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April 1st, 2010
Renesas Electronics Corporation

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User's Manual

IE-78K0-NS-A

In-Circuit Emulator

Target Devices 78K/0 Series

Document No. U14889EJ3V0UM00 (3rd edition)
Date Published October 2003 N CP(K)

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- Development environment specifications (for example, specifications for third-party tools and components, host computers, power plugs, AC supply voltages, and so forth)
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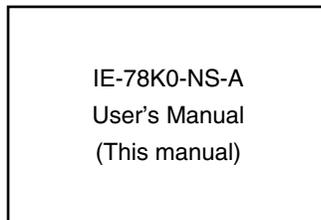
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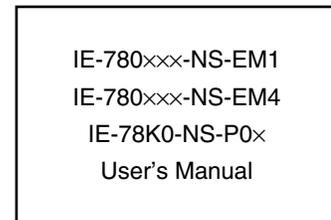
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INTRODUCTION

- Product overview** The IE-78K0-NS-A is used in combination with an emulation board (IE-780xxx-NS-EM1, IE-780xxx-NS-EM4) and I/O board (IE-78K0-NS-P0x) to debug products in the 78K/0 Series of 8-bit single-chip microcontrollers.
- Target readers** This manual is intended for engineers who perform debugging of systems that employ 78K/0 Series 8-bit single-chip microcontrollers using the IE-78K0-NS-A and an emulation board (IE-780xxx-NS-EM1, IE-780xxx-NS-EM4) and I/O board (IE-78K0-NS-P0x).
- Purpose** The purpose of this manual is to help the user understand the debugging functions that are available by using the IE-78K0-NS-A and the emulation board (IE-780xxx-NS-EM1, IE-780xxx-NS-EM4) and I/O board (IE-78K0-NS-P0x) together.
- Organization** When using the IE-78K0-NS-A, please refer to the manual that comes with the IE-78K0-NS-A (this manual) as well as the manual that comes with the emulation board (IE-780xxx-NS-EM1, IE-780xxx-NS-EM4) and I/O board (IE-78K0-NS-P0x).



- Basic specifications
- System configuration
- External interface function



- Function outline
- Target interface differences

- How to read this manual** To understand the overall functions of the IE-78K0-NS-A:
→ Read this manual in the order of the contents.

To understand the basic specifications:
→ Refer to **CHAPTER 1 GENERAL** and **CHAPTER 2 PART NAMES**.

For how to connect the IE-780xxx-NS-EM1, IE-780xxx-NS-EM4, and IE-78K0-NS-P0x and make settings to debug 78K/0 Series products:
→ Refer to **CHAPTER 3 INSTALLATION**.

Terminology

The meanings of the terms used in this manual are described in the table 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 program	This is the program to be debugged.
Target system	This is the system to be debugged. This includes the target program and the hardware provided by the user. When defined narrowly, it includes only the hardware.

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

Please use the following documents in conjunction with this manual.
The related documents listed below may include preliminary versions. However,

not marked as such.

★ Documents Related to Development Tools (User's Manuals)

Document Name	Document Number	
IE-78K0-NS-A In-Circuit Emulator	This manual	
RA78K0 Assembler Package	Operation	U16629E
	Language	U14446E
	Structured Assembly Language	U11789E
CC78K0 C Compiler	Operation	U16613E
	Language	U14298E
SM78K Series Ver.2.52 System Simulator	Operation	U16768E
SM78K Series Ver.2.30 or Later System Simulator	External part user open interface specifications	U15802E
ID78K0-NS Ver.2.52 Integrated Debugger	Operation	U16488E
78K/0 Series Real-Time OS (RX78K0)	Fundamental	U11537E
	Installation	U11536E
PM plus Ver.5.10 or Later		U16569E
PG-FP4 Flash Memory Programmer		U15260E

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

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CHAPTER 1 GENERAL

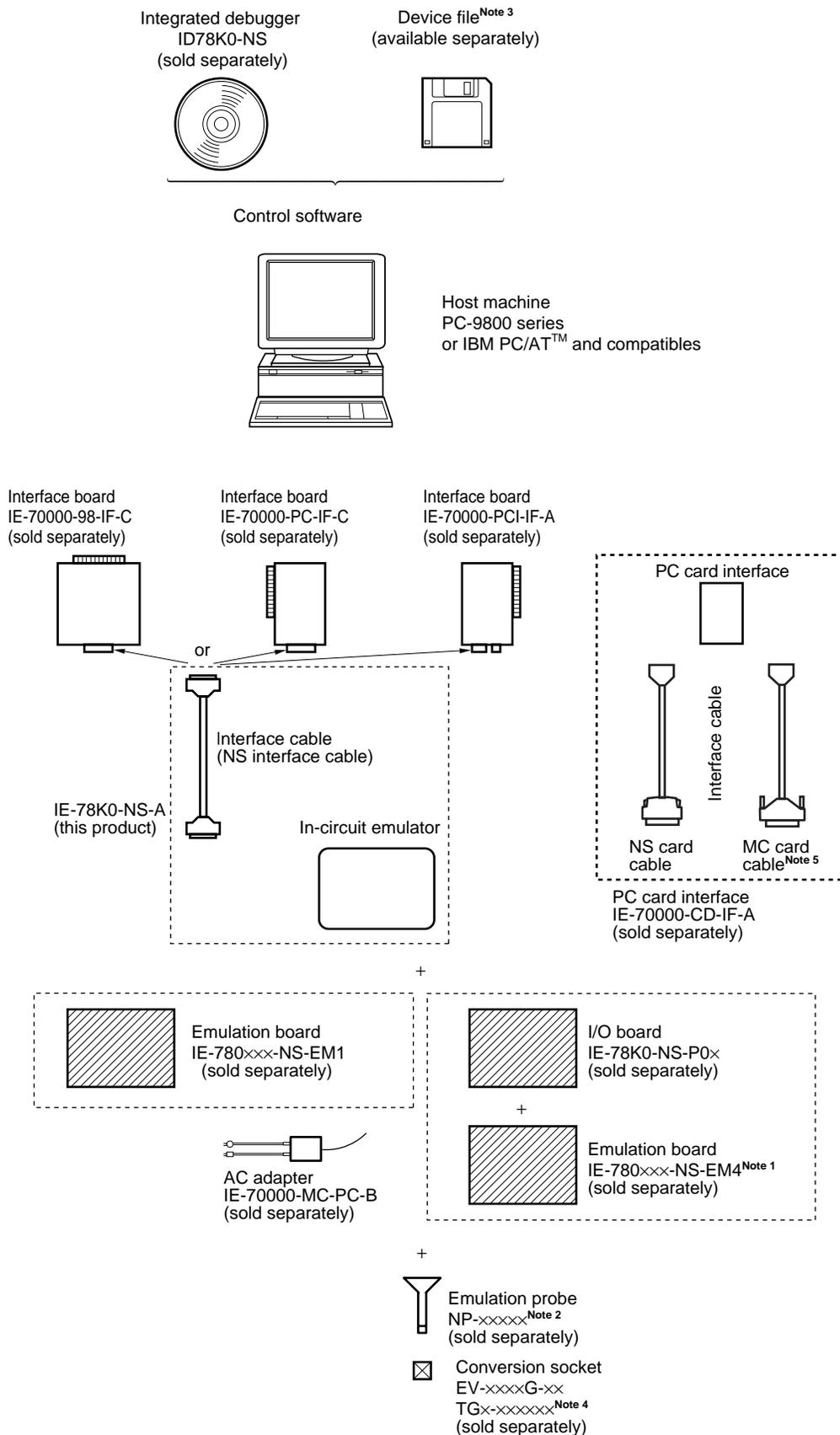
The IE-78K0-NS-A is a development tool for effectively debugging hardware and software in which a 78K/0 Series 8-bit single-chip microcontroller is used.

This chapter describes the system configuration and basic specifications of the IE-78K0-NS-A.

1.1 System Configuration

Figure 1-1 shows the system configuration of the IE-78K0-NS-A.

Figure 1-1. IE-78K0-NS-A System Configuration



- Notes**
1. When using the IE-780xxx-NS-EM4, it is necessary to connect an I/O board, the IE-78K0-NS-P0x. The IE-780xxx-NS-EM4 and IE-78K0-NS-P0x are sold separately.
 2. The NP-xxxxx 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 device file can be downloaded from the NEC Electronics Website
(URL: <http://www.necel.com/micro/>).
 4. The TGx-xxxxxx is a product of TOKYO ELETECH CORPORATION.
Contact: Daimaru kogyo, Ltd. Tokyo Electronic Division (TEL: +81-3-3820-7112)
Osaka Electronic Division (TEL: +81-6-6244-6672)
 5. This is not used for the IE-78K0-NS-A.

1.2 Hardware Configuration

The IE-78K0-NS-A consists of the following hardware units (such as cabinet and boards).

There are two kinds of board configuration for the IE-78K0-NS-A, a two-board (the 78K0 main board and the 78K0 performance board) type and a one-board (a combined 78K0 main board and 78K0 performance board) type.

The board type can be distinguished by the 2nd figure from the left in the serial number. F or earlier indicates the two-board type and G or later indicates the one-board type.

(1) Two-board type (when the 2nd figure from the left in the serial number is F or earlier.)

- Cabinet
- 78K0 main board (G-780009 Board)
- 78K0 performance board (G-78K0H OPTION Board)

Figure 1-2. IE-78K0-NS-A (Two-Board Type) Basic Hardware Configuration 1-1

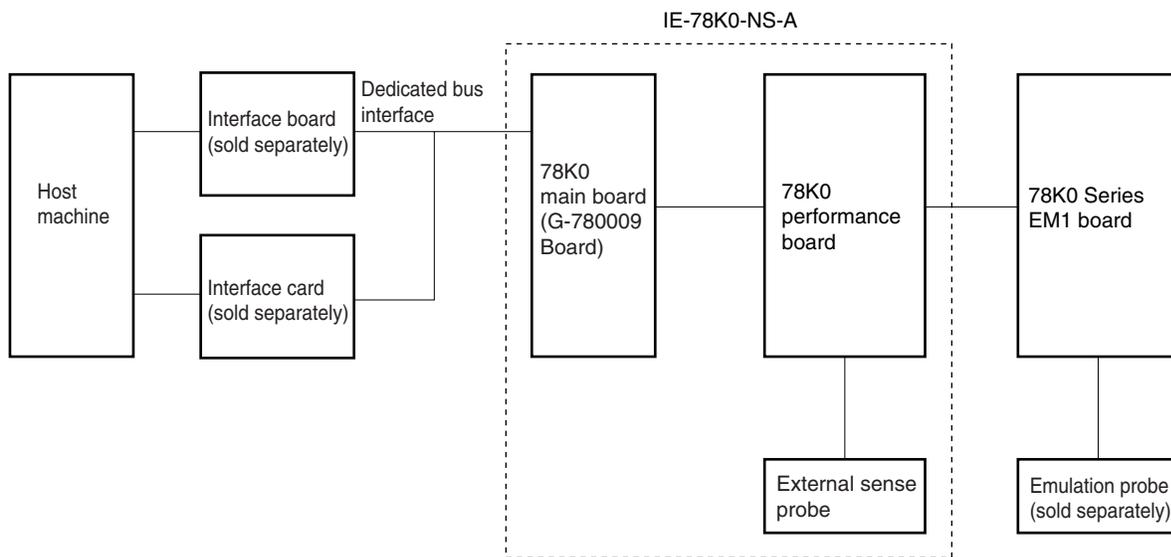
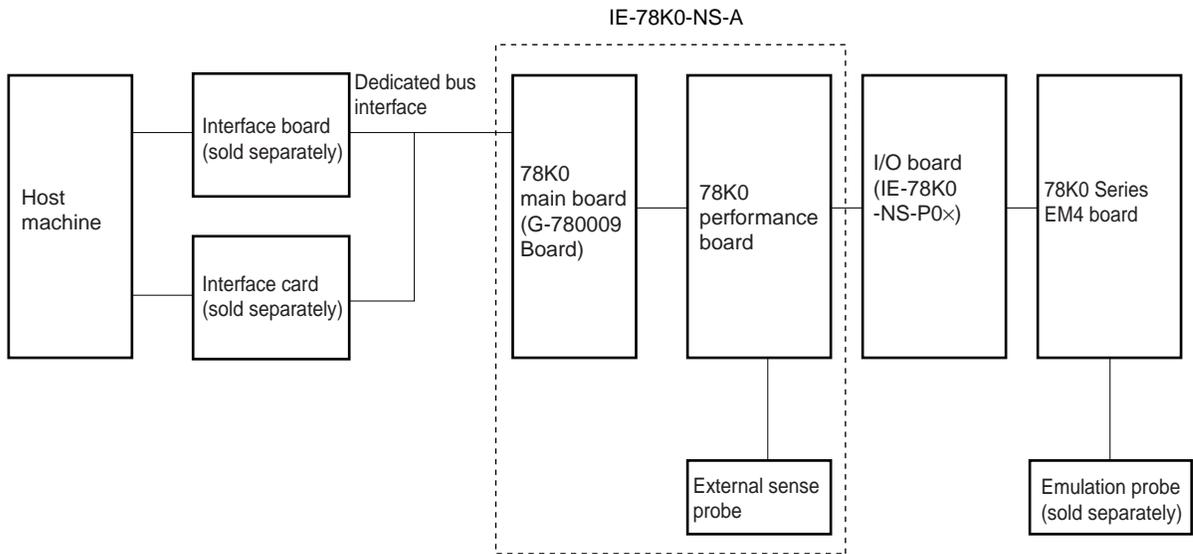


Figure 1-3. IE-78K0-NS-A (Two-Board Type) Basic Hardware Configuration 1-2



★ (2) One-board type (when the 2nd figure from the left in the serial number is G or later)

- Cabinet
- 78K0 main board (G-780009 Board)^{Note}

Note This board is different than the previous 78K0 main board in (1)

