Sophia systems™

EJ-SCT
ARM-Cortex Series
Universal JTAG Emulator

User's Manual

E090836-02

1 Technical Information and Cautions

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1.1 Important Warnings and Precautions

This publication includes important product use warnings and safety precautions. **It is important** for you to read and follow directions for proper operation to avoid possible harm to yourself or others, and prevent damage to your EJ-SCT JTAG emulator.

- Read and study all precautions prior to operating this product.
- Keep these precautions in a safe place with easy operator access.

1.2 Unpacking and Receipt

Check each item itemized on the packing list are present and undamaged by shipment. If damage is noted save all shipping documents, packing and boxes. Immediately contact your freight forwarder and local Sophia Systems office or representative.

This product contains delicate components and should be handled with care.

1.3 Operator Cautions

Warning Always observe the following cautions and instructions. Failure to do so may result in electrical shock, fire, serious injury, loss life, and/or damage to the product hardware.

Use factory supplied connections, cables and test points only. Any other attempts to make connections or connection modifications may result in injury, electrical shock or fire.


Prohibited

There are NO user serviceable components inside the case. Never attempt to disassemble, modify or repair this product. Failure to do so may result in electrical shock and risk of fire. Contact Sophia Systems for authorized repairs.

If you smell smoke or detect any sound of electric arcing while using this product - Immediately turn off electrical power and remove all connections capable of supplying electricity to the unit. Failure to do so may result in injury or fire. Contact Sophia Systems for authorized repairs.

If you suspect that the product is damaged due to impact or having fallen, do not attempt to apply power. If in use at the time of the damage remove power immediately. Failure to do so may result in injury or fire. Contact Sophia Systems for authorized repairs.

Cable and connector cautions. Treat connection cables gently. Never expose them to heat, kink, twist or pull on connection cables. Avoid straining or placing any objects on cables.


Prohibited

AC mains power caution. Only plug the accessory power supply in to standard 110 VAC mains power. Failure to do so may result in injury or fire. Contact Sophia Systems for authorized repairs.


Prohibited

Do not attempt to touch the power connection during electrical storms to avoid electrical shock. If you suspect that this product may have been exposed to a lightening strike do not attempt to use it. Contact Sophia Systems for authorized technical inspection and repair.

Always ensure that this product chassis ground is at the same electromotive potential as ground on any unit under test. Connecting a ground strap from the ground connection on this device to all peripheral devices is highly recommended to eliminate the risk of damage and electrical shock.


Prohibited

Keep the chassis ground on this product away from any gas line or pipe. Failure to do so may result in a gas explosion or fire.


Prohibited

Do not pull on the electric cable. Grasp the plug or cable connector to insert or extract cable connections. Failure to do so may damage the cable and risk injury or fire.


Prohibited

Warnings - continued

Always observe the following cautions and instructions. Failure to do so may result in electrical shock, fire, serious injury, loss life, and/or damage to the product hardware.

Turn off power and remove power plug from AC outlet when connecting or disconnecting an option. Failure to do so may result in electrical shock.


Required

Don't transfer the product with the option connected because the option may drop and lead to injury.


Prohibited

Avoid pulling the electric cable with extreme force. Remove connections by taking the plug on hand only. Failure to do so may result in electrical shock, cable damage or the risk of fire.


Prohibited

Make sure your hands are dry. Avoid handing power plug with wet hands. Failure to do so may result in electrical shock.


Prohibited

Avoid use and storage in humid areas such as found in a bathroom. High humidity may result in electrical failure and shock due to liquid condensation forming on this product.

Keep all liquids away from the product. If a liquid does spill on to the product, turn off power and pull out plug from power outlet immediately. Contact Sophia Systems sales office or distributor for technical inspection and repair.


Prohibited

Do not allow any metal items such as copper wire clippings or staples to get into this product. Failure to do so may result in electrical shock or fire.


Prohibited

Avoid covering the adapter and product. Failure to do so may result in fire or deform the case due to the extreme high temperature.


Prohibited

Don't touch AC adapter or product while their power ON duration. Failure to do so may result in the risk of injury.


Prohibited

Do not cover the air flow ventilation holes in this product. Failure to do so may result in case deformation or fire.


Prohibited

1.4 Class A FCC Notice

This product has been tested and demonstrated to comply with the limits for class A digital device pursuant to part 15 of the FCC Rules. These limits are designed to provide proper protection against harmful interference when the product is operated in a commercial environment. There is a possibility of this product causing interference to radio communications if not used in accordance with procedures in the instruction manual. This product my generate and radiate radio frequency energy.

There is a possibility that this product may cause radio frequency interference when used in residential areas. It is the responsibility of the user to prevent or remedy interference complaints and problems at their own cost if this is the case. This unit will not comply with FCC Rules if modified in any way without Sophia Systems' authorization.

2 Setup for Use With a PC

2.1 WATCHPOINT Software Installation

a) Do not connect the EJ-SCT to the PC USB port until after the WATCHPOINT software has been installed so that the PC will have access to the USB driver.

b) WATCHPOINT versions are determined by the processor that they support. Check to be sure that the version of WATCHPOINT being installed matches the processor on the unit under test.

c) Install Sophia Systems WATCHPOINT debug software using the supplied CD ROM.

d) Do not attempt to start a WATCHPOINT session until the JTAG hardware is installed. For a WATCHPOINT session to start normally the PC must recognize the EJ-SCT on a USB port, and the EJ-SCT must find a compatible processor on an active JTAG port.

e) The EJ-SCT receives power via the USB cable when connected to a personal computer.

f) Make sure that the supplied WATCHPOINTt CD is in the PC ROM drive and connect the USB cable to the PC and EJ-SCT. The PC will detect the new USB hardware and find the needed USB driver on the WATCHPOINT CD.

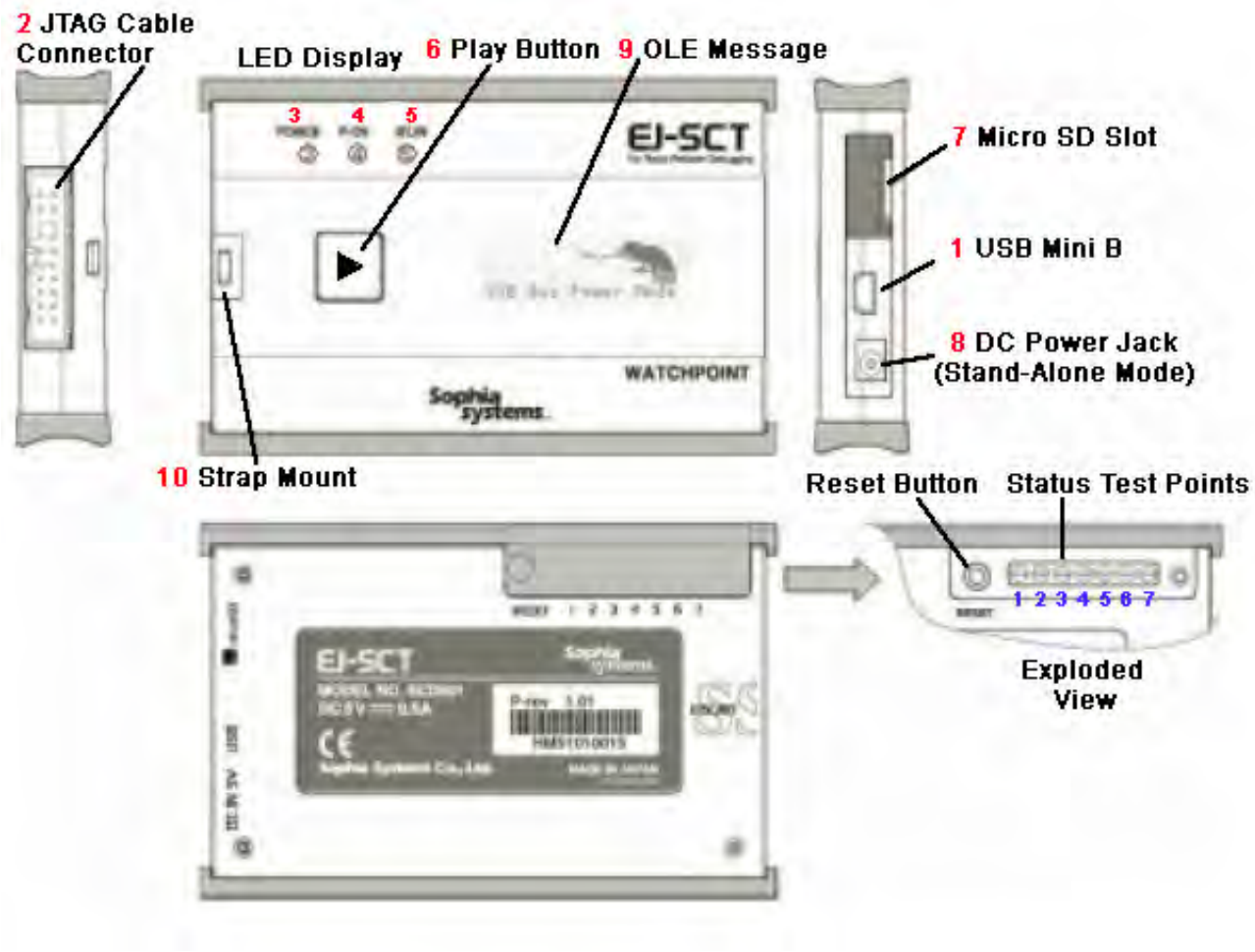
g) **Be sure that the unit under test power is off**. When WATCHPOINT is installed and the EJ-SCT has been recognized by the PC you can plug the EJ-SCT into the unit under test**. Make sure that Pin 1 on the JTAG cable is connected to Pin 1 on the unit under test.** Failure to do so may damage the EJ-SCT and your test unit.

h) Turn on the unit under test. The EJ-SCT target power on LED, (labeled P-ON) should light. Now you are ready to start the first WATCHPOINT session. Refer to the WATCHPOINT manual and WATCHPOINT Help button for additional necessary start-up steps and instructions.

3 Hardware overview

The EJ-SCT is a universal JTAG emulator and FLASH writer that is configured by the WATCHPOINT software. Additional CPU support including multi-processor capabilities are added by simply installing another edition of the WATCHPOINT software. Contact Sophia Systems or your authorized representative for specific details.

The EJ-SCT connects to the host computer via USB interface cable.
The EJ-SCT connects to the unit under test via the supplied JTAG cable.

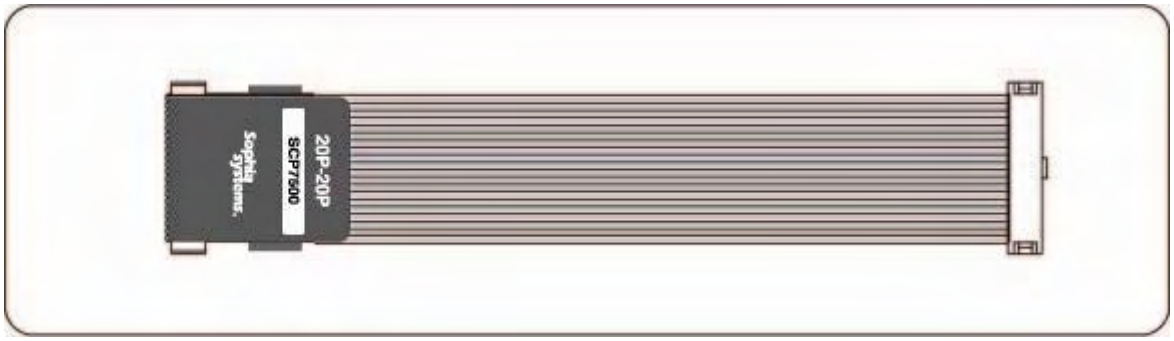


1. USB Mini B Connector	**6**. PLAY Batch Macro Button
2. JTAG Cable Connector	**7.** Micro SD Memory Slot
3. EJ-SCT Power On LED	**8.** Stand-Alone Mode DC Power In Jack
4. Target unit power on LED (P-ON)	**9.** OLED EJ-SCT Message Display
5. Unit Under Test Running LED	**10.** Strap Mounting Hole

3.0.1 Illustration JTAG Hardware Indicators, Connectors & Display

3.1 ARM Series JTAG Cable

The EJ-SCT uses a standard 20 to 20 pin female connector JTAG cable from the emulator to the unit under test as recommended by ARM.



3.1.1 Illustration – EJ-SCT 20-20 Pin Female JTAG Cable

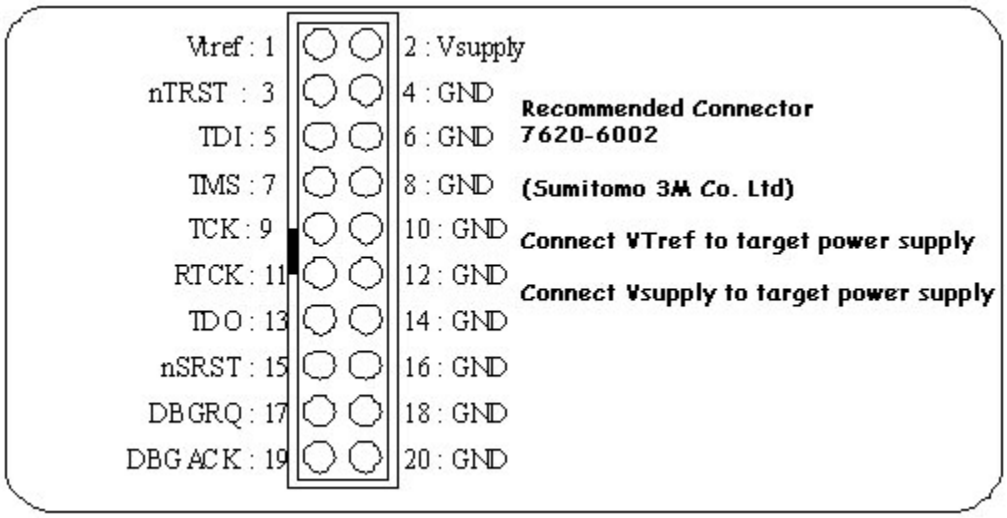
3.2 Proper JTAG to Unit Under Test Connection Sequence

The following procedure must be adhered to for proper connection to the system under test.
Make sure that the EJ-SCT and target system to be tested power is off or not connected in any way to a power source.

1. Connect target system to the EJ-SCT using the provided JTAG cable.
2. Connect the power supply and apply power to the EJ-SCT. The Power LED on the EJ-SCT should be on at this time.
3. Apply power to the target system to be tested.
4. For the WATCHPOINT debugging session to start the EJ-SCT JTAG must detect a valid, working JTAG port on the target system.

3.3 JTAG Connector Pin Assignment

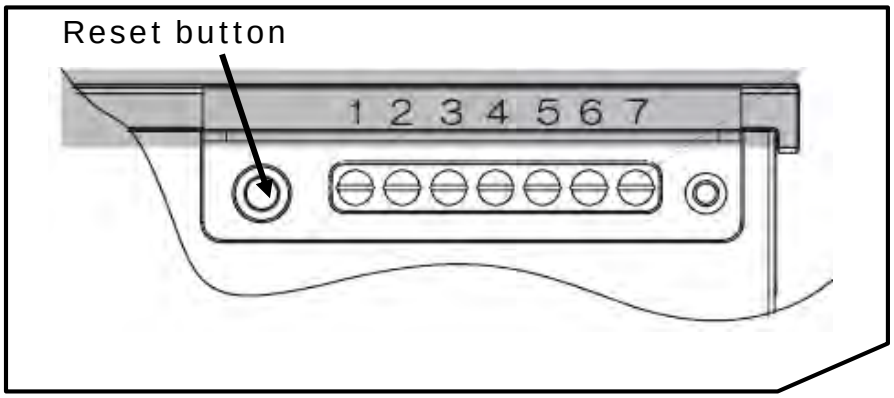
The following pin assignment is recommended by ARM for the target system to be tested.



3.3.1 Illustration - Standard EJ-SCT 20-20 pin female JTAG cable

3.5 Test Terminals & Reset Button Under Rubber Cover

On the underside of the EJ-SCT there is a rubber dust cover protecting a reset button for the unit and several user test point connections.



3.5.1 Illustration – JTAG Reset Button and User Test Terminals

Pin #	Signal	Type	Signal Level	Function
1	GND		---	External Tester Ground Point
2	RUNOUT	Output	Low = 0.55v High = 2.33v	LOW = Unit under test CPU is not running HIGH = Unit under test CPU IS running
3	RESETOUT#	Output	Low = 0.55v High = 2.33v	LOW = Unit under test is In Reset HIGH = Unit under test is NOT in Reset
4	XVCC	Output	---	External Vtref Test Point
5	LEVEL	Input	0~5.0vDC	DC Monitor point. Voltage if >0.8vDC appears on JTAG OLE display. 0~5vDC Resolution 0.25vDC *1
6	Not Used			---
7	EXTBRK#	Input	0~5.0vDC	Assert LOW to stop Unit under test CPU*2

*1 The voltage level is displayed on OLED when voltage connected to the LEVEL terminal over 0.8V.
*2 The input signal threshold-level is equal to half the target system power supply voltage. (Vtref)
*3 Signals referenced to test point GND Pin-1 under the EJ-SCT rubber dust cap.

3.5.2 Table Emulator specification

Supported Cores	ARM 7 9 11 Cortex core series
Target interface	JTAG port connection 2.54mm pitch 2 line 20 pin connect
JTAG clock	Supports approximate frequencies 66, 33, 16 ,8 ,4, 2, 1 MHz and low speed clock
User power	1.2V~5.0V output signal voltage follows target voltage
Memory space	All memory space is available to the User.
Interrupt	All interrupts are available to the User.
Break	Hardware break point ARM7/9 Maximum is 2 hardware break points May be set on command execution address, status, data ARM11 Maximum is 7 hardware break points Reserve command execution address (5p), reserve memory access etc. (2p) Cortex core series (A8) :Reserve command execution address (5p), reserve memory access etc. (2p) (R4) :Reserve command execution address(7p), reserve memory access etc. (8p) (M3): Reserve command execution address(5p) Unlimited software break points Emulator forced break point *ARM7 & ARM9 JTAG emulation uses 1 of the available hardware break points. Software break point Step over Step out Run to cursor

Specifications may be changed without notice.

3.6 Power On and Off Sequence and Cautions

1. When turning on your test system you must apply power to the JTAG emulator first.
2. When turning off your test system always turn off the unit under test first.
3. Be careful that only compatible voltage is ever applied to this product.
4. This emulator will not function if the target unit under test is off.
5. This emulator will not function correctly if the unit under test CPU is not operating normally.
6. The WATCHPOINT debug session will not start normally if it does not detect a working JTAG port on the unit under test.

3.7 Other Technical Cautions

1. Software break points cannot be set in target system ROM address space.
2. A hardware break point must be set to break execution in a ROM space address.
3. The User program will stop executing if the User changes or alters memory while the User program is running. This includes changing or altering assembler code.
4. The ARM ICEBreaker Module debugging scheme is being used internally as one of the debugging algorithms. When this Module is accessed is may cause WP Break command to be ignored for an instant. Contact Sophia Systems for more details if this is causing trouble with your debugging process.

