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User's Manual

Phase-out/Discontinued

IE-78001-R-A

In-Circuit Emulator

Target Devices
   78K/0 Series
   178K Series

[MEMO]

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J01.2

PREFACE

Target Readers This manual is intended for users of the 78K/0 and 178K Series of 8-bit single-chip microcontrollers who debug systems using the IE-78001-R-A.

The IE-78001-R-A can emulate devices of the 78K/0 and 178K Series. Before using this manual, the user should be familiar with the functions and usage of the 78K/0 and 178K Series and have knowledge of debugging.

Organization When using the IE-78001-R-A, refer to the user's manual included with the IE-78001-R-A (this manual), and the user's manual included with the emulation board.

IE-78001-R-A User's Manual		Emulation Board User's Manual

(Included with the emulation board)

- Basic specifications
- System Configuration
- External interface functions

- Function overview
- Connecting the emulation board
- Connecting the emulation probe

Purpose This manual is intended to give users an understanding of the basic specifications of the IE-78001-R-A and how to connect peripheral equipment to it.

How to Read This Manual

- **To understand the basic specifications**
  - → See **CHAPTER 1 OVERVIEW** and **CHAPTER 2 PART NAMES AND FUNCTIONS**

- **To set the clock**
  - → See **CHAPTER 4 CLOCK SETTINGS**

- **To connect peripheral equipment to the IE-78001-R-A**
  - → See **1.3 System Configuration**, **1.4 Setup Procedure**, **CHAPTER 6 CONNECTING PERIPHERAL EQUIPMENT**, **CHAPTER 7 CONNECTING THE TARGET SYSTEM**, and the emulation board user's manual.

Terminology   The following table shows the meanings of the terms used in this manual.

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 (real chip) that is the target for emulation.
Target program	Program to be debugged (user-created program)
Target system	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
Active low representation:	$\overline{\times\times\times}$ (overscore over pin or signal name)
Note:	Footnote for item marked with **Note** in the text
Caution:	Information requiring particular attention
Remark:	Supplementary information
Numerical representation:	Binary ... xxxx or xxxxB
	Decimal ... xxxx
	Hexadecimal ... xxxxH

Related Documents   The related documents indicated in this publication may include preliminary versions. However, preliminary versions are not marked as such.

Documents Related to Devices

Document Name		Document No.
78K/0 Series User's Manual Instructions		U12326E
78K/0 Series Application Note	Basic (I)	U12704E

Document Related to Development Tools (User's Manual)

Document Name		Document No.
RA78K0 Assembler Package	Operation	U11802E
	Language	U11801E
	Structured Assembly Language	U11789E
CC78K0 C Compiler	Operation	U11517E
	Language	U11518E
IE-78001-R-A		This manual
SM78K0 System Simulator Windows^{TM} based	Reference	U10181E
SM78K Series System Simulator	External Part User Open Interface Specifications	U15006E
ID78K0 Integrated Debugger Windows based	Reference	U11539E
	Guide	U11649E

Documents Related to Embedded Software (User's Manual)

Document Name		Document No.
78K/0 Series Real-time OS	Fundamental	U11537E
	Installation	U11536E
78K/0 Series OS MX78K0	Fundamental	U12257E

Other Related Documents

Document Name	Document No.
SEMICONDUCTOR SELECTION GUIDE Products & Packages (CD-ROM)	X13769X
Single-chip Microcontroller Development Tool Selection Guide	U11069E
Semiconductor Device Mounting Technology Manual	C10535E
Quality Grades on NEC Semiconductor Devices	C11531E
NEC Semiconductor Device Reliability/Quality Control System	C10983E
Guide to Prevent Damage for Semiconductor Devices by Electrostatic Discharge (ESD)	C11892E

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

CONTENTS

LIST OF FIGURES (1/2)

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CHAPTER 1 OVERVIEW

The IE-78001-R-A in-circuit emulator is a development tool used in combination with an emulation board (sold separately) to efficiently debug the hardware and software of an application system using the 78K/0 and 178K Series products.

The IE-78001-R-A is connected to a host machine via an interface adapter (IE-70000-PCI-IF(-A), IE-70000-98-IF-C, IE-70000-PC-IF-C, or IE-78000-R-SV3 (sold separately)).

1.1 Features

The IE-78001-R-A has the following superior functions.

- Can support a high-speed PC bus interface.
- Can support a network interface using Ethernet[TM] (network board (sold separately) required).
- Enables real-time execution and real-time trace.
- Various break and trace functions.
- Can output the contents of the tracer without stopping the emulation CPU.
- Can search data in the real-time tracer.
- Can perform symbolic debugging.
- Can perform online assembly and disassembly.
- Can input 8-bit trace data using external sense clips.
- Can output access event triggers using external sense clips.
- Can output 8-bit data at a specified address in real time using external sense clips.
- Contains emulation memory (80 bits $\times$ 32K steps).
- Can support any package by means of an emulation probe (sold separately).
- Can be used as an emulator for other 78K Series and 178K Series products by replacing the emulation board.

Figure 1-1. IE-78001-R-A

Phase-out/Discontinued
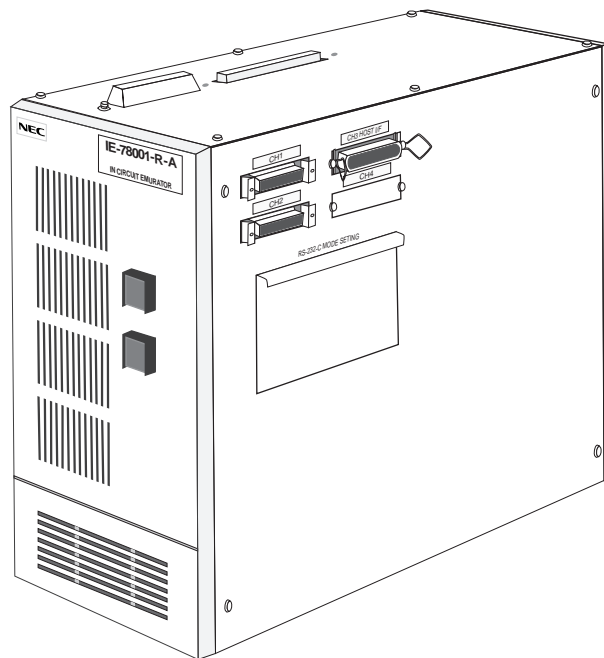
1.2 Hardware Configuration

Figure 1-2 shows the basic hardware configuration of the IE-78001-R-A.

Figure 1-2. Basic Hardware Configuration of IE-78001-R-A

When connected to PC bus

IE-78001-R-A

Host machine

PC interface adapter (sold separately)

PC bus interface cable

Terminal[Note 1] RS-232-C

IE-78000-R-SV3 (sold separately)

Host machine IE-ETHER cable

Supervisor board (fixed)

Trace board (fixed)

Break board

I/O board (sold separately) Note 2

Emulation board (sold separately)

Emulation probe conversion board (sold separately) Note 2

Emulation probe (sold separately)

When connected to network interface

Notes 1. This terminal is used to set network addresses when Ethernet is used.

2. The necessity of these boards depends on the emulation board used. For how to connect the I/O board and emulation probe conversion board, refer to **3.4 Connection of Break Board and Emulation Board**.

1.3 System Configuration

The IE-78001-R-A is used connected to a host machine (PC-9800 series, PC98-NX series, IBM PC/AT^{TM} compatible, or workstation).

Figure 1-3. System Configuration
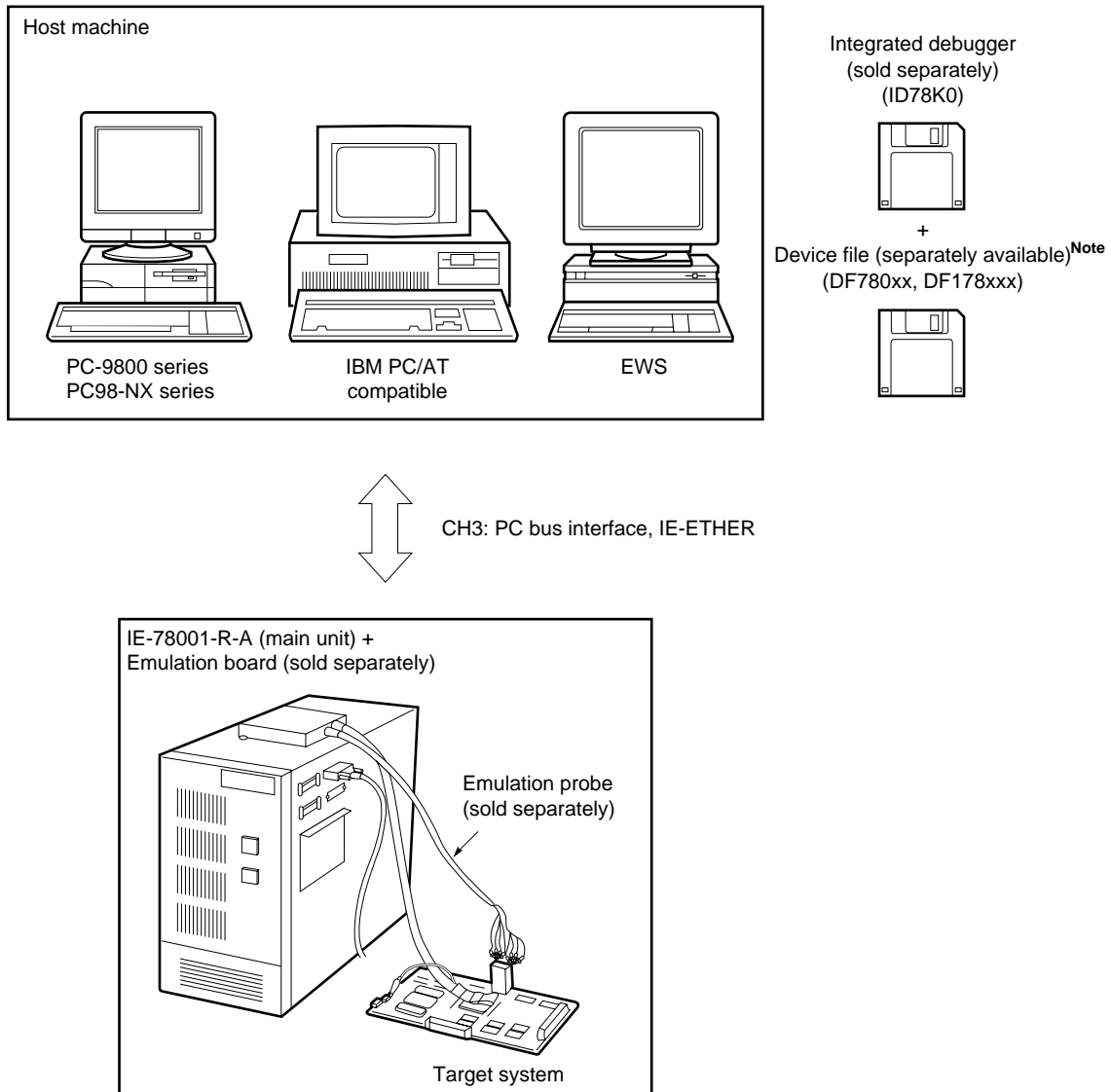
Note The device file can be downloaded from the Web site of NEC Electron Devices (http://www.ic.nec.co.jp/micro/).

1.4 Setup Procedure

The setup procedure is as follows.

(1) Set the clock (see **CHAPTER 3 BREAK BOARD SETTINGS AND CONNECTION** and **CHAPTER 4 CLOCK SETTINGS**).
(2) Connect the emulation board to the break board (see **CHAPTER 3   BREAK BOARD SETTINGS AND CONNECTION**).
(3) Connect the supplied cables (see **CHAPTER 2 PART NAMES AND FUNCTIONS**).
(4) Connect the IE-78001-R-A and peripheral equipment (see **CHAPTER 6   CONNECTING PERIPHERAL EQUIPMENT**).
(5) Connect the target system (see **CHAPTER 7 CONNECTING THE TARGET SYSTEM**).
(6) Start up the host machine.
(7) Apply power to the IE-78001-R-A and target system.
(8) Start up the 78K/0 Series Integrated Debugger (ID78K0).

Cautions 1. When connecting or replacing boards, or changing the settings of switches and jumpers, be sure to turn off the power of the IE-78001-R-A and target system.
       2. For the supply voltage (V_{DD}) of the target system, refer to the relevant emulation board user's manual.
       3. Be sure to apply power to the IE-78001-R-A first and then to the target system. When turning off, reverse the order.

1.5 Target Devices

The IE-78001-R-A can emulate all the products of the 78K/0 Series and 178K Series by incorporating an emulation board, I/O board, and emulation probe conversion board (all sold separately).

For the emulation board corresponding to each device, refer to the **Single-Chip Microcontroller Development Tool Selection Guide (U11069E)** or contact an NEC sales representative.

1.6 Emulation Probe

An emulation probe must be purchased separately to the IE-78001-R-A. When ordering, specify the correct type according to the package of the target device.

Figure 1-4. Emulation Probe
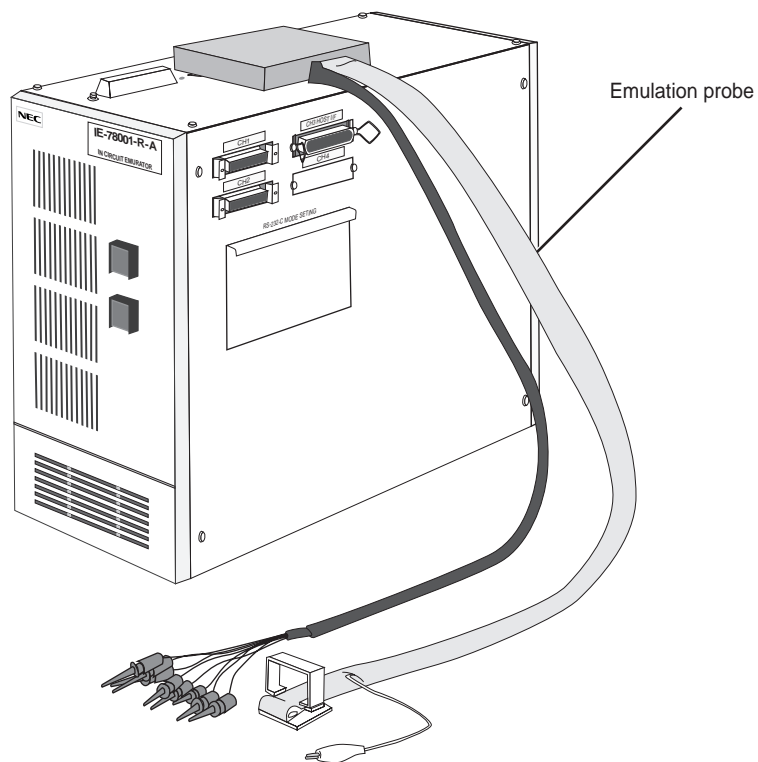
1.7 Contents in Carton

The IE-78001-R-A carton contains the main unit and accessory bags. Three boards are installed in the main unit. The accessory bags contain this manual, cables, parts boards, and other accessories. Check the contents of the carton and contact an NEC salesperson or authorized dealer if anything is missing or broken.

Figure 1-5. Contents Verification
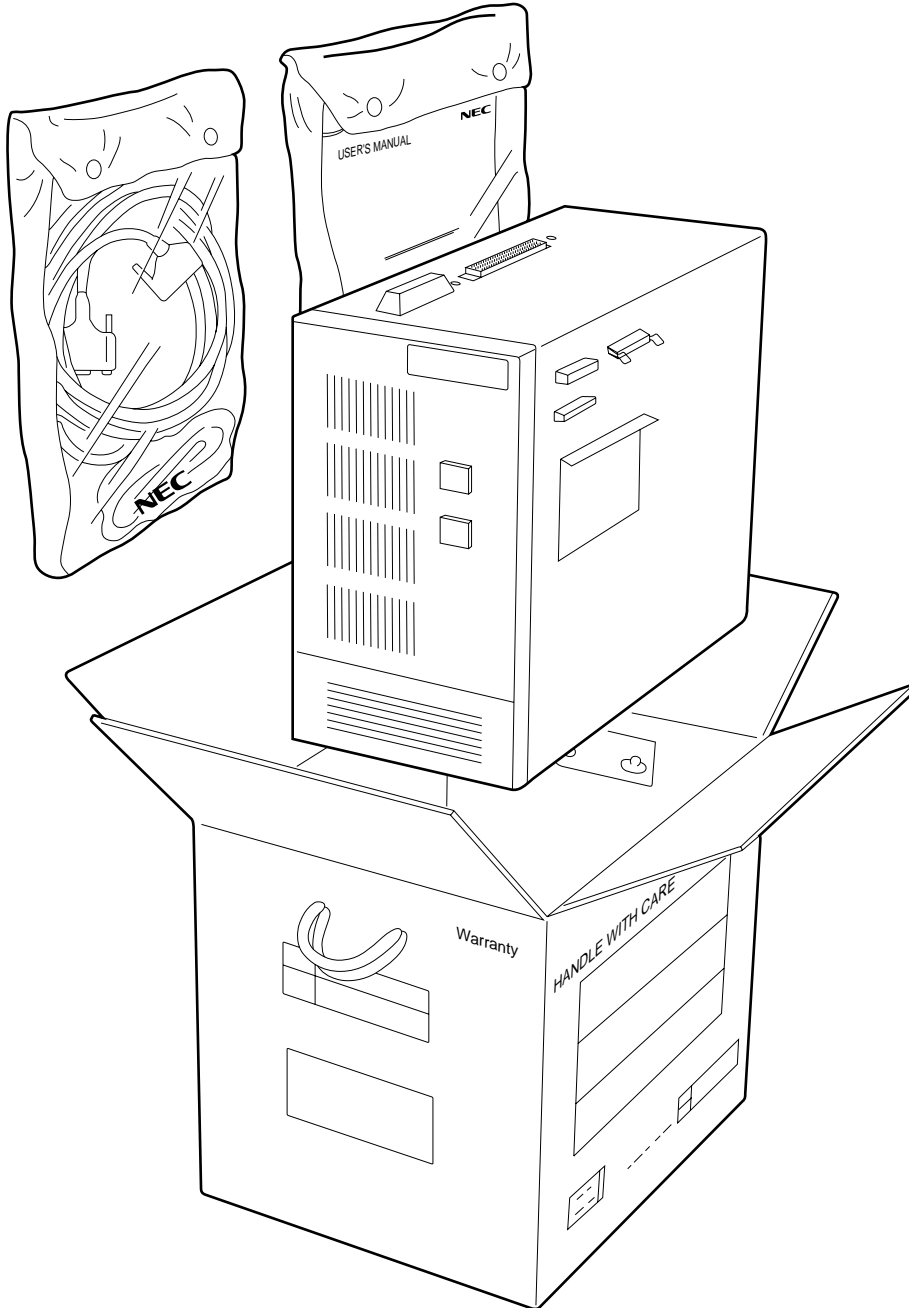
(1) Checking the boards

Three boards are installed in the IE-78001-R-A. Check these boards by removing the six screws from the top of the main unit and opening the cover.

(a) Break board: 1

(b) Trace board (fixed in the IE-78001-R-A):   1

(c) Supervisor board (fixed in the IE-78001-R-A): 1

Figure 1-6. Boards

(a) Break board

(b) Trace board

(c) Supervisor board

<Procedure>
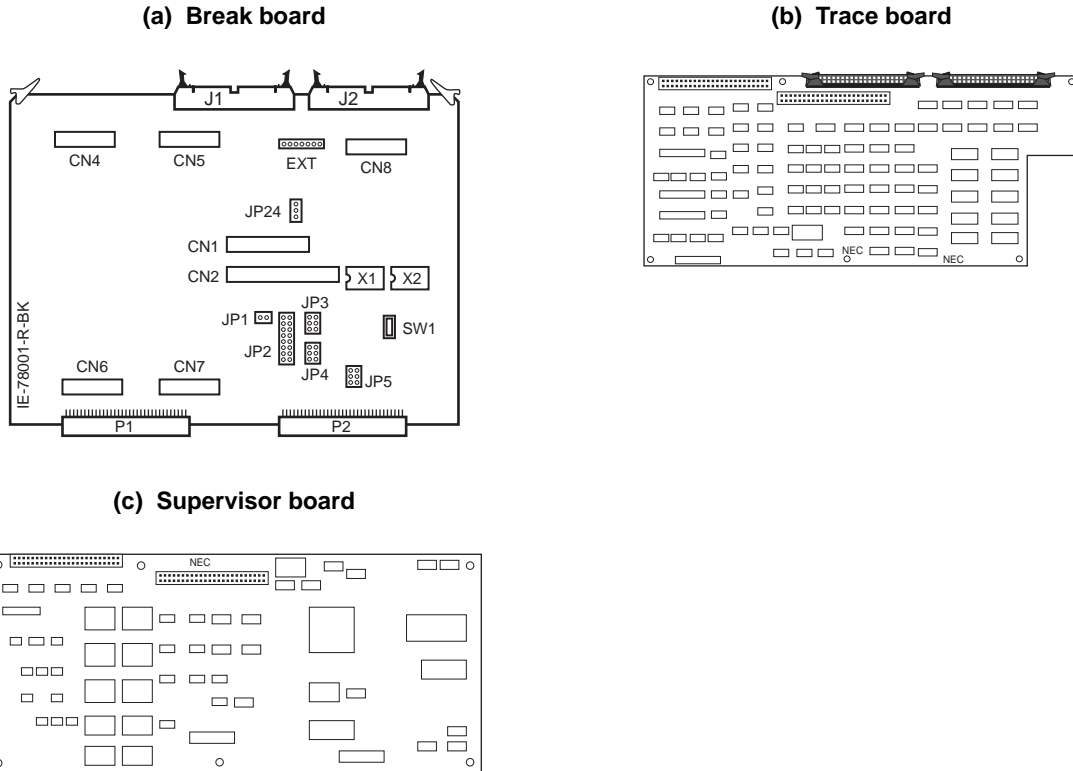
<1> Remove the six screws from the top of the main unit and open the cover.

Figure 1-7. Top View of Main Unit
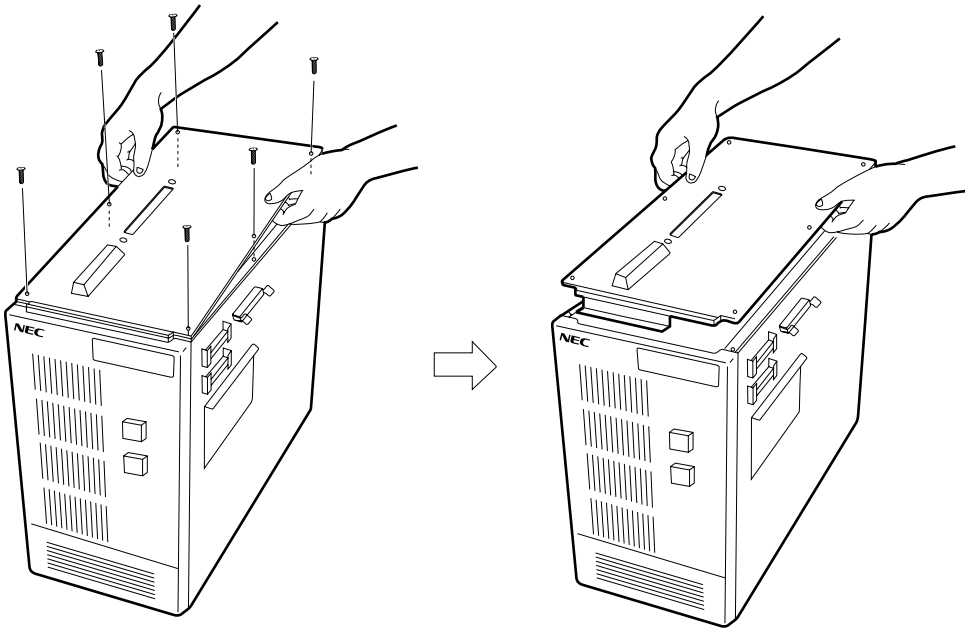
<2> Confirm that the boards are installed as follows.

Figure 1-8. Location of Boards

(a) Break board

(b) Trace board

(c) Supervisor board
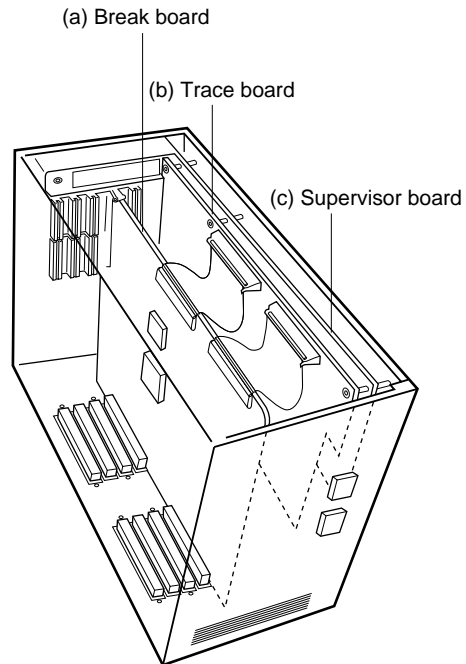
Caution   After checking the boards, remove the break board, and secure the emulation board (sold separately) with screws (refer to the emulation board user's manual).

Phase-out/Discontinued

(2) Checking the accessories

Two accessory bags are packed in the carton. Confirm that the carton contains the following accessories (see Figure 1-9).

