CUSTOMER NOTIFICATION

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IE-780959-NS-EM1

Preliminary User's Manual

1st edition, April 2003

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INTRODUCTION

Product Overview

The IE-780959-NS-EM1 is designed to be used with the IE-78K0-NS or IE-78K0-NS-A to debug the following target device that belongs to the 78K0 Series of 8-bit single-chip microcontrollers.

- μPD780959GC

Target Readers

This manual is intended for engineers who will use the IE-780959-NS-EM1 with the IE-78K0-NS or IE-78K0-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-780959-NS-EM1, see not only this manual (supplied with the IE-780959-NS-EM1) but also the manual that is supplied with the IE-78K0-NS or IE-78K0-NS-A.

When using the IE-78K0-NS in combination with the IE-78K0-NS-PA, it is functionally equal to the IE-78K0-NS-A. In such a case, therefore, read the IE-78K0-NS-A in this document as IE-78K0-NS + IE-78K0-NS-PA.

IE-78K0-NS/IE-78K0-NS-A User's Manual	IE-780959-NS-EM1 User's Manual
• Basic specifications, general • External interface functions	• System configuration, part names • Installation • Differences between target devices and target interface circuits

Purpose

This manual's purpose is to explain various debugging functions that can be performed when using the IE-780959-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 (the real chip) that is the target of emulation.
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-78K0-NS or IE-78K0-NS-A) and the emulation board (IE-780959-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 Document The related documents indicated in this publication may include preliminary versions. However, preliminary versions are not marked as such.

Document Name	Document Number
IE-78K0-NS In-circuit emulator	U13731E
IE-78K0-NS-A In-circuit emulator	U14889E
IE-7890959-NS-EM1 Emulation board	This manual
ID78K Series Integrated Debugger Ver.2.30 or Later Operation (Windows™ Based)	U15185E
μPD780959	To be prepared

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

CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1 GENERAL

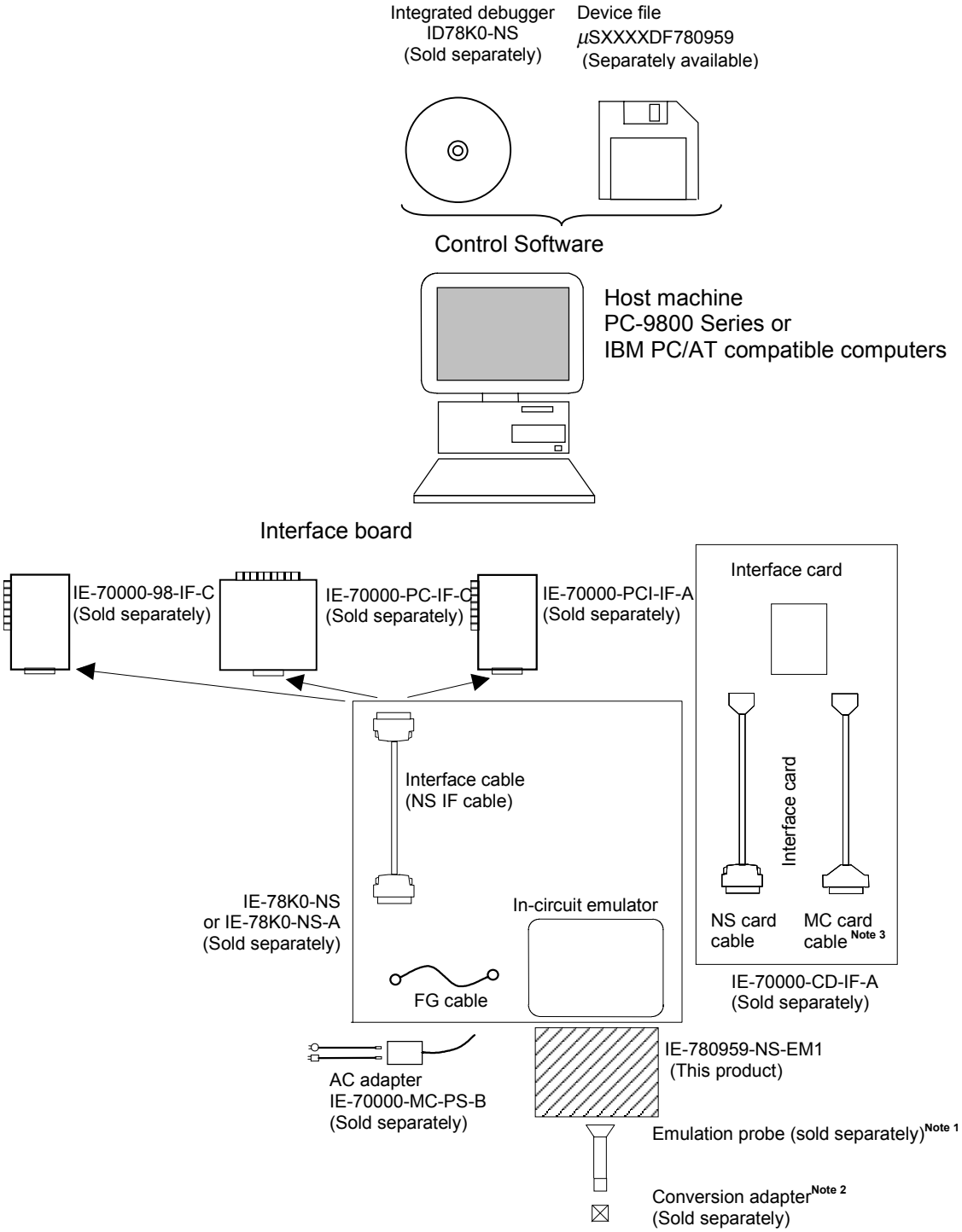
The IE-780959-NS-EM1 is a development tool for efficient debugging of hardware or software when using one of the following target device that belongs to the 78K0 Series of 8-bit single-chip microcontrollers.
This chapter describes the IE-780959-NS-EM1 system configuration and basic specifications.

- Target device
  - μPD780959GC

1.1 System Configuration

Figure 1-1 illustrates the IE-780959-NS-EM1 system configuration.

Figure 1-1. System Configuration



Notes 1. The emulation probes NP-100GC and NP-H100GC-TQ are products of Naito Densei Machida Mfg. Co., Ltd.
For further information, contact Naito Densei Machida Mfg. Co., Ltd. (TEL: +81-45-475-4191)

2. The conversion adapter TGC-100SDW 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)

The correspondence between the separately available emulation probes and conversion adapter is shown in Table 1-1.

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

Package	Emulation Probe	Conversion Adapter
100-pin plastic LQFP	NP-100GC (probe length: 200 mm) NP-H100GC-TQ (probe length: 400 mm)	TGC-100SDW

3. This is not used in the IE-780959-NS-EM1.

1.2 Hardware Configuration

The IE-780959-NS-EM1's position is shown below.

Figure 1-2. Basic Hardware Configuration (When IE-78K0-NS Is Used)

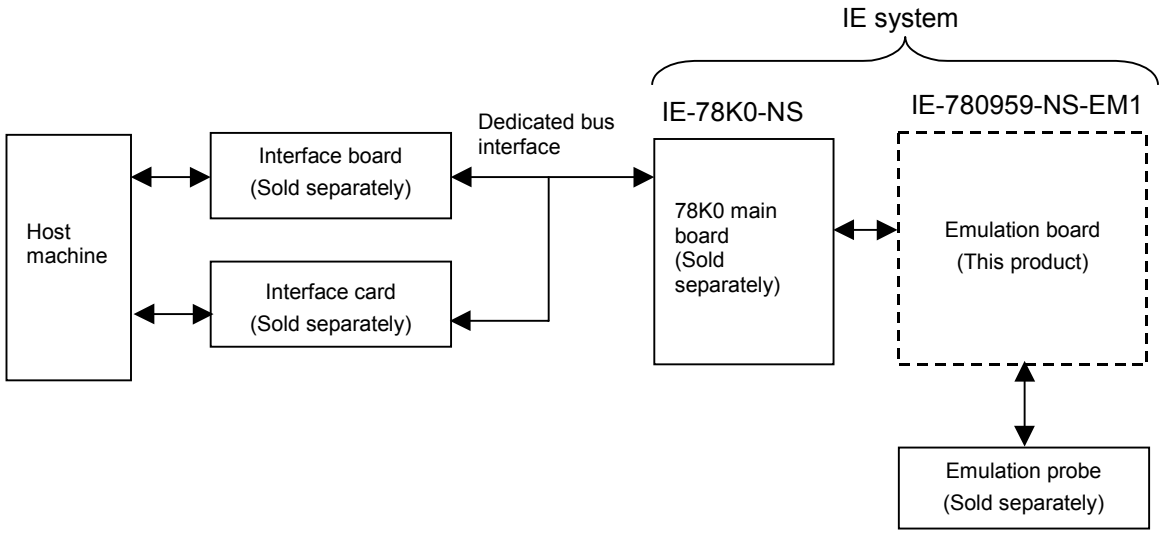
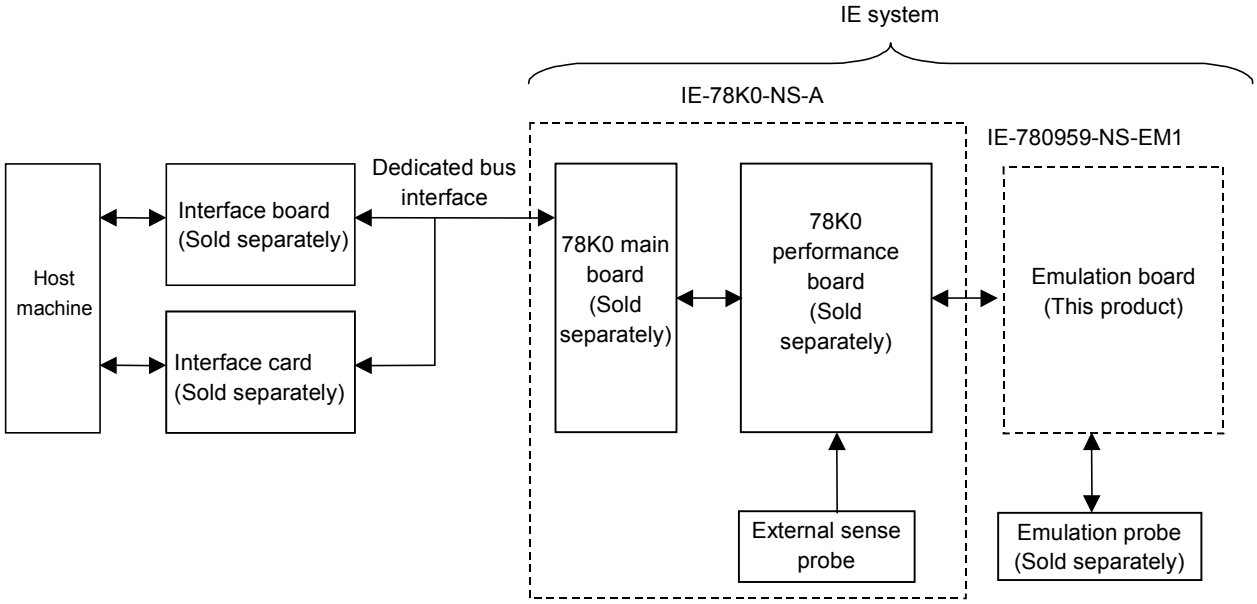


