User's Manual

SS-V850™ In-Circuit Emulation System

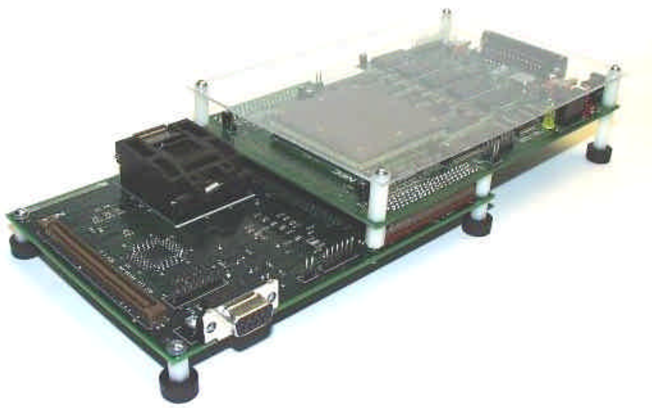
Document no. 50930

Contents

1. INTRODUCTION

The SS-V850 in-circuit emulator (ICE) is a low-cost, full-function ICE for developing embedded systems based on NEC's V850ä microcontrollers. The SS-V850 supports comprehensive ICE functions and on-board flash programming.

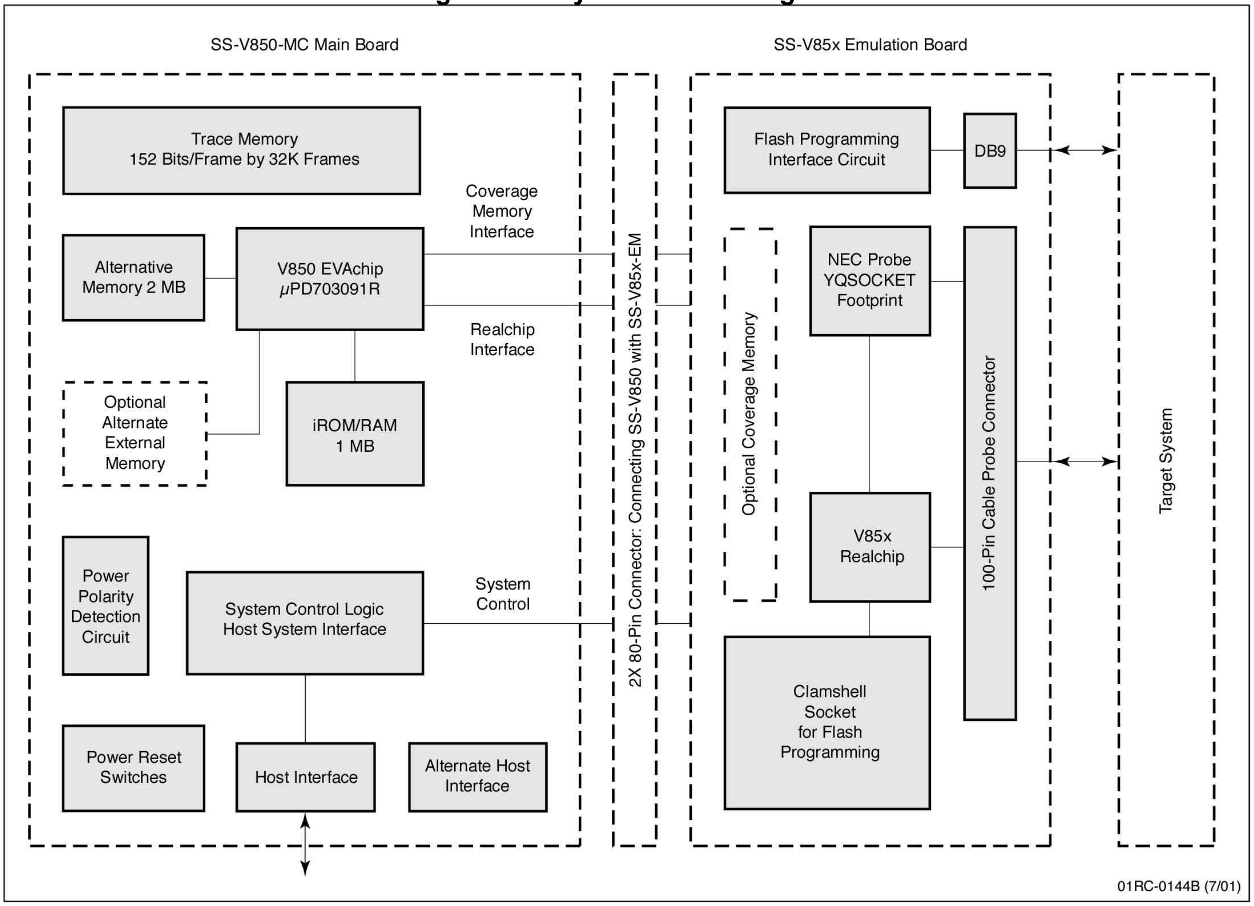
Figure 1. Main Board and Removable Emulation Board



The SS-V850 system consists of the SS-V850-MC main board and a removable emulation board that provides family-specific product emulation. The PC-based system connects to the host computer via a bidirectional parallel port.

The complete emulation system requires an SS-V850-MC main board and a target-specific SS-V85x-EM removable emulation board, for example, an SS-V853A-EM board that emulates a V853 microcontroller or an SS-V850SA1-EM board that emulates a V850/SA1 device. The main board and the emulation board are packaged separately so that different combinations can be assembled.

Figure 2. System Block Diagram

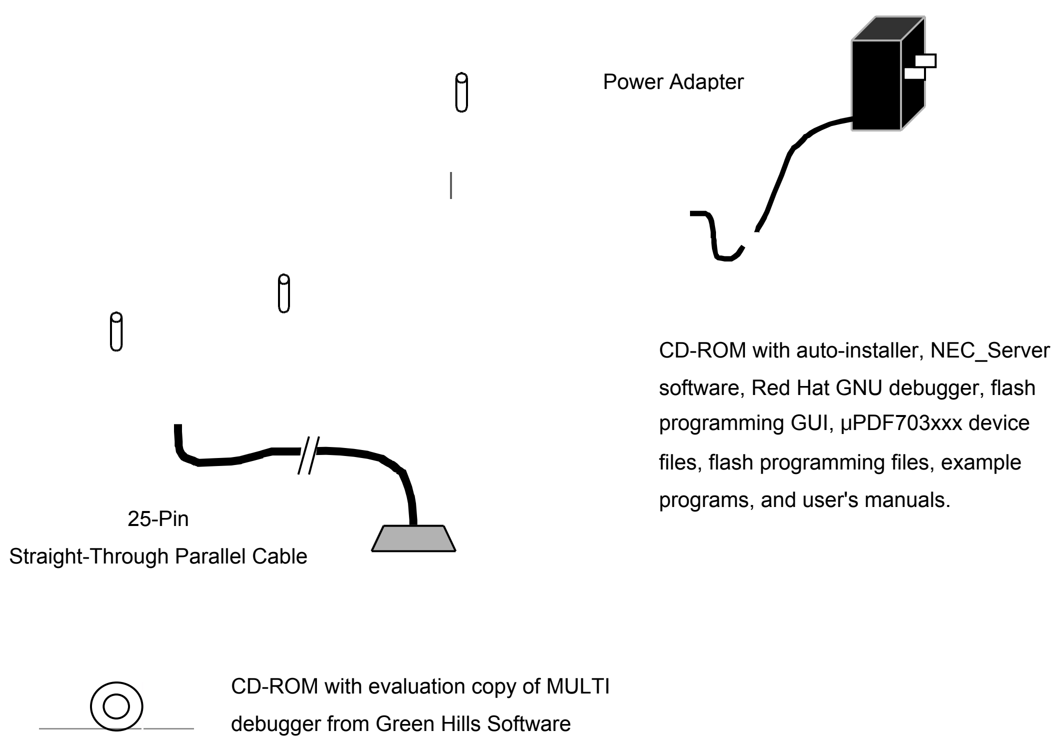


2. SHIPPING CONTENTS

2.1 Main Board Package

- SS-V850-MC main board
- 110 VAC power adapter
- DB-25 straight-through cable
- CD-ROM containing Red Hat® GNU debugger package, demonstration programs, and documentation
- Evaluation copy of Green Hillsä MULTI® 2000 debugger

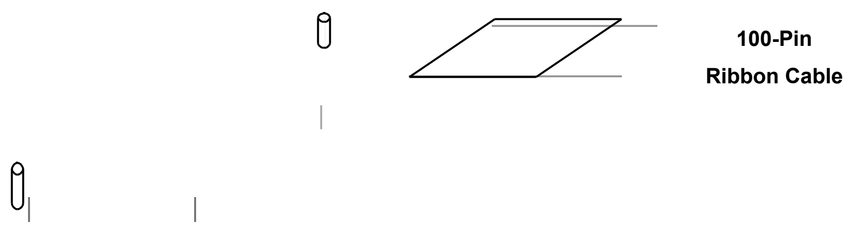
Figure 3. Main Board Contents



2.2 Emulation Board Package

- SS-V85x-EM removable emulation board
- 100-pin ribbon cable (cable probe)

Figure 4. Emulation Board Contents



2.3 Optional Accessories

- Emulation probe
- Main board with 2 MB external extension memory
- Emulation board with coverage memory options

3. SYSTEM SETTINGS

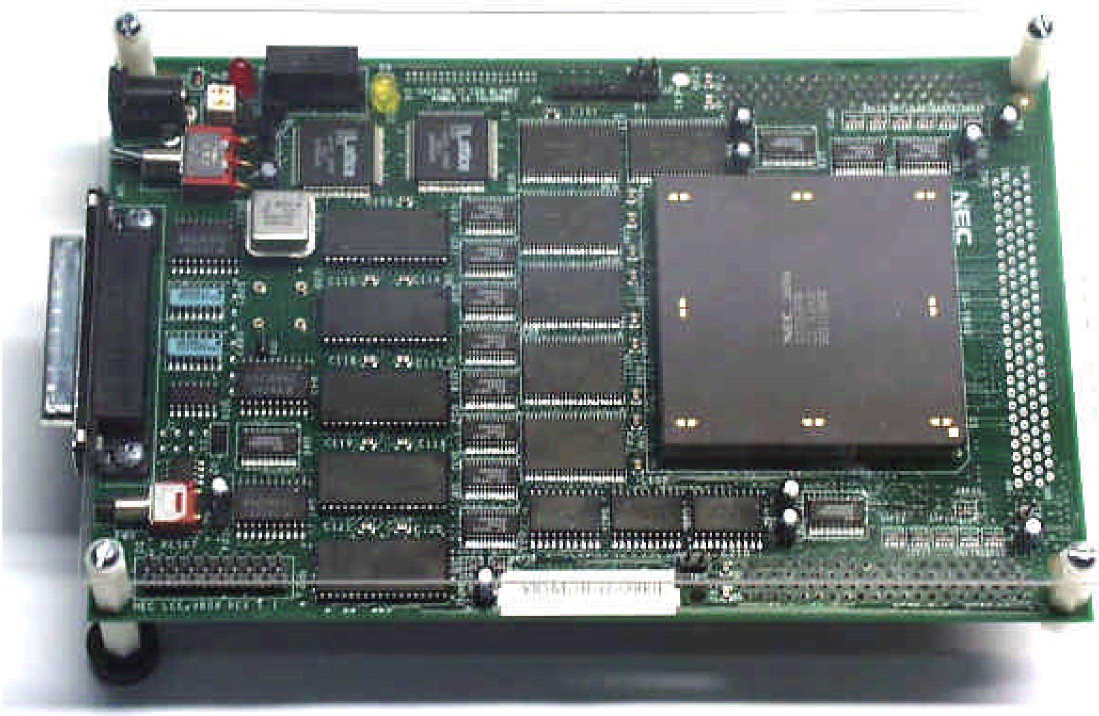
The features listed in Table 1 are implemented in SS-V850 hardware, except for external extension memory and coverage memory, which are optional.

Table 1. System Features

Feature	Target Goal	Implementation
IROM / RAM	1 MB	1 MB program memory
Alternate memory	1MB	2 MB alternate memory
		Additional 2 MB optional extension footprints
		Total 4 MB
Trace memory	64K frames by 152 bits	64K frames by 152 bits
Coverage memory	Optional	Optional on emulation board
		Branch and pass coverage
		Read/write C0 coverage
		M0 coverage
SFR memory	1 KB by 2 bits	1 KB by 2 bits
Flash programming interface	On-board flash programming	On-board flash programming
		Clamshell socket for flash device programming
		DB9 to user system for in-system programming
		By V85x EVAchip, host PC, or V85x realchip UART
Host interface	Bidirectional parallel port	Bidirectional parallel port
		Optional USB 2.0 interface (reserved for future use)
V85x realchip interface	V853A and V850/SA1 interface	Removable emulation board for all V85x devices
Low -voltage emulation	LV_{DD} = 3.3-volt support	SS-V85x-EM can support various voltages when interfaced with V85x EVAchip
Probe	100-pin cable probe	NEC-TQPAQ probe footprint
Power supply	Single 5-volt at 5A	LV_{DD} generated using voltage regulator
		Center-positive support (USA)
		Center-negative support (Japan)
		Built-in over-voltage detection circuit
Physical structure		Motherboard combined with emulation board

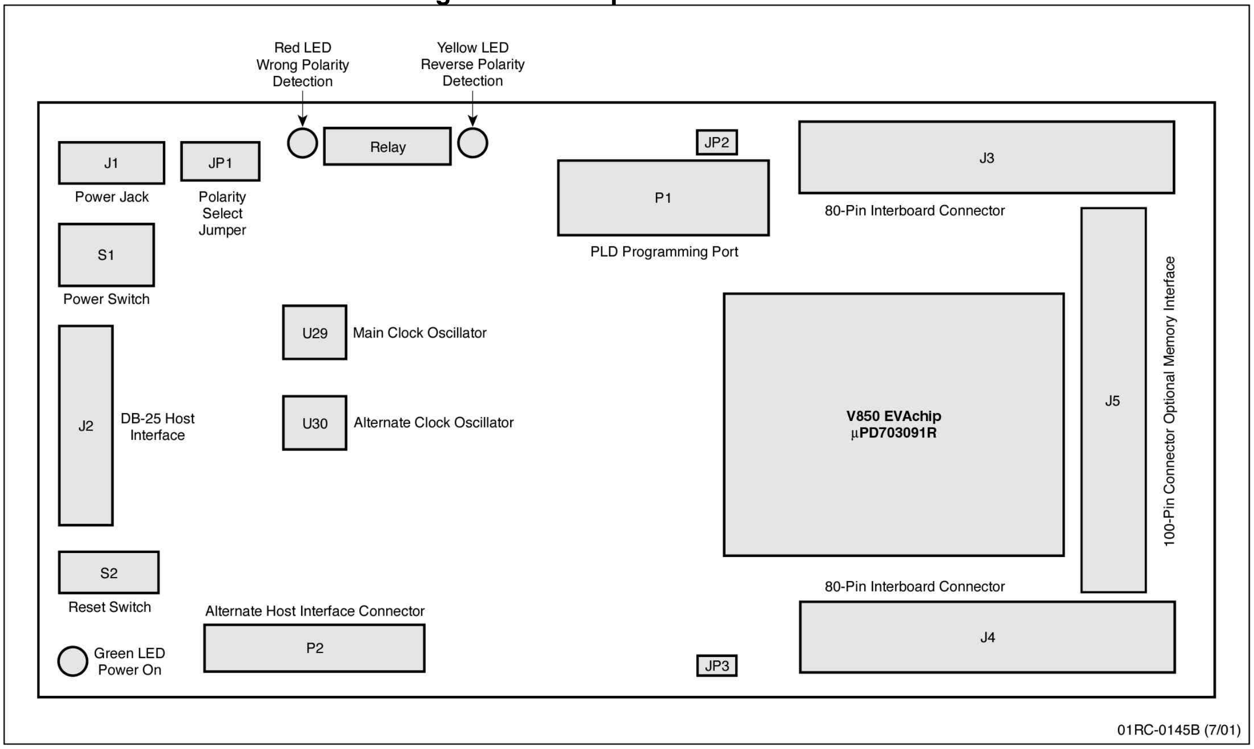
3.1 Main Board Settings

Figure 5. Main Board Layout



Note: NEC Electronics ships the SS-V850-MC board with a protective plastic cover. When changing jumper settings, please unscrew the mounting screws and remove the cover. Apply your settings and then replace the cover when done.