- Accessory bag 1
  - (a) AC 100 V power cable   ×1
  - (b) AC 200 V power cable[Note 1]   ×1
  - (c) Ground lead cable   ×1
  - (d) RS-232-C interface cable   ×1
  - (e) Dedicated 232C interface cable[Note 2]   ×1
  - (f) 14-pin parts board[Note 3]   ×2
  - (g) Spare fuse   ×1
  - (h) PC bus interface cable   ×1
  - (i) R-EM board screws   ×4
  - (j) R-EM board spacers   ×4

- Accessory bag 2
  - (k) Japanese user's manual   ×1
  - (l) English user's manual (this manual)   ×1
  - (m) Probe cable[Note 4]   ×3
  - (n) Probe cable screw 1[Note 4]   ×2
  - (o) Probe cable screw 2 and nut[Note 4]   ×3

- Other
  - (p) Warranty
  - (q) Packing list
  - (r) Supplied equipment list

Notes 1. This cable is used to connect the IE-78001-R-A to a 200 V power supply.
   2. Not normally used.
   3. Used when setting the clock.
   4. Required when using an SL series emulation board.

Caution Accessories may change over time. Check the "Supplied equipment list" included with the IE-78001-R-A for a list of the latest accessories.

Figure 1-9. Accessories

(a) 100 V AC power cable
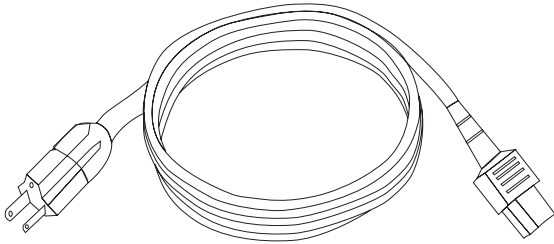
(b) 200 V AC power cable
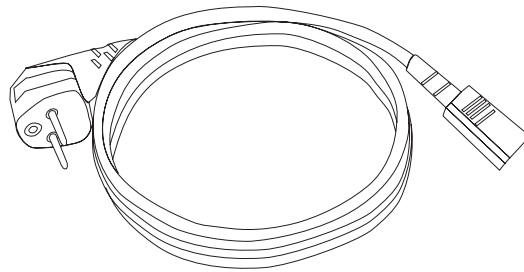
(c) Ground lead cable
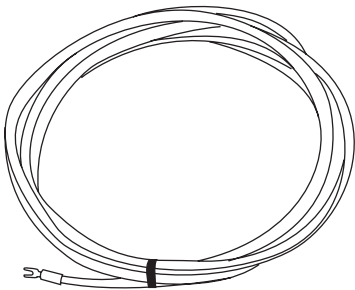
(d) RS-232-C interface cable
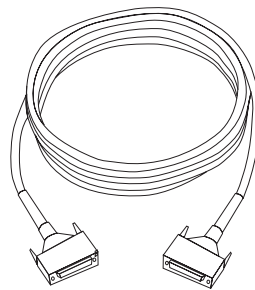
(e) Dedicated 232C interface cable
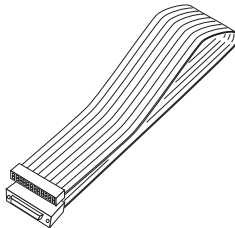
(f) 14-pin parts boards[Note]
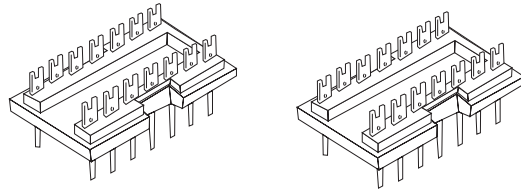
Note The parts boards actually provided have covers.

(g) Spare fuse

(h) PC bus interface cable
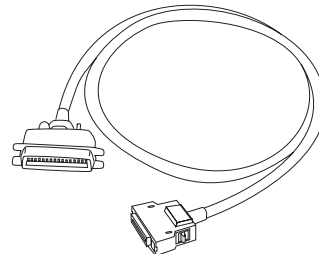
CHAPTER 2 PART NAMES AND FUNCTIONS

This chapter describes the name and function of each part of the IE-78001-R-A, how to set the switches, and how to connect the cables supplied with the IE-78001-R-A.

2.1 Part Names and Functions

(1) Front

Figure 2-1. Front View of IE-78001-R-A
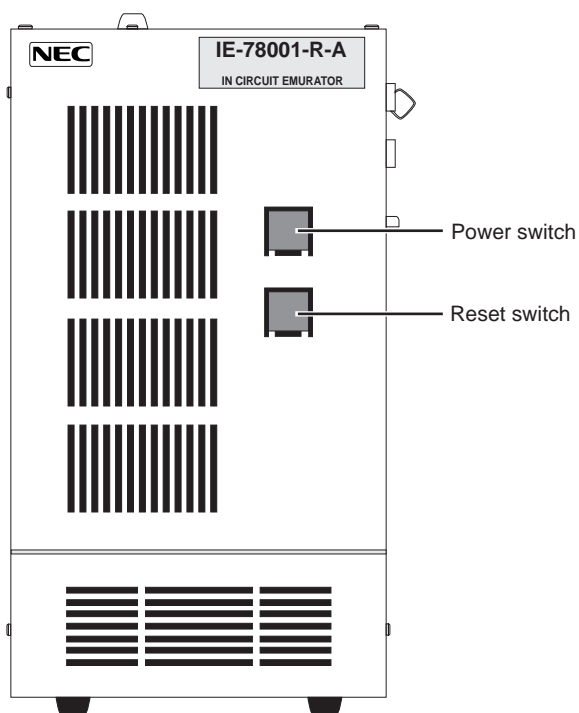
- **Power switch**

  Turns the power on and off.

- **Reset switch**

  Resets the IE-78001-R-A.

(2) Rear

Figure 2-2. Rear View of IE-78001-R-A
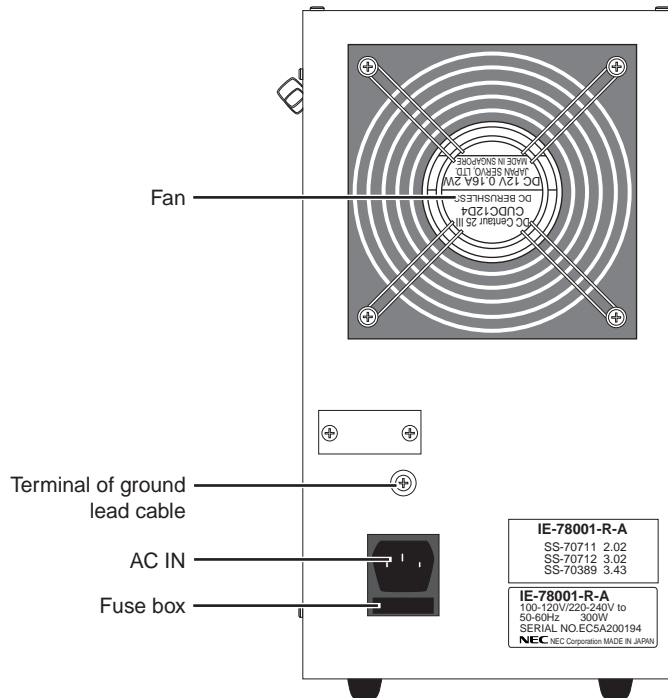
- **Fan**

  Cools the inside of the cabinet.

- **AC IN**

  Supplies power via a connected power cable.

(3) Side

Figure 2-3. Side View of IE-78001-R-A (1)
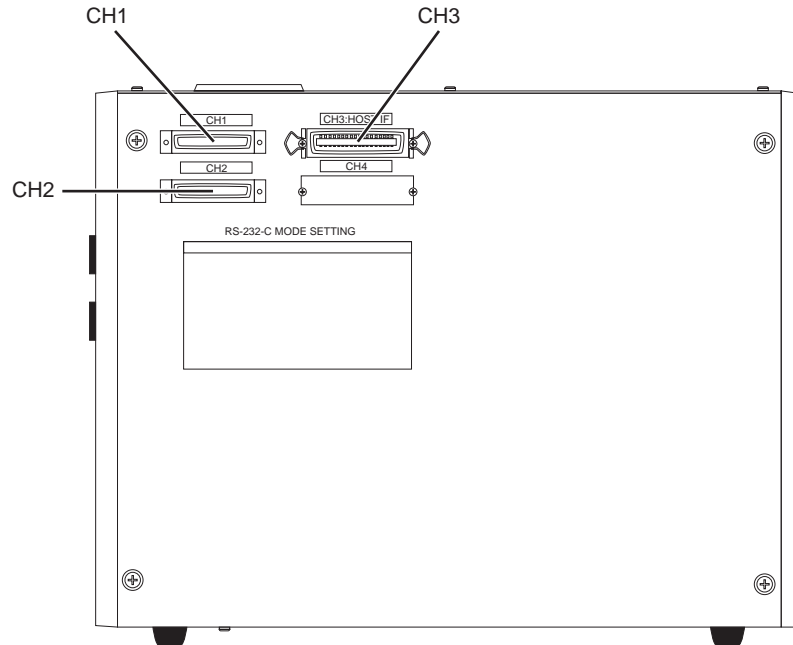
- **CH1 (I/O)**

  Connects a terminal via an RS-232-C interface cable to set network information.

  Interfacing with 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 used when a host machine is connected

  via a PC bus interface cable and an IE-ETHER cable, respectively.

Figure 2-4. Side View of IE-78001-R-A (2)
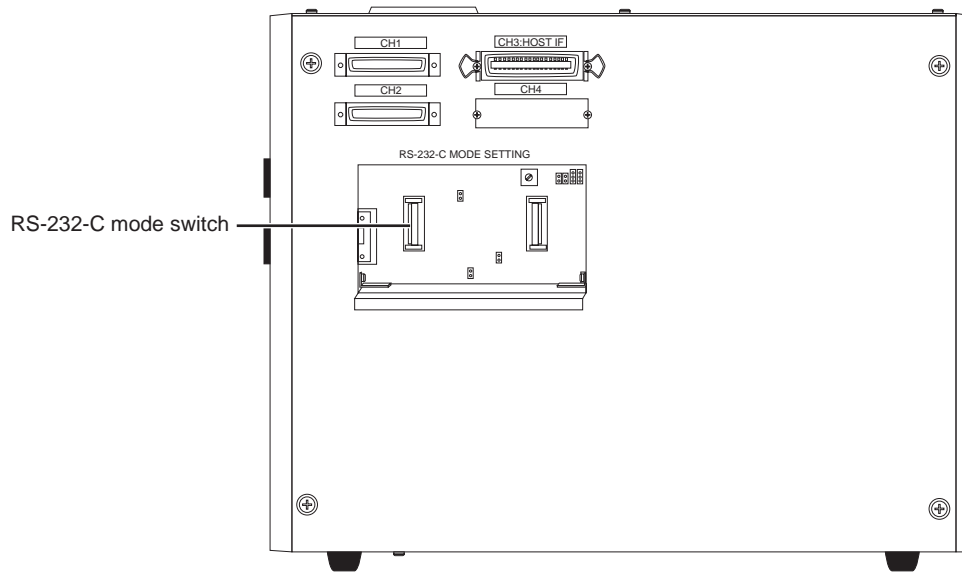
- **RS-232-C mode switches**

  Used for switching the modem/terminal mode and setting the FG and the baud rate.

(4) Boards

- **Break board (IE-78001-R-BK)**

    Controls breaks, events, and tracing.
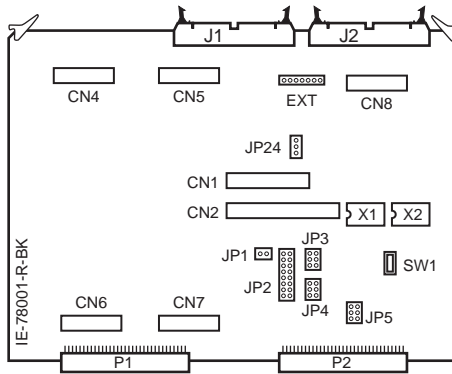
- **Trace board (IE-78000-R-TR)**

    Controls tracing.
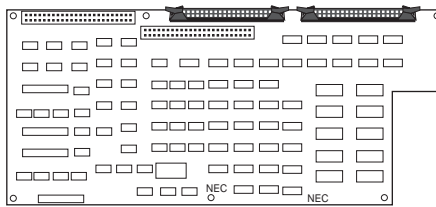
- **Supervisor board (IE-78000-R-SV2)**

    Controls the entire IE-78001-R-A.
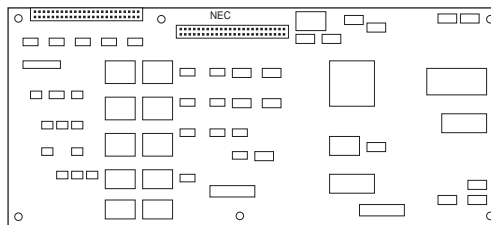
2.2 Switch Settings

Figure 2-5. Power and Reset Switches

Power switch
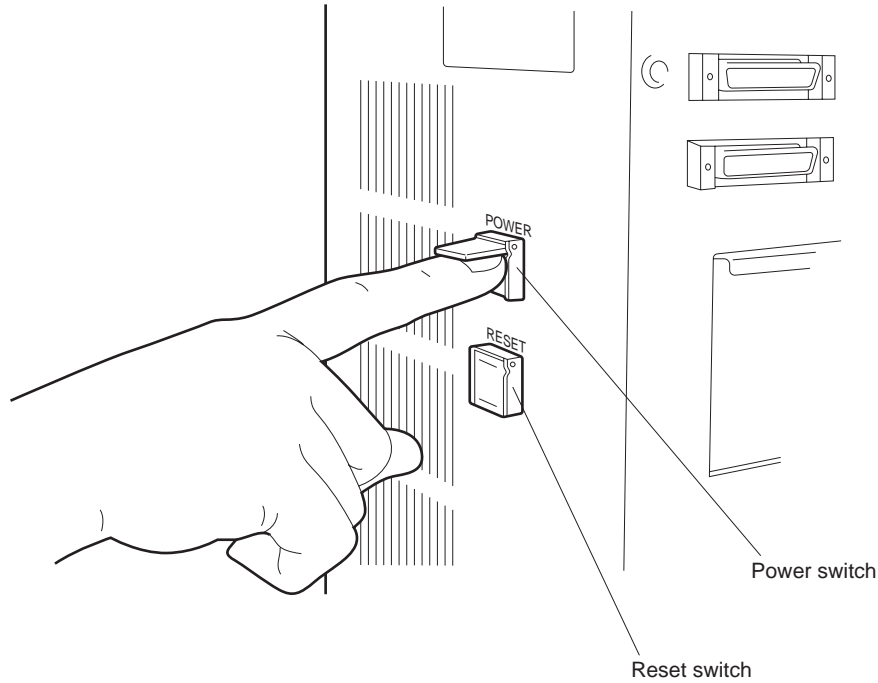
Reset switch

- **Power switch**
  - This is a push-button switch.
  - Setting

    Power-on: Press this switch once. The power-on LED lights up.

    Power-off: Press this switch once. The LED goes off.

- **Reset switch**
  - This is a push-button switch.
  - Setting

    Reset: Press this switch once to reset the IE-78001-R-A.

2.3 Connecting Supplied Cables

● **Location**

Install the IE-78001-R-A in a place satisfying the following conditions.

- A place which is free from dust
- A place where there are no obstructions near the air intake

(1) Power cable

Connect the power cable to the AC IN jack at the rear of the IE-78001-R-A main unit.

Figure 2-6. Power Cable Connection

AC IN

Power cable
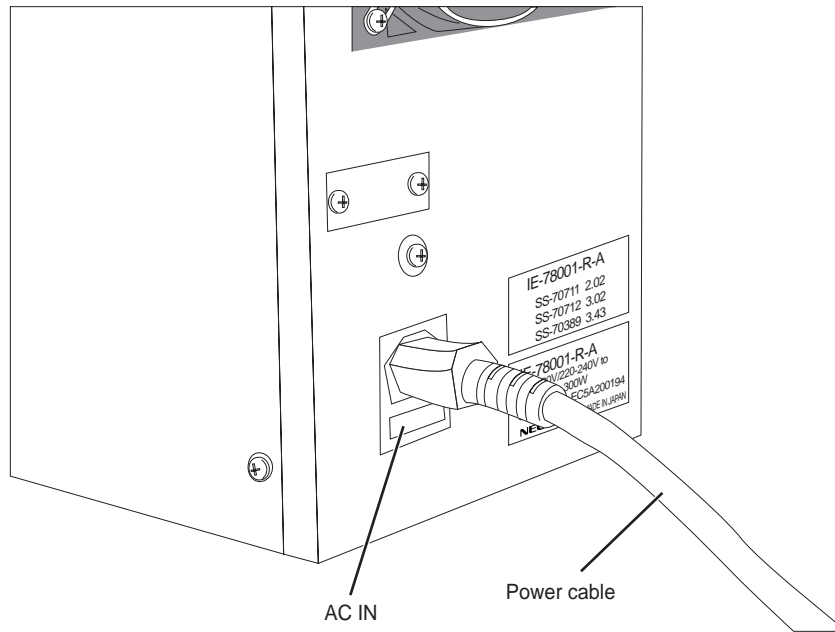
(2) RS-232-C interface cable

Connect the RS-232-C interface cable to the CH1 serial interface port on the right side of the IE-78001-R-A main unit.

Figure 2-7. RS-232-C Interface Cable Connection
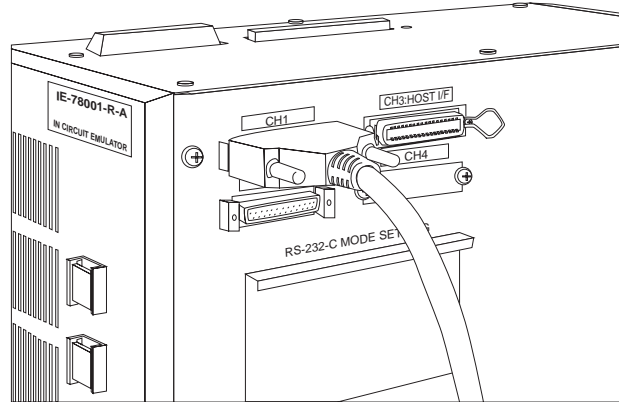
(3) PC bus interface cable

Connect the PC bus interface cable to the PC bus interface/network interface port CH3 on the right side of the IE-78001-R-A main unit.

Figure 2-8. PC Bus Interface Cable Connection
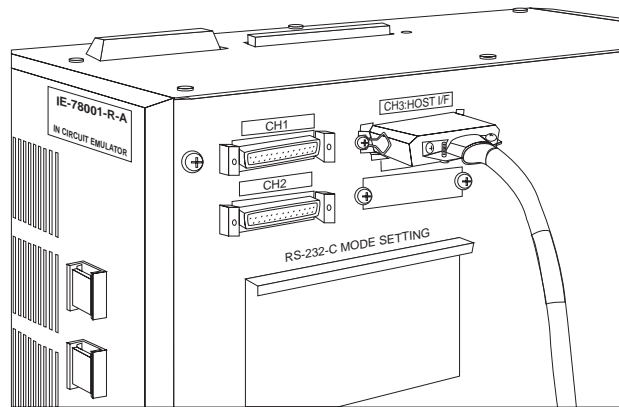
CHAPTER 3 BREAK BOARD SETTINGS AND CONNECTION

78K/0 or 178K Series emulation board is used connected to the break board (IE-78001-R-BK) inside the in-circuit emulator (IE-78001-R-A).

The emulation board differs depending on the device used. Also, an I/O board and/or emulation probe conversion board may be required to connect the emulation board. For the system configuration corresponding to each device, refer to **APPENDIX D SYSTEM CONFIGURATION**.

3.1 Setup Procedure

(1) Remove the top of the in-circuit emulator (IE-78001-R-A) (see **1.7 Contents in Carton**).

(2) Remove the break board (IE-78001-R-BK) from the IE-78001-R-A.
Disconnect the J1 and J2 cables and carefully remove the IE-78001-R-A from the cabinet.

(3) Check the break board settings (see **3.3 Break Board Settings**).

(4) Connect the break board and emulation board (see **3.4 Connection of Break Board and Emulation Board**).

(5) Insert the break board into the IE-78001-R-A.
Insert the board in the 2nd slot from the trace board and supervisor board side.
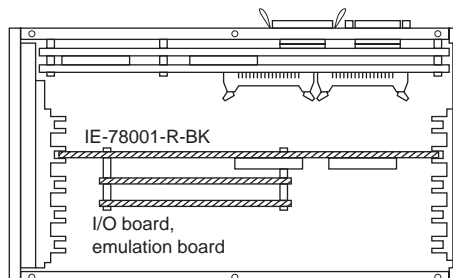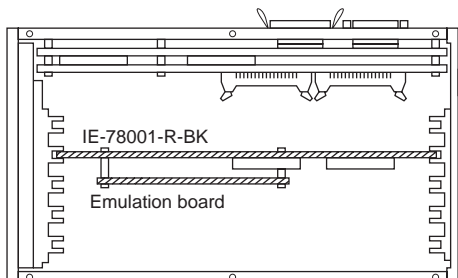
(6) Connect the J1 and J2 cables.

Connect the J1 and J2 cables to J1 and J2 connectors on the break board and trace board.
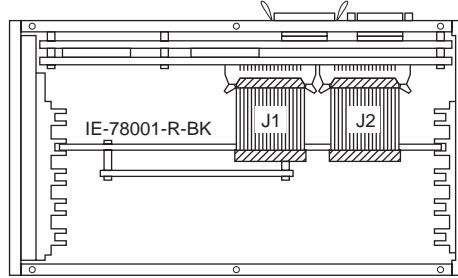
(7) Connect the IE-78001-R-A to the host machine (see **CHAPTER 6   CONNECTING PERIPHERAL EQUIPMENT**).

(8) Connect the emulation probe.

For how to connect the emulation probe, refer to the relevant emulation board or emulation probe user's manual.

Caution   When connecting or replacing boards, or changing the settings of switches and jumpers, be sure to turn off the power of the IE-78001-R-A and target system.

3.2 Names of Parts on Break Board

Figure 3-1 shows the names of the parts on the break board (IE-78001-R-BK). Change the settings on the board in accordance with the application. For the clock settings, refer to **CHAPTER 4 CLOCK SETTINGS**.

Figure 3-1. Break Board (IE-78001-R-BK)
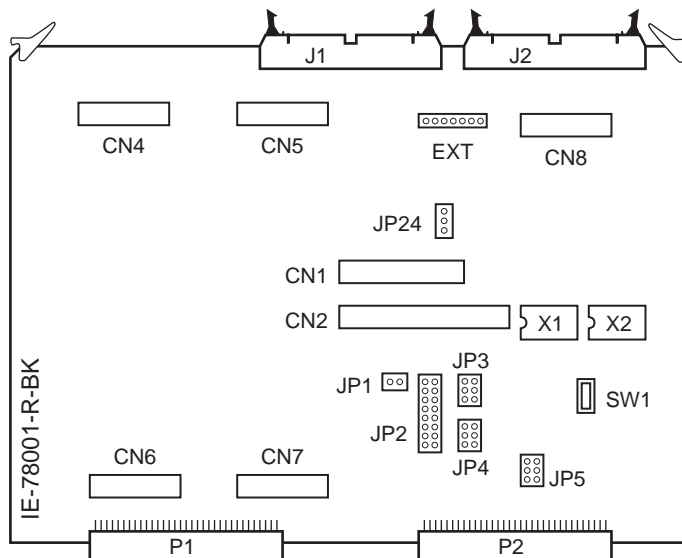
- X1 (MAIN): Place for mounting the parts board for the main system clock.
- X2 (SUB): Place for mounting the parts board for the subsystem clock.
- JP1: Leave open. The setting need not be changed from the factory setting.
- JP2, JP3: Switches to select main system clock.
- JP4: Switch to select internal/external clock of main system clock
- JP5: Switch to select subsystem clock.
- JP24: Fixed to SERIAL LOW. The setting need not be changed from the factory setting.
- SW1: Switch to select power supply used by target system.
- J1, J2: Connectors to connect trace board (IE-78000-R-TR) and break board.
- CN1, CN2: Connectors to connect emulation board (IE-$\times\times\times\times$-R-EM).
- CN4 to CN7: Connectors to connect either the emulation board (IE-$\times\times\times\times$-NS-EMn, IE-$\times\times\times\times$-SL-EMn) or I/O board.
- CN8: Dedicated 232C interface connector (not normally used).
- P1, P2: Motherboard connection ports.
- EXT: Not normally used.

3.3 Break Board Settings

The settings of the parts on the break board are as follows.

(1) X1 (MAIN), X2 (SUB)

When connecting the IE-✕✕✕✕-R-EM, mount a parts board and oscillator in X1 (MAIN) for the main system clock and X2 (SUB) for the subsystem clock. When connecting the IE-✕✕✕✕-NS-EMn or IE-✕✕✕✕-SL-EMn, mount the parts board with 6-8 shorted (factory setting). For how to mount the parts board and oscillator, refer to **CHAPTER 4 CLOCK SETTINGS**.

(2) JP2

When connecting the IE-✕✕✕✕-NS-EMn or IE-✕✕✕✕-SL-EMn, this switch sets the main system clock.

When connecting the IE-✕✕✕✕-R-EM, do not set the clock using JP2; Keep the factory setting of pins 7-8 shorted.

For the JP2 setting corresponding to each emulation board, refer to **4.2 Main System Clock Settings**. Also, for the clock settings on the emulation board and I/O board, refer to the relevant board's user's manual.

(3) JP3

When connecting the IE-✕✕✕✕-NS-EMn or IE-✕✕✕✕-SL-EMn, this switch sets the main system clock multiplier. Table 3-1 shows the JP3 settings.

When connecting the IE-✕✕✕✕-R-EM, do not set the multiplier using JP3; Keep the factory setting of pins 1-2 shorted.

