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April 1st, 2010
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RENESAS

User's Manual

QB-V850ESKX1H

In-Circuit Emulator

Target Devices

V850ES/KE1, V850ES/KE1+,
V850ES/KF1, V850ES/KF1+,
V850ES/KG1, V850ES/KG1+,
V850ES/KJ1, V850ES/KJ1+,
V850ES/KE2, V850ES/KF2,
V850ES/KG2, V850ES/KJ2

Document No. U17214EJ4V0UM00 (4th edition)
Date Published April 2007 NS CP(K)

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M8E 02. 11-1

General Precautions for Handling This Product

1. **Circumstances not covered by product guarantee**
   - If the product was disassembled, altered, or repaired by the customer.
   - If it was dropped, broken, or given another strong shock.
   - Use at overvoltage, use outside guaranteed temperature range, storing outside guaranteed temperature range.
   - If power was turned on while connection to the AC adapter, USB interface cable, or target system was in an unsatisfactory state.
   - If the AC adapter cable, the USB interface cable, the emulation probe, or the like was bent or pulled excessively.
   - If an AC adapter other than the supplied product was used.
   - If the product got wet.
   - If this product is connected to the target system when there is a potential difference between the GND of this product and GND of the target system.
   - If the connectors or cables are plugged/unplugged while this product is in the power-on state.
   - If excessive load is applied to the connectors or sockets.

2. **Safety precautions**
   - If used for a long time, the product may become hot (50°C to 60°C). Be careful of low temperature burns and other dangers due to the product becoming hot.
   - Be careful of electrical shock. There is a danger of electrical shock if the product is used as described above in **1 Circumstances not covered by product guarantee**.
   - The AC adapter supplied with the product is exclusively for this product, so do not use it with other products.

INTRODUCTION

Readers

This manual is intended for users who wish to perform debugging using the QB-V850ESKX1H. The readers of this manual are assumed to be familiar with the device functions and usage, and to have knowledge of debuggers.

Purpose

This manual is intended to give users an understanding of the basic specifications and correct usage of the QB-V850ESKX1H.

Organization

This manual is divided into the following sections.

- General
- Setup procedure
- Settings at product shipment
- Notes
- Optional functions

How to Read This Manual

It is assumed that the readers of this manual have general knowledge in the fields of electrical engineering, logic circuits, and microcontrollers.
This manual describes the basic setup procedures and how to set switches.

To understand the overall functions and usages of the QB-V850ESKX1H
→Read this manual in the order of the CONTENTS. The mark "<R>" shows major revised points. The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

To know the manipulations, command functions, and other software-related settings of the QB-V850ESKX1H
→See the user's manual of the debugger (supplied with the QB-V850ESKX1H) to be used.

Conventions

Note:	Footnote for item marked with **Note** in the text
Caution:	Information requiring particular attention
Remark:	Supplementary information
Numeric representation:	Binary ... xxxx or xxxxB
	Decimal ... xxxx
	Hexadecimal ... xxxxH
Prefix indicating power of 2 (address space, memory capacity):	K (kilo): 2^{10} = 1,024
	M (mega): 2^{20} = $1,024^2$

Terminology

The meanings of the terms used in this manual are described in the table below.

Term	Meaning
Target device	This is the device to be emulated.
Target system	This is the system to be debugged (system provided by the user). This includes the target program and the hardware provided by the user.
IECUBE™	Generic name for NEC Electronics' high-performance/compact in-circuit emulator.

Related Documents

Please use the following documents in combination with this manual.

The related documents listed below may include preliminary versions. However, preliminary versions are not marked as such.

Documents Related to Development Tools (User's Manuals)

Document Name		Document Number
QB-V850ESKX1H (in-circuit emulator)		This manual
CA850 Ver. 3.00 C Compiler Package	Operation	U17293E
	C Language	U17291E
	Assembly Language	U17292E
	Link Directives	U17294E
ID850QB Ver. 3.20 Integrated Debugger	Operation	U17964E
SM+ System Simulator	Operation	U18010E
	User Open Interface	U17663E
RX850 Ver. 3.20 Real-Time OS	Basics	U13430E
	Installation	U17419E
	Technical	U13431E
	Task Debugger	U17420E
RX850 Pro Ver. 3.20 Real-Time OS	Basics	U13773E
	Installation	U17421E
	Technical	U13772E
	Task Debugger	U17422E
AZ850 Ver. 3.30 System Performance Analyzer		U17423E
PM+ Ver. 6.00 Project Manager		U17178E

Caution The related documents listed above are subject to change without notice. Be sure to use the latest version of each document for designing, etc.

CONTENTS

CHAPTER 1 GENERAL

The QB-V850ESKX1H is an in-circuit emulator for emulating the target device shown below.

Hardware and software can be debugged efficiently in the development of systems in which the target device is used. This manual descries basic setup procedures, hardware specifications, system specifications, and how to set switches.

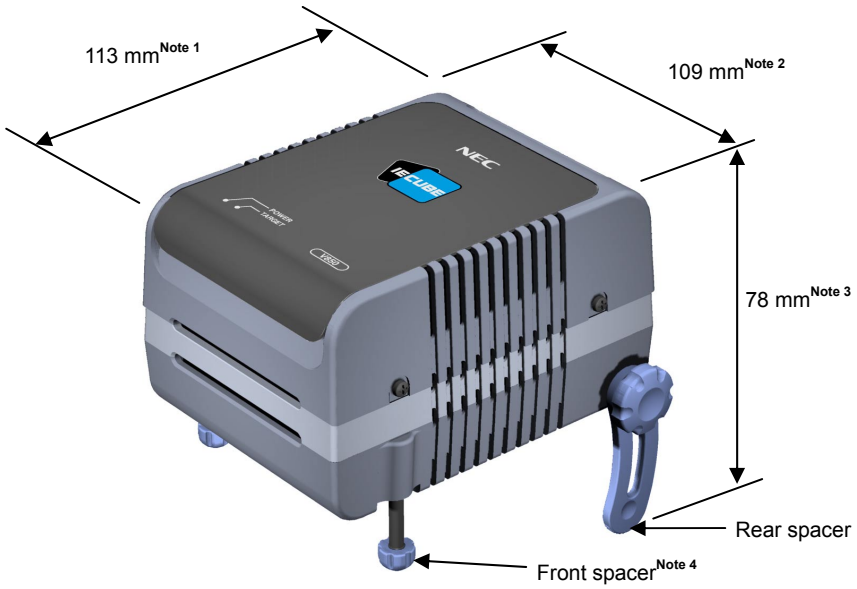
Target device : V850ES/KE1, V850ES/KF1, V850ES/KG1, V850ES/KJ1, V850ES/KE1+, V850ES/KF1+, V850ES/KG1+, V850ES/KJ1+, V850ES/KE2, V850ES/KF2, V850ES/KG2, V850ES/KJ2

1.1 Hardware Specifications

Table 1-1. QB-V850ESKX1H Hardware Specifications

Parameter		Specification				
Target system interface voltage		V_{DD} = EV_{DD} = BV_{DD} = AV_{REF0} = AV_{REF1} V_{SS} = EV_{SS} = BV_{SS} = AV_{SS} = 0 V				
		V_{DD}	EV_{DD}	BV_{DD}	AV_{REF0}	AV_{REF1}
	V850ES/KE1, V850ES/KE1+, V850ES/KF1, V850ES/KF1+, V850ES/KE2, V850ES/KF2	2.7 to 5.5 V	2.7 to 5.5 V	–	2.7 to 5.5 V	–
	V850ES/KG1, V850ES/KG1+, V850ES/KJ1, V850ES/KJ1+, V850ES/KG2, V850ES/KJ2	2.7 to 5.5 V	2.7 to 5.5 V	2.7 to 5.5 V	2.7 to 5.5 V	2.7 to 5.5 V
Maximum operating frequency		20 MHz				
Operating temperature range		0 to 40°C (No condensation)				
Storage temperature range		–15 to +60°C (No condensation)				
External dimensions		See figure below				
Power consumption	AC adapter	15 V, 1 A				
	Target system power supply	Same level or lower than target device (except for standby mode)				
Weight		500 g				
Host interface		USB interface (1.1, 2.0)				

<R>



Notes 1. Does not include projection of power switch

2. Includes projection of screw that fixes rear spacer

3. Dimension when rear spacer is made shortest (108 mm when longest)

4. Front spacer can vary from 20 mm (longest) to 5 mm (shortest)

1.2 System Specifications

This section shows the QB-V850ESKX1H system specifications. For the usage of the debugging function, refer to **ID850QB Ver. 3.20 Operation User's Manual (U17964E)**.

Table 1-2. QB-V850ESKX1H System Specifications

Parameter		Specification
Emulation memory capacity	Internal ROM	1 MB max.
	Internal RAM	60 KB max.
	External memory	16 MB max. (optional) (mapping possible in 1 MB units)
Program execution functions	Real-time execution function	Go, Start from Here, Go & Go, Come Here, Restart, Return Out
	Non-real-time execution function	Step In, Next Over, Slowmotion
Break functions	Hardware break	Execution: 10 points Access: 6 points
	Software break	2000 points
	Fail-safe break	Non-map, I/O illegal, write protect
	Other	Trace full break, forced break, timer overflow break
Trace functions	Trace data types	Branch-source PC, branch-destination PC, all PCs, all execution data, access data, access address, R/W status, time stamp, DMA point (start/end)
	Trace modes	Real-time trace, Complete trace
	Trace events	Delay trigger, section, qualify
	Memory capacity	256K frames
Real-time RAM monitoring function		256 bytes × 8 points
<R> Time measurement functions	Measurement clock	50 MHz
	Measurement objects	Beginning through end of program execution <R> Start event through end event (7 sections)
	Maximum measurement time	<R> Approximately 195 hours (When using measurement-dedicated clock divided by 32)
	Minimum resolution	20 ns
	Number of timers for measurement	8
	Measurement results	Execution time (Start through end of execution) Maximum, minimum, average, pass count (between events)
	Other	Timer overflow break function (1 point)
Coverage function		Detection of execution or pass (optional)
	Measured range	Internal ROM space + arbitrary 1 MB space
Other functions		Mapping function, event function, register manipulation function, memory manipulation function