Figure 6. Jumpers and Switches



The SS-V850-MC operates with the SS-V85x-EM removable emulation board. Before connecting power to the main board, please ensure proper configuration of the hardware, as explained in Table 2.

Table 2. Main Board Settings

Setting	Name	Description
Power supply	JP1	Set to center-positive in U.S.
		Set to center-negative in Japan
Power switch	S1	Turn on power for SS-V850
V_{DD}/ V_{DD}_QS	JP2, JP3	Use when SS-V85X-EM is *not* attached to main board
		Remove when SS-V85X-EM is attached to main board
Pushbutton reset	S2	Push to initiate a system reset operation
DB25 host interface	J2	Connect to host PC
DC power jack	J1	Connect to power supply
Alternate clock oscillator	U30	Connect to user-installed clock
		Select alternate clock frequency via software
Alternate host interface	P2	Reserved for future use
PLD programming port	P1	NEC-only use

3.2 JP1 Settings

A power supply polarity detection circuit on the SS-V850 causes the red LED to flash when you connect a power supply with the wrong polarity. The over-voltage detection circuit causes the yellow LED to flash if you connect a power supply with higher than 5 V_{DC} power.

Figure 7. Power Supply Polarity and Over-voltage Detection Circuits

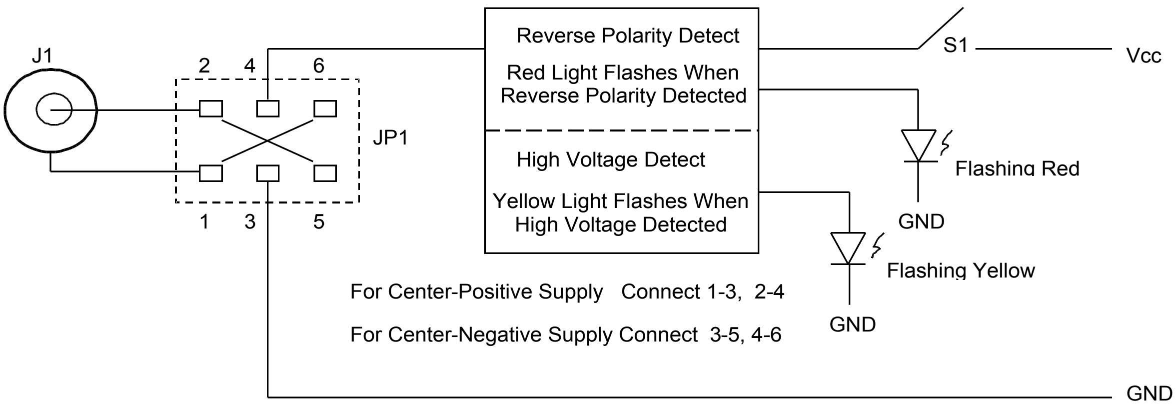


Table 3. JP1 Settings

Setting	Name	Description
Power supply	JP1	Keep power switch (S1) in off position
		Move jumper block (JP1) to select desired power supply polarity
		Connect JP1 1-3 and 2-4 to select center-positive (for most power supplies in the U.S.).
		Connect JP1 3-5 and 4-6 to select center-negative (for most power supplies in Japan).
		Connect the power supply to the J1 power jack.
		If the red LED flashes, disconnect the power supply and set JP1 to the reverse polarity.
		If the yellow LED flashes, disconnect the power supply and replace it with one that is 5 V_{DC}.
		Turn on the S1 power switch and wait for the green light to indicate that power is on and the system is operational.

3.3 U30 Settings

The standard oscillator on SS-V850-MC supplies 6.667 MHz to the CPU. Typically, the on-chip phase-locked loop (PLL) multiplies this clock to produce the main system frequency of 33.33 MHz. To use a nonstandard frequency up to 66.67 MHz, install an alternate clock oscillator and then select the clock type and frequency as described in Section 3.5, "Software Settings."

Table 4. U30 Settings

Setting	Name	Description
Alternate clock oscillator	U30	Use a half-size clock oscillator, DigiKey part number CTX-*nnn*-ND, where *nnn* = clock frequency

Use caution when selecting the frequency of the alternate clock oscillator and the settings for the CKSEL and PLLSEL inputs to the emulation CPU.

3.4 Host Computer

The SS-V850 communicates with an IBM®-compatible host computer through a standard bidirectional parallel port. Connect the DB-25 male-to-male straight-through cable to J2 on the SS-V850 and to LPT1 on the computer.

3.5 Software Settings

SS-V850 settings that affect hardware functionality are defined upon launching of the LV8HW.INI initialization file, located in the working directory from where the debugger is launched. After software installation, the LV8HW.INI file resides in NECEL/NECBox, but you should copy the file to a working directory.

The LV8HW.INI file is an ASCII file divided into sections with headings specified within brackets. (Currently, only the [Clock] section is supported.) Within each section, individual settings contain a parameter, an equal sign, and a value, as shown in Figure 8.

Figure 8. Example LV8HW.INI File

```
:
[Clock]
ClockSource=CLK_6MHZ
ClockDivider=1
ClockSelect=PLLX5
```

3.6 Clock Settings

Three different settings affect clock rate: the clock source setting, the external clock divider setting, and the clock selection settings of the CKSEL and PLLSEL inputs to the emulation CPU.

3.6.1 Clock Source

The SS-V850 uses one of three clock sources: the standard 6.667-MHz system oscillator, the user-installed alternate clock oscillator, or a target-supplied clock to the X1 terminal of the probe. The **ClockSource** parameter is specified in the [Clock] section of the LV8HW.INI file.

Table 5. ClockSource Settings

Setting	Description
ClockSource=CLK_6MHZ	Standard system 6.667 MHz oscillator (default)
ClockSource=CLK_ALT	Alternate oscillator installed in U30
ClockSource=CLK_TX1	Supplied by target at X1 terminal of the probe

The CLK_TX1 setting requires the clock source from the target system to be a driven clock, rather than a crystal/capacitor circuit connected to the X1 and X2 terminal because the SS-V850 system does not drive the X2 terminal.

NOTE: If there is no driving clock for the source selected (for example, CLK_ALT is selected, but there is no oscillator in U30), the emulation CPU generates its own clock of about 1 MHz.

3.6.2 Clock Divider

Each clock source can be divided by hardware that is external to the emulation CPU (µPD703091R) with division factors of 1, 2, 4, 8, or 16. For example, 6.667 MHz can be divided by 4 to produce an input clock to the emulation CPU of 1.667 MHz. If a 40 MHz oscillator is installed in U30, and you specify division by 8, the input clock to the emulation CPU is 5 MHz. Table 6 shows the input frequency for each possible source.

Table 6. ClockDivider Settings

Setting	Source=CLK_6MHZ	Source=CLK_ALT	Source=CLK_TX1
1 (default)	6.667 MHz	ALT	TX1
2	3.333 MHz	ALT/2	TX1/2
4	1.667 MHz	ALT/4	TX1/4
8	0.833 MHz	ALT/8	TX1/8
16	0.417 MHz	ALT/16	TX1/16

3.6.3 CKSEL and PLLSEL

The **ClockSelect** parameter controls CKSEL and PLLSEL, as shown in Table 7. These pins control operation of the on-board clock control circuitry on the emulation CPU. The emulation CPU, like devices in the V850 family, has a PLL circuit that can multiply the input clock by a factor of 1 or 5, depending on the setting of PLLSEL. The CKSEL pin controls whether the input clock is used directly or routed through the PLL for multiplication.

Table 7. CKSEL and PLLSEL Settings

ClockSelect	CKSEL	PLLSEL	System Clock
PLLx5 (default)	0	1	Fx = input clock x 5
PLLx1	0	0	Fx = input clock
DIRECT	1	Don’t care (1 is set)	Fx = input clock

Clock frequencies for the standard system oscillator are shown in Table 8.

Table 8. Standard Clock Frequencies

ClockDivider	ClockSelect		
	PLLx5 (default)	**PLLx1**	**DIRECT**
1	33.333 MHz	6.667 MHz	6.667 MHz
2	16.667 MHz	3.333 MHz	3.333 MHz
4	8.333 MHz	1.667 MHz	1.667 MHz
8	4.167 MHz	0.833 MHz	0.833 MHz
16	2.083 MHz	0.417 MHz	0.417 MHz

If a 40 MHz oscillator is installed in U30, the ALT frequency is 40 MHz, and the clock frequencies are as shown in Table 9.

Table 9. Alternate Clock Frequencies

ClockDivider	ClockSelect		
	PLLx5 (default)	**PLLx1**	**DIRECT**
1	200 MHz ***	40 MHz	40 MHz
2	100 MHz ***	20 MHz	20 MHz
4	50 MHz	10 MHz	10 MHz
8	25 MHz	5 MHz	5 MHz
16	12.5 MHz	2.5 MHz	2.5 MHz

***** CAUTION**: Note that with these settings, you can select a system clock value above the maximum 66 MHz allowable. Do *not* select a system clock greater than 66 MHz because operation of the SS-V850 is not guaranteed under such conditions.

3.7 Default Jumper Settings

NEC Electronics ships the SS-V850-MC main board with the following default settings.

- JP1:3-5 and JP1:4-6 short for center-negative power supply
- JP2 and JP3 open to operate with the SS-V85X-EM emulation board

All other jumpers are open.

3.8 Optional Features

Alternate memory on the SS-V850-MC main board can be extended by an additional 2 MB. These additional memory devices are factory-installed. The SS-V850-EM emulation board also can be equipped with coverage memory. Contact your local NEC representative to learn more about these optional features.

3.9 110 V_{AC} Power Adapter

The 110 V_{AC} power adapter that generates 5 V_{DC} for the SS-V850 emulator. The adapter does not supply power to the target system.

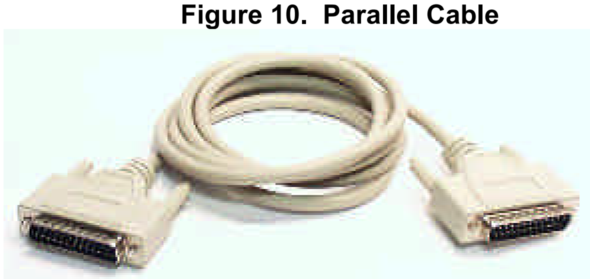
Figure 9. Power Adapter

Note: The 5 V_{DC} connector has the center pin negative.

3.10 DB-25 Straight-through Parallel Cable

The standard straight-through parallel cable connects the SS-V850 emulation system to the host PC.

Figure 10. Parallel Cable



3.11 Emulation Board Settings

The emulation board allows the emulator system to emulate a specific microcontroller. For instance, the SS-V853A-EM emulation board, together with the SS-V850-MC main board, emulates the V853A microcontroller. For information about how to configure the emulation board, please consult *the SS-V85x-EM User's Manual* (document no. 50931).

