To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

Send any inquiries to http://www.renesas.com/inquiry.

Notice

1. All information included in this document is current as of the date this document is issued. Such information, however, is subject to change without any prior notice. Before purchasing or using any Renesas Electronics products listed herein, please confirm the latest product information with a Renesas Electronics sales office. Also, please pay regular and careful attention to additional and different information to be disclosed by Renesas Electronics such as that disclosed through our website.
2. Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
3. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part.
4. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
5. When exporting the products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations. You should not use Renesas Electronics products or the technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations.
6. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
7. Renesas Electronics products are classified according to the following three quality grades: "Standard", "High Quality", and "Specific". The recommended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below. You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application categorized as "Specific" without the prior written consent of Renesas Electronics. Further, you may not use any Renesas Electronics product for any application for which it is not intended without the prior written consent of Renesas Electronics. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for an application categorized as "Specific" or for which the product is not intended where you have failed to obtain the prior written consent of Renesas Electronics. The quality grade of each Renesas Electronics product is "Standard" unless otherwise expressly specified in a Renesas Electronics data sheets or data books, etc.

   "Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; and industrial robots.

   "High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti-crime systems; safety equipment; and medical equipment not specifically designed for life support.

   "Specific": Aircraft; aerospace equipment; submersible repeaters; nuclear reactor control systems; medical equipment or systems for life support (e.g. artificial life support devices or systems), surgical implantations, or healthcare intervention (e.g. excision, etc.), and any other applications or purposes that pose a direct threat to human life.
8. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
9. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or system manufactured by you.
10. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
11. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.

(Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.

(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

User's Manual

IE-78K0-NS

In-Circuit Emulator

Target Devices
78K/0 Series

Document No. U13731EJ3V0UM00 (3rd edition)
Date Published May 2003 N CP(K)

[MEMO]

V40 Family is a trademark of NEC Electronics Corporation.

Windows is either a registered trademark or a trademark of Microsoft Corporation in the United States and/or other countries.

PC/AT is a trademark of International Business Machines Corporation.

- **The information in this document is current as of February, 2003. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC Electronics data sheets or data books, etc., for the most up-to-date specifications of NEC Electronics products. Not all products and/or types are available in every country. Please check with an NEC Electronics sales representative for availability and additional information.**
- No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Electronics. NEC Electronics assumes no responsibility for any errors that may appear in this document.
- NEC Electronics does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of NEC Electronics products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Electronics or others.
- Descriptions of circuits, software and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software and information in the design of a customer's equipment shall be done under the full responsibility of the customer. NEC Electronics assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.
- While NEC Electronics endeavors to enhance the quality, reliability and safety of NEC Electronics products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC Electronics products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment and anti-failure features.
- NEC Electronics products are classified into the following three quality grades: "Standard", "Special" and "Specific".

  The "Specific" quality grade applies only to NEC Electronics products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of an NEC Electronics product depend on its quality grade, as indicated below. Customers must check the quality grade of each NEC Electronics product before using it in a particular application.

  "Standard": Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots.

  "Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support).

  "Specific": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.

The quality grade of NEC Electronics products is "Standard" unless otherwise expressly specified in NEC Electronics data sheets or data books, etc. If customers wish to use NEC Electronics products in applications not intended by NEC Electronics, they must contact an NEC Electronics sales representative in advance to determine NEC Electronics' willingness to support a given application.

(Note)

(1) "NEC Electronics" as used in this statement means NEC Electronics Corporation and also includes its majority-owned subsidiaries.

(2) "NEC Electronics products" means any product developed or manufactured by or for NEC Electronics (as defined above).

M8E 02. 11-1

Regional Information

Some information contained in this document may vary from country to country. Before using any NEC Electronics product in your application, please contact the NEC Electronics office in your country to obtain a list of authorized representatives and distributors. They will verify:

- Device availability
- Ordering information
- Product release schedule
- Availability of related technical literature
- Development environment specifications (for example, specifications for third-party tools and components, host computers, power plugs, AC supply voltages, and so forth)
- Network requirements

In addition, trademarks, registered trademarks, export restrictions, and other legal issues may also vary from country to country.

[GLOBAL SUPPORT]
http://www.necel.com/en/support/support.html

NEC Electronics America, Inc. (U.S.)
Santa Clara, California
Tel: 408-588-6000
800-366-9782

NEC Electronics (Europe) GmbH
Duesseldorf, Germany
Tel: 0211-65 03 01

- **Sucursal en España**
  Madrid, Spain
  Tel: 091-504 27 87
- **Succursale Française**
  Vélizy-Villacoublay, France
  Tel: 01-30-67 58 00
- **Filiale Italiana**
  Milano, Italy
  Tel: 02-66 75 41
- **Branch The Netherlands**
  Eindhoven, The Netherlands
  Tel: 040-244 58 45
- **Tyskland Filial**
  Taeby, Sweden
  Tel: 08-63 80 820
- **United Kingdom Branch**
  Milton Keynes, UK
  Tel: 01908-691-133

NEC Electronics Hong Kong Ltd.
Hong Kong
Tel: 2886-9318

NEC Electronics Hong Kong Ltd.
Seoul Branch
Seoul, Korea
Tel: 02-558-3737

NEC Electronics Shanghai, Ltd.
Shanghai, P.R. China
Tel: 021-6841-1138

NEC Electronics Taiwan Ltd.
Taipei, Taiwan
Tel: 02-2719-2377

NEC Electronics Singapore Pte. Ltd.
Novena Square, Singapore
Tel: 6253-8311

J03.4

Major Revisions in This Edition

Page	Description
Throughout	Change of interface board for desktop PC from IE-70000-PCI-IF to IE-70000-PCI-IF-A
p.12	Modification of **Figure 1-1 IE-78K0-NS System Configuration**
p.36	**A.1 Introduction** • Deletion of **Applicable models**
p.38	**B.1 Introduction** • Deletion of **Applicable models**

The mark ★ shows major revised points.

INTRODUCTION

Product overview

The IE-78K0-NS is used in combination with an emulation board (IE-780×××-NS-EM1, IE-780×××-NS-EM4), I/O board (IE-78K0-NS-P0×), and performance board (IE-78K0-NS-PA) 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 with the IE-78K0-NS and an emulation board (IE-780×××-NS-EM1, IE-780×××-NS-EM4), I/O board (IE-78K0-NS-P0×), and performance board (IE-78K0-NS-PA).

Purpose

The purpose of this manual is to help the user understand the debugging functions that are available by using the IE-78K0-NS and the emulation board (IE-780×××-NS-EM1, IE-780×××-NS-EM4), I/O board (IE-78K0-NS-P0×), and performance board (IE-78K0-NS-PA) together.

Organization

When using the IE-78K0-NS, please refer to the manual that comes with the IE-78K0-NS (this manual) as well as the manual that comes with the emulation board (IE-780×××-NS-EM1, IE-780×××-NS-EM4), I/O board (IE-78K0-NS-P0×), and performance board (IE-78K0-NS-PA).

IE-78K0-NS User's Manual (This manual)	IE-780×××-NS-EM1 IE-780×××-NS-EM4 IE-78K0-NS-P0× IE-78K0-NS-PA User's Manual
• 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:
→ 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-780×××-NS-EM1, IE-780×××-NS-EM4, IE-78K0-NS-P0×, IE-78K0-NS-PA 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, preliminary versions are not marked as such.

○ **Documents Related to Development Tools (User's Manuals)**

Document Name		Document Number
IE-78K0-NS In-Circuit Emulator		This manual
RA78K0 Assembler Package	Operation	U14445E
	Language	U14446E
	Structured Assembly Language	U11789E
CC78K0 C Compiler Package	Operation	U14297E
	Language	U14298E
SM78K Series Ver.2.30 or later System Simulator	Operation (Windows™ Based)	U15373E
	External part user open interface specifications	U15802E
ID78K Series Integrated Debugger Ver.2.30 or later	Operation (Windows Based)	U15185E
ID78K0 Integrated Debugger (EWS Based)	Reference	−
RX78K0 Real-Time OS	Basics	U11537E
	Installation	U11536E
Project Manager Ver. 3.12 or later (Windows Based)		U14610E
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.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1 GENERAL

