

Embest PowerICE for ARM

User Guide

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Version 1.0



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1. Overview

Embest JTAG Emulator contents three types of product: Standard JTAG Emulator (Embest Emulator for ARM), Enhanced JTAG Emulator (Embest PowerICE for ARM) and General JTAG Emulator (Embest UNetICE for ARM). We will introduce Enhanced JTAG Emulator (Embest PowerICE for ARM) detailedly within this user guide.

Enhanced Emulator (Embest PowerICE for ARM) was the New-generation of JTAG emulator, which was released at September 2003 by Embest. The feature is its power supply can be provided by internal or external input, and works at highest speed 120Kbyte per second by transmission.

Embest Enhanced Emulator (Embest PowerICE for ARM) has a Parallel port connecting to the Computer's parallel port, and a JTAG interface connecting to the target system.

There are 3 LEDs on the panel, indicating which state the Embest PowerICE is working in.

Note: Cable connection must not hot swap!



Embest PowerICE For ARM

2. PowerICE JTAG Interface Connections

A standard male-to-female 25-way parallel cable connects the Embest PowerICE for ARM to the PC's parallel port. The connection to the target board is made by a 20-way (or 14 - way) female IDC header cable with all pins connected straight through (1-1, 2-2, ... 20-20). There are two types of IDC interface cable: 14pin and 20 pins. JTAG pin connections are described as figure A – 1 and A – 2.

Vsupply	1	2	RES
RES	3	4	GND
TDI	5	6	GND
TMS	7	8	GND
TCK	9	10	GND
RES	11	12	GND
TDO	13	14	GND
nSRST	15	16	GND
RES	17	18	GND
RES	19	20	GND

Figure A-1 20 Pin JTAG Connections

Vsupply	1	2	RES
nSRST	3	4	GND
TDI	5	6	GND
TMS	7	8	GND
TCK	9	10	GND
TDO	11	12	GND
RES	13	14	GND

Figure A-2 14 Pin JTAG Connections

Note: All GND pins should be connected to 0V on the target board.

The following table shows the JTAG pinouts.

Signal	I/O	Description
Vsupply	Input	This is the supply voltage to Embest PowerICE for ARM. It draws its supply current from this pin via a step-up voltage convertor. This is normally fed by the target Vdd. Valid power supply voltage is form 2.7V to 5.5V.
GND	-	Ground.
TDI	Output	Test Data In signal from Embest PowerICE for ARM to the target JTAG port. It is recommended that this pin be pulled to a defined state.
TMS	Output	Test Mode signal from Embest PowerICE for ARM to the target JTAG port. This pin should be pulled up on the target so that the effect of any spurious TCKs when there is no connection is benign.
TCK	Output	Test Clock signal from Embest PowerICE for ARM to the target JTAG port. It is recommended that this pin be pulled to a defined state.
TDO	Input	Test Data Out from the target JTAG port to Embest PowerICE for ARM.
nSRST	Output	Open collector output from Embest PowerICE for ARM to the target system reset. This pin should be pulled up on the target to avoid unintentional resets when there is no connection.
RES	-	Reserved.

3. PowerICE Power Supply

Power is supplied to the Embest PowerICE for ARM via pin 1 of the 20-way (or 14-way) IDC connector. This is normally fed by the target Vdd. Valid power supply voltage is form 2.7V to 5.5V. Power of Embest PowerICE for ARM also can be supply by external input voltage valid 5V to 9V. Connection jack of the external voltage input show as figure A-3 following:

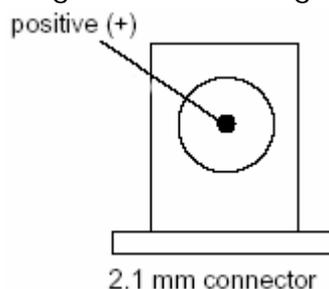


Figure A-3 connection jack of the external voltage input

Note:

- According to the way of voltage input, power supply switch of Embest PowerICE for ARM must place in the right position.
 - Embest PowerICE for ARM cannot work if power voltage out of range, even were badly damaged.
-

4. Target Interface Voltage Levels

The target interface voltage levels of Embest PowerICE for ARM depend on the input voltage levels. It is 3V/5V compatible. Normally, power supply by the external input voltage will give the output single voltage provided 3.3V.

5. LED Indicator

There are three LEDs in the panel of Embest PowerICE for ARM, labeled Power, Run and Con:

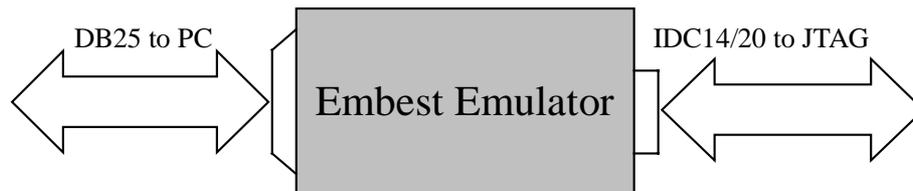
LED Power: power indicator

LED Run: data indicator, indicate the data transmission between host pc and target CPU.

