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USER'S MANUAL

RENESAS

Phase-out/Discontinued

IE-780208-R-EM

Emulation Board

(Preliminary)

Document No. EEU-1501
(O. D. No. EEU-977)
Date Published August 1994 P
Printed in Japan

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INTRODUCTION

Outline: IE-780208-R-EM is connected to IE-78000-R to debug the μPD780208 sub-series 8-bit single-chip micorcomputers.

Readers: This manual is intended for engineers who debug μPD780208 sub-series systems with IE-78000-R and IE-780208-R-EM. IE-78000-R can emulate the μPD780208 sub-series. Therefore, the engineers who read this manual are required to have sufficient knowledge regarding the μPD780208 sub-series functions and applications, and debugger.

Organization: To use IE-78000-R, read the manual supplied with IE-780208-R-EM (this manual), the manual supplied with IE-78000-R, and the manuals supplied with the screen degbugger (Introduction and Reference Manuals).

IE-780208-R-EM
User's Manual

(supplied with IE-780208-R-EM)
Functional outline
Connecting IE-780208-R-EM
connecting emulation probe

IE-78000-R
User's Manual
(EEU-1398)

(supplied with IE-78000-R)
Basic specifications
System configuration
External interface function

SD78K0
Screen debugger
User's Manual
Introduction
(EEU-1414)

Basic use of IE-78000-R

SD78K0
Screen debugger
User's Manual
Reference
(EEU-1413)

Functional outline
Command description
Menu description

(Supplied with screen debugger)

Phase-out/Discontinued

Purpose: This manual describes basic specifications and correct connections for IE-780208-R-EM.

How to read this manual: • To understand the basic specifications, read "CHAPTER 1 GENERAL".
• To connect IE-780208-R-EM, read "CHAPTER 2 INSTALLATION" and the IE-78000-R User's Manual

Terms: The following terms are used throughout this manual:

Term	Meaning
Emulation Device	Device emulating the target device in the emulator. Includes the emulation CPU.
Emulation CPU	CPU executing the user-developed program in the emulator.
Target Device	Device to be emulated (actual chip).
Target Program	Program to be debugged (user-developed program).
Target System	System to be debugged (user-developed system). Includes the target program and user-developed hardware. Narrowly, means the hardware only.

Legend: **Note**: Footnote
Caution or Note: Points to be noted
Remarks: Supplement

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- **1.2 Unpacking 1**
- **1.3 IE-780208-R-EM Appearance and Names for Respective Parts 3**
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CHAPTER 1 GENERAL

IE-780208R-EM is an emulation board for the IE-78000-R development system for NEC's μPD780208 sub-series 8-bit single-chip microcomputers. By combining this board with an optional IE-78000-R with an emulation probe, the μPD780208 sub-series can be efficiently emulated.

1.1 Features

The IE-780208-R-EM features, when it is connected to IE-78000-R, are as follows:

(1) Emulates the peripheral functions (such as I/O ports) for the target device
(2) Traces the I/O port status during emulation
(3) Controls mask option resistor connections and P04/XT1 pin switching through software

1.2 Unpacking

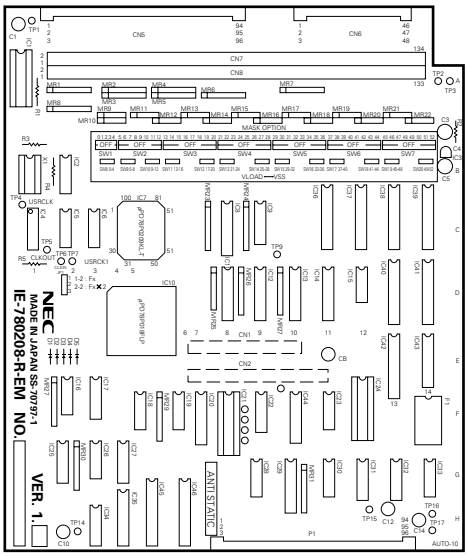
The IE-780208-R-EM shipping carton contains the following accessories, as well as IE-780208-R-EM. On unpacking, confirm that these items are present.

	Qty
(1) IE-780208-R-EM	1
(2) Component block (w/cover)	2
(3) Screw	5
(4) User's manual (this manual)	1

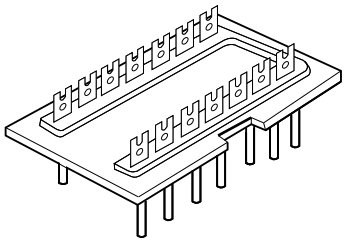
Phase-out/Discontinued

Fig. 1-1 IE-780208-R-EM Accessories

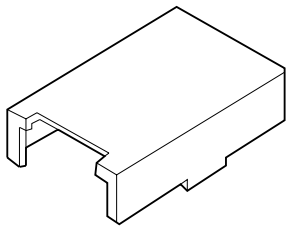
(1) IE-780208-R-EM



(2) Component block**Note**

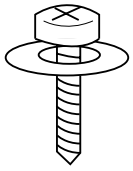


Component block cover



Note: The component block is supplied with the cover shown on the right.

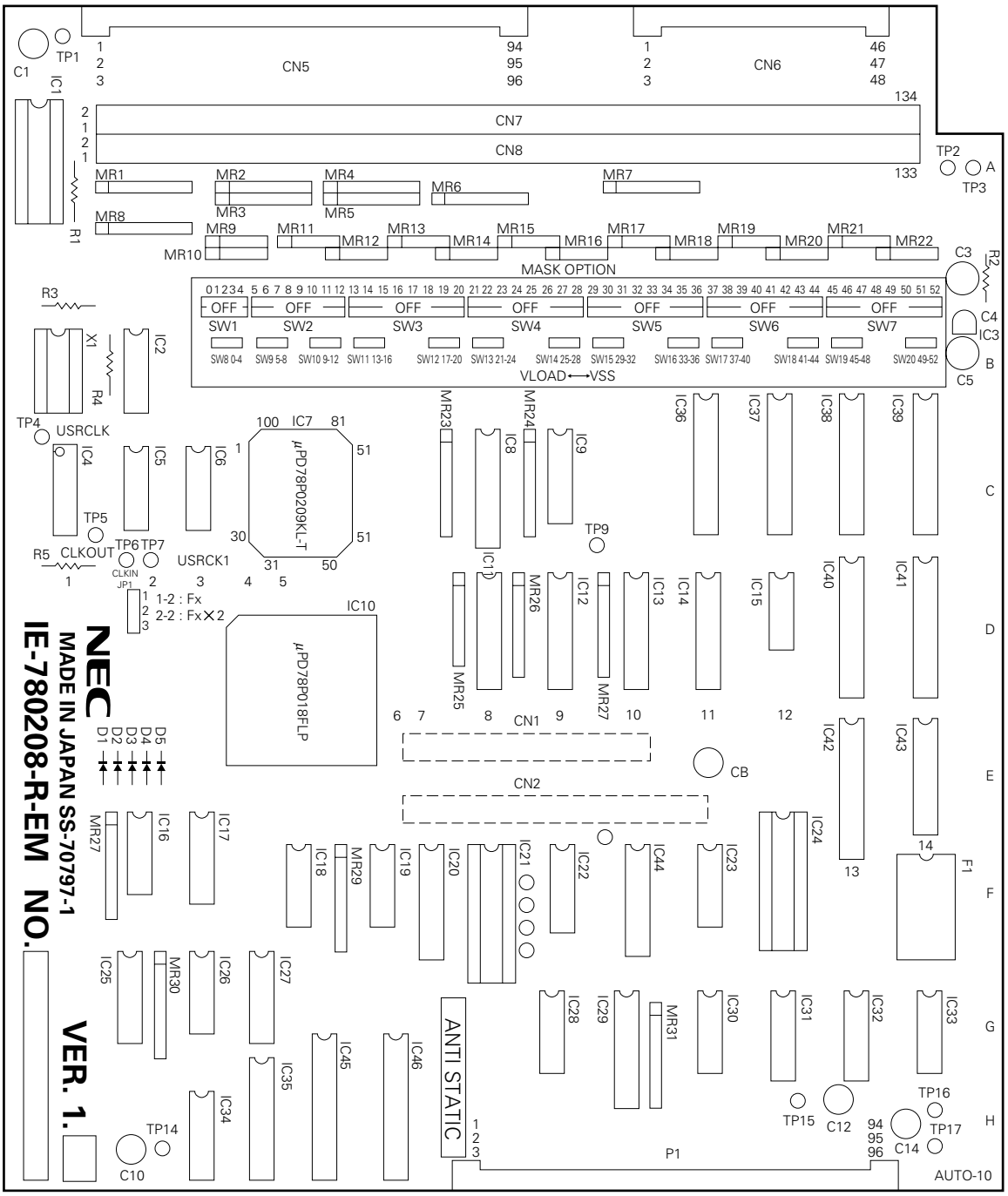
(3) Screw



(4) User's Manual (this manual)

Phase-out/Discontinued

1.3 IE-780208-R-EM Appearance and Names for Respective Parts



Phase-out/Discontinued

Table 1-1 Respective Part Names

Name	Function
CN1	Break board connector
CN2	
CN5	Emulation probe connector
CN6	
CN7	Connector board connector
CN8	
P1	Main bus connector

1.4 Target Device

Devices that can be emulated by IE-78000-R with IE-780208-R-EM are as follows:

Sub-series Name	Target Device
μPD780208 Series (Under development)	μPD780204
	μPD780205
	μPD78P0208

Phase-out/Discontinued

1.5 Emulation Probe

The emulation probe is optional. Select the one best suited to your target device package.

Table 1-2 Emulation Probe and Target Device

Emulation Probe	Target Device
EP-78064GF-R (100-pin plastic QFP)	μPD780204 μPD780205 μPD78P0208

1.6 Notes on correct use of IE-780208-R-EM

(1) Be sure to turn off the power to IE-78000-R and the target system before connecting or disconnecting IE-78000-R and the target system, and changing the setting of switches.

(2) Be sure to turn on power to the IE-78000-R and then to the target system in this order. Turn off power to the target system and then to the IE-78000-R.

(3) When emulating the target device by using IE-780208-R-EM and IE-78000-R, the target device operations slightly differ from those for the actual device. (Refer to CHAPTER 3 DIFFERENCES BETWEEN TARGET DEVICES.)

(4) To input data through the external sense clip, maintain voltage at +15 V.

(5) To output data through the external sense clip, connect a pull-up resistor to the external sense clip on the target system, because the external sense clip has an open-collector output configuration.

(6) Be sure to connect the emulation probe ground clip to the target system signal ground line.

(7) Pins P8 and P12 cannot be traced as port pins.

(8) P8 to P12 are multiplexed with high-voltage, high-current output port pins for display output (–40 V). To use P8 to P12 as FIP pins, do not connect an external sense clip to these pins.

(9) If P8, P9, P11, and P12 are used as FIP pins when port data are traced, the data are undefined.

(10) 5V must be supplied to the target system as V_{DD}.

(11) To use a fluorescent indicator panel that supports dynamic drive only, or to perform motor drive control by using the N-ch open drain port output, do not make a setting that stops the clock in the supervisor mode. Otherwise, a break may occur during emulation, setting the supervisor mode and stopping the clock, causing the filament to burn out. Moreover, a new interrupt may not be accepted and the motor drive control program may not run, damaging the motor by burning.

(12) Because the clock is divided on the IE-780208-R-EM, the duty factor of the clock input from an external source of the IE-780208-R-EM and that of the internal clock are different.

Phase-out/Discontinued

Phase-out/Discontinued

CHAPTER 2 INSTALLATION

This chapter describes the procedure for installing the μPD780208 sub-series development system with the IE-780208-R-EM connected to the following:

- Break board installed in IE-78000-R (IE-78000-R-BK)
- IE-78000-R
- Connector board and emulation probe (optional)

Before connecting these boards and probe, be sure to turn off the power to IE-78000-R and the target system.

For connecting the emulation probe to the target system, refer to CHAPTER 5 CONNECTING TARGET SYSTEM for the IE-78000-R User's Manual.

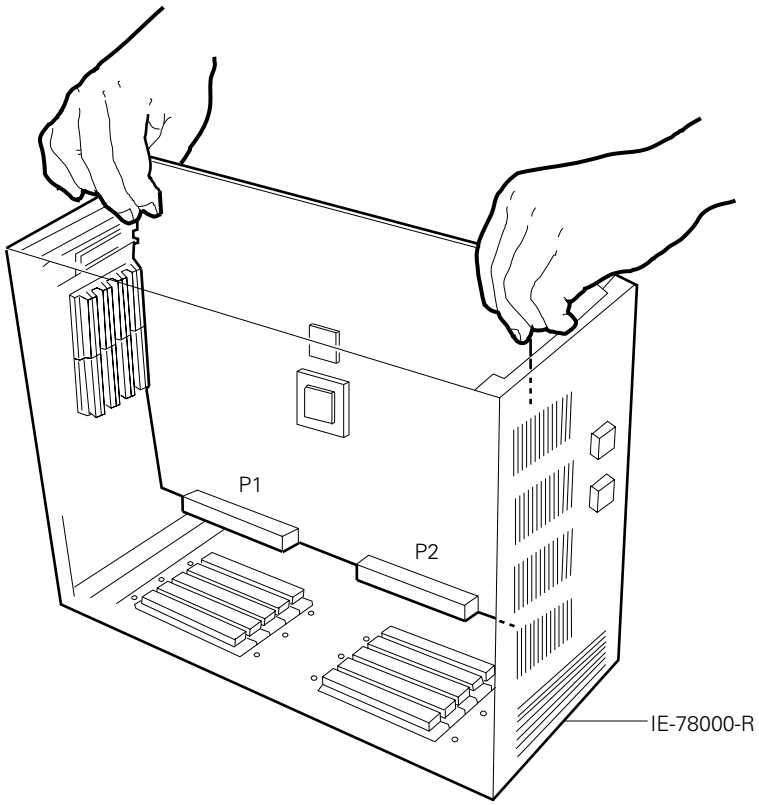
Phase-out/Discontinued

Connect IE-780208-R-EM, break board, IE-78000-R, connector board, and emulation probe as follows:

(1) Remove the six screws from the top cover of IE-78000-R and remove the cover.

