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RENESAS

USER'S MANUAL

IE-70742-BX

IN-CIRCUIT EMULATOR

TARGET DEVICE
V820™

Document No. U10630EJ1V0UM00 (1st edition)
Date Published January 1997 N
Printed in Japan

This equipment is classified as class one data processing equipment (equipment to be used in commercial and industrial areas) and conforms to the Voluntary Control Council for Interference from Data Processing Equipment and Electronic Office Machines (VCCI) intended to prohibit electromagnetic wave interference in commercial and industrial areas.

Therefore, if this equipment is used in a residential area or its vicinity, it may interfere with radio and television reception.

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M7A 96.10

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PREFACE

Readers

This manual is intended for user engineers who wish to design and develop application systems for the μPD70742 (V820).

Organization

This manual consists of the following chapters:

Overview
Installation
Starting
Notes on Hardware Design
Notes on Correct Use

Purpose

This manual explains the functions of the IE-70742-BX which is used to design and develop application systems for the μPD70742.

How to Read This Manual

It is assumed that the readers of this manual have a general knowledge of electricity, logic circuits, and microcontrollers.

To understand the basic specifications
→ Read **CHAPTER 1 OVERVIEW**.

To perform setting and connections
→ Read **CHAPTER 2 INSTALLATION.**

To understand the power-up and power-down sequence, how to connect and disconnect the emulation probe, and operation
→ Read **CHAPTER 3 STARTING**.

To understand the points to be noted in designing hardware and using this in-circuit emulator
→ Read **CHAPTER 4 NOTES ON HARDWARE DESIGN** and **CHAPTER 5 NOTES ON CORRECT USE.**

To understand the overall functions of this in-circuit emulator
→ Read this manual in the order of Table of Contents.

Related documents

Some of the related documents listed below are preliminary editions but are not so specified here.

Documents related to network interface board for BX series in-circuit emulator

Part Number	Document Name	Document Number
IE-70000-BX-SV1	User's Manual	—

Documents related to V820

Part Number	Document Name	Document Number
V820	User's Manual	U10077E
	Data Sheet	U11678E

Documents related to development tools

Part Number	Document Name		Document Number
C compiler (CA732)	User's Manual	Operation, UNIX based	U11013E
		Operation, MS-DOS™ based PC DOS™ based	U11066E
		ANSI C language	U11010E
		Assembly language	U11016E
Source debugger (ID732)	User's Manual	Operation, UNIX based	—
		Installation, UNIX based	—
		Operation, MS-DOS based PC DOS based	—
		Installation, MS-DOS based PC DOS based	—

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CHAPTER 1 OVERVIEW

This chapter explains the system configuration and function specifications of the IE-70742-BX.

1.1 Functional Outline

The IE-70742-BX is an in-circuit emulator for efficiently debugging the hardware and software of a system under development using the V820.

The IE-70742-BX is connected to a host machine and operates under control of the host machine.

A workstation (UNIX operating system) or a personal computer (PC-9800 series or IBM PC series) can be connected as the host machine.

When a workstation is used as the host machine, connect the IE-70742-BX to the host machine via a network. When a personal computer is used, insert a dedicated interface board to the expansion slot of the computer, and connect the in-circuit emulator to the computer via this board.

An optional debugger is necessary for actually executing debugging. For details, refer to the **ID732 User's Manual.**

Remark The in-circuit emulator may sometimes referred to as IE in this manual.

1.2 Features

- Operates with source debugger (ID732)
- Two operation modes: real mode and logic mode
  Real mode ..... Mode in which only the memory of the target system is accessed without the emulation memory or guard area specified.
  Real-time emulation with 25-MHz user wait.
  Logic mode .... Mode in which the program is executed with the emulation memory or guard area specified.
  Emulation with 1 wait + user wait.
- CPU status indication by LEDs
  RUN, NORDY, HOLD, HALT
- Event break
  [Event condition] ..... Fetch/read/write of address and memory, read/write of I/O
  [Number of events] .... 16 MAX.
- Real-time trace at 25 MHz
- Step execution
  Step execution of up to 65,535 instructions at one time
- Emulation memory: 1M bytes (standard)
  2M bytes (expanded)
  Emulation with 2 waits + user wait

Table 1-1 shows the functional specifications of the IE-70742-BX.

Table 1-1. Functional Specifications (1/2)

Parameter	Specifications	Description
Target CPU	μPD70742 (V820)	• 208-pin QFP supported
Operating clock	External Input frequency: 4.16 MHz MAX. Operating frequency: 25 MHz MAX. Internal Input frequency: 4.16 MHz Operating frequency: 25 MHz	• Internal or external clock selectable by command • External cannot be oscillated by crystal oscillator • Internal clock can be changed by changing the oscillator.
CPU status indication	Indicated by LEDs on front panel <1> RUN <2> NORDY <3> HOLD <4> HALT	 <1> Lights while user program is executed (green) <2> Lights if bus cycle cannot be terminated because $\overline{\text{READY}}$ signal is not input from target system (red) <3> Lights during bus hold (red) <4> Lights during HALT instruction execution (red) All statuses <1> to <4> can also be read from host computer.
Mask function	Set by command <1> $\overline{\text{HLDRQ}}$ <2> $\overline{\text{RESET}}$ <3> $\overline{\text{NMI}}$ <4> $\overline{\text{READY}}$ <5> $\overline{\text{SZRQ}}$ <6> SIZ16B <7> $\overline{\text{ICHEEN}}$	 • Can mask control signals from target system • Masked by software even when unmasked unless power is supplied to target system
Emulation memory	1M bytes (standard) (Can be divided into 15 blocks)	• 960K bytes (of which 64K bytes are used as monitor area) • 1 operation • Expansion emulation memory (option) expandable by 2M bytes
Memory mapping function	• Emulation memory : 1 block • Can be allocated with 64K-byte	• Can be allocated to real memory space of 4G bytes with 64K-byte boundary • Target memory area, emulation memory area, and guard area can be mapped
I/O mapping function	None (external)	• Mapping of I/O space is not managed.

Table 1-1. Functional Specifications (2/2)

Parameter	Specifications	Description
Break function[Note]	<1> Event break 16 events MAX. Event condition: Combination of A1 to A31, D0 to D31, $\overline{MRQ}$, $\overline{BE0}$ to $\overline{BE3}$, ST0, ST1, R/$\overline{W}$, XST0, XST1, EXDAT0 to EXDAT7, ADRERR	• Combination of address, data, and bus status as condition of event break • Address range can be specified (up to two ranges). • Data and external sense data are selectable.
	<2> Number of software breakpoints: 100 MAX.	• Break function using BRKRET instruction
	<3> Forced break	• Forced break can be accepted even during HALT
	<4> Break on guard area access	• Break is executed when area specified as guard area is accessed or when fetched instruction is executed
	<5> Logical mode error	• Break is executed if logical mode error occurs
	<6> Trace full break	• Break is executed if trace memory is full
Trace function[Note]	Width: 128 bits Depth: 16K frames	• Real-time trace of up to 25 MHz CPU clock • Disassemble display of executed instructions • Display of program execution time
	Stop condition setting	• Up to 16 stop trigger conditions can be set • Trace memory full stop • Manual stop
	Trace content display during program execution	• Trace contents can be displayed even during user program execution.
	Trace result search function	• Specific address can be searched and displayed from trace result.
Program execution	• Execution can be started from any address. • Step can be executed.	• Program can be executed from any address. • Step execution of up to 65,535 instructions at one time • Traces instruction execution and displays result of disassemble
Supply voltage	AC100 V AC220 V	• Built-in power supply (with AC 100/220 V automatic select function)
Dimensions	Main enclosure: H327.5 × W122 × D320 [mm] Pod: H65 × W95 × D160 [mm]	• Common housing of BX series • With built-in power supply • Power is supplied from main enclosure.
Weight	Approx. 10 kg	• With carrying handle
Power consumption	80 W MAX.	• Forced cooling fan provided
Operating temperature	10 to 40 °C 10 to 80 %RH	• Without condensation
Storage temperature	−15 to +45 °C 10 to 80 %RH	• Without condensation

Note These contents are the hardware specifications of the emulator. For the details during operation, refer to **ID732 User's Manual.**

1.3 Dimensions

Figure 1-1 shows the dimensions of the head of the emulation probe.

Figure 1-2 shows the dimensions of the conversion adapter and Figure 1-3 shows the recommended mounting pattern on printed circuit board.

Figure 1-1. Head of Emulation Probe

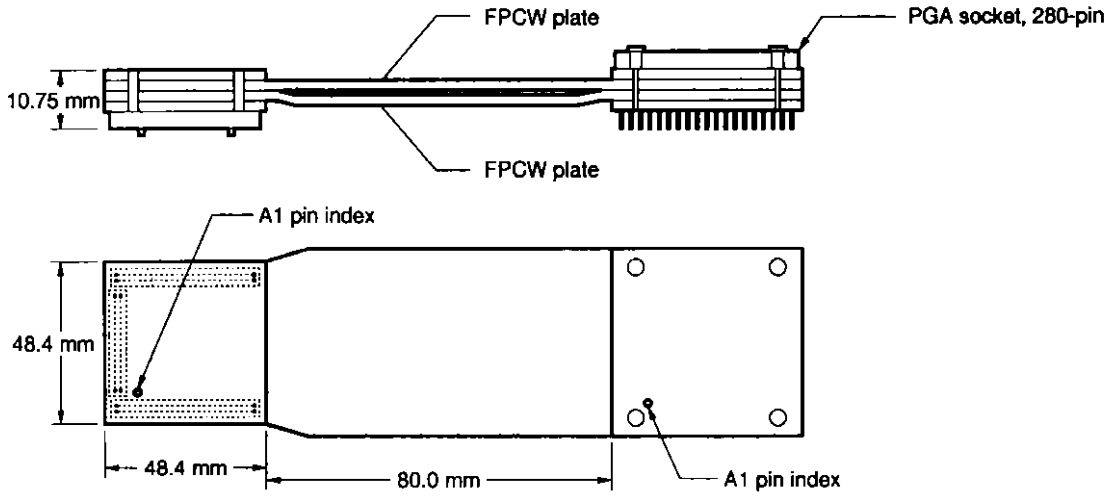


Figure 1-2. Dimensions of Conversion Adapter (reference)

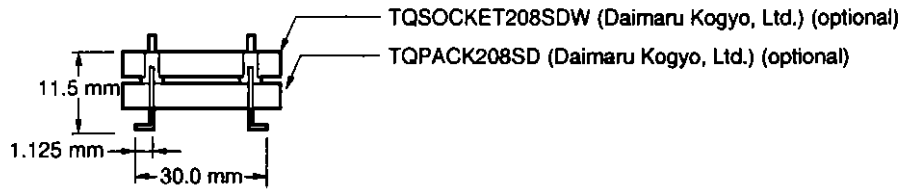
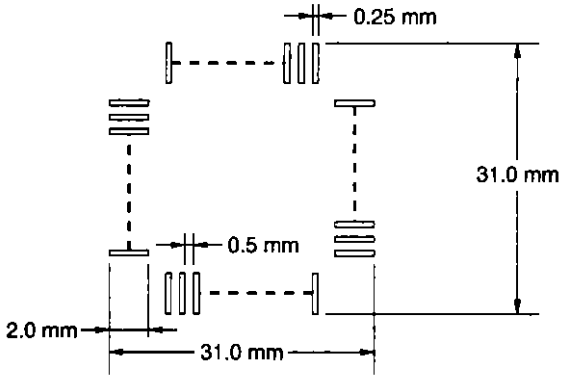


Figure 1-3. Recommended Mounting Pattern on Printed Circuit Board (reference)



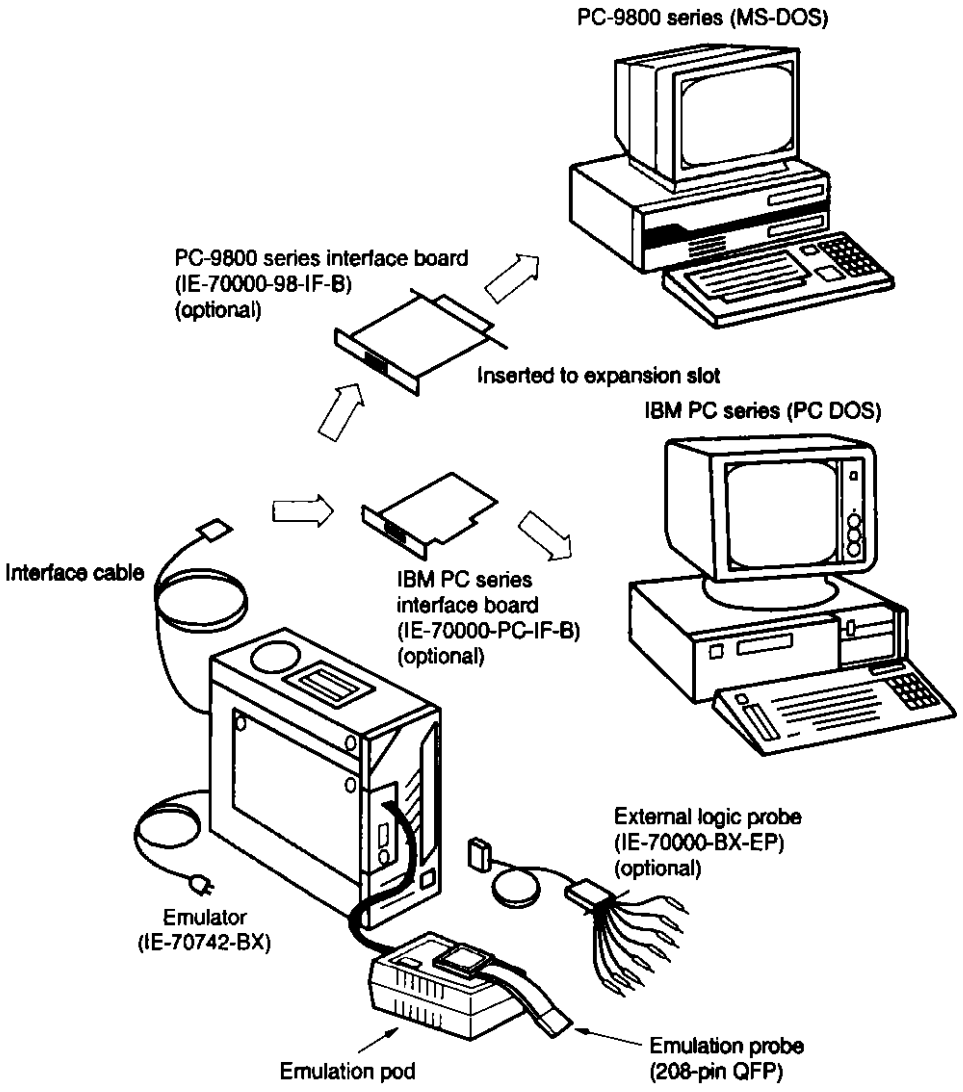
For details of the conversion adapter, contact:

Daimaru Kogyo, Ltd. Tel: (03) 3820-7112
Tel: (06) 244-6672

1.4 System Configuration

Figures 1-4 through 1-6 show the system configuration of the IE-70742-BX.