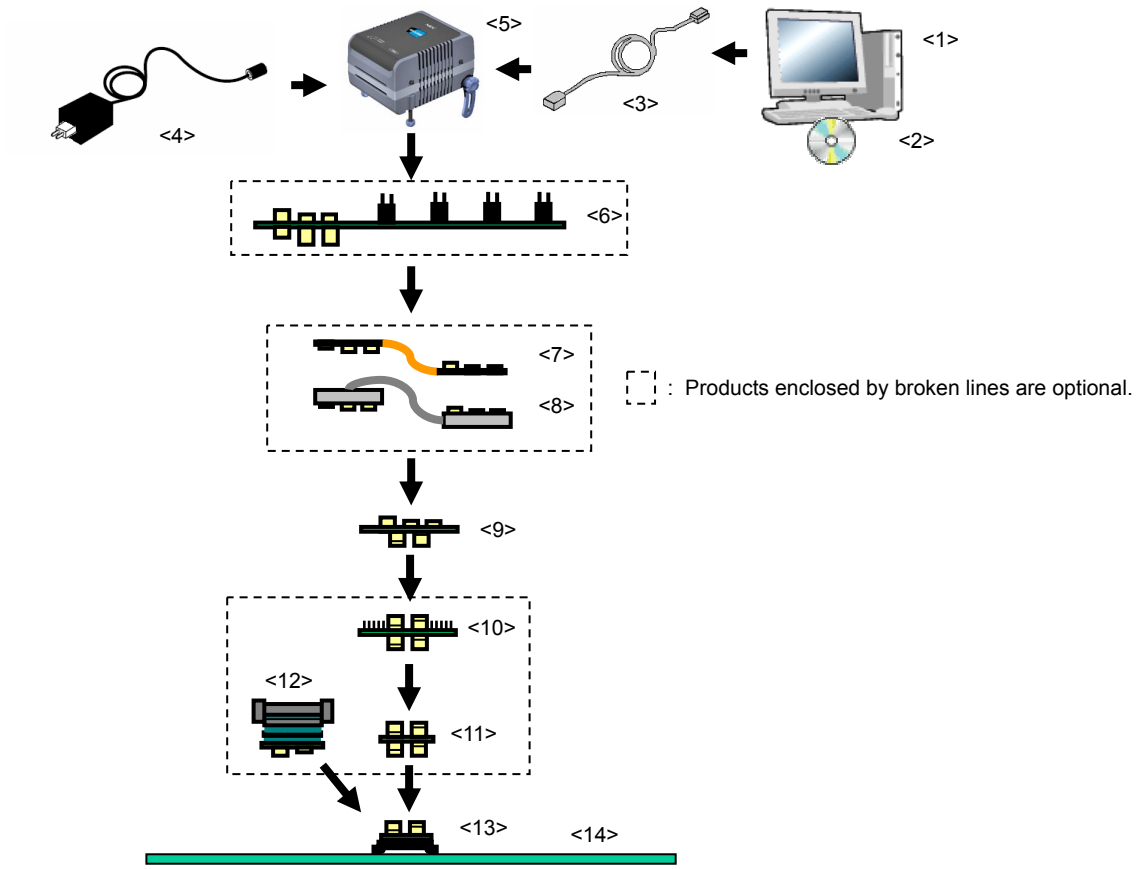
Caution Depending on the debugger, some functions are not supported.

1.3 System Configuration

<R> This section shows the system configuration when using the QB-V850ESKX1H connected to a host machine (a computer equipped with a USB port). Connection is possible even without optional products.

Connectors <9> to <13> differ depending on the target device to be emulated.

Figure 1-1. System Configuration (S type)



<R> <1> Host machine: Computer equipped with a USB port

<2> ID850QB Disk/Accessory Disk[Note 1]: Debugger, USB drivers, manual, etc.

<3> USB interface cable: Cable connecting QB-V850ESKX1H to host machine

<4> AC adapter: Can support 100 to 240 V by replacing AC plug

<5> QB-V850ESKX1H: This product

<6> Check pin adapter (option)[Note 2]: Adapter used when observing waveforms on oscilloscope

<R> <7> Extension probe (flexible type) (option)

<8> Extension probe (coaxial type) (option)

<9> Exchange adapter: Adapter that performs pin conversion

<10> Check pin adapter (option)[Note 3]: Adapter used when observing waveforms on oscilloscope

<11> Space adapter (option)[Note 4]: Adapter for height regulation

<12> Mount adapter (option): Adapter for socket mounting target device

<13> Target connector: Connector soldered to target system

<14> Target system

Notes 1. Obtain device files from the NEC Electronics website.
http://www.necel.com/micro/ods/eng/index.html

2. Please refer to **[Related Information]** on the following URL about the check pin adapter.
http://www.necel.com/micro/english/iecube/index.html

3. If <10> is used, <8> needs to be connected.

4. If both <10> and <11> are used, connection sequence of <10> and <11> may be reversed.

Remark For notes on target system design and package drawings, refer to **[Related Information]** on the following URL.
http://www.necel.com/micro/index_e.html

Table 1-3. List of Probe/Connector for Each Target Device (1/2)

No.	Name	Target Device to Be Emulated			
		V850ES/KE1, V850ES/KE1+, V850ES/KE2		V850ES/KF1, V850ES/KF1+, V850ES/KF2	
		64-Pin GB	64-Pin GK	80-Pin GC	80-Pin GK
<6>	Check pin adapter	QB-144-CA-01 (sold separately)			
<7>	Extension probe (flexible type)	QB-144-EP-02S (sold separately)			
<8>	Extension probe (coaxial type)	QB-144-EP-01S (sold separately)			
<9>	Exchange adapter	QB-64-EA-01S (sold separately)[Note]		QB-80GC-EA-02S (sold separately)[Note]	QB-80GK-EA-01S (sold separately)[Note]
<10>	Check pin adapter	QB-64-CA-01S (sold separately)		QB-80-CA-01S (sold separately)	
<11>	Space adapter	QB-64-SA-01S (sold separately)		QB-80-SA-01S (sold separately)	
<12>	Mount adapter	QB-64GB-MA-01S (sold separately)	QB-64GK-MA-01S (sold separately)	QB-80GC-MA-01S (sold separately)	QB-80GK-MA-01S (sold separately)
<13>	Target connector	QB-64GB-TC-01S (sold separately)[Note]	QB-64GK-TC-01S (sold separately)[Note]	QB-80GC-TC-01S (sold separately)[Note]	QB-80GK-TC-01S (sold separately)[Note]

Table 1-3. List of Probe/Connector for Each Target Device (2/2)

No.	Name	Target Device to Be Emulated		
		V850ES/KG1, V850ES/KG1+, V850ES/KG2		V850ES/KJ1, V850ES/KJ1+, V850ES/KJ2
		100-Pin GC	100-Pin GF	144-Pin GJ
<6>	Check pin adapter	QB-144-CA-01 (sold separately)		
<7>	Extension probe (flexible type)	QB-144-EP-02S (sold separately)		
<8>	Extension probe (coaxial type)	QB-144-EP-01S (sold separately)		
<9>	Exchange adapter	QB-100GC-EA-01S (sold separately)[Note]	QB-100GF-EA-01S (sold separately)[Note]	QB-144GJ-EA-02S (sold separately)[Note]
<10>	Check pin adapter	QB-100-CA-01S (sold separately)		QB-144-CA-01S (sold separately)
<11>	Space adapter	QB-100-SA-01S (sold separately)		QB-144-SA-01S (sold separately)
<12>	Mount adapter	QB-100GC-MA-01S (sold separately)	QB-100GF-MA-01S (sold separately)	QB-144GJ-MA-01S (sold separately)
<13>	Target connector	QB-100GC-TC-01S (sold separately)[Note]	QB-100GF-TC-01S (sold separately)[Note]	QB-144GJ-TC-01S (sold separately)[Note]

Note These accessories are supplied depending on the part number ordered.

1.4 Package Contents

The following items have been placed in the QB-V850ESKX1H packing box. Please check the contents.

Products supplied with QB-V850ESKX1H-ZZZ

1: QB-V850ESKX1H
2: AC adapter
3: USB interface cable
4: ID850QB Disk (CD-ROM)
5: Accessory Disk (CD-ROM)
6: IECUBE Setup Manual
7: User registration (Guarantee card and software contract in one)
8: Simple flash memory programmer (PG-FPL or QB-MINI2)
9: Probe holder
10: Parts board (for clock)

Products supplied with QB-V850ESKX1H-S144GJ

1 to 10
11: Exchange adapter QB-144GJ-EA-02S
12: Target connector QB-144GJ-TC-01S

Products supplied with QB-V850ESKX1H-S100GF

1 to 10
11: Exchange adapter QB-100GF-EA-01S
12: Target connector QB-100GF-TC-01S

Products supplied with QB-V850ESKX1H-S100GC

1 to 10
11: Exchange adapter QB-100GC-EA-01S
12: Target connector QB-100GC-TC-01S

Products supplied with QB-V850ESKX1H-S80GK

1 to 10
11: Exchange adapter QB-80GK-EA-01S
12: Target connector QB-80GK-TC-01S

Products supplied with QB-V850ESKX1H-S80GC

1 to 10
11: Exchange adapter QB-80GC-EA-02S
12: Target connector QB-80GC-TC-01S

Products supplied with QB-V850ESKX1H-S64GK

1 to 10
11: Exchange adapter QB-64-EA-01S
12: Target connector QB-64GK-TC-01S

Products supplied with QB-V850ESKX1H-S64GB

1 to 10

11: Exchange adapter QB-64-EA-01S

12: Target connector QB-64GB-TC-01S

CHAPTER 2 SETUP PROCEDURE

This chapter explains the QB-V850ESKX1H setup procedure.
Setup can be completed by performing installation/setup in the order in which it appears in this chapter.
Perform setup along the lines of the following procedure.
Refer to **2.1 Names and Functions of Hardware** for jumper and clock board positions.

Clock settings

A 5 MHz resonator is mounted when shipped.
The setting does not have to be changed if a 5 MHz resonator can be used.
If modification is necessary, refer to **2.2 Removal of Acrylic Board** and **2.3 Clock Settings**.

↓

Target device settings

The QB-V850ESKX1H is set for the V850ES/KE1+, V850ES/KF1+, V850ES/KG1+, or V850ES/KJ1+ when shipped.
For V850ES/KE1+, V850ES/KF1+, V850ES/KG1+, or V850ES/KJ1+ emulation, no changes are required.
To use for the V850ES/KE1, V850ES/KF1, V850ES/KG1, V850ES/KJ1, V850ES/KE2, V850ES/KF2, V850ES/KG2, or V850ES/KJ2, refer to **2.2 Removal of Acrylic Board** and **2.4 Setting for Target Device**

↓

REGC pin settings

The QB-V850ESKX1H is set so that the potential the same as EV_{DD} is supplied to the REGC pin when shipped.
The setting does not have to be changed if the above setting causes no problems.
If modification is necessary, refer to **2.5 REGC Pin Settings**.

↓

Mask option settings

The QB-V850ESKX1H is set so that the pull-up resistors are not connected to P36 to P39, P614, and P615 by mask option when shipped.
The setting does not have to be changed if the above setting causes no problems
If modification is necessary, refer to **2.6 Mask Option Settings**.

↓

Software settings

Refer to **2.7 Software Settings**.

↓

Mounting and connecting connectors

Refer to **2.8 Mounting and Connecting Connectors**.

↓

Connecting QB-V850ESKX1H to target system

Refer to **2.9 Connecting QB-V850ESKX1H to Target System**.

- When not using the extension probe (QB-144-EP-01S/02S): refer to **2.9.1**.
- When using the extension probe (QB-144-EP-01S/02S): refer to **2.9.2**.

