NEC

User's Manual

IE-789871-NS-EM1

Emulation Board

Target Devices
μPD789871 Subseries

Document No. U16479EJ1V0UM00 (1st edition)
Date Published March 2003 N CP(K)

[MEMO]

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- Product release schedule
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INTRODUCTION

Product Overview

The IE-789871-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.

- μPD789871 Subseries: μPD789870, 789871, 78F9872

Target Readers

This manual is intended for engineers who will use the IE-789871-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-789871-NS-EM1, refer to not only this manual (supplied with the IE-789871-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-789871-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-789871-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.
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 in-circuit emulator (IE-78K0S-NS or IE-78K0S-NS-A) and the emulation board (IE-789871-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 In-Circuit Emulator	U13549E
IE-78K0S-NS-A In-Circuit Emulator	U15207E
IE-789871-NS-EM1 Emulation Board	This manual
ID78K Series Integrated Debugger Ver. 2.30 or Later Operation Windows™ Based	U15185E
μPD789871 Subseries	U14938E

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

CONTENTS

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LIST OF TABLES

CHAPTER 1 GENERAL

The IE-789871-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.

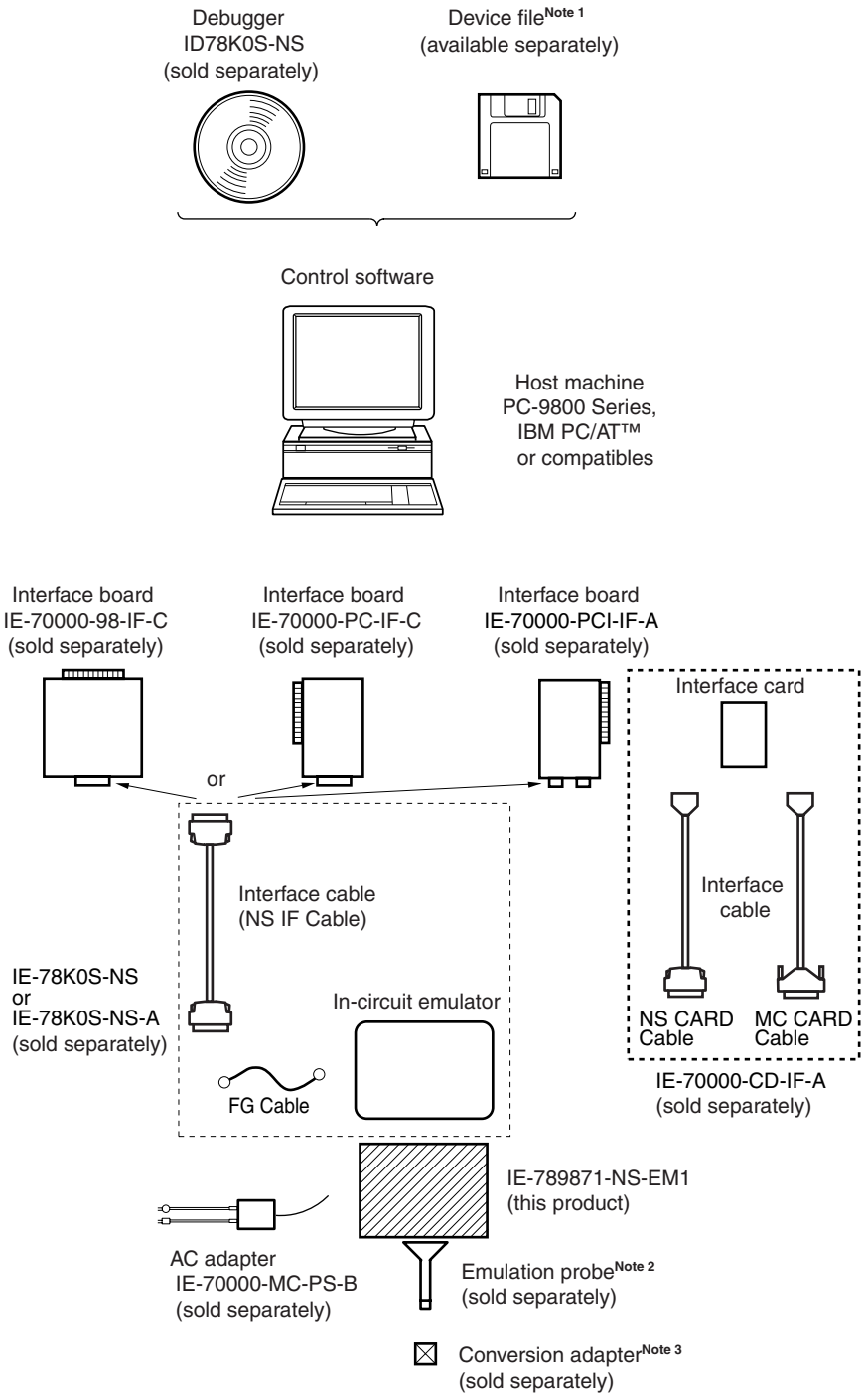
This chapter describes the IE-789871-NS-EM1's system configuration and basic specifications.

- Target devices
  - μPD789871 Subseries

1.1 System Configuration

Figure 1-1 illustrates the IE-789871-NS-EM1's system configuration.

Figure 1-1. System Configuration



Notes 1. The device file is as follows, in accordance with the subseries.

μS××××DF789871: μPD789871 Subseries

The device file can be downloaded from the website of NEC Electronics (http://www.necel.com/micro/)

2. The emulation probe NP-H52GB-TQ is a product of Naito Densei Machida Mfg. Co., Ltd.
For further information, contact Naito Densei Machida Mfg. Co., Ltd. (TEL: +81-45-475-4191)

3. The conversion adapter TGB-052SBP is a product of TOKYO ELETECH CORPORATION.
For further information, contact Daimaru Kogyo Co., Ltd.
Tokyo Electronics Department (TEL: +81-3-3820-7112)
Osaka Electronics Department (TEL: +81-6-6244-6672)

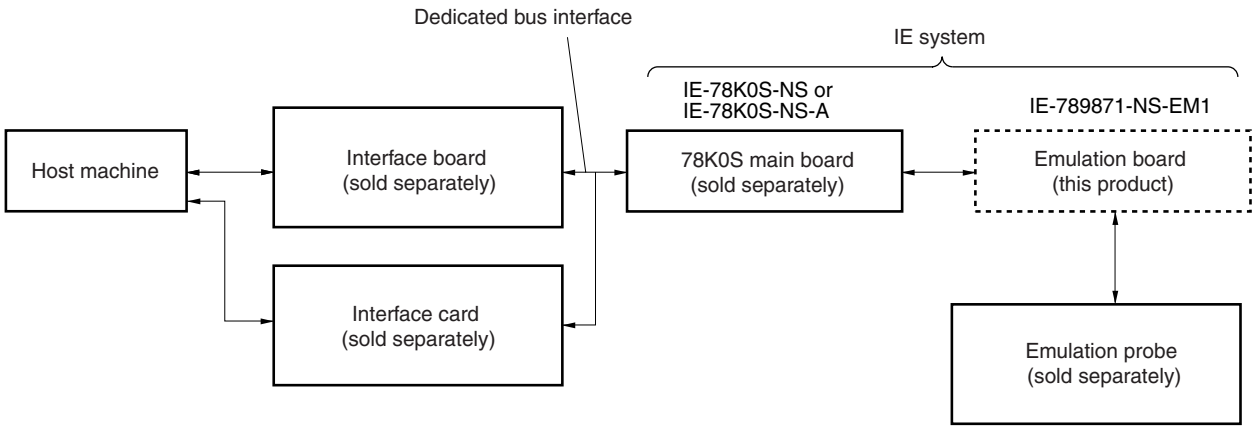
Table 1-1. Correspondence Between Emulation Probe and Conversion Adapter

Package	Emulation Probe	Conversion Adapter
52-pin plastic LQFP (GB type)	NP-H52GB-TQ (probe length: 400 mm)	TGB-052SBP

1.2 Hardware Configuration

Figure 1-2 shows the IE-789871-NS-EM1's position in the basic hardware configuration.

