inSIDE HC08

Basic Debugger for Freescale HC08 Family Devices

User's Manual

Rev. 2.0

SofTec® MICROSYSTEMS

DC01030

SofTec Microsystems

E-mail (general information): info@softecmicro.com

E-mail (marketing department): marketing@softecmicro.com

E-mail (technical support): support@softecmicro.com

Web: http://www.softecmicro.com

Written by Paolo Xausa

Contents

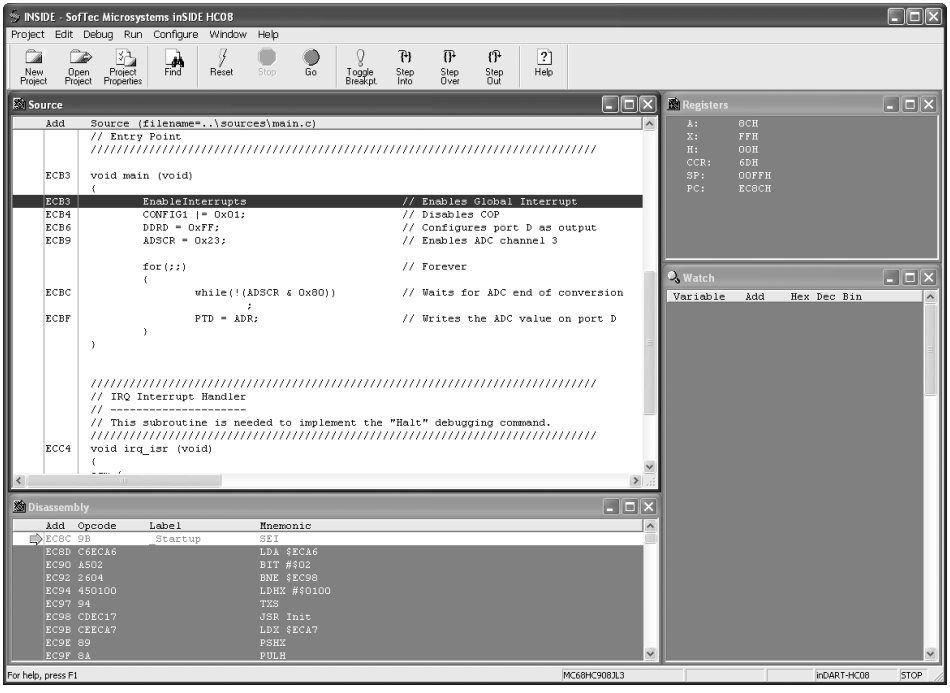
1. Overview

Introduction

inSIDE HC08 is a basic debugger for Freescale HC08 family devices. inSIDE HC08 can be used in conjuction with the inDART-HC08 series of in-circuit, real-time, ISP debuggers/programmers to download and debug user applications directly into the target board, through a standard MON08 connector.

inSIDE HC08 can read binary, Intel-Hex, Freescale S-Record, P&E Map and ELF/DWARF files. inSIDE HC08 provides basic debugging capabilities (run, stop, single step, breakpoints, etc.)

The inSIDE HC08 user interface is made of some hardware-specific functions (required to connect to and configure inDART-HC08) and some common functions related to the debug of the target application. The inDART-HC08-specific functions are explained in detailed in the inDART-HC08 user's manual. This chapter deals with all of the other inSIDE HC08 functions.



The inSIDE HC08 User Interface

Installing the Software

The inSIDE HC08 user interface setup program is located on the SofTec Microsystems “System Software” CD-ROM provided with the inDART-HC08 in-circuit debugger/programmer. The setup program will copy the required files (including the USB driver) to your hard drive. Additionally, an uninstall program will be copied, giving you the option to uninstall the inSIDE HC08 user interface at any time.

To install the inSIDE HC08 user interface:

1. Insert the **“System Software”** CD-ROM into your computer’s CD-ROM drive.
2. A startup window should automatically appear (if the startup window doesn’t appear automatically, manually run the **Setup.exe** file located on

the CD-ROM root). Choose **"Install Instrument Software"** from the main menu.

3. A list of available software should appear. Click on the **"inDART-HC08 Additional Components"** option.
4. Follow the on-screen instructions.

Note: *if you are installing the inDART-HC08 user interface on Windows 2000 or Windows XP you must have logged in as Administrator.*

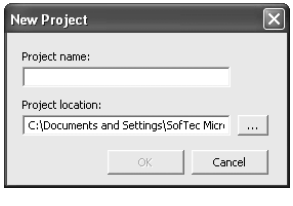
2. Starting Up a Debugging Session

Creating a New Project

Before starting a debugging session, you must create and configure a project. A project can be defined as a *working session*. Everything you do when working with the emulation unit, you do it within a project.