Connecting USB interface cable and AC adapter

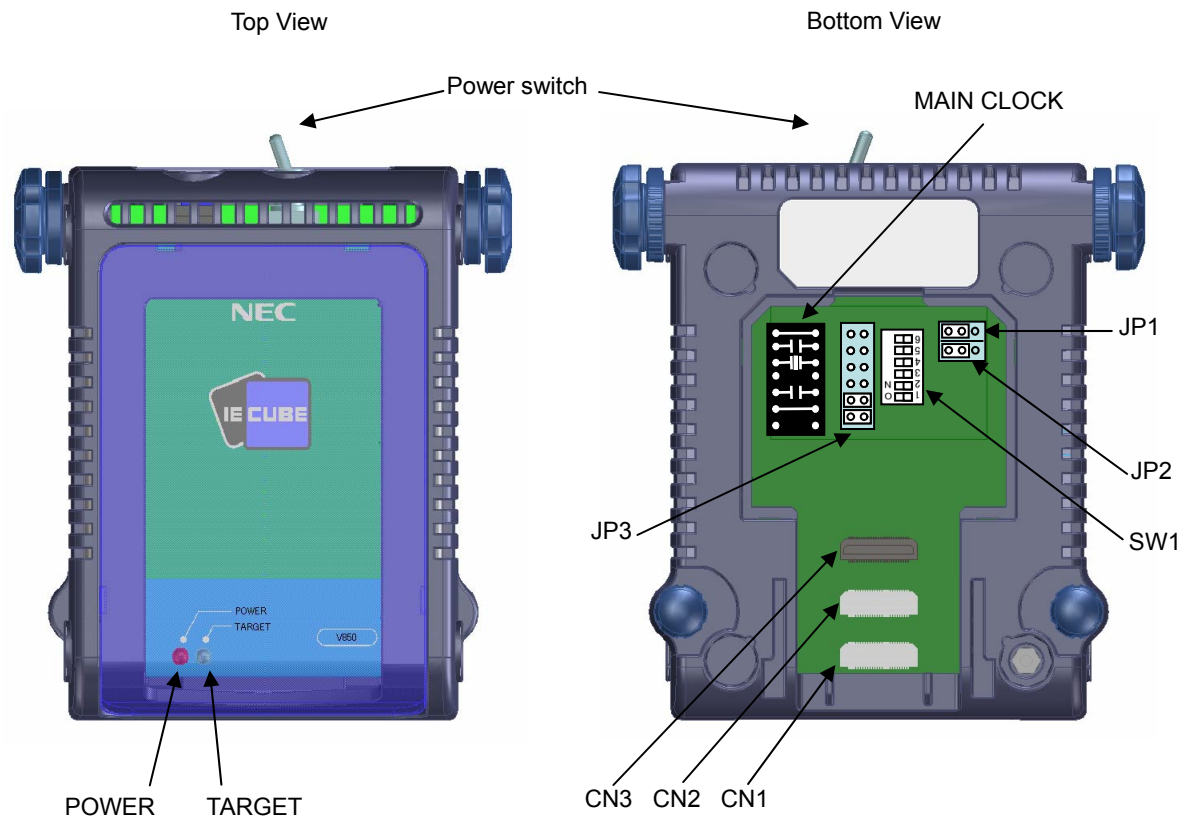
Refer to **2.10 Connecting USB Interface Cable and AC Adapter**.

Switching power on and off

Refer to **2.11 Switching Power On and Off**

2.1 Names and Functions of Hardware

Figure 2-1. Names of Parts of QB-V850ESKX1H



(1) CN1, CN2, CN3

These connectors are used to connect the exchange adapter or extension probe.

(2) MAIN CLOCK

This socket is used to mount the main clock.

An oscillation circuit with a 5 MHz resonator and a capacitor are mounted when shipped.

(For details, refer to **2.3 Clock Settings**.)

(3) JP1

Setting of this jumper is changed depending on the device to be emulated. Pins 1 and 2 are shorted when shipped. (refer to **2.4 Setting for Target Device** for details).

(4) JP2

Setting of this jumper differs in accordance with the REGC pin status.

Pins 1 and 2 are shorted when shipped. (refer to **2.5 REGC Pin Settings** for details)

(5) JP3

Setting of this jumper is changed depending on the type of the clock mounted on the MAIN CLOCK.

Pins 1 and 2, and pins 3 and 4 are shorted, pins 5 and 6, pins 7 and 8, pins 9 and 10, and pins11 and 12 are left open when shipped (refer to **2.3 Clock Settings** for details).

(6) SW1

This switch is used to set mask options of pull-up resistor.

All options are set to off when shipped (refer to **2.6 Mask Option Settings**).

(7) POWER (Red LED)

This is an LED that shows whether or not the power supply of the QB-V850ESKX1H is switched on.

LED State	QB-V850ESKX1H State
Lit	Power switch ON
Not lit	Power switch OFF or AC adapter not connected to QB-V850ESKX1H
Blinking	Internal error occurred (Contact an NEC Electronics sales representative or distributor)

(8) TARGET (Green LED)

This is an LED that shows whether or not the power supply of the target system is switched on.

LED State	Target System State
Lit	Target system power supply ON
Not lit	Target system power supply OFF or target system not connected

(9) Power switch

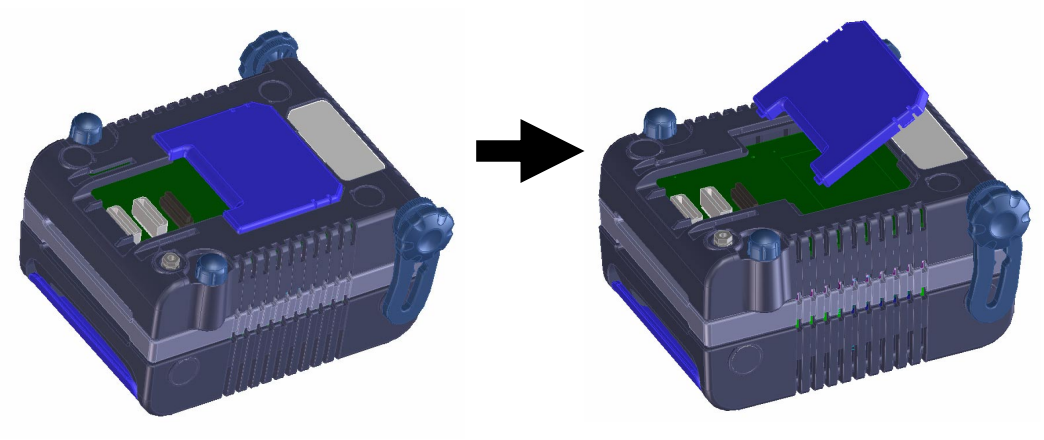
This is the power switch of the QB-V850ESKX1H.

It is OFF when shipped.

2.2 Removal of Acrylic Board

To modify the jumper or clock setting, the acrylic board on the bottom of the QB-V850ESKX1H must be removed. The acrylic board can be removed by lifting it up.

Figure 2-2. Acrylic Board Removal Method



2.3 Clock Settings

2.3.1 Overview of clock settings

(1) Main clock

The following 4 types of clock settings are available.

For details, refer to **2.3.2 Clock setting methods**.

(a) Using the clock generated from a 5 MHz resonator mounted on the QB-V850ESKX1H as an internal clock (setting when shipped).

(b) Using the clock generated from other than a 5 MHz resonator on the QB-V850ESKX1H.

(c) Mounting any oscillator on the QB-V850ESKX1H.

(d) Inputting the clock of the rectangular wave from the target system**.**

Emulation by the oscillation circuit using the X1 and X2 pins on the target system cannot be executed.

When inputting the main clock from the target system, be sure to input the rectangular wave.

(2) Subclock

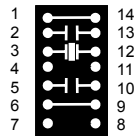
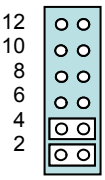
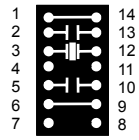
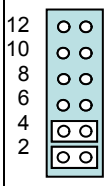
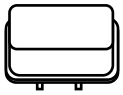
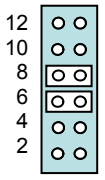
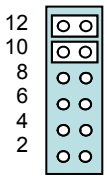
Subclock cannot be input from the target system. 32.768 kHz clock mounted on the QB-V850ESKX1H is used as the subclock.

The frequency of the subclock cannot be changed.

2.3.2 Clock setting methods

This section shows the hardware settings when setting the clock.

Table 2-1. Hardware Setting with Each Clock Setting

Type of Clock Used	MAIN CLOCK	JP3 Setting
The clock generated from a 5 MHz resonator on QB-V850ESKX1H is used as internal clock (Setting at shipment)	 (Setting when shipped)	 11-12: Open 9-10: Open 7-8: Open 5-6: Open 3-4: Shorted 1-2: Shorted (Setting when shipped)
The clock generated from other than a 5 MHz resonator on QB-V850ESKX1H is used as internal clock. For details, refer to **2.3.3 Notes on changing resonator**.	 Supplied parts board is used	 11-12: Open 9-10: Open 7-8: Open 5-6: Open 3-4: Shorted 1-2: Shorted (Setting when shipped)
Any oscillator can be mounted on the QB-V850ESKX1H. For details, refer to **2.3.4 Notes on using oscillator**	 5 V 8-pin or 14-pin type oscillator is used	 11-12: Open 9-10: Open 7-8: Shorted 5-6: Shorted 3-4: Open 1-2: Open
A rectangular wave clock is input from the target system.		 11-12: Shorted 9-10: Shorted 7-8: Open 5-6: Open 3-4: Open 1-2: Open

Caution Settings other than above are prohibited.

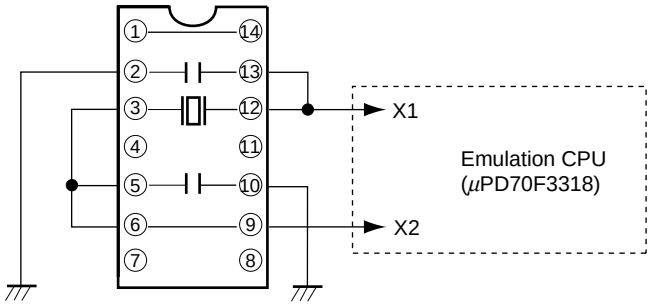
2.3.3 Notes on changing resonator

(1) When changing the resonator that was mounted when shipped, pull the MAIN CLOCK parts board out once to the top.

(2) Solder a resonator and a capacitor to the parts board supply with the QB-V850ESKX1H.
The setting is as follows.

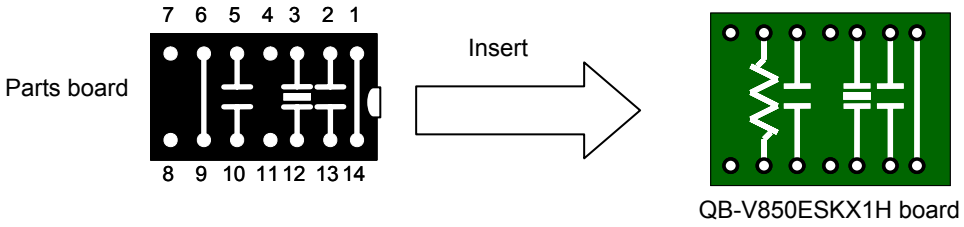
Pins 1 and 14: Be sure to short-circuit.
Pins 2 and 13: Connect a capacitor.
Pins 3 and 12: Connect a resonator.
Pins 4 and 11: Be sure to open.
Pins 5 and 10: Connect a capacitor.
Pins 6 and 9: Be sure to short-circuit.
Pins 7 and 8: Be sure to open.

Figure 2-3. Parts Board Setting and Peripheral Circuit



(3) Insert the parts board to the QB-V850ESKX1H MAIN CLOCK.