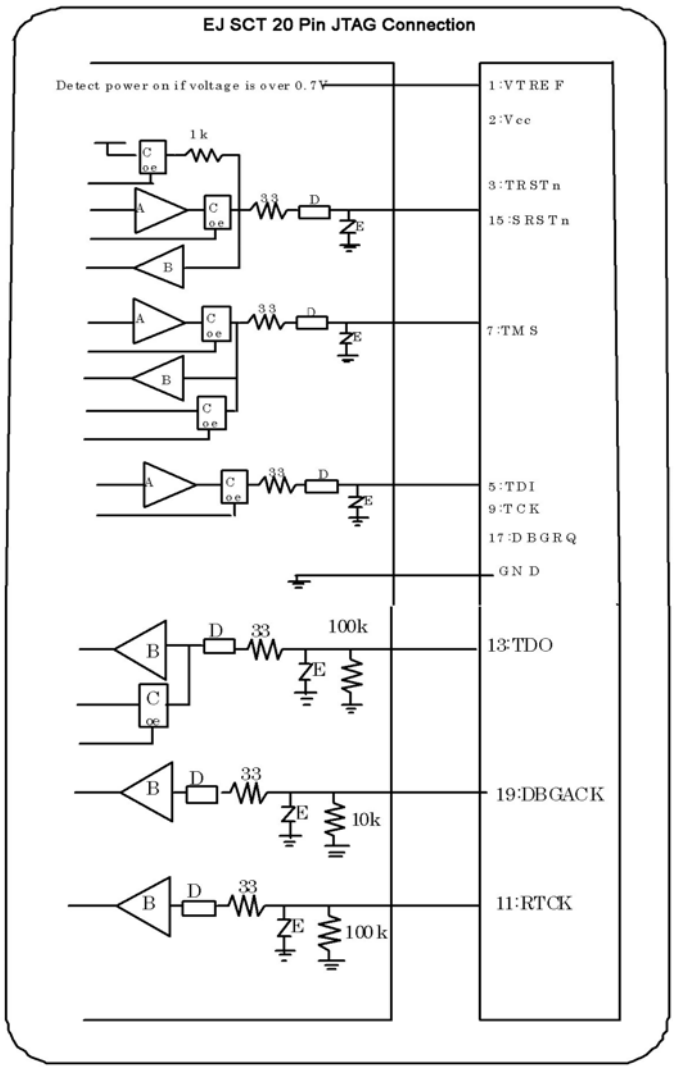
3.8 EJ-SCT Side JTAG Hardware Interface

The target VTREF signal is detected by the EJ-SCT and is used to set signal levels. Valid VTREF levels are from 1.2V~5.0Vdc

When VTREF signal detect voltage is over 0.7, input/output circuit on the JTAG emulator side it will be ON.

JTAG Interface parts are as follows:

Designation	Description	Part Number
A	Analog Devices	ADG719BTZ
B	TI	SN65LVDS33PW
C	PERICOM	PI5C125QE
D	Ferrite bead	
E	EMI filter	



3.8.1 - Illustration JTAG Side Hardware Interface

3.9 Recommended Hot Plug JTAG Connect Circuitry

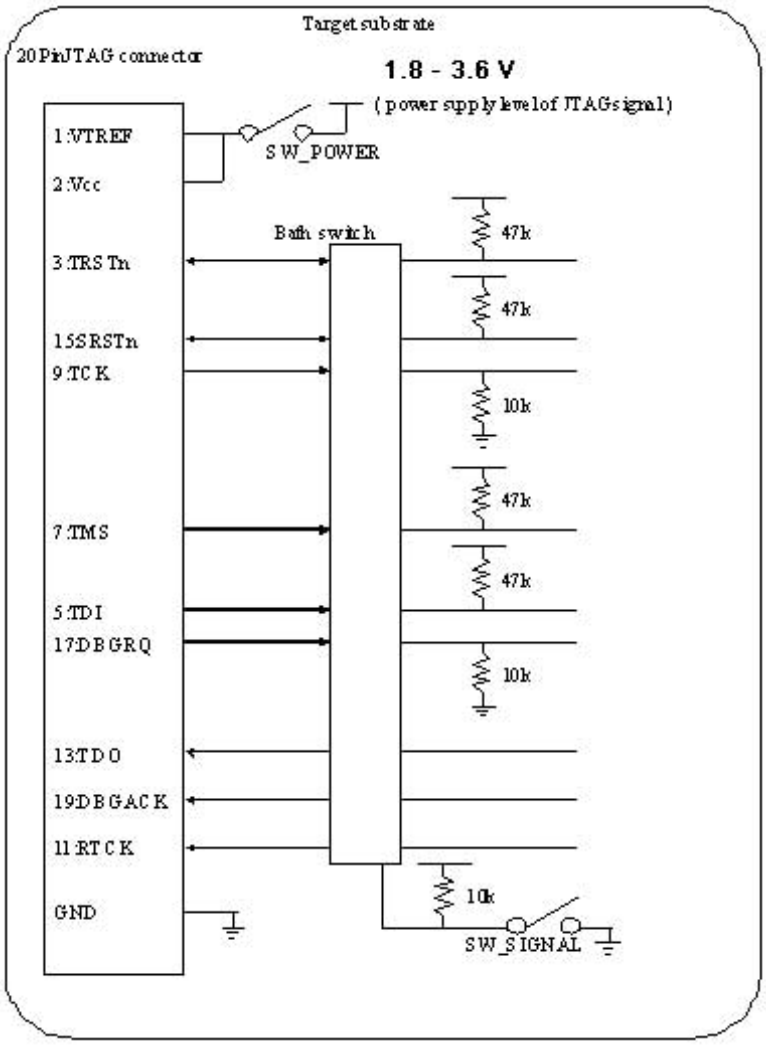
To support Hot Plug connection add the following circuit to target board. A special connector is not necessary .

3.9.1 Hot Plug Operating Instructions

- Turn target POWER, SW_SIGNAL off.
- Turn target POWER SW_SIGNAL on
- EJ-SCT detects target power supply to start normally
- At this point the EJ-SCT can control signal lines.

If the SRSTn (target reset signal), DBGRQ, DBGACK, RTCK signals are not available on the target, then these signals can be no connects, (NC).

Normal connections are detailed below.



3.9.2 Illustration Hot-Plug JTAG Connect Circuitry

3.10 JTAG Signal Specification

1. TCK signal – Required, and must be connected
2. Possible Clock Frequencies –
   2.1. 66.66MHz, 33.33MHz, 16.66MHz ,8.33MHz,.4.16MHz, 2.08 MHz, and 1.04MHz
   2.2. Possible low speed clock is supported from 1~500KHz
3. If RTCK and low speed modes are not being used, that the JTAG clock has a 50% duty cycle.
4. TCK can be left low or high, since it is just used for communication to the CPU for JTAG.
5. When the RTCK signal changes there is some initial delay since the JTAG emulator also needs some time to process the change in RTCK.
6. When the low speed mode is used, then special consideration of the TCK signal should be understood in terms of duty cycle.
7. When automatic setting is selected in the WATCHPOINT set-up menu, the appropriate JTAG frequency will usually be selected. However, if the TDO signal is delayed too long, the JTAG will be set to low frequency.
8. RTCK mode setup is dependent on the RTCK signal information from the target unit under test.
9. The TCK signal specification above may change when WATCHPOINT updates are released.
10. 1.2V~5V output voltage follows the VIREF signal from the target unit under test.

3.11 TMS signal, TDI signal

1. TMS and TDI signals set up timing set at TCK falling edge.
2. When ”RTCK=2 0mode” is used, the RTCK synchronizes with the JTAG emulator for debugging. TCK signal specification above may change when WATCHPOINT updates are released.
3. 1.2V~5V output voltage follows the VIREF signal from the target unit under test.

3.12 TRSTn signal, SRSTn signal

1. TRSTn and SRSTn signal must be connected.
2. Timing is done by an asynchronous assertion.
3. When the JTAG emulator is initialized, the output is at the low state.
4. Output voltage is an open drain output. This signal is a pull-up voltage that follows the unit under test VccIO level. (A 1K Ω ohm pull-up should be added to the controlling device.)

3.13 RTCK Signal

1. The TCK clocking frequency can be set to non-adaptive or adaptive modes. If using adaptive clocking mode, the JTAG emulator uses the RTCK signal to generate the TCK signal. When the emulator detects the falling edge of RTCK, it generates the rising edge of TCK. The TCK signal is delayed due to the time needed to sample the RTCK signal using the emulator internal clock. This might be a problem when using very low clock speeds.
2. There is a 100K pull-down within the JTAG emulator.

3.14 TDO Signal

1. TRSTn signal must be connected.
2. There is a 100K pull-down within the JTAG emulator.
3. In non-adaptive clocking mode the TDO signal is sampled by the JTAG emulator at the rising edge of the TCK signal.
4. In adaptive clocking mode the TDO signal is sampled by the JTAG emulator at the rising edge of the RTCK signal. Sampling requires approximately 9ns setup time, and 5ns hold time form the rising edge of the RTCK when using adaptive clocking mode.
5. The TDO signal timing specifications may be changed in revised versions of the WATCHPOINT debugger.

3.15 DBGRQ Signal

1. This pin allows to quickly enter debug mode and should be connected if the unit under test supports DEGRQ debugging.
2. Output voltage follows target VIREF signal voltage
3. Output timing is asynchronous.

3.16 DBGACK Signal

1. This pin allows the JTAG emulator to quickly determine whether the target is in debug mode or not. It should be connected if the unit under test supports it.
2. There is a 10K pull-down within the JTAG emulator

3.17 VCC Signal

1. Connects to the target power supply.
2. The JTAG emulator monitors the voltage at terminal VccIO.

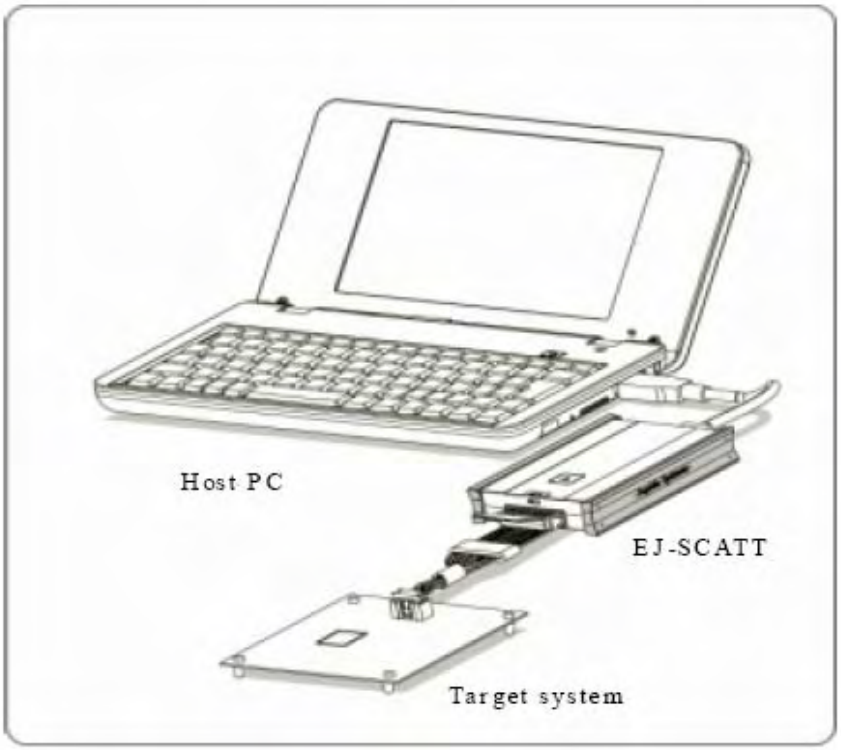
3.18 VTREF Signal

1. Must be connected and goes to the target power supply directly.
2. This pin is usually tied to the target's power supply and used by the JTAG emulator as a logic level reference.

4 Operation Modes - Development & Programming

4.1 Full JTAG Emulator Development Mode

In full development mode the EJ-SCT is connected to a personal computer via a USB connection, and is controlled by a Sophia Systems WATCHPOINT software session. Power to the EJ-SCT is supplied by the USB cable connection. Connection to the unit under test is via the supplied JTAG cable.



4.1.1 Illustration JTAG Emulator Development Mode

4.2 Stand-Alone JTAG FLASH Writer Mode

In stand-alone JTAG FLASH writer mode the EJ-SCT operates under the control of a macro script, “Batch” program created with WATCHPOINT software and saved to SD memory. The SD memory is then installed in the EJ-SCT SD memory slot.

In stand-alone mode the EJ-SCT receives power from the supplied accessory AC mains power supply. Connection to the unit to have FLASH memory written is via the supplied JTAG cable.

The Batch program executes when the operator presses the Start button on the EJ-SCT.

5. WATCHPOINT Tutorial

5.1 Tutorial Location

Tutorial text and illustrations are part of the WATCHPOINT Help file. This file is available apart from a WATCHPOINT session. Go to the \WATCHPOINT\WPS_ARM_M/help directory, and double click on ARM.chm. When the file opens, select the Tutorial folder.

5.2 WATCHPOINT CD Command Definitions and Location

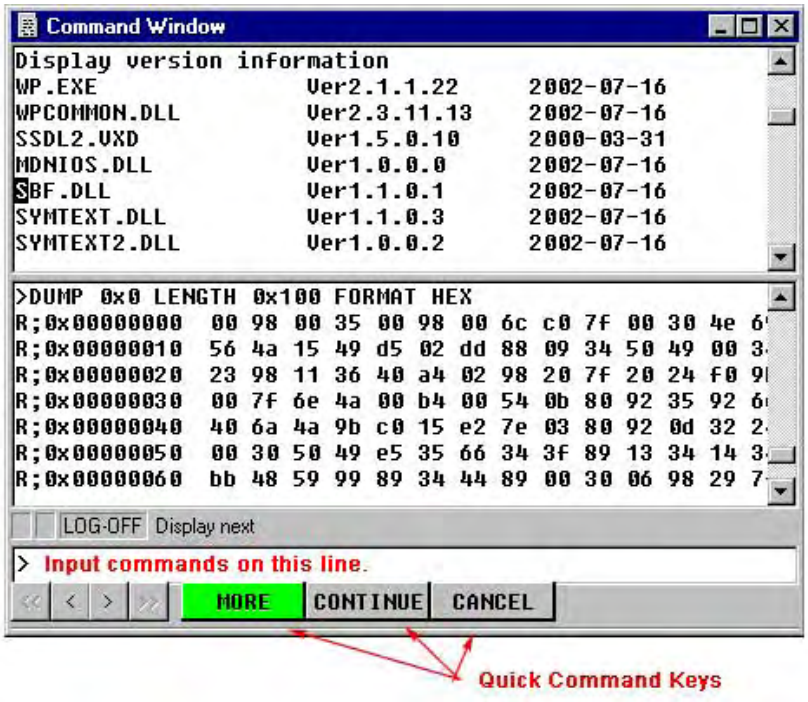
WATCHPOINT command definition text and illustrations are part of the WATCHPOINT Help file. This file is available apart from a WATCHPOINT session. Go to the \WATCHPOINT\WPS_ARM_M/help directory, and double click on ARM.chm. When the file opens, select the Command Line folder.

6 Commands

WATCHPOINT has a command line interface for entering commands directly from the keyboard. Commands are entered in the Command window. Quick command buttons open on the lower edge of the command window as you type a command on the command line. As you type the first few letters of the command new buttons are presented. You can use the Left ← and Right → arrow keys to scroll through the quick command buttons and highlight your desired command. When the command is highlighted, pressing the <**Space**> bar will enter the command text on the command line. You may also use the ↑and ↓ up and down keys to scroll and view command history.

You can also enter the command by using the mouse to click on the > and < buttons under the command line to select desired command button.

Once a quick command is entered additional context sensitive buttons become available for that command's options. Depending on the command, you either select an option as described above, or you are prompted to enter additional information such as address, data value, filename, etc. When all options have been selected or typed in, press <**Enter**> to initiate the command. If any command parameters are omitted when entering a command, the parameter values from the previous command entry are used

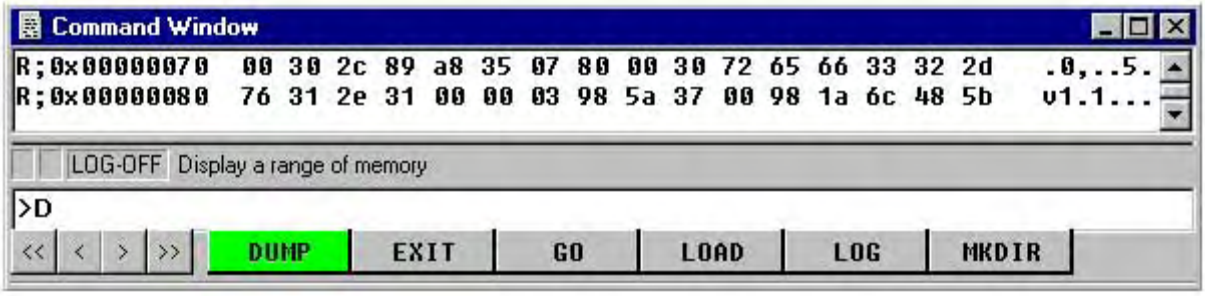


Once an address or data value has been used in a command, it is recalled the next time that you use the command. You can press <**Space**> bar to fill in the previous value when you are prompted for a value, or you can type in a new value. If any command parameters are omitted when entering a command, the parameter values from the previous command entry are used.

The output of some commands executed from the WATCHPOINT main menu may also be sent to the Command window. The Command window can be split into two panes. Each pane can be scrolled to view the command output history.

The Command window output can be logged to a disk file. Press the <**Tab**> key to move the cursor between upper and lower portions of the Command window.

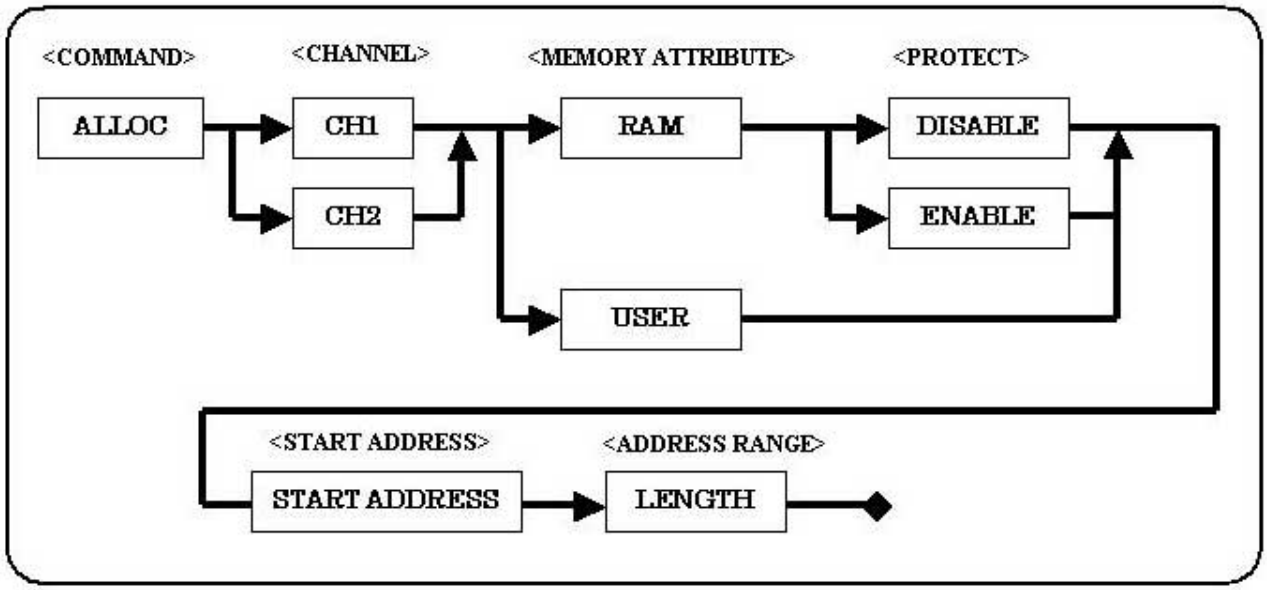
The current active WATCHPOINT command or command option are displayed as buttons along the bottom of the Command window. The command in use is highlighted in **GREEN**.



6.1 ALLOC Allocate In-Circuit Emulator Memory

(Full In-Circuit Emulator memory mapping function. Not a JTAG emulator feature)

Syntax: ALLOC *<Channel><Address range> <Memory attribute> <Write-Protect attribute>*



<Memory Mapping Channel>:

Select memory mapping channel from Memory Map Setup dialog box.

<Memory Attribute>:

USER	Allocate address range to User memory
RAM	Allocate address range to emulation memory

<Write Protect attribute>:

DISABLE	Disable Write Protect
ENABLE	Enable Write Protect

<Start Address> <Address Range>:

<*start address*> **[LENGTH** <*length*> **/TO** <*end address*>**]**

start address	Specify starting address for memory allocate range
length	Specify number of Bytes from the starting address
end address	Specify ending address of memory range

Description:

Allocates emulation memory and assigns attributes. There are 8 Mbytes emulation memory, map-able in two channels.

