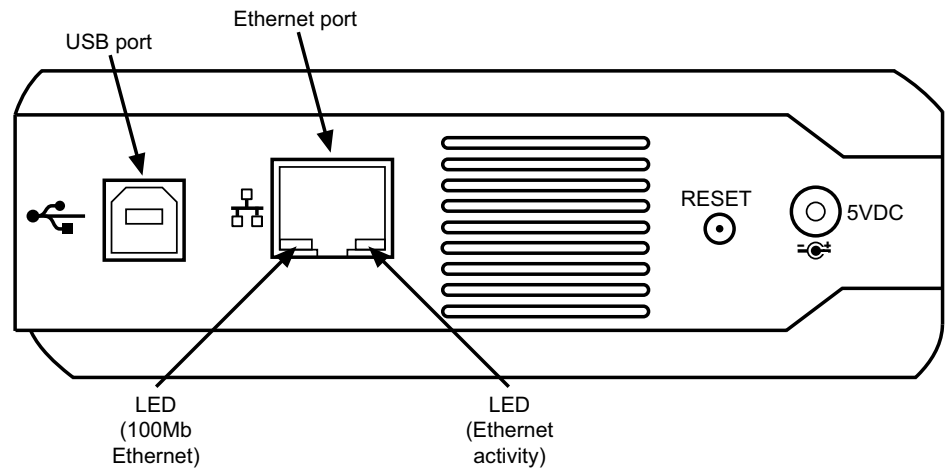

Figure 2-1 Rear of DSTREAM unit

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 RESET button is used to reset the DSTREAM unit when required:

*   Press and hold the RESET button until the STATUS LED starts to flash green rapidly. If you release the RESET button at this point, a normal reboot occurs.

*   If you continue to hold the RESET button for 10 seconds more, the STATUS LED flashes red rapidly. When you release the RESET button after this point, DSTREAM reboots and enters a recovery mode, which enables you to update firmware.

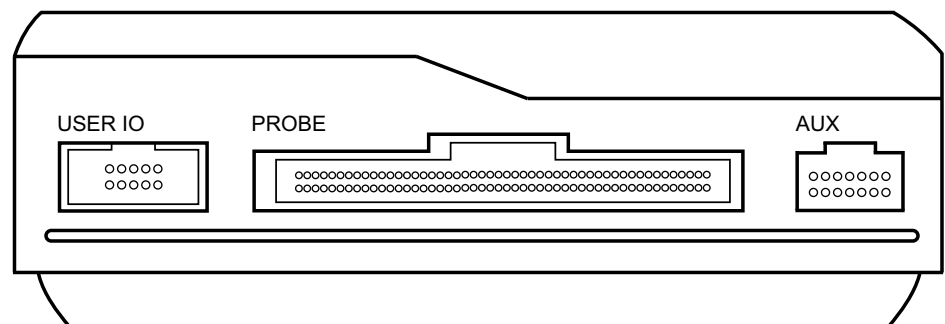The ports at the front of the unit are shown in the following figure.

Figure 2-2 Front of DSTREAM unit

The AUX port is included for future enhancement of the product.

Ethernet, USB and probe cables are supplied to connect the DSTREAM unit to the host computer, and to the target hardware.

The following figure shows the location and name of each of the indicator LEDs.
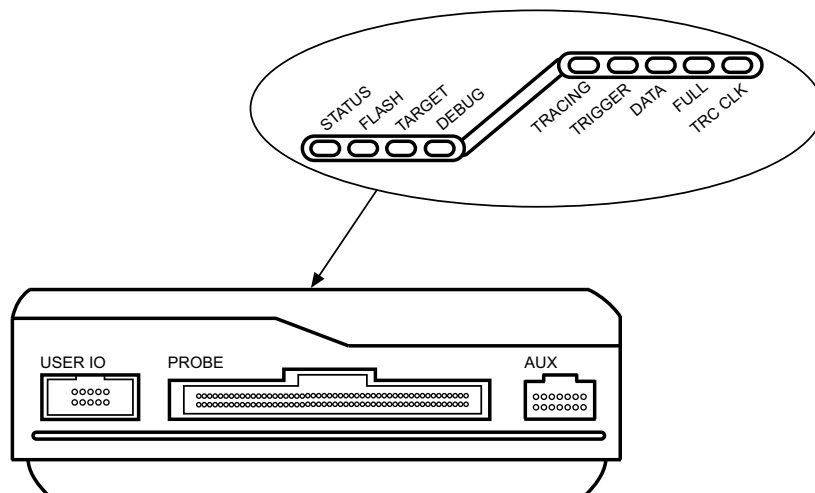

Figure 2-3 Indicator LEDs

When you power-up the DSTREAM unit, the DSTREAM logo on the top of the unit illuminates and the STATUS LED begins to flash. The STATUS LED remains illuminated to show that DSTREAM is in its ready state.

