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User's Manual

Phase-out/Discontinued

IE-784000-R

In-circuit Emulator

IE-784000-R

IE-784000-R-BK

IE-784000-R-EM

IE-70000-98-IF-B

IE-70000-98N-IF

IE-70000-PC-IF-B

IE-78000-R-SV3

[MEMO]

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INTRODUCTION

Readers:

This manual is intended for engineers who wish to debug a system using NEC's 78K/IV series 16-/8-bit single-chip microcomputers with the IE-784000-R. It is also intended for engineers who upgrade other in-circuit emulators to have functions equivalent to those of the IE-784000-R. It is therefore assumed that engineers who read this manual are thoroughly familiar with the functions and usage of the target device and have knowledge of the debugger.

The target devices are as follows:

- μ PD784026 subseries: μ PD784020, 784021, 784025, 784026, 78P4026

Organization:

As manuals for the IE-784000-R, a manual supplied with the IE-784000-R (this manual) and a manual supplied with the I/O emulation board (IE-784026-R-EM1) are available.

IE-784000-R
User's Manual

I/O Emulation Board
User's Manual

(supplied with IE-784026-R-EM1)

Basic specifications
System configuration
External interface function

Functional outline
Connecting I/O emulation board

Purpose:

This manual is intended to describe the basic specifications of the IE-784000-R and how to connect the peripheral equipment correctly.

How to Read This Manual:

- To understand the basic specifications,
→ Refer to **CHAPTER 1 GENERAL** and **CHAPTER 2 NAMES AND FUNCTIONS OF RESPECTIVE PARTS**.
- To connect the IE-784000-R and peripheral equipment,
→ Read **1.3 System Configuration**, **1.4 Setup Sequence**, **2.3 Connecting Accessory Cables**, **CHAPTER 6 CONNECTING PERIPHERAL EQUIPMENT**, and the User's Manual of the I/O emulation board.

Terminology:

The terms used in this manual and their meanings are listed below.

Term	Meaning
Emulation device	Devices that emulate the target device in the emulator, including the emulation CPU
Emulation CPU	CPU in emulator that executes the program developed by the user
Target device	The device (actual chip) that is emulated
Target program	Program to be debugged (program developed by the user)
Target system	System to be debugged (system developed by the user). Includes the target program and the hardware developed by the user. In a narrow sense, only the hardware

Legend:

Note : Footnote

Caution : Important information

Remark : Supplement

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[MEMO]

CHAPTER 1 GENERAL

The IE-784000-R In-Circuit Emulator is a development tool that efficiently debugs the hardware and software of an application system using NEC's 78K/IV series microcomputer.

This in-circuit emulator is used in combination with the optional emulation board (IE-784000-R-EM), I/O emulation board (IE-784026-R-EM1, etc.), and emulation probe (EP-78230GC-R, etc.).

The in-circuit emulator is connected to a host machine with an optional interface board (IE-70000-98-IF-B, IE-70000-98N-IF, IE-70000-PC-IF-B, or IE-78000-R-SV3).

1.1 Features

Here are the features of the IE-784000-R:

- High-speed PC bus interface can be used.
- Network interface by Ethernet can be used (an optional network board is necessary).
- Real-time execution, real-time trace
- A wealth of event detection functions and real-time trace functions
- The contents of the real-time tracer can be checked without stopping execution of the emulation CPU.
- The contents of the real-time tracer can be searched.
- Data can be written to the real-time tracer or the user program can be executed in synchronization with events.
- Execution time and the number of time measurements can be measured at three locations.
- The specified data of the internal RAM can be displayed while the emulation CPU operates real-time.
- The execution area of the program area and data access area can be displayed.
- 8-bit trace by using an external sense clip.
- 1M-byte emulation memory.
- All packages can be supported by using optional I/O emulation board and emulation probe.

Photo 1-1 IE-784000-R

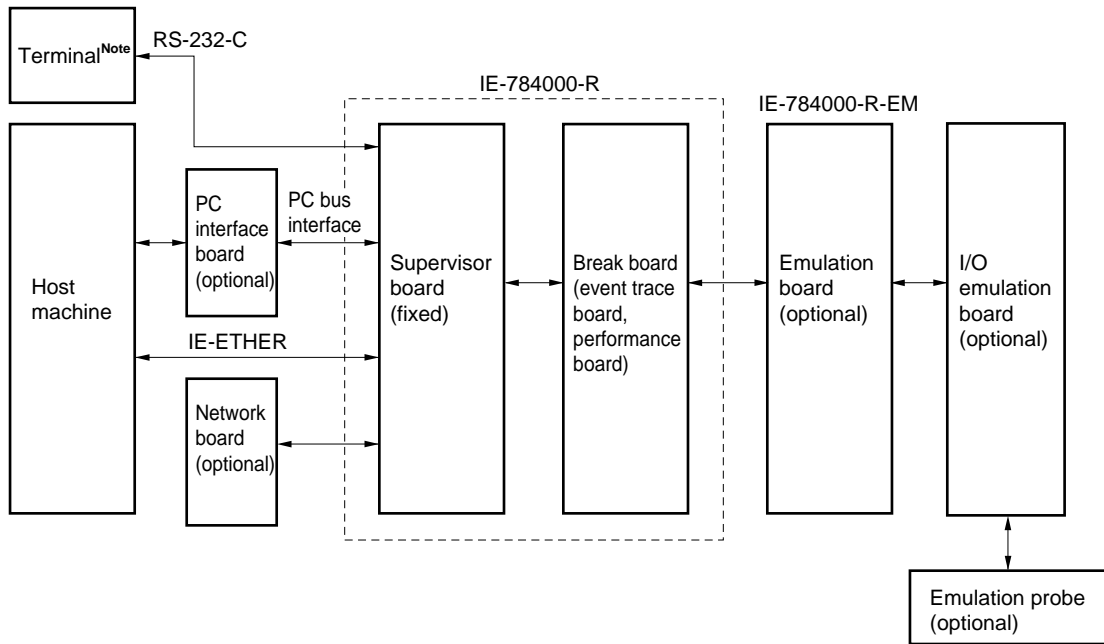


1.2 Hardware Configuration

The IE-784000-R consists of the following hardware (housing and boards):

- Housing
- Break board (event trace board + performance board)
- Supervisor board

Fig. 1-1 Basic Hardware Configuration of IE-784000-R

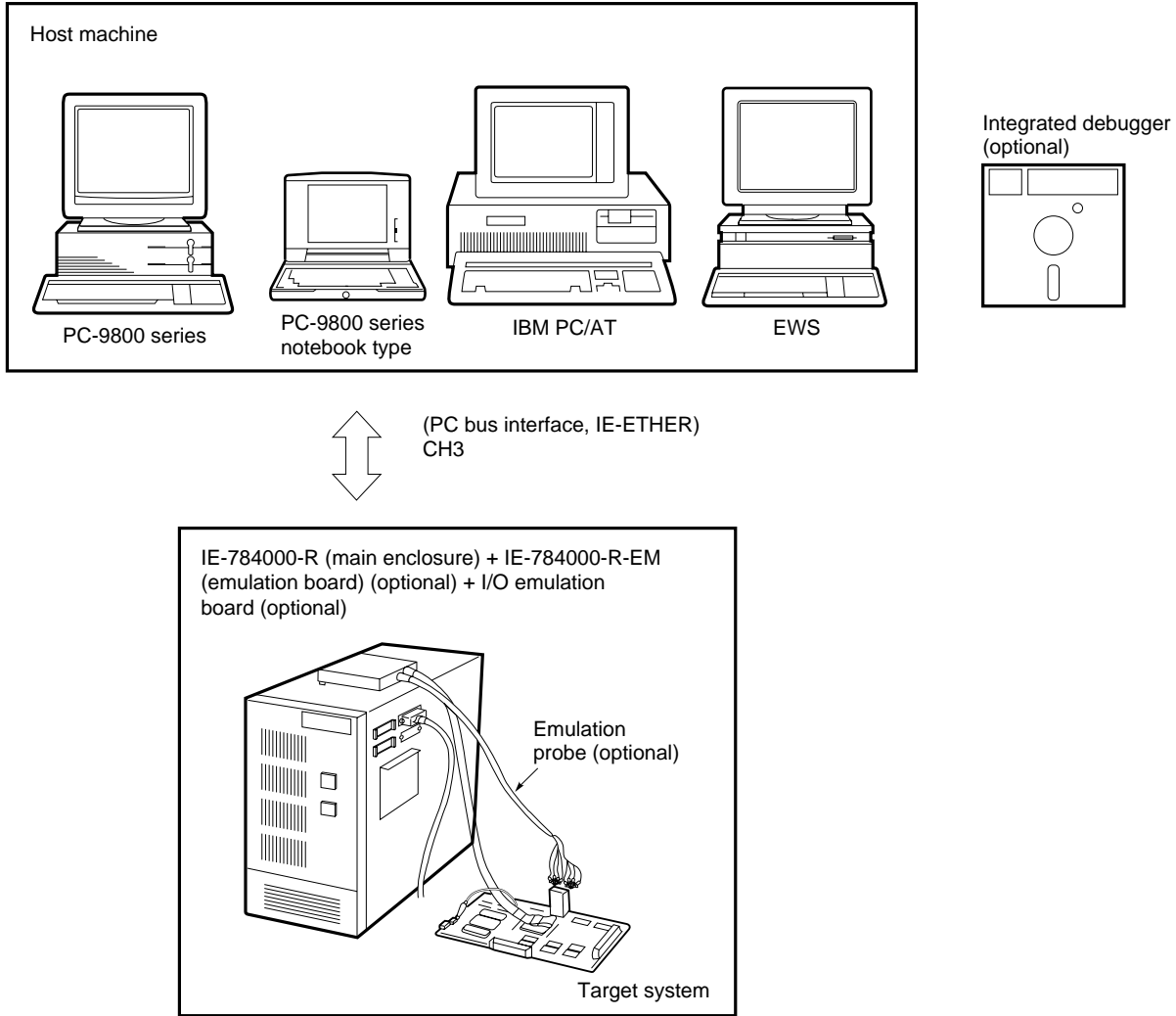


Note This terminal is used to set network addresses when Ethernet is used.

1.3 System Configuration

The IE-784000-R is used connected to a host machine (PC-9800 series, IBM PC/AT™, or work station).

Fig. 1-2 System Configuration



1.4 Setup Sequence

The setup sequence is as follows:

- <1> Connect the emulation board (IE-784000-R-EM).
→ Refer to the User's Manual for the I/O emulation board.
- <2> Connect the I/O emulation board (to emulate the target device).
→ Refer to the User's Manual for the I/O emulation board.
- <3> Set the user clock (when necessary).
Change the operating clock on the I/O emulation board when necessary.
→ Refer to the User's Manual for the I/O emulation board.
- <4> Connect the I/O emulation board and connector board.
Connect the connector board (supplied with the optional emulation probe) to the I/O emulation board (optional).
→ Refer to the User's Manual for the I/O emulation board or emulation probe.
- <5> Connect the accessory cables.
Connect the power cable and interface cable.
→ Refer to **CHAPTER 2 NAMES AND FUNCTIONS OF RESPECTIVE PARTS** in this manual.
- <6> Connect the IE-784000-R to peripheral equipment.
Connect the host machine.
→ Refer to **CHAPTER 6 CONNECTING PERIPHERAL EQUIPMENT** in this manual.
- <7> Connect the target system.
Connect the emulation probe (optional) and target system.
→ Refer to **CHAPTER 7 CONNECTING TARGET SYSTEM** in this manual and the User's Manual for the I/O emulation board or emulation probe.

Remark Connect the emulation board <1>, set the user clock <3>, and connect the I/O emulation board and connector board <4> at the same time to enhance the efficiency.

1.5 Target Device

The IE-784000-R can emulate the devices in the 78K/IV series when used in combination with the optional emulation board, optional I/O emulation board, and optional emulation probe. For details, refer to the User's Manuals for the respective emulation boards.

1.6 Emulation Board and I/O Emulation Board

The emulation board and I/O emulation board are optional.

If the target device is a 78K/IV series product, use the IE-784000-R-EM as the emulation board.

For the details of the I/O emulation board, refer to the User's Manual for the I/O emulation board.

1.7 Emulation Probe

The emulation probe is optional.

For details, refer to the User's Manual for the I/O emulation board or emulation probe.

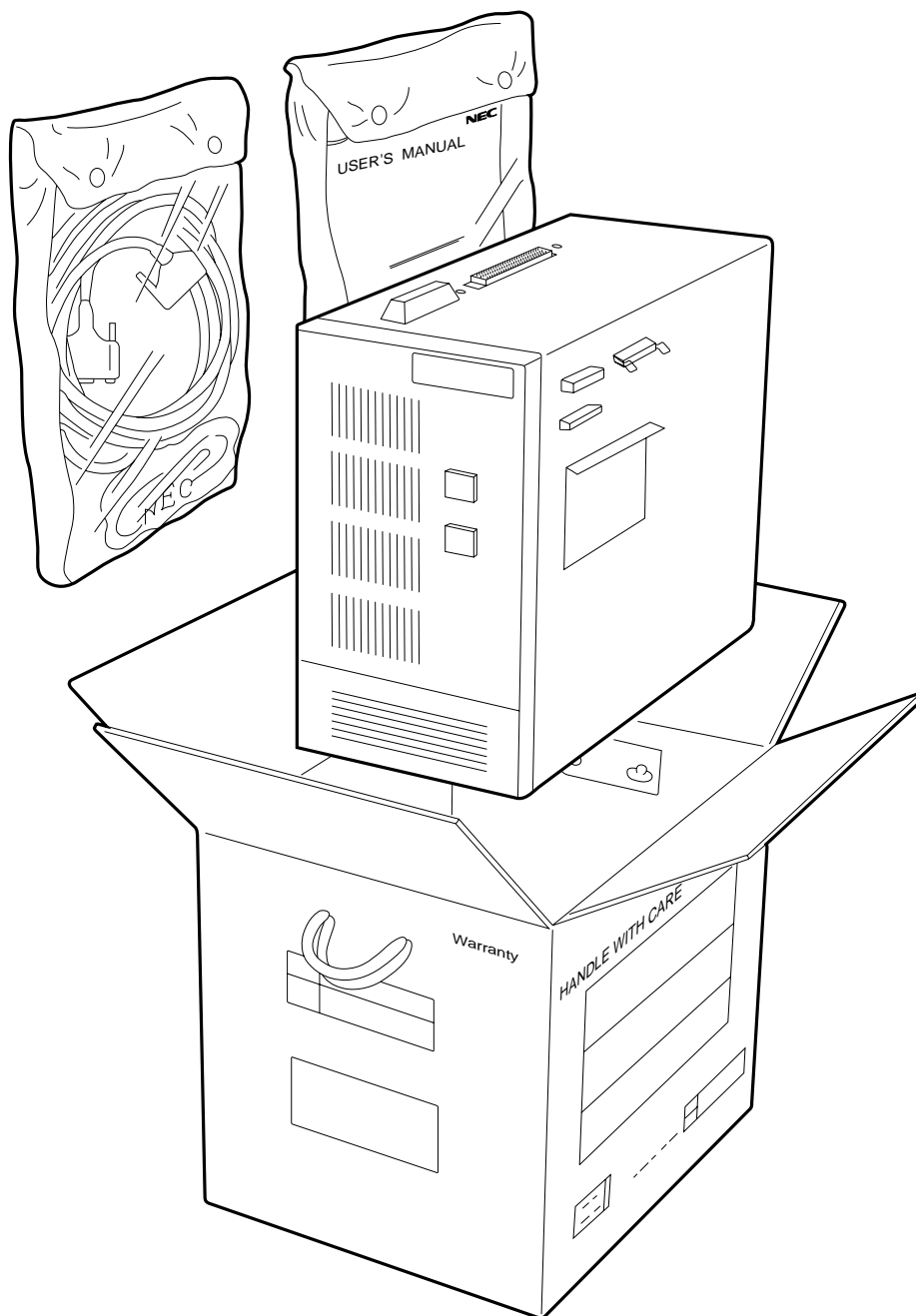
Photo 1-2 Example of Connecting Emulation Probe



1.8 Unpacking Carton Box

The carton box of the IE-784000-R contains the main enclosure of the in-circuit emulator and bags containing accessories. Three boards are installed in the in-circuit emulator. As accessories, cables are supplied in addition to this manual. Check to see if all the accessories are contained when unpacking the carton box. Also check to see if the in-circuit emulator and accessories are not damaged in any way. If you should find some accessories missing or damaged, consult NEC.

Fig. 1-3 Unpacking



(1) Checking boards

The following three boards are installed in the IE-784000-R. Remove the top lid from the in-circuit emulator as described on the following page and check to see if all the boards are correctly installed.

(a) Break board

This board consists of an event trace board and a performance board.

The event trace board and performance board are secured with screws.