Table 3-1. JP3 Settings

Multiplier Selection	JP3 Setting
Multiplied clock not used (factory setting)	1-2 shorted
5 V multiplied clock used	3-4 shorted
1.8 to 5.0 V multiplied clock used	5-6 shorted

(4) JP4

This switch sets whether to use an internal or external clock for the main system clock. In normal operation, internal/external clock selection is performed using the integrated debugger (ID78K0), so keep the factory setting of pins 1-2 shorted.

Table 3-2. JP4 Settings

Internal/External Clock Selection	JP4 Setting
Selected by integrated debugger (factory setting)	1-2 shorted
Internal clock used[Note]	3-4 shorted
Target board clock (external clock) used[Note]	5-6 shorted

Note   The clock is selected forcibly, irrespective of the clock selected by the integrated debugger.

(5) JP5

This switch selects the subsystem clock. Pins 5-6 are shorted at shipment (the clock (32.768 kHz) already mounted on the break board is used).

For the JP5 settings corresponding to each emulation board, refer to **4.3 Subsystem Clock Settings**. Also, for the clock settings on the emulation board and I/O board, refer to the relevant board's user's manual.

(6) SW1

This switch selects the power supply used by the target. Table 3-3 shows the SW1 settings when using the IE-✕✕✕✕-NS-EMn or IE-✕✕✕✕-SL-EMn.

When using the IE-✕✕✕✕-R-EM, keep the factory setting of SW1 set on the IE side (selected on the IE-✕✕✕✕-R-EM board).

Table 3-3. Power Supply Selection

Internal/External Clock Selection	SW1 Setting
Internal power supply of break board used (factory setting)	IE side
Power supply on target board used	USR side

3.4 Connection of Break Board and Emulation Board

An I/O board or emulation probe conversion board may be required, depending on the emulation board used. For details of the emulation board, refer to the relevant emulation board user's manual.

3.4.1 Connection of IE-178×××-R-EM or IE-780×××-R-EM

Connect the emulation board (IE-178×××-R-EM or IE-780×××-R-EM) to CN1 and CN2 on the break board (IE-78001-R-BK).

For the connection between the emulation board and the probe connector board or emulation probe, refer to the user's manual of the relevant emulation board and emulation probe.

Figure 3-2. Connection of IE-178×××-R-EM or IE-780×××-R-EM
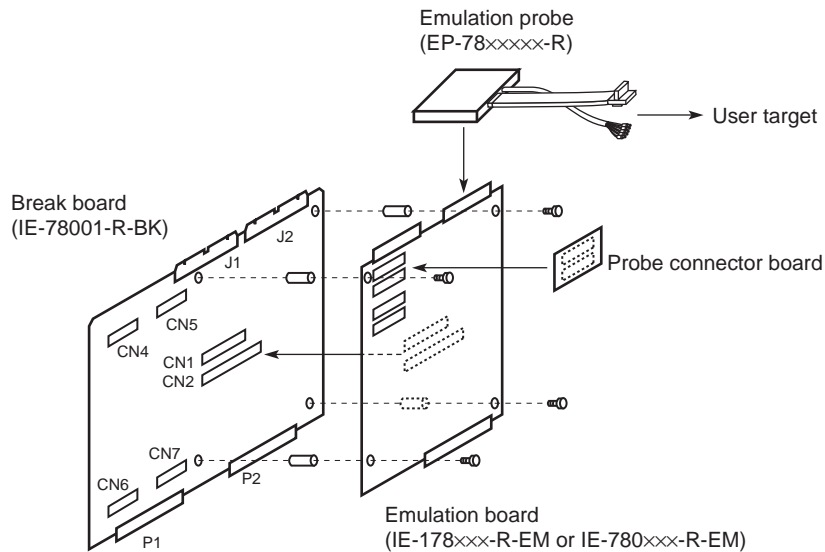
Caution   Use the spacers and screws supplied with the IE-78001-R-A to secure the emulation board on the break board.

3.4.2 Connection of IE-178×××-NS-EM1 or IE-780×××-NS-EM1

Connect emulation board (IE-178×××-NS-EM1 or IE-780×××-NS-EM1) to CN4 to CN7 on the break board (IE-78001-R-BK).

To use either the IE-178×××-NS-EM1 or IE-780×××-NS-EM1 with the IE-78001-R-A, an emulation probe conversion board (IE-78K0-R-EX1, sold separately) is required.

For the connection between the emulation board and emulation probe, refer to the user's manual of the relevant emulation board and emulation probe.

Figure 3-3. Connection of IE-178×××-NS-EM1 or IE-780×××-NS-EM1
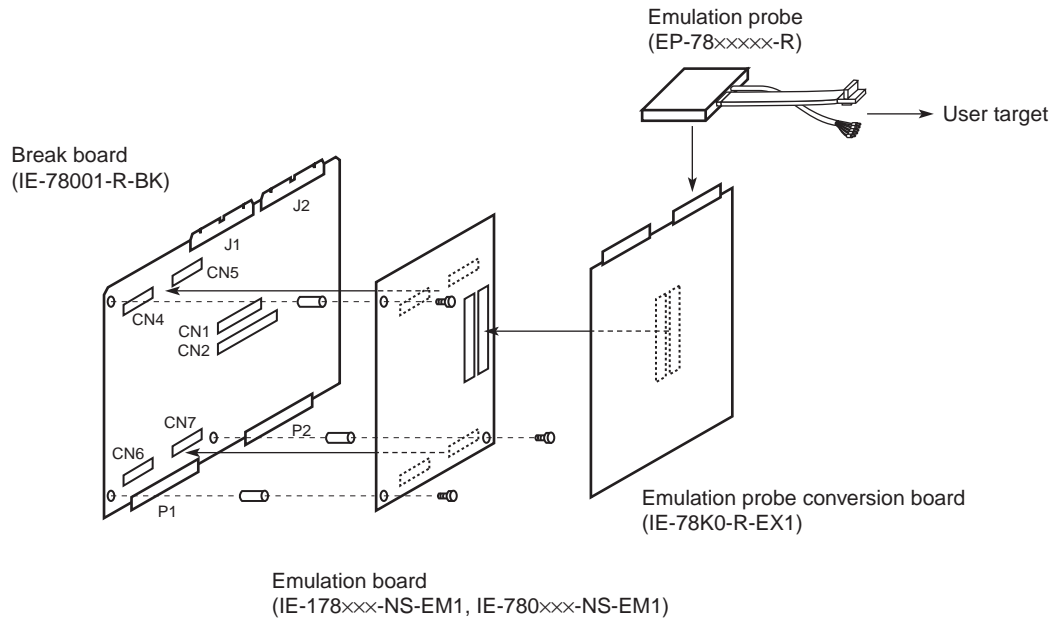
Caution Use the metal spacers and screws to secure the emulation board on the break board.

Phase-out/Discontinued

3.4.3 Connection of IE-780×××-NS-EM4

To connect emulation board (IE-780×××-NS-EM4) to the break board, an I/O board (IE-78K0-NS-P0×, sold separately) is required.

Connect the I/O board to CN4 to CN7 on the break board and then connect the emulation board to the I/O board.

Also, to use the IE-780×××-NS-EM4 on the IE-78001-R-A, an emulation probe conversion board (IE-78K0-R-EX1, sold separately) is required. For the connection between the emulation board and emulation probe, refer to the user's manual of the relevant emulation board and emulation probe.

Figure 3-4. Connection of IE-780×××-NS-EM4
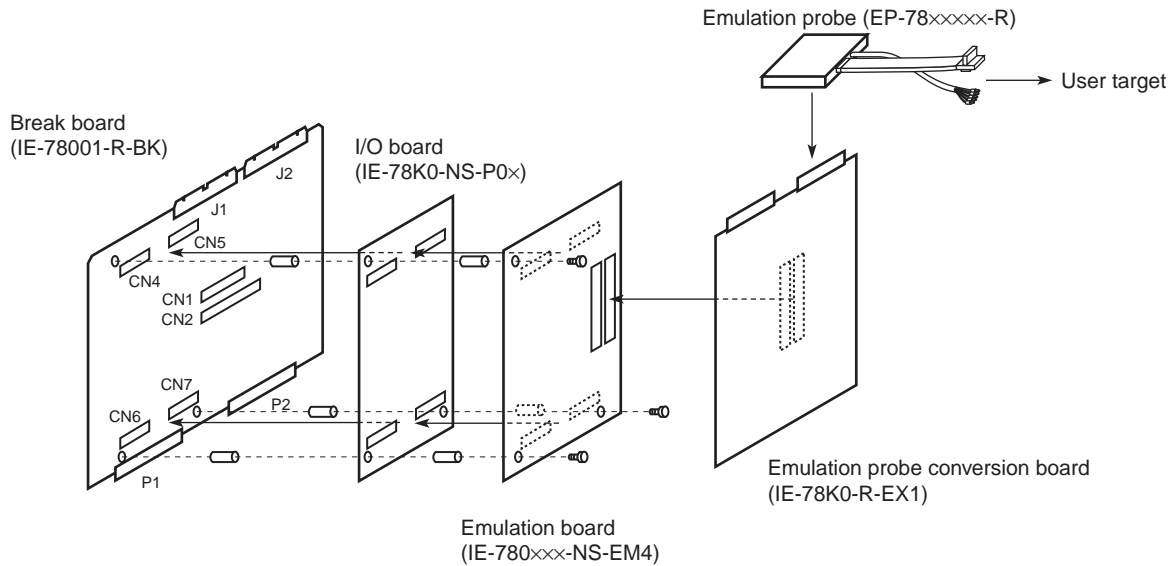
Caution   Use the metal spacers and screws to secure the I/O board and emulation board on the break board.

Phase-out/Discontinued

3.4.4 Connection of IE-780×××-SL-EM1

Connect emulation board (IE-780×××-SL-EM1) to CN4 to CN7 on the break board.

For the connection between emulation board and emulation probe, refer to Figure 3-6 and the user's manual of the relevant emulation board and emulation probe.

Figure 3-5. Connection of IE-780×××-SL-EM1
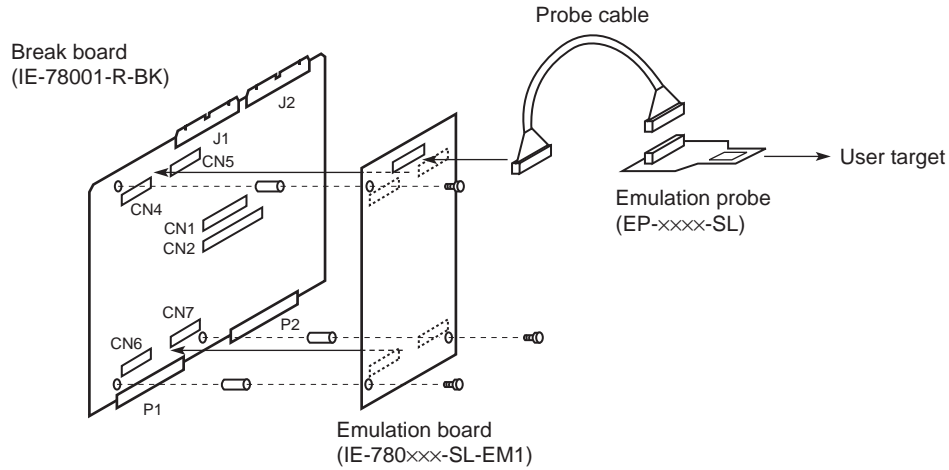
Caution   Use the metal spacers and screws to secure the emulation board on the break board.

Figure 3-6. Example of Emulation Probe Connection (EP-××××-SL)
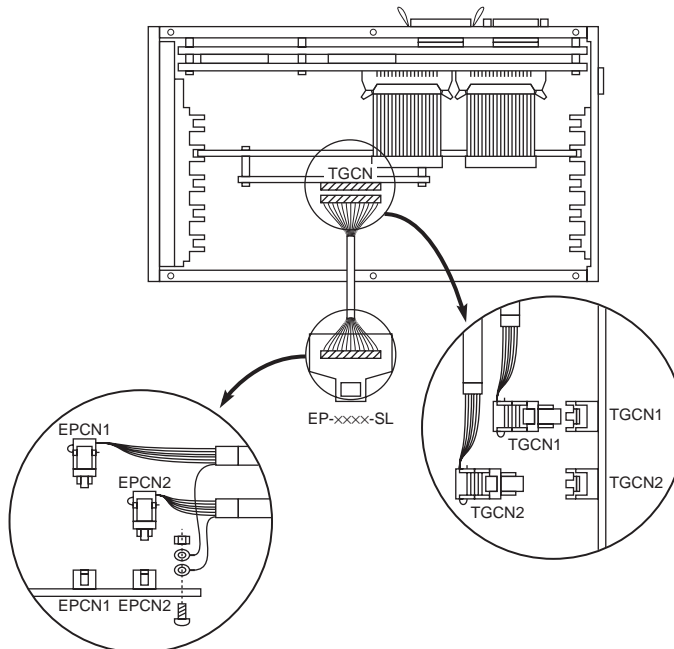
3.4.5 Connection of IE-780×××-SL-EM4

To connect emulation board (IE-780×××-SL-EM4) to the break board, an I/O board (IE-78K0-SL-P01, sold separately) is required.

Connect the I/O board to CN4 to CN7 on the break board, and then connect the emulation board to the I/O board.

For the connection between the emulation board and emulation probe, refer to Figure 3-7 and the user's manual of the relevant emulation board and emulation probe.

Figure 3-7. Connection of IE-780×××-SL-EM4
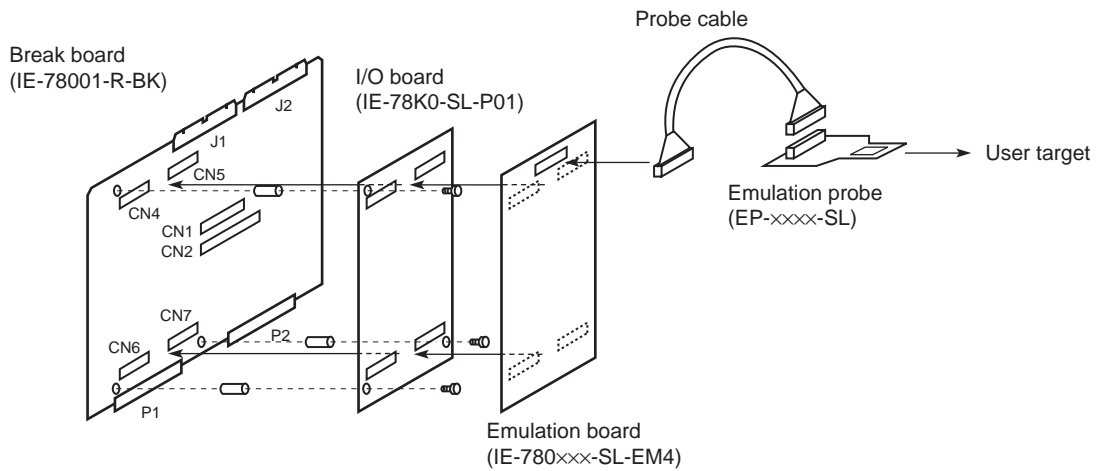
Caution   Use the metal spacers and screws to secure the I/O board on the break board.

CHAPTER 4 CLOCK SETTINGS

This chapter describes how to set the clock.

4.1 Outline of Clock Settings

The main system clock and subsystem clock to be used for debugging can be selected from (1) to (3) below.

(1) Clock already mounted on the board**Note**
(2) Clock mounted by user
(3) External clock

Note   Break board, emulation board, or I/O board

When the target system includes an internal clock, select (1) Clock already mounted on the board or (2) Clock mounted by user. An internal clock is used by connecting a resonator to the target device and using the clock generated by the device's internal oscillator. Figure 4-1 (a) shows the external circuit for an internal clock.

When an external clock is configured in the target system, select (3) External clock. An external clock is a clock that is externally supplied to the target device. When an external clock is used, the oscillator in the target device is not used. Figure 4-1 (b) shows the external circuit for an external clock.

Caution   The resonator provided in the target system cannot be used during emulation. Use the clock mounted on either the break board or emulation board installed in the IE-78001-R-A.

Figure 4-1. External Circuit for System Clock Oscillator

(a) Internal clock   **(b) External clock**
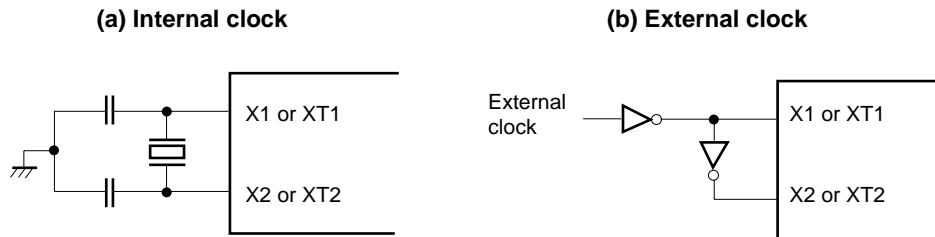
(1) Clock already mounted on the board

A crystal oscillator is already mounted on the break, emulation, or I/O board. The frequency of the oscillator varies depending on the target device. For the clock frequency of each device, refer to the relevant device data sheet.

Table 4-1 shows the frequency of the main system clock mounted on the break board. The frequency of the subsystem clock mounted on the break board is 32.768 kHz. The clock frequency that can be used differs depending on the emulation board used. For the settings corresponding to each emulation board, refer to **4.2 Main System Clock Settings** and **4.3 Subsystem Clock Settings**.

Table 4-1. Frequency of Main System Clock Mounted on Break Board

Frequency of Main System Clock Mounted on Break Board
20 MHz
16.777216 MHz
10 MHz
8.388608 MHz
5 MHz
4.194304 MHz

Figure 4-2. When Using Clock Mounted on Board
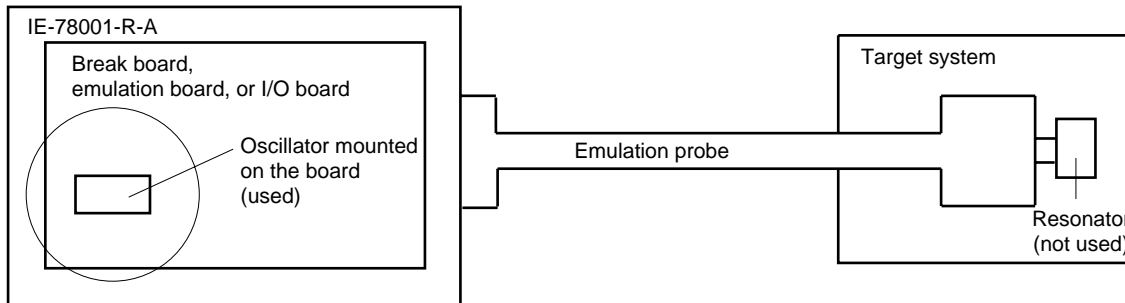
Remark   The clock output by the oscillator (indicated by the circle in the figure) on the board is used.

(2) Clock mounted by user

A clock that accords with the user's system specifications can be mounted on the break, emulation, or I/O board. Mount a parts board, incorporating an oscillator or resonator on the break, emulation, or I/O board. This is useful when debugging the system at a frequency other than that of the clock already mounted on the board. Whether a clock needs to be mounted on the break board, emulation board, or I/O board depends on the target device.

Figure 4-3. When Using Clock Mounted by User
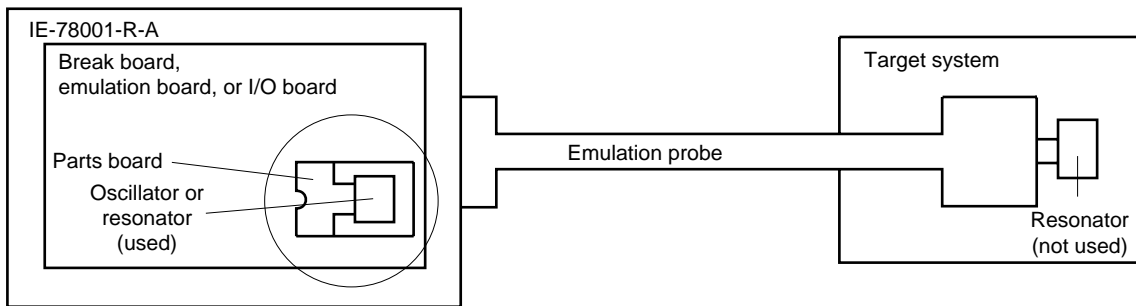
Remark   The clock output by the oscillator or resonator (indicated by the circle in the figure) on the board is used.

(3) External clock

An external clock in the target system can be used via the emulation probe.

Figure 4-4. When Using External Clock
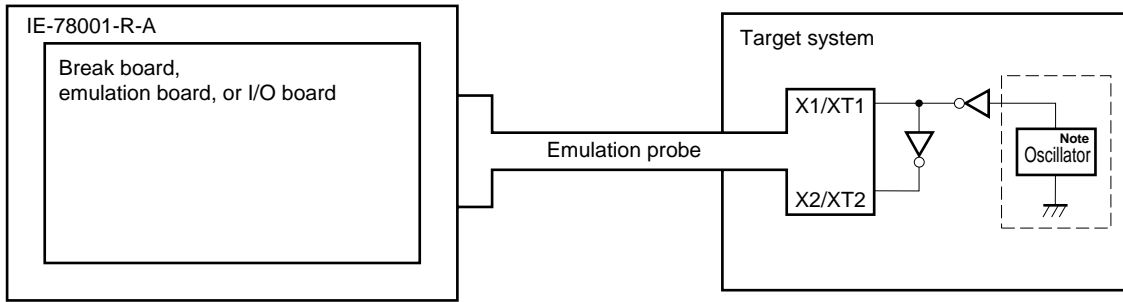
Note   Figure 4-5 (a) shows an example of the circuit enclosed by broken lines in the above figure.

Figure 4-5. External Clock Oscillator

(a) Oscillator example 1   **(b) Oscillator example 2**
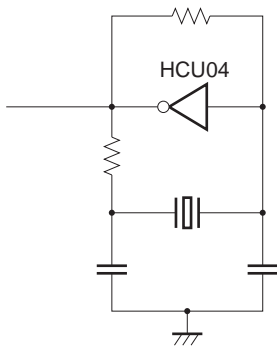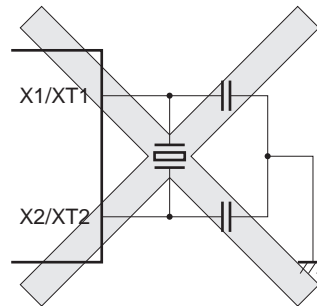
Caution   The in-circuit emulator does not operate when the circuit in Figure 4-5 (b) is used.

Phase-out/Discontinued

4.2 Main System Clock Settings

4.2.1 Break board settings

The following tables list the break board (IE-78001-R-BK) settings for each emulation board.

Caution **Set the emulation board in accordance with the main system clock used. For the emulation board settings, refer to the relevant emulation board user's manual. Also, when using an external clock, select the external clock using the integrated debugger (ID78K0) following IE-78001-R-A startup.**

(1) When IE-78014-R-EM-A is used

Main System Clock Used	IE-78001-R-BK Setting		ID78K0 Clock Setting
	X1 (MAIN) Socket	JP2	
Clock already mounted on break board	Parts board with 6-8 shorted	7-8 shorted	Internal
Clock mounted by user	Oscillator or parts board with oscillator mounted		External
External clock	Parts board with 6-8 shorted		

(2) When IE-780✕✕✕-R-EM or IE-178✕✕✕-R-EM other than (1) is used

Main System Clock Used	IE-78001-R-BK Setting		ID78K0 Clock Setting
	X1 (MAIN) Socket	JP2	
Clock already mounted on break board or emulation board	Parts board with 6-8 shorted	7-8 shorted	Internal
Clock mounted by user[Note]			External
External clock			

Note Mount an oscillator or a parts board that incorporates an oscillator in X1 (main clock socket) on the emulation board.

(3) When IE-780233-NS-EM4, IE-780835-NS-EM4, IE-780958-NS-EM4, IE-780988-NS-EM4, or IE-178134-NS-EM1 is used

Main System Clock Used	IE-78001-R-BK Setting		ID78K0 Clock Setting
	X1 (MAIN) Socket	JP2	
Clock already mounted on emulation board	Parts board with 6-8 shorted	15-16 shorted	Internal
Clock mounted by user[Note]			
External clock		7-8 shorted	External

Note Mount an oscillator or a parts board that incorporates an oscillator in X1 (main clock socket) on the emulation board.

(4) When IE-780xxx-NS-EMn or IE-178xxx-NS-EM1 other than (3) is used

Main System Clock Used	IE-78001-R-BK Setting		ID78K0 Clock Setting
	X1 (MAIN) Socket	JP2	
Clock already mounted on emulation board	Parts board with 6-8 shorted	13-14 shorted	Internal
Clock mounted by user**Note**			
External clock		7-8 shorted	External

Note Mount an oscillator or a parts board that incorporates an oscillator in X1 (main clock socket) on the emulation board.

(5) When IE-780974-SL-EM1 is used

Main System Clock Used	IE-78001-R-BK Setting		ID78K0 Clock Setting
	X1 (MAIN) Socket	JP2	
Clock already mounted on break board	Parts board with 6-8 shorted	1-2 shorted: 20 MHz 3-4 shorted: 16.777216 MHz 5-6 shorted: 10 MHz 7-8 shorted: 8.388608 MHz 9-10 shorted: 5 MHz 11-12 shorted: 4.194304 MHz	Internal
Clock already mounted on emulation board		13-14 shorted	
Clock mounted by user on emulation board**Note**		7-8 shorted	External
External clock			

Note Mount an oscillator or a parts board that incorporates an oscillator in X1 (main clock socket) on the emulation board.