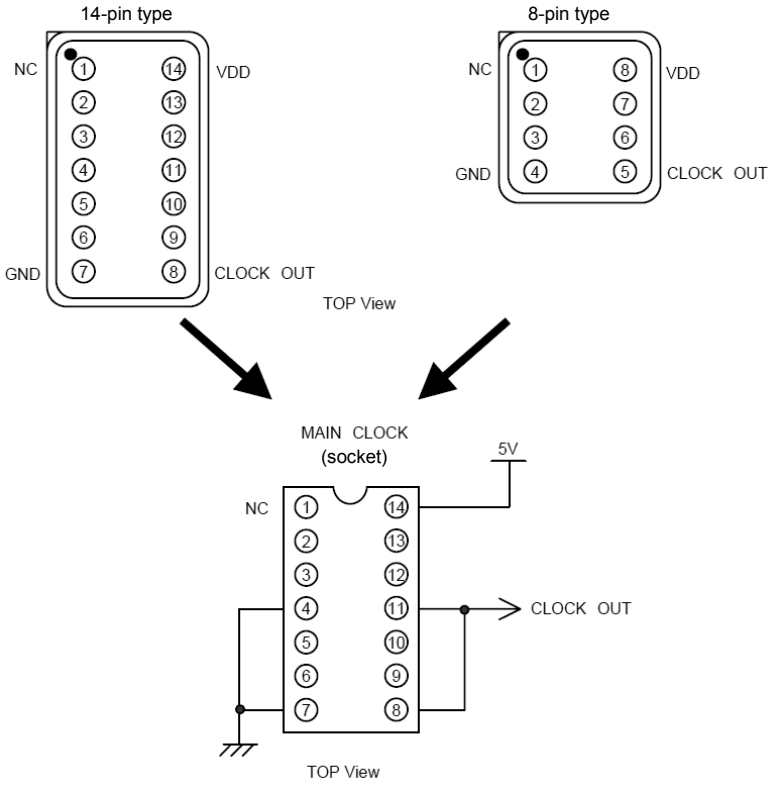
Figure 2-4. Inserting Parts Board



2.3.4 Notes on using oscillator

- Use a 5 V CMOS output type oscillator.
- To change the main clock to the clock generated from the oscillator, pull the parts board mounted on the MAIN CLOCK out.
- Mount the oscillator to be used to the MAIN CLOCK socket as shown below.

Figure 2-5. Mounting MAIN CLOCK

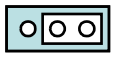


When mounting an 8-pin type crystal oscillator, make pin 1 of the oscillator and pin 1 of the MAIN CLOCK socket match and pin 8 of the oscillator and pin 14 of the MAIN CLOCK socket match.

2.4 Setting for Target Device

The setting of JP1 differs depending on the target device.
Pins 1 and 2 are shorted when shipped.

Table 2-2. JP1 Settings

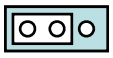
Device to Be Emulated	JP1 Setting
V850ES/KE1+ V850ES/KF1+ V850ES/KG1+ V850ES/KJ1+	 1-2 shorted (setting when shipped)
V850ES/KE1 V850ES/KF1 V850ES/KG1 V850ES/KJ1 V850ES/KE2 V850ES/KF2 V850ES/KG2 V850ES/KJ2	 2-3 shorted (setting when shipped)

Caution Setting other than above is prohibited.

2.5 REGC Pin Settings

JP2 setting differs depending on the REGC pin status.

Table 2-3. JP2 Settings

REGC Pin Status	JP2 Setting
Potential the same as EV_{DD} is supplied to REGC pin.	 1-2 shorted (setting when shipped)
10 μF capacitor is connected to REGC pin.	 2-3 shorted

Cautions 1. Setting other than above is prohibited.
2. Set pins 1 and 2 to be shorted when emulating the V850ES/KE1, V850ES/KE1+, or V850ES/KE2.

2.6 Mask Option Settings

This section describes the mask option settings for the pull-up resistors of P36 to P39, P614, and P615.
In the QB-V850ESKX1H, the pull-up resistors are pulled up at 33 kΩ.

Figure 2-6. SW1 ON/OFF

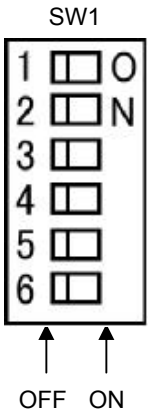


Table 2-4. SW1 Settings

SW1	ON/OFF	Meaning
1	ON	Connect the pull-up resistor to P36 by mask option.
	OFF	Does not connect the pull-up resistor to P36 by mask option.
2	ON	Connect the pull-up resistor to P37 by mask option.
	OFF	Does not connect the pull-up resistor to P37 by mask option.
3	ON	Connect the pull-up resistor to P38 by mask option.
	OFF	Does not connect the pull-up resistor to P38 by mask option.
4	ON	Connect the pull-up resistor to P39 by mask option.
	OFF	Does not connect the pull-up resistor to P39 by mask option.
5	ON	Connect the pull-up resistor to P614 by mask option.
	OFF	Does not connect the pull-up resistor to P614 by mask option.
6	ON	Connect the pull-up resistor to P615 by mask option.
	OFF	Does not connect the pull-up resistor to P615 by mask option.

Caution All pins are set to OFF when shipped.

2.7 Software Settings

2.7.1 When using ID850QB as debugger

For details, refer to the **V850 Series Integrated Debugger ID850QB Operating Precautions** supplied with the debugger (ID850QB).

2.7.2 When using other than ID850QB (MULTI™, etc.) as debugger

Refer to the user's manual of the debugger used and the **V850 IECUBE Setup Manual** (supplied).

2.8 Mounting and Connecting Connectors

This section describes the method for connecting the QB-V850ESKX1H and target system and method for mounting the connectors required for that connection.

Turn off the power for the QB-V850ESKX1H and the target system when connecting connectors to them.

The following abbreviations are used in this section.

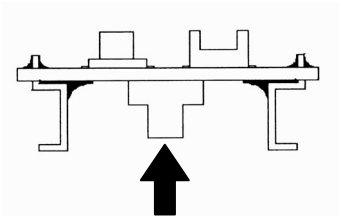
- TC: Target connector
- EA: Exchange adapter
- MA: Mount adapter
- CA: Check pin adapter
- SA: Space adapter

2.8.1 Mounting target connector (TC) to target system

(1) Apply cream solder to the foot pattern of the target system for mounting an IC.

(2) A circular projection is at the center of the bottom side of TC (refer to **Figure 2-7**). Sparingly apply two-liquid hardening epoxy adhesive (type that hardens in 15 to 30 minutes is recommended) to temporarily secure the connector at the specified position on the target system. At this time, match the position of pin 1 (position where a corner of the connector is cut into shape C) with the position of pin 1 from the target system.

Figure 2-7. TC Projection



(3) Soldering condition of TC

(a) Reflow soldering

At 245°C for a maximum of 20 seconds (main heating)

(b) Manual soldering

At 320°C for a maximum of 5 seconds (per pin)

(4) Precautions on flux splatter

If the solder flux splatters when the connector is soldered, faulty contact may occur. Be sure to cover the upper part of the connector with aluminum foil. Do not clean the connector because the flux solvent may remain inside the connector.

2.8.2 Plugging exchange adapter (EA) into TC

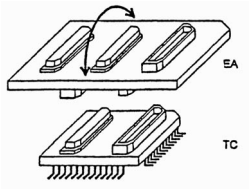
Match the No. 1 pin position of the EA, MA, CA, or SA to the No. 1 pin position of the TC and plug in (C cuts match in both).

(a) When plugging or unplugging, hold down the TC with your fingers so that there is no force on the TC.

(b) When plugging or unplugging, be careful of the direction of rocking (refer to **Figure 2-8**).

As a tool when unplugging, insert some kind of thin non-conductive material such as a wooden stick in between the TC and EA and rock in the direction shown in Figure 2-8 while slowly unplugging. Be careful since the connector will be damaged if this is done in the wrong direction.

Figure 2-8. Plugging and Unplugging



2.8.3 Notes on handling TC, EA, MA, CA, or SA

(1) Cause of faulty contact of connector

(a) If flux gets inside the connector when TC is soldered

It is easy for flux to get inside of the connector. Clean the connector several times with a solvent such as alcohol if flux gets inside.

If conduction is still unstable, repeat cleaning.

(b) If dust gets inside the connector

Faulty contact occurs if dust such as a thread gets inside the connector. Remove dust with a brush.

(c) Notes on using CA or SA

When CA or SA is used, a fractional delay time of signal propagation and a little capacitance are generated as a result of inserting the adapter. Make a thorough evaluation by connecting the target system.

(2) Notes on inserting and removing the connector

(a) When inserting or removing the connector, be sure to hold down the lower (mating) connector or board with your fingers.

(b) Before inserting a connector, make sure that the connectors are correctly positioned.

If the connector is inserted incorrectly positioned, it may be damaged.

(c) When removing a connector, insert some kind of thin non-conductive material such as a wooden stick beneath the connector to protect the board from being damaged. Do not remove the connector all at once. Remove the connector by jiggling it bit by bit.

If only a metallic object such as a screwdriver is available, wind a soft cloth around its tip.

(3) Notes on CA for V850ES/KX1H (QB-80-CA-01S)

The silk screen marking for the check pins is based on the 80-pin GC package. For that reason, be careful since the reading found in Table 2-5 needs to be substituted when using the 80-pin GK package.

(4) About the check pin adapter (QB-144-CA-01)

The signal waveform between IECUBE and the target system can be observed. Please attach a “pin header cover” to the QB-144-CA-01 according to the device used. Please refer to **[Related Information]** on the following URL about attachment of a “pin header cover”.

http://www.necel.com/micro/english/iecube/index.html

Table 2-5. QB-80-CA-01S Pin Layout When Using GK Package

Silk Position	Pin Layout	Silk Position	Pin Layout
1	10	41	50
2	9	42	49
3	8	43	48
4	7	44	47
5	6	45	46
6	1	46	41
7	2	47	42
8	3	48	43
9	5	49	45
10	4	50	44
11	16	51	56
12	17	52	57
13	18	53	58
14	19	54	59
15	20	55	60
16	15	56	55
17	14	57	54
18	13	58	53
19	12	59	52
20	11	60	51
21	21	61	61
22	22	62	62
23	23	63	63
24	24	64	64
25	25	65	65
26	26	66	66
27	27	67	67
28	28	68	68
29	29	69	69
30	30	70	70
31	31	71	71
32	32	72	72
33	33	73	73
34	34	74	74
35	35	75	75
36	36	76	76
37	37	77	77
38	38	78	78
39	39	79	79
40	40	80	80

Remark The Silk Position indicates the pin no. (silk screen) for GC package on the QB-80-CA-01S. Pin Layout indicates the corresponding pin no. when the GK package is used.

