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RENESAS

User's Manual

IE-789177-NS-EM1

Emulation Board

Target Devices

μPD789167 Subseries
μPD789177 Subseries
μPD789167Y Subseries
μPD789177Y Subseries

Document No. U14621EJ2V0UM00 (2nd edition)
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Santa Clara, California
Tel: 408-588-6000
800-366-9782
Fax: 408-588-6130
800-729-9288

NEC do Brasil S.A.
Electron Devices Division
Guarulhos-SP, Brasil
Tel: 11-6462-6810
Fax: 11-6462-6829

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  Milton Keynes, UK
  Tel: 01908-691-133
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NEC Electronics Hong Kong Ltd.
Hong Kong
Tel: 2886-9318
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Major Revisions in This Edition

Page	Description
Throughout	• Addition of description of IE-78K0S-NS-A as supported in-circuit emulator • Addition of NP-H44GB-TQ as supported emulation probe
pp. 12, 13	**Figure 1-1 System Configuration** • Modification of supply medium of debugger ID78K0S-NS to CD-ROM • Modification of **Notes 1 to 3**
p. 15	Modification of part of **Table 1-1 Basic Specifications**
pp. 20 to 22	**3.2.1 Overview of clock settings** • Modification of “internal clock” to “clock oscillator” • **Figure 3-2 External Circuits Used as System Clock Oscillator** Addition of V_{SS} pin to the figure of **(a) Clock oscillator** • **Figure 3-3 When Using Clock That Is Already Mounted on Emulation Board** and **Figure 3-4 When Using User-Mounted Clock** Modification of “resonator” in target system to “clock oscillator or external clock” • Modification of “clock generator” to “external clock” in **Figure 3-5 When Using an External Clock**
p. 34 in previous revision	Deletion of **3.4 Low-Voltage Emulation Setting**
p. 33	Addition of **3.4 Power Supply Voltage Setting of Target Interface**
p. 35	**3.6 Switch and Jumper Settings** • Addition of **(2) Switch and jumper settings on the IE-78K0S-NS-A**
p. 42	Addition of **APPENDIX B CAUTIONS ON DESIGNING TARGET SYSTEM**

The mark ★ shows major revised points.

INTRODUCTION

Product Overview

The IE-789177-NS-EM1 is designed to be used with the IE-78K0S-NS or IE-78K0S-NS-A to debug the following target devices that belong to the 78K/0S Series of 8-bit single-chip microcontrollers.

- μPD789167 Subseries: μPD789166, 789167
- μPD789177 Subseries: μPD789176, 789177, 78F9177, 78F9177A
- μPD789167Y Subseries: μPD789166Y, 789167Y
- μPD789177Y Subseries: μPD789176Y, 789177Y, 78F9177Y, 78F9177AY

Target Readers

This manual is intended for engineers who will use the IE-789177-NS-EM1 with the IE-78K0S-NS or IE-78K0S-NS-A to perform system debugging.
Engineers who use this manual are expected to be thoroughly familiar with the target device's functions and use methods and to be knowledgeable about debugging.

Organization

When using the IE-789177-NS-EM1, refer to not only this manual (supplied with the IE-789177-NS-EM1) but also the manual that is supplied with the IE-78K0S-NS or IE-78K0S-NS-A.

IE-78K0S-NS
User's Manual

- Basic specifications
- System configuration
- External interface functions

IE-789177-NS-EM1
User's Manual

- General
- Part names
- Installation
- Differences between target devices and target interface circuits

IE-78K0S-NS-A
User's Manual

- Basic specifications
- System configuration
- External interface functions

Purpose

This manual's purpose is to explain various debugging functions that can be performed when using the IE-789177-NS-EM1.

Terminology The meanings of certain terms used in this manual are listed below.

Term	Meaning
Emulation device	This is a general term that refers to the device in the emulator that is used to emulate the target device. It includes the emulation CPU.
Emulation CPU	This is the CPU block in the emulator that is used to execute user-generated programs.
Target device	This is the device to be emulated (a real chip).
Target system	This includes the target program and the hardware provided by the user. When defined narrowly, it includes only the hardware.
IE system	This refers to the combination of the IE-78K0S-NS or IE-78K0S-NS-A and the IE-789177-NS-EM1.

Conventions

Data significance: Higher digits on the left and lower digits on the right
Note: Footnote for item marked with **Note** in the text
Caution: Information requiring particular attention
Remark: Supplementary information

Related Documents The related documents (user's manuals) indicated in this publication may include preliminary versions. However, preliminary versions are not marked as such.

Document Name	Document Number
IE-78K0S-NS	U13549E
IE-78K0S-NS-A	U15207E
IE-789177-NS-EM1	U14621E
ID78K0-NS, ID78K0S-NS Integrated Debugger Ver. 2.20 or Later Operation (Windows™ Based)	U14910E
μPD789167, 789177, 789167Y, 789177Y Subseries	U14186E

Caution The documents listed above are subject to change without notice. Be sure to use the latest documents when designing.

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CHAPTER 1 GENERAL

The IE-789177-NS-EM1 is a development tool for efficient debugging of hardware or software when using one of the following target devices that belong to the 78K/0S Series of 8-bit single-chip microcontrollers.

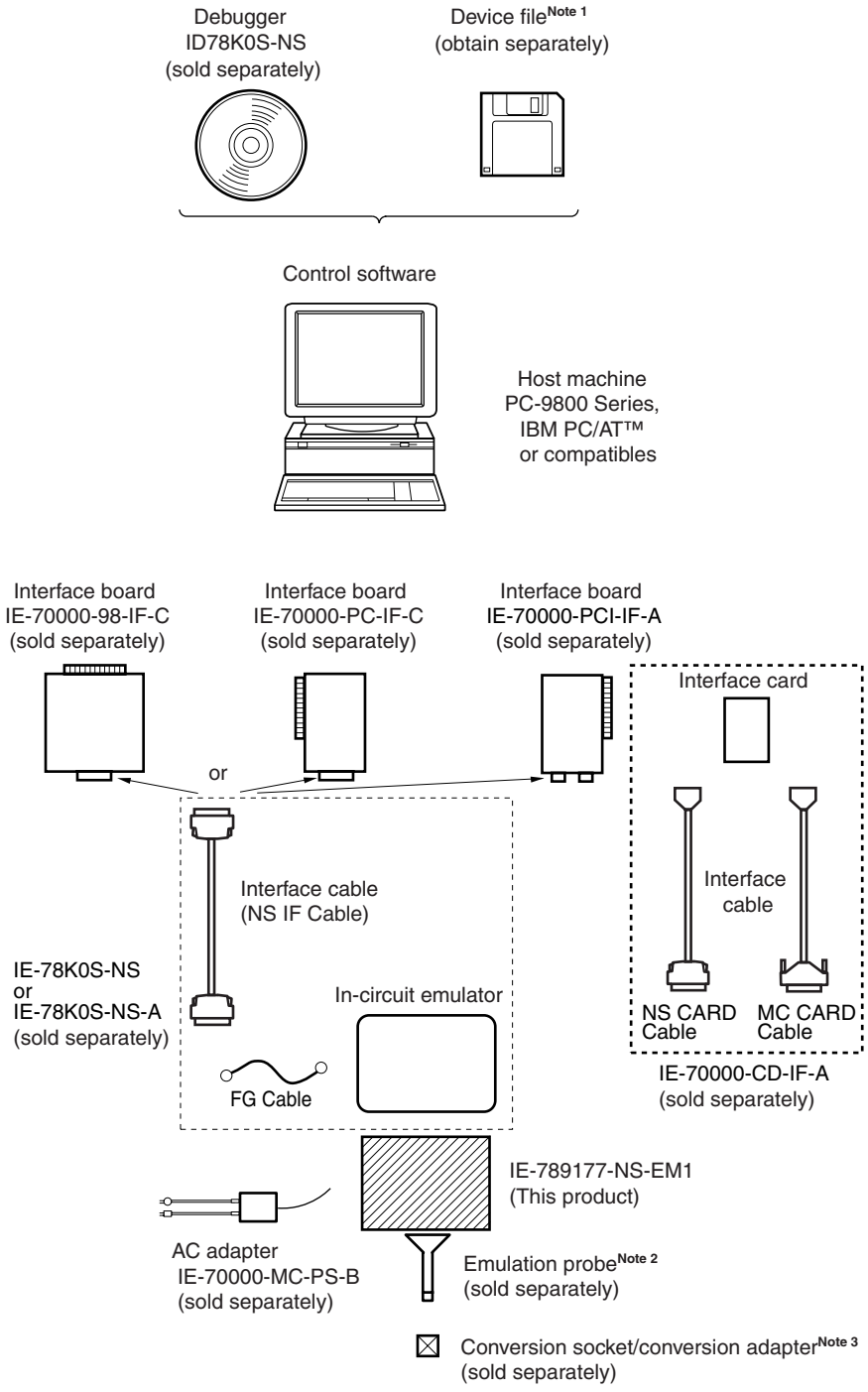
This chapter describes the IE-789177-NS-EM1's system configuration and basic specifications.

- Target devices
  - μPD789167 Subseries
  - μPD789177 Subseries
  - μPD789167Y Subseries
  - μPD789177Y Subseries

1.1 System Configuration

Figure 1-1 illustrates the IE-789177-NS-EM1's system configuration.

★ **Figure 1-1. System Configuration**



Notes 1. The device file is as follows.

μS××××DF789178: μPD789167, 789167Y, 789177, 789177Y Subseries

Device files can be downloaded from the NEC Electron Devices Web site

(URL: http://www.ic.nec.co.jp/micro).

2. The emulation probe is as follows.

NP-44GB: 44-pin plastic QFP (GB-8ES type)

NP-44GB-TQ: 44-pin plastic QFP (GB-8ES type)

NP-H44GB-TQ: Long type for 44-pin plastic QFP (GB-8ES type)

NP-48GA: 48-pin plastic TQFP (GA-9EU type)

The NP-44GB, NP-44GB-TQ, NP-H44GB-TQ, and NP-48GA are products of Naito Densei Machida Mfg. Co., Ltd.

For further information, contact Naito Densei Machida Mfg. Co., Ltd. (+81-45-475-4191)

3. The conversion socket/conversion adapter are as follows.

EV-9200G-44: 44-pin plastic LQFP (GB-8ES type)

TGB-044SAP: 44-pin plastic LQFP (GB-8ES type)

TGA-048SDP: 48-pin plastic TQFP (GA-9EU type)

The TGB-044SAP and TGA-048SDP are products of TOKYO ELETECH CORPORATION.

For further information, contact Daimaru Kogyo Co., Ltd.