Figure 1-3. Basic Hardware Configuration (When IE-78K0-NS-A Is Used)



1.3 Basic Specifications

The basic specifications of the IE-780958-NS-EM1 are listed in Table 1-2.

Table 1-2. Basic Specifications

Parameter	Description
Target device	μPD780959
System clock	Main system clock 1: 1.2 MHz Main system clock 2: 4.91 MHz Subsystem clock: 32.768 kHz
Main system clock 1 supply	External: Input from the target system is prohibited Internal: Mounted on the emulation board (1.2 MHz) or mounted on the board by the user
Main system clock 2 supply	External: Input via an emulation probe from the target system Internal: Mounted on the emulation board (4.91 MHz) or mounted on the 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 board by the user
Low voltage support	V_{DD} = 1.8 to 3.5 V (same as the target device) **Note**

Note When the target system is not connected, the IE system operates at 3.3 V.

CHAPTER 2 PART NAMES

This chapter introduces the part names of the IE-780959-NS-EM1 main unit.

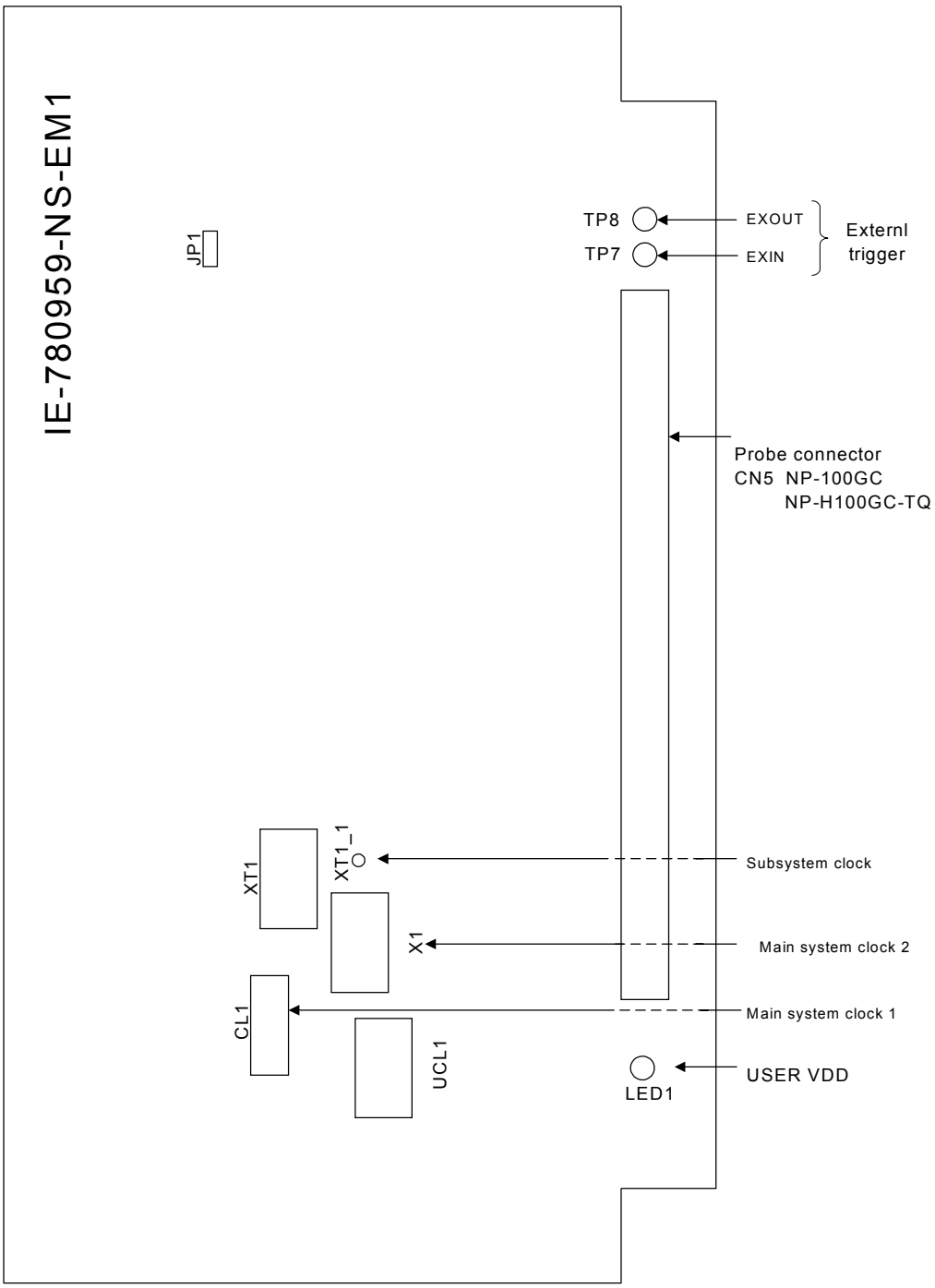
The packing box contains the emulation board (IE-780959-NS-EM1), packing list, user's manual, and guarantee card.

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 Names of Parts on Board

Figure 2-1. IE-780959-NS-EM1 Part Names



CHAPTER 3 INSTALLATION

This chapter describes methods for connecting the IE-780959-NS-EM1 to the IE-78K0-NS or IE-78K0-NS-A and emulation probe. Mode setting methods are also described.

Caution Connecting or removing parts 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-78K0-NS or IE-78K0-NS-A main unit

See the IE-78K0-NS User's Manual (U13731E) for a description of how to connect the IE-780959-NS-EM1 to the IE-78K0-NS.

See the IE-78K0-NS-A User's Manual (U14889E) for a description of how to connect the IE-780959-NS-EM1 to the IE-78K0-NS-A.

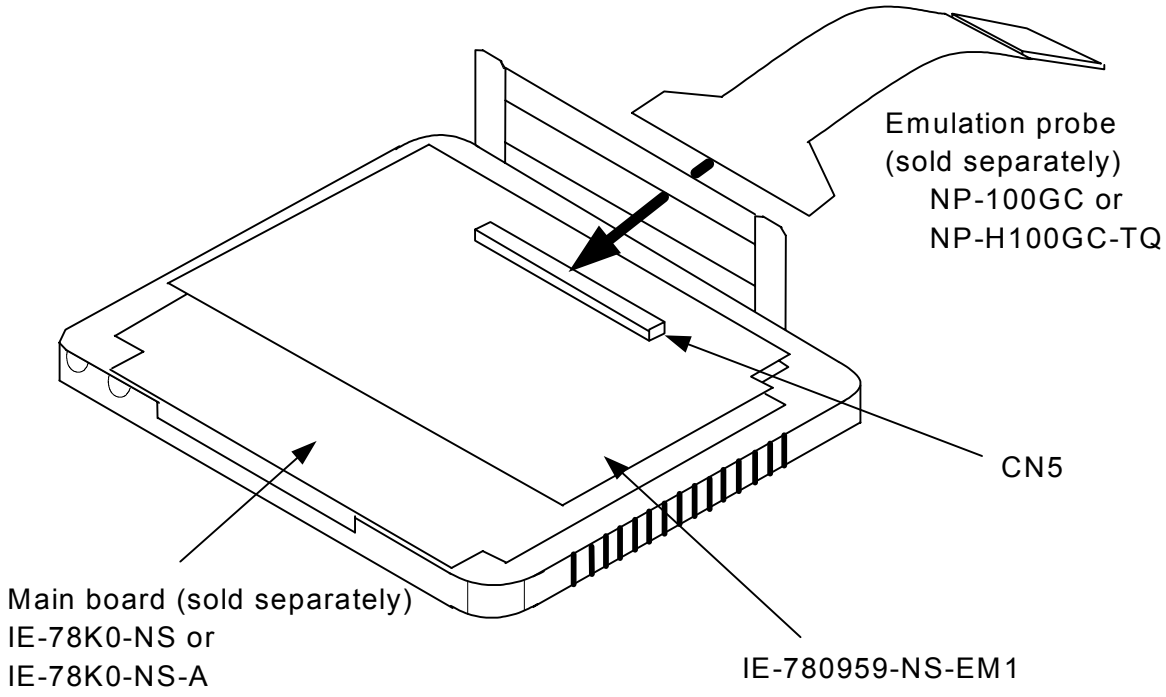
(2) Connection with emulation probe

See the IE-78K0-NS User's Manual (U13731E) or IE-78K0-NS-A User's Manual (U14889E) for a description of how to connect an emulation probe to the IE-780959-NS-EM1.