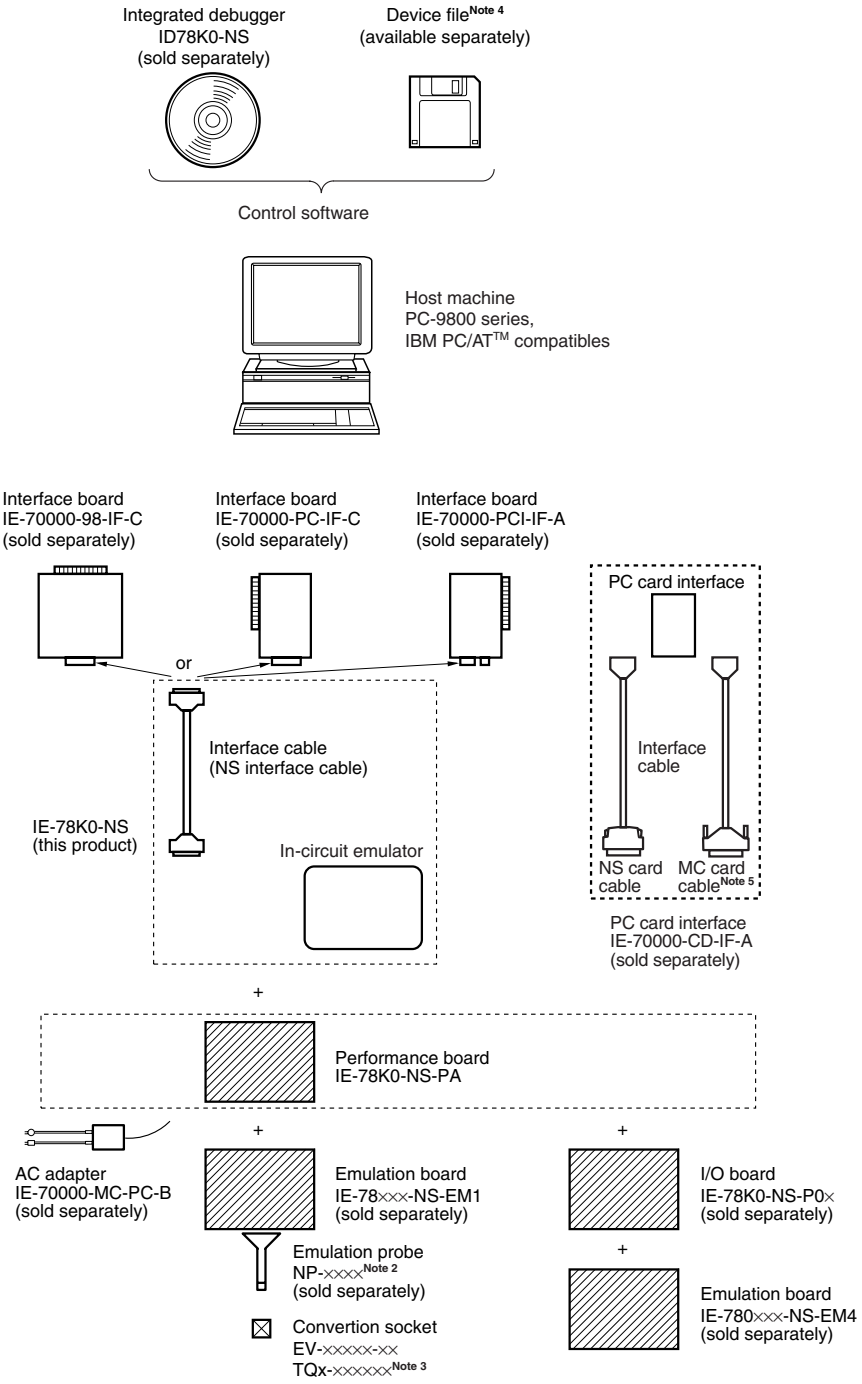
The IE-78K0-NS is a development tool for effectively debugging hardware and software in which a 78K/0 Series 8-bit single-chip microcontroller is used.

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

1.1 System Configuration

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

★ **Figure 1-1. IE-78K0-NS System Configuration**



Notes 1. When using the IE-780×××-NS-EM4, it is necessary to connect an I/O board, IE-78K0-NS-P0×. The IE-780×××-NS-EM4 and IE-78K0-NS-P0× are sold separately.

2. The NP-×××× 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 TQx-xxxxxx are products 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)

Notes **4.** The device file can be downloaded from the NEC Electronics website (URL: http://www.necel.com/micro).

5. This is a cable for the V850 Series. This is not used for the IE-78K0-NS.

1.2 Hardware Configuration

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

- Cabinet
- 78K0 main board
- NS interface cable
- Plastic spacers × 2

Figure 1-2. IE-78K0-NS Basic Hardware Configuration 1

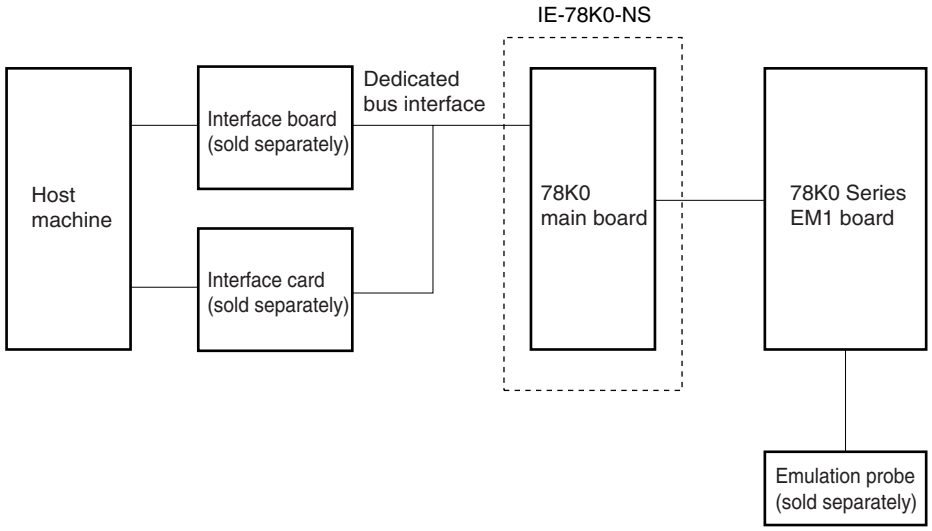


Figure 1-3. IE-78K0-NS Basic Hardware Configuration 2

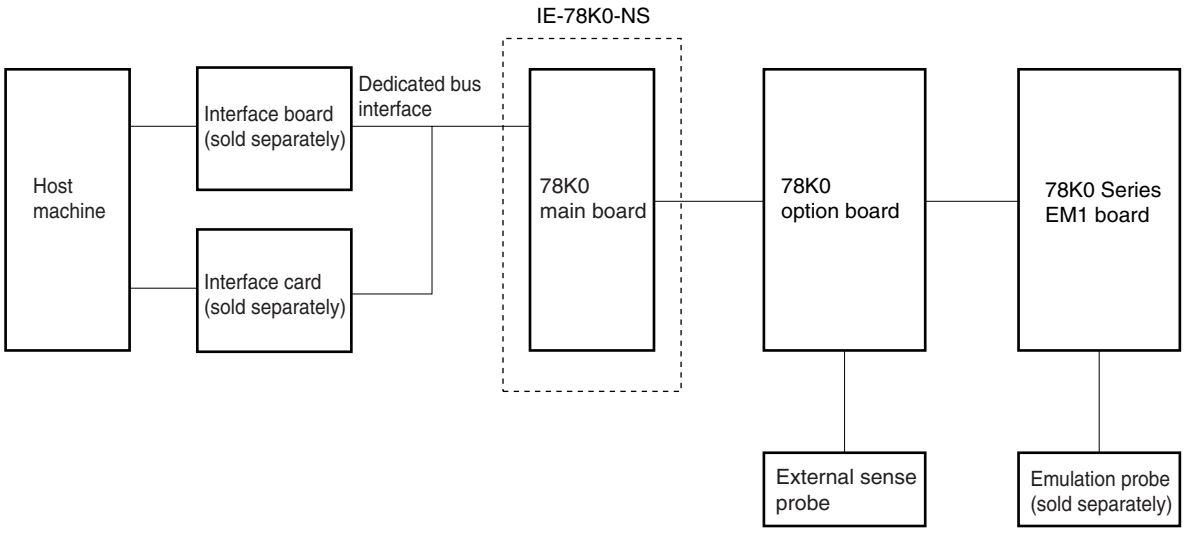


Figure 1-4. IE-78K0-NS Basic Hardware Configuration 3

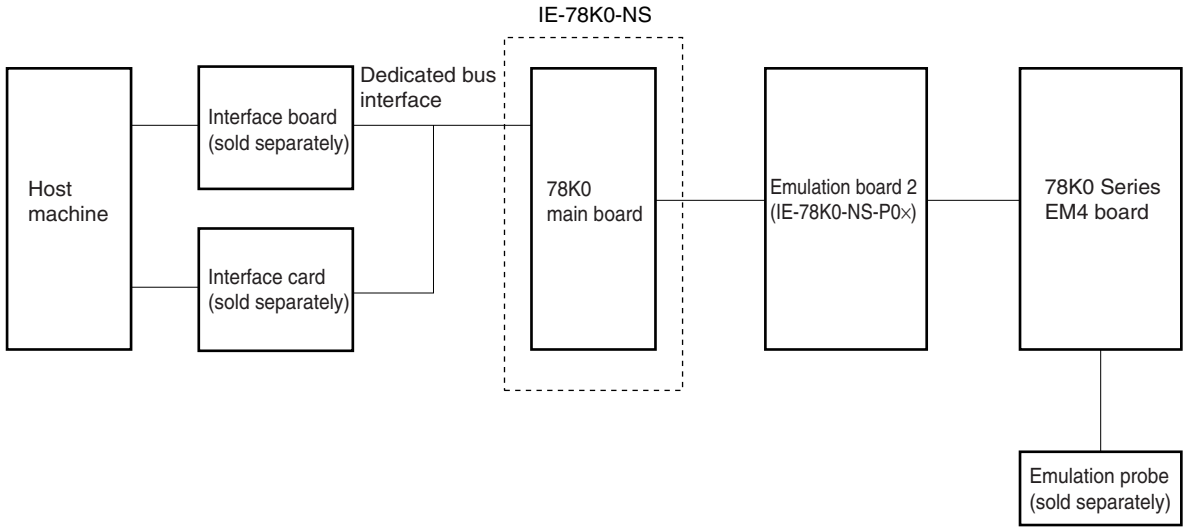
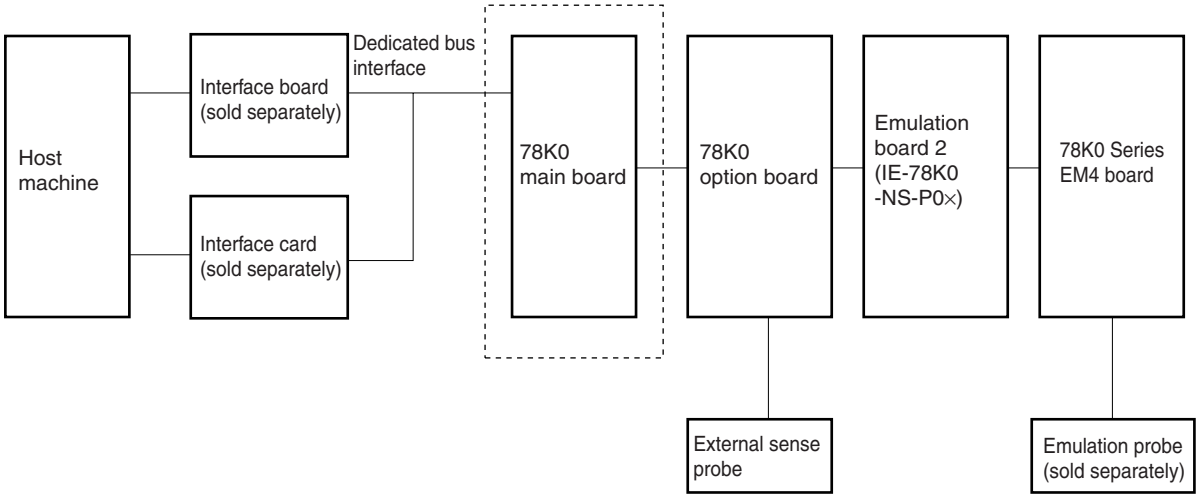