(2) Disconnect cables J1 and J2 connecting the control/trace board (IE-78000-R-CS-A) and break board.

(3) Pull the card pullers at both edges of the break board toward you, to pull out the break board from the slot.



Phase-out/Discontinued

(4) Connect IE-780208-R-EM to the break board.
Connect connectors CN1 and CN2 on IE-780208-R-EM to mating connectors CN1 and CN2 on the break board. Secure the connectors with the screws supplied as accessories.

Caution: Be sure to connect CN1 and CN2 securely.

(5) To use the user clock, mount the main system clock to the emulation board and the subsystem clock to the break board by using the component block (refer to CHAPTER 4 SETTING CLOCK).

(6) Set the mask option by using the DIP switch on IE-780208-R-EM (refer to 3.1 Setting Mask Option).

(7) Connect connectors CN7 and CN8 for IE-780208-R-EM to mating connectors CN3 and CN4 on the connector board, supplied with the optional emulation probe.

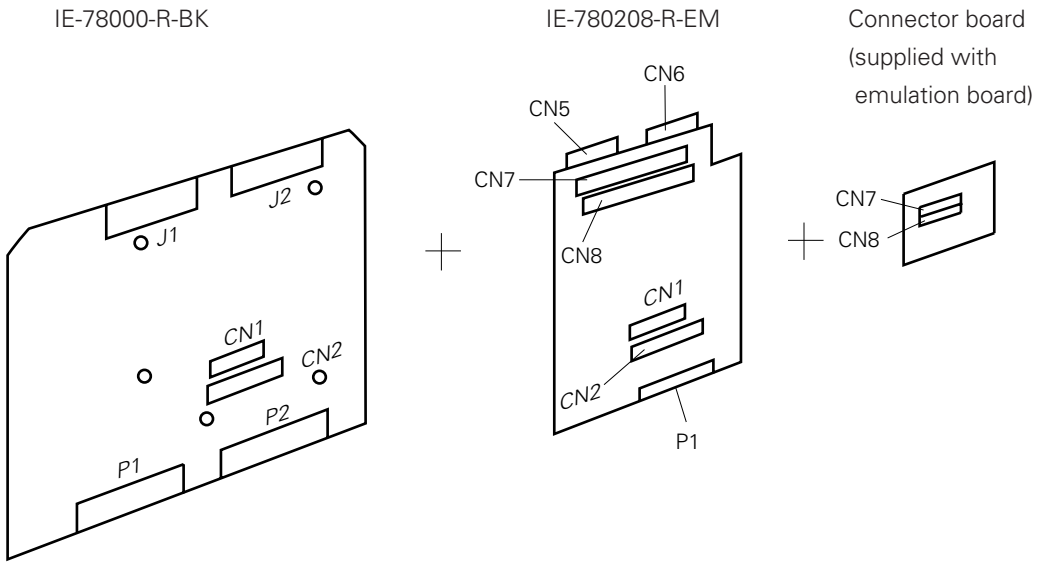
(8) Connect IE-780208-R-EM to the slot for the master board for the IE-78000-R's housing (connect the break board to the second slot from the right, and IE-780208-R-EM to the third slot from the right).

(9) Connect cables J1 and J2.

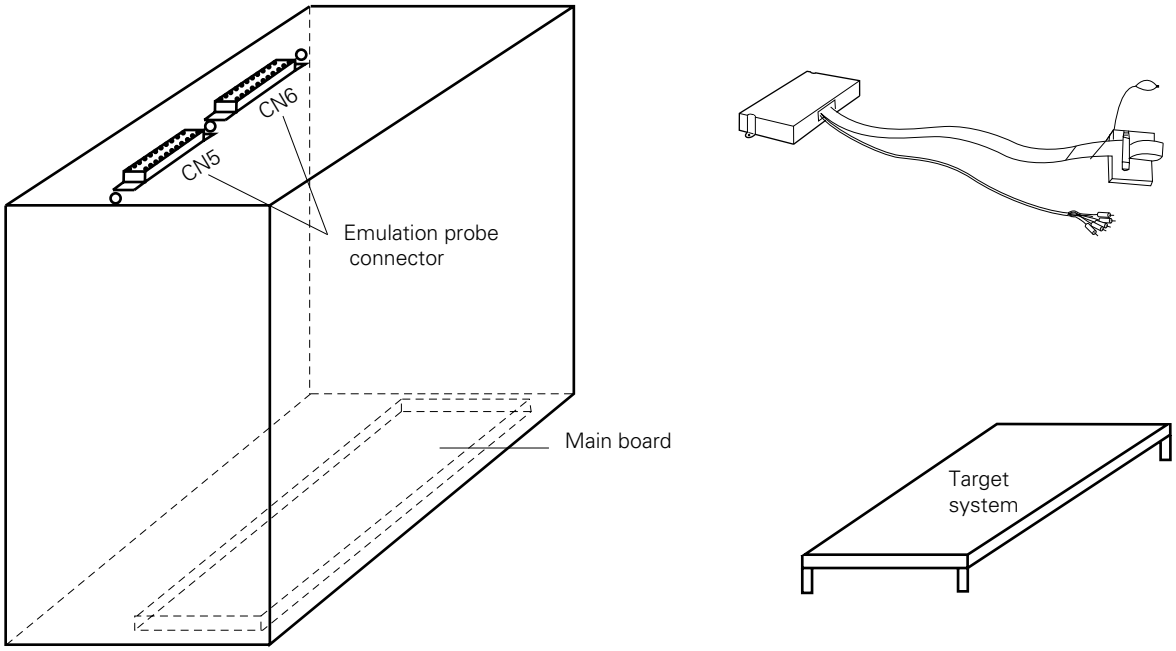
(10) Confirm the positions for the boards. Attach the top cover.

(11) Connect connector CN5 and CN6, on top of IE-78000-R, to the mating connector CN1 and CN2 on the emulation probe. Secure the connectors with screws.

Phase-out/Discontinued



Emulation probe for your target system



IE-78000-R housing

Phase-out/Discontinued

CHAPTER 3 DIFFERENCES BETWEEN TARGET DEVICES

When emulating the target device with IE-780208-R-EM and IE-78000-R, the operations for the target device slightly differ from those for the actual device. This chapter describes these differences.

3.1 Setting Mask Option

Settings for the mask option resistors P1, P3, P7, P8, P9, P10, P11, P12, and FIP0 through FIP12 can be changed by using the screen debugger (SD78K0) or the DIP switch on IE-780208-R-EM.

3.1.1 Setting mask option with screen debugger (SD78K0)

(1) P1

P1 is a CMOS I/O pin that can be connected to a pull-down resistor. Whether the pull-down resistor is connected or not can be selected on the configuration panel of the screen debugger.

(2) P3

P3 is a CMOS I/O pin that can be connected to a pull-down resistor. Whether the pull-down resistor is connected or not can be selected on the configuration panel of the screen debugger.

(3) P7

P7 is N-ch open-drain pins, that can be connected to a pull-up resistor. Note that P7 is a medium-voltage pin that can withstand +15 V. To connect or disconnect a pull-up resistor to these pins, use the configuration panel for the screen debugger.

(4) P04

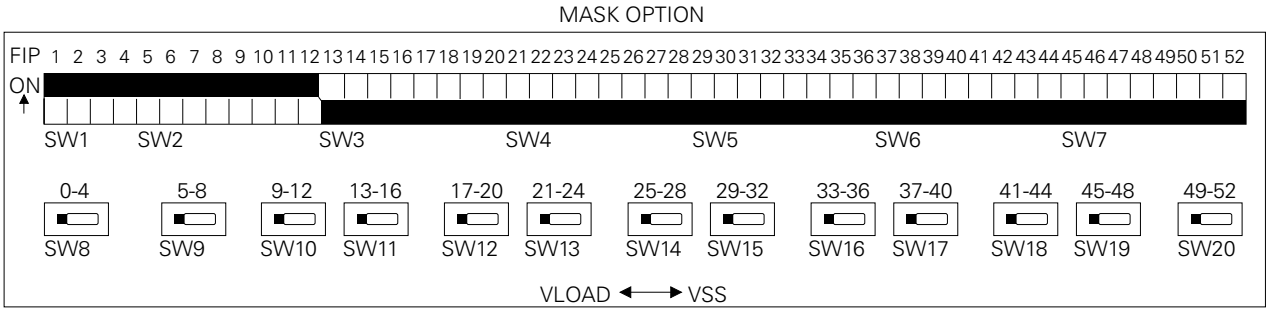
The P0/XT1 pin is a multiplexed pin and can be used as a port pin or a subsystem clock input pin. The function for this pin can be switched by the screen debugger configuration panel.

Phase-out/Discontinued

3.1.2 Setting mask option with DIP-SW

P8 through P12 also serve as FIP pins (-40 V), and FIP0 through FIP12 are used as FIP pins. Therefore, connecting the mask option resistor to these pins is specified by the DIP switch on IE-780208-R-EM in 1 bit units. The connection destination (V_{SS} or V_{LOAD}) is specified by the slide switch below the DIP switch in 4 bit units.

Fig. 3-1 Setting Mask Option (factory-set condition)



FIP0-FIP12: pulled down to V_{LOAD}
FIP13-FIP52: not connected

3.2 Target Interface Circuit

The target interface circuit allows the device to operate in the same manner as the target device on the IE-78000-R. It consists of an emulation device and various gates (ICs, such as CMOS and TTL).

To debug the target system connected to IE-78000-R, emulation is carried out by the target interface circuit in IE-78000-R, as if the actual target device were operating on the target system.

Individual target devices consist of CMOS LSIs. The target interface circuit emulation device also consists of CMOS LSIs. Therefore, the DC and AC characteristics for the target interface circuit are almost the same as those for the target device (V_{DD} = 5 V when operating).

However, the DC and AC characteristics for the target interface circuit are different from those for the target device, when the emulation device signals are input/output through gates.

Note that, a gate delay time (whose duration varies, depending on the gate) occurs each time the signal goes through a gate. This is responsible for the differences in the AC characteristics.

Therefore, design the target system, giving thorough consideration to these points.

Note: When using IE-78000-R and IE-780208-R-EM, 5 V must be supplied to the target system (as the supply voltage V_{DD}).

Phase-out/Discontinued

3.2.1 Circuit inputting/outputting signal directly or via resistor to/from emulation device

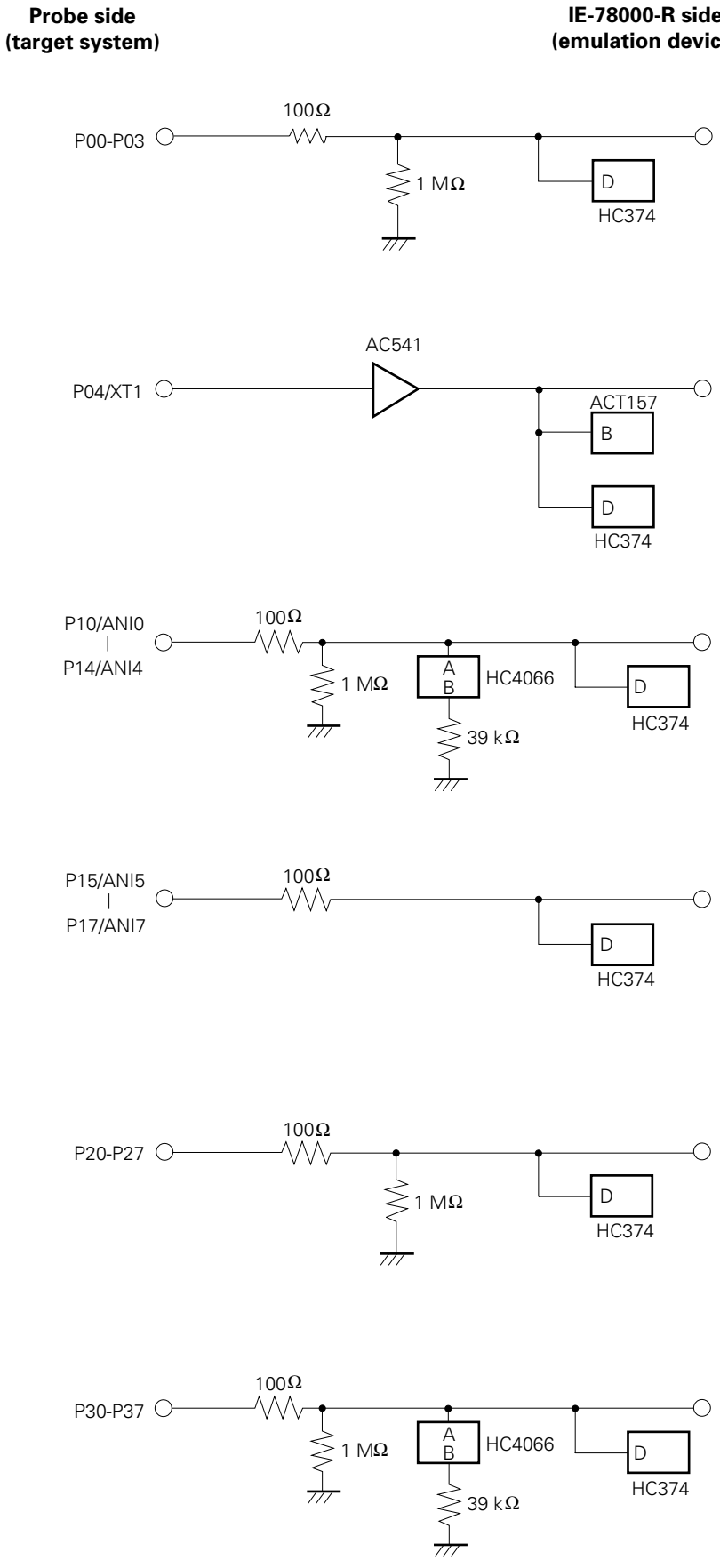
(1) Signals related to port

This circuit interfaces the following signals:

- Signal related to port 0
- Signal related to port 1
- Signal related to port 2
- Signal related to port 3
- Signal related to port 7
- Signal related to port 8
- Signal related to port 9
- Signal related to port 10
- Signal related to port 11
- Signal related to port 12
- Signal FIP0 through FIP12

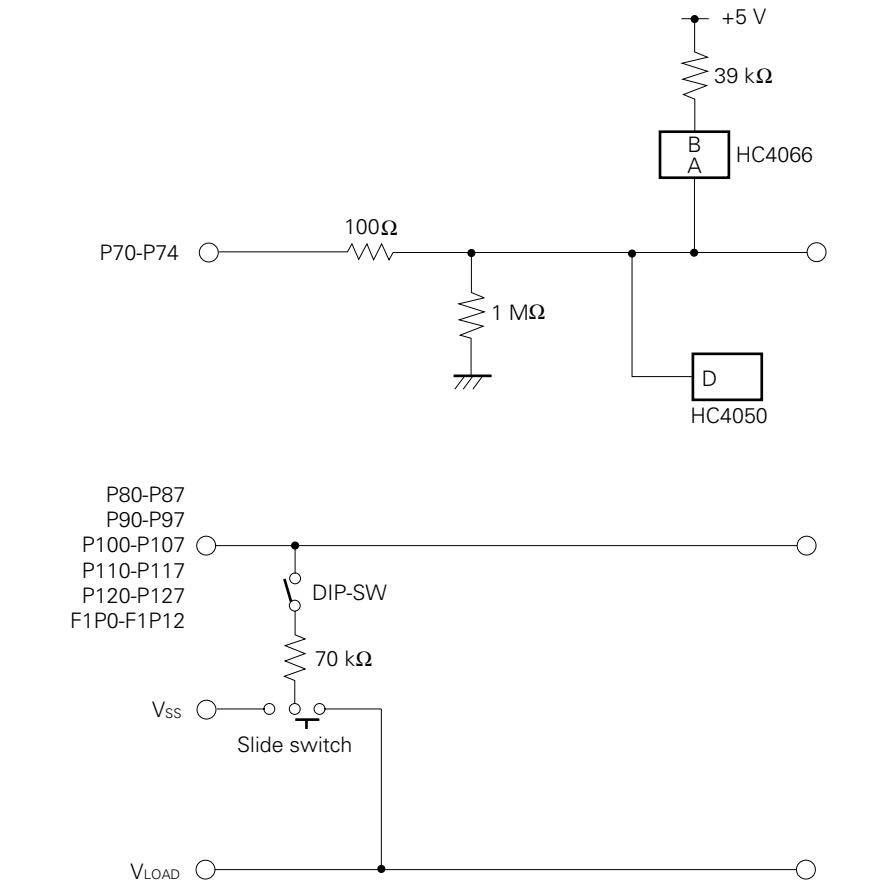
Phase-out/Discontinued

Fig. 3-2 Equivalent Emulation Circuit 1 (1/2)



Phase-out/Discontinued

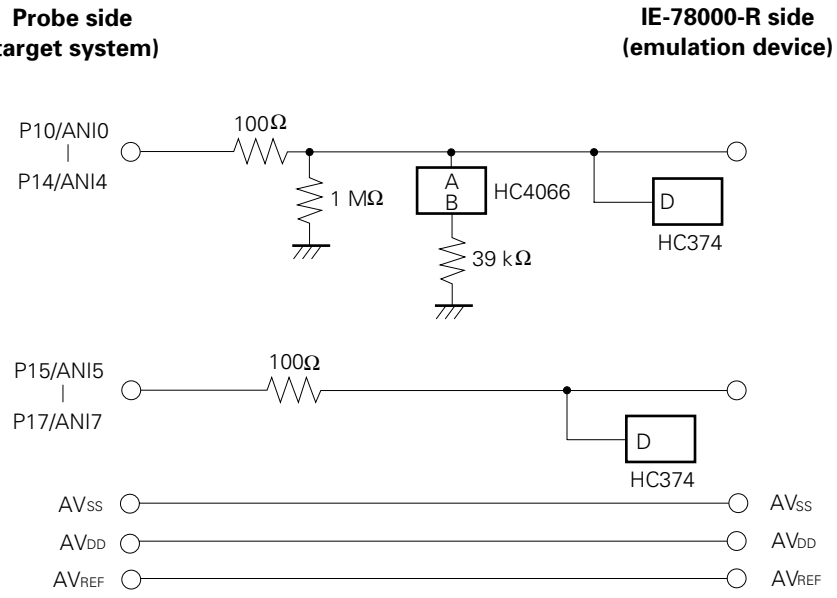
Fig. 3-2 Equivalent Emulation Circuit 1 (2/2)



Phase-out/Discontinued

(2) Analog signals

Fig. 3-3 Equivalent Emulation Circuit 2



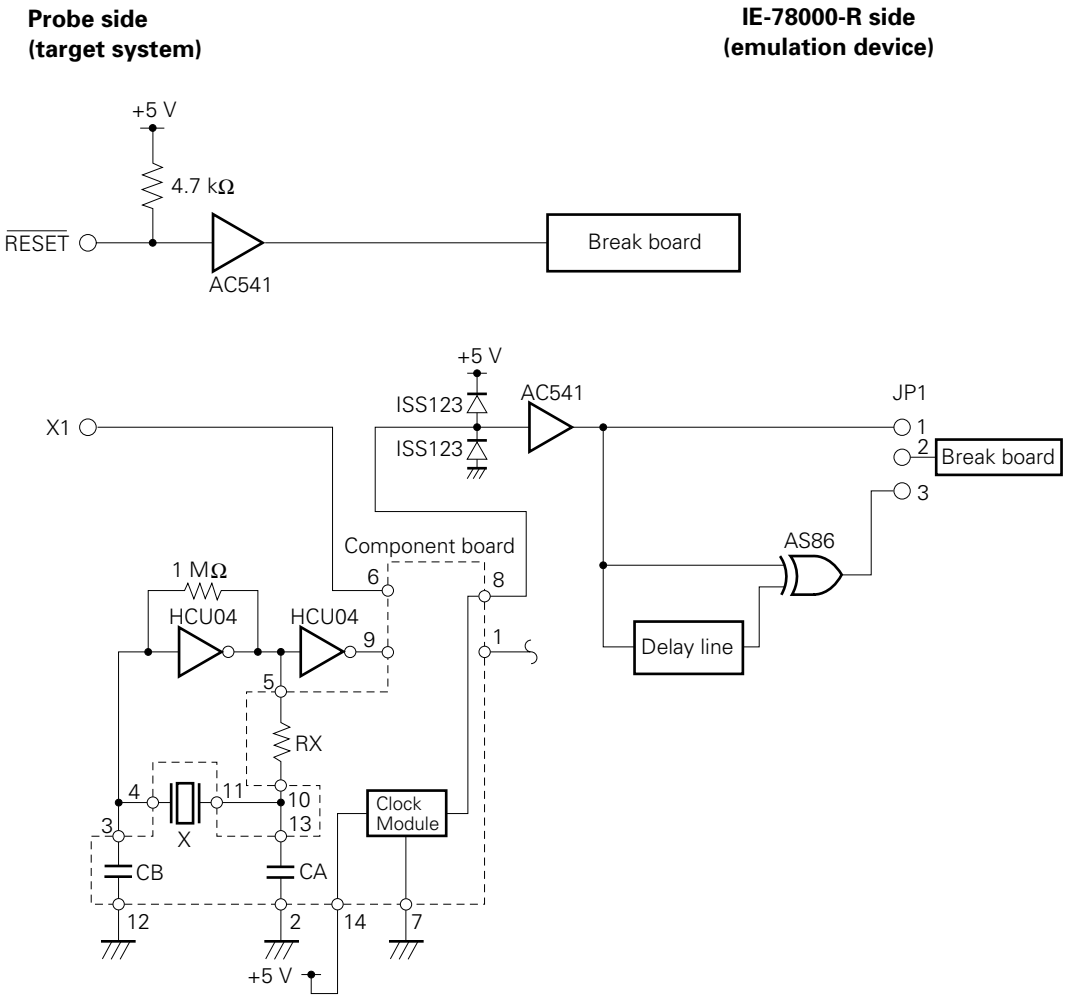
Phase-out/Discontinued

3.2.2 Circuit inputting signal via gate to emulation device

This circuit interfaces the following signals:

- $\overline{\text{RESET}}$ signal
- Signals related to clock input

Fig. 3-4 Equivalent Emulation Circuit 3



Remarks: The area enclosed by broken lines indicates the potion to be attached to the component block.

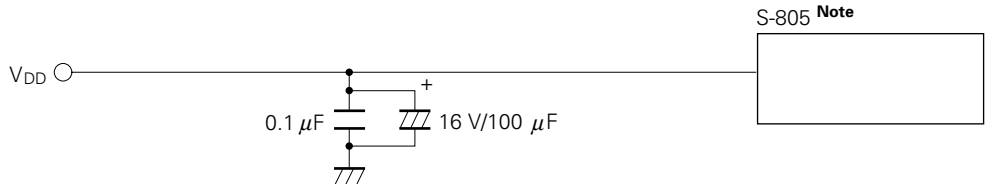
Phase-out/Discontinued

3.2.3 Circuit inputting signal to control/trace module

This circuit interfaces the following signals:

- V_{DD} signal

Fig. 3-5 Equivalent Emulation Circuit 4



Note: S-805 is a Seiko Instruments Inc. IC.

Phase-out/Discontinued

CHAPTER 4 SETTING CLOCK

This chapter describes how to set the clock.

4.1 Outline of Clock Setting

The main system clock can be selected from any of the following for debugging.
The subsystem clock can only be selected from (2) and (3).

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

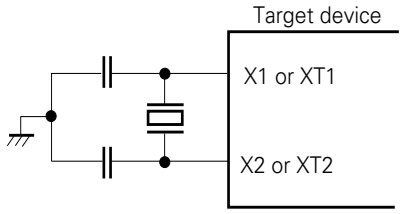
If the target system is provided with an internal clock, select (1) or (2), above. The internal clock is the internal oscillator circuit of the target device. Fig. 4-1 (a) shows an external circuit. The oscillator mounted on the target system is not used for emulation. Instead, the clock mounted on the break board installed in the IE-78000-R is used.

If the target system is provided with an external clock, select (3). The external clock is supplied from to the target device from an external source, and the internal oscillator circuit of the target device is not used. Fig. 4-1 (b) shows the external circuit.

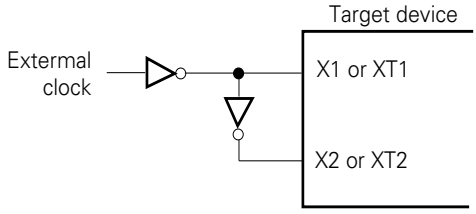
Note: An oscillator for a subsystem clock is not mounted on the break board.
To use the subsystem clock either mount an oscillator to the break board or use an external clock.

Fig. 4-1 External Circuits of System Clock Oscillator Circuit

(a) Internal clock



(b) External clock

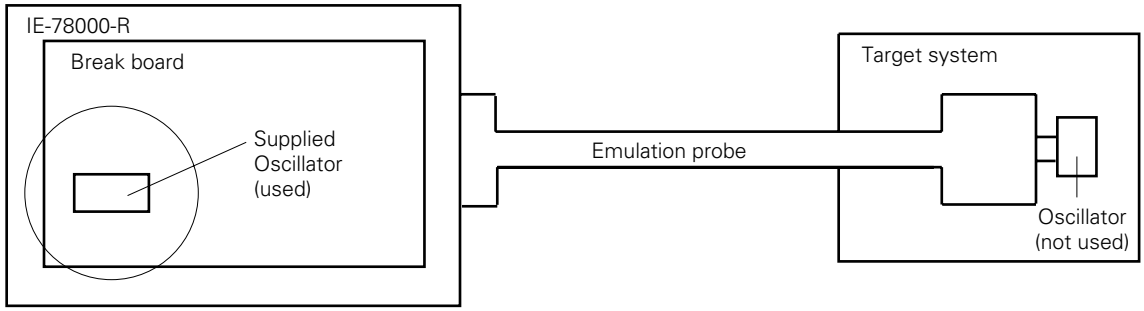


Phase-out/Discontinued

(1) Clock already mounted on break board

A crystal oscillator has been mounted on the break board, and its frequency is 4.19 MHz.

