

EMUL-SX-PC

Getting Started Guide

noHau



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EMUL-SX-PC™

Getting Started Guide

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Sales Offices, Representatives and Distributors

User Responsibility

The in-circuit debugger application, as well as all other unprotected circuits need special mitigation to ensure Electromagnetic Compatibility (EMC).

The user has the responsibility to take required measures in the environment to prevent other activities from disturbances from the debugger application according to the user and installation manual.

If the debugger is used in an environment other than the intended (for example, field service applications), it is the user's responsibility to control that other activities cannot be disturbed in such a way that there may be risk for personal hazard/injuries.

Special Measures for User

To reduce the disturbances to meet conducted emission requirements it is necessary to place a ground plane on the table under the pod cable and the connected processor board. The ground plane shall have a low impedance ground connection to the host computer frame. The insulation sheet between the ground plane and circuit boards shall not exceed 1mm of thickness.

Warnings

The following is a list of warnings that are included throughout this guide:



To avoid damage to the pod or to your target, do not connect the pod to your target when the pod or target power is on.



When the target uses 5 volts Vcc the SX Mini Pod is powered by the target through a diode. If the target uses 3 volts Vcc then the pod must be powered by the external supply. Make note of the power-up and power-down sequences of the debugger and your target system. When powering up or down the system, the target must never be powered when the pod is not powered. To avoid damage, always power up the pod first and then the target. When powering down, turn off the target first and then the pod.



Always turn the power off before you plug in or unplug boards, ribbon cables, or the pod board to avoid hardware damage.

About This Guide

The EMUL-SX-PC is a PC-based debugger for the Scenix family of microprocessors. This guide helps you to get started with the basics of setting up, configuring, and running the Seehau software and debugger.

The *EMUL-SX-PC Getting Started Guide* introduces the following tasks:

- Installing the Hardware
- Installing and Configuring the Seehau Software
- Configuring the Debugger Software
- Using Flash Memory
- Starting Seehau
- Shutting Down Seehau
- Creating Macros

System Requirements

CAUTION

Like all Windows applications, the Seehau software requires a minimum amount of free operating system resources. The recommended amount is at least 40%. Below this percentage, Seehau might become slow, unresponsive or even unstable. If you encounter any of these conditions, check your free resources. If they are under 40%, reboot and limit the number of concurrently running applications. If you are unable to free more than 40% operating system resources, contact your system administrator or Nohau Technical Support.

The following are minimum system requirements:

- Pentium 200 or higher (Pentium II or higher is recommended)
- Single-Processor System (not Dual-Processor)
- Windows 95, 98, NT, or 2000
- Random Access Memory (RAM)
 - For Windows 95/98: 32 MB
 - For Windows NT: 64 MB

1

Overview of the EMUL-SX Debugger System

Hardware

The basic hardware for the EMUL-SX-PC debugger system is the SX Mini Pod. The pod board consists of a variable clock and logic. At present, SeehauSX supports two chip groups: SX18/20/28 and SX48/52. In some cases, features and functions differ between these two groups. This guide indicates when this occurs.

Refer to Chapter 2, “Hardware Overview” for detailed hardware information.

Software

The debugger is configured and operated by the SeehauSX user interface. Seehau is a high-level language user interface that allows you to perform many useful tasks, for example:

- Loading, running, single-stepping, and stopping programs based on the Scenix assembler supplied by Nohau Corporation. This special version of the assembler outputs IEEE695 format specifically for the Nohau debugger. Contact Nohau Technical Support if you do not have this version.
- Modifying and viewing memory contents including general purpose registers and input/output pins on the pod.
- Programming MCU Flash.
- Setting a hardware breakpoint.
- Recording single-step trace history.

2 Hardware Overview



Figure 1. SX Mini Pod Board

SX Mini Pod

The SX Mini Pod contains a variable clock and logic. (See Figure 1.)

Power

The SX Mini Pod requires 5 volts + / - 5% (.25 volts). If your target power supply is out of this range, you must use the external 5-volt power supply provided by Nohau.

Pod Board Indicator Lights

- When the indicator light is on, the controller is running user code.
- When the indicator light is off, the controller is running debug monitor code, and See Hau can analyze target data.

Installing the Hardware

NOTE

You might find it useful to refer to Figure 2 for a diagram of the pod board connectors while completing the following installation steps.

To install your hardware, do the following:

1. Make sure you power-down the SX Mini Pod and your PC.
2. Plug the 25-pin SX Mini Pod connector into your PC's standard printer port.

3. Make sure your target is powered off.
4. Plug the 4-pin SX Mini Pod connector into your target's programming interface. This connector supplies the four signals needed to communicate with the SX Mini Pod.
5. Power your target.
6. Power your PC.

NOTE

When not in use, exit SeeHau and shut down power to the SX Mini Pod and target. The yellow wire attached to the SX Mini Pod is currently not used.

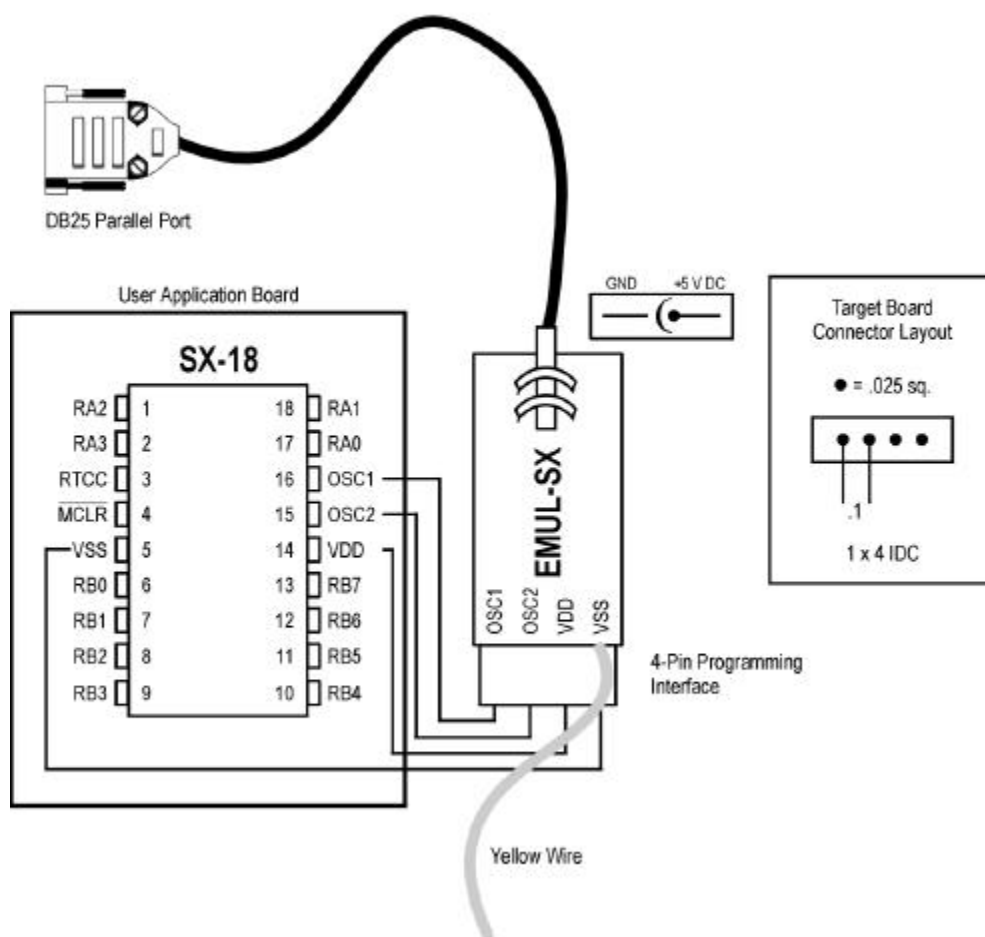


Figure 2. SX Mini Pod Board Connectors

3

Installing the Seehau Software

CAUTION

Like all Windows applications, the Seehau software requires a minimum amount of free operating system resources. The recommended amount is at least 40%. Below this percentage, Seehau might become slow, unresponsive or even unstable. If you encounter any of these conditions, check your free resources. If they are under 40%, reboot and limit the number of concurrently running applications. If you are unable to free more than 40% operating system resources, contact your system administrator or Nohau Technical Support.

Installing Seehau Software from a CD

To install the Seehau software, do the following:

1. Locate your Seehau CD and insert the CD into your CD ROM drive. The installation process will start automatically.
2. Follow the instructions that appear on your screen.

NOTE

If the installation does not start automatically, you probably have your Windows Autorun feature disabled. Then you will need to use Windows Explorer and navigate to the CD root directory. Double-click **Autorun.exe**.

Downloading and Installing Seehau from the Internet

1. Go to the Nohau web site (<http://www.nohau.com/>). Click the Downloads link. The Nohau Software Downloads page appears.
2. Click the Seehau Software link. The Seehau Software Status page appears.
3. Locate the EMUL-SX-PC product listing. Click “Information and Download.”
4. Review the “Known Issues” section.
5. Click the link “Yes I Want to Download.” A Customer Information Form page appears. Complete this form, then click the Proceed button.