Figure 11. Emulation Board Layout

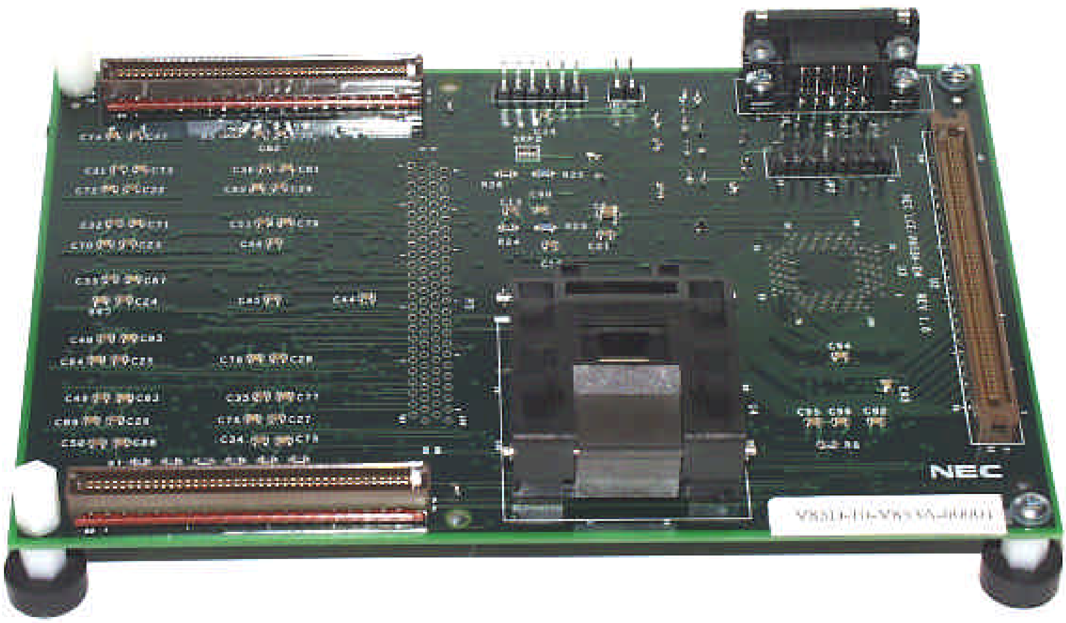
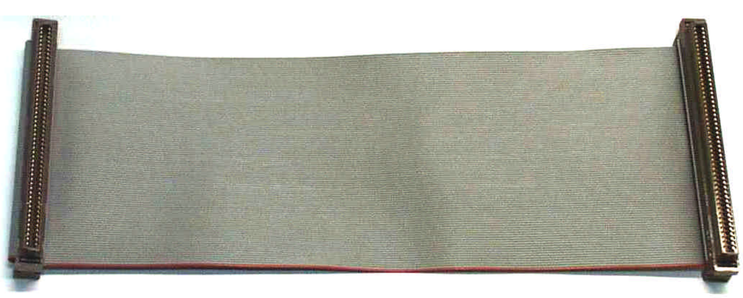


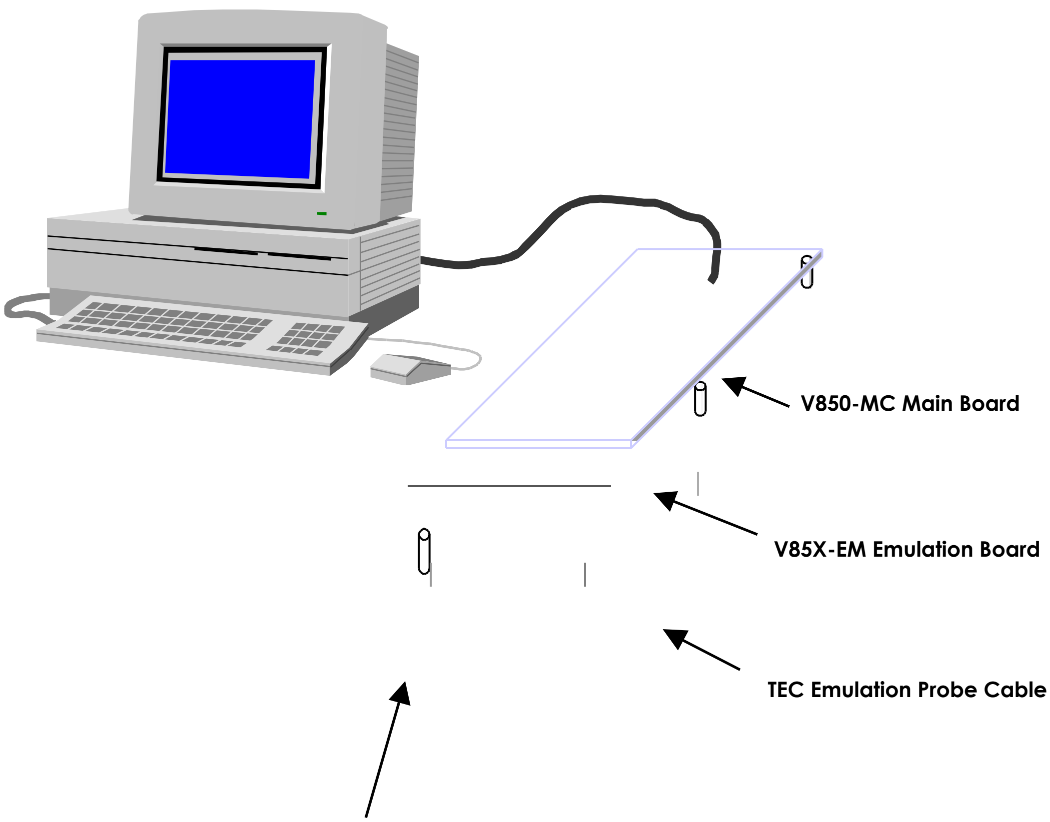
Figure 12. 100-Pin Ribbon Cable (Cable Probe)



4. HARDWARE ASSEMBLY

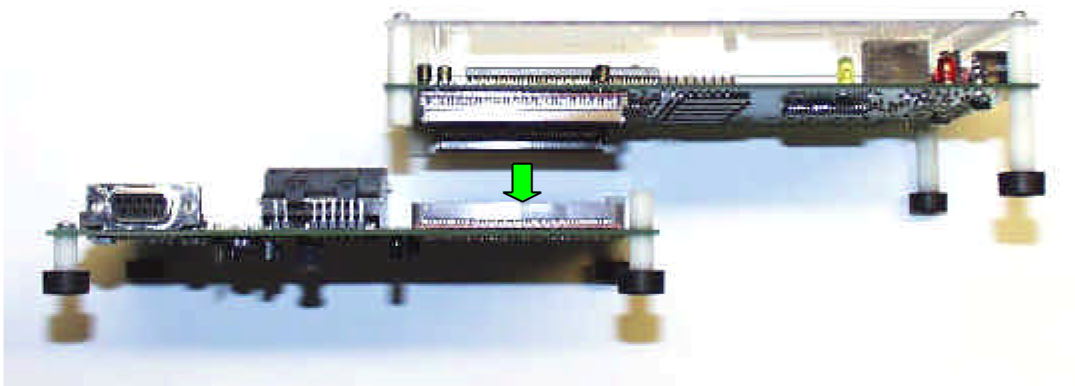
The SS-V850 emulator is shipped in two packages: the SS-V850-MC main board package and the SS-V85X-EM removable emulation board package. This section explains how to assemble, connect, and configure the hardware.

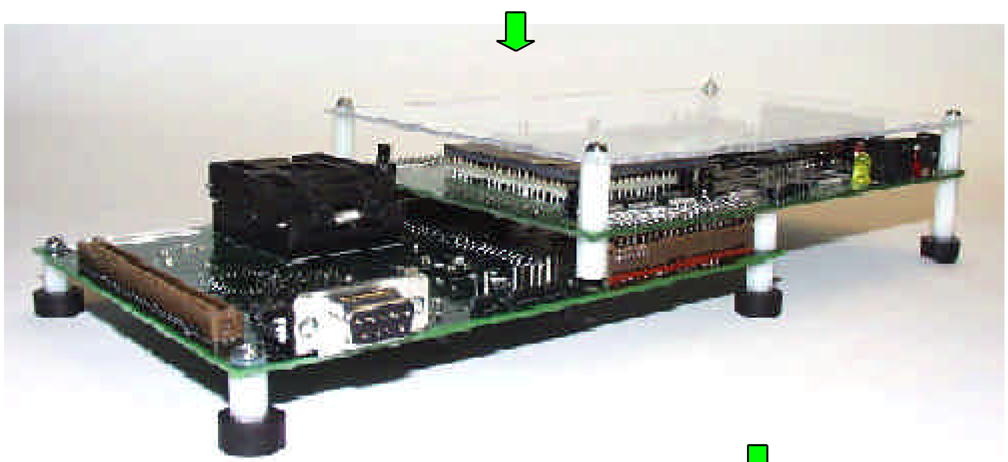
Figure 13. Hardware Components

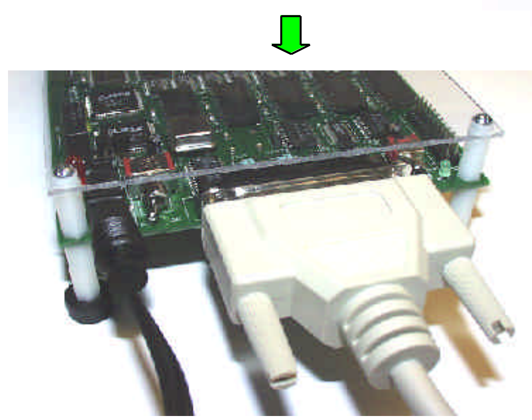


First connect J3 and J4 of the main board to the corresponding P3 and P4 connectors of the emulation board as shown in Figure 14.

Figure 14. Board Assembly







1. Connect parallel cable to connector J2 on the main board and to the parallel port of your computer.
2. With power switch S1 off, connect the power supply to the J1 power connector.
3. Proceed with software installation.

5. HARDWARE SETUP

This section explains how to connect and test the hardware.

5.1 Bidirectional Parallel Port

Operation of the SS-V850 requires a PC with a bidirectional parallel port. Parallel port addresses and modes vary from one computer to another and for help with specific systems, please call the technical hotline at 1-800-366-9782.

Most new PCs have one parallel port with a DB-25 female connector on the back of enclosure, with the parallel port usually configured as LPT1 with a base address of 0378H. Some PCs have add-in cards or more than one parallel port in the base system. In those cases, determine from your system documentation which port is LPT1.

To check the mode of the parallel port, run a hardware setup program. In some systems, the program may be invoked by pressing a particular key or key combination during boot-up. In other systems, it may be possible to invoke the program from the Windows operating system. Check your computer system documentation for information about how to invoke the hardware setup program.

In the hardware setup program, it is usually possible to set the parallel printer port to one of several modes. The names of these modes may vary.

- **Standard output-only mode** only allows output of data to a printer. It does not allow the input of data necessary for bidirectional communication and therefore does allow operation of the SS-V850.

- **Standard bidirectional or PS2 mode** allows bidirectional communication on the parallel port and should be selected for use with the SS-V850.

- **ECP mode** allows for higher speed bidirectional communication, but it should not be selected if bidirectional or PS2 mode is available. For systems without bidirectional or PS2 mode, try selecting ECP mode. Operation of the SS-V850 system may be possible in this mode, but it is not guaranteed.

- **EPP mode** allows for extended capabilities on the parallel port, but it should not be selected if bidirectional or PS2 mode is available. For systems without bidirectional or PS2 modes and ECP mode, you can try selecting EPP mode, but operation of the SS-V850 is not supported in this mode.

Using the hardware setup program, set the computer parallel port to bidirectional or PS2 mode. It may be possible to view and change the I/O port addresses assigned to LPT1 using the hardware setup program. If so, verify that LPT1 is set to the base address of 0378H. If another address is set, change it, if possible, to 0378H.

5.2 Parallel Port Driver

5.2.1 Windows 95/98 Driver

The **msip.vxd** driver loads automatically during software installation.

5.2.2 Windows NT® Driver

1. Log in as "Administrator."
2. Locate **NECEL/NTDRIVER/ tvichw32.inf** on the CD-ROM.
3. Right-click **tvichw32.inf** and choose **Install** to install **vchw11.sys** in **WinNT\Systems32**. Restart your computer to load the driver.

5.3 SS-V85x Software

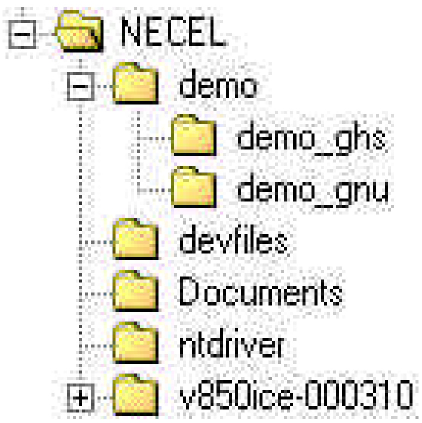
SS-V85x-EM software has two major components:

- Red Hat GNU and Green Hills MULTI debugger software
- NEC low-level server software and flash programming software

6. SOFTWARE SETUP

The CD-ROM for the SS-V850-MC main board contains the items shown in Figure 15.

Figure 15. CD-ROM Contents



→ Demo programs for Red Hat GDB and MULTI debuggers
→ Demo programs for MULTI debugger
→ Demo programs for Red Hat GDB debugger
→ Flash programming files
→ User's manuals in PDF
→ Microsoft® Windows NT® driver
→ Red Hat GNU compiler/debugger software

6.1 Installing the Software

This section explains how to install the software.

1. Insert the CD-ROM in your CD-ROM drive.
2. Open Windows® Explorer and locate **NECEL/SETUP.EXE**. Double-click **SETUP.EXE** and follow the prompts.

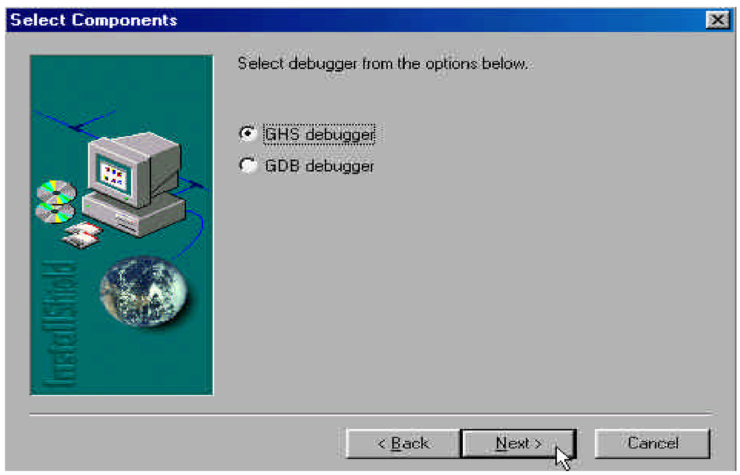
6.1.1 Selecting Components

The **Select Components** dialog box allows you to install the MULTI debugger from Green Hills Software (GHS) and the GNU debugger (GDB) from Red Hat, Inc.