Fig. 4-2 Using Clock Mounted on Break Board

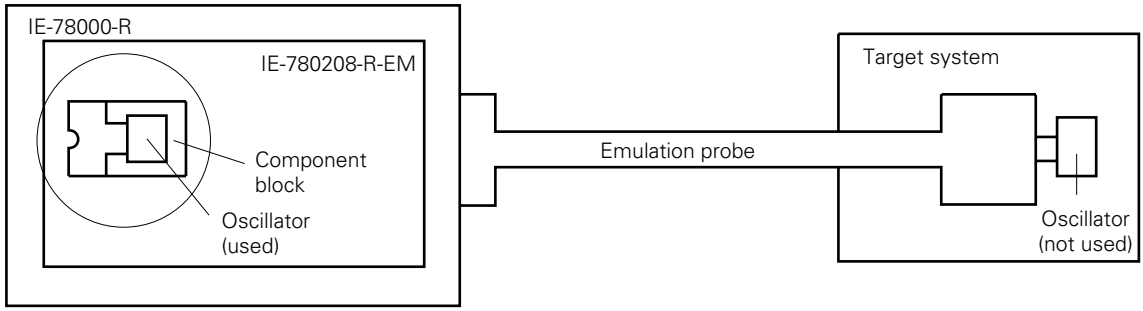


Remarks: The clock supplied by the oscillator on the break board (circled in the above figure) is used.

(2) User mounted clock

A clock meeting specific user specifications can be mounted on the IE-780208-R-EM. Mount the oscillator to be used on the component block, and connect the component block to the IE-780208-R-EM. In this way, the target system can be debugged at a frequency different from that of the supplied clock.

Fig. 4-3 Using a User Mounted Clock



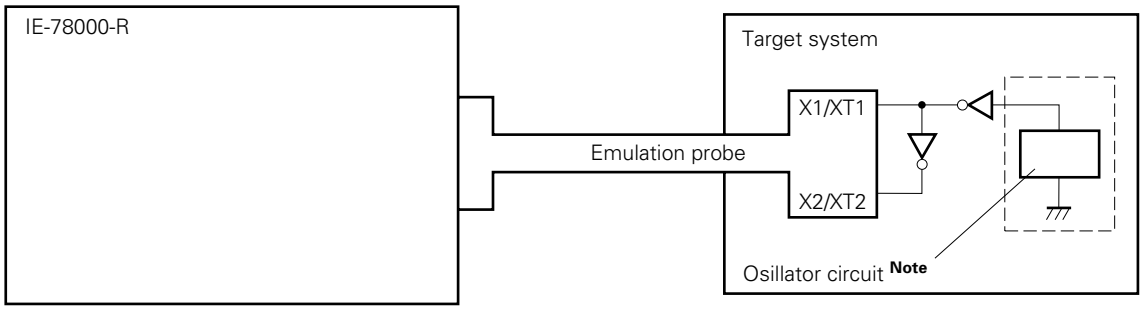
Remarks: The clock supplied by the oscillator on the IE-780208-R-EM (circled in the above figure) is used.

(3) External clock

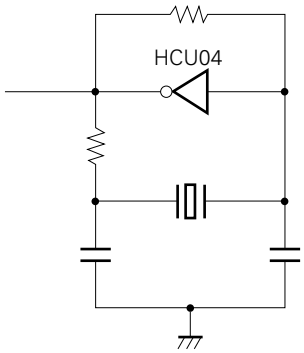
The external clock on the target system can be used via an emulation probe.

Phase-out/Discontinued

Fig. 4-4 Using an External Clock



Note: The following is an example of circuit inside broken lines.



Remarks: The clock supplied by the external clock on the target system in the above figure is used.

Table 4-1 shows the settings of the main system clock.

Table 4-1 Main System Clock Settings

Main System Clock Frequency		X1 (MAIN) Component Block of IE-78000-R-BK	IE-780208-R-EM		Clock Setting for Screen Debugger
			X1 (USRCLK) Component Block	JP1	
To use board mounted clock	4.19 MHz	6-8 shorted	6-8 shorted	2-3 shorted (Fx x 2 side)	IE
To use user mounted clock	A frequency other than 4.19 MHz		Create oscillation circuit		USER
To use external clock			6-8 shorted		

Phase-out/Discontinued

4.2 Main System Clock Setting

4.2.1 Using the clock mounted on the break board

As a factory-set condition for shipment, a component block wired as shown in Fig. 4-5 is mounted to the X1 USRCLK socket on the IE-780208-R-EM. If the wiring of this component block remains the same as the factory-set condition, no additional hardware adjustments are required. However, if the user prepares a component block because another clock source is to be used, or because the wired component block has been lost, then make the connections in accordance with the procedure described below.

When starting the screen debugger (SD78K/0), select "IE" for the clock setting on the initial setting screen or configuration panel (this selects the internal clock of the emulator).

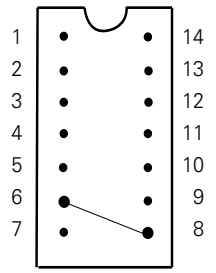
Prerequisites

- Component block (accessory of IE-78000-R)
- Lead wires
- Soldering tools

Procedure

① Wire and solder the component block as illustrated below.

Fig. 4-5 Wiring of Component Block (to use the clock mounted on break board as the main system clock)



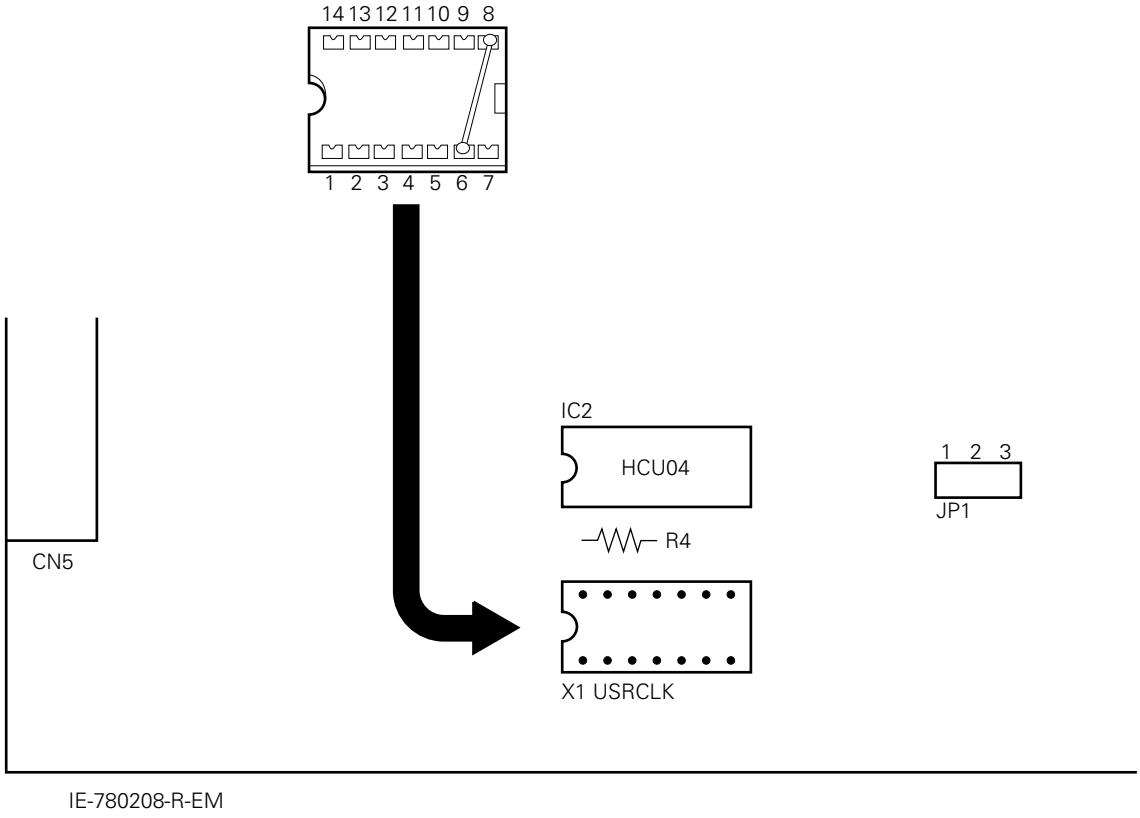
Component block pin number
6-8

Phase-out/Discontinued

② Prepare the IE-780208-R-EM and the wired break board.

③ Mount the component block in 1 to the socket (labeled X1 USRCLK) on the IE-780208-R-EM. At this time, make surethat the pin mark 1 faces the correct direction.

Fig. 4-6 Component Block Mounting Position
(to use the clock mounted on break board as the main system clock)



④ Confirm that the component mounted on the X1 (MAIN) socket on the break board is wired as shown in Fig. 4-5.

⑤ Connect the IE-780208-R-EM and break board to the IE-78000-R.

Phase-out/Discontinued

4.2.2 To use user mounted clock

Either procedure (1) or (2) below must be carried out depending on the clock to be used.

After the screen debugger has been started up, select "USER" on the initial setting screen or the clock configuration panel (selection of the user clock).

(1) To use a ceramic/crystal oscillator

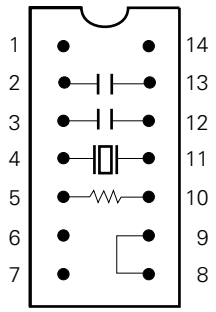
Prerequisites

- Component block (IE-78000-R accessory)
- Ceramic oscillator or crystal oscillator
- Resistor Rx
- Capacitor CA
- Capacitor CB
- Soldering tools

Procedure

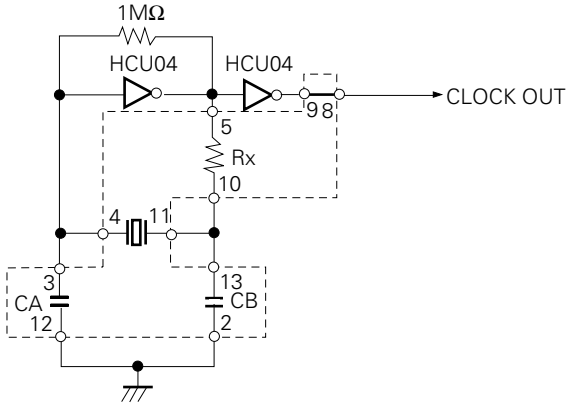
① Solder a ceramic oscillator or crystal oscillator, resistor Rx, capacitor CA, and capacitor CB, all conforming to the frequency of the oscillator, to the component block.

Component block



Pin No.	Connection
2-13	Capacitor CB
3-12	Capacitor CA
4-11	Ceramic/crystal oscillator
5-10	Resistor Rx
8-9	Shorted

Circuit diagram



Remarks: The area enclosed by broken lines indicates the portion to be connected to the component block.

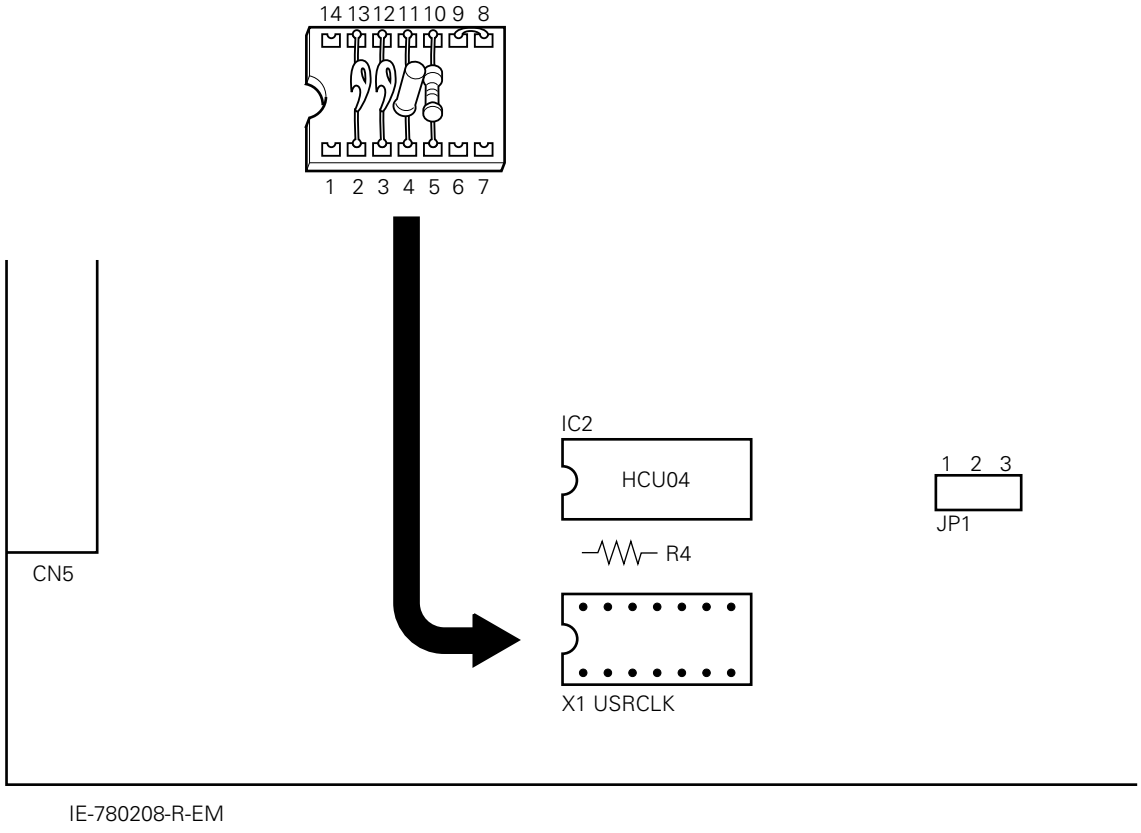
Phase-out/Discontinued

② Prepare the IE-780208-R-EM and the wired break board.