The DSTREAM logo flashes for five seconds when you use the **Identify** tool.

The LEDs representing the DSTREAM debug feature have the following functions:

STATUS   The STATUS LED illuminates as continuous red if a critical error is detected. You must reboot DSTREAM before you can continue using it. To do this, press and hold the RESET button for approximately three seconds, then the STATUS LED turns off.

FLASH   The FLASH LED illuminates green to denote that the unit is accessing its internal flash storage.

TARGET   The TARGET LED illuminates when a target VTref is detected using the probe.

DEBUG   The DEBUG LED illuminates green when debug data transfer is taking place.

The LEDs representing the DSTREAM trace feature have the following functions:

TRACING   The TRACING LED indicates that tracing is in progress.

TRIGGER   The TRIGGER LED indicates that a trigger is detected.

DATA   The DATA LED indicates that there is valid data in the data buffer.

FULL   The FULL LED illuminates when a sufficient amount of trace data has been captured to fill the defined buffer size. The buffer then wraps, and continues to capture trace data, overwriting the original trace data captured.

TRC CLK   If green, the TRC CLK LED indicates that a valid trace clock is detected. If red, the TRC CLK LED indicates that there is a problem with the trace clock.

The DSTREAM unit contains an internal cooling fan that operates to control the internal temperature when necessary. Do not obscure the ventilation panels on the front and back of the DSTREAM unit.

2.4.1   See also

Tasks

- *DSTREAM recovery mode* on page 2-13.

ARM® DSTREAM™ and RVT™ Using the Debug Hardware Configuration Utilities:

- *Installing a firmware update or patch*, `../com.arm.doc.dui0498b/Ciaihbfg.html`.

Concepts

- *The DSTREAM probe* on page 2-8
- *The DSTREAM firmware* on page 2-10
- *The debug host software* on page 2-11
- *Troubleshooting your DSTREAM unit* on page 2-12
- *Tracing with DSTREAM* on page 3-6.

Reference

ARM® DSTREAM™ and RVT™ Using the Debug Hardware Configuration Utilities:

- *Debugging with a target reset*, `../com.arm.doc.dui0498b/CHDBIEFI.html`.

2.5 The DSTREAM probe

The DSTREAM probe unit allows DSTREAM to interface with all commonly-used debug and trace interfaces provided on a target. It connects to the main DSTREAM unit by a 100mm high-density ribbon cable. An optional 2m cable is available. When connecting to the target, select the appropriate connectors on the probe to match the connectors on the target. Cables for each of these connectors are supplied with DSTREAM. At any one time, use only the cables that are to be connected to the probe unit for the current debug trace session. The available connectors are:

ARM JTAG 14

> This is an older ARM connector standard which is now rarely used.

TI JTAG 14 This is a Texas Instruments connector standard used by most TI-based target boards.

ARM JTAG 20

> This is the most commonly-used debug connector standard for ARM-based target boards.

MICTOR 38

> This is the most commonly-used trace connector standard for ARM-based target boards. It can also incorporate all the debug signals if they use the same voltage domain.

MIPI 34 This is a MIPI connector standard that supports debug and trace signals. It has two **VTref** signals, allowing debug and trace signals to use different voltage domains.

CORESIGHT 10/20

> These are high-density connectors that support the 10-way and 20-way CoreSight standards in addition to a subset of the MIPI debug connection standards.