Figure 1-4. IE-78K0-NS-A (One-Board Type) Basic Hardware Configuration 2-1

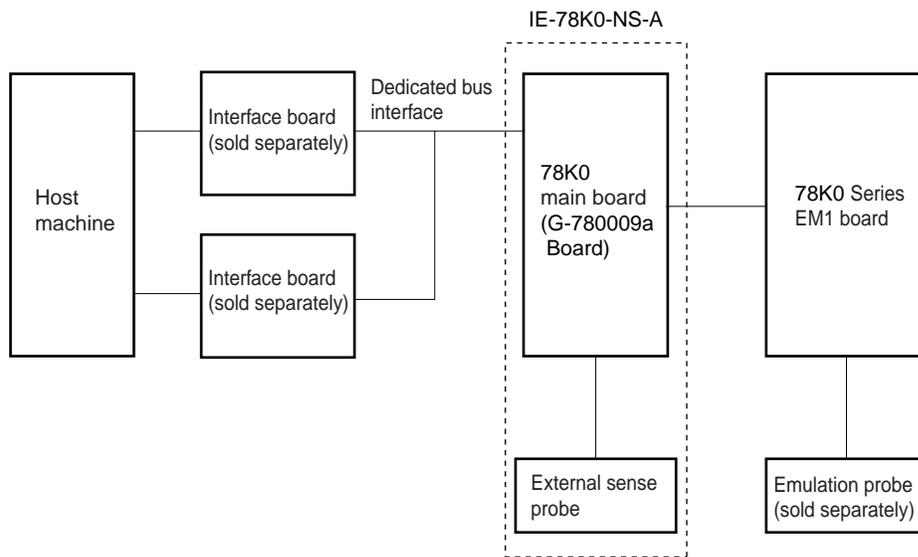
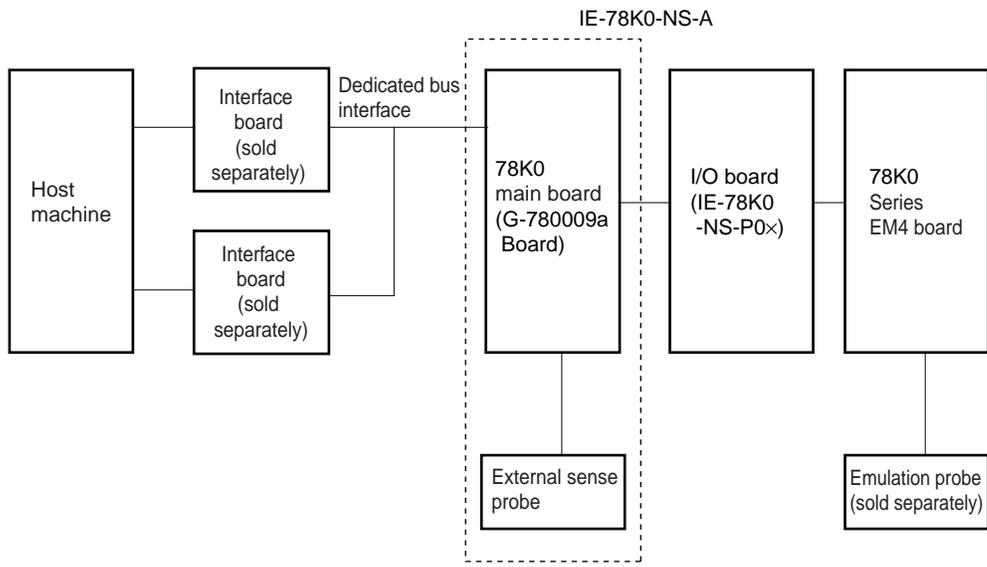


Figure 1-5. IE-78K0-NS-A (One-Board Type) Basic Hardware Configuration 2-2



1.3 Basic Specifications

Table 1-1. List of Functions (MAX. Specifications) (1/2)

Parameter		Description
Supervisor		V40 (operating frequency: 16.0 MHz)
Target device		78K/0 Series (μ PD780xxx)
System clock		According to specification of emulation board (sold separately)
Clock supply	External	Pulse input
	Internal	Mounted on emulation board (sold separately)
Substitute memory capacity		64 KB
Mapping unit	Internal ROM	4 KB
	Internal high-speed RAM	64 bytes
	Internal low-speed RAM	128 bytes
	External expansion memory	8 KB
Emulation function		<ul style="list-style-type: none"> • Real-time execution • Break execution • Step execution
Real-time internal RAM monitor		2 KB of memory space
Event detection		<ul style="list-style-type: none"> • Program execution detection (fetch): 10 (BRS1 to BRS10) • Bus event detection (access): 12 (BRA1 to BRA12)
Event integration		<ul style="list-style-type: none"> • External trigger detection Trigger output (open-drain output (1)) • Path condition (BRS1, BRS2, or BRA1 to BRA4) • Trace qualify condition (BRA1 to BRA4) • Delay condition • Trigger condition (BRS1, BRS2, or BRA1 to BRA4)
Break factors		<ul style="list-style-type: none"> • Event break • Manual break • Command break • Fail-safe break • External single event inputs (8) • Time out break
Real-time trace	Trace factors	<ul style="list-style-type: none"> • All traces • Qualify trace (access only) • Section trace (both fetch and access) (interevent trace)^{Note}
	Trace capacity	80 bits \times 8 KB
	Trace content	Address, data, status, 16 external sense traces (8 of which (EXTCN1) can be used as external single event inputs), time stamp, and snap shot

Note Events use BRS3 to BRS10 and BRA5 to BRA12.

Table 1-1. List of Functions (MAX. Specifications) (2/2)

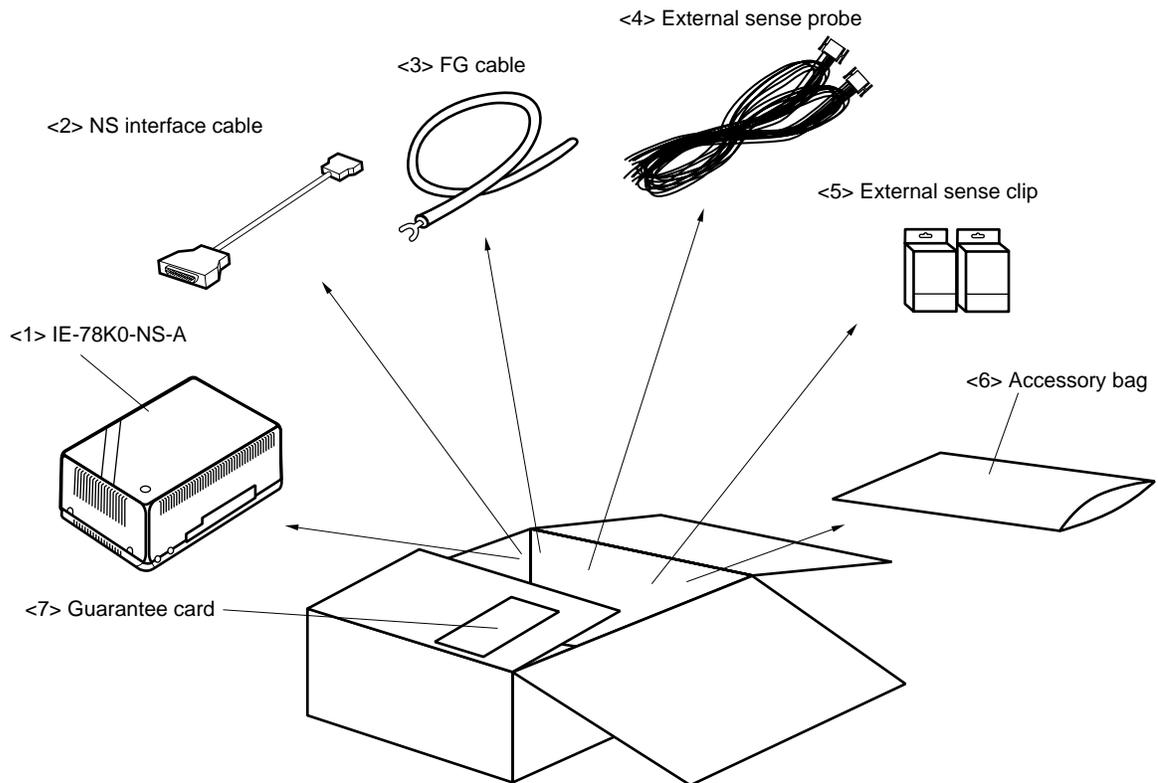
Parameter	Description
Execution time measurement	Up to 4 min 28 s, resolution: 62.5 ns
Interevent time measurement	<ul style="list-style-type: none"> • Resolution: Changeable between 160 ns and 20.56 μs • Maximum measurement time^{Note} When resolution is set to 160 ns: Approximately 11 minutes When resolution is set to 20.56 μs: Approximately 24 hours
Coverage	Between 64 KB (read, write, fetch)
DMM	16 events ^{Note}
Target interface	Emulation probe (sold separately) provided for each target device shape
Host interface	Dedicated bus interface
Low-voltage support	Based on the emulation board (sold separately)
Host machine	PC-9800 series, or IBM PC/AT and compatibles
Power supply	DC 5 V
Operation temperature range	10°C to 40°C
Operation humidity range	0% to 80% (no condensation)
Dimensions	W240 × D197 × H73 (mm)

Note Events use BRS3 to BRS10 and BRA5 to BRA12.

1.4 Contents in Carton

The IE-78K0-NS-A carton contains the main unit, cables, an accessory bag, and a guarantee card. Make sure that the accessory bag contains a packing list, this user's manual, spacers, and screws. In the case of missing or damaged items, please contact an NEC sales representative or NEC distributor.

Figure 1-6. Contents in Carton



- <1> IE-78K0-NS-A main unit × 1
- <2> NS interface cable × 1
- <3> FG cable × 1
- <4> External sense probes × 2
- <5> External sense clips × 20 (10 per case × 2)
- <6> Accessory bag × 1
- <7> Guarantee card × 1

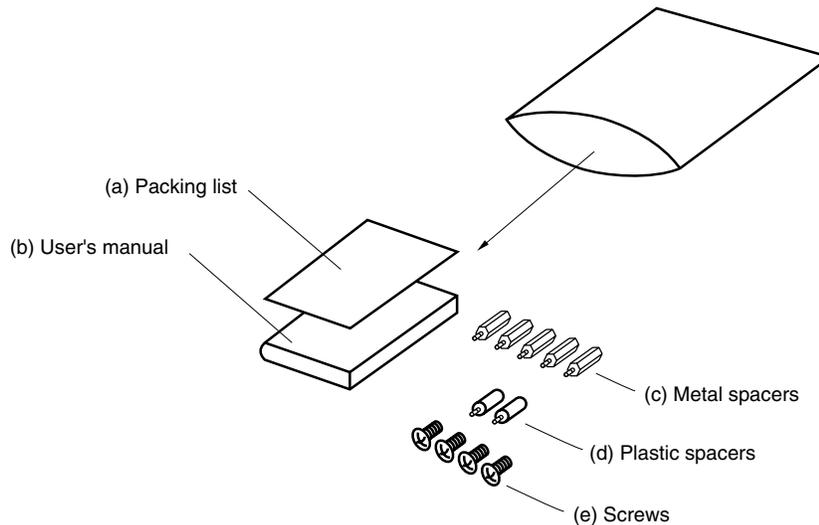
Check that the accessory bag contains the following items

(1) Two-board Type (when the 2nd figure from the left in the serial number is F or earlier)

Refer to **Figure 1-7 Contents in Accessory Bag** (when the 2nd figure from the left in the serial number is F or earlier).

- <a> Packing list × 1
- User's manual (this manual) × 1
- <c> Metal spacers × 5
- <d> Plastic spacers × 2
- <e> Screws × 4

**Figure 1-7. Contents in Accessory Bag, Two-Board Type
(When 2nd Figure from Left in Serial Number Is F or Earlier)**

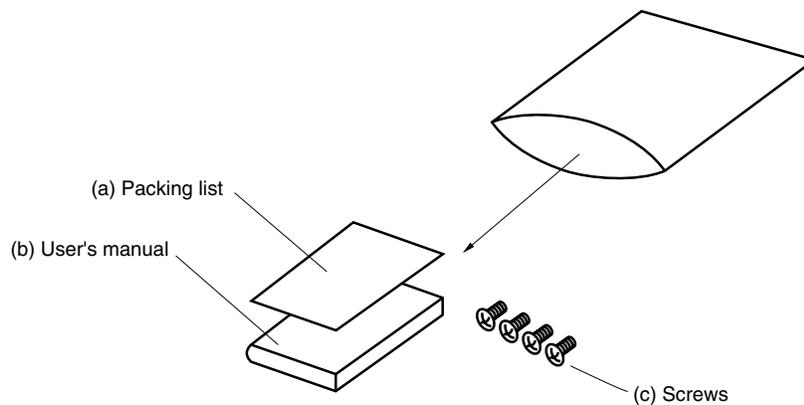


★ **(2) One-board type (when the 2nd figure from the left side of the serial number is G or later)**

Refer to **Figure 1-8 Contents in Accessory Bag** (when the 2nd figure from the left in the serial number is G or later).

- <a> Packing list × 1
- User's manual (this manual) × 1
- <c> Screws × 4

**Figure 1-8. Contents in Accessory Bag, One-Board Type
(When 2nd Figure from Left in the Serial Number Is G or Later)**



CHAPTER 2 PART NAMES

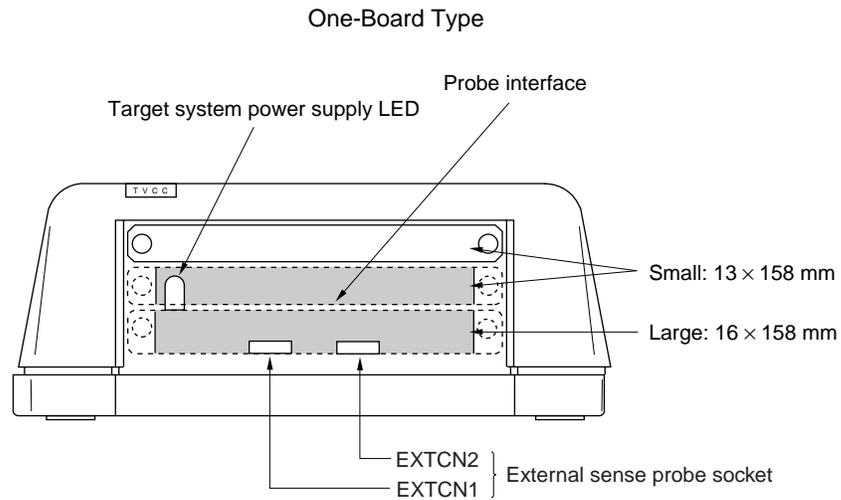
This chapter introduces the parts of the IE-78K0-NS-A main unit.