③ Remove the external clock component block from the socket on the IE-780208-R-EM (socket labeled X1 USRCLK).

④ Attach the component block in 1 to the socket (X1 USRCLK) from which the external clock component block has been removed in step 3. At this time, make sure that pin 1 faces the correct direction.

Fig. 4-7 Component Block Mounting Position (to use a user mounted clock as the main system clock)

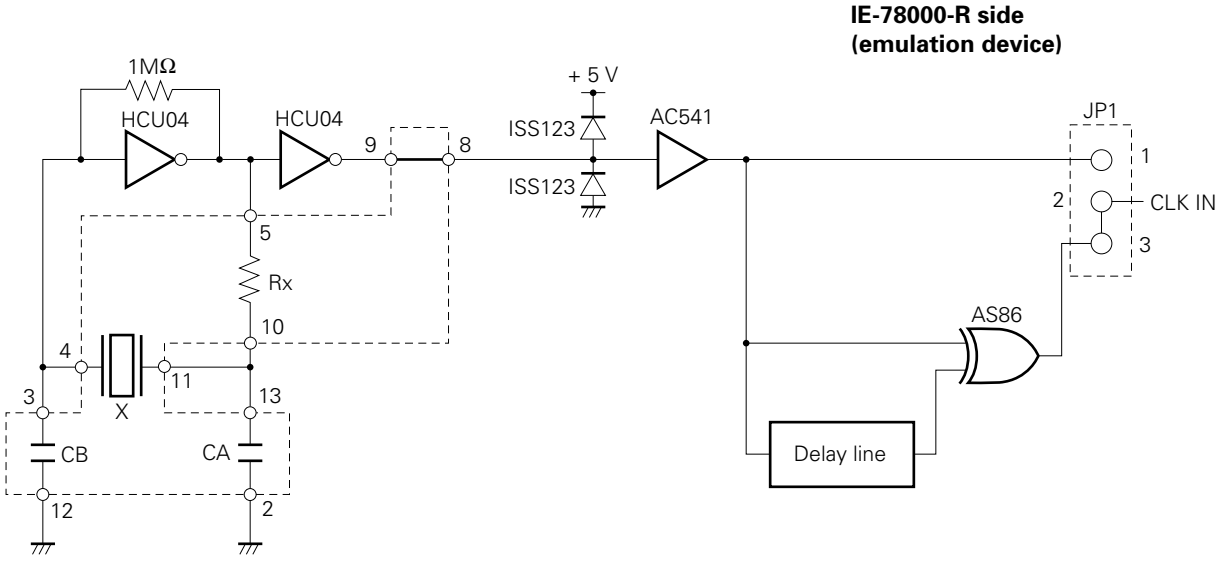


⑤ Confirm that the component block mounted to socket X1 (MAIN) on the break board is wired as shown in Fig. 4-5.

⑥ Connect the IE-780208-R-EM and break board to the IE-78000-R.

The following circuit is configured by the above procedure, and the clock can be supplied from the mounted oscillator to the emulation device.

Phase-out/Discontinued



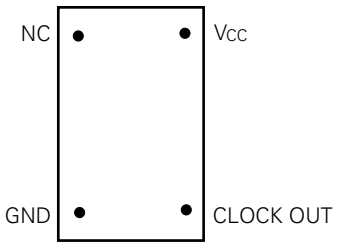
Remarks: The area enclosed by broken lines indicates the portion to be attached to the component block.

(2) To use a crystal oscillator

Prerequisites

- Crystal oscillator (with pins wired as shown in Fig. 4-8)

Fig. 4-8 Crystal Oscillator (to use a user mounted clock as the main system clock)



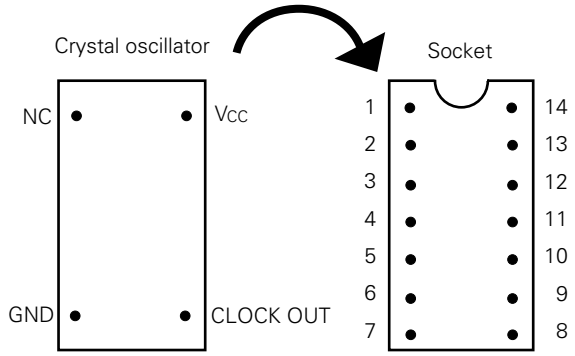
Procedure

① Prepare the IE-780208-R-EM and the wired break board.

② Remove the external clock component block from the socket (socket labeled X1 USRCLK) on the IE-780208-R-EM.

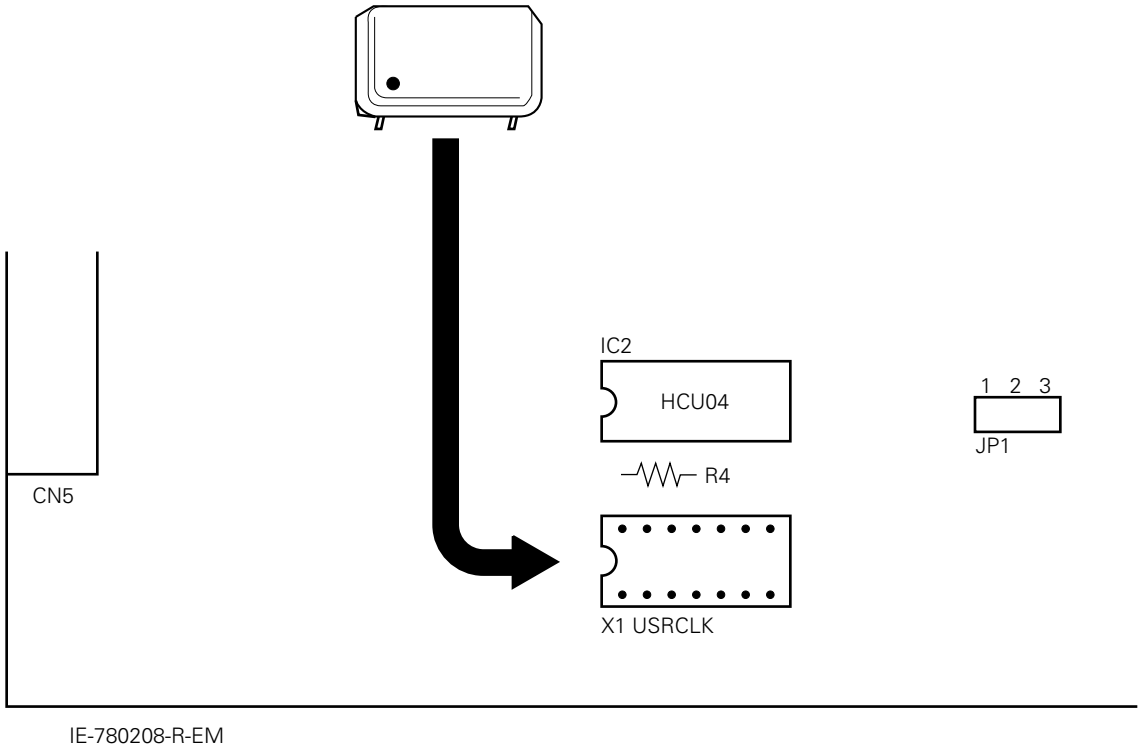
③ Mount the crystal oscillator in socket X1 USRCLK.
Connect the crystal oscillator to the socket pins as illustrated below.

Phase-out/Discontinued



Crystal Oscillator	Socket Pin No.
NC	1
GND	7
CLOCK OUT	8
Vcc	14

Fig. 4-9 Crystal Oscillator Mounting Position (to use a user mounted clock as the main system clock)

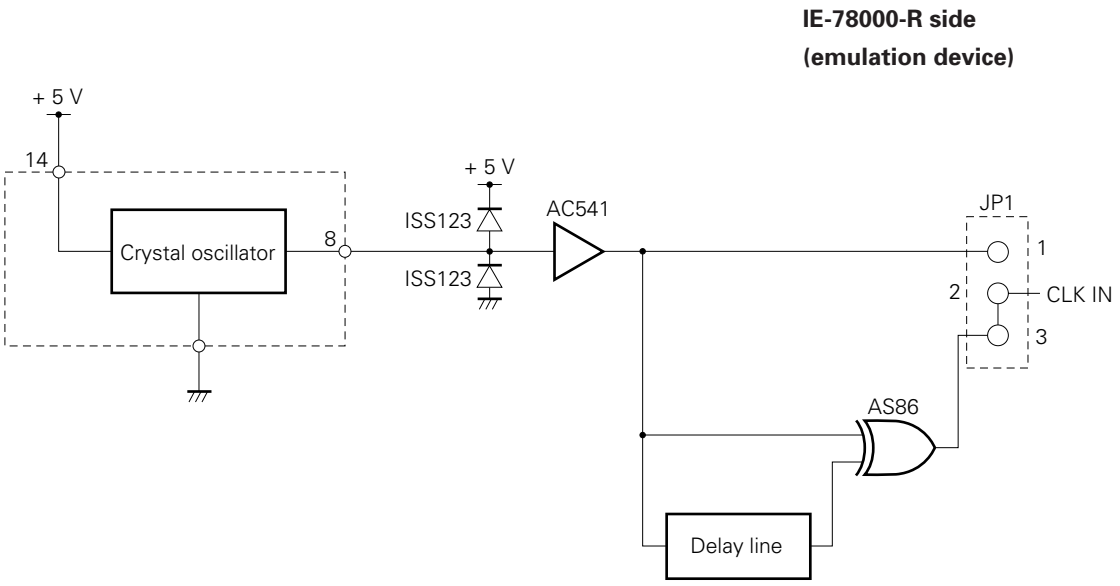


④ Confirm that the component block attached to socket X1 (MAIN) on the break board is wired as shown in Fig. 4-5.

⑤ Connect the IE-780208-R-EM and break board to the IE-78000-R.

Phase-out/Discontinued

The following circuit is configured by the above procedure and the clock can be supplied to the emulation device.



Phase-out/Discontinued

4.2.3 To use an external clock

As a factory-set condition for shipment, a component block wired as shown in Fig. 4-10 is mounted to the X1 USRCLK socket on the IE-780208-R-EM. If the wiring of this component block remains in the factory-set condition, no hardware adjustments are necessary.

However, if the user prepares his or her own component block because another clock source is to be used, or because the wired component block has been lost, then make connections in accordance with the procedure described below.

When starting the screen debugger, select "USER" for the clock setting on the initial setting screen or configuration panel (selection of the user clock).

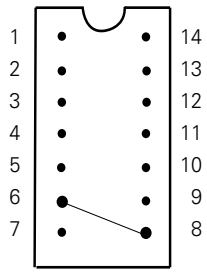
Prerequisites

- Component block (IE-78000-R accessory)
- Lead wires
- Soldering tools

Procedure

① Wire and solder the leads to the component block as shown below.

Fig. 4-10 Wiring of Component Block (to use an external clock as the main system clock)



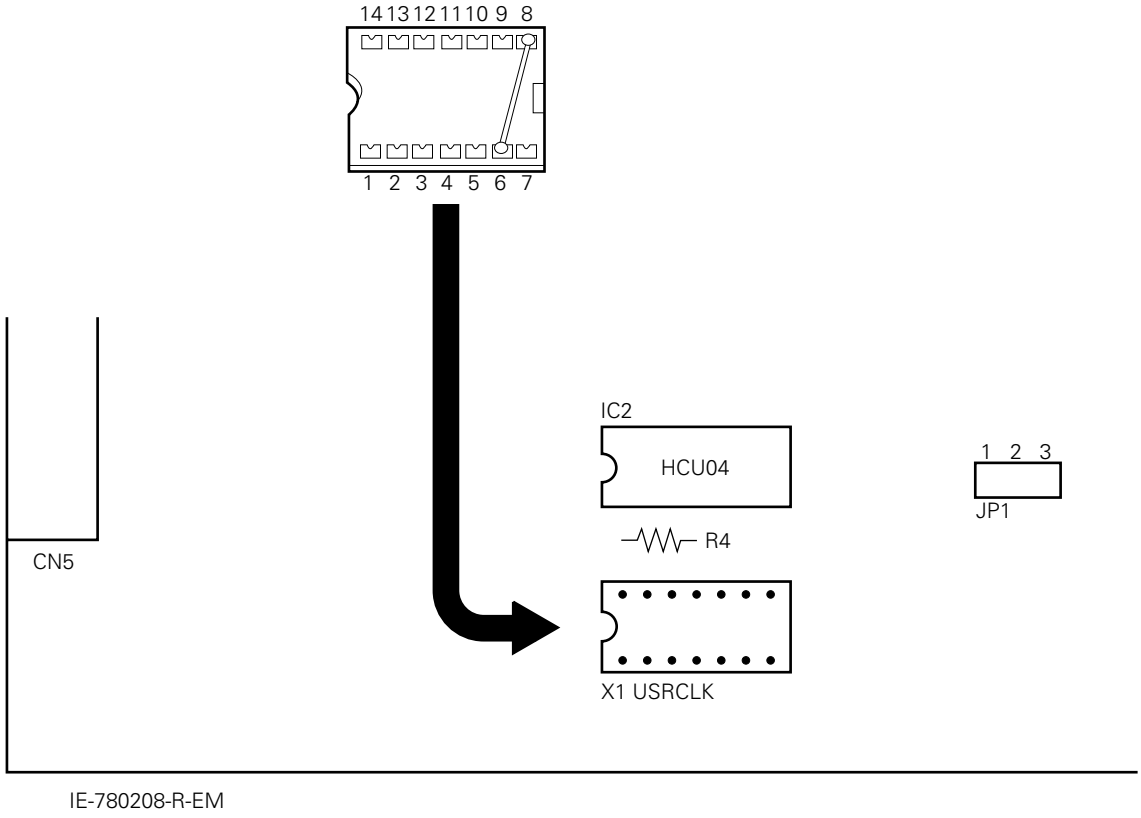
Component block pin number
6-8

② Prepare the IE-780208-R-EM and the wired break board.