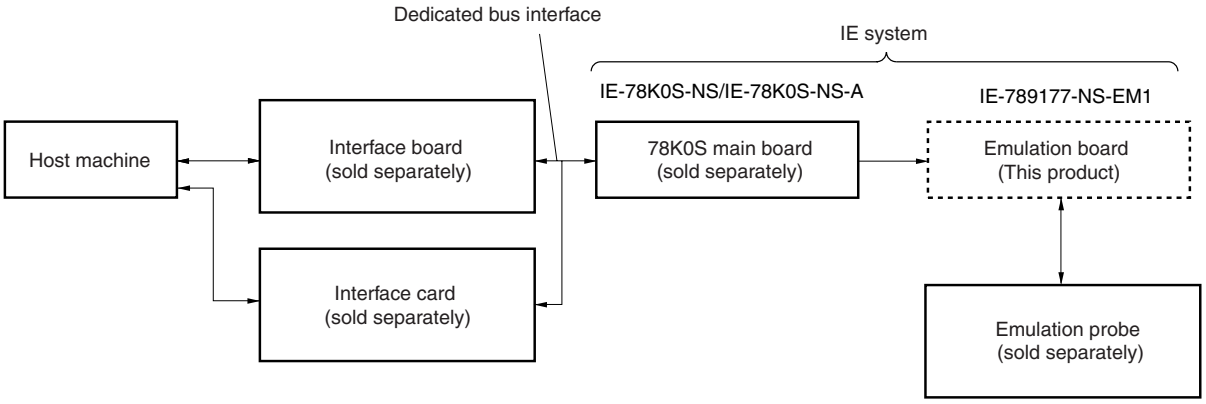
Tokyo Electronics Department (+81-3-3820-7112)

Osaka Electronics Department (+81-6-6244-6672)

1.2 Hardware Configuration

Figure 1-2 shows the IE-789177-NS-EM1's position in the basic hardware configuration.

Figure 1-2. Basic Hardware Configuration



1.3 Basic Specifications

The IE-789177-NS-EM1's basic specifications are listed in Table 1-1.

★ **Table 1-1. Basic Specifications**

Parameter	Description
Target device	μPD789167, 789177, 789167Y, 789177Y Subseries
System clock	10.0 MHz
Main clock supply	External: Input via an emulation probe from the target system Internal: Mounted on emulation board (5.0 MHz), or mounted on the board by the user
Subsystem clock supply	Internal: Mounted on emulation board (32.768 kHz), or mounted on the board by the user
Target interface voltage	V_{DD} = 1.8 to 5.5 V (same as target device) Operates on internal power supply (5 V) when target system not connected

CHAPTER 2 PART NAMES

This chapter introduces the parts of the IE-789177-NS-EM1 main unit.

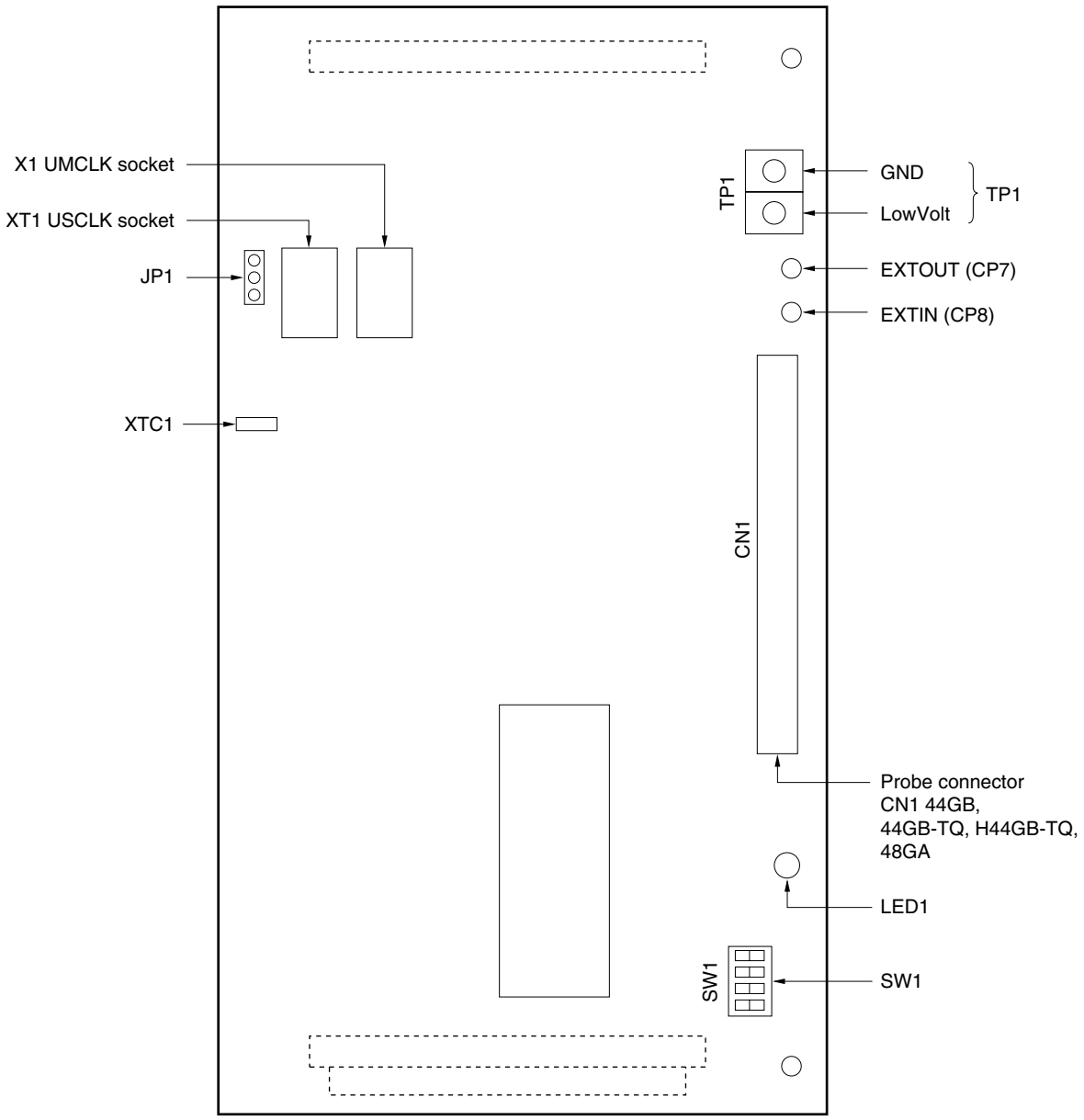
The packing box contains the emulation board (IE-789177-NS-EM1), packing list, user's manual, and guarantee card.

If there are any missing or damaged items, please contact an NEC sales representative.

Fill out and return the guarantee card that comes with the main unit.

2.1 Parts of Main Unit

Figure 2-1. IE-789177-NS-EM1 Part Names



CHAPTER 3 INSTALLATION

This chapter describes methods for connecting the IE-789177-NS-EM1 to the IE-78K0S-NS or IE-78K0S-NS-A, emulation probe, etc. Mode setting methods are also described.

Caution Connecting or removing components to or from the target system, or making switch or other setting changes must be carried out after the power supply to both the IE system and the target system has been switched OFF.

3.1 Connection

(1) Connection with IE-78K0S-NS or IE-78K0S-NS-A main unit

See the **IE-78K0S-NS User's Manual (U13549E)** for a description of how to connect the IE-789177-NS-EM1 to the IE-78K0S-NS[Note].

Note See the **IE-78K0S-NS-A User's Manual (U15207E)** when using the IE-78K0S-NS-A.

(2) Connection with emulation probe

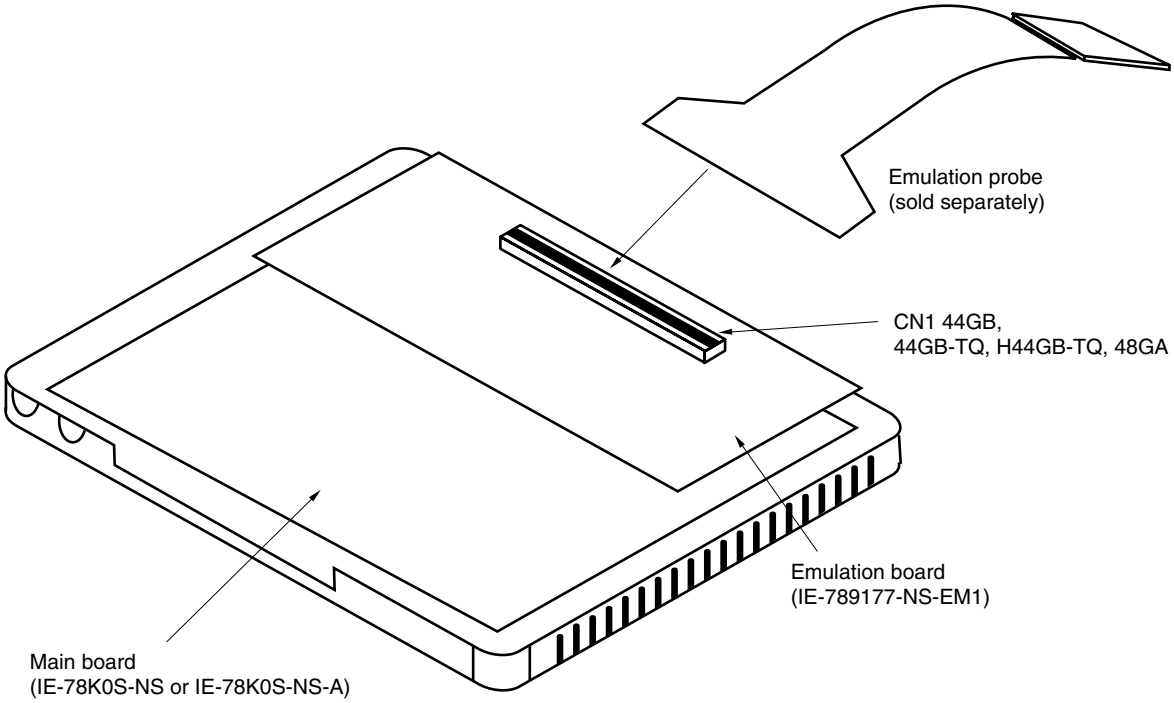
See the **IE-78K0S-NS User's Manual (U13549E)** for a description of how to connect an emulation probe to the IE-789177-NS-EM1[Note].

On this board, connect the emulation probe to CN1.

Note See the **IE-78K0S-NS-A User's Manual (U15207E)** when using the IE-78K0S-NS-A.

Caution Incorrect connection may damage the IE system.
Be sure to read the emulation probe's user's manual for a detailed description of the connection method.

Figure 3-1. Connection of Emulation Probe



3.2 Clock Settings

3.2.1 Overview of clock settings

The main system and subsystem clocks to be used during debugging can be selected from (1) to (3) below.

(1) Clock that is already mounted on emulation board
(2) Clock that is mounted by user
(3) Pulse input from target system

★ If the target system includes a clock oscillator, select either “(1) Clock that is already mounted on emulation board” or “(2) Clock that is mounted by user”. For the clock oscillator, a resonator is connected to the target device and the target device’s internal oscillator is used. An example of the external circuit is shown in part (a) of Figure 3-2. During emulation, the oscillator that is mounted on the target system is not used. Instead, the clock that is mounted on the emulation board installed in the IE-78K0S-NS or IE-78K0S-NS-A is used.