The packing box contains the IE-78K0-NS-A main unit and accessories. If there are any missing or damaged items, please contact an NEC sales representative.

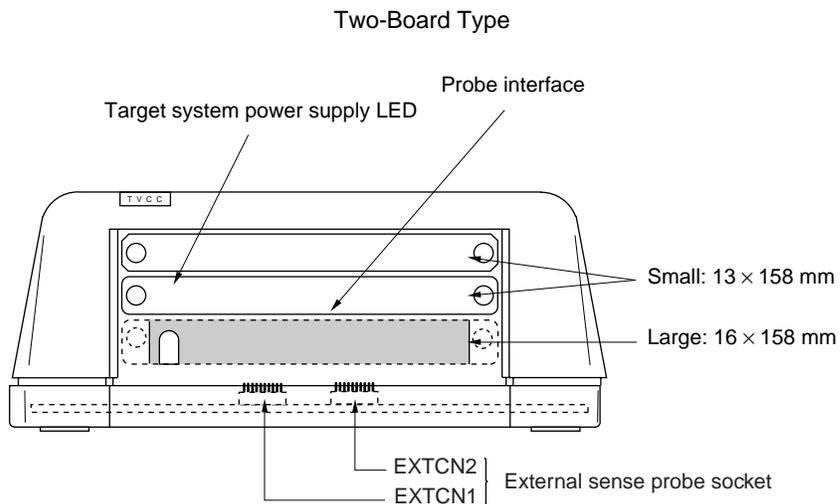
Please make sure to fill out and return the guarantee card that comes with the main unit.

2.1 Parts of Main Unit

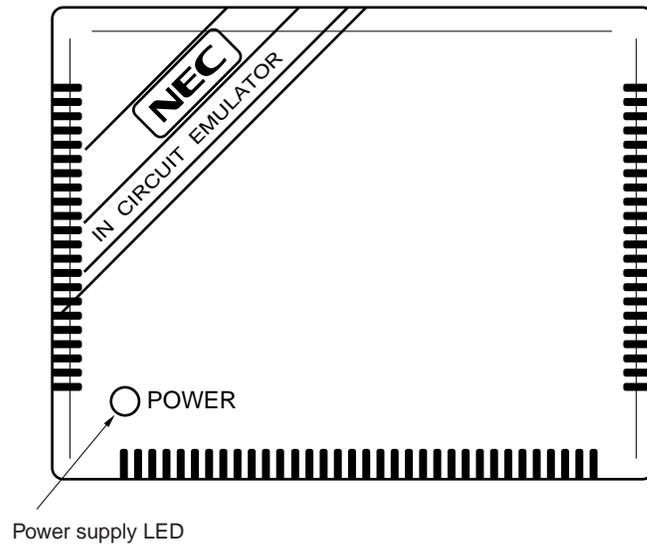
(1) Probe end



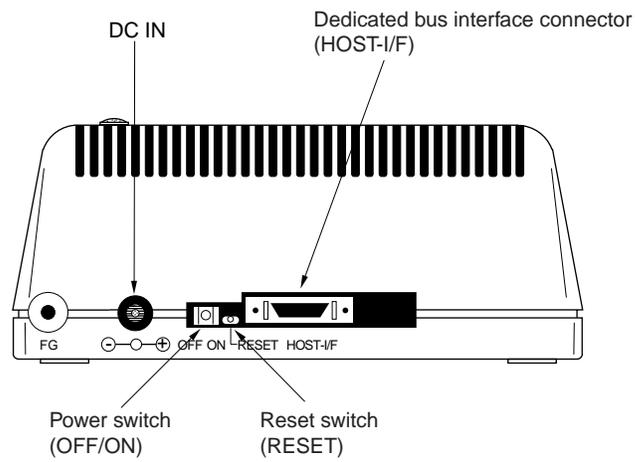
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(2) Top view



(3) Interface



2.2 Board Names

The IE-78K0-NS-A contains the following boards.

(1) Two-board type (when the 2nd figure from the left in the serial number is F or earlier.)

- Main board (G-780009 Board) × 1
- Performance board (G-78K0H OPTION Board) × 1

★

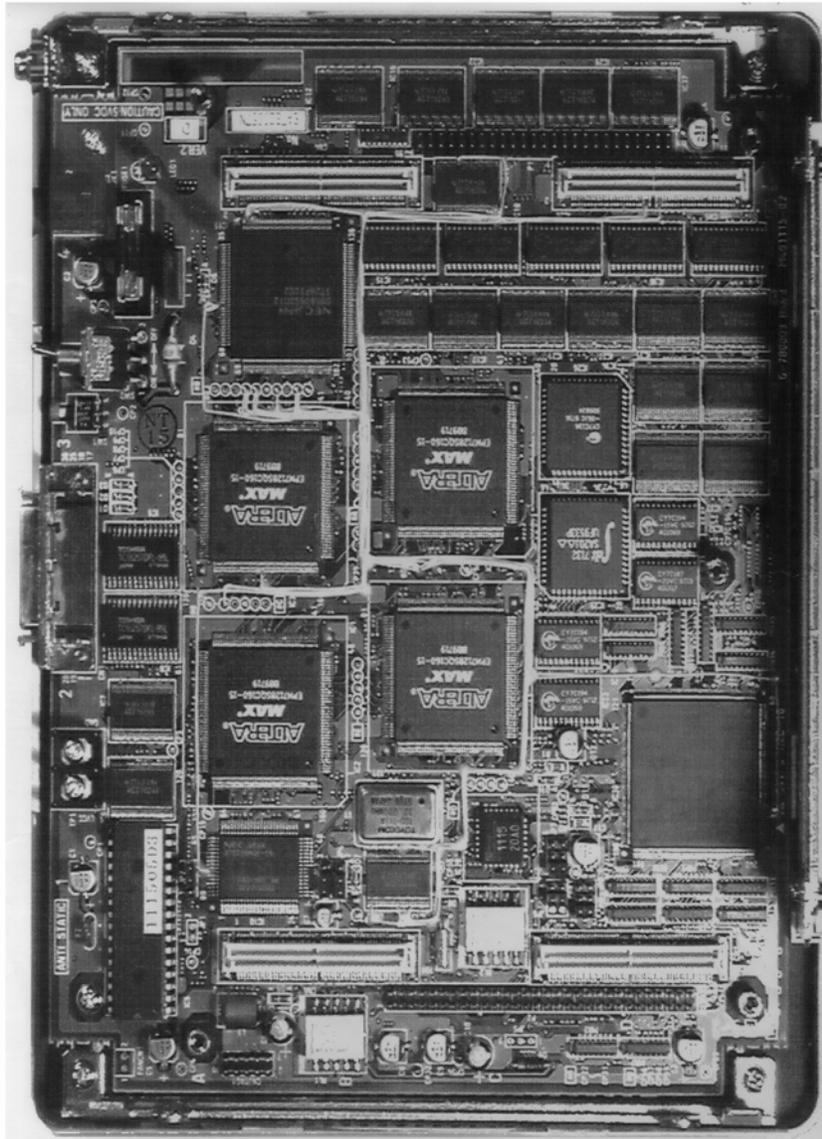
(2) One-board type (when the 2nd figure from the left in the serial number is G or later.)

- Main board (G-780009a Board) × 1

Caution Do not connect the G-78K0H OPTION Board to the G-780009a Board in case a malfunction may occur.

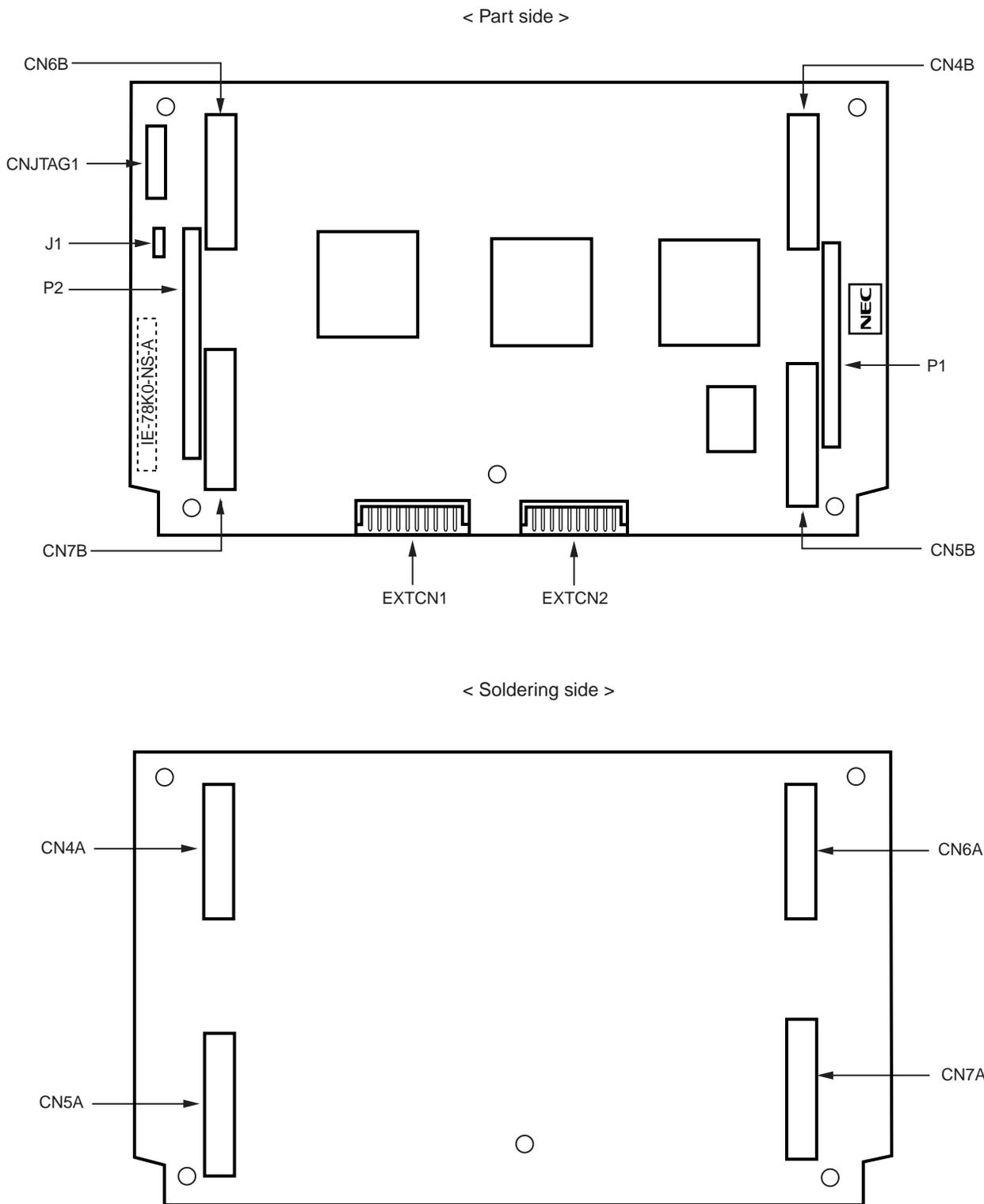
Remove the four screws from the sides of the main unit, and then open the top cover to check that you have the correct boards.

Figure 2-1. Main Board (G-78009 Board) (Two-Board Type)



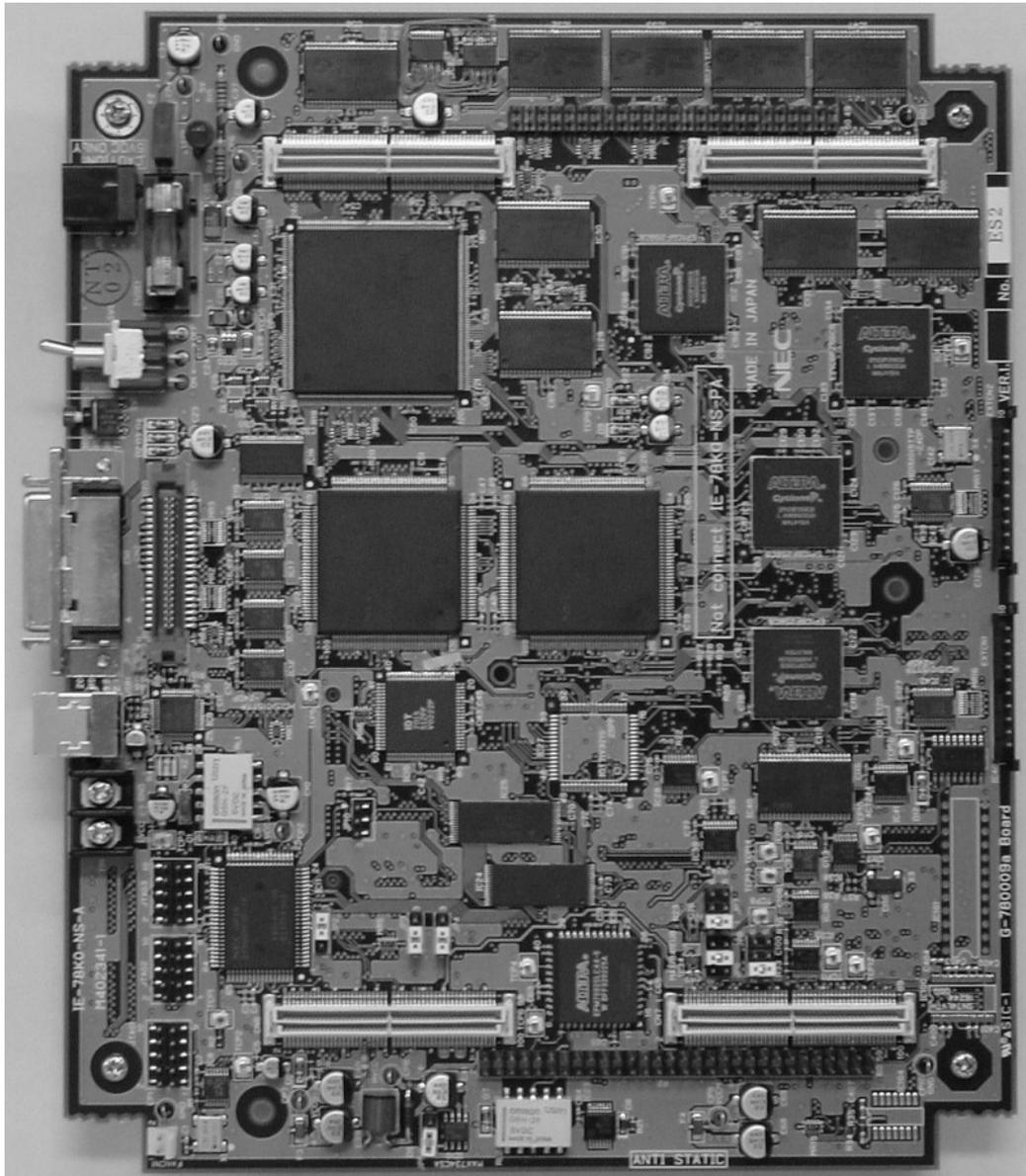
Remark The main board is shown mounted in the main unit.