③ Attach the component block in 1 to the socket (socket printed X1 USRCLK) on the IE-780208-R-EM. At this time, make sure that pin 1 faces the correct direction.

Phase-out/Discontinued

Fig. 4-11 Component Block Mounting Position (to use an external clock as the main system clock)



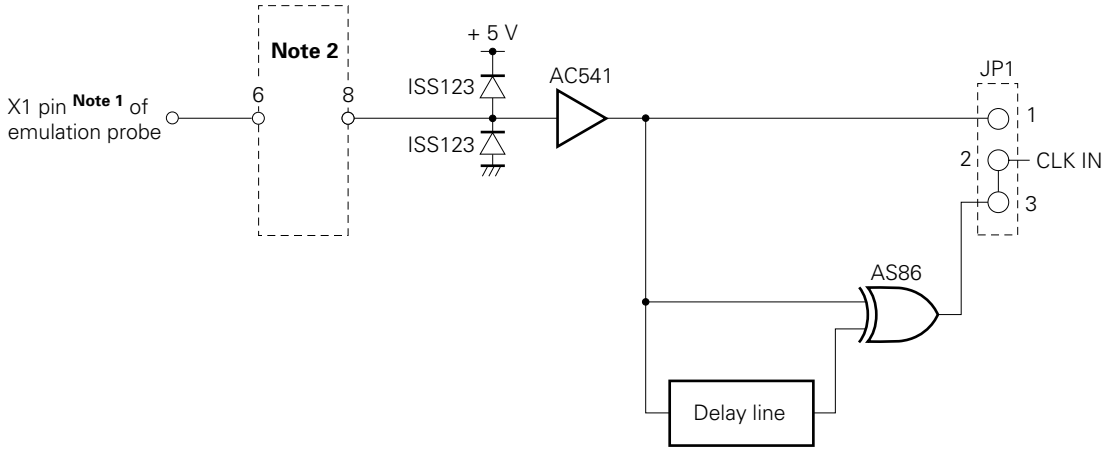
④ Confirm that the component block attached to socket X1 (MAIN) on the break board is wired as shown in Fig. 4-10.

⑤ Connect the IE-780208-R-EM and break board to the IE-78000-R.

The following circuit is configured by the above procedure and the clock can be supplied from the mounted oscillator to the emulation device.

Phase-out/Discontinued

IE-78000-R side
(emulation device)



Note 1: Indicates the pin name of the target device.

2: Indicates the pin name of the component block.

Remarks: The area enclosed by broken lines indicates the portion attached to the component block.

Phase-out/Discontinued

4.3 Setting the Subsystem Clock

4.3.1 To use the user mounted clock

Procedure (1) or (2) below must be carried out depending upon the type of the clock to be used.
These procedures do not have to be performed on the screen debugger.

(1) To use a ceramic/crystal oscillator

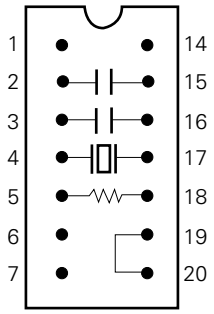
Prerequisites

- Component block (IE-78000-R accessory)
- Ceramic oscillator or crystal oscillator
- Resistor Rx
- Capacitor CA
- Capacitor CB
- Soldering tools

Procedure

① Solder a ceramic oscillator or crystal oscillator, resistor Rx, capacitor CA, and capacitor CB, all conforming to the frequency of the oscillator, to the component block.

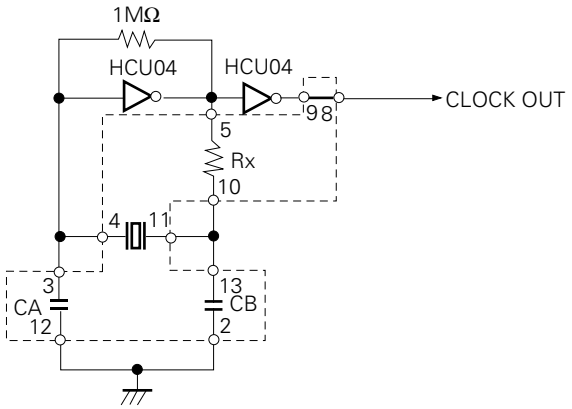
Component block



Pin No.	Connection	Standard Value [Note]
2-13	Capacitor CB	33 pF
3-12	Capacitor CA	15 pF
4-11	Ceramic/crystal oscillator	32.768 kHz
5-10	Resistor Rx	330 kHz
8-9	Shorted	———

Note: These values are for your reference only. The circuit constants may vary depending on the oscillator used. When oscillation is not performed, consult each oscillator manufacturer.

Circuit diagram



Remarks: The area enclosed by broken lines indicates the portion to be attached to the component block.

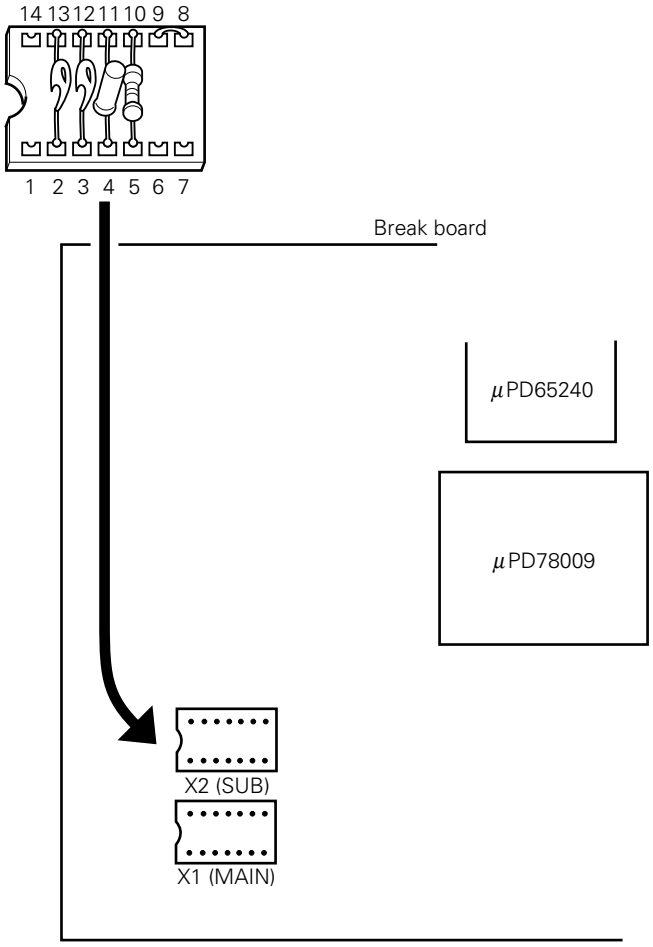
Phase-out/Discontinued

② Prepare the IE-780208-R-EM and the wired break board.

③ Remove the external clock component block from the socket (socket labeled X2 (SUB)) on the IE-780208-R-EM.

④ Mount the component block in 1 to socket X2 (SUB), from which the external clock component block was removed in step 3. Make sure that pin 1 faces in the correct direction.

Fig. 4-12 Component Block Mounting Position (to use a user mounted clock as the subsystem clock)

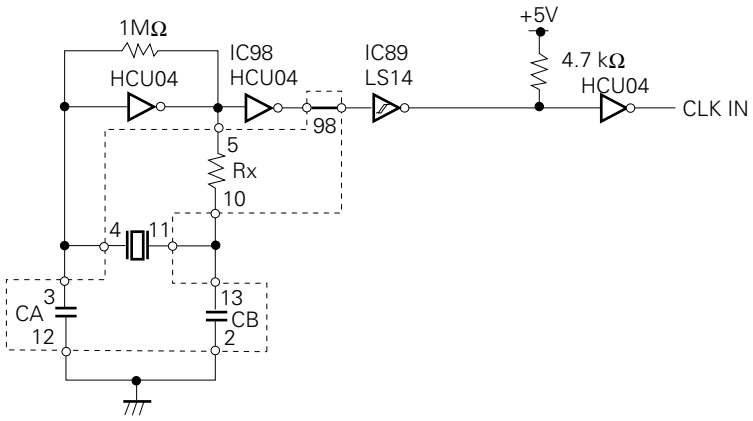


⑤ Connect the IE-780208-R-EM and the break board to the IE-78000-R.

The following circuit is configured by the above procedure, and the clock can be supplied from the mounted oscillator to the emulation device.

Phase-out/Discontinued

IE-78000-R side (emulation device)



Remarks: The area enclosed by broken lines indicates the portion to be attached to the component block.

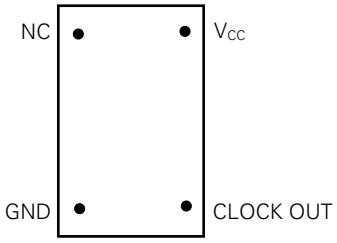
Phase-out/Discontinued

(2) To use a crystal oscillator

Prerequisites

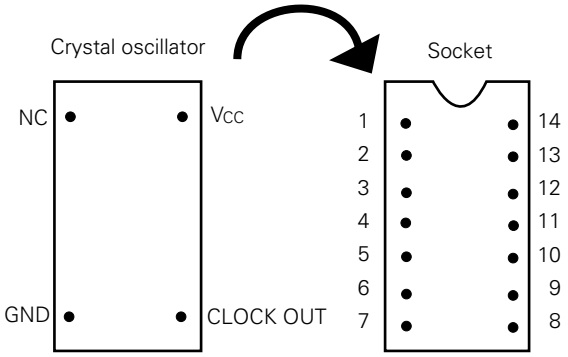
- Crystal oscillator (with pins wired as shown in Fig. 4-13)

Fig. 4-13 Crystal Oscillator (to use a user mounted clock as the subsystem clock)



Procedure

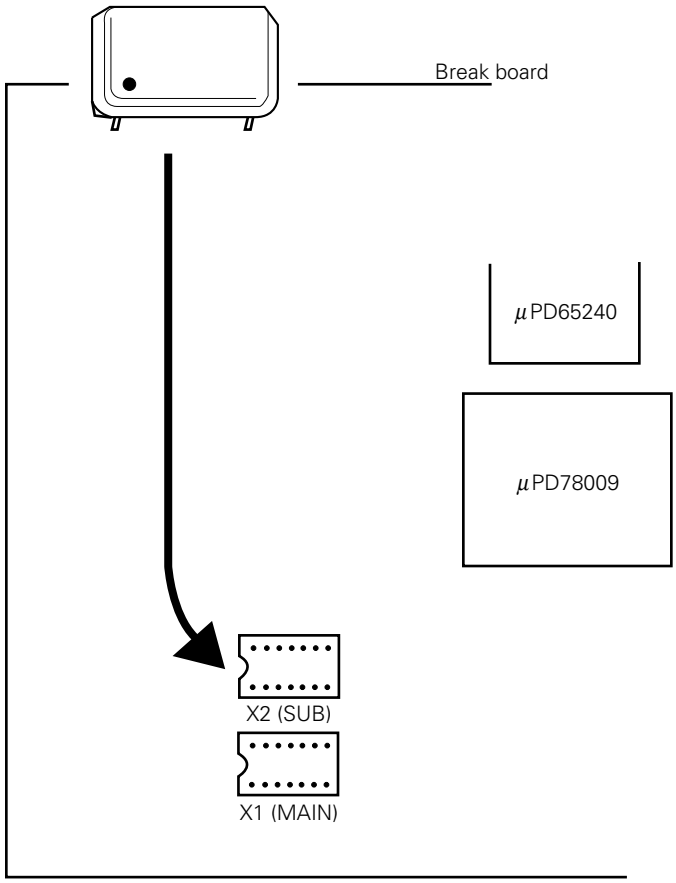
① Prepare the IE-780208-R-EM and the wired break board.
② Remove the external clock component block mounted from the socket (socket labeled X2 (SUB)) on the break board.
③ Attach the crystal oscillator to socket X2 (SUB), from which the external clock component block was removed in step 2. Insert the crystal oscillator into the socket pins as illustrated below.



Crystal Oscillator	Socket Pin No.
NC	1
GND	7
CLOCK OUT	8
VCC	14

Phase-out/Discontinued

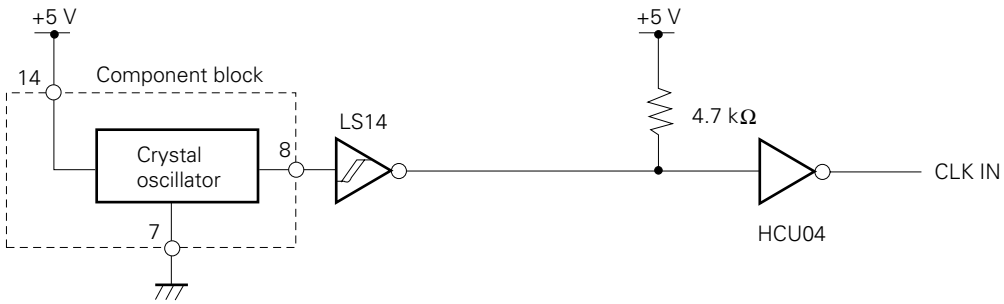
Fig. 4-14 Crystal Oscillator Mounting Position (to use a user mounted clock as the subsystem clock)



④ Connect the IE-780208-R-EM and the break board to the IE-78000-R.