(6) When IE-780948-SL-EM1 + IE-780948-SL-EM4, or IE-780xxx-SL-EM4 + IE-78K0-SL-P01 is used

Main System Clock Used	IE-78001-R-BK Setting		ID78K0 Clock Setting
	X1 (MAIN) Socket	JP2	
Clock already mounted on break board	Parts board with 6-8 shorted	1-2 shorted: 20 MHz 3-4 shorted: 16.777216 MHz 5-6 shorted: 10 MHz 7-8 shorted: 8.388608 MHz 9-10 shorted: 5 MHz 11-12 shorted: 4.194304 MHz	Internal
Clock already mounted on I/O board or IE-780948-SL-EM1		13-14 shorted	
Clock mounted by user on I/O board or IE-780948-SL-EM1**Note**		7-8 shorted	External
External clock			

Note Mount an oscillator or a parts board that incorporates an oscillator in X1 (main clock socket) on the I/O board or IE-780948-SL-EM1.

4.2.2 Mounting parts board and oscillator

(1) How to mount parts board with 6-8 shorted in X1 (MAIN) socket

A parts board, wired as shown in Figure 4-6, is mounted in the X1 (MAIN) socket on the board at shipment. When the parts board is to be used as shipped, no hardware setting is necessary. However, if the user prepares a parts board in order to change from one clock source to another, or because the wired parts board is lost, connect the parts board as described below.

- **Necessary parts and tools**
  - Parts board (supplied with the IE-78001-R-A)
  - Lead wire
  - Soldering tools

<Procedure>

<1> Solder a lead wire to the parts board as shown below.

Figure 4-6. Lead Wire Connection (Main System Clock)

Pins to be connected
6-8
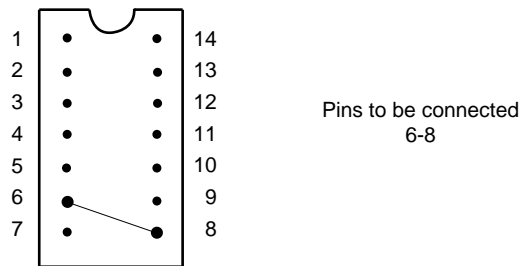
<2> Prepare the break board.
<3> Mount the parts board from <1> above in the X1 (MAIN) socket on the board.
When mounting the parts board, pay particular attention to the orientation of pin 1.

Figure 4-7. Mounting Position of Parts Board (Main System Clock, 6-8 Shorted)
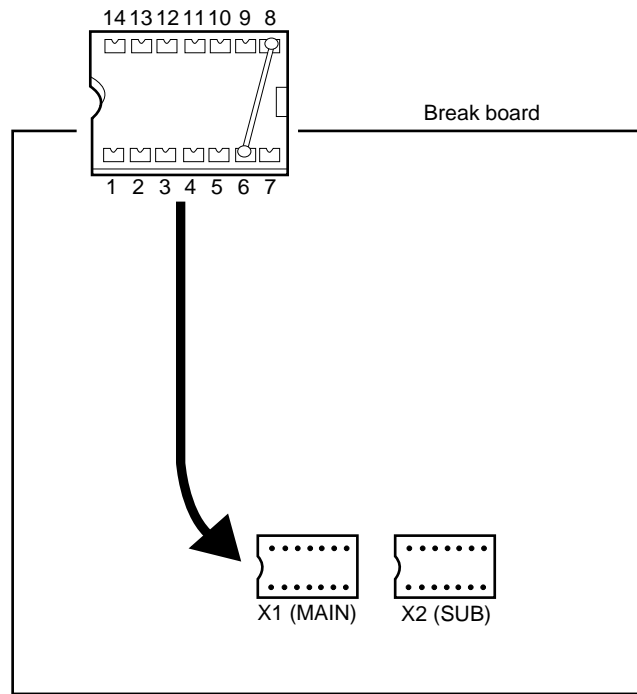
<4> Install the break board in the IE-78001-R-A.

The above steps configure the circuit below and enable supply of the clock on the target system to the emulation device.
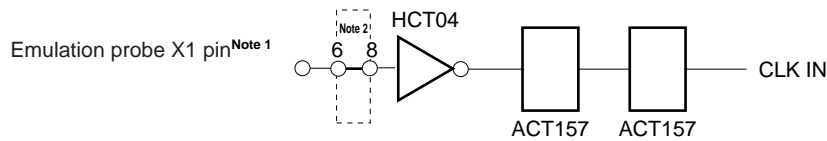
IE-78001-R-A side

(Emulation device)

Notes 1. Indicates the name of the pin on the target device.

2. Indicates the pin number on the parts board.
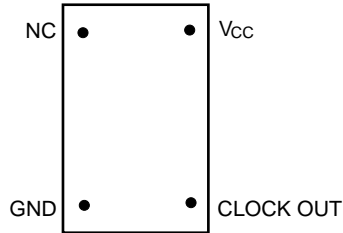
Remark The section enclosed by broken lines indicates the part attached to the parts board.

(2) How to mount oscillator in X1 (MAIN) socket

- **Necessary parts**
  - Crystal oscillator (with pin configuration shown in Figure 4-8)

Figure 4-8. Crystal Oscillator (Main System Clock)

<Procedure>

<1> Prepare the break board.

<2> Remove the external clock parts board from the X1 (MAIN) socket on the board.

<3> Mount the crystal oscillator in the X1 (MAIN) socket from which the external clock parts board was removed in <2>. Insert crystal oscillator, aligning the pins with the corresponding X1 (MAIN) socket pins as shown below.

Crystal oscillator pin	Socket pin number
NC	1
GND	7
CLOCK OUT	8
V_{CC}	14
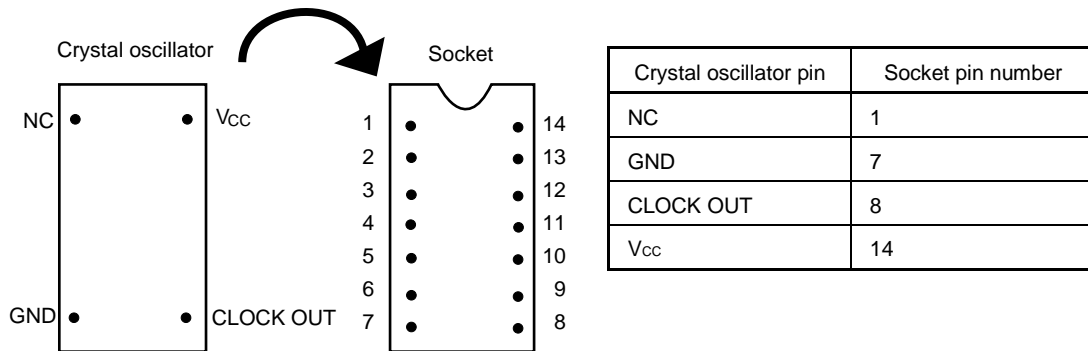
Figure 4-9. Mounting Position of Crystal Oscillator (Main System Clock)
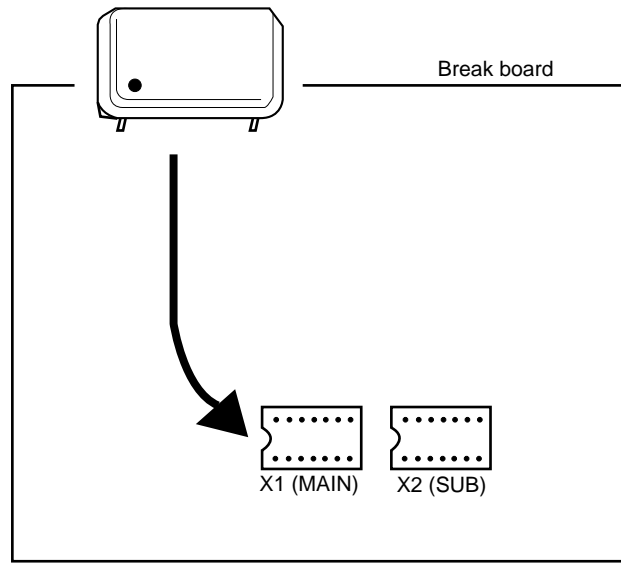
<4> Install the break board in the IE-78001-R-A.

The above steps configure the circuit below and enable supply of the clock generated from the mounted oscillator to the emulation device.

IE-78001-R-A side

(Emulation device)
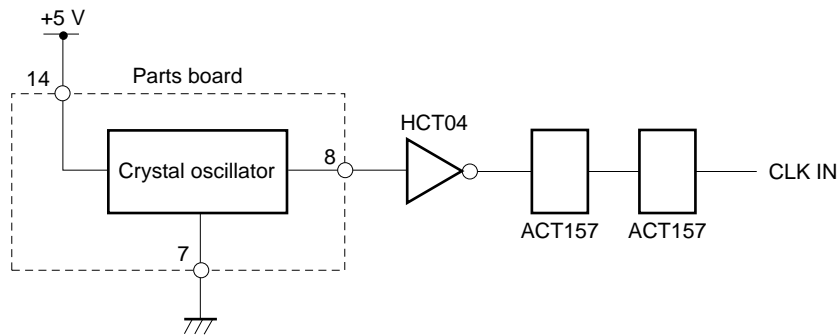
(3) How to mount parts board incorporating oscillator in X1 (MAIN) socket

● **Necessary parts and tools**
  • Parts board (supplied with the IE-78001-R-A)
  • Ceramic or crystal resonator
  • Resistor Rx
  • Capacitor CA
  • Capacitor CB
  • Soldering tools

<Procedure>

<1> Solder the ceramic or crystal resonator on the parts board, as well as resistor Rx and capacitors CA and CB, all with appropriate oscillation frequencies, as shown below.

Figure 4-10. Parts Connection (Main System Clock)

(a) Parts board
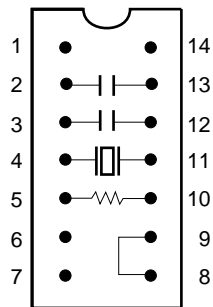
Pins	Connection
2-13	Capacitor CB
3-12	Capacitor CA
4-11	Ceramic/crystal resonator
5-10	Resistor Rx
8-9	Shorted

(b) Circuit diagram
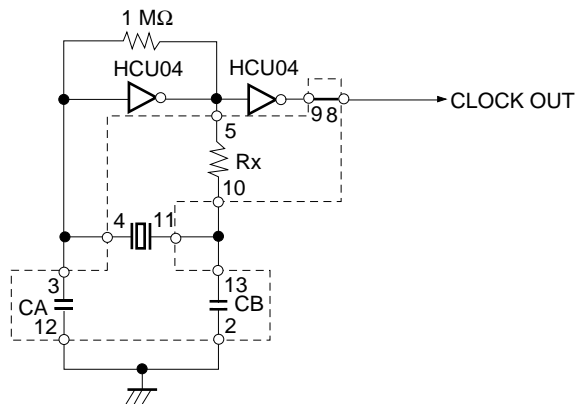
Remark The section enclosed by broken lines indicates the part attached to the parts board.

<2> Prepare the break board.
<3> Remove the external clock parts board from the X1 (MAIN) socket on the board.
<4> Mount the parts board in <1> above in the X1 (MAIN) socket from which the external clock parts board was removed in <3>. Pay particular attention to the orientation of pin 1.

Figure 4-11. Mounting Position of Parts Board (Main System Clock, Oscillator)
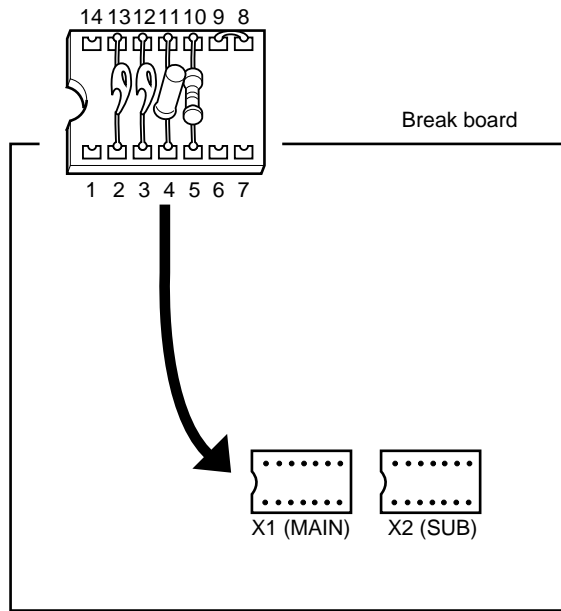
<5> Install the break board in the IE-78001-R-A.

The above steps configure the circuit below and enable supply of the clock generated by the mounted resonator to the emulation device.
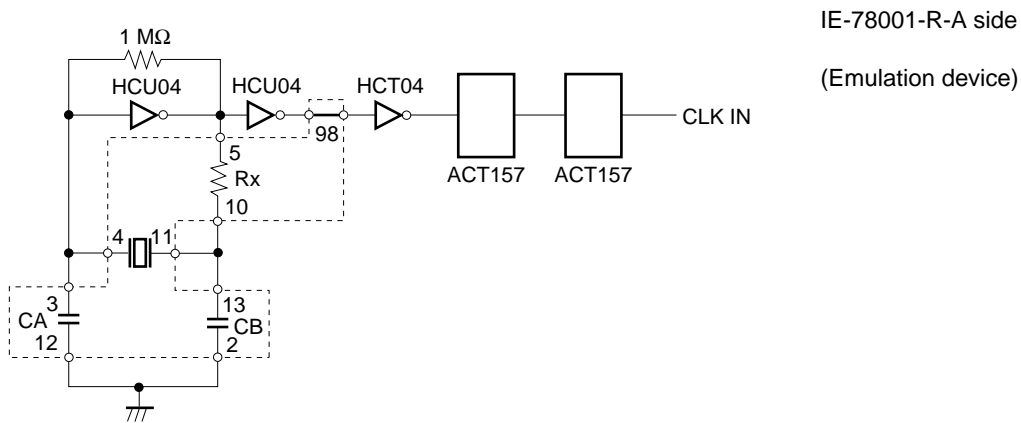
Remark The section enclosed by broken lines indicates the part attached to the parts board.

4.3 Subsystem Clock Settings

4.3.1 Break board settings

The following tables list the break board (IE-78001-R-BK) settings for each emulation board.

Caution Set the emulation board in accordance with the subsystem clock used. For the emulation board settings, refer to the relevant emulation board user's manual.

(1) When IE-780✕✕✕-R-EM or IE-178✕✕✕-R-EM is used

Subsystem Clock Used	IE-78001-R-BK Setting	
	X2 (SUB) Socket	JP5 Setting
Clock (32.768 kHz) already mounted on break board	Parts board with 6-8 shorted	5-6 shorted
Clock mounted by user	Oscillator or parts board with oscillator mounted	3-4 shorted
Subsystem clock not used	Parts board with 6-8 shorted	
External clock		

(2) When IE-780958-NS-EM4 is used

Subsystem Clock Used	IE-78001-R-BK Setting	
	X2 (SUB) Socket	JP5 Setting
Clock already mounted on emulation board	Parts board with 6-8 shorted	3-4 shorted
Clock mounted by user on emulation board**Note**		
External clock		

Note Mount an oscillator or a parts board that incorporates an oscillator in X2 (subclock socket) on the emulation board.

(3) When IE-780✕✕✕-NS-EMn or IE-178✕✕✕-NS-EM1 other than (2) is used

Subsystem Clock Used	IE-78001-R-BK Setting	
	X2 (SUB) Socket	JP5 Setting
Clock (32.768 kHz) already mounted on break board	Parts board with 6-8 shorted	5-6 shorted
Clock mounted by user on emulation board**Note**		1-2 shorted
Subsystem clock not used		
External clock		3-4 shorted

Note Mount an oscillator or a parts board that incorporates an oscillator in X2 (subclock socket) on the emulation board.

Phase-out/Discontinued

(4) When IE-780974-SL-EM1 is used

Subsystem Clock Used	IE-78001-R-BK Setting	
	X2 (SUB) Socket	JP5 Setting
Clock (32.768 kHz) already mounted on break board	Parts board with 6-8 shorted	5-6 shorted
Clock mounted by user	Oscillator or parts board with oscillator mounted	1-2 shorted
Subsystem clock not used	Parts board with 6-8 shorted	
External clock		3-4 shorted

(5) When IE-780948-SL-EM1 + IE-780948-SL-EM4, or IE-780✕✕✕-SL-EM4 + IE-78K0-SL-P01 is used

Subsystem Clock Used	IE-78001-R-BK Setting	
	X2 (SUB) Socket	JP5 Setting
Clock (32.768 kHz) already mounted on break board	Parts board with 6-8 shorted	5-6 shorted
Clock mounted by user on I/O board or IE-780948-SL-EM1**Note**		3-4 shorted
Subsystem clock not used		
External clock		

Note Mount an oscillator or a parts board that incorporates an oscillator in X2 (subclock socket) on the IE-780948-SL-EM1 or I/O board.

4.3.2 Mounting parts board and oscillator

(1) How to mount parts board with 6-8 shorted in X2 (SUB) socket

A parts board, wired as shown in Figure 4-12, is mounted in the X2 (SUB) socket on the break board at shipment. When the parts board is to be used as shipped, no hardware setting is necessary. However, if the user prepares a parts board in order to change from one clock source to another, or because the wired parts board is lost, connect the parts board as described below.

- **Necessary parts and tools**
  - Parts board (supplied with the IE-78001-R-A)
  - Lead wire
  - Soldering tools

<Procedure>

<1> Solder a lead wire to the parts board as shown below.

Figure 4-12. Lead Wire Connection (Subsystem Clock)

Pins to be connected

6-8
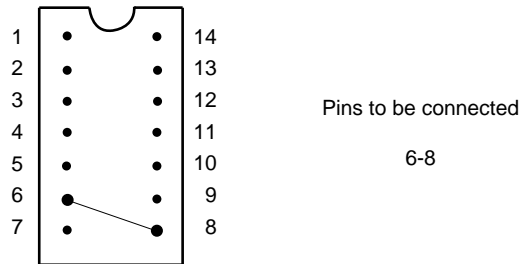
<2> Prepare the break board.

<3> Mount the parts board wired in <1> in the X2 (SUB) socket of the break board. Pay particular attention to the orientation of pin 1.

Figure 4-13. Mounting Position of Parts Board (Subsystem Clock, 6-8 Shorted)

14 13 12 11 10 9 8

1 2 3 4 5 6 7

Break board

X1 (MAIN)   X2 (SUB)
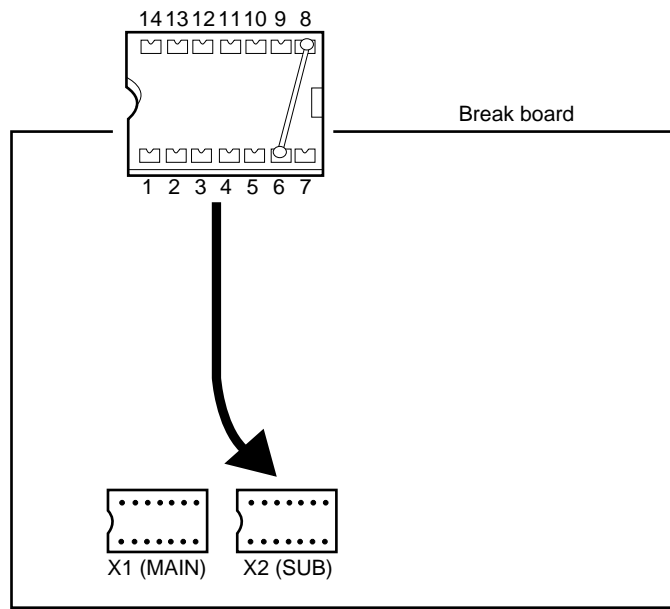
<4> Install the emulation and break boards in the IE-78001-R-A.

The above steps configure the circuit below and enable supply of the clock signal on the target system to the emulation device.
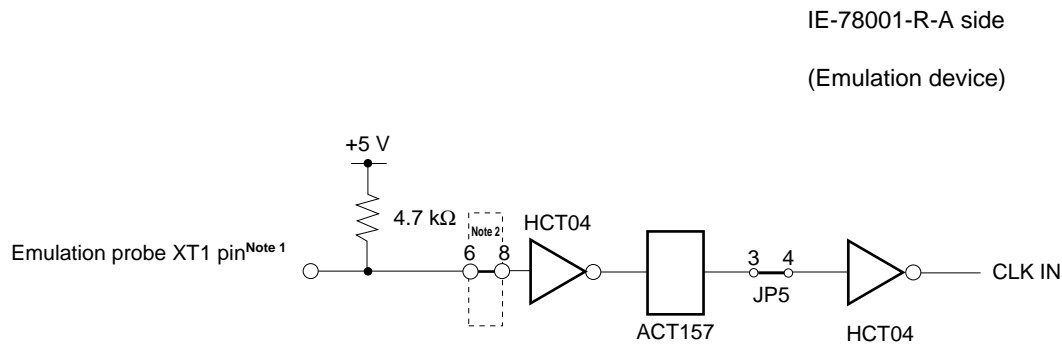
IE-78001-R-A side

(Emulation device)

+5 V

4.7 kΩ

Note 2

6 8

HCT04

ACT157

3 4

JP5

HCT04

CLK IN

Emulation probe XT1 pin[Note 1]

Notes 1. Indicates the name of the pin on the target device.
  2. Indicates the pin number on the parts board.

Remark The section enclosed by broken lines indicates the part attached to the parts board.

(2) How to mount oscillator in X2 (SUB) socket

● **Necessary parts**
  • Crystal oscillator (with the pin configuration shown in Figure 4-14)

Figure 4-14. Crystal Oscillator (Subsystem Clock)

```
        NC  ●        ●  VCC



       GND  ●        ●  CLOCK OUT
```

<Procedure>

<1> Prepare the break board.

<2> Remove the external clock parts board mounted in the X2 (SUB) socket on the break board.

<3> Mount the crystal oscillator in the X2 (SUB) socket from which the external clock parts board was removed in <2>. Insert the crystal oscillator, aligning the pins with the socket pins as shown below.

Crystal oscillator pin	Socket pin number
NC	1
GND	7
CLOCK OUT	8
VCC	14

Phase-out/Discontinued
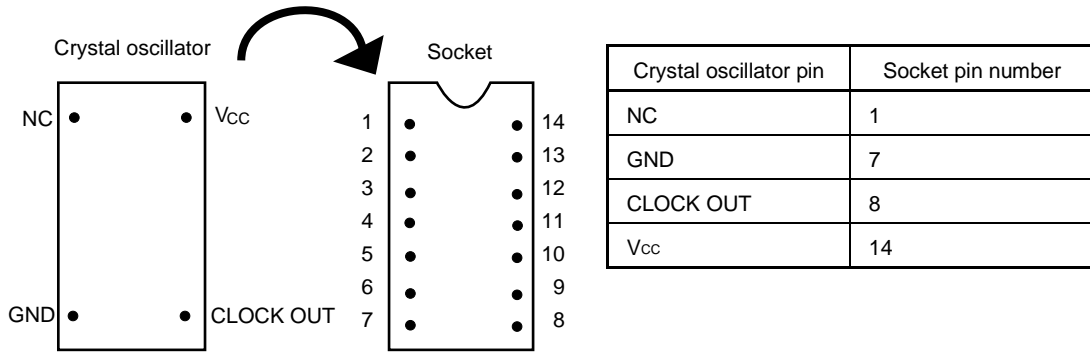
Figure 4-15. Mounting Position of Crystal Oscillator (Subsystem Clock)
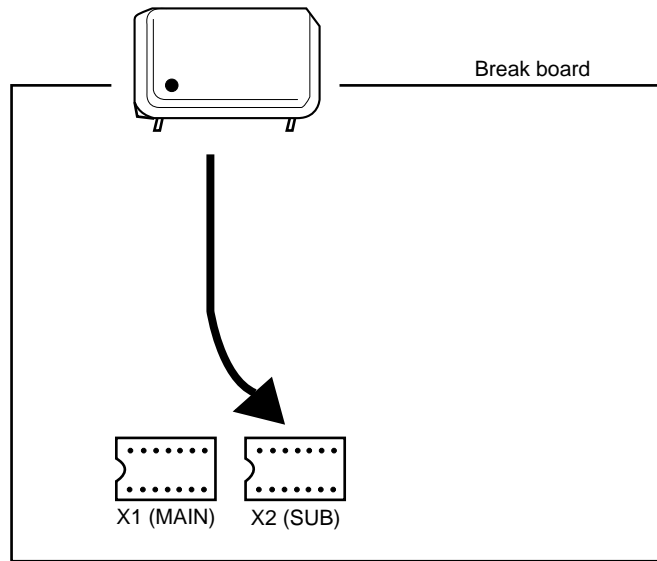
Break board

X1 (MAIN)   X2 (SUB)

<4> Install the break board in the IE-78001-R-A.

   The above steps configure the circuit below and enable supply of the clock generated from the mounted oscillator to the emulation device.

IE-78001-R-A side

(Emulation device)

+5 V

14   Parts board

Crystal oscillator   8

HCT04

ACT157

3 4
JP5

HCT04

CLK IN

7

Phase-out/Discontinued
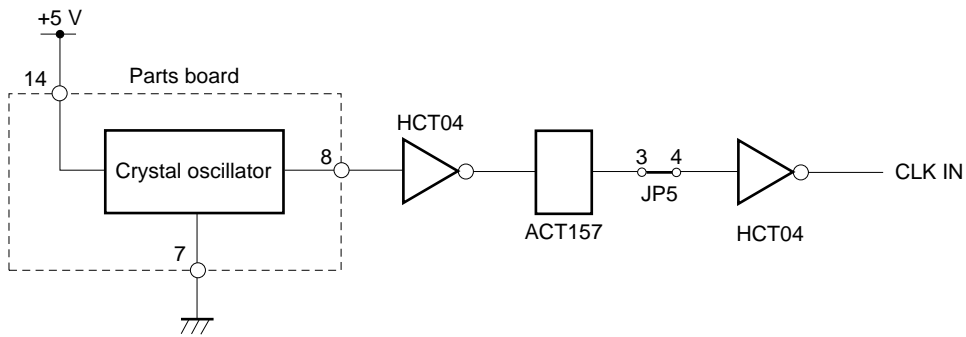
(3) How to mount parts board incorporating oscillator in X2 (SUB) socket

- **Necessary parts and tools**
  - Parts board (supplied with the IE-78001-R-A)
  - Crystal resonator
  - Resistor Rx
  - Capacitor CA
  - Capacitor CB
  - Soldering tools

<Procedure>

<1> Solder the crystal resonator to the parts board, as well as resistor Rx and capacitors CA and CB, all with appropriate oscillation frequencies, as shown below.