On this board, connect the emulation probe to CN5.

Caution Incorrect connection may damage the IE system. For more details on connection, see the user's manual for each emulation probe.

Figure 3-1. Connection of Emulation Probe



3.2 Clock Settings

3.2.1 Outline of clock settings

Main system clock 1 to be used during debugging can be selected from (1) and (2) below, main system clock 2 from (1) to (3), and subsystem clock from (1) to (3).

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

<1> Main system clock 1 (CL1, CL2)

The external system clock oscillator cannot be connected to the IE system. Select (1) Clock already mounted on emulation board or (2) Clock mounted by user.

<2> Main system clock 2 (X3, X4) and subsystem clock (XT1, XT2)

If the target system includes an internal clock, select either (1) Clock already mounted on emulation board or (2) Clock mounted by user. For an internal clock, 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 Figure 3-2 (c). During emulation, the resonator mounted on the target system is not used. Instead, the clock mounted on the emulation board connected to the IE-78K0-NS or IE-78K0-NS-A is used.

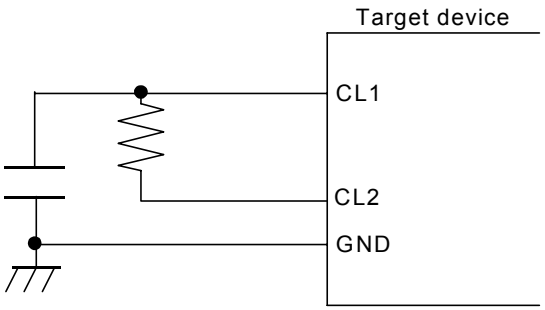
If the target system includes an external clock, select (3) Clock input from the target system. For an external clock, a clock signal is supplied from outside the target device and the target device's internal oscillator is not used. An example of the external circuit is shown in part of Figure 3-2 (d).

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. The IE system does not operate if a crystal resonator is directly connected to CL1 (main system clock 1), X3 (main system clock 2), and XT1 (subsystem clock).

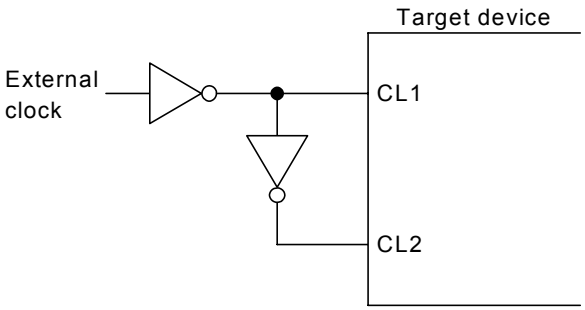
Figure 3-2. External Circuits Used as System Clock Oscillator

<1> Main system clock 1 (CL1, CL2)

(a) RC oscillator

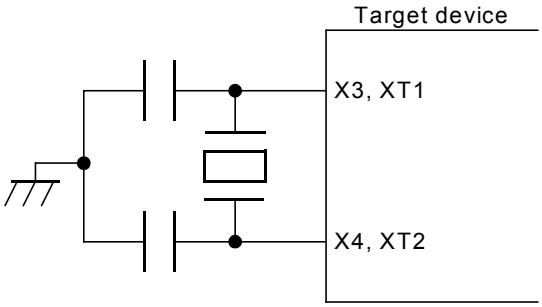


(b) External clock

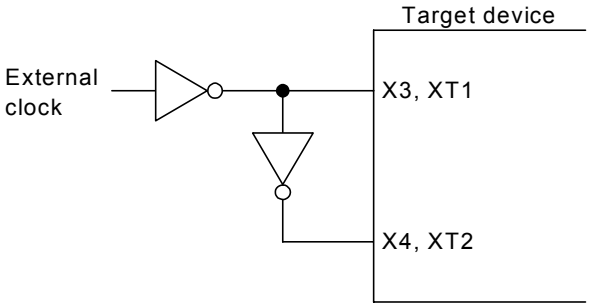


<2> Main system clock 2 (X3, X4) and subsystem clock (XT1, XT2)

(c) Clock oscillator



(d) External clock

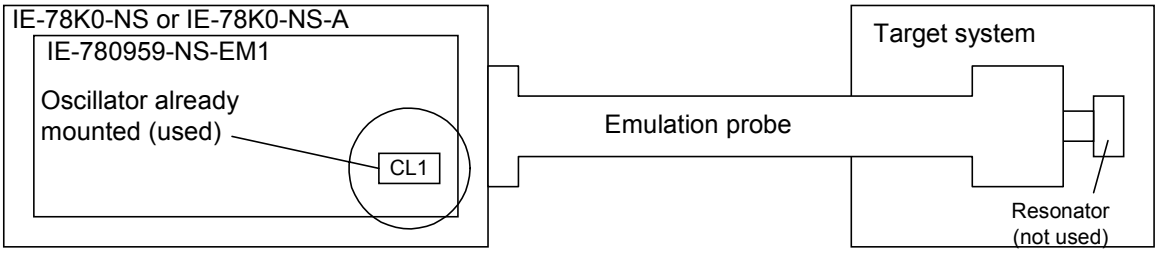


(1) Clock already mounted on emulation board

(a) Main system clock 1

When the IE-780959-NS-EM1 is shipped, a 1.2 MHz crystal oscillator (CL1) is already mounted.

Figure 3-3. When Using Clock Already Mounted on Emulation Board (Main System Clock 1)

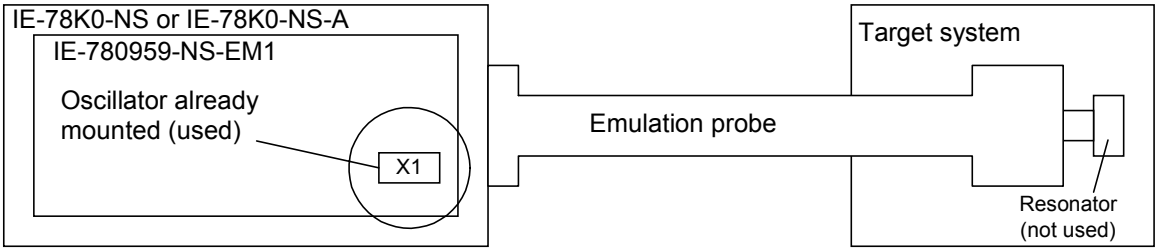


Remark The clock that is supplied by the IE-780959-NS-EM1's oscillator (encircled in the figure) is used.

(b) Main system clock 2

When the IE-780959-NS-EM1 is shipped, a 4.91 MHz crystal oscillator (X1) is already mounted.

Figure 3-4. When Using Clock Already Mounted on Emulation Board (Main System Clock 2)

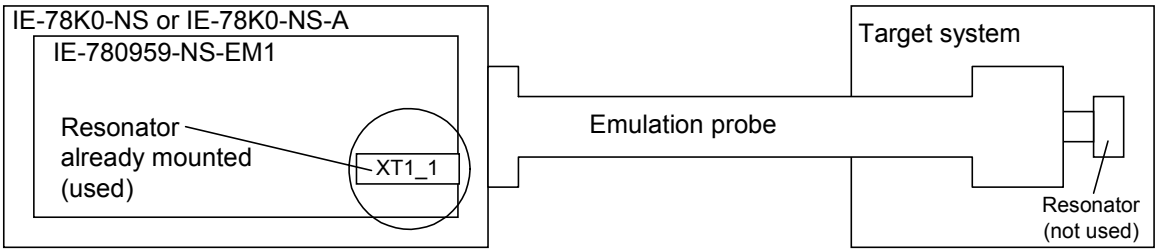


Remark The clock that is supplied by the IE-780959-NS-EM1's oscillator (encircled in the figure) is used.

(c) Subsystem clock

When the IE-780959-NS-EM1 is shipped, a 32.768 kHz resonator (XT1_1) is already mounted.

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



Remark The clock that is supplied by the IE-780959-NS-EM1's resonator (encircled in the figure) is used.

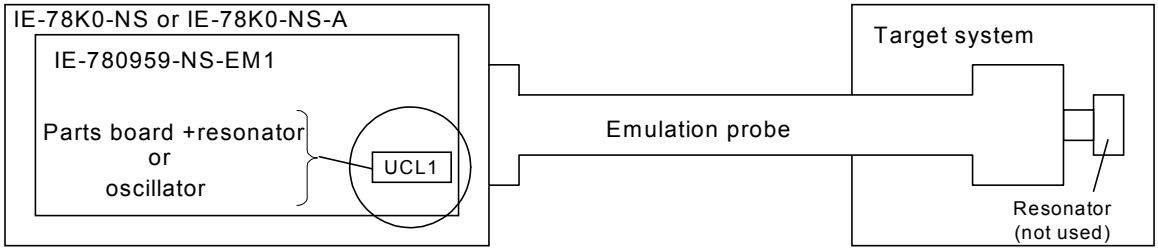
(2) Clock mounted by user

The user is able to mount any clock supported by the set specifications on the IE-780959-NS-EM1.