Figure 1-4. Personal Computer-Based System Configuration



Caution The interface board (IE-70000-98-IF-B/IE-70000-PC-IF-B) is sold separately but is necessary for system configuration.

Figure 1-5. Workstation-Based System Configuration (Ethernet™)

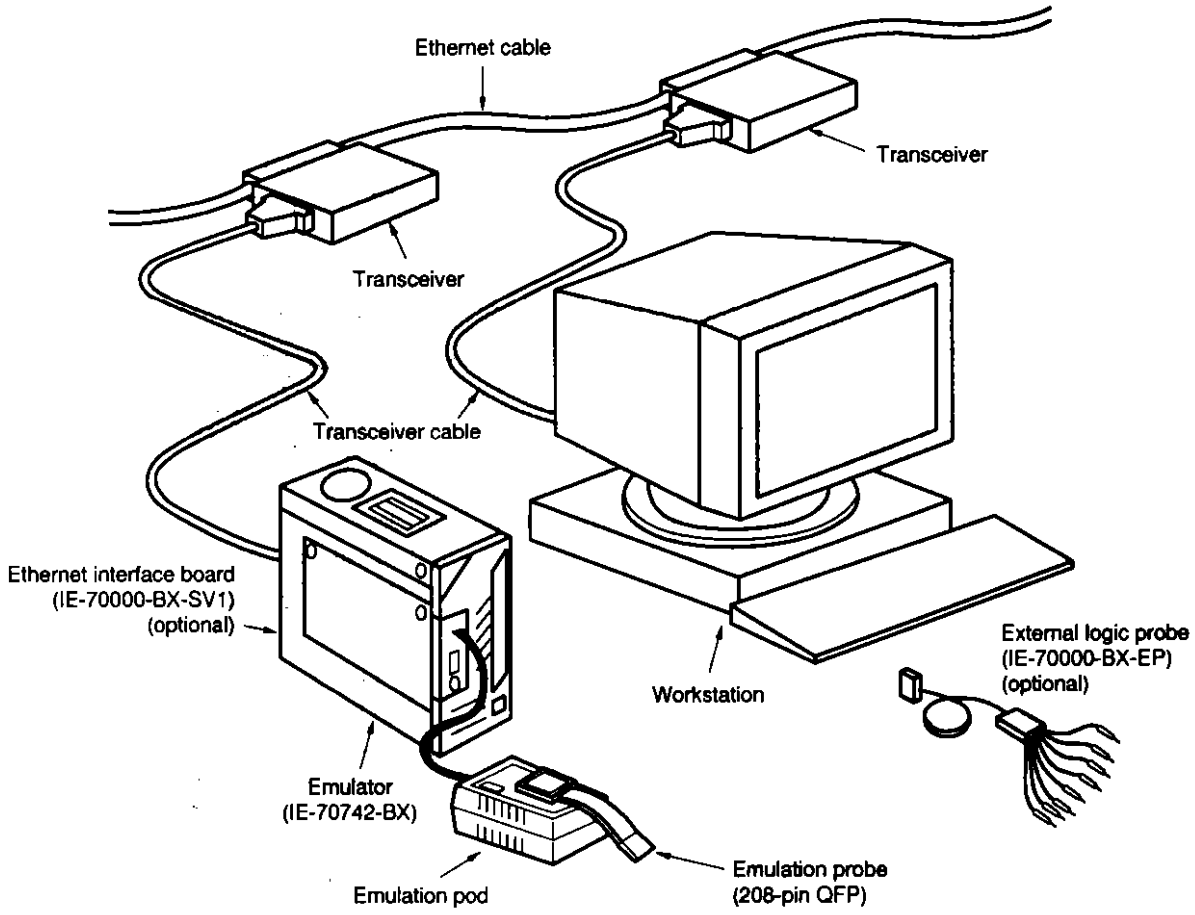
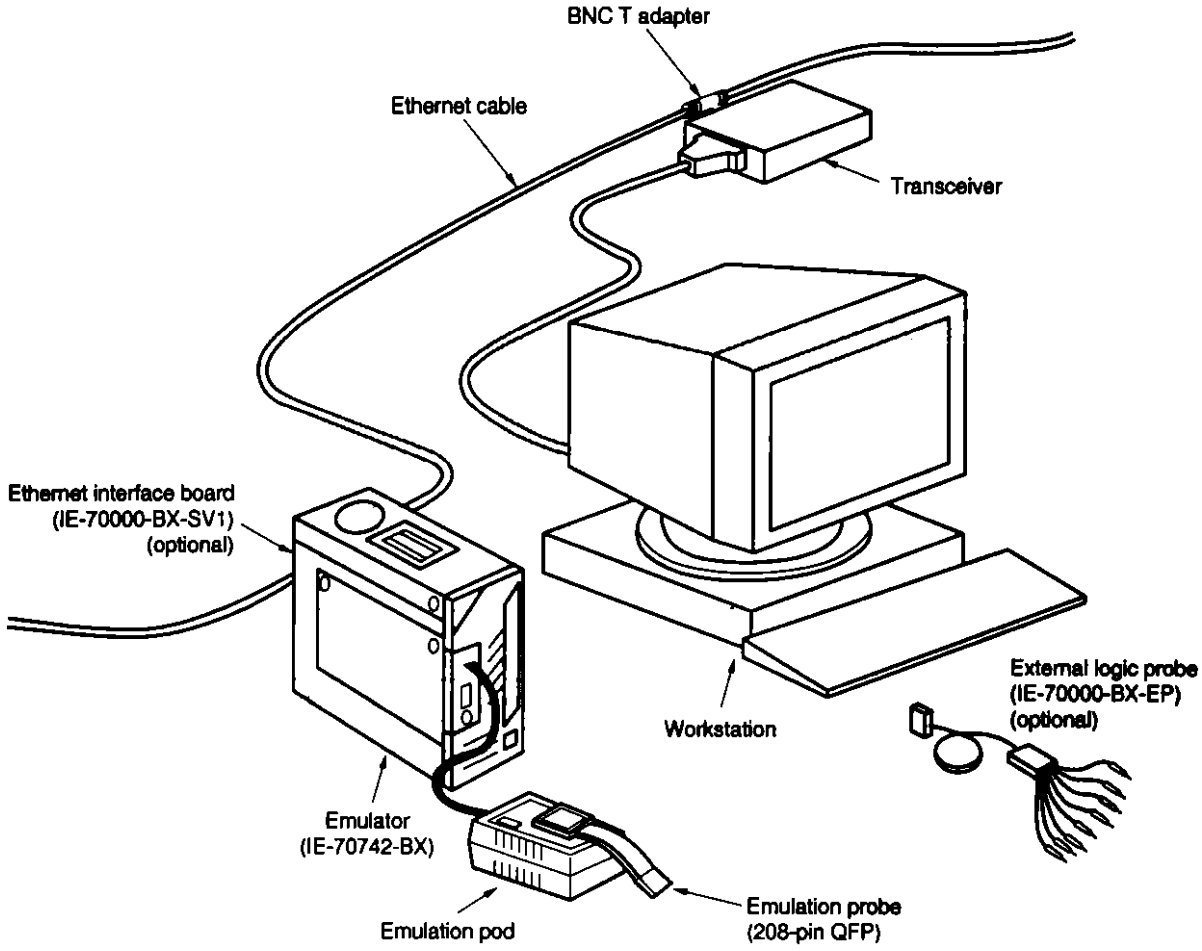


Figure 1-6. Workstation-Based System Configuration (Cheapernet)



1.5 Hardware Configuration

Table 1-2 shows the hardware configuration of the IE-70742-BX.
Table 1-3 lists the options necessary for system configuration.

Table 1-2. Hardware Configuration

No.	Name	Description
<1>	Emulator	• V820 emulation board (EM1 board) • Real-time trace board (TR board)
<2>	Emulation pod	Mounts CPU, emulation probe, and internal clock oscillator
<3>	Interface cable	Connects emulator and interface board (length: approx. 2 m)
<4>	Emulation probe	Connects emulator and target system. • Supports TQSOCKET

Table 1-3. Options

No.	Name	Description
<1>	Personal computer interface board (IE-70000-98-IF-B: for PC-9800 series) (IE-70000-PC-IF-B: for IBM PC series)	Board connecting personal computer and IE (Inserted in expansion slot of personal computer)
<2>	Network interface board (IE-70000-BX-SV1)	Board connecting Ethernet and IE (Inserted in expansion slot of IE)
<3>	Socket conversion adapter (TQSOCKET208SDW, TQPACK208SD)	Adapter converting head of emulation probe to QFP (Product of Daimaru Kogyo, Ltd.)

1.6 Options and Related Products

Table 1-4 shows the options that can be connected to the IE-70742-BX.

Table 1-4. Options

No.	Name	Description
<1>	External logic probe (IE-70000-BX-EP)	Consists of GND (one) and external input (eight), and can use external input as trigger and display trace result
<2>	Expansion emulation memory (IE-70000-BX-MM2)	• Inserted to expansion slot of IE • High-speed 2M-byte SRAM • Operation with 2 waits + user wait

CHAPTER 2 INSTALLATION

This chapter explains how to unpack the IE-70742-BX from the shipping box of and how to connect the respective parts of the IE-70742-BX.

2.1 Unpacking

Confirm that the following items are included in the carton of the IE-70742-BX.

		Qty
(1)	Main enclosure	1
(2)	Others	
	(a) User's Manual (this manual)	1
	(b) Interface cable[Note]	1
	(c) Fuse	1
	(d) Power cable	1
	(e) Accessory list	1
	(f) AC power cable adapter	1
	(g) Packing list	1

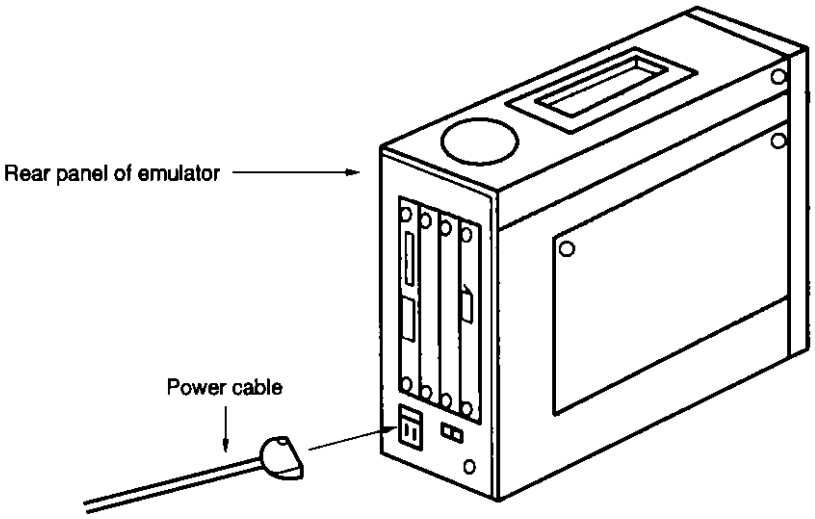
Note The interface board is optional and must be purchased separately.

2.2 Connecting IE

2.2.1 Connecting power cable

Figure 2-1 shows connection between the power cable and emulator.

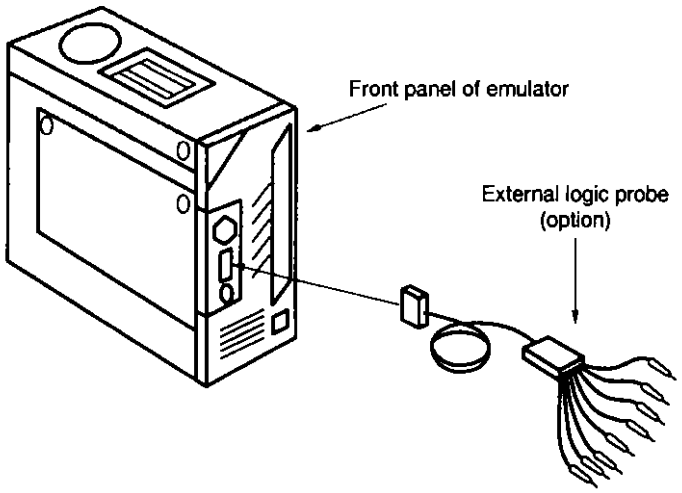
Figure 2-1. Connecting Power Cable



2.2.2 Connecting external logic probe (option)

When using the external logic probe, connect it to the emulator as shown in Figure 2-2. Be sure to connect the external logic probe with the power to the emulator tuned off.

Figure 2-2. Connecting External Logic Probe



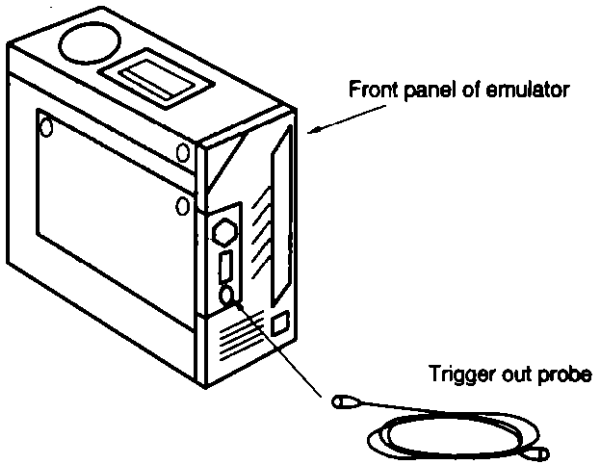
2.2.3 Connecting trigger out probe (general-purpose)

The trigger out terminal is used to connect an external unit with a BNC coaxial cable with connector. To use a trigger out probe, connect it to the emulator as shown in Figure 2-3.