Figure 2-2. Performance Board (G-78K0H OPTION Board) (Two-Board Type)



★

Figure 2-3. Main Board (G-780009a Board) (One-Board Type)



2.3 External Sense Probe Names

The IE-78K0-NS-A includes external sense probes and external sense clips.

(1) External sense probes: 2

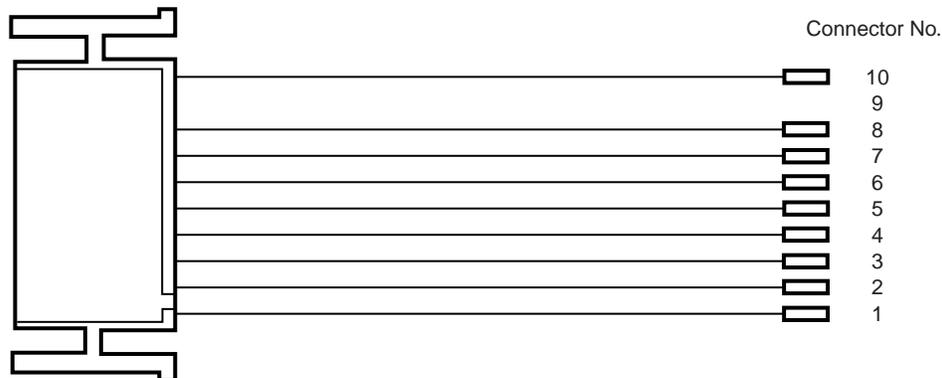


Table 2-1. Correspondence Between Connector No. and Color of Cable

Connector No.	1	2	3	4	5	6	7	8	9	10
Color of cable	Brown	Red	Orange	Yellow	Green	Blue	Purple	Gray	N.C.	Black

The names of the external sense probes when they are connected to EXTCN1 and EXTCN2 are as follows.

Table 2-2. Bit Configuration When Connecting External Sense Probe to EXTCN1

Connector No.	1	2	3	4	5	6	7	8	9	10
External sense	EXT1	EXT2	EXT3	EXT4	EXT5	EXT6	EXT7	EXT8	N.C.	GND

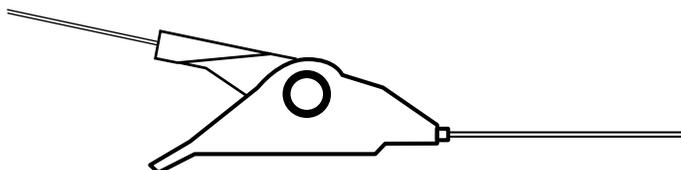
Table 2-3. Bit Configuration When Connecting External Sense Probe to EXTCN2

Connector No.	1	2	3	4	5	6	7	8	9	10
External sense	EXT9	EXT10	EXT11	EXT12	EXT13	EXT14	EXT15	EXT16	N.C.	GND

Remark N.C.: No connection

(2) External sense clips: 20 (16 for external sense probe, 2 for GND, and 2 spares)

- Made by Sunhayato Corporation (2 sets of 10)



CHAPTER 3 INSTALLATION

This chapter describes how to connect the cables to the IE-78K0-NS-A and the mode settings.

3.1 Connection

Connect the following nine products, which are sold separately.

Refer to **Figure 1-1 IE-78K0-NS-A System Configuration** in **CHAPTER 1 GENERAL** for the system configuration of the IE-78K0-NS-A.

- IE-70000-98-IF-C: Interface board (use cable included with IE-78K0-NS-A)
- IE-70000-PC-IF-C: Interface board (use cable included with IE-78K0-NS-A)
- IE-70000-PCI-IF-A: Interface board (use cable included with IE-78K0-NS-A)
- IE-70000-CD-IF-A: PC card interface (use NS card cable)
- IE-70000-MC-PS-B: AC adapter
- IE-780xxx-NS-EM1: Emulation board
- IE-780xxx-NS-EM4: Emulation board
- IE-78K0-NS-P0x: I/O board
- NP-xxxxx: Emulation probe

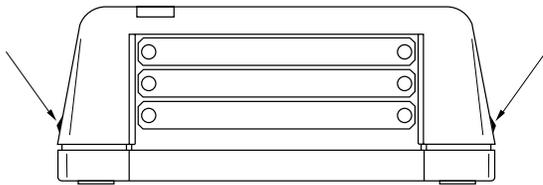
Caution Connecting and removing cables or components from the target system and changing the settings of switches, etc. should be carried out after turning off the power of the IE-78K0-NS-A main unit and the target system.

(1) Two-board type (when the 2nd figure from the left in the serial number is F or earlier.)

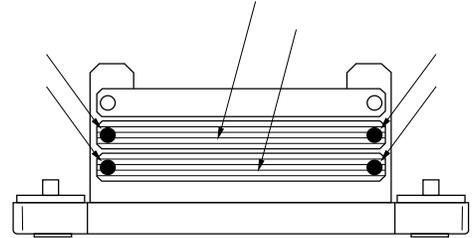
- (a) Connecting emulation board (IE-780xxx-NS-EM1)
 The IE-780xxx-NS-EM1 is sold separately.

Figure 3-1. Connecting Emulation Board (IE-780xxx-NS-EM1) (Two-Board Type) (1/2)

- <1> Remove the screws from the sides of the main unit, and then remove the top cover.

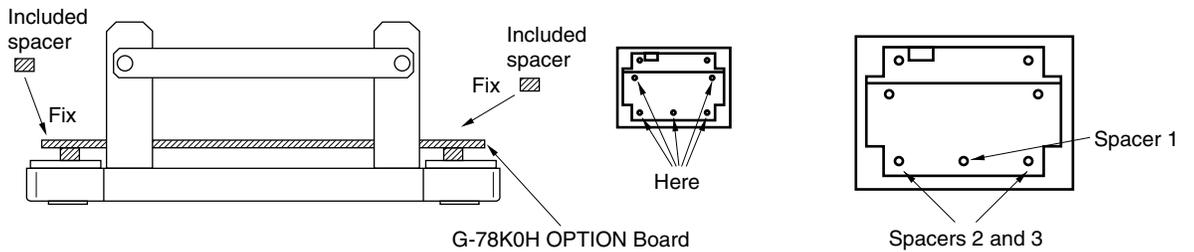


- <2> Remove the first and second plates from the bottom by removing the screws.



- <3> Fix the spacers (metal) included with the IE-78K0-NS-A at five points on the board.

Caution Only when connecting the IE-78018-NS-EM1 on the G-78K0H OPTION Board, remove spacer 1 (metal) of the following figure and replace spacers 2 and 3 (metal) with the included spacers (plastic).



- <4> Connect the IE-780xxx-NS-EM1 to the G-78K0H OPTION Board and fasten the screws at the four corners.

- <5> When using a probe, connect the probe.

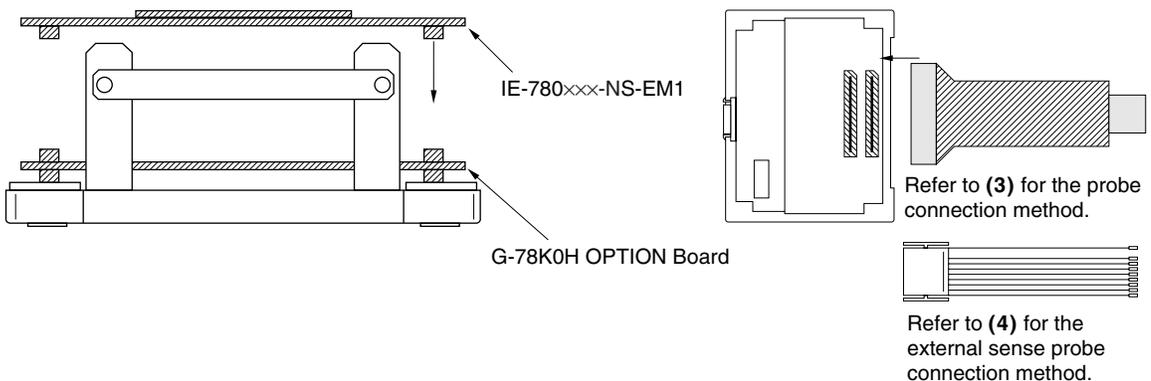
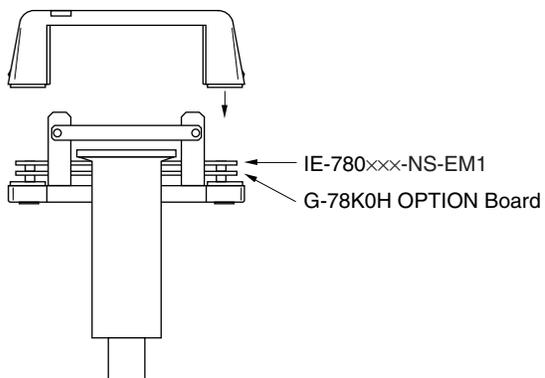


Figure 3-1. Connecting Emulation Board (IE-780xxx-NS-EM1) (Two-Board Type) (2/2)

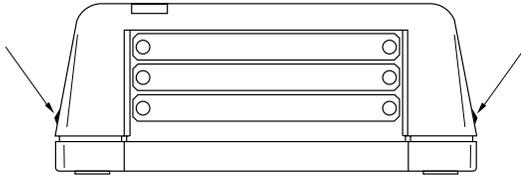
<6> Replace the top cover and fasten the four screws on the sides.



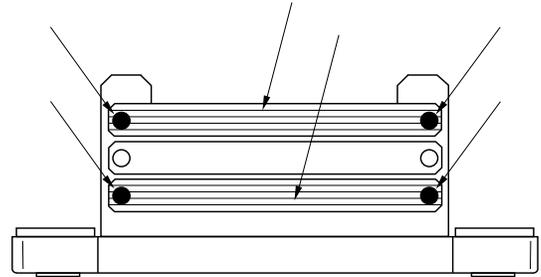
- (b) Connecting I/O board (IE-78K0-NS-P0 \times) and emulation board (IE-780 $\times\times\times$ -NS-EM4)
 The IE-78K0-NS-P0 \times and IE-780 $\times\times\times$ -NS-EM4 are sold separately.

Figure 3-2. Connecting I/O Board and Emulation Board (IE-780 $\times\times\times$ -NS-EM4) (Two-Board Type) (1/2)

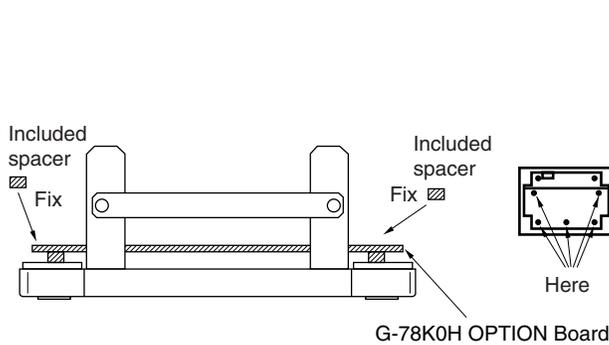
- <1> Remove the screws from the sides of the main unit, and then remove the top cover.



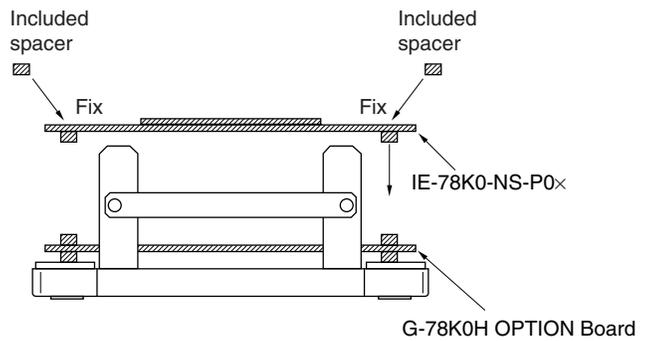
- <2> Remove the first and third plates from the bottom by removing the screws.



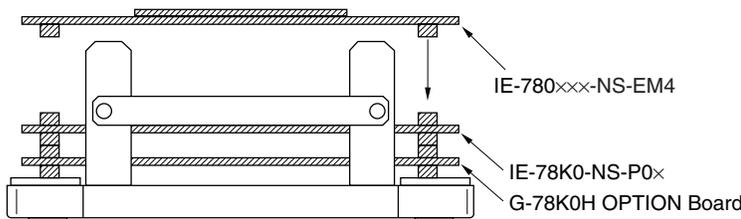
- <3> Fix the spacers (metal) included with the IE-78K0-NS-A at five points on the board.