(a) Main system clock 1

Mount the parts board on which the resonator to be used is mounted or an oscillator on the parts board (UCL1) already mounted on the IE-780959-NS-EM1. This method is useful when debugging with the same clock as the target system clock. Set JP1 on the IE-780959-NS-EM1 to 2-3 shorted.

Figure 3-6. When Using Clock Mounted by User (Main System Clock 1)

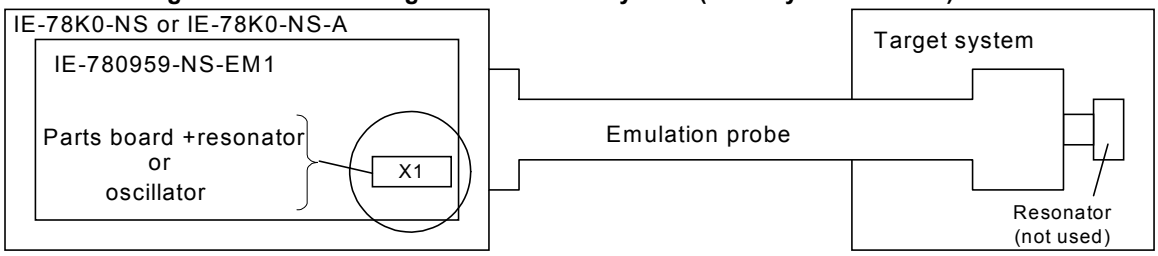


Remark The The clock that is supplied by the IE-780959-NS-EM1's oscillator (encircled in the figure) is used.

(b) Main system clock 2

Remove the parts board (X1) already mounted on the IE-780959-NS-EM1 and mount either the parts board on which the resonator to be used is mounted or an oscillator. This method is useful when debugging with the same clock as the target system clock.

Figure 3-7. When Using Clock Mounted by User (Main System Clock 2)

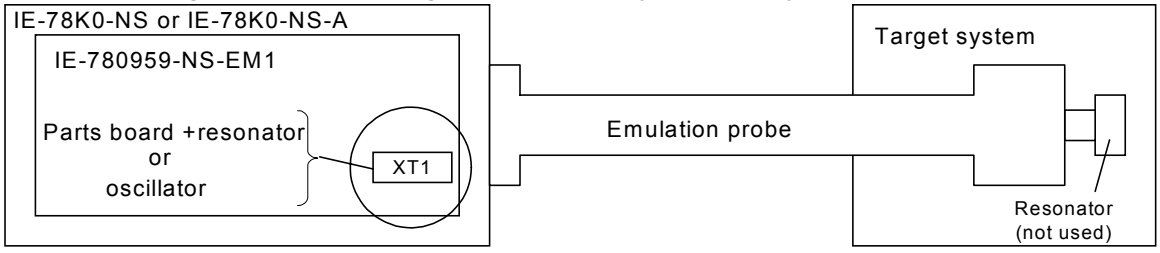


Remark The clock that is supplied by the IE-780959-NS-EM1's oscillator (encircled in the figure) is used.

(c) Subsystem clock

Remove the parts board (XT1) already mounted on the IE-780959-NS-EM1 and mount either the parts board on which the resonator to be used is mounted or an oscillator. This method is useful when debugging with the same clock as the target system clock.

Figure 3-8. When Using Clock Mounted by User (Subsystem Clock)



Remark The clock that is supplied by the IE-780959-NS-EM1's resonator (encircled in the figure) is used.

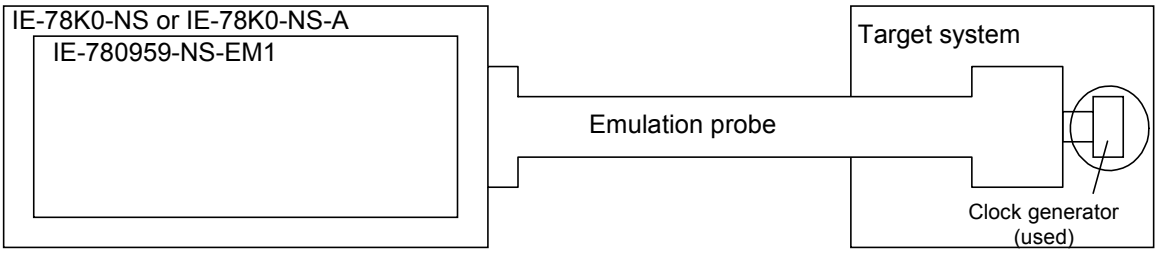
(3) Clock input from the target system

The external clock on the target system can be used via an emulation probe.

(a) Main system clock 2

Set JP1 on the IE-780959-NS-EM1 to 2-3 shorted.

Figure 3-9. When Using Clock Input from Target System (Main System Clock 2)

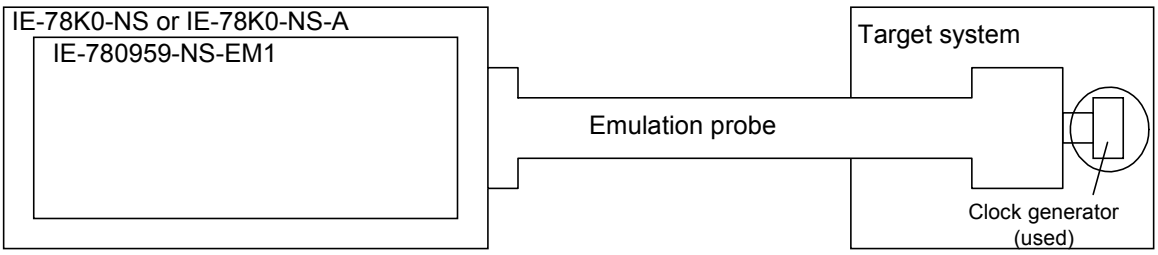


Remark The external clock that is supplied from the target system (encircled in the figure) is used.

(b) Subsystem clock

Set JP8 on the IE-780959-NS-EM1 to 3-4 shorted.

Figure 3-10. When Using Clock Input from Target System (Subsystem Clock)



Remark The external clock that is supplied from the target system (encircled in the figure) is used.

3.2.2 Settings of main system clock 1

Table 3-1. Settings of Main System Clock 1

Frequency of Main System Clock 1 Used (1.2 MHz)	IE-780959-NS-EM1	CPU Clock Source Selection Integrated Debugger (ID78K0-NS)
Clock already mounted on emulation board	CL1 is used (JP1: 1-2 shorted)	Internal
Clock mounted by user	Oscillator assembled on UCL1 or oscillator (JP1: 2-3 shorted)	External

Caution When using an external clock, set JP1 mounted on the IE-780958-NS-EM1 to 2-3 shorted, open the Configuration dialog box when the integrated debugger (ID78K0-NS) is activated and select "External" in the area (Clock) for selecting the CPU's clock source (this selects the user's clock). At this time, "External" must also be selected for main system clock 2.

Remark When the IE-780958-NS-EM1 is shipped, the settings for "when using clock already mounted on emulation board" are preset.

(1) When using clock already mounted on emulation board

When the IE-780959-NS-EM1 is shipped, a 1.2 MHz crystal oscillator is already mounted on the CL1 socket on the parts board. When using the factory-set mode settings, there is no need to make any other hardware settings.

When the integrated debugger (ID78K0-NS) is activated, 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.

Set JP1 mounted on the IE-780958-NS-EM1 to 2-3 shorted.

When the integrated debugger (ID78K0-NS) is activated, 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).

At this time, "External" must also be selected for main system clock 2.

(a) When using a ceramic or crystal resonator

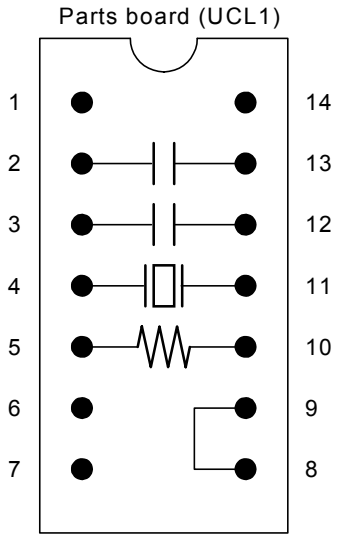
♦ Necessary items

- Parts board
- Ceramic or crystal resonator
- Resistor Rx
- Capacitor CA
- Capacitor CB
- Solder kit

<Procedure>

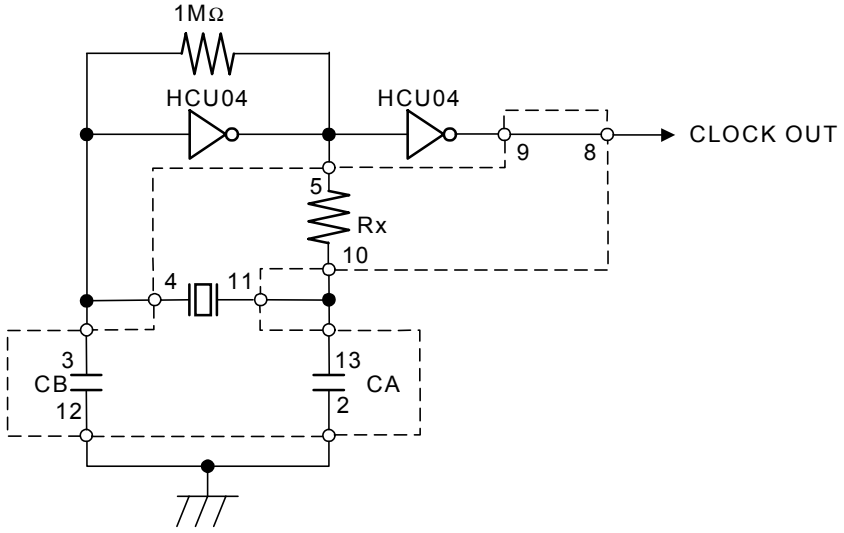
<1> Solder the target ceramic or crystal resonator, resistor Rx, capacitor CA, and capacitor CB (all with suitable oscillation frequencies) onto the supplied parts board (as shown below).

