RealView® Developer Kit

Version 1.0

Debugger Command Line Reference Guide

ARM®

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RealView Developer Kit
Debugger Command Line Reference Guide

Release Information

The following changes have been made to this document.

Change History

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May 2003	A	Release for RVDK v1.0
March 2004	B	Release for RVDK v1.0.1

Proprietary Notice

Confidentiality Status

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Product Status

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

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RealView Developer Kit Debugger Command Line Reference Guide

Preface

This preface introduces the *RealView® Developer Kit v1.0 Debugger Command Line Reference Guide*. It contains the following sections:

- *About this book* on page vi
- *Feedback* on page ix.

About this book

This book describes how to use the *Command-Line Interface* (CLI) of the RealView Debugger application that is provided with RealView Developer Kit (RVDK).

Intended audience

This book has been written for developers who are using RealView Debugger to debug software written to run on ARM® architecture-based processors. It assumes that you are a software developer who is familiar with command-line tools. It does not assume that you are familiar with RealView Debugger.

Using this book

This book is organized into the following parts and chapters:

Chapter 1 ***Working with the CLI***

Read this chapter for an introduction to the RealView Debugger CLI.

Chapter 2 ***RealView Debugger Commands***

Read this chapter for a detailed description of the RealView Debugger CLI commands.

Chapter 3 ***Comparison of Commands***

Read this chapter for a comparison of the commands supported by RealView Debugger with the commands supported by armsd and AXD.

Glossary See this for explanations of terms used in this book.

Typographical conventions

The following typographical conventions are used in this book:

italic	Highlights important notes, introduces special terminology, denotes internal cross-references, and citations.
bold	Highlights interface elements, such as menu names. Denotes ARM processor signal names. Also used for terms in descriptive lists, where appropriate.
`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.

Further reading

This section lists publications from both ARM Limited and third parties that provide additional information on developing code for the ARM family of processors.

ARM periodically provides updates and corrections to its documentation. See the Documentation area of `http://www.arm.com` for current errata sheets, addenda, and the ARM Frequently Asked Questions list.

ARM publications

This book contains reference information that is specific to development tools supplied with RVDK. Other publications included in the suite are:

- *RealView Developer Kit v1.0 Compiler and Libraries Guide* (ARM DUI 0232)
- *RealView Developer Kit v1.0 Linker and Utilities Guide* (ARM DUI 0233)
- *RealView Developer Kit v1.0 Debugger User Guide* (ARM DUI 0234)
- *RealView Developer Kit v1.0 Assembler Guide* (ARM DUI 0235).
- *RealView ICE Micro Edition v1.1 User Guide* (ARM DUI 0220).

The following additional documentation is provided with RealView Developer Kit:

- *ARM FLEXlm License Management Guide* (ARM DUI 0209).

Refer to the ARM web site for additional information and documentation relating to ARM products.

Other publications

For a comprehensive introduction to ARM architecture see:

Steve Furber, *ARM system-on-chip architecture, Second Edition*, 2000, Addison Wesley, ISBN 0-201-67519-6.

For a detailed introduction to regular expressions, as used in the RealView Debuggersearch and pattern matching tools, see:

Jeffrey E. F. Friedl, *Mastering Regular Expressions, Powerful Techniques for Perl and Other Tools*, 1997, O'Reilly & Associates, Inc. ISBN 1-56592-257-3.

For the definitive guide to the C programming language, on which the RealView Debugger macro and expression language is based, see:

Brian W. Kernighan, Dennis M. Ritchie, *The C Programming Language, second edition*, 1989, Prentice-Hall, ISBN 0-13-110362-8.

For more information about IEEE Std. 1149.1 (JTAG), see:

IEEE Standard Test Access Port and Boundary Scan Architecture (IEEE Std. 1149.1), available from the IEEE (`www.ieee.org`).

Feedback

ARM Limited welcomes feedback on both RealView Debugger and its documentation.

Feedback on the RealView Developer Kit

If you have any problems with RealView Developer Kit, contact your supplier. To help them provide a rapid and useful response, give:

- your name and company
- the serial number of the product
- details of the release you are using
- details of the platform you are running on, 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 tool, including the version number and date.

Feedback on RealView Debugger

If you have any problems with RealView Debugger, submit a Software Problem Report:

1. Select **Help → Send a Problem Report...** from the RealView Debugger main menu.
2. Complete all sections of the Software Problem Report.
3. To get a rapid and useful response, give:
    - a small standalone sample of code that reproduces the problem, if applicable
    - 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.
4. Email the report to your supplier.

Feedback on this book

If you have any comments on this book, send email to `errata@arm.com` giving:

- the document title

- the document number
- the page number(s) to which your comments apply
- a concise explanation of your comments.

General suggestions for additions and improvements are welcome.

Chapter 1
Working with the CLI

This chapter introduces the RealView® Debugger *Command-Line Interface* (CLI). It contains the following sections:

1.1 About the CLI

RealView Debugger provides two interfaces from which you can perform all supported operations:

GUI The *Graphical User Interface* (GUI) contains a main Code window, in which the majority of features can be accessed. There are also other dialogs and panes you can access from the Code window. For complete details on using the RealView Debugger GUI, see the chapter on the RealView Debugger desktop in your Getting Started guide.

CLI Enables you to enter commands directly into the debugger without requiring the use of GUI items. This chapter provides an introduction to the components of the commands language that you must read if you want to perform debugger operations from the command line. See Chapter 2 *RealView Debugger Commands* for the full list of commands you can enter.

Expressions for RealView Debugger are written using C language operators and syntax, as described in *Using expressions and statements* on page 1-10.

This section introduces the CLI and contains the following sections:

- *Why use the CLI?*
- *Accessing the CLI* on page 1-3
- *Getting help* on page 1-4.

1.1.1 Why use the CLI?

Although you can perform the complete set of RealView Debugger operations from the GUI, there are specific advantages to using the CLI depending on your requirements, such as:

Setting up the system state

You can use scripted CLI commands, or include files, to place a target in a particular state, either whenever you connect to a target or on demand. For example, you might use a script to initialize peripherals, or to zero video memory.

Running test scripts

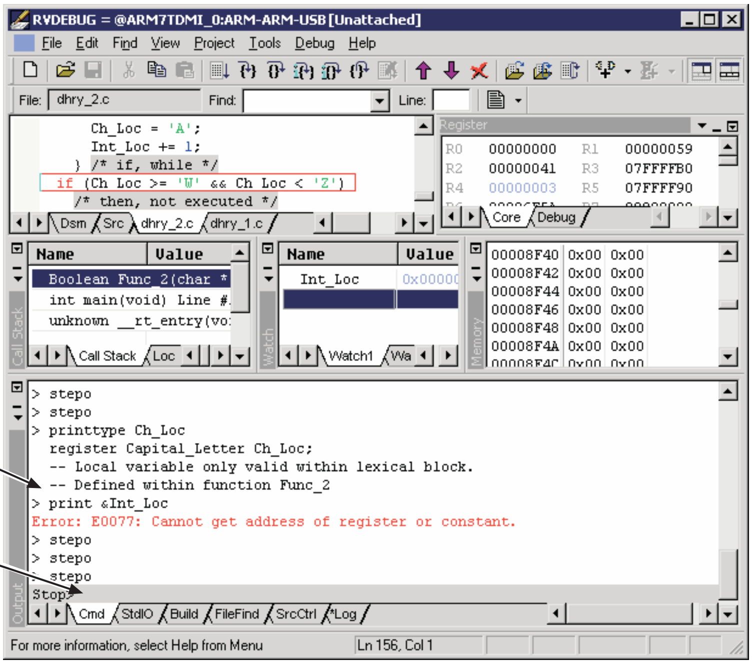
Test scripts are used to check that programs are behaving according to specification. You can use memory reads, writes, and target function calls in the CLI to exercise a module API. You can log semihosting output and check that against known correct output, and you can use the debugger to perform soak tests, using many I/O cycles to check system stability.

Performing test script conversion

The CLI enables you to enter commands that are equivalent to `armsd` and *ARM® eXtended Debugger* (AXD) commands. This is particularly useful when you want to convert test scripts you were running with ADS. For details on converting commands, see *Converting legacy scripts to RealView Debugger format* on page 1-11.

1.1.2 Accessing the CLI

As shown in Figure 1-1, the command line of RealView Debugger is located at the bottom of the interface, directly above the tabs of the Output pane.


Command results and history pane
Command line
RVDEBUG = @ARM7TDMI_0:ARM-ARM-USB [Unattached]
File Edit Find View Project Tools Debug Help
File: dhry_2.c
Find:
Line:
Dsm Src dhry_2.c dhry_1.c
Register
Core Debug
Call Stack Loc
Watch1 Wa
Memory
Output
Cmd StdIO Build FileFind SrcCtrl *Log
For more information, select Help from Menu
Ln 156, Col 1

```
        Ch_Loc = 'A';
        Int_Loc += 1;
      } /* if, while */
  if (Ch_Loc >= 'W' && Ch_Loc < 'Z')
      /* then, not executed */
```

```
R0   00000000   R1   00000059
R2   00000041   R3   07FFFFB0
R4   00000003   R5   07FFFF90
```

Name	Value
Boolean Func_2(char *	
int main(void) Line #.	
unknown __rt_entry(vo:	

Name	Value
Int_Loc	0x0000(

```
00008F40  0x00  0x00
00008F42  0x00  0x00
00008F44  0x00  0x00
00008F46  0x00  0x00
00008F48  0x00  0x00
00008F4A  0x00  0x00
```

```
> stepo
> stepo
> printtype Ch_Loc
  register Capital_Letter Ch_Loc;
  -- Local variable only valid within lexical block.
  -- Defined within function Func_2
> print &Int_Loc
Error: E0077: Cannot get address of register or constant.
> stepo
> stepo
> stepo
Stop>
```

Figure 1-1 Command-line location

Many operations you perform using the GUI have a command-line equivalent, and they are displayed in the command pane as you interact with the GUI. You can perform the same operation later on by entering the command yourself.

1.1.3 Getting help

When you are running RealView Debugger, you can display details of commands using either of the following:

- *Help on Commands*
- *DCOMMANDS command*.

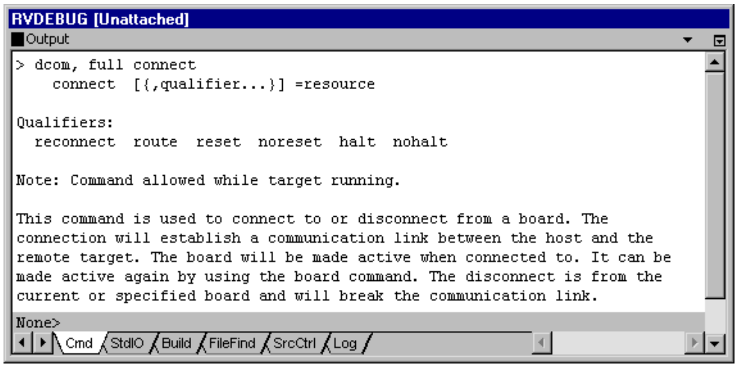
Help on Commands

If you select **Help on Commands** from the **Help** menu in the Code window, the online Help window opens. This enables you to see a brief description of each command.

DCOMMANDS command

The DCOMMANDS command, and its alias DHELP and short form DCOM, is described fully in *DCOMMANDS* on page 2-81. This command displays the syntax or full description of a single command, a group of related commands, or all available commands. There are some commands that DCOMMANDS does not have any information about. For information about these commands see Chapter 2 *RealView Debugger Commands* or use the online help option **Help on Commands**.

As an example, Figure 1-2 shows the use of the DCOMMANDS command to display details of the CONNECT command.



```
> dcom, full connect
    connect  [{,qualifier...}] =resource

Qualifiers:
  reconnect  route  reset  noreset  halt  nohalt

Note: Command allowed while target running.

This command is used to connect to or disconnect from a board. The
connection will establish a communication link between the host and the
remote target. The board will be made active when connected to. It can be
made active again by using the board command. The disconnect is from the
current or specified board and will break the communication link.
None>
```

Figure 1-2 Displaying details of a command

1.2 Using the CLI

This section describes how to enter CLI commands, both manually on the command line, or as batched commands. It also introduces the command syntax supported by the CLI. It contains the following sections:

- *Entering commands interactively*
- *Entering batched commands* on page 1-6
- *General command language syntax* on page 1-7
- *Using expressions and statements* on page 1-10.

1.2.1 Entering commands interactively

You can enter commands directly onto the command line, which is located at the bottom of the RealView Debugger Code window (see Figure 1-1 on page 1-3).

——— **Note** ———

For details on entering batched commands, see *Entering batched commands* on page 1-6.

————————

To enter a command at the command line:

1. Select the Output pane so that the command line is given focus and a blinking cursor appears at the command-line prompt.
2. At the prompt >, enter your command using either of the following methods:

   Entering a new command

   Type the command you want, followed by any necessary qualifiers or parameters (see *Command qualifiers* on page 1-8).

   Reusing a previously entered command

   If you have already entered a command earlier in the session that is similar, or identical, to the command you want, you can use the up and down arrow keys to display commands previously entered.

   To edit your command, you can use the left and right arrow keys to navigate through the entry, and the Backspace and Delete keys to delete characters.

   ——— **Note** ———

   The total length of a command must not exceed 4095 characters.

   ————————

3. When you have entered the desired command, press Enter to execute the command.

1.2.2 Entering batched commands

This section describes the various ways in which you can include, and execute, batch (script) files while working with RealView Debugger. You can also use the CLI to invoke a batch file.

You can use RealView Debugger to execute commands from batch files in the following ways:

- *Using the -inc command-line option*
- *Using the INCLUDE command* on page 1-7
- *Using the Command option from the board file advanced info block* on page 1-7.

Using the -inc command-line option

RealView Debugger supports its own command-line options, accessible using the Target text field of the Windows shortcut Properties dialog, or from the Unix or Windows shell. These CLI options include `-inc`, which executes the contents of the named file on startup, and `-b`, which controls whether the GUI is displayed or not.

To use `-inc`, you must:

1. Construct a script file for your session, for example using the `JOURNAL` command on page 2-145.
2. Exit RealView Debugger.
3. Use a Windows shortcut, or a command shell, to run RealView Debugger in batch mode and specify the script file:

   ```
   rvdebug -install="installdir" -b -inc="\path\to\file.txt"
   ```

   Note

   - Do not use `-b` without `-inc`. If you use only `-inc` , the script file is run with the GUI enabled.
   - You must specify the install location if RealView Debugger is not in the default directory and you have not defined the install directory using the environment variable `RVDEBUG_INSTALL`.

The CLI startup options are explained in the chapter describing getting started in *RealView Developer Kit v1.0 Debugger User Guide*.

Using the INCLUDE command

The `INCLUDE` command executes commands that are stored in an include file you specify. For a complete description of this command, and its syntax, see *INCLUDE* on page 2-143.

Using the Command option from the board file advanced info block

You can configure a board file for each target processor you use with RealView Debugger. The *Extended Target Visibility* (ETV) definitions for each target are held in the `Advanced_Information` block.

In the advanced information block, you can use the `Command` setting to run a single RealView Debugger command when a connection is established. One of the commands you can use here is `INCLUDE`, which enables you to run more commands from a file.

Note

Specifying an `INCLUDE` command in the board file settings requires you to amend your `.brd` file, usually called `rvdebug.brd`, located in your default home directory. It is strongly recommended that you make a backup of this file before editing your configuration so that you can restore your configuration file.

1.2.3 General command language syntax

This section describes the general syntax conventions that are supported by the RealView Debugger CLI:

- *General syntax rules*
- *Command qualifiers* on page 1-8
- *Command parameters* on page 1-8
- *Abbreviations* on page 1-9.

General syntax rules

The commands you submit to RealView Debugger must conform to the following rules:

- Each command line can contain only one debugger command.
- The number of qualifiers and parameters supplied must match the number required or allowed for the command, and these numbers vary between commands.
- You can use any combination of uppercase and lowercase letters in commands.
- A command line can be up to 4095 characters in length.

Command qualifiers

Many commands accept flags, qualifiers, and parameters, using the following syntax:

```
COMMAND [,qualifier | /flag] [parameter]...
```

If a command qualifier is present, it must appear after the command name and before any command parameters.

You introduce each command qualifier with a punctuation character that indicates its type, as follows:

,qualifier A comma introduces a qualifier that provides RealView Debugger with additional information on how to execute a command. A qualifier introduced by a comma is typically a word. For example, the command:

```
DHELP,FULL =command_name
```

displays the full version instead of the summary version of its help text.

Other comma qualifiers are included in the command descriptions described in Chapter 2 *RealView Debugger Commands*.

/flag A forward slash introduces a flag in the form of one or two letters that acts as a switch.

For example, some commands accept a size flag. Valid size flags are:

/B	8 bits. Sets the size of some value or values to a byte.
/H	16 bits. Sets the size of some value or values to a halfword.
/W	32 bits. Sets the size of some value or values to a word.

For an example of a command that accepts these qualifiers, see `FILL` on page 2-126.

Other flags formed by a slash and one or two letters are included in the command descriptions described in Chapter 2 *RealView Debugger Commands*.

Command parameters

As described in *Command qualifiers*, commands accept flags, qualifiers, and parameters.

When entering more than one parameter, you can type a space before each successive parameter to improve readability. If a parameter, for example a filename, includes spaces or other special characters, you must enclose it in double quotes (`"..."`), or single quotes (`'...'`). For details on these and all other commands supported by the CLI, see Chapter 2 *RealView Debugger Commands*.

Command parameters are typically expressions that represent values or addresses to be used by a command. Parameters must be separated from each other with some form of punctuation. However, punctuation for the first parameter might be optional:

`=`*`text`* An equals sign introduces a text string when you have multiple parameters. It is not required for the first parameter. Depending on the command, this might specify:

- a resource
- a process name
- a thread of process name
- a number or string expression
- an address or offset
- a description
- an instance
- a location
- a configuration.

`;`*`window`* A semicolon introduces a specification of where any output produced by the command is to be sent. If you supply a `;`*`window`* parameter, it must be the final parameter of the command.

`;`*`macro-call`* A semicolon also introduces a specification of a macro to be called by the command. If you supply a `;`*`macro-call`* parameter, it must be the final parameter of the command. (No command accepts both a *`;window`* and a *`;macro-call`* parameter.)

The parameters you supply to a RealView Debugger command must conform to the following rules:

- One or more spaces must separate command parameters from a command when there is no punctuation (for example, a `/`, `,`, or `=`).
- In high-level mode, code addresses must be referenced by line numbers, labels, and function names, or casted values.

Abbreviations

You can enter many debugger commands in an abbreviated form. RealView Debugger requires enough letters to uniquely identify the command you enter.

Many commands also have aliases. An alias is a different name that you can use instead of the listed name (see `ALIAS` on page 2-21). If you can use a short form of an alias, the underlined characters show the shortest acceptable form, for example:

`BREAKI`	Is an acceptable short form of `BREAKINSTRUCTION`.
`BINSTRUCTION`	Is an alias of `BREAKINSTRUCTION`.
`BI`	Is the shortest form of `BREAKINSTRUCTION`.
`DCOM`	Is an acceptable short form of `DCOMMANDS`.
`DHELP`	Is an alias of `DCOMMANDS`.

To see if a particular CLI command has an acceptable short form or alias, see its description in Chapter 2 *RealView Debugger Commands*.

1.2.4 Using expressions and statements

The basic components of the RealView Debugger command-line language can be classified as either expressions or statements, or a combination of both, where statements are typically contained in batch files (see *Entering batched commands* on page 1-6).

There are many types of expressions accepted by the RealView Debugger CLI, enabling you to further define a command operation from the CLI. Expressions can be, for example, binary mathematical expressions, references to module names, or calls to functions. For an example of these and other types of expressions, see *Types of RealView Debugger expressions* on page 1-12.

RealView Debugger keywords are conditional statements that can be used in a macro definition. For details on creating macros and using them with RealView Debugger, see the chapter on working with macros in the *RealView Developer Kit v1.0 Debugger User Guide*.

These keywords are the same as the C language program flow keywords, and they cannot be redefined or used in any other context:

- **`BREAK`**
- **`CONTINUE`**
- **`DO`**
- **`ELSE`**
- **`FOR`**
- **`IF`**
- **`RETURN`**
- **`WHILE`**.

1.3 Converting legacy scripts to RealView Debugger format

This section describes how you can convert legacy AXD or armsd scripts to the RealView Debugger format. The RealView Debugger product includes two programs to help with this process:

`axd2rvd`	Converts an `AXD` script to RealView Debugger format.
`armsd2rvd`	Converts an `armsd` script to RealView Debugger format.

The commands have the syntax:

```
axd2rvd [-Vsn] [-A] -I infile.asd [-O rvdfile.txt]
```

```
armsd2rvd [-Vsn] [-A] -I infile.asd [-O rvdfile.txt]
```

where:

`-I` *`infile.asd`*	The name of the existing script file. If you do not specify the input file, the command prints out a usage message. There must be a space between the file option and the filename.
`-O` *`rvdfile.txt`*	The name of the new RealView Debugger script file. If you do not specify this, the converted script is written to the standard output, normally the terminal. There must be a space between the file option and the filename.
`-A`	Include input command lines as comments in the output file.
`-Vsn`	Print the version number on the standard output and exit.

You must quote filenames if they contain space characters. The filename extension used for the input or the output files is not predetermined by these programs.

——— **Note** ———

These commands help you convert a script file to a RealView Debugger include file, but because of the different facilities provided by these debuggers, and the very different command sets implemented, you must check the resulting file for commands that the script cannot convert.

In particular, `armsd` profiling commands are not converted because the RealView Debugger equivalents are too different.

———————————

See Chapter 3 *Comparison of Commands* for a comparison of the commands available in these debuggers.

1.4 Types of RealView Debugger expressions

As described in *General command language syntax* on page 1-7, the CLI requires that you enter commands in a form acceptable to the debugger. The components of these commands are expressions and statements. For more details on statements, see *Using expressions and statements* on page 1-10.

Table 1-1 shows many of the types of expressions accepted by the CLI. For each type, there is a cross-reference to a command in Chapter 2 *RealView Debugger Commands* where the syntax accepts that expression type.

Table 1-1 Types of CLI expressions

Type	Pattern/example	Usage cross-reference
Arithmetical operation (value or address)	`x+(y*5)`	*FILL* on page 2-126
Array element reference (value or address)	`argv[1]`	*ARGUMENTS* on page 2-24
Conditional expression	`c==3`	*BREAKINSTRUCTION* on page 2-45
Floating-point expression	`3.14`	*FPRINTF* on page 2-133
Function name reference (code address)	`main`	*LIST* on page 2-148
Line reference (code address)	`#`*`line_number`*	*SCOPE* on page 2-197
Macro call	*`macro`*`()`	*ALIAS* on page 2-21
Memory address	`&`*`address`*	*ADD* on page 2-15
Memory address	`(type *)` *`expression`*	-
Memory location	`0x8000`	*BREAKREAD* on page 2-50
Memory range expression	`0x100..0x200`	*BREAKREAD* on page 2-50
Qualified line (specifying source module)	`MODULE1\#12`	*SCOPE* on page 2-197
Stack level reference	*`stack_level`*	*SCOPE* on page 2-197
String expression	`"`*`string`*`"`	*FILL* on page 2-126
Symbol reference (value or address)	*`symbol_name`*	*ADD* on page 2-15
Target connection reference	*`targetid`* *`targetname`*	*CONNECT* on page 2-73
Target program function	*`function`*`()`	*BREAKINSTRUCTION* on page 2-45

1.5 Constructing expressions

RealView Debugger groups expressions into two classes:

- C source language expressions, used in assembled or compiled source mode
- assembly language expressions, used in assembly source or disassembly mode.

Most valid C expressions are allowed in RealView Debugger (see *Using expressions and statements* on page 1-10). However, if you are an assembly language user, you do not have to know how to program in C to use the debugger. Simple C expressions are the same as standard algebraic expressions.

The types of expression elements accepted by the CLI are described in *Types of RealView Debugger expressions* on page 1-12. This section introduces the basic elements of the CLI, and how to construct expressions based on these elements. It contains the following sections:

- *Permitted symbol names*
- *Program symbols* on page 1-14
- *RealView Debugger variable symbols* on page 1-15
- *Macro symbols* on page 1-15
- *Reserved symbols* on page 1-15
- *Addresses* on page 1-16
- *Expression strings* on page 1-17
- *Target functions* on page 1-18.

1.5.1 Permitted symbol names

A symbol (also called an identifier) is a name that identifies something, for example program and debugger variables, macros, keywords, and registers.

Symbols can be up to 1 024 characters in length. The first character in a symbol must be alphabetic, an underscore `_`, or the at sign `@`. The characters allowed in a symbol include upper- and lower-case alphabetic characters, numeric characters, the dollar sign `$`, at sign `@`, and underscore `_`. Other symbolic characters cannot be used in symbols. RealView Debugger distinguishes between uppercase and lowercase characters in a symbol. A symbol is therefore matched by the following regular expression:

```
[a-zA-Z_@][a-zA-Z_@$0-9]{0,1023}
```

Regular expressions are described in *Mastering Regular Expressions*.

If your compiler or assembler creates symbols that contain characters that are invalid in RealView Debugger symbols, prefix the symbol name with an `@` and enclose the rest of the name in double quotes " to reference it, for example `@"!parser"`. You cannot access a symbol including a double quote character in its name.

1.5.2 Program symbols

Program symbols are identifiers associated with a source program. They include variables, function names, and, depending on the compiler, macro names. Symbols defined in the source of the application can normally be passed to RealView Debugger. When a program is loaded for debugging, program symbols are normally loaded into a symbol table associated with the target connection.

Some compilers insert a leading underscore _ to all program source symbols so that program symbol names are distinguished from other names. RealView Debugger strips the first leading underscore from such program symbols when an application file is read so references to program symbols are as originally written.

Some compilers pass C and C++ preprocessor macros to RealView Debugger. These are also usable in expressions. RealView Debugger shows the expansion in the output.

Referencing symbols

References to symbols or source-level line numbers can be unqualified or qualified. An unqualified reference includes only the symbol or line number itself. A qualified reference includes the symbol or line number preceded by a root (defined in the following section), module and/or function name. Root, module, and function names are separated from the symbol or line number by a backslash \. Module names must be in uppercase. Table 1-2 summarizes examples of qualified symbols.

Table 1-2 Qualified symbol references

Form	Example	Comment
`@root\\`	`@tst\\TS1ROOT`	References module `TS1ROOT` in root `@tst`. (Usually from file loaded as `tst.x` or `tst.out`.)
`\global` `::global`	`\x` `::x`	References global variable `x` in current root.
`function\local`	`main\x`	References local variable `x` in function `main`.
`MODULE\function`	`SIEVE\main`	References function `main` in module `sieve`.
`MODULE\static`	`SIEVE\y`	References static variable `y` in module `sieve`.
`MODULE\line_number`	`ENTRY\#18`	References line number 18 in module entry.
`MODULE\function\local`	`ENTRY\main\x`	References local variable x in function main in module entry.
`LINE\local`	`#20\x`	References local variable x in an unnamed block at line 20.

1.5.3 RealView Debugger variable symbols

RealView Debugger variables are created during a debugging session with the `ADD` CLI command, and all have global scope. When a debugger symbol is created you can assign it a data type (for example **`char`**, **`int`**, or **`long`**) and an initial value, but cannot assign initial values to **`struct`**, **`union`**, or **`class`** type symbols.

RealView Debugger variables can be stored in either:

- Debugger memory. The debugger allocates memory for the variable for you.
- Target memory. You must specify a target memory address for the variable.

1.5.4 Macro symbols

A RealView Debugger macro is similar to a C function. It has a name, a return type, and optional arguments. You can also define macro-local variables, and the macro itself is a sequence of statements. Symbols are used in macros in two ways:

Macro name	This identifies the macro. You are recommended to avoid using the names of the predefined macros, debugger commands or aliases. See *RealView Developer Kit v1.0 Debugger User Guide* for more information.
Local variables	Local variables can be defined within a macro as working storage while the macro executes. A macro local variable can only be accessed by the macro in which it was defined. It is created when the macro is executed and has an undefined initial value.

All other variable macros can access and use all other symbols. Macros can call other macros, but not recursively.

1.5.5 Reserved symbols

Reserved symbols are reserved words that represent registers, status bits, and debugger control variables. These symbols are always recognized by RealView Debugger and can be used at any time during a debugging session. Since reserved symbols have special meanings within the debugger command language, they cannot be defined and used for other purposes. To avoid conflict with other symbols, the names of all reserved symbols are preceded by an at sign `@`. See Table 1-3 on page 1-16 for a list of reserved symbols and their descriptions.

Referencing reserved symbols

RealView Debugger defines several symbols, known as reserved symbols, that retain specific information for you to access. Table 1-3 shows these reserved symbols with a short description. Reserved symbol names always begin with an at sign `@` and may be all uppercase or all lowercase.

Table 1-3 Reserved symbols

Symbol	Description
`@entry`	Used to form a function pseudo-label, `function\@entry`, to ensure that function parameters can be accessed. This pseudo-label is defined at the first line of a given function. In general, `function\@entry` refers to the first executable line of code in that function or the first auto local that is initialized in that function. In either case, `function\@entry` is beyond the function prologue. If no lines exist for the function `function\@entry` to reference, it is an error. For example, `bi function\@entry`; when (`some_arg ==1`).
`@hlpc`	Indicates your current high-level source code line. `@hlpc` is valid only if the *Program Counter* (PC) is in a module that has high-level line information (that is, a C, C++, or assembler source module compiled with debug turned on).
`@line_range`	Contains the line range of the source code associated with the PC.
`@module`	Indicates the name of the current module as determined by the location of the PC.
`@function`	Indicates the name of the current function as determined by the location of the PC.
`@root`	Indicates the name of the current root name.

1.5.6 Addresses

An address can be represented by most C expressions that evaluate to a single value. In source-level mode, expressions that evaluate to a code address cannot contain numeric constants or operators, unless you use a cast.

Data address and assembly-level code address expressions can also be represented by most legal C expressions. For details on legal C expressions, see the *C language Reference Manual*. There are no restrictions involving constants or operators. Table 1-4 summarizes the special addressing types supported by RealView Debugger.

Table 1-4 Address expressions

Addressing type	Indicator	Example
Indirect addresses	`[ ]`	`PRINTVALUE (H W) [23]`
Line numbers	`#`	`BREAKINSTRUCTION #10`

Address ranges	`..`	`DUMP 0X2200..0X2214`
		`DUMP 0X2200..+14`

Multi-statement reference	`:`	`BREAKINSTRUCTION #21:32` (refers to the statement on line 21 that contains column 32)
	`.`	`BREAKINSTRUCTION #21.2` (refers to the second statement on line 21)
Address of non-label symbol	`&`	`BREAKREAD &var`

1.5.7 Expression strings

An expression string is a list of values separated by commas. The expression string can contain expressions and ASCII character strings enclosed in quotation marks. For several commands, each value in an expression string can be changed to the size specified by the size qualifiers. If the size is changed, padding is added to elements that do not fit.

Examples of expression strings are shown in Table 1-5.

Table 1-5 Examples of expression strings

String	Results
`1,2,"abc"`	Values 1 and 2, and ASCII values of abc.
`3+4, count, foo()`	Value 7, value of count, results of calling foo.
`'1xyz123'`	ASCII values of 1, x, y, z, 1, 2, and 3.

You can cast values to arrays, so that for example you can access the second byte of a 32 bit word by casting the word to a byte array.

Note

If you enter a command line that starts with an open-bracket `(`, or an asterisk `*`, RealView Debugger interprets this as if you had entered a `CE` command with that text as its argument. For example:

```
> *(char*)0x8000 = 0
```

is equivalent to:

```
> CE *(char*)0x8000 = 0
```

As with the normal `CE` command, you can use this to view or modify program variables and memory.

1.5.8 Target functions

Target functions might be called within a debugger expression. Depending on the processor, the data type of the return value determines the type that the function call takes. Public labels, like runtime routines, are assumed to return an integer. Passing structures by returning a pointer is not supported.

A target function called from a debugger expression behaves the same way as if it were called from a user program. Target functions can invoke I/O operations or error messages in addition to activate breakpoints and associated macros. If a breakpoint is hit that stops execution, the registers are restored and the call ends with an error.

Arguments are copied to the stack below the current function. The return address is the entry point of the application where a breakpoint is placed.

Macros take higher precedence than target functions. If a target function and a macro have the same name, the macro is executed unless the target function is qualified. For example, `strcpy` is a predefined debugger macro, while `PROG\strcpy` is a function within the module `PROG`. The predefined macro is referenced as `strcpy(t,s)`, while `PROG\strcpy(t,s)` refers to the function within `PROG`. A target function must be called within a debugger expression that is used within a command. It cannot be directly executed as a command, but a macro can.

Example 1-1 Calling a target function

```
CE PROG\strcpy(t,s)
```

1.6 Using variables in the RealView Debugger

It is important to understand how to access variables that are stored in memory. This section describes symbol storage classes and data types. It describes how to qualify a symbolic reference with a module or function name, how to specify fully referenced variables, and how to make stack references. It contains the following sections:

- *Scope*
- *Data types* on page 1-20
- *Root names* on page 1-22
- *Module names* on page 1-23
- *Variable references* on page 1-24
- *Stack references* on page 1-25.

1.6.1 Scope

All variables and functions in a C or C++ source program have a storage class that defines how the variable or function is created and accessed. C preprocessor symbols might not be available to RealView Debugger.

Global (`extern`)

In RealView Debugger, global variables can be referred to from any module unless a symbol of the same name exists in the local scope, in which case this variable must be qualified by a root name, by \ (current root), or with `::`.

Static In RealView Debugger, static functions can be referred to from the same module without qualification. Static functions in other modules must be qualified with the module name if the name is ambiguous or the module has not been used yet (not loaded).

Local A local variable is accessible when it is local to the current function, local to the current unnamed block, or when its function is on the stack. It can be qualified by function, line, or stack level.

Register Register variables might not be available from all lines in the function, because hardware registers can be shared by more than one local register variable. A register variable is accessible when it is local to the current function or when its function is on the stack. It can be qualified by function or stack level.

Scoping rules

References to symbols follow the standard scoping rules of C and C++. If a symbol is referenced, RealView Debugger searches its symbol table using the following priority:

1. A symbol local to the current macro (if any).
2. A symbol local to the current line (if any).
3. A symbol local to the current function (if any).
4. A symbol local to the class of the current function (if any).
5. A symbol static to the current module (if any).
6. A global symbol not necessarily in the current module (if any).
7. A static symbol in another module.
8. A global symbol in another root (different loaded file).

1.6.2 Data types

All symbols and expressions have an associated data type. Source language modules can contain any valid C or C++ language data type. Assembly language modules can contain variables with the types byte, word, long, 8-byte long, single-precision floating point, double-precision floating point, or label. Some assemblers might have other types such as fixed-point. These types are treated by RealView Debugger as **`unsigned char`**, **`unsigned short int`**, **`unsigned long`**, **`long long`**, **`float`**, **`double`**, and **`label`**, respectively. Each symbol also has an attribute that indicates whether a variable was defined in a code or data area. Further, the assembler can create arrays of these types in addition to structures (check with the assembler manufacturer for details).

Type conversion

RealView Debugger performs data-type conversions under the following circumstances:

- when two or more operands of different types appear in an expression, data type conversion is performed according to the rules of C or C++
- when arguments are passed to a macro or target function, the types of the passed arguments are converted to the types given in the macro function definition
- when the data type of an operand is forced by user-specified type casting, it is converted

- when a specific type is required by a command, the value is converted according to the rules of C/C++.

Type casting

Type casting forces the conversion of an expression to the specified data type. The contents of any variables that are referenced are not altered. RealView Debugger expressions can be cast into different types using the following syntax:

(*type_name*) *expression*

Example 1-2 Casting symbols and expressions into different types

```
(char) prime            /* prime is cast to type char */
(float) 12              /* value is 12.0. (integer 12 in floating point) */
(int) sin(0.2)          /* value is 0, sin(0.2) is 0.198, truncates to 0 */
(int) ptr_char          /* the variable expression ptr_char is */
                        /* cast to type int */
```

RealView Debugger can cast some expression types to an array type. Example 1-3 casts the constant expression 7 to an array of three characters starting at location `0x0007`.

Example 1-3 Casting to an array

```
(char[3]) 7             /* address is 0x0007 */
```

This type of casting to an array can be used with the `PRINTVALUE` command. Assembly language structures can be displayed in a more meaningful form by using this technique. Table 1-6 lists additional special casting types. Arrays of hexadecimal types and pointers to hexadecimal types can also be used.

Table 1-6 Special casting types

Cast	Commands	Meaning
(QUOTED STRING) (Q S)	`PRINTVALUE`	Show as "string"
(INSTRUCTION ADDRESS) (I A)	All	Convert into a legal source-level address
(UNKNOWN TYPE) (U T)	All	Convert into a single byte

Table 1-6 Special casting types (continued)

Cast	Commands	Meaning
(HEX BYTE) (H B)	All	Show in hex bytes
(HEX WORD) (H W)	All	Show in 16 bit hex
(HEX DOUBLE WORD) (H D)	All	Show in 32 bit hex

1.6.3 Root names

Root names indicate the top level in a qualified path name. Each time RealView Debugger is invoked, it automatically creates a base root. This root is assigned the name \\ and contains all RealView Debugger variables, macros, and most user-defined symbols. The only user-defined symbols that are not in the base root are those created with the `ADD` command. The remainder are built-in (see `ADD` on page 2-15).