This command is same as :

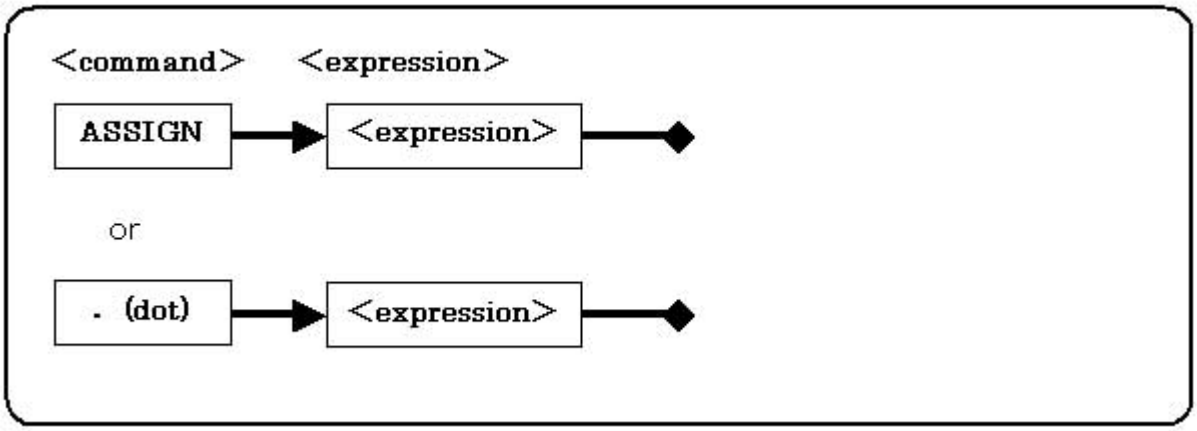
Menu >> Resource >> Memory Map Setup

Related Commands: QUERY

6.2 ASSIGN or (.) Evaluate expression and assign value

Syntax:

Assign *<expression1>* **[=<***expression2***>]**
or
. *<expression1>* **[=<***expression2***>]**



<Expression>:
Specify an expression for evaluation

Description:

If expression2 is included, it assigns the value of expression2 to expression1. Expression1 can be a memory/port address, CPU register, or a work variable. If expression2 is omitted, then expression1 can be any mathematical expression, including symbol names, and the resulting value is displayed. You can type the command "ASSIGN", or use the dot "." notation for viewing and modifying memory/port data, symbol data, I/O data, and register values.

Refer to Address and Data Input Methods for specifying memory/port addresses and CPU register values in expressions. For help using WATCHPOINT system variables, memory/port contents, and CPU registers in expressions, refer to Math Expressions and Batch Processing.

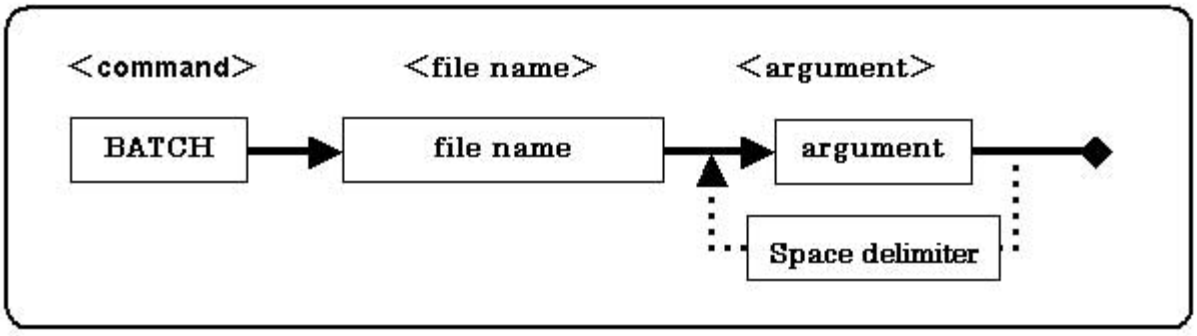
Example:

.[0x4000].B=0x10	Write 0x10 byte data to address 0x4000.
.R0=0x20	Write 0x20 to R0 register

If you use the dot syntax in place of the ***ASSIGN*** *statement. However if the dot syntax is used there will be no command window history.*

6.3 BATCH Execute MACRO batch file

Syntax: BATCH <*file name***> [<***argument***>] [<***argument***>] [<***argument***>]**



<***file name***>:

Specify the name of the batch file.

<***argument***>:

Argument used in the batch file

Specify each argument in the batch file with $1 ~ $9.

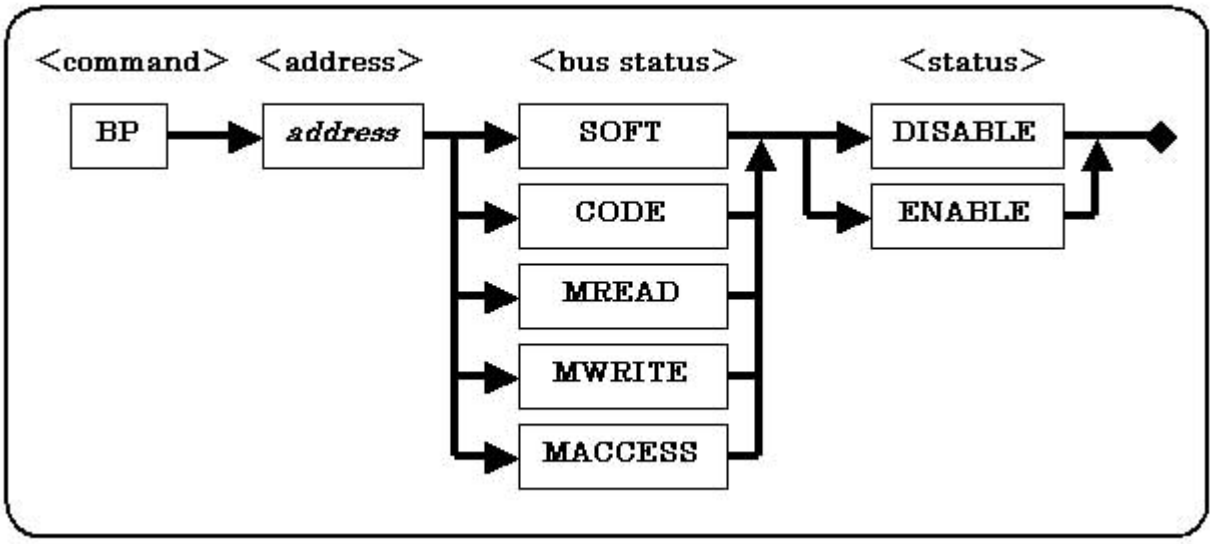
$0 refers to the entire command from the command line.

Description:

Executes commands stored in a batch macro file. You can create a batch file by using the NEWBATCH command that records commands entered on the command line. The batch file is a text file that can be edited with any text editor. Refer to the Batch Processing section.

6.4 BP Add - Enable - Disable breakpoints

Syntax: BP <*address*> <bus status> [ENABLE | DISABLE]



<Address>:
Specify breakpoint address:
R;0x00000000 R;0x000000ff
If address is not specified, press **Enter** key to display BP list.

<Bus status>:

[SOFT I CODE I MREAD I MWRITE I MACCESS]

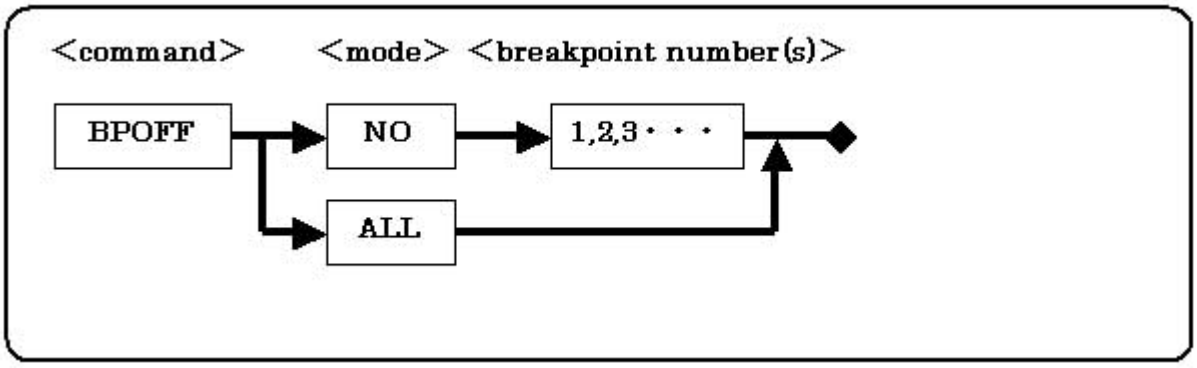
SOFT	Set a Software Breakpoint
CODE	Set a hardware Breakpoint for Code fetch
MREAD	Set a Breakpoint for Memory Read
MWRITE	Set a Breakpoint for Memory Write
MACCESS	Set a Breakpoint for Memory Access

<Status>:
Specify disable/enable Breakpoint

ENABLE	Enable Breakpoint
DISABLE	Disable Breakpoint

Description:
Add or Enable/Disable Breakpoints.
After the command is executed, WATCHPOINT will display the current breakpoint status.
This command is the same as [Breakpoints] in the [Go] menu

6.5 BPOFF Delete Breakpoint(s)



<Mode>:

NO <breakpoint number(s)>:	Specify the breakpoint number(s) that you want to delete. Ex: 2,4,5-7.(see QUERY BP command)
ALL	Delete all breakpoints

Description:

Specify breakpoint number(s) to delete or delete all breakpoints. A list of current breakpoints can be displayed with the QUERY BP command.

After the command is executed, it will display the current breakpoint status.

This command is the same as [Breakpoints] in the [Go] menu.

6.6 BREAK Forced Break

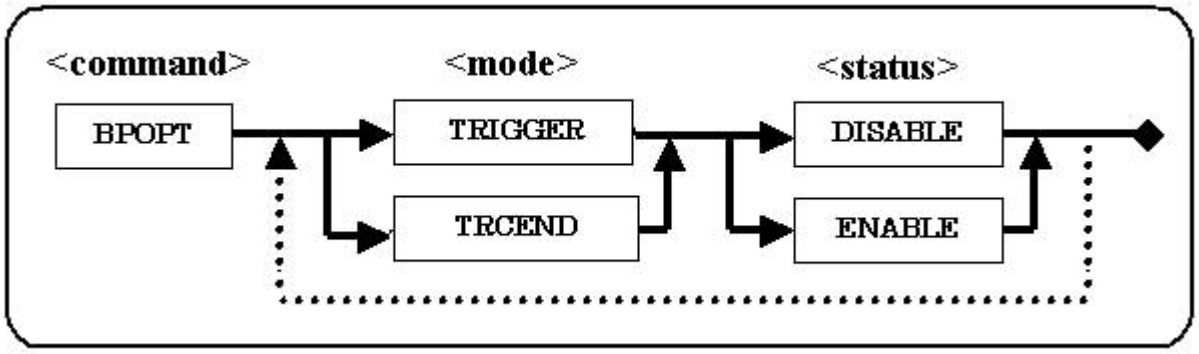
Description: Forces break during real time CPU execution

This command is same as :

Menu >> Go >> Break

6.7 BPOPT Breakpoint Options

Syntax: BPOPT TRIGGER <*Trigger Break*> **TRCEND** <*Trace End Break*>



<Mode>:

TRIGGER (Trigger Break)	Break on Trace Trigger. Specify Trace trigger condition in the Trigger Setup to enable break when trigger condition is met
TRCEND (Trace End Break)	Break on Trace End. Specify Trace trigger condition in the Trigger Setup to enable break on Trace-End (after delay cycles are captured).

<Status>:

DISABLE	CPU will not break on condition
ENABLE	CPU will break execution on condition

Description:

Enable/disable optional break conditions.

This command is same as :

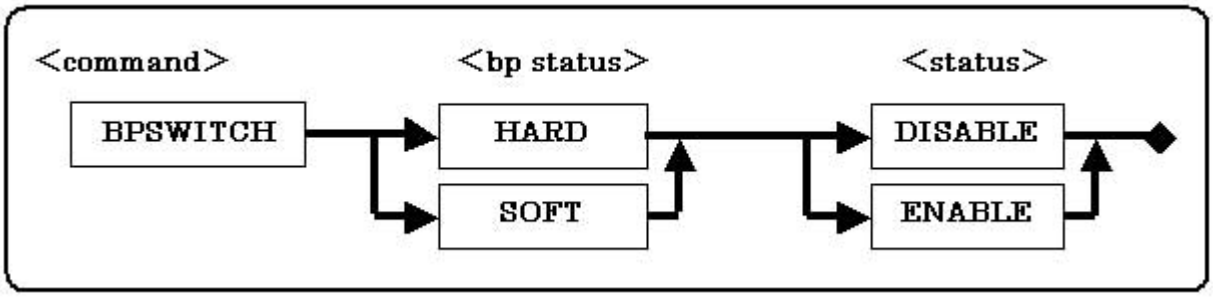
Resource >> ICE Environment..... >> Break....

and :

Resource >> Trace >> Setup >> Trace Break Option

6.8 BPSWITCH Change breakpoint type - Enable/disable Breakpoints

Syntax: BPSWITCH <*bp status*> [*ENABLE* | *DISABLE*]



<Breakpoint status>:

Select Breakpoint Type

HARD	Select all Hardware Breakpoints
SOFT	Select all Software Breakpoints

<Status>:

Specify disable/enable Breakpoint

DISABLE	Disable Breakpoint
ENABLE	Enable Breakpoint

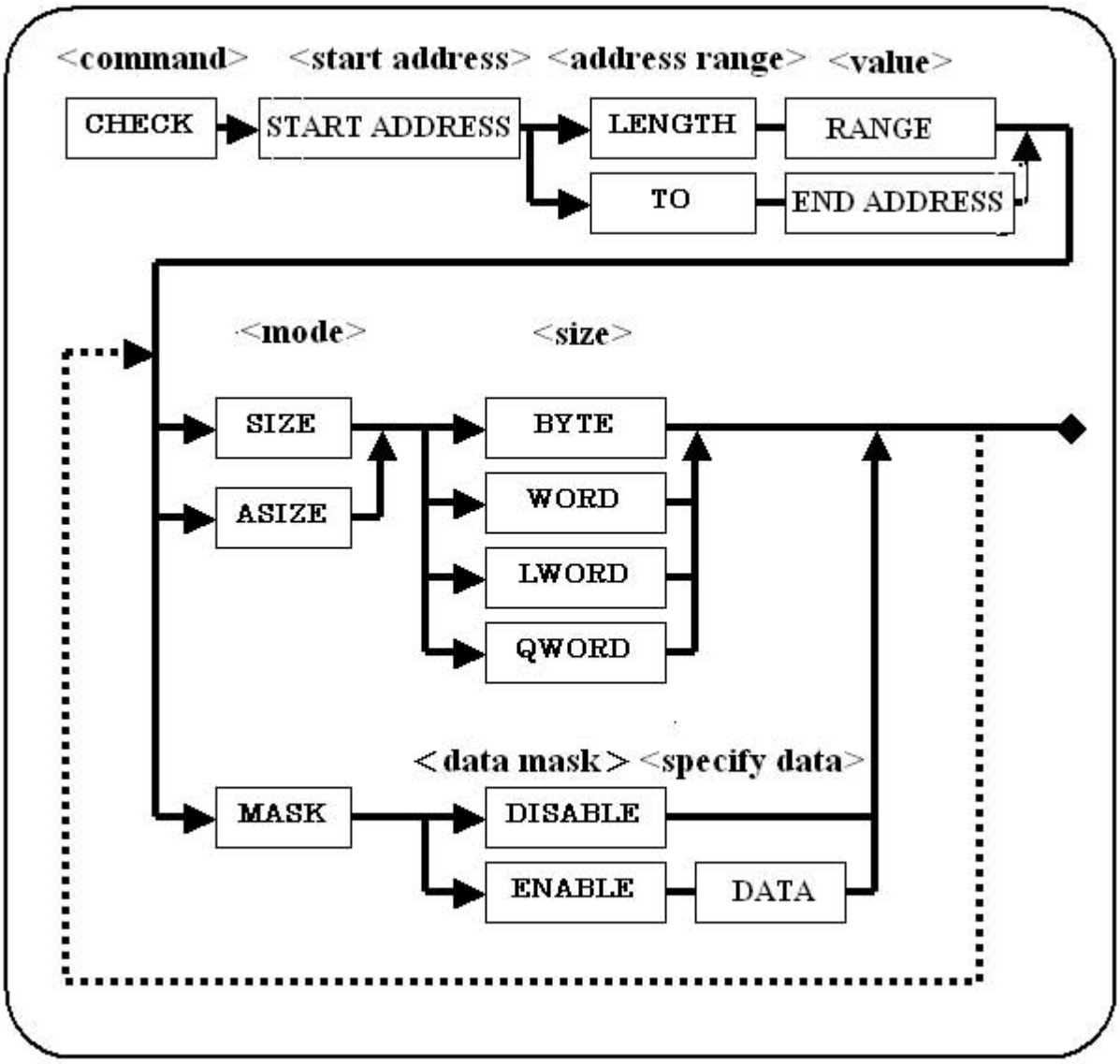
Description:

Change breakpoint type Enable/Disable Breakpoints.

This command is the same as [Breakpoints…] in the [Enable/Disable All S/W BP],[Enable/Disable All H/W BP] menu.

6.9 CHECK Check a memory range

Syntax: CHECK *<address range>*, SIZE *<data size>*, MASK [ENABLE/DISABLE], ASIZE *<access size>*



<address range>:

<start address> ***[LENGTH*** *<length>* ***\| TO*** *<end address>**]***

<start address>	*Specify starting address for memory allocate range*
<length>	*Specify number of Bytes from the starting address*
<end address>	*Specify ending address of memory range*

<SIZE>: *Specify data size for memory check*

BYTE	*Memory check in byte size*
WORD	*Memory check in word size*
LWORD	Memory check in long-word size
QWORD	*Memory check in quad-word size*

<data mask>: *Specify data mask for memory check*

DISABLE	*Do not specify Mask data*
ENABLE	*Specify Mask data*

<ASIZE>: *Specify data access size for memory check*

BYTE	*Memory check in byte size access*
WORD	*Memory check in word size access*
LWORD	Memory check in long-word size *access*
QWORD	*Memory check in quad-word size access*

Description:

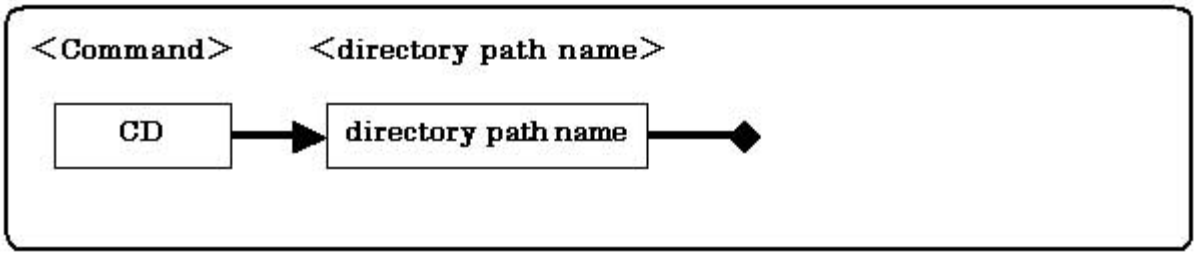
Checks a memory range. If errors are found, the address, write value and read value are listed in a table.

This command is the same as :

Resource >> Memory Port >> Check.