Figure 1-2. Basic Hardware Configuration



1.3 Basic Specifications

The basic specifications of the IE-789871-NS-EM1 are listed in Table 1-2.

Table 1-2. Basic Specifications

Parameter	Description
Target device	μPD789871 Subseries
System clock	Main system clock: 1.0 to 5.0 MHz Subsystem clock: 32.768 kHz
Main system clock supply	External: Input via an emulation probe from the target system Internal: Mounted on the emulation board (5.0 MHz), or mounted on the parts board by the user
Subsystem clock supply	External: Input via an emulation probe from the target system Internal: Mounted on the emulation board (32.768 kHz), or mounted on the parts board by the user
Target interface voltage	V_{DD} = 2.7 to 5.5 V (same as target device) Operates on the internal power supply (5 V) when the target system is not connected

CHAPTER 2 PART NAMES

This chapter introduces the parts of the IE-789871-NS-EM1 main unit.

The packing box contains the emulation board (IE-789871-NS-EM1), packing list, user's manual, and guarantee card.

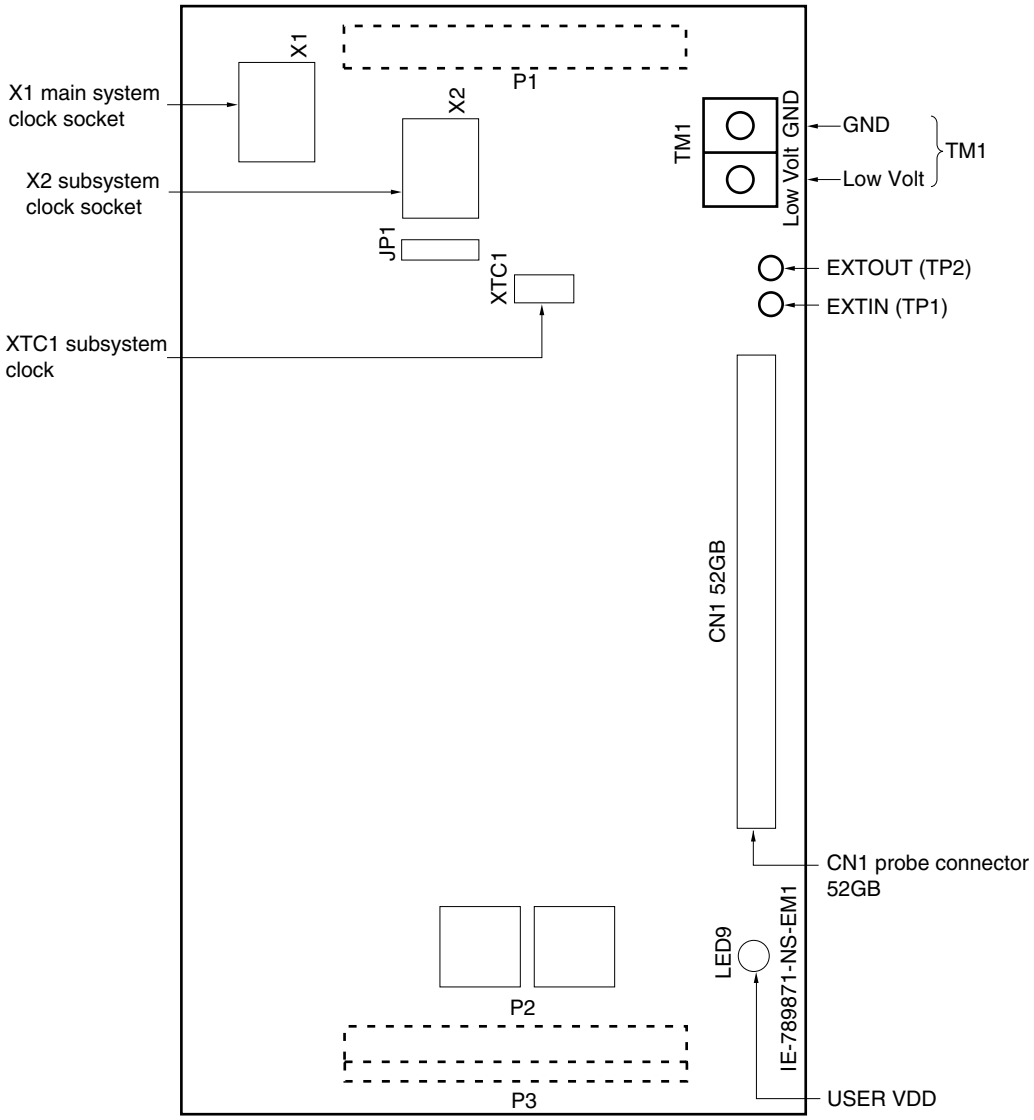
If there are any missing or damaged items, please contact an NEC Electronics sales representative.

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

2.1 Parts of Main Unit

Figure 2-1 shows the part names of the IE-789871-NS-EM1.

Figure 2-1. IE-789871-NS-EM1 Part Names



2.2 Initial Setting of Jumper

Table 2-1 shows the initial setting of the jumper on the IE-789871-NS-EM1.
For the setting of JP1, refer to **3.4 Clock Settings**.

Table 2-1. Initial Setting of Jumper

	JP1
Initial setting	2 and 3 shorted

CHAPTER 3 INSTALLATION

This chapter describes methods for connecting the IE-789871-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-789871-NS-EM1 to the IE-78K0S-NS[Note].

Note When using the IE-78K0S-NS-A, see the **IE-78K0S-NS-A User's Manual (U15207E)**.