When an executable program is loaded, RealView Debugger automatically creates a second root for that program. The name of this root is the name of the program with an at sign `@` prepended to it. For example, when RealView Debugger loads the `proga` program, it creates the root `@PROGA`. An alternative root name can be specified with the `LOAD` command.

If two programs have the same name, RealView Debugger appends an underscore followed by a number (that is, *`@NAME_1`*, *`@NAME_2`*) to the second (and any subsequent) program.

To specify which root a module belongs to, use `@`*`ROOT`*`\\`*`MODULE`* where *`ROOT`* is the root name and *`MODULE`* is the module name. The \\ specifies that the preceding symbol is a root name. Use \\ to specify the base root, which contains builtin type, macro, and reserved word information. In the `PRINTSYMBOLS` command, the root can be specified directly. The reserved symbol `@ROOT` points to the current root name. For more information about RealView Debugger reserved symbols, see *Reserved symbols* on page 1-15. Example 1-4 on page 1-23 shows the use of root names.

Example 1-4 Using root names

```
ps \                          /* Shows all symbols in current root */
ps/t \\                       /* Shows types in base root */
ps/m @sieve\\                 /* Shows all modules in root @sieve */
ps/f                          /* Shows all roots */
```

RealView Debugger considers the context to help determine the current root. If the context is within a module, the root of that module is the current context. The use of a backslash \ refers to the current root, as specified by the context.

1.6.4 Module names

Module names qualify symbolic references. The module name is usually the source filename without the extension. If the extension is not standard (that is, `.c` for C language programs), the extension is preserved, and the dot . is replaced with an underscore _. For example:

- `SIEVE\main`
- `SIEVE_H\#4`
- `PORT_ASG\x`

This convention avoids a conflict with the C period operator ., which indicates a structure reference. Module names are changed as follows:

- `SIEVE.C` becomes `SIEVE`
- `SIEVE.H` becomes `SIEVE_H`

All module names are converted to uppercase by RealView Debugger. To avoid confusion, it is recommended that function names are not all uppercase. If two modules have the same name, RealView Debugger appends an underscore followed by a number (that is, `PROGA_1`, `PROGA_2`, `PROGA_3`, and so on) to the second (and any subsequent) module. To see the current module and function, use the `CONTEXT` command.

To print the current module name and/or current function name, use the `FPRINTF` or `PRINTF` command (with the `%s` format), or use the `PRINTVALUE` command, with the `@module` and `@function` reserved symbol. You can also use the `PRINTSYMBOLS/F` command with no arguments, and the command displays all roots.

The current line number is displayed with `%d` and the reserved symbol `@hlpc`. The reserved symbol `hlpc` contains the line number at the current PC if located in source code. Otherwise, it is zero. To print the current source line as text, use `%h` and `@hlpc`. To print the current instruction, use `%m` and `@pc`. For more information about RealView Debugger reserved symbols, see *Reserved symbols* on page 1-15.

1.6.5 Variable references

In C, using a variable in an expression can result in a value or an address. A fully referenced variable results in a value. A partially referenced variable results in an address. Some legal assembly language variables can conflict with C operators, such as dot `.` and question mark ?. These characters are replaced with an underscore `_`. Examples of variable references are provided in Table 1-7, including an indication of what type of reference is being made.

Table 1-7 Examples of references to variables

Variable reference	Reference type

`int A;`
`A = 5;`
	`A` is fully referenced.

`long temp;`
`temp = 9;`
	`temp` is fully referenced.

`int arr[10], *LABEL;`	`arr` is not fully referenced so its address is used.

`LABEL = arr;`
`arr[3] = 8;`
	`arr[3]` is fully referenced.

`int AB[10][10],*LABX;`	`AB` is not fully referenced so its address is used.

`LABX = AB[5];`
`LABX = LABEL;`
	`LABEL` is fully referenced so its value is used (the address it points to).

`char *p,c;`
`p = &c;`
	`p` is fully referenced. `c` is not fully referenced.

`c = *LABEL;`	`LABEL` is dereferenced so the value of its address is used.

When you refer to a variable in a C/C++ expression that is not fully referenced, you are actually referring to the address of that variable, not the value. For this reason, the variable is considered unreferenced. The normal C operators are implemented to modify references, as shown in Table 1-8.

Table 1-8 C operators for referencing and dereferencing variables

Operator	Scalar	Pointer	Array	Structure	Union
`*`	-	Ref	Ref	-	-
`&`	Deref	Deref	-	Deref	Deref

Table 1-8 C operators for referencing and dereferencing variables (continued)

Operator	Scalar	Pointer	Array	Structure	Union
`->`	-	Ref[a]	-	-	-
`.`	-	-	-	Ref	Ref
`[ ]`	-	Ref	Ref	-	-

a. Must be a pointer to a structure or union. The right side must be a member of that structure or union. Otherwise, it is illegal.

These operators let you reference, or get the value of, and dereference, or get the address of, variables. The concept of referenced and dereferenced variables also applies to breakpoints. For example:

```
BA arrayname
```

This command sets an access breakpoint at the address of the array `arrayname` because `arrayname` is not fully referenced. By including the special operator `&`, the following command enables you to set a breakpoint at the value of `arrayname[3]`:

```
BA &arrayname[3]
```

The following form of the command sets a breakpoint at the value stored in `arrayname[3]` and not the address of `arrayname[3]`, because it is now fully referenced.

```
BA arrayname[3]
```

1.6.6 Stack references

When a function is invoked in C/C++, space is allocated on the stack for most local variables. Typically, space is also allocated for a return address for returning to the calling routine. If a function calls another function, all information is saved on the stack to continue execution when the called function returns. The function is now nested.

You can reference variables and functions nested on the stack implicitly or explicitly.

Implicit stack references

With RealView Debugger, you can implicitly reference variables on the stack as follows:

- To refer to variables on the stack in the current function, specify the name of the variable, for example `x`.

- To refer to a local variable in a nested function, specify the function name followed by a backslash and the name of the local variable (`main\i` for example). If the nested function is recursive, the last occurrence of that function is used. An explicit reference enables any occurrence to be selected.

Explicit stack references

A function is allocated storage for its variables on the stack when it is currently executing. To refer to variables on the stack explicitly, you must specify the nesting level of the function preceded by an at sign `@`. The Call Stack window in source-level mode displays nesting level information. The current function is `@0`, its caller is `@1`.

You can reference functions on the stack as follows:

- To refer to the address where some function on the stack returns, specify the function nesting level preceded by an at sign @. For example, `GO @1` executes the program until RealView Debugger reaches the address that corresponds to the location where the current function returns to its caller (the instruction after the call). The `LIST` and `DISASSEMBLE` commands can be used to show the code at the return address (`LI @2` for example).

  In nonrecursive programs, the command `GO @1` corresponds to setting a breakpoint when the current function returns to its caller. In recursive programs, the address alone might not be enough to specify the instance that you want. A command such as `GO@1; until(depth == 4)` can be used to specify which instance of the address you want (assuming `depth` is a local variable in your recursive function that determines which instance you are executing).

- To explicitly refer to a local variable in a nested function, specify the function nesting level followed by a backslash and the name of the variable. For example, `PRINTVALUE @3\str` references the local variable `str` of the function at nesting level 3.

- To see all available information about a function, specify the `EXPAND` command followed by the function nesting level. For example, `EXPAND @7` displays all information about the function at the specified level for that particular invocation. This information includes the name of the function, the address that is returned to, and all local variables in the function and their values.

Chapter 2
RealView Debugger Commands

This chapter describes available RealView® Debugger commands. It contains the following sections:

- *RealView Debugger commands listed by function* on page 2-2
- *Alphabetical command reference* on page 2-10.

2.1 RealView Debugger commands listed by function

This section lists the commands according to their general function:

- *Board file access*
- *Execution control* on page 2-3
- *Examining source files* on page 2-4
- *Program image management* on page 2-4
- *Target registers and memory* on page 2-5
- *Status enquiries* on page 2-6
- *Macros and aliases* on page 2-7
- *CLI* on page 2-7
- *Program symbol manipulation* on page 2-8
- *Creating and writing to files and windows* on page 2-8
- *Miscellaneous* on page 2-9.

This section does not include command aliases. See *Alphabetical command reference* on page 2-10 for a full, alphabetical list of commands.

2.1.1 Board file access

Table 2-1 shows the commands that operate on boards, that is target processors, development systems and their subcomponents.

Table 2-1 Board file access commands

Description	Command
Add target definition	`ADDBOARD` on page 2-18
Remove target definition	`DELBOARD` on page 2-87
Edit current board definition	`EDITBOARDFILE` on page 2-116
Read, or reread, a board file	`READBOARDFILE` on page 2-185
Connect RealView Debugger to a target	`CONNECT` on page 2-73
Disconnect RealView Debugger from a target	`DISCONNECT` on page 2-98
List board descriptions	`DTBOARD` on page 2-104
Write board memory map as linker file	`DUMPMAP` on page 2-113

2.1.2 Execution control

Table 2-2 shows the commands that control target execution, including instruction and data breakpoints.

Table 2-2 Execution control commands

Description	Command
Initialize or reset the processor	`EMURESET` on page 2-117 `RELOAD` on page 2-189 `RESET` on page 2-191 `RESTART` on page 2-194
Start executing from current state	`GO` on page 2-136 `RUN` on page 2-196
Set a data or instruction breakpoint	`BREAKACCESS` on page 2-31 `BREAKEXECUTION` on page 2-38 `BREAKINSTRUCTION` on page 2-45 `BREAKREAD` on page 2-50 `BREAKWRITE` on page 2-57
Clear, enable or disable a breakpoint	`CLEARBREAK` on page 2-69 `DISABLEBREAK` on page 2-94 `ENABLEBREAK` on page 2-119 `RESETBREAKS` on page 2-192
Display currently set breakpoints	`DTBREAK` on page 2-105
Stop execution at current point	`HALT` on page 2-140 `STOP` on page 2-223
Set or change processor events (for example, exceptions)	`BGLOBAL` on page 2-27
Step by instruction	`STEPINSTR` on page 2-213 `STEPOINSTR` on page 2-218
Step by source line	`STEPLINE` on page 2-215 `STEPO` on page 2-220
Step invoking a macro at each step	`GOSTEP` on page 2-138
Do something when execution starts or stops	`ONSTATE` on page 2-167

2.1.3 Examining source files

Table 2-3 shows the commands that let you examine the program source files.

Table 2-3 Examining source file commands

Description	Command
Display a specific source file	`LIST` on page 2-148
Display execution context	`CONTEXT` on page 2-76 `UP` on page 2-230 `DOWN` on page 2-102 `WHERE` on page 2-242
Display locals of an execution context	`EXPAND` on page 2-122
Select source or assembly display	`MODE` on page 2-162
Move the display location within program	`SCOPE` on page 2-197
Display program source files	`DTFILE` on page 2-107

2.1.4 Program image management

Table 2-4 shows the commands that manipulate image (executable) files.

Table 2-4 Program image management commands

Description	Command
Reload or restart current executable	`RELOAD` on page 2-189 `RESTART` on page 2-194
Add or remove executable file from loaded files list	`ADDFILE` on page 2-19 `DELFILE` on page 2-90
Load target with one or more executable files	`LOAD` on page 2-150 `RELOAD` on page 2-189
Unload an executable file or process	`UNLOAD` on page 2-228
Write to FLASH memory	`FLASH` on page 2-129
Translate host filesystem pathnames	`NAMETRANSLATE` on page 2-165 `PATHTRANSLATE` on page 2-172
Define program (argc, argv)	`ARGUMENTS` on page 2-24

Table 2-4 Program image management commands (continued)

Description	Command
Define run mode (RTOS specific)	`RUN` on page 2-196
Disassemble target memory	`DISASSEMBLE` on page 2-96
Verify data or image file against memory	`VERIFYFILE` on page 2-233
Display more information about load errors	`DLOADERR` on page 2-100
Do something when execution starts or stops	`ONSTATE` on page 2-167

2.1.5 Target registers and memory

Table 2-5 shows the commands that manipulate target registers and memory.

Table 2-5 Target register and memory access commands

Description	Command
Enable and change target memory layout	`MEMMAP` on page 2-157
Fill target memory with value or values	`FILL` on page 2-126 `SETMEM` on page 2-202 `CEXPRESSION` on page 2-67
Copy or compare target memory areas	`COPY` on page 2-78 `COMPARE` on page 2-71
Change target registers	`SETREG` on page 2-204
Display memory in window	`MEMWINDOW` on page 2-160 `LIST` on page 2-148
Disassemble target memory	`DISASSEMBLE` on page 2-96
Search for value or values in memory	`SEARCH` on page 2-199
Write to FLASH memory	`FLASH` on page 2-129
Write memory map to linker file	`DUMPMAP` on page 2-113

Table 2-5 Target register and memory access commands (continued)

Description	Command
Write host file into target memory	`READFILE` on page 2-186
Write target memory to host file	`DUMP` on page 2-111 `WRITEFILE` on page 2-244
Compare host file with target memory	`TEST` on page 2-224 `VERIFYFILE` on page 2-233

2.1.6 Status enquiries

Table 2-6 shows the commands that display information about the current RealView Debugger session.

Table 2-6 Status enquiry commands

Description	Command
Display current process information	`DTPROCESS` on page 2-109
Display current image file information	`DTFILE` on page 2-107
Display more information about load errors	`DLOADERR` on page 2-100
Display execution context	`CONTEXT` on page 2-76 `WHERE` on page 2-242
Display currently set breakpoints	`DTBREAK` on page 2-105
Display board descriptions	`DTBOARD` on page 2-104
Display the contents of a macro	`SHOW` on page 2-211
Display and define user preferences	`OPTION` on page 2-169 `SETTINGS` on page 2-207

2.1.7 Macros and aliases

Table 2-7 shows the commands that define and display command aliases and macros. More information describing macros can be found in Chapter 1 *Working with the CLI* and also in the *RealView Developer Kit v1.0 Debugger User Guide*.

Table 2-7 Macro and alias commands

Description	Command
Define a command macro	`DEFINE` on page 2-84
Invoke a command macro	`MACRO` on page 2-155
Step invoking a macro at each step	`GOSTEP` on page 2-138
Define, list, delete command alias	`ALIAS` on page 2-21
Attach macro to window with auto-update	`VMACRO` on page 2-235
Display the contents of a macro	`SHOW` on page 2-211

2.1.8 CLI

Table 2-8 shows the functions that manipulate the command line itself.

Table 2-8 CLI commands

Description	Command
Run script file	`INCLUDE` on page 2-143
Define error action for script file	`ERROR` on page 2-121
Cause an abnormal error for script file	`FAILINC` on page 2-125
Interrupt current asynchronous command	`CANCEL` on page 2-66
Jump (goto) another point in script or macro	`JUMP` on page 2-147
Log CLI actions to file	`JOURNAL` on page 2-145 `LOG` on page 2-153

2.1.9 Program symbol manipulation

Table 2-9 shows the commands that display and change symbols in the debugger symbol table.

Table 2-9 Program symbol manipulation commands

Description	Command
Create symbols referencing target memory	`ADD` on page 2-15
Create host-debugger symbols	`ADD` on page 2-15
Delete symbols	`DELETE` on page 2-88
Browse C++ class structure	`BROWSE` on page 2-64
Load only the symbols for a program	`LOAD` on page 2-150
Display symbols in the symbol table	`PRINTSYMBOLS` on page 2-177
Display variable type details	`PRINTTYPE` on page 2-179
Evaluate expressions involving symbols	`CEXPRESSION` on page 2-67 `PRINTVALUE` on page 2-181
Display value of symbol every time debugger stops target	`MONITOR` on page 2-163 `NOMONITOR` on page 2-166

2.1.10 Creating and writing to files and windows

Table 2-10 shows the commands that manipulate windows.

Table 2-10 Creating files and text writing commands

Description	Command
Opening a file	`FOPEN` on page 2-131
Creating a new window	`VOPEN` on page 2-237
Clearing a window	`VCLEAR` on page 2-231
Setting the cursor position within a window	`VSETC` on page 2-239

Table 2-10 Creating files and text writing commands (continued)

Description	Command
Deleting a window	`VCLOSE` on page 2-232
Attaching a macro to a window	`VMACRO` on page 2-235
Writing text to a file or window	`PRINTF` on page 2-174 `FPRINTF` on page 2-133 Commands that support the `;<windowid>` parameter.

2.1.11 Miscellaneous

Table 2-11 shows the remaining functions.

Table 2-11 Miscellaneous commands

Description	Command
Define user preferences	`OPTION` on page 2-169 `SETTINGS` on page 2-207
Get help on command	`HELP` on page 2-141 `DCOMMANDS` on page 2-81
Force debugger to wait for a specified number of seconds	`PAUSE` on page 2-173
Force debugger to wait, or not to wait, for command to complete	`WAIT` on page 2-240
Select thread in RTOS thread group	`THREAD` on page 2-226
Quit debugger	`QUIT` on page 2-184

2.2 Alphabetical command reference

This section lists in alphabetical order all the commands that you can issue to RealView Debugger using the CLI.

Many of the commands have alternative names, or aliases, that you might find easier to remember. This section lists all aliases and includes cross references, where appropriate.

Many command names and aliases can be abbreviated. For example, `ADDBOARD` can be abbreviated to `ADDBO`. The syntax definition for each command shows how it can be shortened by underlining the abbreviation, that is <u>ADDBO</u>ARD.

In the syntax definition of each command:

- square brackets `[...]` enclose optional parameters
- words enclosed in braces `{}` separated by a vertical bar `|` indicate alternatives from which you choose one
- parameters that can be repeated are followed by an ellipsis `...`.

Do not type square brackets, braces, or the vertical bar. Replace parameters in *`italics`* with the value you want. When you supply more than one parameter, use a comma or a space or a semicolon as a separator, as shown in the syntax definition for the command. If a parameter is a name that includes spaces, enclose it in double quotation marks.

The following sections describe the available commands:

- *ADD* on page 2-15
- *ADDBOARD* on page 2-18
- *ADDFILE* on page 2-19
- *ALIAS* on page 2-21
- *ARGUMENTS* on page 2-24
- *BACCESS* on page 2-26
- *BEXECUTION* on page 2-26
- *BGLOBAL* on page 2-27
- *BINSTRUCTION* on page 2-29
- *BREAD* on page 2-30
- *BREAK* on page 2-30
- *BREAKACCESS* on page 2-31
- *BREAKEXECUTION* on page 2-38
- *BREAKINSTRUCTION* on page 2-45
- *BREAKREAD* on page 2-50

- *BREAKWRITE* on page 2-57
- *BROWSE* on page 2-64
- *BWRITE* on page 2-65
- *CANCEL* on page 2-66
- *CEXPRESSION* on page 2-67
- *CLEARBREAK* on page 2-69
- *COMPARE* on page 2-71
- *CONNECT* on page 2-73
- *CONTEXT* on page 2-76
- *COPY* on page 2-78
- *DBOARD* on page 2-80
- *DBREAK* on page 2-80
- *DCOMMANDS* on page 2-81
- *DEFINE* on page 2-84
- *DELBOARD* on page 2-87
- *DELETE* on page 2-88
- *DELFILE* on page 2-90
- *DHELP* on page 2-93
- *DISABLEBREAK* on page 2-94
- *DISASSEMBLE* on page 2-96
- *DISCONNECT* on page 2-98
- *DLOADERR* on page 2-100
- *DMAP* on page 2-101
- *DOWN* on page 2-102
- *DTBOARD* on page 2-104
- *DTBREAK* on page 2-105
- *DTFILE* on page 2-107
- *DTPROCESS* on page 2-109
- *DUMP* on page 2-111
- *DUMPMAP* on page 2-113
- *DVFILE* on page 2-115
- *DVPROCESS* on page 2-115
- *EDITBOARDFILE* on page 2-116
- *EMURESET* on page 2-117
- *EMURST* on page 2-118
- *ENABLEBREAK* on page 2-119
- *ERROR* on page 2-121

- *EXPAND* on page 2-122
- *FAILINC* on page 2-125
- *FILL* on page 2-126
- *FLASH* on page 2-129
- *FOPEN* on page 2-131
- *FPRINTF* on page 2-133
- *GO* on page 2-136
- *GOSTEP* on page 2-138
- *HALT* on page 2-140
- *HELP* on page 2-141
- *HWRESET* on page 2-142
- *INCLUDE* on page 2-143
- *JOURNAL* on page 2-145
- *JUMP* on page 2-147
- *LIST* on page 2-148
- *LOAD* on page 2-150
- *LOG* on page 2-153
- *MACRO* on page 2-155
- *MEMMAP* on page 2-157
- *MEMWINDOW* on page 2-160
- *MMAP* on page 2-161
- *MODE* on page 2-162
- *MONITOR* on page 2-163
- *NAMETRANSLATE* on page 2-165
- *NOMONITOR* on page 2-166
- *ONSTATE* on page 2-167
- *OPTION* on page 2-169
- *PATHTRANSLATE* on page 2-172
- *PAUSE* on page 2-173
- *PRINTF* on page 2-174
- *PRINTSYMBOLS* on page 2-177
- *PRINTTYPE* on page 2-179
- *PRINTVALUE* on page 2-181
- *PROPERTIES* on page 2-183
- *PS* on page 2-183
- *PT* on page 2-183
- *QUIT* on page 2-184

- *READBOARDFILE* on page 2-185
- *READFILE* on page 2-186
- *REEXEC* on page 2-188
- *RELOAD* on page 2-189
- *RESET* on page 2-191
- *RESETBREAKS* on page 2-192
- *RESTART* on page 2-194
- *RSTBREAKS* on page 2-195
- *RUN* on page 2-196
- *SCOPE* on page 2-197
- *SEARCH* on page 2-199
- *SETFLAGS* on page 2-201
- *SETMEM* on page 2-202
- *SETREG* on page 2-204
- *SETTINGS* on page 2-207
- *SHOW* on page 2-211
- *SINSTR* on page 2-212
- *SM* on page 2-212
- *SOINSTR* on page 2-212
- *SOVERLINE* on page 2-212
- *SR* on page 2-212
- *STEPINSTR* on page 2-213
- *STEPLINE* on page 2-215
- *STEPOINSTR* on page 2-218
- *STEPO* on page 2-220
- *STOP* on page 2-223
- *TEST* on page 2-224
- *UNLOAD* on page 2-228
- *UP* on page 2-230
- *VCLEAR* on page 2-231
- *VCLOSE* on page 2-232
- *VERIFYFILE* on page 2-233
- *VMACRO* on page 2-235
- *VOPEN* on page 2-237
- *VSETC* on page 2-239
- *WAIT* on page 2-240
- *WARMSTART* on page 2-241

- *WHERE* on page 2-242
- *WRITEFILE* on page 2-244.

2.2.1 ADD

The `ADD` command creates a symbol and adds it to the RealView Debugger symbol table.

Syntax

`ADD [`*`type`*`]` *`symbol_name`* `[&`*`address`*`] [=`*`value`*` [,`*`value`*`]...]`

where:

`type`	One of the following data types:
	`int` The symbol represents a location holding a four byte signed integer value. This is the default type of symbols.
	`char` The symbol represents a location holding a one byte value.
	`short` The symbol represents a location holding a two byte value.
	`long` The symbol represents a location holding a four byte value.
	`long long` The symbol represents a location holding an 8-byte value.
	You can use these types together with `*` and `[]` to indicate pointer and array variables, using the C language syntax.
	You can also create symbols with *`type`* **`float`** or **`double`**, but you cannot initialize them with a value in the `ADD` statement.
	You can create references to existing instances of the following types:
	`struct` The symbol is an instance of, or a pointer to, a C structure.
	`enum` The symbol is an instance of, or a pointer to, a C enumeration.
	`union` The symbol is an instance of, or a pointer to, a C union.
	You cannot create new enumerations, structures, or unions. You cannot initialize complete structures at once, although you can individually assign values to the members with `CEXPRESSION`.
	If the symbol is an array, then the array size must be specified after to the symbol name within in square brackets. You can define multidimensional arrays by appending several bracketed array dimensions.
`symbol_name`	Is the name of the symbol being added. The name must start with an alphabetic character or an underscore, optionally followed by alphabetic or numeric characters or underscores. The symbol name must not already exist (when appropriate, use `DELETE` on page 2-88 to remove a symbol).
`address`	Is the address in target memory that is referred to by this debugger symbol. If you do not specify an address, the new debugger symbol refers to a location in debugger memory, and is not available to code running on the target.

`value` Is the initial value of the added symbol. You can use:

- integer values corresponding to the C types **`int`**, **`char`**, **`short`**, **`long`** or **`long long`**
- pointers to integers in target memory
- strings in double quotes, matching the character array type, **`char`**[*n*], but not **`char`** *
- a list of values separated by a comma.

If the symbol type is a pointer, an assigned value must be the address of the value on the target.

You can initialize array symbols using multiple *`value`* arguments. For example:

```
add char names[3][2] ="aa", "bb"
print names[1]
"bb...
```

The `...` after `bb` indicates that there is no terminating `NUL` for the string, in this case because each element of the array is only 2 characters in size.

The value is loaded into the memory location referred to by the symbol. If value is not specified, the symbol is set to zero in debugger memory but is not given a value in target memory.

Floating-point values are not recognized.

Description

The `ADD` command adds a symbol to the debugger symbol table for the current connection. You cannot add a symbol without a connection, but you do not have to have loaded an executable image file. The symbol survives an executable image being reloaded (**File → Reload Image to Target**) but is destroyed if the target is disconnected and then reconnected or another, different, image is loaded.

You can remove a symbol defined using `ADD` by using the `DELETE` command, and you can modify its value using `CEXPRESSION`.

Rules

The following rules apply to the use of the `ADD` command:

- `ADD` runs asynchronously unless in a macro.
- The specified symbol must not exist at the time it is added.
- To change the symbol type, delete the symbol and then add it again.

- When initializing symbols, the size of the symbol is used, not the size of the type of value supplied. In particular, the size of a `char` array is not determined by the string used to initialize it.
- If a char array is created, for example using `ADD char namearray[n]`, it is filled with the initial value.
- If there is a runtime error in the initial value, the symbol is still created. You can then assign the correct value with the `CEXPRESSION` command, or you can delete the symbol and add it again with a legal initial value.

Examples

The following examples show how to use `ADD`:

`add mysymbol =3`	Adds a new symbol called `mysymbol` of type **`int`** to the debugger symbol table. The new symbol refers to a 1-**`int`** area of debugger memory that is given an initial value of 3.
`add char *xyz`	Adds a new symbol called `xyz` to the debugger symbol table. The new symbol is of character pointer type and has an initial value of zero.

See also

The following commands provide similar or related functionality:

- *CEXPRESSION* on page 2-67
- *DELETE* on page 2-88.

2.2.2 ADDBOARD

The `ADDBOARD` command creates a board file entry that is not persistent across RealView Debugger sessions.

Syntax

```
ADDBOARD name|id [={string,...}]
```

where:

name	The name of the board file that you are modifying.
string	Specifies a comma separated list of *name=value* settings to create in the board file entry.

Description

The `ADDBOARD` command enables you to modify a board file entry in debugger memory, so that you do not have to change the board files themselves.

The command does not modify the file on disk.

See also

The following commands provide similar or related functionality:

- *CONNECT* on page 2-73
- *DELBOARD* on page 2-87.

2.2.3 ADDFILE

The `ADDFILE` command adds the named file to the executable image file list but does not load it. You can optionally empty the list before adding the new filename.

Syntax

```
ADDFILE [,auto] name [={string,...}]
```

where:

`auto`	Specifies that only one added file is allowed per process or processor. Any previously added file is removed when the specified file is added.
`name`	The name of the file to be added. You must use double quotes around the name if it contains any spaces.
`string`	The target pathname for an RTOS loader.

Description

The RealView Debugger executable file list contains the names of the files containing the target code for your application. Normally this contains a single linker output file, for example `dhry.axf` and, in this case, you use the `LOAD` and `RELOAD` commands as required.

However, when the application is more complex it is sometimes easier to create it as several files, for example one file for the *Operating System* (OS) and one for each major process. In these cases, you use the `ADDFILE` and `RELOAD`, or the `ADDFILE` and `LOAD/A` commands, to manipulate the files that are loaded onto the target.

To load the files on the file list use `RELOAD`, described on page 2-189.

Examples

The following example removes any existing files from the executable file list and loads `dhry.axf` into it. The reload command then transfers the executable contents of `dhry.axf` to the target and sets the processor PC to the image entry point:

```
addfile,auto =c:\source\dhry\debug\dhry.axf
reload
```

This is the same as:

```
load c:\source\dhry\debug\dhry.axf
```

This example loads the file `dhry.axf` into the file list, removing any existing files. It then adds the file `kernel.axf` to the file list. The reload command transfers the executable contents of both files to the target and sets the PC to the entry address of the last executable loaded, in this case that of `kernel.axf`.

```
addfile,auto =c:\source\dhry\debug\dhry.axf
addfile =c:\source\OS\debug\kernel.axf
reload
```

See also

The following commands provide similar or related functionality:

- *DELFILE* on page 2-90
- *DVFILE* on page 2-115
- *LOAD* on page 2-150
- *RELOAD* on page 2-189
- *UNLOAD* on page 2-228.

2.2.4 ALIAS

The `ALIAS` command is used to manipulate command aliases. Aliases are new debugger commands constructed from (optionally, parts of) existing debugger commands or macros.

Syntax

```
ALIAS [alias_name [=[definition]]]
```

where:

alias_name	Names your new debugger command. This name is accepted as a legal debugger command name. An optional asterisk `*` embedded in the name indicates that the parts of the name that follow are not required, so your command can be abbreviated.
definition	Defines the replacement string that is substituted in place of *alias_name* whenever *alias_name* is invoked. The definition normally contains macro invocations or debugger internal commands, or parts of such commands. However, any string of legal debugger characters is accepted. Using `$*` within a definition inserts the command-line parameters to the alias in the expansion. By default, parameters are appended to the alias when command expansion occurs.

Description

The `ALIAS` command can create, list, or delete new debugger commands. The building blocks are existing debugger commands and macros and, optionally, specific parameters. You can use `ALIAS` to define either:

- a new name (for example, one that is shorter or easier to remember) for an existing command
- a command that defines fixed parameters for an existing command.

`ALIAS` can only substitute one command for another. If you require a multiple command alias, use the `MACRO` command instead.

Enter `ALIAS` without parameters to display a list of the defined alias commands in the order in which they were added.

You can name your alias using almost any sequence of letters or numbers. However, when a command is entered the debugger searches for internal debugger commands before it searches for aliases. You must therefore ensure that you do not use an alias name that is the same as an internal debugger command. The name priorities are as follows:

1. Debugger internal command, or defined abbreviation of command.
2. Defined alias names, and the defined abbreviations of alias names.
3. Macro names.

You can place alias command arguments in a specific position in the expanded debugger command by inserting the sequence `$*` where the parameters to the command alias must appear.

Rules

The following rules apply to the use of the `ALIAS` command:

- `ALIAS` runs asynchronously unless it is called within a macro.
- *`alias_name`* must not exist at the time it is added. To change the definition of an alias, first define the alias equal to the nothing (`alias nm=`) to delete it and then add it again.
- If a debugger command has the same name as an alias, the debugger command is the one that is executed.
- Alias names are always matched before macros names.
- If two alias abbreviations or an alias and an abbreviation match, the first alias added during the current session is always used.
- An alias definition must be defined in terms of predefined debugger commands or macro names.
- An alias definition can reference debugger commands and macros.

Examples

The following examples show how to use `ALIAS`:

```
alias showf*ile =dtfile ;99
```

Defines a command called `SHOWFILE` that can be abbreviated to `SHOWF`, that is equivalent to the `DTFILE` command with its output directed to window number `99`.

```
alias dub =dump /b
```

Defines a command called `DUB`, with no abbreviation, that expands to the `DUMP` command in byte mode (`/b`).

```
dub 0x20
```

Calls the alias `dub` to print out memory in bytes from address `0x20`. This alias invocation is exactly the same as typing:

```
dump /b 0x20
```

```
alias bpc =breakexecution,continue,message:{Break} $* ;DoCheck()
```

Defines a command called `BPC`, with no abbreviation, that expands to the `breakexecution` command with specific parameters and trigger macro `DoCheck()`. It must be invoked with the address to break at as a parameter:

```
bpc \MAIN_C\#15
```

This is equivalent to typing the command:

```
breakexecution,continue,message:{Break} \MAIN_C\#15 ;DoCheck()
```

See also

The following commands provide similar or related functionality:

- *BREAKEXECUTION* on page 2-38
- *DTFILE* on page 2-107
- *MACRO* on page 2-155.

2.2.5 ARGUMENTS

The `ARGUMENTS` command enables you to specify the command-line arguments for the application. These are used for each subsequent run on this connection.

Syntax

```
ARGUMENTS [,delete]|[,prompt]
```

```
ARGUMENTS [,default] string
```

where:

`delete`	Delete the currently set `ARGUMENTS` list, so the `argv` list for the next run of a program is only the program filename.
`default`	Make the defined arguments the default, so they apply to new connections created in this session.
`prompt`	Display a dialog to prompt you for the arguments when the `ARGUMENTS` command is executed.
`string`	Defines the command line that the application sees when it inspects the `argv[]` array, or equivalent.

Description

The `ARGUMENTS` command enables you to specify arguments that the target application might require when it starts execution. The specified string is made available to ARM® applications through the semihosting mechanism.

If a literal double-quote character is required in the arguments, it must be quoted using the backslash character.

Examples

The following examples show how to use `ARGUMENTS`:

```
ARGUMENTS "-f file.c -o file.o"
```

Sets the command line so that, if the line is parsed in the normal way by `_main()`, the `argv[]` array contains:

argv[0]	target program filename, for example: `com.axf`
argv[1]	`-f`
argv[2]	`file.c`
argv[3]	`-o`

argv[4]	`file.o`
argv[5]	`NULL`

`ARGUMENTS "-f \"my file.c\" -o \"my file.o\""`

Sets the command line so that, if the line is parsed in the normal way by `_main()`, the `argv[]` array contains:

argv[0]	target program filename, for example: "`com.axf`"
argv[1]	`-f`
argv[2]	`"my file.c"`
argv[3]	`-o`
argv[4]	`"my file.o"`
argv[5]	`NULL`

See also

The following commands provide similar or related functionality:

- *GO* on page 2-136
- *LOAD* on page 2-150
- *RESTART* on page 2-194.

2.2.6 BACCESS

BACCESS is an alias of BREAKACCESS (see page 2-31).

2.2.7 BEXECUTION

BEXECUTION is an alias of BREAKEXECUTION (see page 2-38).

2.2.8 BGLOBAL

The `BGLOBAL` command enables or disables global breakpoints, also called *processor events*.

Syntax

```
BGLOBAL [,request] [name] [;macro-call]
```

where:

`request` If specified, must be one of the following:

`enable`	Enable the specified global breakpoint.
`disable`	Disable the specified global breakpoint.
`gui`	Display a list box enabling you to select a global breakpoint to enable or disable.

`name` Identifies the global breakpoint to be enabled or disabled.

`macro-call` Specifies a macro and any parameters it requires. This macro is run when a global breakpoint is triggered.

If the macro returns a true (nonzero) value, execution continues. If the macro returns a false (zero) value, or if you do not specify a macro, target execution stops and the debugger waits in command mode.

Description

The `BGLOBAL` command enables or disables global breaks. A global breakpoint is a processor event that can cause execution to halt in any application using this connection. For example, taking an undefined instruction trap might be a global breakpoint. The list of possible global breakpoint events is defined by a combination of the target processor and the target vehicle. For more information on the meaning of the processor events see the processor architecture manual.

Compatibility

The supported events are determined in part by the currently connected processor type:

ARM architecture processors

The possible events are the exception types supported by the processor. The supported *`name`*s are:

Reset	The RESET exception.
Undefined	The undefined instruction exception.

SWI	The software interrupt (SWI) exception.
P_Abort	The prefetch abort (instruction memory read abort) exception.
D_Abort	The data abort (data memory read or write abort) exception.
Address	The address exception. Used by the now obsolete 26-bit ARM processor architectures.
IRQ	The interrupt request exception.
FIQ	The fast interrupt request exception.
Error	The error exception.

Examples

The following example disables debugger interception of the ARM architecture SWI exception, so that an application can process SWI exceptions itself:

```
bglobal,disable SWI
```

This example enables debugger interception of the ARM architecture UNDEF exception, so that if the application starts executing data literals (the usual reason for unintentionally executing an undefined instruction) you can find out why:

```
bglobal,enable undefined
```

Some processor events interact with other debugger functions. For example, the ARM SWI exception is used by the ARM Semihosting interface.

See also

The following command provides similar or related functionality:

- *GO* on page 2-136.

2.2.9 BINSTRUCTION

`BINSTRUCTION` is an alias of `BREAKINSTRUCTION` (see page 2-45).

2.2.10 BREAD

BREAD is an alias of BREAKREAD (see page 2-50).

2.2.11 BREAK

BREAK is an alias of BREAKINSTRUCTION (see page 2-45).

2.2.12 BREAKACCESS

The BREAKACCESS command sets an access (memory read or memory write) breakpoint at the specified memory location(s).

Syntax

```
BREAKACCESS [{,qualifier...}] [address | address_range] [;macro_call]
```

where:

qualifier Is a list of zero or more qualifiers. The possible qualifiers are described in *Description*.

address | *address_range*

Specifies a single address in target memory, or an address range.

macro_call Specifies a macro and any parameters it requires. This macro runs when the access breakpoint is triggered. The macro is treated as being specified last in the qualifier list.