6.10 CD Change Directory

Syntax: CD <directory path name>



<directory path name>:	Names the directory path to make current

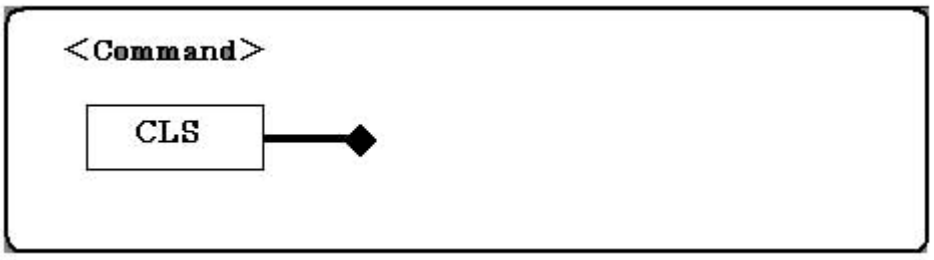
Description:
Change the directory path.

6.11 CLOSE Close Project file

Syntax: CLOSE

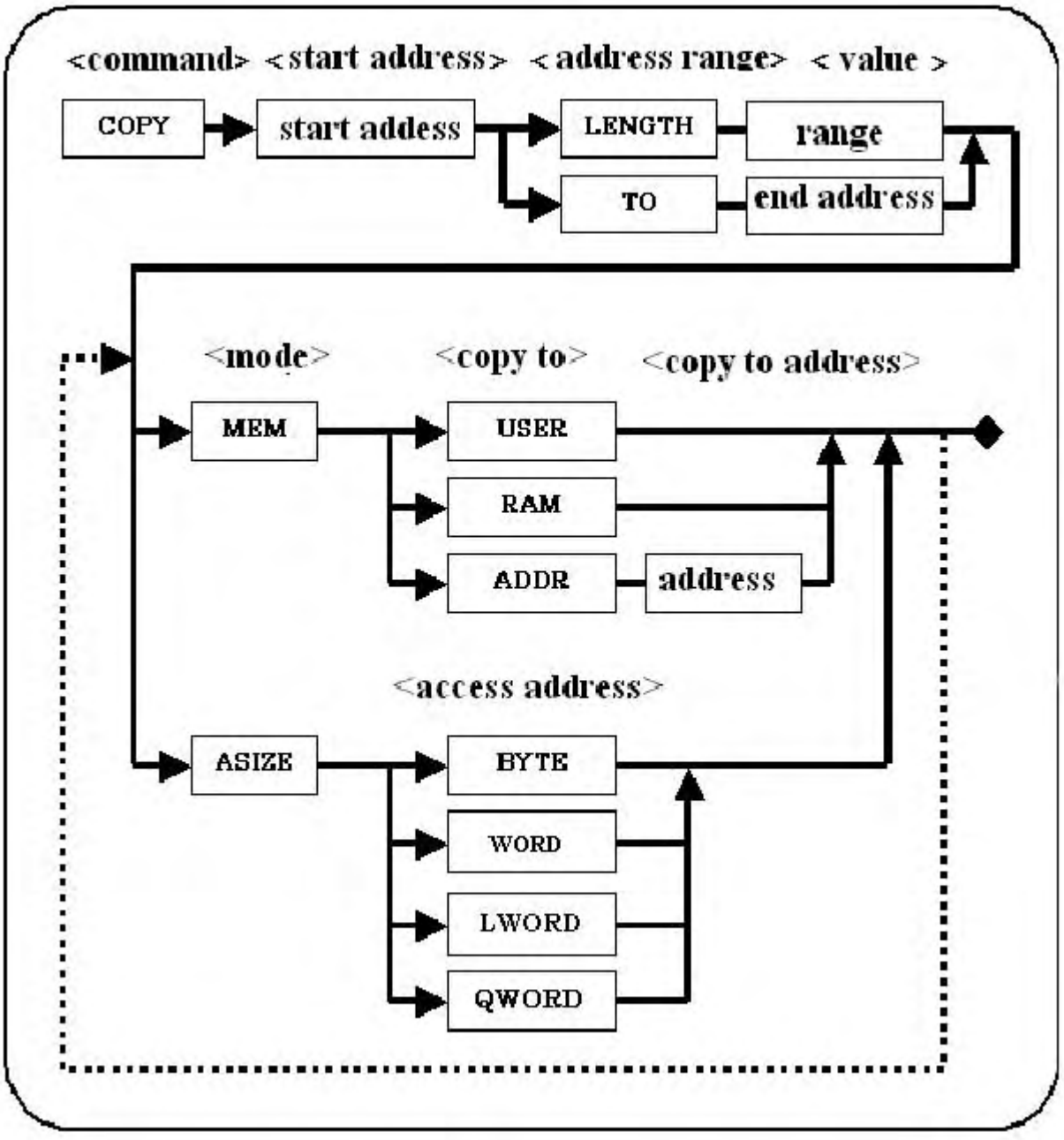
Description:
Closes the currently opened Project file and all windows in **WATCHPOINT**.

6.12 CLS Clear Command Window



Description:
Clear the currently opened Command window in **WATCHPOINT**.

6.13 COPY Copy a memory range



<address range>: *<start address>* ***[LENGTH*** *<length>* ***| TO*** *<end address>**]***

<start address>	*Specify start address for memory allocate range*
<length>	*Specify number of Bytes from the starting address*
<end address>	*Specify end address of memory range*

<MEM>: *Specify memory area to copy to*

USR	*Copy from emulation memory to user memory*
RAM	*Copy from user memory to emulation memory*
ADDR*<address>*	*Specify another address to copy to, within same memory type*

<ASIZE>: *Specify data access size for memory copy*

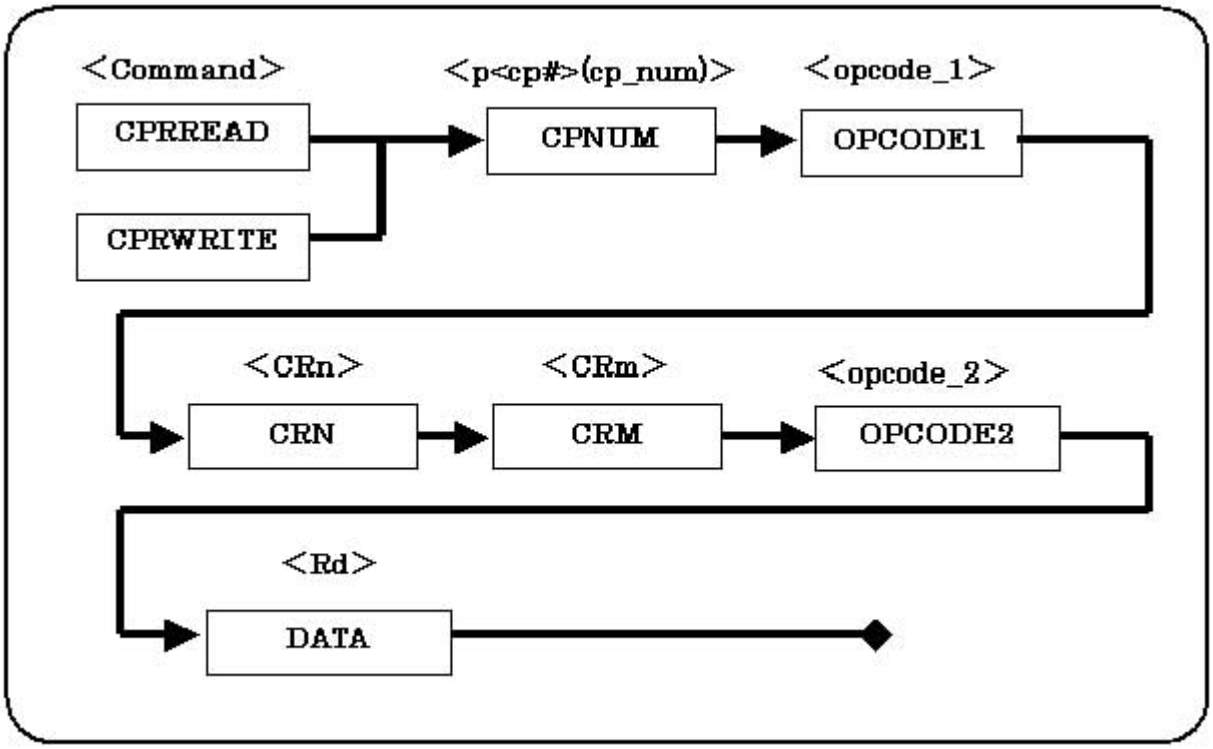
BYTE	*Byte size memory copy*
WORD	*Word size memory copy*
LWORD	Long Word Memory *copy*
QWORD	*Quad-word memory copy*

Description: *Copy from one memory area to another memory area. The destination range, User or Emulation memory, must be allocated in the memory map.*

This command is the same as :

Resource >> Memory Port >> Copy

6.14 CPRREAD/CPRWRITE



<CPNUM>:

CPRREAD	In CPRREAD, specify the p<cp#> (cp_num)of MRC{<cond>}, p<cp#>, <opcode_1>, Rd, CRn, CRm and <opcode_2> with 0 ~ 15.
CPRWRITE	In CPRWRITE, specify the p<cp#> (cp_num)of MCR{<cond>}, p<cp#>, <opcode_1>, Rd, CRn, CRm and <opcode_2> with 0 ~ 15.

<OPCODE1>:

CPRREAD	In CPRREAD, specify the <opcode_1> of MRC{<cond>}, p<cp#>, <opcode_1>, Rd, CRn, CRm and <opcode_2> with 0 ~ 15.
CPRWRITE	In CPRWRITE, specify the p<opcode_1> of MCR{<cond>}, p<cp#>, <opcode_1>, Rd, CRn, CRm and <opcode_2> with 0 ~ 15.

<CRN>:

CPRREAD	In CPRREAD, specify the <CRn> of MRC{<cond>}, p<cp#>, <opcode_1>, Rd, CRn, CRm and <opcode_2> with 0 ~ 7.
CPRWRITE	In CPRWRITE, specify the <CRn> of MCR{<cond>}, p<cp#>, <opcode_1>, Rd, CRn, CRm and <opcode_2> with 0 ~ 7.

<CRM>:

CPRREAD	In CPRREAD, specify the <CRm> of MRC{<cond>}, p<cp#>, <opcode_1>, Rd, CRn, CRm and <opcode_2> with 0 ~ 7.
CPRWRITE	In CPRWRITE, specify the <CRm> of MCR{<cond>}, p<cp#>, <opcode_1>, Rd, CRn, CRm and <opcode_2> with 0 ~ 7.

<OPCODE2>:

CPRREAD	In CPRREAD, specify the <opcode_2> of MRC{<cond>}, p<cp#>, <opcode_1>, Rd, CRn, CRm and <opcode_2> with 0 ~ 15.
CPRWRITE	In CPRWRITE, specify the p<opcode_2> of MCR{<cond>}, p<cp#>, <opcode_1>, Rd, CRn, CRm and <opcode_2> with 0 ~ 15.

<DATA>:

CPRREAD	In CPRREAD, display the Rd value of MRC{<cond>}, p<cp#>, <opcode_1>, Rd, CRn, CRm and <opcode_2>.
CPRWRITE	In CPRWRITE, specify 4 byte Rd value for MCR{<cond>}, p<cp#>, <opcode_1>, Rd, CRn, CRm and <opcode_2>.

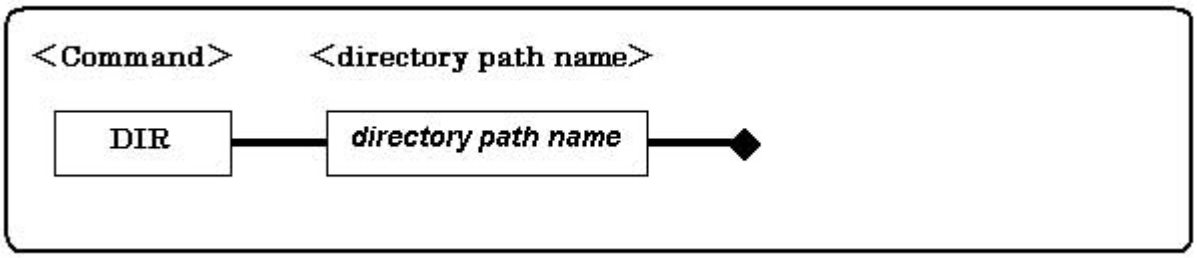
Description:

These commands configure the CPR. Display the Rd values for MRC{<cond>}, p<cp#>, <opcode_1>, Rd, CRn, CRm and <opcode_2>

Set the Rd values for MCR{<cond>}, p<cp#>, <opcode_1>, Rd, CRn, CRm and <opcode_2>.

6.15 DIR List directory contents

Syntax: DIR <directory path name>

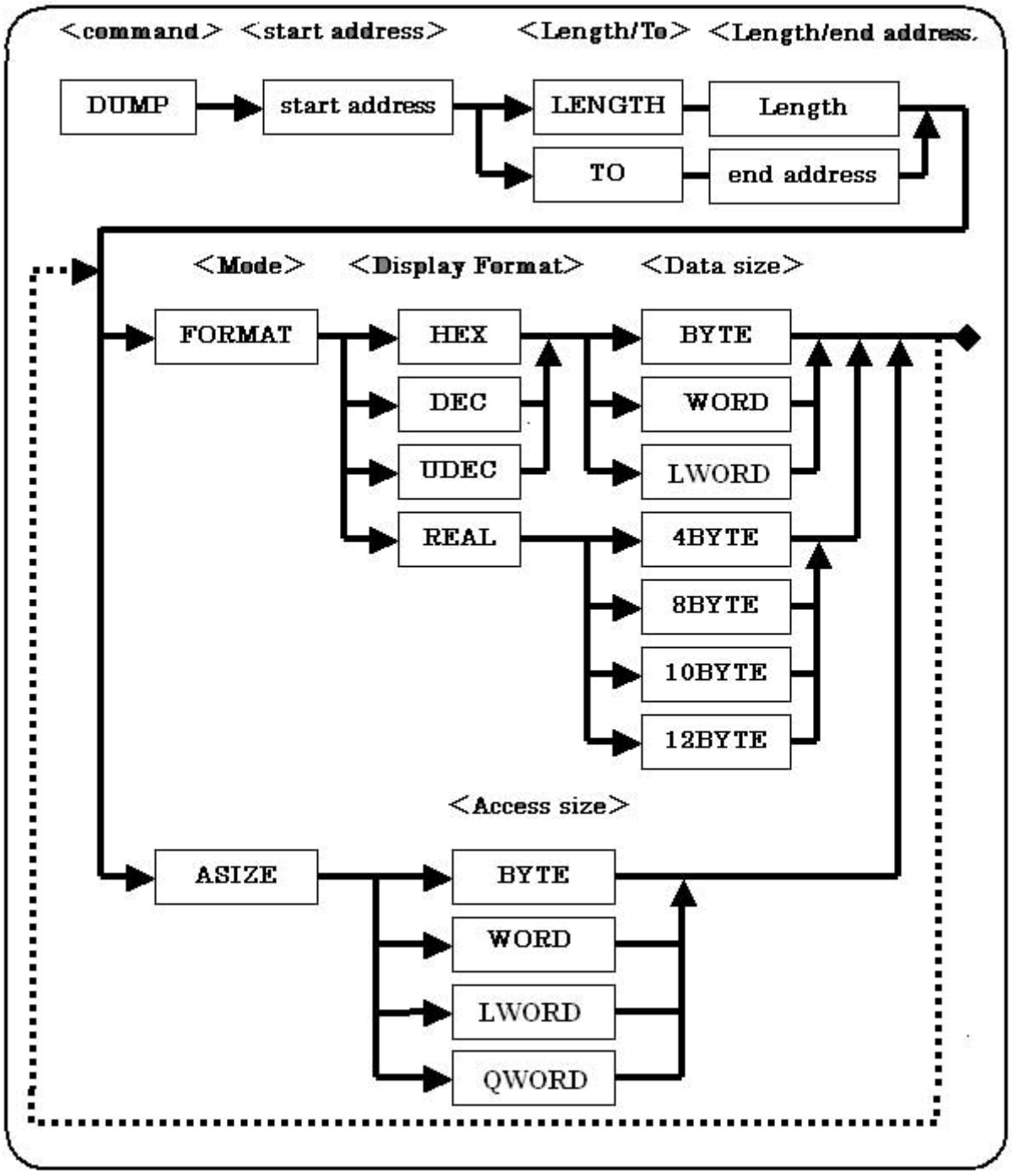


<*directory path name*>:	The name of the directory to display

Description:

Lists the contents of the specified directory. If no directory name is specified, **WATCHPOINT** lists the contents of the current working directory.

6.16 DUMP Display memory range data content



<Display Format><Data size>:

Select display format and data size as follows

BYTE	Specify Byte
WORD	Specify Word
LWORD	Specify Long-word
4BYTE	Specify 4 Byte real number
8BYTE	Specify 8 Byte real number
10BYTE	Specify 10 Byte real number
12BYTE	Specify 12 Byte real number

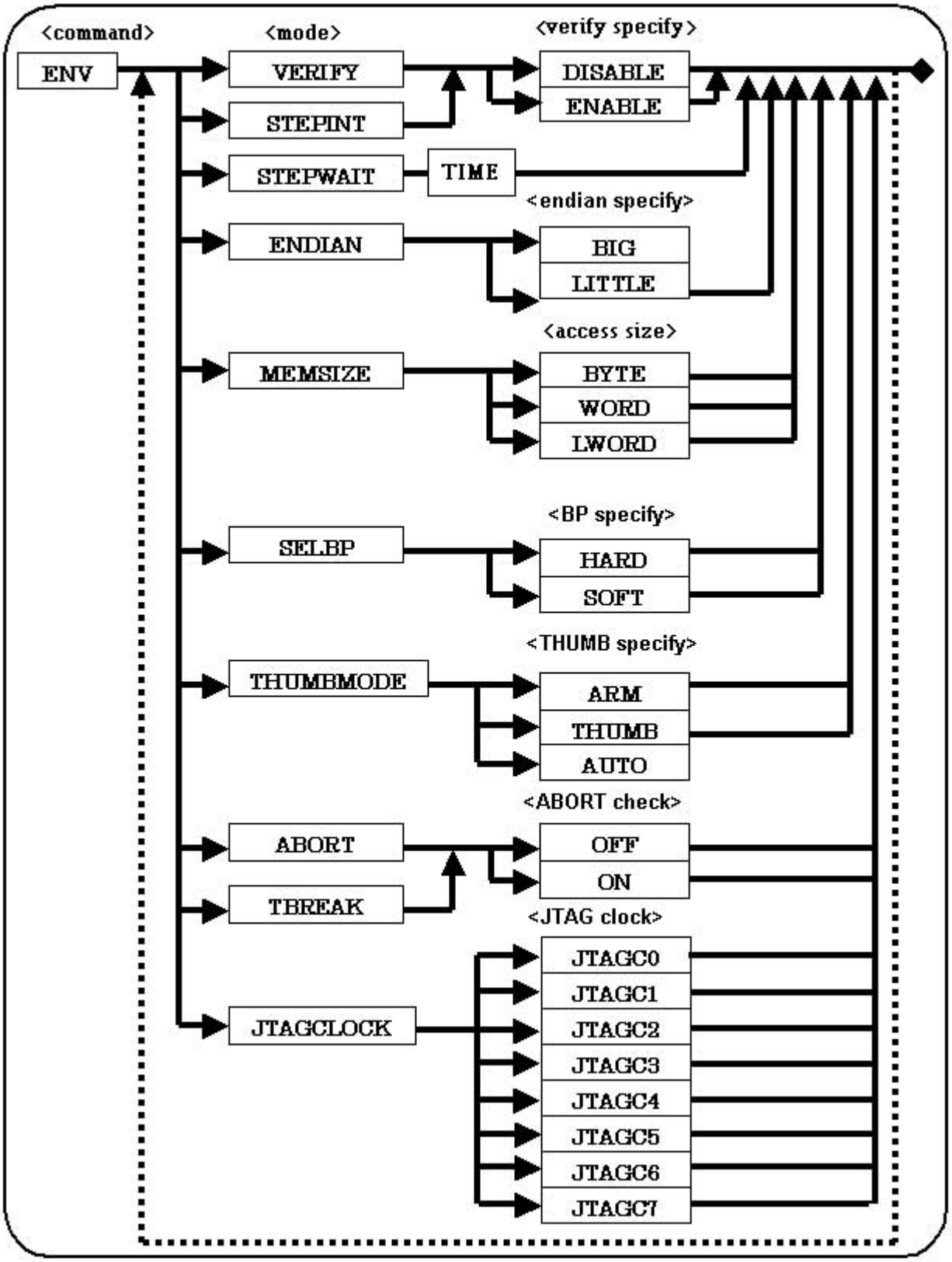
<Access size>: Specify data access size for memory dump

BYTE	Memory dump in bytes
WORD	Memory dump in word size
LWORD	Memory dump in long-word size
QWORD	Memory dump in quad word size

Description: Display data in a specified memory range with a specific format.