2.9 Connecting QB-V850ESKX1H to Target System

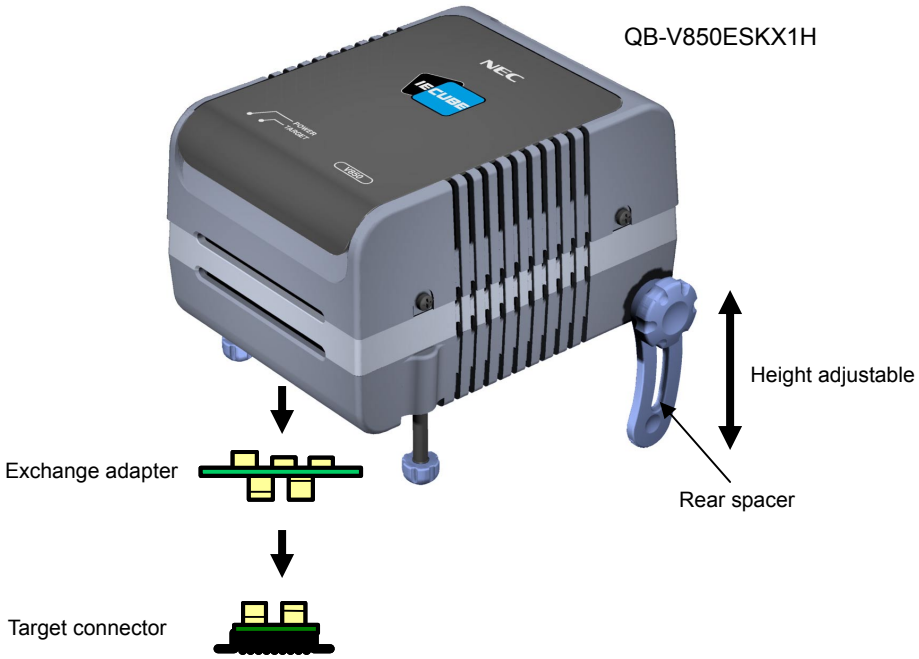
2.9.1 When not using extension probe (QB-144-EP-01S/02S)

The QB-V850ESKX1H can be connected to the target system without using an extension probe.

Adjust the height by using the spacer at the rear part of the QB-V850ESKX1H, so that no stress is applied to the exchange adapter, the target connector, and other connectors.

Sufficiently insulate the target system.

Figure 2-9. Connection Without Extension Probe



2.9.2 When using extension probe (QB-144-EP-01S/02S)

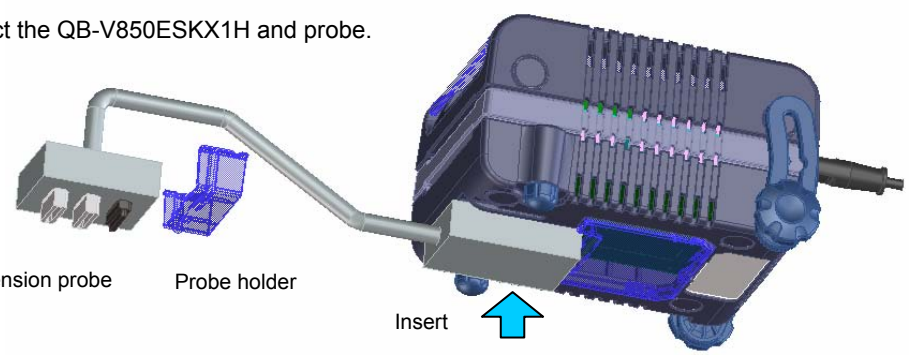
When using the extension probe (QB-144-EP-01S/02S), connect the QB-V850ESKX1H and the target system in the following procedure.

(a) Connecting probe holder

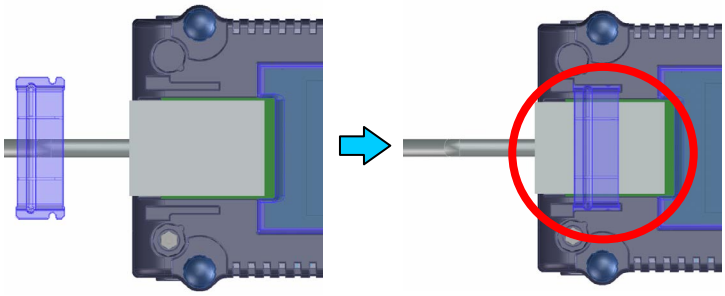
Use the probe holder (supplied with the QB-V850ESKX1H) to connect the extension probe to the QB-V850ESKX1H, as shown below.

Figure 2-10. Using Probe Holder

<1> Connect the QB-V850ESKX1H and probe.



<2> Insert the probe holder into QB-V850ESKX1H.



Insert the probe holder into QB-V850ESKX1H until you hear a click (note the direction).

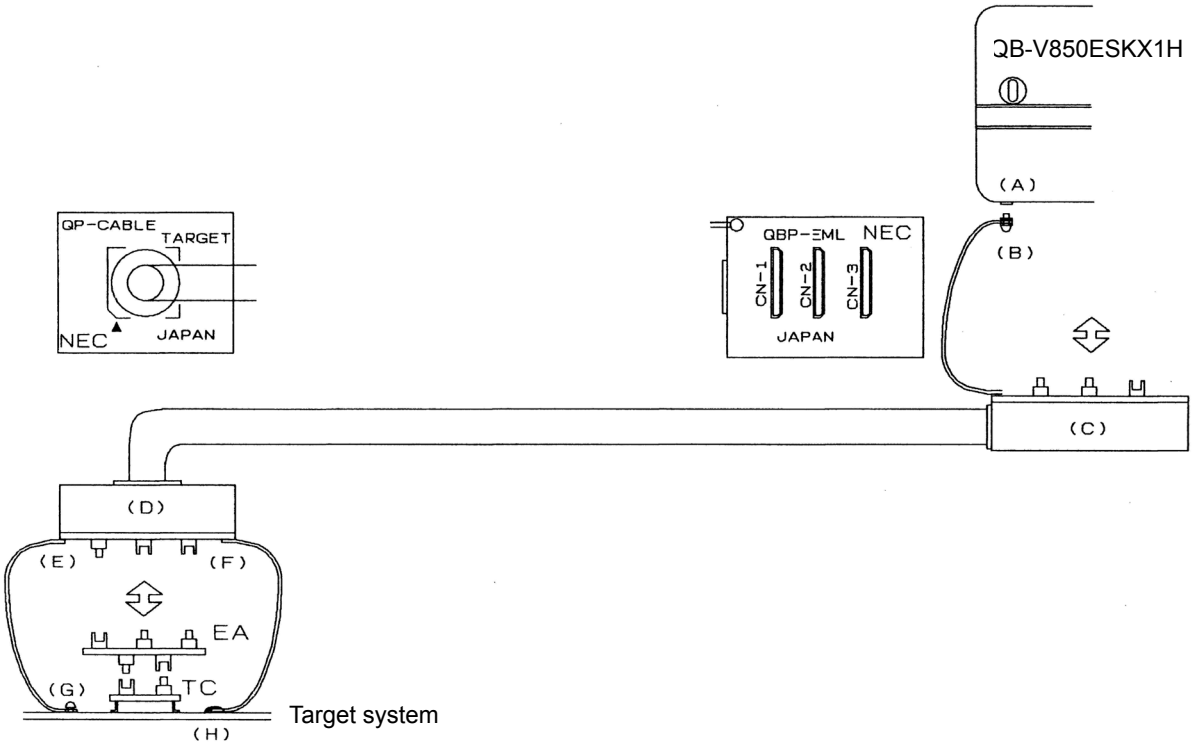
(b) Connection of extension probe GND wire

There are 3 GND wires in the extension probe. Connect them to the QB-V850ESKX1H and target system.

<1> Fasten the GND wire on the QB-V850ESKX1H side of the extension probe to the nut on the bottom of the QB-V850ESKX1H using a #0 or #1 Phillips precision driver (connection of (B) to (A) in Figure 2-11).

<2> Next plug the connector on top of the extension probe into the connector at the opening on the bottom of the QB-V850ESKX1H from below being careful of the insertion direction (connection of (C) in Figure 2-11 to QB-V850ESKX1H).

Figure 2-11. GND Wire



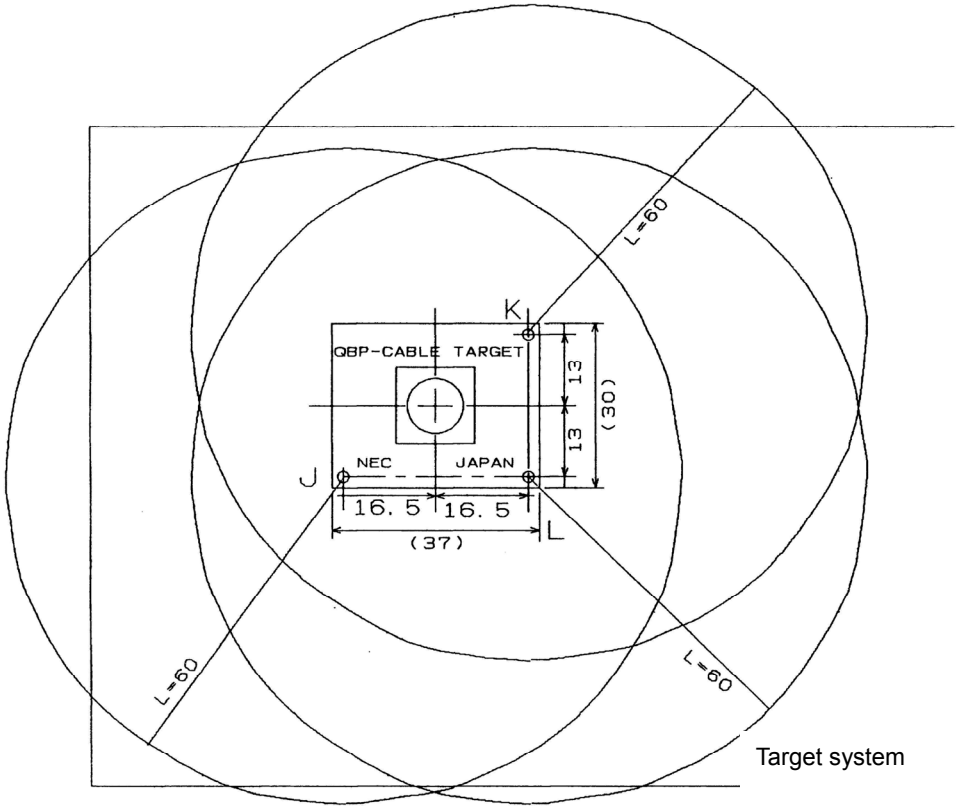
<3> Connect the exchange adapter and extension probe to the target connector.

<4> Connect two GND wires on the target system side of the extension probe to the target system GND.
If a pin or screw is fastened to the target system GND, remove the transparent terminal cover on the end of the GND wire and fasten the Y type pin of the GND wire to the target system ((G) in Figure 2-11). If the GND on the target system is an exposed pad, likewise fasten the Y type pin to the pad on the target system by soldering ((H) in Figure 2-11) (recommended soldering iron temperature setting: 300°C).

<5> If the target system has only one GND, connect only one of the GND wires of the extension probe. Cut off the other GND wires with a nipper or leave it as is without removing the pin cover.

<6> Since the length of the GND wire below the head (insulated part) is approximately 60 mm, there must be at least a GND to which it can be connected to within the range of the three approximately 60 mm radius sections of the target system for connecting the extension probe, as shown in Figure 2-12. The GND wire of the extension probe is soldered to positions J and K in Figure 2-12. To connect it to position L, remove the wire soldered to J or K and then solder it to L.