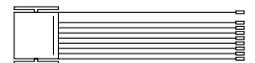
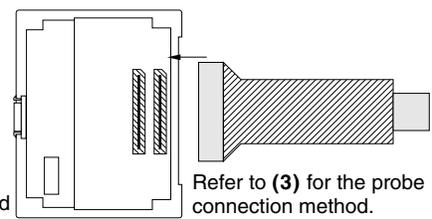
- <4> Connect the IE-78K0-NS-P0 \times on the G-78K0H OPTION Board and fix the spacers included with the IE-78K0-NS-P0 \times at the four corners.



- <5> Connect the IE-780 $\times\times\times$ -NS-EM4 on the IE-78K0-NS-P0 \times , and fasten the screws at the four corners.



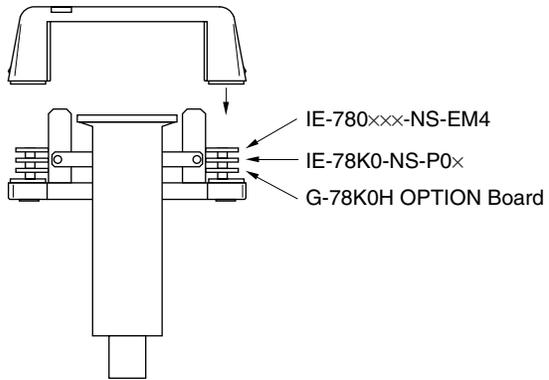
- <6> When using a probe, connect the probe.



Refer to (4) for the external sense probe connection method.

Figure 3-2. Connecting I/O Board and Emulation Board (IE-780xxx-NS-EM4) (Two-Board Type) (2/2)

<7> Replace the top cover and fasten the four screws on the sides.

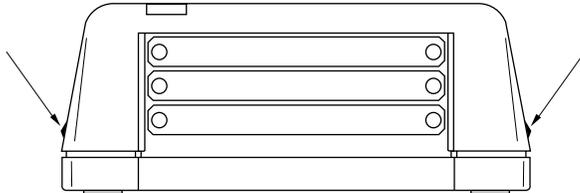


★ (2) One-board type (when the 2nd figure from the left in the serial number is G or later)

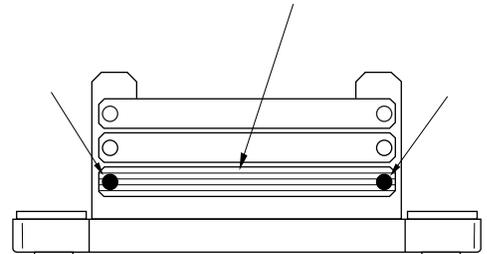
- (a) Connecting emulation board (IE-780xxx-NS-EM1)
 The IE-780xxx-NS-EM1 is sold separately.

Figure 3-3. Connecting Emulation Board (IE-780xxx-NS-EM1) (One-Board Type) (1/2)

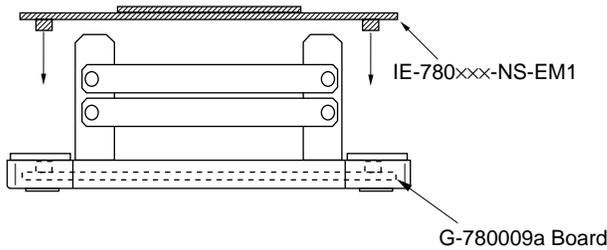
- <1> Remove the screws from the sides of the main unit, and then remove the top cover.



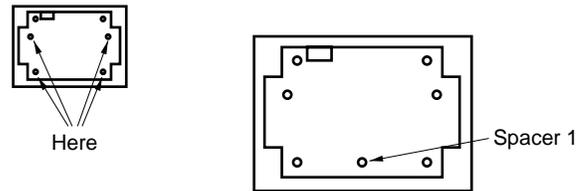
- <2> Remove the first plate from the bottom by removing the screws.



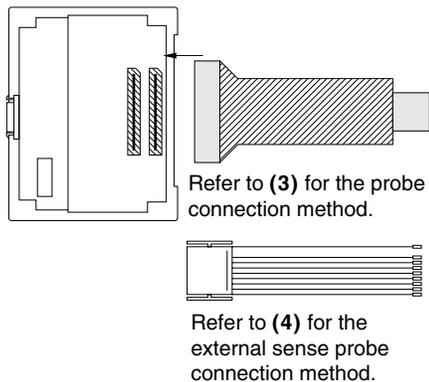
- <3> Connect the IE-780xxx-NS-EM1 to the G-780009a Board and fasten the screws at the four corners.



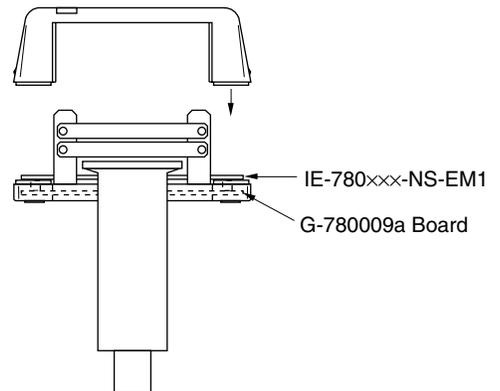
Caution Remove the spacer 1 of the following figure only when connecting the IE-78018-NS-EM1.



- <4> When using a probe, connect the probe.



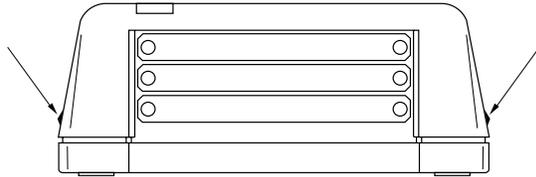
- <5> Replace the top cover and fasten the four screws on the sides.



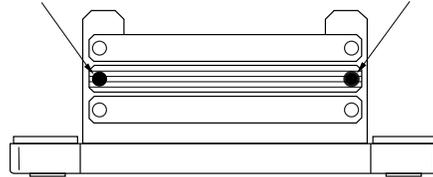
- (b) Connecting I/O board (IE-78K0-NS-P0x) and emulation board (IE-780xxx-NS-EM4)
 The IE-78K0-NS-P0x and IE-780xxx-NS-EM4 are sold separately.

Figure 3-4. Connecting I/O Board and Emulation Board (IE-780xxx-NS-EM4) (One-Board Type)

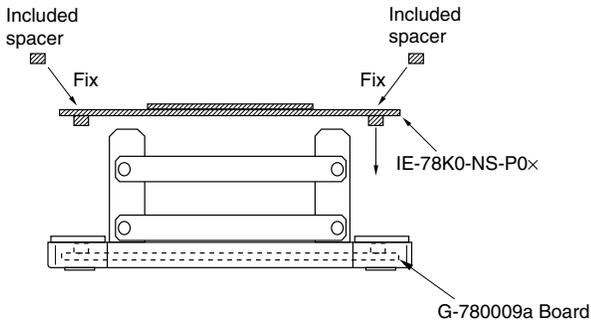
- <1> Remove the screws from the sides of the main unit, and then remove the top cover.



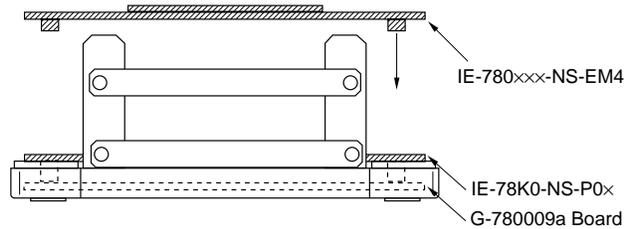
- <2> Remove the second plate from the bottom by removing the screws.



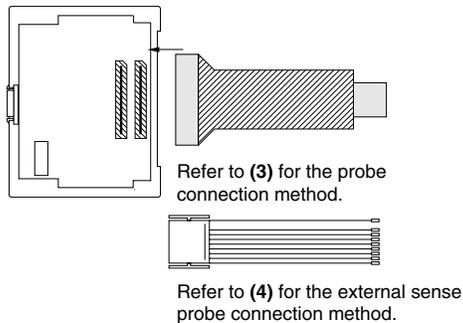
- <3> Connect the IE-78K0-NS-P0x on the G-780009a board, and fix the spacers included with the IE-78K0-NS-P0x at the four corners.



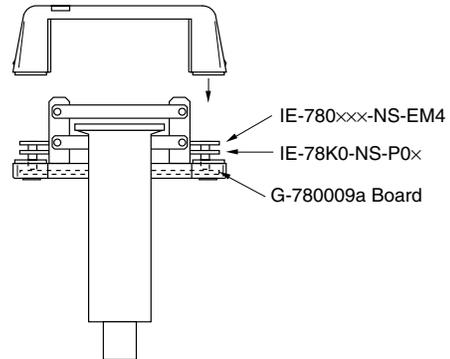
- <4> Connect the IE-780xxx-NS-EM4 on the IE-78K0-NS-P0x, and fasten the screws at the four corners.



- <5> When using a probe, connect the probe.



- <6> Replace the top cover and fasten the four screws on the sides.

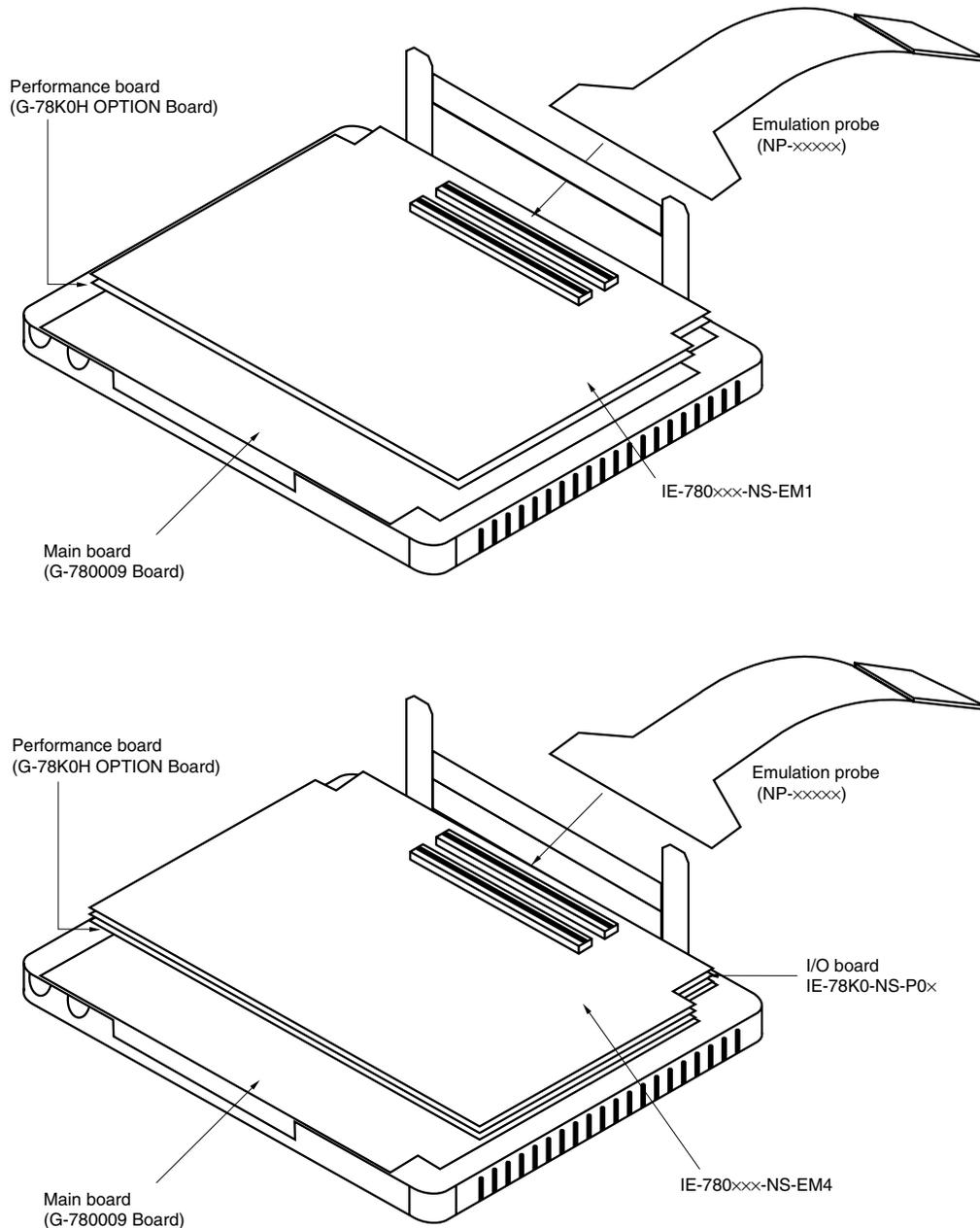


(3) Connecting emulation probe (NP-xxxxx)

The NP-xxxxx is sold separately.