Because this product is not available from NEC, use the one supplied with a logic analyzer, etc.

The trigger out signal is an output signal of TTL level. It is low during break and high during user program execution.

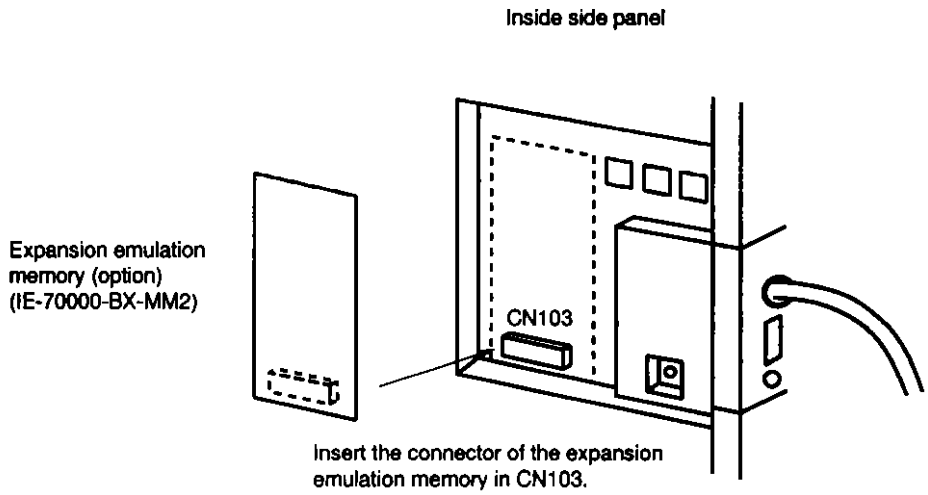
Figure 2-3. Connecting Trigger Out Probe



2.2.4 Connecting expansion emulation memory (option)

When using an external emulation memory, connect it inside the emulator as shown in Figure 2-4.

Figure 2-4. Connecting Expansion Emulation Memory



2.3 Setting of Host Machine (when using personal computer)

When using a personal computer as the host machine, an optional interface board is necessary.

No special setting of the hardware is necessary. If the I/O port that performs handshaking between the computer and IE-70742-BX is already used for other expansion boards, however, either disconnect the board, or change the allocation to the vacant I/O address after changing the setting of the interface board.

- **With PC-9800 series**
  PC-9800 series computers can operate in V30™ mode and 80286/386 mode. Because the emulator operates in either of these modes, it is not necessary to set a specific mode.
- **With IBM PC series**
  The IBM PC series, including both the PC/AT™ and PC/XT™, do not have different modes.

2.3.1 Connecting PC-9800 series and IE-70742-BX

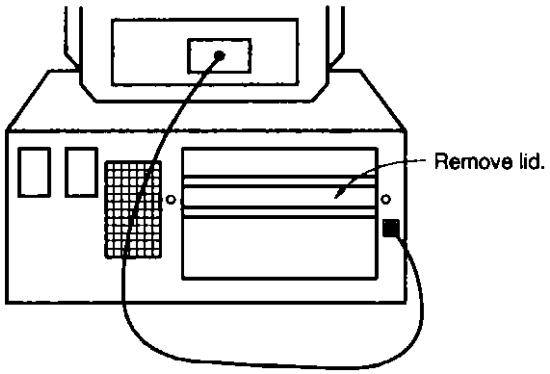
This section explains how to connect the IE-70742-BX to a PC-9800 series computer.

When using an IBM PC series computer, refer to the subsequent explanation.

Connect the PC-9800 series and IE-70742-BX as follows:

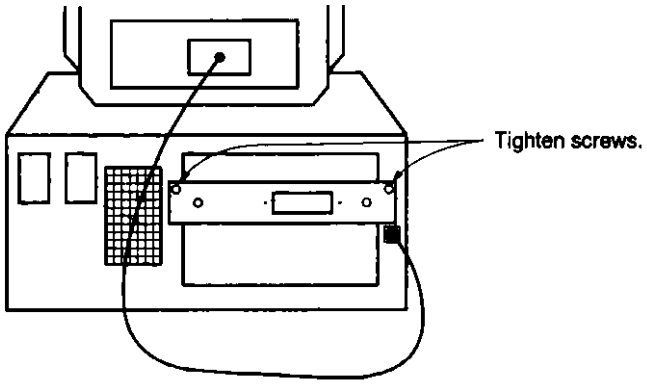
(1) Turn off power to the PC-9800 series.
(2) Remove the lid of the slot bus.

Figure 2-5. Rear View of PC-9800 Series



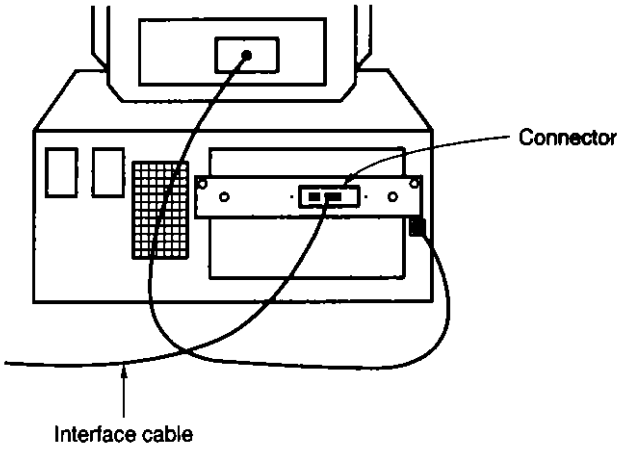
(3) Insert the interface board.
(4) Secure the interface board with screws.

Figure 2-6. Inserting Interface Board



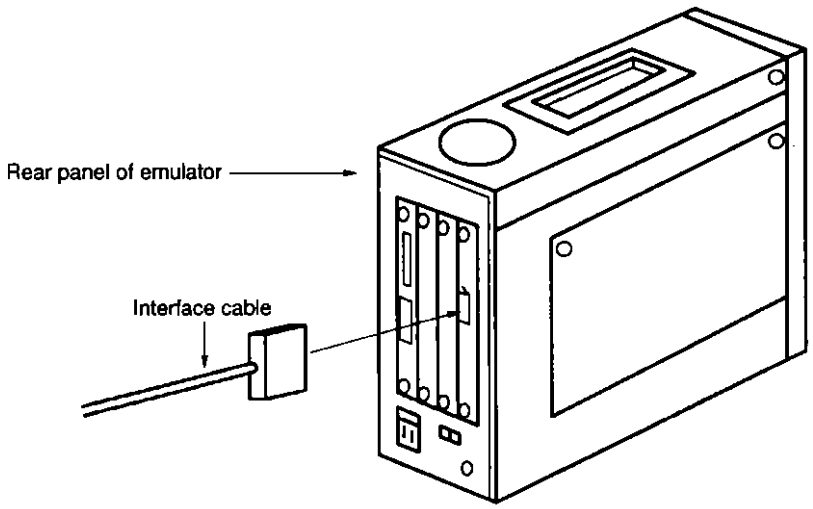
(5) Connect the interface cable.

Figure 2-7. Connecting Interface Cable



(6) Connect the interface cable to the emulator.

Figure 2-8. Connecting Interface Cable to Emulator



2.3.2 Setting of interface board

In order for the IE-70742-BX to handshake with a PC-9800 or IBM PC series computer as the host machine, an I/O address must be set by using the DIP switch on the interface board.

(1) With PC-9800 series (setting of IE-70000-98-IF-B)

The I/O address is set by using DIP switches 1 (SW1) and 2 (SW2) on the interface board.

SW1 and SW2 set the handshake bus address.

Set Nos. 1 through 8 of SW1 as shown in Figure 2-9, and Nos. 5 through 8 of SW2 as shown in Figure 2-10 (addresses 00D0H through 00DBH are set).

Figure 2-9. Setting of DIP Switch 1 (PC-9800 series)

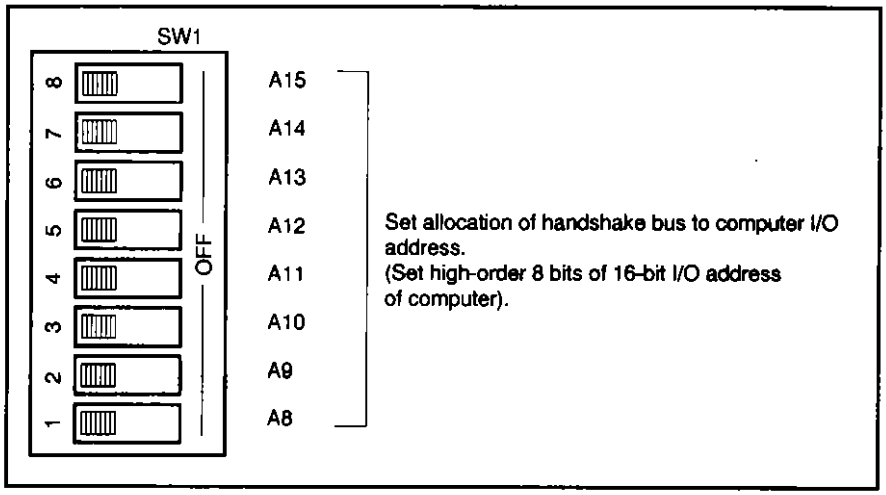


Figure 2-10. Setting of DIP Switch 2 (PC-9800 series)

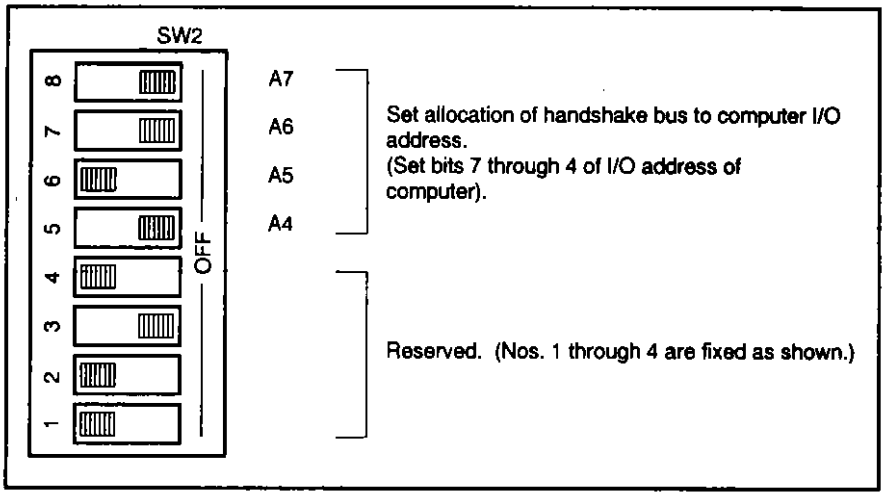
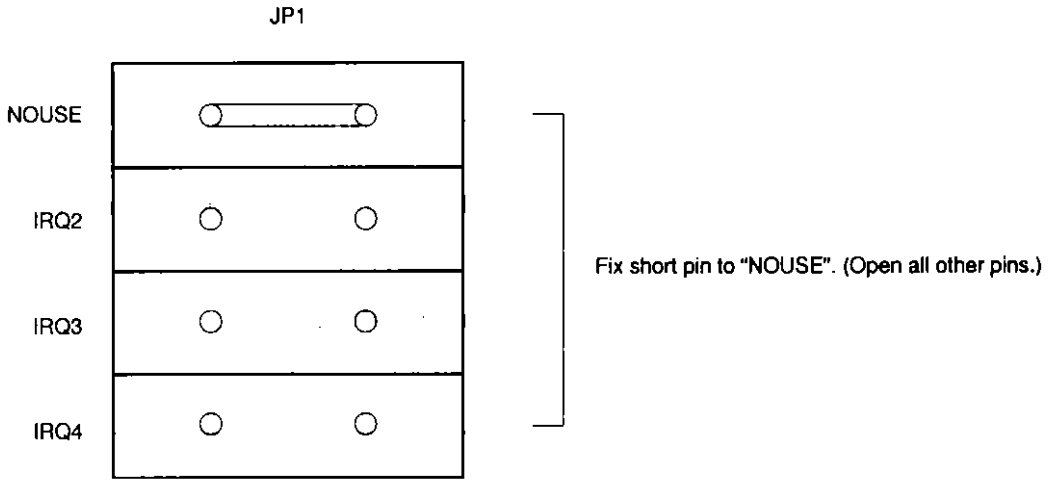


Figure 2-11. Setting of Jumper Switch (PC-9800 series)



(2) With IBM PC series (setting of IE-70000-PC-IF-B)

The I/O address is set by using DIP switches 1 (SW1) and 2 (SW2).

SW1 and SW2 set the handshake bus address.

Set Nos. 1 through 8 of SW1 as shown in Figure 2-12, and Nos. 1 through 4 of SW2 as shown in Figure 2-13 (addresses 0220H through 022DH are set).