The following circuit is configured by the above procedure and the clock can be supplied to the emulation device.

IE-78000-R side
(emulation device)



Phase-out/Discontinued

4.3.2 To use an external clock

As a factory-set condition for shipment, a component block wired as shown in Fig. 4-15 is connected to the X2 (SUB) socket on the IE-780208-R-EM. If the wiring of this component block remains the same as the factory-set condition, no hardware adjustments are necessary. However, if the user prepares a component block because another clock source is to be used, or because the wired component block has been lost, make all connections in accordance with the procedure described below.

No special setting has to be made on the screen debugger.

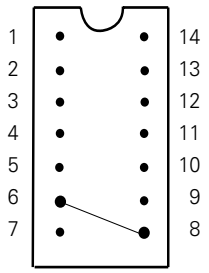
Prerequisites

- Component block (IE-78000-R accessory)
- Lead wires
- Soldering tools

Procedure

① Wire and solder the leads to the component block as shown below.

Fig. 4-15 Wiring of Component Block (to use an external clock as the subsystem clock)



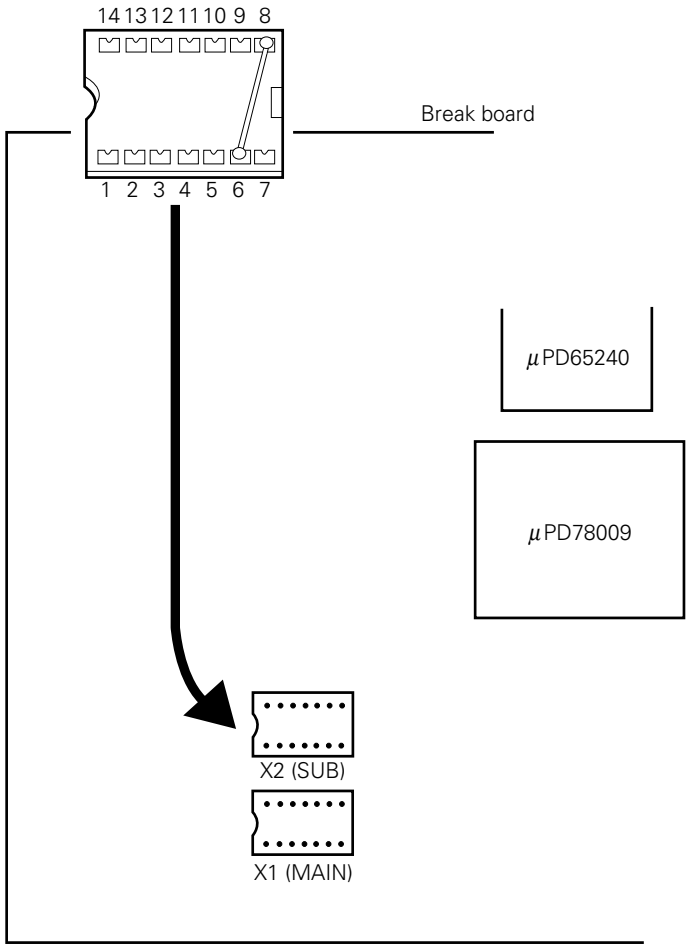
Pin numbers on the component block
6-8

② Prepare the IE-780208-R-EM and the wired break board.

③ Mount the component block in 1 to the socket (socket labeled X2 (SUB) on the break board. At this time, make sure that pin 1 faces in the correct direction.

Phase-out/Discontinued

Fig. 4-16 Component Block Mounting Position (to use an external clock as the subsystem clock)



④ Connect the IE-780208-R-EM and the break board to the IE-78000-R.

The following circuit is configured by the above procedure and the clock signal on the target system can be supplied to the emulation device.

Phase-out/Discontinued

IE-78000-R side
(emulation device)

* 1: Indicates the pin name of the target device.
* 2: Indicates the pin number of the component block.

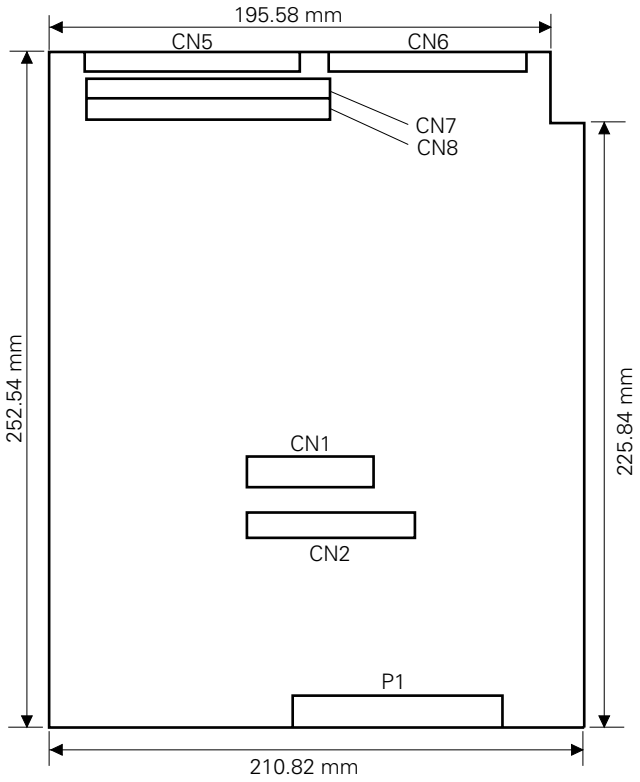
Remarks: The area enclosed by broken lines indicates the portion attached to the component block.

Phase-out/Discontinued

Phase-out/Discontinued

APPENDIX A IE-780208-R-EM PRODUCT SPECIFICATIONS

Product name : IE-780208-R-EM
Peripheral emulation device : μPD78P018F, 78P0209
Operating temperature : 0 to 50°C
Humidity : 10 to 80% RH (without condensation)
Storage temperature : -15 to +60°C
Power requirements : DC 0.5 A max. 2.5 W (supplied from IE-78000-R)
Board dimensions :



Connector : Connector on IE-780208-R-EM board

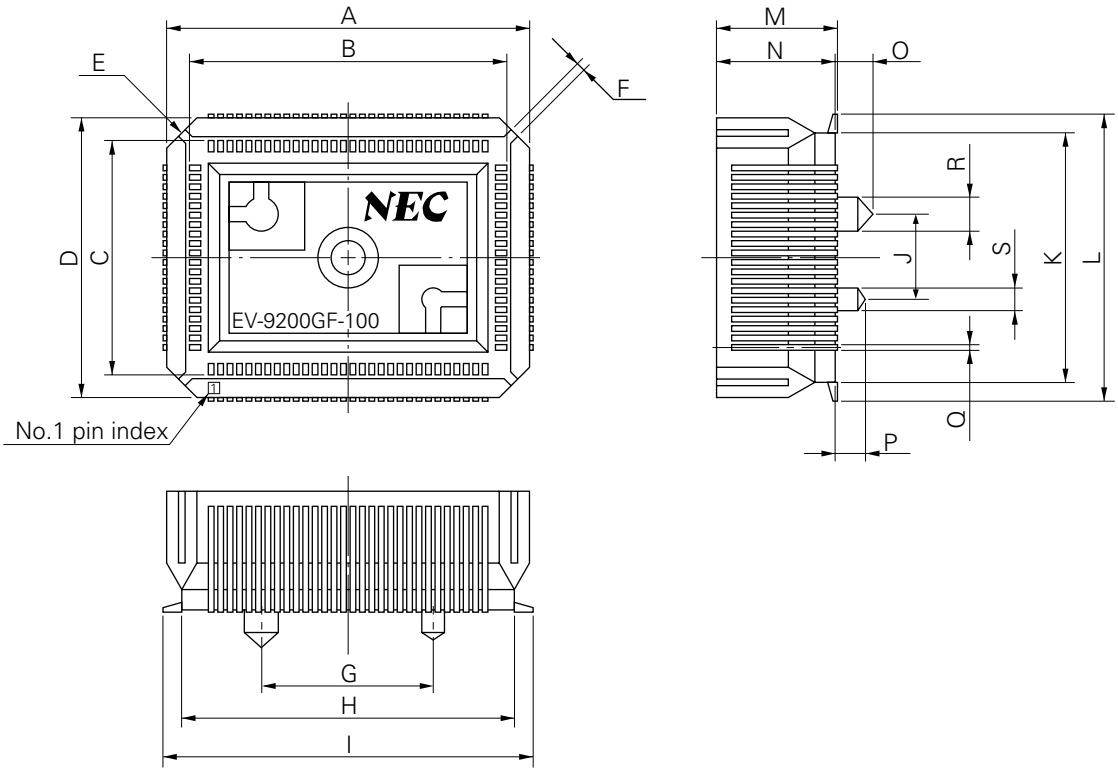
Name	Function
CN1	Break board connector
CN2	
CN5	Emulation probe connector
CN6	
CN7	Connector board connector
CN8	
P1	Main bus connector

Phase-out/Discontinued

Phase-out/Discontinued

APPENDIX B DIMENSIONS OF CONVERSION SOCKET AND RECOMMENDED BOARD MOUNTING PATTERN

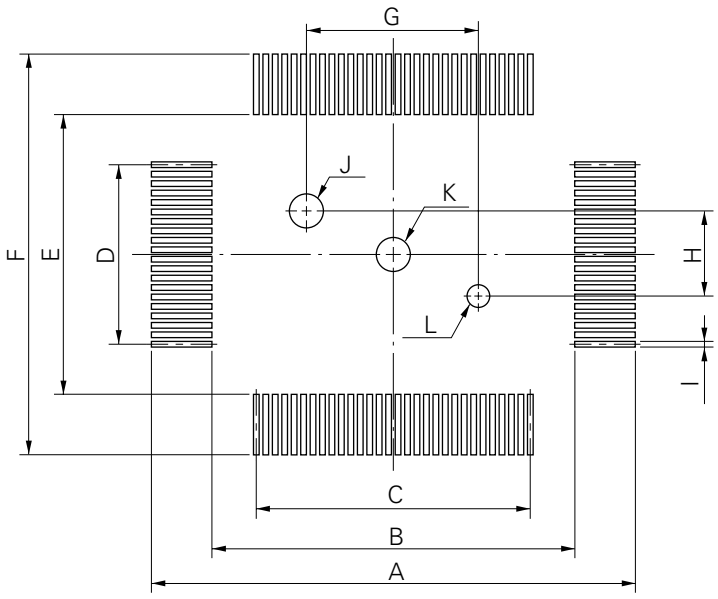
Fig. B-1 DIMENTIONS OF EV-9200GF-100 (reference)



EV-9200GF-100-G0

Phase-out/Discontinued

Fig. B-2 RECOMMENDED BOARD MOUNTING PATTERN OF EV-9200GF-100 (reference)



EV-9200GF-100-P0

Note: The mounting pads on the EV-9200 and the mounting pads on the target device (for QFP) have slightly different dimensions. For the dimensions of the mounting pad for QFP, refer to "Semiconductor Device Mounting Manual (IEI-1207)".

Phase-out/Discontinued

APPENDIX C PIN CONFIGURATION OF EMULATION PROBE

Table C-1 Pin Configuration of EP-78064GF-R (1/2)

CN5 Pin No.	Emulation Probe	**CN5 Pin No.**	Emulation Probe	**CN5 Pin No.**	Emulation Probe	**CN5 Pin No.**	Emulation Probe
1	GND	**25**	3	**49**	15	**73**	45
2		**26**	2	**50**	14	**74**	46
3	30	**27**	1	**51**	100	**75**	47
4	29	**28**	NC	**52**	99	**76**	48
5	28	**29**		**53**	98	**77**	49
6	27	**30**		**54**	97	**78**	50
7	26	**31**		**55**	96	**79**	63
8	25	**32**		**56**	95	**80**	64
9	24	**33**		**57**	94	**81**	65
10	23	**34**		**58**	93	**82**	66
11	22	**35**		**59**	92	**83**	67
12	21	**36**	40	**60**	91	**84**	81
13	20	**37**	39	**61**	NC	**85**	82
14	19	**38**	38	**62**		**86**	83
15	13	**39**	37	**63**		**87**	84
16	12	**40**	36	**64**		**88**	85
17	11	**41**	35	**65**		**89**	86
18	10	**42**	34	**66**		**90**	87
19	9	**43**	33	**67**		**91**	88
20	8	**44**	32	**68**		**92**	89
21	7	**45**	31	**69**	41	**93**	90
22	6	**46**	18	**70**	42	**94**	NC
23	5	**47**	17	**71**	43	**95**	
24	4	**48**	16	**72**	44	**96**	

Remarks: The meanings of the symbols and figures in the column under the heading "Emulation probe" are as follows:

GND : Ground clip
1- 100 : Emulation probe pin numbers
NC : No connection

Phase-out/Discontinued

Table C-1 Pin Configuration of EP-78064GF-R (2/2)