Figure 3-11. Connections on Parts Board (Main System Clock 1)



Pin No.	Connection
2-13	Capacitor CA
3-12	Capacitor CB
4-11	Seramic/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.

See the resonator data sheets prepared by the resonator manufacturer for details of the values for resistor Rx, capacitor CA, and capacitor CB.

<2> Prepare the IE-780959-NS-EM1.

<3> Connect the parts board (<1> above) to the socket (UCL1) on the IE-780959-NS-EM1. Check the pin 1 mark to make sure the board is mounted in the correct direction.

<4> Make sure that the parts board is wired as shown in Figure 3-11.

<5> Set the jumper (JP1) on the IE-780959-NS-EM1 to 2-3 shorted.

<6> Install the IE-78K0-NS or IE-78K0-NS-A.

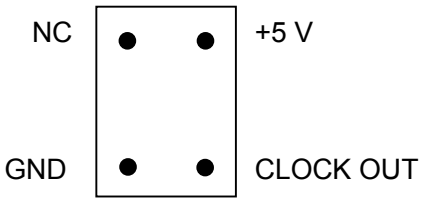
The above steps configure the following circuit and enable supply of the clock from the mounted resonator to the emulation device.

(b) When using a crystal oscillator

♦ Necessary items

- Crystal oscillator (with pin configuration as shown in Figure 3-12)

Figure 3-12. Crystal Oscillator (Main System Clock 1)



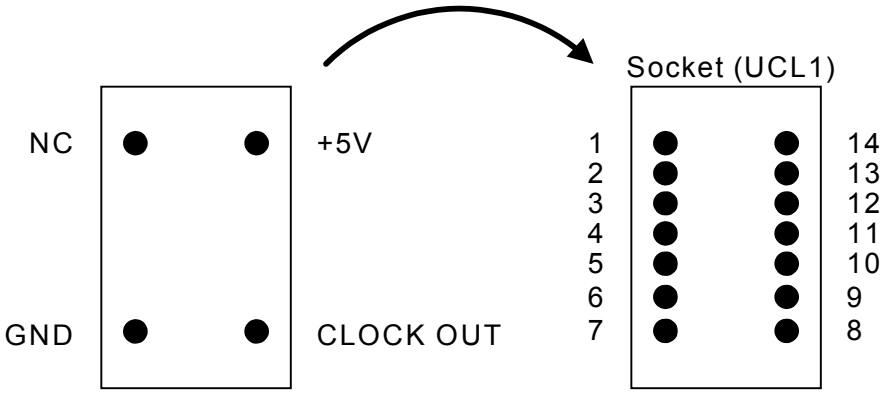
<Procedure>

<1> Prepare the IE-780959-NS-EM1.

<2> Mount the crystal oscillator in the UCL1 socket. At this time, insert the oscillator into the socket aligning the pins as indicated below.

<3> Set the jumper (JP1) on the IE-780959-NS-EM1 to 2-3 shorted.

Figure 3-13. Pin Alignment of Crystal Oscillator and Socket (Main System Clock 1)



<4> Install the IE-780959-NS-EM1 in the IE-78K0-NS or IE-78K0-NS-A.

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

3.2.3 Settings of main system clock 2

Table 3-2. Settings of Main System Clock 2

Frequency of Main System Clock 2 Used (4.91 MHz)	IE-780959-NS-EM1	CPU Clock Source Selection Integrated Debugger (ID78K0-NS)
Clock already mounted on emulation board	X1 is used (JP1: 1-2 shorted)	Internal
Clock mounted by user	Oscillator assembled on X1 or oscillator (JP1: 1-2 shorted)	
Clock input from the target system	(JP1: 2-3 shorted)	External

Caution When using an external clock, set JP1 mounted on the IE-780958-NS-EM1 to 2-3 shorted, open the Configuration dialog box when the integrated debugger (ID78K0-NS) is activated and select "External" in the area (Clock) for selecting the CPU's clock source (this selects the user's clock). At this time, "External" must also be selected for main system clock 1.

Remark When the IE-780958-NS-EM1 is shipped, the settings for "when using clock already mounted on emulation board" are preset.

(1) When using clock already mounted on emulation board

When the IE-780959-NS-EM1 is shipped, a 4.91 MHz crystal oscillator is already mounted on the X1 socket on the parts board. When using the factory-set mode settings, there is no need to make any other hardware settings.

When the integrated debugger (ID78K0-NS) is activated, 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 the integrated debugger (ID78K0-NS) is activated, 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).

(a) When using a ceramic or crystal resonator

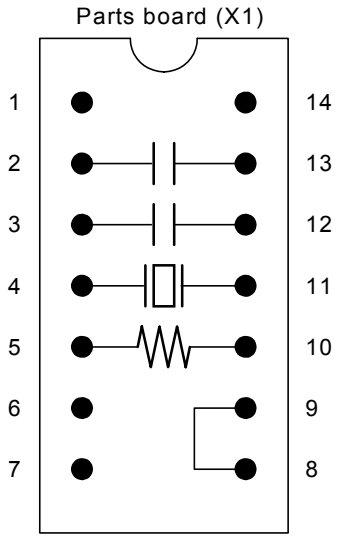
♦ Necessary items

- Parts board
- Ceramic or crystal resonator
- Resistor Rx
- Capacitor CA
- Capacitor CB
- Solder kit

<Procedure>

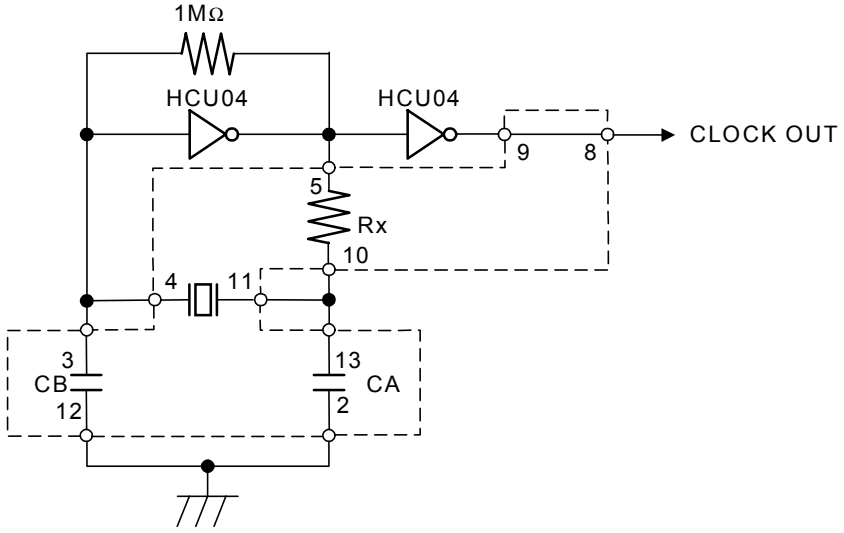
<1> Solder the target ceramic or crystal resonator, resistor Rx, capacitor CA, and capacitor CB (all with suitable oscillation frequencies) onto the supplied parts board (as shown below).

Figure 3-14. Connections on Parts Board (Main System Clock 2)



Pin No.	Connection
2-13	Capacitor CA
3-12	Capacitor CB
4-11	Seramic/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.
See the resonator data sheets prepared by the resonator manufacturer for details of the values for resistor Rx, capacitor CA, and capacitor CB.

<2> Prepare the IE-780959-NS-EM1.

<3> Connect the parts board (<1> above) to the socket (X1) on the IE-780959-NS-EM1. Check the pin 1 mark to make sure the board is mounted in the correct direction.

<4> Make sure that the parts board is wired as shown in Figure 3-14.

<5> Install the IE-780959-NS-EM1 in the IE-78K0-NS or IE-78K0-NS-A.

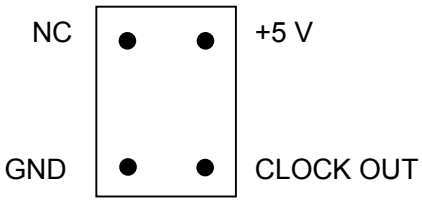
The above steps configure the following circuit and enable supply of the clock from the mounted resonator to the emulation device.

(b) When using a crystal oscillator

♦ Necessary items

- Crystal oscillator (with pin configuration as shown in Figure 3-15)

Figure 3-15. Crystal Oscillator (Main System Clock 2)

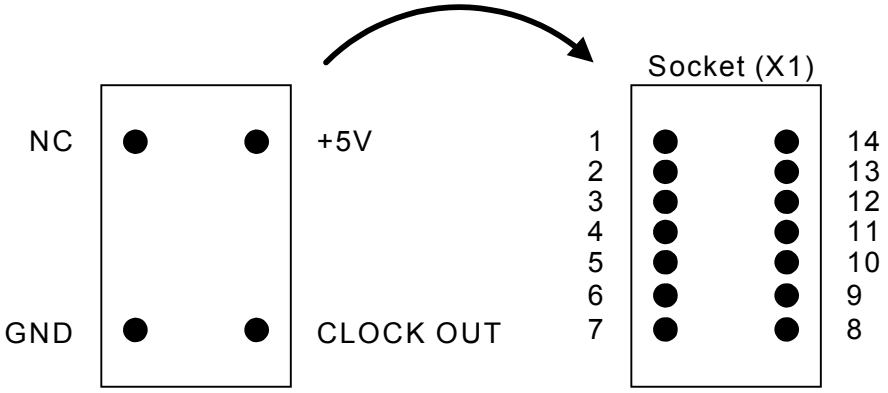


<Procedure>

<1> Prepare the IE-780959-NS-EM1.