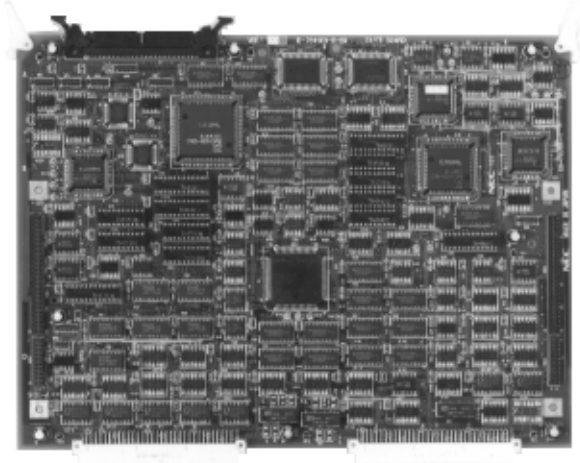
- Event trace board : ×1
- Performance board : ×1

(b) Supervisor board (secured to IE-784000-R) : ×1

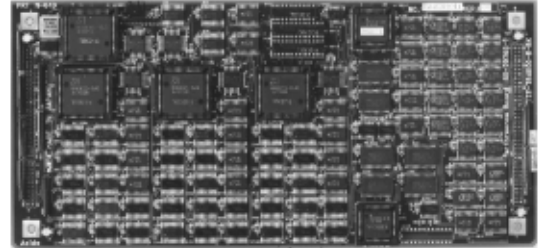
Photo 1-3 Boards

(a) Break board

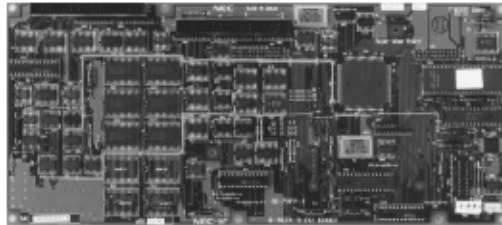
- Event trace board



- Performance board



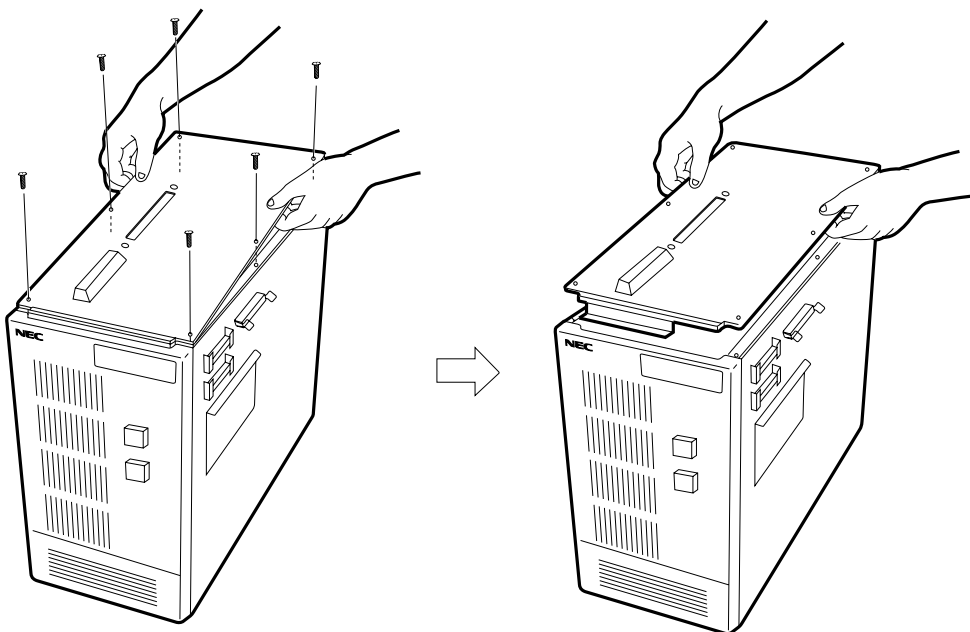
(b) Supervisor board



◇ Procedure

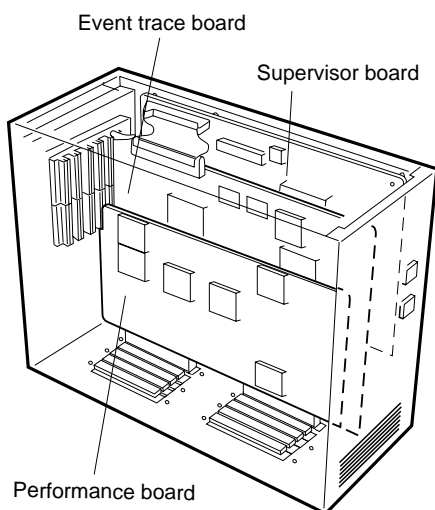
<1> Remove the screws (six places) from the top lid of the in-circuit emulator and open the lid.

Fig. 1-4 Top View of In-Circuit Emulator



<2> Confirm that all the boards are correctly installed as shown in Fig. 1-5.

Fig. 1-5 Board Positions



(2) Checking accessories

The carton box of the in-circuit emulator contains two bags of accessories. Check to see if these bags contain the following accessories (refer to Photo 1-4):

- (a) User's Manual (this manual) : ×1
- (b) AC 100 V power cable (with AC adapter): ×1
- (c) AC 200 V power cable^{Note} : ×1
- (d) RS-232C serial interface : ×1
- (e) Ground lead cable : ×1
- (f) Spare fuse : ×1
- (g) Accessory list : ×1
- (h) Warranty : ×1
- (i) Packing list : ×1
- (j) PC bus interface cable : ×1

Note The AC 200 V power cable is used when the IE-784000-R is used overseas.

Photo 1-4 Accessories

(b) AC 100 V power cable



(c) AC 200 V power cable



(d) RS-232C interface cable



(e) Ground lead cable



(f) Spare fuse



(j) PC bus interface cable



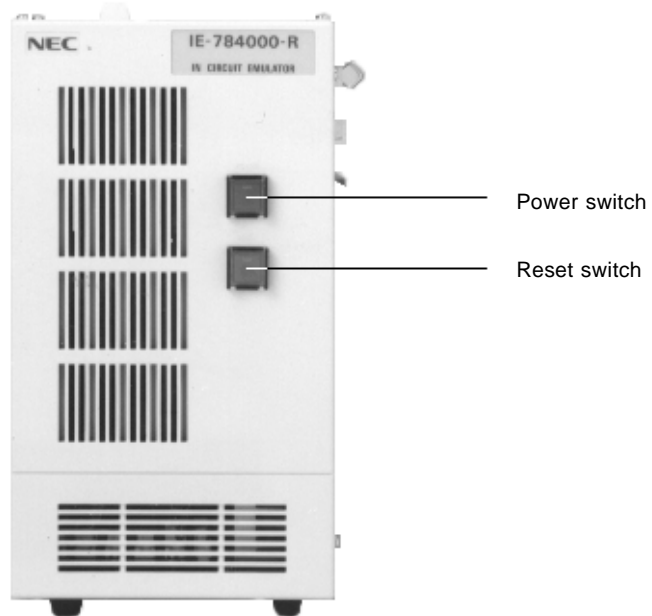
CHAPTER 2 NAMES AND FUNCTIONS OF RESPECTIVE PARTS

This chapter describes the names and functions of the respective parts of the IE-784000-R, how to set switches, and how to connect the accessory cables.

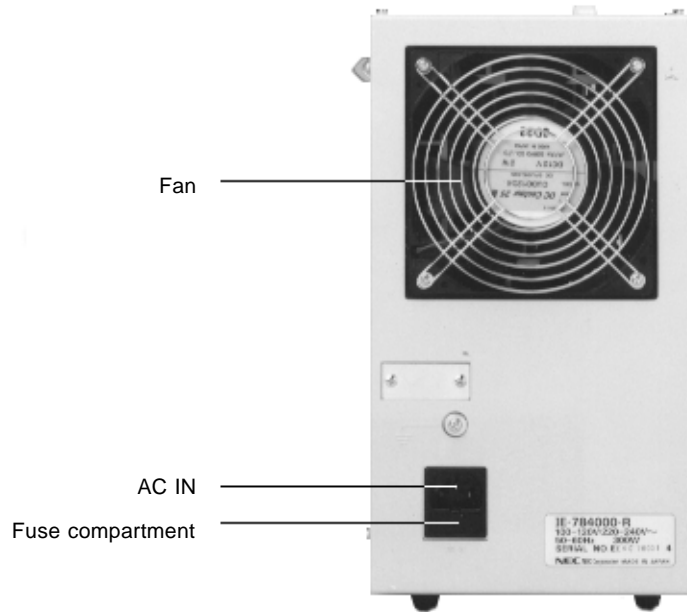
2.1 Names and Functions of Respective Parts

(1) Front view

Photo 2-1 Front View of IE-784000-R

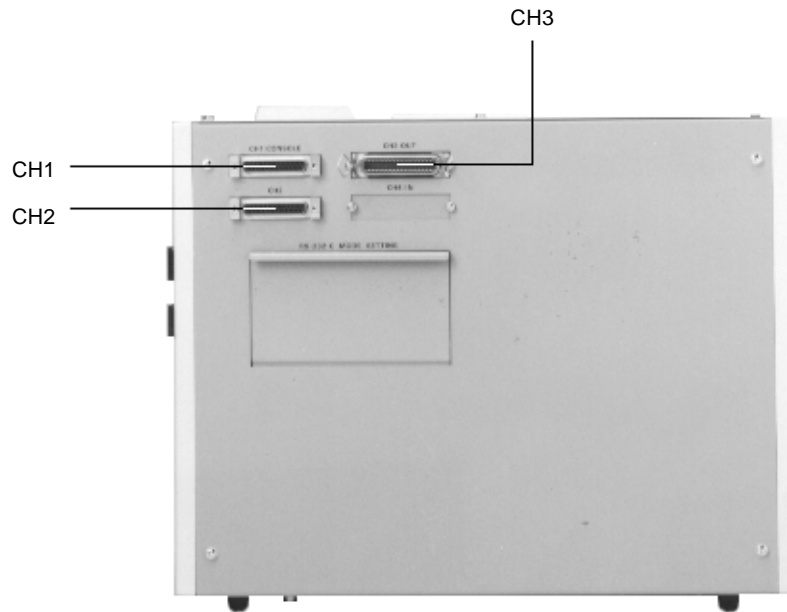


- **Power switch**
Turns ON/OFF power to the IE-784000-R.
- **Reset switch**
Resets the IE-784000-R.

(2) Rear view**Photo 2-2 Rear View of IE-784000-R**

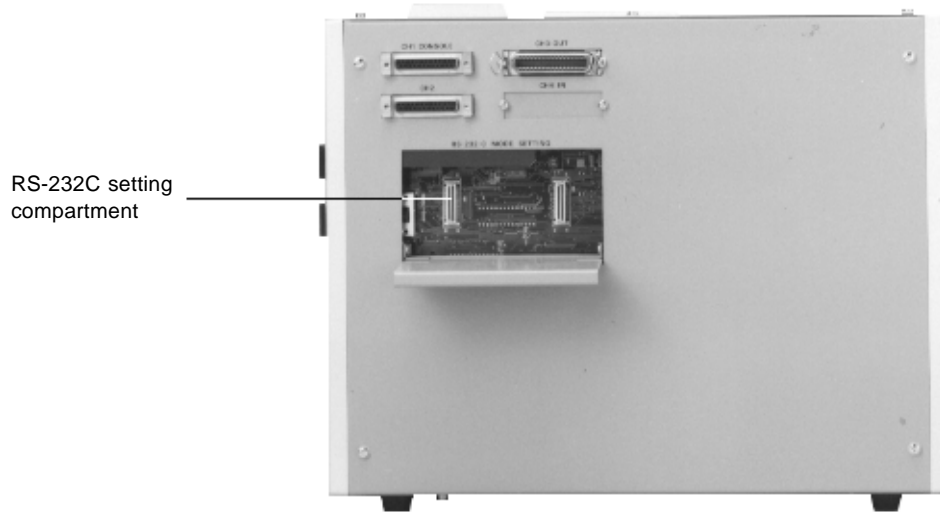
- **Fan**
Cools inside the housing.

- **AC IN**
Connects the power cable and supplies power to the IE-784000-R.

(3) Side view**Photo 2-3 Side View of IE-784000-R (1)**

- **CH1 (I/O)**
Connects a terminal with an RS-232C cable to set network information.
Interfacing a host machine is not supported.
- **CH2 (I/O)**
This channel is reserved and cannot be used.
- **CH3 (I/O)**
Provided with a PC bus interface and a network interface which are respectively used to connect a host machine with a PC bus interface cable and an IE-ETHER cable.

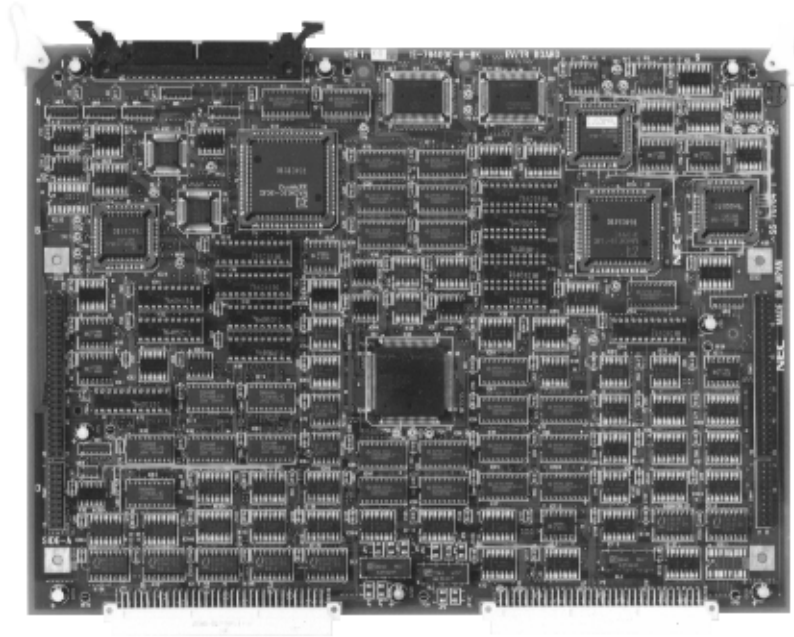
Photo 2-4 Side View of IE-784000-R (2)



- **RS-232C setting compartment**
Selects a modem or terminal mode, sets FG, and selects a baud rate.

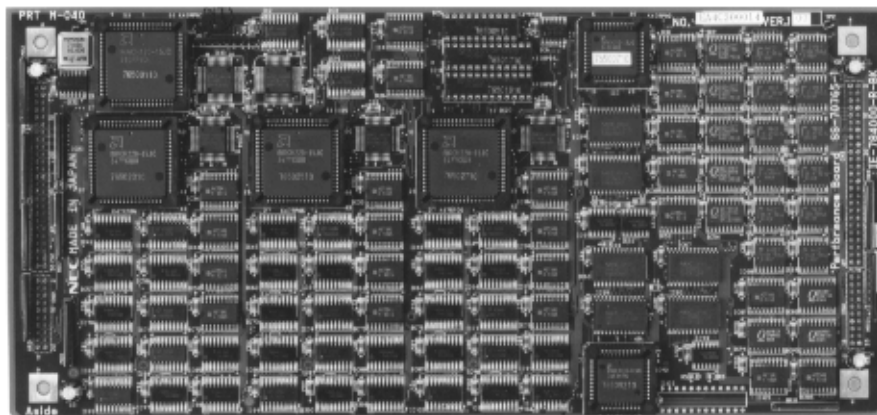
(4) Boards**– Break board (IE-784000-R-BK)**

- Event trace board
Controls event and trace.

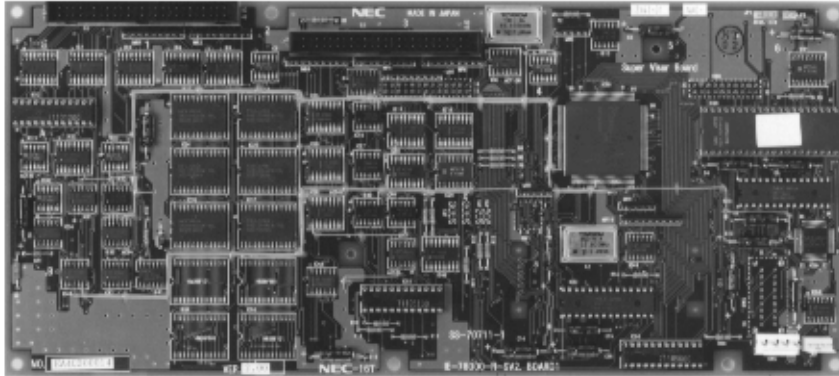


- **Performance board**

- Controls performance measurement.



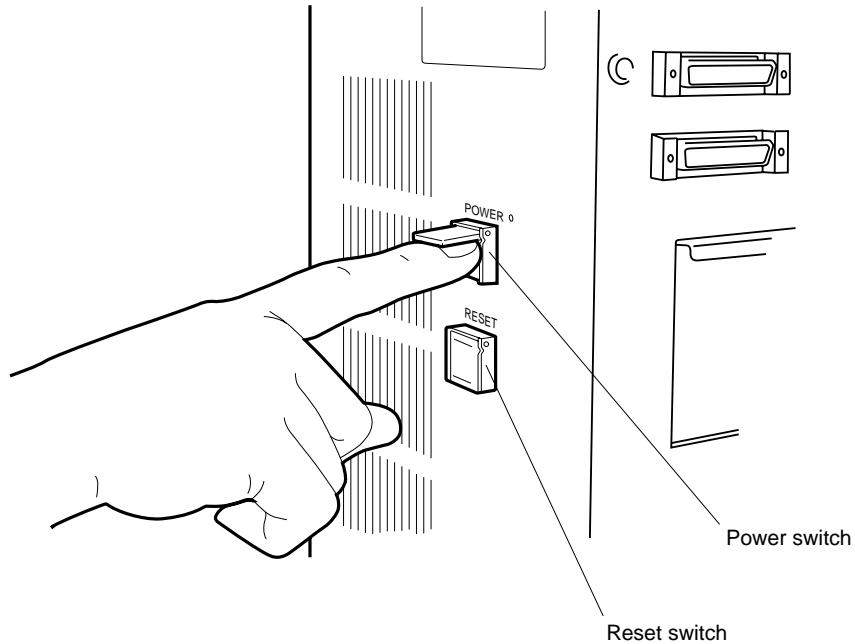
- **Supervisor board (IE-78000-R-SV2)**
Controls the entire IE-784000-R.