(2) Connection with emulation probe

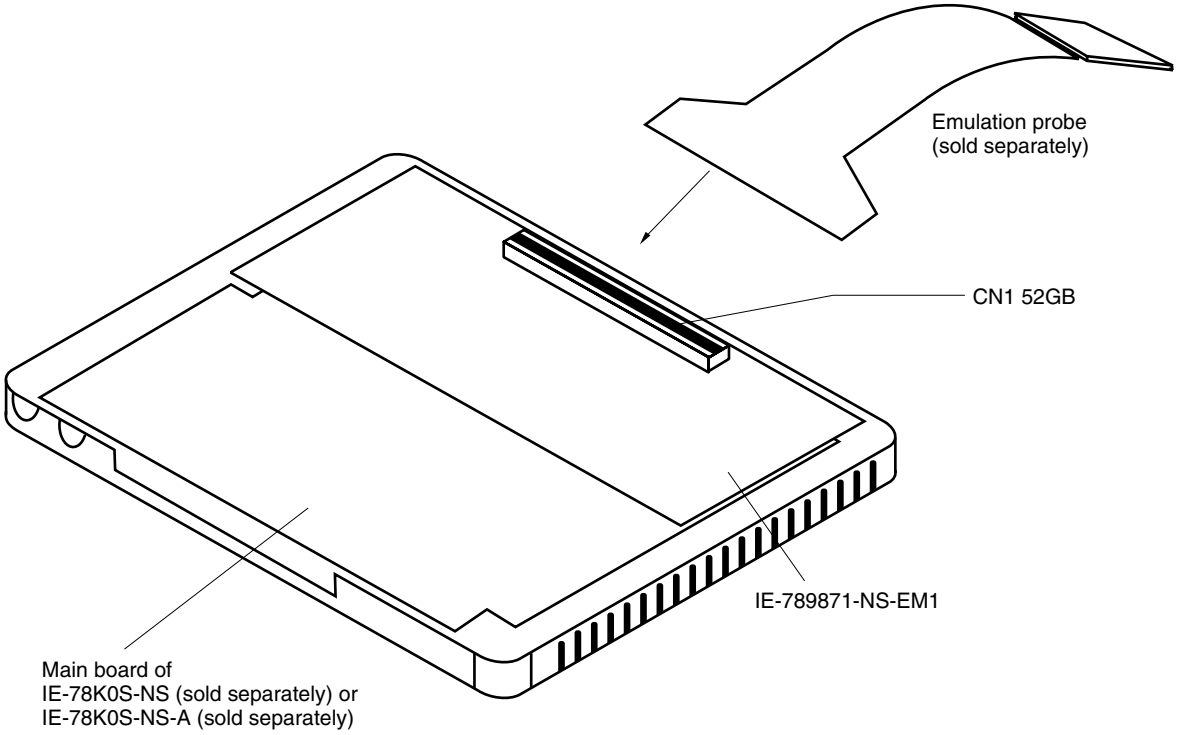
See the **IE-78K0S-NS User's Manual (U13549E)** for a description of how to connect an emulation probe to the IE-789871-NS-EM1[Note].

On this board, connect the emulation probe to CN1.

Note When using the IE-78K0S-NS-A, see the **IE-78K0S-NS-A User's Manual (U15207E)**.

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 Switch and Jumper Settings on Main Unit

(1) Settings on the IE-78K0S-NS

When using the IE-789871-NS-EM1, set the switches and jumpers on the IE-78K0S-NS as shown in Table 3-1. For details of these switch and jumper settings, refer to the **IE-78K0S-NS User's Manual (U13549E)**.

Table 3-1. Switch and Jumper Settings on IE-78K0S-NS

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

Caution Incorrect connection may damage the IE-789871-NS-EM1.

(2) Settings on the IE-78K0S-NS-A

When using the IE-789871-NS-EM1, set the switches and jumpers on the IE-78K0S-NS-A as shown in Table 3-2. For details of these switch and jumper settings, refer to the **IE-78K0S-NS-A User's Manual (U15207E)**.

Table 3-2. Switch and Jumper Settings on IE-78K0S-NS-A

	SW1	JP1	JP3
Setting	OFF	1 and 2 shorted (fixed)	Shorted (fixed)

Caution Incorrect connection may damage the IE-789871-NS-EM1.

3.3 Setting Power Supply Voltage 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 TM1 terminal pin of the IE-789871-NS-EM1 (the same applies when the voltage is 5 V).

Set the target voltage to between 2.7 and 5.0 V.

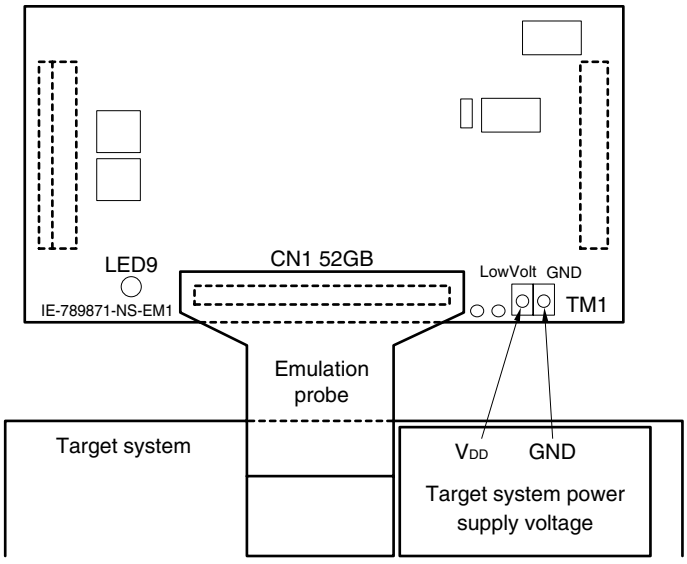
For how to select the operating power supply, refer to the **ID78K Series Ver.2.30 or Later Operation Windows-Based User's Manual (U15185E)**.

- Maximum current consumption of TM1
  2.7 to 5.0 V: Approximately 125 mA

Table 3-3. Setting Power Supply of Target Interface

Power Supply of Target Interface (LV_{CC})		Integrated Debugger (ID78K0S-NS)
		Operating Power Supply Selection
When connecting target system	2.7 to 5.0 V	Target
When not connecting target system	5 V	Internal

Figure 3-2. Connecting TM1 and Target System Power Supply Voltage



Caution Before connecting TM1 on the board and the target system power supply voltage, turn off the power to the IE-78K0S-NS or IE-78K0S-NS-A.

Remark The V_{DD0} and V_{DD1} pins on the target system are exclusively used to control LED9 (USER VDD), which monitors whether the power supply of the target system is connected in the IE-789871-NS-EM1.

3.4 Clock Settings

3.4.1 Overview of clock settings

The main system clock and subsystem clock 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

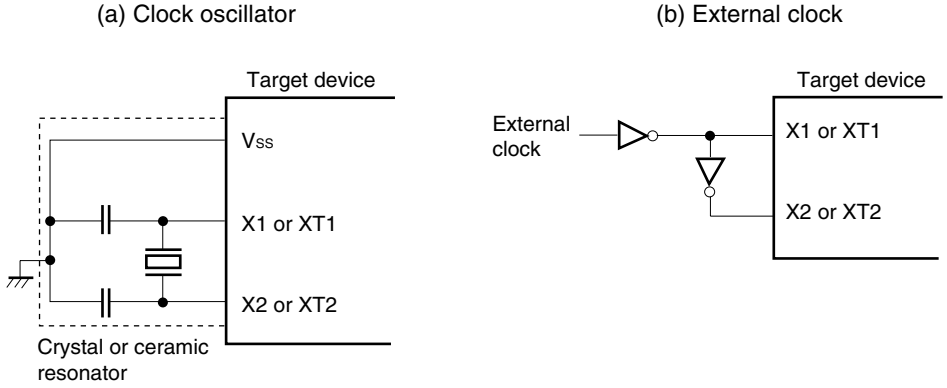
If the target system includes a clock oscillator, select either **(1) Clock that is already mounted on emulation board** or **(2) Clock that is mounted by user**. For the clock oscillator, a resonator is connected to the target device and the target device's internal oscillator is used. An example of the external circuit is shown in part (a) of Figure 3-3. 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 either **(1) Clock that is already mounted on emulation board**, **(2) Clock that is mounted by user**, or **(3) Pulse input from target system**.