If the macro returns a TRUE (nonzero) value, or you specified `continue` in the qualifiers, execution continues. If the macro returns a FALSE (zero) value, or if you do not specify a macro, target execution stops and the debugger waits in command mode.

The macro argument symbols are interpreted when the breakpoint is specified and so they must be in scope at that point, or you must explicitly qualify them.

Description

BREAKACCESS is used to set or modify memory access breakpoints. Access breakpoints trigger when one or more specified memory addresses are read from or written to. If the command has no arguments, it behaves like DTBREAK on page 2-105, listing the current breakpoints.

Hardware address breakpoints can use other hardware tests in association with the address test, such as trigger inputs and outputs, hardware pass counters, and *and-then*, or chained, tests.

All breakpoints can add on-host qualifiers, for example expressions, macros, C++ object tests, and pass counters. All address breakpoints can include on-host actions including: counters, timing (with hardware assist), update of specified windows, and enabling or disabling other breakpoints, and the starting and stopping other threads.

If supported by an RTOS kernel, these breakpoints can be thread-specific, although usually not for hardware-assisted breaks.

When a hardware breakpoint instruction is hit on the target, the following sequence of events occurs:

1. The debugger or the hardware associates the event with a specific debugger breakpoint ID.
2. If the breakpoint has a software pass count associated with it, the count is updated.
3. The conditions for this breakpoint, if any, are tested in the order specified on the command line. If any condition fails, target execution resumes with the instruction at the breakpointed location.
4. If the breakpoint has actions associated with it (for example, using `timed` to note the time the breakpoint occurred) these actions are run, in the order specified on the command line. Macros specified with `macro:` are run in this phase.
5. If there is a macro specified after a semicolon on the command line, this is run.
6. If the qualifiers included continue, target execution resumes with the instruction at the breakpointed location. If not, the debugger updates the state of the GUI and waits for a command, leaving the application halted.

The list of qualifiers is dependent on the processor and vehicle and so the GUI does not present things that do not make sense. The command handler generates an error if a specific combination is not allowed for a specific processor or vehicle, but this is determined when you issue the command. The possible qualifiers are:

`append:(`*`n`*`)`	Instead of creating a new breakpoint, append the qualifiers specified with this command to an existing breakpoint with breakpoint ID number *`n`*. You cannot change the breakpoint address.
<u>`cont`</u>`inue`	Any triggering of the breakpoint is recorded (for example, as a journal entry, or by the action of a macro) but execution then continues.
`context:{`*`context`*`}`	Sets the context for other expressions in this breakpoint command to the value of context. This provides an alternative to specifying the complete context for every symbol. For example: `ba,context:{\HELLO_1\HELLO_C},when:{status>0} #15` This causes a breakpoint to be set at line 15 of `hello.c` that is triggered only when the variable `status` defined in `hello.c` is greater than zero. The alternative form is:

```
ba,when:{\HELLO_1\HELLO_C\status>0} \HELLO_1\HELLO_C\#15
```

`data_only`	The breakpoint is triggered if a data value, specified using `hw_dvalue`, is detected by the debug hardware on the processor data bus.
`gui`	If an error occurs when executing the command or when the breakpoint is triggered, the GUI is used to report it. Otherwise, the error is reported to the command pane.
`hw_ahigh:(`*n*`)`	Specifies the high address for an address-range breakpoint. The low address is specified by the standard breakpoint address. This facility is not supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for any address between `0x1000-0x1200`: `BREAKACCESS,hw_ahigh:0x1200 0x1000`
`hw_amask:(`*n*`)`	Specifies the address mask value for an address-range breakpoint. Addresses that match the standard breakpoint address when masked with this value cause the breakpoint to trigger. This facility is supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for any address between `0x1FA00-0x1FA0F`: `BREAKACCESS,hw_amask:0xFFFF0 0x1FA00`
`hw_dvalue:(`*n*`)`	Specifies a data value to be compared to values transmitted on the processor data bus. This facility is supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for the data value `0x400`: `BREAKACCESS,hw_dvalue:0x440 0x1FA00`
`hw_dhigh:(`*n*`)`	Specifies the high data value for a data-range breakpoint. The low data value is specified by the `hw_dvalue` qualifier. This facility is not supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for any data value between `0x00-0x18`: `BREAKACCESS,hw_dvalue:0x0,hw_dhigh:0x18 0x1000`
`hw_dmask:(`*n*`)`	Specifies the data value mask value for a data-range breakpoint. Data values that match the value specified by the `hw_dvalue` qualifier when masked with this value cause the breakpoint to trigger.

This facility is supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for any data value between `0x400-0x4F0`:

```
BREAKACCESS,hw_dvalue:0x440,hw_dmask:0xF0F 0x1FA00
```

`hw_passcount:(n)`

Specifies the number of times that the specified condition has to occur to trigger the breakpoint. The default value is 1. This qualifier differs from `passcount` only in that it is implemented in hardware. *`n`* is limited to a 32-bit value by the debugger, but might be much more limited by the target hardware, for example to 8 or 16 bits.

You can combine hardware and software pass counts to supplement the hardware one for higher count values. When both hardware and software pass counts are defined:

1. When the hardware count reaches zero, the software count is decremented.
2. When the software count reaches zero, the breakpoint triggers.

`hw_and:{[then-]id}`

Perform an *and* or an *and-then* conjunction with an existing breakpoint. For example, `hw_and:{2}`, or `hw_and:{then-2}`, where *2* is the breakpoint id of another breakpoint.

In the *and* form, the conditions associated with both breakpoints are tied, so that the action associated with the second breakpoint are performed only when both conditions simultaneously match.

In the *and-then* form, when the condition for the first breakpoint is met, the second breakpoint is enabled but the program is not yet stopped. When the second breakpoint condition is matched, the actions associated are performed. At this point, unless the `continue` qualifier is specified in the second breakpoint, the program stops.

The *`id`* is one of:

- the breakpoint list index of an existing breakpoint
- `prev` for the last breakpoint specified for this connection.

Debugger internal handle numbers are not available to users to identify breakpoints.

`hw_in:{}`

In trigger tests. The string that follows matches hardware-supported input tests, per vehicle and processor, as a list of names or a value.

`hw_out:{s}`

Not supported in this release.

`hw_not:{s}` Use this qualifier to invert the sense of an address, data, or `hw_and` term specified in the same command. The argument *`s`* can be set to:

`addr`	Invert the breakpoint address value.
`data`	Invert the breakpoint value.
`then`	Invert an associated `hw_and:{then}` condition.

For example, to break when a data value does not match a mask, you can write:

```
BREAKACCESS,hw_not:data,hw_dmask:0x00FF ...
```

The break commands require an address value, and the `addr` variant of `hw_not` uses this address.

```
BREAKACCESS,hw_not:addr 0x10040
```

This means to break at any address other than `0x10040`. This is probably not useful.

The `hw_not:then` variant of the command is used in conjunction with `hw_and` to form *or* and *nand-then* conditions.

This facility is not supported by ARM EmbeddedICE macrocells.

`macro:(`*`MacroCall(arg1,arg2)`*`)`

The triggering of the breakpoint results in the specified macro being executed. Any program variables or functions must be in scope at the time the breakpoint request is entered, or the names must be fully qualified.

<u>`mess`</u>`age:{`*`message`*`}` Triggering of the breakpoint results in *`message`* being output. Prefixing *`message`* with `$`*`n`*`$` enables you to write the message text to custom window *n*, where *n* is between 50-1024.

`modify:(`*`n`*`)` Instead of creating a new breakpoint, modify the breakpoint with breakpoint ID number *`n`* by replacing the address expression and the qualifiers of the existing breakpoint to those specified in this command.

`obj:(`*`n`*`)` This condition is true if the argument *`n`* matches the C++ object pointer, normally called `this`.

<u>`pass`</u>`count:(`*`n`*`)` Specifies the number of times that the specified condition has to occur to trigger the breakpoint. The default value is 1. If you specify this in the middle of a sequence of break conditions, those specified before the passcount are processed whether or not the count reaches zero. The conditions specified afterwards are run only when the count reaches zero.

There is a hardware passcount qualifier available, `hw_passcount`, for debug hardware that supports it.

——— **Note** ———

If a breakpoint uses a `passcount`, the counting is performed on the host, and so program execution stops briefly every time the breakpoint is hit, even when the count has not been reached.

`register:`*`expression`*
: The breakpoint is triggered if the value stored in the specified memory-mapped register is accessed in any way. The register is identified by *expression*. For example:

```
ba,register:PR1
```

or

```
ba,register:@PR1
```

——— **Note** ———

You cannot specify core registers with this qualifier.

`sample`
: Not supported in this release.

`timed`
: Triggering records the time, in whatever units the debug hardware chooses, from the last reset of time. The time can be in nanoseconds, microseconds, processor cycles, instructions, or units. See the documentation for the hardware interface for more information.

The recorded times are displayed in the Resource Viewer window and in the breakpoint information for this breakpoint.

The timed qualifier can be used for simple profiling, or for a measure of specific response times. If you use `timed` and `continue`, the debugger keeps a log of times for each break.

`update:{@}`
: Update the named windows, or all windows, by reading the memory and processor state when the breakpoint triggers. You can use the name `all` to refresh all windows, or a name specified in the title bar of the window.

This qualifier enables you to get an overview of the process state at a particular point, without having to manually restart the process at each break. The update still takes a significant period of time, and so this method is unsuitable as a non-intrusive debugging tool.

`when:{`*`condition`*`}`	The breakpoint is triggered whenever *condition*, a debugger expression, evaluates to TRUE.
`when_not:{`*`condition`*`}`	The breakpoint is triggered whenever *condition*, a debugger expression, evaluates to FALSE.

Alias

`BACCESS` is an alias of `BREAKACCESS`.

See also

The following commands provide similar or related functionality:

- *BREAKEXECUTION* on page 2-38
- *BREAKINSTRUCTION* on page 2-45
- *BREAKREAD* on page 2-50
- *BREAKWRITE* on page 2-57
- *CLEARBREAK* on page 2-69
- *DTBREAK* on page 2-105
- *ENABLEBREAK* on page 2-119.

2.2.13 BREAKEXECUTION

The `BREAKEXECUTION` command sets an execution breakpoint that enables ROM-based breakpoints by using the hardware breakpoint facilities of the target.

Syntax

```
BREAKEXECUTION [{,qualifier...}] expression [={threads,...}] [;macro-call]
```

where:

qualifier	Is an ordered list of zero or more qualifiers. The possible qualifiers are described in *Description*.
expression	Specifies the address at which the breakpoint is placed. For an unqualified breakpoint, this is the address at which program execution is stopped.
threads	Not supported in this release.
macro-call	Specifies a macro and any parameters it requires. The macro runs when the breakpoint is triggered and before the instruction at the breakpoint is executed. The macro is treated as being specified last in the qualifier list. If the macro returns a TRUE (nonzero) value, or you specified `continue` in the qualifiers, execution continues. If the macro returns a FALSE (zero) value, or if you do not specify a macro, target execution stops and the debugger waits in command mode. The macro argument symbols are interpreted when the breakpoint is specified and so they must be in scope at that point, or you must explicitly qualify them.

Description

This command is used to set or modify instruction address breakpoints. Address breakpoints include breakpoints set by patching special instructions into the program and hardware that tests the address and data values. If the command has no arguments, it behaves like `DTBREAK` on page 2-105, listing the current breakpoints.

Hardware address breakpoints can use other hardware tests in association with the address test, such as trigger inputs and outputs, hardware pass counters, and *and-then*, or chained, tests.

All breakpoints can add on-host qualifiers, for example expressions, macros, C++ object tests, and pass counters. All address breakpoints can include on-host actions including counters, timing (with hardware assist), update of specified windows, and enabling or disabling other breakpoints, and starting and stopping other threads.

If supported by an RTOS kernel, these breakpoints can be thread-specific, although usually not for hardware-assisted breaks.

When a hardware breakpoint instruction is hit on the target, the following sequence of events occurs:

1. The debugger or the hardware associates the event with a specific debugger breakpoint ID.
2. If the breakpoint has a software pass count associated with it, the count is updated.
3. The conditions for this breakpoint, if any, are tested in the order specified on the command line. If any condition fails, target execution resumes with the instruction at the breakpointed location.
4. If the breakpoint has actions associated with it (for example, using `timed` to note the time the breakpoint occurred) these actions are run, in the order specified on the command line. Macros specified with `macro:` are run in this phase.
5. If there is a macro specified after a semicolon on the command line, this is run.
6. If the qualifiers included continue, target execution resumes with the instruction at the breakpointed location. If not, the debugger updates the state of the GUI and waits for a command, leaving the application halted.

The list of qualifiers is dependent on the processor and vehicle and so the GUI does not present things that do not make sense. The command handler generates an error if a specific combination is not allowed for a specific processor or vehicle, but this is determined when you issue the command. The possible qualifiers are:

`append:(`*`n`*`)`	Instead of creating a new breakpoint, append the qualifiers specified with this command to an existing breakpoint with breakpoint ID number *`n`*. You cannot change the breakpoint address.
`continue`	Any triggering of the breakpoint is recorded (for example, as a journal entry, or by the action of a macro) but execution then continues.
`context:{`*`context`*`}`	Sets the context for other expressions in this breakpoint command to the value of context. This provides an alternative to specifying the complete context for every symbol. For example:

```
be,context:{\HELLO_1\HELLO_C},when:{status>0} #15
```

This causes a breakpoint to be set at line 15 of `hello.c` that is triggered only when the variable `status` defined in `hello.c` is greater than zero. The alternative form is:

```
be,when:{\HELLO_1\HELLO_C\status>0} \HELLO_1\HELLO_C\#15
```

`data_only`

The breakpoint is triggered if a data value, specified using `hw_dvalue`, is detected by the debug hardware on the processor data bus.

`gui`

If an error occurs when executing the command or when the breakpoint is triggered, the GUI is used to report it. Otherwise, the error is reported to the command pane.

`hw_ahigh:(`*n*`)`

Specifies the high address for an address-range breakpoint. The low address is specified by the standard breakpoint address.

This facility is not supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for any address between `0x1000-0x1200`:

```
BE,hw_ahigh:0x1200 0x1000
```

`hw_amask:(`*n*`)`

Specifies the address mask value for an address-range breakpoint. Addresses that match the standard breakpoint address when masked with this value cause the breakpoint to trigger.

This facility is supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for any address between `0x1FA00-0x1FA0F`:

```
BE,hw_amask:0xFFFF0 0x1FA00
```

`hw_dvalue:(`*n*`)`

Specifies a data value to be compared to values transmitted on the processor data bus.

This facility is supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for the data value `0x400`:

```
BE,hw_dvalue:0x440 0x1FA00
```

`hw_dhigh:(`*n*`)`

Specifies the high data value for a data-range breakpoint. The low data value is specified by the `hw_dvalue` qualifier.

This facility is not supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for any data value between `0x00-0x18`:

```
BE,hw_dvalue:0x0,hw_dhigh:0x18 0x1000
```

`hw_dmask:(`*`n`*`)`

Specifies the data value mask value for a data-range breakpoint. Data values that match the value specified by the `hw_dvalue` qualifier when masked with this value cause the breakpoint to trigger.

This facility is supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for any data value between `0x400-0x4F0`:

```
BE,hw_dvalue:0x440,hw_dmask:0xF0F 0x1FA00
```

`hw_passcount:(`*`n`*`)`

Specifies the number of times that the specified condition has to occur to trigger the breakpoint. The default value is 1. This qualifier differs from `passcount` only in that it is implemented in hardware. *`n`* is limited to a 32-bit value by the debugger, but might be much more limited by the target hardware, for example to 8 or 16 bits.

You can combine hardware and software pass counts to supplement the hardware one for higher count values. When both hardware and software pass counts are defined:

1. When the hardware count reaches zero, the software count is decremented.
2. When the software count reaches zero, the breakpoint triggers.

`hw_and:{[then-]`*`id`*`}`

Perform an *and* or an *and-then* conjunction with an existing breakpoint. For example, `hw_and:{2}`, or `hw_and:{then-2}`, where *`2`* is the breakpoint id of another breakpoint.

In the *and* form, the conditions associated with both breakpoints are tied, so that the action associated with the second breakpoint are performed only when both conditions simultaneously match.

In the *and-then* form, when the condition for the first breakpoint is met, the second breakpoint is enabled but the program is not yet stopped. When the second breakpoint condition is matched, the actions associated are performed. At this point, unless the `continue` qualifier is specified in the second breakpoint, the program stops.

The *`id`* is one of:

- the breakpoint list index of an existing breakpoint
- `prev` for the last breakpoint specified for this connection.

Debugger internal handle numbers are not available to users to identify breakpoints.

`hw_in:{}`
: In trigger tests. The string that follows matches hardware-supported input tests, per vehicle and processor, as a list of names or a value.

`hw_out:{s}`
: Not supported in this release.

`hw_not:{s}`
: Use this qualifier to invert the sense of an address, data, or `hw_and` term specified in the same command. The argument *s* can be set to:

`addr`	Invert the breakpoint address value.
`data`	Invert the breakpoint value.
`then`	Invert an associated `hw_and:{then}` condition.

For example, to break when a data value does not match a mask, you can write:

```
BREAKEXECUTION,hw_not:data,hw_dmask:0x00FF ...
```

The break commands require an address value, and the `addr` variant of `hw_not` uses this address.

```
BE,hw_not:addr 0x10040
```

This means to break at any address other than `0x10040`. This is probably not useful.

The `hw_not:then` variant of the command is used in conjunction with `hw_and` to form *nand* and *nand-then* conditions.

This facility is not supported by ARM EmbeddedICE macrocells.

`macro:(`*`MacroCall(arg1,arg2)`*`)`
: The triggering of the breakpoint results in the specified macro being executed. Any program variables or functions must be in scope at the time the breakpoint request is entered, or the names must be fully qualified.

`message:{`*`message`*`}`
: Triggering of the breakpoint results in *message* being output. Prefixing *message* with `$`*n*`$` enables you to write the message text to custom window *n*, where *n* is between 50-1024.

`modify:(`*`n`*`)`
: Instead of creating a new breakpoint, modify the breakpoint with breakpoint ID number *n* by replacing the address expression and the qualifiers of the existing breakpoint to those specified in this command.

`obj:(`*`n`*`)`
: This condition is true if the argument *n* matches the C++ object pointer, normally called `this`.

`passcount:(`*n*`)`	Specifies the number of times that the specified condition has to occur to trigger the breakpoint. The default value is 1. If you specify this in the middle of a sequence of break conditions, those specified before the passcount are processed whether or not the count reaches zero. The conditions specified afterwards are run only when the count reaches zero. There is a hardware passcount qualifier available, `hw_passcount`, for debug hardware that supports it. **Note** If a breakpoint uses a `passcount`, the counting is performed on the host, and so program execution stops briefly every time the breakpoint is hit, even when the count has not been reached.
`sample`	Not supported in this release.
`timed`	Triggering records the time, in whatever units the debug hardware chooses, from the last reset of time. The time can be in nanoseconds, microseconds, processor cycles, instructions, or units. See the documentation for the hardware interface for more information. The recorded times are displayed in the Resource Viewer window and in the breakpoint information for this breakpoint. The timed qualifier can be used for simple profiling, or for a measure of specific response times. If you use `timed` and `continue`, the debugger keeps a log of times for each break.
`update:{`*name*`}`	Update the named windows, or all windows, by reading the memory and processor state when the breakpoint triggers. You can use the name `all` to refresh all windows, or a name specified in the title bar of the window. This qualifier enables you to get an overview of the process state at a particular point, without having to manually restart the process at each break. The update still takes a significant period of time, and so this method is unsuitable as a non-intrusive debugging tool.
`when:{`*condition*`}`	The breakpoint is triggered whenever *condition*, a debugger expression, evaluates to TRUE.
`when_not:{`*condition*`}`	The breakpoint is triggered whenever *condition*, a debugger expression, evaluates to FALSE.

Examples

The following examples show how to use `BREAKEXECUTION`:

`BREAKEXECUTION \MATH_1\#449.3`

Set a hardware breakpoint at line 449, statement 3 in the file `math.c`.

`BREAKE,append:(1),continue,update:{all}`

Given an already set breakpoint at position 1 in the breakpoint list, add a request to update all windows in the code window for this connection and continue execution each time the breakpoint triggers.

`BE,hw_pass:(5) \MAIN_1\#49`

Set a hardware breakpoint using a hardware counter to stop at the fifth time that execution reaches line 49 of `main.c`.

`BE \MAIN_1\MAIN_C\#33 ;CheckStruct()`

Set a hardware breakpoint that triggers a call to a debugger macro `CheckStruct` each time it reaches line 33 of `main.c`. If `CheckStruct` returns `TRUE`, the debugger continues application execution.

`BE,when:{check_struct()} \MAIN_1\#33`

Set a hardware breakpoint that triggers a call to a target program function `check_struct()` each time it reaches line 33 of `main.c`. If this function returns `FALSE`, the debugger continues application execution.

Alias

`BEXECUTION` is an alias of `BREAKEXECUTION`.

See also

The following commands provide similar or related functionality:

- *BREAKINSTRUCTION* on page 2-45
- *MACRO* on page 2-155.

2.2.14 BREAKINSTRUCTION

The `BREAKINSTRUCTION` command sets a software instruction breakpoint at the specified memory location. Software breakpoints are implemented by writing a special instruction at the break address, and so cannot be set in ROM.

Syntax

```
BREAKINSTRUCTION [{,qualifier...}] [expression] [={threads,...}] [;macro-call]
```

where:

qualifier Is an ordered list of zero or more qualifiers. The possible qualifiers are described in *Description*

expression Specifies the address at which the breakpoint is placed. For an unqualified breakpoint, this is the address at which program execution is stopped.

threads Not supported in this release.

macro-call Specifies a macro and any parameters it requires. The macro runs when the breakpoint is triggered and before the instruction at the breakpoint is executed. The macro is treated as being specified last in the qualifier list.

If the macro returns a TRUE (nonzero) value, or you specified `continue` in the qualifiers, execution continues. If the macro returns a FALSE (zero) value, or if you do not specify a macro, target execution stops and the debugger waits in command mode.

The macro argument symbols are interpreted when the breakpoint is specified and so they must be in scope at that point, or you must explicitly qualify them.

Description

`BREAKINSTRUCTION` is used to set or modify software address breakpoints. Address breakpoints include breakpoints set by patching special instructions into the program and hardware that tests the address and data values. If the command has no arguments, it behaves like `DTBREAK` on page 2-105, listing the current breakpoints.

If you try to set a software breakpoint at a location in ROM, and the debugger detects that the attempt failed, and hardware breakpoint facilities are available, the software breakpoint request is retried as a hardware breakpoint request.

You can use qualifiers evaluated in the debugger, such as expressions, macros, C++ object tests, and software pass counters. You can also define actions to occur when the breakpoint is *triggered* (hit), including updating counters or windows, and the enabling or disabling of other breakpoints.

When a software breakpoint instruction is hit on the target, the following sequence of events occurs:

1. The debugger associates the address with a specific breakpoint ID. A memory address can only be associated with one user breakpoint at a time.
2. If the breakpoint has a pass count associated with it, the count is updated.
3. The conditions for this breakpoint, if any, are tested in the order specified on the command line. If any condition fails, target execution resumes with the instruction at the breakpointed location.
4. If the breakpoint has actions associated with it (for example, using `timed` to note the time the breakpoint occurred) these actions are run, in the order specified on the command line. Macros specified with `macro:` are run in this phase.
5. If there is a macro specified after a semicolon on the command line, this is run.
6. If the qualifiers included continue, target execution resumes with the instruction at the breakpointed location. If not, the debugger updates the state of the GUI and waits for a command, leaving the application halted.

The list of qualifiers is dependent on the processor and vehicle and so the GUI does not present things that do not make sense. The command handler generates an error if a specific combination is not allowed for a specific processor or vehicle, but this is determined when you issue the command. The possible qualifiers are:

`append:(`*n*`)`	Instead of creating a new breakpoint, append the qualifiers specified with this command to an existing breakpoint with breakpoint ID number *n*. You cannot change the breakpoint address.
`continue`	Any triggering of the breakpoint is recorded (for example, as a journal entry, or by the action of a macro) but execution continues.
`context:{`*context*`}`	Sets the context for other expressions in this breakpoint command to the value of context. This provides an alternative to specifying the complete context for every symbol. For example: `BI,context:{\HELLO_1\HELLO_C},when:{status>0} #15`

	This causes a breakpoint to be set at line 15 of `hello.c` that is triggered only when the variable `status` defined in `hello.c` is greater than zero. The alternative form is: `BI,when:{\HELLO_1\HELLO_C\status>0} \HELLO_1\HELLO_C\#15`
`gui`	If an error occurs when executing the command or when the breakpoint is triggered, the GUI is used to report it. Otherwise, the error is reported to the command pane.
`macro:(`*`MacroCall(arg1,arg2)`*`)`	The triggering of the breakpoint results in the specified macro being executed. Any program variables or functions must be in scope at the time the breakpoint request is entered, or the names must be fully qualified. A macro call specified here is treated in the same way as a macro specified after a `;`.
`message:{`*`message`*`}`	Triggering of the breakpoint results in *`message`* being output. Prefixing *`message`* with `$`*`n`*`$` enables you to write the message text to custom window *n*, where *n* is between 50-1024.
`modify:(`*`n`*`)`	Instead of creating a new breakpoint, modify the breakpoint with breakpoint ID number *`n`* by replacing the address expression and the qualifiers of the existing breakpoint to those specified in this command.
`obj:(`*`n`*`)`	This condition is true if the argument *`n`* matches the C++ object pointer, normally called `this`.
`passcount:(`*`n`*`)`	Specifies the number of times that the specified condition has to occur to trigger the breakpoint. The default value is 1. If you specify this in the middle of a sequence of break conditions, those specified before the passcount are processed whether or not the count reaches zero. Only the conditions specified afterwards are run only when the count reaches zero. There is a hardware passcount qualifier available, `hw_passcount`, for debug hardware that supports it. **Note** If a hardware breakpoint uses a `passcount`, the counting is performed on the host, and so program execution stops briefly every time the breakpoint is hit, even when the count has not been reached.
`sample`	Not supported in this release.

`timed` Triggering records the time, in whatever units the debug hardware chooses, from the last reset of time. The time can be in nanoseconds, microseconds, processor cycles, instructions, or units. See the documentation for the hardware interface for more information.

The recorded times are displayed in the Resource Viewer window and in the breakpoint information for this breakpoint.

The timed qualifier can be used for simple profiling, or for a measure of specific response times. If you use `timed` and `continue`, the debugger keeps a log of times for each break.

`update:{@}` Update the named windows, or all windows, by reading the memory and processor state when the breakpoint triggers. You can use the name `all` to refresh all windows, or a name specified in the title bar of the window.

This qualifier enables you to get an overview of the process state at a particular point, without having to manually restart the process at each break. The update still takes a significant period of time, and so this method is unsuitable as a non-intrusive debugging tool.

`when:{`*`condition`*`}` The breakpoint is triggered whenever *condition*, a debugger expression, evaluates to TRUE.

`when_not:{`*`condition`*`}`

The breakpoint is triggered whenever *condition*, a debugger expression, evaluates to FALSE.

Rules

The following rules apply to the use of the `BREAKINSTRUCTION` command:

- Breakpoints are specific to the board, process, or task active in the window at the time they are set.
- If synchronous breakpoints are set on two or more threads, the debugger stops the threads as close to the same time as the architecture of the board permits.

Examples

The following examples show how to use `BREAKINSTRUCTION`:

```
BREAKINSTRUCTION \MATH_1\MATH_C\#449.3
```

Set a breakpoint at line 449, statement 3 in the file `math.c`.

`BREAKI,append:(1),continue,update:{all}`

Given an already set breakpoint at position 1 in the breakpoint list, add a request to update all windows in the code window for this connection and continue execution each time the breakpoint triggers.

`BI,pass:(5) \MAIN_1\MAIN_C\#49`

Set a breakpoint using a hardware counter to stop at the fifth time that execution reaches line 49 of `main.c`.

`BI \MAIN_1\MAIN_C\#33 ;CheckStruct()`

Set a breakpoint that triggers a call to a debugger macro `CheckStruct` each time it reaches line 33 of `main.c`. If `CheckStruct` returns `TRUE`, the debugger continues application execution.

`BI,when:{count<4 || err==5} \MAIN_1\SUBFN_C\#42`

Set a breakpoint that triggers when the expression `count<4 || err==5` is `TRUE` when execution reaches line 33 of `subfn.c`.

`BI,when:{check_struct()} \MAIN_1\MAIN_C\#33`

Set a breakpoint that triggers a call to a target program function `check_struct()` each time it reaches line 33 of `main.c`. If this function returns `FALSE`, the debugger continues application execution.

Alias

`BINSTRUCTION` and `BREAK` are aliases of `BREAKINSTRUCTION`.

See also

The following commands provide similar or related functionality:

- *BREAKACCESS* on page 2-31
- *BREAKEXECUTION* on page 2-38
- *CLEARBREAK* on page 2-69
- *MACRO* on page 2-155.

2.2.15 BREAKREAD

The BREAKREAD command sets a read breakpoint at the specified memory location(s).

Syntax

BREAKREAD [*address* | *address_range*] [;*macro_call*]

where:

address | *address_range*
: Specifies a single address in target memory, or an address range.

macro_call
: Specifies a macro and any parameters it requires.

Description

BREAKREAD is used to set or modify data read breakpoints. Data read breakpoints trigger when data that matches a condition is read from memory at a particular address or address range. If the command has no arguments, it behaves like DTBREAK on page 2-105, listing the current breakpoints.

If you do not specify an address, the read breakpoint is set at the address defined by the current value of the PC. The breakpoint is triggered if the target program reads data from any specified target memory area.

If specified, this macro runs when the breakpoint is triggered and after the instruction at the breakpoint is executed. If the macro returns a true (nonzero) value, execution continues. If the macro returns a false (zero) value, or if you do not specify a macro, target execution stops and the debugger waits in command mode.

The list of qualifiers is dependent on the processor and vehicle and so the GUI does not present things that do not make sense. The command handler generates an error if a specific combination is not allowed for a specific processor or vehicle, but this is determined when you issue the command. The possible qualifiers are:

append:(*n*)
: Instead of creating a new breakpoint, append the qualifiers specified with this command to an existing breakpoint with breakpoint ID number *n*. You cannot change the breakpoint address.

continue
: Any triggering of the breakpoint is recorded (for example, as a journal entry, or by the action of a macro) but execution then continues.

`context:{context}`	Sets the context for other expressions in this breakpoint command to the value of context. This provides an alternative to specifying the complete context for every symbol. For example: `BREAKREAD,context:{\HELLO_1\HELLO_C},when:{status>0} #15` This causes a breakpoint to be set at line 15 of `hello.c` that is triggered only when the variable `status` defined in `hello.c` is greater than zero. The alternative form is: `BREAD,when:{\HELLO_1\HELLO_C\status>0} \HELLO_1\HELLO_C\#15`
`data_only`	The breakpoint is triggered if a data value, specified using `hw_dvalue`, is detected by the debug hardware on the processor data bus.
`gui`	If an error occurs when executing the command or when the breakpoint is triggered, the GUI is used to report it. Otherwise, the error is reported to the command pane.
`hw_ahigh:(n)`	Specifies the high address for an address-range breakpoint. The low address is specified by the standard breakpoint address. This facility is not supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for any address between `0x1000-0x1200`: `BREAKREAD,hw_ahigh:0x1200 0x1000`
`hw_amask:(n)`	Specifies the address mask value for an address-range breakpoint. Addresses that match the standard breakpoint address when masked with this value cause the breakpoint to trigger. This facility is supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for any address between `0x1FA00-0x1FA0F`: `BREAKREAD,hw_amask:0xFFFF0 0x1FA00`
`hw_dvalue:(n)`	Specifies a data value to be compared to values transmitted on the processor data bus. This facility is supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for the data value `0x400`: `BREAKREAD,hw_dvalue:0x440 0x1FA00`
`hw_dhigh:(n)`	Specifies the high data value for a data-range breakpoint. The low data value is specified by the `hw_dvalue` qualifier.

This facility is not supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for any data value between `0x00-0x18`:

```
BREAKREAD,hw_dvalue:0x0,hw_dhigh:0x18 0x1000
```

`hw_dmask:(n)`

Specifies the data value mask value for a data-range breakpoint. Data values that match the value specified by the `hw_dvalue` qualifier when masked with this value cause the breakpoint to trigger.

This facility is supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for any data value between `0x400-0x4F0`:

```
BREAKREAD,hw_dvalue:0x440,hw_dmask:0xF0F 0x1FA00
```

`hw_passcount:(n)`

Specifies the number of times that the specified condition has to occur to trigger the breakpoint. The default value is 1. This qualifier differs from `passcount` only in that it is implemented in hardware. *n* is limited to a 32-bit value by the debugger, but might be much more limited by the target hardware, for example to 8 or 16 bits.

You can combine hardware and software pass counts to supplement the hardware one for higher count values. When both hardware and software pass counts are defined:

1. When the hardware count reaches zero, the software count is decremented.
2. When the software count reaches zero, the breakpoint triggers.

`hw_and:{[then-]id}`

Perform an *and* or an *and-then* conjunction with an existing breakpoint. For example, `hw_and:{2}`, or `hw_and:{then-2}`, where *2* is the breakpoint id of another breakpoint.

In the *and* form, the conditions associated with both breakpoints are tied, so that the action associated with the second breakpoint are performed only when both conditions simultaneously match.

In the *and-then* form, when the condition for the first breakpoint is met, the second breakpoint is enabled but the program is not yet stopped. When the second breakpoint condition is matched, the actions associated are performed. At this point, unless the `continue` qualifier is specified in the second breakpoint, the program stops.

The `id` is one of:

- the breakpoint list index of an existing breakpoint
- `prev` for the last breakpoint specified for this connection.

Debugger internal handle numbers are not available to users to identify breakpoints.

`hw_in:{}`	In trigger tests. The string that follows matches hardware-supported input tests, per vehicle and processor, as a list of names or a value.
`hw_out:{s}`	Not supported in this release.

`hw_not:{s}`

Use this qualifier to invert the sense of an address, data, or `hw_and` term specified in the same command. The argument *`s`* can be set to:

`addr`	Invert the breakpoint address value.
`data`	Invert the breakpoint value.
`then`	Invert an associated `hw_and:{then}` condition.

For example, to break when a data value does not match a mask, you can write:

```
BREAKREAD,hw_not:data,hw_dmask:0x00FF ...
```

The break commands require an address value, and the `addr` variant of `hw_not` uses this address.

```
BREAKREAD,hw_not:addr 0x10040
```

This means to break at any address other than `0x10040`. This is probably not useful.

The `hw_not:then` variant of the command is used in conjunction with `hw_and` to form *nand* and *nand-then* conditions.

This facility is not supported by ARM EmbeddedICE macrocells.

`macro:(`*`MacroCall(arg1,arg2)`*`)`

The triggering of the breakpoint results in the specified macro being executed. Any program variables or functions must be in scope at the time the breakpoint request is entered, or the names must be fully qualified.

`message:{`*`message`*`}`

Triggering of the breakpoint results in *`message`* being output. Prefixing *`message`* with `$`*`n`*`$` enables you to write the message text to window *n*, where *n* is between 50-1024.

`modify:(`*n*`)`	Instead of creating a new breakpoint, modify the breakpoint with breakpoint ID number *n* by replacing the address expression and the qualifiers of the existing breakpoint to those specified in this command.
`obj:(`*n*`)`	This condition is true if the argument *n* matches the C++ object pointer, normally called `this`.
`passcount:(`*n*`)`	Specifies the number of times that the specified condition has to occur to trigger the breakpoint. The default value is 1. If you specify this in the middle of a sequence of break conditions, those specified before the passcount are processed whether or not the count reaches zero. Only the conditions specified afterwards are run only when the count reaches zero. There is a hardware passcount qualifier available, `hw_passcount`, for debug hardware that supports it. **——— Note ———** If a hardware breakpoint uses a `passcount`, the counting is performed on the host, and so program execution stops briefly every time the breakpoint is hit, even when the count has not been reached. ————————
`sample`	Not supported in this release.

`register:`*expression*	The breakpoint is triggered if the value stored in the specified memory-mapped register is read. The register is identified by *expression*. For example:
	`ba,register:PR1`
	or
	`ba,register:@PR1`
	
	——— Note ———
	You cannot specify core registers with this qualifier.
	————————

`timed`	Triggering records the time, in whatever units the debug hardware chooses, from the last reset of time. The time can be in nanoseconds, microseconds, processor cycles, instructions, or units. See the documentation for the hardware interface for more information. The recorded times are displayed in the Resource Viewer window and in the breakpoint information for this breakpoint.

The timed qualifier can be used for simple profiling, or for a measure of specific response times. If you use `timed` and `continue`, the debugger keeps a log of times for each break.

`update:{@}`	Update the named windows, or all windows, by reading the memory and processor state when the breakpoint triggers. You can use the name `all` to refresh all windows, or a name specified in the title bar of the window. This qualifier enables you to get an overview of the process state at a particular point, without having to manually restart the process at each break. The update still takes a significant period of time, and so this method is unsuitable as a non-intrusive debugging tool.
`when:{`*`condition`*`}`	The breakpoint is triggered whenever *condition*, a debugger expression, evaluates to TRUE.
`when_not:{`*`condition`*`}`	The breakpoint is triggered whenever *condition*, a debugger expression, evaluates to FALSE.