See the following figure.
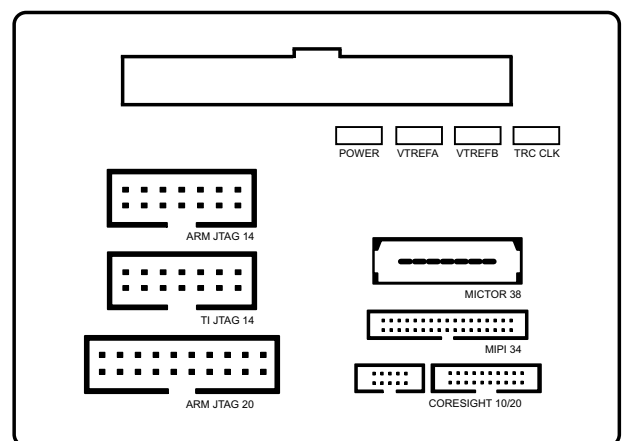
Figure 2-4 DSTREAM probe

2.5.1 See also

Concepts

- *The debug host software* on page 2-11
- *Troubleshooting your DSTREAM unit* on page 2-12.

Reference

ARM® DSTREAM™ System and Interface Design Reference:

- *Target connectors supported by DSTREAM* on page 3-10.

2.6   The DSTREAM firmware

The DSTREAM firmware is located in the DSTREAM unit. It receives commands from the debugger and translates them into debug operations. The DSTREAM firmware contains specific sections of code for each ARM processor. These are called templates.

You can update the DSTREAM firmware using the installed Update utility. DSTREAM firmware updates are supplied with all ARM software development tools. You must ensure that you align the firmware updates with the same version used by the tools.

2.6.1   See also

Concepts
*   *The DSTREAM unit* on page 2-5
*   *The DSTREAM probe* on page 2-8
*   *The debug host software* on page 2-11.

ARM® DSTREAM™ and RVI™ Using the Debug Hardware Configuration Utilities:

*   *Managing the firmware on your debug hardware unit*,
    `../com.arm.doc.dui0498b/Ciadfiba.html`.

2.7 The debug host software

The debug host software provides the interface between your debugger and the DSTREAM hardware that controls the target devices. It translates debugger commands, such as start, stop, and download, into control sequences for a particular processor. The debug software provides support for debugging on a wide range of ARM processors. To see a list of supported processors, open the installed Update utility, connect to your debug hardware, and expand the **Templates** tree and sub-trees. A list of templates for all supported processors is displayed.

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

The debug hardware and software supports multiple concurrent connections from single or multiple clients. You can debug or control multicore systems from a single client debugger or you can debug or control distinct devices in the system from separate client debuggers. Depending on the system, the software can also perform a synchronized start or stop of processors. For more information on the capabilities of multicore debug and synchronization, see the documentation that accompanies your debugger.

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

2.7.1 See also

Concepts
- *The DSTREAM unit* on page 2-5
- *The DSTREAM probe* on page 2-8
- *The DSTREAM firmware* on page 2-10.

ARM® DSTREAM™ and RVI™ Using the Debug Hardware Configuration Utilities:

- *Managing the firmware on your debug hardware unit*, `../com.arm.doc.dui0498b/Ciadfiba.html`.

2.8 Troubleshooting your DSTREAM unit

If you encounter problems when using your DSTREAM unit, confirm that your DSTREAM unit is booting properly.

The power-on sequence is:

1. The DSTREAM backlight illuminates blue.

2. The FLASH LED flashes as accesses take place.

3. The STATUS LED flashes green and then stays illuminated, and the blue power LED on the DSTREAM probe illuminates.

4. If the target is connected and powered, the TARGET LED illuminates green, and the appropriate VTREF LED on the DSTREAM probe illuminates.

The unit has now booted.

Errors are indicated as follows:

- If the STATUS LED flashes red, it signifies that a boot failure has occurred.

- If the *Dynamic Host Configuration Protocol* (DHCP) LED illuminates red when an Ethernet cable is connected and the link light on the Ethernet socket illuminates, it signifies that the unit has failed to obtain an IP address.

——— **Note** ———
The DHCP LED is accessible via the access panel on the underside of the unit.

2.8.1 See also

Tasks
- *DSTREAM recovery mode* on page 2-13.

Concepts
- *The DSTREAM unit* on page 2-5
- *The DSTREAM probe* on page 2-8.