Figure 4-16. Parts Connection (Subsystem Clock)

(a) Parts board
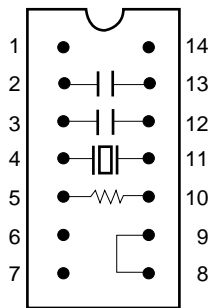
Pins	Connection	Standard value[Note]
2-13	Capacitor CB	33 pF
3-12	Capacitor CA	33 pF
4-11	Crystal resonator	32.768 kHz
5-10	Resistor Rx	330 kΩ
8-9	Shorted	–

Note The values described are typical values. The circuit constant may differ depending on the resonator used, so contact the resonator manufacturer if the resonator fails to oscillate.

(b) Circuit diagram
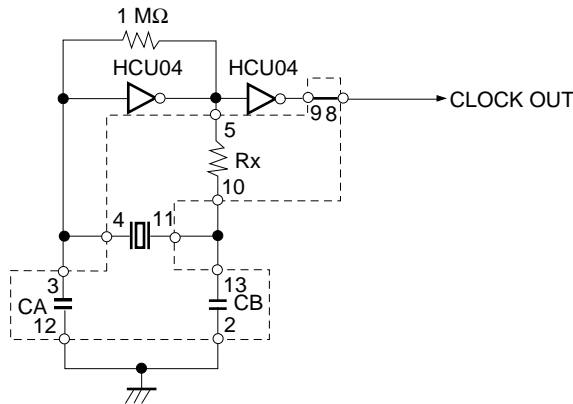
Remark The section enclosed by broken lines indicates the part attached to the parts board.

<2> Prepare the break board.
<3> Remove the external clock parts board from the X2 (SUB) socket on the break board.
<4> Mount the parts board wired in <1> above in the X2 (SUB) socket from which the external clock parts board was removed in <3>. Pay particular attention to the orientation of pin 1.

Figure 4-17. Mounting Position of Parts Board (Subsystem Clock, Oscillator)
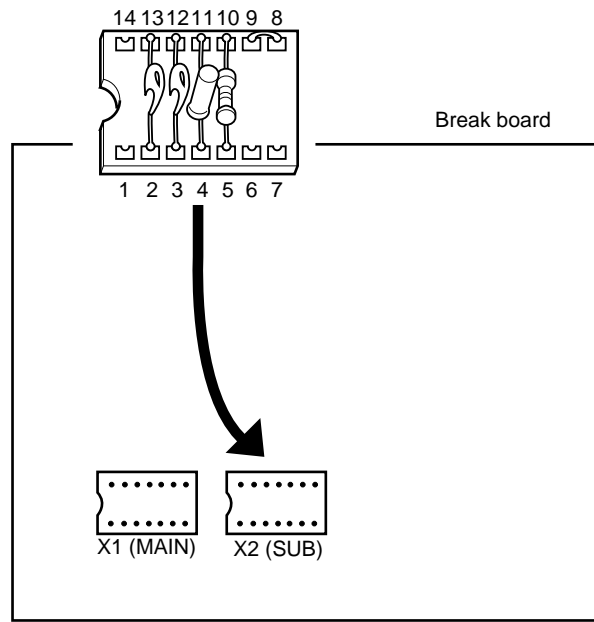
14 13 12 11 10 9 8

Break board

1 2 3 4 5 6 7

X1 (MAIN)   X2 (SUB)

<5> Install the break board in the IE-78001-R-A.

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

IE-78001-R-A side

(Emulation device)
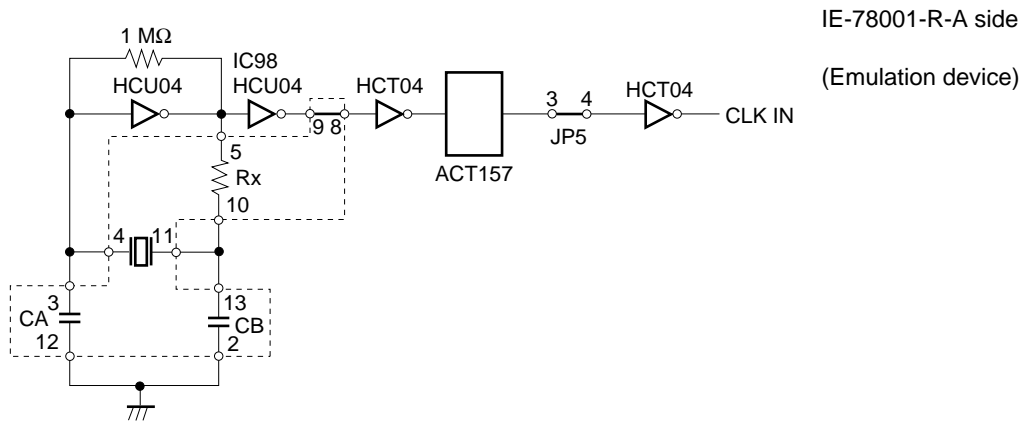
Remark The section enclosed by broken lines indicates the part attached to the parts board.

CHAPTER 5 HOST INTERFACE ADAPTERS

This chapter describes the following interface adapters provided for the 178K and 78K/0 Series.

- IE-70000-PCI-IF(-A)
- IE-70000-98-IF-C
- IE-70000-PC-IF-C
- IE-78000-R-SV3

5.1 Setting of Interface Adapter for Desktop PCs (IE-70000-PCI-IF(-A))

How to set the IE-70000-PCI-IF(-A) when the IE-78001-R-A is connected is described below.

For details, refer to the **IE-70000-PCI-IF(-A) User's Manual (supplied with the product)**.

5.1.1 Outline

The IE-70000-PCI-IF(-A) is an IE series interface adapter that is used mounted in the PCI bus slot of a PC with a Windows 95/98 or Windows NT^{TM} 4.0 OS.

Prior to use, check whether the following items are included in the carton.

- Interface adapter for desktop PC (IE-70000-PCI-IF(-A))   ×1
- 8-bit connector board (already 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>

Supported machines

PCs with Windows 95/98 or Windows NT 4.0 incorporated and a PCI bus slot mounted

Hardware
- I/O addresses: 0000H to FFFFH
- Interrupts: Unused
- Memory: 80H bytes used

Power consumption

300 mA (maximum value at +5 V)

Precautions 1. Do not place heavy items on or apply pressure to the interface adapter or accessories.

2. Do not drop or apply vibration or shock to the interface adapter or accessories.

3. Do not pull on the cord when unplugging the cable.

4. Avoid using in hot, humid, or dusty environments, or an environment exposed to direct sunlight.

5. Avoid sudden changes in environmental conditions (temperature and humidity).

6. Avoid spilling drinks or liquid on the interface adapter or accessories.

7. Do not connect an unauthorized cable to the connector.

5.1.2 Installation

(1) Interface adapter settings
There are no jumpers or DIP switches in the IE-70000-PCI-IF(-A).

(2) Mounting of 8-bit connector board
The 8-bit connector board is mounted at shipment.

Remark   When mounting the 32-bit connector board, remove the 8-bit connector board mounted at shipment, and connect the 32-bit connector board using the coupling connector (see Figure 5-1). Be sure to secure the connection with screws.

Caution The 32-bit board connector is supplied for future function expansion. Please keep this board in a safe place.

Figure 5-1. Mounting of IE-70000-PCI-IF(-A) and Connector Board
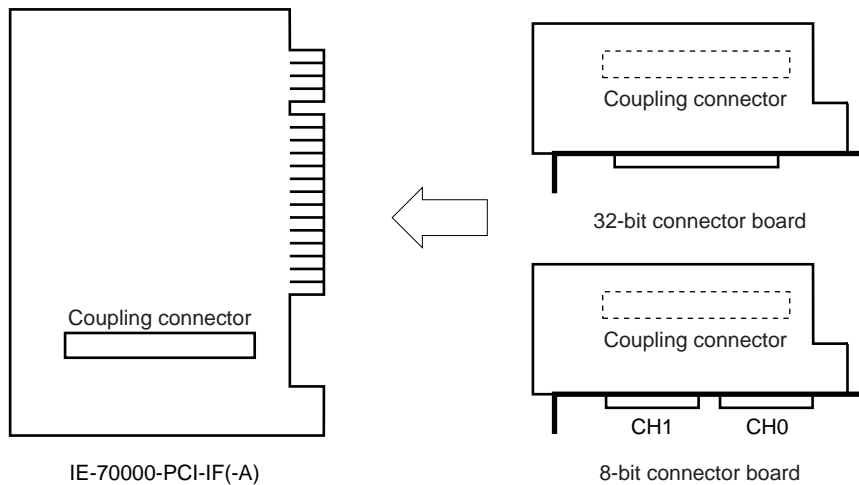
Coupling connector

32-bit connector board

Coupling connector

Coupling connector

CH1   CH0

IE-70000-PCI-IF(-A)   8-bit connector board

(3) Mounting on the PC
Check that the power of the PC is turned off, then mount the interface adapter in the PCI bus slot following the directions in the PC user's manual.

(4) PCI driver installation
Refer to "Readme_e.txt" in the supplied DRV-DISK and start installation.

(5) Connection with IE-78001-R-A
Connect CH3 on the IE-78001-R-A and CH1 on the IE-70000-PCI-IF(-A) using the supplied cables.

Caution   The IE-78001-R-A can only be connected to CH1 on the IE-70000-PCI-IF(-A).

5.2 Settings of Interface Adapter for IBM PC/AT or Compatibles (IE-70000-PC-IF-C)

How to set the IE-70000-PC-IF-C when the IE-78001-R-A is connected is described below.

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

5.2.1 Outline

The IE-70000-PC-IF-C is an interface adapter for IBM PC/AT or compatibles that is used mounted in the ISA bus slot in an IBM PC/AT or compatible machine.

Prior to use, check whether the following items are included in the carton.

- Interface adapter for IBM PC/AT or compatibles (IE-70000-PC-IF-C) ×1

<Basic specifications>

Supported machines

IBM PC/AT or compatibles with an ISA bus slot.

Hardware

- I/O addresses: 16 bytes within any 16-byte boundary (020×H to 03F×H)
- Interrupts, etc.: Unused

Power consumption

500 mA (maximum value at +5 V)

Precautions **1.** Do not place heavy items on or apply pressure to the interface adapter or accessories.

2. Do not drop or apply vibration or shock to the interface adapter or accessories.

3. Do not pull on the cord when unplugging the cable.

4. Avoid using in hot, humid, or dusty environments, or an environment exposed to direct sunlight.

5. Avoid sudden changes in environmental conditions (temperature and humidity).

6. Avoid spilling drinks or liquid on the interface adapter or accessories.

7. Do not connect an unauthorized cable to the connector.

5.2.2 Installation

(1) I/O address settings

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

In the IE-78001-R-A, set the I/O address between 020×H and 03F×H. Note that the value is 0 when the switch is on and 1 when the switch is off.

The addresses set here must be values not used in the PC's system or other boards. Also, these values are used for software installation, so be sure to save them.

Table 5-1. SW1 and SW2 Settings When Setting I/O Address to 022×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
OFF		1				1		

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

Caution   The numbers 5 to 8 of SW2 must be set to OFF.

(2) Jumper settings

INT JP and WAIT JP are jumpers for setting the ISA bus interrupt and WAIT.

In the IE-78001-R-A, set INT JP to one of IRQ2 to IRQ7 and WAIT JP to 2-3 shorted.

Figure 5-2. INT JP and WAIT JP Settings When Interrupt Is Set to IRQ3
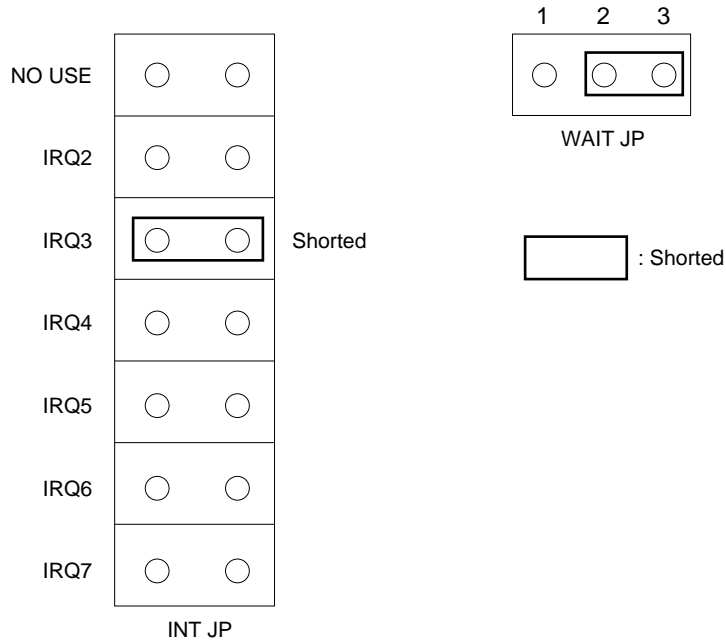
(3) Mounting on the PC

Check that the power of the PC is turned off, then mount the interface adapter in the ISA bus slot following the directions in the PC user's manual.

(4) Connection with IE-78001-R-A

Connect CH3 on the IE-78001-R-A and CH1 on the IE-70000-PC-IF-C using the supplied cables.

Caution   The IE-78001-R-A can only be connected to CH1 on the IE-70000-PC-IF-C.

5.3 Settings of Interface Adapter for PC-9800 Series (IE-70000-98-IF-C)

How to set the IE-70000-98-IF-C when the IE-78001-R-A is connected is described below.

For details, refer to the **IE-70000-98-IF-C User's Manual (to be prepared)**.

5.3.1 Outline

The IE-70000-98-IF-C is an interface adapter for the PC-9800 Series (except PC98-NX) that is used mounted in the C bus slot in a PC-9800 Series machine.

Caution   The PC98-NX Series is handled as an IBM PC/AT compatible.

Refer to 5.1 Setting of Interface Adapter for Desktop PCs (IE-70000-PCI-IF(-A)).

Prior to use, check whether the following items are included in the carton.

- Interface adapter for PC-9800 Series (IE-70000-98-IF-C) $\times 1$

<Basic specifications>

Supported machines

PC-9800 Series with a C bus slot.

Hardware

- I/O addresses: 16 bytes within any 256-byte boundary (00D$\times$H, 01D$\times$H, ..., FFD$\times$H)
- Interrupts, etc.: Unused

Power consumption

500 mA (maximum value at +5 V)

Precautions 1. Do not place heavy items on or apply pressure to the interface adapter or accessories.

2. Do not drop or apply vibration or shock to the interface adapter or accessories.

3. Do not pull on the cord when unplugging the cable.

4. Avoid using in hot, humid, or dusty environments, or an environment exposed to direct sunlight.

5. Avoid sudden changes in environmental conditions (temperature and humidity).

6. Avoid spilling drinks or liquid on the interface adapter or accessories.

7. Do not connect an unauthorized cable to the connector.

Phase-out/Discontinued

5.3.2 Installation

(1) I/O address settings

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

In the IE-78001-R-A, set the I/O address to 16 bytes of 00D×H, 01D×H, ..., FFD×H. Note that the value is 0 when the switch is on, and 1 when the switch is off.

The addresses set here must be values not used in the PC's system or other boards. Also, these values are used for software installation, so be sure to save them.

Table 5-2. SW1 and SW2 Settings When Setting I/O Address to 00D×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
OFF	1		1	1				

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

Caution   The numbers 5 to 8 of SW2 must be set to OFF.

(2) Jumper settings

INT JP and WAIT JP are jumpers for setting the C bus interrupt and WAIT.

In the IE-78001-R-A, set INT JP to one of IR3, IR5, IR6, IR9, IR11, IR12, or IR13, and WAIT JP to 2-3 shorted.

Figure 5-3. INT JP and WAIT JP Settings When Interrupt Is Set to IR5
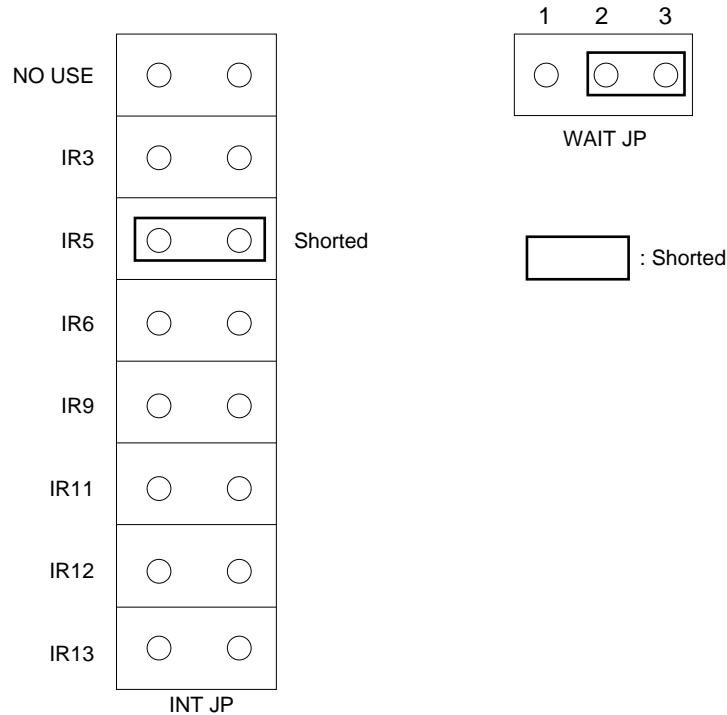
(3) Mounting on the PC

Check that the power of the PC is turned off, then mount the interface adapter in the C bus slot following the directions in the PC user's manual.

(4) Connection with IE-78001-R-A

Connect CH3 on the IE-78001-R-A and CH1 on the IE-70000-98-IF-C using the supplied cables.

Caution   The IE-78001-R-A can only be connected to CH1 on the IE-70000-98-IF-C.

Phase-out/Discontinued

5.4 IE-78000-R-SV3

5.4.1 General

The IE-78000-R-SV3 is an interface adapter and cable used when an EWS is used as the host machine, and is connected to an internal board of the IE-78001-R-A. The Ethernet standard 10Base-5 is supported as the access method. For any other method, a commercially available conversion adapter is necessary.

Figure 5-4. IE-78000-R-SV3
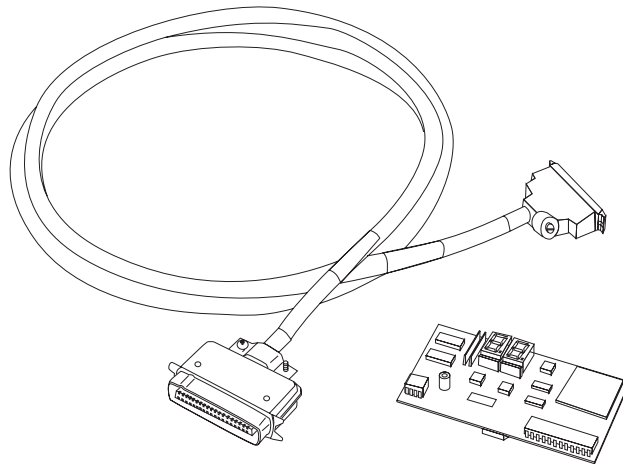
5.4.2 Contents in Carton of IE-78000-R-SV3

The carton containing the IE-78000-R-SV3 also contains the following accessories (a) through (c).
Contact an NEC salesperson or authorized dealer if anything is missing or broken.

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

5.4.3 Setting of IE-78000-R-SV3

For how to set the IE-78000-R-SV3, see **CHAPTER 9 SETTING NETWORK INFORMATION**.

CHAPTER 6 CONNECTING PERIPHERAL EQUIPMENT

By connecting peripheral equipment and thus configuring a system, the IE-78001-R-A can be used to debug or program the target device. This chapter explains how to connect the peripheral equipment to the IE-78001-R-A and how to set each device. Read this chapter before connecting the peripheral equipment.

For the sequence of system configuration, see **1.4 Setup Procedure**. For the details on how to start the system, refer to the **ID78K0 Integrated Debugger User's Manual**.

6.1 Peripheral Equipment

A "host machine" can be connected to the IE-78001-R-A as peripheral equipment.

<Host machine>

- **PC**
  By using a PC to operate an integrated debugger and device file for the IE-78001-R-A (sold separately) via Windows, it is possible to provide a seamless development environment, from software development to overall evaluation, including hardware.

  - PC with PCI bus slot
  - PC-9800 series with C bus slot
  - IBM PC/AT compatible with ISA bus slot

- **Workstation**
  By using a workstation to operate an integrated debugger and device file for the IE-78001-R-A (sold separately) via an OS, it is possible to provide a seamless development environment, from software development to overall evaluation, including hardware.

Phase-out/Discontinued

6.2 Interface of IE-78001-R-A

To connect the IE-78001-R-A with peripheral equipment, a serial interface (channel 1), PC bus interface (channel 3), or network interface (channel 3) is used.

A serial interface (channel 1) can be used only for setting network information.

Note that channel 2 of the IE-78001-R-A is reserved and cannot be used.

(1) Serial interface (channel 1)

Serial interface	Peripheral equipment to be connected
Channel 1 (I/O)	Terminal
Channel 2 (I/O)	None

Table 6-1 outlines the functions of channel 1. For details, see **CHAPTER 8 FUNCTIONS OF EACH CHANNEL**.

Table 6-1. Functional Outline of Channel 1

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 specifications	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. Ethernet is employed as the network interface.

For details, see **CHAPTER 5 HOST INTERFACE ADAPTERS**.

Phase-out/Discontinued

6.3 Connecting PC Supporting PCI Bus

Connect a PC with a PCI bus slot using the IE-70000-PCI-IF(-A) and PC bus interface cable.

6.3.1 General

- Turn off the power.
- Connect channel 3 of the IE-78001-R-A and the IBM PC/AT (hereafter referred to as host machine) using the PC bus interface cable.
- Turn on the power.
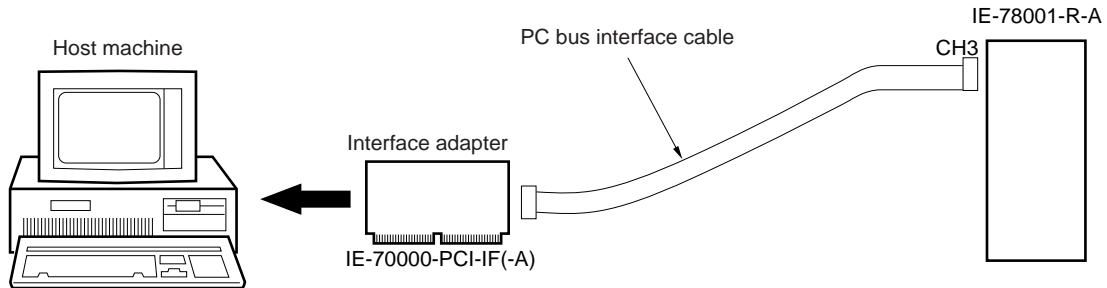
6.3.2 Connection method

(1) Turn off the power
Before connection, turn off the power to each device.

(2) Set the IE-70000-PCI-IF(-A)
For details of the IE-70000-PCI-IF(-A) settings, refer to **5.1 Setting of Interface Adapter for Desktop PCs (IE-70000-PCI-IF(-A))**.

(3) Insert the IE-70000-PCI-IF(-A) into an expansion slot in the host machine

(4) Connect the IE-78001-R-A to the host machine

Table 6-2. Cable Connection

IE-78001-R-A	Connecting Cable	Connected to:
CH3	PC bus interface cable	IE-70000-PCI-IF(-A)

(5) Turn on the power

Phase-out/Discontinued

6.3.3 Power-on sequence

Turn on the power in the sequence described below. Turn off the power in the reverse sequence. The sequence of turning on/off the power during operation is the same.

<1> Turn on the power switch of the host machine.
<2> Turn on the power switch of the IE-78001-R-A.
<3> Start Windows and then the integrated debugger. For details on how to start the debugger, refer to the **ID78K0 Integrated Debugger User's Manual**.

Caution   If communication with the IE-78001-R-A cannot be established after starting the integrated debugger, check the following points.

<1> Is the cable between the IE-78001-R-A and host machine connected correctly?
<2> Is the IE-70000-PCI-IF(-A) connected correctly to the host machine?
<3> Are the IE-70000-PCI-IF(-A) settings correct?
<4> Do the IE-70000-PCI-IF(-A) settings match the integrated debugger settings?
<5> Are the jumpers on the emulation board, supervisor board, or trace board set as described in **CHAPTER 4 CLOCK SETTINGS** or **APPENDIX C JUMPER SETTINGS?**
<6> Are the break board, emulation board, and connector board mounted correctly in the specified positions?
<7> If the target system is connected, check that the RESET pin of the target device is not fixed to low level.

If the IE-78001-R-A still cannot be started, contact an NEC sales representative or local distributor.

6.3.4 Power-off sequence

<1> Turn off the power switch of the IE-78001-R-A.
<2> Turn off the power switch of the host machine.

6.4 Connecting PC-9800 Series Computer

Connect a PC-9800 series computer with a C bus slot using the IE-70000-98-IF-C and PC bus interface cable.