6. Click the Go to Download link.
7. Click either option for a download site. The Nohau Software Updates page appears.
8. Click the EMUL-SX-PC link.
9. Click the sSX.exe link. The application will start downloading.
10. Following the download, click the sSX.exe and follow installation instructions.

NOTE

After installing the Seehau software, the **Setup Complete** dialog box appears that allows you to view the Readme.txt file and/or launch the Seehau SX configuration.

You must launch the Seehau SX configuration before running the Seehau software.

4

Configuring the Seehau Software

Automatically Starting the Seehau Configuration Program

After installing Seehau, it is recommended that you automatically start the Seehau Configuration program. Do the following steps before starting Seehau:

1. From the **Setup Complete** dialog box, select **Launch SeehauSX Configuration**.
2. Click **Finish**.



If you do not choose to automatically launch the Seehau Configuration Program, click the Config icon on your desktop to access the **Emulator Configuration Communications** dialog box (Figure 3).

You do not need the hardware connected at this time.



WARNING

To avoid damage to the pod or to your target, do not connect the pod to your target when pod or target power is on.

Configuring the Communications Interface

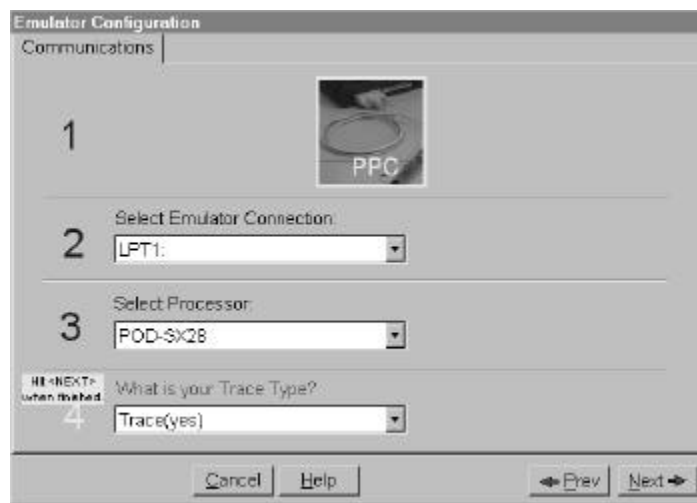


Figure 3. Emulator Configuration Communications Dialog Box

The graphical user interface for this dialog box is divided into four regions. Do the following in each region:

1. Region 1—**Communications Interface:**
No action required. Shown for reference only. Displays the PPC (printer port cable) communications interface for the SX Mini Pod.
2. Region 2—**Emulator Connection:**
Select the port you will use for the debugger connection.
3. Region 3—**Select Processor:**
Click the down arrow and select a processor type. This number can be found on the target chip.
4. Region 4—**Trace Type:**
No action required. Automatically set to **Yes**.
5. Click **Next**. The **Emulator Configuration—Hdw Config** dialog box appears (Figure 4):

Complete the following fields in the **Hardware Configuration** dialog box: (For further details about hardware settings, you can obtain SX18/20/28AC and SX 48/52BD data sheets from the Nohau EMUL-SX-PC Installation CD or from the Scenix web site at www.scenix.com.

Processor: Shown for reference only. If you need to change the processor type, click **Prev**.

Port address: Shown for reference only. If you need to change the port address, click **Prev**.

Emulator Configuration

Hdw Config

Processor: POD-SX28

Port Address: 200

Oscillator Selection: External

External Clock: 20.000000 MHz

External OSC Config.: HS1(100b)

Delay Reset Time: 18.4 ms(11b)

Brown-out Reset: BOR Disabled(11b)

Brown-out Trim: minimum

Stack Extension: 8 levels

ID String(1-8char): SX

Miscellaneous:

- ☒ Watch dog disable
- ☐ Mask Interrupt on step
- ☐ Crystal Buffer Enabled
- ☐ Sleep Clock
- ☐ Carry Flag Enabled
- ☒ Turbo Mode
- ☐ Synchronous Inputs
- ☐ Code Protect Mode

☒ Debug Mode

Required Fields

Cancel Help Prev Finish

Figure 4. Hardware Configuration Dialog Box

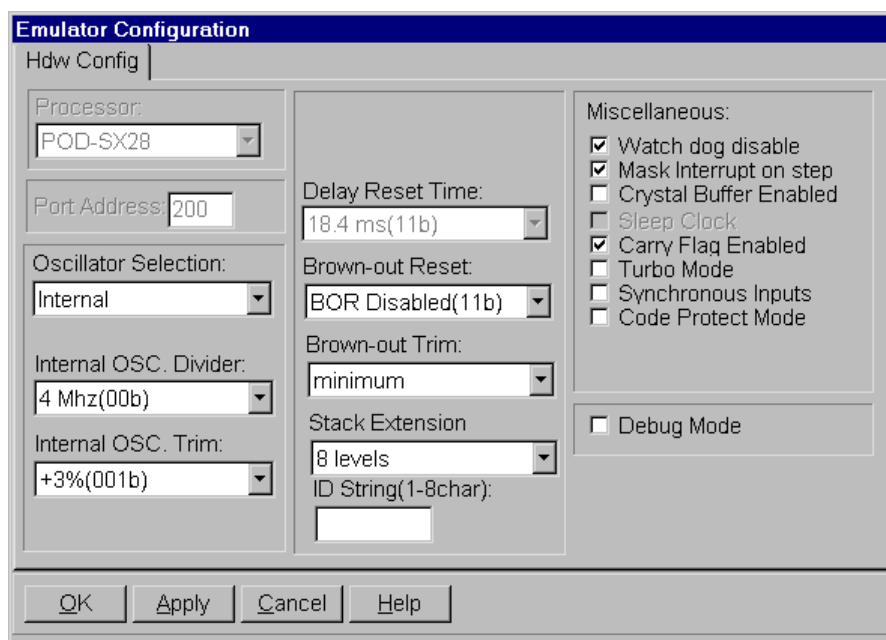


Figure 5. Oscillator Selection–Internal

Oscillator Selection Internal (Figure 5):

If you select the **Internal** option, choose one of the following:

Internal OSC Divider

- 4 MHz (= 00b)
- 1 MHz (= 01b)
- 128 kHz (= 10b)
- 32 kHz (= 11b)

Internal OSC Trim: Found in the Fusex Word bits

11 (IRCTRM2): 9 (IRCTRM1): 8 (IRCTRM0)

Select one of the following options:

- +0% (000b=minimum)
- +3% (001b)
- +6% (010b)
- +9% (011b)
- +12% (100b)
- +15% (101b)
- +18% (110b)
- +21% (111b=maximum)

NOTE

Each value changes the clock by approximately 3%. The **Internal** option is only available when **Debug Mode** is not selected. The **Internal** option can be selected during initial configuration when **Debug Mode** is selected.

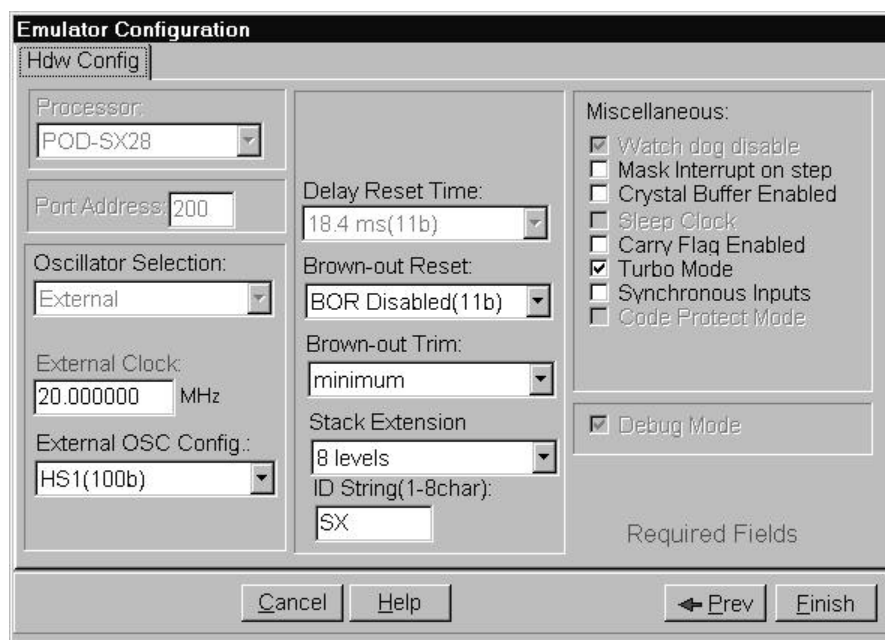


Figure 6. Oscillator Selection–External

Oscillator Selection: External (Figure 6):

If you select **External**, the **External OSC Config** options appear. (See **External OSC Config** options following.)

External Clock: Enter a value from 1 MHz to 100 MHz.