A project contains all the information you need to work properly with the target: the microcontroller used, the working frequency and the source file, just to name a few. A project also contains user-specific information, such as breakpoint list and watch list, and environment options, such as type of windows displayed on the screen. When you open a project, all these information are automatically loaded, and automatically saved when another project is opened or you exit the inSIDE HC08 user interface.

To create a new project, select **Project > New** from the main menu. The following dialog box will appear.

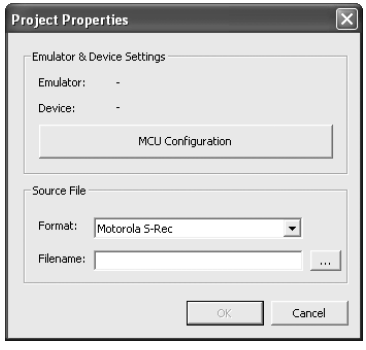


The *New Project* Dialog Box

First, assign the project a name. Then, specify a location. Click **"OK"** when done. inSIDE HC08 will create a **.prj** file with the project name you specified in the selected location.

Defining Project Properties

After naming the new project, a *Project Properties* dialog box will appear. From this dialog box you can set all of the parameters that are required in order to correctly set up a debugging session.

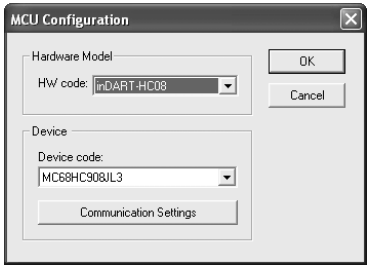


The *Project Properties* Dialog Box

inSIDE HC08 supports binary, Intel-Hex, Freescale S-Record, P&E Map and ELF/DWARF files. Only P&E Map and ELF/DWARF object files contain debug information—therefore only these two formats allow source level debugging. For details on how to generate these object file, please consult your compiler's documentation.

Project Properties > MCU Configuration

By clicking the **"MCU Configuration"** button in the *Project Properties* dialog box, a new dialog box will appear, allowing you to select the hardware model and the target microcontroller you are working with.

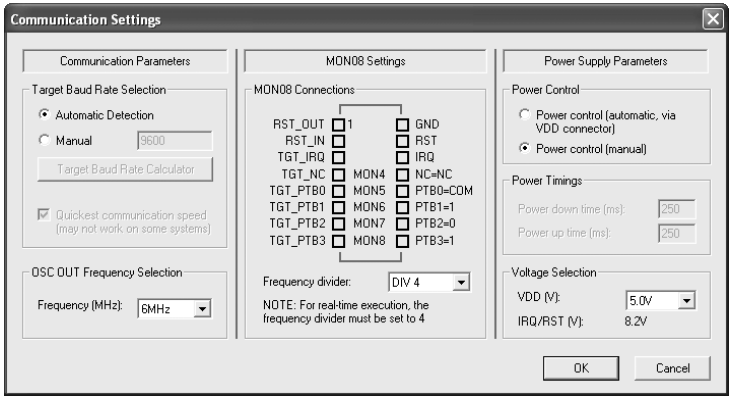


The *MCU Configuration* Dialog Box

First, ensure that the **"Hardware Model"** parameter is set to **"inDART-HC08"**. Then, set the **"Device Code"** parameter to the specific target microcontroller you are working with.

MCU Configuration > Communication Settings

The **"Communication Settings"** button in the *MCU Configuration* dialog box allows you to fine-tune critical parameters needed for proper operation with the chosen target microcontroller.



The *Communication Settings* Dialog Box

The dialog box is divided into three sections: "Communication Parameters", "MON08 Settings" and "Power Supply Parameters". All of the parameters must be carefully set, otherwise unsuccessful operations will result. For further details, please consult the inDART-HC08 user's manual.

3. inSIDE HC08 Common Functions

User Interface Overview

The inSIDE HC08 user interface is organized in a series of windows that display various information about the emulation process. There are five types of different windows: *Source*, *Registers*, *Disassembly*, *Memory*, *Watch*.

The inSIDE HC08 user interface provides a menu bar (from which you can access all of the user interface and emulation commands), a toolbar (which groups the most used commands) and a status bar (which shows information about your current emulation session).

Managing inSIDE HC08 Windows

The **Window** menu groups all the command related to the opening, closing and arranging of all of the inSIDE HC08 user interface windows.