6.4.1 General

- Turn off the power.
- Connect channel 3 of the IE-78001-R-A and the PC-9800 series computer (hereafter referred to as host machine) using the PC bus interface cable.
- Turn on the power.
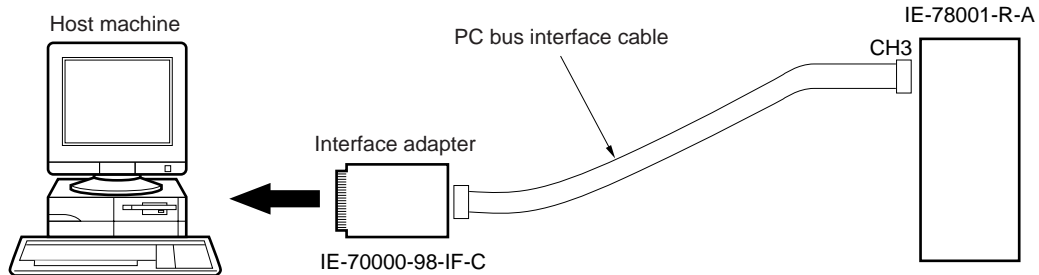
6.4.2 Connection method

(1) Turn off the power

Before connection, turn off the power to each device.

(2) Set the IE-70000-98-IF-C

Before using the IE-70000-98-IF-C, I/O addresses and interrupts must be set. For details of setting the switches on the IE-70000-98-IF-C, see **5.3 Settings of Interface Adapter for PC-9800 Series (IE-70000-98-IF-C)**.

(3) Insert the IE-70000-98-IF-C into an expansion slot in the host machine

(4) Connect the IE-78001-R-A to the host machine

Table 6-3. Cable Connection

IE-78001-R-A	Connecting Cable	Connected to:
CH3	PC bus interface cable	IE-70000-98-IF-C

(5) Turn on the power

6.4.3 Power-on sequence

Turn on the power in the sequence described below. Turn off the power in the reverse sequence. The sequence of turning on/off the power during operation is the same.

<1> Turn on the power switch of the host machine.
<2> Turn on the power switch of the IE-78001-R-A.
<3> Start Windows and then the integrated debugger. For details of how to start the debugger, refer to the **ID78K0 Integrated Debugger User's Manual**.

Caution If communication with the IE-78001-R-A cannot be established after starting the integrated debugger, check the following points.

<1> Is the cable between the IE-78001-R-A and host machine connected correctly?
<2> Is the IE-70000-98-IF-C connected to the host machine correctly?
<3> Are the settings of the IE-70000-98-IF-C correct?
<4> Do the settings of the IE-70000-98-IF-C match the settings of the integrated debugger?
<5> Are the jumpers on the emulation board, supervisor board, or trace board set as described in **CHAPTER 4 CLOCK SETTINGS** and **APPENDIX C JUMPER SETTINGS**?
<6> Are the break board, emulation board, and connector board mounted correctly in the specified positions?
<7> If the target system is connected, check that the RESET pin of the target device is not fixed to low level.

If the IE-78001-R-A still cannot be started, contact an NEC sales representative or local distributor.

6.4.4 Power-off sequence

<1> Turn off the power switch of the IE-78001-R-A.
<2> Turn off the power switch of the host machine.

6.5 Connecting IBM PC/AT Compatible

Connect an IBM PC/AT compatible machine with an ISA bus slot using the IE-70000-PC-IF-C and PC bus interface cable.

6.5.1 General

- Turn off the power.
- Connect channel 3 of the IE-78001-R-A and the IBM PC/AT compatible (hereafter referred to as host machine) using the PC bus interface cable.
- Turn on the power.
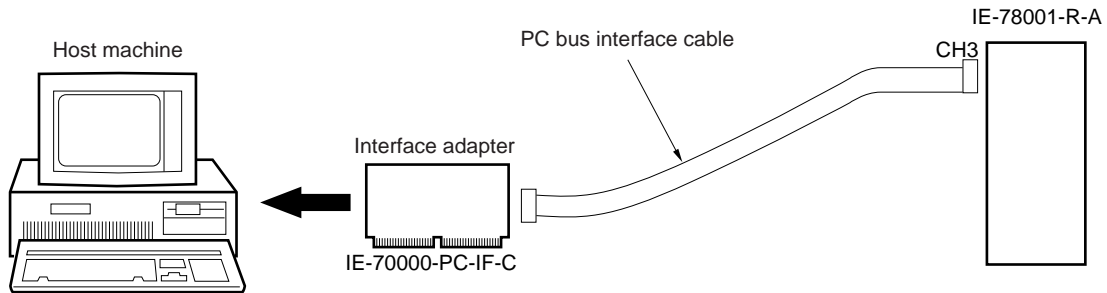
6.5.2 Connection method

(1) Turn off the power
Before connection, turn off the power to each device.

(2) Set the IE-70000-PC-IF-C board
Before using the IE-70000-PC-IF-C, I/O addresses and interrupts must be set. For details of setting the switches on the IE-70000-PC-IF-C, see **5.2 Settings of Interface Adapter for IBM PC/AT or Compatibles (IE-70000-PC-IF-C)**.

(3) Insert the IE-70000-PC-IF-C into an expansion slot in the host machine

(4) Connect the IE-78001-R-A to the host machine

Table 6-4. Cable Connection

IE-78001-R-A	Connecting Cable	Connected to:
CH3	PC bus interface cable	IE-70000-PC-IF-C

(5) Turn on the power

6.5.3 Power-on sequence

Turn on the power in the sequence described below. Turn off the power in the reverse sequence. The sequence of turning on/off the power during operation is the same.

<1> Turn on the power switch of the host machine.
<2> Turn on the power switch of the IE-78001-R-A.
<3> Start Windows and then the integrated debugger. For details on how to start the debugger, refer to the **ID78K0 Integrated Debugger User's Manual**.

Caution   If communication with the IE-78001-R-A cannot be established after starting the integrated debugger, check the following points.

<1> Is the cable between the IE-78001-R-A and host machine connected correctly?
<2> Is the IE-70000-PC-IF-C connected to the host machine correctly?
<3> Are the settings of the IE-70000-PC-IF-C correct?
<4> Do the settings of the IE-70000-PC-IF-C match the settings of the integrated debugger?
<5> Are the jumpers on the emulation board, supervisor board, or trace board set as described in **CHAPTER 4 CLOCK SETTINGS** and **APPENDIX C JUMPER SETTINGS**?
<6> Are the break board, emulation board, and connector board mounted correctly in the specified positions?
<7> If the target system is connected, check that the RESET pin of the target device is not fixed to low level.

If the IE-78001-R-A still cannot be started, contact an NEC sales representative or local distributor.

6.5.4 Power-off sequence

<1> Turn off the power switch of the IE-78001-R-A.
<2> Turn off the power switch of the host machine.

6.6 EWS Connection

Use a network interface to connect an EWS.

6.6.1 General

- Turn off the power.
- If the IE-78001-R-A is connected to Ethernet for the first time, or if the network information has been changed, set the network information according to **CHAPTER 9 SETTING NETWORK INFORMATION**.
- Connect channel 3 of the IE-78001-R-A and Ethernet using the IE-ETHER cable.
- Turn on the power.

Ethernet cable
10Base-5

EWS

IE-ETHER cable

IE-78001-R-A

CH3

CH1

(with expansion board)

IE-78000-R-SV3

RS-232-C interface cable

Terminal (necessary for setting network information by software)
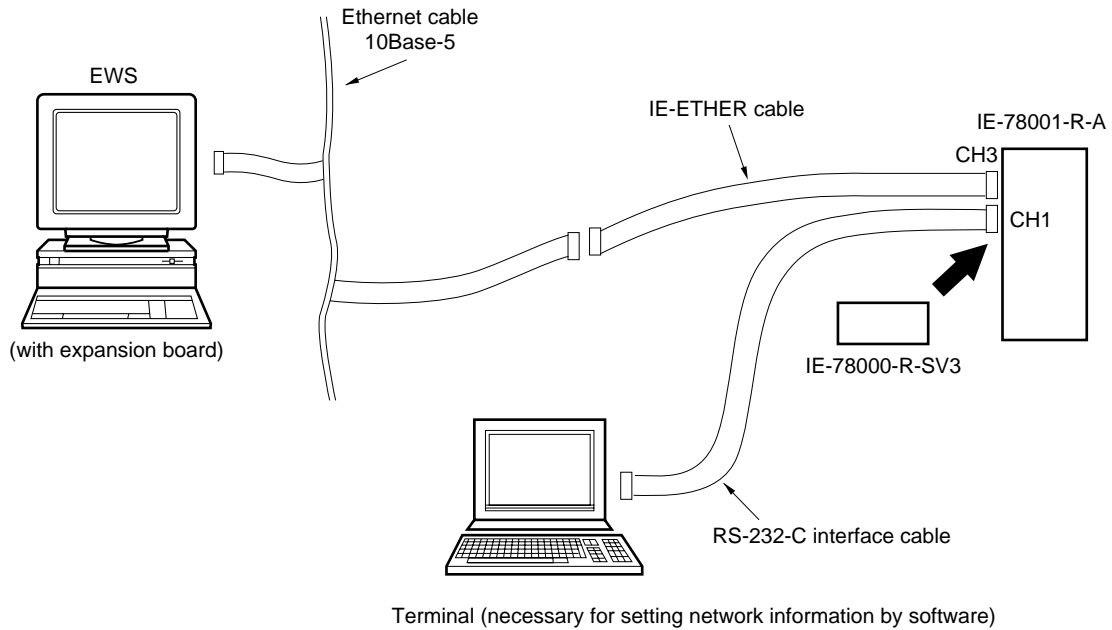
6.6.2 Setting network information (by software)

(1) Turn off the power

(2) Connect the IE-78000-R-SV3 board to the RS-232-C mode setting compartment on the side of the IE-78001-R-A

(3) Connect the IE-ETHER cable to CH3

(4) Connect the terminal to CH1 on the IE-78001-R-A

Table 6-5. Cable Connection

IE-78001-R-A	Connecting Cable	Connected to:
CH1	RS-232-C interface cable	Terminal
CH3	IE-ETHER cable	Ethernet or open

(5) Turn on the power
Turn on the power in the following sequence.

<1> Terminal
<2> IE-78001-R-A

(6) Set the network information
Set the necessary information from the terminal. For details, see **CHAPTER 9   SETTING NETWORK INFORMATION**.

(7) Turn off the power
Turn off the power in the following sequence.

<1> IE-78001-R-A
<2> Terminal

6.6.3 Setting network information (by hardware)

(1) Turn off the power

(2) Connect the IE-78000-R-SV3 board to the RS-232-C mode setting compartment on the side of the IE-78001-R-A

(3) Connect the IE-ETHER cable to CH3

Table 6-6. Cable Connection

IE-78001-R-A	Connecting Cable	Connected to:
CH3	IE-ETHER cable	Ethernet or open

(4) Turn on the power while pressing SW1 of the IE-78000-R-SV3

(5) Set the network information
Set the necessary information by using the switches on the IE-78000-R-SV3. For details, see **CHAPTER 9 SETTING NETWORK INFORMATION**.

(6) Turn off the power

6.6.4 Connection method

(1) Turn off the power
Before starting connection, be sure to turn off the power to the IE-78001-R-A.

(2) Set the network information

(3) Connect the IE-ETHER cable to Ethernet

Table 6-7. Cable Connection

IE-78001-R-A	Connecting Cable	Connected to:
CH3	IE-ETHER cable	Ethernet

(4) Turn on the power

6.6.5 Power-on sequence

Turn on the power in the sequence described below. Turn off the power in the reverse sequence. The sequence of turning on/off the power during operation is the same.

<1> Turn on the power switch of EWS.
<2> Turn on the power switch of the IE-78001-R-A.
<3> Start the integrated debugger. For details on how to start the debugger, refer to the **ID78K0 Integrated Debugger User's Manual**.

Caution If communication with the IE-78001-R-A cannot be established after starting the integrated debugger, check the following points.

<1> Is the cable between the IE-78001-R-A and EWS connected correctly?
<2> Is the IE-78000-R-SV3 connected correctly to the IE-78001-R-A?
<3> Is the setting of the network information correct?

If the IE-78001-R-A still cannot be started, contact an NEC sales representative or local distributor.

6.6.6 Power-off sequence

<1> Turn off the power switch of the IE-78001-R-A.
<2> Turn off the power switch of the EWS.

CHAPTER 7 CONNECTING THE TARGET SYSTEM

This chapter explains how to connect the target system to the emulation probe connected to the IE-78001-R-A. It also explains the handling of latch-up. Be sure to read this chapter before connecting the target system.

Refer to the emulation board user's manual for how to connect the IE-78001-R-A to the emulation probe.

7.1 Connecting Target System

● **Before connection**

- When the user clock is used
  → See **CHAPTER 4 CLOCK SETTINGS**.

- When the user power supply is used (usable when IE-×××-NS-EMn or IE-×××-SL-EMn is connected)
  → See **CHAPTER 3 BREAK BOARD SETTINGS AND CONNECTION**.

- When the emulation probe has not been connected
  → Refer to the emulation board user's manual.

● **Outline of connection**

<1> Connect the target system to the emulation probe.
<2> Connect the target system to the external sense clips (usable when IE-×××-R-EM is connected).

7.1.1 Connecting target system to emulation probe

The following outlines how to connect the target system to the emulation probe. For further connection details, refer to the emulation board user's manual.

<Procedure>

<1> Connect the ground clip of the emulation probe to GND (signal ground) in the CPU socket of the target system. If the ground clip is not connected, the IE-78001-R-A may be damaged by static electricity.
<2> Insert the tip of the emulation probe main unit into the CPU socket of the target system with the pin 1 mark of the emulation probe aligned with pin 1 of the CPU socket. Do not break or bend the pins of the emulation probe.

Phase-out/Discontinued

7.1.2 Connecting target system to external sense clips

The IE-78001-R-A can trace the bus cycle of the target device in real time. It can also trace any eight signal lines in real time using the external sense function. Therefore, eight external sense clips are provided.

Cautions 1. External sense clips are usable only when the IE-xxx-R-EM is connected.

2. Connect the external sense clips only to TTL-level signal lines. If a sense clip is connected to another signal line, the IE-78001-R-A cannot correctly detect the high or low level of the signal. This may damage the sensor of the IE-78001-R-A main unit, depending on the voltage level.

3. Connect the external sense clips to V$_{DD}$ via a pull-up resistor (about 3.3 kΩ) when using them as external data outputs. This is not necessary when using the external sense clips as trigger outputs.

4. Use an IC clip for connecting the external sense clips.

<Procedure>

<1> Turn off the power to the IE-78001-R-A.

<2> Turn off the power to the target system.

<3> Attach an IC clip to the IC to be traced in the target system.

<4> Connect the external sense clips to the IC clip.

Figure 7-1. Connecting External Sense Clips
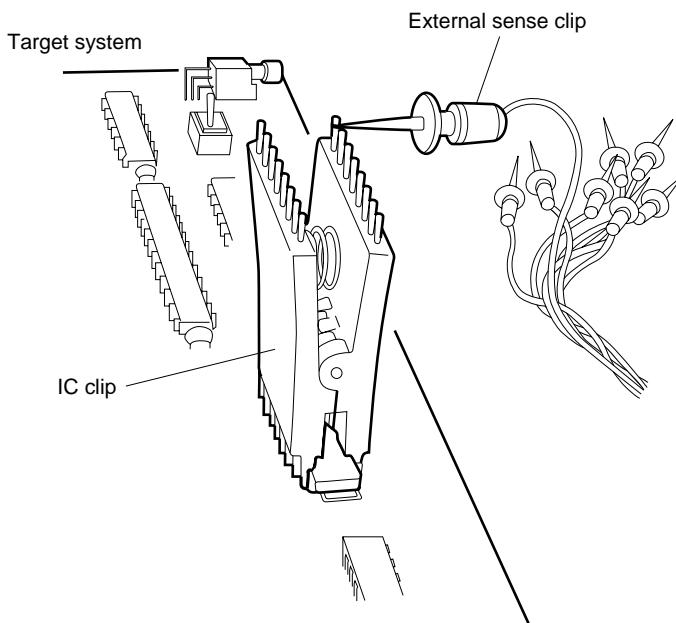
7.2 Power-On/Power-Off Sequence

Turn on and off the power in the following sequence after connecting the target system. For details of how to start up and shut down the IE-78001-R-A, refer to the **ID78K0 Integrated Debugger User's Manual**.

Caution   Turn on and off the power in the correct sequence, otherwise the IE-78001-R-A may operate abnormally or suffer damage.

<Procedure>

● **Power-on sequence**

<1> Turn on the power to the host machine.
<2> Turn on the power to the IE-78001-R-A.
<3> Turn on the power to the target system.
<4> Start up the integrated debugger.

● **Power-off sequence**

<1> Shut down the integrated debugger.
<2> Turn off the power to the target system.
<3> Turn off the power to the IE-78001-R-A.
<4> Turn off the power to the host machine.

7.3 Handling Latch-Up

If latch-up occurs in the emulation device, interface driver, or emulation device peripheral CMOS in the IE-78001-R-A, turn off the power immediately.

- If the IE-78001-R-A detects latch-up, the power to the following devices is automatically turned off.

  - Emulation device
  - Interface driver
  - Emulation device peripheral CMOS
  - Other CMOSs

- In this case, turn off the power immediately.

Caution   Be sure to turn off the power in the correct sequence (see 7.2 Power-On/Power-Off Sequence).

CHAPTER 8 FUNCTIONS OF EACH CHANNEL

This chapter explains in detail the functions of channels 1 and 3 of the IE-78001-R-A.

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

Without reading this chapter, the user can still operate the IE-78001-R-A correctly by connecting with the host machine, using either of the following methods according to **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 a network interface is used. This channel employs an RS-232-C interface. The RS-232-C setting compartment on the side of the IE-78001-R-A contains a switch that sets the mode of channel 1 (CHANNEL1). Located above this compartment is a serial interface port (CH1).

Figure 8-1. Channel 1
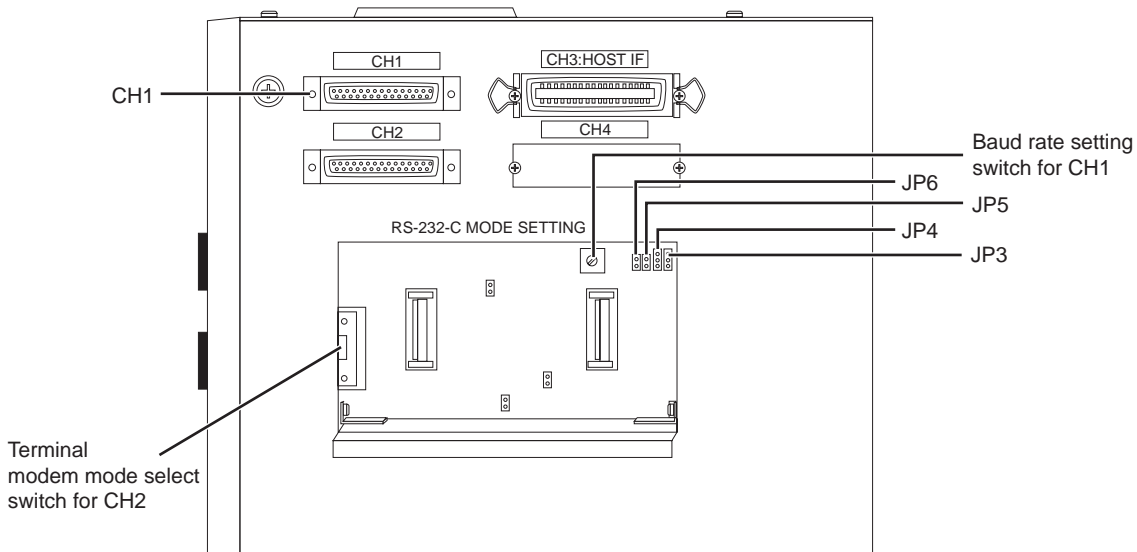
Remark JP3: Selects SG or FG of CH1

JP4: Selects SG or FG of CH2

JP5: Shorted

JP6: Shorted

Phase-out/Discontinued

Channel 1 controls the RS-232-C interface by setting the following five parameters (1) through (5) and sets the 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	Setting Contents	Setting
Mode	Modem mode	Fixed

(2) FG setting

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

(3) Baud rate selection

Parameter	Setting 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	Setting Contents	Setting
Handshake mode	Hardware handshaking used together with software handshaking	Fixed

(5) Character specifications

Parameter	Setting 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) FG setting

The FG select jumper (JP3) is used for the FG setting. 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 connected.

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

Figure 8-2. Circuit Diagram of FG Select Jumper (CH1)
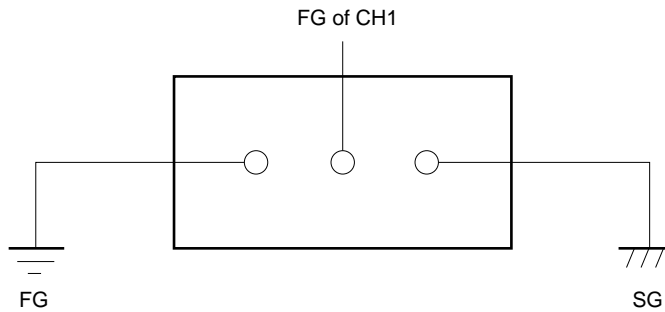
(3) Baud rate selection

It is necessary to set the baud rate of the terminal to the same rate as that of the IE-78001-R-A. To set the baud rate, use the baud rate setting rotary DIP switch.

Figure 8-3. Baud Rate Setting Switch
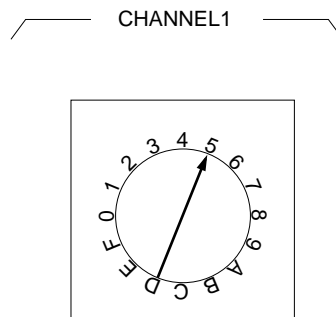
Table 8-1. Baud Rate Setting

Switch	Baud Rate [bps]	Switch	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-78001-R-A is changed. However, the baud rate must be 19200 bps or less.

Phase-out/Discontinued

(4) Handshake mode

Hardware handshaking is established by connecting handshake signals RTS, CTS, DSR, and DTR. When 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 used to transfer data 1 byte at a time via a handshake signal. This is called single-character handshaking. Software handshaking does not allow byte-by-byte handshaking, but allows block-by-block handshaking. This is called flow control.

The IE-78001-R-A automatically adjusts its hardware by using each handshake signal so that no data overlaps during handshaking. For example, when the buffer becomes full, the IE-78001-R-A controls the CTS signal and completely stops data transfer. Therefore, no data is lost as long as the handshake signals are connected. When the handshake signals are not connected, however, only software handshaking is executed, and data can be lost.

(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-78001-R-A and host machine, and loads object files.

Figure 8-4. Channel 3
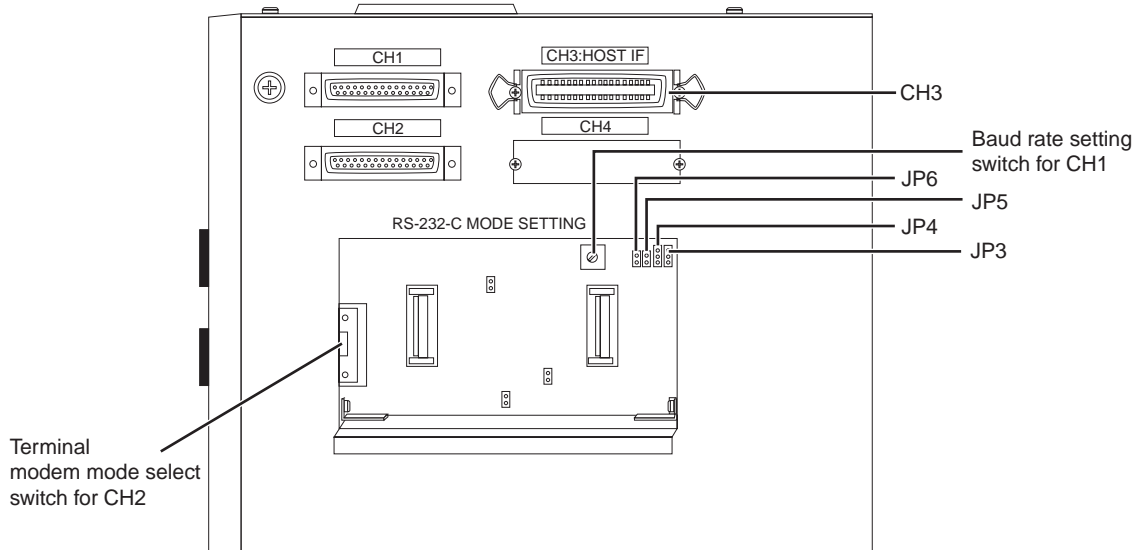
Remark   JP3: Selects SG or FG of CH1
JP4: Selects SG or FG of CH2
JP5: Shorted
JP6: Shorted

CHAPTER 9 SETTING NETWORK INFORMATION

This chapter describes how to set the network information necessary for implementing network interfacing.

The network information is written to the EEPROM^{TM} on the IE-78000-R-SV3. Once set, therefore, the information is retained even if the 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 (PC, etc.)	All information	See 9.2.	All information can be set/ A terminal is necessary.
Setting by hardware	Unnecessary	Only IP address and port numbers	See 9.5.	A terminal is not necessary/ Not all information can 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-78001-R-A and terminal using the RS-232-C cable supplied as an accessory (for the setting of RS-232-C, see Table 9-1).

<3> Connect the IE-ETHER cable included with the IE-78000-R-SV3 to channel 3 on the IE-78001-R-A (the other side of the cable may be left open).

<4> When the power is turned on, the menu shown in Figure 9-1 will be displayed.