External OSC Config:

LP1 (=000b); low power crystal (32 kHz)

LP2 (=001b0; low power crystal/resonator (32 kHz to 1 MHz)

XT1 (=010b); normal crystal/resonator (32 kHz to 10 MHz)

XT2 (=011b); normal crystal/resonator (1 MHz to 24 MHz)

HS1 (=100b); high speed crystal/resonator (1 MHz to 50 MHz)

HS2 (=101b); high speed crystal/resonator (1 MHz to 50 MHz)

HS3 (=110b); high speed crystal/resonator (1 MHz to 50 MHz)

RC network (=111b); OSC2 is pulled high with a weak pull-up (no CLKOUT output)

Delay Reset Time: A 2-bit field in the FUSEX register can be used to specify the Delay Reset Timer timeout period that results in an automatic wake-up from the power-down mode.

SX48/52:

DRT1:DRT0 Delay Reset Timer (DRT) timeout period

0.06 msec = 10b

18.4 msec = 11b

60 msec = 00b

960 msec = 01b

SX18/20/28: The default is set at 18.4 msec.

Brown-Out Reset: The default is set to disabled.

BOR1:BOR0 Sets the Brown Out Reset threshold voltage.

4.2V = 00b

2.6V = 10b

2.2V = 01b

BOR disabled = 11b

Stack Size: Select one of the following options:

8 Level: Enables stack and option extensions.

2 Level: Disables stack and option extensions.

Brown-Out Trim: Parts are shipped out of the factory untrimmed.

00B = minimum threshold voltage

11B = maximum threshold voltage

Miscellaneous

Watchdog disable: Select this option to disable the watchdog timer when programming the chip. (If you select the debug option, the watchdog is automatically disabled.)

Mask Interrupt on step: Affects the flag register so no interrupts can be performed during the following single-step, and then restores the flag register.

Crystal Buffer Enabled: This feature applies only to SX48/52.

XTLBUF_EN Crystal buffer enable (disable when not using a crystal to reduce load)

Clear to disable the crystal buffer.

Select to enable the crystal buffer.

Sleep Clock: Select this option to enable operation of the clock during power-down mode. This feature applies only to SX48/52.

Carry Flag Enabled: Select to enable carry bit input to Add and Sub instructions.

Turbo Mode: This feature applies to SX18/20/28 only.

Turbo mode enable:

0 = turbo (instruction clock = osc/1). Select to enable turbo mode.

1 = instr clock = osc/4. Select to enable compatible mode.

Synchronous Inputs: Select to synchronous the input pin signal to the internal clock.

Code Protect Mode: Select to enable security to protect your code.




Debug Mode

Select this option to enable the debug feature. When debug mode is enabled, Seehau merges the user and debug monitor code and then writes this code into the chip. Seehau disables the watchdog and sets the oscillator to the external clock to make sure the target is in debug mode. Debug mode also requires that some memory be set aside for the debug monitor.

Clear this option to disable the debug feature. When disabled, Seehau operates as an IDE and FLASH programmer. Refer to Figure 19 for more information.

Use the Source window to edit your source code.

Use the ASM, FLASH Program, and Reset buttons on the Seehau speedbar to do the following tasks:

- ASM button  : assemble the currently focused file.
- FLASH Programming button  : program the FLASH on the SX chip without the debug monitor.
- Reset button  : reset and run the target SX chip.



WARNING

When the target uses 5 volts Vcc the SX Mini Pod is powered by the target through a diode. If the target uses 3 volts Vcc then the pod must be powered by the external supply. Make note of the power-up and power-down sequences of the debugger and your target system. When powering up or down the system, the target must never be powered when the pod is not powered. To avoid damage, always power up the pod first and then the target. When powering down, turn off the target first and then the pod.

5 Using the Seehau User Interface

Using the Seehau Speedbar

The Seehau speedbar provides a shortcut to performing various functions and commands (see Figure 7). Most of the icons on the speedbar provide shortcuts to **Run** menu and **New** menu commands.

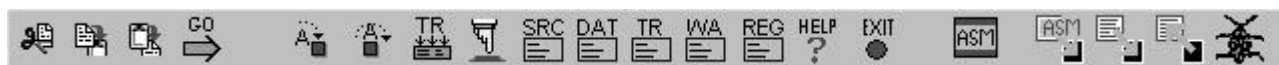










Figure 7. Seehau Speedbar













Standard Microsoft Windows Functions

- Cut to Clipboard 
- Copy to Clipboard 
- Paste from Clipboard 

Run Command Icons

- Start or Stop Emulator  : Starts or stops emulation of your code.
- ASM Step Into  : Performs an assembly level function step into.
- ASM Step Over  : Performs an assembly level function step over.
- Start or Stop Trace  : Starts or stops trace recording of code execution flow.
- Reset the Chip  : Resets the microcontroller that is under emulation.

New Command Icons

- Source Window  : Opens a new Source window.
- Data Window  : Opens a new Data window.
- Trace Window  : Opens a new Trace window.
- Watch Window  : Opens a new Watch window.
- Register Window  : Opens a new Register window.
- Help Contents  : Opens online Help.
- Exit  : Exits the Seehau program.
- Assemble  : Automatically assembles and links the user code and then outputs an IEEE695 file for the Nohau debugger to load.
- FLASH Program  : Programs the FLASH in the target SX. If a source file is currently focused, the file is assembled and then programmed into the SX FLASH . If a Data window is displaying the code space, the FLASH is programmed from that buffer.
- Read  : Reads the FLASH from the target SX chip into a buffer in PC memory. This can be viewed in the Source or Data window as code space.
- Debug Mode  : Selects the debug mode and indicates that Non Debug mode is active. The SX Mini Pod is initialized, the FLASH is read, and the monitor code is added and reprogrammed to the flash in the target SX chip.
- Program Mode  : Selects the Non Debug mode and indicates that debug mode is active. In debug mode, the Mini Pod is not initialized. The Source window is available for editing, and the Assembler is available. The FLASH is programmed with the user code only.

Seehau Menu Bar



Figure 8. Seehau Menu Bar and Speedbar

File Menu

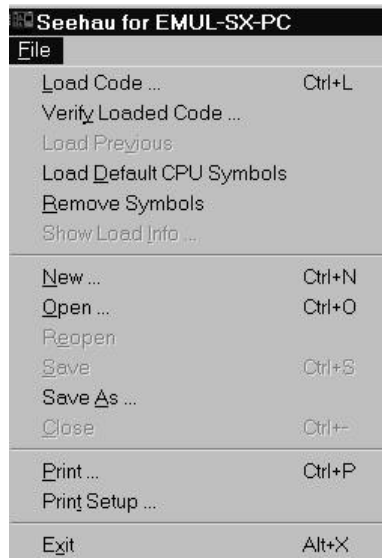


Figure 9. File Menu

Load Code: Loads the object file containing the binary pattern and symbolic information.

Verify Loaded Code: After loading code, verifies that each byte was loaded correctly.

Load Previous: Loads the last loaded object file.

Load Default CPU Symbols: (Currently not implemented.) Loads the special function registers that exist in the microcontroller you are emulating.

Remove Symbols: Clears the symbol table in the debugger software.

Show Load Info: Presents the dialog box displaying statistics about the last loaded file.

New: Opens a new file for editing.

Open: Opens an existing file for viewing/editing.

Reopen: Closes the current file and opens the updated, edited file.

Save/Save As: Saves the currently selected source file in the Source window.

Print: Prints the currently selected source file in the Source window.

Exit: Exits the program.

Macro Menu



Figure 10. Macro Menu

Start Recording: Starts recording debugger actions that are done by you in a macro file, which are saved when you click **Stop Recording**.

Stop Recording: Closes the macro recording session and saves the file.

New: Opens a new macro file in the Macro Edit window.

Open: Opens a new macro file in the Macro Edit window.

Run: Lets you run a macro file.

Break: Stops the macro currently being executed.

Show: Opens a Macro Edit window.

Edit Menu

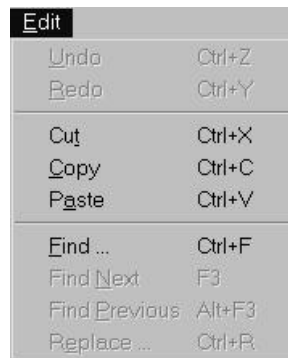


Figure 11. Edit Menu

NOTE

The menu items in the **Edit** menu are used in the same way as all Microsoft Windows programs and apply to the MDI window that is selected.

View Menu



Figure 12. View Menu

Symbol Browser: Allows you to view the symbolic information that is stored away in the software symbol table that was loaded from the object file. This includes line numbers, symbols, and types.

Local Variables: Opens a new Local Variable window that displays the local variables in the function that are currently in scope.

Call Stack: (Currently not supported.) Opens a Call Stack window that presents the call chain.

Evaluate: Allows you to evaluate a symbolic expression, for example, symbol + 3.

Breakpoints: Opens the **Breakpoint** dialog box so you can see whether all breakpoints are active or inactive.

Macros: Opens the Macro window.