LED Con: connection indicator

6. Connecting the Emulator Hardware

Embvest PowerICE is a JTAG-based debugging channel for ARM microprocessors. It provides an interface between Embvest IDE and an ARM microprocessor deeply embedded.



A standard male-to-female 25-way parallel cable connects the Embvest PowerICE to the PC's parallel port.

The connection to the target board is made by a 20-way (or 14 - way) female IDC header cable (BT224 type) with all pins connected straight through (1-1, 2-2, ... 20-20).

Note: Connecting cable dose not provide hot swap

7. Settings of connect PowerICE with IDE

Embed PowerICE for ARM is able to support Embed IDE very well. The settings of connecting Embed PowerICE with Embed IDE are as following:

Open the project which needs to be debugged with the Embed IDE, use hotkey Alt+F7 or choose the Settings in the Project menu, and in the dialog box of Project Settings, choose Remote. Here you can config the connection of Embed PowerICE.

Remote Device: Config the remote device. Choose "PowerICEARM7" when using Embed PowerICE for ARM to debug ARM7 based processor, or you can choose "PowerICEARM9" if you want to use PowerICE to debug the ARM9 based processor.

Speed: Here to config the work speed of PowerICE. The work speed of Embed PowerICE for Arm can be selected as Full Speed (120Kbyte/s), High Speed, Medium Speed or Low Speed.

Communication Type: To config communication port with remote device. We choose "PARALLEL" here due to the PowerICE is connected to Host via Parallel port.

Parallel Port: Select the one you are using. Here we choose LPT1 as the following Fig. A-4.

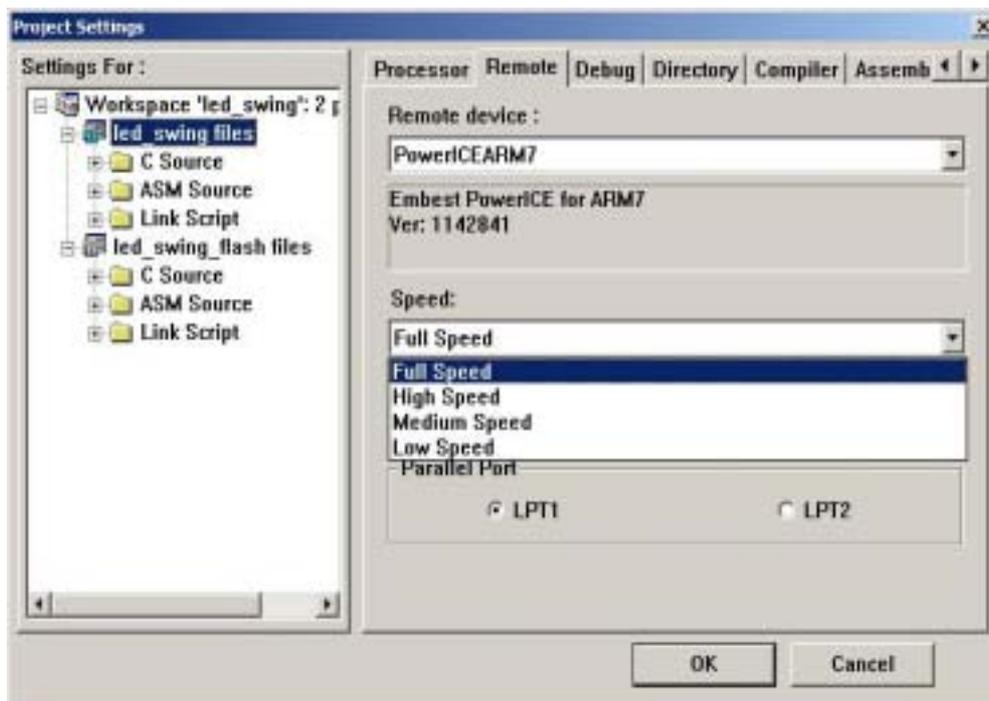


Fig. A-4 Project Settings while using PowerICE

We can begin to start the debugging after you have finished all the Project Settings (More information can be found in the UserGuide of Embest IDE pro 2004). Use hotkey F8 or choose the Remote Connect in the Debug Menu (as the following Fig. A-5 shows), Embest Debugger will begin to connect the target board via Embest PowerICE.