Examples

The following examples show how to use `BREAKREAD`:

`BREAKREAD 0x8000`	Stop program execution if a read occurs at location `0x8000`.
`BREAKREAD 0x100..0x200`	Stop program execution if a read occurs in the 257 bytes from `0x100-0x200` (inclusive).

Alias

`BREAD` is an alias of `BREAKREAD`.

See also

The following commands provide similar or related functionality:

- *BREAKEXECUTION* on page 2-38
- *BREAKINSTRUCTION* on page 2-45
- *BREAKREAD* on page 2-50
- *BREAKWRITE* on page 2-57
- *CLEARBREAK* on page 2-69

- *DTBREAK* on page 2-105
- *ENABLEBREAK* on page 2-119.

2.2.16 BREAKWRITE

The `BREAKWRITE` command sets a write breakpoint at the specified memory location(s).

Syntax

`BREAKWRITE [address | address_range][; macro_call]`

where:

address | *address_range*	Specifies a single address in target memory, or an address range.
macro_call	Specifies a macro and any parameters it requires.

Description

`BREAKWRITED` is used to set or modify data write breakpoints. Data write breakpoints trigger when data that matches a condition is written to memory at a particular address or address range. If the command has no arguments, it behaves like `DTBREAK` on page 2-105, listing the current breakpoints.

If you do not specify an address, the write breakpoint is set at the address defined by the current value of the PC. The breakpoint is triggered if the target program writes data to any part of the specified target memory area.

If specified, the macro runs when the breakpoint is triggered and after the instruction at the breakpoint is executed. If the macro returns a true (nonzero) value, execution continues. If the macro returns a false (zero) value, or if you do not specify a macro, target execution stops and the debugger waits in command mode.

The list of qualifiers is dependent on the processor and vehicle and so the GUI does not present things that do not make sense. The command handler generates an error if a specific combination is not allowed for a specific processor or vehicle, but this is determined when you issue the command. The possible qualifiers are:

`append:(`*n*`)`	Instead of creating a new breakpoint, append the qualifiers specified with this command to an existing breakpoint with breakpoint ID number *n*. You cannot change the breakpoint address.
`continue`	Any triggering of the breakpoint is recorded (for example, as a journal entry, or by the action of a macro) but execution then continues.

`context:{context}`	Sets the context for other expressions in this breakpoint command to the value of context. This provides an alternative to specifying the complete context for every symbol. For example:
	`BREAKWRITE,context:{\HELLO_1\HELLO_C},when:{status>0} #15`
	This causes a breakpoint to be set at line 15 of `hello.c` that is triggered only when the variable `status` defined in `hello.c` is greater than zero. The alternative form is:
	`BWRITE,when:{\HELLO_1\HELLO_C\status>0} \HELLO_1\HELLO_C\#15`

`data_only`	The breakpoint is triggered if a data value, specified using `hw_dvalue`, is detected by the debug hardware on the processor data bus.
`gui`	If an error occurs when executing the command or when the breakpoint is triggered, the GUI is used to report it. Otherwise, the error is reported to the command pane.
`hw_ahigh:(n)`	Specifies the high address for an address-range breakpoint. The low address is specified by the standard breakpoint address. This facility is not supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for any address between `0x1000-0x1200`: `BREAKWRITE,hw_ahigh:0x1200 0x1000`
`hw_amask:(n)`	Specifies the address mask value for an address-range breakpoint. Addresses that match the standard breakpoint address when masked with this value cause the breakpoint to trigger. This facility is supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for any address between `0x1FA00-0x1FA0F`: `BREAKWRITE,hw_amask:0xFFFF0 0x1FA00`
`hw_dvalue:(n)`	Specifies a data value to be compared to values transmitted on the processor data bus. This facility is supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for the data value `0x400`: `BREAKWRITE,hw_dvalue:0x440 0x1FA00`
`hw_dhigh:(n)`	Specifies the high data value for a data-range breakpoint. The low data value is specified by the `hw_dvalue` qualifier.

This facility is not supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for any data value between `0x00-0x18`:

```
BREAKWRITE,hw_dvalue:0x0,hw_dhigh:0x18 0x1000
```

`hw_dmask:(n)`
Specifies the data value mask value for a data-range breakpoint. Data values that match the value specified by the `hw_dvalue` qualifier when masked with this value cause the breakpoint to trigger.

This facility is supported by ARM EmbeddedICE macrocells. For example, this command sets a breakpoint that triggers for any data value between `0x400-0x4F0`:

```
BREAKWRITE,hw_dvalue:0x440,hw_dmask:0xF0F 0x1FA00
```

`hw_passcount:(n)`
Specifies the number of times that the specified condition has to occur to trigger the breakpoint. The default value is 1. This qualifier differs from `passcount` only in that it is implemented in hardware. *n* is limited to a 32-bit value by the debugger, but might be much more limited by the target hardware, for example to 8 or 16 bits.

You can combine hardware and software pass counts to supplement the hardware one for higher count values. When both hardware and software pass counts are defined:

1. When the hardware count reaches zero, the software count is decremented.
2. When the software count reaches zero, the breakpoint triggers.

`hw_and:{[then-]id}`
Perform an *and* or an *and-then* conjunction with an existing breakpoint. For example, `hw_and:{2}`, or `hw_and:{then-2}`, where *2* is the breakpoint id of another breakpoint.

In the *and* form, the conditions associated with both breakpoints are tied, so that the action associated with the second breakpoint are performed only when both conditions simultaneously match.

In the *and-then* form, when the condition for the first breakpoint is met, the second breakpoint is enabled but the program is not yet stopped. When the second breakpoint condition is matched, the actions associated are performed. At this point, unless the `continue` qualifier is specified in the second breakpoint, the program stops.

The *id* is one of:

- the breakpoint list index of an existing breakpoint
- `prev` for the last breakpoint specified for this connection.

Debugger internal handle numbers are not available to users to identify breakpoints.

`hw_in:{}`	In trigger tests. The string that follows matches hardware-supported input tests, per vehicle and processor, as a list of names or a value.
`hw_out:{s}`	Not supported in this release.

`hw_not:{s}`
: Use this qualifier to invert the sense of an address, data, or `hw_and` term specified in the same command. The argument *s* can be set to:

`addr`	Invert the breakpoint address value.
`data`	Invert the breakpoint value.
`then`	Invert an associated `hw_and:{then}` condition.

For example, to break when a data value does not match a mask, you can write:

```
BREAKWRITE,hw_not:data,hw_dmask:0x00FF ...
```

The break commands require an address value, and the `addr` variant of `hw_not` uses this address.

```
BREAKWRITE,hw_not:addr 0x10040
```

This means to break at any address other than `0x10040`. This is probably not useful.

The `hw_not:then` variant of the command is used in conjunction with `hw_and` to form *nand* and *nand-then* conditions.

This facility is not supported by ARM EmbeddedICE macrocells.

`macro:(`*`MacroCall(arg1,arg2)`*`)`

The triggering of the breakpoint results in the specified macro being executed. Any program variables or functions must be in scope at the time the breakpoint request is entered, or the names must be fully qualified.

`message:{`*`message`*`}`
: Triggering of the breakpoint results in *message* being output. Prefixing *message* with `$`*`n`*`$` enables you to write the message text to window *n*, where *n* is between `50-1024`.

`modify:(`*n*`)`	Instead of creating a new breakpoint, modify the breakpoint with breakpoint ID number *n* by replacing the address expression and the qualifiers of the existing breakpoint to those specified in this command.
`obj:(`*n*`)`	This condition is true if the argument *n* matches the C++ object pointer, normally called `this`.
`passcount:(`*n*`)`	Specifies the number of times that the specified condition has to occur to trigger the breakpoint. The default value is 1. If you specify this in the middle of a sequence of break conditions, those specified before the passcount are processed whether or not the count reaches zero. Only the conditions specified afterwards are run only when the count reaches zero. There is a hardware passcount qualifier available, `hw_passcount`, for debug hardware that supports it. ——— **Note** ——— If a hardware breakpoint uses a `passcount`, the counting is performed on the host, and so program execution stops briefly every time the breakpoint is hit, even when the count has not been reached. ————————

`register:`*expression*	The breakpoint is triggered if a value is written to the specified memory-mapped register. The register is identified by *expression*. For example:
	`ba,register:PR1`
	or
	`ba,register:@PR1`
	——— **Note** ———
	You cannot specify core registers with this qualifier.
	————————

`sample`	Not supported in this release.
`timed`	Triggering records the time, in whatever units the debug hardware chooses, from the last reset of time. The time can be in nanoseconds, microseconds, processor cycles, instructions, or units. See the documentation for the hardware interface for more information. The recorded times are displayed in the Resource Viewer window and in the breakpoint information for this breakpoint.

	The timed qualifier can be used for simple profiling, or for a measure of specific response times. If you use `timed` and `continue`, the debugger keeps a log of times for each break.
`update:{@}`	Update the named windows, or all windows, by reading the memory and processor state when the breakpoint triggers. You can use the name `all` to refresh all windows, or a name specified in the title bar of the window. This qualifier enables you to get an overview of the process state at a particular point, without having to manually restart the process at each break. The update still takes a significant period of time, and so this method is unsuitable as a non-intrusive debugging tool.
`when:{`*`condition`*`}`	The breakpoint is triggered whenever *condition*, a debugger expression, evaluates to TRUE.
`when_not:{`*`condition`*`}`	The breakpoint is triggered whenever *condition*, a debugger expression, evaluates to FALSE.

Examples

The following examples show how to use `BREAKWRITE`:

`BREAKWRITE 0x8000`	Stop program execution if the program writes to location `0x8000`.
`BREAKW 0x100..0x200`	Stop program execution if the program writes to the 257 bytes from `0x100-0x200` (inclusive).
`BWRITE 0x100..0x200 ; CheckMem(0x100)`	Stop program execution if the program writes to the 257 bytes from `0x100-0x200` (inclusive) and calls the macro `CheckMem` with the base address `0x100`.

Alias

`BWRITE` is an alias of `BREAKWRITE`.

See also

The following commands provide similar or related functionality:

- *BREAKEXECUTION* on page 2-38
- *BREAKINSTRUCTION* on page 2-45

- *BREAKREAD* on page 2-50
- *BREAKWRITE* on page 2-57
- *CLEARBREAK* on page 2-69
- *DTBREAK* on page 2-105
- *ENABLEBREAK* on page 2-119.

2.2.17 BROWSE

The `BROWSE` command invokes the C++ class browser interface

Syntax

`BROWSE [symbol]`

where:

symbol	Specifies a C++ class or structure to be browsed.

Description

Displays the parent class or classes and any child classes for the class you specify. You can specify the class as either a variable name or the class name.

Examples

The following example shows how to use `BROWSE`:

```
browse Shakespeare
                   Shakespeare
  parents              |                     children
   ____________________|____________________
  /                                         \
  | baseclass
```

See also

There are no other commands that provide similar or related functionality.

2.2.18 BWRITE

`BWRITE` is an alias of `BREAKWRITE` (see page 2-57).

2.2.19 CANCEL

The `CANCEL` command cancels, or interrupts, the execution of commands.

Syntax

```
CANCEL
```

Description

The `CANCEL` command enables you to interrupt, or cancel, an asynchronous command that the is still executing. It is equivalent to the Cancel toolbar icon. If the target is running, only commands that can definitely be run with a running target are executed. Other commands are held in a queue for execution when the target stops. This is called *pending* the command. Pended commands can be cleared from the list, and so never executed, with the `CANCEL` command.

You cannot use this command to halt target execution. Use `HALT` to do this.

——— **Note** ———

Synchronous commands can only be run when target program execution has stopped.

Asynchronous commands can be run at all times.

————————

See also

The following commands provide similar or related functionality:

- *HALT* on page 2-140
- *WAIT* on page 2-240.

2.2.20 CEXPRESSION

The `CEXPRESSION` command calculates and displays the value of an expression. You can also modify variables using the assignment operator.

Syntax

`CEXPRESSION` *`expression`*

where:

`expression`	Is a valid debugger expression.

Description

The `CEXPRESSION` command calculates the value of an expression or assigns a value to a variable. Debugger expressions are described in more detail in *About the CLI* on page 1-2, but include target function and procedure calls, debugger macro invocation, and scalar C languages expressions. You cannot manipulate values larger than 4 bytes, other than **`double`** values, in an expression.

If you use `CEXPRESSION` to run a target function, it is called using the target resources, including stack and heap space. The debugger ensures that the core processor registers are saved before calling the debugger function and restored afterwards. The following issues must be remembered when calling target application functions:

- Target function calls must be supported for your processor.
- You must ensure that the target has initialized those resources that the called function, and any function it calls, requires.

  This normally requires at least that the C runtime code has completed execution so that the stack and heap are set up.
- If the target function has side effects, for example changing global variables, the side effects might not be reflected in the original application straight away, because the compiler might have stored elements of that global state in registers, or even indirectly in the PC. It is likely that programs compiled with optimization enabled are more prone to this issue.

Rules

The following rules apply to the use of the `CEXPRESSION` command:

- `CEXPRESSION` runs synchronously if the expression uses target registers, including the stack pointer, or if it uses target memory and background memory access is not available.

Use the `WAIT` command to force it to run synchronously.

- You must have a valid target execution context before you can run target functions correctly.
- Macros take higher precedence than target functions. If a target function and a macro have the same name, the macro is the one that is executed unless the target function is qualified.
- Results are displayed in either floating-point format, address format, or in decimal, hexadecimal, or ASCII format depending on the type of variables used in the expression.
- The ASCII representation is displayed if the expression value is a printable ASCII character.
- Floating-point numbers are shown as double by default (14 decimal digits of precision). They can be cast to float to display 6 decimal digits of precision.

Examples

The following examples show how to use `CEXPRESSION`:

`CEXPRESSION Run_Index`	Displays the current value of the variable named `Run_Index`.
`CE Run_Index=50`	Assigns a value of `50` to the variable named `Run_Index`.
`CE sin(0.2)`	Displays the value of the application function `sin()`, passing in the value `(double)0.2`.
`CE @R0 =20h`	Writes `0x20` to target register `R0`.

See also

The following commands provide similar or related functionality:

- *ADD* on page 2-15
- *DEFINE* on page 2-84
- *DUMP* on page 2-111
- *MACRO* on page 2-155
- *PRINTVALUE* on page 2-181
- *SETMEM* on page 2-202
- *SETREG* on page 2-204.

2.2.21 CLEARBREAK

The `CLEARBREAK` command deletes one or more breakpoints.

Syntax

```
CLEARBREAK [breakpoint_number | breakpoint_number_range]
```

where:

breakpoint_number

Specifies the breakpoint number to be cleared.

breakpoint_number_range

Specifies a range of breakpoint numbers as two integers separated by the range operator (`..`).

Description

This command clears (deletes) the breakpoints you specify, using the position of the breakpoint in a list of breakpoints to identify the breakpoints to clear.

You can display a list of the currently define breakpoints using the command `DTBREAK` (see page 2-105), and also by displaying the Break/Tracepoints pane in the Code window.

When specifying a range of breakpoints, you can either specify the end of the range as an absolute position, or you can specify the number of breakpoints to delete by typing a plus sign followed by the number of breakpoints. For example: `+3` indicates three breakpoints.

To delete all breakpoints, use `CLEARBREAK` with no parameters.

`CLEARBREAK` runs synchronously.

Note

You can disable a breakpoint, so that the breakpoint is unset but remembered by the debugger, using the `DISABLEBREAK` command. You can enable breakpoints that you have disabled, so setting them on the target again, using the `ENABLEBREAK` command.

Examples

`CL`	Clears every breakpoint.
`CL 5`	Clears the breakpoint listed fifth in the current list of breakpoints.

`CL 5..7`	Clears the fifth, sixth, and seventh breakpoints in the current list.
`CL 5..+3`	Clears the fifth, sixth, and seventh breakpoints in the current list.

See also

The following commands provide similar or related functionality:

- *BREAKACCESS* on page 2-31
- *BREAKEXECUTION* on page 2-38
- *BREAKINSTRUCTION* on page 2-45
- *BREAKREAD* on page 2-50
- *BREAKWRITE* on page 2-57
- *DISABLEBREAK* on page 2-94
- *DTBREAK* on page 2-105
- *ENABLEBREAK* on page 2-119.

2.2.22 COMPARE

The `COMPARE` command compares two blocks of memory and displays the differences.

Syntax

`COMPARE [/R] [address_range, address]`

where:

`/R` Instructs the debugger to continue comparing and displaying mismatches until the end of the block is reached or until CTRL-Break is pressed.

address_range

Specifies the address range to be compared using two addresses separated by the range operator (`..`).

address Specifies the starting address of the block of memory to use as a comparison.

Description

A specified block of memory is compared to a block of the same size starting at a specified location.

Mismatched addresses and values are displayed in the Output pane. Entering the command again at this point without parameters continues the process starting with the first byte after the mismatch.

If the contents of the two blocks of memory are the same, the debugger displays the message:

```
Memory blocks are the same.
```

`COMPARE` runs synchronously unless background access to target memory is supported. Use the `WAIT` command to force it to run synchronously.

Examples

The following examples show how to use `COMPARE`:

`com 0x8100..0x82FF,0x8700`

Compares the contents of memory from `0x8100` to `0x82FF` with the contents of memory from `0x8700` to `088FF`, stopping at the first mismatch.

```
com/r 0x8100..0x81FF,0x8700
```

Compares the contents of memory from `0x8100` to `0x81FF` with the contents of memory from `0x8700` to `087FF`, displaying all the differences found.

```
com/r 0x8100..+512,0x8700
```

Compares the contents of memory from `0x8100` to `0x81FF` with the contents of memory from `0x8700` to `087FF`, displaying all the differences found.

See also

The following commands provide similar or related functionality:

- *COPY* on page 2-78
- *FILL* on page 2-126
- *MEMWINDOW* on page 2-160
- *TEST* on page 2-224
- *VERIFYFILE* on page 2-233.

2.2.23 CONNECT

The `CONNECT` command is used to connect the debugger to a specified target.

Syntax

```
CONNECT [,route] [,reset|,noreset] [,halt|,nohalt] [=][targetid]|[@targetname]
```

where:

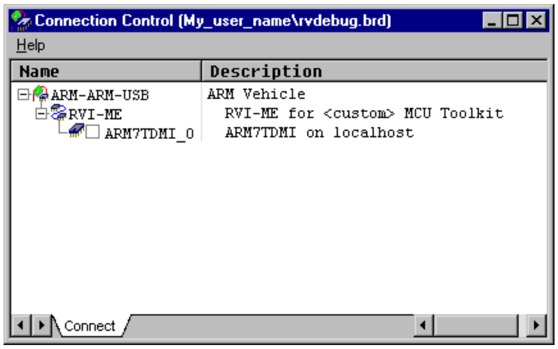
`route`	Indicates that the specified *targetid* is the RealView ICE Micro Edition target, not the final target processor.
`reset`	Reset the target before connecting to it.
`noreset`	Do not reset the target on connecting to it.
`halt`	Stop the target on connecting to it.
`nohalt`	Do not stop the target on connecting to it.
`targetid`	Specifies the required target as a number. See *Description* for details.
`targetname`	Specifies the required target as a name. See *Description* for details.

Description

The `CONNECT` command creates a new target connection. There are two ways to specify the target:

- as a number
- as an identifier string.

Using the `CONNECT` command means that you do not use the Connection Control window (shown in Figure 2-1 on page 2-74). However, it is helpful to think of that window when considering the operation of the `CONNECT` command.



```
Name              Description
ARM-ARM-USB       ARM Vehicle
  RVI-ME            RVI-ME for <custom> MCU Toolkit
    ARM7TDMI_0      ARM7TDMI on localhost
```

Figure 2-1 Connection Control window

Making numbered connections

To connect to the required target processor, shown in Figure 2-1, you must first specify the inteface device, that is RealView ICE Micro Edition. To do this, enter:

```
connect,route 1
```

This command enables the RealView ICE Micro Edition connection and expands it in the Connection Control window. (Entering the same command again disables the connection and collapses it.)

To connect to the target processor use `CONNECT` again, without the route qualifier:

```
connect 2
```

If you use the `connect,route 1` command on the enabled RealView ICE Micro Edition connection, that is expanded in the Connection Control window, this immediately hides the target processor.

If you use the `connect,route 1` command on a connected target processor, it has no effect.

Making named connections

You can use a named connection using similar principles to the numbered technique described in *Making numbered connections*. However, you can use a named connection to connect to the target processor when the RealView ICE Micro Edition connection is not currently enabled (see *Making named target processor connections* on page 2-75 for details).

To enable or disable a route, you enter the route name with an `@` prefix. So:

```
connect,route @RVI-ME
```

is the same as:

```
connect,route 1
```

This command enables the RealView ICE Micro Edition connection and expands it in the Connection Control window. (Entering the same command again disables the connection and collapses it.)

Note

If you specify a target that has not been configured, you are prompted to configure the target before the RealView ICE Micro Edition connection is enabled.

Now you can connect to a named target processor, for example:

```
connect @ARM7TDMI_0
```

Making named target processor connections

You can use named target processor connections to connect to a named target where the RealView ICE Micro Edition connection is not currently enabled. Specify the full target name in prefix notation:

```
connect @ARM7TDMI_0@RVI-ME
```

This command connects to the RealView ICE Micro Edition and opens the `ARM7TDMI_0` device, expecting this to be available when the RealView ICE Micro Edition is enabled. If the `RVI-ME` connection, has not been configured with an `ARM7TDMI`, the connection fails with the message `Types of objects in list do not match`. You must configure the target before you connect to it.

See also

The following commands provide similar or related functionality:

- *ADDBOARD* on page 2-18
- *DISCONNECT* on page 2-98
- *EDITBOARDFILE* on page 2-116
- *RESTART* on page 2-194
- *RUN* on page 2-196.

2.2.24 CONTEXT

The CONTEXT command displays the current context in the Output pane.

Syntax

```
CONTEXT [/F]
```

where:

/F Displays all contexts (roots).

Description

The CONTEXT command displays the current context in the Output pane. The context includes the current root, module, procedure, and line. The context must be in a module with high-level debug information for the line number to be displayed.

CONTEXT runs asynchronously unless it is run in a macro.

Examples

The following example shows how to use CONTEXT using the dhrystone application:

```
> context
At the PC: (0x00008000): STARTUP_S\__main
Source view: DHRY_1\main Line 78
```

This demonstrates the case where the PC and the current source view do not correspond. In this case, the editor is displaying the beginning of the function main() at line 78, while the pc is at location 0x8000 in the __main(), the routine that calls main().

The next example shows the user setting a breakpoint in main() and running to it.

```
> bi \DHRY_1\#98:0
> go
Stopped at 0x00008530 due to SW Instruction Breakpoint
Stopped at 0x00008530: DHRY_1\main Line 98
> con
At the PC: (0x00008530): DHRY_1\main Line 98
```

Now the PC and the source view are synchronized, the form of the message changes.

Finally, the /F form, of CONTEXT adds in the Root: specification shown below. See Chapter 1 *Working with the CLI* for more information on root context specifications.

```
> CONTEXT/F
At the PC: (0x00008530): DHRY_1\main Line 98
Root: @dhrystone\\ [SCOPE]
```

See also

The following commands provide similar or related functionality:

- *CONTEXT* on page 2-76
- *DOWN* on page 2-102
- *PRINTSYMBOLS* on page 2-177
- *SCOPE* on page 2-197
- *SETREG* on page 2-204
- *UP* on page 2-230.

2.2.25 COPY

The `COPY` command copies a region of memory.

Syntax

```
COPY addressrange, targetaddr
```

where:

addressrange	Specifies the address range to be copied.
targetaddr	Specifies the starting address where the copied memory is placed.

Description

The `COPY` command copies the contents of a specified block of memory to a block of the same size starting at a specified location.

The command copies data from low address to high addresses, without taking account of overlapping source and destination memory regions. You must not rely on this behavior in future versions of the debugger.

`COPY` runs synchronously unless background access to target memory is supported. Use the `WAIT` command to force it to run synchronously.

Examples

The following examples show how to use `COPY`:

`copy 0x8100..0x81FF,0x8700`

Copies the contents of memory at `0x8100` to `0x81FF` to memory at `0x8700` to `087FF`.

`copy 0x8100..+128,0x8700`

Copies the contents of memory at `0x8100` to `0x81FF` to memory at `0x8700` to `087FF`.

See also

The following commands provide similar or related functionality:
- *COMPARE* on page 2-71
- *FILL* on page 2-126
- *LOAD* on page 2-150
- *READFILE* on page 2-186

- *SETMEM* on page 2-202
- *TEST* on page 2-224.

2.2.26 DBOARD

`DBOARD` is an alias of `DTBOARD` (see page 2-104).

2.2.27 DBREAK

`DBREAK` is an alias of `DTBREAK` (see page 2-105).

2.2.28 DCOMMANDS

The `DCOMMANDS` command lists the commands available based on vehicle, target processor, and type of connection.

Syntax

```
DCOMMANDS [,full | ,alias] [,cmd_class...] [;windowid]
```

```
DCOMMANDS [,full | ,alias] =specific_cmd [;windowid]
```

where:

`cmd_class` Specifies a class of commands to have details displayed, and can be any of the following:

`status` **or** `display`

to list *status* and *display* commands

`setstatus` **or** `ss`

to list *setstatus* commands

`breakcomplex` **or** `bc`

to list *breakcomplex* commands

If no command class is specified, all of the commands known to `DCOMMANDS` are described.

`alias` Show a summary of names and aliases for the specified command class.

`full` Show more detailed information on the specified command class.

`specific_cmd` Specifies a particular command to display, or `all` to display all commands known to `DCOMMANDS`.

`windowid` Identifies the window in which you want the command to display its output. If you do not supply a `;`*`windowid`* parameter, output is displayed in the Output pane.

For further information see *VOPEN* on page 2-237.

Description

The `DCOMMANDS` command displays the list of commands supported by the current target. The optional command class qualifier enables you to display one or more specific classes of commands. The *`specific_cmd`* argument shows a specified command. The `full` qualifier provides extended detail on the command.

Note

Some commands are not listed in the DCOMMANDS command list, and DCOMMANDS reports that these commands are unknown if you request help with the *specific_cmd* argument. This is a limitation of the current implementation of the help system and does not indicate a fault in the operation of the commands.

Examples

The following examples show the use of DCOMMANDS. The first command displays a summary of all status commands that are available on the current target:

```
> dcom,status =all
    dcommands [{,cmd_classes...}] [=specific_cmd] [;windowid]
or  dhelp    [{,cmd_classes...}] [=specific_cmd] [;windowid]
    dtboard  [={resource,...}] [;windowid]
or  dboard   [={resource,...}] [;windowid]
    dtprocess [={task,...}] [;windowid]
or  dvprocess [={task,...}] [;windowid]
    dtfile   [={value,...}] [;windowid]
or  dvfile   [={value,...}] [;windowid]
or  dmap     [={value,...}] [;windowid]
    dtbreak  [={threads,...}] [;windowid]
or  dbreak   [={threads,...}] [;windowid]
```

This command displays a more complete summary of the connect command:

```
> > dcom, full connect
    connect  [{,qualifier...}] =resource

Qualifiers:

  reconnect  route  reset  noreset  halt  nohalt

Note: Command allowed while target running.

This command is used to connect to or disconnect from a board. The
connection will establish a communication link between the host and the
remote target. The board will be made active when connected to. It can be
made active again by using the board command. The disconnect is from the
current or specified board and will break the communication
link.
```

Alias

DHELP is an alias of DCOMMANDS.

See also

The following commands provide similar or related functionality:

- *HELP* on page 2-141
- *SHOW* on page 2-211.

2.2.29 DEFINE

The `DEFINE` command creates a macro for use by other RealView Debugger components.

——— **Note** ———

Because a macro definition requires multiple lines, you cannot use the `DEFINE` command from the RealView Debugger command prompt. Instead, you must either:

- Use the macro command GUI. See the macros chapter in the *RealView Developer Kit v1.0 Debugger User Guide* for more information.
- Write your macro definition in a text file and load it into RealView Debugger using the `INCLUDE` command.

———————————

Syntax

```
DEFINE [/R] [return_type] macro_name ([parameters])[parameter_definitions]
{ macro_body }
.
```

where:

`/R` The new macro can replace an existing symbol with the same name.

`return_type` Specifies the return type of the macro. If a type is not specified, *`return_type`* defaults to type `int`.

`macro_name` Specifies the name of the macro.

`parameters` Lists parameters (comma-separated list within parentheses). These parameters can be used throughout the macro definition and are later replaced with the values of the actual parameters in the macro call.

`param_definitions`

Defines the types of the variables in *`parameter_list`*. If types are not specified, the default type `int` is assumed.

`macro_body` Represents the contents of the macro, and is split over many lines. The syntax for *`macro_body`* is:

```
[local_definitions]
macro_statement;[macro_statement;] . . .
```

`local_definitions` are the variables used within the `macro_body`.

A *`macro_statement`* is any legal C statement except switch and goto statements, or a debugger command. If *`macro_statement`* is a debugger command, it must start with a dollar sign (`$`) and end with a dollar sign and a semicolon (`$;`). All statements are terminated by a semicolon.

The `macro_body` ends with a line containing only a period (full stop).

Description

The definition contains a macro name, the parameters passed to the macro, the source lines of the macro, and a terminating period as the first and only character on the last line.

After a macro has been loaded into RealView Debugger, the definition is stored in the symbol table. If the symbol table is recreated, for example when an image is loaded with symbols, any macros are automatically deleted. The number of macros that can be defined is limited only by the available memory on your workstation.

Macros can be invoked by name on the command line where the name does not conflict with other commands or aliases and the return value is not required. You can also invoke a macro on the command line using the `MACRO` command, and in expressions, for example using the `CEXPRESSION` command.

Macros can also be invoked as actions associated with:

- a window, for example `VMACRO`
- a breakpoint, for example `BREAKEXECUTION`
- deferred commands, for example `BGLOBAL`.

Note

Macros invoked as associated actions cannot execute `GO`, or `GOSTEP`, or any of the stepping commands, for example `STEPINSTR`.

If you require a breakpoint that, when the condition is met, does something and then continues program execution, you must use the breakpoint `continue` qualifier, or return `1` from the macro call, instead of the `GO` command. See the breakpoint command descriptions for more details.

Examples

The following examples show how to use `DEFINE`:

```
define float square(f)
 float f;
{
  return (f*f);
}
.

define show_i()
{
  $fprintf 100, "value of i = %d\n", i$;
  return (1);
}
.
```

See also

The following commands provide similar or related functionality:

- *ALIAS* on page 2-21
- *BGLOBAL* on page 2-27
- *BREAKEXECUTION* on page 2-38
- *CEXPRESSION* on page 2-67
- *GOSTEP* on page 2-138
- *INCLUDE* on page 2-143
- *MACRO* on page 2-155
- *SHOW* on page 2-211
- *VMACRO* on page 2-235.

2.2.30 DELBOARD

The `DELBOARD` command deletes a board entry from the displayed list.

Syntax

```
DELBOARD [={resource,...}]
```

where:

resource	Identifies the board that is to have its entry deleted from the list.

Description

Use this command to delete a non-connected board entry or all non-connected board entries. You supply the number or name of the board, or 0 for all. This does not affect the file stored on disk, only what is shown.

Example

The following example shows how to use `DELBOARD`:

```
delboard =6
```

This command deletes the connection definition numbered 6, that must be unconnected when the command is issued. See *CONNECT* on page 2-73 for more information about connection numbers. The deleted connection definition becomes available again when a `READBOARDFILE` command is issued or the debugger is restarted.

See also

The following commands provide similar or related functionality:

- *ADDBOARD* on page 2-18
- *CONNECT* on page 2-73
- *EDITBOARDFILE* on page 2-116.

2.2.31 DELETE

The `DELETE` command deletes macros or one or more symbols from the symbol table.

Syntax

```
DELETE {symbol_name | \\ | \ | macroname} [,y]
```

where:

symbol_name	Specifies the symbol to be removed from the symbol table.
symbol_name\	Deletes the specified symbol and all symbols it owns (its child symbols).
root\\	Deletes all symbols of the specified root.
\\	Deletes all user-defined symbols of the base root.
\	Deletes all symbols of the current root.
macroname	Deletes the specified macro.
y	Specifies that `DELETE` can delete child symbols if the specified symbol has them. If this is not done, `DELETE` prompts for confirmation before deleting child symbols.

Description

The `DELETE` command deletes symbols from the symbol table associated with the current connection. Symbols are entered into the symbol table when an executable file containing them is loaded onto the connection using `LOAD` or `RELOAD`, and when you use the `ADD` command.

Deleting a symbol or group of symbols is useful if the program has changed, perhaps as a result of runtime patching of the executable. To change the memory location of a symbol such as an address label, you must first delete it and then add it again at the new location.

You can also use the `DELETE` command to delete debugger macros that you have created using the `MACRO` command.

You cannot use `DELETE` to delete debugger command aliases. Instead, define the alias to be nothing:

```
alias name=
```

Rules

The following rules apply to the use of the `DELETE` command:

- The `DELETE` command runs asynchronously unless in a macro.
- All debugging information for that symbol is deleted, but program execution is unchanged.
- Only program symbols, macros, and user-defined debugger symbols can be deleted from the symbol table. Predefined symbols, such as register names, cannot be deleted.
- If the specified symbol or macro has local symbols, confirmation is requested that you want to delete all the local symbols. Entering the `,y` parameter provides this confirmation automatically.

See also

The following commands provide similar or related functionality:
- *ADD* on page 2-15
- *ALIAS* on page 2-21
- *DEFINE* on page 2-84
- *PRINTSYMBOLS* on page 2-177.

2.2.32 DELFILE

The `DELFILE` command removes filenames from the executable file list, provided the specified file is not loaded onto the target.

Syntax

```
DELFILE [,auto] [name | id]
```

where:

`auto`	Causes the command to remove unloaded files from the file list that were added as a result of the `ADDFILE,auto` command.
`name|id`	Identifies a filename to be removed.

Description

The `ADDFILE` and the `DELFILE` commands are used to manipulate the executable image file list. This list is in most cases only one file, the executable you load onto the target using `LOAD`. There are circumstances where you must load more than one file onto the target at once. In these cases you use `ADDFILE` to set up the files to load, and `RELOAD` or `LOAD/A` to load them onto the target.

You use `DELFILE` to remove unloaded files that you have added to the executable file list. There are several ways to specify the files to delete:

- by complete filename, for example `C:\Source\dhry\Debug\dhry.axf`
- by short filename, for example `dhry.axf`
- by file number, for example `2`
- as the currently unloaded files that were added to the list by `ADDFILE,auto`
- as all currently unloaded files.

`DELFILE` with no arguments deletes all currently unloaded files, and `DELFILE,auto` deletes any currently unloaded files added as a result of an `ADDFILE,auto`.

Use `DTFILE` to display the current file list, including the defined short filenames, file numbers and whether the file is loaded or not.

Note

- If you use the full filename you must enclose it in double quotes. You do not have to quote the short filename in quotes, although you can.
- You cannot delete multiple named or numbered files in a single command. Use multiple `DELFILE` commands, or delete all files and then use `ADDFILE` as required.

- A executable file must be unloaded from the target before its name can be removed from the file list. Use the UNLOAD command to unload a file that is no longer being used by the target.

Examples

The following examples show how to use ADDFILE and DELFILE:

```
> addfile ="C:\Source\helloworld\Debug\helloworld.axf"
> dtfile
File 1 with modid <not loaded>: Symbols not Loaded. 0 Sections.
  'helloworld.axf' As 'C:\Source\helloworld\Debug\helloworld.axf'
```

A file is added to the executable list, using ADDFILE, and DTFILE shows that it is on the list and has file number, or id, of 1 (the File 1 part of the output from DTFILE).

Because the file has not been loaded, the debugger has not read the symbol table to determine the code, data and *Base Stack Segment* (BSS) section sizes that a DTFILE following a LOAD displays. See DTFILE on page 2-107 for more information.

To delete this file, you can use the file ID, reported in the first line of DTFILE output, as follows:

```
> delfile 1
> dtfile
No files for this process.
```

The DTFILE output tells you that the deletion was successful. In this particular case, the file id is not required, because a DELFILE with no parameters deletes all unloadable files. For example:

```
> addfile ="C:\Source\helloworld\Debug\helloworld.axf"
> delfile
> dtfile
No files for this process.
```

You can name the file to delete, using either the full name of the file or the short name listed in the DTFILE result:

```
> addfile ="C:\Source\helloworld\Debug\helloworld.axf"
> delfile helloworld.axf
> dtfile
No files for this process.

> addfile ="C:\Source\helloworld\Debug\helloworld.axf"
> delfile "C:\Source\helloworld\Debug\helloworld.axf"
> dtfile
No files for this process.
```

See also

The following commands provide similar or related functionality:

- *ADDFILE* on page 2-19
- *DTFILE* on page 2-107
- *LOAD* on page 2-150
- *RELOAD* on page 2-189
- *UNLOAD* on page 2-228.

2.2.33 DHELP

`DHELP` is an alias of `DCOMMANDS` (see page 2-81).

2.2.34 DISABLEBREAK

The DISABLEBREAK command disables one or more specified breakpoints.

Syntax

```
DISABLEBREAK [,h] [{break_num,...}]
```

where:

break_num	Specifies one or more breakpoints to disable, separated by commas. You identify breakpoints by their position in the list displayed by the DTBREAK command (see page 2-105).
h	Do not use this qualifier. It is for debugger internal use only.