Messages: Opens a window so you can see message tracking between the debugger GUI and its main software (mainly used for debug purposes).

Real Time OS: (Currently not applicable.) Opens a real-time operating system presentation window where you can select different real-time operating system vendor's specific debug applications.

S F Regs: (Currently not applicable.) Opens a dialog box that allows you to add special function registers to Register windows, and view special function register information.

Watch: Opens a new Watch window.

Command Line: Brings the window's focus to the command line.

New Menu



Figure 13. New Menu

Add Watch: Allows you to add a variable to the Watch window list.

Source: Opens a new Source window.

Data: Opens a new Data window.

Inspect: Allows you to inspect a variable.

Register: Opens a new Register window.

Trace: Opens a new Trace window.

Run Menu



Figure 14. Run Menu

Step Into: (Currently not implemented.) Performs a C level function step-into.

Step Over: (Currently not implemented.) Performs a C level function step-over.

ASM Step Into: Performs an assembly level function step-into.

ASM Step Over: Performs an assembly level function step-over.

Animate: Automatically continues to single-step through your source or assembly code.

Go: Starts emulation of your code.

Go to Cursor: Places a breakpoint at the line where the cursor is located, and then performs a Go, and removes a breakpoint.

Break: Stops emulation of your code.

Mask Interrupts While Stepping: (Currently not applicable.) Affects the flag register so no interrupts can be performed during the following single-step, and then restores the flag register.

Force Hardware Step: Forces the use of hardware breakpoints to perform a source level step.

Trace Start: Starts trace recording of code execution flow.

Trace Stop: Stops trace recording of code execution flow.

Reset Chip: Performs a reset of the microcontroller that is under emulation.

Full Reset: Downloads logic and monitor code if applicable, and performs a reset of the microcontroller under emulation.

Reset and Go: Resets the microcontroller under emulation and then performs an immediate Go. For some emulator families, this requires that emulation is currently in progress.

Breakpoints Menu

Add Breakpoint: Adds a software breakpoint to the specified address or line.

Fast Break: (Currently not supported.)



Figure 15. Breakpoints Menu

Setup: Opens the **Breakpoint List** dialog box.

Enable All: Enables all breakpoints currently available in the **Breakpoint List** dialog box.

Disable All: Disables all breakpoints currently available in the **Breakpoint List** dialog box.

Delete All: Removes all breakpoints in the **Breakpoint List** dialog box.

Tools Menu

(Not applicable.)

Config Menu

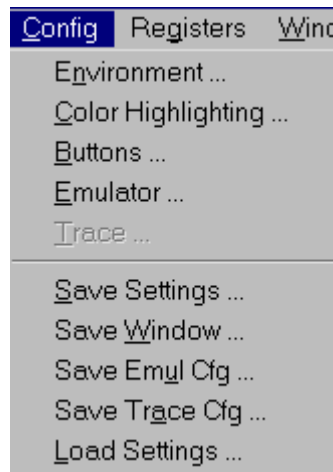


Figure 16. Config Menu

Environment: Lets you configure several items that control the debugger software.

Color Highlighting: Configures the colors used in the Source window for color highlighting.

Buttons: Opens the **Customize Buttons** dialog box.

Emulator: Opens the **Emulator Hardware Configuration** dialog box.

Trace: Opens the **Trace Board Configuration** dialog box where you can specify trigger events and filter conditions.

Save Settings: Forces a save of all selected software settings to a configuration macro.

Save Window: Forces a save of the window configurations to a macro file.

Load Settings: Loads and executes a configuration macro.

Local Menus

If one of the following windows is active, a local menu for that specific window appears in Seehau's main menu bar:

- Source window local menu: (to be documented)
- Data window local menu: (to be documented)
- Registers window local menu (to be documented)
- Trace window local menu (to be documented)

Window Menu



Figure 17. Window Menu

The menu items in the **Window** menu are used in the same way as all Microsoft Windows programs.

Help Menu

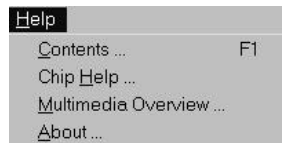


Figure 18. Help Menu

Contents: Opens online Help.

Chip Help: (Currently not implemented.)

Multimedia Overview: Starts the multimedia overview presentation.

About: Displays information about the software such as version and compile date.

6 Using Flash Memory

Address Requirements for Flash Memory

When using flash memory, Seehau's debugger needs to use target code memory space to communicate with the Seehau user interface. To allow this communication, Seehau uses addresses 0x780 to 0x7FF for the SX18/SX20/SX28. For the SX48/SX52, Seehau uses addresses 0xF30 to 0xFFF (Figure 19).

Seehau's debugger also requires two free consecutive addresses from the first code memory page. When writing your target program, make sure you reserve two consecutive addresses from Scenix's first code memory page for Seehau's initialization address.

NOTE

Seehau will not destroy data in the data memory. All of the data space is available for use by the target program.

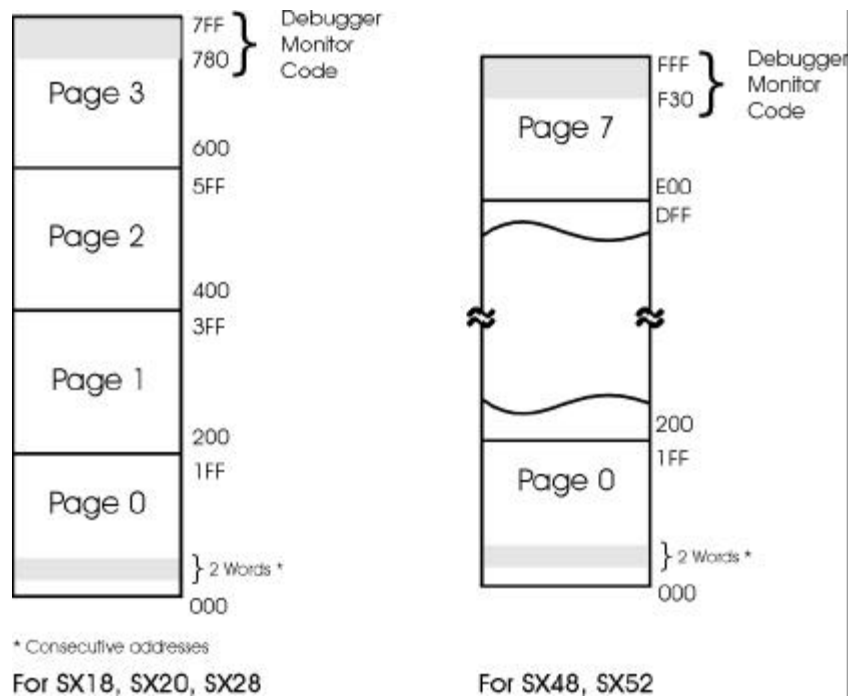


Figure 19. Memory Address Requirements

7 Starting Seehau

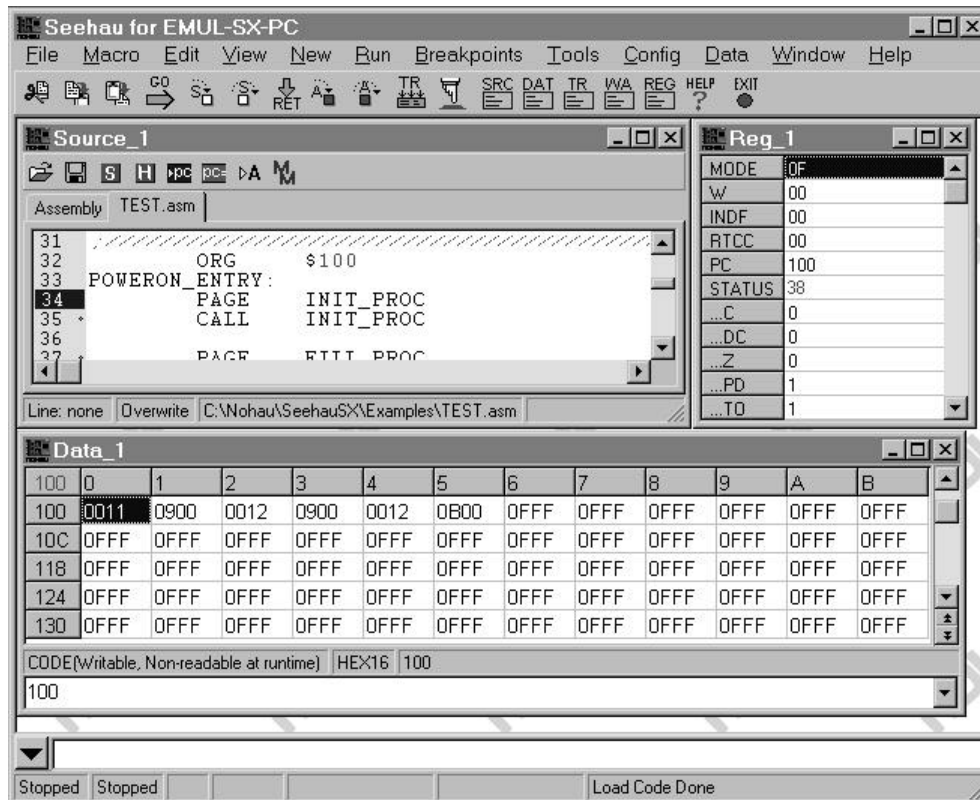


Figure 20. Seehau for EMUL-SX-PC

To start Seehau, double-click the Seehau SX icon. The Seehau main window opens (Figure 20). Seehau will load its configuration from the Startup.bas file. Notice that **Macro** is displayed in red at the bottom of the main window while Startup.bas is running.