Figure 2-12. Setting of DIP Switch 1 (IBM PC series)

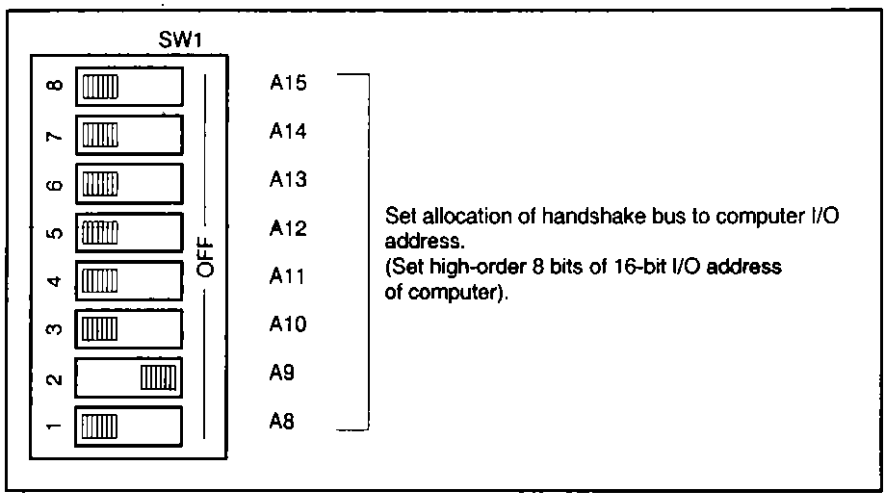


Figure 2-13. Setting of DIP Switch 2 (IBM PC series)

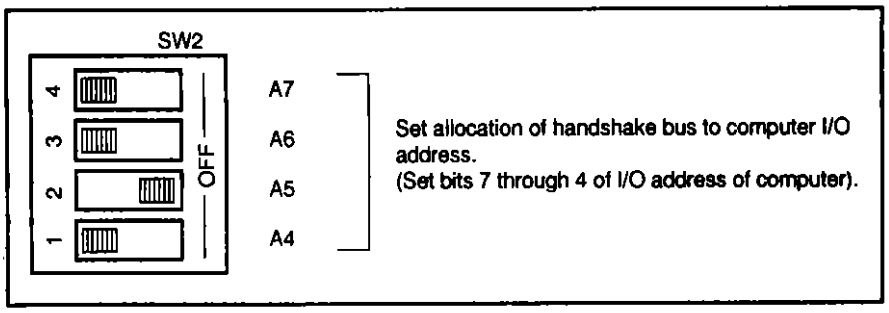
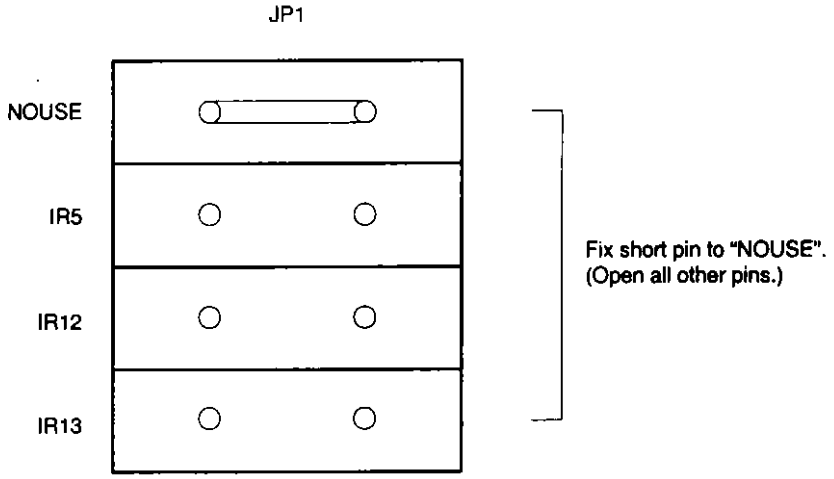


Figure 2-14. Setting of Jumper Switch (IBM PC series)



2.3.3 Setting environmental variables

- **Changing handshake bus address**

The default value of the handshake address bus is as follows when the environmental variables are not set:

PC-9800 series : address 00DXH
IBM PC series : address 022XH

If the above address cannot be used, the address can be changed by specifying a base address for environmental variable "IE-70742_BASE". At this time, also change the setting of the DIP switch (refer to **2.3.2 Setting of Interface board**).

Example A>SET IE70742_BASE=01D0

In this example, the base address is set to 01DX. The low-order 4 bits of the set value can be any value, but must be described.
Input the value in hexadecimal. If a character other than a hexadecimal number is input, the default value is assumed.
For the specific environment settings of the host machine, refer to **ID732 User's Manual - Installation, MS-DOS Based, PC DOS Based**.

2.4 Setting of Host Machine (when using workstation)

2.4.1 Operational outline of system

The IE has a TCP/IP program and programs for initialization, such as routing of a network, in ROM.

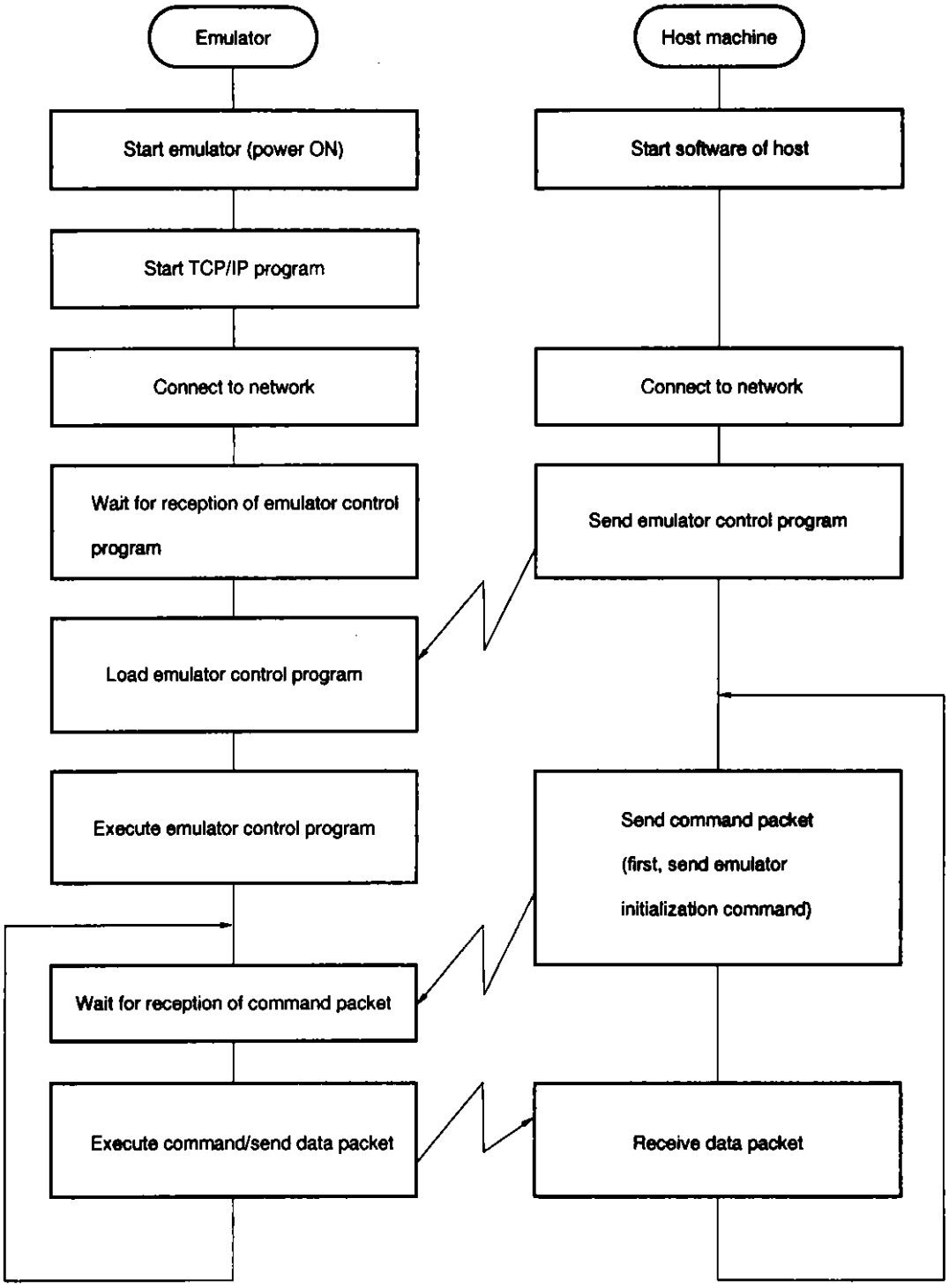
The emulator, when connected to a network, can send or receive debug commands and data with TCP/IP.

To start up the system or initialize the emulator, an emulator control program must be downloaded from the host machine.

Because all the other emulator control programs are downloaded from the host machine after the program that connects the emulator to the network has been started, they are not provided to the emulator in advance.

The programs downloaded to the emulator are lost when the power to the emulator is turned off. To turn on power again, restart the software of the host machine and reload the emulator control program again. Figure 2-15 outlines the operations of the emulator, including from starting the system and command acceptance.

Figure 2-15. Operational Outline



2.4.2 Connection to network

The IE-70742-BX is connected to a network with a network interface board (IE-70000-BX-SV1)[Note].

The network interface board (hereafter referred to as "SV1 board") is equipped with two types of external interfaces (10BASE5 and 10BASE2) conforming to IEEE802.3, and can be connected to either Ethernet or Cheapernet. However, it cannot be connected to both at the same time.

10BASE5 or 10BASE2 is selected by the jumper on the SV1 board.

For specific connection of each network cable, refer to **2.4.10 Connecting network cable**.

For the details of the SV1 board, refer to **2.4.4 Setting of jumper switches** and **2.4.5 Installing SV1 board**.

Note This is optional. For details, refer to **IE-70000-BX-SV1 User's Manual**.

2.4.3 Setting of IE

To connect the IE-70742-BX to a network, the emulator must be initialized. This section explains how to do this.

Before initializing the emulator, the following are necessary:

<1> IE-70742-BX (main enclosure)

<2> IE-70000-BX-SV1 (SV1 board)[Note 1]

<3> Terminal (terminal having RS-232C terminals such as personal computer)[Note 2]

<4> RS-232C cable (For the details of the specifications and connections, refer to **2.4.9 Connecting RS-232C cable**.)

Notes 1. The transceiver, transceiver cable, coaxial cable, and RS-232C cable are not supplied. Prepare these as the system requires.

2. The terminal and RS-232C cable are necessary for initializing the SV1 board.

2.4.4 Setting of jumper switches

It is not necessary to set the jumper switches of the emulator. This section explains only how to set the jumper switches of the SV1 board.

Figures 2-16 and 2-17 show the locations and factory-set conditions of the jumper switches on the SV1 board. Change the setting of these jumper switches as necessary.

Table 2-1 shows the functions of the jumper switches.

Table 2-1. Functions of Jumper Switches

Jumper Switch		Function	Factory-Set Condition
Board side	JP1	Selects SCSI terminal power supply (Do not change factory-set condition.)	1-2
	JP2	Used to connect terminal necessary for initialization. Selects baud rate of RS-232C.	1-2 (9600 bps)
	JP3-8	Selects network connection standard (Ethernet/Cheapernet).	1-2 (Cheapernet)
	SW4	Reserved (Do not change factory-set condition.)	OFF
Panel side	MASTER	Selects host connection. Selects whether host to be connected to emulator is connected to network (SV) or personal computer interface (EM).	SV (Network connection)
	CONF.	Initialization switch Selects whether initialization mode or TCP/IP program start mode is set on power application.	1 (Initialization mode)

Figure 2-16. Factory-Set Conditions of SV1 Board (on board)

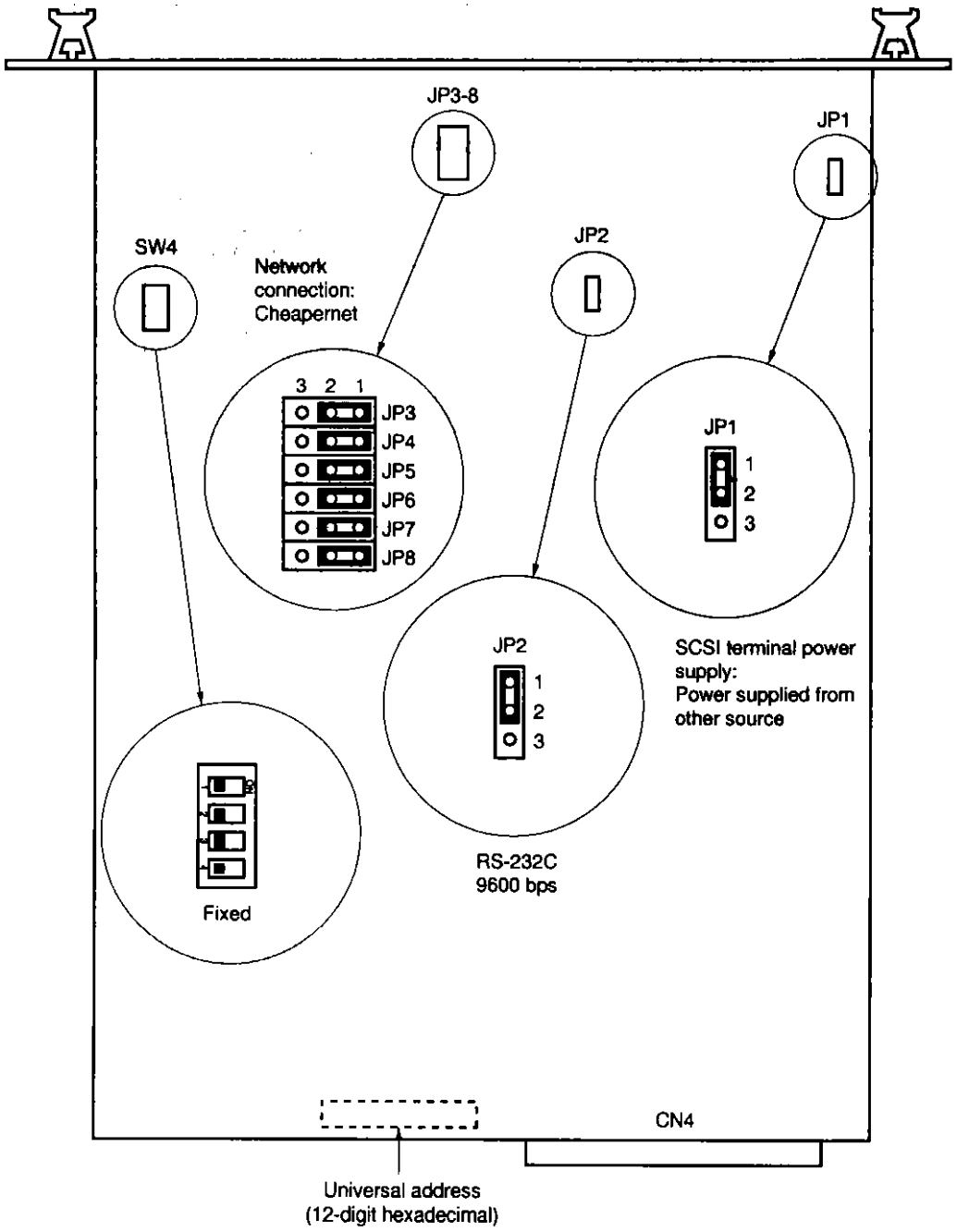
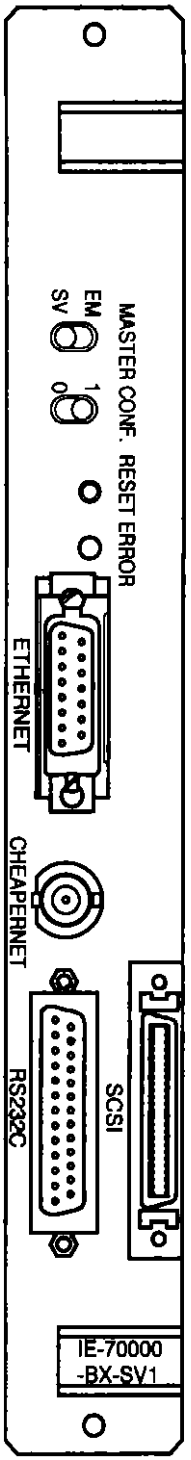


Figure 2-17. Factory-Set Conditions of SV1 Board (on front panel)



Host select switch

Initialization switch

Reset switch

Error indicator LED

Transceiver connector

Cheapernet connector

RS-232C connector

SCSI connector

(1) Setting of jumper switches on board

Set this jumper switch in accordance with the system used.