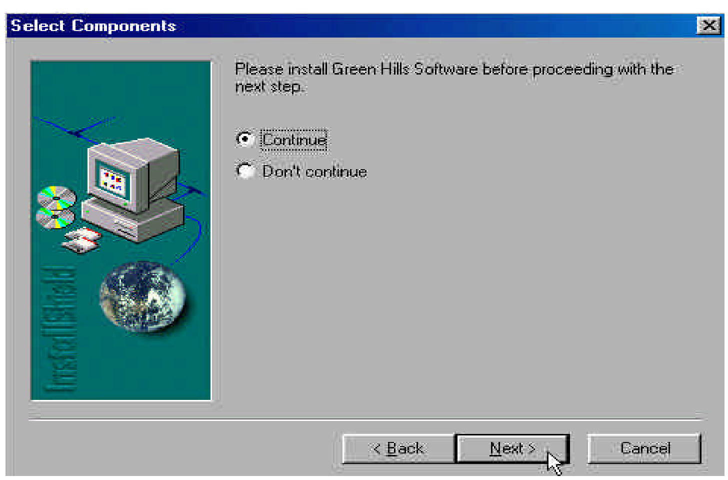
6.1.1.1 Installing Green Hills MULTI Debugger

The MULTI debugger shipped with the SS-V850 system is an evaluation copy. To purchase an official copy, please contact Green Hills Software directly.

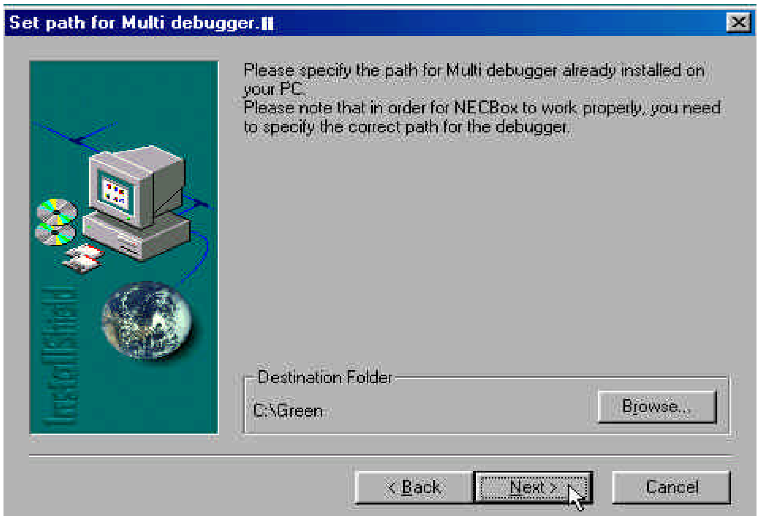
1. Select **GHS debugger** and then click **NEXT**.



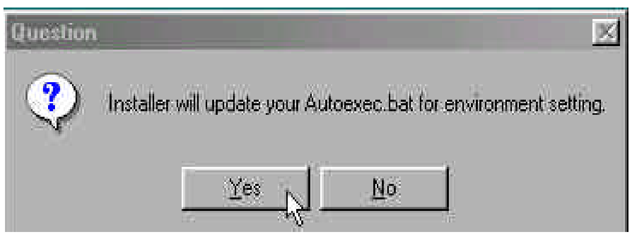
2. If the MULTI debugger is not installed, select **Don't continue** and click **NEXT** to exit the setup. Install the MULTI debugger and then restart the installation. If MULTI is installed, select **Continue** and then click **NEXT**.



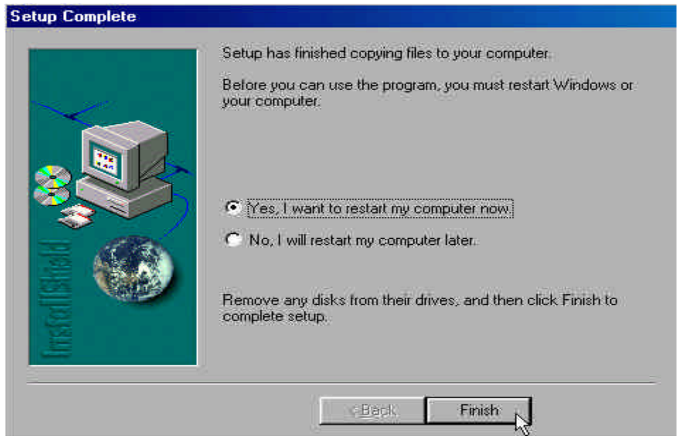
4. Specify the path where the MULTI debugger resides. Click **NEXT** to continue or **Browse** to specify a different path.



5. Click **YES** to accept the modified **autoexec.bat** or **NO** to return to the previous box.

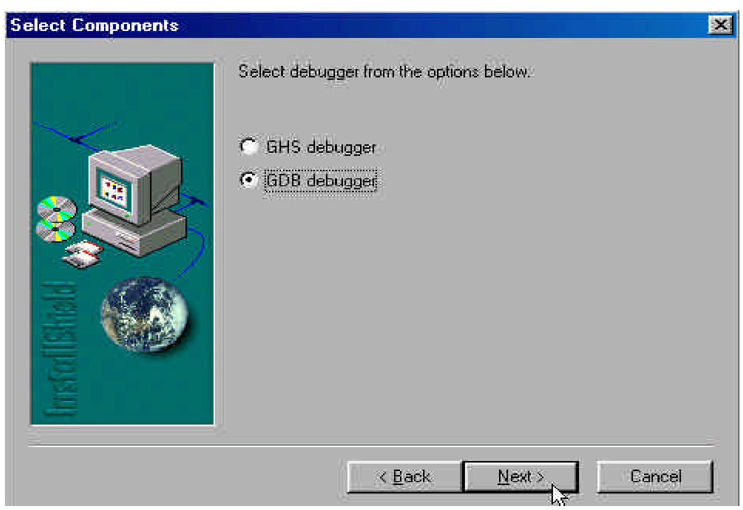


6. Click **Finish** to complete installation and restart your computer.

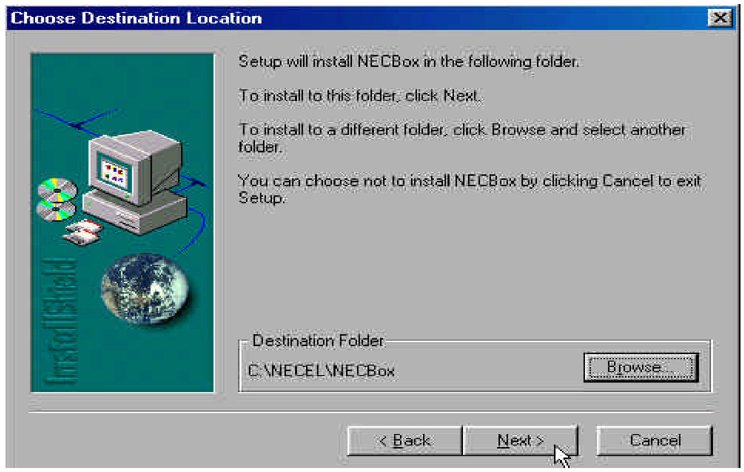


6.1.2 Installing the Red Hat GNU Debugger

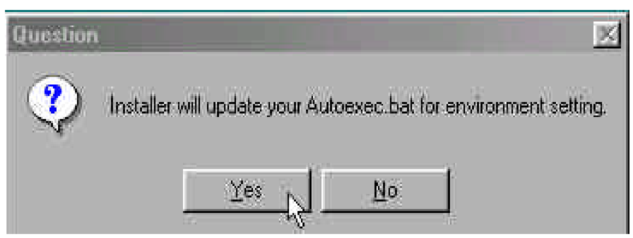
1. Select **GDB debugger** and then click **NEXT**.



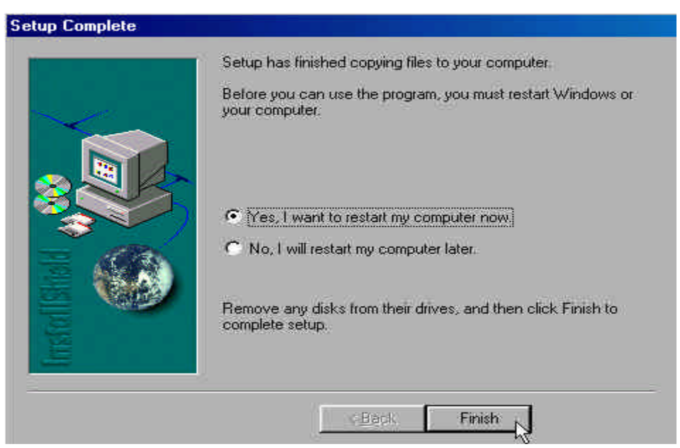
2. Click **NEXT** to continue or **Browse** to specify a different path.



3. Click **YES** to accept the modification to **autoexec.bat** or **NO** to return to the previous box.

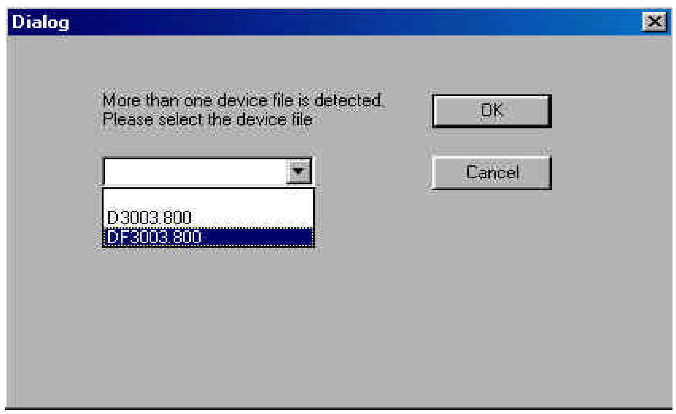


4. Click **Finish** to complete the installation and restart your computer.

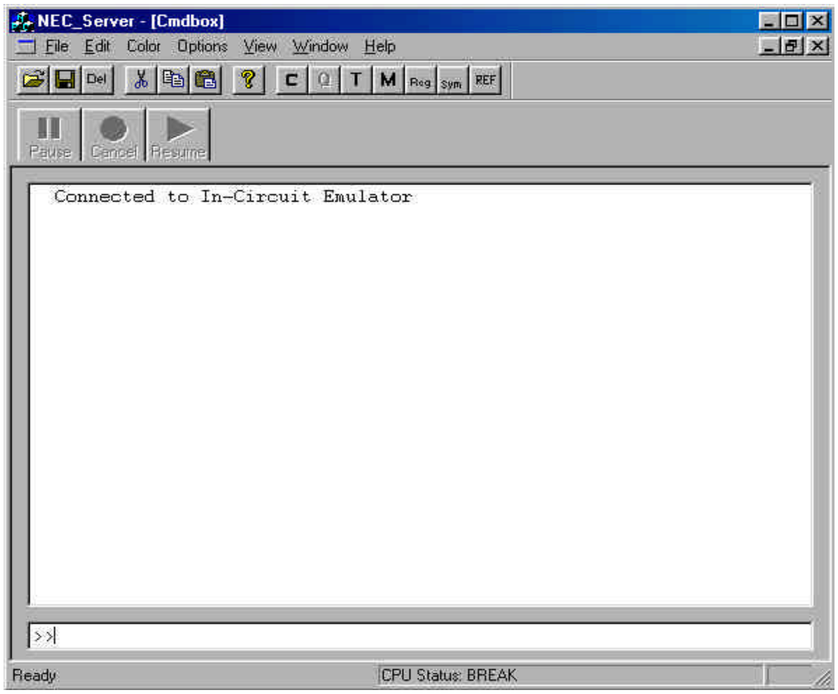


6.2 Testing System Operation

1. Connect the SS-V850 emulation system to your computer and then turn on power switch S1.
2. From the desktop of your Windows operating system, click the **Start** button.
3. Click **Programs** and then select the **MS-DOS® prompt**.
4. Execute **MDI.EXE** to launch the NEC_Server Cmdbox.
5. From the **Dialog** dialog box, select a device file and click **OK**.



6. If the hardware and software are working properly, the program displays **`Connected To In-Circuit Emulator`**.



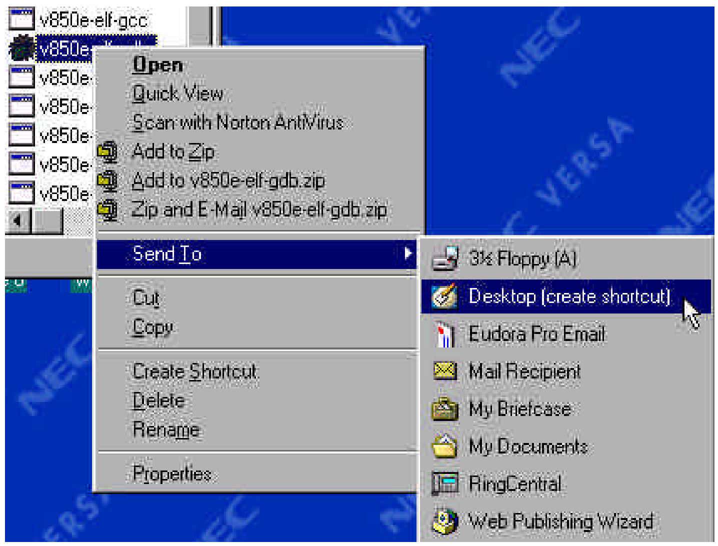
7. If the hardware and software are not working properly, the program displays **`Failed to connect to In-Circuit Emulator`**. In that case, close the application and troubleshoot the problem as described later in Section 9.

6.2.1 Creating A Shortcut for GDB

1. From Windows Explorer, locate **C:\NECEL\NECBOX\v850ice-000310\H-i686-cygwin32\bin\v850e-elf-gdb.exe**.

2. Right-click **v850e-elf-gdb.exe**.

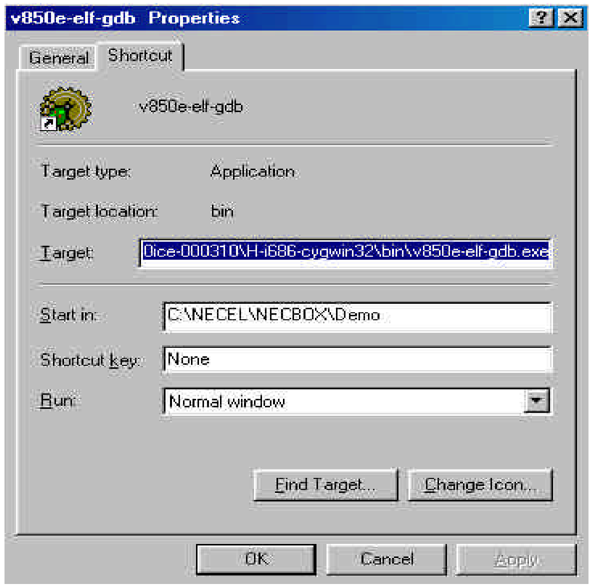
3. Click **Send To** and then click **Desktop[create shortcut]**.