<2> Mount the crystal oscillator in the X1 socket. At this time, insert the oscillator into the socket aligning the pins as indicated below.

Figure 3-16. Pin Alignment of Crystal Oscillator and Socket (Main System Clock 2)



<3> Install the IE-780959-NS-EM1 in the IE-78K0-NS or IE-78K0-NS-A.

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

(3) Clock input from the target system

Set JP1 mounted on the IE-780958-NS-EM1 to 2-3 shorted.

When the integrated debugger (ID78K0-NS) is activated, open the Configuration dialog box and select “External” in the area (Clock) for selecting the CPU’s clock source (this selects the user clock).

3.2.4 Settings of subsystem clock

Table 3-3. Settings of Subsystem Clock

Frequency of Subsystem Clock Used (32.768 kHz)	IE-780959-NS-EM1	CPU Clock Source Selection Integrated Debugger (ID78K0-NS)
Clock already mounted on emulation board	XT1-1 is used (JP1: 1-2 shorted)	Internal
Clock mounted by user	Oscillator assembled on XT1 or oscillator (JP1: 1-2 shorted)	
Clock input from the target system	Set on the main board (JP8: 3-4 shorted)	External

Remark When the IE-780958-NS-EM1 is shipped, the settings for "when using clock already mounted on emulation board" are preset.

(1) When using clock already mounted on emulation board

When the IE-780959-NS-EM1 is shipped, a 32.768 kHz crystal oscillator is already mounted on the XT1 socket on the parts board. When using the factory-set mode settings, there is no need to make any other hardware settings.

When the integrated debugger (ID78K0-NS) is activated, 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 the integrated debugger (ID78K0-NS) is activated, 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).

(a) When using a ceramic or crystal resonator

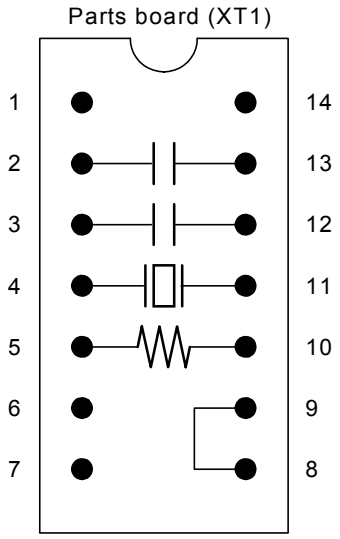
♦ Necessary items

- Parts board
- Ceramic or crystal resonator
- Resistor Rx
- Capacitor CA
- Capacitor CB
- Solder kit

<Procedure>

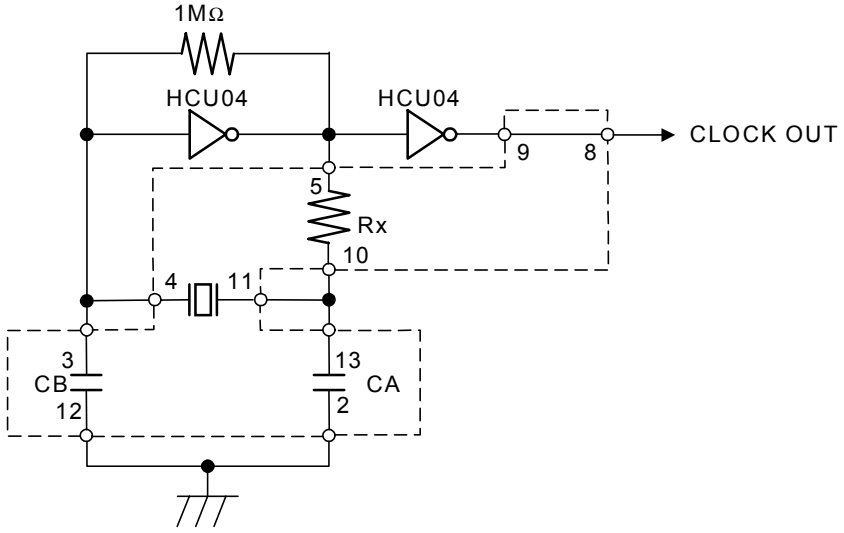
<1> Solder the target ceramic or crystal resonator, resistor Rx, capacitor CA, and capacitor CB (all with suitable oscillation frequencies) onto the supplied parts board (as shown below).

Figure 3-17. Connections on Parts Board (Subsystem Clock)



Pin No.	Connection
2-13	Capacitor CA
3-12	Capacitor CB
4-11	Seramic/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.

See the resonator data sheets prepared by the resonator manufacturer for details of the values for resistor Rx, capacitor CA, and capacitor CB.

<2> Prepare the IE-780959-NS-EM1.

<3> Connect the parts board (<1> above) to the socket (XT1) on the IE-780959-NS-EM1. Check the pin 1 mark to make sure the board is mounted in the correct direction.

<4> Make sure that the parts board is wired as shown in Figure 3-17.

<5> Install the IE-780959-NS-EM1 in the IE-78K0-NS or IE-78K0-NS-A.

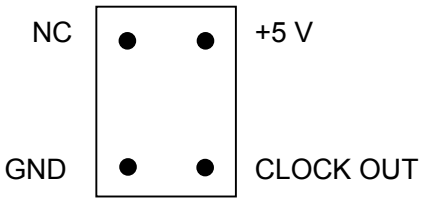
The above steps configure the following circuit and enable supply of the clock from the mounted resonator to the emulation device.

(b) When using a crystal oscillator

♦ Necessary items

- Crystal oscillator (with pin configuration as shown in Figure 3-18)

Figure 3-18. Crystal Oscillator (Subsystem Clock)

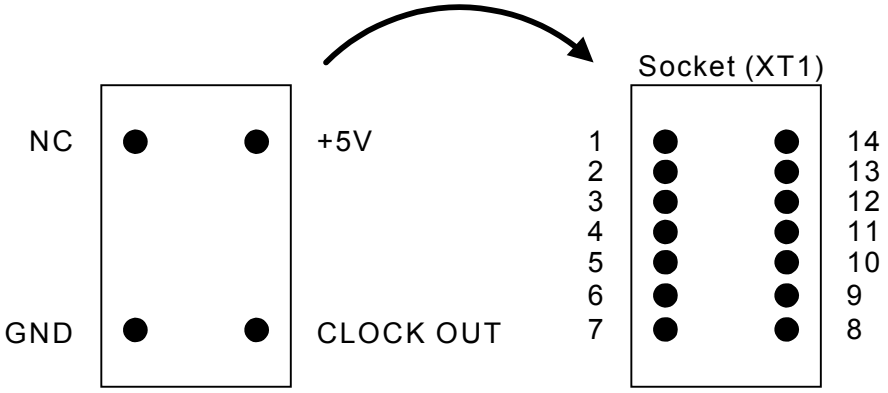


<Procedure>

<1> Prepare the IE-780959-NS-EM1.

<2> Mount the crystal oscillator in the XT1 socket. At this time, insert the oscillator into the socket aligning the pins as indicated below.

Figure 3-19. Pin Alignment of Crystal Oscillator and Socket (Subsystem Clock)



<3> Install the IE-780959-NS-EM1 in the IE-78K0-NS or IE-78K0-NS-A.

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

(3) Clock input from the target system

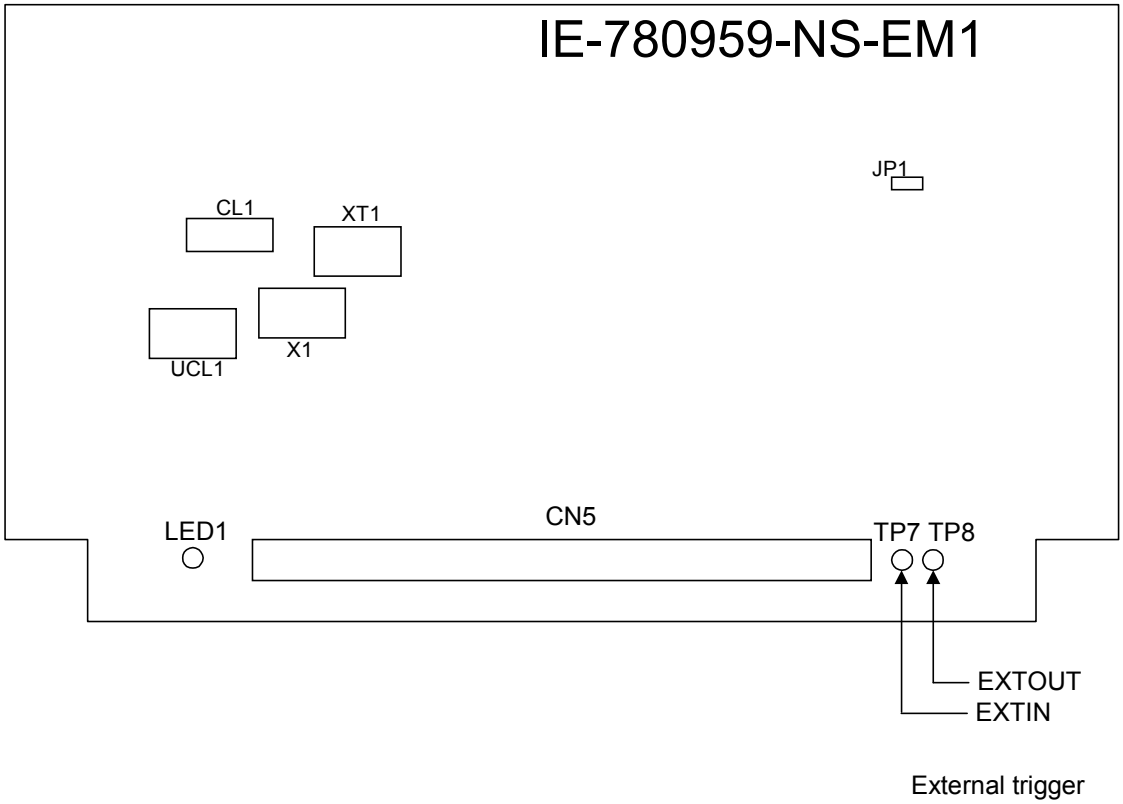
Set JP8 mounted on the IE-78K0-NS or IE-78K0-NS-A to 3-4 shorted.