- (a) Two-board type (when the 2nd figure from the left in the serial number is F or earlier)

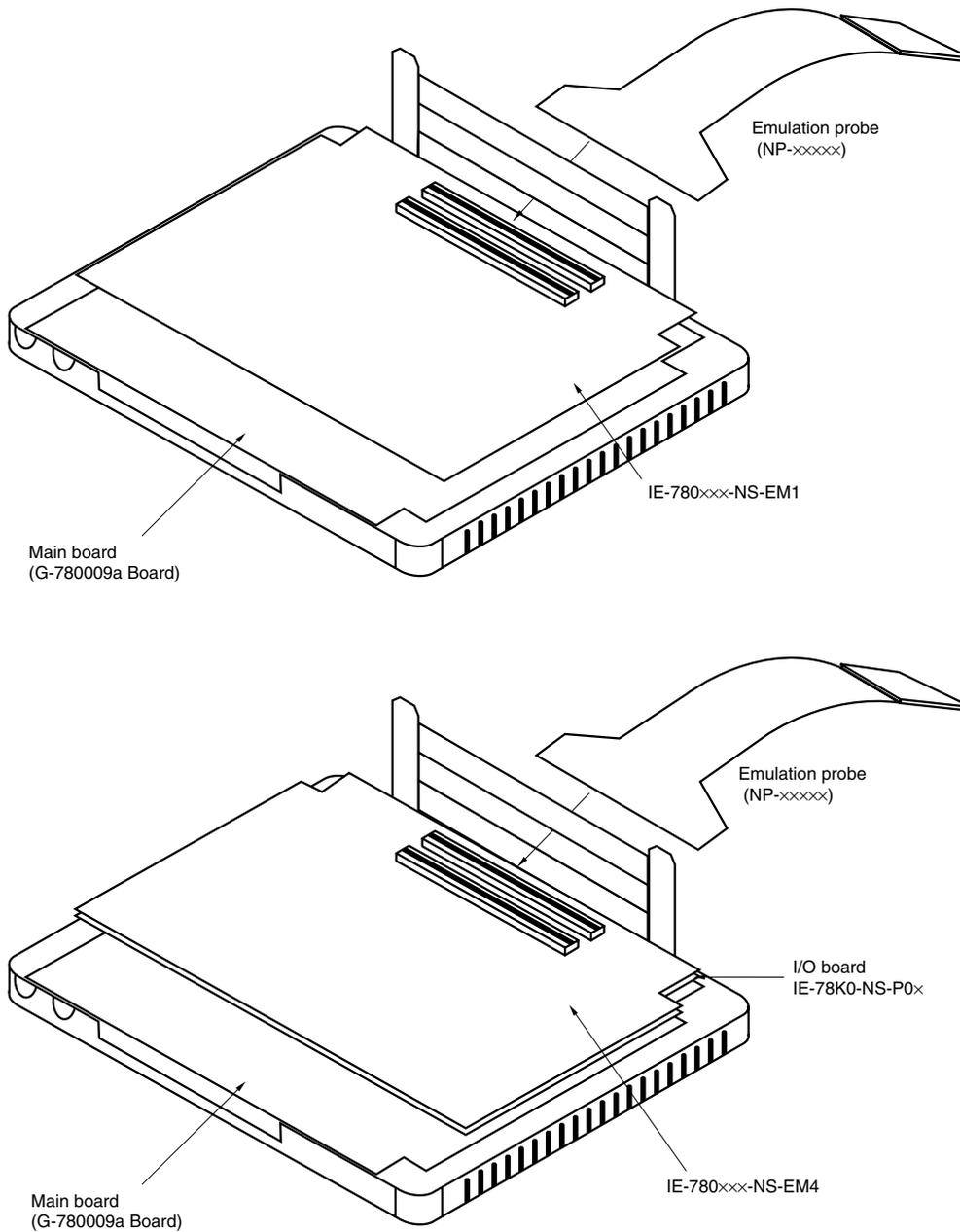
Figure 3-5. Connecting Emulation Probe (Two-Board Type)



Caution The emulation probe (NP-xxxxx) mounting location varies depending on the model of the I/O emulation board, IE-780xxx-NS-EMn (n = 1 or 4) in use. For details, refer to the IE-780xxx-NS-EMn User's Manual.

- ★ (b) One-board type (when the 2nd figure from the left in the serial number is G or later)

Figure 3-6. Connecting Emulation Probe (One-Board Type)

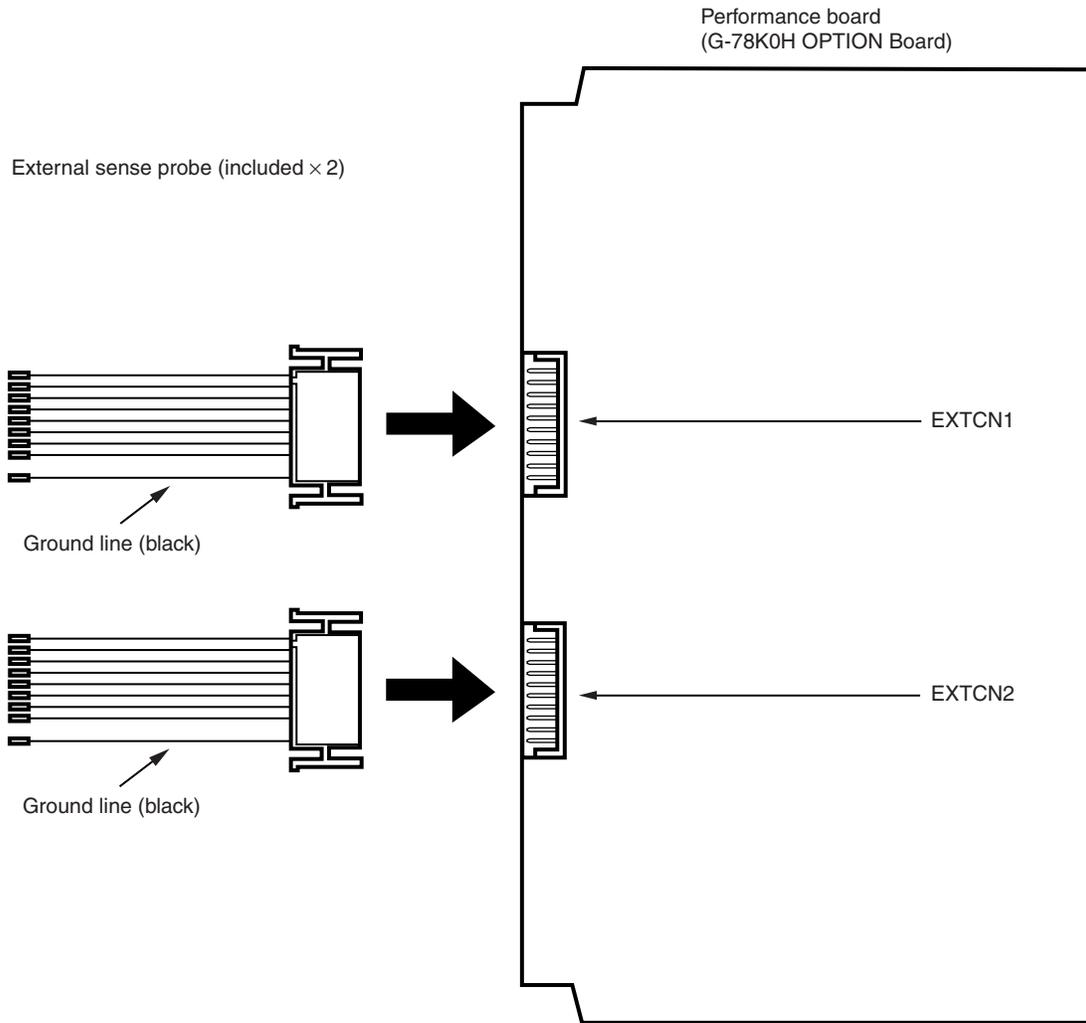


Caution The emulation probe (NP-xxxxx) mounting location varies depending on the model of the I/O emulation board, IE-780xxx-NS-EMn (n = 1 or 4) in use. For details, refer to the IE-780xxx-NS-EMn User's Manual.

(4) Connecting external sense probe

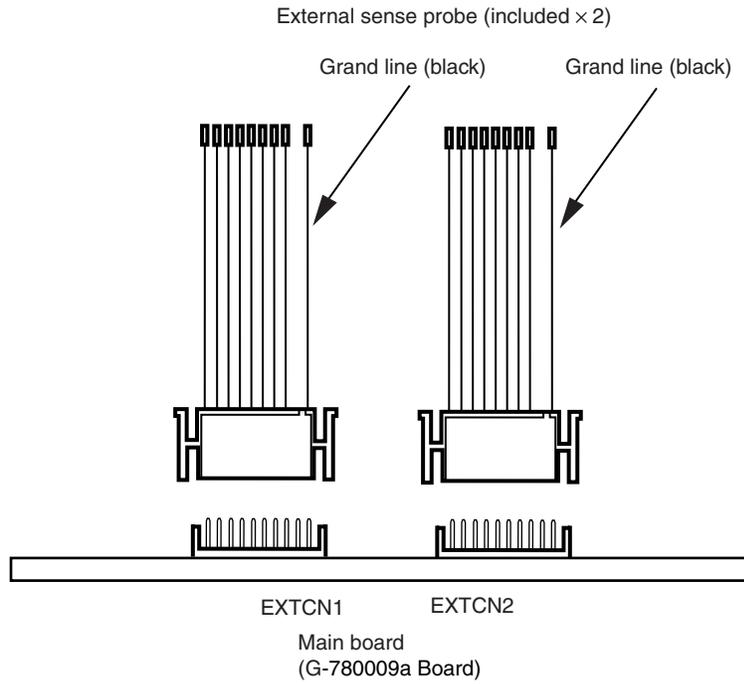
- (a) Two-board type (when the 2nd figure from the left in the serial number is F or earlier)

Figure 3-7. Connecting External Sense Probe (Two-Board Type)



- ★ (b) One-board type (when the 2nd figure from the left in the serial number is G or later)

Figure 3-8. Connecting External Sense Probe (One-Board Type)

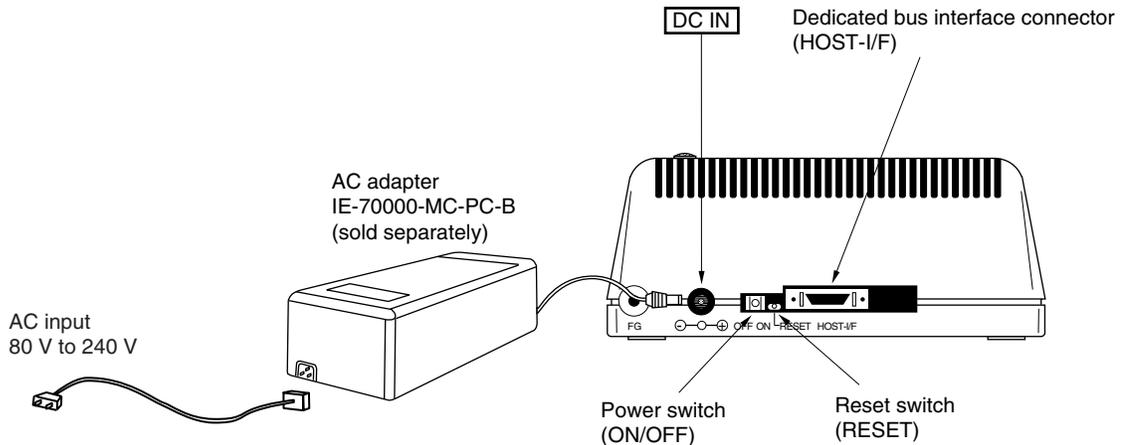


(5) Connecting AC adapter (IE-70000-MC-PS-B)

IE-70000-MC-PS-B is sold separately.

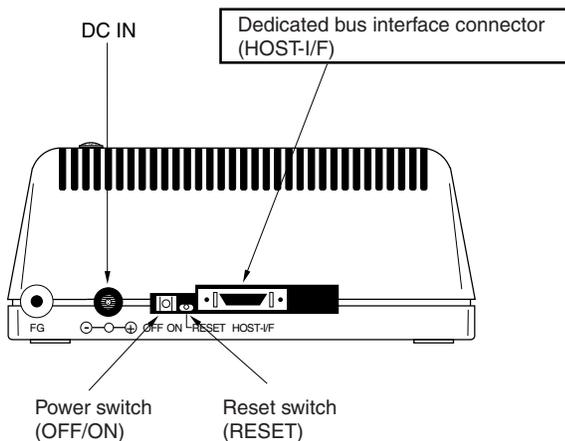
- <1> Insert the plug of the AC adapter (IE-70000-MC-PS-B) into the DC IN socket on the interface side of the IE-78K0-NS-A.

Figure 3-9. Connecting AC Adapter

**(6) Connecting interface cable**

- <1> Insert the cable into the bus interface connector on the IE-78K0-NS-A main unit.

Figure 3-10. Connecting Dedicated Bus Interface Cable



Caution The type of interface cable varies depending on whether an interface board or a PC card interface is used.

- When using an interface board (IE-70000-98-IF-C, IE-70000-PC-IF-C, or IE-70000-PCI-IF(-A))
→ Connect the NS interface cable included with the IE-78K0-NS-A.
- When using a PC card interface (IE-70000-CD-IF-A)
→ Connect the NS card cable included with the IE-70000-CD-IF-A.

The IE-70000-98-IF-C, IE-70000-PC-IF-C, IE-70000-PCI-IF(-A), and IE-70000-CD-IF-A are sold separately.

3.2 External Trigger Functions

(1) EXTOUT

At the occurrence of a break event, the EXTOUT pin on the emulation board outputs a low level for 1.3 μ s.

Caution Because the output is open drain, connect a pull-up resistor in the target system.

(2) EXTIN

The EXTIN pin on the emulation board can be used to input an event signal. Enter high-level pulse signals for two or more CPU clocks.

Caution For the electrical specifications, refer to Table 3-1.

Table 3-1. Electrical Specifications

Parameter	MIN. [V]	MAX. [V]
Input voltage, high	Target voltage \times 0.7	Target voltage
Input voltage, low	0	Target voltage \times 0.3

3.3 External sense

Up to 16 bits of data can be input to the IE-78K0-NS-A from the target system via an external sense probe. Also, when using an external sense break, input a level of at least 2 CPU clocks.

Table 3-2. Electrical Specifications of External Sense

Parameter	MIN. [V]	MAX. [V]
Input voltage, high	Target voltage ^{Note} \times 0.7	Target voltage ^{Note}
Input voltage, low	0	Target voltage ^{Note} \times 0.3

Note 2.0 V when the target voltage is less than 2.0 V.