2.9   DSTREAM recovery mode

To restore a DSTREAM unit that fails to boot:

1.   Press and hold the reset button on the DSTREAM unit for approximately 10 seconds.

2.   When the STATUS LED flashes red, release the button. The unit is now in recovery mode, and the STATUS LED flashes alternately red and green.

3.   Use the installed Update utility to install a working firmware. The unit then reboots into normal mode.

——— **Note** ———

While in recovery mode, debug and trace operations are not enabled. You must perform a firmware update to restore full functionality.

2.9.1   See also

Concepts
*   *The DSTREAM unit* on page 2-5
*   *The DSTREAM probe* on page 2-8
*   *Troubleshooting your DSTREAM unit* on page 2-12.

ARM® DSTREAM™ and RVI™ Using the Debug Hardware Configuration Utilities:

*   *Managing the firmware on your debug hardware unit*,
    `../com.arm.doc.dui0498b/Ciadfiba.html`.

Chapter 3
System requirements for using ARM DSTREAM

The following topics describe the system requirements for ARM® DSTREAM™, and how to connect the DSTREAM unit to your host computer and target system:

3.1 Requirements for connecting the DSTREAM unit

The following items comprise the DSTREAM product kit:

- the DSTREAM unit

- the power adaptor for the DSTREAM unit

- the mains cable for the power adaptor that is appropriate for your region

- one of the following cables, to connect the DSTREAM unit to the PC or the network:
  — the USB cable, to connect the DSTREAM unit directly to the PC using the USB port
  — the RJ-45 Ethernet cable, to connect the DSTREAM unit to the network.

- one of the following cables, to connect the DSTREAM unit to the target hardware:
  — the target-compatible JTAG cable
  — the Mictor cable if you want to perform tracing.

You must also provide the following items:
- a host computer that conforms to the host software and hardware requirements
- some target hardware containing a debug interface supported by DSTREAM.

3.1.1 See also

Tasks
- *Connecting the DSTREAM unit* on page 3-3.

Concepts
- *Hot-plugging and unplugging the debug cable* on page 3-5
- *Tracing with DSTREAM* on page 3-6.

3.2 Connecting the DSTREAM unit

The procedures described in this topic provide information on how to set up the hardware for the DSTREAM unit.

3.2.1 Prerequisites

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

3.2.2 Procedure

To connect the DSTREAM unit to your host computer and to the target hardware, carry out the following:

1. Connect the host computer to the DSTREAM unit as shown in the following figure, using either the USB port or a TCP/IP network 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 DSTREAM unit.

     ——— **Note** ———
     The USB drivers are installed with the debug host software.

   - If you are connecting across an Ethernet network, connect the Ethernet port of the DSTREAM unit to a socket for the Ethernet network using the supplied RJ-45 Ethernet cable.

   - If you are using a cross-over cable (not supplied), connect one end of the cable to the Ethernet port of the host computer, and the other end to the Ethernet port of the DSTREAM unit.
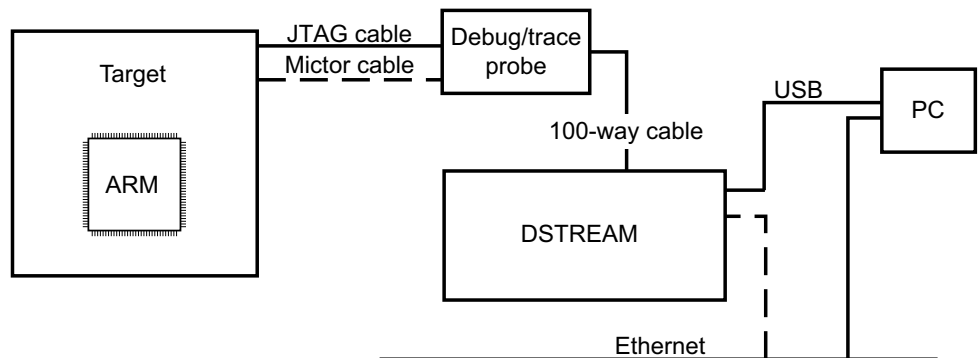

Figure 3-1 Connecting the DSTREAM hardware

2. Connect the DSTREAM unit to the target hardware, using the appropriate debug or trace cables:

   a. Connect one end of the supplied 100-way cable to the DSTREAM unit, and connect the other end of the cable to the probe unit.

   b. Connect the target hardware to the probe using the appropriate cables and connector.