The **Window > Cascade**, **Window > Horizontal Tile** and **Window > Vertical Tile** commands arrange all of the open windows by respectively cascading, horizontal tiling and vertical tiling them.

To save the current windows' layout on the current project, select **Window > Save Layout**. Next time you open the project, the windows will open with the saved sizes and positions.

The **Window > Source** command opens the *Source* window. Depending on the source file format you specified in the *Project Properties* dialog box, the *Source* window will contain your disassembled source code (without symbolic information), the Assembly source code or a complete C source code with symbolic information. The leftmost column of the *Source* window displays the current position of the Program Counter (indicated by an arrow) and the location of the breakpoint (if it has been set).

The **Window > Disassembly** command opens the *Disassembly* window, which contains the disassembled project's binary file. The disassembling starts from the current PC location and continues for a certain number of locations. A right-click on the *Disassembly* window opens the **Debug** menu.

Note: *the* Disassembly *window is particularly useful when stepping on a C source file. inSIDE HC08's step instructions (**Step Into**, **Step Out**, **Step Over**) actually step at the Assembly level.*

The **Window > Memory** command opens the *Memory* window, in which you have the possibility to view/edit the code/data, by simply double-clicking on a memory location and typing the new value. A right-click opens the **Edit** menu.

Note: *when the* Memory *window is open, step commands may execute slower, since the window contents need to be refreshed after every step.*

The **Window > Registers** command opens the *Registers* window, in which are displayed the target microcontroller's registers. By double-clicking on a line on the *Registers* window you can edit its content. Alternatively, a right-click opens the **Edit** menu.

The **Window > Watch** command opens the *Watch* window, which shows the list of all of the variables you added to the watch list, together with their address and their value in hexadecimal, decimal and binary format. You have the possibility to directly change the content of the variables, by simply double-clicking on them and typing the new value. A right-click opens the **Debug** menu.

User Interface Preferences

The font used in the emulation windows can be customized with the **Configure > Set Font** command. In addition, the inSIDE HC08 user interface allows you to customize the background color and text color of each emulation window type—just choose the **Configure > Set Colors** command.

Reloading/Reverting Source Code

If you have modified the source code and you want to reload the last saved version, just select **Project > Reload Program**.

If the code has been changed by an external editor while inSIDE HC08 was running, you are requested to reload program when you re-enter in the user

interface. This allows you not to select **File > Open** again every time the source needs to be updated.

Every time the source code is reloaded/reverted, inSIDE HC08 uploads the new source code into the emulation unit.

Edit Commands

All of the edit commands are located under the **Edit** menu.

The **Edit > Goto Address** command (available when the *Source*, *Disassembly* or *Memory* window is active) moves the current visualization point to the specified address.

The **Edit > Set Program Counter** command allows you to set a new value for the Program Counter.

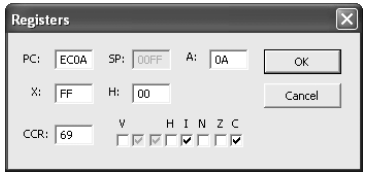
The **Edit > Edit Data** command (available when the *Registers*, *Watch* or *Memory* window is active) allows you to modify:

- the value of the Program Counter or the value of a register, if you selected the corresponding item on the *Registers* window;
- the value of a variable (if you are in the *Watch* window);
- the content of the byte located at the selected memory location (if you are in the *Memory* window).

In all of the above condition, a double-click on the item to be modified achieves the same result as selecting **Edit > Edit Data**.

The **Edit > Find** command looks for a search pattern on the active window (this command is only available on the *Source*, *Disassembly* and *Memory* windows).

The **Edit > Registers...** command opens the *Edit Registers* dialog box, which allows you to view/modify the contents of the target's registers (it is the same as executing the **Edit Data** command when the *Registers* window is active).



The *Edit Registers* Dialog Box

3

Debug Commands

All of the debug commands are located under the **Debug** menu.

The **Debug > Toggle Breakpoint** command quickly toggles a breakpoint on the selected source code line in the *Source* window.

The **Debug > Add Watch** and **Debug > Delete Watch** commands allows you to add/remove a variable on the *Watch* window. The content of the variables listed on the *Watch* window is updated every time the execution is stopped.

The **Debug > Select Source File** command can be used to open a different source code file belonging to the current project. This feature is only available for P&E Map and ELF/DWARF file-based projects.

Note: *if your project is made of several source code files, inSIDE HC08 always switches, during debugging, to the source code file which contains the instruction pointed to by the Program Counter.*

Run Commands

All of the commands related to run/stop the emulation are located under the **Run** menu.