Figure 1-5. IE-78K0-NS Basic Hardware Configuration 4



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 (μPD780×××)
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		• Real-time execution • Break execution • Step execution
Real-time internal RAM monitor		2 KB of memory space
Event detection		• Program execution detection • Bus event detection • External trigger detection Trigger output (open drain output (1))
Event integration		• Path condition • Trace qualify condition • Delay condition • Trigger condition
Break factor		• Event break • Manual break • Command break • Fail-safe break
Real-time trace	Trace factor	• All traces • Qualify trace
	Trace capacity	32 bits × 8 KB
	Trace content	Address, data, and status

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

Parameter	Description
Execution time measurement	Up to 4 mins 28 sec, resolution: 62.5 ns
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 compatibles
Power supply	DC 5 V
Operation temperature range	10°C to 40°C
Dimensions	W240 × D197 × H73 (mm)

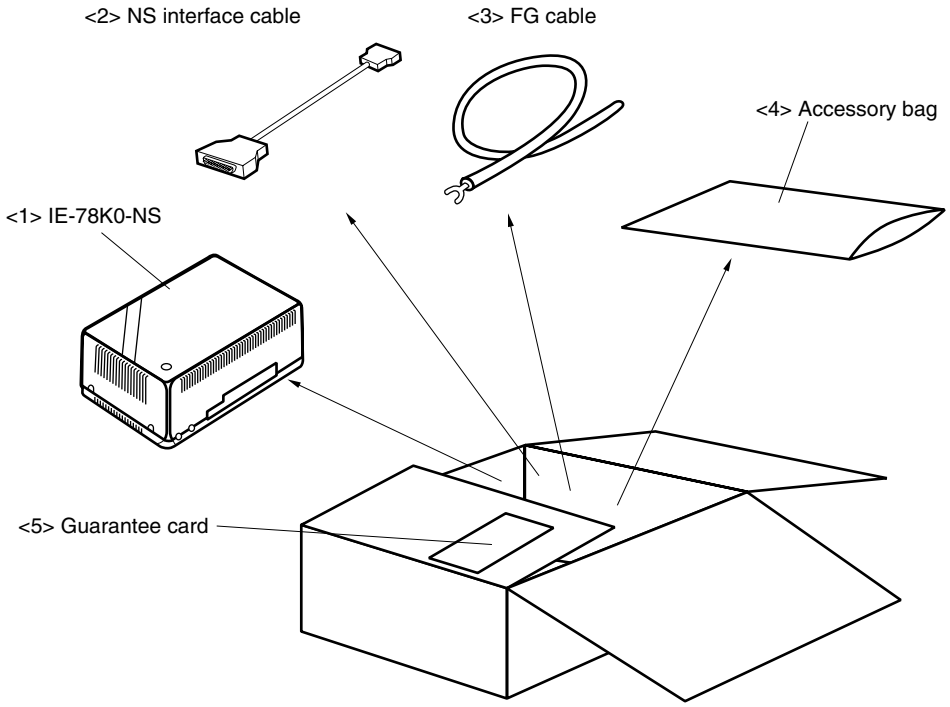
1.4 Contents in Carton

The IE-78K0-NS 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 case of missing or damaged items, please contact an NEC Electronics sales representative or NEC Electronics distributor.

Figure 1-6. Contents in Carton

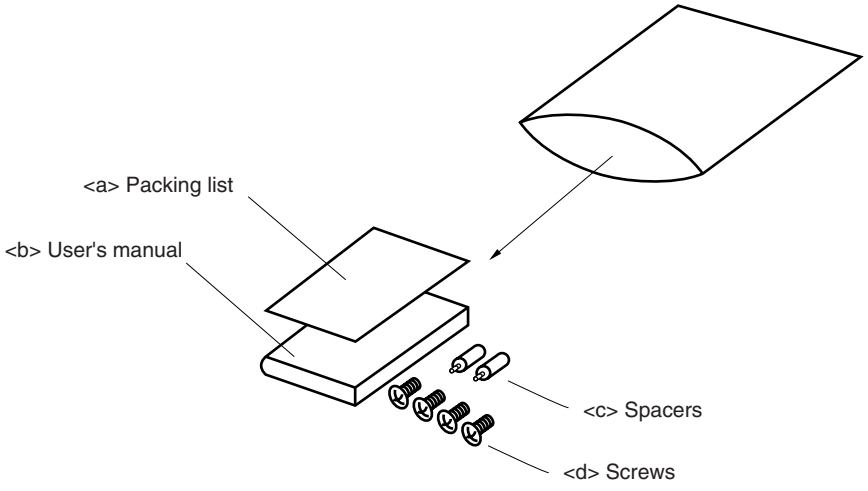


<1> IE-78K0-NS main unit × 1
<2> NS interface cable × 1
<3> FG cable × 1
<4> Accessory bag × 1
<5> Guarantee card × 1

Check that the accessory bag contains the following items (refer to **Figure 1-7 Contents in Accessory Bag**).

<a> Packing list × 1
<b> User's manual (this manual) × 1
<c> Spacers × 2
<d> Screws × 4

Figure 1-7. Contents in Accessory Bag



CHAPTER 2 PART NAMES

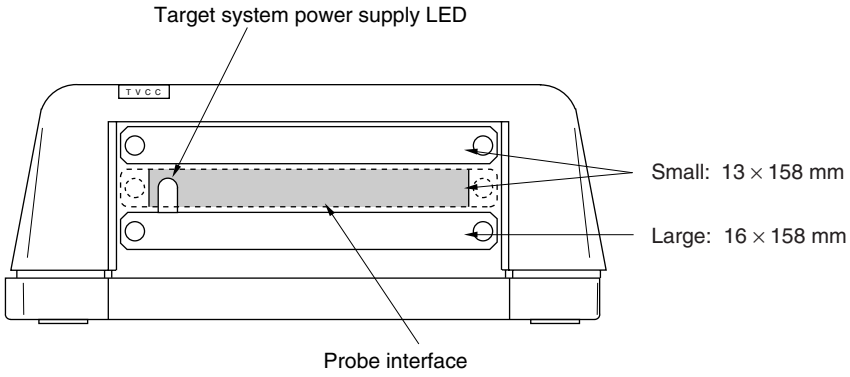
This chapter introduces the parts of the IE-78K0-NS main unit.

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

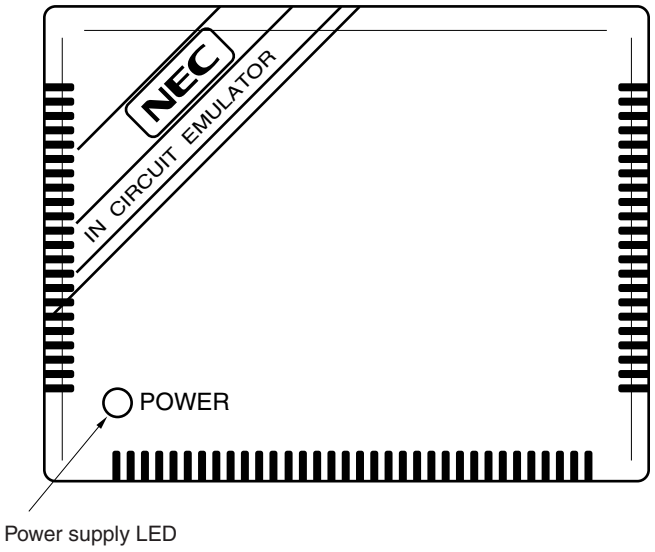
Please make sure to fill out and return the guarantee card that comes with the main unit.