If the target system includes an external clock, select “(3) Pulse input from target system”.

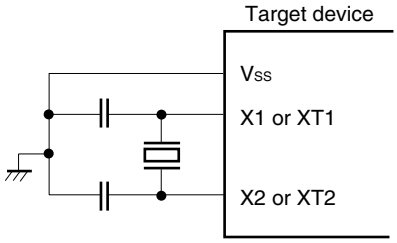
For the external clock, a clock signal is supplied from outside the target device and the target device’s internal oscillator is not used. An example of the external circuit is shown in part (b) of Figure 3-2.

Caution The IE system will be hung-up if the main system clock is not supplied normally. Moreover, be sure to input a rectangular wave as the clock from the target. There is no need to supply a clock to the X2 pin.

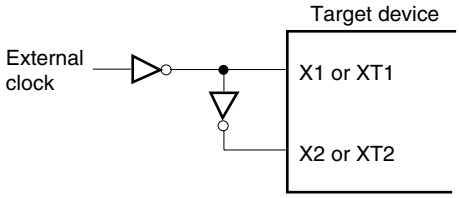
Figure 3-2. External Circuits Used as System Clock Oscillator

★

(a) Clock oscillator



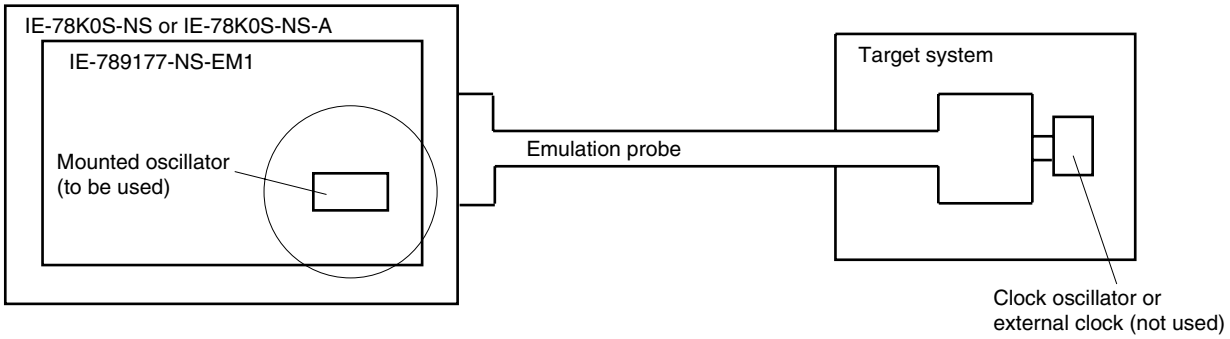
(b) External clock



(1) Clock that is already mounted on emulation board

A crystal oscillator is already mounted on the emulation board. Its frequency is 5.0 MHz.

★ **Figure 3-3. When Using Clock That Is Already Mounted on Emulation Board**

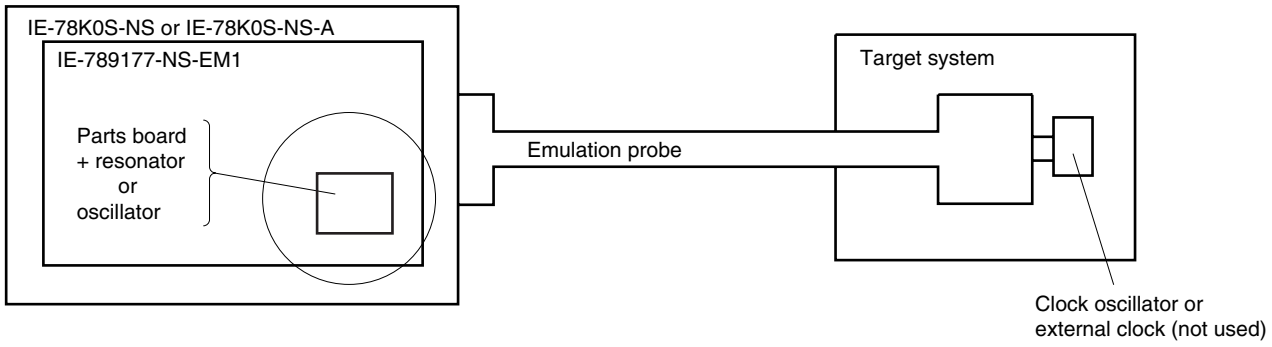


Remark The clock that is supplied by the IE-789177-NS-EM1's oscillator (encircled in the figure) is used.

(2) Clock that is mounted by user

The user is able to mount any clock supported by the set specifications on the IE-789177-NS-EM1. Either attach the parts board on which the resonator to be used is mounted or an oscillator to the IE-789177-NS-EM1. This method is useful when using a different frequency from that of the premounted clock.

★ **Figure 3-4. When Using User-Mounted Clock**

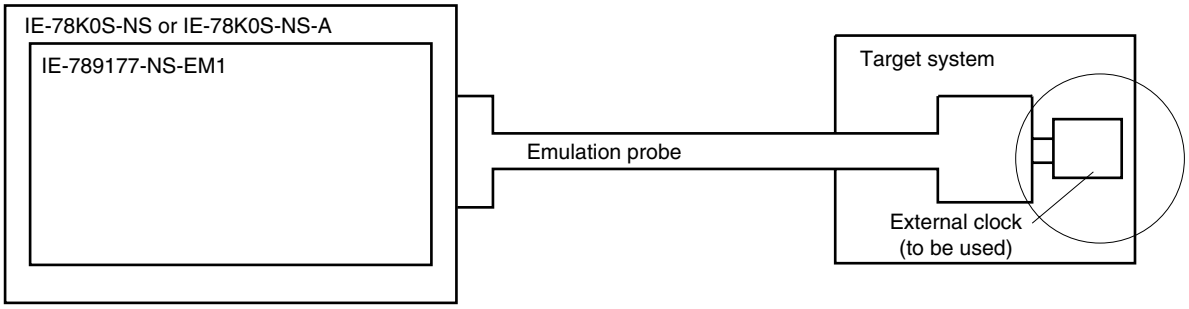


Remark The clock that is supplied by the parts board on which the IE-789177-NS-EM1's resonator is mounted (encircled in the figure) or by the oscillator is used.

(3) Pulse input from target system

An external clock connected to the target system can be used via an emulation probe.

★ **Figure 3-5. When Using an External Clock**



Remark The clock supplied by the target system's external clock (encircled in the figure) is used.

3.2.2 Main system clock settings

Table 3-1. Main System Clock Settings

Frequency of Main System Clock		IE-789177-NS-EM1 Parts Board (X1 UMCLK)	CPU Clock Source Selection (ID)
When using clock that is already mounted on emulation board	5.0 MHz	Oscillator used	Internal
When using clock mounted by user	Other than 5.0 MHz	Oscillator assembled by user	
When inputting pulse from target system		Oscillator not used	External

Caution When inputting pulse from the target system, open the configuration dialog box when starting the integrated debugger (ID78K0S-NS) and select "External" in the area (Clock) for selecting the CPU's clock source (this selects the user's clock).

Remark The IE-789177-NS-EM1's factory settings are those listed above under "when using clock that is already mounted on emulation board".

(1) When using clock that is already mounted on emulation board

When the IE-789177-NS-EM1 is shipped, a 5.0 MHz crystal oscillator is already mounted in the IE-789177-NS-EM1's X1 UMCLK socket. When using the factory-set mode settings, there is no need to make any other hardware settings.

When starting the integrated debugger (ID78K0S-NS), open the configuration dialog box and select "Internal" in the area (Clock) for selecting the CPU's clock source (this selects the emulator's internal clock).

(2) When using clock mounted by user

The settings described under either (a) or (b) are required, depending on the type of clock to be used.

When starting the integrated debugger (ID78K0S-NS), open the configuration dialog box and select “Internal” in the area (Clock) for selecting the CPU’s clock source (this selects the emulator’s internal clock).

(a) When using a ceramic resonator or crystal resonator

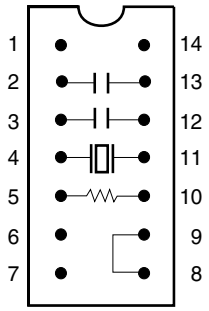
- Items to be prepared
  - Parts board
  - Ceramic resonator or crystal resonator
  - Resistor Rx
  - Capacitor CA
  - Capacitor CB
  - Solder kit

<Steps>

<1> Solder the target ceramic resonator or crystal resonator, resistor Rx, capacitor CA, and capacitor CB (all with suitable oscillation frequency) onto the parts board (as shown below).

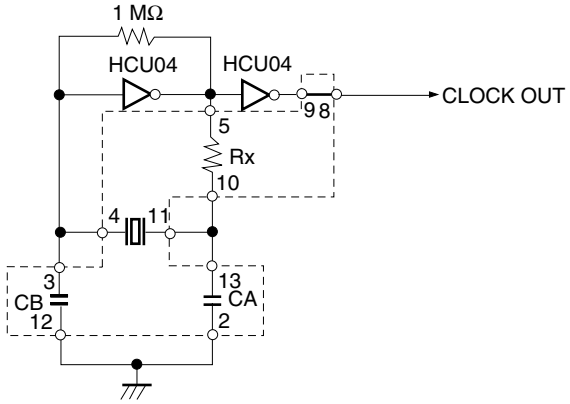
Figure 3-6. Connections on Parts Board (When Using Main System Clock or User-Mounted Clock)

Parts board (X1 UMCLK)



Pin No.	Connection
2-13	Capacitor CA
3-12	Capacitor CB
4-11	Ceramic resonator or crystal resonator
5-10	Resistor Rx
8-9	Short

Circuit diagram



Remark The sections enclosed in broken lines indicate parts that are attached to the parts board.

<2> Prepare the IE-789177-NS-EM1.