4. Right-click the newly created icon.

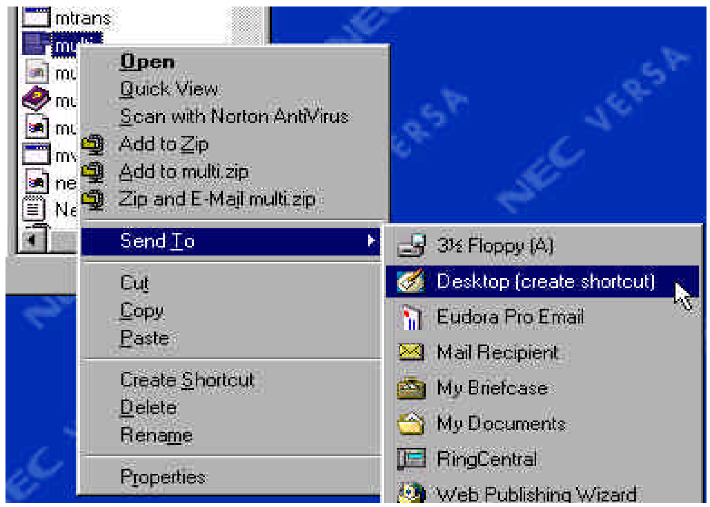
5. Click **Properties** and then click the **Shortcut** tab.

6. Specify the project path in the **Start-in** field and then click **OK**.

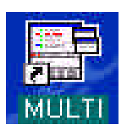


6.2.2 Creating A Shortcut for the MULTI Debugger

1. From Windows Explorer, locate **C:\GREEN\ multi.exe**.
2. Right-click **multi.exe**.
3. Click **Send To** and then click **Desktop[create shortcut]**.

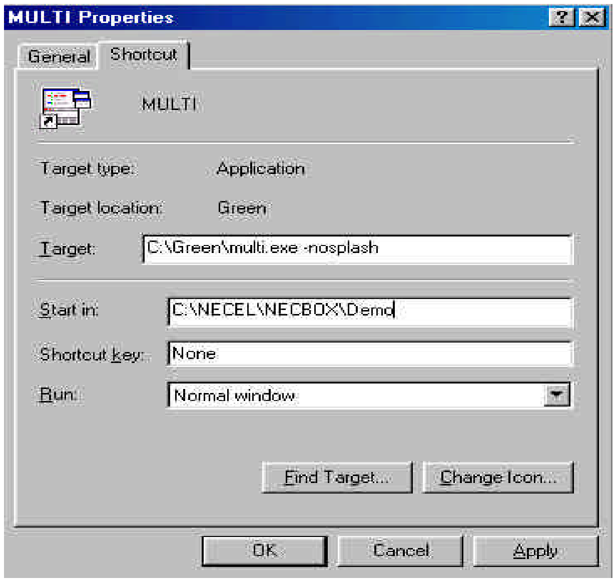


4. Right-click the newly created icon.



5. Select **Properties**.

6. Specify the project path in the **Start-in** field and then click **OK**.



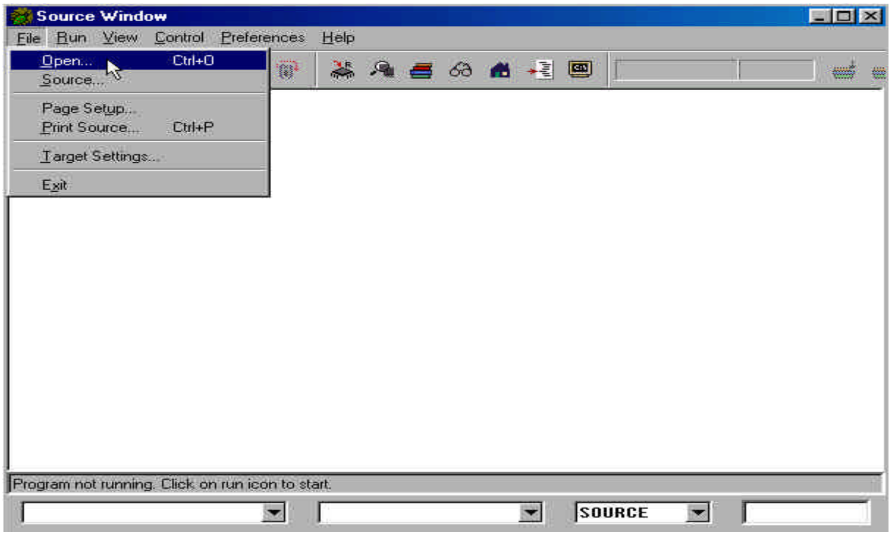
7. OPERATION

7.1 GDB Debugger Operation

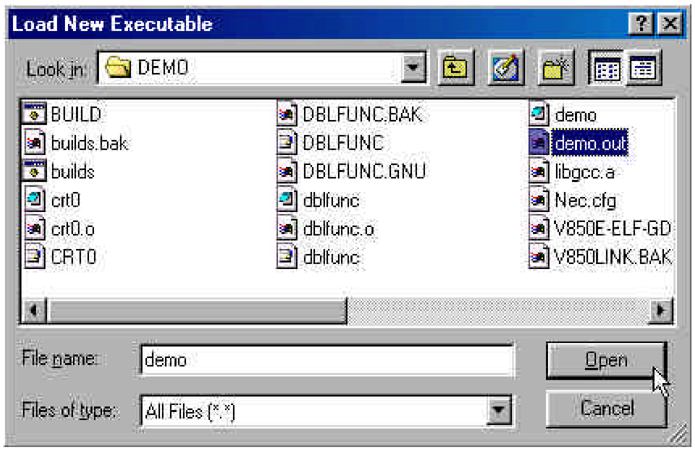
This section explains how to operate the SS-V850 emulator system.

1. From your desktop, double-click the **GDB** icon.

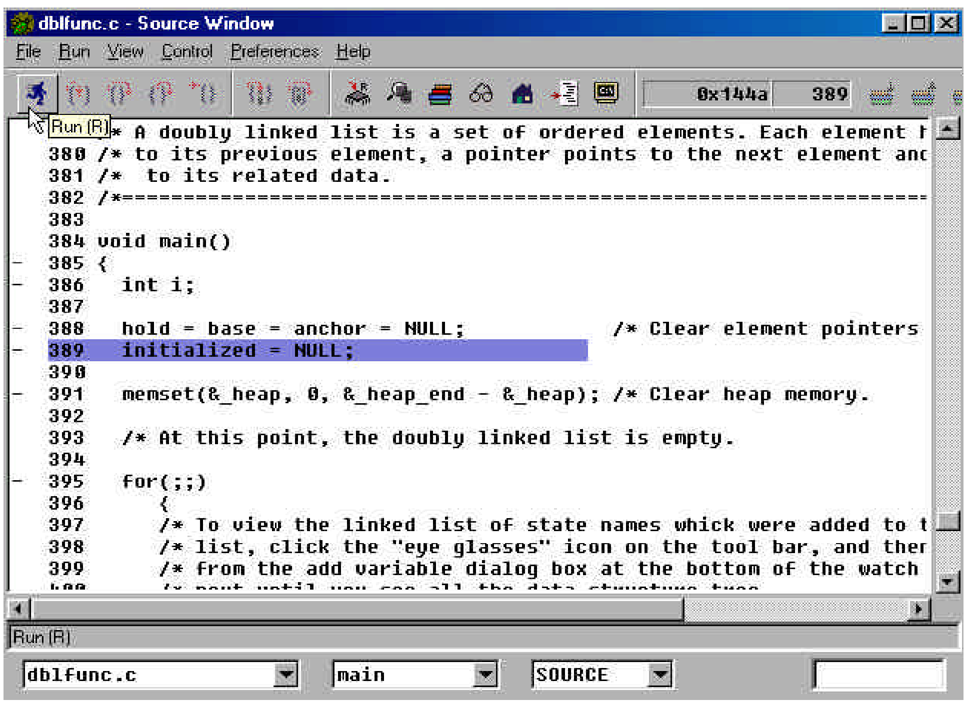
2. In the **Source** window, click **File** and then click **Open**.



3. In the **Load New Executable** dialog box, select an *.out file and then click **Open**.

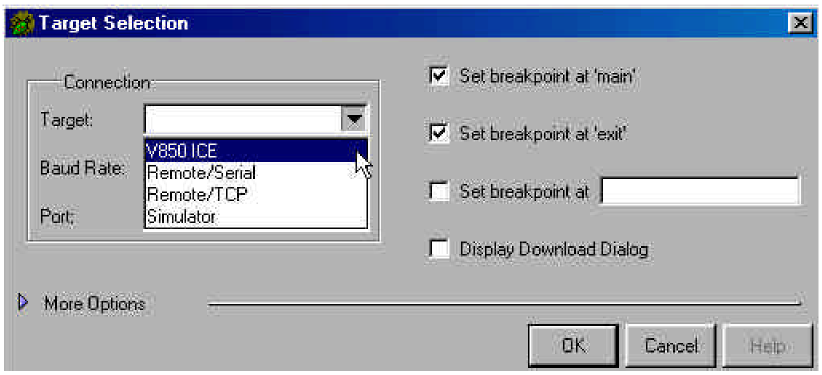


4. When the source code is visible in the Source window, click the **Run** icon on tool bar.

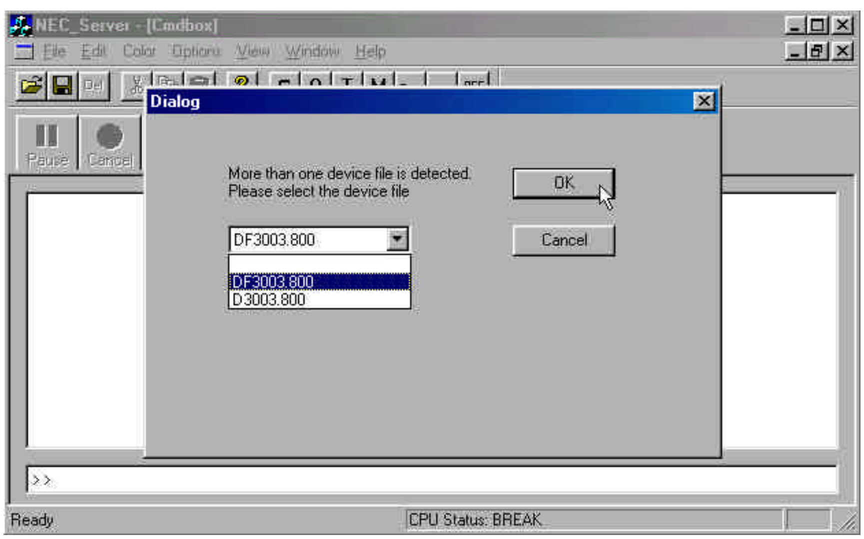


5. In the **Target Selection** dialog box, select **V850ICE**.

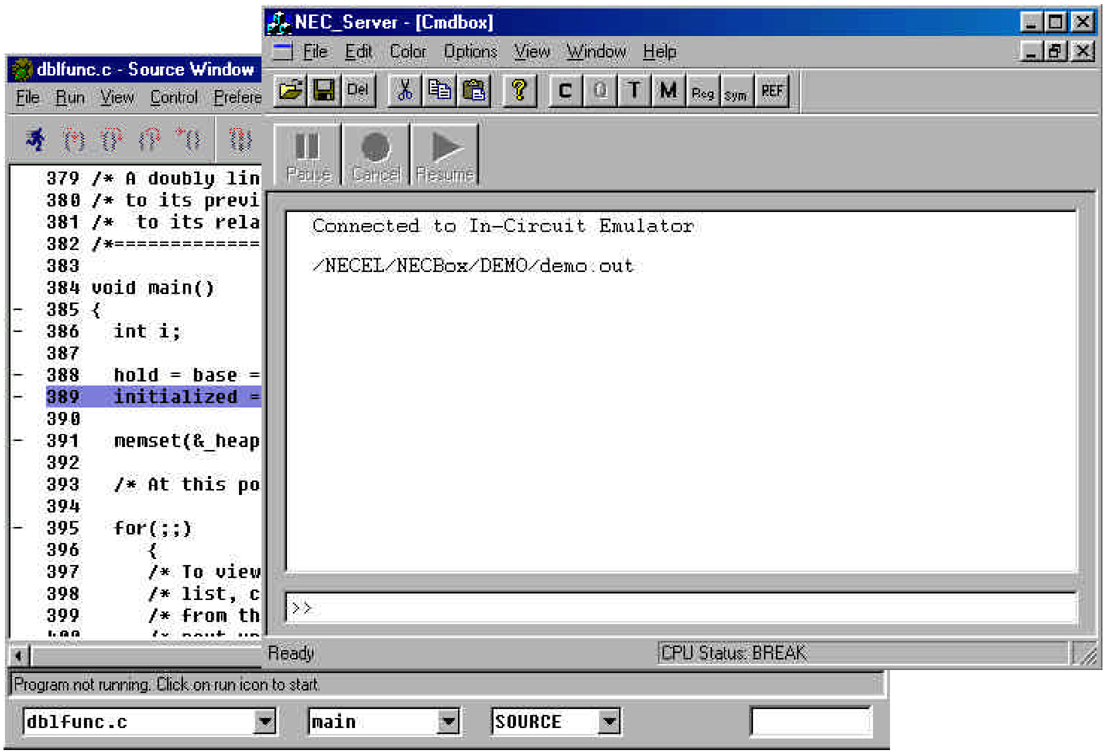
6. Click the check boxes to set target options as explained in Section 7.1.1. and then click **OK**.