2.2 Switch Setting

(1) Power switch and reset switch

Fig. 2-1 Power Switch and Reset Switch



– Power switch

- The power switch is a pushbutton switch.
- Setting
 - [Power ON]** Press the switch once. The switch LED will light.
 - [Power OFF]** Press the switch once. The LED will extinguish.

– Reset switch

- The reset switch is a pushbutton switch.
- Setting
 - [Reset]** Press the switch once. The IE-784000-R will be reset.

2.3 Connecting Accessory Cables

– Installation location

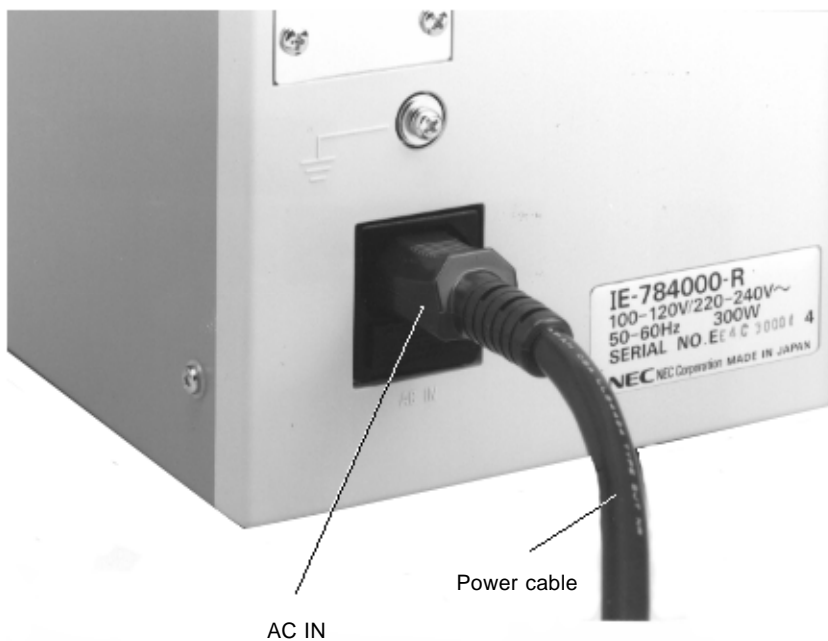
When installing the IE-784000-R, bear in mind the following points:

- Do not install the IE-784000-R where is subject to dust and dirt.
- Do not place any object in the vicinity of the air inlet of the IE-784000-R.

(1) Power cable

Insert the power cable into the AC IN inlet on the rear panel of the IE-784000-R.

Photo 2-5 Connecting Power Cable



(2) RS-232C interface cable

Connect the RS-232C interface cable to the serial interface port CH1 on a side panel of the IE-784000-R.

Photo 2-6 Connecting RS-232C Cable



(3) PC bus interface cable

Connect the PC bus interface cable to the PC bus interface/network interface port CH3 on a side panel of the IE-784000-R.

Photo 2-7 Connecting PC Bus Interface Cable



[MEMO]

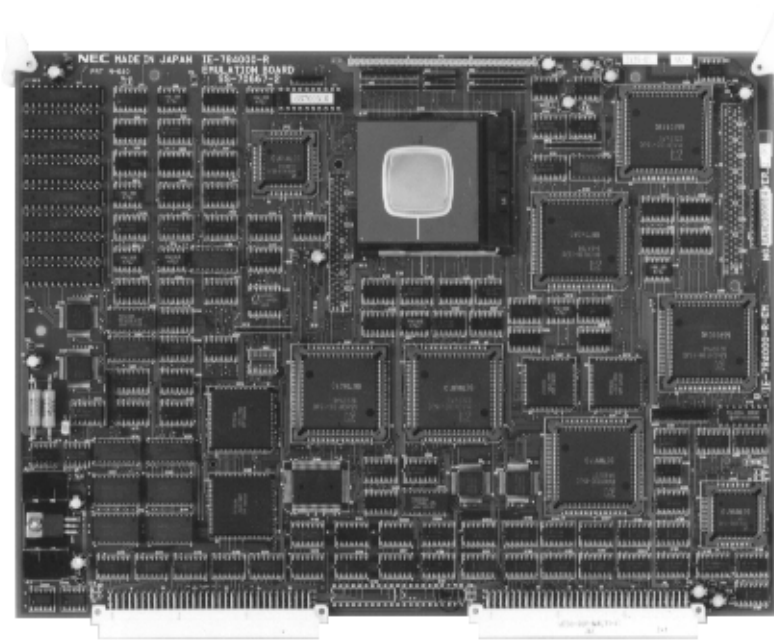
CHAPTER 3 IE-784000-R-EM (EMULATION BOARD)

3.1 General

The IE-784000-R-EM is an emulation board for the 78K/IV series.

This board is used in combination with the IE-784000-R and a peripheral emulation board.

Photo 3-1 IE-784000-R-EM



3.2 Unpacking Carton Box of IE-784000-R-EM

The carton box containing the IE-784000-R-EM also contains the following accessories (a) through (d). Check to see that each accessory is not damaged or missing. If you find any abnormality, consult NEC.

- **Accessories**
 - (a) Installation manual: ×1
 - (b) Warranty : ×1
 - (c) Packing list : ×1
 - (d) Accessory list : ×1

[MEMO]

CHAPTER 4 IE-784000-R-BK (BREAK BOARD)

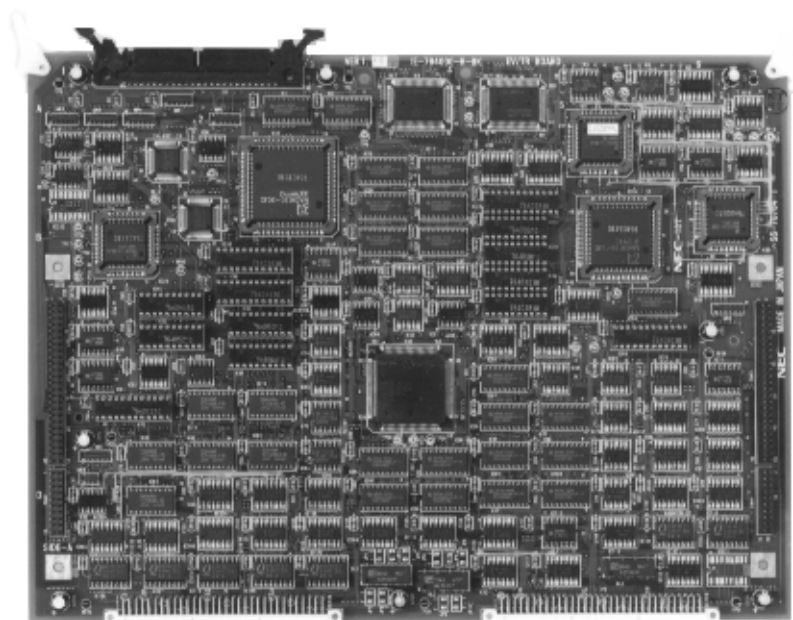
4.1 General

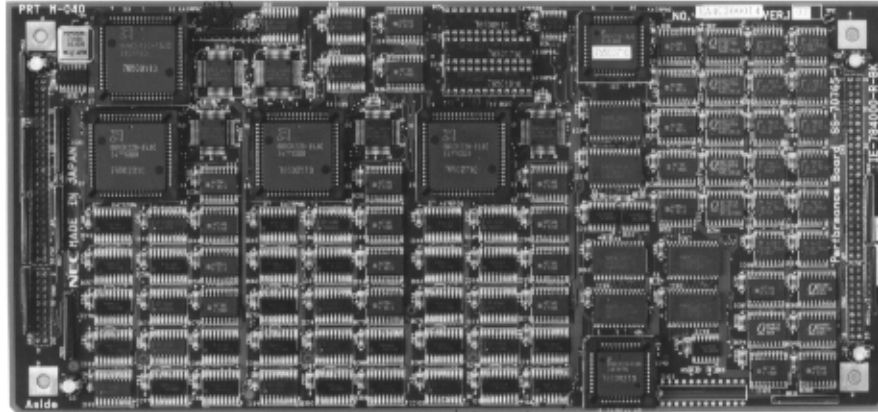
The IE-784000-R-BK is a break board for the 78K/IV series.

This board consists of an event trace board and a performance board. These two boards are secured with screws.

Photo 4-1 Break Board

(1) Event trace board



(2) Performance board**4.2 Unpacking Carton Box of IE-784000-R-BK**

The carton box containing the IE-784000-R-BK also contains the following accessories (a) through (d). Check to see that each accessory is not damaged or missing. If you find any abnormality, consult NEC.

• Accessories

- (a) Installation manual: ×1
- (b) Warranty : ×1
- (c) Packing list : ×1
- (d) Accessory list : ×1

CHAPTER 5 HOST INTERFACE BOARDS

This chapter describes the following four boards for the 78K/IV series:

- IE-70000-98-IF-B
- IE-70000-98N-IF
- IE-70000-PC-IF-B
- IE-78000-R-SV3

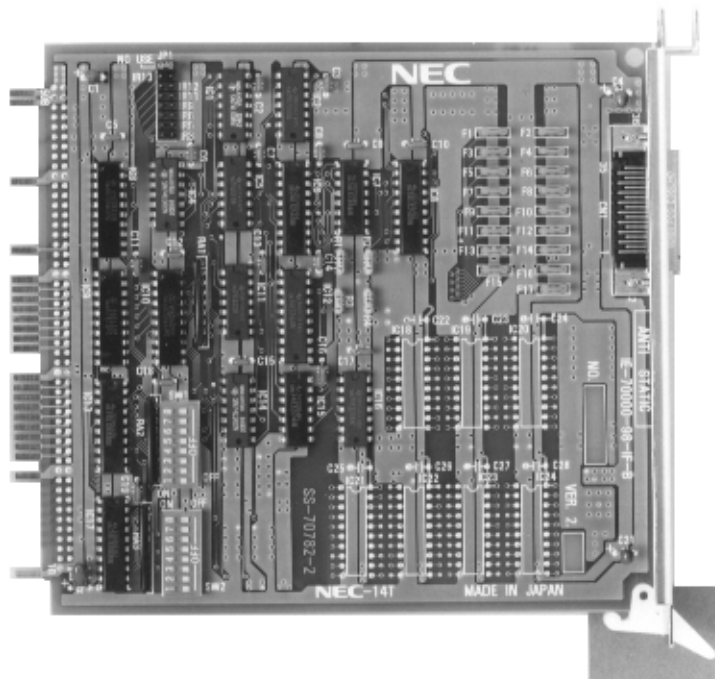
5.1 IE-70000-98-IF-B

5.1.1 General

The IE-70000-98-IF-B consists of an interface adapter and a cable that are used when an NEC's PC-9800 series personal computer is used as the host machine.

This board is inserted to an expansion slot of the PC-9800 series.

Photo 5-1 IE-70000-98-IF-B



5.1.2 Unpacking carton box of IE-70000-98-IF-B

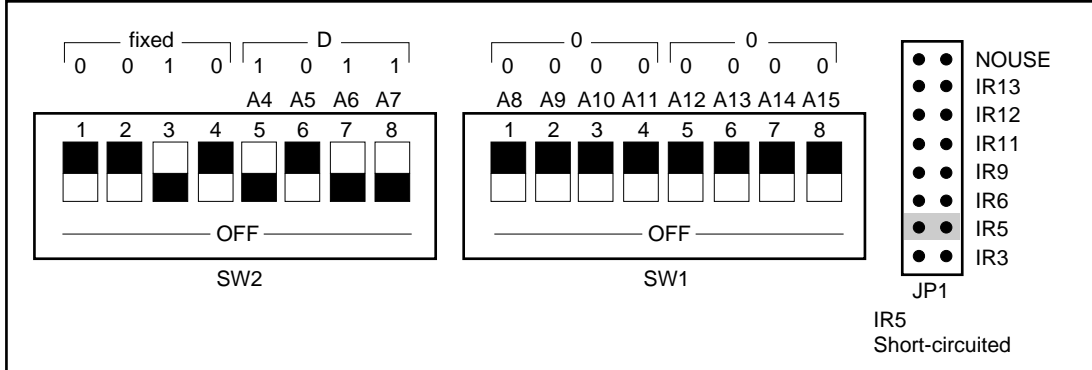
The carton box containing the IE-70000-98-IF-B also contains the following accessories (a) through (c). Check to see that each accessory is not damaged or missing. If you find any abnormality, consult NEC.

- **Accessories**
 - (a) Warranty : ×1
 - (b) Packing list : ×1
 - (c) Accessory list : ×1

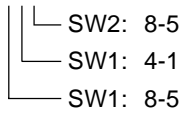
5.1.3 Setting IE-70000-98-IF-B

Set the I/O address of the IE-70000-98-IF-B by using the DIP switches, and set the interrupt vector address by using the jumper, as illustrated below.

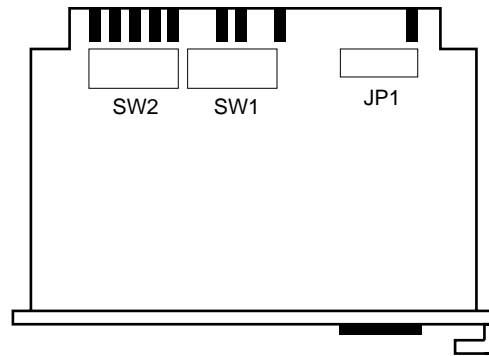
Example



I/O address = xxx0



Set Value of Jumper	Vector Number	IE-70000-98-IF-B
IR3 (INT0)	0 × 0B	○
IR5 (INT1)	0 × 0D	○
IR6 (INT2)	0 × 0E	○
IR9 (INT3)	0 × 11	○
IR11 (INT4)	0 × 12	○
IR12 (INT5)	0 × 14	○
IR13 (INT6)	0 × 15	○



Caution If the setting of the PC interface board has been changed, the setting of the EXPC.INI file must be changed accordingly.

5.2 IE-70000-98N-IF

5.2.1 General

The IE-70000-98N-IF consists of an interface adapter and a cable that are used when an NEC's PC-9800 series notebook type personal computer is used as the host machine.

Photo 5-2 IE-70000-98N-IF



5.2.2 Unpacking carton box of IE-70000-98N-IF

The carton box containing the IE-70000-98N-IF also contains the following accessories (a) through (c). Check to see that each accessory is not damaged or missing. If you find any abnormality, consult NEC.

- **Accessories**

- (a) Warranty : ×1
- (b) Packing list : ×1
- (c) Accessory list : ×1

5.2.3 Setting of IE-70000-98N-IF

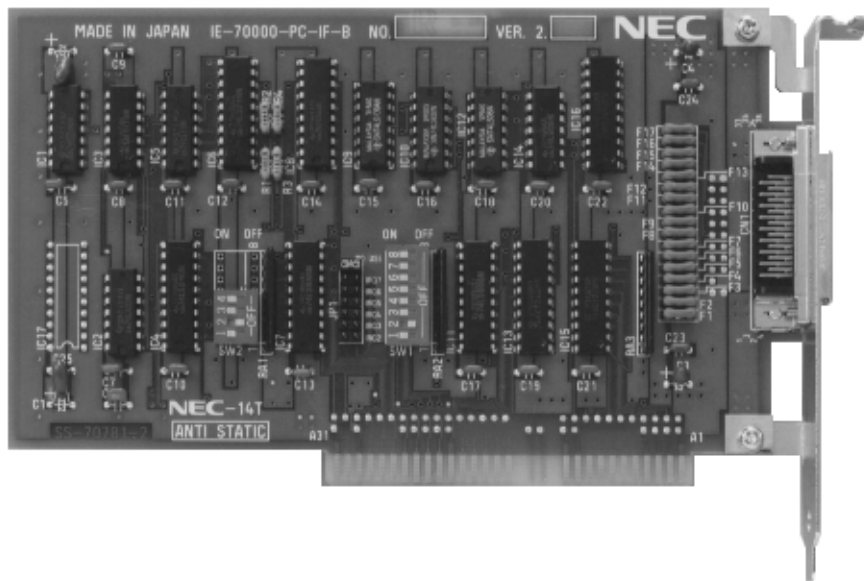
The IE-70000-98N-IF has no parts to be set.

5.3 IE-70000-PC-IF-B

5.3.1 General

The IE-70000-PC-IF-B consists of an interface adapter and a cable that are used when an IBM PC/AT is used as the host machine. This board is inserted in a bus slot of the IBM PC/AT.