JP1: This switch is not used for this system. Do not change the factory-set condition of this switch.

JP2: Change the setting of this switch according to the baud rate of the terminal used when setting network information.

Table 2-2. Setting of JP2

Baud Rate	Description
9600 bps	1-2 short (factory-set condition)
4800 bps	2-3 short

JP3 through JP8: Change the setting of these switches according to the standard of the network cable connected.

Table 2-3. Setting of JP3 through JP8

Network Standard	Description
Cheapernet (10BASE2)	1-2 short (factory-set condition)
Ethernet (10BASE5)	2-3 short

Caution Set JP3 through JP8 in the same manner.
Setting where 1 and 2 of one switch is short-circuited and 2 and 3 of another switch is short-circuited may cause malfunction.

SW4: This switch is not used for this system. Do not change the factory-set condition of this switch.

(2) Setting of switches on front panel

Set the switches on the front panel as follows:

Table 2-4. Setting of Switches on Front Panel

Switch Name	Description
MASTER	Set this switch to SV side (factory-set condition).
CONF.	Set this switch to "1" side (factory-set condition) when no network information is set or when network information is set again. Set it to "0" side when setting of network information is completed.

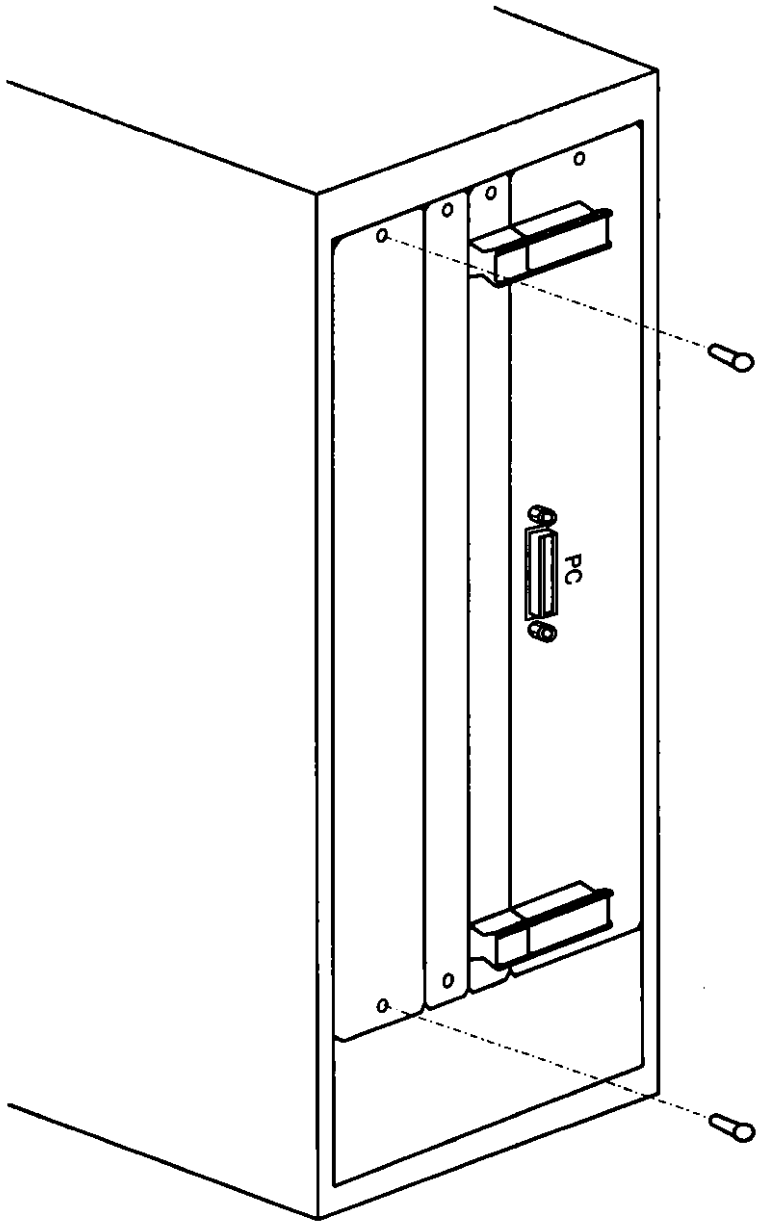
2.4.5 Installing SV1 board

The following paragraphs (1) through (3) explain the procedure to install the SV1 board.

(1) Remove the back panel of the emulator. In doing so, keep in mind the following points.

- Do not lose the mounting screws because they will be used again.
- The emulator has four slots, and the slot to which the SV1 board is to be inserted is fixed. The board cannot be inserted to any other slots.

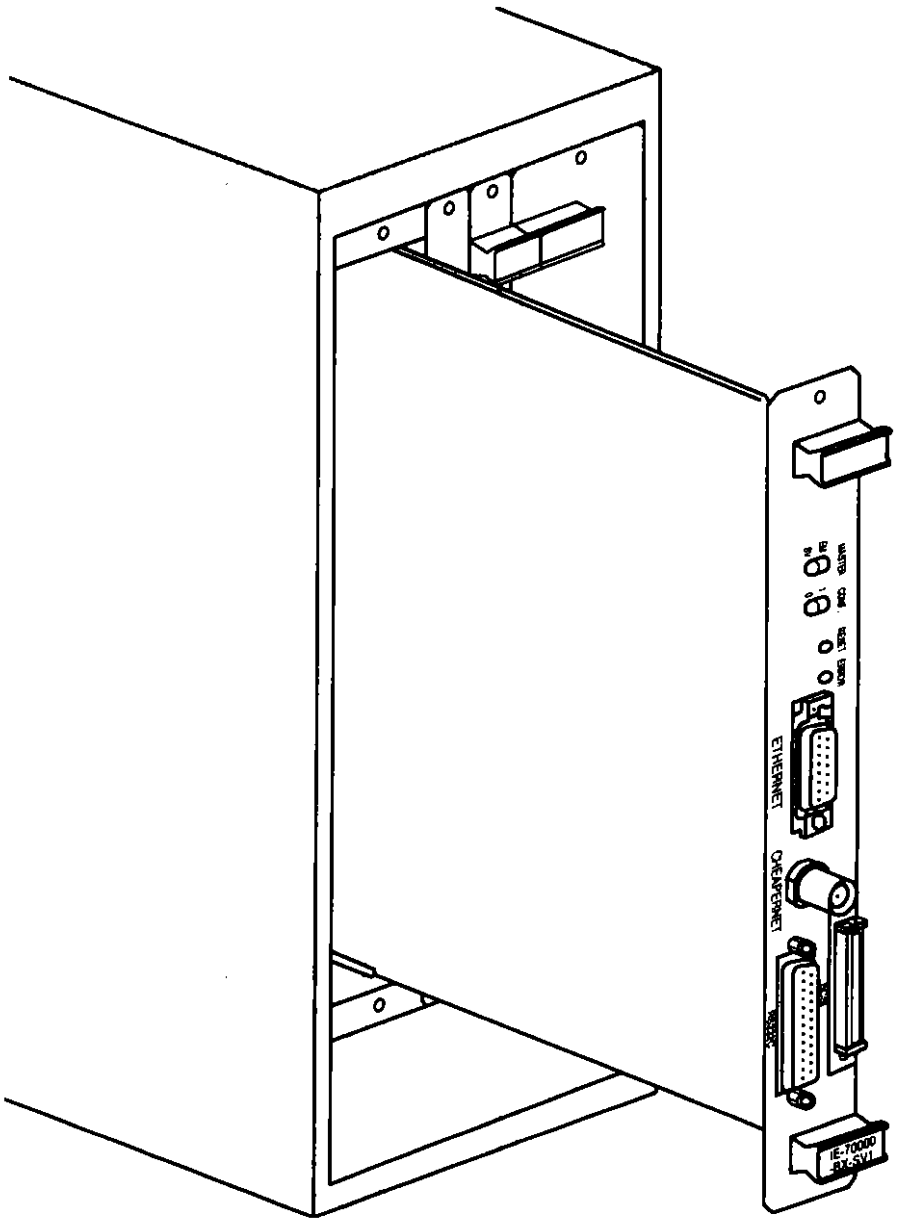
Figure 2-18. Removing Back Panel



(2) Install the SV1 board in the emulator. In doing so, keep in mind the following points.

- Confirm that the power to the emulator has been turned off.
- Confirm that the jumper switches are correctly set.
- Insert the SV1 board in the correct direction (notice the direction of the component side of the board).
- Make sure that the board is inserted along the guard rail.

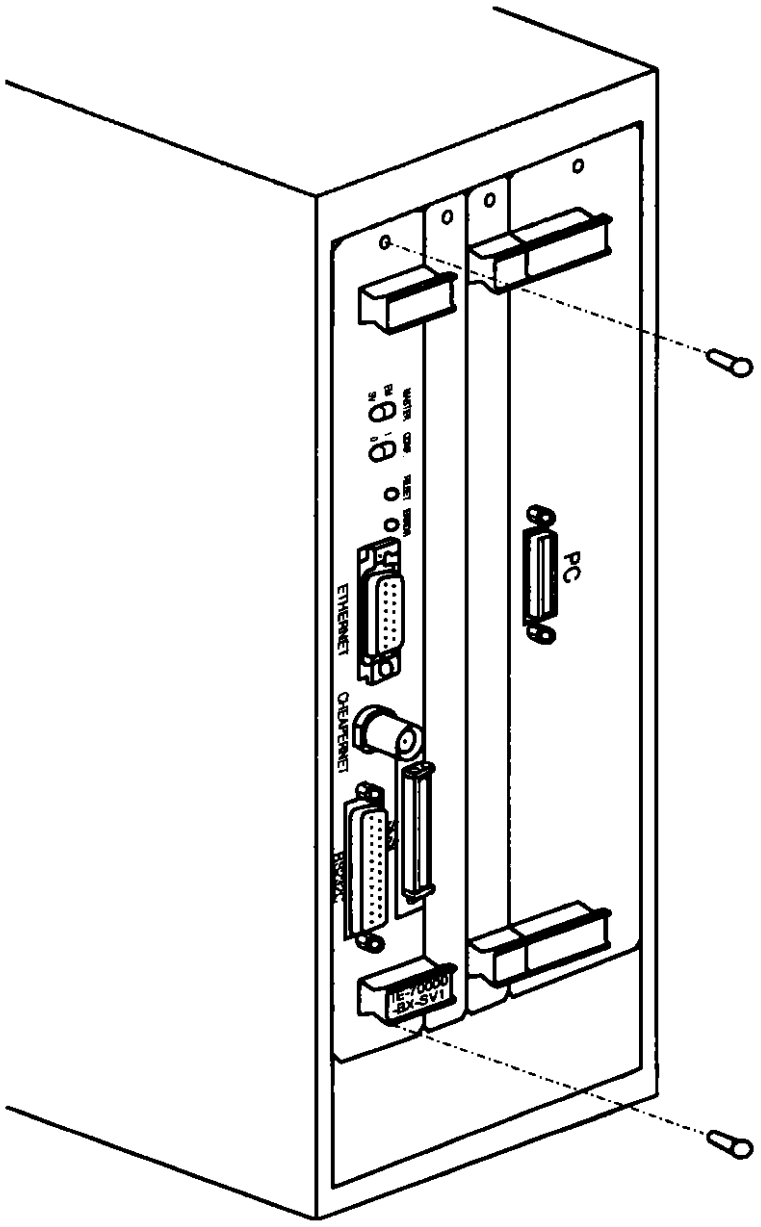
Figure 2-19. Inserting SV1 Board



(3) Secure the back panel with the screws. In doing so, keep in mind the following points.

- Confirm that the connector of the board is connected to the connector of the chassis.
- Secure the SV1 board to the chassis with the mounting screws of the back panel.

Figure 2-20. Securing Panel with Screws



2.4.6 Setting network information

To connect the emulator to the network, network information must be set on the host machine and in the emulator.

For how to set the network information on the host machine, refer to **ID732 User's Manual**.

To set the network information, the information used when the environment was set up on the host machine is necessary.

This information is usually given by the manager of the UNIX operating system on the host machine, or by the network manager.

Confirm in advance the following network information necessary for environment setting.

- **IP address (LOCAL IP ADDRESS)**
  Network-specific address allocated to emulator
  (This address is expressed in decimal numbers delimited with a period on the host machine. To set this address to the emulator, express it as an 8-digit hexadecimal number.)
- **Host name (LOCAL HOST NAME)**
  Use the same name as on the host (alphanumeric character string of up to 16 characters).
- **Port number (LOCAL PORT NO.)**
  Set a 4-digit hexadecimal number (usually 0401H or higher) other than 0.

2.4.7 Starting initialization program

Set the network information by starting the network initialization program on the SV1 board. Before turning on power to the emulator, check the following points.