This command is same as:
Memory dump window >> View memory

6.17 ENV Emulator environment options



<VERIFY>: Enable/disable verification of emulator memory writes:

ENABLE	Verify emulator memory writes by reading back data
DISABLE	Do not read back data to verify emulator memory writes

<STEPIN>: Enable/disable interrupt during single stepping

ENABLE	Enable interrupt during single Stepping
DISABLE	Disable interrupt during single Stepping

<STEPWAIT>: Enter WAIT duration for single Step. Enter the value x 10ms for duration.

<ENDIAN>: Specify endian.

BIG	Specify big endian
LITTLE	Specify little endian

<Memory access size>: Specify the default access size for ICE system memory access

BYTE	Byte size memory access
WORD	Word size memory access
LWORD	Long word memory access

<BP type>: Specify Breakpoint type

HARD	Select hardware breakpoints
SOFT	Select software breakpoints

<THUMB mode>: Specify the trace history analysis mode in the **Disassembly** window.

ARM	ARM mode
THUMB	THUMB mode
AUTO	Select ARM or THUMB mode automatically according to the CPSR register.

<ABORT check>: Enable/disable ABORT check function.

OFF	Disable ABORT check during memory access
ON	Enable ABORT check during memory access

<THUMB mode break>: Enable/disable THUMB mode to break

OFF	Disable break at 4n + 2 address during THUMB mode
ON	Enable break at 4n + 2 address during THUMB mode

<JTAGCLOCK>: Specify the JTAG clock frequency for emulation CPU

JTAGC0	1.375MHz
JTAGC1	2.5MHz
JTAGC2	3.75MHz
JTAGC3	5MHz
JTAGC4	7.5MHz
JTAGC5	10MHz
JTAGC6	15MHz
JTAGC7	20MHz

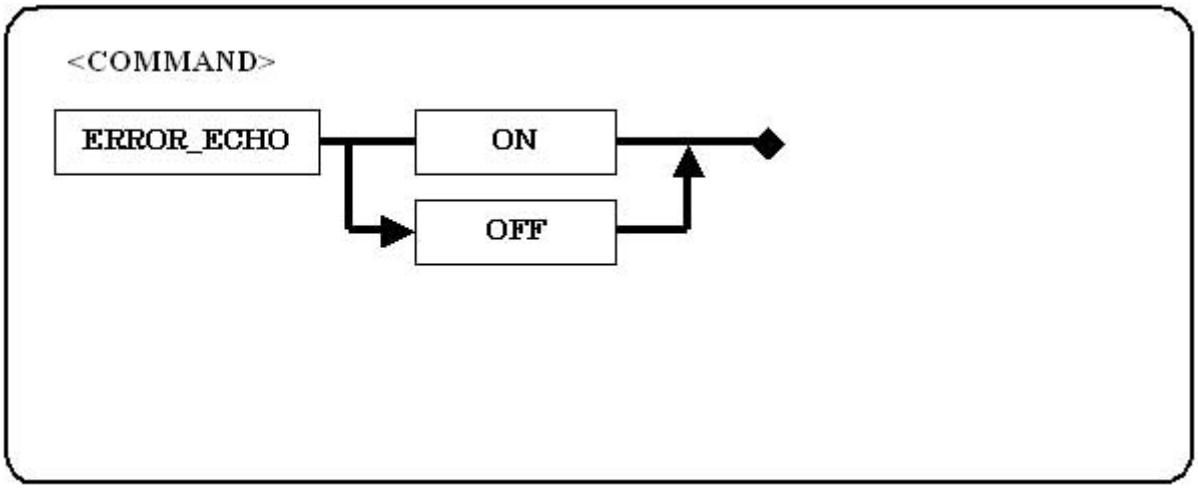
Description: These commands configure the ICE environment.

This command is same as:

Resource >> ICE Environment

6.18 ERROR ECHO Error message display settings

Syntax: ERROR ECHO [ON/OFF]



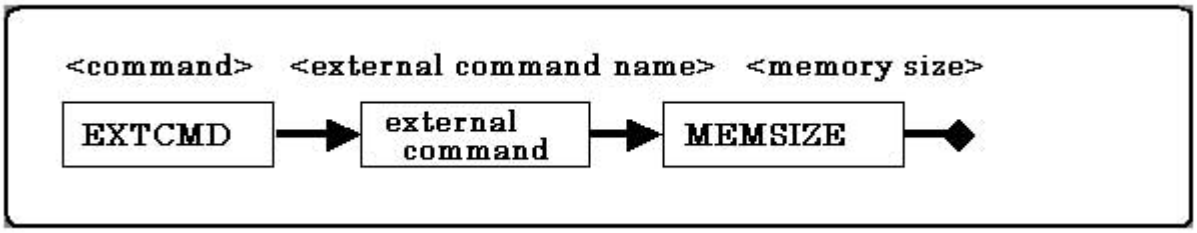
<ERROR ECHO>:

ON	Display error message in [Command window].
OFF	Display error message in [Message box].

Description:

Specify the error message display method.

6.19 EXTCMD Execute WATCHPOINT commands from an external application



EXTCMD>:
Enable/disable display of command window:

ON	Display command window
OFF	Do not display command window

<MEMSIZE> (Memory size):
Specify common memory storage size for result data from an external command. Default memory size is 0x4100.

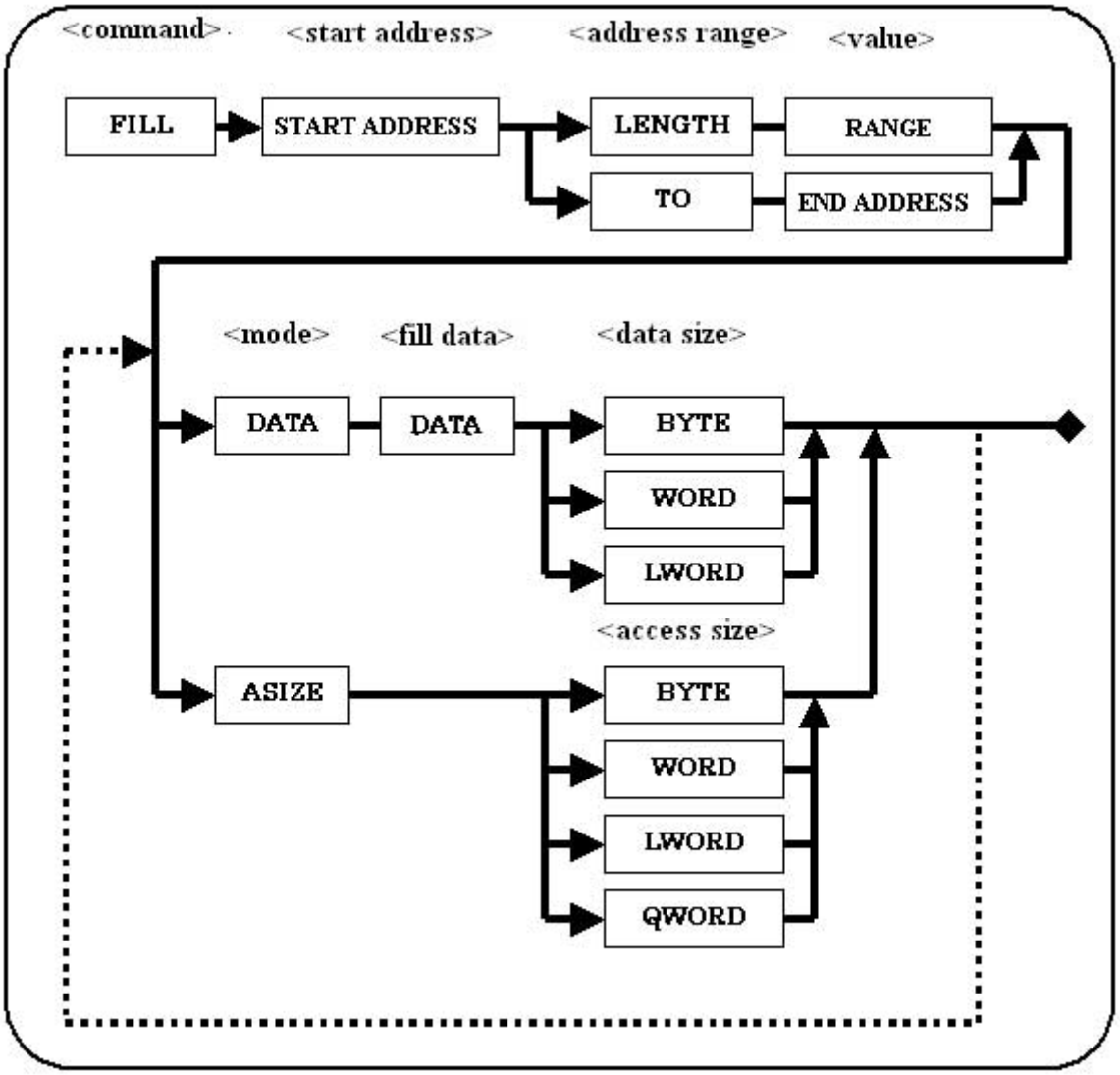
Description

Executes WATCHPOINT commands from external application. During the command execution period, operation from WATCHPOINT is unavailable. EXTCMD works with the optional WPWXPCommand.dll..

6.20 FILL Fill a memory range

Syntax: FILL [address range]

DATA <*fill data*> **[BYTE/WORD/LWORD ASIZE** <*access size* **[BYTE/WORD/LWORD]**



<address range>:

start address	Specify starting address for memory fill range
length	Specify number of Bytes from the starting address
end address	Specify ending address of memory range

<fill data>:
Specify data value for memory fill

BYTE	Memory fill byte data operand
WORD	Memory fill word data operand
LWORD	Memory fill long-word data operand

<access size>:Specify data access size for memory fill

BYTE	Memory fill byte data access
WORD	Memory fill word data access
LWORD	Memory fill long-word data access

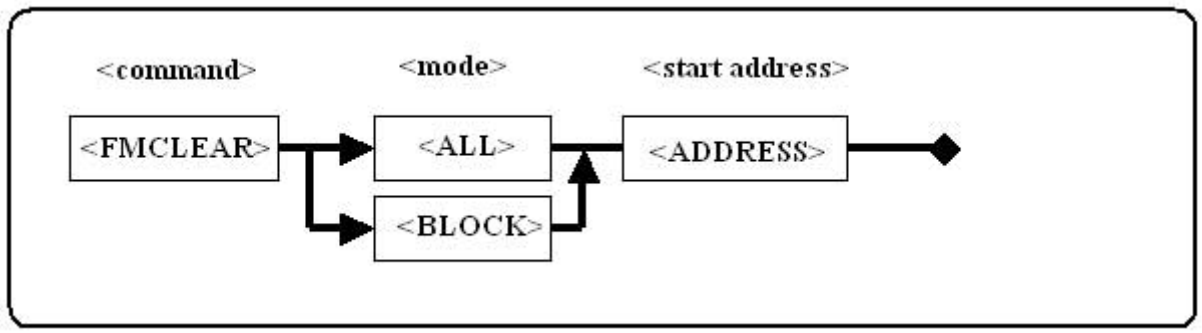
Description: Specify the memory fill address range and data

This command is same as:

Resource >> Memory/Port >> Fill

6.21 FMCLEAR Clear Flash Memory

Syntax: FMCLEAR [ALL/BLOCK] <*address*>



<mode>: Specify clear range.

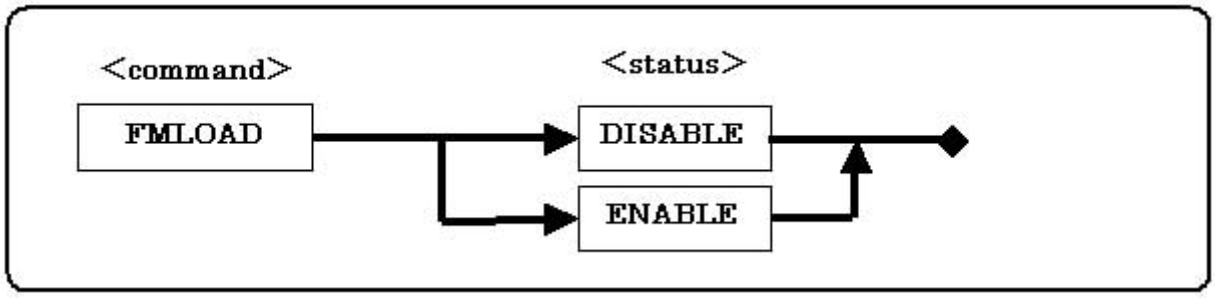
ALL	Clear all device sectors including address.
BLOCK	Clear block including address.

<start address>: Specifies start clear address.

Description: Clears the Flash Memory contents.

6.22 FMLOAD Change enable/disable flash memory download

Syntax: FMLOAD [ENABLE | DISABLE]



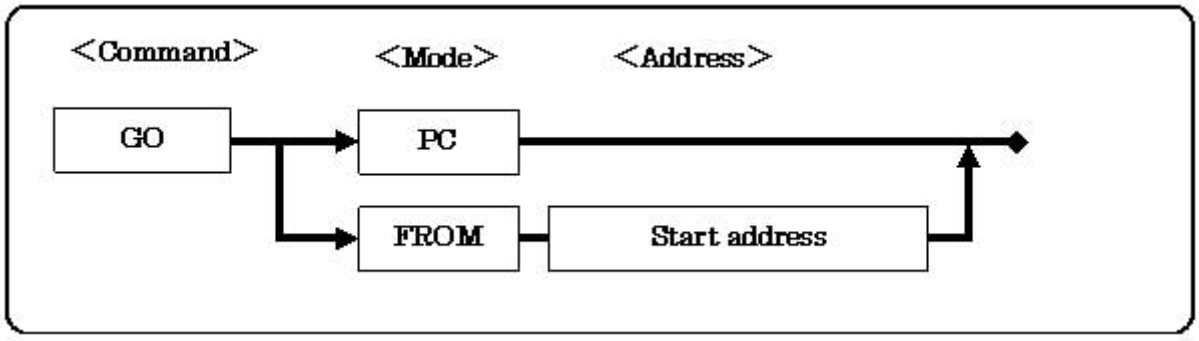
<*Status*>: Specify disable/enable Flash memory Download

DISABLE	Disable *Flash memory Download*
ENABLE	Enable *Flash memory Download*

Description: Change Enable/Disable Flash memory Download.
This command is the same as [Disable flash memory, & Not download to flash memory.] in the [Resource] -> [Flash Memory] -> [Setup…] menu.

6.23 GO Start real-time program execution

Syntax: GO [*PC/FROM* < *address* >]

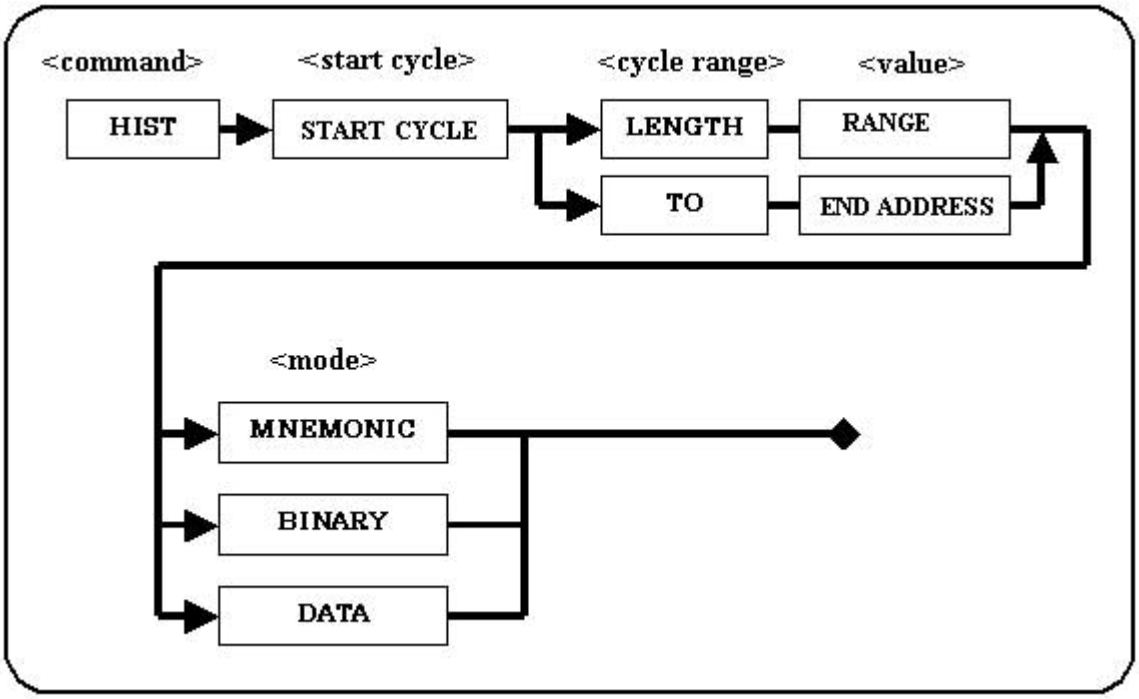


PC	Starts real time execution from the current program counter
FROM <address>	Starts real time execution from the specified address

Description: Starts real time execution from the PC or from a specific address.
Note: Not all emulator functions are available while the GO command is active.

6.24 HIST Display Trace History

Syntax: HIST <*start cycle*> **[LENGTH** <*length*> **/TO** <*end cycle*>
FORMAT [MNEMON/BINARY] SIGNAL [ENABLE/DISABLE]



<cycle range>:

start cycle	Specify the starting Trace cycle number to display
length	Specify number of Trace cycles to display
end cycle	Specify the last Trace cycle number to display

<format>: Specify data format in the Trace memory dump

MNEMONIC	Display command fetch cycles in disassemble code
BINARY	Display all bus cycles in binary
DATA	Display all bus cycles in dump form

Description:

Display real-time trace history data. You can use the logging command to store the HIST command results to a file for printing or for future reference.