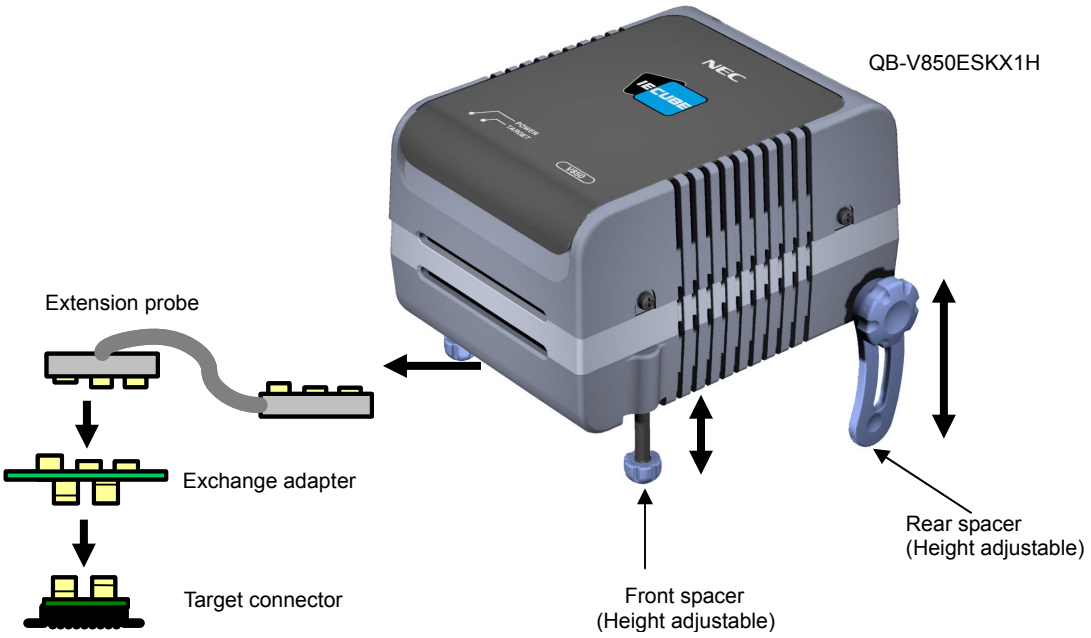
Figure 2-12. Where GND Wire Can Be Connected



(c) Ensuring isolation

When connecting the target system to the QB-V850ESKX1H using an extension probe, adjust the height using the front spacer or rear spacer of the QB-V850ESKX1H and ensure isolation from the target system.

Figure 2-13. Connection Using Extension Probe



(d) Cautions related to extension probe

The following cautions pertain to using the extension probe.

<1> Be careful that stress of the extension probe is not placed on the target connector. Moreover, when removing the extension probe, remove it slowly while holding down on the exchange adapter with a finger so that there is no stress on the target connector.

<2> Be sure to connect the GND wire of the extension probe to the QB-V850ESKX1H and the target system. If not, the impedance of the cable becomes unstable, resulting in the lowering of signal transmission characteristics or distortion of the output waveform for an input waveform.

2.10 Connecting USB Interface Cable and AC Adapter

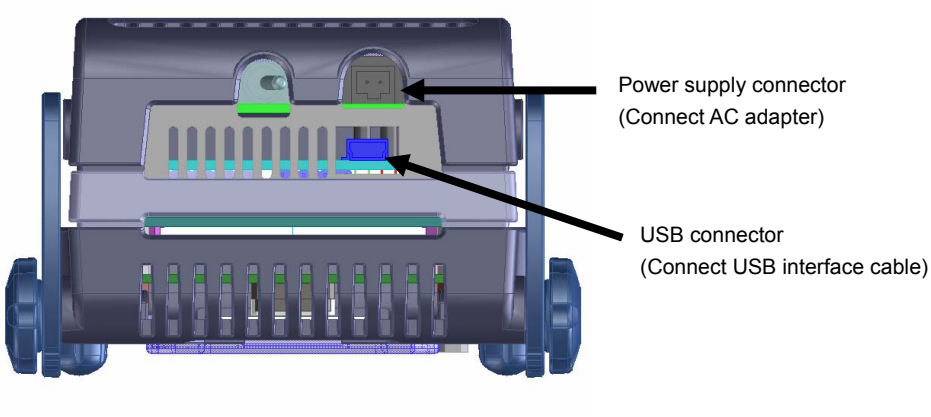
Plug the USB interface cable supplied with the QB-V850ESKX1H into the USB connector of the host machine, and plug the other side into the USB connector on the rear of the QB-V850ESKX1H.

Plug the AC adapter supplied with the QB-V850ESKX1H into a receptacle and plug the other side into the power supply connector on the rear of the QB-V850ESKX1H.

For QB-V850ESKX1H connector positions, see **Figure 2-14**.

By replacing the AC plug, the AC adapter can support the voltage from 100 to 240 V. The AC plug for 100 V is attached when shipped. Replace it with the AC plug for 220 or 240 V (supplied with the QB-V850ESKX1H) when the AC adapter is used at 220 or 240 V.

Figure 2-14. Connector Positions



2.11 Switching Power On and Off

Be sure to switch the power on and off according to the following procedures.

- Switching power on

<1> QB-V850ESKX1H power on
<2> Target system power on[Note]
<3> Debugger startup

- Switching power off

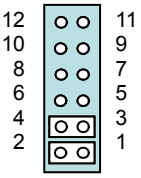
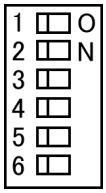
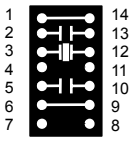
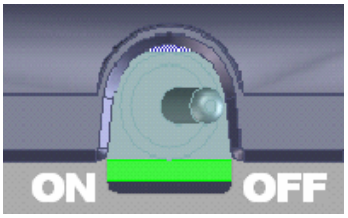
<1> Debugger termination
<2> Target system power off[Note]
<3> QB-V850ESKX1H power off

Note In the procedures, <2> is unnecessary if the target system is not connected.

Caution If the wrong sequence was used for the operation, the target system or QB-V850ESKX1H may fail.

CHAPTER 3 SETTINGS AT PRODUCT SHIPMENT

Table 3-1. Settings at Shipment

Item	Setting	Remarks
JP1		Pins 1 and 2 are shorted when shipped. For details, refer to **2.4 Setting for Target Device**.
JP2		Pins 1 and 2 are shorted when shipped. For details, refer to **2.5 REGC Pin Settings**.
JP3		Pins 1 and 2, and 3 and 4 are shorted, pins 5 and 6, 7 and 8, 9 and 10, and 11 and 12 are left open (oscillator on the parts board is used). For details, refer to **2.3 Clock Settings**.
SW1		All pins are set to off when shipped. For details, refer to **2.6 Mask Option Settings**.
MAIN CLOCK		A 5 MHz resonator is connected to pins 3 and 12. A 27 pF capacitor is connected to pins 2 and 13, and pins 5 and 10. The frequency can be changed by mounting an oscillator on the parts board of the QB-V850ESKX1H. For details, refer to **2.3 Clock Settings**.
Power switch		Set to OFF when shipped.

CHAPTER 4 NOTES

<R> 4.1 Cautions Regarding Differences Between Actual Device And Emulator

When debugging is performed with QB-V850ESKX1H connected to the target system, QB-V850ESKX1H performs emulation as if the actual device operates in the target system, although operations of the actual device and QB-V850ESKX1H differ in the following points. Therefore, the user is responsible for using the actual device for the final evaluation before starting mass production and judging its applicability.

4.1.1 Operation after power application to target system

The target device mounted in the target system starts program execution when reset is released after power application. With QB-V850ESKX1H, however, the program will not be executed until manipulation to start the program downloaded with the debugger is performed.

QB-V850ESKX1H can download and execute objects even before their initial value information of a variable is ROMized, but the actual device does not operate normally if the objects have not been ROMized. For details on ROMization, refer to **CA850 Ver.3.00 Operation User's Manual (U17293E)**.

4.1.2 Oscillator

QB-V850ESKX1H does not support clock input from the oscillator in the target system. The operating cock frequency may therefore vary between when the target device is mounted and when QB-V850ESKX1H is connected.

4.1.3 Pin characteristics

Since the connectors, adapters and circuit board are placed between QB-V850ESKX1H and the target system, unlike when the target device is mounted in the target system, the electrical characteristics of the pins differ. In particular, note that the A/D converter conversion results can easily be affected.

When an extension probe is connected, one additional data wait must be inserted into the external bus.

4.1.4 Notes on ROM correction function

QB-V850ESKX1H does not support emulation of the ROM correction function. To use this function, make an evaluation by using the target device.

4.1.5 Notes on flash self programming function

The flash self programming function cannot be emulated. To use this function, make an evaluation by using an on-chip debug emulator or the target device.

Some devices support the pseudo emulation function, using a debugger. For the usage, refer to **ID850QB Ver. 3.20 Operation User's Manual (U17964E)**.

4.1.6 Notes on DBTRAP instruction

The DBTRAP instruction cannot be used in the user program because it is used for software breaks.

4.1.7 On-chip debug function

Emulation of the on-chip debug function is not possible.

4.1.8 Current consumption

The current consumed by QB-V850ESKX1H differs from that of the actual device.

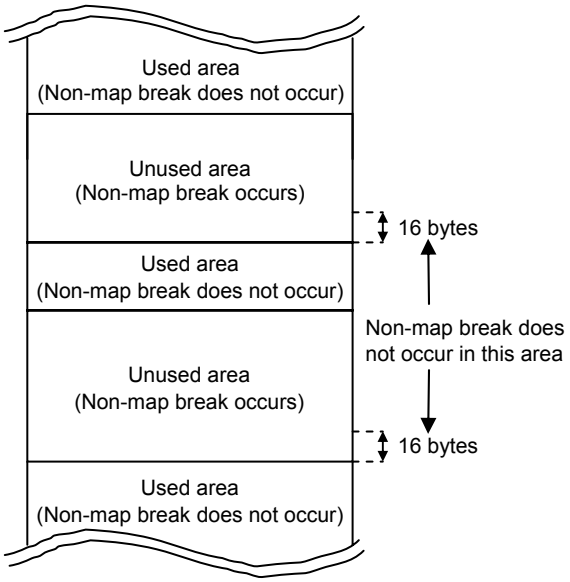
The current consumption of QB-V850ESKX1H is equal to or lower than that of the actual device during normal operation, and HALT and IDLE modes, but it becomes higher than that in the actual device in the STOP mode.

<R> 4.2 Notes On Debugging

4.2.1 Notes on Non-map Break

If a program is fetched from an area not used by a program (unused area) with an emulator, a non-map break usually occurs. However, a non-map break does not occur in the first 16-byte space of each unused area (refer to **Figure 4-1**).

Figure 4-1. Break at Fetching Unused Area



4.2.2 PSC Register Access

Data is written to the PSC register in the following sequence. If a software break is set to the NOP instruction immediately after the register has been accessed, the debugger hangs up.