When the integrated debugger (ID78K0-NS) is activated, open the Configuration dialog box and select “External” in the area (Clock) for selecting the CPU’s clock source (this selects the user clock).

3.3 External Trigger

Connect the external trigger to the IE-780958-NS-EM1's check pins EXTOUT and EXTIN as shown below.
See the **ID78K Series Integrated Debugger Ver.2.30 or Later Operation User's Manual (U15181E)** for descriptions of usage. See the **IE-78K0-NS User's Manual (U13731E)** or **IE-78K0-NS-A User's Manual (U14889E)** for descriptions of pin characteristics.

Figure 3-20. External Trigger Input Position



3.4 Switch/Jumper Settings

3.4.1 Switch/jumper settings of IE-780959-NS-EM1

See the following table for the IE-780959-NS-EM1 jumper settings.

Table 3-4. Jumper Settings of IE-780959-NS-EM1

	Setting	Description
JP1	1-2 shorted	Main system clock 1: Clock on CL1 Main system clock 2: Clock on X1 Integrated debugger ID78K0-NS: Internal
	2-3 shorted	Main system clock 1: Clock on UCL1 Main system clock 2: Clock input from the target system Integrated debugger ID78K0-NS: External

3.4.2 Jumper settings of IE-78K0-NS

When using the IE-780959-NS-EM1 in combination with IE-78K0-NS, set the jumpers of the IE-78K0-NS as shown below. See the **IE-78K0-NS User's Manual (U13731E)** for details of jumper positions.

Caution Incorrect jumper settings may damage the IE-78K0-NS.

Table 3-5. Jumper Settings of IE-78K0-NS

	JP2	JP3	JP4	JP6	JP7	JP8
Setting	2-3 shorted	1-2 shorted	1-2 shorted	3-4 shorted	1-2 shorted	1-2 shorted

3.4.3 Jumper settings of IE-78K0-NS-A

When using the IE-780959-NS-EM1 in combination with IE-78K0-NS-A, set the jumpers of the IE-78K0-NS-A as shown below. See the **IE-78K0-NS-A User's Manual (U14889E)** for details of jumper positions.

Caution Incorrect jumper settings may damage the IE-78K0-NS-A.

Table 3-6. Jumper Settings of IE-78K0-NS-A G-780009 Board

	JP2	JP3	JP4	JP6	JP7	JP8
Setting	2-3 shorted	1-2 shorted	1-2 shorted	3-4 shorted	1-2 shorted	1-2 shorted

Table 3-7. Jumper Setting of IE-78K0-NS-A G-78K0H Option Board

	J2
Setting	2-3 shorted

CHAPTER 4 DIFFERENCES BETWEEN TARGET DEVICES AND TARGET INTERFACE CIRCUITS

This chapter describes the differences between the signal lines of the target device and those of the IE-780959-NS-EM1's target interface circuit.

The target device consists of CMOS circuits, whereas the IE-780959-NS-EM1's target interface circuit consists of emulation circuits such as the emulation CPU, TTL, and CMOS-IC.

At the time of debugging by connecting the IE system and the target system, the IE system performs emulation as if the actual target device is operating on the target system, however, in reality, it is the IE system that performs the emulation, thus producing slight differences.

Table 4-1. Target I/F Signal Equivalent Circuits (1/2)

μPD780959 Pin Number	Pin Name	ICE Internal Handling	μPD780959 Pin Number	Pin Name	ICE Internal Handling
1	P110	Equivalent circuit E	51	P40	Equivalent circuit A
2	P101	Equivalent circuit A	52	P41	Equivalent circuit A
3	P100	Equivalent circuit A	53	P42	Equivalent circuit A
4	P90	Equivalent circuit A	54	P43	Equivalent circuit A
5	P91	Equivalent circuit A	55	P44	Equivalent circuit A
6	P92	Equivalent circuit A	56	P45	Equivalent circuit A
7	P93	Equivalent circuit A	57	P46	Equivalent circuit A
8	P94	Equivalent circuit A	58	P47	Equivalent circuit A
9	P95	Equivalent circuit A	59	P50	Equivalent circuit A
10	P96	Equivalent circuit A	60	P51	Equivalent circuit A
11	P97	Equivalent circuit A	61	P52	Equivalent circuit A
12	P00	Equivalent circuit B	62	P53	Equivalent circuit A
13	P01	Equivalent circuit B	63	P54	Equivalent circuit A
14	P02	Equivalent circuit B	64	P55	Equivalent circuit A
15	P03	Equivalent circuit B	65	P56	Equivalent circuit A
16	P04	Equivalent circuit B	66	P57	Equivalent circuit A
17	P05	Equivalent circuit B	67	P70	Equivalent circuit A
18	P20	Equivalent circuit A	68	P71	Equivalent circuit A
19	P21	Equivalent circuit A	69	P72	Equivalent circuit A
20	P22	Equivalent circuit A	70	P73	Equivalent circuit A
21	P23	Equivalent circuit A	71	P74	Equivalent circuit A
22	P24	Equivalent circuit A	72	P75	Equivalent circuit A
23	P25	Equivalent circuit A	73	P76	Equivalent circuit A
24	P26	Equivalent circuit A	74	P77	Equivalent circuit A
25	P27	Equivalent circuit A	75	RESET_B	Equivalent circuit F
26	P30	Equivalent circuit A	76	X4	Leave open
27	P31	Equivalent circuit A	77	X3	Equivalent circuit G
28	P32	Equivalent circuit A	78	TEST1	Leave open
29	P33	Equivalent circuit A	79	CL2	Leave open
30	P34	Equivalent circuit A	80	CL1	Leave open
31	P35	Equivalent circuit A	81	TEST2	Leave open
32	P36	Equivalent circuit A	82	XT2	Leave open
33	P87	Equivalent circuit A	83	XT1	Equivalent circuit G

Table 4-1. Target I/F Signal Equivalent Circuits (2/2)

μPD780959 Pin Number	Pin Name	ICE Internal Handling	μPD780959 Pin Number	Pin Name	ICE Internal Handling
34	P86	Equivalent circuit A	84	VSS1	GND
35	P85	Equivalent circuit A	85	VDD1	Equivalent circuit H
36	P84	Equivalent circuit A	86	VROUT1	Leave open
37	P83	Equivalent circuit A	87	VROUT0	Leave open
38	P82	Equivalent circuit A	88	AVREF2	Equivalent circuit I
39	P81	Equivalent circuit A	89	P10/ANI0	Equivalent circuit C
40	P80	Equivalent circuit A	90	P11/ANI1	Equivalent circuit C
41	VDD0	Equivalent circuit H	91	P12/ANI2	Equivalent circuit C
42	VSS0	GND	92	P13/ANI3	Equivalent circuit C
43	P60	Equivalent circuit D	93	AVSS2	GND
44	P61	Equivalent circuit A	94	AVDD	Leave open
45	P62	Equivalent circuit A	95	AVSS1	GND
46	P63	Equivalent circuit A	96	ANO1	Equivalent circuit J
47	P64	Equivalent circuit A	97	AVREF1	Equivalent circuit I
48	P65	Equivalent circuit A	98	AVSS0	GND
49	P66	Equivalent circuit A	99	ANO0	Equivalent circuit J
50	P67	Equivalent circuit A	100	AVREF0	Equivalent circuit I