- Is the terminal of the RS-232C port of the emulator connected?
- Is the "CONF." switch on the back panel of the SV1 board set to "1" (if the "CONF." switch is set to "0", the network initialization program cannot be started).

When power to the emulator is turned on, or when reset is executed, the messages shown in Figure 2-21 are displayed on the terminal screen. Following these messages, a prompt is displayed, indicating that the SV1 board is waiting for input of a command.

Figure 2-21. Start Messages

```
8088/86 Modular BIOS Ver x.xx  mm/dd/yy
Copyright (c) 1984-89 Award Software Inc.
IBM Compatible DSIF-BIOS (c) Digital Electronics Corp.
SIZING SYSTEM MEMORY.....640K FOUND

MEMORY-DISK BIOS VERSION x.xx
Copyright (c) 1990 Digital Electronics Corporation
MEMORY-DISK INSTALLED DRIVE A:

DSIF : VIDEO RESOURCES       < OPTIMIZING >
DSIF : KEYBOARD RESOURCES    < OPTIMIZING >
 entry TCP/IP System Driver. < OPTIMIZING >
TCP/IP Driver Ver x.xx

A>BREAK ON

A>CONF

A>IF ERRORLEVEL 1 GOTO END

A>
A>
```

After confirming output of the prompt, input "ENET" to start the initialization program.

Correctly set the network information obtained in the preceding section in accordance with the setting menu. For the details of the initialization program, refer to **IE-70000-BX-SV1 User's Manual**.

Figure 2-22. Setting Menu

```
A>ENET

--- SETUP NETWORK INFORMATION -----------------------
    1. LOCAL ETHERNET ADDRESS    XXXXXXXXXXXX
    2. LOCAL IP ADDRESS          XXXXXXXX
    3. LOCAL HOST NAME           XXXXXXXXXXXXXXX
    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. >>■
```

(1) Setting of LOCAL ETHERNET ADDRESS

As the local Ethernet address (1: LOCAL ETHERNET ADDRESS), the universal address is set as a factory-set condition for shipment.

This universal address is a board-specific address and cannot be changed by the user. Therefore, function number "1" cannot be selected.

The values set in this menu is written to the EEPROM and therefore, is not lost even when the power is turned off.

(2) Setting of LOCAL IP ADDRESS

[Function]

Sets the IP address of the IE-70000-BX-SV1. One IP address is allocated to each node. Set the address given by the network manager.

[Input format]

Input the IP address as an 8-digit hexadecimal number.

[Example]

```
          .
          .
          .
    11. EXIT
-----------------------------------------------------
  FUNCTION NO. >>2 ↵                                  Select function No. 2.

  LOCAL IP ADDRESS            >XXXXXXXX               The current IP address is displayed.
  NEW LOCAL IP ADDRESS        >12345678 ↵             Input a new IP address.

--- SETUP NETWORK INFORMATION ----------------------- The menu is displayed.
     1. LOCAL ETHERNET ADDRESS  XXXXXXXXXXXX
          .
          .
          .
     2. LOCAL IP ADDRESS        12345678             The new IP address is displayed.
          .
          .
          .
    11. EXIT
-----------------------------------------------------
  FUNCTION NO. >>■
```

(3) Setting of LOCAL HOST NAME

[Function]

Sets the host name (node name) of the IE-70000-BX-SV1.

[Input format]

Input the host name as an alphanumeric string of 16 characters or less.
Set the host name given by the network manager.

[Example]

```
          .
          .
          .
     11. EXIT
-------------------------------------------------------
  FUNCTION NO. >>3 ↵                                    Select function No. 3.

  LOCAL HOST NAME              >XXXXXX                  The current host name is displayed.
  NEW LOCAL HOST NAME          >LOCALHOSTNAME ↵         Input a new host name.

--- SETUP NETWORK INFORMATION ------------------------ The menu is displayed.
      1. LOCAL ETHERNET ADDRESS  XXXXXXXXXXXX
          .
          .
          .
      3. LOCAL HOST NAME         LOCALHOSTNAME          The new host name is displayed.
          .
          .
          .
     11. EXIT
-------------------------------------------------------
  FUNCTION NO. >>■
       .
```

(4) Setting of LOCAL PORT NO.

[Function]

Set the port number of the IE-70000-BX-SV1.

[Input format]

Input a port number as a 4-digit hexadecimal number other than 0. Usually, a port number of 0401 (1025 in decimal) or higher is set.

[Example]

```
          .
          .
          .
     11. EXIT
-----------------------------------------------------
FUNCTION NO. >>4 ↵                                    Select function No. 4.

LOCAL HOST NO.                >XXXX                   The current port number is displayed.
NEW LOCAL PORT NO.            >0401 ↵                 Input a new port number.

--- SETUP NETWORK INFORMATION ------------------------ The menu is displayed.
      1. LOCAL ETHERNET ADDRESS  XXXXXXXXXXXX
          .
          .
          .
      4. LOCAL PORT NO.          0401                 Input a new port number.
          .
          .
          .
     11. EXIT
-----------------------------------------------------
FUNCTION NO. >>■
```

(5) Setting of REMOTE ETHERNET ADDRESS

[Function]

Sets the Ethernet address of the host machine through which the in-circuit emulator is manipulated.

[Input format]

Input the address as a 12-digit hexadecimal number.
If the host machine is not specified, input FFFFFFFFFFFF. Usually, input FFFFFFFFFFFF.

[Example]

```
          .
          .
          .
     11. EXIT
-----------------------------------------------------
  FUNCTION NO. >>5 ↵                                  Select function No. 5.

  REMOTE ETHERNET ADDRESS      >XXXXXXXXXXXX          The current Ethernet address is
                                                      displayed.
  NEW REMOTE ETHERNET ADDRESS >0123456789AB ↵         Input a new Ethernet address.

--- SETUP NETWORK INFORMATION ------------------------ The menu is displayed.
      1. LOCAL ETHERNET ADDRESS  XXXXXXXXXXXX
          .
          .
          .
      5. REMOTE ETHERNET ADDRESS 0123456789AB         The new Ethernet address is
                                                      displayed.
          .
          .
          .
     11. EXIT
-----------------------------------------------------
  FUNCTION NO. >>■
```

(6) Setting of REMOTE IP ADDRESS

[Function]

Sets the IP address of the host machine.

[Input format]

Input the address as an 8-digit hexadecimal number.

If the host machine is not specified, set 0. Usually, input 0.

[Example]

```
          .
          .
          .
     11. EXIT
-----------------------------------------------------
  FUNCTION NO.  >>6 ↵                                  Select function No. 6.

  REMOTE IP ADDRESS           >XXXXXXXX                The current IP address is displayed.
  NEW REMOTE IP ADDRESS       >12345678 ↵              Input a new IP address.

--- SETUP NETWORK INFORMATION ----------------------- The menu is displayed.
      1. LOCAL ETHERNET ADDRESS  XXXXXXXXXXXX
          .
          .
          .
      6. REMOTE IP ADDRESS       12345678              The new IP address is displayed.
          .
          .
          .
     11. EXIT
-----------------------------------------------------
  FUNCTION NO. >>■
```

(7) Setting of REMOTE HOST NAME

[Function]

Sets the host name (node name) of the host machine.

[Input format]

Input the host name as an alphanumeric string of 16 characters or less.

If the host machine is not specified, only input a carriage return. Usually, input only a carriage return.

[Example]

```
          .
          .
          .
     11. EXIT
-------------------------------------------------------
  FUNCTION NO. >>7 ↵                                    Select function No. 7.

  REMOTE HOST NAME              >XXXXXX                 The current host name is displayed.
  NEW REMOTE HOST NAME          >REMOTEHOSTNAME ↵       Input a new host name.

--- SETUP NETWORK INFORMATION ------------------------ The menu is displayed.
      1. LOCAL ETHERNET ADDRESS  XXXXXXXXXXXX
          .
          .
          .
      7. REMOTE HOST NAME        REMOTEHOSTNAME         The new host name is displayed.
          .
          .
          .
     11. EXIT
-------------------------------------------------------
  FUNCTION NO. >>■
```

(8) Setting of REMOTE PORT NO.

[Function]

Sets the port number of the host machine.

[Input format]

Input the port number as a 4-digit hexadecimal number.
If the host machine is not specified, input 0. Usually, input 0.

[Example]

```
          .
          .
          .
     11. EXIT
-----------------------------------------------------
  FUNCTION NO. >>8 ↵                                  Select function No. 8.

  REMOTE PORT NO.              >XXXX                  The current port number is displayed.
  NEW REMOTE PORT NO.          >0123 ↵                Input a new port number.

--- SETUP NETWORK INFORMATION ------------------------ The menu is displayed.
      1. LOCAL ETHERNET ADDRESS  XXXXXXXXXXXX
          .
          .
          .
      8. REMOTE PORT NO.          0123                The new port number is displayed.
          .
          .
          .
     11. EXIT
-----------------------------------------------------
  FUNCTION NO. >>■
```

(9) Setting of ROUTER ADDRESS

[Function]

Sets the IP address of the router. Set this address when the emulator is connected to the host machine via the router.

[Input format]

Input the IP address as an 8-digit hexadecimal number.
Input 0 if routing is not necessary.

[Example]

```
          .
          .
          .
     11. EXIT
-----------------------------------------------------
  FUNCTION NO. >>9 ↵                                  Select function No. 9.

  ROUTER ADDRESS              >XXXXXXXX               The current router address is
                                                      displayed.
  NEW ROUTER ADDRESS          >12345678 ↵             Input a new router address.

--- SETUP NETWORK INFORMATION ------------------------ The menu is displayed.
      1. LOCAL ETHERNET ADDRESS  XXXXXXXXXXXX
          .
          .
          .
      9. ROUTER ADDRESS          12345678             The new router address is
          .                                           displayed.
          .
          .
     11. EXIT
-----------------------------------------------------
  FUNCTION NO. >>■
```

(10) Setting of SUBNET ADDRESS MASK

[Function]

Sets the subnet address mask field.

[Input format]

Set the bit indicating the address position of the subnet to 1, and input the subnet address mask field as an 8-digit hexadecimal number.

If subnet address mask is not set, input 0.

[Example]

To use the high-order 24 bits of the IP address to recognize the subnet, and the low-order 8 bits to recognize the host

```
          .
          .
          .
    11. EXIT
-----------------------------------------------------
  FUNCTION NO. >>10 ↵                                  Select function No. 10.

  SUBNET ADDRESS MASK          >XXXXXXXX               The current subnet address mask is
                                                       displayed.
  NEW SUBNET ADDRESS MASK      >FFFFFF00 ↵             Input a new subnet address mask.

--- SETUP NETWORK INFORMATION ------------------------ The menu is displayed.
     1. LOCAL ETHERNET ADDRESS  XXXXXXXXXXXX
          .
          .
          .
    10. SUBNET ADDRESS MASK     FFFFFF00               The new subnet address mask is
                                                       displayed.
          .
          .
          .
    11. EXIT
-----------------------------------------------------
  FUNCTION NO. >>■
```

(11) EXIT

[Function]

Terminates the network information setting menu and updates the contents of the EEPROM™ with the set values.

[Input format]

Input S, Q, or C.

S : Writes the set network information to EEPROM and closes the menu.

Q : Closes the menu without writing the set network information.

C : Continue setting of the network information. Returns to the menu.

[Example]

<1> When S is input

```
          .
          .
          .
    11. EXIT
-------------------------------------------------------
  FUNCTION NO. >>11 ↵                          Select function No. 11.

  Save & quit / Quit / Continue  >S ↵          Writes the network information to
                                               EEPROM and closes the menu.
A>■
```

<2> When Q is input

```
          .
          .
          .
    11. EXIT
-------------------------------------------------------
  FUNCTION NO. >>11 ↵                          Select function No. 11.

  Save & quit / Quit / Continue  >Q ↵          Closes the menu without writing the
                                               network information to EEPROM.
A>■
```

<3> When C is input

```
          .
          .
          .
    11. EXIT
-----------------------------------------------------
  FUNCTION NO. >>11 ↵                                  Select function No. 11.

  Save & quit / Quit / Continue  >C ↵                  Continue setting of the network
                                                       information.

--- SETUP NETWORK INFORMATION ----------------------- The menu is displayed.
     1. LOCAL ETHERNET ADDRESS  XXXXXXXXXXX
          .
          .
          .
    11. EXIT
-----------------------------------------------------
  FUNCTION NO. >>■
```

2.4.8 Operation check

When the initialization has been completed, check the operation.

Check following points with the power to the emulator off.

- Is the terminal connected to the RS-232C port of the emulator?
- Is the "CONF." switch on the back panel of the SV1 board set to "0" (if the "CONF." switch is set to "1", the TCP/IP program cannot be automatically executed).

Turn on power to the emulator, and confirm that the messages shown in Figure 2-23 are displayed on the terminal screen.

Figure 2-23. Operation Screen

```
8088/86 Modular BIOS Ver x.xx  mm/dd/yy
Copyright (c) 1984-89 Award Software Inc.
IBM Compatible DSIF-BIOS (c) Digital Electronics Corp.
SIZING SYSTEM MEMORY.........640K FOUND

MEMORY-DISK BIOS VERSION x.xx
Copyright (c) 1990 Digital Electronics Corporation
MEMORY-DISK INSTALLED DRIVE A:

DSIF : VIDEO RESOURCES        < OPTIMIZING >
DSIF : KEYBOARD RESOURCES     < OPTIMIZING >
 entry TCP/IP System Driver. < OPTIMIZING >
TCP/IP Driver Ver x.xx

A>BREAK ON

A>CONF

A>IF ERRORLEVEL 1 GOTO END

A>EXELOAD -C
A>
```

This has completed setting of the emulator.

2.4.9 Connecting RS-232C cable

Connect the RS-232C cable to the emulator as shown in Figure 2-24.

Table 2-5 shows the specifications of the RS-232C, and Figure 2-25 shows the pin connections.