This command is same as:

View >> Binary History window or View >> Mnemonic History window

Inf1, Inf2, Inf3:
Depending on a data format specified in the Trace memory dump, the CPU pin status can be displayed in the Inf1, Inf2 and Inf3 tables as follows:

[Inf1]

BIT0	CS0#	BIT14	WE6#/CAS6#/DQM6
BIT1	CS1#	BIT15	WE7#/CAS7#/DQM7/REG#
BIT2	CS2#	BIT16	RD/WR#
BIT3	CS3#	BIT17	BS#
BIT4	CS4#	BIT18	RD#/CASS#/FRAME#
BIT5	CS5#	BIT19	RAS#
BIT6	CS6#	BIT20	RDY#
BIT7	Not used	BIT21	CKE
BIT8	WE0#/CAS0#/DQM0	BIT22	DACK0
BIT9	WE1#/CAS1#/DQM1	BIT23	DACK1
BIT10	WE2#/CAS2#/DQM2/ICI0RD#	BIT24	Not used
BIT11	WE3#/CAS3#/DQM3/ICI0WR#	:	Not used
BIT12	WE4#/CAS4#/DQM4	BIT31	Not used
BIT13	WE5#/CAS5#/DQM5		

[Inf1] [Inf2]:

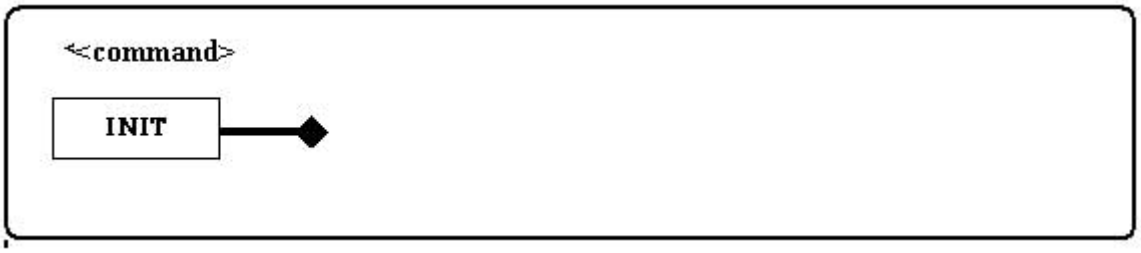
BIT0	Not used	BIT19	IRL2
:	Not used	BIT20	IRL3
BIT7	Not used	BIT21	RESET#
BIT8	P0DEXI0	BIT22	BREW#/BSACK#
BIT9	P0DEXI1	BIT23	BACK#/BSREQ#
BIT10	P0DEXI2	BIT24	DREQ0#
BIT11	P0DEXI3	BIT25	DREQ1#
BIT12	Not used	BIT26	DRAK0
BIT13	Not used	BIT27	STATUS0
BIT14	Not used	BIT28	STATUS1
BIT15	Not used	BIT29	Not used
BIT16	NMI	BIT30	SCK2/MRESET#
BIT17	IRL0	BIT31	TRST#
BIT18	IRL1		

[Inf3]

BIT0	RX0#	BIT14	Not used
BIT1	CTS2#	BIT15	Not used
BIT2	Not used	BIT16	Not used
BIT3	MD0/SCK#	BIT17	WPERR#
BIT4	MD2/RXD#	BIT18	Not used
BIT5	MD1/TXD#	BIT19	Not used
BIT6	MD3/CE2A#	BIT20	Not used
BIT7	MD4/CE2B#	BIT21	EXI1CMP
BIT8	MD5/RAS2#	BIT22	EXI2
BIT9	MD6/I0IS16#	BIT23	Not used
BIT10	MD7/TXD	BIT24	Not used
BIT11	MD8/RTS2	:	Not used

6.25 INIT Initialize the emulator environment

Syntax: INIT

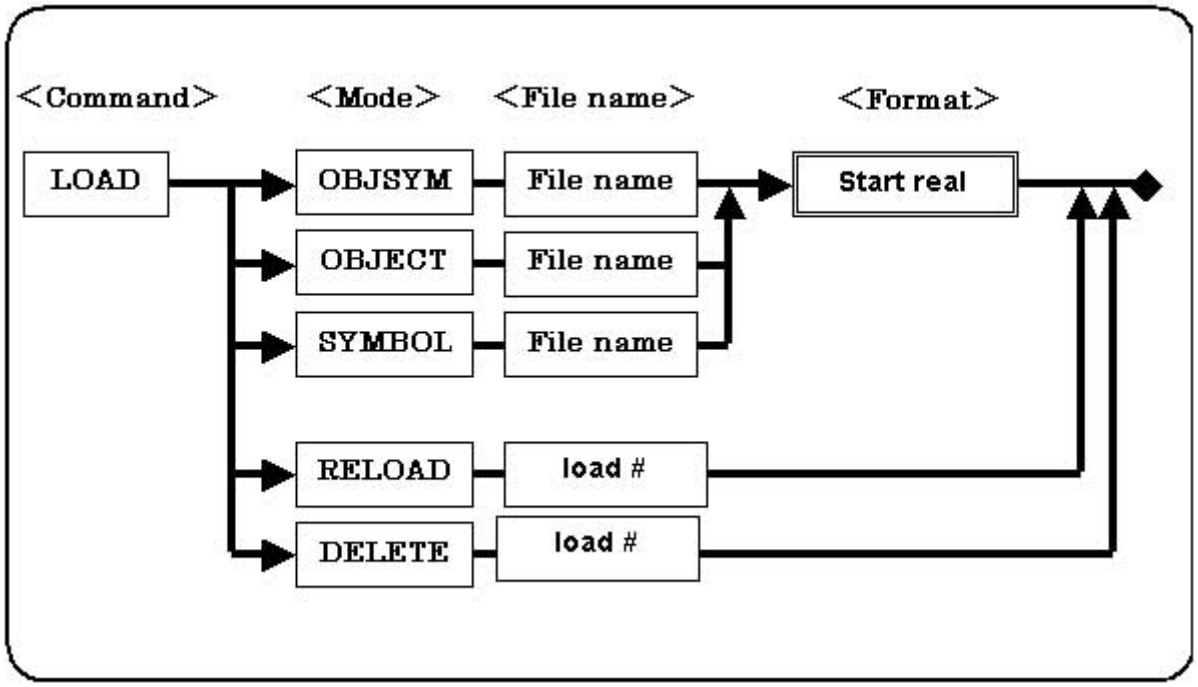


Description: Initialize the emulator hardware.

This command initializes the emulator environment, breakpoint setup, and emulation memory map.

6.26 LOAD Load object and symbol files for debugging

Syntax: **LOAD [OBJSYM** <*file name*>**[ENABLE | DISABLE]** <*source file path*>**|**
OBJECT <*file name*>**<format>[ENABLE | DISABLE]** <*source file path*>**|**
SYMBOL <*file name*>**<format>[ENABLE | DISABLE]** <*source file path*>**|**
SYMBOL RELOAD < load #> | DELETE <*load #*>**]**



<LOAD>:

OBJSYM	Specify object symbol file for downloading. <Supported format> [AUTO|SYSROF|COFF|ELF|IEEE695|SAUF|CODEVIEW]
OBJECT	Specify object file for downloading. <Supported format> [AUTO|SYSROF|COFF|ELF|IEEE695|SAUF|CODEVIEW|IHEX|MHEX|SHF|BINARY]
SYMBOL	Specify SYMBOL file for downloading.> <Supported format> [AUTO|SYSROF|COFF|ELF|IEEE695|SYMTEXT|SYMTEXT2]
RELOAD	Specify the load number of the file to be reloaded.
DELETE	Specify the load number of the file to be deleted.

<Format>:

AUTO	Automatically recognize file format
ELF	Specify ELF format (for Green Hills toolset)
IHEX	Specify Intel Hex format
MHEX	Specify Motorola Hex format
SHF	Specify original high speed download format
BINARY <Start address>	Download Binary data from the specific address
SYMTEXT	Specify Text Symbol file format 1
SYMTEXT2	Specify Text Symbol file format 2

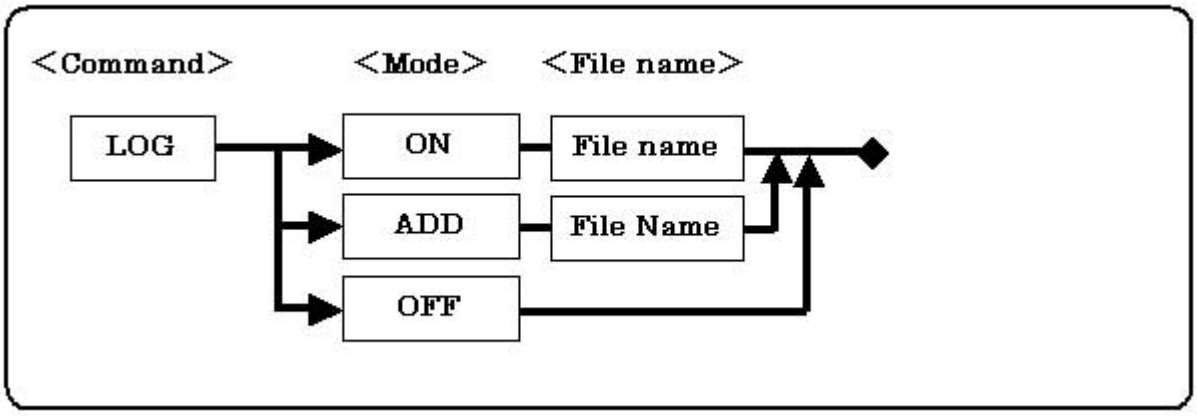
<<Source file path>:

ENABLE	Enable alternate search path for source file
DISABLE	Do not use alternate path for source files

Description: Downloads object and symbol files or deletes them. WATCHPOINT can Auto-detect most common file formats, so AUTO is the normal setting. A key exception is that AUTO will not detect BINARY file types, and the user must specify them.

6.27 LOG Start/stop logging Command Window output

Syntax: LOG [ON <*file name*>| ADD <*file name*>| OFF]



<Mode>:

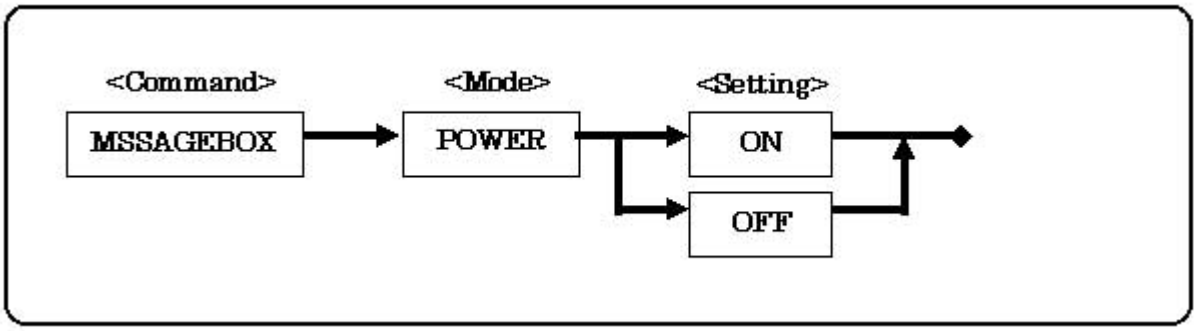
Specify the Record Mode	**ON**	Start a new log file over-write an existing log file.
	ADD	Add commands to an existing log file.
	OFF	Stop recording commands to a log file.

***<file name>*:**Specify log filename to store command output

Description:

Saves the output from the Command window to a file. This command can be used to store reverse-assembled program from target memory, trace history, memory dump, etc.

6.28 MESSAGEBOX Enable target power On/Off a user message box



<MESSAGEBOX>:

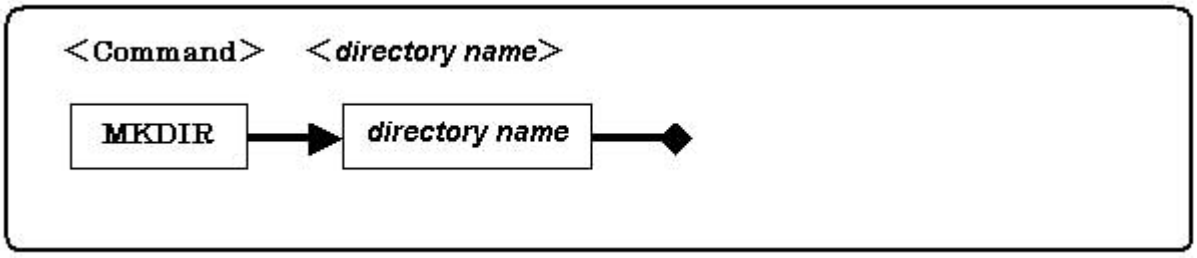
<mode>: *Target power On/Off message*

<setting>:

ON	Display the message in [Command window].
OFF	Display the message in [Message box].

Description: *Specify the target power On/Off message display.*

6.29 MKDIR Create a Directory

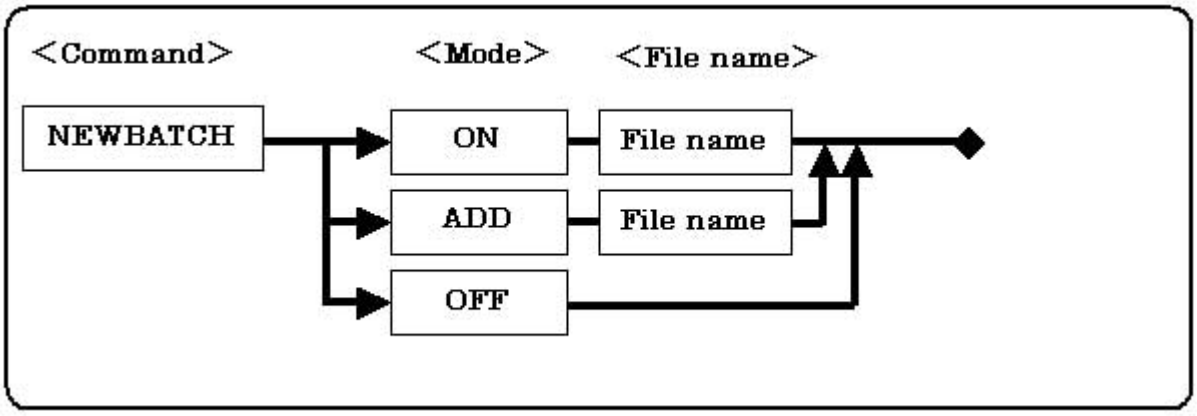


<*Directory name*>:	The name of the directory to create

Description:
Creates a new directory. You can also use the CD command to change working directories to a new directory.

6.30 NEWBATCH Start/stop recording user commands to a macro batch file

Syntax: NEWBATCH [ON <*file name*>| ADD <*file name*>| OFF]



<Mode>:

Specify the Record Mode	**ON**	Start a new batch file over-write an existing batch file.
	ADD	Add commands to an existing batch file.
	OFF	Stop recording commands to a batch file.

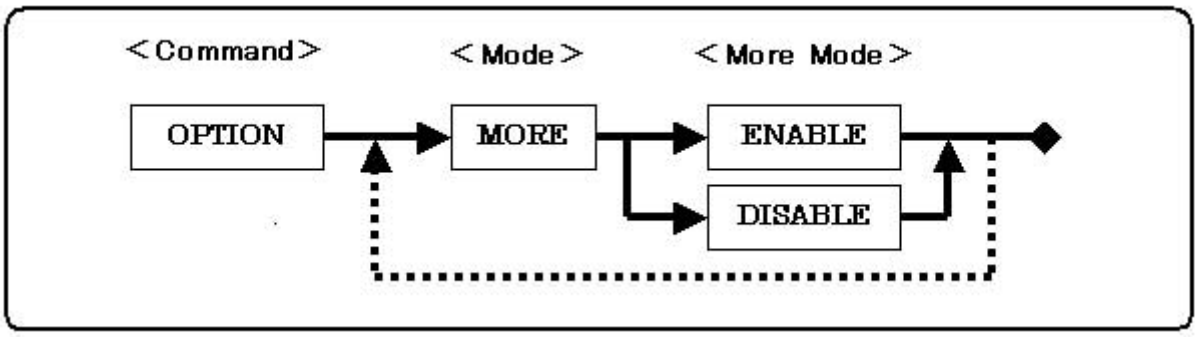
<*file name*>:Specify the name of the batch file

Description:
Saves commands entered on the command line to a file. The commands are not executed as they are being recorded. Use the BATCH command to play back the recorded commands.

Use ON when creating a new batch file. If using an existing file name, the new data will over-write the old file.
Use ADD to append new commands to the end of an existing batch file.
Use OFF to stop recording commands and return to normal command mode.

6.31 OPTION Command window options

Syntax: OPTION MORE <More Mode



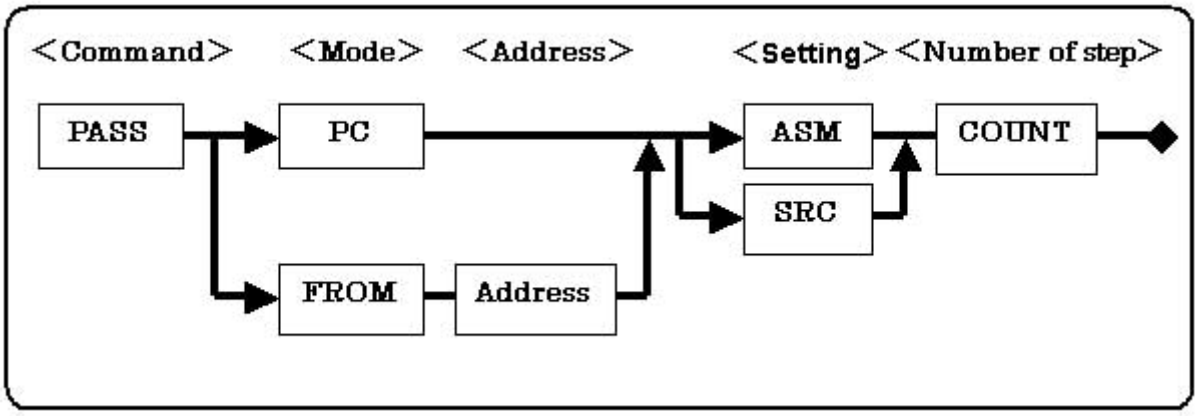
<MORE MODE>: Specifies More mode for Command execution

ENABLE	Displays one window full of command data at a time if there is more data than can be shown within the window.
DISABLE	Scroll when there is more than one screen display

Description:
Currently, MORE is the only option supported. If MORE is enabled, it will temporarily stop scrolling if there is more than one screen of data from a single command. When active you can view the data one screen at a time.
(MORE), view the remainder all at once
(CONTINUE), or cancel without viewing the rest of the data
(CANCEL). If MORE is DISABLED, it will scroll continuously until the command output is completed. You can also CANCEL the screen output before it is completed.

6.32 PASS Step Over

Syntax: PASS [PC | FROM < *address* **>] [ASM | SRC] COUNT <***number of steps***>**



<***Address***>:

PC	Start Step execution from the current Program counter
FROM<*Start address*>	Start Step execution from the specified address

<***Mode***>:

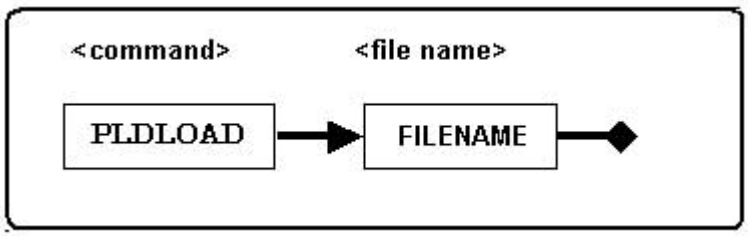
ASM	Step execution at the assembly level
SRC	Step execution at the source level

<***Number of steps***>:
Specify number steps to execute. If ***** is input single steps will execute until a breakpoint is met, or user keyboard ESC command is input

Description:
Single Step from the Program Counter or from a specific address, stepping over all subroutines and function calls. A called function or subroutine is executed in real-time. If a breakpoint is set in the called function or subroutine, the program will stop at that breakpoint.

This command is the same as the [GO] - [Step Over] menu item

6.33 PLDLOAD Load PLD initialization files



<FILENAME>: Specify PLD initialization data file.