Fig. A-5 Remote Connect

There will be some prompting if the connecting was unsuccessful. Please check the relative configuration or connection is connect or not according to the prompt. If it is correct, the Debug Menu will become to be as the following Fig. A-6 shows:

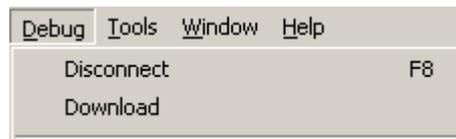


Fig. A-6 The Debug Menu while the connection is successful

8. Settings of connect PowerICE with ADS/SDT

Embest PowerICE for ARM is able to support ARM ADS/SDT. Embest ICE Sever for ARM should be installed before using Embest PowerICE for ARM in ARM ADS/SDT.

8.1 ICE Server settings

Debugging equipment selection and setting

Right click the ICE Server tray icon , and the ICE Server control menu will pop up as shown in the following figure A-7:

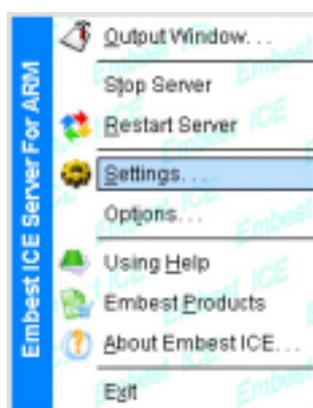


Fig. A-7

Select the submenu Setting... and a dialog box for debugging equipment selection and setting will pop up, as shown in the following figure A-8:

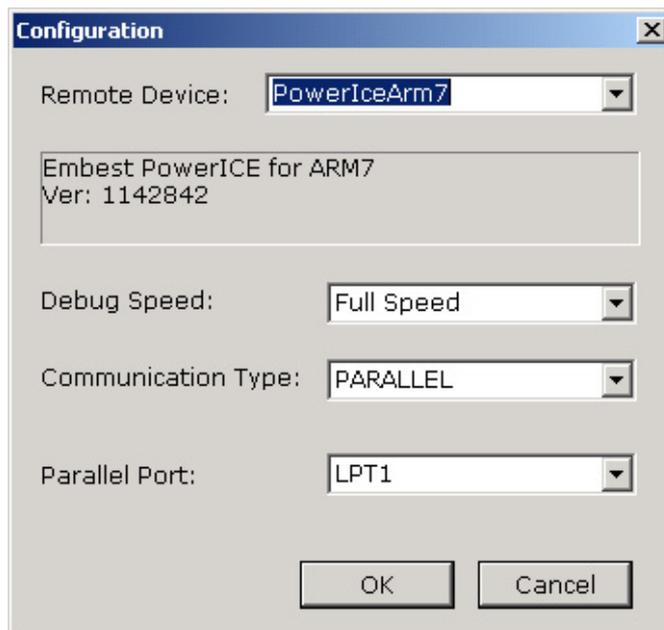


Fig. A-8

Remote Device: the pull-down box displays all the debugging equipment supported by the software, and users can select one of them. At the lower part of the pull-down box, the equipment's description and version information will be displayed. At present, the software supports the following programming equipment:

Jtagarm7	Embtest Emulator: standard emulator supports ARM7 core processor
Jtagarm9	Embtest Emulator: standard emulator, supports ARM9 core processor
PowerICEArm7	Embtest PowerICE enhanced emulator, supports ARM7 core processor
PowerICEArm9	Embtest PowerICE enhanced emulator, supports ARM9 core processor

Debug Speed: to set the download debugging speed of the emulator. This setting is valid only when the emulator supports the debugging download speed.

Embtest Emulator	Does not support the option
------------------	-----------------------------

Embest PowerICE Full Speed, High Speed, Medium Speed and Low Speed

Communication Type: to set the connection mode between the equipment and the host, and the host communication port connected.

Parallel Port: to be set according to the actual situations.

Setting of mapping files in storage area

During the software debugging, there may be something abnormal in some processors or target boards when accessing nonexistent storage addresses or other illegal storage areas. If the problem is not solved, software debugging may discontinue, and use of the mapping files (*.map) in the storage area can prevent the problem from happening.

Users can opt whether to set mapping files of the storage area or not according to specific situations, and the steps for setting the mapping files of the storage area are as follows:

Right click the ICE Server tray icon , and the ICE Server control menu will pop up as shown in the following figure A-9:

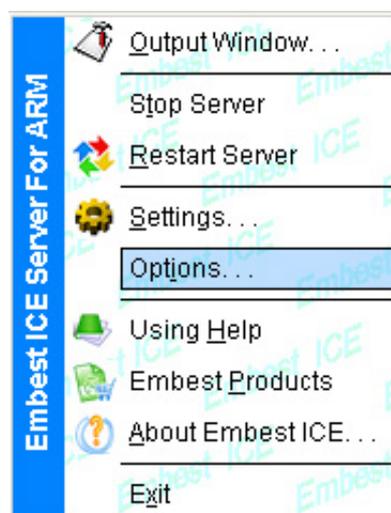


Fig. A-9

Select the submenu Options... and a dialog box will pop up, as shown in the following figure A-10:

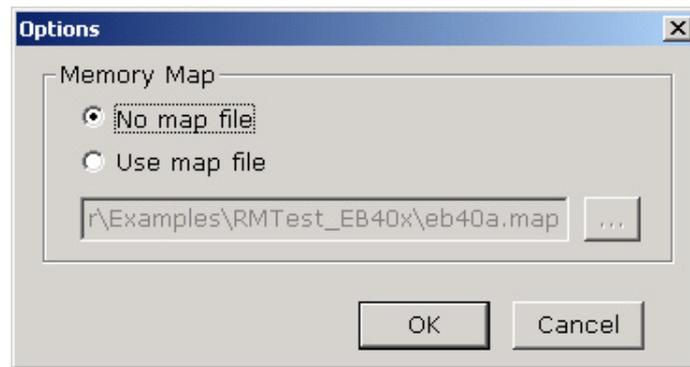


Fig. A-10

To select "Use map file", the full path name for the memory mapping file has to be set in the edit box at the same time, then reading and writing memory during the debugging process will be done according to the memory scope and attributes set in the memory mapping files.

Format of mapping files in memory area

Each line of the mapping files in the storage area describes a storage area, and the column starting with "#" is for note. The description line of the storage area comprises 9 parts, and a space symbol is used to separate the various parts.

Item	Type	Description
Name	Character string	Item name of storage area with a maximum of 64 digits
Start address	Hexadecimal number	Start address of storage area
Length	Hexadecimal number	Length of storage area
Attribute	Character string	Read and write attributes. R means reading, and W means writing
Bus width	Number	Bus width of storage area, 1 represents 8 digits, 2 represents 16 digits, and 4 represents 32 digits.
Access size	Number	Access size of storage area. 1 represents 8 digits, 2 represents 16 digits, and 4 represents 32 digits.
Read waiting	Number	Read waiting cycle, with a unit of ns
Write waiting	Number	Write waiting cycle, with a unit of ns
High-speed access waiting	Number	To tell access waiting cycle, with a unit of ns

Note: the 4 leading items for the various parts above are mandatory, while other items are optional, and "-" means that users do not pay attention.

Example of mapping file of storage area

Generally, **BusWidth AccessSize ReadWait WriteWait BurstWait** means does not pay attention (notWarry), and the map file is given below for illustration:

Name	Start	Size	Attribute	NotWarry
INTERNRAM	10000000	2000	RW	- - - - -
COREINTERNALIO	78000000	8000000	RW	- - - - -
STANDARDAPBIO	B0000000	8000000	RW	- - - - -
COREAPBIO	B8000000	8000000	RW	- - - - -
EXTERNDRAM	C0000000	800000	RW	- - - - -
EXTERNSRAM	C8000000	100000	RW	- - - - -
FLASH	C8100000	200000	R	- - - - -
EXTERNSRAM	D0000000	80000	RW	- - - - -
EXTERNIO	F0000000	8000000	RW	- - - - -

8.2 SDT debugging settings

In the ARM SDT2.50/2.51 software, the debugging setting procedures are as follows:

(1) Start up ARM Debugger

You can directly run the ARM Debugger, or select menus Project -> Debug xxxx.apj to run it in the ARM Project Manager.

(2) Open the dialog box for debugging configuration

In the ARM Debugger, select menus Options→ Configure Debugger as the following Fig. A-11, and open the dialog box for ARM Debugger debugging configuration.