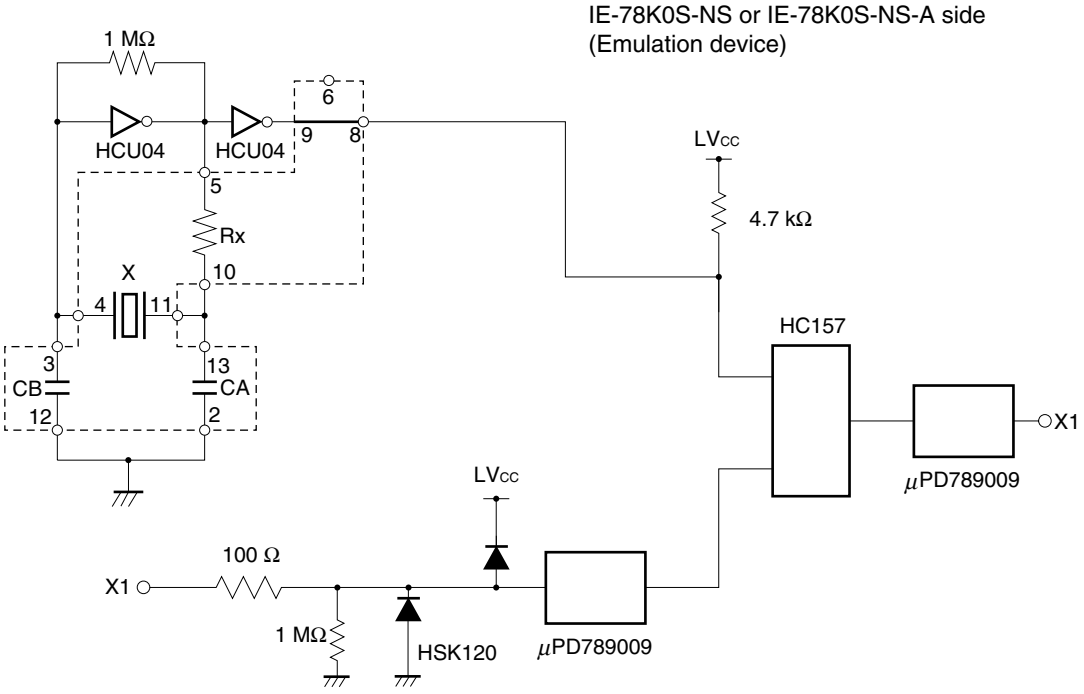
<3> Remove the crystal oscillator that is mounted in the IE-789177-NS-EM1's socket (X1 UMCLK).

<4> Connect the prepared parts board to the socket (X1 UMCLK) from which the crystal oscillator was removed. Check the pin 1 mark to make sure the board is mounted in the correct direction.

<5> Make sure that the parts board mounted in the socket (X1 UMCLK) on the emulation board is wired as shown in Figure 3-6 above.

<6> Install the IE-789177-NS-EM1 in the IE-78K0S-NS or IE-78K0S-NS-A.

The above steps configure the following circuit and enable supply of the clock from the mounted resonator to the emulation device.

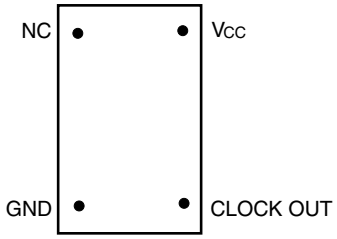


Remark The sections enclosed in broken lines indicate parts that are attached to the parts board.

(b) When using a crystal oscillator

- Items to be prepared
  - Crystal oscillator (see pinouts shown in Figure 3-7)

Figure 3-7. Crystal Oscillator (When Using Main System Clock or User-Mounted Clock)



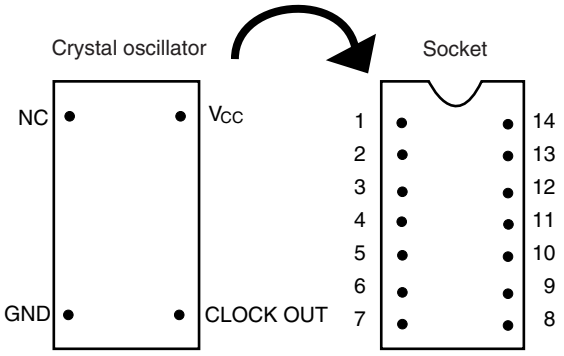
<Steps>

<1> Prepare the IE-789177-NS-EM1.

<2> Remove the crystal oscillator that is mounted in the IE-789177-NS-EM1's socket (X1 UMCLK).

<3> Connect the prepared crystal oscillator to the socket (X1 UMCLK) from which the crystal oscillator was removed. Insert the crystal oscillator pin into the socket aligning the pins as shown in the figure below.

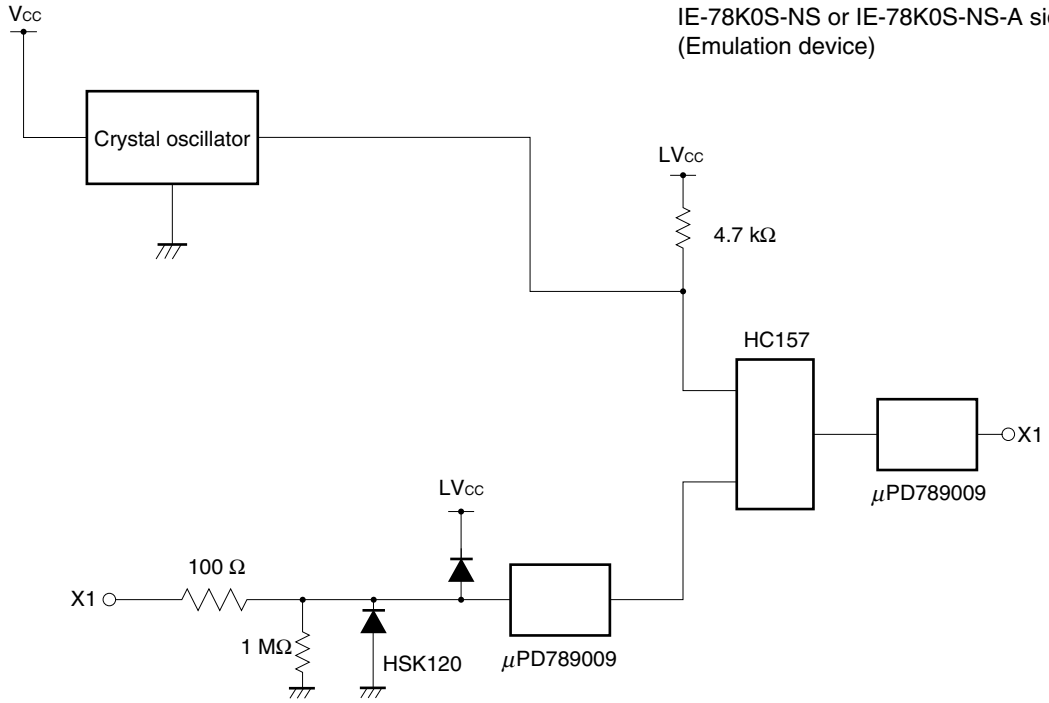
Figure 3-8. Pin Alignment of Crystal Oscillator and Socket



Crystal Oscillator Pin Name	Socket Pin No.
NC	1
GND	7
CLOCK OUT	8
VCC	14

<4> Install the IE-789177-NS-EM1 in the IE-78K0S-NS or IE-78K0S-NS-A.

The above steps configure the following circuit and enable supply of the clock from the mounted resonator to the emulation device.



(3) When inputting pulse from target system

No hardware settings are required for this situation.

When starting the integrated debugger (ID78K0S-NS), open the configuration dialog box and select “External” in the area (Clock) for selecting the CPU’s clock source (this selects the user’s clock).

3.2.3 Subsystem clock settings

Table 3-2. Subsystem Clock Settings

Frequency of Subsystem Clock		IE-789177-NS-EM1	
		Parts board (XT1 USCLK)	JP1
When using clock that is already mounted on emulation board	32.768 kHz	6 and 8 shorted	Short 2 and 3
When using clock mounted by user	Other than 32.768 kHz	Oscillator assembled by user	
When inputting pulse from target system		Not used	Short 1 and 2

Caution Jumper JP1, which is used to select the board's clock or an external clock, should be set only after turning off the power of IE-78K0S-NS or IE-78K0S-NS-A.

Remark When the IE-789177-NS-EM1 is shipped, the settings for "when using clock that is already mounted on emulation board" are preset.

(1) When using clock that is already mounted on emulation board

When the IE-789177-NS-EM1 is shipped, a 32.768 kHz crystal resonator (XTC1) and a parts board (XT1 USCLK) on which pins 6 and 8 are shorted are already mounted on the IE-789177-NS-EM1. Short pins 2 and 3 on the IE-789177-NS-EM1's jumper (JP1). There is no need to make any other settings via the integrated debugger (ID78K0S-NS).

(2) When using the clock mounted by user

The settings described under either (a) or (b) are required, depending on the type of clock to be used. Short pins 2 and 3 on the IE-789177-NS-EM1's jumper (JP1).

There is no need to make any other settings via the integrated debugger (ID78K0S-NS).

(a) When using a ceramic resonator or crystal resonator

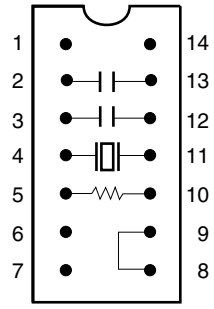
- Items to be prepared
  - Parts board
  - Ceramic resonator or crystal resonator
  - Resistor Rx
  - Capacitor CA
  - Capacitor CB
  - Solder kit

<Steps>

<1> Solder the target ceramic resonator or crystal resonator, resistor Rx, capacitor CA, and capacitor CB (all with suitable oscillation frequency) onto the parts board (as shown in the following diagram).

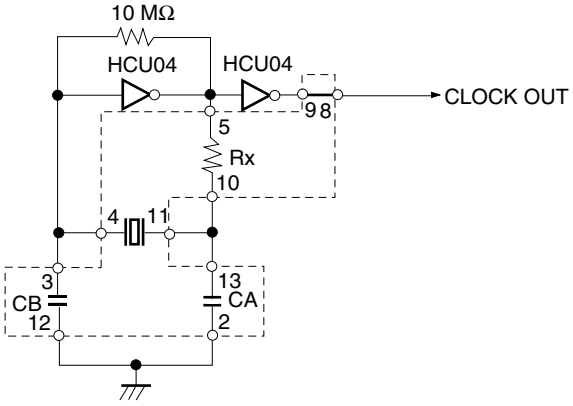
Figure 3-9. Connections on Parts Board (When Using Subsystem Clock or User-Mounted Clock)

Parts board (XT1 USCLK)



Pin No.	Connection
2-13	Capacitor CA
3-12	Capacitor CB
4-11	Ceramic resonator or crystal resonator
5-10	Resistor Rx
8-9	Short

Circuit diagram



Remark The sections enclosed in broken lines indicate parts that are attached to the parts board.