For the external clock, a clock signal is supplied from outside of 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 3-3.

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 pulse from the target system. There is no need to supply a clock to the X2 and XT2 pins. Also, even if a crystal resonator is connected directly to X1 (for the main system clock) or XT1 (for the subsystem clock), the target device will not operate.

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



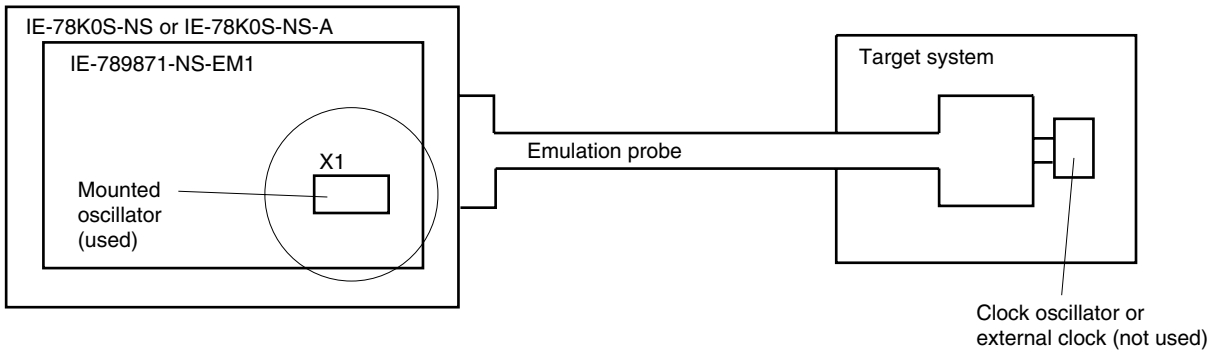
(1) Clock that is already mounted on emulation board

The crystal oscillator mounted on the IE-789871-NS-EM1 can be used.

(a) Main system clock

A crystal oscillator (X1) is already mounted on the emulation board. Its frequency is 5.0 MHz.

Figure 3-4. When Using Clock That Is Already Mounted on Emulation Board (Main System Clock)

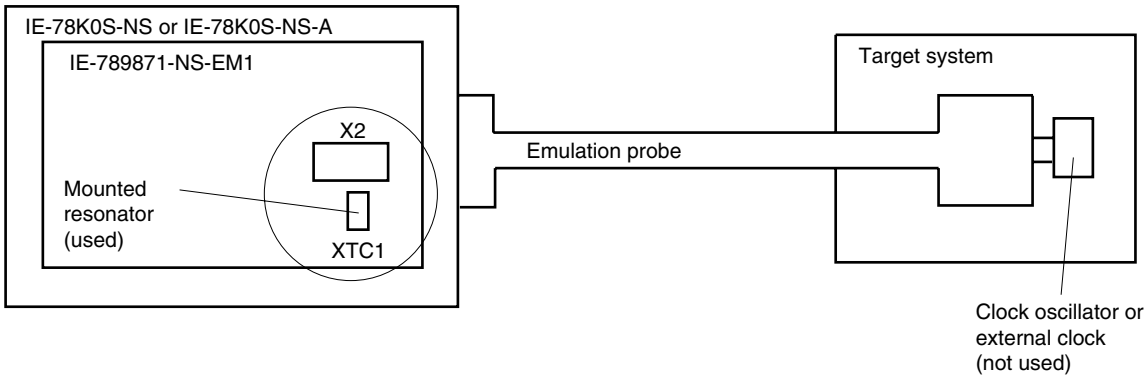


Remark The clock that is supplied by the oscillator of the IE-789871-NS-EM1 (encircled in the figure) is used.

(b) Subsystem clock

A crystal resonator (XTC1) is already mounted on the emulation board. Its frequency is 32.768 kHz

Figure 3-5. When Using Clock That Is Already Mounted on Emulation Board (Subsystem Clock)



Remark The clock that is supplied by the resonator of the IE-789871-NS-EM1 (encircled in the figure) is used.

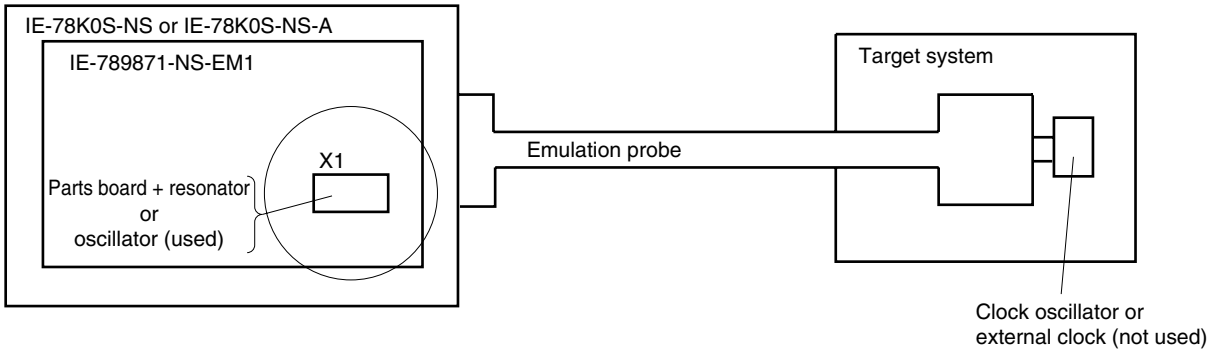
(2) Clock that is mounted by user

The user can mount any clock supported by the set specifications on the IE-789871-NS-EM1. This feature is effective when debugging at a different frequency than the clock already mounted.

(a) Main system clock

Remove the crystal oscillator (X1) that is already mounted on the emulation board, and mount the parts board on which the resonator to be used is mounted or mount the oscillator to be used.

Figure 3-6. When Using User-Mounted Clock (Main System Clock)

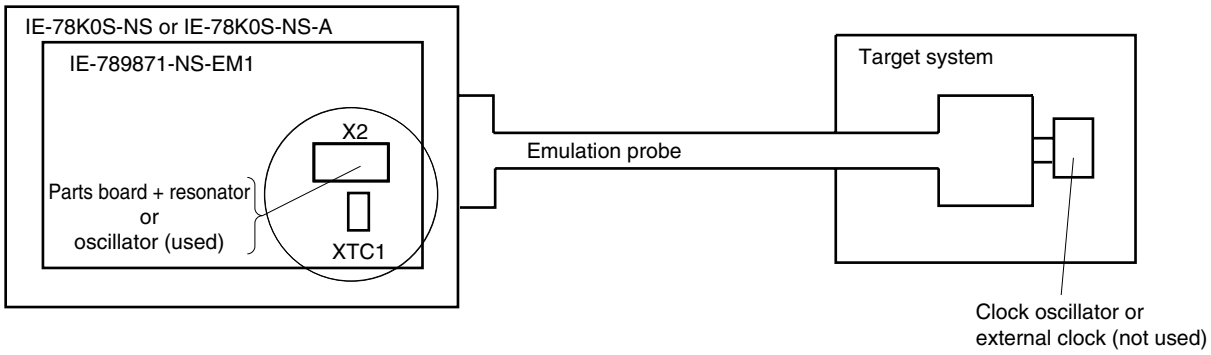


Remark The clock that is supplied by the resonator of the IE-789871-NS-EM1 (encircled in the figure) or the oscillator is used.