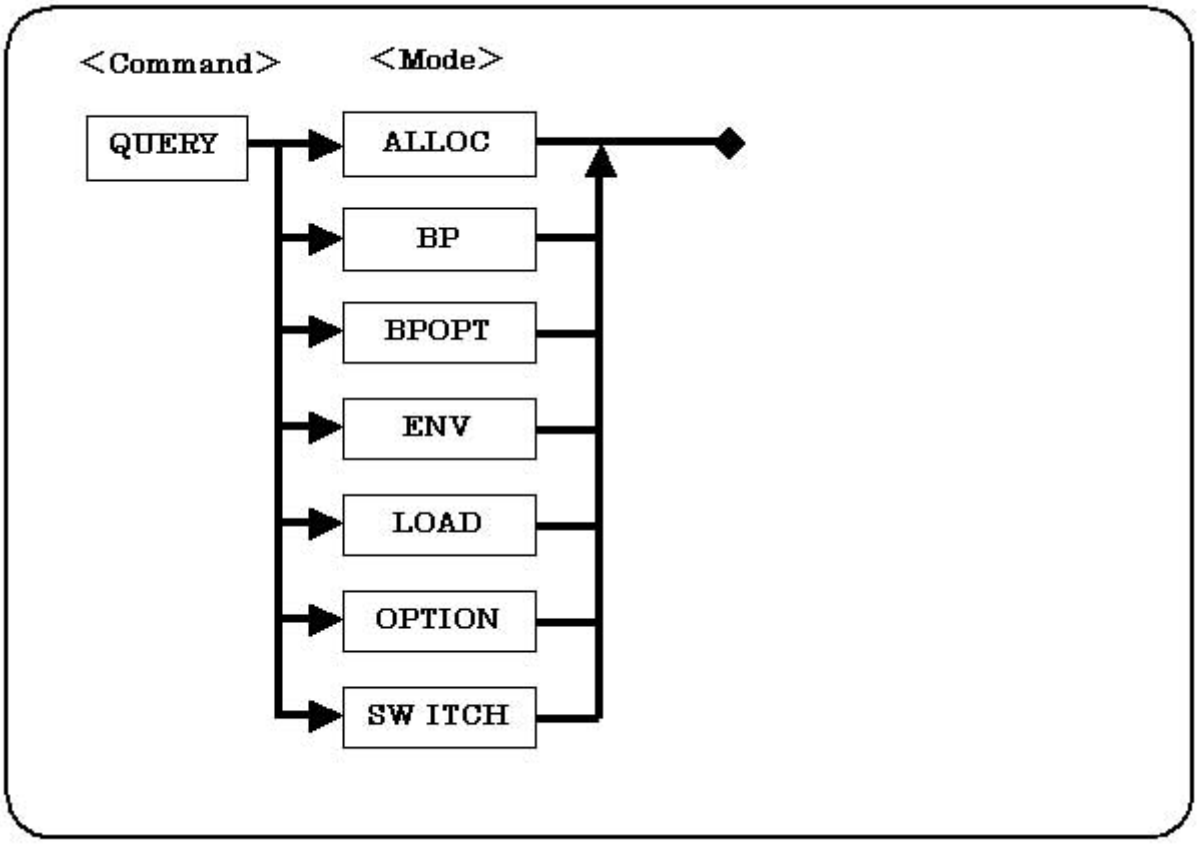
Description: Write initialization data file into PLD.

This command is same as:

Resource >> PLDLOAD

6.34 QUERY Display current environment setting

Syntax: QUERY [ALLOC | BP | BPOPT | ENV | LOAD | OPTION | SWITCH]



<Mode>:

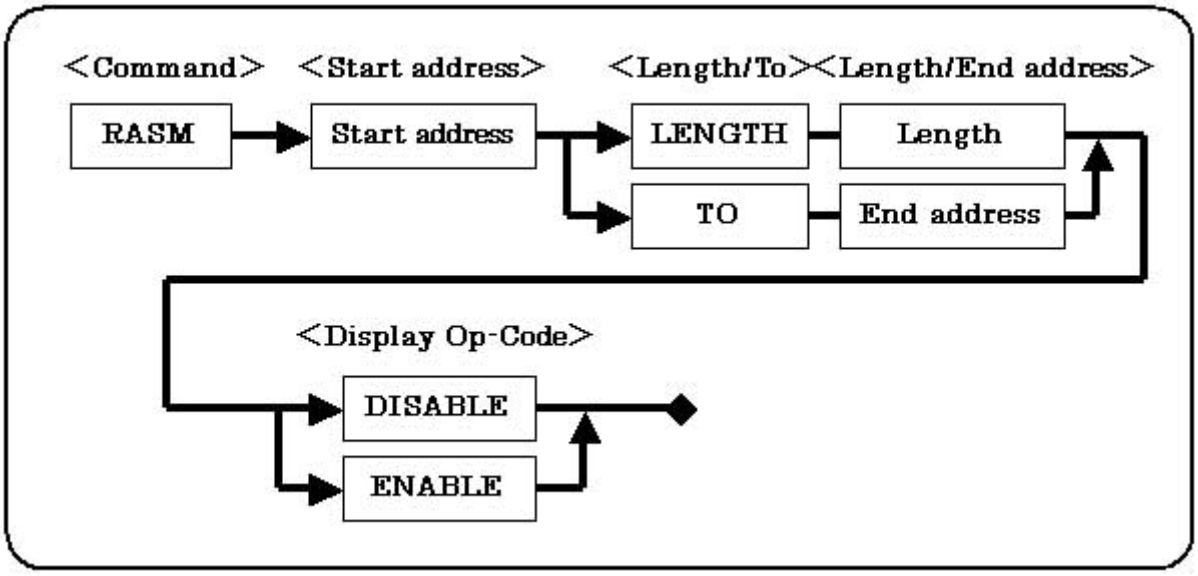
BP	Display list of current breakpoints
LOAD	Display currently loaded modules
OPTION	Display current Command window options

Description: The QUERY command displays current settings for the following commands:

- ALLOC or [Resource] - [Memory Mapping]
- BP or [Go] [Breakpoint]
- BPOPT or [Resource] - [ICE Environment] - [Break]
- ENV or [Resource] - [ICE Environment]
- LOAD or [Resource] - [Download]
- SWITCH or [Resource] - [ICE Environment]
- OPTION command.

6.36 RASM Reverse assembly

Syntax: RASM < address range > [ENABLE | DISABLE]



<address range><start address>: [LENGTH <length> | TO <end address>]

<*start address*>:	Specify start address for memory range
<*length*>:	Specify number of Bytes from the start address
<*end address*>:	Specify end address of memory range

<Op-Code>:

ENABLE	Display Op-Code hex data with mnemonics
DISABLE	Do not display Op-Code

Description:
Displays disassembled code from the specified memory range. This command output is similar to the Disassembly window. It can be used with logging turned on to reverse-assemble a program from memory and save it to disk.

6.37 REG Viewing CPU register value

Syntax: REG

Description: View current CPU register contents. To modify a register value, use the ASSIGN, or (.), command.

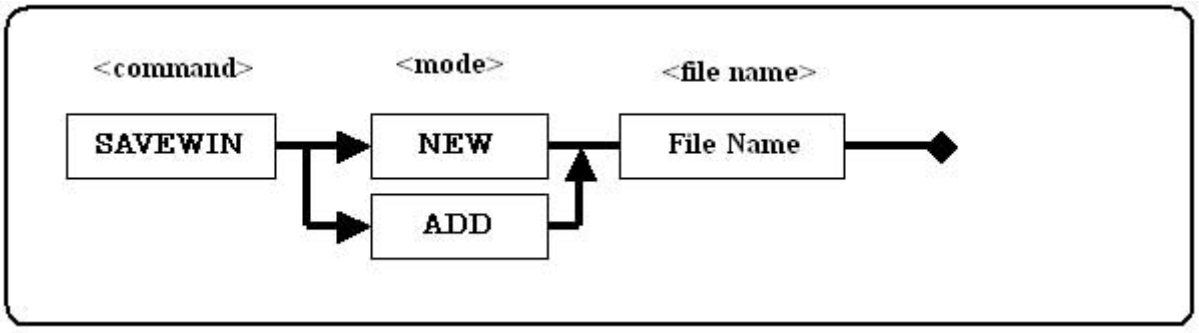
6.38 RESET Reset the CPU

Description: Reset the CPU.

This command is same as:
Go >> Reset

6.39 SAVEWIN Save command window contents to file

Syntax: SAVEWIN [NEW/ADD]



mode>:

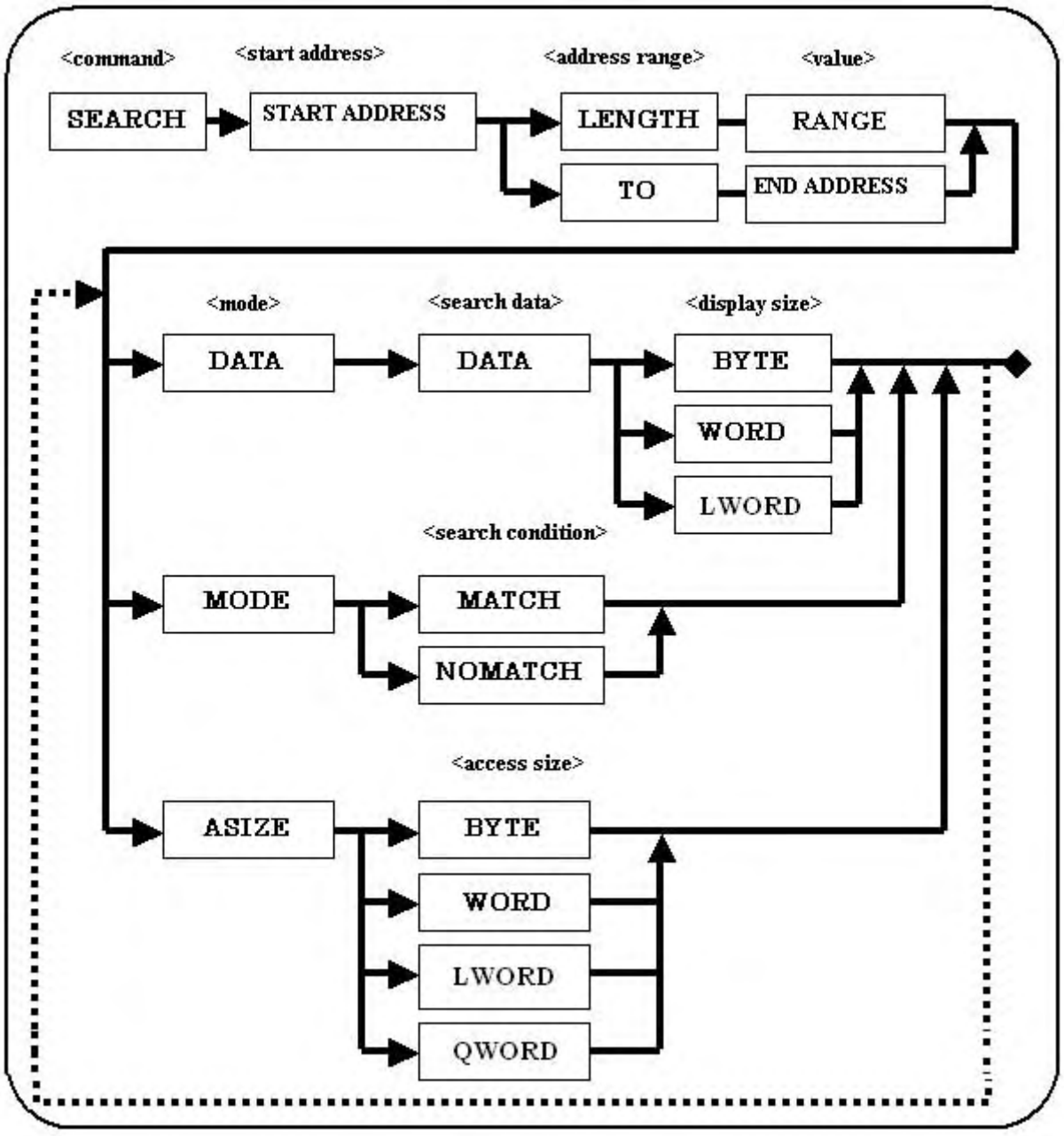
NEW	Create a new file.
ADD	Save the currently exiting file.

<file name>: Saved file name

Description: Save the currently opened Command window history to a file. Differs from the LOG command, The SAVEWIN command saves all of the executed expression contents in command window.

6.40 SEARCH Memory search

Syntax: SEARCH [address range] DATA <*searchdata*> **[BYTE/WORD/LWORD] MODE [MATCH/NOTMATCH] ASIZE** <*access size*>



<address range>:

start address	Specify start address of the memory search
length	Specify number of bytes from the start address
end address	Specify end address of the memory search

<search data>:
Specify data being searched for. Use quotation marks (" ") or (' ')to search for a specific string. You cannot use a space or tab characters in search strings.
Use ASCII HEX code \x20 for space and HEX \x9 for TAB.

<display size>: *Specify the memory search data size*

BYTE	Byte data memory search
WORD	Word data memory search
LWORD	LWORD data memory search

When data search of a character string is specified you should match the memory search to the size of the character string.

<search condition (MODE)>: *Specify data operand for memory search*

MATCH	Search for a match between the search data and memory
NOMATCH	Search for a mismatch between the search data and memory content. Only a single character can be specified. A character string cannot be specified for NOMATCH. If you use a character string, only the first character of the string will be used.

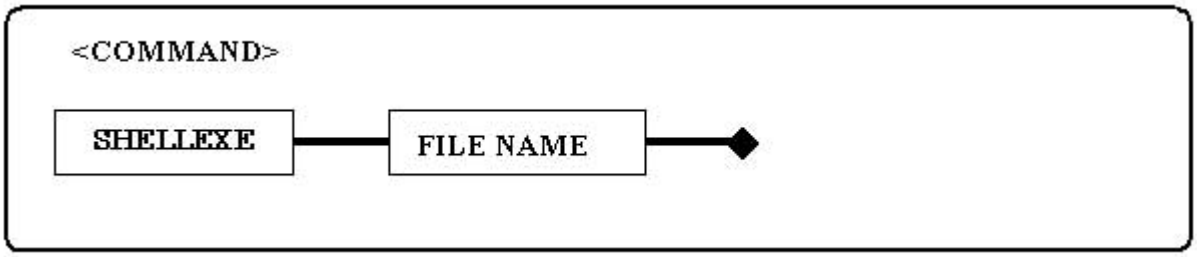
<access size (ASIZE)>: *Specify data access size for memory search*

BYTE	Byte length memory search in byte data access
WORD	Word length memory search
LWORD	Long word memory search
QWORD	Quad word memory search

Description:
Specify a memory range for specific data match or mismatch.
This command is same as:
Resource >> Memory/Port >> Search

6.41 SHELLEXE Execute a shell script

Syntax: SHELLEXE <*FILE name*> Execute a shell program

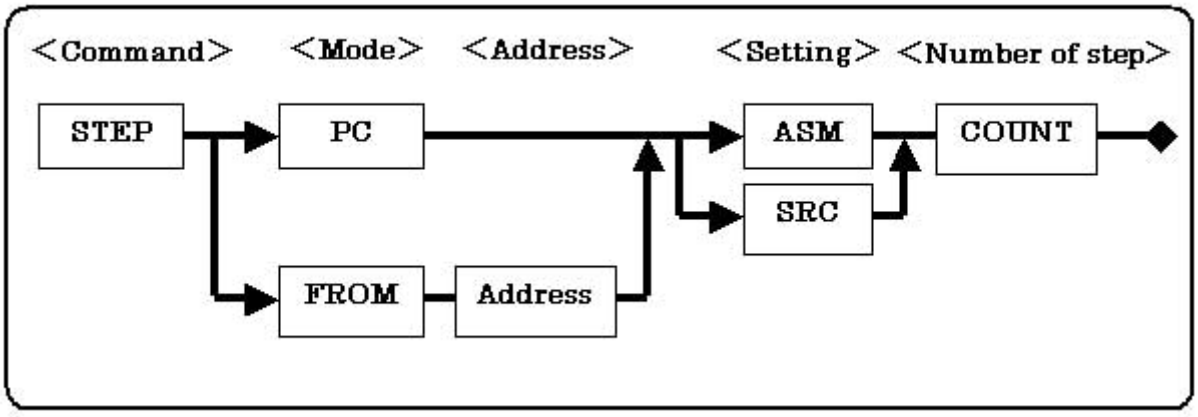


<*SHELLEXE*>: Specify the PC path and file name.

Description: Execute the specified shell program.

6.42 STEP Step in

Syntax: STEP [PC | FROM < *address* **>] [ASM | SRC] COUNT <***Number of steps*



<Mode>: Specify start address for single step execution

PC	Start Step from the current Program counter
FROM<*Start address*>	Start Step from the specified address

***<Setting>*:**

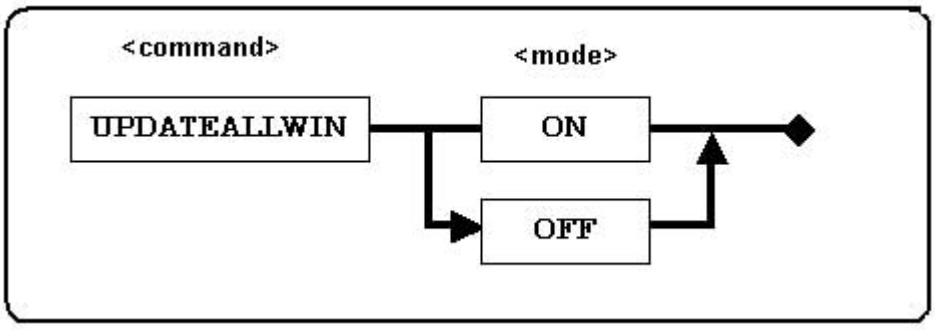
ASM	Assembly code step
SRC	Source code step

***<Number of steps>*:** Specify number of steps to execute. If 0(ZERO) is input then STEP command will execute until it reaches a breakpoint, or the user inputs a keyboard ESC command.

Description: Single Step from the program counter or from a specific address, stepping into all subroutines and function calls.

This command is the same as [GO] - [Step In]

6.43 UPDATEALLWIN Update All WATCHPOINT Display Windows



<UPDATEALLWIN>:

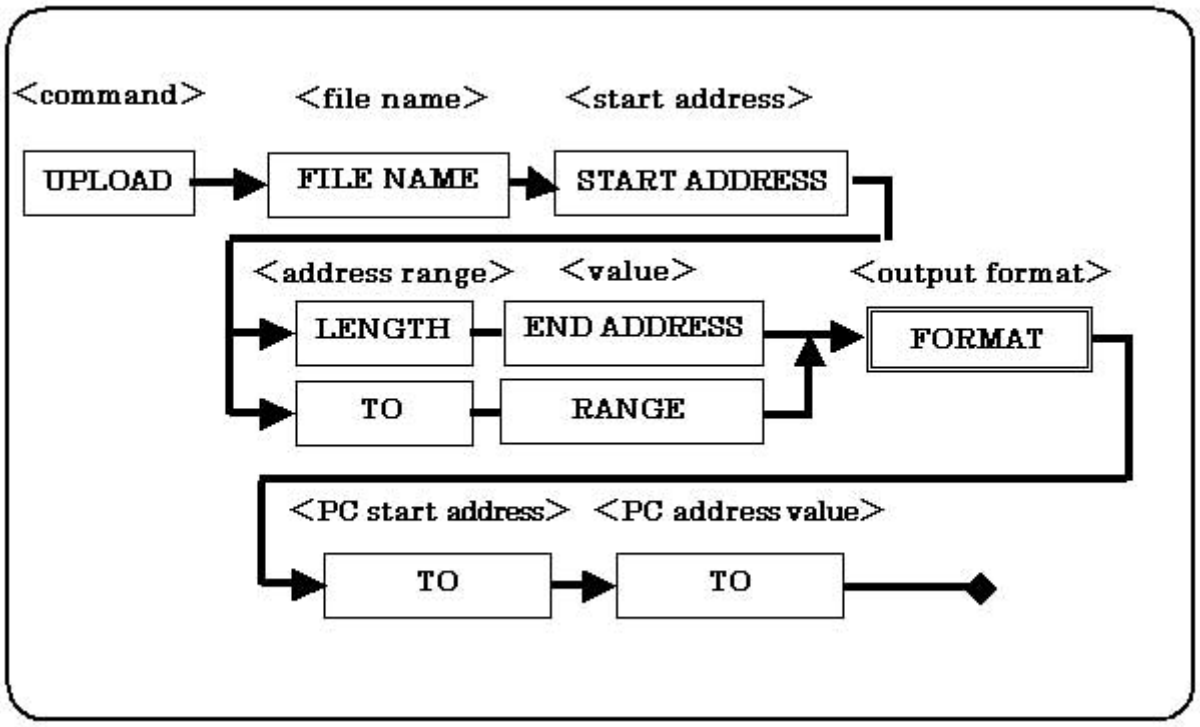
ON	Update all of WATCHPOINT windows.
OFF	Don't update all WATCHPOINT windows.