Photo 5-3 IE-70000-PC-IF-B



5.3.2 Unpacking carton box of IE-70000-PC-IF-B

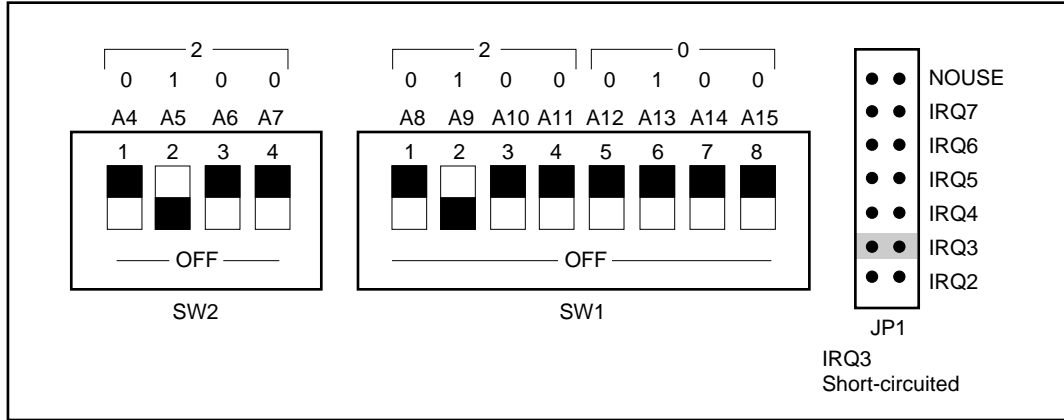
The carton box containing the IE-70000-PC-IF-B also contains the following accessories (a) through (c). Check to see that each accessory is not damaged or missing. If you find any abnormality, consult NEC.

- **Accessories**
 - (a) Warranty : ×1
 - (b) Packing list : ×1
 - (c) Accessory list : ×1

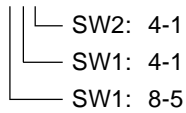
5.3.3 Setting IE-70000-PC-IF-B

Set the I/O address of the IE-70000-PC-IF-B by using the DIP switches, and set the interrupt vector address by using the jumper, as illustrated below.

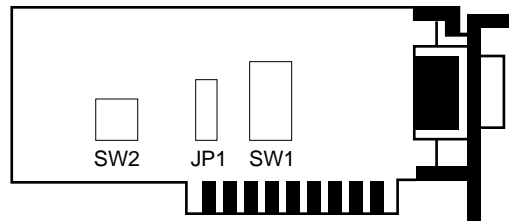
Example



I/O address = xxx0



Set Value of Jumper	Vector Number	IE-70000-98-IF-B
IRQ2	0 × 0A	0
IRQ3	0 × 0B	0
IRQ4	0 × 0C	0
IRQ5	0 × 0D	0
IRQ6	0 × 0E	0
IRQ7	0 × 0F	0



Caution If the setting of the PC interface board has been changed, the setting of the EXPC.INI file must be changed accordingly.

5.4 IE-78000-R-SV3

5.4.1 General

The IE-78000-R-SV3 is an interface board that is used when an EWS is used as the host machine, and is connected to an internal board of the IE-784000-R. As Ethernet, 10BASE5 is supported. For any other method, a commercially available conversion adapter is necessary.

Photo 5-4 IE-78000-R-SV3



5.4.2 Unpacking carton box of IE-78000-R-SV3

The carton box containing the IE-78000-SV3 also contains the following accessories (a) through (c). Check to see that each accessory is not damaged or missing. If you find any abnormality, consult NEC.

- **Accessories**
 - (a) Warranty : ×1
 - (b) Packing list : ×1
 - (c) Accessory list : ×1

5.4.3 Setting of IE-78000-R-SV3

For the setting of the IE-78000-R-SV3, refer to **CHAPTER 9 SETTING NETWORK INFORMATION**.

[MEMO]

CHAPTER 6 CONNECTING PERIPHERAL EQUIPMENT

The IE-784000-R can debug or program the target device when it is connected to peripheral equipment, and thereby to organize a system. This chapter describes how to connect the peripheral equipment, and the set values and setting of each. Be sure to read this chapter when connecting peripheral equipment.

For the sequence of system configuration, refer to **1.4 Setup Sequence**. For the details on how to start the system, refer to the **User's Manual for the ID78K/IV Integrated Debugger**.

6.1 Peripheral Equipment

A “host machine” is connected to the IE-784000-R as peripheral equipment.

<Host machine>

– PC-9800 series

The PC-9800 series can supply a consistent development environment where software development and total evaluation of hardware can be carried out, when an optional control program for the IE-784000-R is executed on Windows™.

– IBM PC/AT

The IBM PC/AT can supply a consistent development environment where software development and total evaluation of hardware can be carried out, when an optional control program for the IE-784000-R is executed on Windows.

– Work station

A work station can supply a consistent development environment where software development and total evaluation of hardware can be carried out, when an optional control program for the IE-784000-R is executed on OS.

6.2 Interface of IE-784000-R

To connect the IE-784000-R with peripheral equipment, a serial interface (channel 1), PC bus interface (channel 3), or network interface (channel 3) is used.

Note that channel 2 of the IE-784000-R is reserved and cannot be used.

(1) Serial interface (channel 1)

Serial Interface	Connected Peripheral Equipment
Channel 1 (I/O)	Terminal
Channel 2 (I/O)	None

Table 6-1 outlines the functions of channel 1. For further information on the functions of channel 1, refer to **CHAPTER 8 FUNCTIONS OF RESPECTIVE CHANNELS**.

Table 6-1 Functional Outline of Channel 1

Set Item		Functional Outline of Channel 1	Setting
Mode		Modem mode	Fixed
Baud rate		Internal : 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 78600, 153600 [bps] MAX. External : 19200 [bps] MAX.	H
Handshaking		Hardware: 1 character Software : Flow control } Shared	Fixed
Character specification	Character length	8 bits	Fixed
	Parity bit	None	Fixed
	Stop bit	2 bits	Fixed

Remark H: selected by switch (hardware)

(2) PC bus interface and network interface (channel 3)

Channel 3 is a PC bus interface/network interface port that is used to connect the host machine. As the network interface, Ethernet is employed.

For details, refer to **CHAPTER 5 HOST INTERFACE BOARDS**.

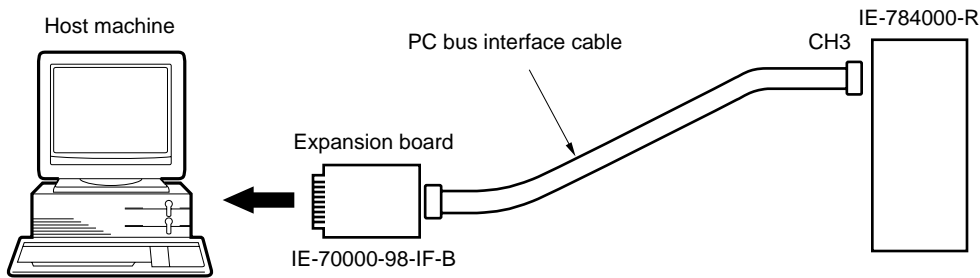
6.3 Connecting PC-9800 Series

To connect the PC-9800 series, use the PC bus interface.

6.3.1 Connecting PC-9800 series as host machine

– General

- Turn off power.
- Connect channel 3 of the IE-784000-R and the PC-9800 series (hereafter referred to as the “host machine”) with the PC bus interface cable.
- Turn on power.



– Connecting

(1) Turn off power.

Before connection, turn off the power to each equipment. If power to the IE-784000-R and host machine is on, be sure to turn it off.

(2) Set the IE-70000-98-IF-B board.

(3) Insert the board to an expansion slot of the host machine.

(4) Connect the IE-784000-R with the host machine.

Table 6-2 Cable Connection

IE-784000-R	Connecting Cable	Host Machine
CH3	PC bus interface cable	IE-70000-98-IF-B

(5) Turn on power

Turn on power in the sequence described below. Turn off power in the reverse sequence. Usually, turn power on/off in the described sequence.

◇ Procedure**– Power-on sequence**

- <1> Turn on the power switch of the host machine.
- <2> Turn on the power switch of the IE-784000-R.
- <3> Start Windows and then the integrated debugger. For details on how to start the debugger, refer to the **User's Manual for the ID78K/IV Integrated Debugger**.

Caution If communication with the IE-784000-R cannot be established after the integrated debugger has been started, check the following points:

- <1> Is the cable between the IE-784000-R and host machine connected correctly?
- <2> Is the PC interface board connected to the host machine correctly?
- <3> Is the setting of the PC interface board correct?
- <4> Does the setting of the PC interface board match the setting of the integrated debugger?
- <5> Is the jumper on the emulation board or supervisor board set as described in **APPENDIX C JUMPER SETTING**?
- <6> Are the break board, emulation board, I/O emulation board, and connector board correctly mounted to specified positions?
- <7> If the target system is connected, is the RESET pin of the target device fixed to the low level or not?

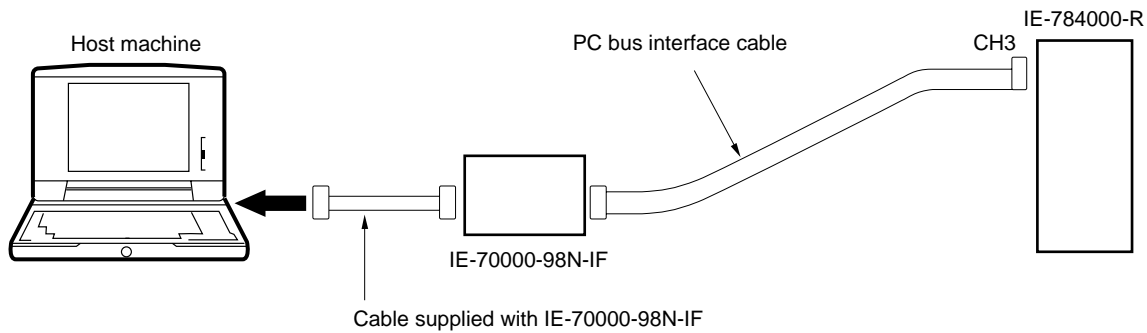
If the IE-784000-R still cannot be started, consult NEC.

– Power-off sequence

- <1> Turn off the power switch of the IE-78400-R.
- <2> Turn off the power switch of the host machine.

6.3.2 When using PC-9800 series notebook type personal computer as host machine**– General**

- Turn off power.
- Connect channel 3 of the IE-784000-R and the PC-9800 series notebook type personal computer (hereafter referred to as the “host machine”) with the PC bus interface cable.
- Turn on power.

**– Connecting****(1) Turn off power.**

Before starting connection, turn off power to each equipment. If power to the IE-784000-R and host machine is on, first turn it off.

(2) Connect the IE-70000-98N-IF to the expansion connector of the host machine.**(3) Connect the IE-784000-R and IE-70000-98N-IF.****Table 6-3 Cable Connection**

IE-784000-R	Connecting Cable	Host Machine
CH3	PC bus interface cable	IE-70000-98N-IF

(5) Turn on power

Turn on power in the sequence described below. Turn off power in the reverse sequence. Usually, turn power on/off in the described sequence.

◇ Procedure**– Power-on sequence**

- <1> Turn on the power switch of the host machine.
- <2> Turn on the power switch of the IE-784000-R.
- <3> Start Windows and then the integrated debugger. For details on how to start the debugger, refer to the User's Manual for ID78K/IV Integrated Debugger.

Caution If communication with the IE-784000-R cannot be established after the integrated debugger has been started, check the following points:

- <1> Is the cable between the IE-784000-R and IE-70000-98N-IF connected correctly?
- <2> Is the connecting cable between the IE-70000-98N-IF and host machine connected correctly?
- <3> Is the setting of the integrated debugger for the IE-70000-98N-IF?
- <4> Is the jumper on the emulation board or supervisor board set as described in **APPENDIX C JUMPER SETTING**?
- <5> Are the break board, emulation board, I/O emulation board, and connector board correctly mounted to specified positions?
- <6> If the target system is connected, be sure that the RESET pin of the target device is not fixed to the low level.

If the IE-784000-R still cannot be started, consult NEC.

– Power-off sequence

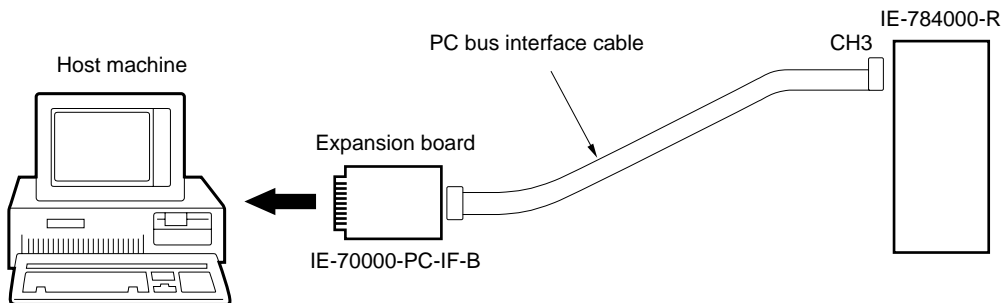
- <1> Turn off the power switch of the IE-784000-R.
- <2> Turn off the power switch of the host machine.

6.4 Connecting IBM PC/AT

To connect the IBM PC/AT, use the PC bus interface.

– General

- Turn off power.
- Connect channel 3 of the IE-784000-R and the IBM PC/AT (hereafter referred to as the “host machine”) with the PC bus interface cable.
- Turn on power.



– Connecting

(1) Turn off power.

Before connection, turn off the power to each equipment. If power to the IE-784000-R and host machine is on, be sure to turn it off.

(2) Set the IE-70000-PC-IF-B board.

(3) Insert the board to an expansion slot of the host machine.

(4) Connect the IE-784000-R with the host machine.

Table 6-4 Cable Connection

IE-784000-R	Connecting Cable	Host Machine
CH3	PC bus interface cable	IE-70000-PC-IF-B

(5) Turn on power

Turn on power in the sequence described below. Turn off power in the reverse sequence. Usually, turn power on/off in the described sequence.

◇ Procedure**– Power-on sequence**

- <1> Turn on the power switch of the host machine.
- <2> Turn on the power switch of the IE-784000-R.
- <3> Start Windows and then the integrated debugger. For details on how to start the debugger, refer to the **User's Manual for the ID78K/IV Integrated Debugger**.

Caution If communication with the IE-784000-R cannot be established after the integrated debugger has been started, check the following points:

- <1> Is the cable between the IE-784000-R and host machine connected correctly?
- <2> Is the PC interface board connected to the host machine correctly?
- <3> Is the setting of the PC interface board correct?
- <4> Does the setting of the PC interface board match the setting of the integrated debugger?
- <5> Is the jumper on the emulation board or supervisor board set as described in **APPENDIX C JUMPER SETTING**?
- <6> Are the break board, emulation board, I/O emulation board, and connector board correctly mounted to specified positions?
- <7> If the target system is connected, be sure that the RESET pin of the target device is not fixed to the low level.

If the IE-784000-R still cannot be started, consult NEC.

– Power-off sequence

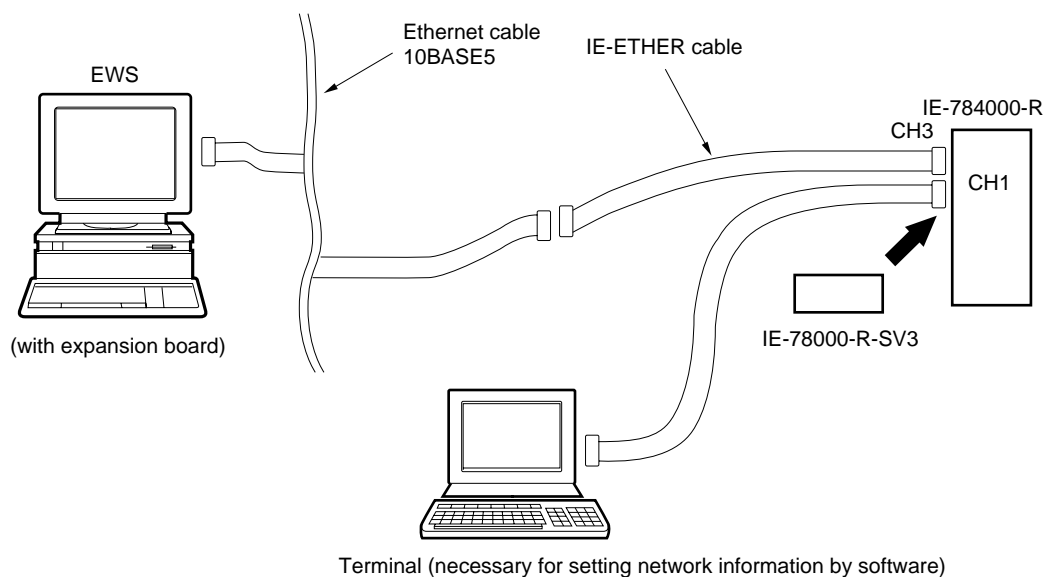
- <1> Turn off the power switch of the IE-784000-R.
- <2> Turn off the power switch of the host machine.

6.5 Connecting EWS

To connect an EWS, use the network interface.