(b) Subsystem clock

Remove the parts board (X2) that is already mounted on the emulation board, and mount the parts board on which the resonator to be used is mounted or mount the oscillator to be used.

Figure 3-7. When Using User-Mounted Clock (Subsystem Clock)

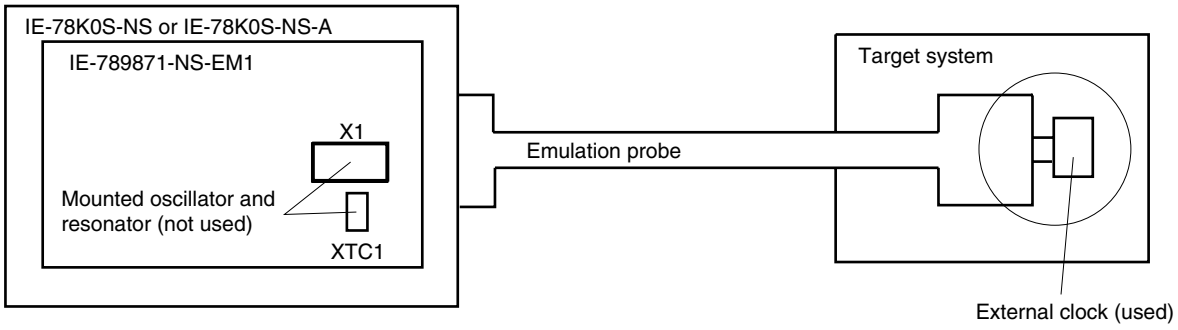


Remark The clock that is supplied by the resonator of the IE-789871-NS-EM1 (encircled in the figure) or the oscillator is used.

(3) Pulse input from target system

An external clock on the target system can be used as both the main system clock and subsystem clock via an emulation probe.

Figure 3-8. When Supplying Pulse from Target System



Remark The pulse that is supplied by the external clock on the target system (encircled in the figure) or the oscillator is used.

3.4.2 Main system clock settings

Table 3-4 shows the settings of the IE-789871-NS-EM1 when the main system clocks in (1) to (3) are used.

Table 3-4. Main System Clock Settings

Frequency of Main System Clock		IE-789871-NS-EM1 X1 Socket	CPU Clock Source Selection (ID78K0S-NS)
(1) When using clock that is already mounted on emulation board	5.0 MHz	Oscillator	Internal
(2) When using clock mounted by user	Other than 5.0 MHz	Oscillator configured by user	
(3) When inputting pulse from target system		Oscillator (not used)	External

Caution When inputting a 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 factory settings of the IE-789871-NS-EM1 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-789871-NS-EM1 is shipped, a 5.0 MHz crystal oscillator is already mounted in the IE-789871-NS-EM1's X1 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

Perform the settings described under either (a) or (b), 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

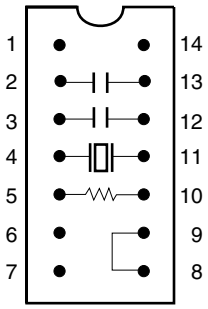
- Items to be prepared
  - Parts board
  - Ceramic resonator or crystal resonator
  - Resistor Rx
  - Capacitor CA
  - Capacitor CB
  - Solder kit

<Steps>

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

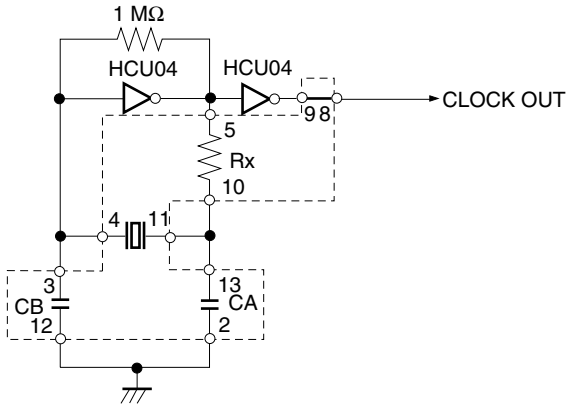
Figure 3-9. Connections on Parts Board (Main System Clock)

Parts board (X1)



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

Circuit diagram



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

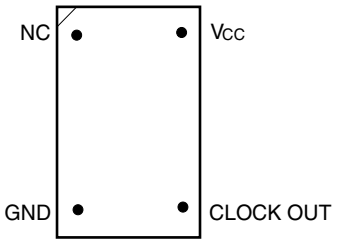
<2> Prepare the IE-789871-NS-EM1.
<3> Remove the crystal oscillator that is mounted in the IE-789871-NS-EM1's X1 socket.
<4> Connect the parts board (from <1> above) to the X1 socket from which the crystal oscillator was removed. Check the pin 1 mark to make sure the board is mounted in the correct direction.
<5> Make sure that the parts board is wired as shown in Figure 3-9 above.
<6> Install the IE-789871-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.

(b) When using a crystal oscillator

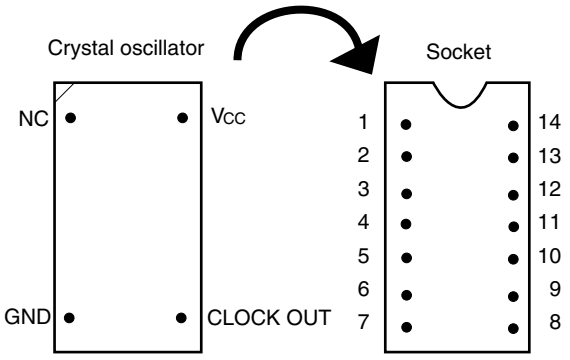
- Items to be prepared
  - Crystal oscillator (see pinouts shown in Figure 3-10)

Figure 3-10. Crystal Oscillator (Main System Clock)



<Steps>
<1> Prepare the IE-789871-NS-EM1.
<2> Remove the crystal oscillator that is mounted in the IE-789871-NS-EM1's X1 socket.
<3> Connect a crystal oscillator to the X1 socket from which the crystal oscillator was removed (in <2> above). Insert the pins of the crystal oscillator into the socket aligning the pins as shown in the figure below.

Figure 3-11. Pin Alignment of Crystal Oscillator and Socket (Main System Clock)



Crystal Oscillator Pin Name	Socket Pin No.
NC	1
GND	7
CLOCK OUT	8
V_{CC}	14

<4> Install the IE-789871-NS-EM1 in the IE-78K0S-NS or IE-78K0S-NS-A.

(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).