Figure 2-24. Connecting RS-232C Cable

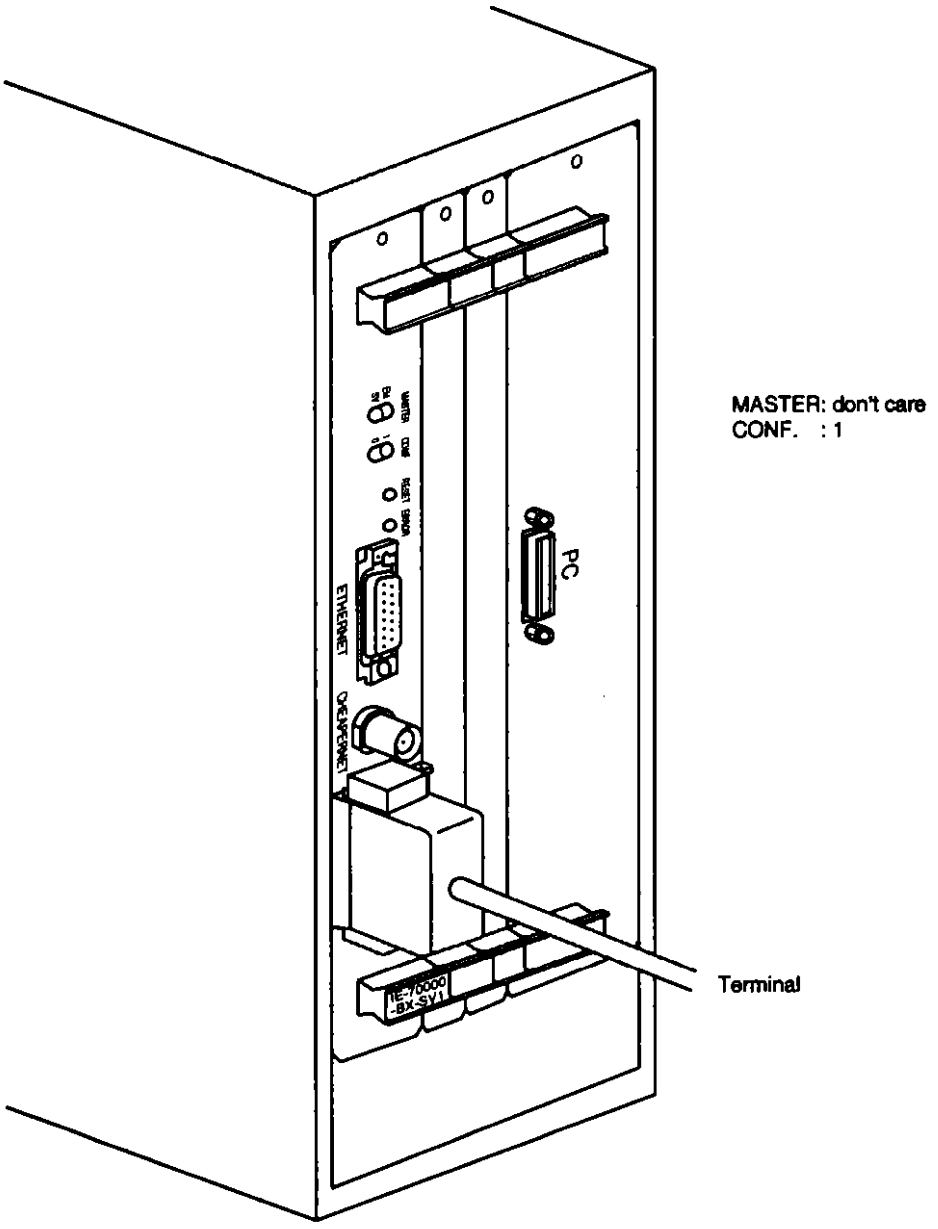
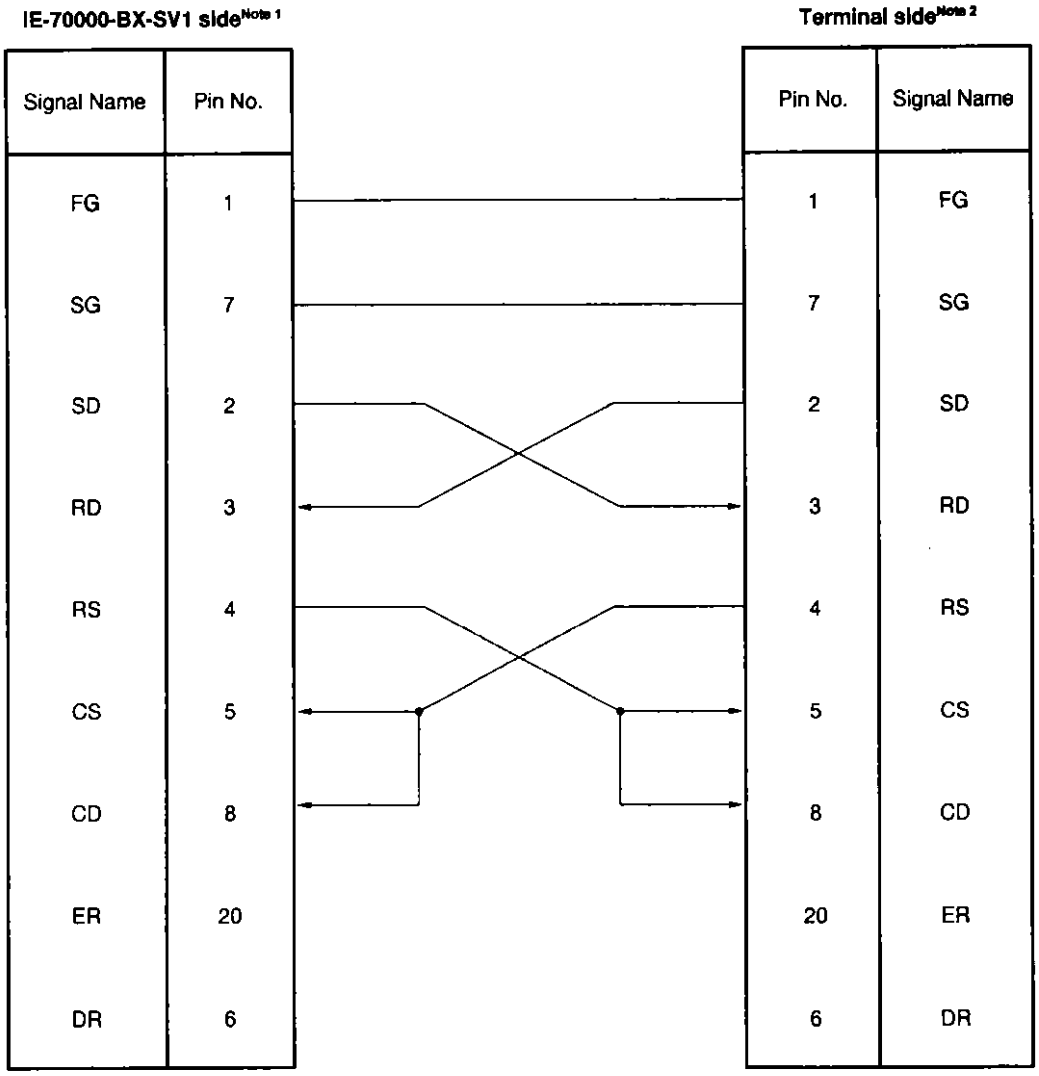


Table 2-5. RS-232C Setting

Parameter	Description
Character length	8 bits
Parity check	None
Stop bit	2 bits
Baud rate[Note]	4800 or 9600 bps

Note The baud rate can be selected by using a jumper on the SV1 board.

Figure 2-25. Pin Connections of RS-232C Cable



Notes 1. Connect the male-connector of the RS-232C cable to the SV1 board.

2. Match the connector of the terminal used.

2.4.10 Connecting network cable

Connect the network cable to the emulator as shown in Figures 2-26 and 2-27 according to the type of the network cable used.

Figure 2-26. Connection to Cheapernet (10BASE2)

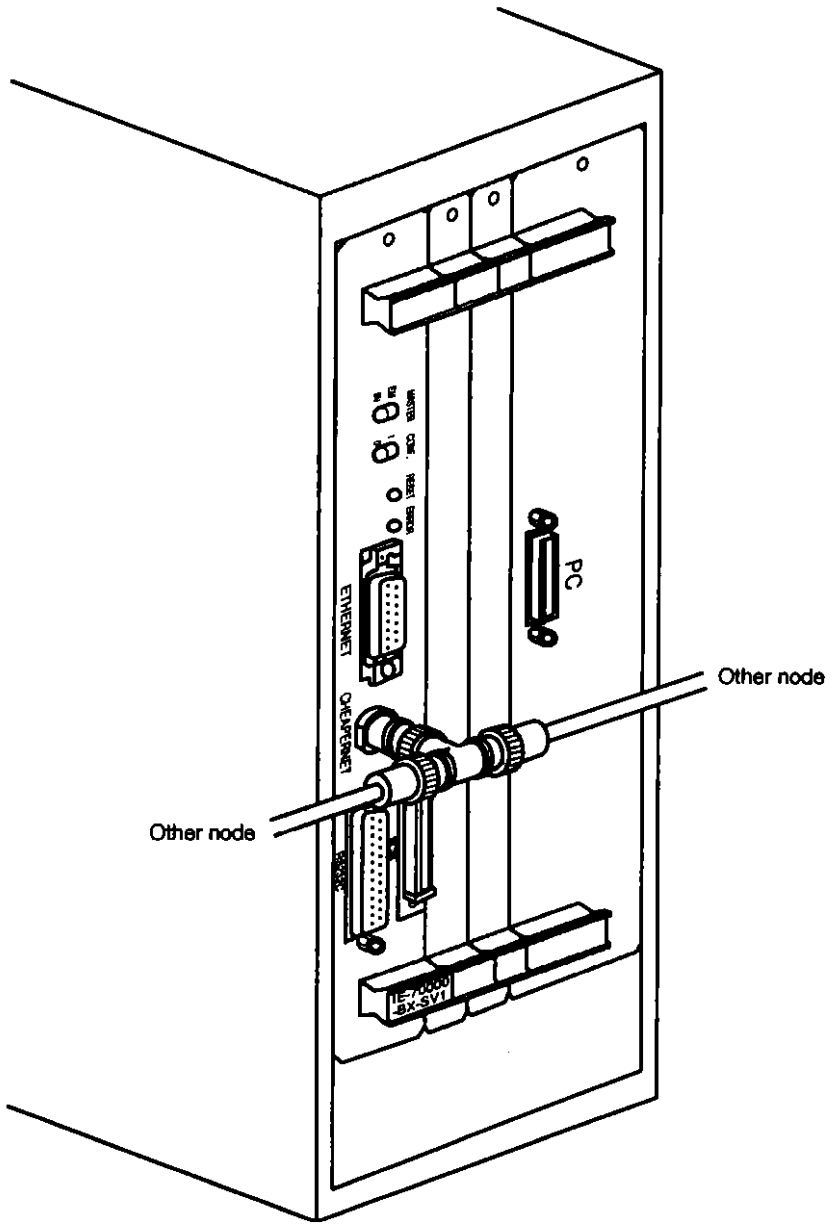
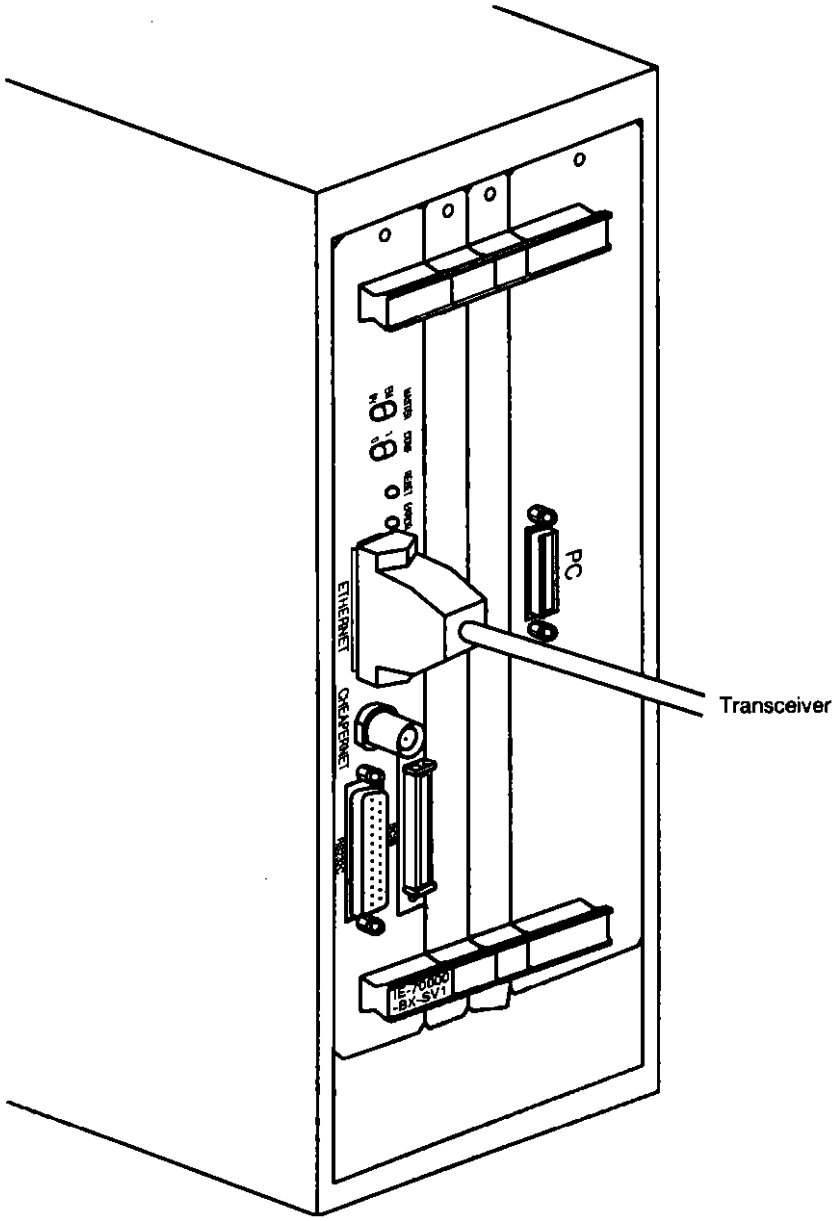


Figure 2-27. Connection to Ethernet (10BASE5)