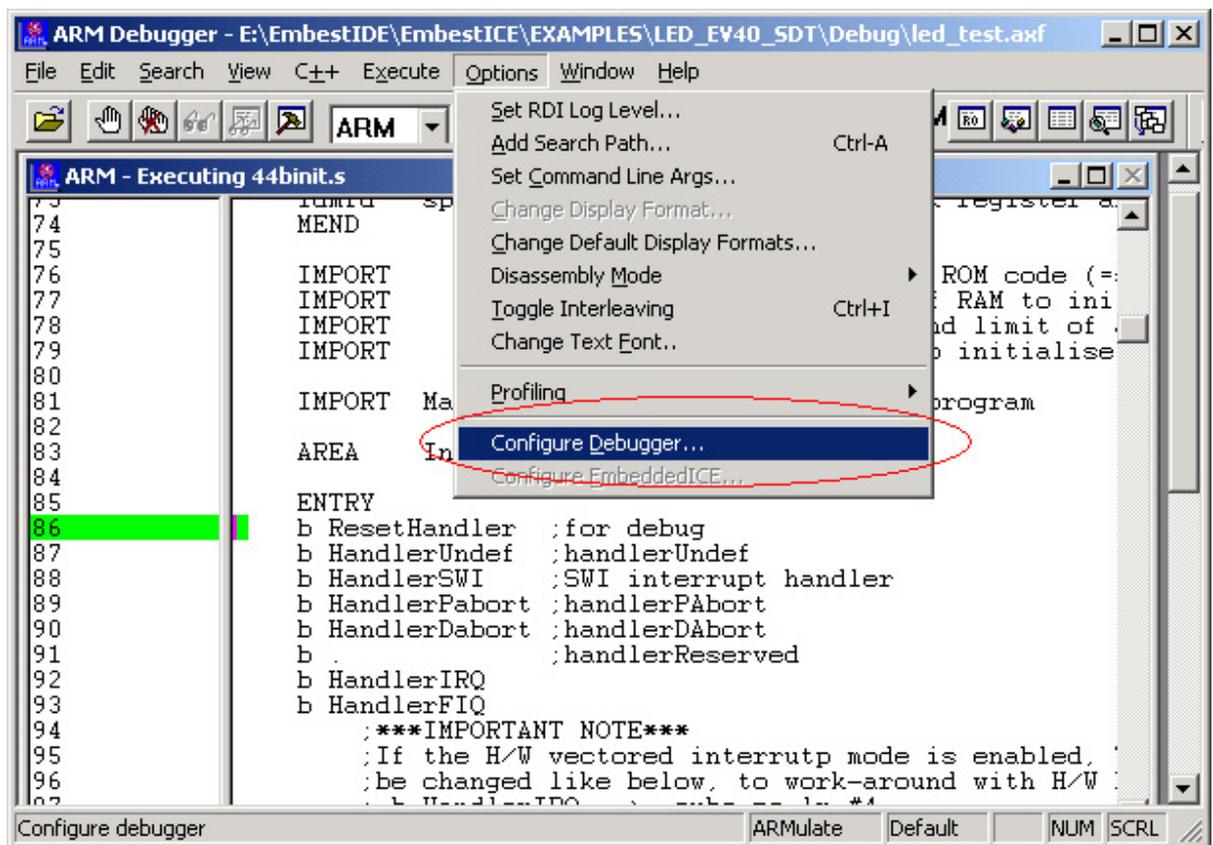


Fig. A-11

(3) Debugging configuration

Remote_A: Select the Target attribute tab in the debugging configuration dialog box as shown in the following figure A-12, and select Remote_A from the combo box Target Environment.



Fig. A-12

Click the "Configure..." button, and the dialog box for Remote_A configuration will pop up.

Select Ethernet for Remote Connection, and input the host IP address for Embest ICE Server running in the edit box. If the Embest ICE Server and the ARM Debugger run on the same host, the loopback IP address 127.0.0.1 can be entered, as shown in the following figure A-13.

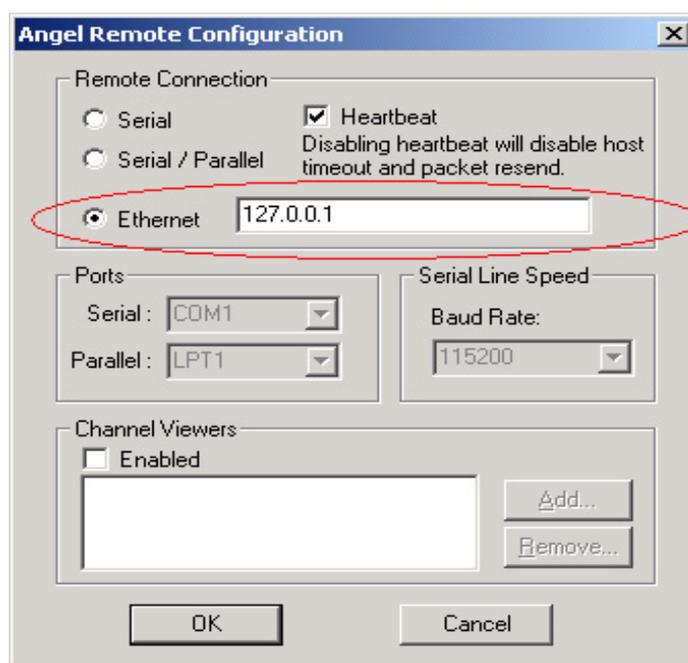


Fig. A-13

(4) Little and big Endian setting

Select the Debugger attribute tab for debugging configuration, and select Little Endian or Big Endian according to the targets to be debugged, as shown in the following figure A-14:



Fig. A-14

8.3 ADS debugging settings

In the ARM ADS 1.2 software, the debugging setting procedures are as follows:

(1) Start up AXD

You can separately and directly run the AXD, or select menus Project → Debug to in the CodeWarrior for ADS project management window to open the AXD.