2.1 Parts of Main Unit

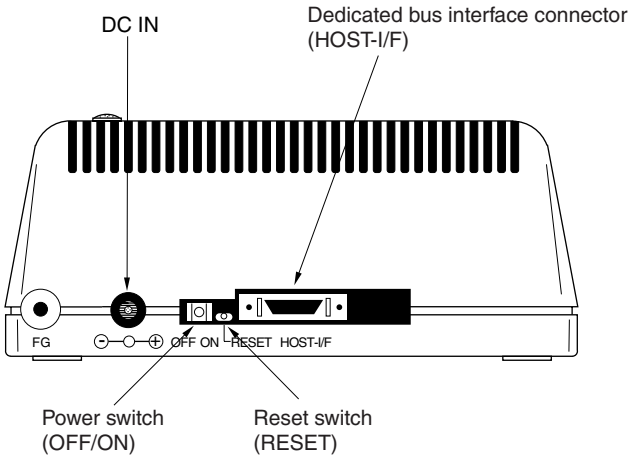
(1) Probe end



(2) Top view



(3) Interface


DC IN
Dedicated bus interface connector
(HOST-I/F)
FG
OFF ON
RESET
HOST-I/F
Power switch
(OFF/ON)
Reset switch
(RESET)

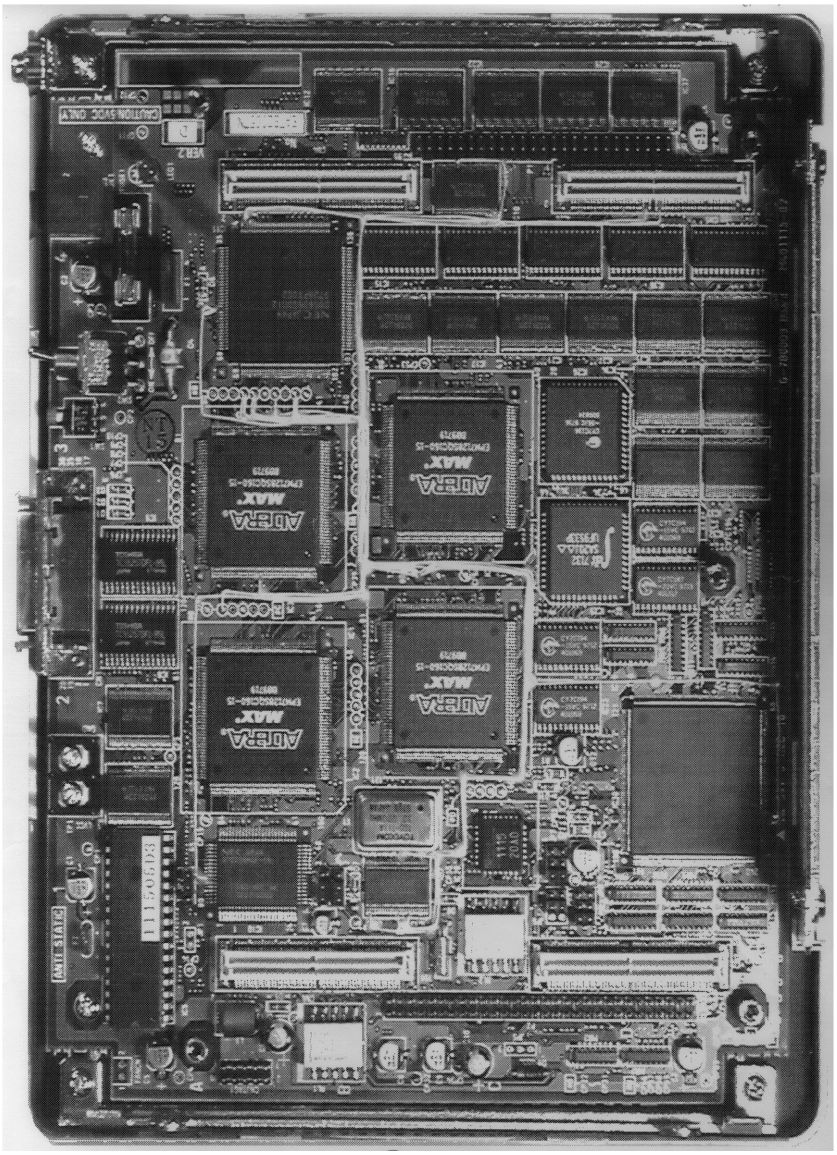
2.2 Board Name

The IE-78K0-NS contains the following board.

- Main board (G-780009 Board) × 1

Check that you have the correct board. To access the inside of the unit, remove the four screws from the sides of the main unit and open the lid.

Figure 2-1. Main Board (G-780009 Board)



Remark The main board is shown mounted in the main unit

CHAPTER 3 INSTALLATION

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

3.1 Connection

Connect the following ten products, which are sold separately.

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

- IE-70000-98-IF-C: Interface board (use cable that comes with IE-78K0-NS)
- IE-70000-PC-IF-C: Interface board (use cable that comes with IE-78K0-NS)
- IE-70000-PCI-IF-A: Interface board (use cable that comes with IE-78K0-NS)
- IE-70000-CD-IF-A: PC card interface (use NS card cable)
- IE-70000-MC-PS-B: AC adapter
- IE-780×××-NS-EM1: Emulation board
- IE-780×××-NS-EM4: Emulation board
- IE-78K0-NS-P0×: I/O board
- IE-78K0-NS-PA: Performance board
- NP-×××××: Emulation probe

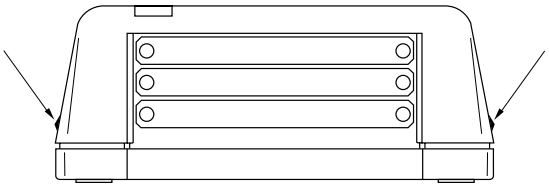
Caution Connecting and removing cables or components from the target system and changing the settings of switches, etc. should be carried out after turning off the power of the IE-78K0-NS main unit and the target system.

(1) Connecting emulation board (IE-780xxx-NS-EM1)

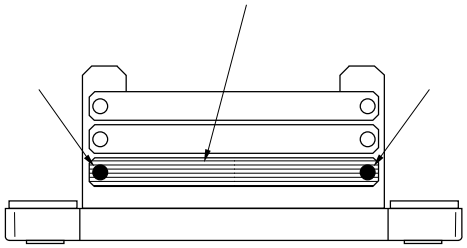
The IE-780xxx-NS-EM1 is sold separately.

Figure 3-1. Connecting Emulation Board (IE-780xxx-NS-EM1)

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

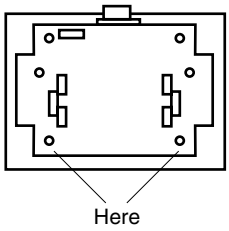


<2> Remove the first plate from the bottom by removing the screws.

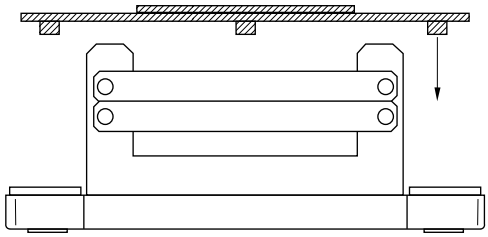


<3> Replace the spacers (metal) of the main board, as indicated in the diagram below, with the spacers (plastic) attached to the IE-78K0-NS.

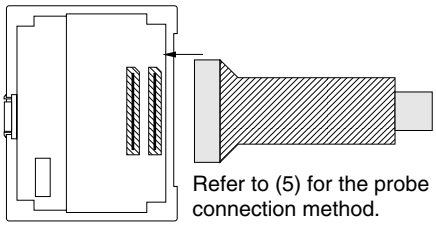
Caution This procedure is needed only when using the IE-78018-NS-EM1.



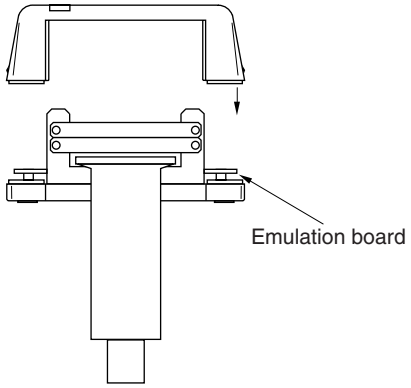
<4> Connect the IE-780xxx-EM1 and fasten the two screws to the emulation board.



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



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

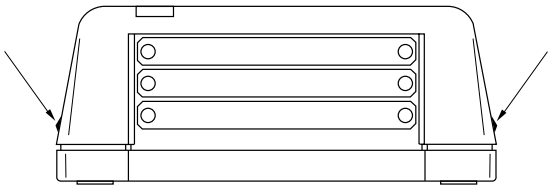


(2) Connecting performance board (IE-78K0-NS-PA) and emulation board (IE-780×××-NS-EM1)

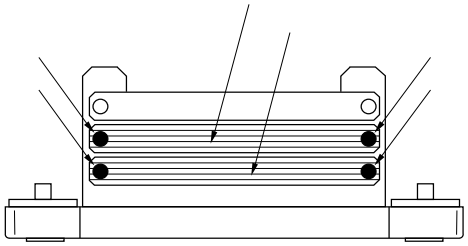
The IE-78K0-NS-PA and IE-780×××-NS-EM1 are sold separately.