The **Run > Reset Processor** command resets the instrument. The operation is the equivalent of asserting a RESET signal on the HC08 family of microcontrollers. All registers and flags are set to their default values.

The **Run > Go From Reset** command resets the instrument and then runs your program. Selecting **Run > Go From Reset** is the equivalent of selecting the **Reset Processor** command followed by **Go** command.

The **Run > Go** command starts execution from the current Program Counter. inSIDE HC08 executes the program until you interrupt it, until it reaches a breakpoint, or until the program terminates.

The **Run > Go From New PC** command allows you to run your program starting from a specified location. If you select this command, a dialog box appears asking you from where you want your program to start. If a debug code is loaded, you'll find here a list of labels. You can specify one of these labels as the starting value for the Program Counter.

The **Run > Stop** command stops the current emulation session. To continue the execution of the program just select **Go**.

The **Run > Step Into** command causes inSIDE HC08 to execute a single instruction. If the *Source* or *Disassembly* window is open, the next instruction to be executed will be highlighted (the arrow of the Program Counter also points to this line).

The **Run > Step Over** command executes a single line of your program and skips over any procedure or function calls. If the next executable instruction is a BSR instruction, selecting **Step Over** will cause the debugger to step over the routine being called (but fully executing it) and return to the line directly beneath the BSR instruction. If the *Source* or *Disassembly* window is open, the next instruction to be executed will be highlighted (the arrow of the Program Counter also points to this line).

The **Run > Step Out** command works in the same way of **Step Into**, but if it's invoked inside a subroutine causes the rest of the procedure to be executed, returning to the instruction right beneath the BSR instruction. If the *Source* or *Disassembly* window is open, the next instruction to be executed will be highlighted (the arrow of the Program Counter also points to this line).

Note: *the **Step Out** command only works if the stack pointer has not been modified inside the subroutine.*

The **Run > Multiple Step** command causes a specified number of instructions to be executed. You can specify this number by selecting the **Run > Multiple Step Value** command.

4. Troubleshooting

Common Problems and Solutions

This section reports some common problems that may arise during general use. However, working with a specific target device may cause device-specific issues.

Communication Can't Be Established with inDART-HC08

1. Make sure the inDART-HC08 in-circuit debugger is connected to the PC and powered on. inDART-HC08 is powered by the USB connection.
2. Make sure you are working with the correct inDART hardware model. To view/change the inDART hardware model in use, choose **Project > Properties** from the inSIDE HC08 user interface's main menu and click the **"MCU Configuration"** button.
3. Make sure the demo board/target application board is powered on and the target microcontroller is working. Programming and debugging rely on a MON08 serial communication between the inDART-HC08 board and the demo board/target application. This means that, in order to work correctly, the target microcontroller must be running. In particular, make sure that:

   - The MON08 cable is connected to the demo board/target application's MON08 connector.
   - The target microcontroller is in place.
   - All of the MON08 connector signals are correctly tied to the target microcontroller.
   - The TGT_IRQ# and the RST_IN# MON08 lines aren't driven low by the target.
   - The oscillator circuitry is working at the frequency required to generate the specified MON08 target's baud rate. To view/change the MON08 baud rate, choose **Project > Properties** from the inSIDE HC08 user interface's main menu and click the **"Communication Settings"** button.

4. Make sure that the target baud rate setting, required to enter the monitor mode, has been calculated taking into account the **"Frequency divider"** parameter (in the *Communication Settings* dialog box).

A Communication Error Is Returned on a Program Execution Command (Go, Step, etc.)

- Make sure that the target microcontroller's I/O bit corresponding to the MON08 line dedicated to the bidirectional communication is set to input by your program.
- Make sure that your program works correctly. Among other things, your program must not access reserved memory locations.

Peripheral Speed is Low

The **"Frequency divider"** parameter should always be set to 4 in order to guarantee that, in monitor mode, all of the target microcontroller's peripherals run at the same speed they do in user mode. If, however, you set this parameter to 2 not all peripherals will work at this doubled speed.

Stepping Execution is Slow

When the *Memory* window is open, step commands may execute slower, since the *Memory* window contents need to be refreshed after every step.

Getting Technical Support

Technical assistance is provided free to all customers. For technical assistance, documentation and information about products and services, please refer to your local SofTec Microsystems partner.

To benefit the free technical support service, the Registration Card must have been filled out and sent in.

SofTec Microsystems offers its customers a free technical support service at *support@softecmicro.com*. Before to get in contact with us we suggest you, however, to visit our online FAQ section and to be sure you are working with the latest version of the inDART-HC08 user interface (upgrades are available for free at *http://www.softecmicro.com/download.html*)