(2) Open target selection dialog box

If no configuration debugging mode is set for the ADS, a prompt dialog box will pop up during startup of AXD. Click the Configure button to open the dialog box for target selection, as shown in the following figure A-15:

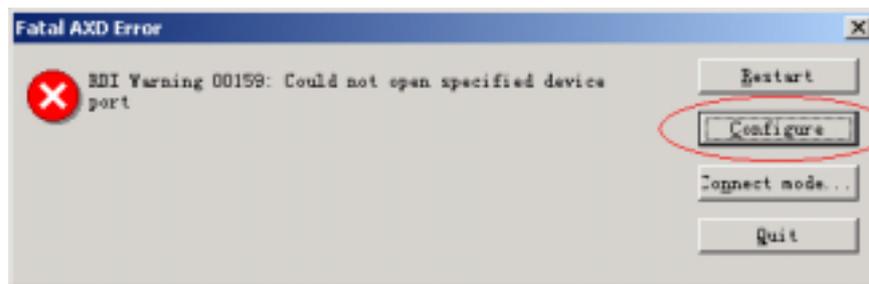


Fig. A-15

If debugging mode is configured for the ADS, select menus Options → Configure Target to open the dialog box for target selection, as shown in the following figure A-16:

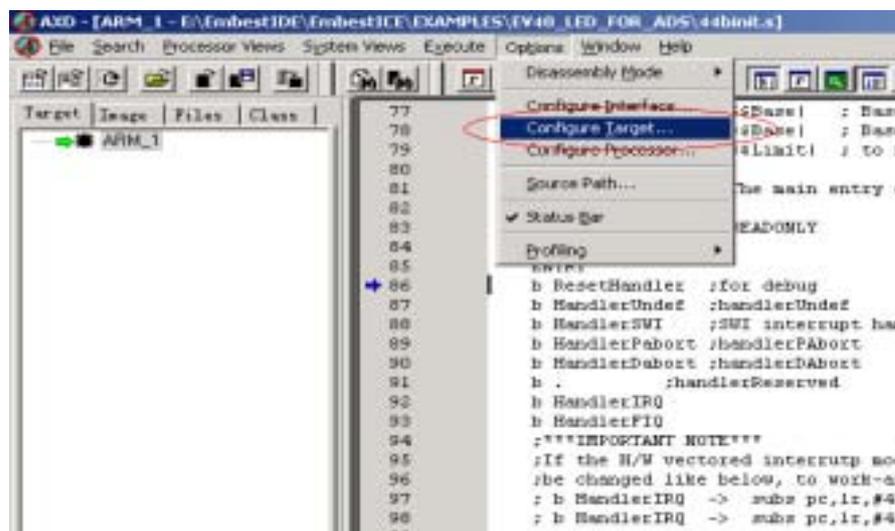


Fig. A-16

(3) Select target ADP

Select the ADP from the list of the dialog box for target selection as the following Fig. A-17

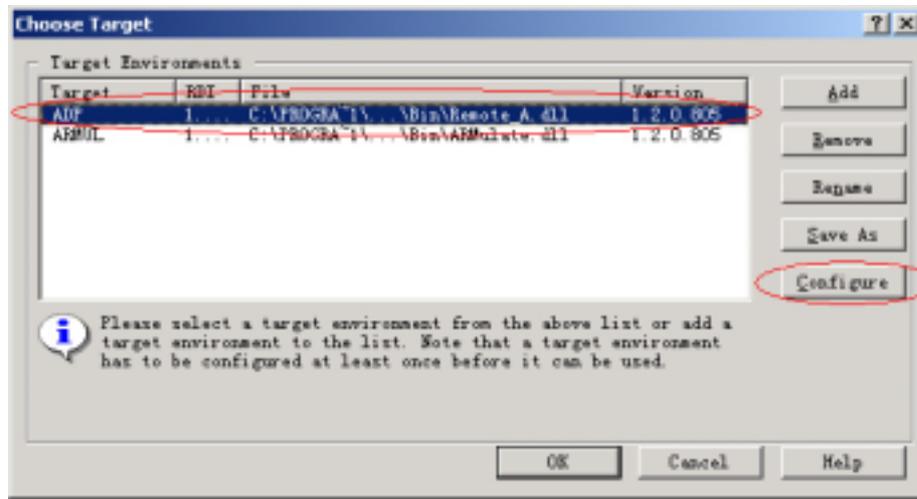


Fig. A-17

(4) Configure ADP parameters

Click the Configure button in the dialog box for target selection, open the dialog box for ADP configuration, and select Little Endian or Big Endian according to debugging objects as the following Fig. A-18