– General

- Turn off power.
- If the IE-784000-R is connected to Ethernet for the first time, or if the network information is changed, set the network information by referring to **CHAPTER 9 SETTING NETWORK INFORMATION**.
- Connect channel 3 of the IE-784000-R and Ethernet with the IE-ETHER cable.
- Turn on power.



– Setting network information (by software)

- (1) Turn off power.
- (2) Connect the IE-78000-R-SV3 board to the RS-232C setting compartment on a side panel of the IE-784000-R.
- (3) Connect the IE-ETHER cable to CH3.

- (4) Connect the terminal to CH1 of the IE-784000-R.

Table 6-5 Cable Connecting

IE-784000-R	Connecting Cable	Connected to:
CH1	RS-232C cable	Terminal
CH3	IE-ETHER cable	Ethernet or open

- (5) **Turn on power**

Turn on power in the following sequence:

- <1> Terminal
- <2> IE-784000-R

- (6) **Set network information**

Set the necessary information from the terminal. For details, refer to **CHAPTER 9 SETTING NETWORK INFORMATION**.

- (7) **Turn off power**

Turn off power in the following sequence:

- <1> IE-784000-R
- <2> Terminal

– Setting network information (by hardware)

- (1) Turn off power.
- (2) Connect the IE-78000-R-SV3 board to the RS-232C setting compartment on a side panel of the IE-784000-R.
- (3) Connect the IE-ETHER cable to CH3.

Table 6-6 Cable Connecting

IE-784000-R	Connecting Cable	Connected to:
CH3	IE-ETHER cable	Ethernet or open

- (4) Turn on power while pressing SW1 of the IE-784000-R-SV3.
- (5) **Set network information.**
Set the necessary information by using the switches on the IE-78000-R-SV3. For details, refer to **CHAPTER 9 SETTING NETWORK INFORMATION**.
- (6) Turn off power.

– **Connecting**

(1) **Turn off power.**

Before starting connection, be sure to turn off power to the IE-784000-R first.

(2) **Set network information.**

(3) **Connect the IE-ETHER cable to Ethernet.**

Table 6-7 Cable Connection

IE-784000-R	Connecting Cable	Connected to:
CH3	IE-ETHER cable	Ethernet

(4) **Turn on power.**

Turn on power in the sequence described below. Turn off power in the reverse sequence. Usually, turn power on/off in the described sequence.

◇ **Procedure**

– **Power-on sequence**

- <1> Turn on the power switch of EWS.
- <2> Turn on the power switch of the IE-784000-R.
- <3> Start the integrated debugger. For details on how to start the debugger, refer to the **User's Manual for the ID78K/IV Integrated Debugger**.

Caution If communication with the IE-784000-R cannot be established after the integrated debugger has been started, check the following points:

- <1> Is the cable between the IE-784000-R and EWS connected correctly?
- <2> Is the IE-78000-R-SV3 connected correctly to the IE-784000-R?
- <3> Is the setting of the network information correct?

If the IE-784000-R still cannot be started, consult NEC.

– **Power-off sequence**

- <1> Turn off the power switch of the IE-784000-R.
- <2> Turn off the power switch of the EWS.

[MEMO]

CHAPTER 7 CONNECTING TARGET SYSTEM

This chapter describes how to connect the emulation probe connected to the IE-784000-R to the target system. Also described is the action to be taken in case a latchup occurs.

Be sure to read this chapter when you connect the IE-784000-R to the target system.

7.1 Connection

– Before connection

- If the user clock has not yet been set (only when the user clock must be set)
→ Refer to the User's Manual for the I/O emulation board.

– General

- Connect the emulation probe to the target system.
- Connect the external sense clip to the target system.

(1) Connect the target system and emulation probe

Connect the emulation probe to the target system following the steps described below.

For the details of connection, refer to the User's Manual of the I/O emulation board or emulation probe.

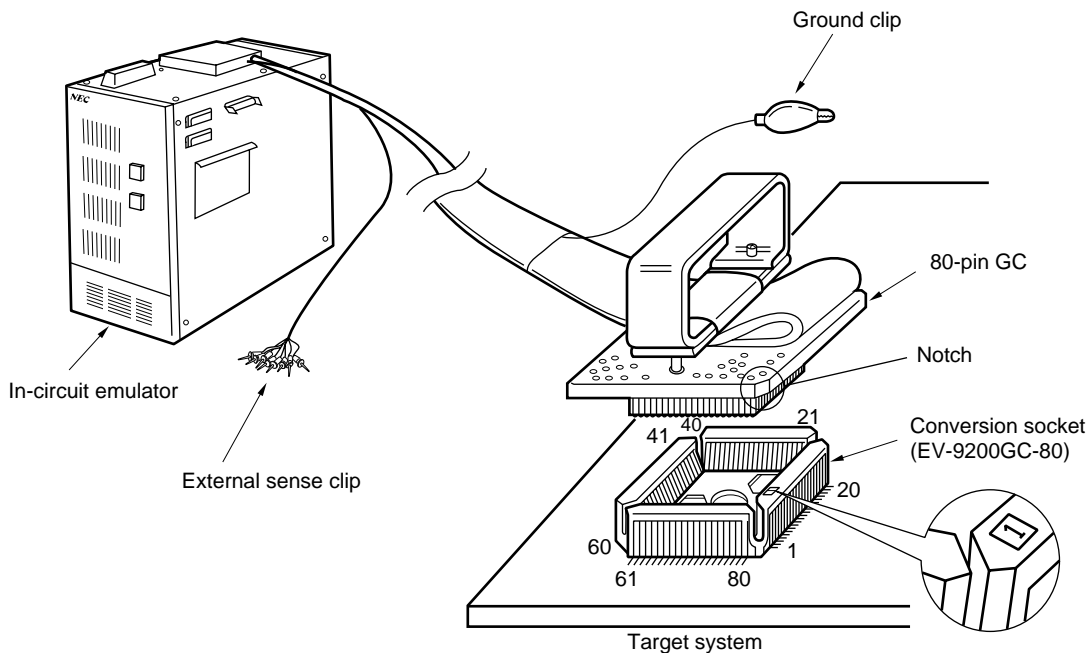
◇ Procedure

<1> Connect the ground clip of the emulation probe to GND (signal ground) of the CPU on the target system.

Caution Unless the ground clip is connected, the IE-784000-R may be damaged by static electricity.

<2> Insert the tip of the emulation probe to the CPU socket on the target system. At this time, match pin 1 of the CPU socket and pin 1 of the tip of the emulation probe.

Fig. 7-1 Example of Connecting Target System with EP-78230GC-R



Caution Do not bend the pins of the CPU and those of the emulation probe.

(2) Connect the external sense clip to the target system

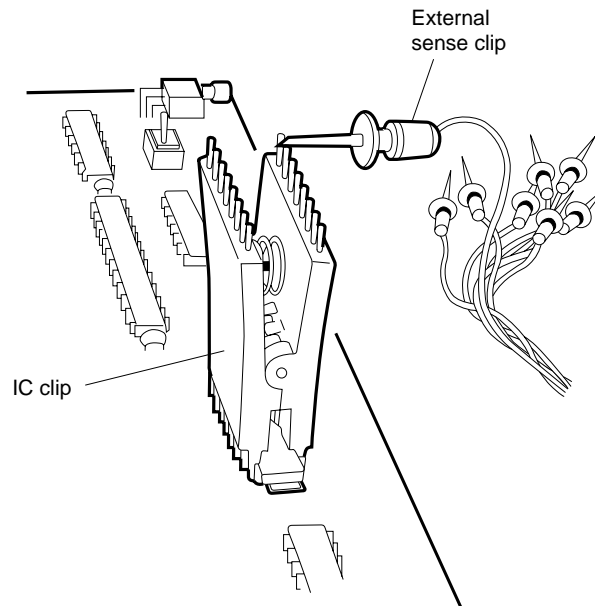
The IE-784000-R can trace the bus cycle of the emulation CPU real-time. Eight external sense clips are available for evaluating the five types of functions listed below. For details on how to use the external sense clips, refer to the **User's Manual for the ID78K/IV Integrated Debugger**.

- <1> External sense function to trace any eight signal lines real-time
- <2> External data detection condition
- <3> External data condition of bus event detection
- <4> External data condition of program execution event condition
- <5> External trigger output function

- Cautions**
1. **Connect the external sense clip to a signal line of TTL or CMOS level. If the external sense clip is connected to any other signal line, the signal level cannot be accurately detected. Moreover, the sensor of the IE-784000-R may be damaged depending on the voltage level.**
 2. **Usually, the eight external sense clips are used as input signal lines. However, external sense clip 1 can be used to output a trigger signal to an external system when an event occurs if so set by using an external trigger output function (for details, refer to the User's Manual for the ID78K/IV Integrated Debugger). To use external sense clip 1 as an output signal line, do not connect it to a line that outputs a signal of the target system.**
 3. **To connect the external sense clip, use an IC clip.**

◇ Procedure

- <1> First, turn off power to the IE-784000-R.
- <2> Next, turn off power to the target system.
- <3> Attach the IC clip to an IC on the target system to be traced.
- <4> Connect the external sense clip to the IC clip.

Fig. 7-2 Connecting External Sense Clip

7.2 Power-On/Off Sequence

After connecting the target system, turn on power in the sequence described below. For the details on how to start and end the IE-784000-R's operation, refer to the **User's Manual for the ID78K/IV Integrated Debugger**.

Caution Be sure to turn on/off power in the correct sequence; otherwise, the IE-784000-R may not operate correctly or, in the worst case, may be damaged.

◇ Procedure

– Power-on sequence

- <1> Turn on power to the IE-784000-R.
- <2> Start the integrated debugger.

– Power-off sequence

- <1> Turn off power to the target system.
- <2> Turn off power to the IE-784000-R.

7.3 Action to Be Taken in Case of Latchup

If a latchup occurs in the emulation CPU of the IE-784000-R or in the peripheral CMOS devices, immediately turn off power.

- The IE-784000-R automatically turns off power when it has detected a latchup.
 - Emulation CPU
 - Peripheral CMOS devices of emulation CPU
 - Other CMOS devices
- Turn off power to the target system.
- Turn off power to the IE-784000-R.

[MEMO]

CHAPTER 8 FUNCTIONS OF RESPECTIVE CHANNELS

This chapter describes in detail the functions of channels 1 and 3 of the IE-784000-R.

Channel 1 is an interface for setting network information, and channel 3 is an interface for the host machine.

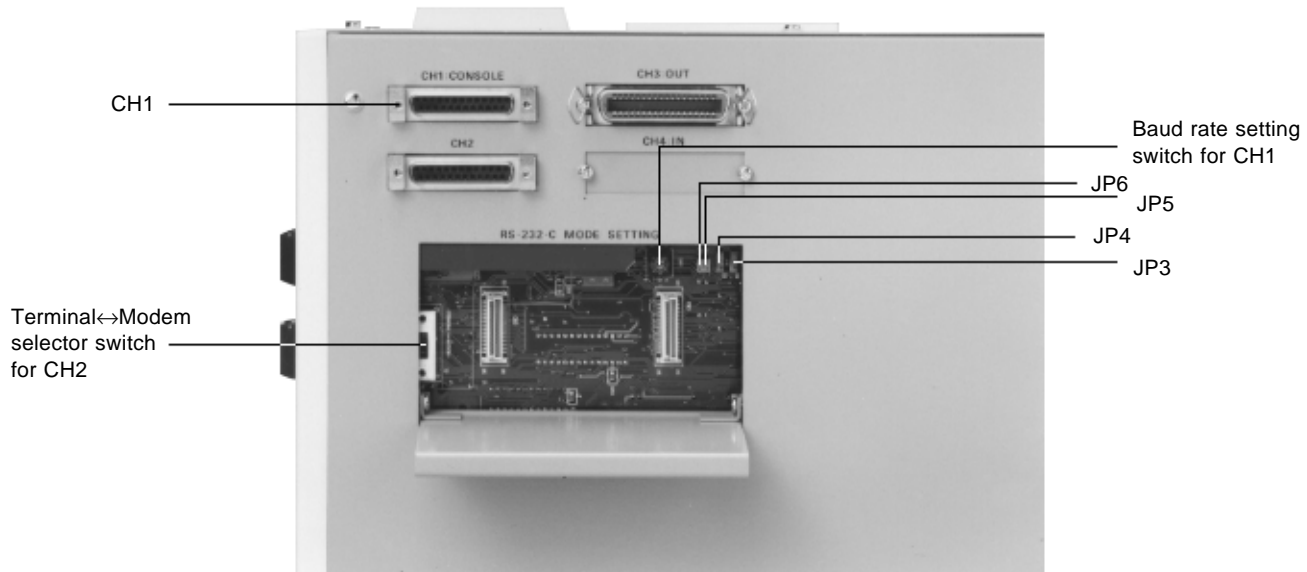
You do not have to read this chapter as long as the IE-784000-R is connected to the host machine by either of the following methods in accordance with **CHAPTER 6 CONNECTING PERIPHERAL EQUIPMENT**.

1. Connect the PC bus interface port (CH3) and host machine.
2. Connect the network interface port (CH1) and host machine.

8.1 Function of Channel 1

Channel 1 is a serial interface provided for setting network interface information when the network interface is used. This channel employs an RS-232C interface. The RS-232C setting compartment on a side panel of the IE-78400-R contains a switch that sets a mode of channel 1 (CHANNEL1). Located above this compartment is a serial interface port (CH1).

Photo 8-1 Channel 1



- Remark**
- JP3: Selects SG or FG of CH1
 - JP4: Selects SG or FG of CH2
 - JP3: Shorted
 - JP6: Shorted

Channel 1 controls the RS-232C interface by setting the following five parameters (1) through (5) and sets network information necessary for using the network interface.

Parameters (2) and (3) can be set by using the setting switch or jumper of channel 1. The other parameters, (1), (4), and (5), are fixed and cannot be changed.

(1) Mode

Parameter	Contents	Setting
Mode	Modem mode	Fixed

(2) Setting of FG

Parameter	Contents	Setting
Setting of FG	Open/short	JP3 shorted to FG side

(3) Baud rate

Parameter	Contents	Setting
Baud rate	Internal : 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 78600, 153600 [bps] External : 19200 [bps]	Baud rate setting switch

(4) Handshake mode

Parameter	Contents	Setting
Handshake mode	Hardware/software shared	Fixed

(5) Character specification

Parameter	Contents	Setting
Character length	8 bits	Fixed
Parity bit	No parity	
Stop bit length	2 bits	

(1) Mode

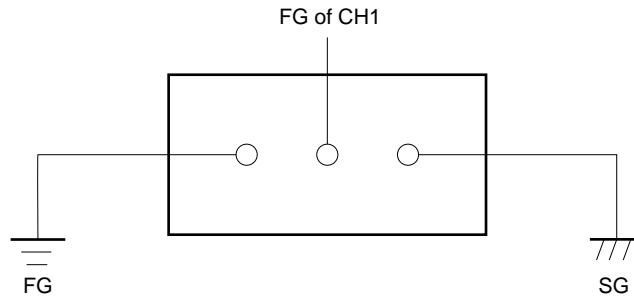
The mode is fixed to the modem mode.

(2) Setting of FG

The FG select jumper (JP3) is used for setting of FG. When this jumper is set to the FG (frame ground) side, FG is opened. When it is set to the SG (signal ground) side, FG and SG are shared.

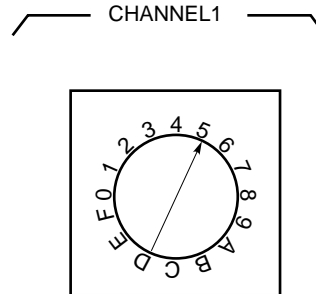
Usually, set the jumper to the FG side (open).

Fig. 8-1 Circuit Diagram of FG Select Jumper (CH1)



(3) Baud rate

It is necessary to set the baud rate of the terminal same as that of the IE-784000-R. To set a baud rate, use the baud rate setting rotary DIP switch.

Fig. 8-2 Baud Rate Setting Switch**Table 8-1 Setting Baud Rate**

Switch Position	Baud Rate [bps]	Switch Position	Baud Rate [bps]
0	300	6	19200
1	600	7	38400
2	1200	8	76800
3	2400	9	153600
4	4800	A to F	External ^{Note}
5	9600		

Note This is the mode in which the baud rate of the terminal is used. If the setting of the baud rate is changed, the setting of the IE-784000-R is changed. However, the baud rate must be 19200 bps or less.

(4) Handshake mode

Hardware handshaking is established by connecting handshake signals RTS, CTS, DSR, and DTR. If these signals are not connected, software handshaking is executed. Usually, channel 1 executes both hardware handshaking and software handshaking simultaneously to transfer data.

Hardware handshaking is to transfer data 1 byte at a time by using a handshake signal. This is called character handshaking. Software handshaking cannot handshake on a byte-by-byte basis, but can handshake on a block basis. This is called flow control.

The IE-784000-R automatically adjusts its hardware by using the respective handshake signals so that no data overlap during handshaking. For example, if a buffer becomes full, the IE-784000-R controls the CTS signal and completely stops data transfer. Therefore, no data is skipped as long as the handshake signals are connected. If the handshake signals are not connected, however, only software handshaking is executed, and there is a possibility that some data are skipped.