Table 9-1. Setting of RS-232-C (Factory-Set Conditions)

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

Figure 9-1. Menu Screen

```
IE-SV  VX. XX [XX/XX/XX]

- - - SETUP  NETWORK  INFORMATION - - - - - - - - - - - - - - - - - - - -

         1. LOCAL   ETHERNET  ADDRESS    XXXXXXXXXXXX

         2. LOCAL   IP  ADDRESS          XXXXXXXX

         3. LOCAL   HOST  NAME           XXXXXXXXXXXXXXXX

         4. LOCAL   PORT  NO.            XXXX

         5. REMOTE  ETHERNET  ADDRESS    XXXXXXXXXXXX

         6. REMOTE  IP  ADDRESS          XXXXXXXX

         7. REMOTE  HOST  NAME           XXXXXXXXXXXXXXXX

         8. REMOTE  PORT  NO.            XXXX

         9. ROUTER  ADDRESS              XXXXXXXX

        10. SUBNET  ADDRESS MASK         XXXXXXXX

        11. EXIT

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

        FUNCTION  NO.  > XX
```

9.2.2 Operation

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

```
FUNCTION NO.  >  □□
```

Input a parameter number, 1 to 11, in □□ and press the return key (↓).
Parameter "1" is for display only and cannot be changed.

```
- - -  SETUP  NETWORK  INFORMATION  - - - - - - - - - - - - - - - - - - - - -
          1. LOCAL    ETHERNET  ADDRESS    XXXXXXXXXXXX          ...  (1)

          2. LOCAL    IP  ADDRESS          XXXXXXXX              ...  (2)

          3. LOCAL    HOST   NAME          XXXXXXXXXXXXXXXX      ...  (3)

          4. LOCAL    PORT   NO.           XXXX                  ...  (4)

          5. REMOTE   ETHERNET  ADDRESS    XXXXXXXXXXXX          ...  (5)

          6. REMOTE   IP  ADDRESS          XXXXXXXX              ...  (6)

          7. REMOTE   HOST   NAME          XXXXXXXXXXXXXXXX      ...  (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 local station. This parameter is for display only and cannot be set.

(2) LOCAL IP ADDRESS

Sets the IP address of the local 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 in □□.

(3) LOCAL HOST NAME

Sets the host name of the local 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 in □□.
```

(4) LOCAL PORT NO.

Sets the port number of the local 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 in □□.
```

(5) REMOTE ETHERNET ADDRESS

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

```
<1> REMOTE ETHERNET ADDRESS             >XXXXXXXXXXXX
```
                                          XX is currently set.
```
<2> NEW REMOTE ETHERNET ADDRESS         >□□□□□□□□□□□□↓
```
                                        Set the new value in □□.
                                        If the current address is not changed, only input ↓.

(6) REMOTE IP ADDRESS

Sets the IP address of a remote 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 in □□.
                                        If the current address is not changed, only input ↓.

(7) REMOTE HOST NAME

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

If the remote station is not specified, input ↓.

```
<1> REMOTE HOST NAME                 >XXXX      XX is currently set.
<2> NEW REMOTE HOST NAME             >□□□□↓     Set the new value in □□.
```

(8) REMOTE PORT NO.

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

If the remote station is not specified, input 0.

```
<1> REMOTE PORT NO.                  >XXXX      XX is currently set.
<2> NEW REMOTE PORT NO.              >□□□□↓     Set the new value in □□.
```

(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               >□□□□□□□□↓
                                     Set the new value in □□.
```