When the software startup is complete, you can position and resize the main window to your preference.

To open new windows, go to the **New** menu, and click a window option.

For further information, refer to “Troubleshooting Tips” in the Appendix in this guide or contact Nohau Technical Support at support@nohau.com.

8

Seehau Tutorial

This chapter explains how to do the following tasks in Seehau:

- Assemble and run the Testxx.sxe program.
- Use the Hardware Breakpoint
- Set a Breakpoint
- View and Edit Memory
- Reset the Debugger
- Break Emulation
- Shut down Seehau

Connecting the SX Mini Pod to the Scenix Evaluation Board with the SX28 Chip

In order to use the SX Evaluation Board with the Nohau Debugger, do the following steps:

1. Connect the SX Mini Pod PPC connector to your PC's parallel port.
2. Remove the OSC jumpers J3 and J4 on the evaluation board.
3. Connect the SX Mini Pod to the J2 header on the evaluation board.
4. Verify that JP3 is in the SX28 position.
5. Apply power to the evaluation board.


Connecting the SX Mini Pod to the Scenix Evaluation Board with the SX52 Chip

In order to use the SX Evaluation Board with the Nohau Debugger, do the following steps:


1. Connect the SX Mini Pod PPC connector to your PC's parallel port.
2. Remove the OSC jumpers J16 and J17 on the evaluation board.
3. Connect the SX Mini Pod to the J19 header on the evaluation board.
4. Verify that JP3 is in the SX52 position.
5. Apply power to the evaluation board.

Assembling the Testxx.sxe Program

The SASM assembler is integrated with the Seehau debugger. After assembling a program, any errors generated will appear in the bottom of the Source window. To assemble the Testxx.sxe program, do the following:

1. Focus the Source window.
2. From the **File** menu, click **Open**. From the **Open** dialog box, select **AsmTest28.asm** or **AsmTest52.asm**.
3. Click the  button on the Seehau speedbar. If you have changed your source code, the code is automatically saved and then assembled.

If the assembler generated any errors, the Error window opens below the source with a yellow cursor pointing to the first error.

4. From the **File** dialog box, select AsmTest28.asm or AsmTest52.asm.
5. Correct any errors. Then, click the  button in the Seehau speedbar to re-assemble your code.

When the code has been successfully assembled without errors, a message dialog box displays **Assembly Complete**.

Running the Testxx.sxe Program

Nohau provides a small example program called Testxx.sxe that is found in the C:\Nohau\Seehau1SX\Examples default directory. (Xx is the specific chip you are using.)

Start the debugger following the instructions in Chapter 7, “Starting Seehau.” Then do the following steps to run the test program:

1. Resize the windows on your screen, but do not add the Watch window.
2. If visible on the speedbar, click the Debug Mode button to enter Debug mode. This action enables debug and initializes the SX Mini Pod. When the Non Debug mode button is visible and Debug mode is enabled, proceed to Step 3.
3. Open the **Seehau File** menu and select **Load Code**. The **Open** dialog box appears (Figure 21). Select the .sxe file for your controller.
4. Highlight the Testxx.sxe file for your pod and click **Open**. You can also double-click the file name and it will load into the debugger. The source file automatically displays the testxx.asm in source only (Figure 22).
5. Focus the **Assembly** tab and click the Program button to program your code into the FLASH of the SX.

6. To single-step in mixed mode, click the Assembly Step Into or Step Over button. You will see assembly code mixed in with the associated source lines (Figure 23).

To single-step in source only mode, first click the Source window. Select the **Testxx.asm** tab. Right-click to verify that mixed mode is cleared. Then point to the **Setting** sub-menu item, and select **Lock Tabs**.

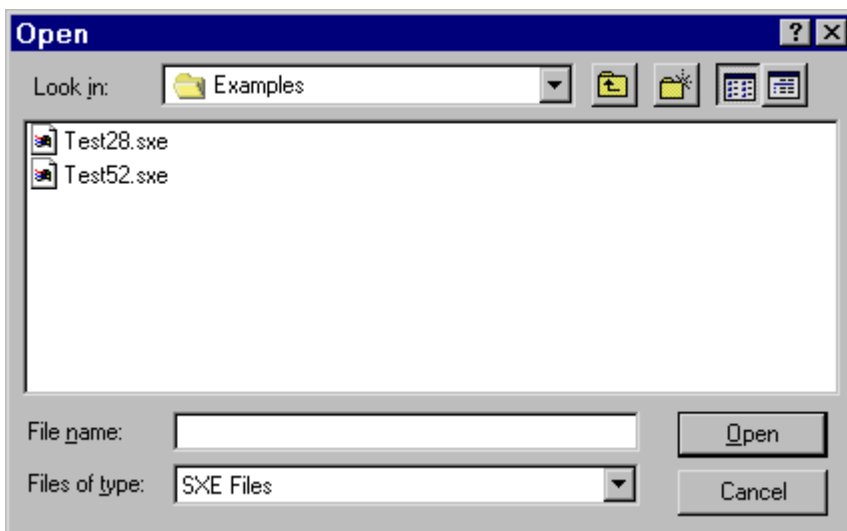


Figure 21. Loading Code

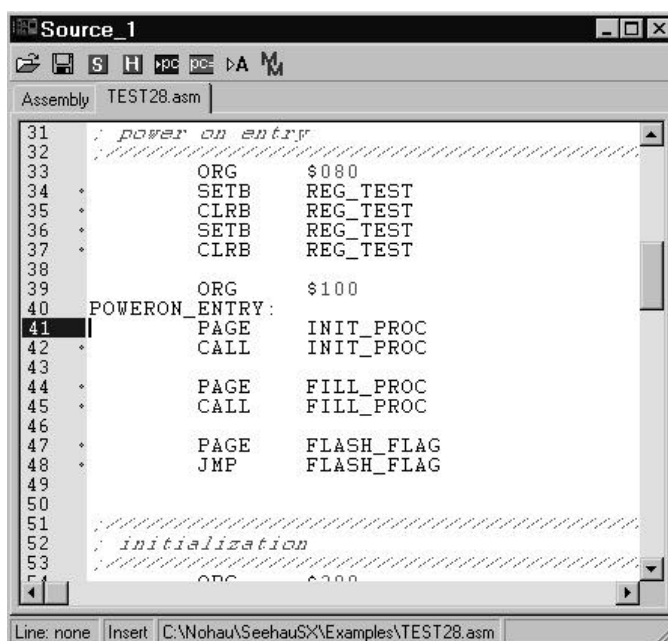


Figure 22. Test Program in Source Only


```

Source_1
Assembly TEST28.asm
31  ; power on entry
32  ; =====
33  ORG      $080
34  SETB    REG_TEST
35  080: C605      SETB    RB.6
36  CLR     REG_TEST
37  081: C604      CLR     RB.6
38  SETB    REG_TEST
39  082: C605      SETB    RB.6
40  CLR     REG_TEST
41  083: C604      CLR     RB.6
42
43  ORG      $100
44  POWERON_ENTRY:
45  PAGE    INIT_PROC
46  100: 1100      PAGE    $200
47  CALL    INIT_PROC
48  101: 0009      CALL    $00
49
50  PAGE    FILL_PROC
51  102: 1200      PAGE    $400
52  CALL    FILL_PROC
53  103: 0009      CALL    $00
54
55  PAGE    FLASH_FLAG
56  104: 1200      PAGE    $400
57  JMP     FLASH_FLAG
58  105: 000B      JMP     $100
59
60  ; =====
61  ; initialization
62  ; =====

```

Line: 41 | Read only | C:\Nohau\SeehauSX\Examples\TEST28.asm | Scope: File: TEST28.asm

Figure 23. Test Program in Mixed Mode

Using the Hardware Breakpoint

In SeehauSX you can set only one breakpoint. The debugger will stop at the next executable instruction after the hardware breakpoint address. This is known as a *one instruction skid* and is a function of the Scenix silicon implementation.

If you place a breakpoint on a jump instruction, note that the program counter will show the jump destination address after reaching the breakpoint.

If you do a step-over of a call instruction that is immediately followed by a jump instruction, the program counter will show the destination address of the jump instruction after the step-over is completed. This is also caused by the one instruction skid.

NOTE

When you do a step-over command, Seehau will ignore the user-set breakpoint and use the only hardware breakpoint for the step-over feature.