(5) Character specifications

The character specifications for data transmission/reception are as follows:

- **Character length**
Fixed to 8 bits

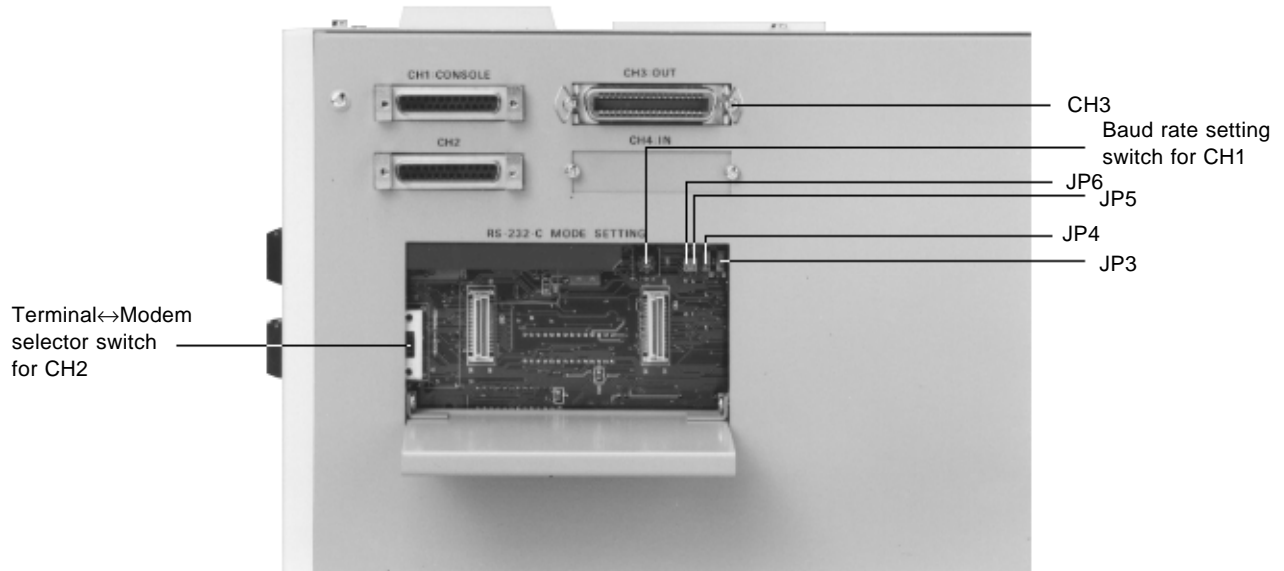
- **Parity bit**
None

- **Stop bit length**
Fixed to 2 bits

8.2 Function of Channel 3

Channel 3 is a PC bus interface/network interface provided for the host machine. It transmits control data between the IE-784000-R and host machine, and loads object files.

Photo 8-2 Channel 3



- Remark** JP3: Selects SG or FG of CH1
 JP4: Selects SG or FG of CH2
 JP5: Shorted
 JP6: Shorted

[MEMO]

CHAPTER 9 SETTING NETWORK INFORMATION

This chapter describes how to set network information necessary for implementing network interfacing. Be sure to set the network information because it is necessary for network interfacing.

The network information is written to the EEPROM on the IE-78000-R-SV3. Once set, therefore, the information is retained even if power has been turned off.

9.1 Setting Network Information

The network information can be set in the following two ways:

- <1> By connecting a terminal (by software)
- <2> By using hardware switches (by hardware)

Features

	Environment	Set Information	Setting	Merit/Demerit
Setting by software	Terminal (personal computer, etc.)	All information	Refer to 9.2.	All information can be set. Terminal is necessary.
Setting by hardware	Unnecessary	Only IP address port No.	Refer to 9.5.	Terminal is not necessary. All information cannot be set.

9.2 Setting by Software

9.2.1 Connecting equipment

To set the network information by software, the equipment must be set as follows:

- <1> Confirm that the IE-78000-R-SV3 is connected to the setting window.
- <2> Connect channel 1 of the IE-784000-R and terminal with the RS-232C cable supplied as an accessory (for the setting of RS-232C, refer to Table 9-1).
- <3> Connect the IE-ETHER cable supplied as an accessory to channel 3 of the IE-784000-R (the other side of the cable may be left open).
- <4> When power is turned on, the menu shown in Fig. 9-1 will be displayed.

Table 9-1 Setting of RS-232C (factory-set condition)

Baud rate	9600 bps
Character	8 bits
Parity bit	None
Stop bit	2 bits
Modem/terminal	Modem

Fig. 9-1 Menu Screen

```

IE-SV VX.XX [XX/XX/XX]
--- SETUP NETWORK INFORMATION -----
  1.LOCAL  ETHERNET ADDRESS  XXXXXXXXXXXXX
  2.LOCAL  IP ADDRESS       XXXXXXXXX
  3.LOCAL  HOST NAME        XXXXXXXXXXXXXXXXX
  4.LOCAL  PORT NO.         XXXX
  5.REMOTE ETHERNET ADDRESS  XXXXXXXXXXXXX
  6.REMOTE IP ADDRESS       XXXXXXXXX
  7.REMOTE HOST NAME        XXXXXXXXXXXXXXXXX
  8.REMOTE PORT NO.         XXXX
  9.ROUTER ADDRESS          XXXXXXXXX
 10.SUBNET ADDRESS MASK     XXXXXXXXX
 11.EXIT
-----
FUNCTION NO. > XX

```

9.2.2 Operation

This section describes the operations to be performed after the menu screen has been displayed.

FUNCTION NO. > □□

On the menu screen, you can set 11 types of parameters.

Input a parameter number, 1 to 11, to the position of □□ and press the return key (↓).

Parameter "1" is to display only and the setting cannot be changed.

```

--- SETUP NETWORK INFORMATION -----
  1.LOCAL  ETHERNET ADDRESS  XXXXXXXXXXXX      ... (1)
  2.LOCAL  IP ADDRESS        XXXXXXXX          ... (2)
  3.LOCAL  HOST NAME         XXXXXXXXXXXXXXXXX ... (3)
  4.LOCAL  PORT NO.         XXXX                      ... (4)
  5.REMOTE ETHERNET ADDRESS XXXXXXXXXXXX      ... (5)
  6.REMOTE IP ADDRESS       XXXXXXXX          ... (6)
  7.REMOTE HOST NAME       XXXXXXXXXXXXXXXXX ... (7)
  8.REMOTE PORT NO.       XXXX                      ... (8)
  9.ROUTER ADDRESS        XXXXXXXX          ... (9)
 10.SUBNET ADDRESS MASK   XXXXXXXX          ... (10)
 11.EXIT                   ... (11)
-----
FUNCTION NO. > XX

```

Each of the 11 parameters is described in detail next.

(1) LOCAL ETHERNET ADDRESS

Indicates the Ethernet address of the station. This parameter is only displayed and cannot be set.

(2) LOCAL IP ADDRESS

Sets the IP address of the station. Input an 8-digit hexadecimal number.

<1> LOCAL IP ADDRESS > XXXXXXXX
 XX is currently set.
 <2> NEW LOCAL IP ADDRESS > □□□□□□□↓
 Set the new value to the position of □□.

(3) LOCAL HOST NAME

Sets the host name of the station. Input up to 16 alphanumeric characters.

<1> LOCAL HOST NAME > XXXX XX is currently set.
 <2> NEW LOCAL HOST NAME > □□□↓ Set the new value to the position of □□.

(4) LOCAL PORT NO.

Sets the port number of the station. Input a 4-digit hexadecimal number except 0.

<1> LOCAL PORT NO. > XXXX XX is currently set.
 <2> NEW LOCAL PORT NO. > □□□↓ Set the new value to the position of □□.

(5) REMOTE ETHERNET ADDRESS

Sets the Ethernet address of the other station. Input a 12-digit hexadecimal number.

<1> REMOTE ETHERNET ADDRESS > XXXXXXXXXXXXX
 XX is currently set.
 <2> NEW REMOTE ETHERNET ADDRESS > □□□□□□□□□□↓
 Set the new value to the position of □□.
 If the current address is not changed, only input ↓.

(6) REMOTE IP ADDRESS

Sets the IP address of the other station. Input an 8-digit hexadecimal number.

<1> REMOTE IP ADDRESS > XXXXXXXX
 XX is currently set.
 <2> NEW REMOTE IP ADDRESS > □□□□□□□↓
 Set the new value to the position of □□.
 If the current address is not changed, only input ↓.

(7) REMOTE HOST NAME

Sets the host name of the other station. Input up to 16 alphanumeric characters.

If the other station is not specified, input ↓.

<1> REMOTE HOST NAME > XXXX XX is currently set.
 <2> NEW REMOTE HOST NAME > □□□↓ Set the new number to the position of □□.

(8) REMOTE PORT NO.

Sets the port number of the other station. Input a 4-digit hexadecimal number.

If the other station is not specified, input ↓.

<1> REMOTE PORT NO. > XXXX XX is currently set.
 <2> NEW REMOTE PORT NO. > □□□□↓ Set the new number to the position of □□.

(9) ROUTER ADDRESS

Sets the IP address of the router. Input an 8-digit hexadecimal number.

If the IP address of the router is not set, input 0.

<1> ROUTER ADDRESS > XXXXXXXX
 XX is currently set.
 <2> NEW ROUTER ADDRESS > □□□□□□□↓
 Sets the new value to the position of □□.

(10) SUBNET ADDRESS MASK

Sets a subnet address mask field. Input an 8-digit hexadecimal number. When the subnet address mask is not set, input 0.

<1> SUBNET ADDRESS MASK > XXXXXXXX
 XX is currently set.
 <2> NEW SUBNET ADDRESS MASK > □□□□□□□↓
 Sets the new value to the position of □□.

(11) EXIT

Finishes the setting of the network information.

<1> Save & quit/Quit/Continue
 If S or s is input in response to this message, the set information is written to the EEPROM, and the setting will be completed.
 If Q or q is input, the set information is not written to the EEPROM, and the setting will be completed.
 If C or c is input, the menu screen is displayed again.

9.3 List of Network Set Values

No.	Input Parameter	Input Format	Number of Digits	Input Range	Default Value
1	LOCAL ETHERNET ADDRESS	Hexadecimal	12	0-FFFFFFFFFFFF	00004C80XXXX
2	LOCAL IP ADDRESS	Hexadecimal	8	0-FFFFFFF	C00101FE
3	LOCAL HOST NAME	Alphanumeric	16	—	IESV3
4	LOCAL PORT NO.	Hexadecimal	4	1-FFFF	1000
5	REMOTE ETHERNET ADDRESS	Hexadecimal	12	0-FFFFFFFFFFFF	FFFFFFFFFFFF
6	REMOTE IP ADDRESS	Hexadecimal	8	0-FFFFFFF	00000000
7	REMOTE HOST NAME	Alphanumeric	16	—	—
8	REMOTE PORT NO.	Hexadecimal	4	0-FFFF	0000
9	ROUTER ADDRESS	Hexadecimal	8	0-FFFFFFF	00000000
10	SUBNET ADDRESS MASK	Hexadecimal	8	0-FFFFFFF	00000000

No.	Input Parameter	Number of Digits		In Case of Abnormal Data Input
		Too few	Too many	
1	LOCAL ETHERNET ADDRESS	Left-justified. 0 for remaining digits	12 digits from left	0
2	LOCAL IP ADDRESS	Right-justified. 0 for remaining digits	8 digits from right	0
3	LOCAL HOST NAME	Left-justified	16 characters from left	—
4	LOCAL PORT NO.	Right-justified. 0 for remaining digits	4 digits from right	0
5	REMOTE ETHERNET ADDRESS	Left-justified. 0 for remaining digits	12 digits from left	0
6	REMOTE IP ADDRESS	Right-justified. 0 for remaining digits	8 digits from right	0
7	REMOTE HOST NAME	Left-justified	16 characters from left	—
8	REMOTE PORT NO.	Left-justified. 0 for remaining digits	4 digits from right	0
9	ROUTER ADDRESS	Right-justified. 0 for remaining digits	8 digits from right	0
10	SUBNET ADDRESS MASK	Left-justified. 0 for remaining digits	8 digits from right	0

9.4 Meaning of Network Set Values

(1) LOCAL ETHERNET ADDRESS (station Ethernet address)

This value indicates the Ethernet address of the station. A different value is assigned to each station. The address cannot be changed.

(2) LOCAL IP ADDRESS (station IP address)

This value indicates the IP address of the station. Usually, one IP address is assigned to each node. Be sure to set this address.

(3) LOCAL HOST NAME (station host name)

This value indicates the host name of the station.

(4) LOCAL PORT NO. (station port number)

This value indicates the port number of the station. Be sure to set a port number other than 0. Usually, one port number is assigned to one user application process.

(5) REMOTE ETHERNET ADDRESS (other station Ethernet address)

This value indicates the Ethernet address of the other station. This address must be set to specify the other station. If the Ethernet address of the other station is not known, set FFFFFFFFFF.

(6) REMOTE IP ADDRESS (other station IP address)

This value indicates the IP address of the other station. Set this address to specify the other station. Set 0 if the other station is not specified.

(7) REMOTE HOST NAME (other station host name)

This value indicates the host name of the other station. Set this name to specify the other station. Input ↓ if the other station is not specified.

(8) REMOTE PORT NO. (other station port number)

This value indicates the port number of the other station. Set this port number to specify the other station. Set 0 if the other station is not specified.

(9) ROUTER ADDRESS (router IP address)

This value indicates the IP address of the router. It is used to communicate with a station having different net_ID.

(10) SUBNET ADDRESS MASK (subnet address mask)

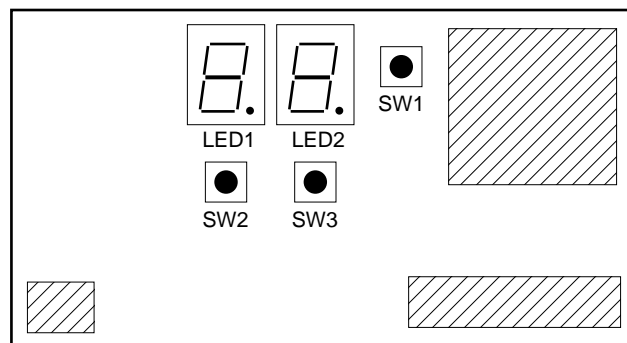
This value indicates a subnet address mask field. net_ID is determined by this value.

9.5 Setting by Hardware

Of the network information, the IP address (LOCAL IP ADDRESS) and port number (LOCAL PORT NO.) can be set by using hardware switches. In this case, no special equipment such as a terminal is necessary.

<Setting procedure>

- <1> Confirm that the IE-78000-R-SV3 is connected to the setting window.
- <2> Connect the IE-ETHER cable to channel 3 of the IE-784000-R (the other side of the cable may be open).
- <3> Turn on power while holding SW1 (pushbutton switch) on the IE-78000-R-SV3. LED1 and LED2 will blink two times (the network information setting mode is set).



IE-78000-R-SV3

- <4> Perform setting according to the flowchart in Fig. 9-2.

<Meanings of LEDs and switches>

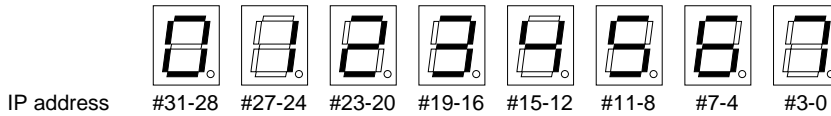
• LED1

Indicates the position (pointer) of the data displayed on LED2.

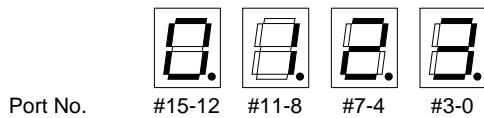
0 to 7 (decimal point remains dark) : IP address

0. to 3. (decimal point lights) : port No.

<1> Indication of LED1 (with decimal point remaining dark)



<2> Indication of LED1 (with decimal point lighting)



• LED2

Indicates the value of data indicated by LED1 (hexadecimal indication).

• SW1

<1> Sets the network information setting mode when power is turned ON while this switch is held down.

<2> Writes data to the buffer. (Press this switch once. The LED will blink once.)

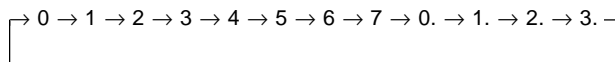
<3> Writes the buffer contents to the EEPROM (Hold down this switch for about 2 seconds. The LED will blink two times.)

• SW2

Increments the value indicated by LED1.

The value indicated by LED1 is successively incremented while this switch is held down.