(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          >□□□□□□□□↓
                                     Set the new value in □□.
```

(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 setting ends.

If Q or q is input, the set information is not written to the EEPROM, and setting ends.

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 to FFFFFFFFFFFF	00004C80XXXX
2	LOCAL IP ADDRESS	Hexadecimal	8	0 to FFFFFFFF	C00101FE
3	LOCAL HOST NAME	Alphanumeric	16	−	IESV3
4	LOCAL PORT NO.	Hexadecimal	4	1 to FFFF	1000
5	REMOTE ETHERNET ADDRESS	Hexadecimal	12	0 to FFFFFFFFFFFF	FFFFFFFFFFFF
6	REMOTE IP ADDRESS	Hexadecimal	8	0 to FFFFFFFF	00000000
7	REMOTE HOST NAME	Alphanumeric	16	−	−
8	REMOTE PORT NO.	Hexadecimal	4	0 to FFFF	0000
9	ROUTER ADDRESS	Hexadecimal	8	0 to FFFFFFFF	00000000
10	SUBNET ADDRESS MASK	Hexadecimal	8	0 to FFFFFFFF	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

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

(2) LOCAL IP ADDRESS

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

(3) LOCAL HOST NAME

This value indicates the host name of the local station.

(4) LOCAL PORT NO.

This value indicates the port number of the local 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

This value indicates the Ethernet address of a remote station. This address must be set to specify a remote station. If the Ethernet address of the remote station is not known, set FFFFFFFFFFFF.

(6) REMOTE IP ADDRESS

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

(7) REMOTE HOST NAME

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

(8) REMOTE PORT NO.

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

(9) ROUTER ADDRESS

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

(10) SUBNET ADDRESS MASK

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

Phase-out/Discontinued

9.5 Setting by Hardware

Of the network information, the IP address (LOCAL IP ADDRESS) and port number (LOCAL PORT NO.) can be set 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 included with the IE-78000-R-SV3 to channel 3 on the IE-78001-R-A (the other side of the cable may be open).

<3> Turn on the power while holding SW1 (push-button switch) on the IE-78000-R-SV3. LED1 and LED2 will blink twice (the network information setting mode is set).
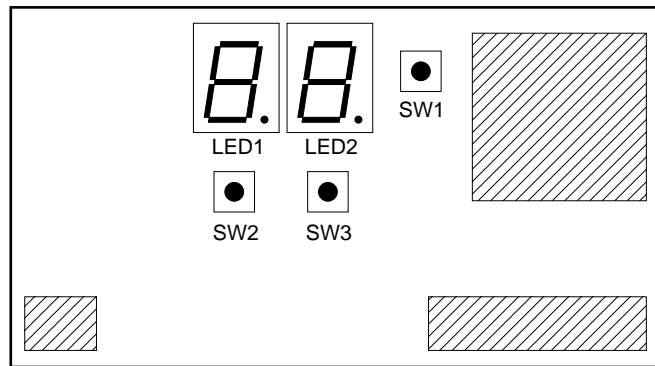
IE-78000-R-SV3

<4> Perform settings according to the following flowchart.

<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)

  IP address   #31-28   #27-24   #23-20   #19-16   #15-12   #11-8   #7-4   #3-0
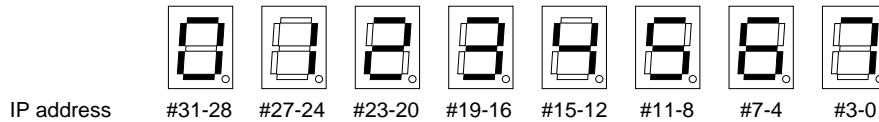
  <2> Indication of LED1 (with decimal point lighting)

  Port No.   #15-12   #11-8   #7-4   #3-0
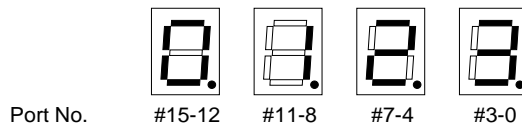
- **LED2**

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

- **SW1**

  <1> Sets the network information setting mode when the 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 twice.)

- **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)
  $\rightarrow 0 \rightarrow 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow 7 \rightarrow 0. \rightarrow 1. \rightarrow 2. \rightarrow 3.$

- **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)
  $\rightarrow 0 \rightarrow 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow 7 \rightarrow 8 \rightarrow 9 \rightarrow A \rightarrow B \rightarrow C \rightarrow D \rightarrow E \rightarrow F$

Figure 9-2. Network Information Setting Flow

<Example of setting>
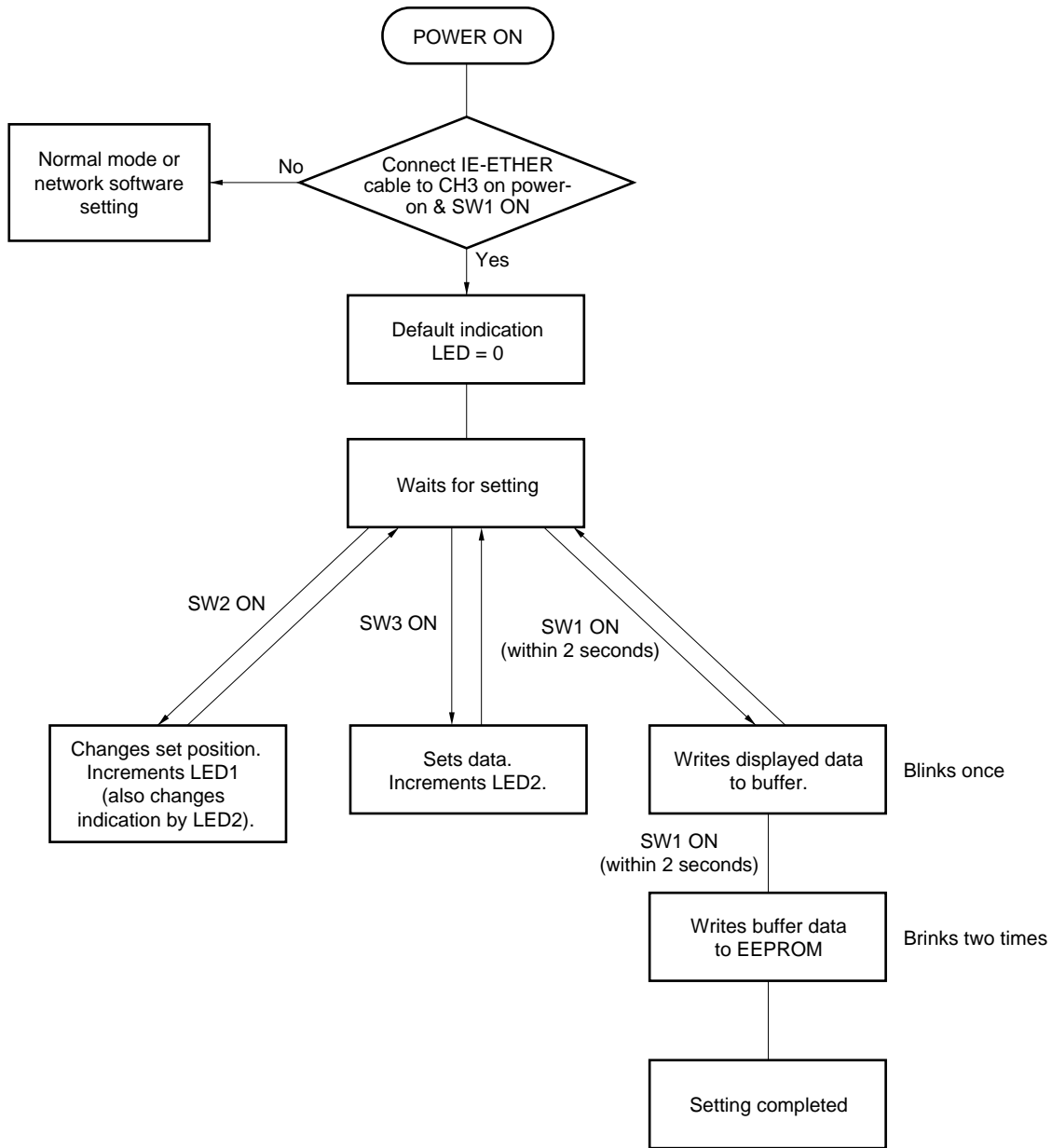
Here is a setting example:

IP address   =   12xxxxxxH
Port No.   =   xxx4H

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

Turn on the power while holding down SW1 with IE-ETHER cable connected to CH3.	0 C	Displays current data value after blinking.
Press SW3 once.	0 d	Data is incremented to D.
Press SW3 and display 1 on LED2.	0 1	Displays data to be set.
Press SW1 once.	0 1	Blinks once (data is stored to buffer).
Press SW2 once.	1 0	Pointer is incremented.
Press SW3 and increment indication on LED2 to 2.	1 2	Displays data to be set.
Press SW1 once.	1 2	Blinks once (data is stored to buffer).

These operations are repeated to store the data to be set to the buffer sequentially.

| Press SW1 once. | 3. 4 | All data has been completely written to buffer. |
| Hold down SW1 for 2 seconds or longer. | 8. 8. | Blinks twice and then goes off (buffer contents are written to EEPROM). |

The stored data can be checked by pressing SW2 successively.

APPENDIX A SPECIFICATIONS

This appendix describes the IE-78001-R-A specifications. The specifications are divided into two categories: product specifications (including external dimensions and electrical specifications) and debugger specifications.

Phase-out/Discontinued

● **Product specifications**

External dimensions	Length: 370 mm
	Width: 160 mm
	Height: 283 mm

Weight   8.5 kg

Input voltage   85 to 132 V AC or 170 to 265 V AC (automatic input switching)

Current   100 V AC
                           50/60 Hz
                           3 A

Operating temperature $0°C$ to $50°C$

Storage temperature $-20°C$ to $+60°C$

Ambient humidity   20% to 80% RH

- **Basic debugger specifications**

  - **Applicable devices**
    - 78K/0 Series
    - 178K Series
      (The emulation board corresponding to the device is needed)

  - **Operating frequency** Up to 20 MHz (factory setting: 8.38 MHz)

  - **Clock supply** Crystal oscillator in IE-78001-R-A (clock can be supplied from the target system)

  - **Memory**
    - Alternate memory capacity   Internal ROM
      Expansion memory   } 64 KB
      Internal RAM

    - Mapping unit   Internal ROM: In units of 8 KB
      Expansion memory: In units of 4 KB
      Internal RAM: In units of 128 bytes

  - **Event detection**
    - Access detection: 4 points (address/data/status/external signal level)
    - Program execution detection: 7-point parallel (address/external signal level)
      4-level sequential (address/external signal level)
    - External signal level: 8 bits (set by ANDing access detection and program execution function)
    - Number of events: 1 to 255

  - **Break function and cause of break**
    - Event detection: Access detection: Address
      Data
      Status
      External signal data
      Fetch detection: 4-point parallel fetch
      4-level sequential fetch

    - Fail-safe breaks: Manual break
      Non-map break
      Write-protect break
      SFR illegal access break
      System stack overflow break
      User stack overflow break

  - **Real-time trace**
    - Cause of trace   Total trace or triggered by event detection
    - Trace capacity   80 bits × 32K steps
    - Trace contents   Fetch bus (16 bits), access bus (16 bits), data (8 bits), status (9 types), external sense data
      (8 bits)

- **Target interface**
  - Emulation probe (sold separately)
  - The power supply voltage (V$_{DD}$) of the target system depends on the emulation board.

- **External interface**
  - RS-232-C   CH1:   For setting network information
  - PC bus interface   CH3:   For connecting host machine
  - Network interface   CH3:   For connecting host machine
                        (Conforms to IEEE802.3. Compatible with Ethernet: 10Base-5)

- **Host machine**   PC-9800 series
                   PC98-NX series
                   IBM PC/AT compatibles
                   EWS

- **Integrated debugger**
  - ID78K0

- **Device file**
  - DF178×××
  - DF780×××

- **Language processing program**
  - Relocatable assembler   RA78K0
  - C compiler   CC78K0
  - C compiler library source file   CC78K0-L

- **Other**
  - Support of standby functions
  - On-chip latch-up protection circuit
  - Trace display and event detection setting modification during emulation CPU operation

APPENDIX B BLOCK DIAGRAMS

This appendix provides the block diagrams of the supervisor board, trace board, and driver module, which represent key functions of the IE-78001-R-A.

B.1 Supervisor Board Block

- **Driver control**

  Interfaces the driver module.

- **Serial interface**

  One channel of an RS-232-C interface is provided.
  This interface channel is used to set network information.

- **RAM**

  768 KB memory with symbol and program work areas

- **ROM**

  512 KB ROM storing the program that starts the IE-78001-R-A

- **PC bus interface**

  One dedicated parallel interface channel that can be used when a dedicated interface board is connected to the expansion bus of PC (PC-9800 series, PC98-NX series, or IBM PC/AT) is provided (the connector is also used to connect the network interface).

- **Network interface**

  One network interface channel (supporting Ethernet) conforming to IEEE802.3 is provided (the connector is also used to connect the PC bus interface). To use the network interface, network board (sold separately) is needed.

Figure B-1. Block Diagram of Supervisor Board

To the trace board
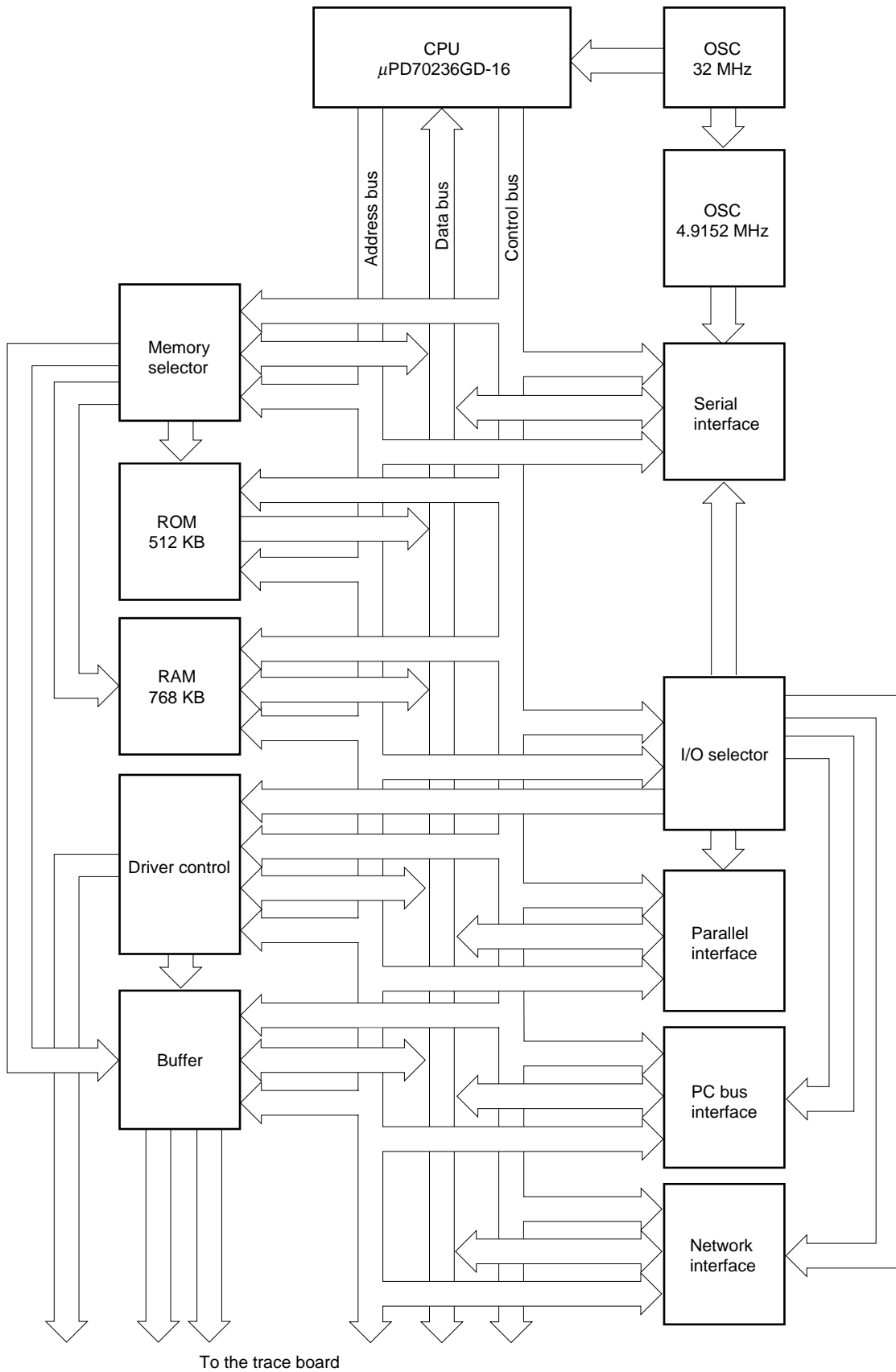
B.2 Trace Board Block

- **Trace RAM**

  A 128 KB trace RAM is included to enable holding of trace data (for 32K steps).

Figure B-2. Block Diagram of Trace Board
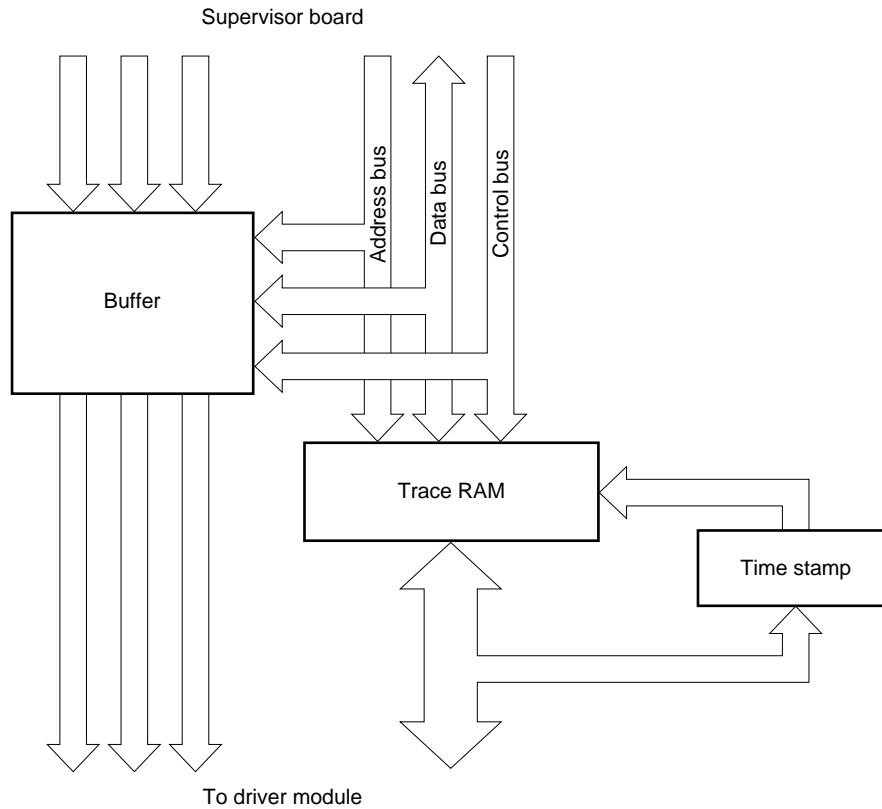
B.3 Driver Module Block

● **Event control**

This controls the wide variety of event detection functions available with the IE-78001-R-A.

● **Break control**

This controls the wide variety of break functions provided by the IE-78001-R-A. Many different break conditions can be set by a combination of event conditions.

● **Trace control**

This controls the trace conditions. The IE-78001-R-A has a trace function with a capacity of 32K words by 80 bits for storing the CPU execution status. Many different trace conditions can be set by a combination of event conditions.

● **Latch-up**

When a latch-up occurs with an emulation device or peripheral CMOS-TTL, this section stop the supply of power to the emulation device, CMOS around the emulation device, and TTL preceding the CMOS.

● **Alternate memory**

This memory is used to control basic operations when a break occurs in the emulation device.

● **Emulation memory**

This memory is a 64 KB alternate memory that can be accessed by the target device. Even when a target system is not completed, software can be debugged using this memory. By using the mapping function, memory from 0 to 64 KB can be allocated to internal ROM in 8 KB units, and to user memory in 4 KB units.

● **Fail-safe control**

This circuit protects memory and the SFR read-only area.

Figure B-3. Block Diagram of Driver Module
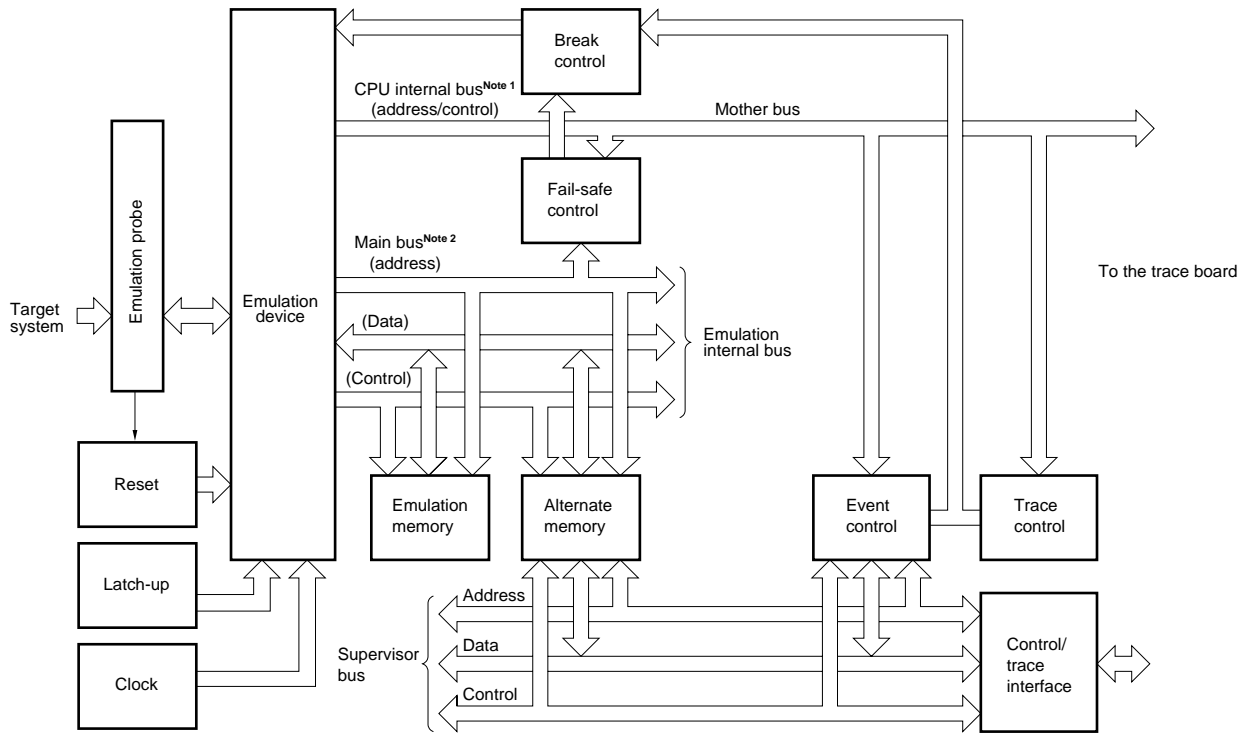
Notes 1. CPU internal bus: Bus for accessing data in the CPU internal RAM and SFR
      2. Main bus: Bus for fetching programs into and accessing data in the internal ROM or expansion memory

APPENDIX C JUMPER SETTINGS

This appendix explains the factory-set conditions of the jumpers on the supervisor board (IE-78000-R-SV2) and trace board (IE-78000-R-TR). Usually, the user need not modify the settings.

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 Settings (Factory-Set Conditions)

Board	Jumper No.	Setting
Supervisor board (parts 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 monitor ROM mounted (equivalent to μPD27C1024/ μPD27C4096). The supervisor board does not operate correctly if the factory-set conditions are 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.

Phase-out/Discontinued

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

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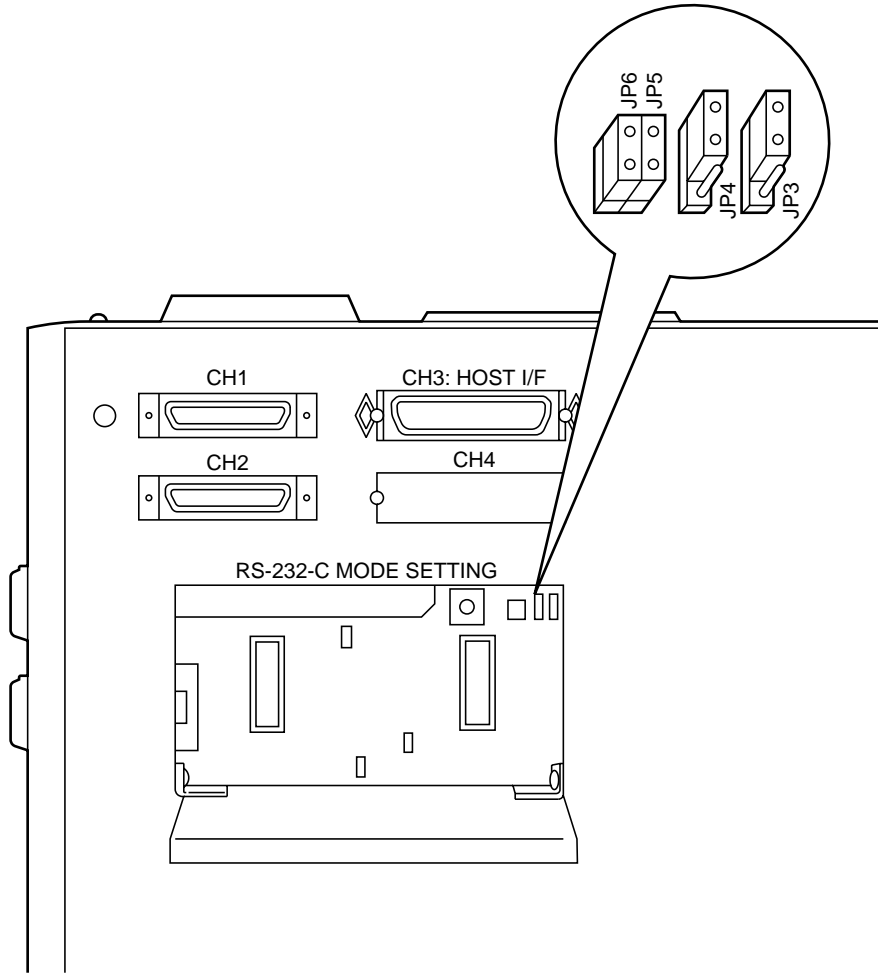
Figure C-1. Locations of Jumpers on IE-78000-R-SV2 Board (2/2)

Parts side
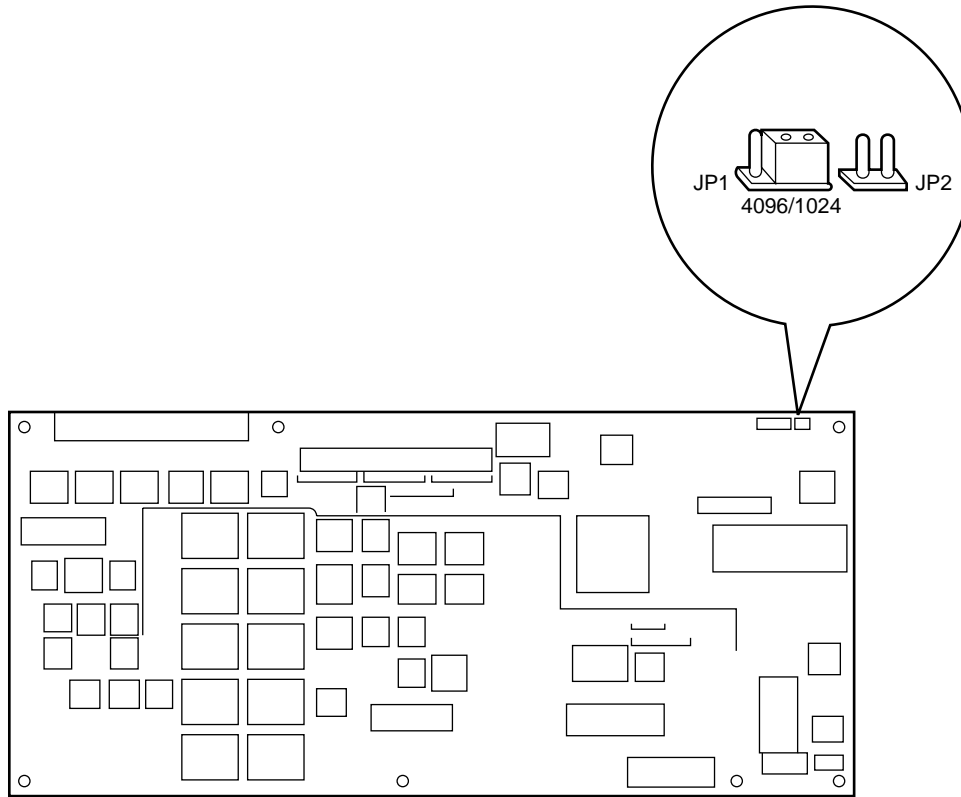
C.2 Setting Jumper on Trace Board

The factory-set conditions of the jumper on the trace board (IE-78000-R-TR) are as follows.

Table C-2. Jumper Setting (Factory-Set Conditions)

Board	Jumper No.	Setting
Trace board	JP3	Open

Caution   If the factory-set conditions of the jumper are changed, the trace board does not operate correctly. Do not change the factory-set conditions of the jumper, because they do not have to be changed for ordinary use.

Figure C-2. Location of Jumper on IE-78000-R-TR Board

Parts side
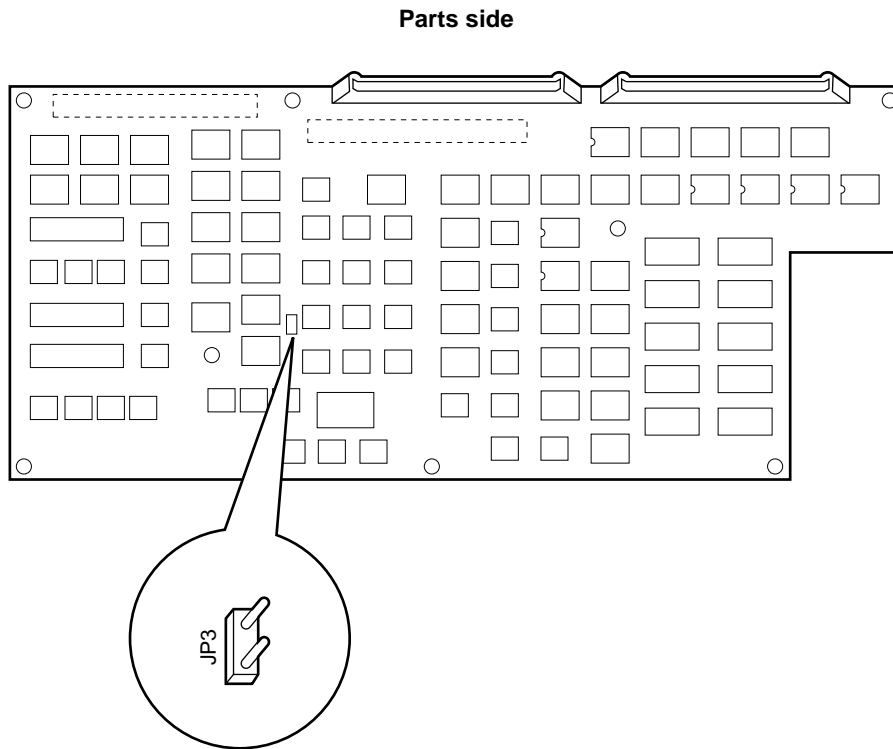
APPENDIX D SYSTEM CONFIGURATION

This appendix shows the system configuration of the IE-78001-R-A.

For the system configuration of each device, refer to the **Single-chip Microcontroller Development Tool Selection Guide (U11069E)**.

- **Support of PC98-NX Series**

  Unless otherwise stated, tools supported by IBM PC/AT compatibles can be used for the PC98-NX Series. When using the PC98-NX Series, refer to the descriptions of IBM PC/AT compatibles.

- **Windows**

  Unless otherwise stated, "Windows" indicates the following OSs.
  - Microsoft Windows Version 3.1
  - Microsoft Windows 95
  - Microsoft Windows NT Version 4.0

Figure D-1. Development Tool Configuration
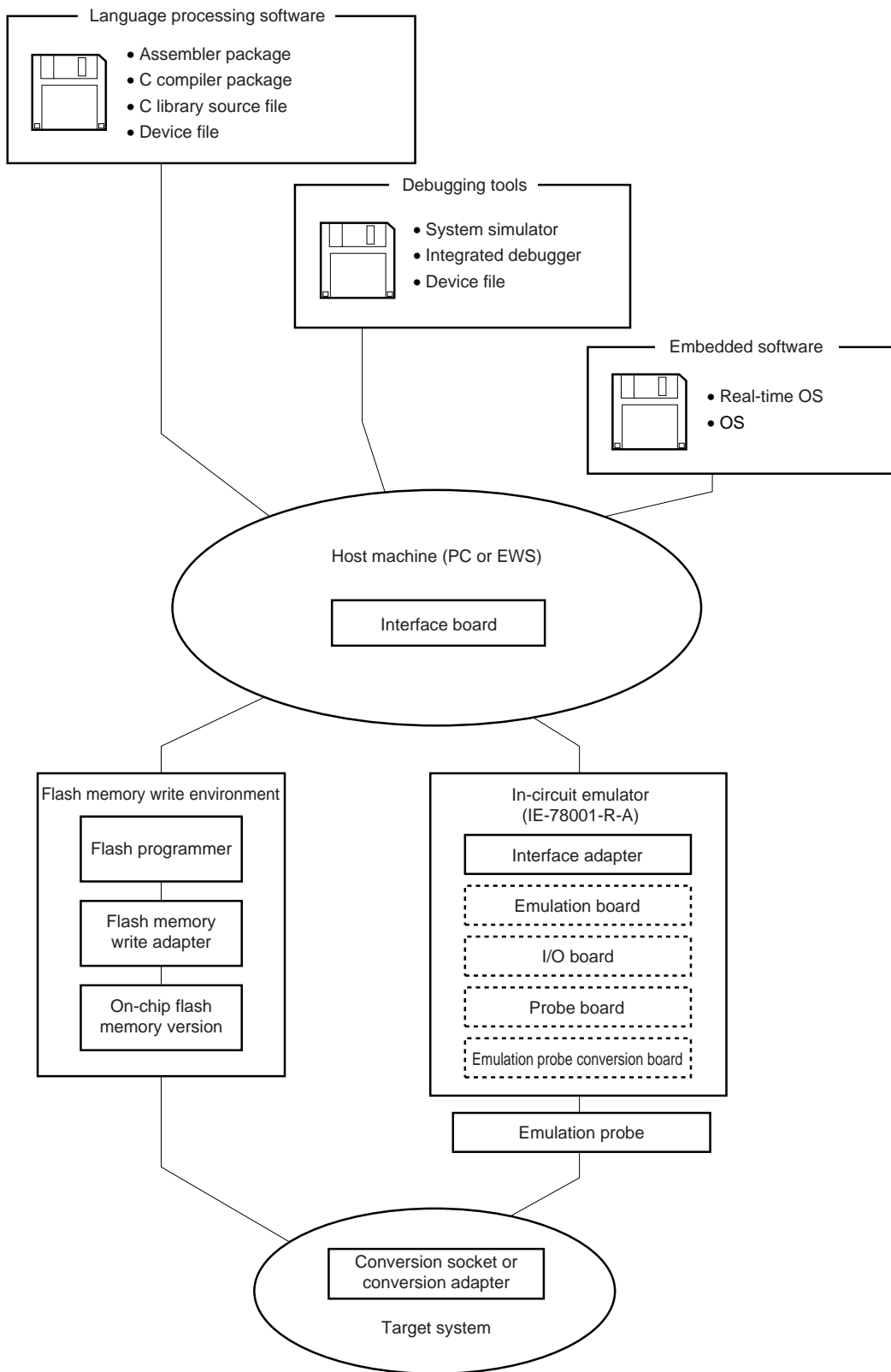
Remark Items enclosed in the broken lines differ depending on the development environment.

D.1 Debugging Tools

D.1.1 Hardware tools

For details of the system configuration of each device, refer to the **Single-chip Microcontroller Development Tool Selection Guide (U11069E)**.

IE-78001-R-A In-circuit Emulator	The in-circuit emulator serves to debug hardware and software when developing application systems using a 78K/0 Series product. It corresponds to the integrated debugger (ID78K0). This emulator should be used in combination with an emulation board, emulation probe, and interface adapter, which is required to connect this emulator to the host machine.
IE-70000-PCI-IF(-A) Interface Adapter	This adapter is required when using a PC with a PCI bus as the IE-78001-R-A host machine.
IE-70000-PC-IF-C Interface Adapter	This adapter is required when using an IBM PC/AT or compatible as the IE-78001-R-A host machine (ISA bus supported).
IE-70000-98-IF-C Interface Adapter	This adapter is required when using a PC-9800 Series computer (except notebook type) as the IE-78001-R-A host machine (C bus supported).
IE-78000-R-SV3 Interface Adapter	This is the adapter and cable required when using an EWS computer as the IE-78001-R-A host machine, and is used connected to the board in the IE-78001-R-A. 10Base-5 is the Ethernet standard supported as the access method. For other methods, a commercially available conversion adapter is required.
IE-××××-R-EM×, IE-××××-NS-EM×, IE-××××-SL-EM× Emulation Board	This board emulates the operations of the peripheral hardware peculiar to a device. It should be used in combination with an in-circuit emulator and emulation probe conversion board.
IE-78K0-R-EX× Emulation Probe Conversion Board	This board is required when using the IE-××××-NS-EM× on the IE-78001-R-A.
IE-78K0-NS-P0×, IE-78K0-SL-P01 I/O Board	This board is required when using the IE-××××-NS-EM4, IE-××××-SL-EM4 on the IE-78001-R-A.
EP-××××-R, EP-××××-SL Emulation Probe	This probe is used to connect the in-circuit emulator to the target system. Use the device that complies with the package used.
EV-××××-×× Conversion Socket	This conversion socket connects the emulation probe to the target system board.
TG×-×××× Conversion Adapter	This conversion adapter connects the emulation probe to the target system board.

D.1.2 Software tools

SM78K0 System Simulator	The system simulator used for the 78K/0 Series. This system simulator is used to perform debugging at C source level or assembler level while simulating the operation of the target system on a host machine. This simulator runs on Windows. Use of the SM78K0 allows the execution of application logic testing and performance testing on an independent basis from hardware development without having to use an in-circuit emulator, thereby providing higher development efficiency and software quality. The SM78K0 should be used in combination with a device file (sold separately).
	Part number: μS××××SM78K0
ID78K0 Integrated Debugger	The integrated debugger for the IE-78001-R-A. This debugger is a control program to debug 78K/0 Series microcontrollers. It adopts a graphical user interface, which is equivalent visually and operationally to Windows or OSF/Motif™. It also has an enhanced debugging function for C language programs, and thus trace results can be displayed on screen at the C-language level by using the window integration function, which links a trace result with its source program, disassembled display, and memory display. In addition, by incorporating function expansion modules such as a task debugger and system performance analyzer, the efficiency of debugging programs that run on real-time OSs can be improved. This debugger should be used in combination with a device file (sold separately).
	Part number: μS××××ID78K0
DFΔΔΔΔ**Note** Device file	This file contains information peculiar to the device. This device file should be used in combination with a tool (SM78K0, ID78K0, ID78K0-NS, RA78K0, and CC78K0) (sold separately). The corresponding OS and host machine differs depending on the tool to be used.
	Part number: μS××××DFΔΔΔΔ

Note   The device file can be used in common with the SM78K0, ID78K0, ID78K0-NS, RA78K0, and CC78K0.

Phase-out/Discontinued

Remark ××× in the part number differs depending on the host machine and OS used.

μS××××SM78K0

××××	Host Machine	OS	Supply Medium
AA13	PC-9800 Series	Windows (Japanese version)	3.5-inch 2HD FD
AB13	IBM PC/AT and compatibles	Windows (Japanese version)	3.5-inch 2HC FD
BB13		Windows (English version)	

μS××××ID78K0

μS××××DF$\Delta\Delta\Delta$

××××	Host Machine	OS	Supply Medium
AA13	PC-9800 Series	Windows (Japanese version)	3.5-inch 2HD FD
AB13	IBM PC/AT and compatibles	Windows (Japanese version)	3.5-inch 2HC FD
BB13		Windows (English version)	
3P16	HP9000 Series 700^{TM}	HP-UX^{TM} (Rel.10.10)	DAT (DDS)
3K13	SPARCstation^{TM}	SunOS^{TM} (Rel.4.1.4)	3.5-inch 2HC FD
3K15		Solaris^{TM} (Rel.2.5.1)	1/4-inch CGMT
3R13	NEWS^{TM} (RISC)	NEWS-OS^{TM} (Rel.6.1)	3.5-inch 2HC FD

Phase-out/Discontinued

D.2 Language Processing Software

RA78K0 Assembler Package	This assembler converts programs written in mnemonics into object codes executable by a microcontroller. Further, this assembler is provided with functions that enable the automatic creation of symbol tables and branch instruction optimization. This assembler should be used in combination with a device file (sold separately). <Precaution when using RA78K0 in PC environment> This assembler package is a DOS-based application. It can also be used in Windows, however, by using the Project Manager (included in assembler package) in Windows.
	Part number: μS$\times\times\times\times$RA78K0
CC78K0 C Compiler Package	This compiler converts programs written in C language into object codes executable by a microcontroller. This compiler should be used in combination with an assembler package and device file (both sold separately). <Precaution when using CC78K0 in PC environment> This C compiler package is a DOS-based application. It can also be used in Windows, however, by using the Project Manager (included in assembler package) in Windows.
	Part number: μS$\times\times\times\times$CC78K0
CC78K0-L C Library Source File	This is a source file of functions comprising the object library included in the C compiler package. This file is required in order to match the object library included in the C compiler package to the customer's specifications. The operating environment does not depend on the OS because this is a source file.
	Part number: μS$\times\times\times\times$CC78K0-L

Remark $\times\times\times\times$ in the part number differs depending on the host machine and OS used.

μS$\times\times\times\times$RA78K0
μS$\times\times\times\times$CC78K0
μS$\underline{\times\times\times\times}$CC78K0-L

$\times\times\times\times$	Host Machine	OS	Supply Medium
AA13	PC-9800 Series	Windows (Japanese version)[Note]	3.5-inch 2HD FD
AB13	IBM PC/AT and compatibles	Windows (Japanese version)[Note]	3.5-inch 2HC FD
BB13		Windows (English version)[Note]	
3P16	HP9000 Series 700	HP-UX (Rel.10.10)	DAT (DDS)
3K13	SPARCstation	SunOS (Rel.4.1.4)	3.5-inch 2HC FD
3K15		Solaris (Rel.2.5.1)	1/4-inch CGMT
3R13	NEWS (RISC)	NEWS-OS (Rel.6.1)	3.5-inch 2HC FD

Note   Can also be operated in a DOS environment.

D.3 Flash Memory Writing Tools

Flashpro III (type FL-PR3, PG-FP3) Flash Programmer	Flash programmer dedicated to microcontrollers with on-chip flash memory.
FA-×××× Flash Memory Writing Adapter	Flash memory writing adapter used connected to Flashpro III.
Flashpro III controller	A program that enables control of the flash programmer from a PC. Supplied with Flashpro III.

Remark Flashpro× and FA-×××× are products made by Naito Densei Machida Mfg. Co., Ltd.
For further information, contact Naito Densei Machida Mfg. Co., Ltd. (+81-45-475-4191).

Phase-out/Discontinued

D.4 Embedded Software

For efficient development and maintenance of the program, the following embedded software is available.

Real-time OS (1/2)

RX78K/0 Real-time OS	RX78K/0 is a real-time OS conforming to μITRON specifications. A tool (configurator) for generating the nucleus of the RX78K/0 and multiple information tables is supplied. This OS should be used in combination with an assembler package (RA78K/0) and device file (both sold separately). <Precaution when using RX78K/0 in PC environment> This real-time OS is a DOS-based application. It should be used from the DOS prompt when using in Windows.
	Part number: μS$\times\times\times\times$RX*****-$\Delta\Delta\Delta\Delta$

Caution   **When purchasing the RX78K/0, fill in the purchase application form in advance and sign the User Agreement.**

Remark $\times\times\times\times$ and $\Delta\Delta\Delta\Delta$ in the part number differ depending on the host machine and OS used.

μS$\underline{\times\times\times\times}$RX*****-$\underline{\Delta\Delta\Delta\Delta}$

$\Delta\Delta\Delta\Delta$	Product Outline	Maximum Number for Use in Mass Production
001	Evaluation object	Do not use for mass-produced product.
100K	Mass-production object	0.1 million units
001M		1 million units
010M		10 million units
S01	Source program	Source program for mass-produced object

$\times\times\times\times$	Host Machine	OS	Supply Medium
AA13	PC-9800 Series	Windows (Japanese version)[Note]	3.5-inch 2HD FD
AB13	IBM PC/AT and compatibles	Windows (Japanese version)[Note]	3.5-inch 2HC FD
BB13		Windows (English version)[Note]	
3P16	HP9000 Series 700	HP-UX (Rel.10.10)	DAT (DDS)
3K13	SPARCstation	SunOS (Rel.4.1.4)	3.5-inch 2HC FD
3K15		Solaris (Rel.2.5.1)	1/4-inch CGMT
3R13	NEWS (RISC)	NEWS-OS (Rel.6.1)	3.5-inch 2HC FD

Note   Can also be operated in a DOS environment.

Phase-out/Discontinued

Real-Time OS (2/2)

MX78K0 OS	MX78K0 is an OS for μITRON-specification subsets. A nucleus for the MX78K0 is also included as a companion product. This manages tasks, events, and time. In task management, determining the task execution order and switching from one task to the next task are performed. <Precaution when using MX78K0 in PC environment> The MX78K0 is a DOS-based application. It should be used from the DOS prompt when using in Windows.
	Part number: μS××××MX78K0-$\Delta\Delta\Delta$

Remark ×××× and $\Delta\Delta\Delta$ in the part number differ depending on the host machine and OS used.

μS<u>××××</u>MX78K0-<u>$\Delta\Delta\Delta$</u>

$\Delta\Delta\Delta$	Product Outline	Maximum Number for Use in Mass Production
001	Evaluation object	Use in preproduction stages.
XX	Mass-production object	Use in mass production stages.
S01	Source program	Only users who purchased mass-production objects are able to purchase this program.

××××	Host Machine	OS	Supply Medium
AA13	PC-9800 Series	Windows (Japanese version)[Note]	3.5-inch 2HD FD
AB13	IBM PC/AT and compatibles	Windows (Japanese version)[Note]	3.5-inch 2HC FD
BB13		Windows (English version)[Note]	
3P16	HP9000 Series 700	HP-UX (Rel.10.10)	DAT (DDS)
3K13	SPARCstation	SunOS (Rel.4.1.4)	3.5-inch 2HC FD
3K15		Solaris (Rel.2.5.1)	1/4-inch CGMT
3R13	NEWS (RISC)	NEWS-OS (Rel.6.1)	3.5-inch 2HC FD

Note Can also be operated in a DOS environment.

D.5 Upgrading from IE-78000-R-A to IE-78001-R-A

If you already have the IE-78000-R-A, operation equivalent to the IE-78001-R-A can be obtained by replacing the internal break board with the IE-78001-R-BK.

Table D-1. Upgrading from Former In-Circuit Emulator for 78K/0 Series to IE-78001-R-A

Current In-Circuit Emulator	Products to Be Purchased
IE-78000-R	IE-78001-R-A**Note**
IE-78000-R-A	IE-78001-R-BK

Note It is necessary to purchase the IE-78001-R-A if you currently have the IE-78000-R.

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