3.4.3 Subsystem clock settings

Table 3-5 shows the settings of the IE-789871-NS-EM1 when the subsystem clocks in (1) to (3) are used.

Table 3-5. Subsystem Clock Settings

Frequency of Subsystem Clock		IE-789871-NS-EM1	
		X2 Socket	JP1
(1) When using clock (XTC1) that is already mounted on emulation board	32.768 kHz	6 and 8 shorted	2 and 3 shorted
(2) When using clock mounted by user	Other than 32.768 kHz	Oscillator configured by user	
(3) When inputting pulse from target system		Not used	1 and 2 shorted

Caution Before setting JP1 to switch between the clock on the board and external clock, turn off the power of the IE-78K0S-NS or IE-78K0S-NS-A.

Remark The factory settings of the IE-789871-NS-EM1 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-789871-NS-EM1 is shipped, a 32.768 kHz crystal resonator (XTC1) and a parts board on which pins 6 and 8 are shorted are already mounted on the IE-789871-NS-EM1. Short 2 and 3 of the jumper (JP1) on the IE-789871-NS-EM1. No settings are required on the integrated debugger (ID78K0S-NS).

(2) When using clock mounted by user

Perform the settings in (a) or (b) below, depending on the type of clock to be used. Short 2 and 3 of the jumper (JP1) on the IE-789871-NS-EM1.

No settings are required on the integrated debugger (ID78K0S-NS).

(a) When using a ceramic resonator or crystal resonator

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

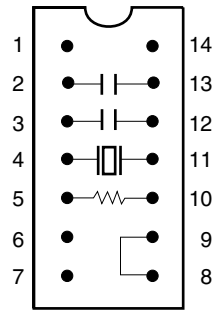
<Steps>

<1> Prepare the IE-789871-NS-EM1.

<2> Solder the target ceramic resonator or crystal resonator, resistor Rx, capacitor CA, and capacitor CB (all with suitable oscillation frequencies) onto the parts board (X2).

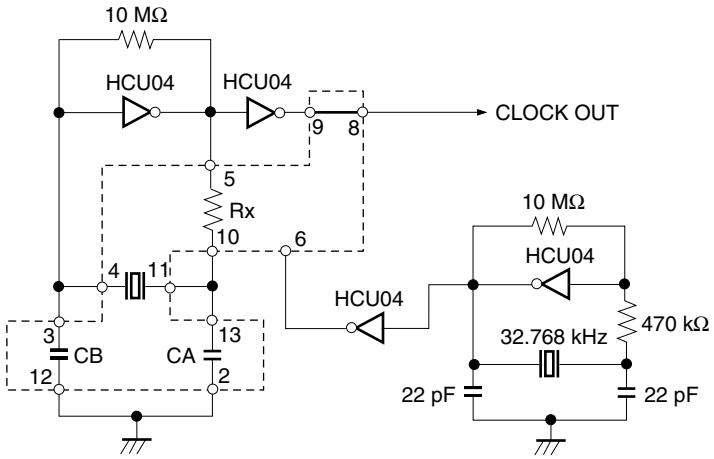
Figure 3-12. Connections on Parts Board (Subsystem Clock)

Parts board (X2)



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

Circuit Diagram



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

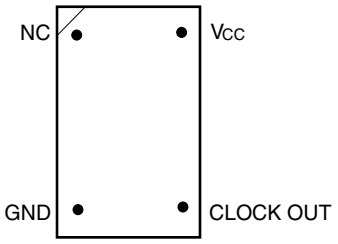
<3> Make sure that the parts board (X2) is wired as shown in Figure 3-12 above.

<4> Install the IE-789871-NS-EM1 in the IE-78K0S-NS or IE-78K0S-NS-A.

(b) When using a crystal oscillator

- Items to be prepared
  - Crystal oscillator (see pinouts shown in Figure 3-13)

Figure 3-13. Crystal Oscillator (Subsystem Clock)



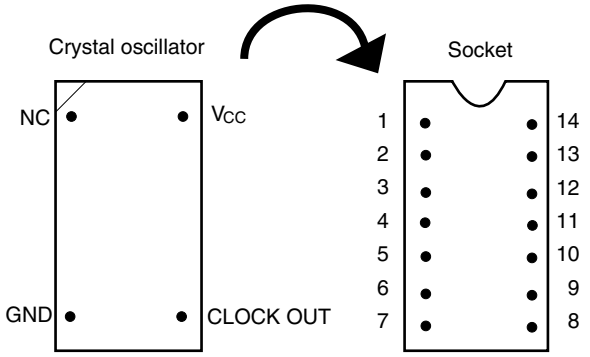
<Steps>

<1> Prepare the IE-789871-NS-EM1.

<2> Remove the parts board that is mounted in the X2 socket of the IE-789871-NS-EM1.

<3> Connect a crystal oscillator to the X2 socket from which the parts board was removed (in <2> above). Insert the crystal oscillator pins into the socket aligning the pins as shown in the figure below.

Figure 3-14. Pin Alignment of Crystal Oscillator and Socket (Subsystem Clock)



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

<4> Install the IE-789871-NS-EM1 in the IE-78K0S-NS or IE-78K0S-NS-A.

(3) When inputting pulse from target system

Short 1 and 2 of the jumper (JP1) on the IE-789871-NS-EM1.

No settings are required on the integrated debugger (ID78K0S-NS).

3.5 External Trigger

To set an external trigger, connect the IE-789871-NS-EM1's check pins EXTOUT and EXTIN as shown below.

See the **IE-78K0S-NS User's Manual (U13549E)** or **IE-78K0S-NS-A User's Manual (U15207E)** for pin characteristics.

For the use methods, see the **ID78K Series Ver.2.30 or Later Operation Windows Based User's Manual (U15185E)**.