Setting a Breakpoint

To set a breakpoint, do the following:

1. From the **File** menu, open the source file where you want to set a breakpoint.
2. Check to make sure the line is executable, as indicated by a small blue circle. (Refer to Figure 23 and note the small circles in the address line number column.)
3. Click once on an executable line number to set a breakpoint. The breakpoint is indicated by a red highlighted bar. To toggle the breakpoint on or off, click the line number.

Single-Step on a NOP Instruction

When doing a single-step on a NOP instruction, the chip will ignore all NOP instructions and do a single-step on the first non-NOP instruction, for example:

```
1 BANK 0
2 NOP
3 NOP
4 NOP
5 MOV W, $FF
6 JMP $100
```

When you do a single-step on a BANK instruction (Line#1), the program stops at the first NOP (Line#2). When you do the second single-step, the program stops at the JMP instruction (Line#6). The three NOP instructions are ignored by the chip. The MOV instruction will be executed.

Viewing and Editing Memory

By default, a Data window is already open in the Seehau main window.

To open a new Data window, click the Data icon  on the Seehau speedbar.

Viewing Memory

There are three tasks involved in viewing memory as follows:

1. Enter an address in the Data window's address field or right click and select **Go to Address** (Figure 24).
2. Right click in the Data window. Point to **Address Space** and click **Code** or **Data** (Figure 25).
3. From the right-click menu, click **Display As**. The **Format** dialog box appears (Figure 26).



Figure 24. Data Window Right-Click Menu

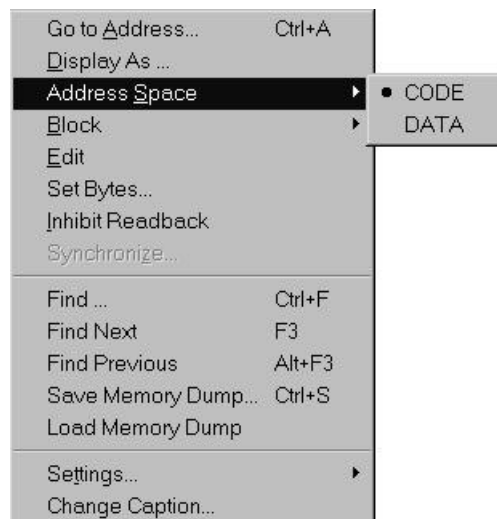


Figure 25. Address Space Sub-Menu

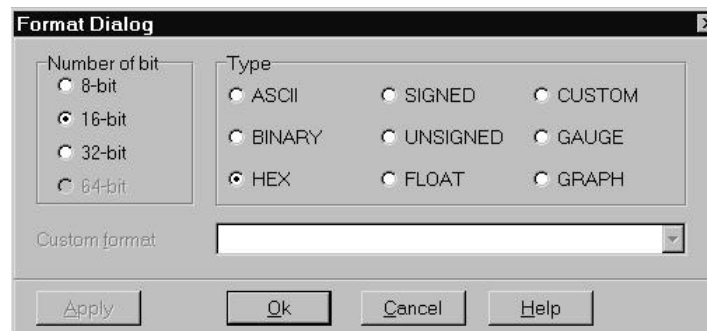


Figure 26. Format Dialog Box


The last three options are special formats:

- **Custom:** Allows you to specify a Printf format string.
- **Gauge:** Allows you to display an address in one of five graphical formats.
- **Graph:** Allows you to display data on an XY axis.

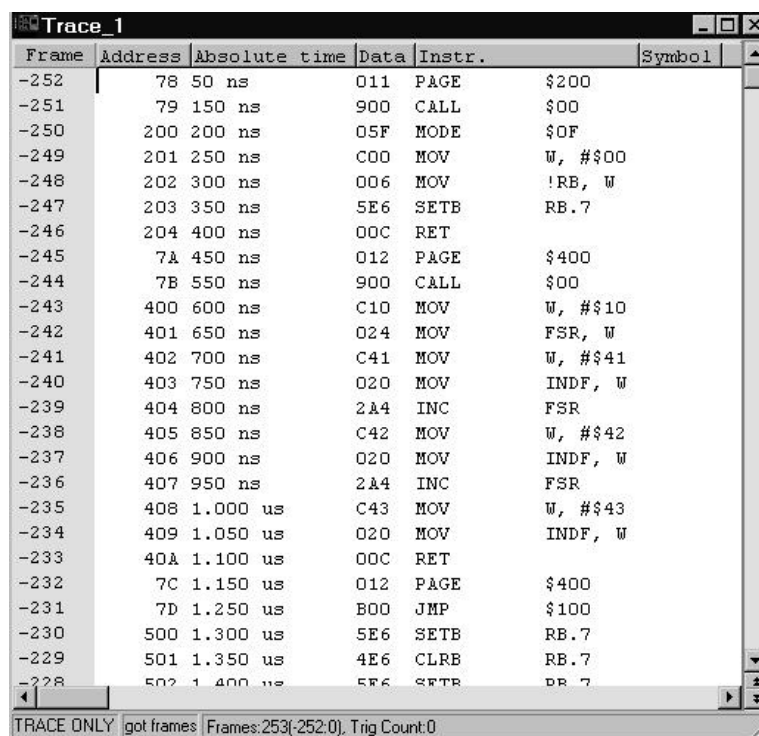
Using the Trace Feature

Overview

The Seehau debugger software is capable of generating an execution trace history by doing a rapid succession of single steps.

To start the trace feature, press the Trace icon  on the Speedbar. The Trace icon changes from green to red to indicate the trace execution has begun. Depending on how long trace has been executing, trace can collect up to 4K frames of execution history.

To stop trace execution, press the Trace icon. The trace display automatically updates.



Frame	Address	Absolute time	Data	Instr.	Symbol
-252	78	50 ns	011	PAGE	\$200
-251	79	150 ns	900	CALL	\$00
-250	200	200 ns	05F	MODE	\$0F
-249	201	250 ns	C00	MOV	W, # \$00
-248	202	300 ns	006	MOV	!RB, W
-247	203	350 ns	5E6	SETB	RB.7
-246	204	400 ns	00C	RET	
-245	7A	450 ns	012	PAGE	\$400
-244	7B	550 ns	900	CALL	\$00
-243	400	600 ns	C10	MOV	W, # \$10
-242	401	650 ns	024	MOV	FSR, W
-241	402	700 ns	C41	MOV	W, # \$41
-240	403	750 ns	020	MOV	INDF, W
-239	404	800 ns	2A4	INC	FSR
-238	405	850 ns	C42	MOV	W, # \$42
-237	406	900 ns	020	MOV	INDF, W
-236	407	950 ns	2A4	INC	FSR
-235	408	1.000 us	C43	MOV	W, # \$43
-234	409	1.050 us	020	MOV	INDF, W
-233	40A	1.100 us	00C	RET	
-232	7C	1.150 us	012	PAGE	\$400
-231	7D	1.250 us	B00	JMP	\$100
-230	500	1.300 us	5E6	SETB	RB.7
-229	501	1.350 us	4E6	CLRB	RB.7
-228	502	1.400 us	5E6	SETB	RB.7

TRACE ONLY | got frames | Frames: 253(-252:0), Trig Count: 0

Figure 27. Trace Display Window

Description of Trace Window Fields

- **Frame:** The trace frame number.
- **Address:** The current program counter of the frame number.
- **Timestamp** (relative or absolute):
 - **Relative:** The execution time of the current instruction.
 - **Absolute:** The cumulative execution time from a zero reference point.
- **Data:** The opcode of the current instruction.
- **Instruction:** The assembly mnemonic of the current instruction.
- **Symbol:** Displays symbolic label of the current address if available.

Resetting the Debugger

Seehau allows you to perform three kinds of reset: **Reset Chip**, **Full Reset**, and **Reset and Go**. To reset the debugger, go to the **Run** menu in the Seehau main window. Click one of the following options:

- **Reset Chip:** Resets the CPU.
- **Full Reset:** Re-loads the debugger logic files and resets the processor.
- **Reset and GO:** Holds the CPU in reset and allows the user code to begin execution without any interference from the monitor code. This is critical for CPUs that have protective registers that must be initialized within a fixed number of bus cycles out of reset.

Breaking Emulation

The Break feature pauses code execution which allows you to analyze internal registers and memory addresses. To break emulation, go to the **Run** menu and click **Break**. This generates a non-maskable interrupt which pushes the return address onto the interrupt stack. At this point, the debugger enters the debug monitor code.

Shutting Down Seehau

1. Do one of the following:

Click the **X** (Close button) on the far right end of the title bar. The **Save Settings** dialog box appears (Figure 28).

From the **File** menu, click **Exit**. The **Save Settings** dialog box appears.