< Equivalent Circuit of Emulation Circuit >

Figure 4-1. Equivalent Circuit A

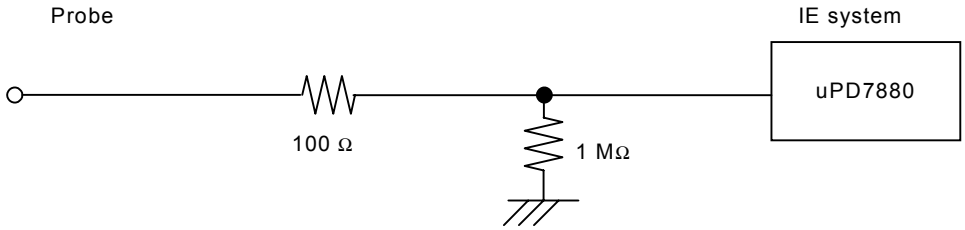


Figure 4-2. Equivalent Circuit B

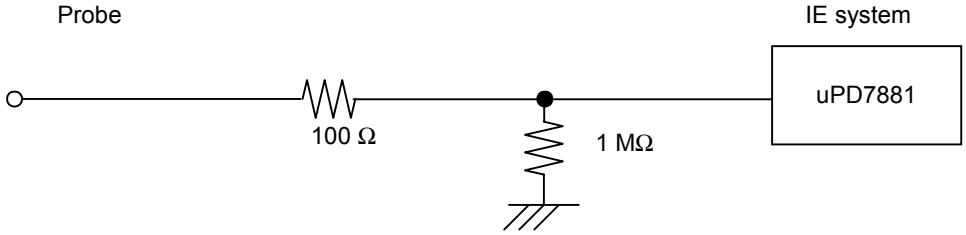


Figure 4-3. Equivalent Circuit C

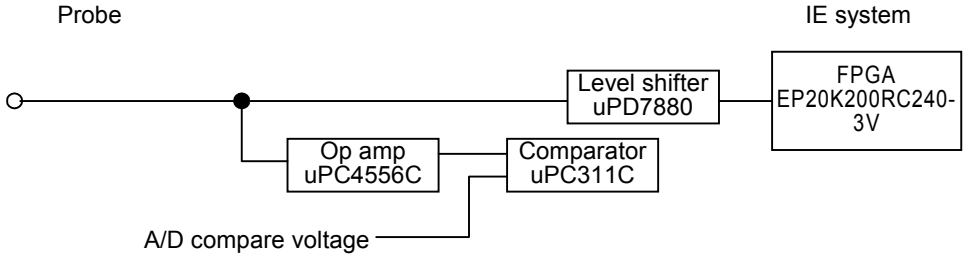


Figure 4-4. Equivalent Circuit D

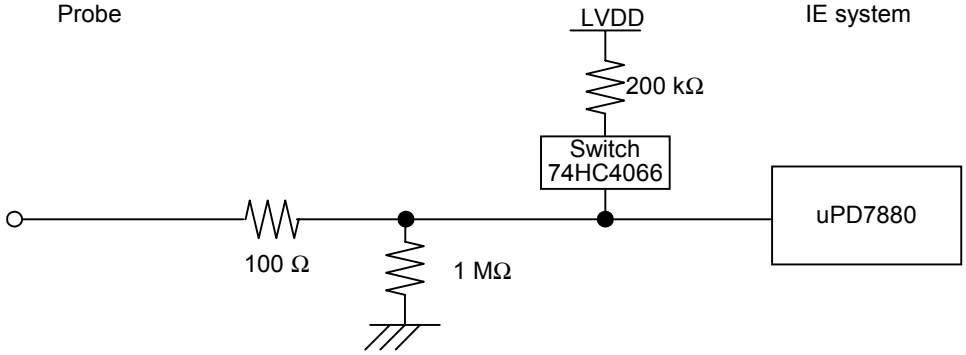


Figure 4-5. Equivalent Circuit E

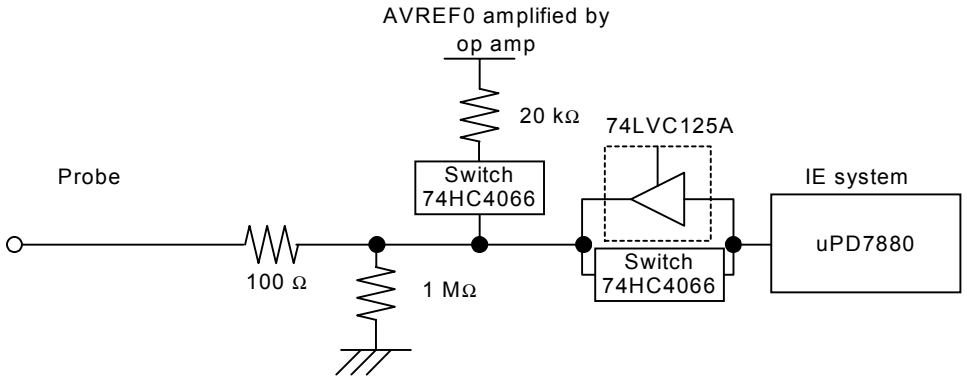


Figure 4-6. Equivalent Circuit F

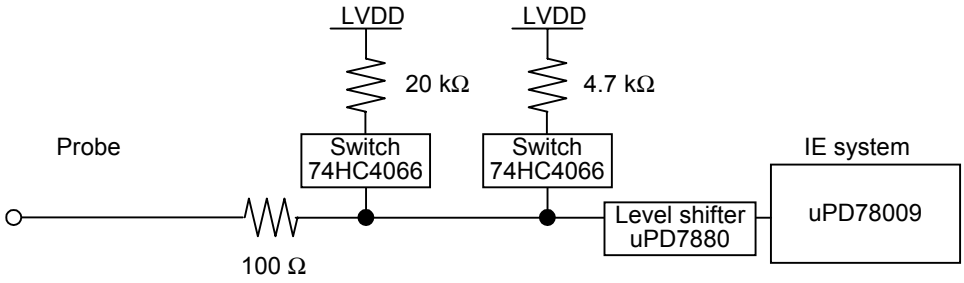


Figure 4-7. Equivalent Circuit G

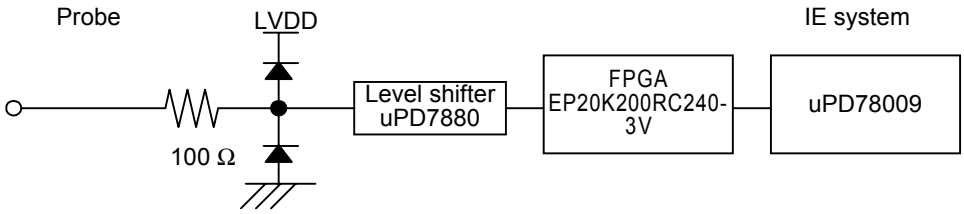


Figure 4-8. Equivalent Circuit H

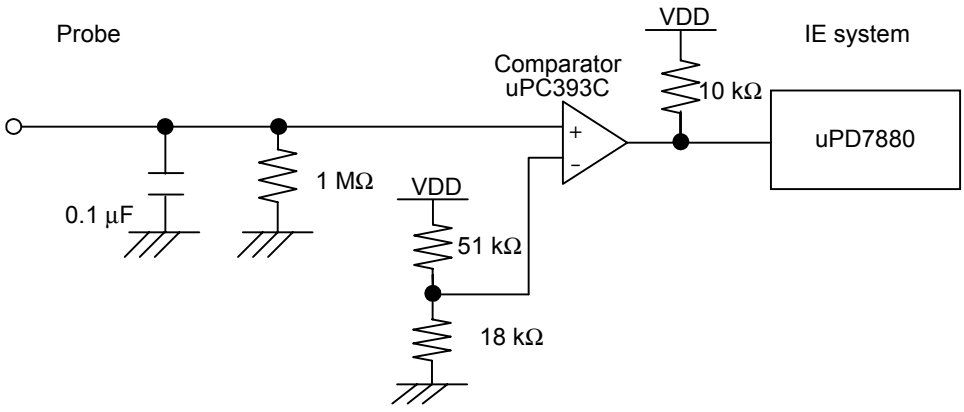


Figure 4-9. Equivalent Circuit I

Figure 4-5. Equivalent Circuit J

APPENDIX A EMULATION PROBE PIN ASSIGNMENT TABLE

Table A-1. Pin Assignment of NP-100GC and NP-H100GC-TQ (1/2)

Emulation Device Pin	CN5 Pin Number	Emulation Device Pin	CN5 Pin Number
1	118	26	34
2	117	27	37
3	114	28	38
4	113	29	43
5	108	30	44
6	107	31	47
7	104	32	48
8	103	33	51
9	100	34	52
10	99	35	57
11	94	36	58
12	93	37	59
13	30	38	60
14	29	39	55
15	24	40	56
16	23	41	49
17	20	42	50
18	19	43	45
19	16	44	46
20	15	45	41
21	10	46	42
22	9	47	35
23	6	48	36
24	5	49	31
25	33	50	32

Table A-1. Pin Correspondence of NP-100GC and NP-H100GC-TQ (2/2)

Emulation Device Pin	CN5 Pin Number	Emulation Device Pin	CN5 Pin Number
51	4	76	88
52	3	77	83
53	8	78	84
54	7	79	77
55	14	80	78
56	13	81	73
57	18	82	74
58	17	83	69
59	22	84	70
60	21	85	63
61	28	86	64
62	27	87	61
63	92	88	62
64	91	89	65
65	98	90	66
66	97	91	71
67	102	92	72
68	101	93	75
69	106	94	76
70	105	95	79
71	112	96	80
72	111	97	85
73	116	98	86
74	115	99	89
75	87	100	90

Remarks 1. The numbers in the Emulation Probe Device Side column refer to the pin number of the target system.

2. The numbers in the CN5 Pin Number column refer to the emulation probe pin to be connected to the IE system.

APPENDIX B SETTINGS OF MASK OPTIONS

The following mask options are provided in the IE-780959-NS-EM1.

- ResetPullUp
- P60PullUp
- P110Level

Open the Mask Option dialog box in the integrated debugger by selecting [Mask Option] on the [Option] menu to set the mask options.
See the **ID78K Series Integrated Debugger Ver.2.30 or Later Operation User's Manual (U15185E)** for details of the settings.

- ResetPullUp (initial value: Non Pull-up)

Non Pull-up:	The Reset pin is not internally pulled up.
Nonstop:	The Reset pin is internally pulled up.
	The pull-up resistor value is 20 KΩ TYP.

- P60PullUp (initial value: N-ch O.D.)

N-ch O.D.:	The P60 pin is not internally pulled up.
Pull-up:	The P60 pin is internally pulled up.
	The pull-up resistor value is 20 KΩ TYP.

- P110Level (initial value: P110/SO3)

P110/SO3:	The output voltage is set to the VDD level.
AVSO3:	The output voltage is AVref0.
	The P11 and PU11 registers cannot be used.