Figure 3-2. Connecting Performance Board and Emulation Board (IE-780×××-NS-EM1) (1/2)

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

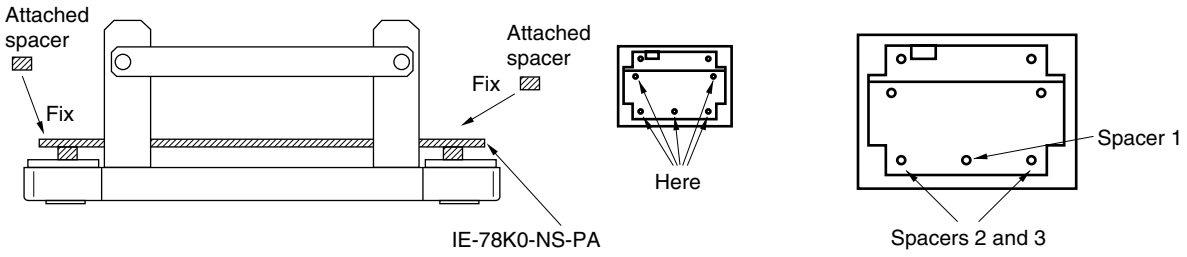


<2> Remove the first and second plates from the bottom by removing the screws.



<3> Connect the IE-78K0-NS-PA and affix the attached spacers to the IE-78K0-NS-PA at five points on the board.

<4> When only connecting the IE-78018-NS-EM1 on the IE-78K0-NS-PA, remove spacer 1 (metal) of the following figure and replace spacers 2 and 3 (metal) with the attached spacers (plastic).



<5> Connect the IE-78×××-NS-EM1 on the IE-78K0-NS-PA and fasten the two screws.

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

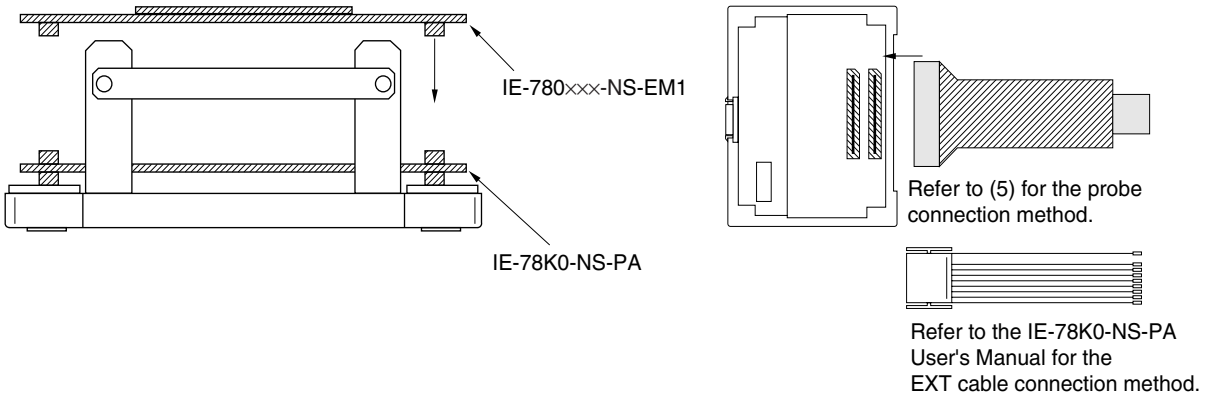
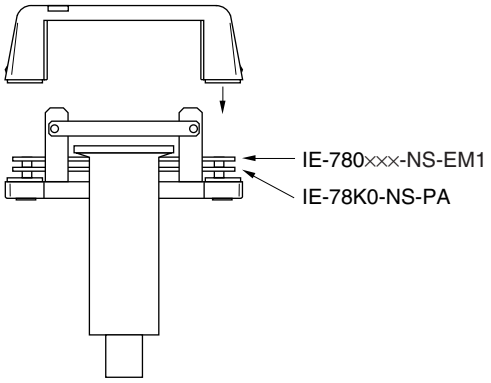


Figure 3-2. Connecting Performance Board and Emulation Board (IE-780×××-NS-EM1) (2/2)

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

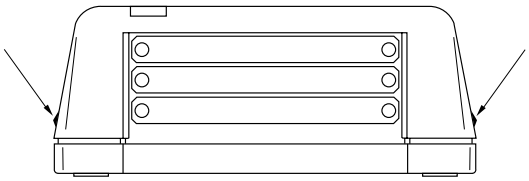


(3) Connecting I/O board (IE-78K0-NS-P0×) and emulation board (IE-78K0-NS-P0× and IE-780×××-NS-EM4)

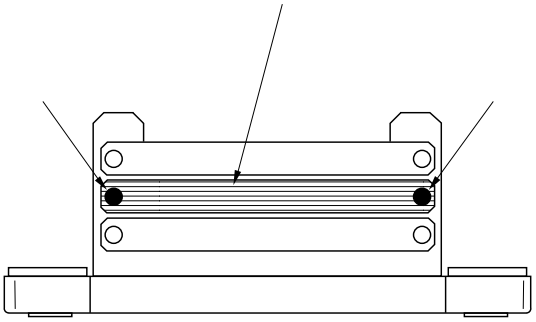
The IE-78K0-NS-P0× and IE-780×××-NS-EM4 are sold separately.

Figure 3-3. Connecting I/O Board and Emulation Board (IE-780×××-NS-EM4)

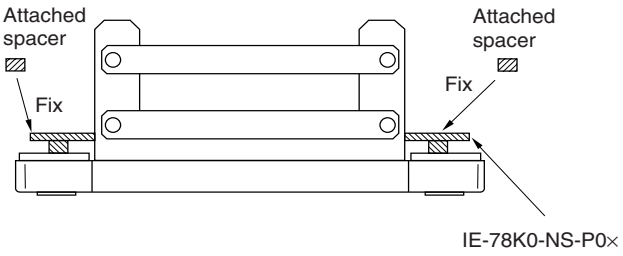
<1> Remove the screws from the sides of the main unit, and then remove the top cover.



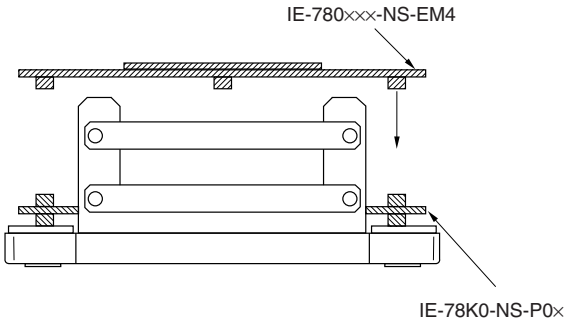
<2> Remove the second plate from the bottom by removing the screws.



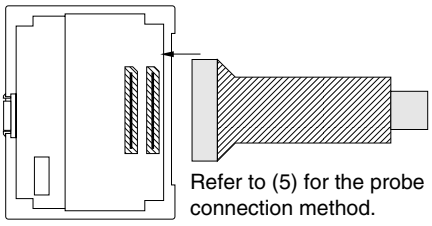
<3> Connect the IE-78K0-NS-P0× to the main board. Fix the attached spacers to the IE-78K0-NS-P0× at the four corners of the board.



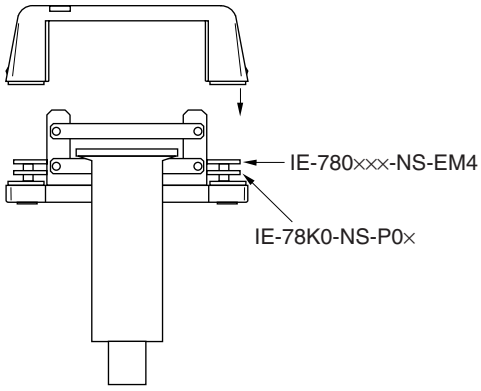
<4> Connect the IE-780×××-NS-EM4 on the IE-78K0-NS-P0×, and fasten the screws at the four corners.



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



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

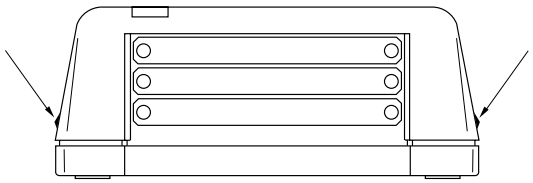


(4) Connecting performance board (IE-78K0-NS-PA), I/O board (IE-78K0-NS-P0×) and emulation board (IE-780×××-NS-EM1 and IE-78K×××-NS-EM4)

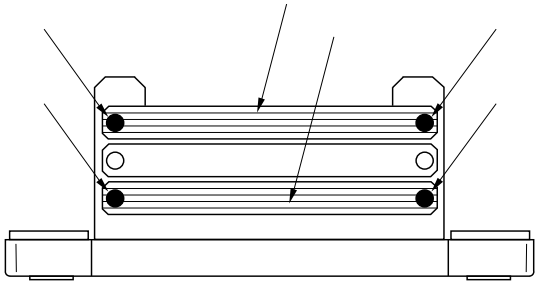
The IE-78K0-NS-PA, IE-78K0-NS-P0×, and IE-780×××-NS-EM4 are sold separately.

Figure 3-4. Connecting Performance Board, I/O Board and Emulation Board (1/2)

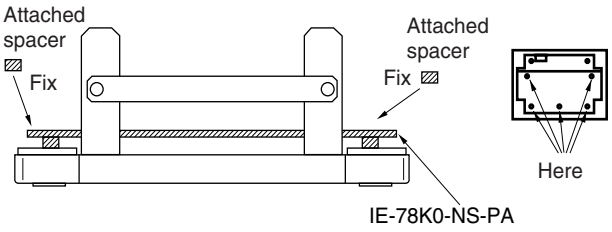
<1> Remove the screws from the sides of the main unit, and then remove the top cover.