Example:

```
mov 0x2,r1
st.b r1,prcmd
st.b r1,psc
nop          ← Debugger hangs up if a software break is set here.
nop          ← There is no problem if a software break is set here or later.
```

To set a break immediately after the PSC register has been written, use a hardware break.

4.2.3 Notes on DBPC, DBPSW, and ECR Registers

The DBPC, DBPSW, and ECR registers cannot be accessed during a break.

If a value is written to any of these registers during a break, the written value is ignored.

If these registers are read, 0 is always read.

4.2.4 Notes on Trace Display Sequence

When the trace mode that displays the access history is used, the display sequence may be reversed.

- If read and write instructions are successively executed
- If a bit manipulation instruction that executes read-modify-write is executed (such as SET, NOT, or CLR)

In both the cases, the trace results of write and read are displayed in that order.

4.2.5 Notes on Starting Debugger

When the debugger is started, the following warning or error may occur depending on the setting of the debugger and the status of the target system. This is because the status of the target system is not in accordance with the setting of the debugger. If a warning or error occurs, check the status of the target system or the setting of the debugger.

It is recommended that the conversion adapter be connected to the QB-V850ESKX1H even when the target system is not connected. If the conversion adapter is not connected, the value of the input port may not be correctly read.

- ID850QB

Error No.	Error Message	"Target" Field of ID850QB Configuration Window		Target System Connection		Exchange Adapter		Target System Power	
		Connect	Not Connect	Connected	Not Connected	Used	Not Used	ON	OFF
Ff606	Check connection with the target and turn on power to the target.	√							√
Wf607	Check the connection of the conversion adapter.		√		√		√		√
Ff608	Disconnect the target.		√	√					√
Ff609	Turn off power to the target and disconnect the target.		√					√	

- MULTI

Error Message	"-tc" of 850eserv Start Option		Target System Connection		Exchange Adapter		Target System Power	
	With -tc	Without -tc	Connected	Not Connected	Used	Not Used	ON	OFF
Check the target power on. Or please delete "-tc" option.	√							√
Check the exchange adapter is connected.		√		√		√		√
Remove the target. Or please add "-tc" option and power on the target.		√	√					√
Power off and remove the target. Or please add "-tc" option.		√					√	

4.2.6 Simultaneously Executing Two Instructions When Hardware Break Is Set

If a hardware break is set at the first or the next of two instructions that are executed at the same time, the following phenomena may occur.

- Break occurs at a place different from where it has been set.
- The set break does not occur.

To prevent these phenomena, set a software break.

The conditions under which two instructions are simultaneously executed are shown on the following pages.

[Combination of instructions for the occurrence of the simultaneous execution of two instructions]

- Condition where “mov + operation instruction” are executed as one instruction
  If dst of mov and dst of the operation instruction are the same register, except r0, in combination of “mov src, dst” and one of the following instructions:

Format I	satsubr/satsub/satadd/mulh
	or/xor/and
	subr/sub/add
Format II	shr/sar/shl/mulh

Remark “mov + operation instruction” are executed as one instruction only when the mov instruction is the first instruction of the above combinations of instructions.

- Condition of parallel execution of instructions
  <1> Combination of one of the following instructions and br instruction

Format I	nop/mov/not/sld
	satsubr/satsub/satadd/mulh
	or/xor/and/tst
	subr/sub/add/cmp
Format II	mov/satadd/add/cmp
	shr/sar/shl/mulh
Format IV	sld.b/sst.b/sld.h/sst.h/sld.w/sst.w

<2> Combination of one of the following instructions (instructions that do not update flags) and bcc instruction except br instruction

Format I	nop/mov/sld
	mulh/sxb/sxh/zxb/zxh
Format II	mov/mulh
Format IV	sld.b/sst.b/sld.h/sst.h/sld.w/sst.w

<3> Combination of one of the following instructions and sld instruction

Format I	nop/mov/not
	satsubr/satsub/satadd/mulh
	or/xor/and/tst
	subr/sub/add/cmp
Format II	mov/satadd/add/cmp
	shr/sar/shl/mulh

Remark Of <1> to <3>, two instructions are simultaneously executed only when the second instruction of the above combinations of instructions is br/brcc/sld

Caution Formats I, II, and IV are the instruction formats described in the V850ES Architecture User’s Manual (U15943E).

- Cases in which two instructions are not simultaneously executed

  In the following cases, two instructions are not simultaneously executed.

  (a) If the first instruction is the first instruction after execution branches to an address that is not word aligned.

  Example

  ```
  0x1006   mov r10,r12
  0x1008   sld.b 0x8[ep],r11
  ```

  If a branch to address 0x1006 occurs, the two instructions are not executed simultaneously because the first instruction is not word aligned (because the lower 1 byte of the address is not 0, 4, 8, A, or C).

  (b) If the second instruction is sld and writing to the ep register is not completed.

  Example

  ```
  0x1004   mov r10,ep
  0x1006   sld.b 0x8[ep],r11
  ```

  In this case, the value of r10 is written to the ep register by the mov instruction at address 0x1004. However, the two instructions are not executed simultaneously because WB (writeback) of the mov instruction is not completed when the sld.b instruction at address 0x1006 is executed.

  (c) If the second instruction is bcc (conditional branch instruction) and a flag hazard occurs (the instruction immediately before or the instruction before that instruction may update the flags).

  Example

  ```
  0x1004   cmp r0,r10
  0x1006   bn 0xf0
  ```

  The bn instruction that references the S flag and branches must wait for execution of the cmp instruction at address 0x1004 because the S flag is changed by the cmp instruction. As a consequence, the bn instruction causes a flag hazard and the two instructions are not executed simultaneously.

  (d) If the second instruction is sld and both of the load buffers are in the WB wait status.

  Example

  Suppose that the following instructions are located in the memory.

  ```
  0x1000   nop
  0x1002   nop
  0x1004 ld.w 0x3000[r10],r11
  0x1008 ld.w 0x3004[r10],r12
  0x100c mov r8,r9
  0x100e sld.b 0x10[ep],r13
  ```

  If ld.w at addresses 0x1004 and 0x1008 accesses the external memory, several clocks of wait states are inserted. If the instruction at address 0x100e is executed, then the load buffer is in the “WB wait” status because WB of the ld.w instructions at addresses 0x1004 and 0x1008 is not completed, and the two instructions at address 0x100c and 0x100e are not simultaneously executed.

4.2.7 Operation during Break

Since various peripheral functions operate even during breaks in the in-circuit emulator, interrupts due to peripheral functions, generated during breaks, are suspended and, when re-executing after the breaks, execution may occur after processing of suspended interrupts. The watchdog timer counter, however, stops during the breaks.

4.2.8 When an Illegal Break Occurs during Program Execution in Internal RAM

An illegal break may occur when a peripheral I/O register is accessed during program execution in the internal RAM.

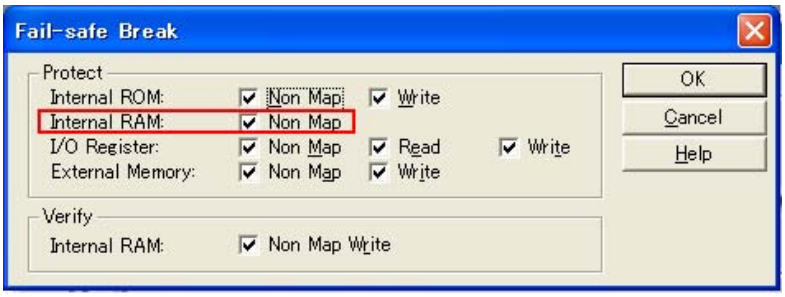
A non-map break occurs if all of the following conditions are satisfied, even if the program itself is correct.

- A program is executed in the internal RAM area.
- Data access for the internal RAM area is performed twice in succession.
- An execution branches to the internal ROM area using a JR or JARL instruction immediately after the above successive data access, or one NOP instruction after the above successive data access.

In order not to generate the break, cancel the fail-safe break setting for the internal RAM in the debugger.

<When using ID850QB>

Click the [Detail] button in the Fail-safe Break field in the Configuration window and clear the check in the check box for “Internal RAM”.



<When using MULTI>

Cancel the fail-safe break for “ramgrd” and “ramgrdv” using the Target flsf command.

4.2.9 Conflict between program execution for internal RAM and DMA transfer

If the following two operations are executed at the same time, the CPU may deadlock due to an internal bus conflict.

- Instruction for accessing data at addresses mis-aligned in the internal RAM
- DMA transfer for the internal RAM

<R>

CHAPTER 5 OPTIONAL FUNCTIONS

The following functions can be added to the QB-V850ESKX1H. This chapter explains the functional outline and specifications of the optional functions, and how to obtain them.

- Memory emulation function
- Coverage measurement function
- TimeMachine™ function

The support status of each optional function differs depending on the debugger used. The following table lists the support statuses as of February 2007. If you have any questions regarding the support status, consult an NEC Electronics sales representative or distributor.

Function	Support Status	
	ID850QB	MULTI
Memory emulation function	Supported in V2.90, V3.10 and later	Supported in 850eserv V2.233 and later and earlier than V3.000, as well as in 850eserv V3.233
Coverage measurement function	Supported in V2.90, V3.10 and later	Support under consideration
TimeMachine function	Not supported	Supported in 850eserv2 V1.000 and later

5.1 Memory Emulation Function

This section explains the functional outline of the memory emulation function and differences in specifications that occur after the addition of this function.

5.1.1 Functional outline

Using the memory emulation function, the QB-V850ESKX1H can be substituted for the external memory on the target system, so that programs and data can be allocated to the QB-V850ESKX1H.

This function was designed for use in cases such as the following.

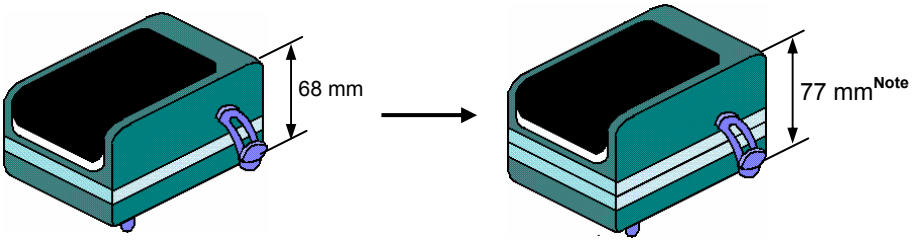
- Development of the target system is delayed, so program development for external spaces cannot be started.
  Through memory substitution, program development can be started in advance.
- Writing to the flash memory on the target system takes too much time and thus development is inefficient.
  Through memory substitution, the program development efficiency can be improved.

Refer to the user's manual for the debugger for details on use of the memory emulation function.

5.1.2 Differences from hardware specifications

After addition of the memory emulation function, differences from the hardware specifications described in this manual are as follows.

- External dimensions
  The height increases by 9 mm.



Note When the rear spacer is adjusted to the lowest height (107 mm max.)

- Weight
  The weight increases by approximately 70 g.