2. To save your settings, type in `Startup.bas` or another macro file name in the **File name** text box.

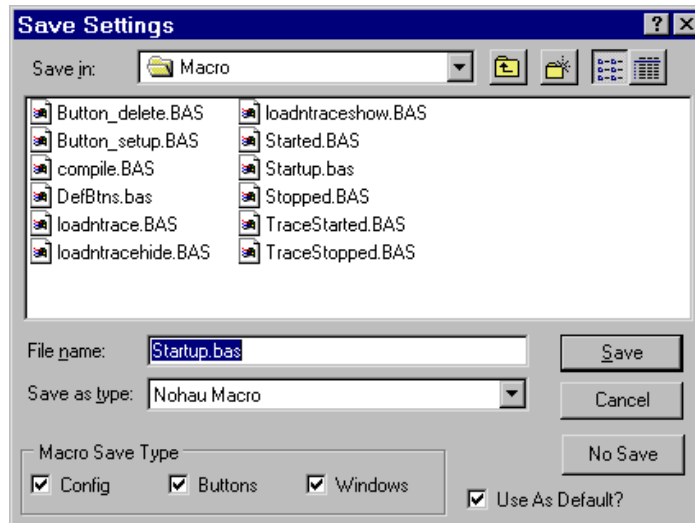


Figure 28. Save Settings Dialog Box

3. Select the **Use as Default** option in the lower right of the dialog box. When Seehau starts, it will use Startup.bas or the macro file you entered in the **File name** text box.
4. Under **Macro Save Type** in the lower region of the dialog box, select the appropriate options: **Config**, **Buttons**, or **Windows**. The items you select here will be saved in the macro indicated by the file name.
5. Click **Save** and exit Seehau. If you do not want to save your settings, click **No Save**.

If you need assistance, refer to “Troubleshooting Tips” in the Appendix, or contact Nohau Technical Support at support@nohau.com.

Important Software and Hardware Notes

Always use **Uninstall** to unload any existing versions of Seehau from your computer before loading another copy. Do not simply delete the Seehau files or folders. Do not install Seehau on top of an existing copy.

To use **Uninstall**, do the following:

1. From the **Start** menu, select **Settings**. Then click **Control Panel**.
2. Double-click **Add/Remove Programs**.
3. Save your personal macros and source files into another directory. Make sure you delete the old copy of Startup.bas and other remaining files.

9

Macro Overview

Macro commands control all interactions with the debugger. The graphical user interface uses the same commands as those you can type in a macro file. This ensures that you can control all debugger functionality from your script or from the command line.

Seehau Commands

Seehau commands allow you to control the Seehau user interface either from the command line or by typing in a sequence of commands in a macro file. You can run this macro file by opening the **Macro** menu and clicking **Run**.

When Seehau starts up, it will look for the file Startup.bas. This file is a script file containing Seehau macro commands. When this macro executes, the commands in the file will be processed in sequential order. The sequence of commands sets up the debugger hardware and configures the graphical user interface.

For an introduction to what a macro file looks like, click the **Macro** menu and select **Open**. The **Open** dialog box appears. Now select the Captured.bas file. You can now see what a typical macro looks like.

The Seehau commands are an extension to the Seehau Basic scripting language. The scripting language allows you to write basic code using IF, WHILE, and FOR statements.

Description of the Macro Window

The Macro window gives you full visibility of the macro code. As shown in Figure 29, the Macro window provides you with a full development and debug environment. In the second row of the speedbar you can see the **Step Into** and **Step Over** buttons. As you single-step through your code, variables can be inspected by selecting the **Debug** menu and clicking **Quick Watch**.

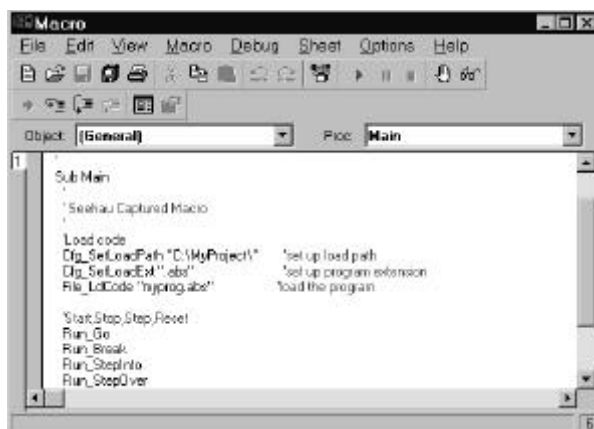


Figure 29. Seehau Macro Window

Macro Construction

To create a macro, click the **Macro** menu and select **Start Recording**. You can now perform tasks in the user interface, for example, clicking a **Single Step** button. This action is now recorded in the macro as follows:

Run_StepInto

Select the **Macro** menu and click **Stop Recording**. The **File Save** dialog box appears and prompts you for the macro file name of the macro you just recorded.

You can type in the macro commands with any editor in a file ending with the extension .bas. Any such macro can then be executed by clicking the **Macro** menu and selecting **Run**.

Macro Execution

You can type in a macro file name on the command line, and then press ENTER. This executes the command sequence as it was entered in the macro file.

When Seehau starts up, it executes the Startup.bas file. You can specify other macros that will be executed at debugger events such as starting emulation, stopping emulation, starting trace, or stopping trace. Specify these macro names from the **Config** menu. Click **Environment**, and the **Environment Configuration** dialog box appears. Then click the **Macro** tab.

Individual commands execute as you enter them on the Seehau command line and press ENTER. Figure 30 illustrates the command line at the bottom of the main window. Click the down arrow by the **Edit** box to see a command line history. By double-clicking a command in the history list, the command appears on the command line. You can view the result of the individual command that executed in the status bar located at the bottom of the main window. (See Figure 30.)

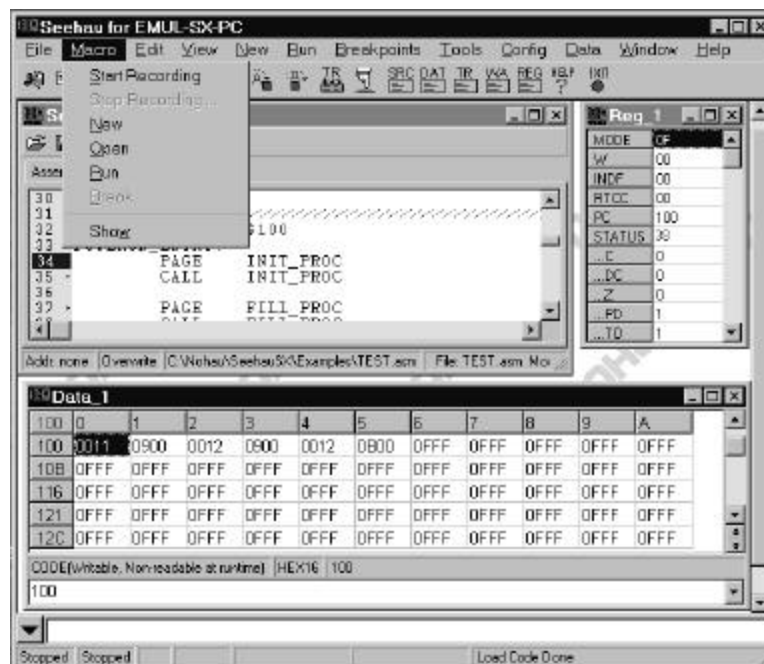


Figure 30. Macro Menu

Command Format

Commands are of the form **groupname_commandname** fields. The commands are in ASCII text. Commands are written in upper and lower case letters for easy readability but Seehau is case insensitive. An example of a command is: Cfg_ResetDelay "100". This command tells the debugger to use a 100 ms delay after reset.

Command Examples

The following is an example of directly entering a command:

In the dialog entry box enter: `Wnd_height "300"` and press RETURN. The open window or the one most recently selected by a macro command will have its height adjusted to 300 pixels. To modify the main window, you might have to type in this command first:

```
Wnd_select "Seehau for EmulSX."
```

This example uses the EmulSX Debugger for the Scenix family. Enter the appropriate fields for your system as indicated in the caption on the main window.

If you enter these commands in the file `/Macro/Startup.bas`, the commands will be executed every time you start up Seehau. You can also save your own macro with the Seehau configuration setup when you exit Seehau. Figure 31 shows the options you can select:

Config: Saves hardware configuration items such as breakpoints and triggers.

Buttons: Saves the position and type of buttons displayed on the main window.

Windows: Determines which windows are displayed and their position and size.

Use as Default: The specified file will be the one used by Seehau on startup. The `Startup.bas` file is the initial default. If `Startup.bas` is not present, Seehau will create it from a composite of existing `.bas` files. You can specify any macro file name as the default `Startup.bas`.

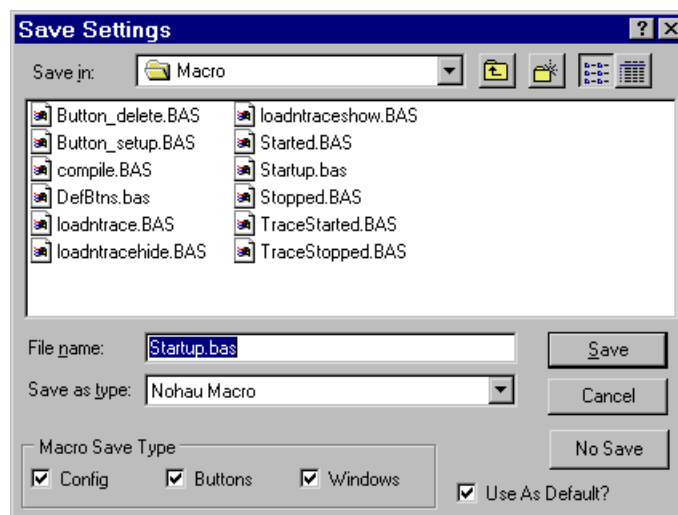


Figure 31. Save Settings Dialog Box

Command Groups

Macro commands are divided into 12 groups. Each group represents one basic function. The group is specified in the first part of the command name as in **Brkpt_ClrBrkPoints**.