Description

The DISABLEBREAK command disables one or more breakpoints. A disabled breakpoint is removed from the target as if the breakpoint were deleted, but the debugger keeps a record of it. You can then enable it again by referring to the breakpoint number when required, rather than having to reset it from scratch.

If you issue the command with no parameters then all breakpoints for this connection are disabled. Disabling a breakpoint that is already disabled has no effect.

Examples

The following examples show how to use DISABLEBREAK:

```
disablebreak 4,6,8
```

Disables the fourth, sixth, and eighth breakpoints in the current list of breakpoints.

`disablebreak` Disables all the current breakpoints.

See also

The following commands provide similar or related functionality:

- *BREAKACCESS* on page 2-31
- *BREAKEXECUTION* on page 2-38
- *BREAKINSTRUCTION* on page 2-45
- *BREAKREAD* on page 2-50
- *BREAKWRITE* on page 2-57

- *CLEARBREAK* on page 2-69
- *DTBREAK* on page 2-105
- *ENABLEBREAK* on page 2-119.

2.2.35 DISASSEMBLE

The `DISASSEMBLE` command displays memory addresses and corresponding assembly code on the `DSM` tabbed page of the Code window.

Syntax

```
DISASSEMBLE [/D|/S|/A|/J] [address | @stack_level]
```

where:

`/D`	Disassemble using the default instruction format. This is ARM state.
`/S`	Disassemble using the standard instruction format. This is ARM state.
`/A`	Disassemble using the alternate instruction format. This is Thumb state.
`/J`	Disassemble using the Java instruction set.
address	Specifies the starting address for disassembly. This can be a literal address or a debugger expression.
stack_level	Enables you to specify the starting point without knowing its address. Stack level 0 is the current address in the current procedure, stack level 1 is the code address from which the current procedure was called.

Description

The `DISASSEMBLE` command displays memory addresses in hexadecimal and assembly code on the `DSM` tabbed page of the Code window, starting at the specified memory location and using the assembler mnemonics and register names associated with the processor type of this connection.

If the specified address falls in the middle of an instruction, the whole instruction is displayed. Memory is displayed starting at the address held in the PC if you do not supply an address. The current execution context and variable scope of the program remains unchanged even if you select an alternate stack level.

If you issue the `OPTION` command with the `LINES=ON` option, source code is intermixed with the assembly language code. If you issue the `OPTION` command with the `SYMBOLS=ON` option, symbol references are displayed with the assembly language symbols and labels.

The `DISASSEMBLE` command runs synchronously unless background access to target memory is supported. Use the `WAIT` command to force it to run synchronously.

Examples

The following examples show how to use `DISASSEMBLE`:

`DISASSEMBLE /S @1`

Disassemble, using the standard instruction format (ARM state format), the instructions that are executed when the current function returns, displaying the result in the **Dsm** tab in the File Editor pane.

`DISASSEMBLE 0x80200`

Disassemble, using an instruction format selected using symbol table information, the instructions starting at address `0x80200`, displaying the result in the **Dsm** tab in the File Editor pane.

See also

The following commands provide similar or related functionality:

- *DUMPMAP* on page 2-113
- *DUMP* on page 2-111
- *LOAD* on page 2-150
- *MEMWINDOW* on page 2-160
- *MODE* on page 2-162
- *WHERE* on page 2-242.

2.2.36 DISCONNECT

The `DISCONNECT` command disconnects the debugger from a target.

Syntax

```
DISCONNECT [,all | ,gui] [=][targetid]|[@targetname]
```

where:

`all`	Disconnects the connection.
`gui`	Creates a dialog that enables you to specify the disconnect mode. This specifies what state you want the debugger to leave the target in after the disconnection. See *Description* for more details.
`targetid`	Specifies the required target as a number.
`targetname`	Specifies the required target as a name as it appears in the GUI.

Description

The `DISCONNECT` command disconnects the debugger from the target, undoing the action of a previous `CONNECT`. You can specify the target using the numeric or textual methods outlined for the `CONNECT` command.

When you disconnect from a target, the disconnect mode determines what happens to the target:

As-is now	Leave the target in the current state. That is, if the target is running now, leave it running. If the target is stopped in debug state now, leave it stopped.
Running	Leave the target running.
Stopped	Leave the target stopped.

The `DISCONNECT` command runs asynchronously.

For more information see *CONNECT* on page 2-73 for details about connection `id` and named connections.

Examples

The following examples show how to use `DISCONNECT`:

`disconnect,all`	Disconnect the currently connected connection.

`disconnect`	Disconnect the current target (the target shown in the title bar).
`disconnect =2`	Disconnect the target with a connection `id` of 2.
`disconnect,gui 2`	Display the Disconnect Mode selection box to disconnect the target with a connection `id` of 2.
`disconnect @ARM7TDMI_0`	Disconnect the named RVI-ME target processor. The target processor name must be entered as it appears in the Connection Control window.

See also

The following commands provide similar or related functionality:

- *ADDBOARD* on page 2-18
- *CONNECT* on page 2-73
- *RESTART* on page 2-194.

2.2.37 DLOADERR

The DLOADERR command displays possible reasons for the last load error.

Syntax

```
dloaderr [,gui | ;windowid]
```

where:

gui	This qualifier causes the results to be displayed in a dialog.
windowid	This parameter identifies the window in which you want the command to display its output.

Description

The DLOADERR command displays possible reasons for the most recent program executable load error, and suggests actions you might take.

If you issue the command with no qualifier or parameter, then its output is displayed in the Output pane. For further information on redirecting message output, see *VOPEN* on page 2-237.

See also

The following commands provide similar or related functionality:

- *LOAD* on page 2-150
- *RELOAD* on page 2-189.

2.2.38 DMAP

`DMAP` is an alias of `DTFILE` (see page 2-107).

2.2.39 DOWN

The DOWN command moves the variable scope and source location down the stack (that is, away from the program entry point, towards the current PC).

Syntax

```
DOWN [levels]
```

where:

levels	Specifies the number of stack levels to move down. This must be a positive number.

Description

This command moves the current variable scope, and source or disassembly view location down the stack by the specified number of levels. The debugger modifies the local variable scope to display the variables in the new location, and potentially hiding those at the previous level.

If you are already at the lowest level (nearest to the program entry point), a message reminds you that you cannot move down any further. You must have used an UP command or a SCOPE command before a DOWN command becomes meaningful. You can move down one level by using the command without parameters.

The DOWN command runs synchronously unless background access to target memory is supported. Use the WAIT command to force it to run synchronously.

Example

The following example shows how to use DOWN. The UP command moves the context up the stack to the enclosing function, so that a variable index is in scope. The value of the variable is displayed, and it is decided to discover that another variable, count, by looking at the preceding function. Once count is displayed, the DOWN 2 command is used to return down the stack two levels, to the scope of the initial function

```
> up
> ce index
index = 3
> up
> ce count
count = 55
> down 2
```

See also

The following commands provide similar or related functionality:

- *CEXPRESSION* on page 2-67
- *CONTEXT* on page 2-76
- *EXPAND* on page 2-122
- *SCOPE* on page 2-197
- *UP* on page 2-230
- *WHERE* on page 2-242.

2.2.40 DTBOARD

The DTBOARD command displays information about the current or a specified board.

Syntax

DTBOARD [={*resource*,...}] [;*windowid*]

where:

resource	Identifies the board that is to have its details displayed.
windowid	Identifies the window in which you want the command to display its output.

Description

The DTBOARD command displays information about the current or a specified board. If you do not specify a board, the command displays information about the current board. If you do not supply a ;*windowid* parameter, output is displayed in the Output pane. For further information see *VOPEN* on page 2-237.

Example

The following example shows how to use DTBOARD.

```
> dtboard
Connected Board 'ARM7TDMI_0' Port 0: Server supporting Single Tasking.
  Port string: localhost
  Entry of router/broker RealView ICE Micro Edition
```

Alias

DBOARD is an alias of DTBOARD.

See also

The following commands provide similar or related functionality:

- *ADDBOARD* on page 2-18
- *DTFILE* on page 2-107
- *DTPROCESS* on page 2-109.

2.2.41 DTBREAK

The DTBREAK command displays breakpoint information.

Syntax

DTBREAK [={*thread*,...}] [;*windowid*]

where:

thread	Not supported in this release.
windowid	Identifies the window in which you want the command to display its output. If you do not supply a ;*windowid* parameter, output is displayed in the Output pane. For further information see VOPEN on page 2-237.

Description

The DTBREAK command displays information about the currently defined breakpoints.

Example

The following example shows how to use DTBREAK.

```
> dtbreak
S Type  Address         Count   Miscellaneous
- ----  -------         -----   -------------
  Instr 0x00008894      0
  Read  0x00008928      0
```

Alias

DBREAK is an alias of DTBREAK.

See also

The following commands provide similar or related functionality:

- *BREAKACCESS* on page 2-31
- *BREAKEXECUTION* on page 2-38
- *BREAKINSTRUCTION* on page 2-45
- *BREAKREAD* on page 2-50
- *BREAKWRITE* on page 2-57
- *CLEARBREAK* on page 2-69
- *DISABLEBREAK* on page 2-94

- *ENABLEBREAK* on page 2-119.

2.2.42 DTFILE

The `DTFILE` command displays information about one or more specified files or all files of the current process.

Syntax

```
DTFILE [={file_number,...}][;windowid]
```

where:

file_number,...

Is a list of integer numbers that identify the file or files about which you want to see information. If you do not supply this parameter, details of all the currently loaded files are displayed.

windowid Identifies the window in which you want the command to display its output. If you do not supply a ;*windowid* parameter, output is displayed in the Output pane. For further information, see *VOPEN* on page 2-237.

Description

The `DTFILE` command displays information about the currently loaded executable file. The file numbers are the same as those used in the `ADDFILE` and `DELFILE` commands. The information displayed varies:

- If the file has been loaded onto the target, then the information contains details about the code and data section sizes and the load addresses
- If the file has not been loaded, the debugger has not yet determined the code and data sizes and so does not display them.

The first line of the output includes the following information:

Fileid Used by the `ADDFILE` and `DELFILE` commands to refer to the file.

Modid An internal number used by some RTOS loader programs.

Symbols Loaded

This item tells you whether the executable file has program debug symbols and whether they have been loaded. In most cases you require debug symbols in order to make sense of the program instructions.

***n* sections** This item tells you how many program sections there are in the file. Each loaded program section is normally listed with any associated information.

The second line of output contains first the shortname and then the file path name of the file. The short name is an abbreviation of the name, normally the filename with no directory specification. The file path name includes the full directory path name for the file. You must normally specify the file path name enclosed in double quotes when entering it in commands.

If a separate target name is used, or if program arguments have been defined with the ARGUMENTS command, they are also shown in the output.

Example

The following example illustrates the output of DTFILE, displaying information about a loaded executable called shapes.axf.

```
> dtfile =1
File 1 with modid 1: Symbols Loaded. 2 Sections.
  'shapes.axf' As 'C:\Source\cpp\DebugRel\shapes.axf'
  Code section of size 11912 at 0x00008000: ER_RO
  BSS  section of size   492 at 0x0000AE88: ER_ZI
```

Alias

DMAP and DVFILE are aliases of DTFILE.

See also

The following commands provide similar or related functionality:

- *ADDFILE* on page 2-19
- *LOAD* on page 2-150
- *MEMMAP* on page 2-157
- *RELOAD* on page 2-189.

2.2.43 DTPROCESS

The DTPROCESS command displays information about a specified process.

Syntax

<u>DTP</u>ROCESS [={*process_number*,...}][;*windowid*]

where:

process_number,...

Identifies one or more processes about which you want to see information.

windowid Identifies the window in which you want the command to display its output. If you do not supply a ;*windowid* parameter, output is displayed in the Output pane. For further information see *VOPEN* on page 2-237.

Description

The DTPROCESS command displays information about the processes that this connection refers to. A *process* is one or more sequences of control that, as a group, have a single distinct address space from any other process running on a single processor. Each sequence of control within a process is referred to as a *thread*. A processor normally directly implements one process. An operating system can timeslice that process to implement more than one process, and more than one thread within a process.

The RealView Debugger considers the current sequence of control on a target to be process P1 unless the RTOS extension is licensed and makes other processes on the target visible.

If you do not supply the process number, information about the current process is displayed.

Example

The following example illustrates the output of DTPROCESS, displaying information about a loaded executable.

```
> dtprocess =1
P1: Primary Owned Process (Single). Currently Stopped.
  'dhry.axf' As 'C:\Source\dhry\Debug\dhry.axf'
```

Alias

DVPROCESS is an alias of DTPROCESS.

See also

The following commands provide similar or related functionality:

- *RELOAD* on page 2-189
- *RESTART* on page 2-194.

2.2.44 DUMP

The `DUMP` command displays memory contents in hexadecimal or ASCII format.

Syntax

`DUMP [/B|/H|/W|/8|/16|/32] [address | address_range]`

where:

`/B, , /8`	Sets the display format to byte (8 bits). If the processor naturally addresses bytes (for example, ARM7TDMI) then this is the default setting.
`/H, , /16`	Sets the display format to halfword (16 bits).
`/W, , /32`	Sets the display format to word (32 bits).
`address`	Specifies a memory address at which to begin the display of contents. The remainder of that 16-byte line and the whole of the following 16-byte line are displayed.
`address_range`	Specifies a range of memory addresses whose contents are to be displayed.

Description

The `DUMP` command displays memory contents in bytes, words or longwords as hexadecimal and ASCII characters in the Output pane.

If you do not specify any parameters, the next five lines of data after the previously dumped address range are displayed. In the character output format, nonprintable characters (such as a carriage return) are represented by a period (`.`).

The `DUMP` command runs synchronously unless background access to target memory is supported. Use the `WAIT` command to force it to run synchronously.

Example

The following example illustrates the output of `DUMP`. The first example displays two rows of memory from `0x8000`.

```
> dump 0x8000
  00008000 ED EB 97 C3 DC F4 01 1C  EA E3 BF E0 1A 57 65 04 .............We.
  00008010 58 C3 0F 46 92 50 21 B5  FF 63 7E A3 16 DE 84 97 X..F.P!..c~.....
```

Executing `DUMP` again displays a page of memory from `0x8020`.

```
> dump
           00 01 02 03 04 05 06 07  08 09 0A 0B 0C 0D 0E 0F
           -----------------------------------------------
  00008020 AC FA DF 30 22 88 9A 52  FE 94 42 D7 EB 0D 52 28 ...0"..R..B...R(
  00008030 69 29 EB 5D 09 46 17 33  79 2F 69 7B FD 8C 09 D9 i).].F.3y/i{....
  00008040 21 D0 5E 63 22 88 00 58  17 C4 F8 D5 BF E9 07 84 !.^c"..X........
  00008050 1E 5A 65 27 67 08 1C 90  DD 0C 4C DE 05 51 C8 31 .Ze'g.....L..Q.1
  00008060 B3 4C 61 AE 8E 15 44 80  37 EF EE 07 49 20 31 5F .La...D.7...I 1_
```

Requesting a `DUMP` of words of memory, and specifying a range of addresses produces the following result:

```
dump /h 0x9004..0x9012
  00009000             801F  766A    86C1  B780  2BC1  36FC     ..jv.....+.6
  00009010 FF8E  7ED6                                       ...~
```

See also

The following commands provide similar or related functionality:

- *CEXPRESSION* on page 2-67
- *FILL* on page 2-126
- *MEMWINDOW* on page 2-160
- *WRITEFILE* on page 2-244.

2.2.45 DUMPMAP

The `DUMPMAP` command writes the current memory map out as a file, using the native linker format.

Syntax

```
DUMPMAP [{,gui...}] [filename]
```

where:

gui	If an error occurs when executing the command or when the breakpoint is triggered, the GUI is used to report it. Otherwise, the error is reported to the command pane.
name	Specifies the filename or file pathname to which the map is written.

Description

The `DUMPMAP` command writes a linker map file in the format associated with the current processor to the named file.

If the *filename* is a file path name, it must be enclosed in double quotes. If it is not absolute path name, it is written relative to the current directory of RealView Debugger, which on Windows is normally your desktop.

If the file already exists, RealView Debugger only replaces the information between the `RVDEBUG: generated data block` and the `RVDEBUG: generated data above` comments.

The command runs synchronously.

Example

The following command shows the output of `DUMPMAP` when run on an ARM architecture processor, writing information about the `dhrystone` example program to the file `c:\source\ld.map`:

```
dumpmap "c:\source\ld.map"
```

This file contains:

Example 2-1 ARM Architecture linker map file output

```
/* Linker Command file for the ARM processor */
/* This file was generated by RVDEBUG. You can edit everything
   outside the MEMORY block defined by RVDEBUG. Updates by
   RVDEBUG will only affect that block.*/

/* RVDEBUG: generated data block.
   Do not modify this block. Do not put MEMORY lines above
   this line, put below end of this block.*/
MEMORY
{
  A_RAM:        org=0x1000000, len=0x6000000  /* external 'Sect dhry.axf,dhry.axf,dhry.axf' */
  A_RAM1:       org=0x7000004, len=0xFFFFFC   /* external 'Sect Stack' */
}
/* RVDEBUG: generated data above */
```

See also

The following command provides similar or related functionality:

- *MEMMAP* on page 2-157.

2.2.46 DVFILE

`DVFILE` is an alias of `DTFILE` (see page 2-107).

2.2.47 DVPROCESS

`DVPROCESS` is an alias of `DTPROCESS` (see page 2-109).

2.2.48 EDITBOARDFILE

The `EDITBOARDFILE` command enables you to edit a specified board file.

Syntax

```
EDITBOARDFILE [=boardfilename,...]
```

where:

`boardfilename,...`	Identifies one or more board files that you want to edit.

Description

The `EDITBOARDFILE` command displays the Connection Properties window to edit the specified board file. If you do not specify a board file, the settings of the current board file are displayed for you to edit. If you make any changes to a board file, the updated file is reread when you close the Connection Properties window.

The command runs asynchronously.

Example

The following example shows how to use `EDITBOARDFILE`.

```
editboardfile
```

See also

The following commands provide similar or related functionality:
- *ADDBOARD* on page 2-18
- *DTBOARD* on page 2-104
- *READBOARDFILE* on page 2-185.

2.2.49 EMURESET

The `EMURESET` command is not supported.

2.2.50 EMURST

`EMURST` is an alias of `EMURESET` (see page 2-117).

2.2.51 ENABLEBREAK

The `ENABLEBREAK` command enables one or more specified breakpoints.

Syntax

```
ENABLEBREAK [,h] [{break_num,...}]
```

where:

break_num	Specifies one or more breakpoints to enable, separated by commas. You identify breakpoints by their position in the list displayed by the `DTBREAK` command (see page 2-105).
`h`	Do not use this qualifier. It is for debugger internal use only.

Description

The `ENABLEBREAK` command enables one or more breakpoints that have been disabled. A disabled breakpoint is removed from the target as if the breakpoint were deleted, but the debugger keeps a record of it. You can enable it again, using this command, by referring to the breakpoint number, avoiding then having to recreate it from scratch.

If you issue the command with no parameters then all breakpoints are enabled. Enabling a breakpoint that is already enabled has no effect.

The command runs synchronously.

Example

The following examples show how to use `ENABLEBREAK`:

`enablebreak 4,6,8`	Enables the fourth, sixth, and eighth breakpoints in the current list of breakpoints.
`enablebreak`	Enables all the current breakpoints.

See also

The following commands provide similar or related functionality:

- *BREAKEXECUTION* on page 2-38
- *BREAKINSTRUCTION* on page 2-45
- *BREAKREAD* on page 2-50
- *BREAKWRITE* on page 2-57
- *CLEARBREAK* on page 2-69

- *DISABLEBREAK* on page 2-94
- *DTBREAK* on page 2-105
- *RESETBREAKS* on page 2-192.

2.2.52 ERROR

The `ERROR` command specifies what happens if an error occurs in processing an `INCLUDE` file.

Syntax

```
ERROR = {quit | abort | continue}
```

where:

`quit`	Instructs the debugger to quit the session and exit to the operating system.
`abort`	Instructs the debugger to return to command mode and wait for keyboard input.
`continue`	Instructs the debugger to abandon this command and execute the next command in the include file.

Description

The `ERROR` command specifies the action the debugger takes if an error occurs while processing an include file. If you issue the `ERROR` command without parameters, program execution terminates.

The `ERROR` command runs asynchronously unless in a macro.

Example

The following example shows how to use `ERROR`:

`error = abort`	If an error occurs, abort reading the include file and return to the command prompt.

See also

The following commands provide similar or related functionality:

- *INCLUDE* on page 2-143
- *QUIT* on page 2-184.

2.2.53 EXPAND

The `EXPAND` command displays the values of parameters to a procedure and any local variables that have been set up.

Syntax

```
EXPAND @stack_level [,windowid]
```

Where:

`@stack_level` Specifies a stack level if you want to see only a single level expanded. For example, you can specify `@3` to expand stack level 3 only.

`windowid`

Indicates that the output is to be directed to the specified window or to the file associated with that window number. You must use one of the following window numbers:

`1`	Code window (and journal file if enabled).
`20`	Standard I/O window.
`28`	Log file.
`29`	Journal file.
`50-1024`	Window number. For further information, see *FOPEN* on page 2-131 or *VOPEN* on page 2-237.

Description

The `EXPAND` command displays the values of parameters to a procedure and any local variables that have been set up. You can expand any procedure in a directly called chain from the main program to the current procedure. Other procedures are not accessible.

If no stack level is specified, all procedures nested on the stack are displayed. Stack levels are numbered starting with the current procedure equaling `0`, the caller of this procedure is `1`, the caller of that procedure is `2`.

The `EXPAND` command runs synchronously.

Messages that can be output by the `EXPAND` command have the following meanings:

`<Bad float>`	Invalid floating-point value, cannot be converted.
`<bad size>`	Type size invalid.
`<UNKNOWN: xx>`	Invalid enum value, where xx = value.

`<INFINITY>`	Floating-point value is infinity.
`<Invalid value (x)>`	Error number (x) occurred.
`<NAN>`	Not a number (for a floating-point value).
`<not a source procedure. Address is ...>`	Routine is not defined as a function in the object file.
`<not alive>`	Local register variable no longer exists.
`<Not in procedure>`	PC located before first executable line.
`<unknown type>`	Type is not recognized by the debugger.

Example

The following example illustrates the `EXPAND` command executed during a run of the `dhrystone` program. You can see three of the messages in use: an `UNKNOWN` enum value, a variable that is not alive, and a procedure that has no source or debug information available.

```
> go
> expand
  00. Proc_1: at line 309.
    Ptr_Val_Par07FFFF60 = (record *)0x01000260
    Next_Record00000005 = (record *)0x0100C274
  01. main: at line 170.
    Int_1_Loc 07FFFF60 = 16777824
    Int_2_Loc 07FFFF60 = 16777824
    Int_3_Loc 07FFFF5C = 134217624
    Ch_Index  'C'
    Enum_Loc  07FFFF58 = <UNKNOWN: 255>
    Str_1_Loc 07FFFF38 = "\xFF\xFF\xFF\xFFx\x1E"
    Str_2_Loc 07FFFF18 = ""
    Run_Index 07FFFF64 = 16827048
    Number_Of_Runs100000
    n          <not alive>
  02. <not a source procedure. Address is 01001DF0>
```

The program was halted in `Proc_1` at line 309. The output shows that `Proc_1` was called from `main` line 170, and `main` was called by unnamed code at address `0x01001DF0`, which is part of the C runtime library.

Because `main` is called from the C runtime library, no source and no debug information is available for the procedure that called `main`, so `EXPAND` reports the pc address from which the call to `main` is made.

See also

The following commands provide similar or related functionality:

- *CEXPRESSION* on page 2-67
- *JOURNAL* on page 2-145
- *PRINTVALUE* on page 2-181
- *WHERE* on page 2-242.

2.2.54 FAILINC

The `FAILINC` command causes an abnormal exit from processing an include file.

Syntax

```
FAILINC {"string"}
```

where:

`string`	A string to display that explains the reason for aborting the include file.

Description

The `FAILINC` command enables you to abort processing an include file. You might do this when checks of the target or debugger environment have failed to find resources the include file requires.

Use the string parameter to explain the abort.

Example

The following example shows how to use the `FAILINC` command in a macro:

```
if ( *((char*)(0xffe00)) != 0 )
  $failinc "Peripheral not initialized. Aborting$";
```

The following example shows how to use the `FAILINC` command in an include file:

```
jump nofail,( *((char*)(0xffe00)) == 0 )
failinc "Peripheral not initialized. Aborting"
:nofail
```

These two examples test a memory address, expecting to read a `0` from some peripheral register. If it does not read `0`, it aborts include file processing.

See also

The following commands provide similar or related functionality:

- *ERROR* on page 2-121
- *FAILINC*
- *INCLUDE* on page 2-143
- *JUMP* on page 2-147.

2.2.55 FILL

The `FILL` command fills a memory block with values.

Syntax

`FILL [/B|/H|/W|/8|/16|/32] addressrange ={expression | expressionlist}`

where:

`/B, , /8` Sets the fill size to byte (8 bits).

If the processor naturally addresses bytes (for example, ARM7TDMI) then this is the default setting.

`/H, , /16` Sets the fill size to halfword (16 bits).

`/W, , /32` Sets the fill size to word (32 bits).

`addressrange` Specifies the range of addresses whose memory contents are filled with the pattern. The start and the end of the range is included in the range. For example a byte fill from `0x400..0x500` writes to `0x400` and to `0x500`.

`expression` Specifies the pattern used to fill memory. The expression can be:

- a decimal or hexadecimal number
- a debugger expression, for example a math calculation
- a string enclosed in quotation marks.

If you use a quoted string:

- each character of the string is treated as a byte value in an *expressionlist*
- no C-style zero terminator byte is written to memory.

`expressionlist`

Specifies the pattern used to fill memory. An *expressionlist* is a sequence of values separated by commas, for example:

```
0x20,0x40,0x20
```

Note

All expressions in an expression string are padded or truncated to the size specified by the size qualifiers if they do not fit the specified size evenly. This also applies to each character of a string.

Description

The `FILL` command fills a memory block with values obtained from evaluating an expression or list of expressions. The size qualifier is used to determine the size of each element of *`expressionlist`*.

If the number of values in *`expressionlist`* is less than the number of bytes in the specified address range, the debugger repeatedly writes the list to memory until all of the designated memory locations are filled.

If more values than can be contained in the specified address range are given, the last repetition is completed before the process stops, so up to `(length(expressionlist)-1)` bytes, halfwords or words might be written beyond the range end address.

If you specify an address range with equal start and end addresses, the memory at that address is modified. If an expression is not specified, the debugger acts as if `=0` had been specified as the expression.

The `FILL` command runs synchronously unless background access to target memory is supported. Use the `WAIT` command to force it to run synchronously.

Examples

The following examples show how to use `FILL`:

`fill 0x1000..0x1004="hello"`

Writes `h`,`e`,`l`,`l`,`o`, to locations `0x1000`...`0x1004`.

`fill 0x1000..0x1001="hello"`

Writes `h`,`e`,`l`,`l`,`o`, to locations `0x1000`...`0x1004`.

`fill 0x1000..0x1013`

Writes as bytes the value `0` to locations `0x1000`...`0x1013`.

`fill /h 0x1000..0x1014`

Writes the 16-bit value `0` to locations `0x1000`...`0x1014`.

`fill 0x1000..0x1013="hello"`

Writes `h`,`e`,`l`,`l`,`o`,`h`,`e`,`l`,`l`,`o`,... to locations `0x1000`...`0x1013`.

`fill /w 0x2032..0x2053=0xDEADC0DE`

For a little-endian memory system, writes `0xDE` to `0x2032`, `0xC0` to `0x2033`, `0xDC` to `0x2034` and on to: `0xDE` to `0x2052`, `0xC0` to `0x2053`.

`fill 0x3000..0x4756 =0xEA000000/2`

Writes `0x00` to `0x3000..0x4576`. The value of `0xEA000000/2` is calculated as `0x75000000`. Because fill defaults to a byte expression width, this is then truncated to `0x00` and written.

`fill /32 0x3000..0x4756 =0xEA000000`

Writes 1373 ARM processor `NOP` instructions to memory, changing locations `0x3000..0x4578`, and so writing 2 bytes more than the specified range.

See also

The following commands provide similar or related functionality:

- *CEXPRESSION* on page 2-67
- *MEMWINDOW* on page 2-160
- *SETMEM* on page 2-202.

2.2.56 FLASH

The `FLASH` command enables you to write or erase flash blocks that have been opened.

Syntax

```
flash [{,qualifier...}] [={address, ...}]
```

where:

`qualifier` If specified, must be one of the following:

`cancel`	Discard the patched or downloaded changes.
`erase`	Erase the specified blocks. This normally sets every byte in the block to `0xFF` or `0x00`, depending on the type of flash memory used.
`write`	Write data to the specified blocks of flash memory.
`verify`	If you specify this qualifier the data written to the flash blocks is verified against the data source.
`useorig`	This qualifier specifies that the original contents of the memory is used wherever it is not explicitly modified.
`ram:`*`addr`*	If `ram` and `ramlen` are specified, they specify the region of memory used for data buffers and the flash programming code on target.
`ramlen:`*`len`*	See `ram`. Specifies the length of the memory area that is used to store the flash programming code stored in the `FME` file.
`scratch`	This qualifier specifies that the original contents of the memory buffer is not saved first. This might saves you some time if the buffer is large. By default the memory buffer is saved first, and restored afterwards.
`gui`	Display any messages in the Flash Control dialog, not in the CLI pane of the Code window.

`address` The flash block can be specified by address.

Description

This command is used to manage flash memory. This command enables you to write, erase and verify flash memory blocks that have been opened. The flash block is specified by address. You cannot program more than one target device at a time.

Debugger internal handle numbers are not available to users to identify memory blocks.

If this command is used with no arguments, it reports the currently open blocks.

See also

The following command provides similar or related functionality:

- *MEMMAP* on page 2-157.

2.2.57 FOPEN

The FOPEN command opens a file and assigns it a window number.

Syntax

```
FOPEN [/A] [/R] windowid, "filename"
```

where:

/A	Appends new data to an existing file. You cannot read or write the existing information, and the existing information is retained.
/R	Opens a file as read-only. This qualifier is used only in conjunction with the fgetc() macro.
windowid	Specifies a window or file number (in the range 50–1024).
filename	Specifies the file being opened. Quotation marks are optional if the filename consists of only alphanumeric characters, slashes, or a period. However, filenames with a leading slash must be in double quotes, and filenames with a leading backslash must be in single quotes, for example "/file" or '\file'.

Description

This command enables you to read or write a file on the host filesystem by associating it with a RealView Debugger custom window number. However, FOPEN does not create a GUI window, and output is only sent to the file. If you require the output in a window, use the VOPEN command on page 2-237.

The file is opened for writes only by default, but you can specify append or read-only modes instead. You write to the file using the FPRINTF command, or by redirecting output from a command to a window with the ; specifier. You read the file using the fgetc macro. You close the file using the VCLOSE command.

The FOPEN command runs asynchronously unless in a macro.

Examples

The following examples show how to use FOPEN:

```
fopen 50, 'c:\temp\file.txt'
fprintf 50, "Start of function\n"
```

Open a file and write some text to it.

```
fopen /r 50, 'c:\temp\file.txt'
ce fgetc(50)
```

Open a file and read the first character of the file.

See also

The following commands provide similar or related functionality:

- *FPRINTF* on page 2-133
- *VCLOSE* on page 2-232
- *VOPEN* on page 2-237.

2.2.58 FPRINTF

The `FPRINTF` command displays formatted text to a specified file or window.

Syntax

`FPRINTF windowid, "format_string" [,argument]...`

where:

windowid

Specifies a window or file number (in the range 50–1024).

format_string

Specifies the format to be applied to argument.

argument The value or values to be written.

Description

The command is similar to the C run-time `fprintf` function. You select the `windowid` to use from the range `50..1024`, and it must be opened using the `FOPEN` command, for output to a file, or the `VOPEN` command, for output to a user window.

The text in *format_string* is defines what is displayed. If there are no `%` characters in the string, the text is written out and any other arguments to `FPRINTF` are ignored. The `%` symbol is used to indicate the start of an argument conversion specification. The syntax of the specification is:

`%<flag><fieldwidth><precision><lenmod><convspec>`

where:

`flag`	An optional conversion modification flag `-`. If specified, the result is left-justified within the field width. If not specified, the result is right-justified.
`fieldwidth`	An optional minimum field width specified in decimal.
`precision`	An optional precision specified in decimal, with a preceding `.` (period character) to identify it.
`lenmod`	An optional argument length specifier:

h	a 16-bit value
l	a 32-bit value
ll	a 64-bit value

The possible conversion specifier characters, `<convspec>`, are:

% A literal `%` character.

m The mnemonic for the processor instruction in memory pointed to by the argument. The expansion includes a newline character. The information that is printed includes:
- the memory address in hexadecimal
- the memory contents in hexadecimal
- the instruction mnemonic and arguments
- an ASCII representation of the memory contents, if printable.

H A line from the current source file, where the argument is the line number.

h A line from the current source file, where the argument is the source line address (as opposed to a target memory address).

d, i, or u An integer argument printed in decimal. **`d`** and `i` are equivalent, and indicate a signed integer. **`u`** is used for unsigned integers.

x or X An integer argument printed in unsigned hexadecimal. **`x`** indicates that the letters `a` to `f` are used for the extra digits, and **`X`** indicates that the letters `A` to `F` are used.

c A single character argument.

s A string argument. The string itself can be stored on the host or on the target.

p A pointer argument. The value of the pointer is printed in hexadecimal.

e, E, f, g, or G

A floating point argument, printed in scientific notation, fixed point notation, or the shorter of the two. The capital letter forms use a capital `E` in scientific notation rather than an `e`.

Output is formatted beginning at the left of the format string and is copied to the Output pane. Whenever a conversion specification is encountered, the next argument is converted according to the specification, and the result is copied to the Output pane.

The following rules apply to the use of the `FPRINTF` command:

- `FPRINTF` runs synchronously
- *`windowid`* must be one of the predefined values or have been previously assigned by an `FOPEN` or `VOPEN` command

- if there are too many arguments, some of them are not printed
- if there are too few arguments (that is, there are more conversion specifiers in the format string than there are arguments after the format string), the string `<invalid value>` is output instead
- if the argument type does not correspond to its conversion field specification, arguments are converted incorrectly.

Example

The following examples show how to use `FPRINTF`:

`fprintf 50,"Syntax error\n"`

Write the string `Syntax error` to the window or file.

`fprintf 50, "Execution time: %d seconds\n", tend-tstart`

Print the result of the calculation to the window or file, in the format:

```
Execution time: 20 seconds
```

`fprintf 50, "Value is %d\n"`

Print the following to the window or file:

```
Value=<invalid value>
```

See also

The following commands provide similar or related functionality:

- *CEXPRESSION* on page 2-67
- *FOPEN* on page 2-131
- *PRINTF* on page 2-174
- *PRINTVALUE* on page 2-181
- *VCLOSE* on page 2-232
- *VOPEN* on page 2-237.

2.2.59 GO

The GO command executes the target program starting from the current PC or from a specified address.

Syntax

```
GO [=start_address[,]][ {temp_break [%%passcount][,] }... [;macro_call]]
```

where:

start_address	Specifies an address at which execution is to begin.
temp_break	Acts as a temporary instruction breakpoint, which is automatically cleared when program execution is suspended.
passcount	Specifies the number of times the *temp_break* address is executed before the command actually halts.
macro_name	Invokes a macro if a temporary break occurs. The macro return value determines whether execution continues or not. If there is an attached macro, execution continues when the macro returns a nonzero value. If the macro returns a zero, execution halts.

Description

This command executes the target program starting from the current PC or from a specified address. The command also causes program execution to resume after it has been suspended. Execution continues until a permanent or temporary breakpoint, an error, or a halt instruction is encountered. You can also click **Stop** to halt execution.

RealView Debugger continues to accept commands after GO has been entered. Commands that cannot be completed while the target is running (synchronous commands) are delayed until the target is next stopped. You can stop the target by clicking **Stop**. For more information about the limitations the target vehicle imposes while the target is running, see your target documentation.

You can specify a temporary instruction breakpoint with the GO command, providing similar functionality to the **Go to Cursor** GUI command. The temporary breakpoint is removed as soon as the target next stops, whether the breakpoint was hit or not. You can also associate a macro to be run that can also determine whether the target remains stopped at the breakpoint.

The GO command runs synchronously.

Note

When specifying a start address you must be careful to make sure that the processor stack has been set up and remains balanced.

Examples

The following examples show how to use `GO`:

`GO` Start or resume executing the target program from the current PC.

`GO @1` Resume executing the target program from the current PC, stopping when the current function returns to its caller.

```
GO write_io; until (x==2)
```

Resume executing the target program from the current PC, stopping when the current function returns to its caller.

See also

The following commands provide similar or related functionality:

- *BREAKEXECUTION* on page 2-38
- *BREAKINSTRUCTION* on page 2-45
- *GOSTEP* on page 2-138
- *HALT* on page 2-140
- *RUN* on page 2-196
- *STEPINSTR* on page 2-213
- *STEPLINE* on page 2-215
- *STOP* on page 2-223.

2.2.60 GOSTEP

The `GOSTEP` command single-steps through the program, invoking a named macro at every step.