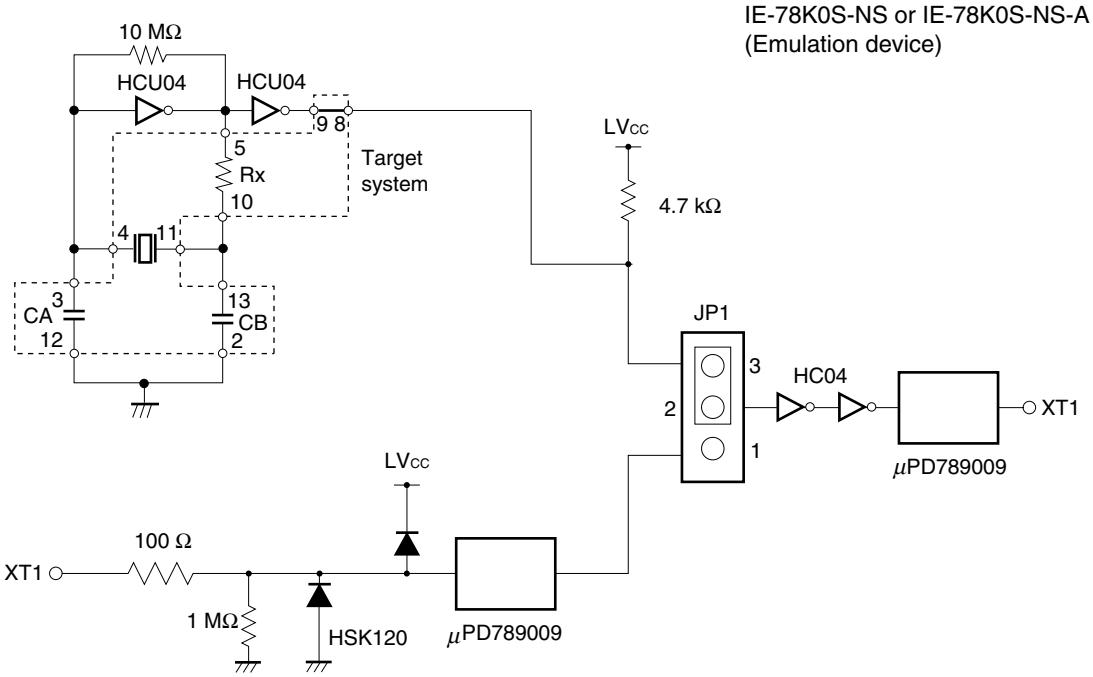
<2> Prepare the IE-789177-NS-EM1.

<3> Remove the parts board that is mounted in the IE-789177-NS-EM1's socket (XT1 USCLK).

<4> Connect the prepared parts board to the socket (XT1 USCLK) from which the parts board was removed. Check the pin 1 mark to make sure the board is mounted in the correct direction.

<5> Install the IE-789177-NS-EM1 in the IE-78K0S-NS or IE-78K0S-NS-A.

The above steps configure the following circuit and enable supply of the clock from the mounted resonator to the emulation device.

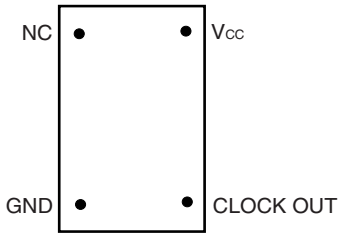


Remark The section enclosed in broken lines indicates parts that are attached to the parts board.

(b) When using a crystal oscillator

- Items to be prepared
  - Crystal oscillator (see pinouts shown in Figure 3-10)

Figure 3-10. Crystal Oscillator (When Using Subsystem Clock or User-Mounted Clock)



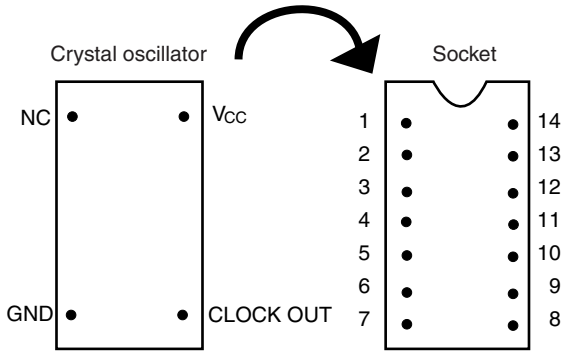
<Steps>

<1> Prepare the IE-789177-NS-EM1.

<2> Remove the parts board that is mounted in the IE-789177-NS-EM1's socket (XT1 USCLK).

<3> Connect the prepared crystal oscillator to the socket (XT1 USCLK) from which the parts board was removed. Insert the crystal oscillator into the socket aligning the pins as shown below.

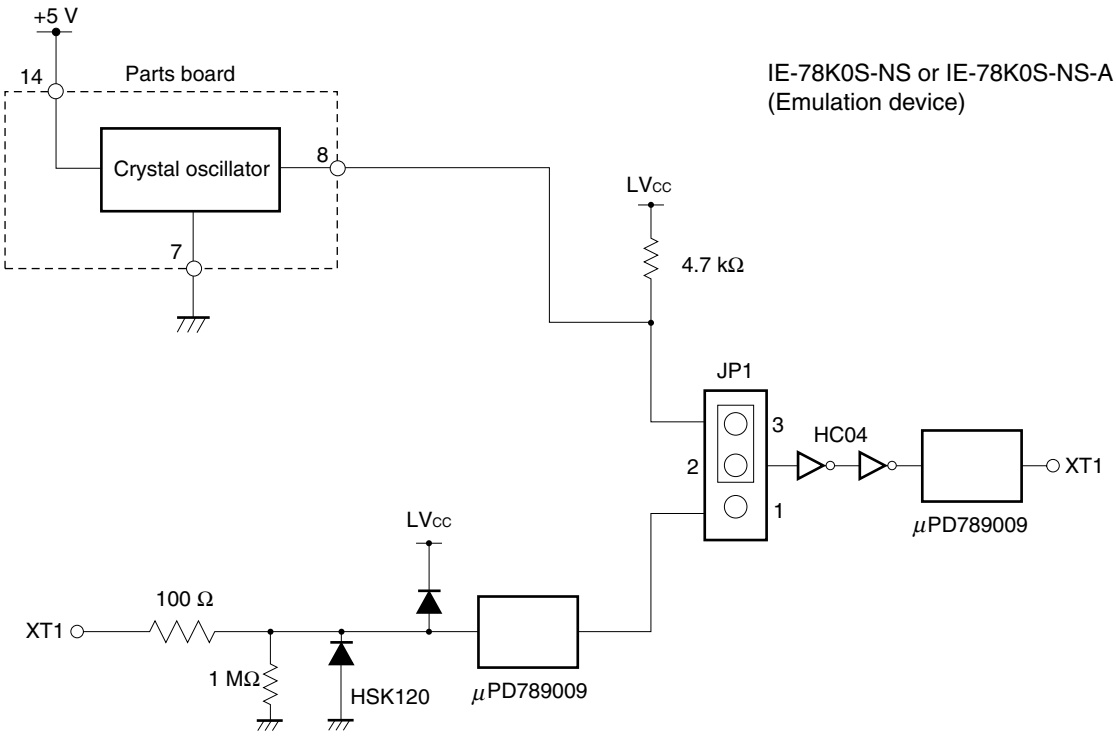
Figure 3-11. Pin Alignment of Crystal Oscillator and Socket



Crystal Oscillator Pin Name	Socket Pin No.
NC	1
GND	7
CLOCK OUT	8
VCC	14

<4> Install the IE-789177-NS-EM1 in the IE-78K0S-NS or IE-78K0S-NS-A.

The above steps configure the following circuit and enable supply of the clock from the mounted oscillator to the emulation device.



(3) When inputting pulse from target system

Short pins 1 and 2 on the IE-789177-NS-EM1's jumper (JP1). There is no need to make any settings via the integrated debugger (ID78K0S-NS).

3.3 Mask Option Settings

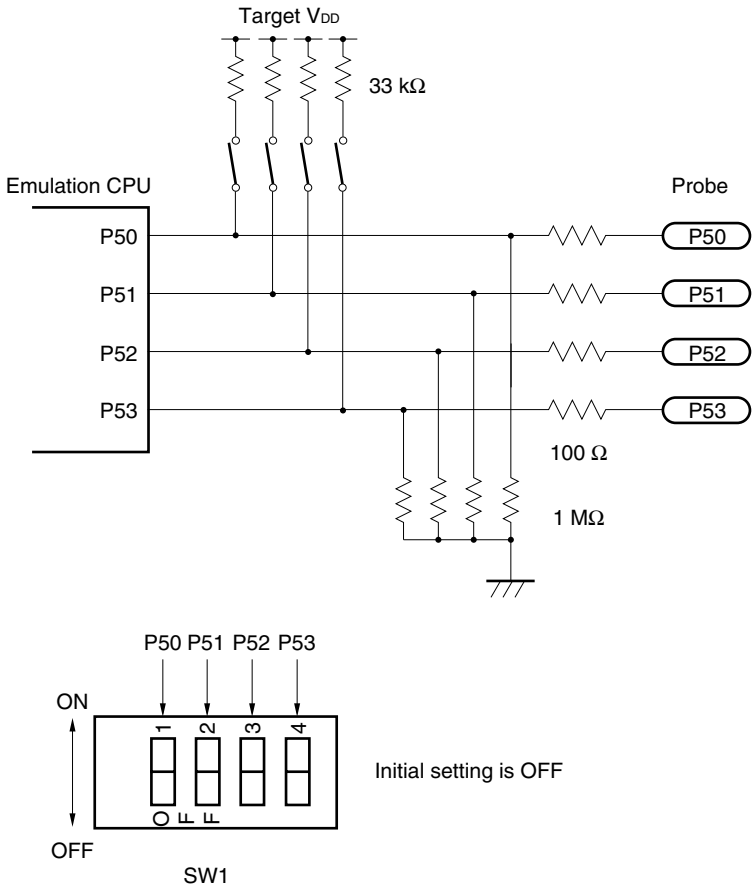
By setting the DIP switch (SW1) in the IE-789177-NS-EM1, a 33 kΩ pull-up resistor can be connected to P50 to P53 by a mask option.

Table 3-3. SW1 Switch Setting

	SW1			
	1	2	3	4
Destination pin	P50	P51	P52	P53

When the DIP switch is ON, the corresponding pin is pulled-up by the target V_{DD} pin. When it is OFF, the corresponding pull-up resistor is disconnected. Set the DIP switch to OFF for ports that do not exist.