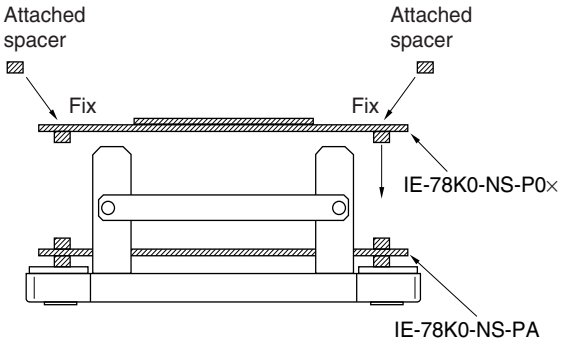
<2> Remove the first and third plates from the bottom by removing the screws.



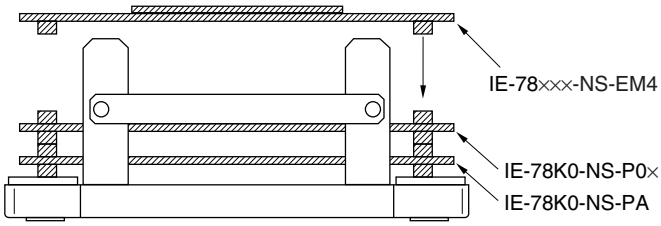
<3> Connect the IE-78K0-NS-PA and affix the attached spacers to the IE-78K0-NS-PA at five points on the board.



<4> Connect the IE-78K0-NS-P0× on the IE-78K0-NS-PA, and fix the spacers to the IE-78K0-NS-P0× at the four corners.



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



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

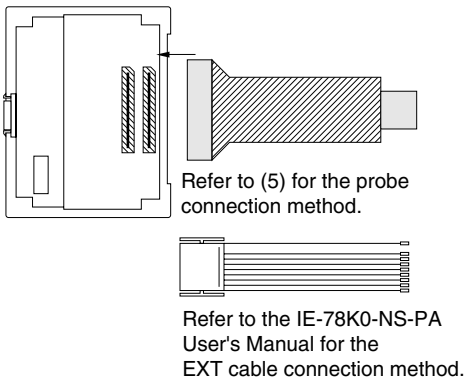
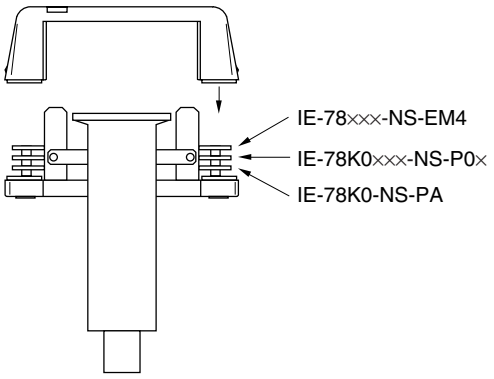


Figure 3-4. Connecting Performance Board, I/O Board and Emulation Board (2/2)

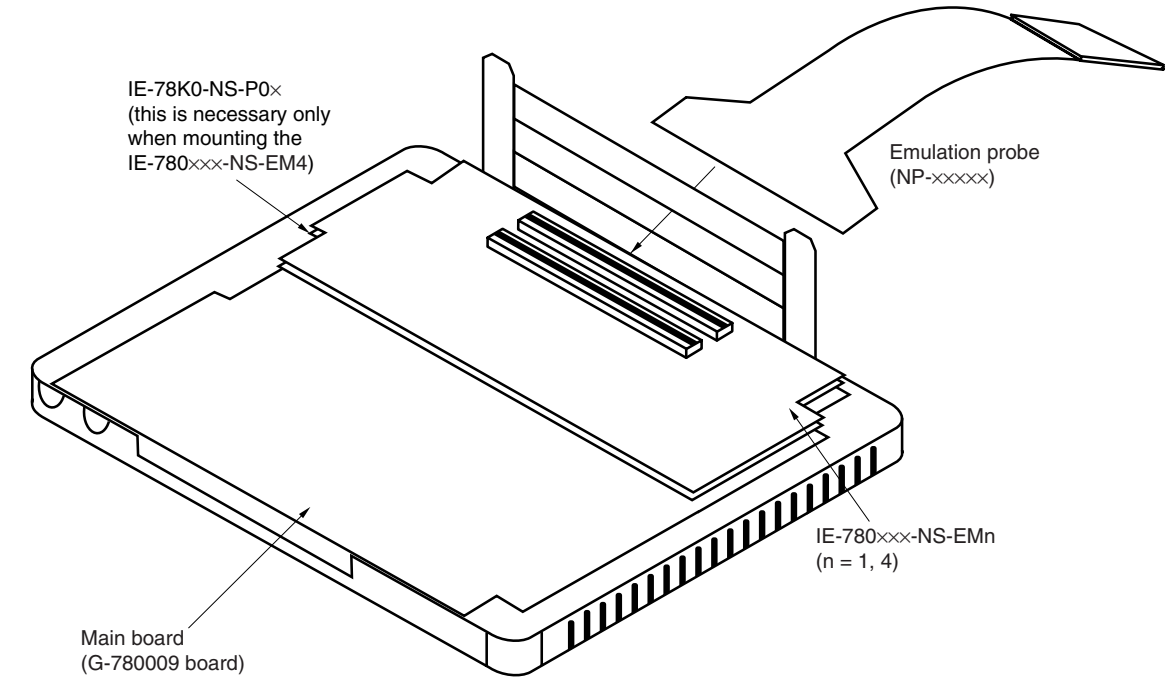
<7> Replace the top cover and fasten the four screws on the sides.

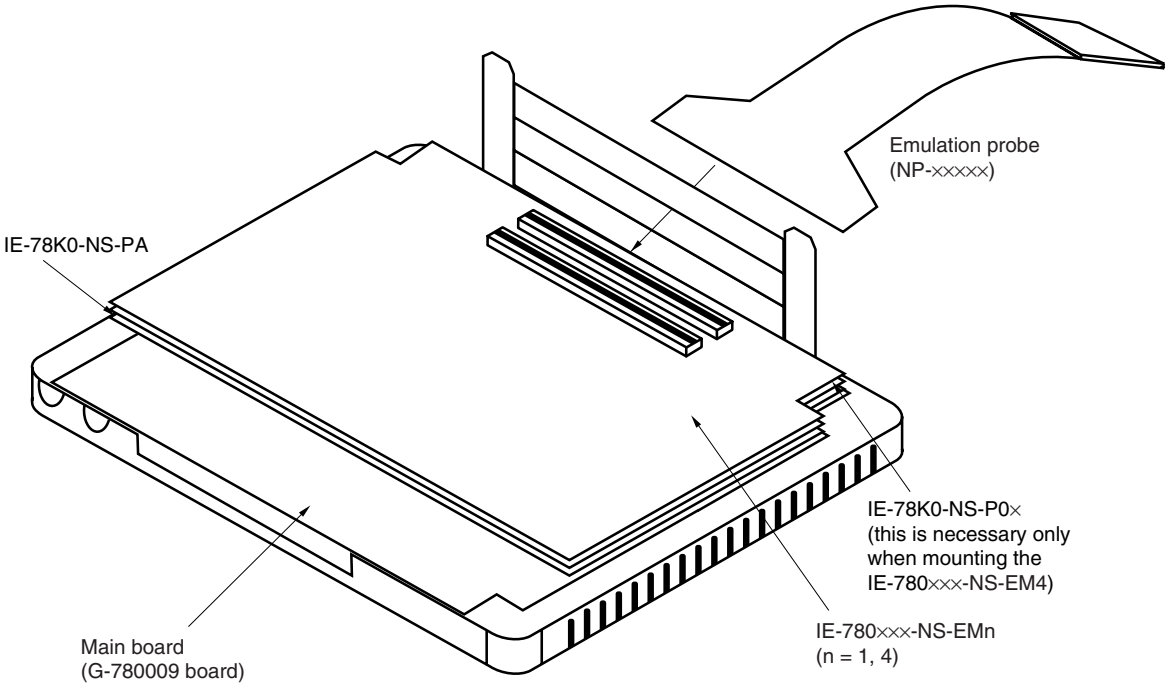


(5) Connecting emulation probe (NP-××××)

The NP-×××× is sold separately.

Figure 3-5. Connecting Emulation Probe





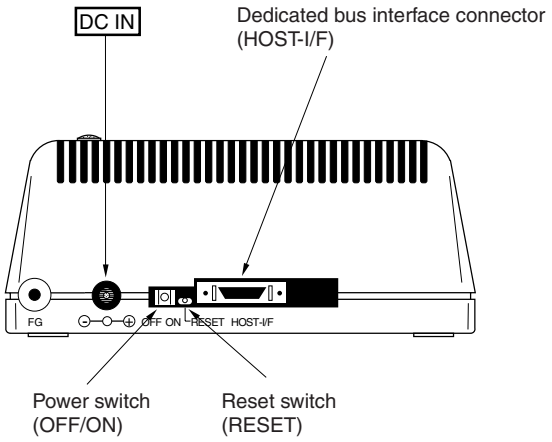
Caution The emulation probe (NP-××××) mounting location varies depending on the model of the IE-780××-NS-EMn (n = 1 or 4) in use. For details, refer to the IE-780××-NS-EMn User's Manual.