(Incrementing value indicated by LED1)



- **SW3**

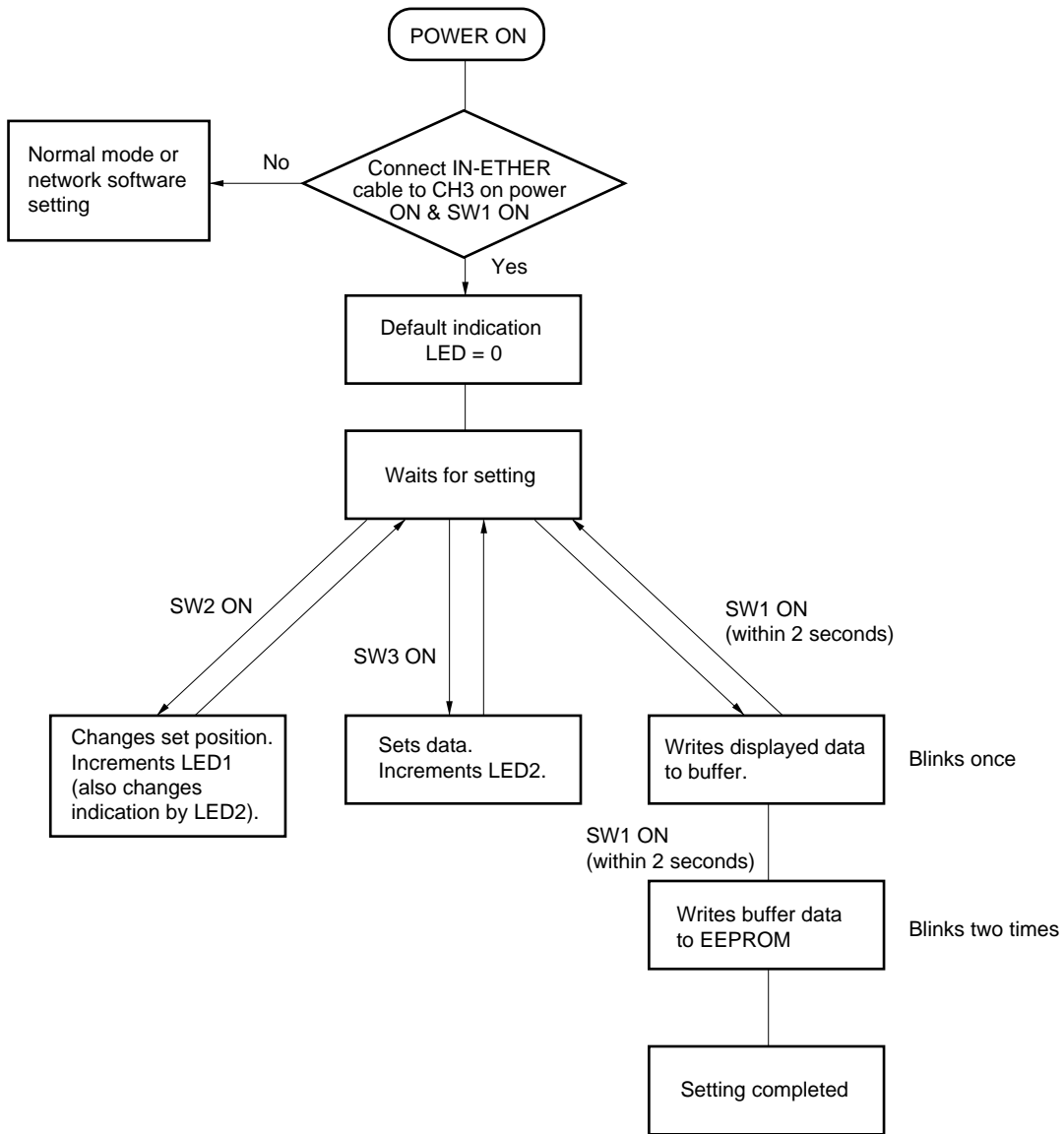
Increments the value indicated by LED2.

The value indicated by LED2 is successively incremented while this switch is held down.

(Incrementing value indicated by LED2)

→ 0 → 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → A → B → C → D → E → F]

Fig. 9-2 Network Information Setting Flow



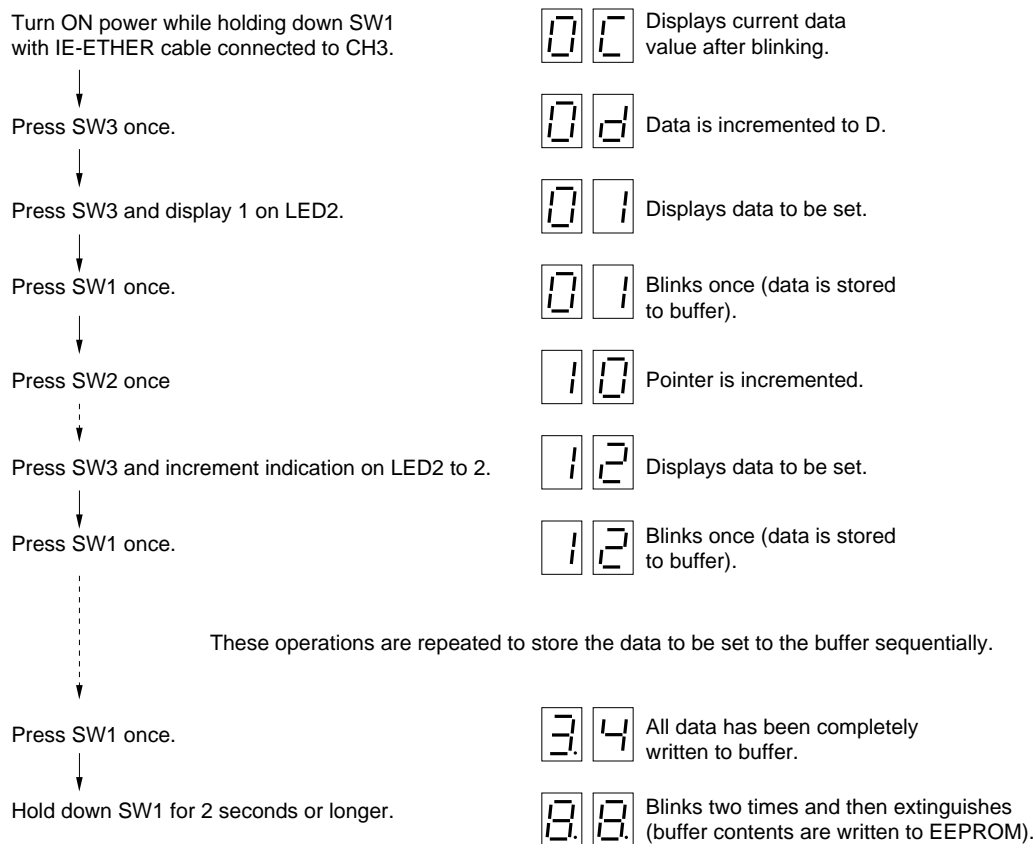
<Example of setting>

Here is a setting example:

IP address = 12XXXXXXh

Port No. = XXX4h

Both the IP address and port No. are set in hexadecimal number.



The stored data can be checked by pressing SW2 successively.

[MEMO]

APPENDIX A SPECIFICATIONS

This appendix describes the product specifications (dimensions and electrical specifications) of the IE-784000-R.

A.1 Product Specifications

Parameter	Specifications
Dimension	<ul style="list-style-type: none">• Depth : 370 mm• Width : 160 mm• Height : 283 mm
Weight	8.5 kg
Power requirement	AC100 – 120/220 – 240 V, 50/60 Hz
Power dissipation	300 W (MAX.)
Operating temperature range	10 to 40 °C
Storage temperature range	–15 to –45 °C
Ambient humidity range	10 to 80 % RH

A.2 Basic Specifications as an In-Circuit Emulator**◆ Target device**

μ PD784026 subseries: μ PD784020, 784021, 784025, 784026, 78P4026

◆ Internal system clock

16 MHz MAX. (However, the clock may be less than 16 MHz depending on the target device.)

◆ Clock supply

The clock is supplied from the internal crystal oscillator of the IE-784026-R-EM1 and target system.

◆ Memory

- Alternate memory capacity

Internal ROM and alternate memory: 1M bytes (0 wait, except SFR internal RAM)

- Mapping units

Peripheral RAM : 32K bytes MAX.

Internal ROM : 8K-byte units

Alternate memory : 4K-byte units

Peripheral RAM : 256-byte units

◆ Event detection

- Bus event detection condition : Detects data read/write or program fetch operation. Can be set by mask data (address/data/status/external data signal).
- Program execution detection condition : Detects program execution at any address. Four points can be set (address/external data signal).
- External data detection condition : Detects that external sense clips 1 through 4 have reached predetermined levels.
Can be set by mask data.
- External trigger output : High-level signal is output from TRGOUT pin when external trigger condition is satisfied.

◆ **Event integration**

- Break condition setting : Break condition can be set during real-time execution.
- Pass condition setting : Counts the specified number of times of event occurrence.
- Delay condition setting : Sets the number of trace frames until the real-time tracer stops.
- Enable condition setting/
disable condition setting : Sequential point pulse becomes active in bus cycle in which four enable conditions are satisfied in the order of 1 to 4.
When the disable condition is satisfied, all the enable conditions become invalid.
Two sequential circuits are provided.
- Zone measurement condition setting : Performs “real-time trace in zone trace mode” measurement from when the start condition of the zone measurement conditions is satisfied, until the stop condition is satisfied.
- Trace qualify condition setting : Sets a qualify trace condition under which only a specified bus cycle is traced.
- Check point condition setting : Writes the following specified condition to the real-time tracer and re-executes writing when a check point condition is satisfied:
<1> Register, memory, SFR
<2> User check routine of target program

◆ **Performance measurement**

Measures time (mean, maximum, or minimum value) of a zone specified by three time measurement conditions.

- Maximum measurement time : 14 minutes 18 seconds
- Resolution : 200 nanoseconds
- Number of measurements : 65535 MAX.

◆ **Internal RAM real-time display**

The addresses of the specified internal RAM space can be displayed real-time.

◆ **C0 coverage**

Displays the accessed area of the program area and data area.

“Accessing” means fetching, reading, and writing.

◆ **Break source**

- Break by event detection
- Manual break
- Break by command
- Trace full break
- Fail-safe break : Non-map break
Write-protect break
SFR illegal access break
Illegal relocation break

◆ **Real-time trace**

- Trace source : All trace
Section trace
Qualify trace
- Trace capacity : 32K bytes × 142 bits
- Traced contents : Main bus^{Note 1} : Address : 24 bits
Data : 16 bits
Status : 5 bits
CPU internal bus^{Note 2} : Address : 10 bits
Data : 32 bits
Status : 7 bits
Others : External sense data signal: 8 bits
Time tag: 24 bits
Others : 15 bits } Selectable

Notes 1. Bus to fetch the program from or access data to the internal ROM or expansion memory, and to access SFR data

2. Bus to access the CPU's internal RAM and data

◆ **Target interface**

Emulation probe (optional)

◆ External interface

- RS-232C : CH1 ... for setting network information
- PC bus interface : CH3 ... for connecting host machine
- Network interface : CH3 ... for connecting host machine
(Conforms to IEEE802.3, supports Ethernet: 10BASE5)

◆ Host machine

- PC-9800 series
- IBM PC/AT
- EWS

◆ Control program

- For Windows (optional)
- Others, supporting each software

◆ Language processor program**◆ Others**

- Standby function supported
- Internal latchup protection circuit
- Changes event detection and displays trace result during emulation CPU operation

[MEMO]

APPENDIX B BLOCK DIAGRAM

This appendix shows the block diagrams of the control board and driver module that implements the pivotal functions of the IE-784000-R.

(1) Control board block

- ◆ **Driver control**

Interfaces the driver module.

- ◆ **Serial interface**

One channel of an RS-232C interface is provided.

This interface channel is used to set network information.

- ◆ **RAM**

768K-byte memory with symbol and program work areas

- ◆ **ROM**

512K-byte ROM storing the program that starts the IE-784000-R

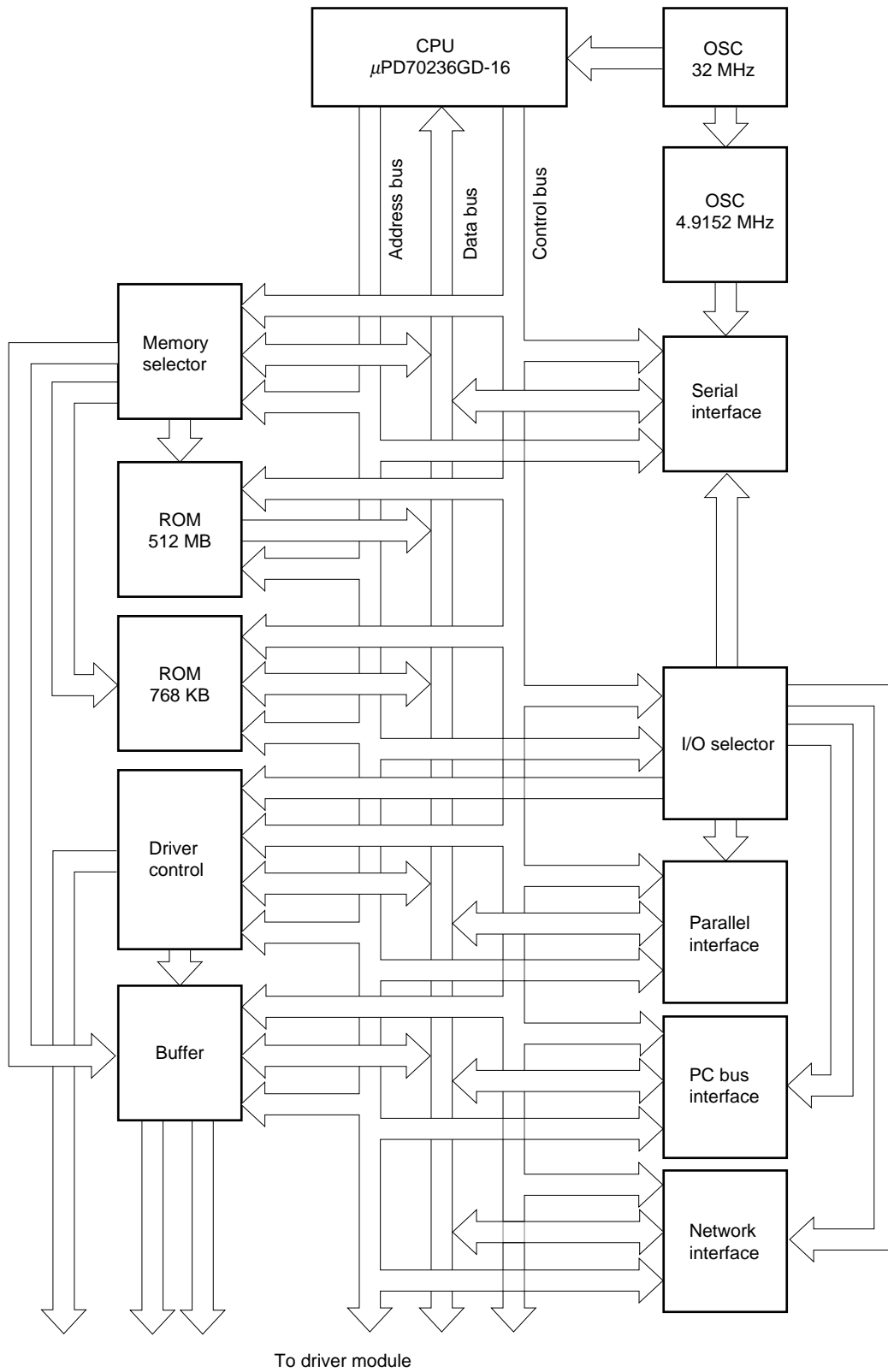
- ◆ **PC bus interface**

One dedicated parallel interface channel that can be used when a dedicated interface board is connected to a personal computer (PC-9800 series or IBM PC/AT) is provided (the connector is also used to connect the network interface).

- ◆ **Network interface**

One channel of network interface (supporting Ethernet) conforming to IEEE802.3 is provided (the connector is also used to connect the PC bus interface). To use the network interface, an optional network board is necessary.

Fig. B-1 Block Diagram of Control Board



(2) Driver module block

The driver module block consists of the following six:

- (a) I/O emulation board
- (b) Emulation board
- (c) Mother bus interface
- (d) Event trace board
- (e) Performance board
- (f) Control interface

Each of these is described next.

(a) I/O emulation board**◆ I/O emulation**

Emulates the target device.

◆ Target interface

Interfaces the target system via the emulation probe.

◆ Clock block

The clock block selects the clock to be supplied to the evachip under direction by the supervisor.

<1> The internal clock of the IE is used.

<2> The user clock is used (supplied from the emulation probe or a user clock is mounted).

(b) Emulation board**◆ Emulation CPU**

Provided with the CPU emulation function of the target device and special functions of the IE-784000-R.

◆ Latchup warning block

Turns off power to the emulation CPU, peripheral CMOS devices of the emulation CPU, and TTL at the stage preceding to the CMOS devices if a latchup occurs in the emulation CPU, peripheral CMOS devices, or TTL.

◆ Program execution detection block

Detects program execution at a set address.

◆ 3-V emulation/5-V emulation selector block

Allows emulation in accordance with the supply voltage of the target.

◆ **Emulation memory**

Alternate memory of 0-FFFFFFH (except SFR, internal RAM, and peripheral RAM) that can be accessed by the target device in the μ PD784026 subseries. Even if the target system has not been developed, software debugging can be implemented by using this memory. With a mapping function, 0 to 64K bytes can be allocated as an alternate memory in 4K-byte units, and an internal ROM can be allocated in 8K-byte units. Map a space of 64K to 12K in 64K-byte units.

◆ **Peripheral RAM**

Can be allocated as an internal expansion RAM in 256-byte units.

◆ **Break control block**

Controls break, manual break, and fail-safe break of the emulation CPU caused by detection of each event.