Syntax

`GOSTEP` *`macro_name`*

where:

`macro_name` Specifies the name of the macro that is invoked after each instruction.

The macro return value determines whether execution continues or not. Execution continues when the macro returns a nonzero value.

Description

The `GOSTEP` command single-steps through the program, invoking a named macro at every step. Execution starts at the current PC, and continues until you click **Stop** to halt execution, the macro returns zero, or a breakpoint is hit. Single-stepping is by source line for high-level source code and by processor instruction for assembly language code.

The `GOSTEP` command runs synchronously.

Note

- Using the command significantly slows target execution speed.
- Using the command might cause target program execution errors because of timing issues.

Example

The following examples show how to use `GOSTEP`:

`GOSTEP checkvariable`

Start or resume executing the target program from the current PC. At each step, invoke a macro called `checkvariable`. A step is an instruction or a statement, depending on the source display `MODE`.

`GOSTEP until (y>100)`

Resume executing the target program, stopping when the program variable `y` exceeds `100`. `until` is a predefined macro.

See also

The following commands provide similar or related functionality:

- *BREAKEXECUTION* on page 2-38
- *BREAKINSTRUCTION* on page 2-45
- *GO* on page 2-136
- *HALT* on page 2-140
- *MODE* on page 2-162
- *RUN* on page 2-196
- *STEPINSTR* on page 2-213
- *STEPLINE* on page 2-215
- *STOP* on page 2-223.

2.2.61 HALT

The `HALT` command stops target program execution.

Syntax

```
HALT
```

Description

The `HALT` command stops the target program if it was executing. All processes or threads are stopped, and if the RTOS extension is loaded the state of any attached threads is updated.

See also

The following commands provide similar or related functionality:

- *GOSTEP* on page 2-138
- *RUN* on page 2-196
- *STEPINSTR* on page 2-213.

2.2.62 HELP

The `HELP` command displays RealView Debugger online help. To do this type:

```
HELP
```

The topic **Welcome to RealView Debugger Help** includes more information about using online help in RealView Debugger.

2.2.63 HWRESET

`HWRESET` is an alias of `EMURESET` (see page 2-117).

2.2.64 INCLUDE

The `INCLUDE` command executes commands stored in the specified file.

Syntax

`INCLUDE "filename"`

where:

filename	Specifies the command file to be read. Quotation marks are optional if the filename contains only alphanumeric characters and periods. Filenames that contain a leading slash must be in double quotation marks (`"/filename"`, for example). Filenames that contain a backslash must be in single quotation marks (`'\filename'`, for example).

Description

The `INCLUDE` command executes a group of commands stored in the specified file as though they were entered from the keyboard. Commands in the file are executed until the end of the file is reached or an error occurs. If an error occurs, the debugger behaves as specified by the `ERROR` command. If a filename extension is not specified, the debugger automatically appends the extension `.inc`.

The `INCLUDE` command is normally used to perform repetitive or complex initializations, such as:

- loading and running programs, setting up breakpoints and initial variable definitions
- creating debugger aliases and macros, perhaps for use in later debugging

  Note

  The `DEFINE` command, used to create macros, can only be used in an `INCLUDE` file.

- running test suites.

You can configure the debugger to load a given include file automatically when a target connection is made using the `Commands` setting of the `Advanced Information` block for your target.

You can also run script files using the `-inc` argument to RealView Debugger itself. See *Using the CLI* on page 1-5 for more information.

The `INCLUDE` command runs asynchronously unless in a macro.

Example

The following example shows how to use `INCLUDE`:

```
INCLUDE "startup.inc"
```

Read the file `startup.inc` in the current directory and interpret the contents as RealView Debugger commands. The file `startup.inc` might contain:

```
; startup.inc 12/12/00
; Author: J.Doe
;
alias sf*ile =dtfile ;99
alias dub =dump /b
vopen 99
```

See also

The following commands provide similar or related functionality:

- *ALIAS* on page 2-21
- *DEFINE* on page 2-84
- *ERROR* on page 2-121
- *FAILINC* on page 2-125
- *JUMP* on page 2-147
- *MACRO* on page 2-155.

2.2.65 JOURNAL

The `JOURNAL` command controls the logging of information displayed in the **Cmd** tab of the Output pane.

Syntax

```
JOURNAL [/A] [OFF | ON="filename"]
```

where:

`/A`	Appends information to an existing file.
`OFF`	Closes the journal file and stops collecting information. This is the default setting.
`ON`	Starts writing information to the journal file.
`filename`	Specifies the journal filename. If you do not specify a filename extension, the extension `.jou` is used. Quotation marks are optional if the filename contains only alphanumeric characters or periods. Filenames that contain a leading forward slash must be in double quotation marks (`"/`*`filename`*`"`, for example). Filenames that contain a leading backward slash must be in single quotation marks (`'\`*`filename`*`'`, for example).

Description

The `JOURNAL` command starts or stops saving, in a specified file, information displayed in the **Cmd** tab of the Output pane. The information you can direct to a file includes user command input, resulting output, error messages, and text specifically sent to the journal file.

Note

If the specified file exists and you do not specify the `/A` parameter, the existing contents of the file are overwritten and lost.

The `JOURNAL` command runs asynchronously unless it is in a macro.

Example

The following examples show how how to use `JOURNAL`:

`JOURNAL ON='c:\temp\log.txt'`

Start logging output to the file `c:\temp\log.txt`, overwriting any existing file of that name.

`JOURNAL /A ON="log"`

Start logging output to the file `log.jou` in the current directory of the debugger, appending the new log text to the file if it already exists.

`JOURNAL OFF`

Stop logging output.

See also

The following commands provide similar or related functionality:

- *LOG* on page 2-153
- *VOPEN* on page 2-237.

2.2.66 JUMP

The JUMP command goes to a label in an include file.

Syntax

```
JUMP label [, condition]
```

where:

label	Is the string that identifies the target line in the include file to which you want control to jump. The first character of the target label must be a colon :, and it must be followed by a label string.
condition	Is an optional expression that can be evaluated as TRUE or FALSE. The jump to the specified label takes place only if the condition is true, otherwise control passes to the next command in the include file.

Description

The JUMP command can only be used in a macro or include file. If you specify a condition, then the jump takes place only if the condition is true. Otherwise control passes to the next line in the include file.

If you use the JUMP command in a macro, the target label must be in the same macro.

Example

The following fragment of an include file shows the use of labels and jumps:

```
initialise
:retry
jump skip_setup,x==1 // variable x is 1 when setup is complete
some_commands
jump retry           // keep trying to initialize
:skip_setup
```

See also

The following commands provide similar or related functionality:

- *DEFINE* on page 2-84
- *FAILINC* on page 2-125
- The IF, WHILE and DO flow control constructs of a macro
- The macros chapter in the *RealView Developer Kit v1.0 Debugger User Guide*.

2.2.67 LIST

The `LIST` command displays source code in the Code window.

Syntax

```
LIST [ line_number | function_name | @stack_level]
```

where:

`line_number`	Specifies the number of the first line to be displayed.
`function_name`	Specifies a function that is to have its source code displayed.
`@stack_level`	Displays the line that is returned to after the specified nesting level. For example, `@1` represents the instruction after the call to the current procedure.

Description

The `LIST` command displays the source code in the Code window beginning at the specified line number, stack level, or function name.

You can qualify line number or procedure names by preceding them with a module name. If you do not specify a parameter for the `LIST` command, the line pointed to by the PC is displayed.

The `LIST` command runs asynchronously unless in a macro.

Example

The following examples show how to use `LIST`:

`list`	List the text of the current source file from the current PC location, if that refers to a source file with debugging information.
`list #44`	List the text of the current source file from line 44.
`list @1`	List the text of the source file containing the call to the current procedure, starting from the statement after the call.

See also

The following commands provide similar or related functionality:
- *CONTEXT* on page 2-76

- *DISASSEMBLE* on page 2-96
- *DOWN* on page 2-102
- *EXPAND* on page 2-122
- *SCOPE* on page 2-197
- *UP* on page 2-230
- *WHERE* on page 2-242.

2.2.68 LOAD

The `LOAD` command loads the specified executable file into the debugger.

Syntax

```
LOAD [/A] [/C] [/N] [/NI] [/NP|/SP] [/NS] [/NW] [/PD] [/R]
absolute_filename[,root] [&base_address] [;section [,section]...] [;arg1 ...]
```

where:

`/A`	This loads and appends another executable image without deleting any existing one. If the new image file overlaps the addresses of the existing object modules, the load terminates and displays an error message. If you want to replace the current image with a new one, use `/R`. This option might be the default option if you are running an operating system extension to RealView Debugger. For more information, consult the manual provided with the extension.
`/C`	Converts all symbols to lowercase as they are read by the absolute file reader.
`/NI`	Loads only the symbol table. Overlap of addresses is checked if `/A` is also used. Does not load the program image code or the data.
`/NP`	Prevents the command changing the value of the PC.
`/NS`	Prevents the command loading debug information into the symbol table. Only the program image is loaded. No check for overlapping addresses is made. The `/NS` option can be used to reload the current program image without affecting the symbol table.
`/PD`	Pop dialog. Display a dialog for errors and warnings, rather than dumping them to the log.
`/R`	Replaces the existing program with the program being loaded.
`/SP`	Sets the PC to the start address specified in the object module. This is the default behavior when symbols are loaded, the image file specifies an entry address and the `/A` flag is not also specified.
`/NW`	The option does nothing in this release of RealView Debugger.

`absolute_filename`

Specifies the name of the absolute object file to be loaded. Quotation marks are optional if the filename contains only alphanumeric characters or periods. Filenames that contain a leading slash must be in double quotation marks ("`/filename`", for example). Filenames that contain a leading backslash must be in single quotation marks (‘`\filename`', for example).

root	Specifies the root associated with the symbols in the program being loaded. The default root is the filename without an extension.
base_address	Specifies an address offset to be added to all sections when computing the load addresses. For this option to work correctly, the program must have been compiled with *Position-Independent Code* (PIC) and *Position-Independent Data* (PID).
section	Lists sections to load when an image is being loaded. The default is to load all sections. This option is commonly used to reload the initialized data area when starting a program. The section names that are available for a specific image can be listed using the ARM development tools command `fromelf` or the GNU development tools command `objdump`.
args	Specifies an optional, space-separated, list of arguments to the image. Where several arguments are provided, single quotes must be used. The case of arguments is preserved.

Description

The `LOAD` command loads the specified executable file into the debug target. The file specified must be a format supported by the RealView Debugger.

To reset the initialized values of program variables after entering a `RESET` or a `RESTART` command, you must reload your program using the `LOAD` command. The `RELOAD` command checks the file date to determine whether program symbols have changed and therefore whether they must be reloaded.

If a load is performed that includes the symbol table, any breakpoints or macros referring to symbols in the previous root are invalidated.

The `LOAD` command runs synchronously.

Examples

The following examples show how to use `LOAD`:

```
load c:\source\myfile.axf
```

Load the executable file `myfile.axf` to the target.

`load /ni/sp c:\source\rtos.axf`

Load the symbol table for an image `rtos.axf` that is also in target ROM, setting the PC to the program start address so that a subsequent `GO` runs the program.

`load /ni/sp c:\source\myos.axf`

Load the symbol table for an image `myos.axf` that is also in target ROM, setting the PC to the program start address so that a subsequent `GO` runs the program.

`load /np c:\source\mp3.axf`

Load the executable library `mp3.axf` onto the target so that the preloaded executable can use it. The PC is not modified. Symbol table entries in `mp3.axf` are added to the existing symbol table.

Note

Ensure that executables you load in this way occupy distinct memory regions. No relocation is performed by RealView Debugger unless you specify a base offset.

`load /pd/r c:\source\demofile.axf &0x8A00 ;ER_RO,ER_ZI`

Load the executable file `demofile.axf` to the default target. Specify an offset added to all sections to compute the load addresses. Load only the specified sections `ER_RO` and `ER_ZI`.

`load /pd/r 'c:\source\myfile.axf;;arg1 arg2 arg3'`

Load the executable file `myfile.axf` to the default target using an arguments list. An empty *section* list is given so all sections are loaded.

See also

The following commands provide similar or related functionality:

- *ADDFILE* on page 2-19
- *GO* on page 2-136
- *RELOAD* on page 2-189
- *RESET* on page 2-191
- *RESTART* on page 2-194
- *RUN* on page 2-196
- *UNLOAD* on page 2-228.

2.2.69 LOG

The `LOG` command records user input and places it in a specified file.

Syntax

```
LOG [/A] [OFF | ON="filename"]
```

where:

`/A`	Specifies that new records are to be added to any that already exist in the specified file.
`OFF`	Closes the log file and stops collecting information.
`ON`	Starts writing information to the log file.
`filename`	Specifies the name of the log file. Quotation marks are optional if the filename contains only alphanumeric characters or periods. Filenames that contain a leading slash must be in double quotation marks (`"/`*`filename`*`"`, for example). Filenames that contain a leading backslash must be in single quotation marks (`'\`*`filename`*`'`, for example). If you do not supply a filename extension, the extension `.log` is used by default.

Description

This command records user input and places it in a specified file. Commands that are issued but not successfully completed are written to the log file as comments along with the associated error codes. All successful commands are written to the log file, so the file can be used as an include file.

If the specified file exists and you do not specify the `/A` parameter, the existing contents of the file are overwritten and lost. A window number (28) is associated with the log file so that text can be written to it using `FPRINTF`.

Using `LOG` with no parameters shows the current log file, if any. User input is recorded in the log file until the `LOG OFF` command is issued.

The `LOG` command runs asynchronously unless in a macro.

Example

The following examples show how to use `LOG`:

`LOG ON='c:\temp\log.txt'`

Start logging output to the file `c:\temp\log.txt`, overwriting any existing file of that name.

`LOG /A ON="log"`

Start logging output to the file `log.log` in the current directory of the debugger, appending the new log text to the file if it already exists.

`LOG OFF` Stop logging output.

See also

The following commands provide similar or related functionality:

- *JOURNAL* on page 2-145
- *VOPEN* on page 2-237.

2.2.70 MACRO

The `MACRO` command enables you to run a predefined or user-defined macro.

Syntax

```
MACRO macroname(parameters...)
```

where:

`macroname`	Specifies that name of the macro.
`parameters`	The actual values of parameters required by the macro.

Description

The `MACRO` command runs a macro. You can run macros in these ways:

- as part of the expression in a `CE` command
- as the argument to the `MACRO` command
- as a command on its own.

The `CE` command enables you to see the result of the macro, as set with the `RETURN` statement. If the macro does not explicitly return information, or you do not have to know the return value, you can use the macro name as a command. However, in this case the macro is only run if the name does not match any other debugger command or any alias defined with `ALIAS`. You can therefore use the `MACRO` command to ensure that the command that is run is the macro, and not a debugger command or an alias.

Note

It is recommended that, if you call macros in an include file and they do not return a value, that you use `MACRO` to make the call. This ensures that the future operation of the include file is not changed if new commands are added to the debugger, for example using `ALIAS`.

Macros can also be invoked as actions associated with:

- a window, for example `VMACRO`
- a breakpoint, for example `BREAKEXECUTION`
- deferred commands, for example `BGLOBAL`.

Note

Macros that are not directly invoked from the command line cannot execute `GO`, or `GOSTEP`, or any of the stepping commands, for example `STEPINSTR`.

Example

The following example shows how to use `MACRO`:

`macro fgetc(50)`

Read a character from the file associated with window number `50` and throw it away, with the side effect of advancing the file pointer to the next character.

See also

The following commands provide similar or related functionality:

- *ALIAS* on page 2-21
- *CEXPRESSION* on page 2-67
- *DEFINE* on page 2-84
- *INCLUDE* on page 2-143
- *PRINTSYMBOLS* on page 2-177
- *SHOW* on page 2-211
- *VMACRO* on page 2-235.

2.2.71 MEMMAP

The `MEMMAP` command enables you to define and control memory mapping.

Syntax

```
MEMMAP [{,qualifier...}] [=address]
```

where:

`qualifier` One of the following:

`enable` Turns on memory mapping control. This is the default.

The debugger only accesses the target memory in regions that are defined in the map, and uses the access method to determine the operations that are permitted.

`disable` Turns off memory mapping control. The debugger assumes that all memory is RAM.

`delete` Deletes memory map entries:

- if you supply a memory map entry start address in *`address`*, delete that entry
- if you supply no arguments, delete all memory maps.

`autosection` When loading an image, create memory mappings automatically from the sections of the image. This is default behavior.

`updateautomap` Update the memory map based on the information provided in the board file. This is automatically done when:

- the debugger starts up
- the target program stops
- the registers that control the map are changed by you.

This qualifier enables you to manually request a map update.

`define` Creates a new memory region using the address range in *`address`*. You can specify additional information about the region with the `type`, `access`, and `description` qualifiers.

`descr`iption:*text*	Set the name of this memory map region to *text*. This is used to label the entry for your own reference.
access:*text*	Set the memory access type to *text*, which must be one of the predefined strings:

RAM	memory can be read and written with no specific provision.
ROM	memory can only be read.
WOM	memory can only be written.
NOM	there is no memory in this region.
Flash	there is Flash memory in this region. It can always be read, and it can be written as required using the flash memory procedure if this is defined.
Auto	There is memory in this region but the type is inferred by the image that is loaded. Memory in regions not defined by the image are assumed to be absent (equivalent to NOM).
Prompt	There is memory in this region but you set the type by responding to a prompt when loading an image to it. The default is there is no memory.

type:*text*	Set the memory type to *text*, which must be one of the defined memory type strings for the processor architecture. For ARM architecture-based processors, the only available type is Any.

description The memory region, specified as a single address (delete) or an address range (define).

Description

The MEMMAP command enables you to define and control memory mapping. You can enable and disable mapping, and define new memory regions based on type and access rights. The list of allowed access rights and types is defined by the vehicle and processor.

Note

Debugger internal handle numbers are not available to users to identify memory blocks. There is no command that lists out the memory maps with the map handle numbers.

Examples

The following examples show how to use `MEMMAP`:

`mmap,def,access:RAM,type:Any,description:"Data space"=0x0000..0x7FFF`

Define a read/write memory region called `Data space` in the first 32KB of memory.

`mmap,def,access:ROM,type:Any,descr:"Bootrom"=0x10000..+0xFFFF`

Define the 64KB region starting at `0x10000` as a read-only region called `Bootrom`.

`mmap,delete =0x10000`

Delete the memory map entry that starts at `0x10000`, resetting the map for that area to the `Auto` map.

`mmap,delete` Delete all memory map entries, resetting the map to the default `Auto` map over the whole address space.

`mmap,disable` Disable memory mapping.

Alias

`MMAP` is an alias of `MEMMAP`.

See also

The following commands provide similar or related functionality:

- *MEMWINDOW* on page 2-160
- *SETMEM* on page 2-202.

2.2.72 MEMWINDOW

The `MEMWINDOW` command sets the base address of the memory pane.

Syntax

```
MEMWINDOW [/B|/H|/W|/8|/16|/32] address
```

where:

`/B, , /8`	Sets the display format to byte (8 bits). If the processor naturally addresses bytes (for example, ARM7TDMI) then this is the default setting.
`/H, , /16`	Sets the display format to halfword (16 bits).
`/W, , /32`	Sets the display format to word (32 bits).
`address`	The base address for the memory pane.

Description

The `MEMWINDOW` command sets the base address of the memory pane. You can specify the size of each printed value using the qualifiers. If you do not specify a size, the previous size is retained.

Example

The following example shows how to use `MEMWINDOW`:

```
memw /b 0x200
```

Display in the memory pane bytes from address `0x200`.

See also

The following command provides similar or related functionality:

- *SETMEM* on page 2-202.

2.2.73 MMAP

`MMAP` is an alias of `MEMMAP` (see page 2-157).

2.2.74 MODE

The MODE command switches the code window between disassembly and source view.

Syntax

```
MODE [HIGHLEVEL | ASSEMBLY]
```

where:

HIGHLEVEL	Set the code window to the source view.
ASSEMBLY	Set the code window to the disassembly view.

Description

The MODE command enables you to toggle between disassembly and source modes of the Code view, and along with this, the stepping mode of the GOSTEP command. Without an argument, the current mode is toggled. With an argument, the current view mode is set to the indicated mode.

See also

The following commands provide similar or related functionality:

- *CONTEXT* on page 2-76
- *DISASSEMBLE* on page 2-96
- *GOSTEP* on page 2-138
- *LIST* on page 2-148.

2.2.75 MONITOR

The `MONITOR` command adds the named variable to the list of monitored, or watched, variables, displayed in the Watch pane.

Syntax

```
MONITOR variable_name
```

where:

`variable_name`	The name of a variable or expression in the current context, or a path name, using the `\\module\proc\variable` syntax, for a variable that you are monitoring.

Description

The `MONITOR` command adds a variable to the list of watched variables displayed in the Watch pane of the debugger. This list displays the values of each variable every time the debugger stops, for example at a breakpoint. If the variable is out of scope when the debugger stops, the value is printed as `Symbol not found without qualification`.

You can add pointer and structure variables to this list. If you do, the values of members and referenced variables can be displayed using the ⊞ icon next to the pointer name in the watch pane.

Note

- `MONITOR` is equivalent to `display`, found in some other debuggers.
- You can print the value of a variable using the `CEXPRESSION` or `PRINTVALUE` command.

Examples

The following examples show how to use `MONITOR`:

`monitor count`	Monitor the value of the variable count, displaying the value as an integer.
`moni this`	Monitor the members of the current C++ class, through the C++ class pointer `this`.
`moni \\MAIN_1\ALLOC\maxalloc`	Monitor the global variable `maxalloc` from the file `main.c`.

See also

The following commands provide similar or related functionality:

- *CEXPRESSION* on page 2-67
- *CONTEXT* on page 2-76
- *DUMP* on page 2-111
- *NOMONITOR* on page 2-166
- *PRINTVALUE* on page 2-181.

2.2.76 NAMETRANSLATE

The NAMETRANSLATE command manipulates the host/target name translation list.

Syntax

```
NAMETRANSLATE [{,qualifier...}] [={name-translation, ...}]
```

where:

qualifier If specified, must be one of the following:

- `replace` The current name translation list is to be replaced by the list specified in this command.
- `delete` The current name translation list is to be deleted.

If you do not supply a qualifier, the name translation list specified in this command is appended to the current name translation list.

name_translation

A list of name translations. The format is:

`hname,hname,hname=tname,tname`

where `hname` is the filename on the host (or a comma-separated list of them) and `tname` is the filename on the target (or a comma-separated list of them).

The whole translation must be enclosed in double quotes.

Description

The NAMETRANSLATE command extends, replaces, or deletes the name translation list. Name translation enables a host filename to be different from a target filename.

If you supply no arguments, the NAMETRANSLATE command displays the current name translation list.

If translating from host name to target name, the first target name in the list is used. If translating from target name to host name, the first host name in the list is used.

See also

The following commands provide similar or related functionality:

- *LOAD* on page 2-150
- *PATHTRANSLATE* on page 2-172.

2.2.77 NOMONITOR

The `NOMONITOR` command deletes variables from the Watch pane.

Syntax

<u>NOMO</u>`NITOR linenum | linenum..linenum`

where:

`linenum`	A line number or a line number range for the items to delete.

Description

This `NOMONITOR` command deletes variables added to the Watch pane by `MONITOR`, using a line number in the pane to identify the item to delete.

Line numbers start at 1 for the first line and increment by one for each top-level variable. A structure or array variable that has been expanded using the icon to the left of the variable name, ⊞, counts as only one line. If you reference a line that is not present, the command is ignored.

You can delete several consecutive elements from the Watch pane using a line number range, separating the first and last line numbers with a double-dot `..`. If the end of a line range is not present, only the lines that are present are deleted.

Examples

The following examples show how to use `NOMONITOR`:

`nomonitor 2`	Delete the variable on line 2 of the watch pane.
`nomonitor 2..4`	Delete the variables on line 2, 3, and 4 of the watch pane.

See also

The following command provides similar or related functionality:

- *MONITOR* on page 2-163.

2.2.78 ONSTATE

The `ONSTATE` command executes the associated command when a particular event occurs.

Syntax

```
ONSTATE [,event] [,timer] [,replace] [command]
```

where:

`event` Specifies the event to trigger on from the following list:

- `start` Execute the command immediately before program execution starts.
- `stop` Execute the command immediately after program execution stops.
- `starttimed`
  Execute the command immediately before program execution starts and at the specified interval thereafter until the program stops running. The target must support execution of commands on a running target.
- `tstart` An alias of `starttimed`.
- `stoptimed`
  Execute the command immediately after program execution stops and at the specified interval thereafter, until the debugger starts the program again or the target is disconnected. Specify the time interval using the `,timer` qualifier, with the interval in milliseconds.
- `tstop` An alias of `stoptimed`.
- `reset` If target reset is detected by the debugger, execute the command.

`timer` A qualifier used to specify the time interval used with timed events. The minimum interval is 10ms.

`replace` A qualifier used to specify that this `ONSTATE` command replaces all previous `ONSTATE` commands for the same event.

If this qualifier is not specified, new commands for an event are added to the end of a list of commands to execute when the event happens.

`command` The debugger command to execute. It can be more than one word.

Description

The `ONSTATE` command executes a given debugger command when a specified event occurs. If no arguments are provided, `ONSTATE` lists out the currently registered commands for each type of event.

Examples

The following examples show how to use `ONSTATE`:

`onstate,tstop,timer:5000 ce 0x8000`

While the debugger has the target stopped at a five-second interval, execute the command `ce 0x8000`.

`onstate,stop,replace`

Delete the event commands associated with the stop event.

`onstate`

List the current event commands in the following format:

```
On Start:
  <no commands registered>

On Stop:
  <no commands registered>

On Start Timed (every 0 msecs):
  <no commands registered>

On Stop Timed (every 5000 msecs):
  ce 0x8000

On Reset:
  <no commands registered>
```

See also

The following command provides similar or related functionality:

- *BGLOBAL* on page 2-27.

2.2.79 OPTION

The OPTION command enables you to change the settings of debugger options for this session, or to display their current settings.

Syntax

```
OPTION [option = value]
```

where:

option Specifies a setting from the list:

RADIX The number base used for numeric input and output. The *value* must be one of:

DECIMAL The default input number base is decimal, base 10, using the digits 0..9. A decimal number can also be suffixed with t. This is the default setting.

HEXADECIMAL

The default input number base is hexadecimal, base 16, using the digits 0..9 and a..f, or 0..9 and A..F. A hexadecimal number can also be prefixed with 0x or suffixed with h.

Note

You must prefix every hex number with a numeric digit to avoid confusion with symbol names.

OUTDEC The output number base is decimal, base 10, using the digits 0..9. This is the default setting.

OUTHEX The output number base is hexadecimal, base 16, is prefixed with 0x and uses the digits 0..9 and A..F.

The number base for a particular session can also be set in the workspace options.

FRAMESTOP

A flag that controls the behavior of the call stack algorithm. The *value* must be one of:

ON The call stack stops when a stack frame is encountered that does not have associated debug information.

OFF The call stack stops when the end of stack is reached or when the stack frame no longer makes sense.

DEMANDLOAD

A flag that controls when the debugger symbol table is loaded. The *value* must be one of:

ON	The debug sections of the executable file are loaded into the debugger symbol table as required, speeding up the target load time. This is the default setting.
OFF	The whole symbol table is loaded from the file when the LOAD or RELOAD commands are issued.

ENDIANITY

A flag that indicates the endianess of the target. The *value* must be one of:

LITTLE	The least significant byte of data is in the lowest address in memory, or appears first in a word in a data stream.
BIG	The most significant byte of data is in the lowest address in memory, or appears last in a word in a data stream.

Note

The option changes how the debugger sends and receives data from the target. It cannot be used to change the endianess of the target itself. You must set this value, or the equivalent board file setting, to reflect the target, or the debugger might not work with your target.

value Defines the value that you want to assign to the specified option.

Description

The OPTION command enables you to change the settings of debugger options for this session, or to display their current settings. If you supply no parameters, the command displays the current settings of various options.

Examples

option Displays the current option settings, for example:

```
RADIX = DECIMAL, OUTHEX
FRAMESTOP = OFF
DEMANDLOAD = ON
ENDIANITY = LITTLE
```

`option radix=hex`	The numerical input base is hexadecimal. The following are valid numbers when the default number base is hexadecimal: • `0xAB` (AB hex, 171 decimal) • `0AB` (AB hex, 171 decimal) • `45` (45 hex, 69 decimal) • `45t` (45 decimal) • `45H` (45 hex, 69 decimal). and the following are not valid: • `AB` (does not start with a digit) • `0t45` (`t` must be at the end).

See also

The following commands provide similar or related functionality:

- *CEXPRESSION* on page 2-67
- *LOAD* on page 2-150
- *PRINTVALUE* on page 2-181
- *SETTINGS* on page 2-207.

2.2.80 PATHTRANSLATE

The PATHTRANSLATE command manipulates the host/target name translation list.

Syntax

```
PATHTRANSLATE [{,qualifier...}] [={path-translation, ...}]
```

where:

qualifier	If specified, must be one of the following:
	`replace` The current path translation list is to be replaced by the list specified in this command.
	`delete` The current path translation list is to be deleted.
	If you do not supply a qualifier, the path translation list specified in this command is appended to the current path translation list.
path_translation	A list of path translations. The format is:
	`host=target`
	Target may be `'-'` which means that a grab of a process with no path prepends the host path.

Description

The PATHTRANSLATE command extends, replaces, or deletes the path translation for a board. Path translation enables the paths on a host computer to be different from those on a remote target.

If you supply no arguments, the PATHTRANSLATE command displays the current name translation list.

If translating from host name to target name, the first target name in the list is used. If translating from target name to host name, the first host name in the list is used.

See also

The following commands provide similar or related functionality:

- *LOAD* on page 2-150
- *NAMETRANSLATE* on page 2-165.

2.2.81 PAUSE

The `PAUSE` command waits for a specified number of seconds.

Syntax

`PAUSE [n]`

where:

n	Specifies a period of time, in seconds.

Description

The `PAUSE` command pauses command file reading. It stops execution of commands from the include file for a specified time, or until the user indicates that execution can continue.

If you do not supply a parameter, or supply a value of zero, the command waits indefinitely. Execution continues when you press `Return`, `Enter`, or `Cancel`.

If you supply a positive integer, a countdown of seconds from that number to zero is displayed. Execution continues when zero is reached, or earlier if you press `Return`, `Enter`, or `Cancel`.

Examples

The following examples show how to use `PAUSE`:

`pause 5`	Wait for 5 seconds, or for you to press `Return`, `Enter`, or `Cancel`, and then continue.
`pause`	Wait for you to press `Return`, `Enter`, or `Cancel`.

See also

The following command provides similar or related functionality:

- *WAIT* on page 2-240.

2.2.82 PRINTF

The `PRINTF` command prints formatted text to the Output pane.

Syntax

```
PRINTF "format_string" [,argument]...
```

where:

`format_string`

Is a format specification conforming to C/C++ rules with extensions. It might be a text message, or it can describe how one or more values are to be presented.

`argument`	Is a list of values that you want displayed in the way described by the specified format.

Description

The `PRINTF` command uses a special format string to write text and numbers to the command Output pane. It works in a similar way to the ANSI C standard library function `printf()`, with a number of extensions to better support the debugger environment.

The message in `format_string` is a string. If there are no `%` characters in the string, the message is written out and any arguments are ignored. The `%` symbol is used to indicate the start of an argument conversion specification. The syntax of the specification is:

```
%<flag><fieldwidth><precision><lenmod><convspec>
```

where:

`flag`	An optional conversion modification flag `-`. If specified, the result is left-justified within the field width. If not specified, the result is right-justified.
`fieldwidth`	An optional minimum field width specified in decimal.
`precision`	An optional precision specified in decimal, with a preceding `.` (period character) to identify it.
`lenmod`	An optional argument length specifier:

h	a 16-bit value
l	a 32-bit value
ll	a 64-bit value

The possible conversion specifier characters are:

%	A literal `%` character.
m	The mnemonic for the processor instruction in memory pointed to by the argument. The expansion includes a newline character. The information that is printed includes: • the memory address in hexadecimal • the memory contents in hexadecimal • the instruction mnemonic and arguments • an ASCII representation of the memory contents, if printable.
H	A line from the current source file, where the argument is the line number.
h	A line from the current source file, where the argument is a target memory address.
d, i, or u	An integer argument printed in decimal. `d` and `i` are equivalent, and indicate a signed integer. `u` is used for unsigned integers.
x or X	An integer argument printed in unsigned hexadecimal. `x` indicates that the letters `a` to `f` are used for the extra digits, and `X` indicates that the letters `A` to `F` are used.
c	A single character argument.
s	A string argument. The string itself can be stored on the host or on the target.
p	A pointer argument. The value of the pointer is printed in hexadecimal.
e, E, f, g, or G	A floating point argument, printed in scientific notation, fixed point notation, or the shorter of the two. The capital letter forms use a capital `E` in scientific notation rather than an `e`.

Examples

The following examples show how to use `PRINTF`:

```
printf "Found %d errors\n", ecount
```

Print out a message, substituting the value of `ecount`. So, if `ecount` had the value `5`, the message is:

```
Found 5 errors
```

```
printf "Completion %%\n", runs
```

Print out a message that includes a single percent symbol. The argument `runs` is ignored, so the message is:

```
Completion %
```

```
printf "%h\n", #82
```

Print out a source file line 82. For example:

```
REG   char            Ch_Index;
```

```
printf "Var is %hd.\n", short_var
```

Print out the variable `short short_var`. For example:

```
Var is 22.
```

```
printf "Instruction1 %m\nInstruction2 %m", 0x100, 0x104
```

Print out the disassembly of the contents of location `0x100`, two newlines and the contents of location `0x104`. For example, it might print:

```
Instruction1 000000100 20011410  ANDCS    r1,r1,r0,LSL r4

Instruction2 000000104 20011412  ANDCS    r1,r1,r2,LSL r4
```

```
printf "Average execution time %f secs\n", totaltime / (double)20
```

Print out a message, substituting the value of the expression. So, if `totaltime` had the value `523.3`, the message is:

```
Average execution time 26.165 secs
```

See also

The following commands provide similar or related functionality:

- *CEXPRESSION* on page 2-67
- *FPRINTF* on page 2-133
- *PRINTTYPE* on page 2-179
- *PRINTVALUE* on page 2-181.

2.2.83 PRINTSYMBOLS

The PRINTSYMBOLS command displays information about the specified symbol including its name, data type, storage class, and memory location.

Syntax

```
PRINTSYMBOLS [/C|/D|/E|/F|/M|/R|/T|/W] [name[*]] [\|\\|*]
```

where:

`/C`	Displays functions and labels.
`/D`	Displays data and macros.
`/E`	Displays any symbol declaration conflicts. Mismatch errors occur when global variables are declared with different types in different modules or global functions are declared with different return types or argument counts in different modules.
`/F`	Displays symbols in all roots (all contexts). All matching names in all roots are shown.
`/M`	Displays modules and module names.
`/R`	Displays reserved symbols, registers, and internal variables.
`/T`	Displays types.
`/W`	Displays symbols in wide format (names only).
`name`	Specifies the symbolic unit. The wildcard character (`*`) can be used to match the first zero or more letters of a name. The `*` must be the last character in the partial name.
`*`	An asterisk as the only parameter displays all symbols in the current context.
`\`	Displays information about all modules.
`\\`	Displays information about debugger symbols.

Description

The PRINTSYMBOLS command displays information about the specified symbol including its name, data type, storage class, and memory location. If you want to see all modules in your current root, use only \ and \\. If you want to see all symbols in a particular function or module, append \ to the module name. All symbols are displayed that match the name when no options are specified.

Note

The symbol name must be specified in the correct case, even when a wildcard is used.

Examples

The following examples show how to use PRINTSYMBOLS:

`printsymbols funct1\`

Prints the names of all symbols within `funct1`, for example, all local variables.

`printsymbols /m *`

Prints the names of all modules in the program. For example, for the `dhrystone` program this command prints:

```
@dhrystone\\DHRY_H    : Codeless Include File.
@dhrystone\\DHRY_2    : NON-LOADED module.
                        Code section = 000080E0 to 0000833B
@dhrystone\\DHRY_1    : High level module.
                        Code section = 00008344 to 0000916B
@dhrystone\\STARTUP_S : Assembly level module.
                        Code section = 00008000 to 000080DF
@dhrystone\\ARMSYS    : Assembly level module.
                        Code section = 0000916C to 00009173
                        Code section = 0000CDFC to 0000CEF7
...
```

Alias

PS is an alias of PRINTSYMBOLS.

See also

The following command provides similar or related functionality:

- *PRINTTYPE* on page 2-179.

2.2.84 PRINTTYPE

The `PRINTTYPE` command displays language type information for a symbol.

Syntax

`PRINTTYPE` *`symbol_name | expression`*

where:

`symbol_name`	Specifies the name of a symbol.
`expression`	Specifies a debugger expression.

Description

The `PRINTTYPE` command displays language type information for a symbol or debugger expression. The information is displayed in a style similar to the source language.

Note

The symbol name must be specified in the correct case, even if a wildcard is used for part of the name.

Examples

The following examples show how to use `PRINTTYPE`:

`printtype Enumeration`

Shows details of the **`enum`** type `Enumeration`, defined by the dhrystone program:

```
typedef enum Enumeration
 {
 , Ident_1:0  Ident_2:1, Ident_3:2, Ident_4:3, Ident_5:4
 } Enumeration;
 -- Defined within module DHRY_H
```

`printtype ptr->databuf`

Shows type details of a field referenced by the pointer `databuf`.