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

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

<1> Insert the AC adapter plug into the DC IN socket of the IE-78K0-NS.

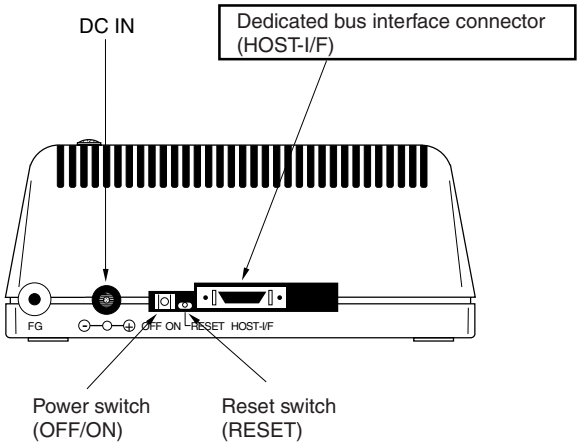
Figure 3-6. Connecting AC Adapter



(7) Connecting interface cable

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

Figure 3-7. 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 that comes with the IE-78K0-NS.

• When using a PC card interface (IE-70000-CD-IF-A)

→ Connect the NS card cable that comes 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 μs.

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.

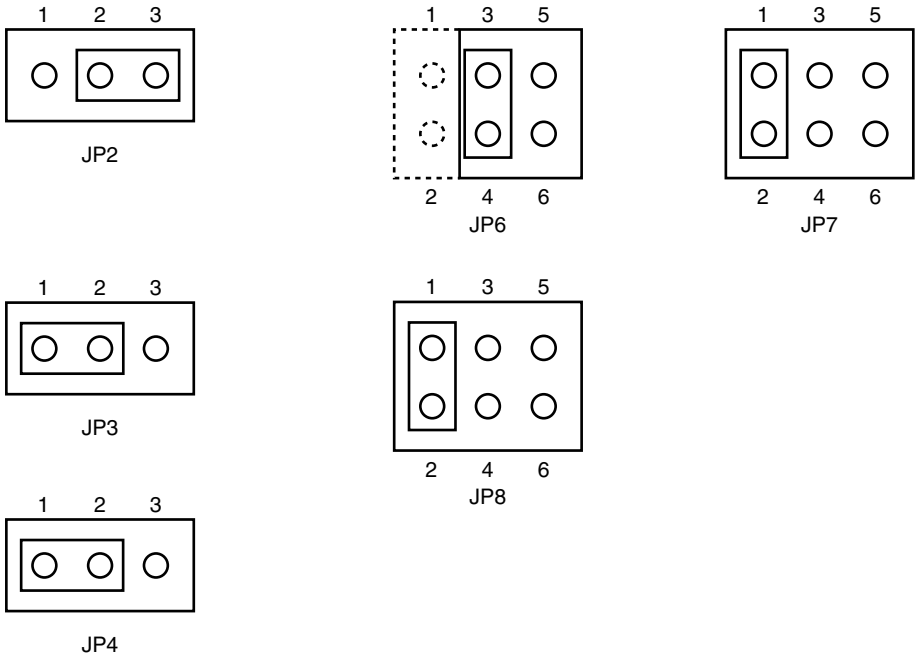
Table 3-1. Electrical Specifications

Parameter	MIN. [V]	MAX. [V]
High-level input voltage	Target voltage × 0.7	Target voltage
Low-level input voltage	0	Target voltage × 0.3

3.3 Jumper Settings (on Main Board (G-780009 Board))

(1) Default jumper settings

Figure 3-8. Default Settings of JP2, JP3, JP4, JP6, JP7, and JP8

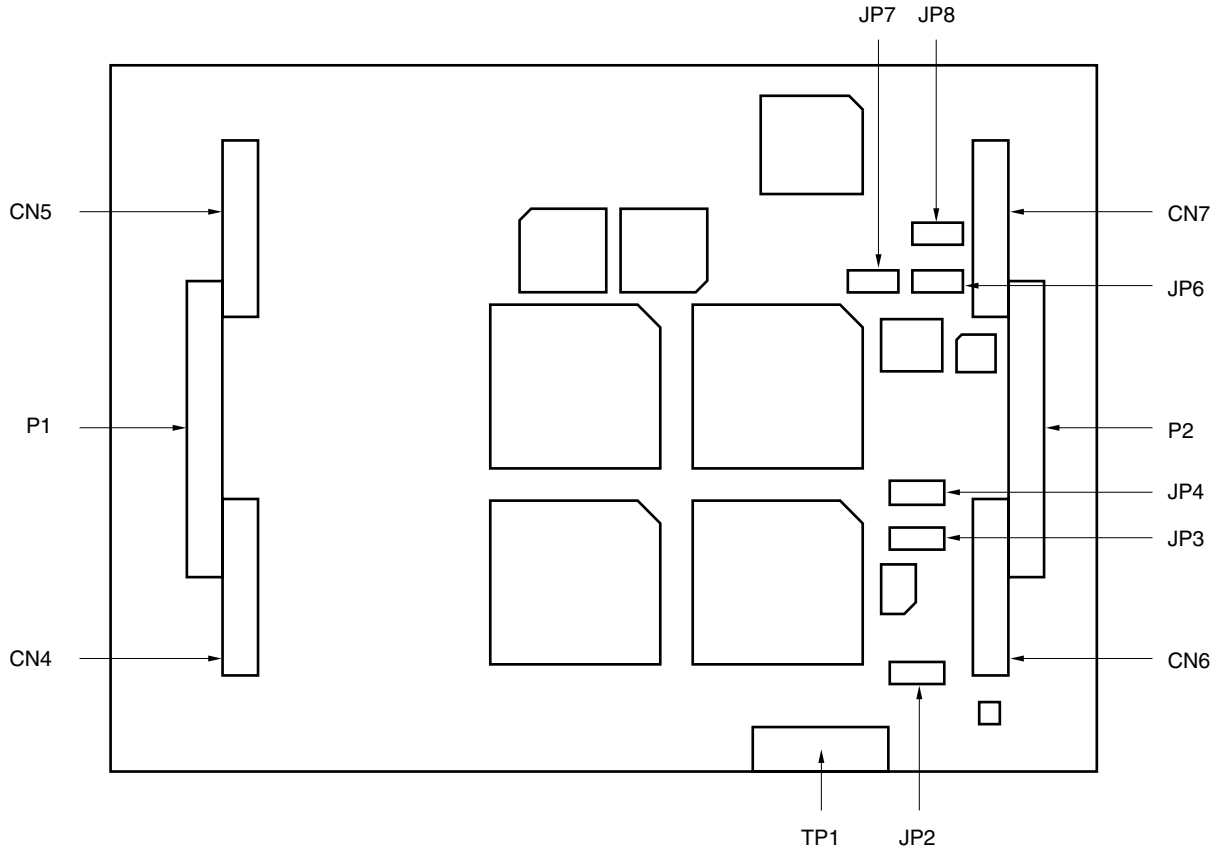


JP8: Selection of the subsystem clock source (default setting: 1 and 2 shorted)

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

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

Figure 3-9. Part Names of G-780009 Board

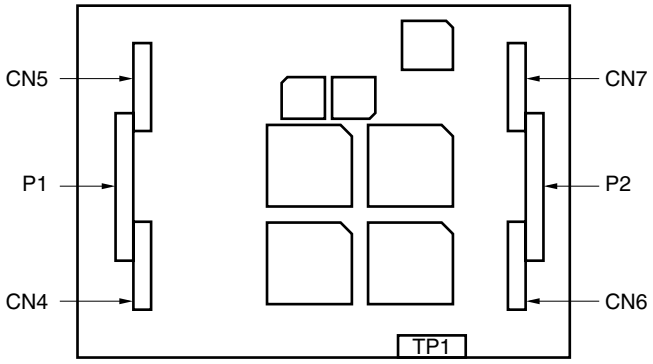


3.4 Low-Voltage Emulation Settings

Low-voltage emulation can be executed in the IE-78K0-NS 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 TP1 terminal pin. (This also applies when the voltage is 5 V.)

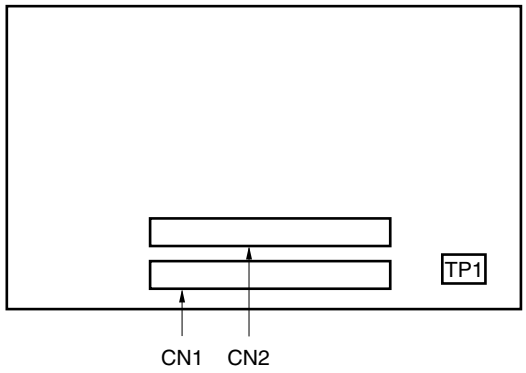
Figure 3-10. Position of TP1 on IE-78K0-NS



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 3-11. 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.
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
- DRV-DISK × 1

★ **<Basic specifications>**

Hardware resources used

- I/O address .....0000H to FFFFH
- Interrupts .....Unused
- Memory.....Uses 80 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.