◆ **Internal RAM real-time display**

The value of the internal RAM can be displayed real-time.

◆ **Alternate memory**

Dual-port memory to establish alternate communication between the supervisor CPU and emulation CPU.

(c) **Mother bus interface**

Connector to establish communication among the emulation board, event board, and trace board.

(d) **Event trace board**

◆ **Bus event detection block**

Detects read/write access to memory and SFR and prefetch operation of the program.

◆ **External data detection block**

Detects that external sense clips 1 to 4 reach predetermined levels.

◆ **Event control block**

Integrates many types of event detection.

◆ **Trace control block**

Controls the trace condition and data. The IE-784000-R has a trace memory of 32K words x 142 bits that records the execution status of the emulation CPU. Various trace conditions can be set by combining event conditions.

(e) Performance board**◆ Performance measurement block**

Measures the execution time of a zone specified as one of the three zone measurement conditions, and the number of executed instructions.

◆ C0 coverage block

Records the accessed area of the program area and data area.

(f) Control interface

Used by the supervisor CPU to communicate with the driver module.

Fig. B-2 Block Diagram of Driver Module (1)

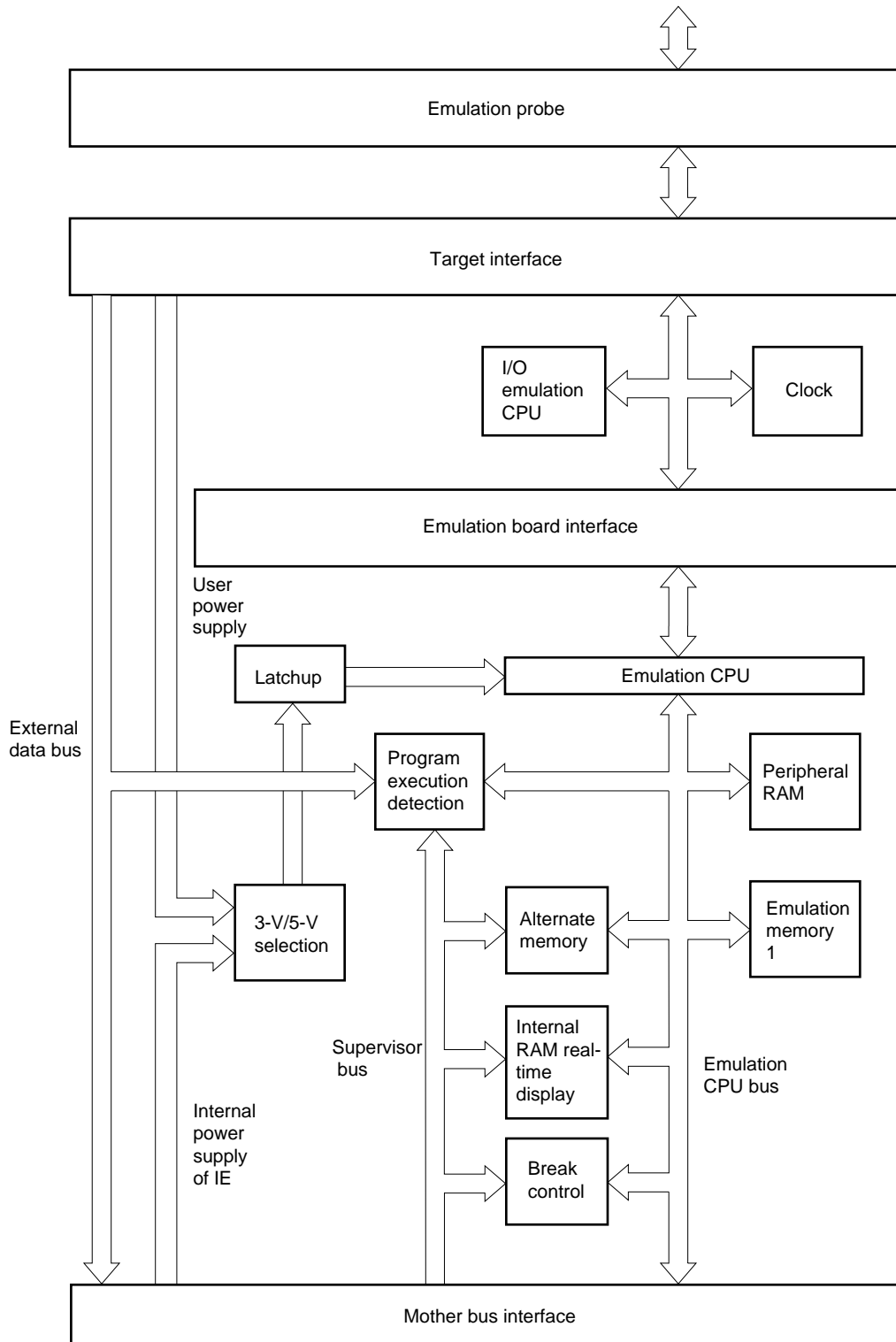
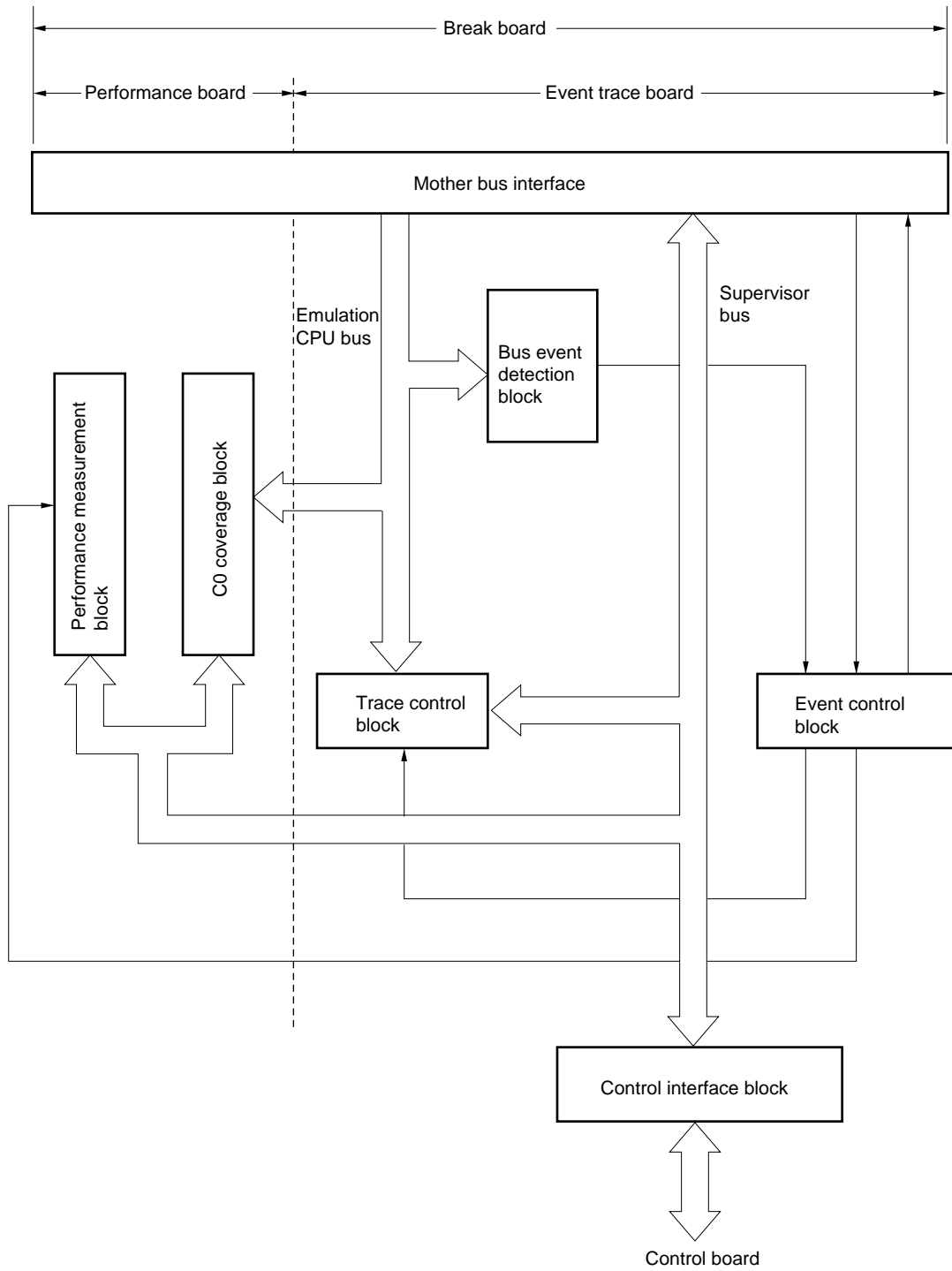


Fig. B-3 Block Diagram of Driver Module (2)



[MEMO]

APPENDIX C JUMPER SETTING

This appendix describes the factory-set conditions of the jumpers on the supervisor board (IE-78000-R-SV2) and emulation board (IE-784000-R-EM). Usually, the setting of the jumpers needs not to be changed.

C.1 Setting of Jumpers on Supervisor Board

The factory-set conditions of the jumpers on the supervisor board (IE-78000-R-SV2) are as follows:

Table C-1 Jumper Setting (factory-set conditions)

Board	Jumper No.	Setting
Supervisor board (component side)	JP1	Shorted to 1024 side/shorted to 4096 side ^{Note}
	JP2	Open
Supervisor board (setting window)	JP3	Shorted to FG side
	JP4	Shorted to FG side
	JP5	Shorted
	JP6	Shorted

Note Set to either side depending on the type of the monitor ROM mounted (equivalent to μ PD27C1024/ μ PD27C4096). The supervisor board does not operate correctly if the factory-set condition is changed.

Caution If the factory-set conditions of JP1, JP2, JP5, and JP6 are changed, the supervisor board does not operate correctly. Do not change the factory-set conditions of the jumpers, because they do not have to be changed for ordinary use.

Fig. C-1 Locations of Jumpers on IE-78000-R-SV2 Board (1/2)

Setting window

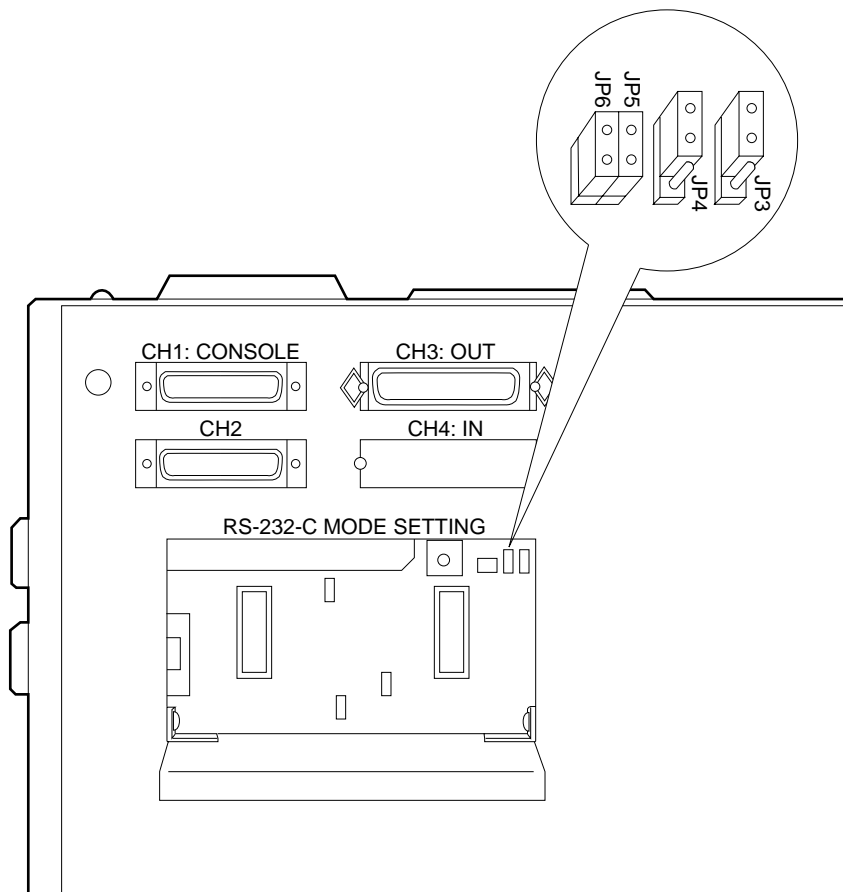
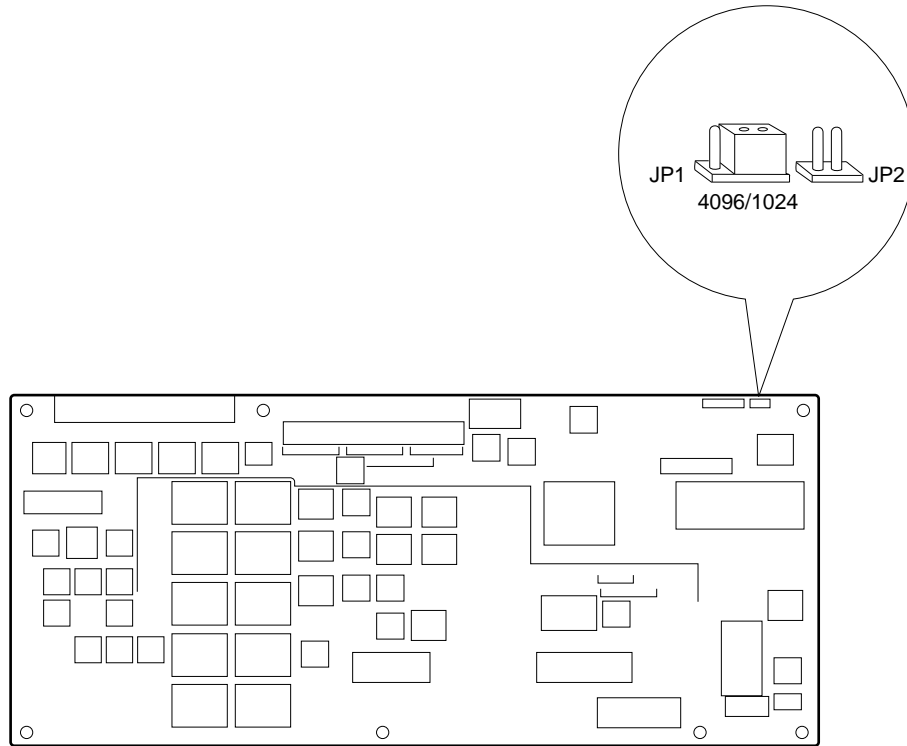


Fig. C-1 Locations of Jumpers on IE-78000-R-SV2 Board (2/2)

Component side



C.2 Setting Jumper on Emulation Board

The factory-set conditions of the jumper on the emulation board (IE-784000-R-EM) are as follows:

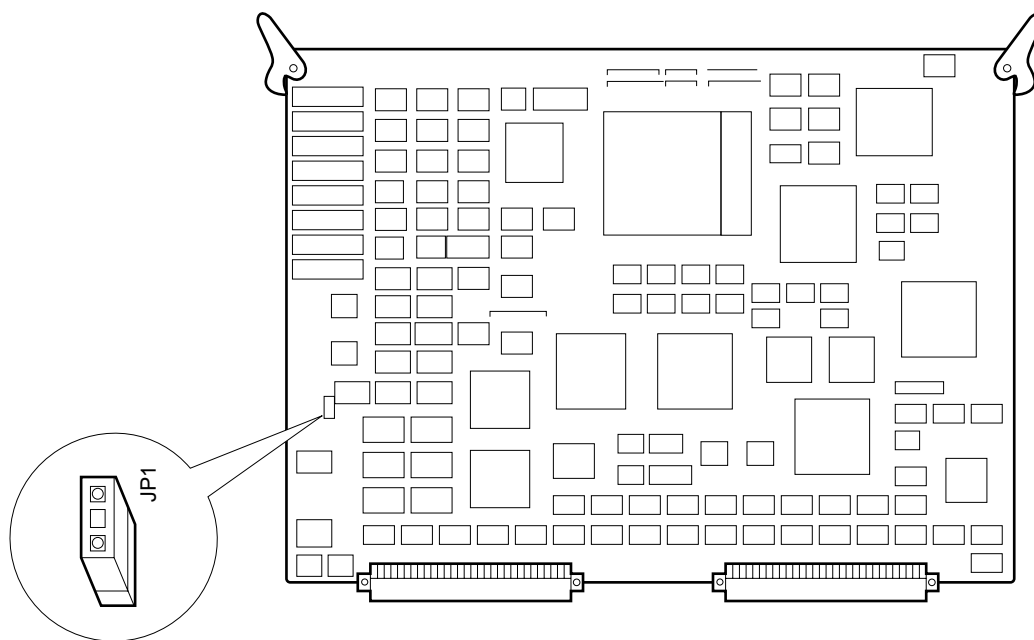
Table C-2 Jumper Setting (factory-set conditions)

Board	Jumper No.	Setting
Emulation board	JP1	Shorted

Caution If the factory-set condition of the jumper is changed, the emulation board does not operate correctly. Do not change the factory-set conditions of the jumper, because it does not have to be changed for ordinary use.

Fig. C-2 Location of Jumper on Emulation Board

Component side



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