3.4 Jumper Settings (on Main Board (G-780009 Board and G-780009a Board))

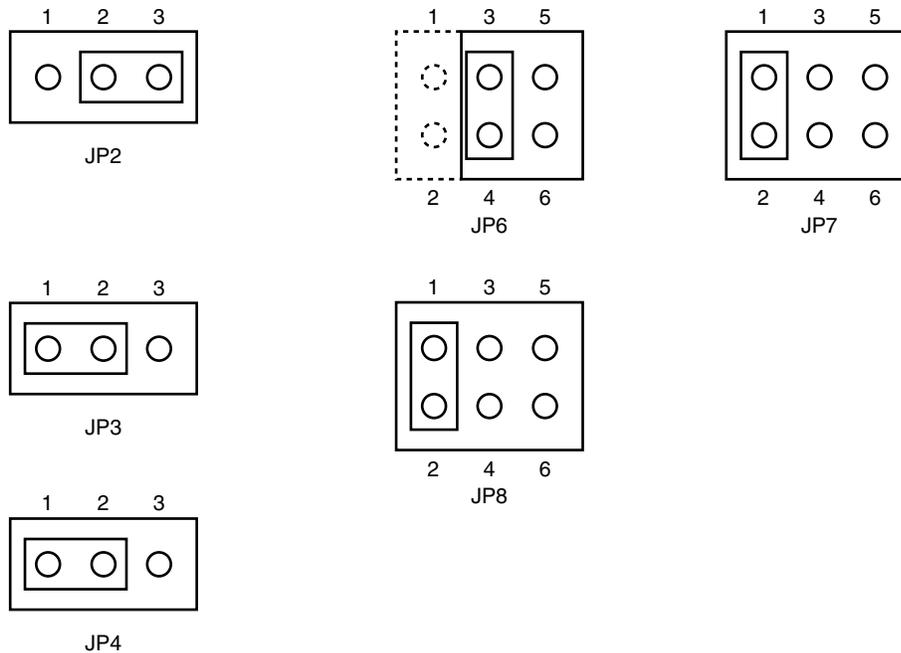
(1) Default jumper settings

Figure 3-11 shows the position of the jumpers used on the G-780009 Board and the G-780009a Board.

When changing the settings of jumpers on the G-780009 Board, remove the five spacers on the G-78K0H OPTION Board, and then remove the G-78K0H-OPTION Board.

For details of the settings, refer to the user's manual of each emulation board.

Figure 3-11. Default Settings of JP2, JP3, JP4, JP6, JP7, and JP8



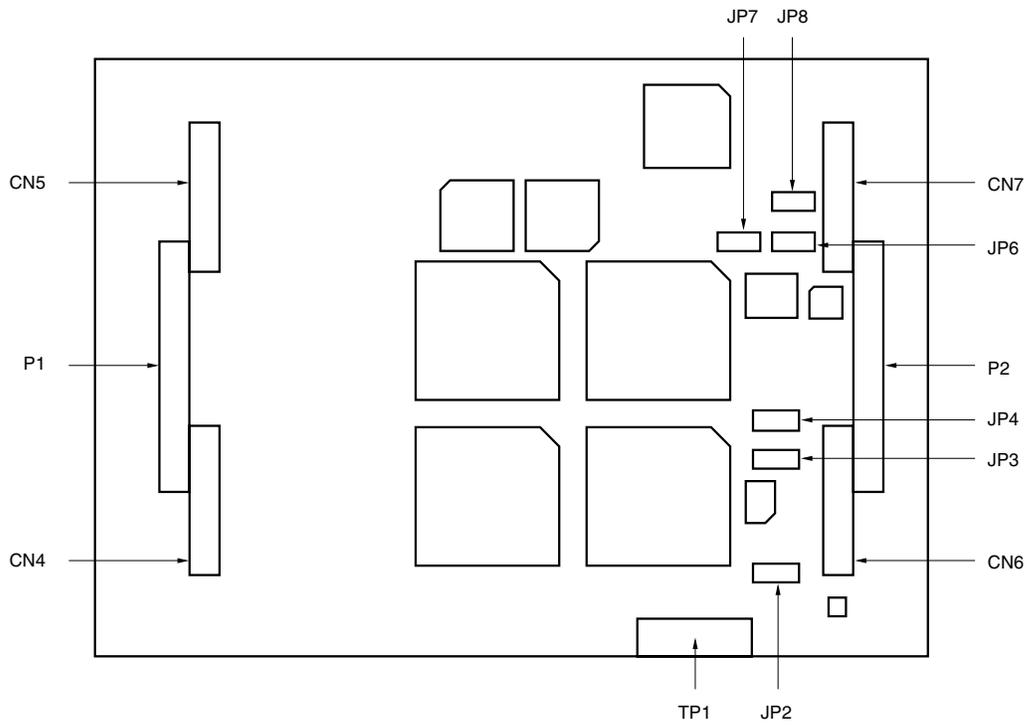
JP8: Selection of the subsystem clock source (default setting: 1 and 2 shorted)

- 1 and 2 shorted: Internal (mounted on the emulation board or mounted on the parts board by the user)
- 3 and 4 shorted: External (input via an emulation probe from the target system)

Cautions 1. Jumper settings differ depending on the emulation board. For details, refer to the relevant emulation board user's manual.

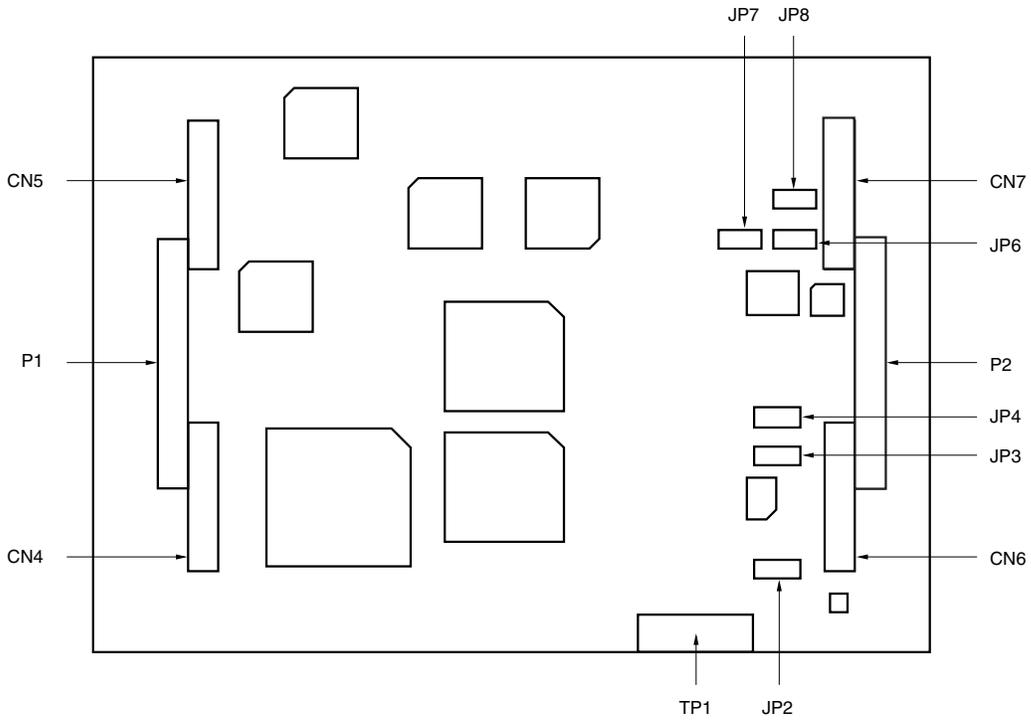
2. Set the jumpers on the G-780009 Board when the IE-78K0-NS-A, two-board type (the 2nd figure from the left side of the serial number is F or earlier), is used. Set the jumpers on the G-780009a Board when the IE-78K0-NS-A, one-board type (the 2nd figure from the left side of the serial number is G or later), is used.

Figure 3-12. Part Names of G-780009 Board



★

Figure 3-13. Part Names of G-78000a Board

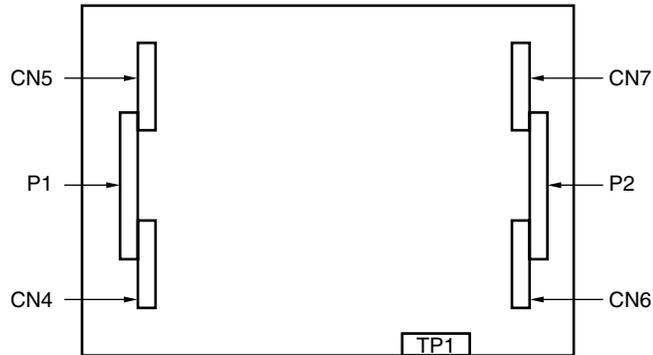


3.5 Low-Voltage Emulation Settings

Low-voltage emulation can be executed in the IE-78K0-NS-A by connecting an emulation board that supports low-voltage operation.

- (1) When using other than the IE-78018-NS-EM1 when the target is at low voltage, supply the same supply voltage as that of the target to the IE-78K0-NS-A TP1 terminal pin on the G-780009 Board. (This also applies when the voltage is 5 V.)

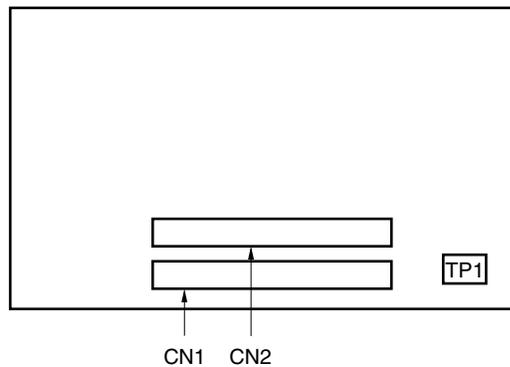
Figure 3-14. Position of TP1 on IE-78K0-NS-A



Remark The maximum current consumption of TP1 is from 100 mA (1.8 V) to 300 mA (5 V).

- (2) When using the IE-78018-NS-EM1 when the target is at low voltage, supply the same supply voltage as that of the target to the TP1 terminal pin on the IE-78018-NS-EM1. (This also applies when the voltage is 5 V.)

Figure 3-15. Position of TP1 on IE-78018-NS-EM1



Remark The maximum current consumption of TP1 is from 100 mA (1.8 V) to 300 mA (5 V).

Caution For details of the target voltage or maximum current consumption, refer to the relevant emulation board user's manual.

APPENDIX A INTERFACE BOARD (IE-70000-PCI-IF-A) FOR DESKTOP PC

This chapter describes the setting method when connecting the IE-78K0-NS-A.
For details, refer to the **IE-70000-PCI-IF-A User's Manual (to be prepared)**.

A.1 Introduction

The IE-70000-PCI-IF-A is an interface board for an IE product that is installed in the PCI bus slot of a PC.
First of all, check that you have the following items.

- Interface board (IE-70000-PCI-IF-A) for desktop PC × 1
- 8-bit connector board (connected to IE-70000-PCI-IF-A) × 1
- 32-bit connector board × 1
- User's manual × 1
- DLL-DISK × 1
- IE-PC Driver DISK × 1
- Guarantee card × 1

<Basic specifications>

Hardware resources used

- I/O address0000H to FFFFH
- Interrupts.....Unused
- Memory.....Uses 80H bytes

Current consumption

300 mA (MAX. when using +5 V)

- Cautions**
1. Do not place heavy objects on or apply pressure to the board.
 2. Do not drop the board or subject it to excessive vibration or shock.
 3. When removing a cable, do not pull it by the cord.
 4. Do not use or keep the board in a hot, humid or dusty environment or in a location where it is directly exposed to sunlight.
 5. Avoid subjecting the board to extreme changes in temperature or humidity.
 6. Do not spill drinks or other liquids onto the board or its accessories.
 7. Do not connect a cable for a different product to the connector.

A.2 Installation

(1) Board settings

There are no jumpers or DIP switches on the IE-70000-PCI-IF-A.

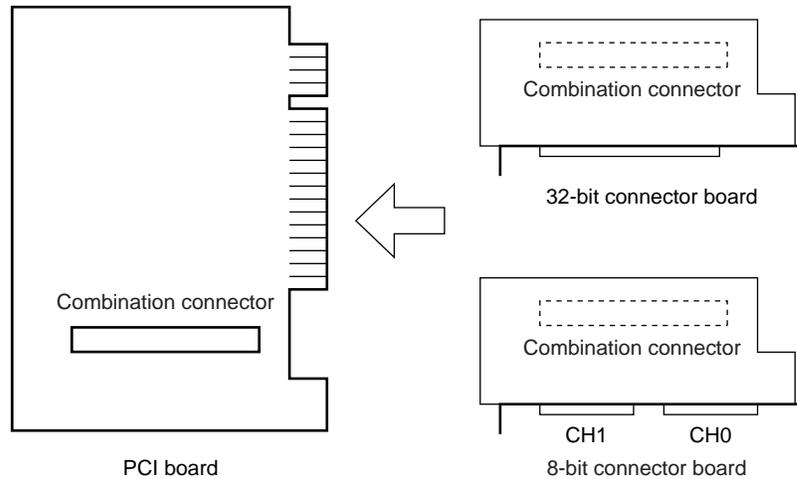
(2) 8-bit connector board mounting

An 8-bit connector board is premounted at shipment.

Remark When a 32-bit board is mounted, place it on the 8-bit connector board using the combination connector (refer to Figure A-1) and fasten them together with screws.

Caution The 32-bit connector board is included for future function expansion.

Figure A-1. Mounting of PCI Board and Connector Boards



(3) Installation in PC

Make sure that the PC is turned off, then install the interface board in the PCI bus slot following the instructions in the PC's manual.

(4) PCI driver installation

Refer to the supplied IE-PC Driver DISK Readme_e.txt for PCI driver installation.

(5) Connecting with IE-78K0-NS-A

Using the supplied cable, connect the IE-78K0-NS-A to the CH0 side.

Caution Connection with the IE-78K0-NS-A is possible on the CH0 side only.

APPENDIX B PC CARD INTERFACE (IE-70000-CD-IF-A)

This chapter describes the setting method when connecting the IE-78K0-NS-A.

For details, refer to the **IE-70000-CD-IF-A User's Manual (to be prepared)**.

B.1 Introduction

The PC card interface (IE-70000-CD-IF-A) is an interface card for an IE product that is installed in a PCMCIA2.1/JEIDA standard Ver.4.2-compliant PC card slot.

First of all, check that you have the following items.