CN6 Pin No.	Emulation Probe	**CN6 Pin No.**	Emulation Probe	**CN6 Pin No.**	Emulation Probe	**CN6 Pin No.**	Emulation Probe
1	NC	**13**	58	**25**	75	**37**	NC
2		**14**	59	**26**	76	**38**	
3		**15**	60	**27**	77	**39**	EXT0
4		**16**	61	**28**	78	**40**	EXT1
5		**17**	62	**29**	79	**41**	EXT2
6	51	**18**	68	**30**	80	**42**	EXT3
7	52	**19**	69	**31**	NC	**43**	EXT4
8	53	**20**	70	**32**		**44**	EXT5
9	54	**21**	71	**33**		**45**	EXT6
10	55	**22**	72	**34**		**46**	EXT7
11	56	**23**	73	**35**		**47**	GND
12	57	**24**	74	**36**		**48**	

Remarks: The meanings of the symbols and figures in the column under the heading "Emulation probe" are as follows:

GND : Ground clip
EXT0-EXT7 : External sense clip
51-80 : Emulation probe pin numbers
NC : No connection

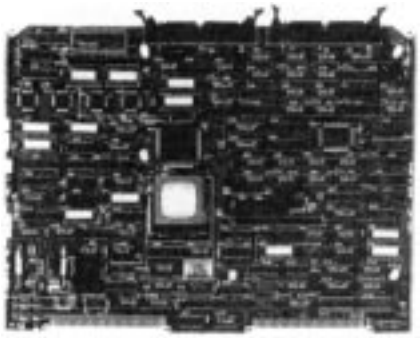
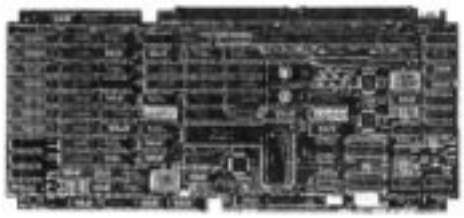
Phase-out/Discontinued

APPENDIX D SYSTEM CONFIGURATION

The IE-78000-R system configuration is shown on the following pages:

Phase-out/Discontinued

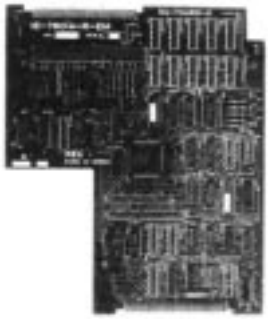
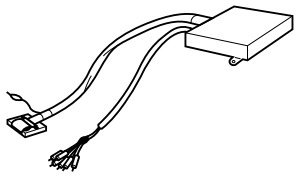
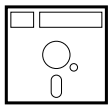
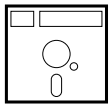
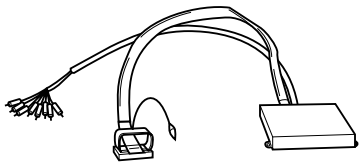
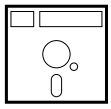
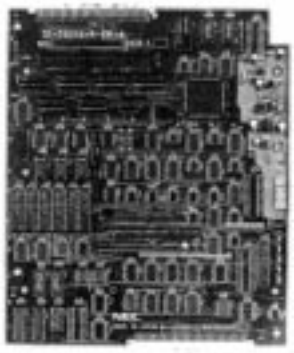
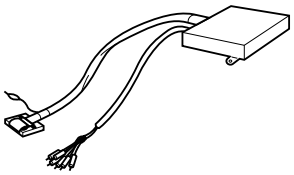
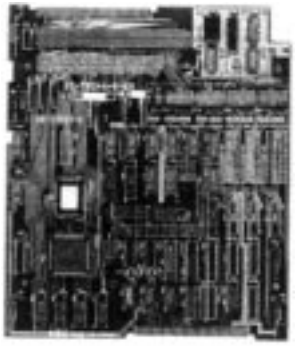
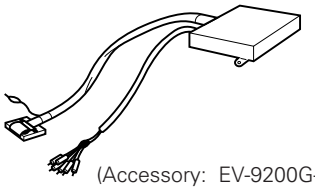
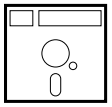
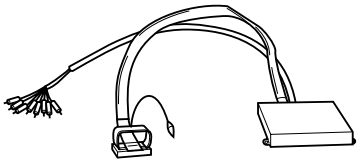
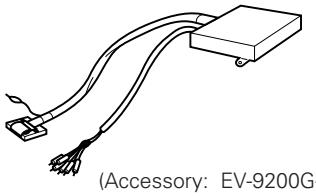
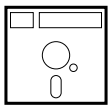
Table D-1 IE-78000-R System Configuration (1/6)

Target Device	Housing and Control/Trace Board	Break Board
μPD78002 Sub-series μPD78002Y Sub-series	 78K Series housing (w/power supply)	 IE-78000-R-BK (78K/0 Series common break board)
μPD78014 Sub-series μPD78014Y Sub-series		
μPD78018F Sub-series		
μPD78024 Sub-series	 IE-78000-R-CS-A (78K Series common control/trace board)	
μPD78044 Sub-series		

Note: μPD78018F and μPD78024 sub-series are under development.

Phase-out/Discontinued

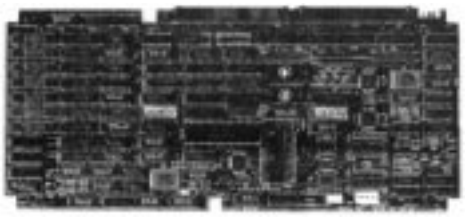
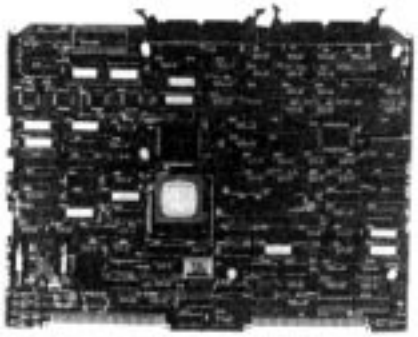
Table D-1 IE-78000-R System Configuration (2/6)

Emulation Board (Optional)	Emulation Probe (Optional)	Screen Debugger (Optional)	Device File (Optional)
 IE-78014-R-EM	 (Accessory: EV-9200GC-64 (1)) EP-78240GC-R	 SD78K0 (with ROM)	 DF78002
	 EP-78240CW-R		 DF78014
 IE-78014-R-EM-A	 (Accessory: EV-9500GK-64 (1)) EP-78012GK-R**Note**		
 IE-78044-R-EM	 (Accessory: EV-9200G-64 (1)) EP-78024GF-R		 DF78024
	 EP-78024CW-R		
	 (Accessory: EV-9200G-80 (1)) EP-78130GF-R		 DF78044

Note: For μPD78018F Sub-series only

Phase-out/Discontinued

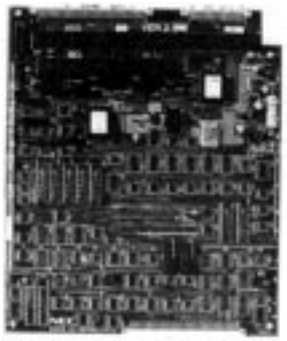
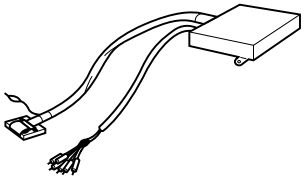
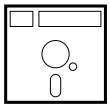
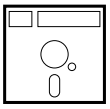
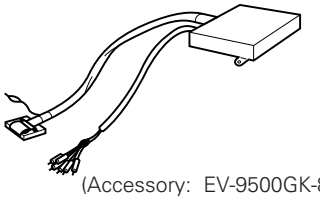
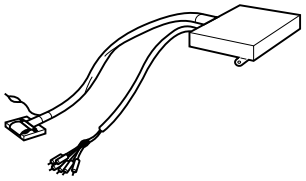
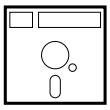
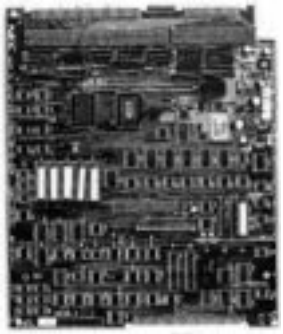
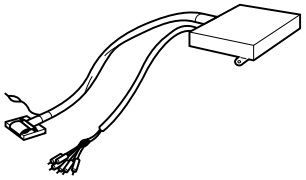
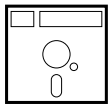
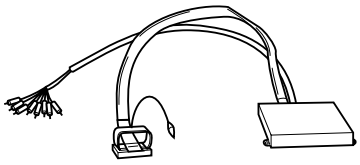
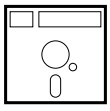
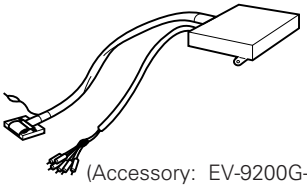
Table D-1 IE-78000-R System Configuration (3/6)

Target Device	Housing and Control/Trace Board	Break Board
μPD78054 Sub-series	 78K Series housing (w/power supply)  IE-78000-R-CS-A (78K Series common control/trace board)	 IE-78000-R-BK (78K/0 Series common break board)
μPD78064 Sub-series		
μPD78078 Sub-series		
μPD78083 Sub-series		

Note: μPD78078 and 78083 sub-series are under development.

Phase-out/Discontinued

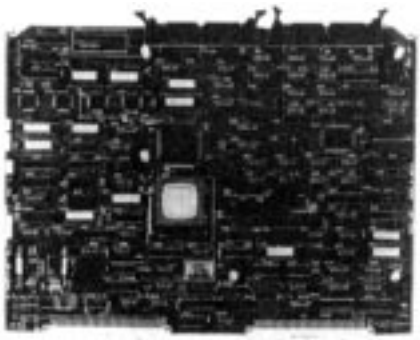
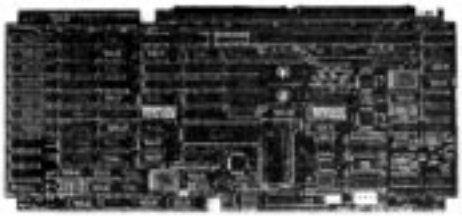
Table D-1 IE-78000-R System Configuration (4/6)

Emulation Board (Optional)	Emulation Probe (Optional)	Screen Debugger (Optional)	Device File (Optional)
 IE-78064-R-EM	 (Accessory: EV-9200GC-80 (1)) EP-78230GC-R	 SD78K0 (with ROM)	 DF78054
	 (Accessory: EV-9200GK-80 (1)) EP-78054GK-R		
	 (Accessory: EV-9500GC-100 (1)) EP-78064GC-R		 DF78064
 IE-78078-R-EM	 (Accessory: EV-9200GF-100 (1)) EP-78064GF-R		 DF78078
	 EP-78083CU-R		 DF78083
	 (Accessory: EV-9200G-44 (1)) EP-78083GB-R		

Note: EP-78083GB-R, EP-78083CU-R, DF78078, and DF78083 are under development.

Phase-out/Discontinued

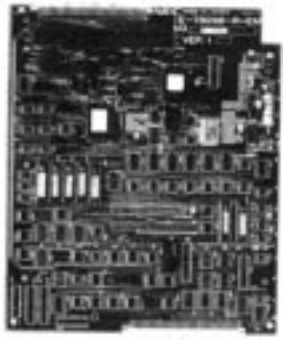
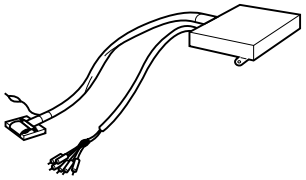
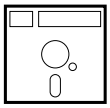
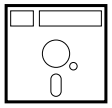
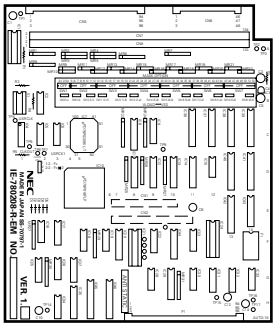
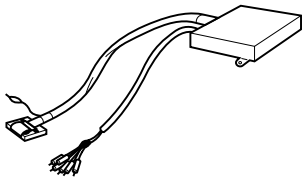
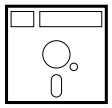
Table D-1 IE-78000-R System Configuration (5/6)

Target Device	Housing and Control/Trace Board	Break Board
μPD78098 Sub-series	 78K Series common housing (w/power supply)	 IE-78000-R-BK (78K/0 Series common break board)
μPD780208 Sub-series	 IE-78000-R-CS-A (78K Series common control/trace board)	

Note: μPD780208 Sub-series is under development.

Phase-out/Discontinued

Table D-1 IE-78000-R System Configuration (6/6)

Emulation Board (Optional)	Emulation Probe (Optional)	Screen Debugger (Optional)	Device File (Optional)
 IE-78098-R-EM	 (Accessory: EV-9200GC-80 (1)) EP-78230GC-R	 SD78K0 (with ROM)	 DF78098
 IE-780208-R-EM	 (Accessory: EV-9200GF-100 (1)) EP-78064GF-R		 DF780208

Note: DF78098 and DF780208 are under development.

Phase-out/Discontinued

Phase-out/Discontinued

APPENDIX E UPGRADING OTHER IN-CIRCUIT EMULATORS TO THE IE-78000-R

If you already have an in-circuit emulator in the 78K Series or 75X Series, it can be upgraded to the 78K/0 in-circuit emulator IE-78000-R by replacing the internal break board with the IE-78000-R-BK.

Table E-1 Upgrading System

Series Name	Your In-Circuit Emulator	Necessary Board
75X Series	IE-75000-R, IE-75001-R	IE-78000-R-BK
78K/I Series	IE-78130-R, IE-78140-R	
78K/II Series	IE-78230-R, IE-78230-R-A, IE-78240-R, IE-78240-R-A	
78K/III Series	IE-78320-R, IE-78327-R, IE-78330-R, IE-78350-R	
78K/VI Series	IE-78600-R	

Phase-out/Discontinued