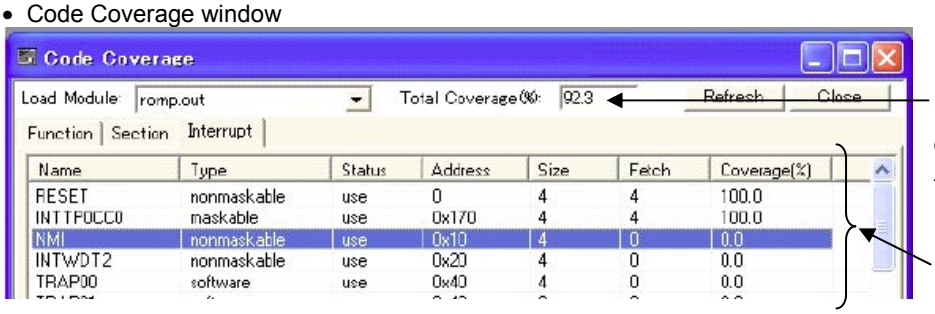
5.2 Coverage Measurement Function

This section explains the functional outline of the coverage measurement function and differences in specifications that occur after the addition of this function.

5.2.1 Functional outline

The coverage measurement function is used to measure the percentage of the executed code in a load module, section, or other such area. After the addition of this function, the Code Coverage window will be added and the Source and Assemble windows will be modified in the debugger ID850QB, as follows.

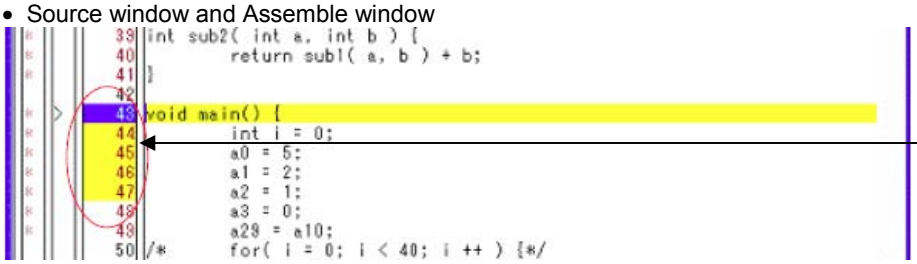
- Code Coverage window



Displays the coverage (%) of the executed code for total code in a load module.

Displays the coverage (%) of the executed code separately by functions, sections and vectors.

- Source window and Assemble window



The executed lines are highlighted.

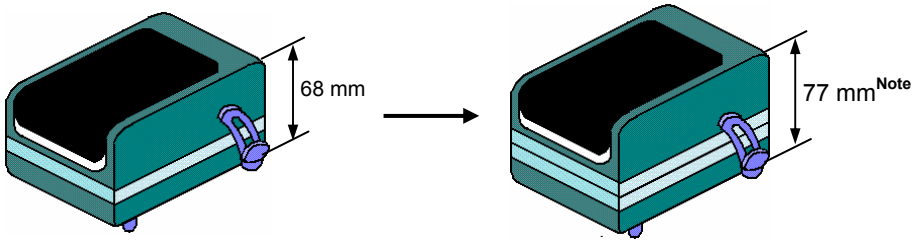
Refer to the user's manual for the debugger for details on use of the coverage measurement function.

5.2.2 Differences from hardware specifications

After addition of the coverage measurement function, differences from the hardware specifications described in this manual are as follows.

- External dimensions

  The height increases by 9 mm.



Note When the rear spacer is adjusted to the lowest height (107 mm max.)

- Weight

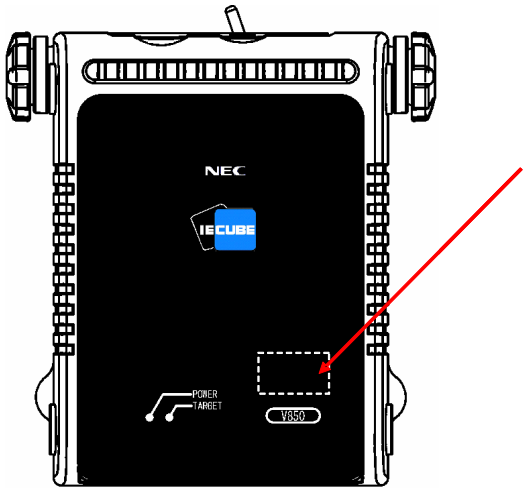
  The weight increases by approximately 70 g.

5.3 TimeMachine Function

This function is supported by the Green Hills Software™ (GHS) debugger. For details on the functional outline and specifications, consult a GHS tool distributor.

5.4 Changes to Top Side of Product Consequent to Addition of Optional Functions

After the addition of the optional functions, the following stickers will be attached to the top of the QB-V850ESKX1H. The addition of the optional functions can be confirmed through the presence of these stickers.



QB-V850ESKX1H Top View

A sticker is attached to this position according to the function added, as follows.

For the memory emulation func

For the coverage measuring function:

For the TimeMachine funct

5.5 How to Add Optional Functions

To add the optional functions, the option board corresponding to each function, as listed in the following, must be mounted.

Function	Option Board Required for Adding Function
Memory emulation function	Emulation memory board
Coverage measurement function	Coverage memory board[Note 1]
TimeMachine function	SuperTrace™ Probe board[Notes 1, 2]

Notes 1. Either the coverage memory board or the SuperTrace Probe board can be added, but not both.

2. To use the TimeMachine function, the SuperTrace Probe (Green Hills Software (GHS)) must be mounted in the QB-V850ESKX1H, in addition to the SuperTrace Probe board.
For details on specifications and purchases, consult a GHS tool distributor.

The following two methods have been provided for mounting the option boards.

For more information on ordering, price and schedule, consult an NEC Electronics sales representative or distributor.

- New purchase

  By adding one of the following suffixes at the end of the ordering code, you can purchase the QB-V850ESKX1H with the corresponding option board mounted.

  -M: Emulation memory board mounted
  -C: Coverage memory board mounted
  -S: SuperTrace Probe board mounted
  -CM: Coverage memory board and emulation memory board mounted
  -SM: SuperTrace Probe board and emulation memory board mounted

  Part number examples: QB-V850ESKX1H-S100GC-M
  QB-V850ESKX1H-S144GJ-CM

- System upgrade

  Using this method, the option board can be mounted in your QB-V850ESKX1H.

APPENDIX A REVISION HISTORY

A.1 Major Revisions in This Edition

Page	Description
Throughout	Addition of QB-144-EP-02S as extension probe (flexible type)
CHAPTER 1 GENERAL	
p.10	Change of **Figure 1-1. External Dimensions**
p.11	Change of **Table 1-2. QB-V850ESKX1H System Specifications**
p.12	Change of **1.3 System Configuration**
CHAPTER 4 NOTES	
p.36	Addition of **4.1 Cautions Regarding Differences Between Actual Device And Emulator**
p.37	Addition of **4.2 Notes On Debugging**
APPENDIX A CHARACTERISTICS OF TARGET INTERFACE in third edition	
p.43 in third edition	Deletion of chapter

A.2 Revision History of Preceding Editions

Here is the revision history of the preceding editions. Chapter indicates the chapter of each edition.

Edition	Description	Applied to
2nd edition	**2.8.3 Notes on handling TC, EA, MA, CA, or SA** • Addition of (3) • Addition of **Table 2-5.**	CHAPTER 2 SETUP PROCEDURE
3rd edition	Addition of the products shown below to target devices • V850ES/KE2, V850ES/KF2, V850ES/KG2, V850ES/KJ2	Throughout
	Deletion of **APPENDIX B PACKAGE DRAWINGS**	
	Addition of **APPENDIX B REVISION HISTORY**	
	Modification of **Figure 1-1. System Configuration (S type)**	CHAPTER 1 GENERAL
	Table 1-3. List of Probe/Connector for Each Target Device • Addition of <6> Check pin adapter • Addition of **Remark**	
	2.8.3 Notes on handling TC, EA, MA, CA, or SA • Addition of (4)	CHAPTER 2 SETUP PROCEDURE
	4.2 Notes on Flash Self Programming Function • Change of description	CHAPTER 4 NOTES
	Addition of **4.11 Operation During Break**	
	CHAPTER 5 NOTES ON TARGET SYSTEM DESIGN • Deletion of **5.1** and **5.2** • Change of description	CHAPTER 5 NOTES ON TARGET SYSTEM DESIGN
	Modification of **Figure A-9. Equivalent Circuit I** and **Figure A-10. Equivalent Circuit J**	APPENDIX A CHARACTERISTICS OF TARGET INTERFACE

For further information,
please contact:

NEC Electronics Corporation
1753, Shimonumabe, Nakahara-ku,
Kawasaki, Kanagawa 211-8668,
Japan
Tel: 044-435-5111
http://www.necel.com/

[America]

NEC Electronics America, Inc.
2880 Scott Blvd.
Santa Clara, CA 95050-2554, U.S.A.
Tel: 408-588-6000
800-366-9782
http://www.am.necel.com/

[Europe]

NEC Electronics (Europe) GmbH
Arcadiastrasse 10
40472 Düsseldorf, Germany
Tel: 0211-65030
http://www.eu.necel.com/

Hanover Office
Podbielskistrasse 166 B
30177 Hannover
Tel: 0 511 33 40 2-0

Munich Office
Werner-Eckert-Strasse 9
81829 München
Tel: 0 89 92 10 03-0

Stuttgart Office
Industriestrasse 3
70565 Stuttgart
Tel: 0 711 99 01 0-0

United Kingdom Branch
Cygnus House, Sunrise Parkway
Linford Wood, Milton Keynes
MK14 6NP, U.K.
Tel: 01908-691-133

Succursale Française
9, rue Paul Dautier, B.P. 52
78142 Velizy-Villacoublay Cédex
France
Tel: 01-3067-5800

Sucursal en España
Juan Esplandiu, 15
28007 Madrid, Spain
Tel: 091-504-2787

Tyskland Filial
Täby Centrum
Entrance S (7th floor)
18322 Täby, Sweden
Tel: 08 638 72 00

Filiale Italiana
Via Fabio Filzi, 25/A
20124 Milano, Italy
Tel: 02-667541

Branch The Netherlands
Steijgerweg 6
5616 HS Eindhoven
The Netherlands
Tel: 040 265 40 10

[Asia & Oceania]

NEC Electronics (China) Co., Ltd
7th Floor, Quantum Plaza, No. 27 ZhiChunLu Haidian
District, Beijing 100083, P.R.China
Tel: 010-8235-1155
http://www.cn.necel.com/

NEC Electronics Shanghai Ltd.
Room 2511-2512, Bank of China Tower,
200 Yincheng Road Central,
Pudong New Area, Shanghai P.R. China P.C:200120
Tel: 021-5888-5400
http://www.cn.necel.com/

NEC Electronics Hong Kong Ltd.
Unit 1601-1613, 16/F., Tower 2, Grand Century Place,
193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: 2886-9318
http://www.hk.necel.com/

NEC Electronics Taiwan Ltd.
7F, No. 363 Fu Shing North Road
Taipei, Taiwan, R. O. C.
Tel: 02-8175-9600
http://www.tw.necel.com/

NEC Electronics Singapore Pte. Ltd.
238A Thomson Road,
#12-08 Novena Square,
Singapore 307684
Tel: 6253-8311
http://www.sg.necel.com/

NEC Electronics Korea Ltd.
11F., Samik Lavied'or Bldg., 720-2,
Yeoksam-Dong, Kangnam-Ku,
Seoul, 135-080, Korea
Tel: 02-558-3737
http://www.kr.necel.com/