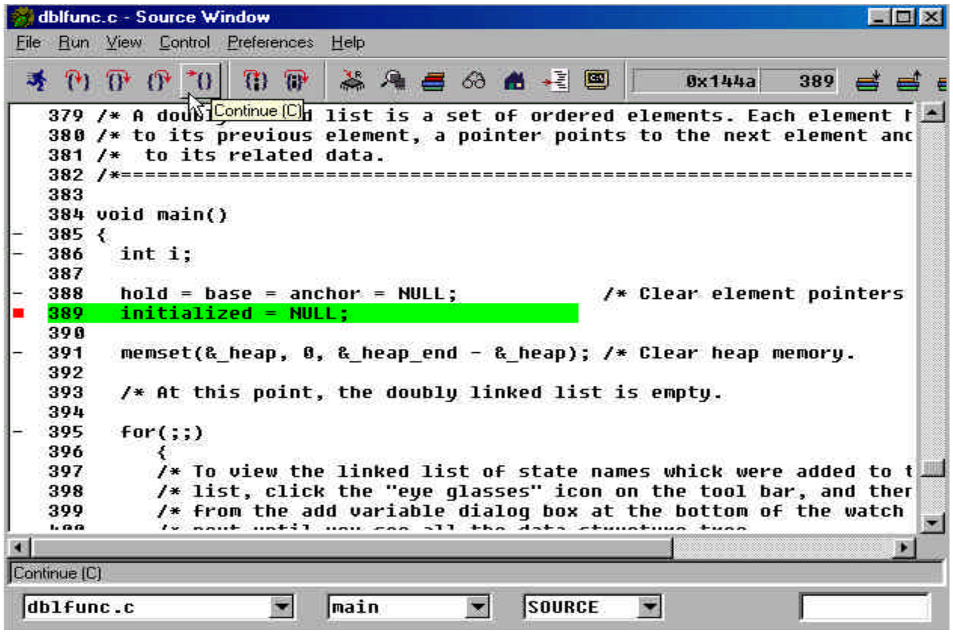
7. Select a device file, for example, DF3003.800, and then click **OK**.



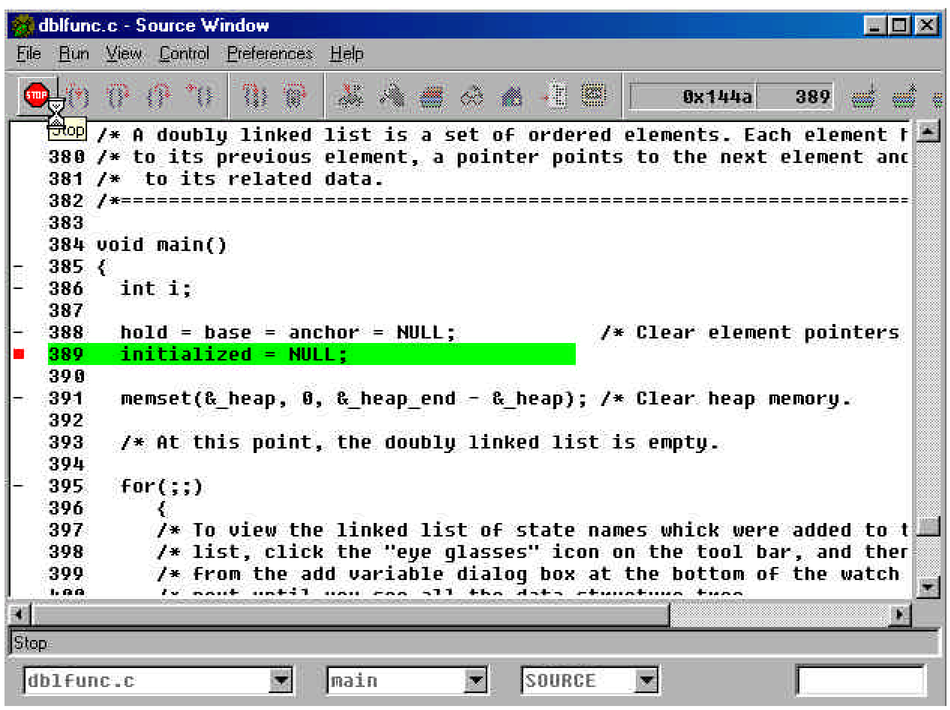
8. The program executes in the Source window and then stops at breakpoints specified in the target options (Section 7.1.1).



9. Click the **Continue** icon to continue program execution.

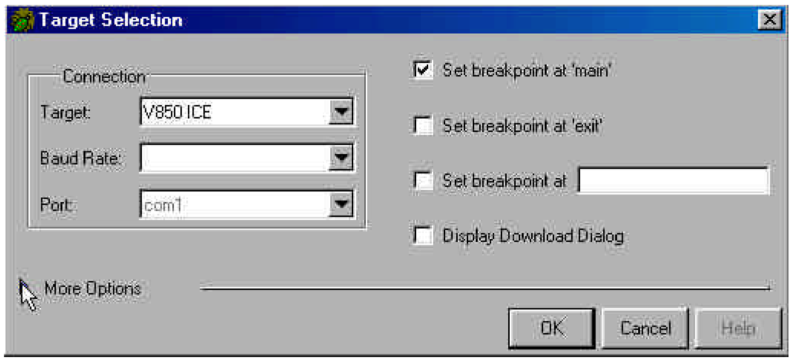


10. To halt execution, click the **Stop** icon.

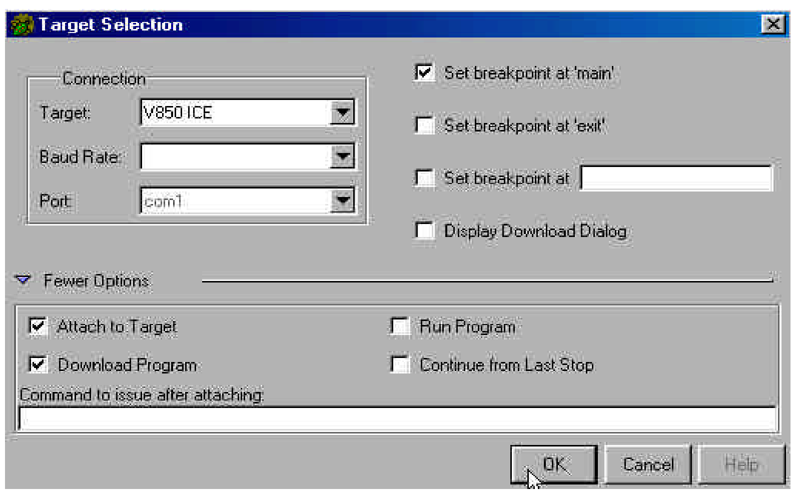


7.1.1 Target Options

From the **Target Selection** dialog box, you can set breakpoints and other options for the target program. Options are stored in memory and do *not* have to be set each time you launch the debugger.



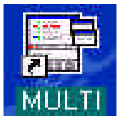
1. For example, click **Set breakpoint at 'main'** to set a breakpoint at the beginning of the 'main' function in the program.



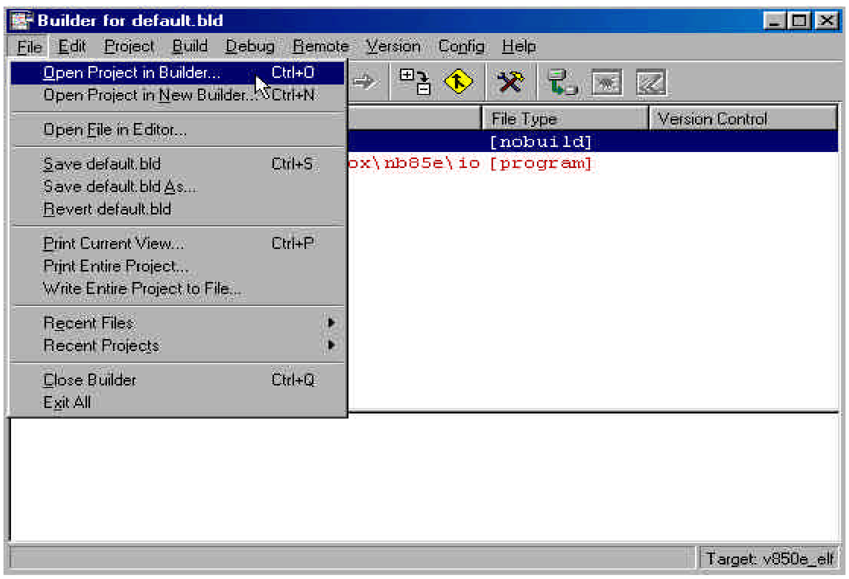
2. Click **More Options** to set additional options, including **Attach to Target**, **Download to Program**, **Run Program**, and **Continue from Last Stop**.

7.2 MULTI Debugger Operation

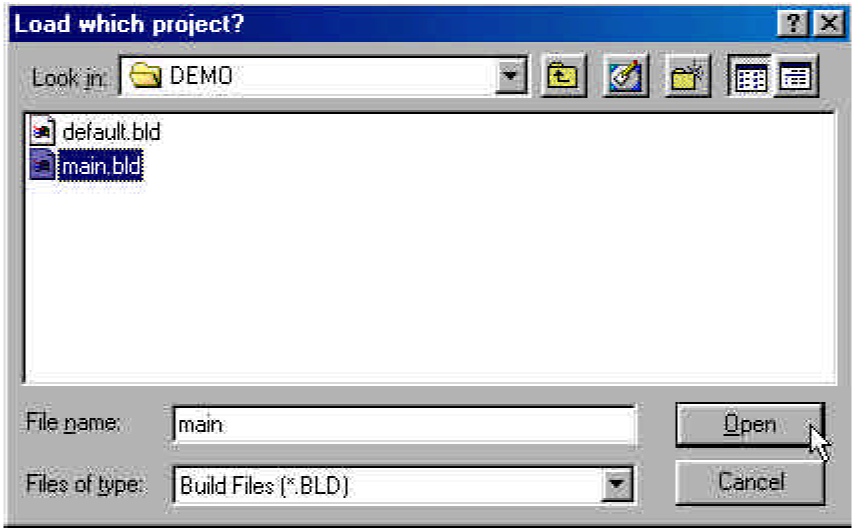
1. From your desktop, double-click the **MULTI** icon.



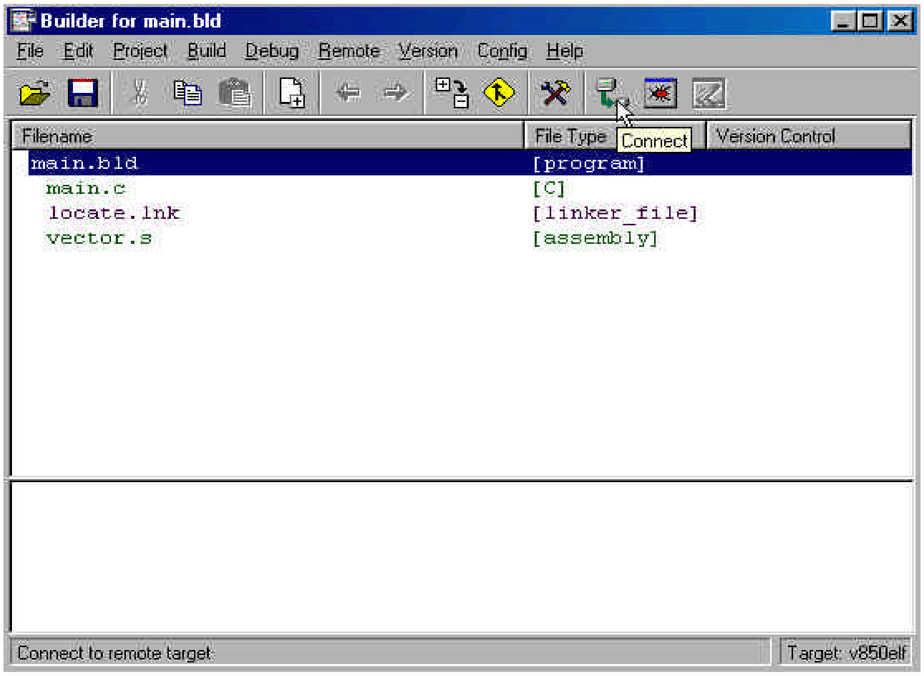
2. In the **Builder for default.bld** dialog box, click **File** and then click **Open Project in Builder**.



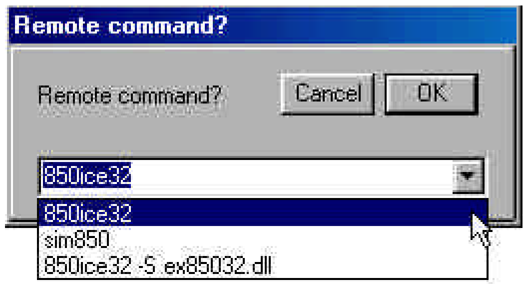
3. In the **Load which project?** dialog box, select a build (*.bld) file and then click **Open**.



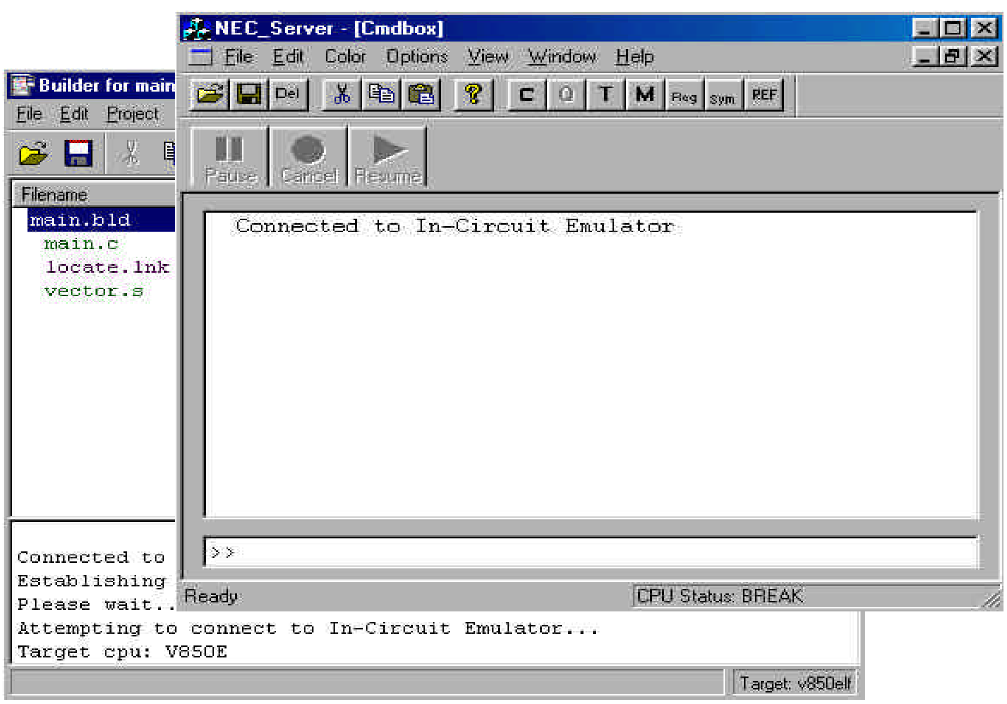
4. When the file name and file type are visible in the Builder for main.bld window, click the **Connect** icon.