Figure 3-12. Mask Option Setting



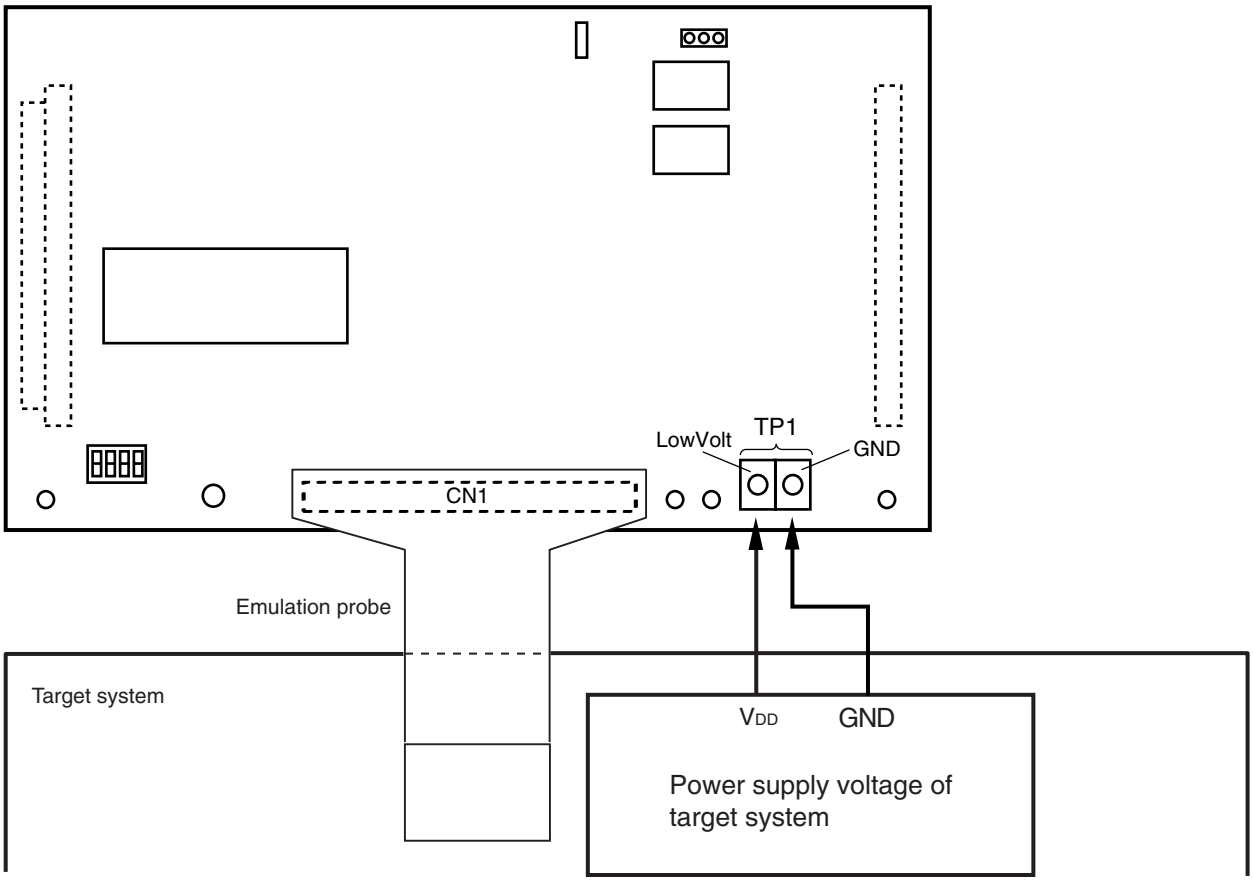
★ 3.4 Power Supply Voltage Setting of Target Interface

In the IE system, emulation is possible with a voltage of the same level as the power supply voltage of the target system.

When the target system is not connected, the IE system automatically operates with the emulator's internal power supply (5 V). When debugging with a voltage that is the same level as that of the target system, supply the same voltage as that of the target system to the TP1 terminal pin of the IE-789177-NS-EM1 (the same applies when the voltage is 5 V). Set the target voltage to between 1.8 and 5.0 V.

Maximum current consumption of TP1
1.8 to 5.0 V: Approximately 100 mA

Figure 3-13. Connection of TP1 and Power Supply Voltage of Target System



Caution Connect TP1 on the board and the power supply voltage of the target system after turning off the power of the IE-78K0S-NS or IE-78K0S-NS-A.

Remark The V_{DD} pin of the target system is only used for controlling LED1 (TV_{CC}), which monitors whether the power supply of the target system is connected in IE-789177-NS-EM1.

3.5 External Trigger

To set up an external trigger, connect it to the IE-789177-NS-EM1's check pins EXTOUT and EXTIN as shown below.

For the pin characteristics, see the **IE-78K0S-NS User's Manual (U13549E)** or **IE-78K0S-NS-A User's Manual (U15207E)**. For the use methods, see the **ID78K0-NS, ID78K0S-NS Integrated Debugger Ver. 2.20 or Later Operation (Windows Based) User's Manual (U14910E)**.

(1) EXTOUT

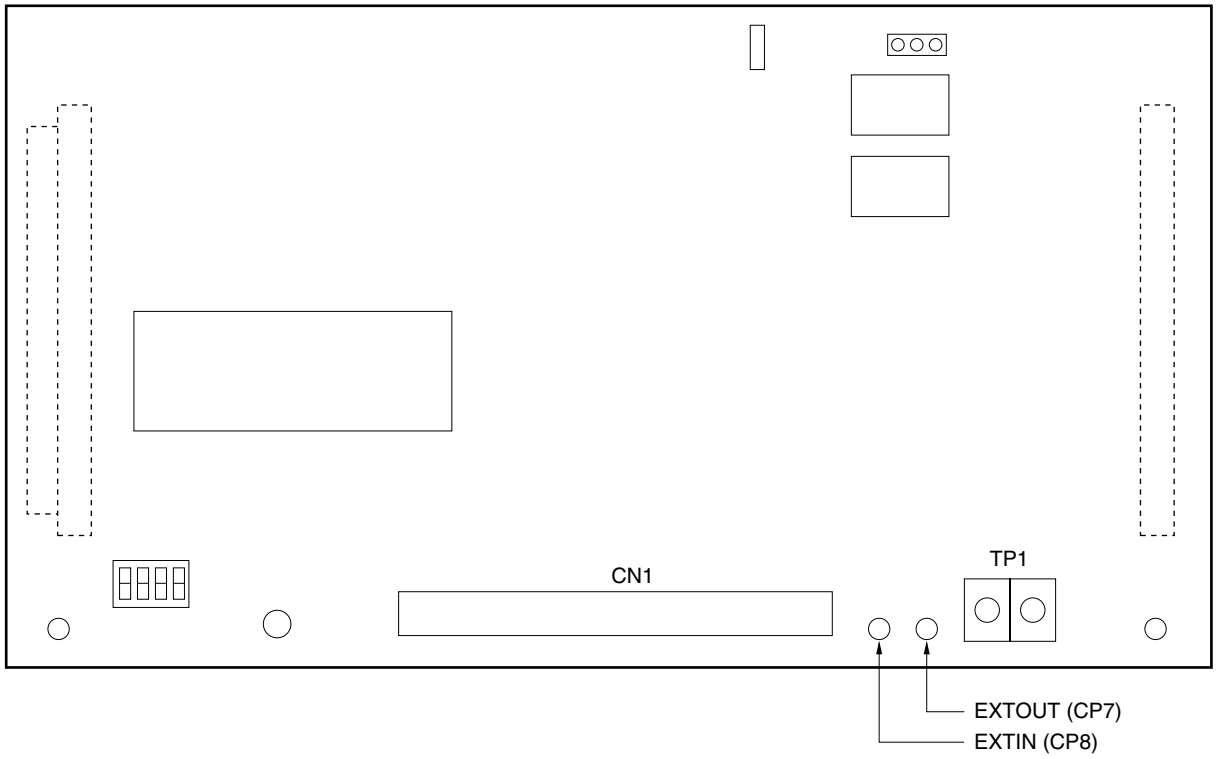
Output a low level from the EXTOUT pin on the IE-789177-NS-EM1 for 1.3 μs upon the occurrence of a break event.

Caution Connect a pull-up resistor on the target system since this is an open-drain output.

(2) EXTIN

An event signal can be input from the EXTIN pin on the IE-789177-NS-EM1. Input a high-level pulse signal for 2 CPU operation clocks or more.

Figure 3-14. External Trigger Input Position



3.6 Switch and Jumper Settings

(1) Switch and jumper settings on the IE-78K0S-NS

When using the IE-789177-NS-EM1, set the switches and jumpers on the IE-78K0S-NS as shown in Table 3-4. For details of these switch and jumper settings, refer to the **IE-78K0S-NS User's Manual (U13549E)**.

Table 3-4. Switch and Jumper Settings on IE-78K0S-NS

	SW1	SW3	SW4	JP1	JP4
Setting	OFF	All switches ON	All switches ON	2 and 3 shorted	1 and 2 shorted

Caution Incorrect settings may damage the IE-789177-NS-EM1.

★ **(2) Switch and jumper settings on the IE-78K0S-NS-A**

When using the IE-789177-NS-EM1, set the switches and jumpers on the IE-78K0S-NS-A as shown in Table 3-5. For details of these switch and jumper settings, refer to the **IE-78K0S-NS-A User's Manual (U15207E)**.

Table 3-5. Switch and Jumper Settings on IE-78K0S-NS-A

	SW1	JP1	JP3
Setting	OFF	1 and 2 shorted	Shorted

Caution Incorrect settings may damage the IE-78K0S-NS-A.

(3) Initial settings of switch and jumper on the IE-789177-NS-EM1

The initial settings of switch and jumper on the IE-789177-NS-EM1 are shown in Table 3-6.

Table 3-6. Initialize Settings of Switch and Jumper on IE-789177-NS-EM1

	SW1	JP1
Setting	All switches OFF	2 and 3 shorted

For details, refer to **3.2 Clock Settings** or **3.3 Mask Option Settings**.

CHAPTER 4 DIFFERENCES BETWEEN TARGET DEVICES AND TARGET INTERFACE CIRCUITS

This chapter describes the differences between the target device's signal lines and the signal lines of the IE-789177-NS-EM1's target interface circuit.

Although the target device is a CMOS circuit, the IE-789177-NS-EM1's target interface circuit consists of emulators such as an emulation CPU, TTL, and CMOS-IC.

When the IE system is connected with the target system for debugging, the IE system performs emulation so as to operate as the actual target device would operate in the target system.

However, some minor differences exist since the operations are performed via the IE system's emulation.

(1) Signals directly input/output to/from the evaluation chip and peripheral evaluation chip
(2) Signals input from the target system via a gate
(3) Analog signals
(4) Other signals

The IE system's circuit is used as follows for signals listed in (1) to (4) above.

(1) Signals directly input/output to/from the evaluation chip and peripheral evaluation chip

The following signals perform the same operations as in the μPD789167, 789177 Subseries. However, a 1 MΩ pull-down resistor and 100 Ω resistor are inserted in series.

- Signals related to port 0
- Signals related to port 1
- Signals related to port 2
- Signals related to port 3
- Signals related to port 5

(2) Signals input from the target system via a gate

Since the following signals are input via a gate, their timing shows a delay compared to the μPD789167, 789177 Subseries.

- $\overline{\text{RESET}}$ signal
- X1, XT1 signals

(3) Analog signals

Because the following signals input/output analog-related signals, special processing is not performed in the IE-789177-NS-EM1.

- AV_{DD} pin
- AV_{REF} pin
- Signals related to port 6

(4) Other signals

- V_{DD}, V_{DD1} pins

  When the target system is not connected, the internal power supply voltage (5 V) of the IE-789177-NS-EM1 is supplied to the emulation CPU. When the target system is connected, power is supplied from the voltage supply pin (TP1). The V_{DD0}, V_{DD1} pins of the target system are only used to control the LED1 in the IE-789177-NS-EM1 that monitors the input of the target system's power supply (TV_{CC}).

- V_{SS0}, V_{SS1}, AV_{SS} pins

  The V_{SS0}, V_{SS1}, and AV_{SS} pins are connected to GND in the IE-789177-NS-EM1.

- TEST/V_{PP} pin

  The TEST/V_{PP} pin is not used in the IE-789177-NS-EM1.

- X2, XT2 pins

  The X2, XT2 pins are not used in the IE-789177-NS-EM1.