For example, to view a list of all the Breakpoint commands, type `BrkPt` in the command line at the bottom of the main window. You then can select the command you want. This is useful as a reference when writing macros.

The Seehau Help files contain detailed information of all the macro commands. Consult Seehau Help for details on fields associated with the commands and for more examples.

BrkPT: These commands are associated with breakpoints. For example, `Brkpt_ClrBrkPoints` clears all the breakpoints.

Cfg: General debugger configuration settings. For example, `Cfg_Map` maps debugger memory to the target.

Data: Operations on data such as move, search and set. For example, `Data_Move` moves data from a source to a destination address.

File: Operations on files such as symbol table and user code loads into the debugger or target memory. For example, `File_LdCode filename` loads the specified user object code into the debugger.

Hlp: Help commands. Displays Help on various subjects from Seehau Help.

Src: Program commands. These refer to the user code in the source window. For example, `Src_SelectModule` selects the source module to be displayed in the Source window.

Reg: CPU Register commands used to inform Seehau of the name, size and address of the CPU registers. These commands are used in operating Seehau and also to display registers in the Register window. For example, `Reg_Size "16"` informs Seehau the previously selected register is 16 bits wide.

Run: Commands used to start the emulation CPU. Commands include `Run_Break`, `Run_Stepover`, and `Run_GoForever`.

Symbr: Used to provide symbolic information for the Symbol Browser form which can be viewed in the user interface. This command group is only used by the user interface.

Trace: Commands that control the hardware trace functions. For example, `Trace_TraceBegin` is used to start the trace.

View: These commands control the Inspect, Evaluate and Watch windows. For example, `View_Evaluate` passes the expression to Seehau it is to evaluate.

Wnd: Window commands are used to control aspects of the windows including position and size, button definition and show/hide windows. For example, `Wnd_Open "data"` opens a Data window.

Quick Saving of the Hardware Configuration

1. To save the debugger configuration, click the **Configuration** menu and select **Emulator**.
2. From the **Macro** menu, click **Start Recording**. The Configuration window will disappear.
3. Re-open the Configuration window from the appropriate menu item. Click **Apply**. The settings associated with this window will be saved.
4. In the **Macro** menu, select **Stop Recording**.
5. The **Save Settings** dialog box opens where you can choose the filename for the newly created macro (Figure 31). Enter a filename of your choosing and click **Save**. The macro is ready to use and will accurately re-create your debugger configuration settings. Configuration menus are also saved when general Seehau settings are saved through exit or from the **Config** menu, **Save Settings** option.

Creating New Buttons

Buttons can be created and deleted on the button bar in Seehau's main window. You can create a button that is attached to a macro. The buttons are Windows bitmaps (*.bmp) and created with virtually any graphics program.

To create a new button, do the following:

1. Open the **Customize Buttons** dialog box (Figure 32) from Seehau's main window. Right-click the toolbar, then click **Buttons**. Or from the **Config** menu, click **Buttons**.
2. From the **Customize Buttons** dialog box, open the bitmap browser by clicking the button to the right of the **Bitmap** text field. The **Select Glyph** dialog box appears, displaying the contents of the bitmap directory (Figure 33).



Figure 32. Customize Buttons Dialog Box

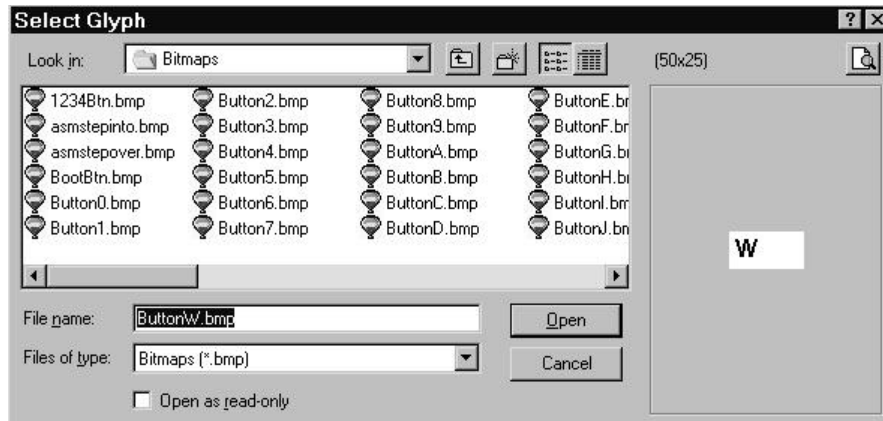


Figure 33. Select Glyph Dialog Box

3. Highlight the file ButtonW.bmp. Click **Open** and the image appears on the right of the dialog box (Figure 33).
4. In the **Hint** text box, type in a sentence as shown in the example (Figure 32). Then position the cursor on the W image. Note that the sentence appears in a yellow box.
5. Under **Command Type** (Figure 32), select **Macro**. The **Command Type** options specify what action will be associated with the new button.
6. From the **Cmnd list**, select the file Startup.bas. Use the drop-down list to select the Macro directory or use the browse button to navigate to the file.
7. Drag the W image to the Seehau main window right of **Exit**. Confirm that if you place your cursor on the W image, the hint you typed appears.
8. Click **W** in the Seehau main window and the Startup.bas sequence will execute.

NOTE

To remove a button, drag it back to the **Customize Buttons** dialog box.

Appendix

Troubleshooting Tips

If you encounter a problem when starting or running the debugger and/or Seehau, try the following troubleshooting tips.

- Verify the proper chip type is selected.
- Reload Seehau. To reload, use the Windows **Add/Remove Programs** option. This ensures all files and registry entries are properly deleted. To access the **Add/Remove Programs Properties** dialog box, go to the **Start** menu and point to **Settings**. Click **Control Panel**. Double-click **Add/Remove Programs**.
- Open the Task Manager and check that **ncore** is no longer running after an access violation.
- Try another PC.
- Like all Windows applications, the Seehau software requires a minimum amount of free operating system resources. The recommended amount is at least 40%. Below this percentage, Seehau might become slow, unresponsive or even unstable. If you encounter any of these conditions, check your free resources. If they are under 40%, reboot and limit the number of concurrently running applications. If you are unable to free more than 40% operating system resources, contact your system administrator or Nohau Technical Support.



WARNING

Always turn the power off before you plug in or unplug boards, ribbon cables, or the pod board to avoid hardware damage.

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19700 – 19999 DE: ETA

20000 – 20099 DC: Embedded Technology

20100 – 20199 VA: Embedded Technology

20200 – 20599 DC: Embedded Technology

20600 – 21999 MD: Embedded Technology

22000 – 24699 VA: Embedded Technology

24700 – 26899 WV: ETA

27000 – 28999 NC: ETA

29000 – 29999 SC: ETA

30000 – 31999 GA: ETA

32000 – 34999 FL: ETA

35000 – 36999 AL: ETA

37000 – 38599 TN: ETA

38600 – 39799 MS: ETA

40000 – 42799 KY: ETA

43000 – 45899 OH: Claassen & Associates

46000 – 46299 IN: Dearborn Group, Inc.

46300 – 46699 IN: Silicon Engines, Ltd.

46700 – 47899 IN: Dearborn Group, Inc.

47900 – 47999 IN: Silicon Engines, Ltd.

48000 – 48599 MI: Dearborn Group, Inc.

48600 – 48799 MI: Claassen & Associates

48800 – 49299 MI: Dearborn Group, Inc.

49300 – 49999 MI: Claassen & Associates

50000 – 51699 IA: Claassen & Associates

52000 – 52099 IA: Silicon Engines, Ltd.

52100 – 52699 IA: Claassen & Associates

52700 – 52899 IA: Silicon Engines, Ltd.

53000 – 53599 WI: Silicon Engines, Ltd.

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57000 – 57799 SD: Claassen & Associates

58000 – 58899 ND: Claassen & Associates

59000 – 59999 MT: Claassen & Associates

60000 – 61999 IL: Silicon Engines, Ltd.

62000 – 62299 IL: Claassen & Associates

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62800 – 62999 IL: Claassen & Associates

63000 – 65899 MO: Claassen & Associates

66000 – 67999 KS: Claassen & Associates

68000 – 69399 NE: Claassen & Associates

70000 – 71499 LA: Columbus Technology
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73000 – 74999 OK: Columbus Technology
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82000 – 83199 WY: Claassen & Associates

83200 – 83899 ID: Claassen & Associates

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