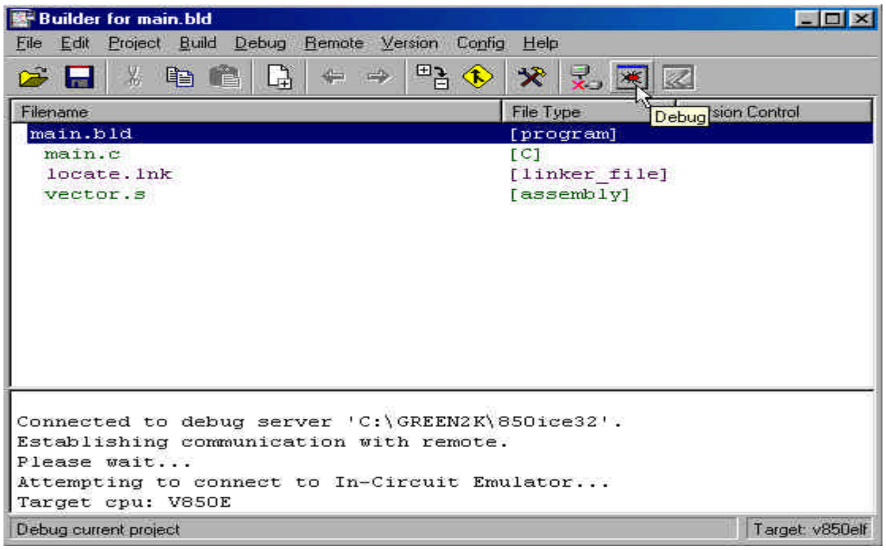
5. In the **Remote command?** dialog box, select **850ice32** and then click **OK**.



Automatic connection to the target can be specified in the **.RC** script file along with the name of the project (for example, **main.rc**). Afterward, when you launch the MULTI debugger, the NEC_Server connects to the target automatically.

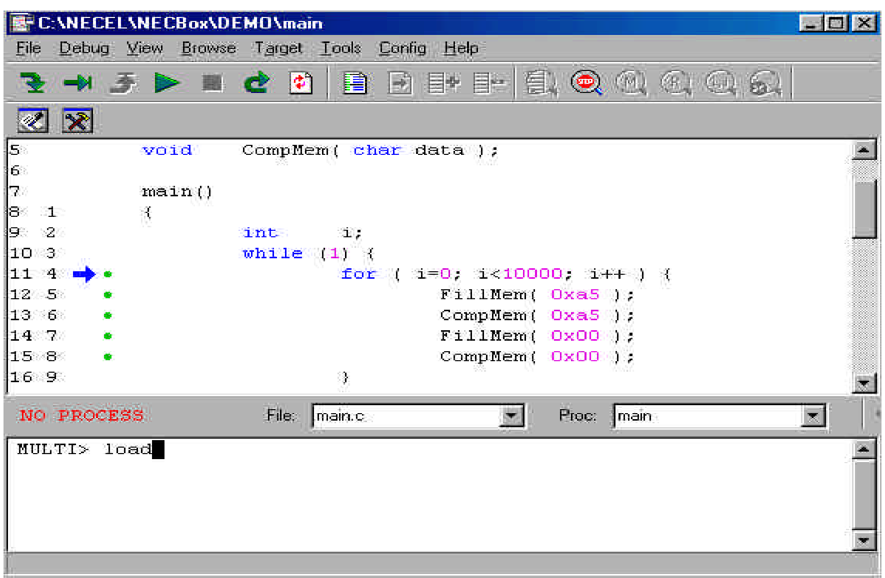


6. Click **Debug** to launch the MULTI debugger.

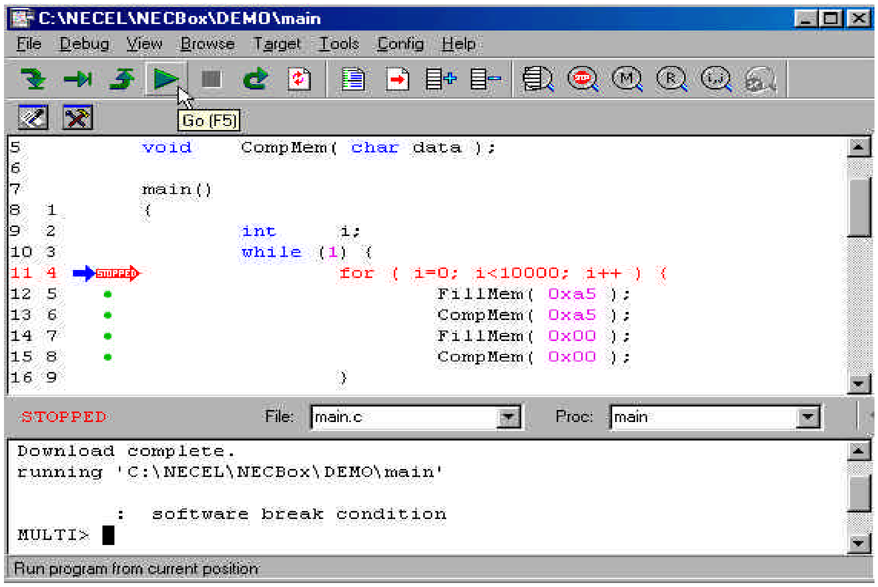


7. When the source code appears in the Builder for main.bld window, download the executable code.

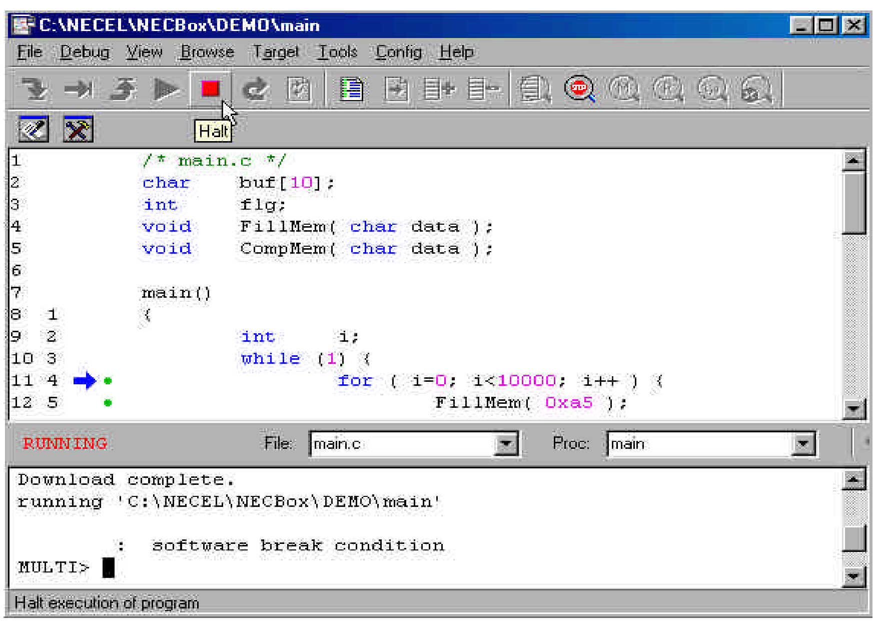
8. Type **load** in the **Command** window and then press **Enter**.



9. Click the **Go** icon to execute the program. When the program stops at 'main', click the **GO** icon to resume program execution.



11. To stop program execution, click the **Halt** icon *or* click the **Halt execution of program** command on the task bar.



8. FLASH PROGRAMMING

8.1 Overview

The SS-V850 system performs flash programming for NEC microcontrollers in the V850 family and other families, depending on the emulation board used and the characteristics of the device to be programmed.

The circuitry and connectors mounted on the emulation board support flash programming of V850 devices corresponding to that particular board. For some devices, the V_{DD} and V_{PP} programming voltages may be different. For example, the µPD70F3025A in the V853A subfamily requires V_{DD} at 5 V_{DC} and V_{PP} at 10 V_{DC}; the µPD70F3017A in the V850/SA1 subfamily requires V_{DD} at 3.3 V_{DC} and V_{PP} at 7.6 V_{DC}.

The SS-V853A-EM emulation board supports V_{DD} at 5 V_{DC} and V_{PP} at 10 V_{DC} and is suitable for programming the µPD70F3025A and other V853A devices requiring these voltages. The board is also suitable for programming of 8-bit K0 and K0S microcontroller families that require these voltages. However, the board does not program the µPD70F3017A microcontroller, which requires V_{DD} at 3.3 V_{DC} and V_{PP} at 7.6 V_{DC}.

The SS-V850SA1-EM emulation board for V850/SA1 microcontrollers supports V_{DD} at 3.3 V_{DC} and V_{PP} at 7.6 V_{DC} and is suitable for programming of the µPD70F3017 and other V850/SA1 devices requiring these voltages. The board does not program the µPD70F3025A or other devices requiring V_{DD} at 5 V_{DC} and/or V_{PP} at 10 V_{DC}.

Table 10 lists supported devices grouped by V_{DD} and V_{PP} programming voltages and emulation board.

Table 10. Programming Voltages

Emulation Board	SS-V853A-EM	SS-V850SA1-EM
V_{DD} voltage	5 V_{DC}	3.3 V_{DC}
V_{DC} voltage	10 V_{DC}	7.6 V_{DC}
V850 devices supported	µPD70F3003 µPD70F3003A µPD70F3025A	µPD70F3017A µPD70F3040 µPD70F3102 µPD70F3102A µPD70F3107 µPD78F3102A
Other devices supported	K0S family	µPD78F9xxx
	K0 family	µPD78F0xxx

8.2 Flash Device

The SS-V850 system has an on-board clamshell socket for loose devices and a DB-9 connector for off-board programming of devices. Off-board devices may be in the target system or in a flash-programming adapter such as the PA-80GG.

8.2.1 On-board Clamshell Socket

Flash devices may be inserted or removed from the on-board clamshell socket while power is applied to the SS-V850. The socket has no power unless a flash programming operation is in progress.

1. To use the on-board clamshell socket, lift its latch and insert the flash device.
2. Orient pin 1 of the flash device with the pin 1 mark on the emulation board, which is along the edge of the socket closest to the edge of the emulation board and at the left side of that edge.
3. Close the latch on the clamshell socket and begin flash programming.

8.2.2 DB9 Connector

The DB9 connector serves as an interface to an off-board device for three-wire serial I/O programming (V_{PP} pulses = 0).

- To use the DB9 connector to program devices in a flash-programming adapter, first ensure that the adapter is wired for the target device to be flash programmed. Refer to the user's manual for your chosen adapter and then consult NEC technical support about proper wiring.

- To use the DB9 connector to program a target device soldered or socketed in a target system, confirm that the target system is connected properly and able to isolate flash programming signals from target system signals. In normal operation, the target device's V_{PP}, RESET, X1, X2, SI, SO, and SCK pins are connected to target system resources. For flash programming, you must disconnect these signals from the target system and connect them to the DB9 connector, either by changing jumpers or by other methods of switching signals.

The system supports driving of V_{DD}_FLSH (pin 7 of the DB9 connector) either from the SS-V850 system or by the target system. Upon initialization of the software, the SS-V850 system senses V_{DD}_FLSH to determine whether voltage is applied. If V_{DD} _FLSH is non-zero, the system does not drive this pin. If V_{DD}_FLSH is zero, the SS-V850 drives V_{DD}_FLSH at the start of a flash programming operation with the appropriate V_{DD} voltage.

The device socket has no power during a flash programming operation. Therefore, it is not necessary to insert or connect a flash device before starting the FLASHDLL program. You may insert or remove a device at any time, *except* during flash programming.

For connection of flash programming signals to a target device in a target system, please see the flash programming section of the appropriate device data sheet.

8.2.3 FLASHDLL.EXE Program

The 32-bit, Windows-based FLASHDLL.EXE program operates the flash programming circuitry of the SS-V850 emulation system and other emulators supplied by NEC, such as the K0S-LCE and K0-LCE low-cost emulators.

The FLASHDLL program operates independently of the software debuggers and should not be used while the SS-V850 system is under control of a software debugger. Conversely, the software debuggers should not be used while the SS-V850 system is under control of the FLASHDLL program.

8.2.4 Installation of FLASHDLL.EXE Program

Install the FLASHDLL.EXE program in the directory containing the LV8HW.DLL file and other system files.

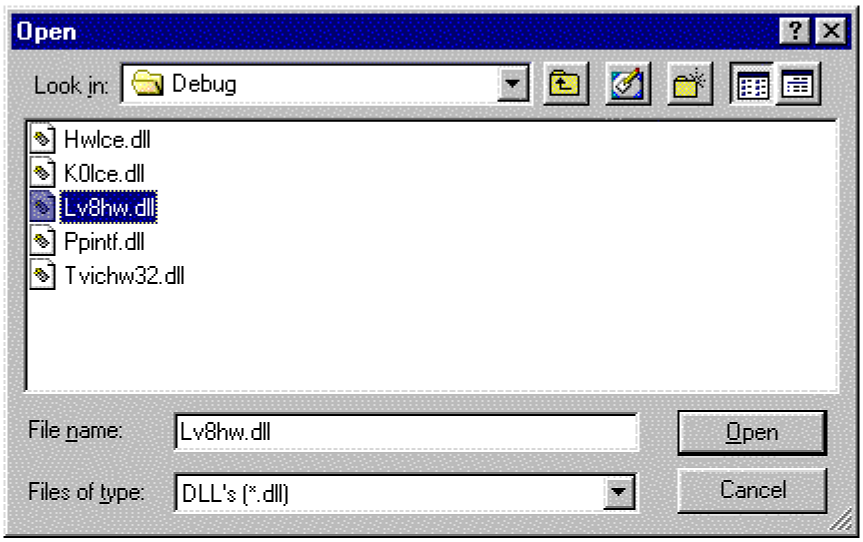
From the **Start** menu, click the shortcut to FLASHDLL.EXE, which should read **<dir>/FLASHDLL.EXE LV8HW.DLL**, where <dir> is the directory where the FLASHDLL.EXE program resides. If the shortcut does not exist, create one in the location of your choice.