Figure 4-1. Equivalent Circuit 1 of Emulator

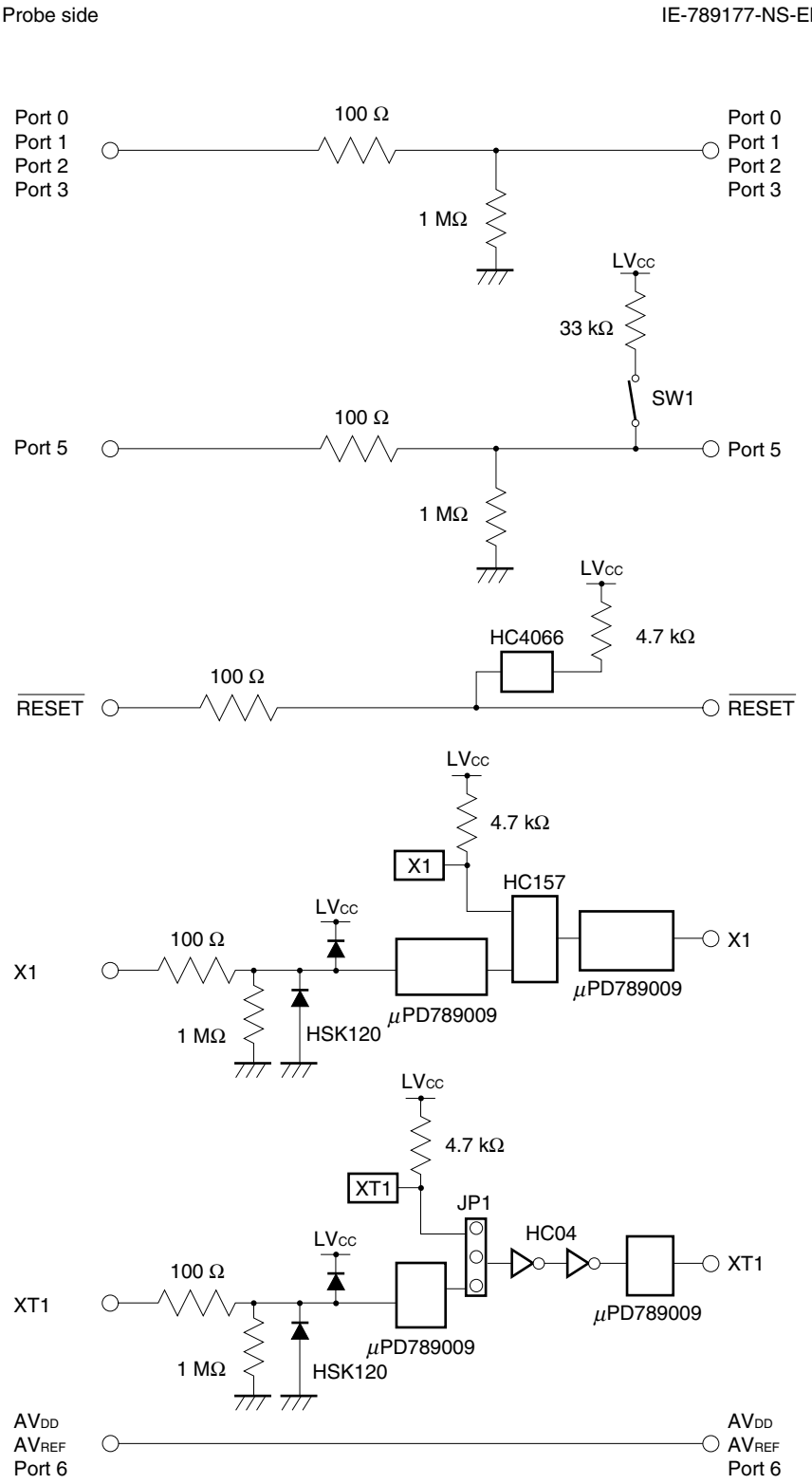
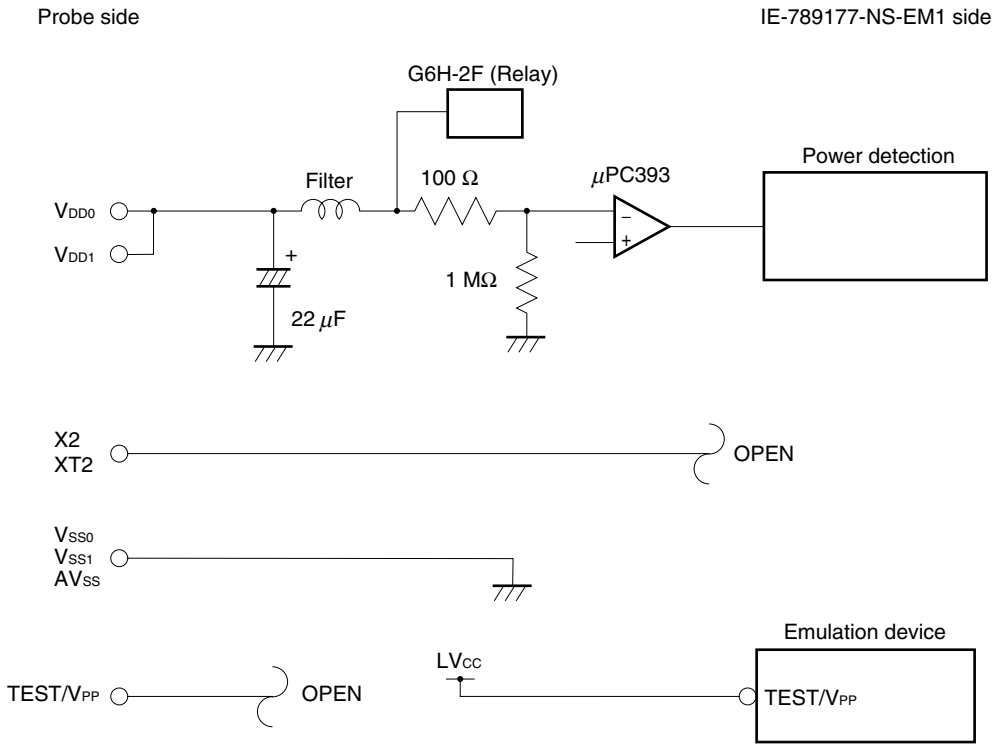


Figure 4-2. Equivalent Circuit 2 of Emulator



APPENDIX A. EMULATION PROBE PIN ASSIGNMENT TABLE

Table A-1. NP-44GB, NP-44GB-TQ, NP-H44GB-TQ Pin Assignments

Emulation Probe	CN1 Pin No.	Emulation Probe	CN1 Pin No.
1	104	23	18
2	103	24	17
3	100	25	22
4	99	26	21
5	94	27	28
6	93	28	27
7	30	29	92
8	29	30	91
9	24	31	98
10	23	32	97
11	20	33	102
12	47	34	73
13	48	35	72
14	51	36	69
15	52	37	70
16	57	38	63
17	58	39	64
18	59	40	61
19	60	41	62
20	55	42	65
21	56	43	66
22	49	44	71

Remarks 1. NP-44GB, NP-44GB-TQ, and NP-H44GB-TQ are products of Naito Densei Machida Mfg. Co., Ltd.

2. The numbers in the “Emulation probe” column indicate the corresponding pin number on the emulation probe tip.

Table A-2. NP-48GA Pin Assignments

Emulation Probe	CN1 Pin No.	Emulation Probe	CN1 Pin No.
1	104	25	18
2	103	26	17
3	100	27	22
4	99	28	21
5	94	29	28
6	93	30	27
7	30	31	101
8	29	32	92
9	24	33	91
10	23	34	98
11	20	35	97
12	19	36	102
13	47	37	73
14	48	38	72
15	51	39	69
16	52	40	70
17	57	41	63
18	58	42	64
19	50	43	61
20	59	44	74
21	60	45	62
22	55	46	65
23	56	47	66
24	49	48	71

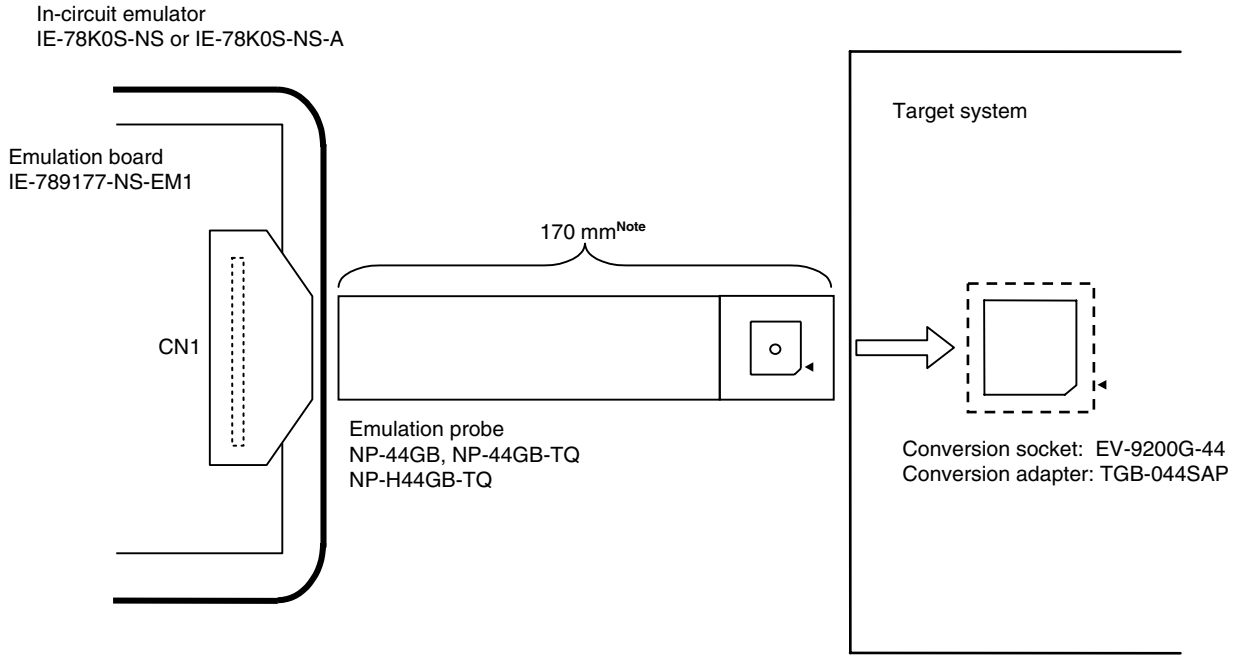
Remarks 1. NP-48GA is a product of Naito Densei Machida Mfg. Co., Ltd.

2. The numbers in the “Emulation probe” column indicate the corresponding pin number on the emulation probe tip.

★ APPENDIX B. CAUTIONS ON DESIGNING TARGET SYSTEM

The following shows the conditions when connecting the emulation probe to the conversion connector or conversion socket. Follow the configuration below and consider the shape of parts to be mounted on the target system when designing a system.