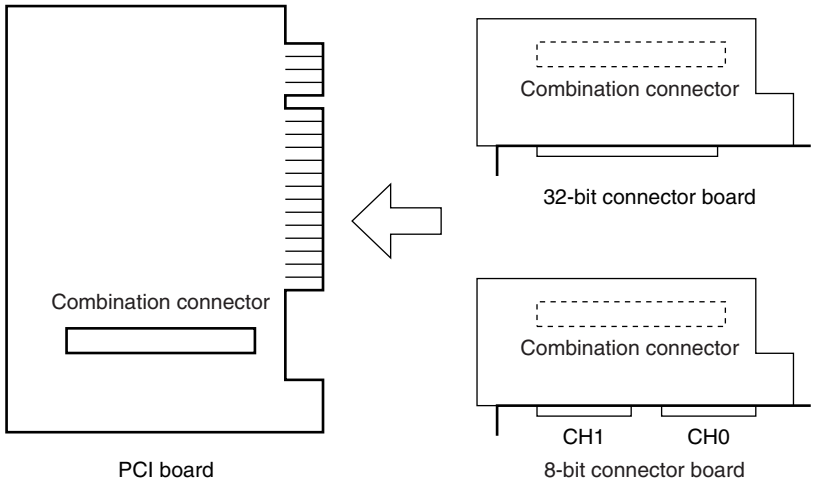
(2) 8-bit connector board mounting

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.

Caution The 32-bit connector board is attached 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 DRV_DISK Readme_e.txt for PCI driver installation.

(5) Connecting with IE-78K0-NS

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

Caution Connection with the IE-78K0-NS 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.

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 PC PCI bus slot compliant with PCMCIA2.1/JEIDA standard Ver. 4.2.

Check that you have the following items.

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

★ **<Basic specifications>**

Hardware resources used

- I/O address .....20 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 NT4.0, 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 DRV-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 DRV-DISK install menu. In this case, however, the installation is invalid.

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

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

Caution Be sure to use the NS-A CABLE when connecting to the IE-78K0-NS. If MC-A 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.
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 an IE product that is installed in the C bus slot of a PC9800 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 correct interface board.

- Interface board (IE-70000-98-IF-C) for PC-9800 series × 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, 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			

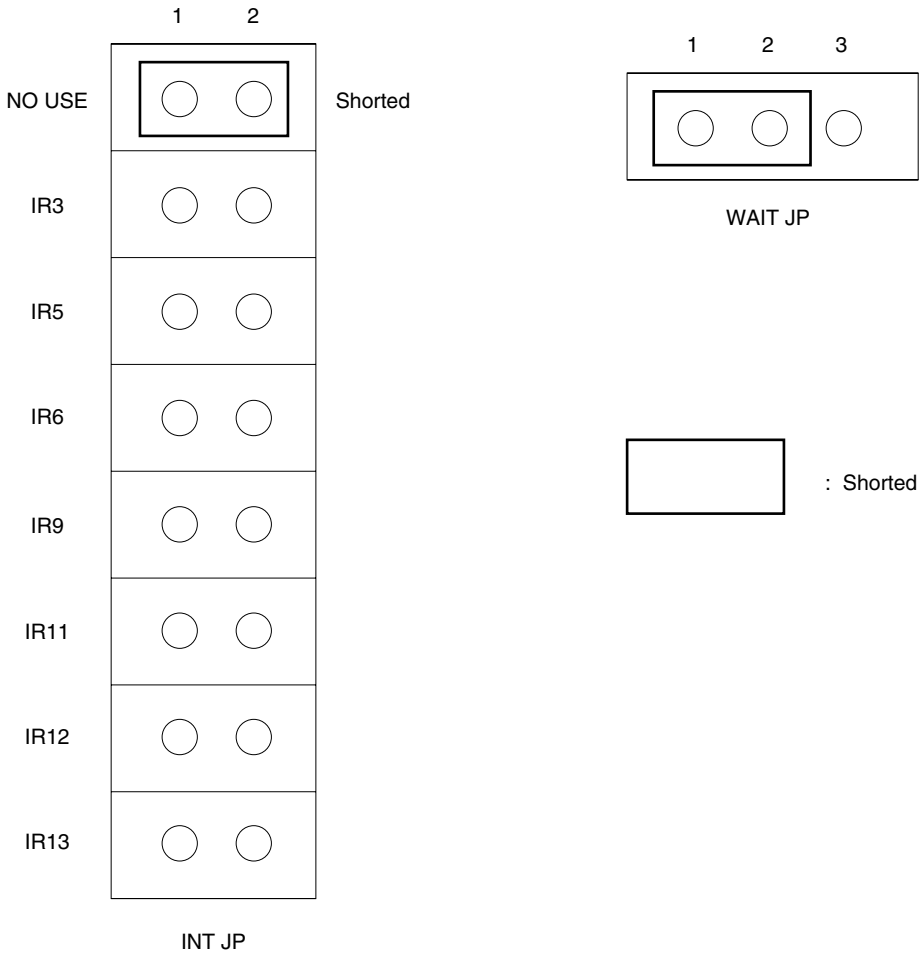
SW2 Number	1	2	3	4	5	6	7	8
Address	A12	A13	A14	A15	OFF	OFF	ON	OFF
ON	0	0	0	0			0	
OFF					1	1		1

Caution Use the default setting for SW1 numbers 1 to 4.

(2) Jumper settings

The INT JP and WAIT JP are C bus interrupt and WAIT selection jumpers.
In the IE-78K0-NS, 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

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

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

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

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

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 that is installed in the ISA bus slot of an IBM PC/AT compatible.

First of all, check that you have the correct interface board.

- Interface board (IE-70000-PC-IF-C) for IBM PC/AT × 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, the addresses should be set between 020×H and 03F×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 D-1. SW1 and SW2 Settings When Setting I/O Address to 020×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	0		0	0
OFF						1		

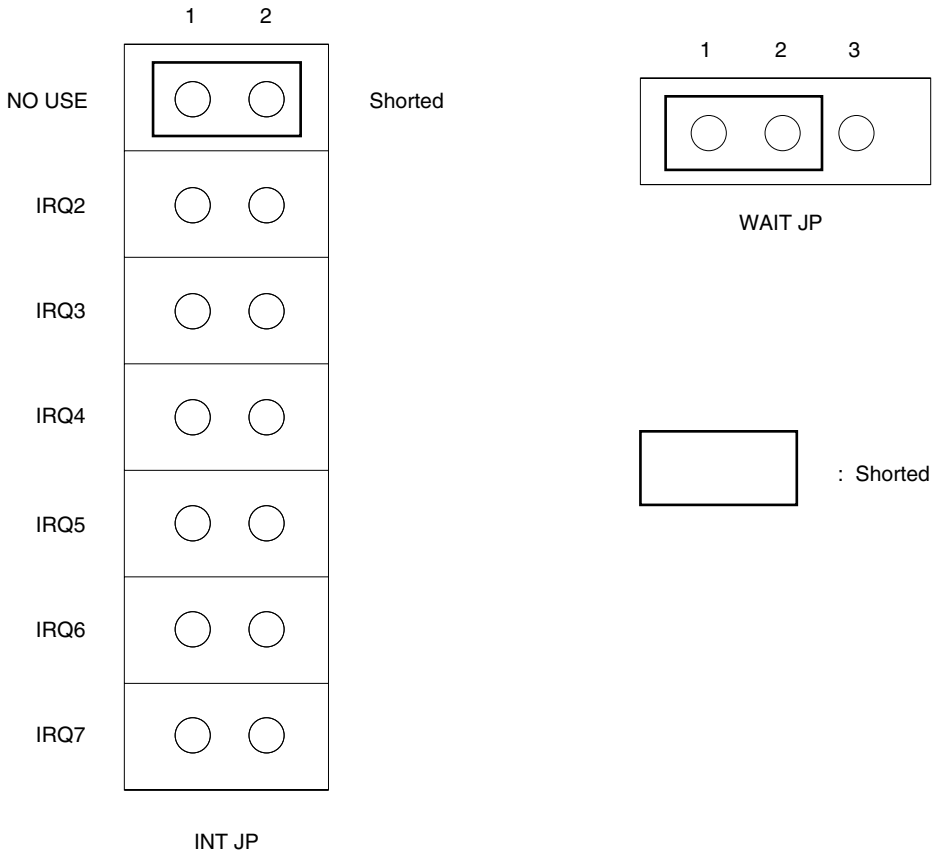
SW2 Number	1	2	3	4	5	6	7	8
Address	A12	A13	A14	A15	OFF	OFF	ON	OFF
ON	0	0	0	0			0	
OFF					1	1		1

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 C bus interrupt and WAIT selection jumpers.
In the IE-78K0-NS, 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

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

Caution Connection with the IE-78K0-NS is possible on the CH0 side 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	Modification of **Figure 1-1 IE-78K0-NS System Configuration**	**CHAPTER 1 GENERAL**
	Modification of **Figure 1-2 IE-78K0-NS Basic Hardware Configuration 1**	
	Addition of **1.4 Contents in Carton**	
	Modification of **3.1 Connection**	**CHAPTER 3 INSTALLATION**
	Addition of INTERFACE BOARD (IE-70000-PCI-IF-A) FOR DESKTOP PC	**APPENDIX A**
	Addition of PC CARD INTERFACE (IE-70000-CD-IF-A)	**APPENDIX B**
	Addition of REVISION HISTORY	**APPENDIX E**
3rd	Change of interface board for desk top PC from IE-70000-PCI-IF to IE-70000-PCI-IF-A	**Throughout**
	Modification of **Figure 1-1 IE-78K0-NS System Configuration**	**CHAPTER 1 GENERAL**
	A.1 Introduction • Deletion of **Applicable models**	**APPENDIX A**
	B.1 Introduction • Deletion of **Applicable models**	**APPENDIX B**

[MEMO]