Description: Enable/disable WATCHPOINT window update at the program counter location indicated by yellow highlighted text.

This command is same as :
Resource >> UPDATEALLWIN

6.44 UPLOAD Save object data to a file

Syntax: UPLOAD <*file name*> **[address range]** <*output format*> **PC [ENABLE/DISABLE** <*address value*>



<fill name>: Specify the upload file name

<address range>:

start address	Specify the memory range start address
length	Specify the number of bytes from the start address
end address	Specify the memory range end address

<output format>:

Specify the saved file data format

IHEX64K	Output Intel Hexadecimal 64K file format
IHEX1M	Output Intel Hexadecimal 1M file format
IHEX4G	Output Intel Hexadecimal 4G file format
MHEX64K	Output Motorola Hexadecimal 64K file format
MHEX1M	Output Motorola Hexadecimal 1M file format
MHEX4G	Output Motorola Hexadecimal 4G file format
BINARY	Output binary file format

<PC> <start address>:

Specify if the PC (program counter) address should be included in the saved file

ENABLE	Specify PC (program counter) address is in the output file
DISABLE	Specify PC (program counter) address is NOT in the output file

<PC> <address value>:

start address	Specify PC (program counter) starting address included in the HEX file. Invalid if the output is a binary file format
value	Specify PC (program counter) address value included in the binary file format. Invalid if the output is a HEX file format

Description: Specify address range and data value of the memory to be uploaded.

This command is same as:

Resource >> Upload

Example 1:

UPLOAD c:/wp/updata1.hex 0x1200 LENGTH 0x100 MHEX64K ENABLE_PC 0x5678
File name: updata1
Starting address: 0x1200
Length: 0x100 (bytes) (end address 0x12FF)
Output format: MHEX64K (Motorola HEX 64 Kbyte length)
PC address: Enable, value 0x5678

Example 2:

UPLOAD c:/wp/updata2.hex 0x40000200 TO 0x400045FF IHEX4G DISABLE_PC
File name: updata2
Starting address: 0x40000200
End address: 0x400045FF
Output format: IHEX4G (Intel HEX 4 Gbyte length)
PC address: Disable, no address value

Refer to the [CD (Change Directory)] command for details for setting the location to save the upload file.

7 Batch Macro Command Processing

Batch macro processing is used to automatically perform repetitive tasks. WATCHPOINT batch processing supports program loops and conditional branches. Expressions can contain WATCHPOINT work variables, system variables, and references to memory, register contents and symbols values. Each batch line requires a carriage return at the end of line. Command execution does not wait for the result of the current command and will continue to execute the next command. (If "pass" stepping over a module at full peed is used, there is the possibility that it will be interrupted by as subroutine.)

Following is an example that shows how to cause the current command to finish prior to the next command.

Example Finish command prior to the next command

If the CPU has topped, then batch execution drops out of the loop and executes the print BREAKNUM line.

If the CPU is running, the batch execution will execute the next command after 10 attempts. You can replace the print BREAKNUM command with any other command that you want to execute.

```
FOR $A=0 TO $A<10 TEP 1
IF CPUSTATUS==0
print BREAKNUM
FBREAK
ENDIF
wait 1
NEXT $A
```

You can create a batch macro program and execute it from within the Command Window using the BATCH command. The easiest way to create a new macro is by using the NEWBATCH command within the Command window to record the commands as they are used by the operator.

They are entered on the command line and can refined later with a text editor. You can save the batch macro program to a file and reload it again from the Command window. Unlimited nesting of is allowed within Windows .

7.1 Work Variable

Batch macro work variables are used for temporary storage and for passing parameters when the batch file is executed. You can create a global work variable that is available to all batch macro programs from an expression that contains local work variables. Memory data, I/O data, a CPU register value, or a string character to a Work variable may be assigned. You can use a Work variable in a math expression to perform conditional processing, as shown in the example below. Number expressions are evaluated first, and then string characters.

Work Variable Type	Designator
Batch	$0 All string characters from the command line $1 ~ $9 Batch variables range from 1 ~ 9
Global variable	$A ~ $Z

Example

.$a=0x10	Assign value 0x10 to Local variable $a
.$B=[0x4000].W	Assign Word data at address 0x4000 to Global variable $B
If ($a==0x1234)	True, when Local variable $a equals 0x1234

7.2 System Variable

WATCHPOINT system variables can be used in to perform an action based on system status. For example: do nothing while the user program is running and perform some action when it stops at a breakpoint. WATCHPOINT system variables are defined in the following table. The system variable names must be entered in UPPER CASE characters.

System Variable	Description
CPUSTATUS	0 during Break 1 during user program execution
CPUCODE	Not public
SYSTEMBOARD	ICE Unit installed status. In bit field; 0 = not installed, 1 = installed. bit 0 : Emulation Memory Unit bit 1 : Trace Unit bit 2 : CPA Unit
SRAMMEM	SRAM memory size (byte)
DRAMMEM	DRAM memory size (byte)
CPUMEMSIZE	CPU memory range (Kbytes)
CPUIOSIZE	CPU I/O range (Kbytes)
TRACESTATUS	0 : Trace off 1 : Trace executing 2 : Trace end

Example:

```
if (CPUSTATUS==1)//True during CPU execution
```

7.3 Label

The batch macro program can use label to branch to a different part of the program. Label starts with a colon (:). You cannot write a command on a Label line.

Example:

```
: CSOME_HERE
```

7.4 Comment

Comment lines must start with double forward slash (//) followed by the comment statement. Comment Lines do not affect program execution.

Example:
// This is Comment Line if ($a==0x1234) //if $a equal to 0x1234
You can not write a comment on the same line when using the following commands.

- **batch**
- **bp**
- **bpl**
- **check**
- **copy**
- **dump**
- **exit**
- **fill**
- **mkdir**
- **newbatch**
- **option**
- **overlay**
- **print**
- **search**
- **upload**

Example: The following example causes an error to occur.
batch test.bat // comment

7.5 View Memory, I/O Data

You can print memory data and I/O data or assign memory and I/O data to work variables. Enclose the memory address in brackets, [address].
To specify the memory data, use ASSIGN command or dot (**.**) to specify the data and length as follows:

Expression	Description
[Address]**.**B	Get Byte data at the specified address
[Address]**.**W	Get Word data at the specified address
[Address]**.**L	Get Longword data at the specified address

Example:

.$A=[0x4000].L	Assign 4 bytes at address 0x4000 to Work variable $A
If ([0x4000].W==0x1234)	True when data at address 0x4000 equals 0x1234.
.[0x4000].W	Word data value at address 0x4000.

7.6 Modify Memory, I/O Data

Use the ASSIGN, or dot (**.**), command to modify memory and I/O data, as follows:

Expression	Description
[Address].B=<byte data>	Write Byte data to the specified address
[Address].W=<word data>	Write Word data to the specified address
[Address].L=<longword data>	Write Longword data to the specified address

Example:

.$A=[0x4000].B=0x10.	Write 0x10 byte data to address 0x4000 and to Global Work variable $A
.[0x4000].W=0x1234	Write 0x1234 word data to address 0x4000

7.7 View Register Value

You can display register values and assign register values to work variables by using the name of the register in an expression as follows:

Expression	Description
.RegisterName	The specified register's current value

Example:

.[0x4000].B=RegX	Write byte data in Reg X to address 0x4000
.[0x4000].W=RegY	Write word data in Reg Y to address 0x4000
$A=RegZ	Assign the value in the Reg Z register to Work variable $A
If (RegX==0x1234)	True when Reg X value equals 0x1234

7.8 Modify Register Value

Use the ASSIGN, or dot (**.**), command to modify register, as follows:

Expression	Description
.RegisterName=<value>	Write a value to the specified register

Example:

.RegX=0x10	Assign 0x10 byte value to Reg X
.RegY=0x1234	Assign 0x1234 value to Reg Y

7.9 FOR, FBREAK, NEXT Repeat processing

Syntax: FOR <Work variable>=<Initial value> TO <Condition> [STEP <Step value>]
<Command>....
[FBREAK]
<Command>....
NEXT <Work variable>

<Work variable>:	The <work variables> is used as a counter and is initialized by <initial value>. It is incremented by the value specified by <step value>. You can specify the work variable from $ A ~ $ Z, and $ a ~ $ z. The <work variable> of the NEXT command must be as the same as the one specified in the FOR command.
<Initial value>:	The <Initial value> is a signed number specified for the work variable.
<Condition>:	The <Condition> is used to control the flow of the repeat processing with a terminating value.
<Step value>:	The <Step value> is a signed number added to the work variable after each completed loop is processed. The default number is 1. The step value can be a negative number.

Description:

The FOR command repeats a series of commands between FOR and NEXT until the value of a counter (work variable) is satisfied

The FBREAK within the FOR - NEXT loop is used for exiting the FOR - NEXT loop.

Example:

```
FOR $A=0 TO $A<100 TEP 10
IF $A==50
FBREAK
ENDIF
DUMP 0 LENGTH $A
NEXT $A
```

7.10 WHILE, WBREAK, WEND Repeats batch processing

Syntax:

WHILE<Condition>
  <Command>....
[WBREAK]
  <Command>....
WEND

Description:

The WHILE command repeats the series of commands between WHILE and WEND while the specified <Condition> is true (not 0). The loop ends when the <Condition> is false (equals 0). The <Condition> is used to control the processing flow.

The WBREAK within the WHILE - WEND loop is used for exiting the WHILE - WEND loop. WHILE - WEND loops may be nested, but each WHILE - WEND loop must be contained completely within another WHILE - WEND loop

Example:

```
. $A=0
WHILE $A<100
IF $A==50
WBREAK
ENDIF
DUMP 0 LENGTH $A
. $A+=10
WEND
```

Notes:

WHILE, WEND, WBREAK must be on separate lines.
WHILE and WEND must be paired.

7.11 GOTO Unconditional branch

Syntax: GOTO<Label>

<Label>:	Specify <Label> for branch in the Batch

Description:
The GOTO command changes the batch processing flow where the <Label> is specified. It transfers control to the line defined by <label>. Batch processing terminates if <label> is not defined. <label> Lines must start with colon (**:**).

Example:

```
:LOOP
:
:
GOTO LOOP
```

7.12 IF, ELSEIF, ELSE, ENDIF Conditional Process Control

Syntax:
IF <Condition>
<Command>....
[ELSEIF <Condition>]
<Command>....
[ELSE]
<Command>....
ENDIF

<Condition>:	Used to control the macro batch process flow.

Description:
If the result of evaluating <Condition1>,<Condition2>, etc is true (not 0), the batch program is executed up to the next ELSEIF or the next ELSE, whichever comes first. If ELSE (and ELSEIF) are omitted, the lines up to ENDIF are executed.
If the result of the evaluating <Condition> is false (0), the lines after ELSE and up to END IF are executed. If ELSE is omitted, control is transferred to the line following ENDIF

Example:

```
IF $A>$B
DUMP 0 LENGTH $A
ELSEIF $A==$B
DUMP 0x10 LENGTH $A
ELSEIF $A<$B
DUMP 0x20 LENGTH $B
ELSE
DUMP 0x30 LENGTH $B
ENDIF
```

Notes:
IF, ELSE ELSEIF and ENDIF must be specified on separate lines.
IF and ENDIF must be paired.
IF and ENDIF may be nested, but each IF and ENDIF must be contained completely within another IF and ENDIF.

7.13 END Terminate Batch processing

Syntax: END
Description:
The END command terminates the entire batch operation of the current nested and any calling . The batch operation is ended unconditionally when this command line is encountered. If the was called from another , control does not return to the calling .

Example:

```
IF $A>$B
END
ENDIF
```

7.14 QUIT End the current macro

Syntax:
QUIT
Description:
When QUIT is executed, one nested is canceled and control returns to the calling .
If the batch file was not called from another , QUIT terminates batch processing like the END command.

Example:

```
IF $A>$B
QUIT
ENDIF
```

7.15 ECHO Batch commands display on/off

Syntax: ECHO (ON/OFF)

Description:
By default, the command lines in the batch file are not displayed as they are executed. ECHO ON command is used to display the command lines as they executed. Batch commands are not displayed when ECHO OFF is elected.

Example:

```
IF $A>$B
ECHO ON
ELSE
ECHO OFF
ENDIF
```

7.16 KEYIN (Keyboard input)

Syntax: KEYIN [<comment> [<Work variable>]]

<comment>:	A character string enclosed in double-quotes is displayed on the status bar of the Command window.
<work variable>:	Specify the <work variable> to store the keyboard input value.

Description:
This command displays the specified <comment> and waits for keyboard input. The entered string must be a numeric expression. The expression is analyzed and the result is stored in <Work variable>. If an assignment is entered, the assignment is performed and the value is stored in the <Work variable>.
If <comment> and <Work variable> are not specified, WATCHPOINT imply analyzes the input value and displays the results.
The Enter key is used to specify the end of the input character string.

Example:

```
KEYIN "$A="
```

7.17 PRINT (Screen display)

Syntax:
PRINT{[<comment>][<number expression>][<format>]}+

<comment>:	The specified <comment> is displayed in the Command window
<numeric expression>:	Specify the <work variables> to the keyboard input value
<format>:	Specify the format for <numeric expression>

<Format>:

Format	Description
None	Default format. Displays hexadecimal and (assigned decimal) number
.#B	Displays 2Bytes binary number
.#LB	Displays 4Bytes binary number
.#D	Displays 2Bytes signed decimal number
.#LD	Displays 4Bytes signed decimal number
.#U	Displays 2Bytes unassigned decimal number
.#LU	Displays 4Bytes unassigned decimal number
.#H	Displays 2Bytes hexadecimal number
.#LH	Displays 4Bytes hexadecimal number

Description:
This command evaluates the <numeric expression>, and displays the result in the specified <format> in the Command window. separates <comment> and <numeric expression> by a pace.

Example:

```
PRINT"abcdefg"
abcdefg
PRINT"$A=" 1+2+3 "$B=" 1*2*3
$A=0x00000006 (6) $B=0x00000006 (6)
.$A=0xffffffff
PRINT"$A=" $A
$A=0xffffffff (-1)
PRINT"$A=" $A.#B
$A=1111 1111 1111 1111
PRINT"$A=" $A.#LB
$A=1111 1111 1111 1111 1111 1111 1111 1111
```

7.18 BEEP (PC Audible alert)

Syntax: BEEP

Description:
When the BEEP command is executed, a beep sound is output to the PC speaker.

Example:

```
IF $A>$B
BEEP
ENDIF
```

7.19 WAIT Delay batch macro process

Syntax: WAIT <second>

<Second>	Specify number of seconds for delay before batch processing is topped

Description:
When the WAIT command is encountered in a , batch processing will top for the specified number of seconds before continuing with the next command line.

Example:

```
IF $A>$B
WAIT 10 //wait for 10 seconds
ENDIF
```

7.20 Work variable

Work Variable Type	Designator
Batch	$0 All string characters from the command line $1 ~ $9 Batch variables range from 1 ~ 9
Global variable	$A ~ $Z
Local variable	$a ~ $z

Example:

.$a=0x10	Assign value 0x10 to Local variable $a
.$B=[0x4000].W	Assign Word data at address 0x4000 to Global variable $B
If ($a==0x1234)	True, when Local variable $a equals 0x1234

8 Data Expression Formats

8.1 Memory I/O Port Reference

Use the [**address**] notation to refer to the data stored at the specific memory address. This notation can be used in batch macro files as a test for conditional branching or with the ASSIGN or dot "." command in the command line interface to view or modify memory or I/O ports.

Expression	Meaning
[address expression]. B	Refers to byte data at specified address
[address expression]. W	Refers to word data at specified address
[address expression]. L	Refers to long-word data at specified address

Example:

.[0x4000].B=0x10 Write 0x10 byte data to address 0x4000

.[0x4000].W View a word data at address 0x4000

Input to internal I/O register area. - Prefix with INR

.[INR:0x0x4000].B=0x10 Write 0x10 byte data to address 0x4000

.[INR:0x4000].W View a word data at address 0x4000

8.2 WATCHPOINT Data Expressions

Numerical values can be entered in hexadecimal, decimal, or binary using the following prefixes to indicate the radix:

Expression	Meaning
0x<*number*>	Hexadecimal number
H'<*number*>	Hexadecimal number (Only used for in-line assembler in Disassembly window)
@<*number*>	Binary number
<*number*>	Decimal number

8.3 Address Expressions

Memory addresses and Internal Peripheral Register addresses are entered as follows:

Address Expression	Meaning	Comment
<*Address value*>	Logic address	N/A
mmu:<*Address value*>	Logic address	Not available for memory map
r:<*Address value*>	Physical address	N/A
INR:<*Address value*>	Internal I/O register area	N/A
<*Global symbol*>	Global symbol address	N/A

Some expressions may not be available depending on the device under test configuration

8.4 CPU Register Expressions

Use the following notation when using CPU register values in expressions. Expressions are not case sensitive:

R0	R1	R2	R3
R4	R5	R6	R7
R8	R9	R10	R11
R12	R13	R14	R15
CPSR	SPSR	-	-

8.5 Address Input Format

WATCHPOINT address input to a dialog box or command line argument may be entered as a combination of numeric values, address expressions, and register expressions.

8.6 Data Input Format

WATCHPOINT data value input into a dialog box or command line argument may be entered as a combination of numerical values, register expressions, and math expressions.

8.7 Memory I/O Port References

Use the [**address**] notation to refer to the data stored at the specific memory address. This notation can be used in batch files as a test for conditional branching or with the ASSIGN or dot "." command in the command line interface to view or modify memory, I/O port.

Expression	Meaning
[address expression]. B	Refers to byte data at specified address
[address expression]. W	Refers to word data at specified address
[address expression]. L	Refers to long-word data at specified address

Example:

.[0x4000].B=0x10	Write 0x10 byte data to address 0x4000
.[0x4000].W	View a word data at address 0x4000

Input to internal I/O register area using the INR prefix.

.[INR:0x0x4000].B=0x10	Write 0x10 byte data to address 0x4000
.[INR:0x4000].W	View a word data at address 0x4000

9 Data Expression

9.1 Numeric Value

Numerical values are entered in hexadecimal, decimal, or binary using the following prefixes to indicate the radix:

Expression	Meaning
0x<*number*>	Hexadecimal number
H'<*number*>	Hexadecimal number (only used for in-line assembler in Disassembly window)
@<*number*>	Binary number
<*number*>	Decimal number

9.2 Address Expression

Memory addresses and Internal Peripheral Register addresses are entered as follows:

Address Expression	Meaning	Comment
<*Address value*>	Logic address	N/A
mmu:<*Address value*>	Logic address	Not available for memory map
r:<*Address value*>	Physical address	N/A
INR:<*Address value*>	Internal I/O register area	N/A
<*Global symbol*>	Global symbol address	N/A

Some expressions may not apply to all Sophia Systems emulator configurations.

9.3 CPU Register Expression

Use the following notation when using CPU register values in expressions. Input notation is not case sensitive.

R0	R1	R2	R3
R4	R5	R6	R7
R8	R9	R10	R11
R12	R13	R14	R15
CPSR	SPSR	-	-

9.4 Address Format

When WATCHPOINT requires an address input in a dialog box or command line argument, the address may be entered as a combination of numerical values, address expressions, and register expressions.

9.5 Data Format

When WATCHPOINT requires a data value in a dialog box or command line argument, the data can be entered as a combination of numerical values, register expressions, and math expressions

9.6 Memory I/O Port Reference

Use [**address**] notation to refer to the data stored at the specific memory address. This notation may be used in batch files as a test for conditional branching or with the ASSIGN or dot "." command in the command line interface to view or modify memory and I/O ports.

Expression	Meaning
[address expression] [address expression]. B	Refers to byte data at specified address
[address expression]. W	Refers to word (2 bytes) data at specified address
[address expression]. L	Refers to long-word (4 bytes) data at specified address

Examples:

.[0x4000].B=0x10 Write 0x10 byte data to address 0x4000

.[0x4000].W View a word data at address 0x4000

Input data to internal I/O register area.

.[INR:0x0x4000].B=0x10 Write 0x10 byte data to address 0x4000

.[INR:0x4000].W View a word data at address 0x4000

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