Alias

`PT` is an alias of `PRINTTYPE`.

See also

The following commands provide similar or related functionality:

- *ADD* on page 2-15
- *BROWSE* on page 2-64
- *DELETE* on page 2-88
- *PRINTF* on page 2-174
- *PRINTSYMBOLS* on page 2-177.

2.2.85 PRINTVALUE

The `PRINTVALUE` command prints the value of a variable or expression.

Syntax

`PRINTVALUE [/H|/S|/T] {`*`expression`*` | `*`expression_range`*`}`

where:

`/T`	Displays the value in decimal format.
`/H`	Displays the value in hexadecimal format.
`/S`	Suppresses the display of characters in the string, but displays the character pointer.
`expression`	Specifies an expression to be displayed in the Output pane.
`expression_range`	Specifies an expression range to be displayed in the Output pane.

Description

The `PRINTVALUE` command prints to the Output pane the value of a variable or expression using its natural type for formatting. It can display all of aggregate types, such as structures, and expressions can be type cast to display it in a different format. All values that make up a complex type are printed.

Each value within an `expression_range` is displayed according to the base type if one exists. All expressions printed with this command are displayed according to their type. If the type of the expression is unknown, it defaults to type byte.

The `PRINTVALUE` command runs synchronously unless access to target memory is required and background access is not possible. Use the `WAIT` command to force it to run synchronously.

The following messages can be displayed by the `PRINTVALUE` command:

`<ENUM: xx>`	Invalid enum value, xx = value.
`<INFINITY>`	Floating-point value is infinity.
`<NAN>`	Not a number. A floating-point error.

Examples

The following examples show how to use PRINTVALUE:

`printvalue *Ptr_Glob`

The command can be used to print the full contents of a record, for example this instance from a run of dhrystone:

```
> printv *Ptr_Glob
0001A050 = {Ptr_Comp=(record *)0x0001A018,Discr=Ident_1,variant={var_1=
          {Enum_Comp=Ident_3,Int_Comp=40,Str_Comp="DHRYSTONE PROG
            RAM, SOME  STRING"},var_2={E_Comp_2=Ident_3,Str_2_Comp="\xC3
            (\x90("},var_3={Ch_1_Comp='\x02',Ch_2_Comp='\xC3'}}}
```

Note

For the same expression, CEXPRESSION prints the address, not the full value:

```
> ce *Ptr_Glob
  Result is: data address 0100C2A8
```

`p Ptr_Glob` Printing the value of the pointer tells you the address of the pointer, its type and the value stored there:

```
01009478 = (record *)0x0100C2A8
```

Note

For the same expression, CEXPRESSION prints the value of the pointer, but not its type and address:

```
> ce Ptr_Glob
  Result is: data address 0100C2A8
```

See also

The following commands provide similar or related functionality:

- *CEXPRESSION* on page 2-67
- *MONITOR* on page 2-163.

2.2.86 PROPERTIES

`PROPERTIES` is an alias of `SETTINGS` (see page 2-207).

2.2.87 PS

`PS` is an alias of `PRINTSYMBOLS` (see page 2-177).

2.2.88 PT

`PT` is an alias of `PRINTTYPE` (see page 2-179).

2.2.89 QUIT

The `QUIT` command causes the debugger to exit.

Syntax

```
QUIT [Y]
```

where:

`Y`	Exits the debugger without displaying a confirmation dialog.

Description

The `QUIT` command exits the debugger. It displays a dialog box where you can confirm the operation.

If you have any unsaved changes, you are prompted to save these before the debugger exits.

Examples

The following examples show how to use `QUIT`:

`quit`	Exits the debugger. Displays a dialog box where you can choose to confirm or abort the operation. If you choose to exit, the debugger warns of any unsaved changes.
`quit y`	Exits the debugger without further confirmation. The debugger warns of any unsaved changes.

2.2.90 READBOARDFILE

The `READBOARDFILE` command reads the specified board file.

Syntax

```
READBOARDFILE [,auto] [=board-filename]
```

where:

`auto` Is an optional qualifier. If you specify `auto` the command does not read the specified board file if it is the same as the last one read.

`board-filename`

Specifies the name of the board file to read.

Note

For this command, the file path name must be enclosed in double quotes.

Description

The `READBOARDFILE` command reads the specified board file. If you do not specify a board file, the command rereads the current board file. If you do not specify a board file and no board file has been read, the command reads the default `rvdebug.brd`.

The `READBOARDFILE` command runs synchronously.

Examples

The following example shows how to use `READBOARDFILE`:

```
readboardfile ="c:\sources\gizmo.brd"
```

Read the file gizmo.brd into memory, replacing the current file.

See also

The following commands provide similar or related functionality:

- *ADDBOARD* on page 2-18
- *DELBOARD* on page 2-87
- *EDITBOARDFILE* on page 2-116.

2.2.91 READFILE

The `READFILE` command reads a file into target memory.

Syntax

```
READFILE ,[obj|raw|ascii] [,opts] {name} [=address]
```

where:

`obj` The file is an *ARM Toolkit Proprietary ELF* (ATPE) format executable file.

There are no *`opts`* supported for this file type.

`raw` The file is a stream of 8-bit values that are written to target memory without further interpretation.

There are no *`opts`* supported for this file type.

`ascii` The file is a stream of ASCII digits separated by whitespace. The interpretation of the digits is specified by other qualifiers. The starting address of the file must be specified in a bracketed line one of the following ways:

`[start]`	The start address.
`[start,end]`	The start address, a comma, and the end address.
`[start,+len]`	The start address, a comma, and the length.
`[start,end,size]`	The start address, a comma, the end address, a comma, and a character indicating the size of each value, where `b` is 8 bits, `h` is 16 bits and `l` is 32 bits.

If the size of the items in the file is not specified, the debugger determines the size by examining the number of white-space separated significant digits in the first data value. For example, if the first data value was `0x00A0`, the size is set to 16-bits.

The following *`opts`* are supported for this file type:

`byte`	The file is a stream of 8-bit values that are written to target memory without further interpretation.
`half`	The file is a stream of 16-bit values.
`long`	The file is a stream of 32-bit values.
`gui`	You are prompted to enter the file type with a dialog.

`name` Specifies the filename to be read.

address The starting address of target memory must be given if not in the file. If the file contains a start address, the parameter becomes a signed offset that is added to the file starting address.

Description

The `READFILE` command reads a file, performs a format conversion if necessary on its contents, and loads the resulting information into target memory.

The types of file and file formats supported depend on the target processor and any loaded DLLs. The type of memory assumed depends on the target processor. For example, ARM architecture-based processors have byte addressable memory.

Examples

The following examples show how to use `READFILE`:

```
readfile ,obj "c:\temp\file.exe"
```

Reads the contents of the named executable file into memory at its specified start address.

```
readfile ,ascii,long "c:\temp\file.txt" =0x2000
```

Reads the contents of the named text file into memory, writing values as words using the target endianess to translate values in the file into bytes in target memory. The file is written starting at address `0xA000`, because the file contains a start address and an offset is specified. The file contents can look, for example, like this:

```
[0x8000,0x9000,l]
E28F8090 E898000F E0800008 E0811008
E0822008 E0833008 E240B001 E242C001
E1500001 0A00000E E8B00070 E1540005
...
```

See also

The following commands provide similar or related functionality:

- *FILL* on page 2-126
- *LOAD* on page 2-150
- *SETMEM* on page 2-202
- *VERIFYFILE* on page 2-233
- *WRITEFILE* on page 2-244.

2.2.92 REEXEC

`REEXEC` is an alias of `RESTART` (see page 2-194).

2.2.93 RELOAD

The `RELOAD` command loads a linked program image containing program code and data.

Syntax

```
RELOAD [{,qualifier...}] [name | id] [=task]
```

where:

qualifier	If specified, *qualifier* must be one of the following:

`all`	Loads all the files in the file list.
`symbols_only`	Reloads the symbols only, not the executable image.
`image_only`	Reloads the executable image only, not the symbols.
`force`	Forces the load to proceed even if it might be aborted because, for example, the file being loaded overlaps a file already loaded.
`killtasks`	Applicable only to RTOS and when threads identify the entry function. Attempts to identify any threads connected to a file being unloaded or reloaded and stop their execution.
`nokilltasks`	Does not attempt to identify affected threads and stop their execution.

name | *id*	Specifies the file to be reloaded, either by its name or by an identifier allowing its selection from the executable file list. If you do not specify a file, the whole process is reloaded.
`task`	Specifies the task that is to start. This parameter is required only when the target is running multiple tasks.

Description

The `RELOAD` command loads or reloads an absolute file image containing program code and data. You can load a specified file, or one or more files from the file list. The PC is reset to the start location.

If any file being reloaded is already loaded, it is unloaded before being loaded again. If the symbols for a given file are already loaded, they are not reloaded unless the file modification date has changed.

You can reload symbols only, or the image only. For details see the descriptions of the command qualifiers.

The effect of reloading the system file is defined by the vehicle.

See also

The following commands provide similar or related functionality:

- *ADDFILE* on page 2-19
- *LOAD* on page 2-150
- *READFILE* on page 2-186
- *UNLOAD* on page 2-228.

2.2.94 RESET

The `RESET` command performs or simulates a target processor reset.

Syntax

```
RESET [{,cleanup}] [=resource]
```

where:

`cleanup`	Use this command qualifier only with operating systems that support it. Its purpose is to cleanup thread states and other OS issues.
`resource`	Specifies the processor that is to be reset.

Description

This command is used to reset the target processor and peripherals on the board. If an actual hardware reset is not possible, the command places the processor in a state that is as close as possible to the hardware reset state. The actual behavior varies from one processor type to another and from one vehicle type to another. Check with the manufacturer for details. Variables are not reset to their original values, because memory is not reinitialized

The `RESET` command runs synchronously.

Alias

`WARMSTART` is an alias of `RESET`.

See also

The following command provides similar or related functionality:

- *RESTART* on page 2-194.

2.2.95 RESETBREAKS

The RESETBREAKS command resets breakpoint pass counters and *and-then* conditions.

Syntax

<u>resetb</u>reaks [,h] [{*break_num*,...}] [={*thread*,...}]

where:

h	Do not use this qualifier. It is for debugger internal use only.
break_num	Specifies one or more breakpoints to have their pass counters reset to zero. You identify breakpoints by their position in the list displayed by the DTBREAK command (see page 2-105).
thread	Specifies one or more threads to which this command applies. Other threads remain unaffected. If you do not supply this parameter, then breakpoints on all threads are reset. You do not have to supply this parameter if the processor has only a single execution thread or the RTOS extension is not enabled.

Description

The RESETBREAKS command resets breakpoints pass counters. The pass counters are the counts of the number of times breakpoints have been triggered, as shown by the DTBREAK command (see page 2-105). It also resets the *and* and *and-then* condition state so that the first breakpoint is once again required before the second can trigger. For more information on *and* and *and-then* conditions see *BREAKEXECUTION* on page 2-38.

If you issue a RESETBREAKS command without specifying a breakpoint number, the pass counter, *and* and *and-then* conditions for all the current pass counters are reset to zero.

You might typically issue a RESETBREAKS command after a RELOAD command, so that the counts all begin again from zero when you restart execution.

Examples

The following examples show how to use RESETBREAKS:

`resetbreaks 4,6,8`	Resets the pass counters and conditions of the fourth, sixth, and eighth breakpoints in the current list of breakpoints.
`resetbreaks =2`	Resets all the pass counters and conditions in thread 2.

Alias

`RSTBREAKS` is an alias of `RESETBREAKS`.

See also

The following commands provide similar or related functionality:

- *BREAKEXECUTION* on page 2-38
- *BREAKINSTRUCTION* on page 2-45
- *BREAKREAD* on page 2-50
- *BREAKWRITE* on page 2-57
- *CLEARBREAK* on page 2-69
- *DTBREAK* on page 2-105
- *RELOAD* on page 2-189.

2.2.96 RESTART

The `RESTART` command resets the PC to the program starting address.

Syntax

`RESTART [=task]`

where:

`task`	Specifies the task that is to start. This parameter is required when the target is running multiple tasks and the RTOS extension is enabled.

Description

The `RESTART` command resets the PC to the program starting address, so that the next `GO`, `STEP` or `GOSTEP` command restarts execution at the beginning of the program. The `RESTART` command does not reset the values of variables, the stack pointer is not reset and breakpoints are not cleared. If required, `RESTART` can be configured to reload the image using the `SETTINGS` command. All declared I/O ports are unaffected. You can use the `ARGUMENTS` command (see page 2-24) to change the arguments passed to the process for a restart.

Note

- If the program relies on the initial values of variables in initialized data areas, and those variables are modified during program execution, then using `RESTART` to rerun the program fails.
- The `RESTART` command might behave differently if you are using the RTOS extension to RealView Debugger. See the instructions for the specific RTOS extension for more details.

The `RESTART` command runs synchronously.

Alias

`REEXEC` is an alias of `RESTART`.

See also

The following commands provide similar or related functionality:

- *GO* on page 2-136
- *RELOAD* on page 2-189.

2.2.97 RSTBREAKS

`RSTBREAKS` is an alias of `RESETBREAKS` (see page 2-192).

2.2.98 RUN

The `RUN` command starts execution using a specific mode, or sets the default mode used by the `GO` command.

Syntax

`RUN [,`*`mode`*`]`

where:

`setdefault`	Set the default mode for the `GO` command to the mode specified by this command, but do not start execution.
`mode`	If specified, must be one or more of the following:

`debug` **or** `normal`	Run with breakpoints active. This is the default mode.
`clock` **or** `benchmark`	Run programs with breakpoint timing hardware enabled. This option is only available on some targets.
`free` **or** `user`	Run at full speed, with breakpoints disabled. Depending on the target, hardware, this might not be any faster than `normal` mode.

Description

If supported by the target, the `RUN` command starts execution using a specific mode, or sets the default mode used by the `GO` command. If you supply no parameters, `RUN` displays the current mode.

Examples

The following examples show how to use `RUN`:

`run,setdefault,normal`

Set the default run mode to `normal`, so that the next GO command for this connection runs the target in the normal way.

`run,free` Run the target using the `free` run mode.

See also

The following command provides similar or related functionality:

- *GO* on page 2-136.

2.2.99 SCOPE

The SCOPE command specifies the current module and procedure scope.

Syntax

```
SCOPE /F

SCOPE root_name\\

SCOPE [root_name\\] module_name

SCOPE [[root_name\\] module_name\] {function_name | (expression) | @stack_level
| #line_number}]
```

where:

/F	Selects the first module of the next root.
root_name	Specifies the name of a root (for example, @sieve).
module_name	Specifies the name of a module (for example, SIEVE).
function_name	Specifies the name of a function (for example, proc1).
expression	Specifies an expression specifying the location of a calling function.
stack_level	Specifies a stack level.
line_number	Specifies a high-level line number.

Description

The SCOPE command specifies the current module and procedure scope. This determines the current context. The current context determines how local variables are accessed and what symbol qualification is required. The following context types are supported:

- the current PC
- a specific module, function, or source file line
- a stack frame position
- auto-set, used when the debugger is in source mode and the PC is not in a source view context, for example when the program is at the entry point.

The SCOPE command can change the default root, module, procedure, line number, or stack level, but it does not change the PC.

To return the scope to display source at the current PC location, use `SCOPE` with no parameters. To display the current scope, use the `CONTEXT` command.

The current root and module is the default when line numbers and local symbols are referenced without a module or procedure qualifier. For example, if line number 3 is entered on the command line as `#3`, it is interpreted as `default_module\#3`. The new source file or disassembly is shown in the Code window.

The `SCOPE` command runs asynchronously. Use the `WAIT` command to force it to run synchronously.

Examples

The following examples show how to use `SCOPE`:

`scope #155` Set the current context to line 155 in the current module (file).

```
Scoped to: (0x01000560): DHRY_1\main Line 155
```

`sc \\DHRY_1` Set the current context to the start of the file dhry_1.c.

```
Scoped to: (0x010002BC): DHRY_1\main Line 78
```

`sc @1` Set the scope to the stack frame of the calling function.

`sc` Return the current context to the execution point.

```
At the PC: (0x01000544): DHRY_1\main Line 152
```

See also

The following commands provide similar or related functionality:

- *CONTEXT* on page 2-76
- *PRINTVALUE* on page 2-181
- *WHERE* on page 2-242.

2.2.100 SEARCH

The `SEARCH` command searches memory for a specified value or pattern.

Syntax

```
SEARCH [/B|/H|/W|/8|/16|/32] [/R] [address_range [={expression |
expression_string}]]
```

where:

`/B, , /8`	Sets the display format to byte (8 bits). If the processor naturally addresses bytes (for example, ARM7TDMI) then this is the default setting.
`/H, , /16`	Sets the display format to halfword (16 bits).
`/W, , /32`	Sets the display format to word (32 bits).
`/R`	Continues to search for the specified expression displaying each match until the end of the block or until the `STOP` button is used.
`address_range`	Specifies the range of addresses to be searched.
`expression`	Specifies the value to search for.
`expression_string`	Specifies the pattern to search for.

Description

The `SEARCH` command searches a memory area for the specified value or pattern string. When it is found, the debugger stops searching and displays the address where the expression was found.

If they do not fit the specified size evenly, all expressions in an expression string are padded or truncated to the size specified by the size qualifiers. If you do not specify an expression or expression string, the debugger searches the memory area for zeros. If you issue a `SEARCH` command without parameters, the debugger continues searching through the originally specified address range starting from where the last match was found.

The `SEARCH` command runs synchronously.

Examples

The following examples show how to use `SEARCH`:

```
search 0x1000..0x2000 =122
```

Search for the first occurrence of the byte value `122` (ASCII `z`), in the 4KB block of memory starting at `0x1000`.

```
search /r 0x1000..0x2000 =163
```

Display all occurrences of the byte value `163` (ASCII `£`) in the 4KB block of memory starting at `0x1000`.

```
search 0x1000..0x2000 ="-help"
```

Search for the first occurrence of the string `-help` in the 4KB block of memory starting at `0x1000`.

See also

The following commands provide similar or related functionality:

- *MEMWINDOW* on page 2-160
- *SETMEM* on page 2-202.

2.2.101 SETFLAGS

The `SETFLAGS` command is reserved for internal use by the RealView Debugger.

2.2.102 SETMEM

The `SETMEM` command changes the contents of memory to a specified value.

Syntax

`SETMEM [/B|/H|/W|/8|/16|/32] address [={expression | expression_string}]`

where:

`/B, , /8`	Sets the fill size to byte (8 bits). This is the default setting.
`/H, , /16`	Sets the fill size to halfword (16 bits).
`/W, , /32`	Sets the fill size to word (32 bits).
`address`	Specifies the memory address where the contents are to be changed.
`expression`	Specifies an expression to be evaluated to a value and placed into the specified memory address.
`expression_string`	Specifies the string pattern to be placed into the specified memory address.

Description

The `SETMEM` command changes the contents of the specified memory location to the value or values defined by `expression` or `expression_string`. `SETMEM` is used to set assembly-level memory. For example, you can use it to work around a section of code that is producing incorrect results by changing variables to the correct values. If you do not specify a value then the interactive setting dialog is displayed.

An expression string is a list of values separated by commas. ASCII characters enclosed in quotation marks are treated as an array of characters, and with the `/H` and `/W` qualifiers are each expanded to 2 or 4 bytes. All `expressions` in an expression string are padded or truncated to the size specified by the size qualifiers (`/B`, `/H`, `/W`).

Note

The `SETMEM` command does not recognize variable typing, so you must ensure the expression size qualifier is compatible with the variable type.

The `SETMEM` command runs synchronously unless background access to target memory is supported. Use the `WAIT` command to force it to run synchronously.

Examples

Assuming the following definitions:

```
    int count=2, buf[8];
    int *ptr = buf;
```

And the following memory map:

```
0x10200 : 0x00000002   count
0x10204 : 0x00000000   buf
0x10224 : 0x00010204   ptr
```

The following two statements both set the value of `count` to 5:

```
setmem /32 &count=5
setmem /32 0x10200=5
```

The following two statements both set the value of `buf[0]` to `0x40`:

```
sm /W 0x10204 =0x40
sm /W ptr     =0x40
```

Note

The command `SM count=5` sets the memory location addressed by the value of `count` to 5, leaving the contents of `count` unchanged.

Alias

`SM` is an alias of `SETMEM`.

See also

The following commands provide similar or related functionality:

- *CEXPRESSION* on page 2-67
- *FILL* on page 2-126.

2.2.103 SETREG

The SETREG command changes the contents of a register, status flag, or a special target variable such as the cycle count.

Syntax

```
SETREG [@register_name [=value]]
```

where:

register_name
: Specifies a register. Register names begin with an at sign (@).

value
: Defines the value to be placed in the register.

Description

This command changes the contents of a register, status flag, or a special target variable such as the cycle count.

Register names

You can set the value of any register, or register bit-field, that is defined by an active .bcd file. To link a relevant definition file to the current connection, use Connection Properties window to set the BoardChip name for the connection.

You can view the currently defined register names by selecting **Debug** → **Simple Breakpoints** → **Simple Break if X**, click on the down-arrow after the expression text field and selecting **<Register list...>**.

By defining new registers in a .bcd file, you can extend the register list to, for example, include peripheral control registers for your target.

——— **Note** ———

Some processors and peripherals have some read-only registers. These cannot be written to with SETMEM.

——————————

Command line usage

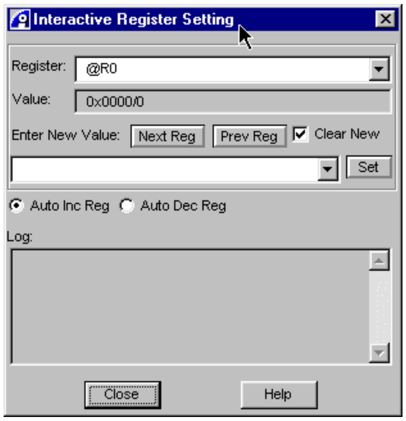
You can set the value of registers defined in a board chip file or by the processor model, by prefixing the register name with the @ symbol and assigning it a value. The value can include program and debugger symbols and debugger expressions.

Note

Change the values of processor and device registers with care. Compilers and operating systems do not always use registers in the expected manner.

Fully Interactive register setting

If you supply no parameters, the SETREG command displays the Interactive Register Setting dialog where you can specify a register and a value, shown in Figure 2-2. The Register drop-down list contains the names of recently used registers. To select other register names, click either **Next Reg** or **Prev Reg**. The current value of the register is displayed in the Value field, in both unsigned hexadecimal and in signed decimal.



Register: @R0
Value: 0x0000/0
Enter New Value:
☑ Clear New
● Auto Inc Reg ○ Auto Dec Reg

Figure 2-2 Interactive Register Setting dialog

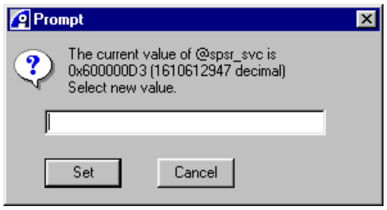
Enter a new value in the combo-box beneath **Enter New Value** and then click **Set**. The **Log** tab displays the changes you have made.

Check **Clear New** to clear the **Enter New Value** field after setting a register with **Set**. If **Clear New** is unchecked, the value you enter remains in the field and you can set multiple registers with repeated clicks on **Set**.

Click **Auto Inc Reg** or **Auto Dec Reg** to select whether, after clicking **Set**, the next higher or next lower numbered register is selected.

Partly Interactive register setting

If you supply only a register name, the SETREG command displays a prompt, shown in Figure 2-3 on page 2-206, enabling you to enter a new value for that register.



The current value of @spsr_svc is
0x600000D3 (1610612947 decimal)
Select new value.

Figure 2-3 Register value prompt

Enter the value in the text field and click **Set** to change the register, or click **Cancel** to abort the command.

Alias

`SR` is an alias of `SETREG`.

Examples

The following examples show how to use `SETREG`:

`setreg @r3=0x50`

Write the value `0x50` to processor register `R3`.

`setreg @spsr_svc`

Display a prompt, shown in Figure 2-3, containing the current value of ARM processor register `SPSR_SVC` (saved program status register, supervisor mode). Use the text box to enter a new value.

`setreg @v=1`

Set the ALU overflow flag in the current program status register.

`setreg`

Invoke the Interactive Register Setting dialog shown in Figure 2-2 on page 2-205.

See also

The following commands provide similar or related functionality:

- *ADD* on page 2-15
- *CEXPRESSION* on page 2-67.

2.2.104 SETTINGS

The `SETTINGS` command enables you to define target settings.

Syntax

```
SETTINGS [{default | option_list}]
```

where:

`default`	Causes all settings to revert to their default values.
`option_list`	A list of option names and values. Each option-value pair consists of a setting name, an equals sign, and a value. The available option names and values are described in *Description*. You can specify multiple options in the list by separating each option-value pair with a colon.

Description

The `SETTINGS` command enables you to define settings (properties) for target support. These options are also set using the project manager interface.

If the only parameter is the `default` qualifier, then all the settings revert to their default values. If you supply no parameters, the command displays the current values of settings for which a default value is defined.

Each setting is defined in the form of *`name`*`=`*`value`*, and multiple settings can be changed using a colon (`:`) as a separator.

The standard option names are:

`loadact` Action on load. The possible values are:

`default`	Normal load image behavior. For ARM architecture-based processors, the processor is placed in ARM state and supervisor mode with interrupts disabled.
`noimask`	Do not change the processor status register. For example, on ARM architecture-based processors, the default modification of CPSR is not performed.
`reset`	Reset the processor after the load, to perform a start from reset.
`pre_reset`	Reset the processor before the load.

pcset
: When to change the PC when loading an image. The possible values are:

  auto
  : Normal behavior. The PC is modified if there is an entry point specified in the image file and:
    - an image file without symbols is loaded and the `LOAD` option `/SP` is used
    - an image file with symbols is loaded.

  never
  : Do not set PC.

  always
  : Always set the PC. If no entry point is specified in the image, the PC is set to the reset vector (normally to address `0`).

  user_default
  : Always set the PC to the value specified in the `pcdefault` setting.

pcdefault
: User default PC value. This value is written to the target PC when a image file is `LOAD`ed or `RELOAD`ed and the `pcset` option is `user_default`.

regset
: Set the values of registers before the image is loaded. Use the format `@`*`regname`*`=`*`value`* for each register, and separate multiple assignments with a semicolon.

  See `SETREG` on page 2-204 for more information on possible register names.

restart
: Defines the action of the `RESTART` command. The possible values are:

  set_pc
  : Set the PC to the entry point of the image.

  reload
  : Reload the image as for `RELOAD`. The options relating to `RELOAD`, `loadact` and `pcset`, also apply.

  reload_data
  : Reload only the initialized data of the image. The options relating to `RELOAD`, for example `loadact` and `pcset`, also apply.

restart_reset
: Reset on restart. The possible values are:

  true
  : Reset the processor on `RESTART`, in addition to any other actions.

  false
  : Do not reset the processor on `RESTART`.

verify
: Verify the image `LOAD`ed or `RELOAD`ed. The possible values are:

  none
  : Do not verify the image.

`fast`	Perform the normal image verify. The first and last words of every image file section written to the target are read and checked. For individual sections larger than about 2KB, then the first and last words of each 2KB block of the section is checked.
`full`	Read and check every byte of the image.

`verify_warns` Determines what happens if an image file verification failure occurs. The possible values are:

`true`	The failure is treated as a warning and operation continues.
`false`	The failure is an error and the image load is aborted.

`disasm` Set the disassembly mode. The possible values are:

`default`	Attempt to auto-detect the disassembly mode. Select from ARM, Thumb or Java instructions, using information from the image file where available.
`standard`	Select the standard, normal instruction disassembly mode. Select ARM state (32-bit) instructions.
`alternate`	Select the standard, normal instruction disassembly mode. Select Thumb state (16-bit) instructions.

`dsmvalue` Selects whether the instruction code is displayed in disassembly listings. The possible values are:

`true`	Disassembly listings include the instruction opcode, along with the instruction memory address and mnemonics.
`false`	Disassembly listings do not include the instruction opcode.

Additional options might be implemented for particular target interfaces. See the target interface documentation for more information.

Alias

`PROPERTIES` is an alias of `SETTINGS`.

Examples

The following examples show how to use `SETTINGS`:

```
settings regset=@r2=1;@spsr_svc=0xd0
```

Set the value of processor the ARM processor register R2 and SVC mode SPSR whenever an image is loaded or reloaded.

```
settings pcset=use:pcdefault=0x8000
```

When any image is loaded or reloaded, set the PC to `0x8000`.

```
settings loadact=reset
```

After an image is loaded or reloaded, reset the processor (in hardware). This is useful when the image has been constructed to run from target reset.

```
settings verify=full:verify__warns=true
```

When an image is loaded, check every byte written to the target but do not consider a difference in the value read back to be an error.

See also

The following commands provide similar or related functionality:

- *DISASSEMBLE* on page 2-96
- *LOAD* on page 2-150
- *RELOAD* on page 2-189
- *OPTION* on page 2-169
- *RESET* on page 2-191
- *RESTART* on page 2-194.

2.2.105 SHOW

The `SHOW` command displays the source code of a specified debugger macro.

Syntax

```
SHOW macro_name [[;|,]windowid]
```

where:

macro_name	Specifies the name of the macro to be displayed.
windowid	Identifies the window in which the macro is to be displayed. Valid values include:

`20`	Standard I/O window.
`28`	Log file.
`29`	Journal File.
`50-1024`	Window or file number. For further information see *VOPEN* on page 2-237.

If you do not supply a *windowid* parameter, the macro is displayed in the Output pane.

Description

The `SHOW` command displays the source code of a specified macro. See the macros chapter in the *RealView Developer Kit v1.0 Debugger User Guide* for more information.

Examples

The following example shows how to use `SHOW`:

```
show mac ;50
```

Display the contents of a macro called `mac` in window number 50.

See also

The following commands provide similar or related functionality:

- *DEFINE* on page 2-84
- *INCLUDE* on page 2-143
- *MACRO* on page 2-155.

2.2.106 SINSTR

SINSTR is an alias of STEPINSTR (see page 2-213).

2.2.107 SM

SM is an alias of SETMEM (see page 2-202).

2.2.108 SOINSTR

SOINSTR is an alias of STEPOINSTR (see page 2-218).

2.2.109 SOVERLINE

SOVERLINE is an alias of STEPO (see page 2-220).

2.2.110 SR

SR is an alias of SETREG (see page 2-204).

2.2.111 STEPINSTR

The `STEPINSTR` command executes a specified number of processor instructions.

Syntax

```
STEPINSTR [value]
```

```
STEPINSTR =starting_address [,value]
```

where:

`starting_address`

Specifies where execution is to begin. If you do not supply this parameter execution continues from the current PC.

Note

Specifying an address is equivalent to directly modifying the PC. Do not specify a starting address unless you are sure of the consequences to the processor and program state.

`value` Specifies the number of instructions to be executed.

If you do not supply this parameter a single instruction is executed. All instructions, including instructions that fail a conditional execution test, count towards the number of instructions executed.

Description

The `STEPINSTR` command executes a specified number of instructions. If the instructions include procedure calls, these are stepped into.

Note

For some procedure call standards there is code inserted between the call site and the destination of the call by the linker, and this might not have debug information or source code available. If this is true for your code, a `STEPINSTR` call that stops in this code causes the source window to be blanked.

It is normal to use this instruction in conjunction with the disassembly mode of the source window, selected using the `MODE` command.

Examples

The following examples show how to use `STEPINSTR`:

`stepinstr`

Step the program by one instruction.

`si 5`

Step the program five instructions.

`si =0x8000,5`

Starting at address `0x8000`, step the program five instructions.

Alias

`SINSTR` is an alias of `STEPINSTR`.

See also

The following commands provide similar or related functionality:

- *BEXECUTION* on page 2-26
- *DISASSEMBLE* on page 2-96
- *GO* on page 2-136
- *GOSTEP* on page 2-138
- *MODE* on page 2-162
- *STEPLINE* on page 2-215.

2.2.112 STEPLINE

The `STEPLINE` command executes one or more program statements, and steps into procedure and function calls.

Syntax

```
STEPLINE [value]
```

```
STEPLINE =starting_address [,value]
```

where:

starting_address

Specifies where execution is to begin. If you do not supply this parameter execution continues from the current PC.

Note

Specifying an address is equivalent to directly modifying the PC. Do not specify a starting address unless you are sure of the consequences to the processor and program state.

value	Specifies the number of lines of source code to be executed. If you do not supply this parameter a single statement or source line is executed. All lines that contain executable code, including those in called functions, count towards the number of lines executed.

Description

The `STEPLINE` command executes one or more source program units. If the debug information in the executable:

- describes the boundaries of program statements, then `STEPLINE` steps by program statement
- describes the source file line for each machine instruction, then `STEPLINE` steps by source line
- describes only the external functions in the code, then `STEPLINE` steps by machine instruction.

`STEPLINE` steps into procedure or function calls. When line or statement debug information is available, the transition from the call site to the first executable statement of the called code counts as one step. If source debug information is available for some but not all of the functions in the program, `STEPLINE` steps to the next source line, whether this is within a called function, for example, from program entry-point to main(), or outside of the current function, for example from an assembler library routine PC to an enclosing source function.

If the step starts in the middle of a statement (for example, because you have used `STEPINSTR`) a single step takes you to the start of the next statement.

If you compile high level language code with debug information and with optimization enabled, for example using `armcc -g -O1`, it is possible that:

- source code is not executed in the order it appears in the source file
- some source program statements are not executed because the optimizer has deduced they are redundant
- some source program statements appear to be not executed because the optimizer has indivisibly combined them with other statements
- statements are executed fewer times than you expect
- it might not be possible to breakpoint or step some statements, because the machine instructions are shared with other source code.

These, and other effects, are the normal consequences of compiler optimization.

For assembler source files assembled with debug information, a single assembly statement consists of;

- an explicitly written assembly instruction
- an assembler pseudo-operation resulting in machine instructions, even if several instructions are generated. for example an ARM `ADR` instruction
- a call of an assembler macro that generates machine instructions.

It is normal to use this instruction in conjunction with the disassembly mode of the source window, selected using the `MODE` command.

Examples

The following examples show how to use `STEPLINE`:

```
stepline
```

Step the program by one statement.

```
stepline 5
```

Step the program five statements.

```
s =0x8000,5
```

Starting at address `0x8000`, step the program five statements.

See also

The following commands provide similar or related functionality:

- *BEXECUTION* on page 2-26
- *DISASSEMBLE* on page 2-96
- *GO* on page 2-136
- *GOSTEP* on page 2-138
- *MODE* on page 2-162
- *STEPINSTR* on page 2-213.

2.2.113 STEPOINSTR

The `STEPOINSTR` command executes a specified number of instructions, and completely executes program calls.

Syntax

`STEPOINSTR [value]`

`STEPOINSTR =starting_address [,value]`

where:

starting_address

Specifies where execution is to begin. If you do not supply this parameter execution continues from the current PC.

Note

Specifying an address is equivalent to directly modifying the PC. Do not specify a starting address unless you are sure of the consequences to the processor and program state.

value Specifies the number of instructions to be executed.

If you do not supply this parameter a single instruction is executed. All instructions in the current function, including instructions that fail a conditional execution test, count towards the number of instructions executed. Function calls count as one instruction.

Description

The `STEPOINSTR` command executes a specified number of instructions. If the instructions include procedure calls, these are stepped over, counting as only one instruction.

It is normal to use this instruction in conjunction with the disassembly mode of the source window, selected using the `MODE` command.

Examples

The following examples show how to use `STEPOINSTR`:

`stepoinstr`

Step the program by one instruction.

```
stepoinstr 5
```

Step the program five instructions.

```
soi =0x8000,5
```

Starting at address `0x8000`, step the program five instructions, counting a subroutine call as one instruction.

Alias

`SOINSTR` is an alias of `STEPOINSTR`.

See also

The following commands provide similar or related functionality:

- *BEXECUTION* on page 2-26
- *DISASSEMBLE* on page 2-96
- *GO* on page 2-136
- *GOSTEP* on page 2-138
- *MODE* on page 2-162
- *STEPINSTR* on page 2-213
- *STEPLINE* on page 2-215
- *STEPO* on page 2-220.

2.2.114 STEPO

The `STEPO` command executes a specified number of lines, and completely executes functions.

Syntax

```
STEPO [=starting_address [,value] | value]
```

where:

starting_address	Specifies where execution is to begin. If you do not supply this parameter execution begins at the address currently defined by the PC.
value	Specifies the number of lines of source code to be executed. If you do not supply this parameter a single line is executed. All lines in the current program count towards the number of lines executed. A call to a function causes the whole of the function to be executed, and counts as one line.

Description

The `STEPO` command executes one or more source program units. If the debug information in the executable:

- describes the boundaries of program statements, then `STEPO` steps by program statement
- describes the source file line for each machine instruction, then `STEPO` steps by source line
- describes only the function entry points in the code, then `STEPO` steps by machine instruction.

If a statement calls one or more procedures or functions, they are all executed to completion as part of the execution of the statement.

If the step starts in the middle of a statement (for example, because you have used `STEPINSTR`) a single step takes you to the start of the next statement.