8.3 Execution of FLASHDLL.EXE Program

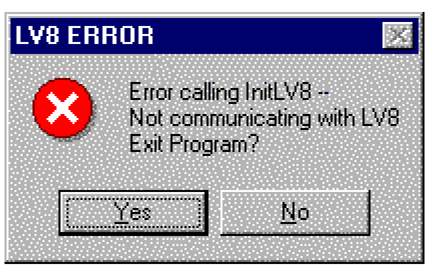
You can execute FLASHDLL.EXE in one of three ways.

- Click the shortcut on the **Start** menu to launch FLASHDLL.EXE and load the LV8HW.DLL component
- Enter a FLASHDLL LV8HW.DLL command after an MS-DOS prompt to start the program and load the LV8HW.DLL component
- Double-click the file name in Windows Explorer

In the last case, double-clicking the file name in Windows Explorer, the program prompts you to specify a DLL file. In the **Open** dialog box, select **LV8HW.DLL** and click **OK**. The name and location of the .DLL file are stored for future invocation.



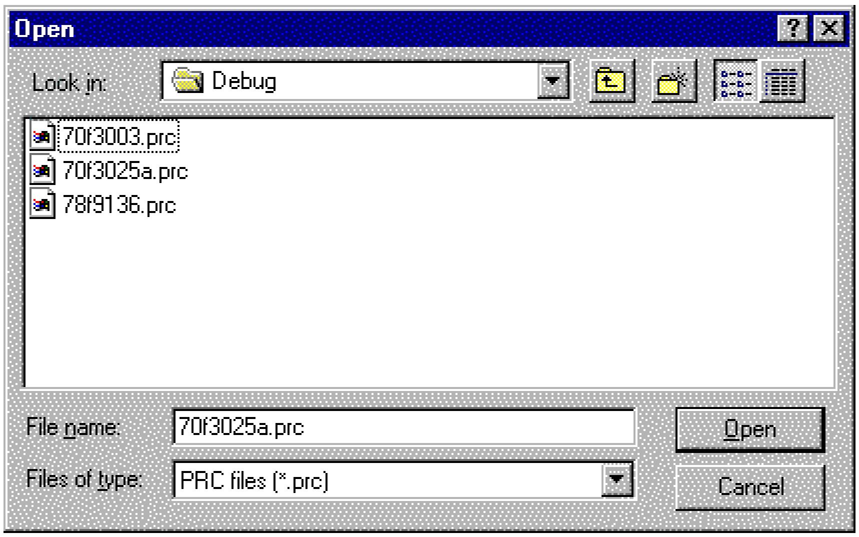
The program then attempts to communicate with the SS-V850 system. If communication is successful, the program asks you to specify a parameter file. If communication is unsuccessful, an error occurs.



Click **Yes** to terminate the program. Check the power connections and verify that the SS-V850 system is connected properly to your computer before attempting to restart the program.

8.3.1 Selecting the Parameter File

After the system loads the LV8HW.DLL file, the program prompts you to specify the .PRC parameter file that contains the characteristics of the device to be programmed. Double-click the file name to open it for the first time. Otherwise, click **Open** to open the last .PRC file loaded.



8.3.2 Verifying Hardware Capabilities Against .PRC File Requirements

After you select the parameter file, the FLASHDLL program checks the V_{DD} and V_{PP} values specified in the parameter file for the selected device against the V_{DD} and V_{PP} voltages for the emulation board being used.

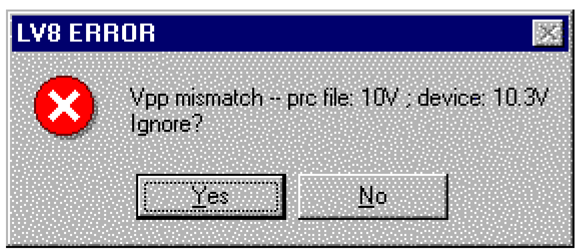
If the V_{DD} voltage of the board does not match the device specifications in the parameter file, the program displays a **DLL error** message.

Click **OK** to terminate the FLASHDLL program.

If the board's V_{DD} voltage matches, but the V_{PP} voltage doesn't, the resulting action depends on how far apart the board V_{PP} and device V_{PP} are. If they differ by more than 0.3 volts, the program displays the following message.

Click **OK** to terminate the program.

If the V_{PP} voltages are within 0.3 volts of each other, you may be able to program the target device, depending on device specifications, since there is typically a range of at least ±0.3V for V_{PP} on NEC flash devices. Check the data sheet for the device you are programming for V_{PP} voltages allowed. The program lists the mismatched voltages, allowing you to ignore the mismatch if you so choose.



Click **NO** to exit the FLASHDLL program or **YES** to ignore the V_{PP} mismatch and continue FLASHDLL program execution.

8.3.3 Check for Flash Device Communication

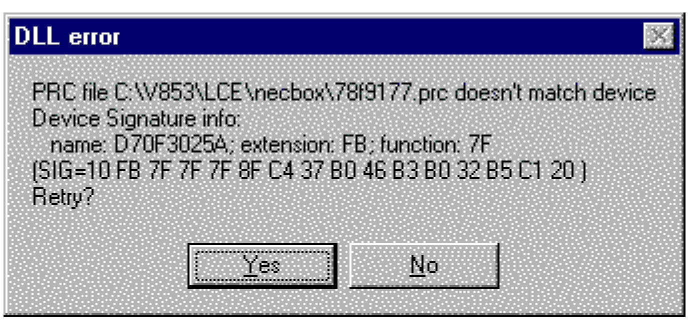
After initialization of communication with the SS-V850 system, the FLASHDLL program checks for communication with a flash device. If it finds no flash device in the clamshell socket or connected to the DB9 connector, the program sends an error message.

Click **OK** to exit the program.

If a flash device is inserted in the clamshell socket or connected to the DB9 connector, check for proper pin orientation or signal connection. Since parameters for initialization of the flash device are taken from the .PRC file, it may be possible that the device does not match the .PRC file specifications and cannot be initialized with those parameters. Check that the specified .PRC file matches the device in the socket or connected to the DB9 connector.

8.3.4 Flash Device Detection

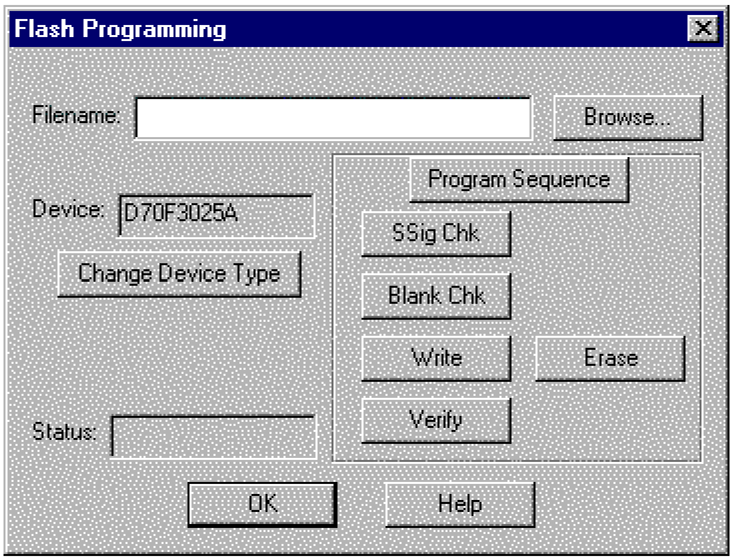
If the device can be initialized, but the silicon signature in the device does not match the one specified in the .PRC file, you receive an error message stating, for example, that the device detected a 70F3025A but the PRC file specified the µPD78F9177. In this case, click **YES** to return to the previous dialog box where you can select another .PRC file. Otherwise, click **NO** to exit the FLASHDLL program.



8.4 FLASHDLL.EXE Functions

8.4.1 FLASHDLL Program

Once the FLASHDLL program verifies communication with the flash device and opens the .PRC file, it displays the **Flash Programming** dialog box where you can choose to perform a silicon signature check (**SSig Chk**), blank check (**Blank Chk**), **Erase**, **Write**, or **Verify** operation individually or in sequence (**Program Sequence**).



8.4.2 Silicon Signature Check Operation

When you click **SSig Chk**, the flash programmer checks the signature of the device against the specified parameter file and then displays the part number in the **Device** box. The **Status** box briefly shows **Ssig Checking…** while the operation is in process.

If the device signature does not match the parameter file, the program displays an error message and the **Device** box is blank.

8.4.3 Blank Check Operation

1. To perform a blank check on the device, click **Blank Chk**.
2. The **Status** box displays **Blank checking…**.
3. If the device is blank, the **Status** box displays **Blank**.
4. If the device is not blank, the **Status** box displays **Device is not blank**.

8.4.4 Erase Operation

1. To erase the entire device, click **Erase**.
2. Throughout the operation, the **Status** box shows **Erasing…**.
3. When the device is erased, the **Status** box displays **Erased**.
4. If an error occurs during the erase operation, the program sends a message indicating the type of error and the **Status** box displays **Erase failed**.

8.4.5 Write and Internal Verify Operation

1. To program the device, click **Browse...** and select a file with data for writing. The FLASHDLL program currently supports two types of files.
   - .BIN files that contain a binary image of the data to be written, starting at address 000000 and ending with the last address of the write data
   - .HEX files that contain data in Intel® hexadecimal format that specifies individual records of data with addresses and checksums
2. Click **Write** to program the device. Programming time varies depending on the size of the file being written, but the **Status** box displays **Writing…** throughout the operation.
3. After the program writes the data, it then performs an internal verify operation on the device. After completion, the **Status** box displays **Written and verified**.
4. If the program detects an error, it sends an error message and the **Status** box displays **Write failed**.

8.4.6 Verify Operation

1. To verify the contents of a device against a file, click **Browse…**.
2. Select a file and then click **Verify**. The status box displays **Verifying…**.

   When you select this method of verifying, the program sends data to the flash device for all areas of memory, even those outside the area specified by the file. The time to perform a verify operation is generally no longer than the time needed to write a file.

3. After all the data is verified, the **Status** box displays either **Verified** or **Verify failed**, depending on whether the contents of the file exactly match the data in the flash device.

8.4.7 Complete Programming Cycle

1. To automate the programming sequence, click **Program Sequence** to execute the silicon signature check, blank check, erase (if necessary), and write operations in sequential order.

   During these operations, the status box displays **Ssig Checking**, **Blank Checking…**, **Erasing…** (if the device is not blank), and **Writing…** as the program cycles through the individual operations.

2. After completion of the sequence, the **Status** box displays **Written and verified**. If the program detects an error at any step in the sequence, it displays an error message and aborts programming at that step.

8.4.8 Programming of a New Device

Upon completion of any operation or sequence of operations, the program turns off V_{DD}_FLSH and V_{PP} power to the clamshell socket and DB9 connector so that you can safely remove the device from the unit.

You can then insert a new device and select another operation. The program performs a silicon signature check on the new device to detect whether it matches the selected parameter file. Several devices may be programmed with the same data.

1. Select a file to be written.
2. Insert a device in the clamshell socket.
3. Click **Program Sequence**.
4. When programming is complete, remove the programmed device and return to step 2.

8.4.9 Programming a Different Device

The signature of the device inserted in the clamshell socket or connected to the DB9 connector is checked before every operation, to guard against accidental programming of the wrong device.

If you wish to program a device other than the one specified in the current .PRC file, click **Change Device Type** and select a .PRC file to match the new device.

8.4.10 Exiting the FLASHDLL Program

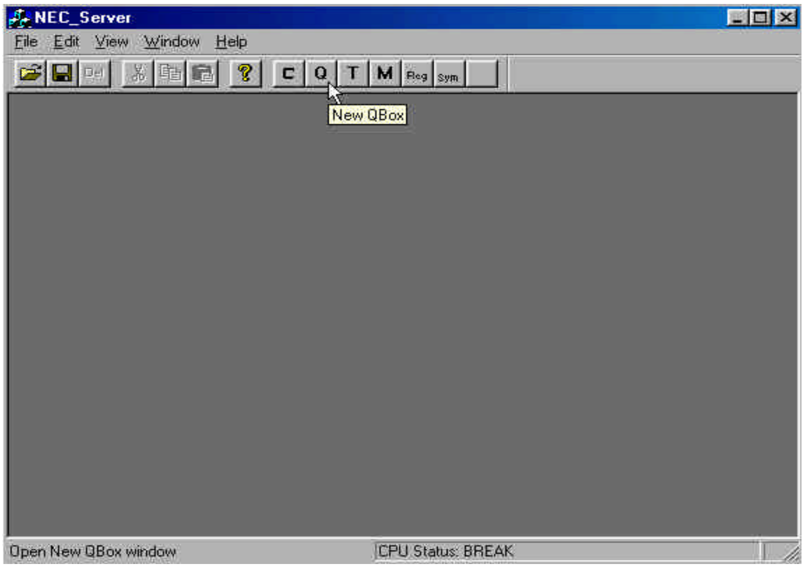
To exit the FLASHDLL program, click **OK**.

9. TROUBLESHOOTING

9.1 Command Window Errors

When NEC_Server launches for the first time from any working directory, the window appears gray.

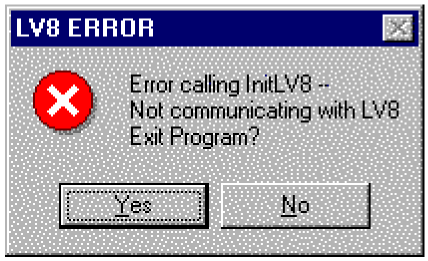
1. To open the command window, click **Q** on the tool bar.



2. Quit the program.
3. Relaunch **NEC_Server**.
4. The program then saves the configuration in **NEC.cfg** in your local directory.

9.2 Communication Errors

The following message indicates that communication with the SS-V850 is not established.



1. Clicking **No** in response to the error message generates another error message: **`Failed to Connect to In-Circuit Emulator`**.

2. Exit the NEC_Server program.

3. Refer to Section 8.3 for information about how to troubleshoot programming errors

4. Clicking **Yes** in response to the error message exits the program.

5. Check the power supply connection and polarity setting.

6. Check the parallel cable connection and settings.

7. If communication is still unsuccessful, uninstall NEC_Server in My computer/Control Panel using the **Remove Software** command in your Windows operating system.

8. Reinstall the software

9. Restart the program.

10. If you still need help, call technical support at 1-800-366-9782.

For additional information, visit our web site at www.necel.com,
call 1-800-366-9782 or fax 1-800-729-9288.

NEC Electronics Inc.