(1) EXTOUT

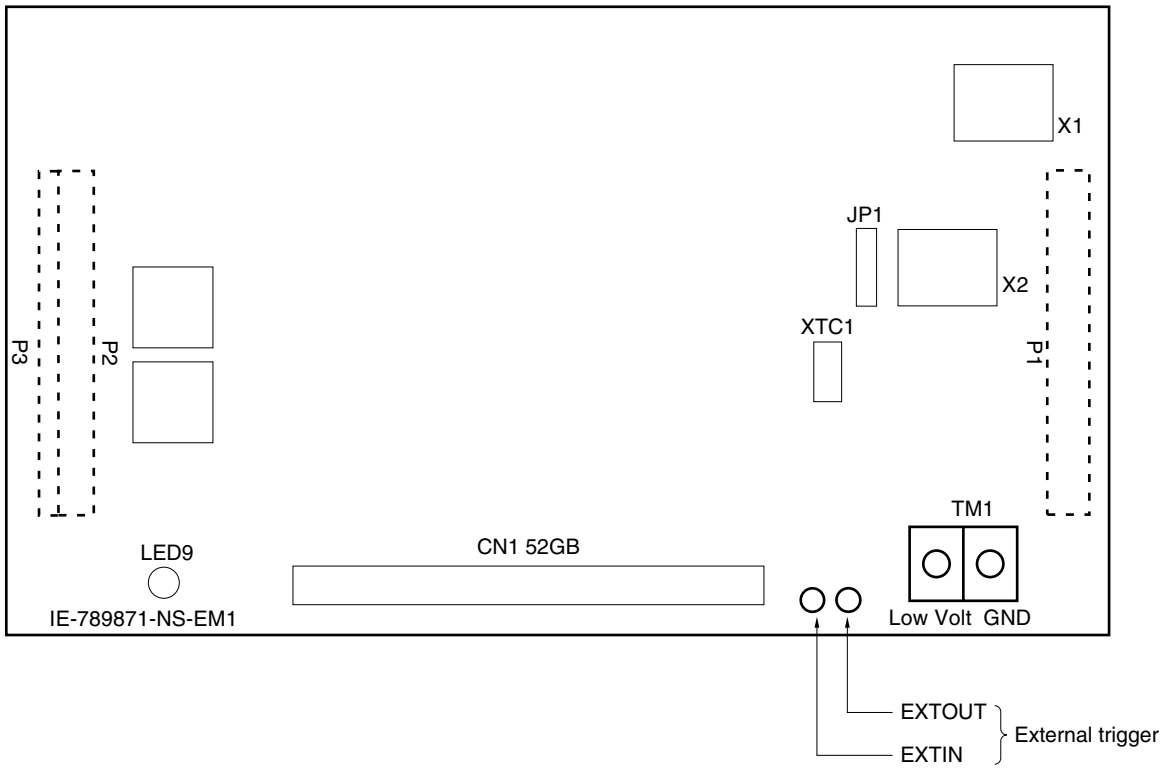
The EXTOUT pin on the IE-789871-NS-EM1 outputs a low level for 1.3 μs when a break event occurs.

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

(2) EXTIN

An event signal can be input from the EXTIN pin on the IE-789871-NS-EM1. Input a high-level pulse signal for 2 CPU operation clocks or more.

Figure 3-15. External Trigger Input Position



CHAPTER 4 DIFFERENCES BETWEEN TARGET DEVICE AND TARGET INTERFACE CIRCUIT

This chapter describes differences between the target device's signal lines and the signal lines of the target interface circuit of the IE system.

The target interface circuit of the IE system realizes emulation via an emulation circuit configured by an emulation CPU, TTL, CMOS-IC, and other components. The electrical characteristics are different from those of the target device because a protector and other circuits are provided.

(1) Signals directly input to or output from the emulation CPU
(2) Signals input from the target system via a gate
(3) FIP signals
(4) Other signals

The circuits of the IE-789871-NS-EM1 are used as follows for signals listed in (1) to (4) above. The same applies to handling alternate-function pins, for which no circuit is provided in the IE system.

(1) Signals directly input to or output from the emulation CPU

Refer to **Figure 4-1 Equivalent Circuit 1 of Emulation Circuit**. The following signals operate the same as in the μPD789871 Subseries.

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

Figure 4-1. Equivalent Circuit 1 of Emulation Circuit

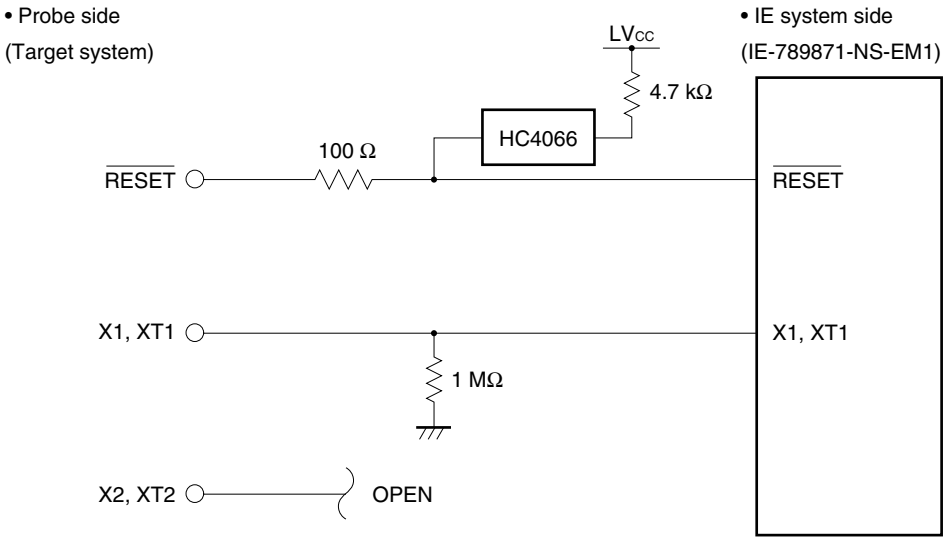
(2) Signals input from the target system via a gate

Since the following signals are input via a gate, their timing shows a delay compared to the μPD789871 Subseries. Refer to **Figure 4-2 Equivalent Circuit 2 of Emulation Circuit**.

- $\overline{\text{RESET}}$ signal
- Signals related to clock input

  The X2 and XT2 pins are not used in the IE-789871-NS-EM1.

Figure 4-2. Equivalent Circuit 2 of Emulation Circuit



(3) FIP signals

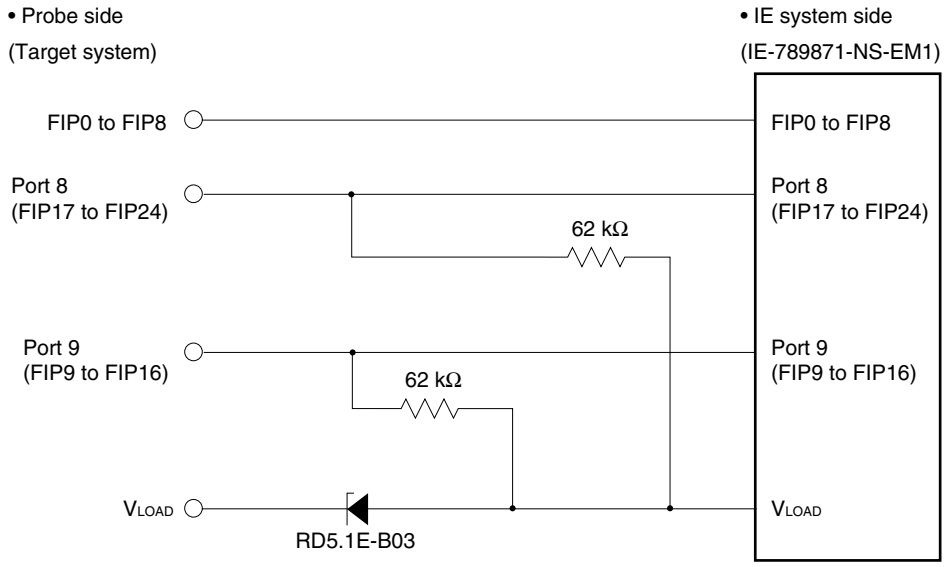
The following signals operate the same as in the μPD789871 Subseries.

- FIP0 to FIP8

The functions of the following signals are switched by a relay in the IE-789871-NS-EM1 so that alternate functions between port I/O pins and FIP pins and the mask option function can be realized. Refer to Figure 4-3 Equivalent Circuit 3 of Emulation Circuit

- Port 8 (FIP17 to FIP24)
- Port 9 (FIP9 to FIP16)
- V_{LOAD}

Figure 4-3. Equivalent Circuit 3 of Emulation Circuit



(4) Other signals

Refer to **Figure 4-4 Equivalent Circuit 4 of Emulation Circuit**.