   All connectors are keyed to prevent incorrect connections.

3. Power-up the target hardware and power-up the DSTREAM unit.

4. Configure the IP address on a debug hardware unit using the installed ConfigIP utility. This enables you to access your unit by Ethernet. (You do not need to do this if you are using a USB connection).

3.2.3 See also

Concepts
- *Requirements for connecting the DSTREAM unit* on page 3-2
- *Hot-plugging and unplugging the debug cable* on page 3-5
- *Tracing with DSTREAM* on page 3-6.

Reference

ARM® DSTREAM™ and RVT™ Using the Debug Hardware Configuration Utilities:
- *Using Trace*, `../com.arm.doc.dui0498b/I999867.html`
- *Configuring the network settings for a debug hardware unit*, `../com.arm.doc.dui0498b/BGBHAIGH.html`
- *Connecting to a debug hardware unit*, `../com.arm.doc.dui0498b/Ciagaiec.html`.

3.3 Hot-plugging and unplugging the debug cable

You can connect and disconnect the DSTREAM unit to the target hardware without affecting operation of the target if:

- the DSTREAM unit is powered by its original, earthed-output power supply
- the target hardware is earthed either through its PSU or separate earth connection.

———— **Note** ————

If the DSTREAM unit or the target hardware are not properly earthed, potential differences can occur between them, causing unwanted pulses in the debug interface during connection. This can cause unwanted resets to occur.

You might want to connect the debug cable if you have a target that is operating without a DSTREAM 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 DSTREAM unit and configure the connection without affecting the state of the target. This requires that the DSTREAM unit is powered before it is connected to the target.

When unplugging the debug connector, you must be aware that:

- If you are using an RTCK system, make sure that no communication is taking place between the system and the DSTREAM unit. Otherwise, if the DSTREAM unit is waiting for a return clock, it might lock up.

- If you are not using an RTCK system, the debug software can handle this situation. However, you must arrange to do a *Test Access Port* (TAP) reset using the debugger when you next plug the DSTREAM unit into a target. This can be performed during the advanced configuration part of the process.

3.3.1 See also

Tasks

- *Connecting the DSTREAM unit* on page 3-3.

Concepts
- *Requirements for connecting the DSTREAM unit* on page 3-2
- *Tracing with DSTREAM* on page 3-6.

Reference

ARM® DSTREAM™ and RVI™ Using the Debug Hardware Configuration Utilities:
- *Using Trace*, `../com.arm.doc.dui0498b/I999867.html`
- *Configuring the debug hardware Advanced settings*, `../com.arm.doc.dui0498b/CIHGABDH.html`.

3.4   Tracing with DSTREAM

When you have connected DSTREAM to your host computer, you are ready to begin using DSTREAM with your debugger. See the documentation that accompanies your debugger for information on using DSTREAM to capture trace.

DSTREAM is capable of capturing trace data into a cyclic buffer, and you can define the buffer size up to a maximum of 4GB. When a sufficient amount of trace data has been captured to fill the buffer, the FULL LED illuminates. The buffer then wraps, continues to capture trace data, and overwrites the original trace data captured. You can stop trace captured by using a trigger condition or a manual stop, and you can configure the amount of trace captured after a trigger event.

——— **Note** ———

The buffer size might not be supported by your debugger. See your debugger documentation for details of the trace capabilities of your debugger, and for configuring trace.

3.4.1   See also

Tasks

*   *Connecting the DSTREAM unit* on page 3-3.

Concepts
*   *Requirements for connecting the DSTREAM unit* on page 3-2
*   *Hot-plugging and unplugging the debug cable* on page 3-5
*   *The DSTREAM unit* on page 2-5.

Reference

ARM® DSTREAM™ and RVT™ Using the Debug Hardware Configuration Utilities:
*   *Managing the firmware on your debug hardware unit*, `../com.arm.doc.dui0498b/Ciadfiba.html`
*   *Creating debug hardware target configurations*, `../com.arm.doc.dui0498b/Cegfeehb.html`
*   *Using Trace*, `../com.arm.doc.dui0498b/I999867.html`.

Other information
*   Development Tools Downloads, `http://www.arm.com/support`