- PC card interface (IE-70000-CD-IF-A) × 1
- MC card cable × 1
- NS card cable × 1
- User's manual × 1
- DLL-DISK × 1
- IE-PC Driver DISK × 1
- Guarantee card × 1

<Basic specifications>

Hardware resources used

- I/O address20H bytes starting from 220H, 260H, 2E0H, 320H, or 3E0H as a base address
- Interrupts.....Unused
- Memory.....Unused

Current consumption

300 mA (MAX. when using +5 V)

- Cautions**
1. Do not place heavy objects on or apply pressure to the board.
 2. Do not drop the board or subject it to excessive vibration or shock.
 3. When removing a cable, do not pull it by the cord.
 4. Do not use or keep the board in a hot, humid or dusty environment or in a location where it is directly exposed to sunlight.
 5. Avoid subjecting the board to extreme changes in temperature or humidity.
 6. Do not spill drinks or other liquids onto the board or its accessories.
 7. Do not connect a cable for a different product to the connector.

B.2 Installation

(1) Installation in PC

Insert the PCMCIA card in the card slot when the power supply of the PC is turned on.

For Windows NT™4.0, insert the card in the slot when the power supply is turned off. Be careful to insert the card in the correct direction.

(2) PCMCIA driver installation

Refer to the supplied IE-PC Driver DISK Readme_e.txt for PCMCIA driver installation.

Caution This interface card cannot be connected to the IE-78xxxx-R. Actually, installation ends completely by selecting “IE-78xxxx-R” displayed in the IE-PC Driver DISK installation menu. In this case, however, the installation is invalid.

(3) Connection with the IE-78K0-NS-A

Using the NS card cable, connect the IE-70000-CD-IF-A to the IE-78K0-NS-A.

Caution Be sure to use the NS-A CABLE when connecting to the IE-78K0-NS-A. If MC card cable is used, the IE-70000-CD-IF-A may be damaged.

APPENDIX C INTERFACE BOARD (IE-70000-98-IF-C) FOR PC-9800 SERIES

This chapter describes the setting method when connecting the IE-78K0-NS-A.
For details, refer to the **IE-70000-98-IF-C User's Manual (to be prepared)**.

C.1 Introduction

The IE-70000-98-IF-C is an interface board for the PC-9800 series that is installed in the C bus slot of a PC-9800 series machine.

Caution The PC98-NX series is treated as an IBM PC/AT compatible machine. Refer to **APPENDIX A INTERFACE BOARD (IE-70000-PCI-IF(-A)) FOR DESKTOP PC**.

First of all, check that you have the following items.

- Interface board (IE-70000-98-IF-C) for PC-9800 series × 1
- User's manual × 1
- DLL-DISK × 1
- IE-PC Driver DISK × 1
- Guarantee card × 1

<Basic specifications>

Applicable models

This product is designed for devices incorporating a PC-9800 series C bus.

Hardware resources used

- I/O addresses 16 bytes at a 256-byte boundary (00D×H, 01D×H,...FFD×H)
- Interrupts and others....Unused

Current consumption

500 mA (MAX. when using +5 V)

- Cautions**
1. Do not place heavy objects on or apply pressure to the board.
 2. Do not drop the board or subject it to excessive vibration or shock.
 3. When removing a cable, do not pull it by the cord.
 4. Do not use or keep the board in a hot, humid or dusty environment or in a location where it is directly exposed to sunlight.
 5. Avoid subjecting the board to extreme changes in temperature or humidity.
 6. Do not spill drinks or other liquids onto the board or its accessories.
 7. Do not connect a cable for a different product to the connector.

C.2 Installation

(1) I/O address settings

SW1 and SW2 are the switches selecting the C bus I/O addresses. SW1 numbers 1 to 8 correspond to C bus addresses A4 to A11, and SW2 numbers 1 to 4 correspond to C bus addresses A12 to A15.

In the IE-78K0-NS-A, the addresses should be set in the 16 bytes between 00D×H and FFD×H. The switch takes the value “0” when ON and “1” when OFF.

The addresses used for setup must be values that are not used in the PC system or for other boards. In addition, since these values are used during software installation, make a note of them for future reference.

Setting examples of I/O address, SW1 and SW2 are shown below.

Table C-1. SW1 and SW2 Settings When Setting I/O Address to 01D×H

SW1 Number	1	2	3	4	5	6	7	8
Address	A4	A5	A6	A7	A8	A9	A10	A11
ON		0				0	0	0
OFF	1		1	1	1			

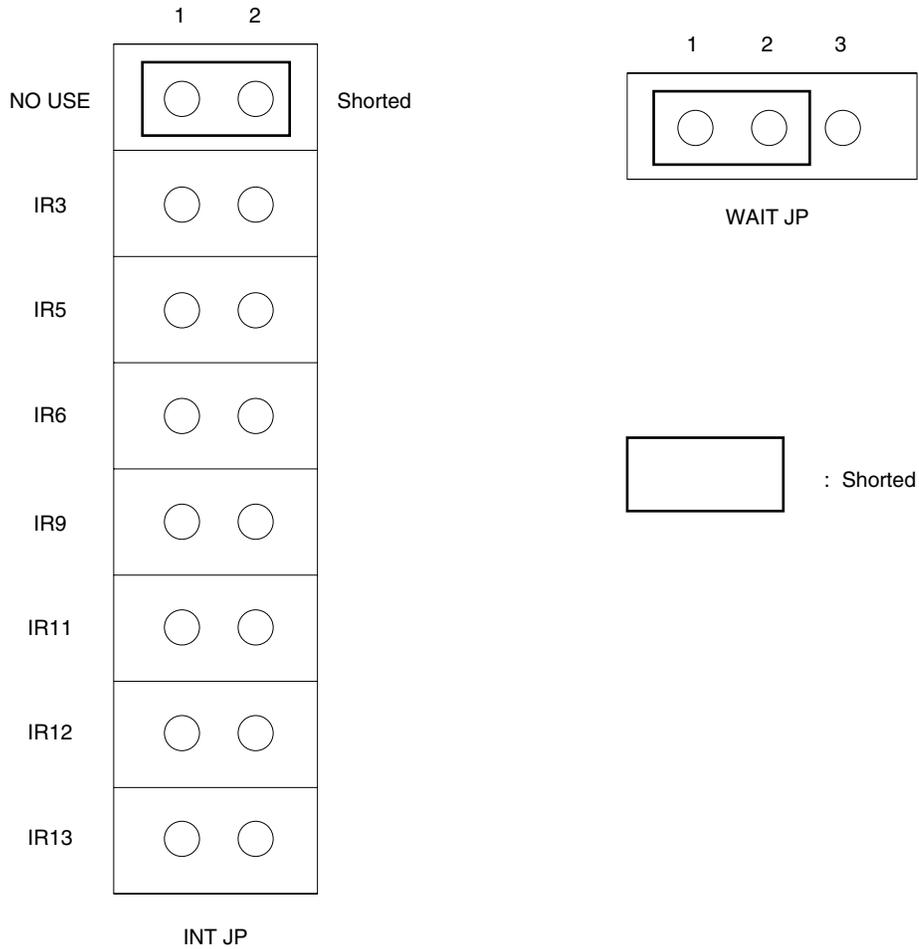
SW2 Number	1	2	3	4	5	6	7	8
Address	A12	A13	A14	A15	OFF	OFF	ON	OFF
ON	0	0	0	0			0	
OFF					1	1		1

Caution Set SW2 number 7 to ON and SW2 numbers 5, 6, and 8 to OFF.

(2) Jumper settings

The INT JP and WAIT JP are C bus interrupt and WAIT selection jumpers.
 In the IE-78K0-NS-A, set INT JP to NO USE, and WAIT JP to 1 and 2 shorted.

Figure C-1. INT JP, WAIT JP Settings



(3) Installation in PC

Make sure that the PC is turned off, then install the interface board in the C bus slot following the instructions in the PC's manual.

(4) Connecting with IE-78K0-NS-A

Using the supplied cable, connect the IE-78K0-NS-A to CH0.

Caution Connection with the IE-78K0-NS-A is possible to CH0 only.
 For connection with other models, refer to their respective manuals.

APPENDIX D INTERFACE BOARD (IE-70000-PC-IF-C) FOR IBM PC/AT AND COMPATIBLES

This chapter describes the setting method when connecting the IE-78K0-NS-A.

For details, refer to the **IE-70000-PC-IF-C User's Manual (to be prepared)**.

D.1 Introduction

The IE-70000-PC-IF-C is an interface board for IBM PC/AT compatibles and is installed in the ISA bus slot of an IBM PC/AT compatible.

First of all, check that you have the following items.

- Interface board (IE-70000-PC-IF-C) for IBM PC/AT × 1
- User's manual × 1
- IE-PC Driver DISK × 1
- DLL-DISK × 1
- Guarantee card × 1

<Basic specifications>

Applicable models

The IE-70000-PC-IF-C is designed for IBM PC/AT compatibles incorporating an ISA bus.

Hardware resources

- I/O address 16 bytes at any 16-byte boundary (020×H to 03F×H)
- Interrupts and others ... Unused

Current consumption

500 mA (MAX. when using +5 V)

- Cautions**
1. Do not place heavy objects on or apply pressure to the board.
 2. Do not drop the board or subject it to excessive vibration or shock.
 3. When removing a cable, do not pull it by the cord.
 4. Do not use or keep the board in a hot, humid or dusty environment or in a location where it is directly exposed to sunlight.
 5. Avoid subjecting the board to extreme changes in temperature or humidity.
 6. Do not spill drinks or other liquids onto the board or its accessories.
 7. Do not connect a cable for a different product to the connector.

D.2 Installation

(1) I/O address settings

SW1 and SW2 are the switches selecting the ISA bus I/O addresses. SW1 numbers 1 to 8 correspond to ISA bus addresses A4 to A11, and SW2 numbers 1 to 4 correspond to ISA bus addresses A12 to A15.

In the IE-78K0-NS-A, the addresses should be set between 020xH and 03FxH. The switch takes the value "0" when ON and "1" when OFF.

The addresses used for setup must be values that are not used in the PC system or for other boards. In addition, since these values are used during software installation, make a note of them for future reference.

Setting examples of I/O address, SW1 and SW2 are shown below.

Table D-1. SW1 and SW2 Settings When Setting I/O Address to 020xH

SW1 Number	1	2	3	4	5	6	7	8
Address	A4	A5	A6	A7	A8	A9	A10	A11
ON	0	0	0	0	0		0	0
OFF						1		

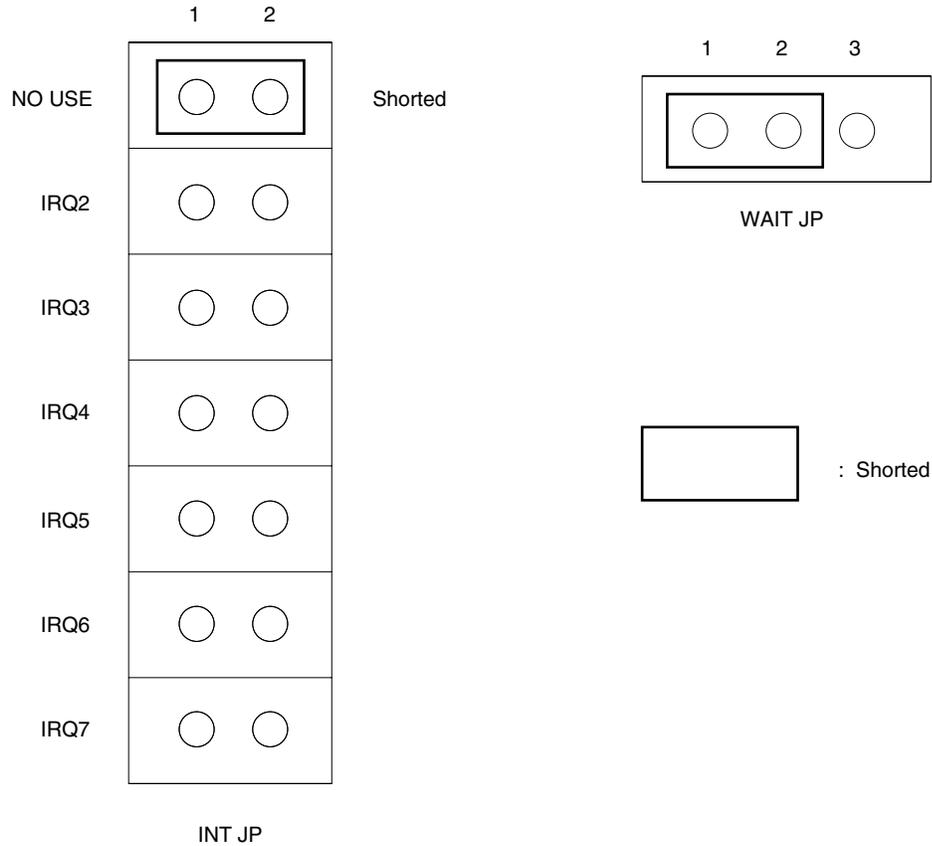
SW2 Number	1	2	3	4	5	6	7	8
Address	A12	A13	A14	A15	OFF	OFF	ON	OFF
ON	0	0	0	0			0	
OFF					1	1		1

Caution Set SW2 number 7 to ON and SW2 numbers 5, 6, and 8 to OFF.

(2) Jumper settings

The INT JP and WAIT JP are ISA bus interrupt and WAIT selection jumpers. In the IE-78K0-NS-A, set INT JP to NO USE, and WAIT JP to 1 and 2 shorted.

Figure D-1. INT JP, WAIT JP Settings



(3) Installation in PC

Make sure that the PC is turned off, then install the interface board in the ISA bus slot following the instructions in the PC's manual.

(4) Connecting with IE-78K0-NS-A

Using the supplied cable, connect the IE-78K0-NS-A to CH0.

Caution Connection with the IE-78K0-NS-A is possible to CH0 only.
For connection with other models, refer to their respective manuals.

APPENDIX E REVISION HISTORY

A history of the revisions up to this edition is shown below. “Applied to:” indicates the chapters to which the revision was applied.

Edition	Major Revisions from Previous Edition	Applied to:
2nd	Change of interface board for desktop PC from IE-70000-PCI-IF to IE-70000-PCI-IF-A	Throughout
	Modification of Figure 1-1 IE-78K0-NS-A System Configuration	CHAPTER 1 GENERAL
	A.1 Introduction • Deletion of Applicable models	APPENDIX A
	B.1 Introduction • Deletion of Applicable models	APPENDIX B
3rd	Addition of the description of the G-780009a Board	Throughout

The mark ★ shows major revised points.