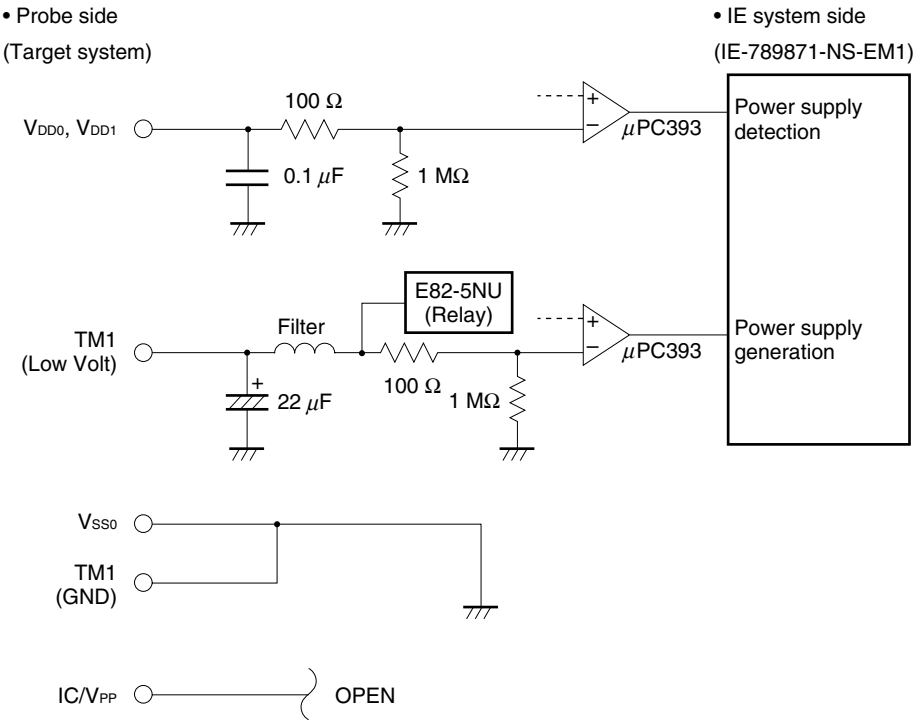
- V_{DD0}, V_{DD1} pins

  The power supply of the emulation CPU operates on the internal power supply voltage (5 V) when the target system is not connected, and on the voltage supplied from the power voltage supply pin (TM1) (LV_{CC}) when the target system is connected. In the IE-789871-NS-EM1, the V_{DD0} and V_{DD1} pins of the target system are exclusively used for controlling LED9 (USER VDD), which monitors whether the power of the target system is on.
- V_{SS0} pin

  The V_{SS} pin is connected to GND in the IE-789871-NS-EM1.
- IC/V_{PP} pin

  The IC/V_{PP} pin is not used in the IE-789871-NS-EM1.

Figure 4-4. Equivalent Circuit 4 of Emulation Circuit



APPENDIX A EMULATION PROBE PIN ASSIGNMENT TABLE

Table A-1. NP-H52GB-TQ Pin Assignments

Emulation Probe	CN1 Pin No.	Emulation Probe	CN1 Pin No.
1	118	27	4
2	114	28	8
3	108	29	14
4	104	30	18
5	100	31	22
6	94	32	28
7	30	33	92
8	29	34	91
9	24	35	98
10	20	36	102
11	16	37	106
12	10	38	112
13	6	39	116
14	33	40	87
15	37	41	83
16	43	42	77
17	47	43	73
18	51	44	69
19	57	45	63
20	59	46	61
21	55	47	65
22	49	48	71
23	45	49	75
24	41	50	79
25	35	51	85
26	31	52	89

Remarks 1. NP-H52GB-TQ 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 NOTES ON TARGET SYSTEM DESIGN

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

Among the products described in this appendix, NP-H52GB-TQ is a product of Naito Densei Machida Mfg. Co., Ltd, and TGB-064SBP is a product of TOKYO ELETECH CORPORATION.

Table B-1. Distance Between IE System and Conversion Adapter

Emulation Probe	Conversion Adapter	Distance Between IE System and Conversion Adapter
NP-H52GB-TQ	TGB-052SBP	370 mm

Figure B-1. Distance Between In-Circuit Emulator and Conversion Adapter

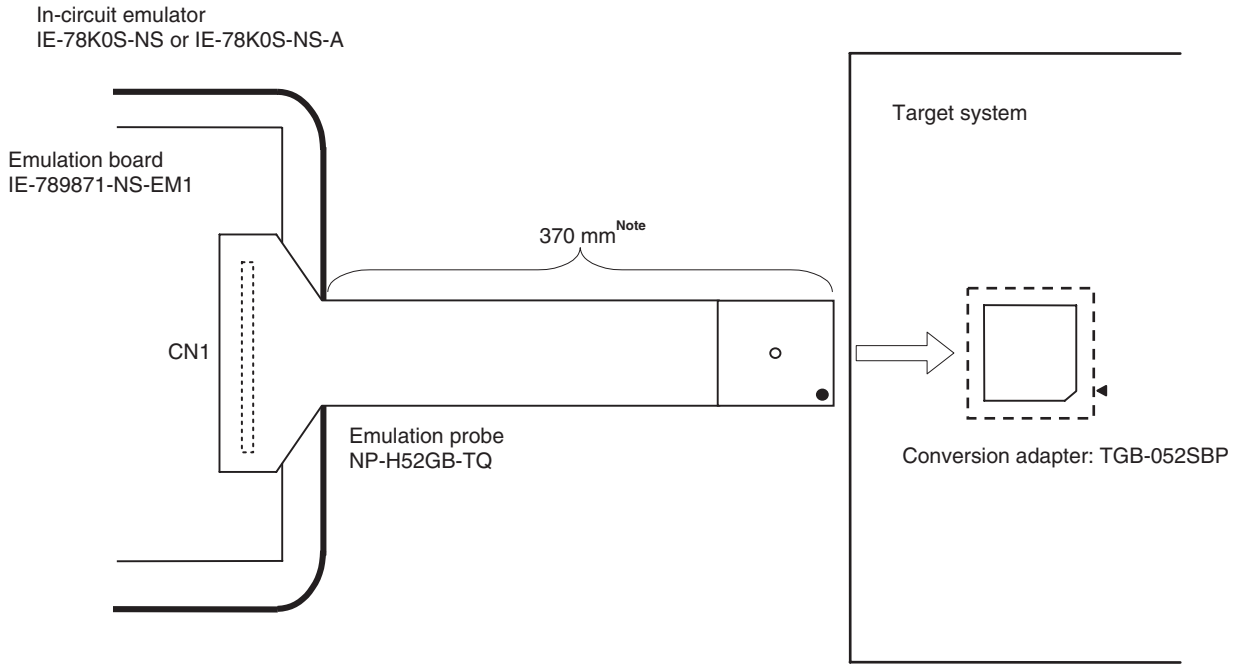


Figure B-2. Connection Conditions of Target System