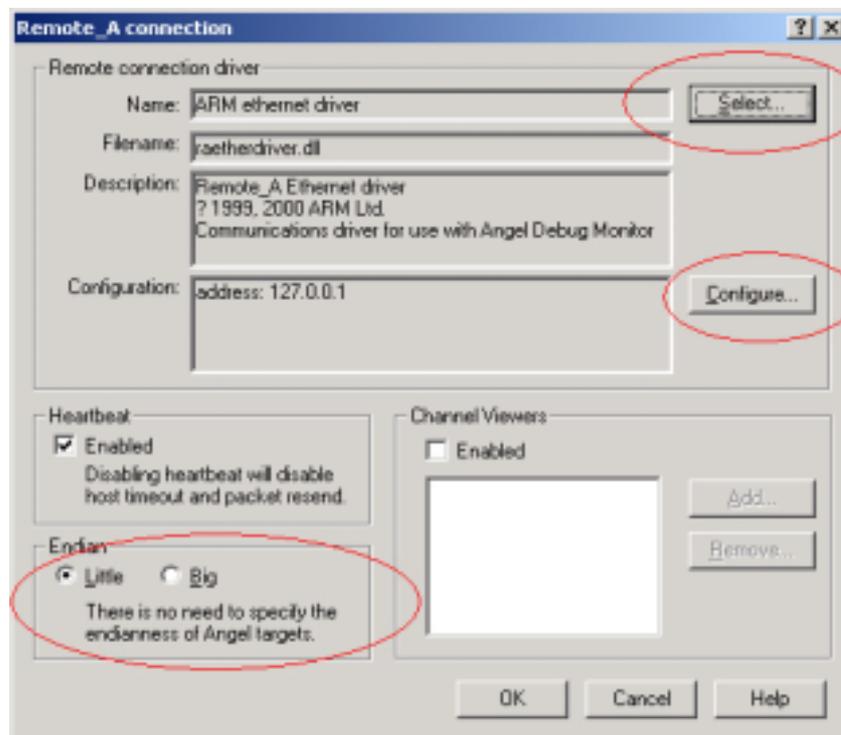


Fig. A-18

Click the Select button, and a dialog box for selection of usable drive programs will pop up, and select the ARM Ethernet driver, as shown in the following figure A-19:

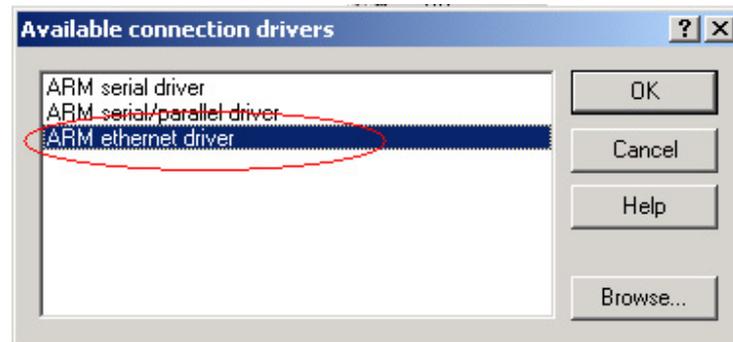


Fig. A-19

Click the Configure button, and a dialog box for network connection will pop up. Enter the host IP address run by the Embest ICE Server. If the Embest ICE Server and the AXD are running in the same host, the loopback IP address 127.0.0.1 can be entered, as shown in the following figure A-20:



Fig. A-20

(5) Cancel Semihosting

Select AXD software menus Options → Configure Processor to open the dialog box for processor configuration as the following Fig. A-21

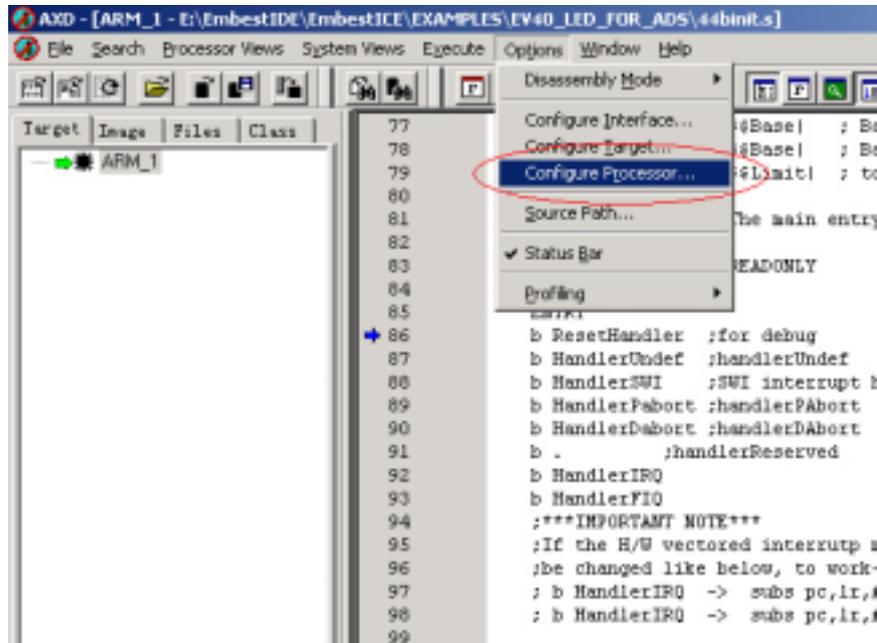


Fig. A-21

Cancel Semihosting in the dialog box for processor configuration, as shown in the following figure A-22:

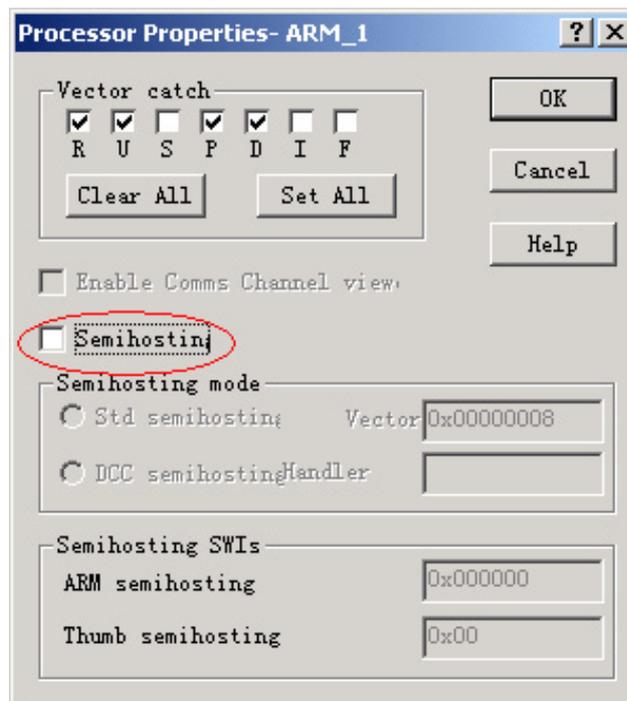


Fig. A-22

8.4 GDB debugging Settings

Installation required

(1) Install Cygwin.

Cygwin is a Linux-like environment for Windows; it enables you to use GNU tools in Windows. It can be download from the site <http://www.cygwin.com> for free.

(2) Install ARM Development Tool Chains

Download EmbestArmTool.exe from <http://support.embedinfo.com>, and install this software to the root directory where Cygwin was installed.

(3) Install arm-elf-gdb tool

Locate arm-elf-gdb.exe under this directory "Cygwin/usr/local/ armtools/bin/".

Steps of debugging programs

Step 1: Start up EmbstICE Server for ARM and finish the settings.

Step 2: Run Cygwin and set the cross compiler executable files directories.

```
$ PATH="/usr/local/armtools/bin:$PATH"
```

Step 3: Compiling and Linking

```
$ arm-elf-gcc -g -c gdb_test_led.c -o gdb_test_led.o // compile
```

```
$ arm-elf-ld -Tram_ice.ld -g -o gdb_test_led.elf gdb_test_led.o // link
```

Step 4: Connect GDB to target board.

```
$ arm-elf-gdb gdb_test_led.elf
```

```
GNU gdb 6.2
```

```
Copyright 2004 Free Software Foundation, Inc.
```

```
GDB is free software, covered by the GNU General Public License, and you are
welcome to change it and/or distribute copies of it under certain conditions.
```

```
Type "show copying" to see the conditions.
```

```
There is absolutely no warranty for GDB. Type "show warranty" for details.
```

```
This GDB was configured as "--host=i686-pc-cygwin --target=arm-elf"...
```

```
main.c captured_main : before captured_command_loop
```

```
main.c captured_command_loop : before current_interp_command_loop
```

```
[interps.c current_interp_command_loop : command_loop_proc]
```

```
(gdb) target rdi e=192.192.192.22
```

```
Embest ICE Server For ARM V1.2
```

```
Embest Info&Tech Co.,Ltd.
```

```
www.embedinfo.com
```

```
Released build April 20 2004
```

```
Device: Embest Emulator, PowerICE, UNetICE.
```

```
Connected to ARM RDI target.
```

9. Customer Service

Get support on demand. Connect Customer Service for more information on how to use the Embest's products.

(1) Web Site

Get the latest information and docs about Embest's products from the web site:

<http://www.armkits.com>

<http://www.embedinfo.com>

You may have noticed some trouble issues at the support forums. In the meantime, you can get help by subscribing to the following forum:

<http://www.embedinfo.com/cforum/login.asp>

(2) E-Mail

If you have any questions, comments, feedback or suggestions, contact us at

support@embedinfo.com

(3) Telephone Number

You can also call **+86-755-25635626** with the extension to the Customer Service Center.

(4) Fax Number

Our fax number is **+86-755-25616057**