Figure B-1. Distance Between In-Circuit Emulator and Conversion Socket (NP-44GB, NP-44GB-TQ)

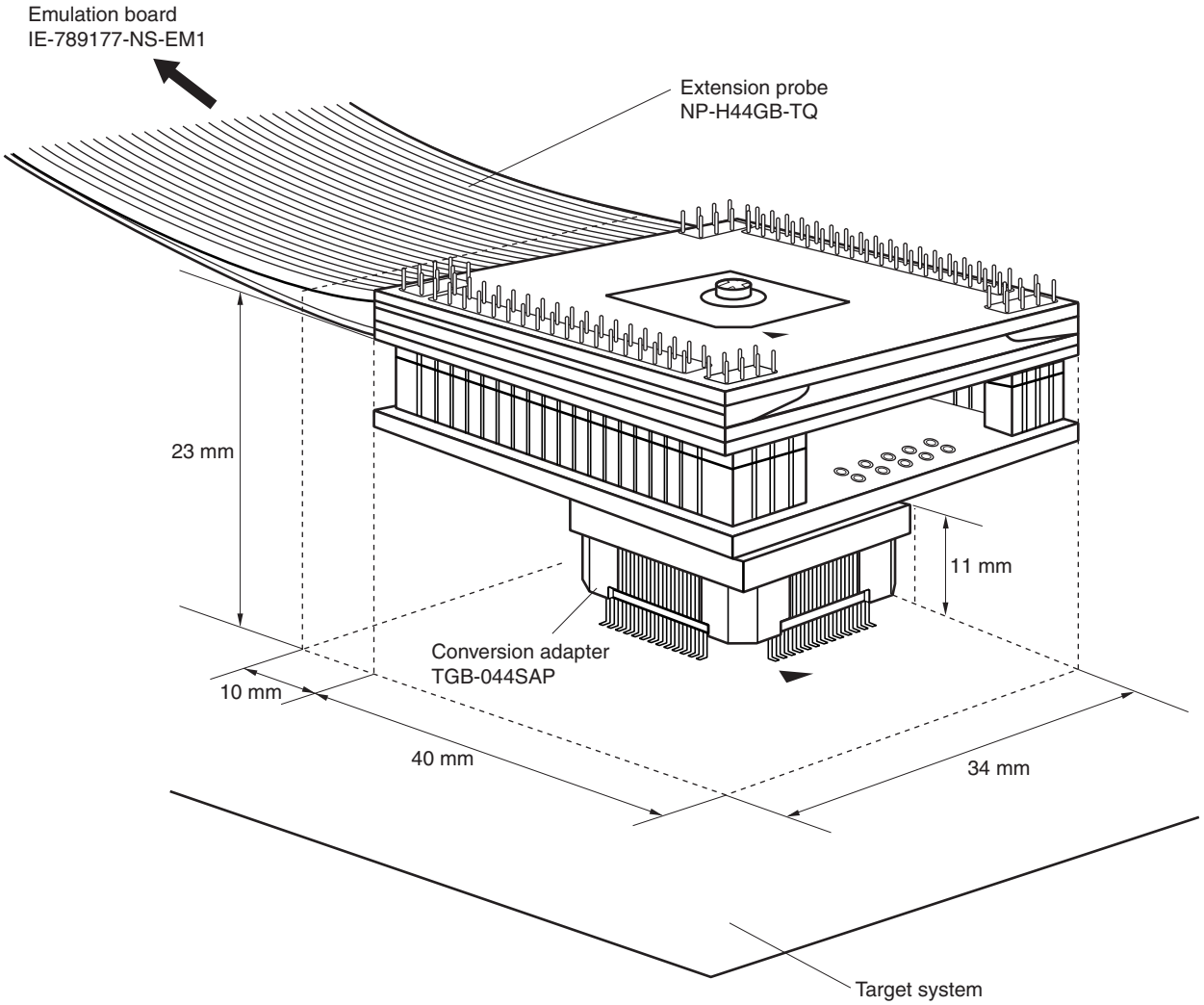


Note Distance when NP-44GB and NP-44GB-TQ are used. When NP-H44GB-TQ is used, the distance is 370 mm.

Remarks 1. NP-44GB, NP-44GB-TQ, and NP-H44GB-TQ are products of Naito Densei Machida Mfg. Co., Ltd.

2. TGB-044SAP is a product of TOKYO ELETECH CORPORATION.

Figure B-2. Connection Condition of Target System (NP-H44GB-TQ)



Remarks 1. NP-H44GB-TQ are products of Naito Densei Machida Mfg. Co., Ltd.

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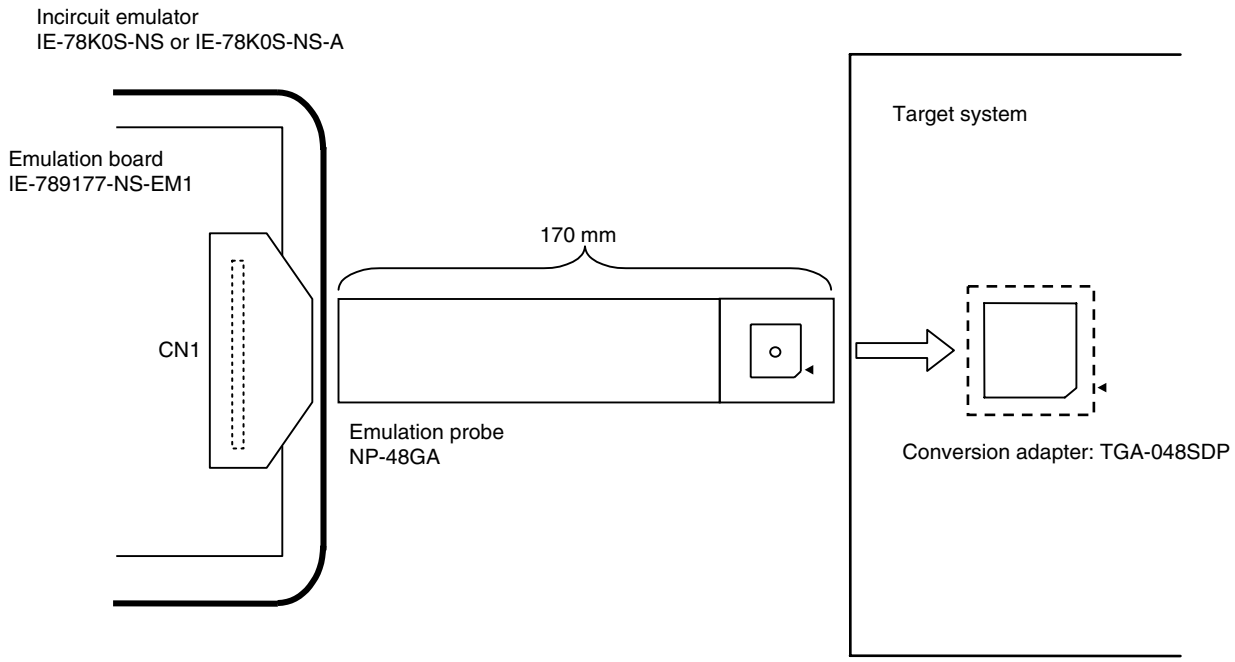
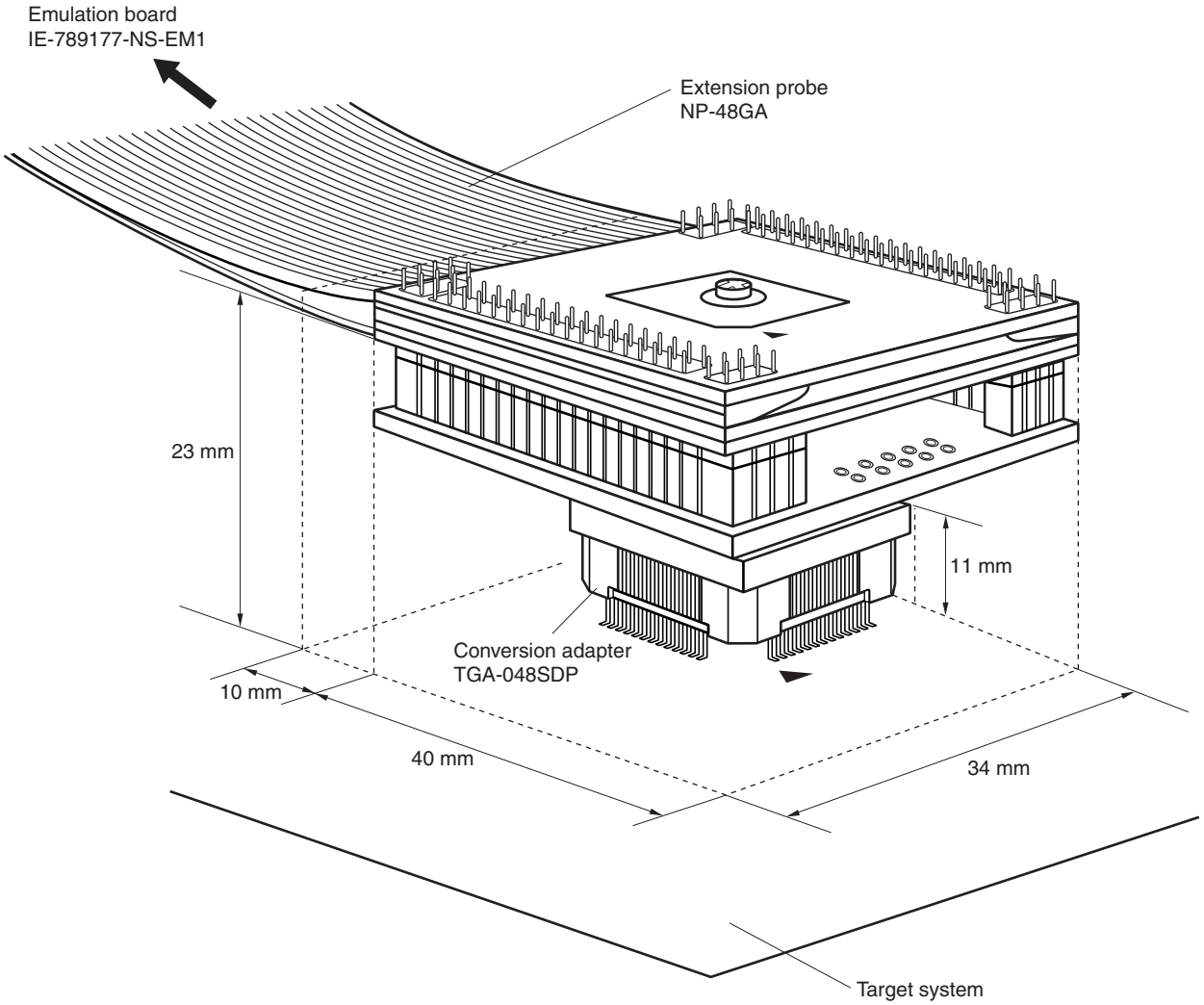
Figure B-3. Distance Between In-Circuit Emulator and Conversion Socket (NP-48GA)



Remarks 1. NP-48GA is a product of Naito Densei Machida Mfg. Co., Ltd.

2. TGA-048SDP is a product of TOKYO ELETECH CORPORATION.

Figure B-4. Connection Condition of Target System (NP-48GA)



Remarks 1. NP-48GA is a product of Naito Densei Machida Mfg. Co., Ltd.

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