If you compile high level language code with debug information and with optimization enabled, for example using `armcc -g -O1`, it is possible that:

- source code is not executed in the order it appears in the source file
- some source program statements are not executed because the optimizer has deduced they are redundant

- some source program statements appear to be not executed because the optimizer has indivisibly combined them with other statements
- statements are executed fewer times than you expect
- it might not be possible to breakpoint or step some statements, because the machine instructions are shared with other source code.

These, and other effects, are the normal consequences of compiler optimization.

For assembler source files assembled with debug information, a single assembly statement consists of;

- an explicitly written assembly instruction
- an assembler pseudo-operation resulting in machine instructions, even if several instructions are generated. for example an ARM `ADR` instruction
- a call of an assembler macro that generates machine instructions.

It is normal to use this instruction in conjunction with the disassembly mode of the source window, selected using the `MODE` command.

Alias

`SO` is an alias of `STEPO`.

Examples

The following examples show how to use `STEPO`:

`stepo`	Step the program by one statement.
`so 5`	Step the program five statements.
`so =0x8000,5`	Starting at address `0x8000`, step the program five statements.

See also

The following commands provide similar or related functionality:

- *BEXECUTION* on page 2-26
- *DISASSEMBLE* on page 2-96
- *GO* on page 2-136
- *GOSTEP* on page 2-138
- *MODE* on page 2-162
- *STEPINSTR* on page 2-213

- *STEPLINE* on page 2-215
- *STEPOINSTR* on page 2-218.

2.2.115 STOP

The STOP command with no argument is equivalent to `HALT` (see page 2-140).

2.2.116 TEST

The TEST command reads target memory to verify that specified values exist throughout the specified memory area.

Syntax

```
TEST [/B|/H|/W|/8|/16|/32] [/R] [address_range [={expression | stringexpr}]]
```

where:

/B, , /8	Sets the expression size to byte (8 bits). This is the default setting.
/H, , /16	Sets the expression size to halfword (16 bits).
/W, , /32	Sets the expression size to word (32 bits).
/R	Continues to test for the specified expression, displaying each match until the end of the block or until the stop button **Cancel** is pressed.
address_range	Specifies the range of addresses to be tested.
expression	Specifies a value to check against the contents of memory.
stringexpr	Specifies a string pattern to check against the contents of memory. The debugger tests the memory area to verify that it is filled with those values in the pattern of the string. An expression string is a list of values separated by commas and can include ASCII characters enclosed in quotation marks. All expressions in an expression string are padded or truncated to the size specified by the size qualifiers if they do not fit the specified size evenly.

Description

The TEST command examines target memory to verify that specified values exist throughout the specified memory area. Unless you use the /R qualifier, Testing stops when a mismatch is found. The debugger always displays any mismatched address and value.

Subsequent TEST commands issued without parameters cause the debugger to continue testing through the address range originally specified, beginning with the last address that did not match.

The TEST command runs synchronously.

Examples

The following examples show how to use `TEST`:

`test/8 0x8000..0x9000 =0`

Find the address of the first non-zero byte in the 4KB page from `0x8000`.

`test/r/16 0x10000..0x20000 =0xFFFF`

Find and display the addresses of any half-word in the address range that is not `0xFFFF`. This might be useful to find out which regions of a flash memory device are programmed.

See also

The following command provides similar or related functionality:

- *SETMEM* on page 2-202.

2.2.117 THREAD

The `THREAD` command sets the specified thread, or process and thread, to be the current thread, or process and thread.

Note

See the *RealView Extensions Guide* for more information about the RTOS features of the debugger.

Syntax

```
THREAD [,next]|[,default]]
```

```
THREAD [=task]
```

where:

`next`	Change the current thread to be the next one in the list of threads.
`default`	Ensures that there is a valid current thread.
`task`	Define the process or thread that is to become the current thread. You can use the thread name or the thread ID.

Description

The `THREAD` command sets the specified thread, or process and thread, to be the current thread, or process and thread.

The current process is normally set by the last one grabbed. The current thread is normally set by whichever thread stops last. This command enables you to specify a thread, or a thread of a specific process, that is to be the current thread. By default, all actions apply to the current board, process, and thread.

Examples

The following examples show how to use `THREAD`:

```
thread,next
```

Change the current thread to the next thread.

```
thread =2
```

Change the current thread to thread `2`.

See also

The following commands provide similar or related functionality:

- *RUN* on page 2-196.

2.2.118 UNLOAD

The `UNLOAD` command unloads a specified file.

Syntax

```
UNLOAD [,all]|[,symbols_only]|[,image_only]|[,killtasks]|[,nokilltasks]
[filename | file_ID] [=task]
```

where:

`all`	Unloads all the files in the file list.
`symbols_only`	Unloads the symbols only, not the executable image.
`image_only`	Unloads the executable image only, not the symbols.
`killtasks`	Applicable only to RTOS and when threads identify the entry function. Attempts to identify any threads connected to a file being unloaded and stop their execution.
`nokilltasks`	Does not attempt to identify affected threads and stop their execution.
`filename | file_ID`	Specifies a file to be unloaded.
`task`	Applicable only to RTOS, this specifies a task to be unloaded. Use this form of the command if you are running multiple tasks and want to unload only one of them.

Description

The `UNLOAD` command unloads a specified file. If you do not specify a file then all files are unloaded. If you specify a file, using either a filename or a file identifier, then only that file is unloaded. Any unloaded files remain in the file list and can be reloaded.

The effect of unloading the system file is defined by the vehicle. You can unload only symbols or only the image.

Examples

The following example shows how to use `UNLOAD`:

```
unload c:\source\dhry\debug\dhry.axf
```

Unload the symbols (and macros, if any) for the dhrystone program from debugger.

See also

The following commands provide similar or related functionality:

- *ADDFILE* on page 2-19
- *LOAD* on page 2-150
- *RELOAD* on page 2-189.

2.2.119 UP

The `UP` command moves up stack levels.

Syntax

`UP [`*`levels`*`]`

where:

`levels`	Specifies the number of levels to climb. If you do not supply a parameter, you move up one level.

Description

The `UP` command moves up stack levels

Each time you move up one level you can see the source line to which you return when you complete execution of your current function or subroutine. At each level you can examine the values of variables and registers that are in scope.

If you are already at the top level a message reminds you that you cannot move up any further. When you have moved up one or more levels, you can use the `DOWN` command (see page 2-102) to move down. When you have moved up one or more levels, any `STEPLINE` or `STEPINSTR` command you issue is effective at the lowest level, not at the level currently in view.

See also

The following commands provide similar or related functionality:

- *CONTEXT* on page 2-76
- *DOWN* on page 2-102
- *DTFILE* on page 2-107.

2.2.120 VCLEAR

The `VCLEAR` command clears a window and sets the cursor to home.

Syntax

`VCLEAR` *`windowid`*

where:

`windowid`

Specifies the window to be cleared. Valid values for *`windowid`* when used in the `VCLEAR` command are:

`50-1024`	Window or file number. For further information see *VOPEN* on page 2-237.

Description

The `VCLEAR` command clears a window and sets the cursor to home.

Examples

The following example shows how to use `VCLEAR`:

```
vclear 50
```

Clear window number 50.

See also

The following commands provide similar or related functionality:

- *PRINTF* on page 2-174
- *VCLOSE* on page 2-232
- *VOPEN* on page 2-237
- *VSETC* on page 2-239.

2.2.121 VCLOSE

The `VCLOSE` command removes and closes a window or file.

Syntax

`VCLOSE` *`window`*

where:

`window`	Specifies the window to be closed. Valid values for *`window`* lie in the range 50–1024.

Description

The `VCLOSE` command removes and closes a window opened with `VOPEN`. or closes a file opened with `FOPEN`.

Examples

The following example shows how to use `VCLOSE`:

`vclose 50`	Close window number 50.

See also

The following commands provide similar or related functionality:

- *FOPEN* on page 2-131
- *PRINTF* on page 2-174
- *VCLEAR* on page 2-231
- *VOPEN* on page 2-237
- *VSETC* on page 2-239.

2.2.122 VERIFYFILE

The `VERIFYFILE` command compares the contents of a specified file with the contents of target memory.

Syntax

`VERIFYFILE ,[obj|raw|ascii] [,opts] name [=address/offset]`

where:

`obj`	The file is an ATPE format executable file. There are no *opts* supported for this file type.
`raw`	The file is a stream of 8-bit values that are written to target memory without further interpretation. There are no *opts* supported for this file type.
`ascii`	The file is a stream of ASCII digits separated by whitespace. The interpretation of the digits is specified by other qualifiers. The starting address of the file must be specified in a bracketed line one of the following ways:

`[start]`	The start address.
`[start,end]`	The start address, a comma, and the end address.
`[start,+len]`	The start address, a comma, and the length.
`[start,end,size]`	The start address, a comma, the end address, a comma, and a character indicating the size of each value, where `b` is 8 bits, `h` is 16 bits and `l` is 32 bits.

If the size of the items in the file is not specified, the debugger determines the size by examining the number of white-space separated significant digits in the first data value. For example, if the first data value was `0x00A0`, the size is set to 16-bits.

The following *opts* are supported for this file type:

`byte`	The file is a stream of 8-bit values that are written to target memory without further interpretation.
`half`	The file is a stream of 16-bit values.
`long`	The file is a stream of 32-bit values.
`gui`	You are prompted to enter the file type with a dialog.

`name`	Specifies the name of the file to be read.

`address/offset`

Specifies the starting address in target memory for the comparison. If the file being read contains this information, you can adjust it by specifying an offset.

Description

The `VERIFYFILE` command compares the contents of a specified file with the contents of target memory.

Data might be stored in a file in a variety of formats. You can specify the format by specifying the file type. The command then converts the data read from the file before performing the comparison.

The types of file and file formats supported depend on the target processor and any loaded DLLs. The type of memory assumed depends on the target processor. For example, ARM architecture-based processors have byte addressable memory.

Examples

The following example shows how to use `VERIFYFILE`:

```
verifyfile,ascii,byte "c:\images\rom.dat" =0x8000
```

Verify that the ROM image file in `rom.dat` matches target memory starting at location `0x8000`.

See also

The following commands provide similar or related functionality:

- *READFILE* on page 2-186
- *TEST* on page 2-224
- *WRITEFILE* on page 2-244.

2.2.123 VMACRO

The `VMACRO` command attaches the output of a macro to a window.

Syntax

```
VMACRO window [,macro_name(args)]
```

where:

window	Specifies the window to be associated with the macro. Valid values for *window* lie in the range 50–1024.
macro_name	Specifies the name and call arguments of the macro that is invoked when the associated window is updated. This happens whenever: • A special update request is received from the execution environment. • Execution stops.

Description

The `VMACRO` command attaches a specified macro to a specified window. The macro is then executed whenever it is called or whenever the window is updated. You can use the `FPRINTF` command (see page 2-133) to write data to the window.

If you do not supply a macro name, the window is disassociated from any macro. The `VMACRO` command runs asynchronously.

Examples

The following examples show how to use `VMACRO`:

```
vmacro 50,showmyvars
```

Use the macro `showmyvars` to write formatted variables to window 50.

```
vmacro 50
```

Unbind all macros from user window 50.

See also

The following commands provide similar or related functionality:

- *DEFINE* on page 2-84
- *FPRINTF* on page 2-133
- *MONITOR* on page 2-163

- *PRINTVALUE* on page 2-181
- *VOPEN* on page 2-237
- *VSETC* on page 2-239.

2.2.124 VOPEN

The VOPEN command creates a window that you can use with commands that have a ;*window* parameter.

Syntax

```
VOPEN window [,screen_number,loc_top,loc_left,loc_bottom,loc_right]
```

where:

window

Specifies a number to identify the new window. If a window already exists with the specified number the command fails.

Integers in the range 50–1024 are valid for identifying the window. Use this value for the ;*window* parameter in commands that you want to display their output in this window.

screen_number

This parameter is maintained for backward compatibility but is no longer used. If you want to specify the position and size of the new window, you must enter a *screen_number* value for the command to parse correctly.

loc_top	Specifies the number of characters the upper edge of the window is positioned from the top of the screen.
loc_left	Specifies the number of characters the left side of the window is positioned from the left side of the screen.
loc_bottom	Specifies the number of characters the bottom row of the window is positioned from the top of the screen.
loc_right	Specifies the number of characters the right side of the window is positioned from the left side of the screen.

Description

The VOPEN command creates a window. When you have created a window you can direct the output from various other commands to it. The commands that can have their output redirected are those that have an optional ;*window* parameter.

If you supply only the *windowid* parameter, a window is opened with default position and size of 10 rows of 33 characters. The size of a character is determined by the currently selected font so the size and placement of the window may appear to vary between machines and between sessions.

After opening a window you can move and resize it as required.

If the error message `Bad size specification for window` is displayed, check that the following are true:

- *`loc_top`* is smaller than *`loc_bottom`*
- *`loc_left`* is smaller than *`loc_right`*
- *`loc_bottom`* and *`loc_right`* are smaller than the screen size.

Examples

The following examples show how to use `VOPEN`:

`vopen 50`	Open window number 50 at the default size of 10 rows of 33 characters.
`vopen 50,0,5,5,50,40`	Open window number 50 at position (5,5) and 45 rows of 35 characters.

See also

The following commands provide similar or related functionality:

- *FOPEN* on page 2-131
- *FPRINTF* on page 2-133
- *VCLOSE* on page 2-232.

2.2.125 VSETC

The `VSETC` command positions the cursor in the specified window.

Syntax

`VSETC` *`windowid`*, *`row`*, *`column`*

where:

`windowid`

Identifies the window that is to have its cursor positioned. Window numbers in the range 50–1024 are available for the window.

`row`	Specifies the row number in the window, counting from 0, the number of the top row.
`column`	Specifies the column number in the window, counting from 0, the number of the leftmost column.

Description

The `VSETC` command positions the cursor in the specified window. This defines where the next output to be directed to that window appears.

Example

The following example shows how to use `VSETC`:

```
vsetc 50,2,5
fprintf 50,"Status: %d", status
```

Write `Status:` to window 50, starting from the third column of the sixth row.

See also

The following commands provide similar or related functionality:

- *FOPEN* on page 2-131
- *FPRINTF* on page 2-133
- *VCLOSE* on page 2-232.

2.2.126 WAIT

The `WAIT` command tells the debugger whether to wait for a command to complete before permitting another command to be issued.

Syntax

```
WAIT = [ON | OFF]
```

where:

`ON`	specifies that all following commands are to run synchronously.
`OFF`	specifies that following commands run according to their default behavior.

Description

The `WAIT` command makes commands run synchronously. If `WAIT` is not used, commands use their default behavior.

All commands run from a macro run synchronously unless `WAIT` is set `OFF`.

Example

The following example shows how to use `WAIT`:

```
wait on
fill/b 0x8000..0x9FFF =0
wait off
```

These commands cause the debugger to fill memory synchronously, forcing you to wait until the fill is complete before accepting another command.

See also

The following command provides similar or related functionality:

- *DEFINE* on page 2-84.

2.2.127 WARMSTART

`WARMSTART` is an alias of `RESET` (see page 2-191).

2.2.128 WHERE

The `WHERE` command displays a call stack.

Syntax

`WHERE [number_of_levels]`

where:

number_of_levels

Specifies the number of levels you want to examine. If you do not supply this parameter, all levels are displayed.

Description

The `WHERE` command displays a call stack. This shows you the function that you are in, and the function that called that, and the function that called that, until the debugger cannot continue. A call stack is not a history of every function call in the life of the process.

The call stack requires debug information for every procedure called. If debug information is not available, the call stack stops. The call stack might also stop prematurely because the stack frames read by the debugger do not conform to the expected structure, for example if memory corruption has occurred, or if a scheduler has created new stack frames.

Examples

The following example shows how to use `WHERE`:

```
> where
#0: (0x000081C0) DHRY_2\\Proc_7 Line 79. File='c:\program
files\arm\rvd\examples\1.6.1\release\windows\dhrystone\dhry_2.c'
#1: (0x000087BC) DHRY_1\\main Line 164. File='c:\program
files\arm\rvd\examples\1.6.1\release\windows\dhrystone\dhry_1.c'
```

This shows that the program was stopped at line 79 of procedure `Proc_7()`. The call stack tells you that this call of `Proc_7()` was made by code at line 164 of `main()`.

The call stack does not tell you what called `main()`. Normally, there is bootstrap code in `__main()` that calls main, but because this code is not normally compiled with debug symbols included, this procedure is not shown in the call stack.

```
> where 1
#0: (0x00008390) DHRY_1\\Proc_3 Line 355. File='c:\program
files\arm\rvd\examples\1.6.1\release\windows\dhrystone\dhry_1.c'
```

This shows that the program was stopped at line 355 of procedure `Proc_3()`. Compare this to the output of `CONTEXT` at the same location:

```
> context
At the PC: (0x00008390): DHRY_1\Proc_3 Line 355
```

See also

The following commands provide similar or related functionality:

- *CONTEXT* on page 2-76
- *SCOPE* on page 2-197
- *SETREG* on page 2-204.

2.2.129 WRITEFILE

The `WRITEFILE` command writes the contents of memory to a file, performing a format conversion if necessary.

Syntax

```
WRITEFILE ,[OBJ|raw|ascii] [,opts] [name] =addressrange
```

where:

`OBJ` Write the file in the ATPE executable file format.

There are no *`opts`* supported for this file type.

`raw` Write the file as a stream of 8-bit values without further interpretation.

There are no *`opts`* supported for this file type.

`ascii` Write the file as a stream of ASCII digits separated by whitespace. The exact format is specified by other qualifiers. The file has a one line header that is compatible with `READFILE` and `VERIFYFILE`:

`[start,end,size]`	The start address, a comma, the end address, a comma, and a character indicating the size of each value, where `b` is 8 bits, `h` is 16 bits and `l` is 32 bits.

The following *`opts`* are supported for this file type:

`byte`	The file is a stream of 8-bit hexadecimal values that are written to the file without further interpretation.
`half`	The file is a stream of 16-bit hexadecimal values.
`long`	The file is a stream of 32-bit hexadecimal values.
`gui`	You are prompted to enter the file type with a dialog.

`name` Specifies the name of the file to be written.

`addressrange` The address range in target memory to write to the file.

Description

The `WRITEFILE` command writes the contents of memory to a file, performing a format conversion if necessary.

The type of memory assumed depends on the target processor. For example, ARM architecture-based processors have byte addressable memory.

Examples

The following examples show how to use `WRITEFILE`:

```
writefile ,raw "c:\temp\file.dat" =0x8000..0x9000
```

Write the contents of the 4KB memory page at `0x8000` to the file `c:\temp\file.dat`, storing the data in raw, uninterpreted, form.

```
writefile ,ascii,long "c:\temp\file.txt" =0x8000..0x9000
```

Write the contents of the 4KB memory page at `0x8000` to the file `c:\temp\file.dat`, storing it as 32-bit values in target memory endianess. For example, the file might look similar to this:

```
[0x8000,0x9000,l]
E28F8090 E898000F E0800008 E0811008
E0822008 E0833008 E240B001 E242C001
E1500001 0A00000E E8B00070 E1540005
...
```

Note

By writing a file as longs and reading it back as longs on a different target, you can convert the endianess of the data in the file.

See also

The following commands provide similar or related functionality:

- *FILL* on page 2-126
- *LOAD* on page 2-150
- *READFILE* on page 2-186
- *SETMEM* on page 2-202.

Chapter 3
Comparison of Commands

This chapter compares the commands supported by the command-line interface of RealView® Debugger with those supported by ARM® eXtended Debugger (AXD) and `armsd`. It contains the following section:

- *RealView Debugger, armsd, and AXD commands* on page 3-2.

3.1 RealView Debugger, armsd, and AXD commands

RealView Debugger and AXD are normally driven through graphical user interfaces, but they can also be driven by typed commands. For full details of the commands available in AXD and armsd, see the *AXD and armsd Debuggers Guide*.

Some commands listed here are only similar to each other, and specific features might not be available using the listed command. If you require these features, you are recommended to check the other command descriptions for alternative ways of performing the required task.

The tables in this chapter list the commands available in a specific debugger and the RealView Debugger command that most closely matches it, see:

- Table 3-1 for AXD commands, and their RealView Debugger equivalents
- Table 3-2 on page 3-6 for armsd commands, and their RealView Debugger equivalents.

3.1.1 AXD commands

Look up any AXD command in Table 3-1 for the equivalent RealView Debugger command.

Table 3-1 AXD commands and equivalents

AXD commands	RealView Debugger commands
`BACKTRACE`	`WHERE` on page 2-242
`BREAK`	`BREAKEXECUTION` on page 2-38 `BREAKINSTRUCTION` on page 2-45 `DTBREAK` on page 2-105
`CCLASSES`	`BROWSE` on page 2-64
`CFUNCTIONS`	`BROWSE` on page 2-64
`CLASSES`	`BROWSE` on page 2-64
`CLEAR`	`VCLEAR` on page 2-231
`CLEARSTAT`	-
`CLEARWATCH`	`CLEARBREAK` on page 2-69
`COMMENT` *`string`*	`FPRINTF` on page 2-133

Table 3-1 AXD commands and equivalents (continued)

AXD commands	RealView Debugger commands
CONTEXT	CONTEXT on page 2-76 WHERE on page 2-242
CONVARIABLES	EXPAND on page 2-122 SCOPE on page 2-197
CVARIABLES	BROWSE on page 2-64
DBGINTERNALS	EDITBO on page 2-116
DISASSEMBLE	DISASSEMBLE on page 2-96 MODE on page 2-162
ECHO	-
EXAMINE	DUMP on page 2-111
FILES	-
FILLMEM	FILL on page 2-126 SETMEM on page 2-202
FINDSTRING	SEARCH on page 2-199
FINDVALUE	SEARCH on page 2-199
FORMAT	OPTION RADIX on page 2-169 SETTINGS DISASM on page 2-207 SETTINGS DSMVALUE on page 2-207
FUNCTIONS	PRINTSYMBOLS on page 2-177
GETFILE	READFILE on page 2-186
GO	GO on page 2-136
HELP	DCOMMANDS on page 2-81 HELP on page 2-141
IMAGES	DTFILE on page 2-107
IMGPROPERTIES	DTFILE on page 2-107
IMPORTFORMAT	-
IN	UP on page 2-230

Table 3-1 AXD commands and equivalents (continued)

AXD commands	RealView Debugger commands
LET	CEXPRESSION on page 2-67 SETMEM on page 2-202
LIST	DISASSEMBLE on page 2-96 MODE on page 2-162 DUMP on page 2-111
LISTFORMAT	-
LOAD	LOAD on page 2-150 RELOAD on page 2-189
LOADBINARY	READFILE on page 2-186
LOADSESSION	READBOARDFILE on page 2-185
LOADSYMBOLS	LOAD/NS on page 2-150
LOG	JOURNAL on page 2-145
LOWLEVEL	PRINTSYMBOLS on page 2-177
MEMORY	DUMP on page 2-111
OBEY	INCLUDE on page 2-143
OUT	DOWN on page 2-102
PARSE	-
PRINT	PRINTF on page 2-174 CEXPRESSION on page 2-67 PRINTVALUE on page 2-181
PROCESSORS	DTPROCESS on page 2-109
PROCPROPERTIES	-
PUTFILE	WRITEFILE on page 2-244
QUITDEBUGGER	QUIT on page 2-184
READSYMS	LOAD/NS on page 2-150
RECORD	LOG on page 2-153
REGBANKS	-

Table 3-1 AXD commands and equivalents (continued)

AXD commands	RealView Debugger commands
REGISTERS	-
RELOAD	RELOAD on page 2-189
RUN	GO on page 2-136
RUNTOPOS	GO on page 2-136
SAVEBINARY	WRITEFILE on page 2-244
SAVESESSION	-
SETACI	-
SETBREAKPROPS	BREAKEXECUTION on page 2-38 BREAKINSTRUCTION on page 2-45
SETIMGPROP "*file*" cmdline	ARGUMENTS on page 2-24
SETMEM	CEXPRESSION on page 2-67 FILL on page 2-126 SETMEM on page 2-202
SETPC	SETREG @PC on page 2-204
SETPROC	THREAD on page 2-226
SETPROCPROP	-
SETPROCPROP vector_catch SETPROCPROP semihosting_enabled	BGLOBAL on page 2-27
SETREG	SETREG on page 2-204
SETSOURCEDIR	-
SETWATCH	CEXPRESSION on page 2-67 SETMEM on page 2-202
SETWATCHPROPS	BREAKEXECUTION on page 2-38 BREAKINSTRUCTION on page 2-45
SOURCE	LIST on page 2-148
SOURCEDIR	-
STACKENTRIES	WHERE on page 2-242

Table 3-1 AXD commands and equivalents (continued)

AXD commands	RealView Debugger commands
STACKIN	UP on page 2-230
STACKOUT	DOWN on page 2-102
STATISTICS	-
STEP	STEPINSTR on page 2-213 STEPLINE on page 2-215 STEPOINSTR on page 2-218 STEPO on page 2-220
STEPSIZE	RUN on page 2-196
STOP	STOP on page 2-223
TYPE	LIST on page 2-148
UNBREAK	CLEARBREAK on page 2-69
UNWATCH	CLEARBREAK on page 2-69
VARIABLES	PRINTTYPE on page 2-179
WATCHPT	BREAKACCESS on page 2-31 BREAKREAD on page 2-50 BREAKWRITE on page 2-57
WHERE	CONTEXT on page 2-76 WHERE on page 2-242

3.1.2 armsd commands

Look up any armsd command in Table 3-2 for the equivalent RealView Debugger command.

Table 3-2 armsd commands and equivalents

armsd commands	RealView Debugger commands
!	-
$cmdline = "*string*"	ARGUMENTS on page 2-24
$semihosting_enabled = [0|1]	BGLOBAL on page 2-27

Table 3-2 armsd commands and equivalents (continued)

armsd commands	RealView Debugger commands
`$vector_catch = [0|1]`	`BGLOBAL on` page 2-27
`@`*`regname`* `=` *`value`*	`SETREG` on page 2-204
`|`	`#` or `;`
`ALIAS`	`ALIAS` on page 2-21
`ARGUMENTS`	`EXPAND` on page 2-122
`BACKTRACE`	`WHERE` on page 2-242
`BREAK`	`BREAKEXECUTION` on page 2-38 `BREAKINSTRUCTION` on page 2-45
`CALL`	*`function_name`*`(`*`params`*`)` as an expression.
`COMMENT`	`FPRINTF` on page 2-133
`CONTEXT`	`SCOPE` on page 2-197
`Control-C`	`STOP` on page 2-223
`COPROC`	-
`CREGDEF`	Edit board file
`CREGISTERS`	`@`*`regname`* as an expression.
`CWRITE`	`SETREG` on page 2-204
`EXAMINE`	`DUMP` on page 2-111
`FIND`	`SEARCH` on page 2-199
`FPREGISTERS`	`@`*`regname`* for each register as an expression
`GETFILE`	`READFILE` on page 2-186
`GO`	`GO` on page 2-136
`HELP`	`DCOMMANDS` on page 2-81 `HELP` on page 2-141
`IN`	`DOWN` on page 2-102
`ISTEP`	`STEPINSTR` on page 2-213 `STEPOINSTR` on page 2-218

Table 3-2 armsd commands and equivalents (continued)

armsd commands	RealView Debugger commands
LANGUAGE	-
LET	SETREG on page 2-204 CEXPRESSION on page 2-67
LIST	DISASSEMBLE on page 2-96 MODE on page 2-162 DUMP on page 2-111
LOAD	LOAD on page 2-150
LOG	LOG on page 2-153
LSYM	PRINTSYMBOLS on page 2-177
lvalue_memoryaddress = data_value	CEXPRESSION on page 2-67
OBEY	INCLUDE on page 2-143
OUT	UP on page 2-230
PAUSE	PAUSE on page 2-173
PRINT	CEXPRESSION on page 2-67 PRINTF on page 2-174 PRINTVALUE on page 2-181
PROFCLEAR	-
PROFOFF	-
PROFON	-
PROFWRITE	-
PUTFILE	WRITEFILE on page 2-244
QUIT	QUIT on page 2-184
READSYMS	LOAD/NS on page 2-150
REGISTERS	@*regname* for each register as an expression
RELOAD	RELOAD on page 2-189
RETURN	-

Table 3-2 armsd commands and equivalents (continued)

armsd commands	RealView Debugger commands
STEP	STEPLINE on page 2-215 STEPO on page 2-220
SYMBOLS	EXPAND on page 2-122 PRINTSYMBOLS on page 2-177
TYPE	LIST on page 2-148
UNBREAK	CLEARBREAK on page 2-69
UNWATCH	CLEARBREAK on page 2-69
VARIABLE	PRINTTYPE on page 2-179
WATCH	BREAKACCESS on page 2-31 BREAKREAD on page 2-50 BREAKWRITE on page 2-57
WHERE	CONTEXT on page 2-76
WHILE	WHILE statement (in macro or include file).

Glossary

The items in this glossary are listed in alphabetical order, with any symbols and numerics appearing at the end.

Access-provider connection
A debug target connection item that can connect to one or more target processors. The term is normally used when describing the RealView Debugger Connection Control window.

Address breakpoint
A type of breakpoint.

See also Breakpoint.

ADS
See ARM Developer Suite.

ATPE
See ARM Toolkit Proprietary ELF.

ARM Developer Suite (ADS)
A suite of software development applications, together with supporting documentation and examples, that enable you to write and debug applications for the ARM family of *RISC* processors.

ARM Toolkit Proprietary ELF (ATPE)
The binary file format used by RealView Developer Kit. ATPE object format is produced by the compiler and assembler tools. The ARM linker accepts ATPE object files and can output an ATPE executable file. RealView Debugger can load only ATPE format images, or binary ROM images produced by the `fromELF` utility.

ARM state
A processor that is executing ARM (32-bit) instructions is operating in ARM state.

See also Thumb state

Asynchronous execution
Asynchronous execution of a command means that the debugger accepts new commands as soon as this command has been started, enabling you to continue do other work with the debugger.

ATPCS
ARM-Thumb Procedure Call Standard.

Backtracing
See Stack Traceback.

Big-endian
Memory organization where the least significant byte of a word is at the highest address and the most significant byte is at the lowest address in the word.

See also Little-endian.

Board
RealView Debugger uses the term *board* to refer to a target processor, memory, peripherals, and debugger connection method.

Board file
The *board file* is the top-level configuration file, normally called `rvdebug.brd`, that references one or more other files.

Breakpoint
A user defined point at which execution stops in order that a debugger can examine the state of memory and registers.

See also Hardware breakpoint and Software breakpoint.

Conditional breakpoint
A breakpoint that halts execution when a particular condition becomes true. The condition normally references the values of program variables that are in scope at the breakpoint location.

Context menu
See Pop-up menu.

Core module
In the context of Integrator, an add-on development board that contains an ARM processor and local memory. Core modules can run stand-alone, or can be stacked onto Integrator motherboards.

See also Integrator.

CPSR	Current Program Status Register. *See also* Program Status Register.
Debug With Arbitrary Record Format (DWARF)	ARM code generation tools generate debug information in DWARF2 format.
Deprecated	A deprecated option or feature is one that you are strongly discouraged from using. Deprecated options and features will not be supported in future versions of the product.
Doubleword	A 64-bit unit of information.
DWARF	*See* Debug With Arbitrary Record Format.
EmbeddedICE logic	The EmbeddedICE logic is an on-chip logic block that provides TAP-based debug support for ARM processor cores. It is accessed through the TAP controller on the ARM core using the JTAG interface. *See also* IEEE1149.1.
Emulator	In the context of target connection hardware, an emulator provides an interface to the pins of a real core (emulating the pins to the external world) and enables you to control or manipulate signals on those pins.
Endpoint connection	A debug target processor, normally accessed through an *access-provider connection*.
ETV	*See* Extended Target Visibility.
Execution vehicle	Part of the debug target interface, execution vehicles process requests from the client tools to the target.
Extended Target Visibility (ETV)	Extended Target Visibility enables RealView Debugger to access features of the underlying target, such as chip-level details provided by the hardware manufacturer or SoC designer.
Floating Point Emulator (FPE)	Software that emulates the action of a hardware unit dedicated to performing arithmetic operations on floating-point values.
FPE	*See* Floating Point Emulator.
Halfword	A 16-bit unit of information.

Hardware breakpoint

A breakpoint that is implemented using non-intrusive additional hardware. Hardware breakpoints are the only method of halting execution when the location is in *Read Only Memory* (ROM). Using a hardware breakpoint often results in the processor halting completely. This is usually undesirable for a real-time system.

See also Breakpoint and Software breakpoint.

IEEE Std. 1149.1 The IEEE Standard that defines TAP. Commonly (but incorrectly) referred to as JTAG.

See also Test Access Port

Integrator A range of ARM hardware development platforms. *Core modules* are available that contain the processor and local memory.

Joint Test Action Group (JTAG)

An IEEE group focussed on silicon chip testing methods. Many debug and programming tools use a *Joint Test Action Group* (JTAG) interface port to communicate with processors. For further information see IEEE Standard, Test Access Port and Boundary-Scan Architecture specification 1149.1 (JTAG).

JTAG *See* Joint Test Action Group.

JTAG interface unit A protocol converter that converts low-level commands from RealView Debugger into JTAG signals to the EmbeddedICE logic.

Little-endian Memory organization where the least significant byte of a word is at the lowest address and the most significant byte is at the highest address of the word.

See also Big-endian.

Pop-up menu Also known as *Context menu*. A menu that is displayed temporarily, offering items relevant to your current situation. Obtainable in most RealView Debugger windows or panes by right-clicking with the mouse pointer inside the window. In some windows the pop-up menu can vary according to the line the mouse pointer is on and the tabbed page that is currently selected.

Processor core The part of a microprocessor that reads instructions from memory and executes them, including the instruction fetch unit, arithmetic and logic unit and the register bank. It excludes optional coprocessors, caches, and the memory management unit.

Profiling Accumulation of statistics during execution of a program being debugged, to measure performance or to determine critical areas of code.

Program Status Register (PSR)

Contains information about the current execution context. It is also referred to as the *Current PSR* (CPSR), to emphasize the distinction between it and the *Saved PSR* (SPSR), which records information about an alternate processor mode.

PSR	*See* Program Status Register.
RealView Compilation Tools (RVCT)	*RealView Compilation Tools* is a suite of tools, together with supporting documentation and examples, that enables you to write and build applications for the ARM family of *RISC* processors.
RVCT	*See* RealView Compilation Tools.
Scan chain	A scan chain is made up of serially-connected devices that implement boundary-scan technology using a standard JTAG TAP interface. Each device contains at least one TAP controller containing shift registers that form the chain. Processors might contain several shift registers to enable you to access selected parts of the device.
Scope	The range within which it is valid to access such items as a variable or a function.
Script	A file specifying a sequence of debugger commands that you can submit to the command-line interface using the `include` command.
Semihosting	A mechanism whereby I/O requests made in the application code are communicated to the host system, rather than being executed on the target.
Software breakpoint	A *breakpoint* that is implemented by replacing an instruction in memory with one that causes the processor to take exceptional action. Because instruction memory must be altered software breakpoints cannot be used where instructions are stored in read-only memory. Using software breakpoints can enable interrupt processing to continue during the breakpoint, making them more suitable for use in real-time systems. *See also* Breakpoint and Hardware breakpoint.
Software Interrupt (SWI)	An instruction that causes the processor to call a programmer-specified subroutine. Used by the ARM standard C library to handle semihosting.
SPSR	Saved Program Status Register. *See also* Program Status Register.
Stack traceback	This a list of procedure or function call instances on the current program stack. It might also include information about call parameters and local variables for each instance.
SWI	*See* Software Interrupt.
Synchronous execution	*Synchronous execution* of a command means that the debugger stops accepting new commands until this command is complete.

Synchronous starting
Setting several processors to a particular program location and state, and starting them together.

Synchronous stopping
Stopping several processors in such a way that they stop executing at the same instant.

TAP *See* Test Access Port.

TAP Controller Logic on a device which allows access to some or all of that device for test purposes. The circuit functionality is defined in IEEE1149.1.

See also Test Access Port and IEEE1149.1.

Target The target hardware, including processor, memory, and peripherals, real or simulated, on which the target application is running.

Target Vehicle Server (TVS)
Essentially the debugger itself, this contains the basic debugging functionality. TVS contains the run control, base multitasking support, much of the command handling, target knowledge, such as memory mapping, lists, rule processing, board-files and `.bcd` files, and data structures to track the target environment.

Test Access Port (TAP)
The port used to access the TAP Controller for a given device. Comprises **TCK**, **TMS**, **TDI**, **TDO**, and **nTRST** (optional).

Thumb state A processor that is executing Thumb (16-bit) instructions is operating in Thumb state.

See also ARM state

TLA *See* Tektronix Logic Analyzer.

Tracepoint A tracepoint can be a line of source code, a line of assembly code, or a memory address. In RealView Debugger, you can set a variety of tracepoints to determine exactly what program information is traced.

Trigger In the context of breakpoints, a trigger is the action of noticing that the breakpoint has been reached by the target and that any associated conditions are met.

TVS *See* Target Vehicle Server.

Vector Floating Point (VFP)
A standard for floating-point coprocessors where several data values can be processed by a single instruction.

VFP *See* Vector Floating Point.

Watch	A watch is a variable or expression that you require the debugger to display at every step or breakpoint so that you can see how its value changes. The Watch pane is part of the RealView Debugger Code window that displays the watches you have defined.
Watchpoint	In RealView Debugger, this is a hardware breakpoint.
Word	A 32-bit unit of information.

Index

The items in this index are listed in alphabetical order, with symbols and numerics appearing at the end. The references given are to page numbers.