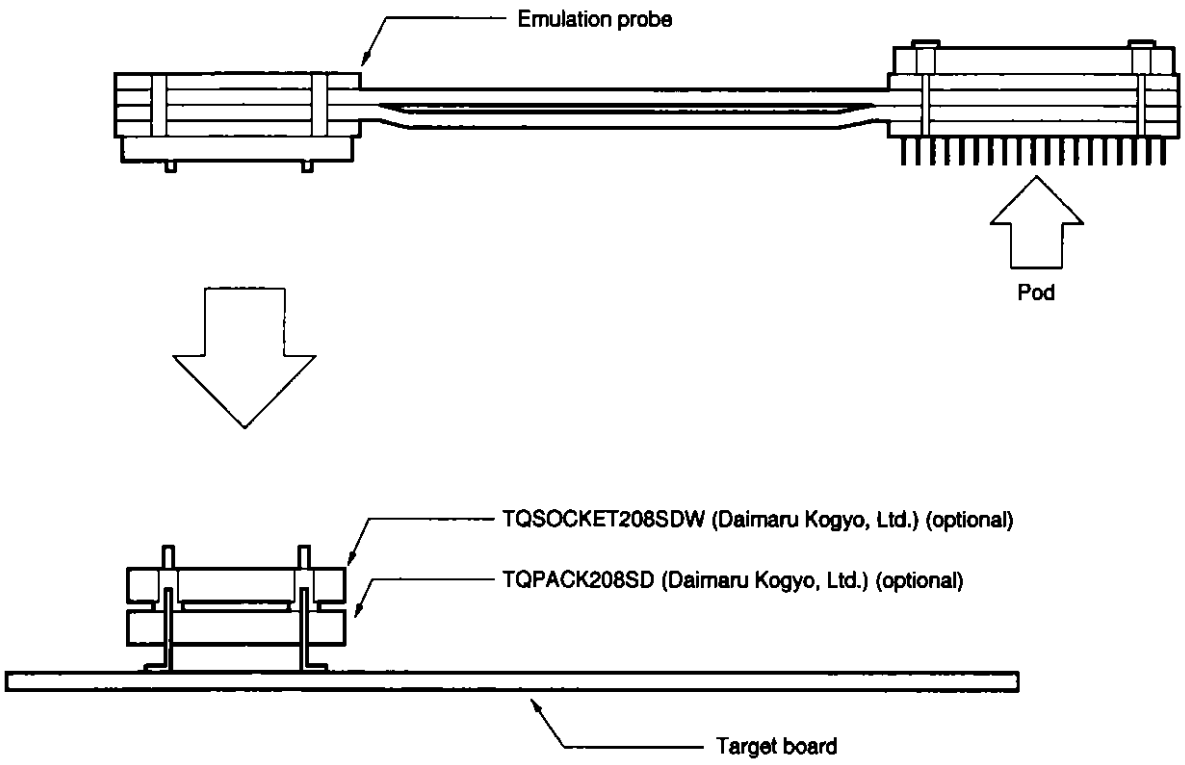


2.5 Connecting Target System

Connect the emulator and target system with the emulation probe attached to the pod.

When connecting, a QFP socket conversion adapter (TQSCKET208DW or TQPACK208SD) is necessary for matching the head of the probe with the shape of a 208-pin QFP package.

Figure 2-28. Connecting Target System



[MEMO]

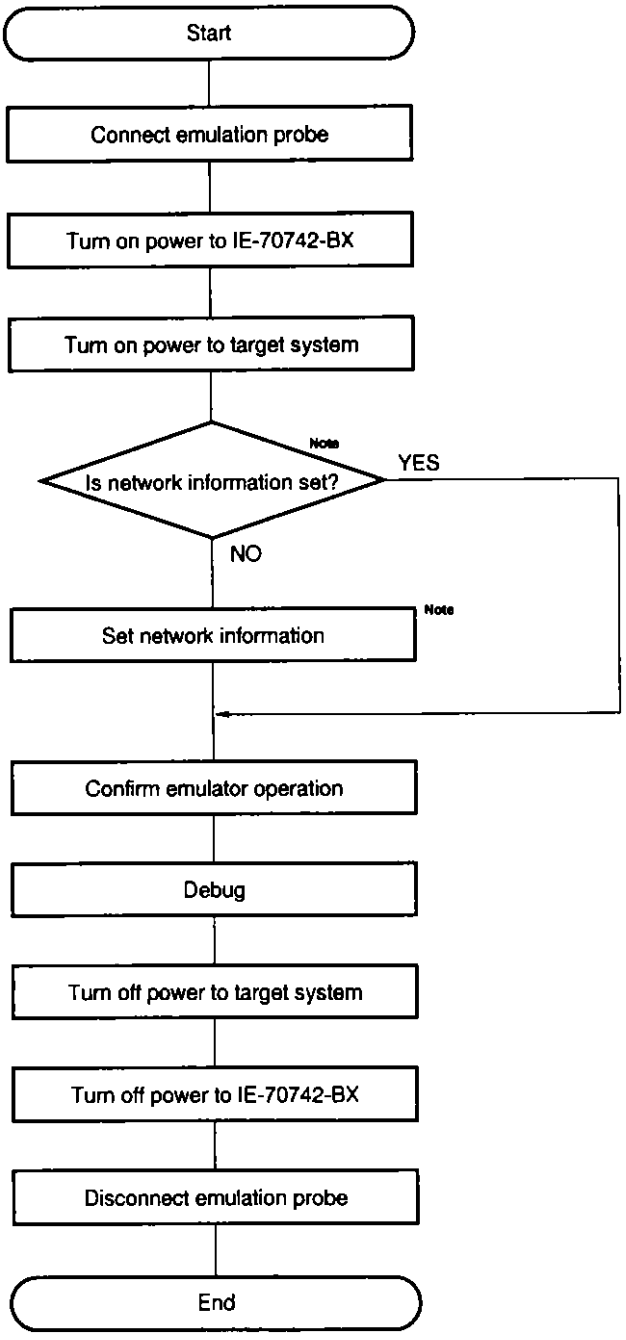
CHAPTER 3 STARTING

This chapter explains how to turn on or off power to the emulator, connect or disconnect the emulation probe, and check the operation of the emulator.

3.1 Starting Procedure

Figure 3-1 illustrates the procedure to start up the emulator.

Figure 3-1. Starting Procedure



Note This step is necessary when the IE-70742-BX is used with a network.

3.2 Turning On/Off Power

After connecting the power cable, network cable, and target system, turn on power to the IE-70742-BX.
Turn on or off power to the IE-70742-BX in the following sequence:

(1) Power-up sequence

<1> IE-70742-BX
<2> Target system

(2) Power-down sequence

<1> Target system
<2> IE-70742-BX

3.3 Connecting/Disconnecting Emulation Probe

When connecting or disconnecting the emulation probe to or from the target system, be sure to turn off power to the target system.

However, because the emulator has a circuit that senses the supply voltage of the target system, all the output signals become inactive when power to the target system is turned off. Therefore, power to the emulator does not have to be turned off when attaching or detaching the emulation probe if power to the target system is turned off.

Confirm that the residual charge has been completely discharged immediately after the power to the target system has been turned off.

When connecting or disconnecting the target system, either terminate the operation of the debugger or issue the reset command or initialization command to prevent the emulator from deadlock because of changes in the environment.

[MEMO]

CHAPTER 4 NOTES ON HARDWARE DESIGN

This chapter explains the points to be noted in designing the hardware of a V820 system, assuming that the emulator is connected to the system.

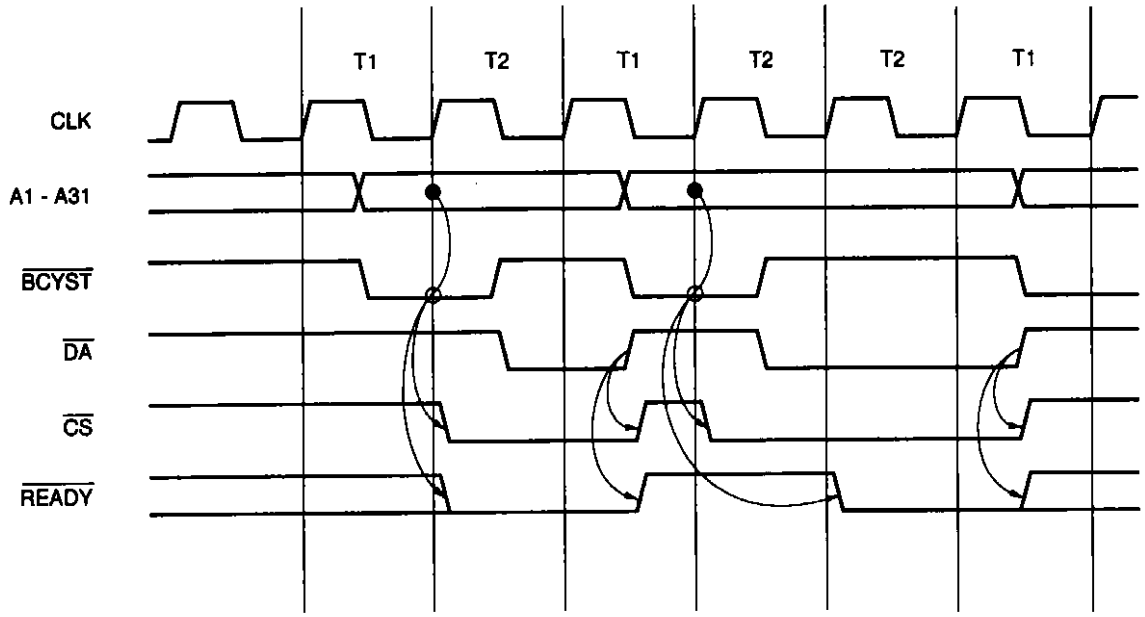
4.1 Timing Designing

The AC characteristics of the emulator significantly differ from those of the real chip. For details, refer to **4.2 Emulation CPU Interface Circuit.**

In all, the delay time of the output signal in respect to the clock is considerably longer than that of the real chip. This delay time must be taken into consideration when designing the I/O access control circuit and bus control circuit.

In particular, make sure that generation of the $\overline{\text{READY}}$ signal, and generation of the bus strobe signals such as I/O select signal is performed in the handshaking procedure as shown below.

Figure 4-1. Generation of Bus Strobe Signal



4.2 Emulation CPU Interface Circuit

Figure 4-2 shows the interface circuit between the emulation CPU in the emulator and target system when the emulator is connected to the target system.

Figure 4-2. Interface Circuit between Emulation CPU and Target System (1/4)

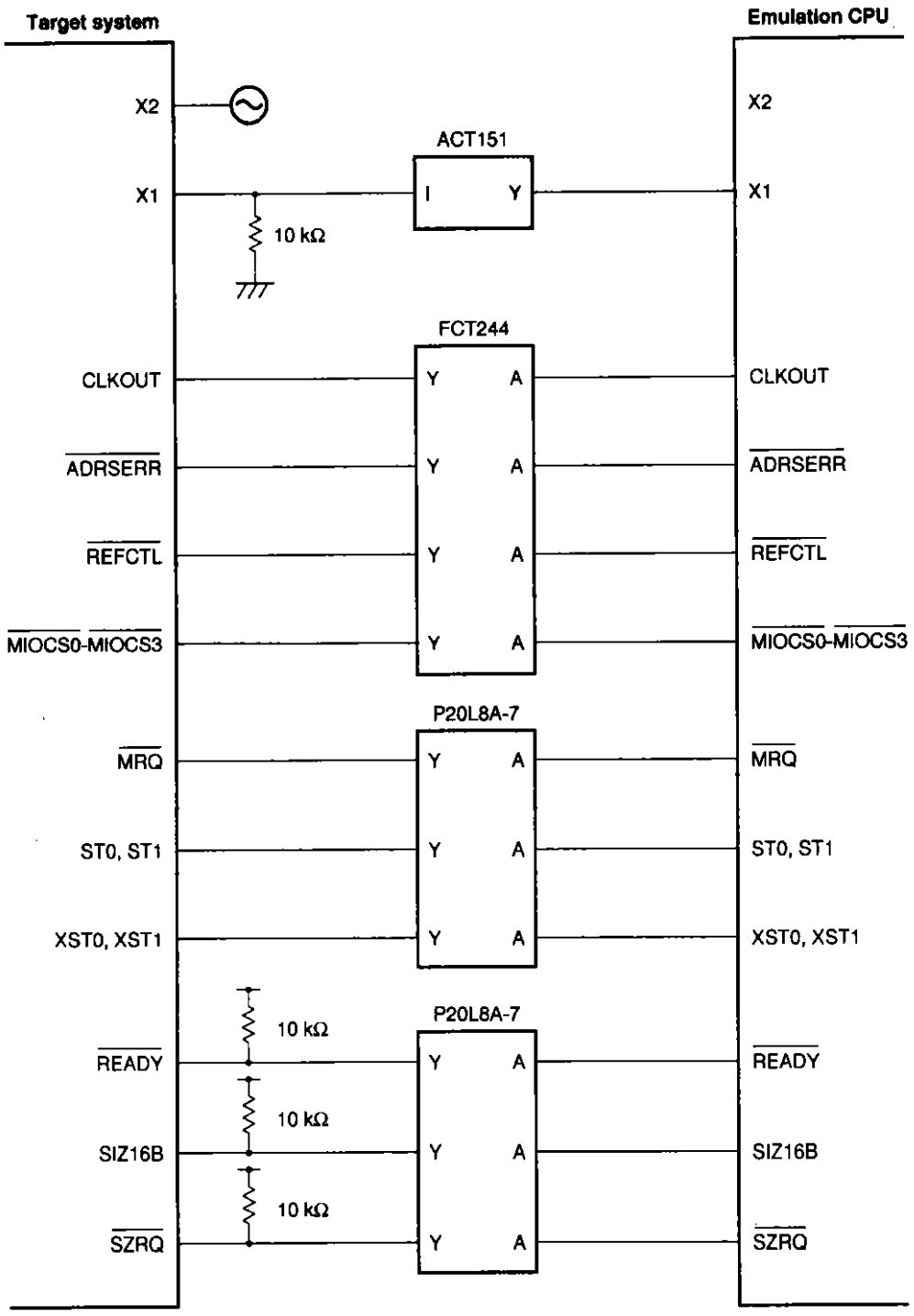


Figure 4-2. Interface Circuit between Emulation CPU and Target System (2/4)

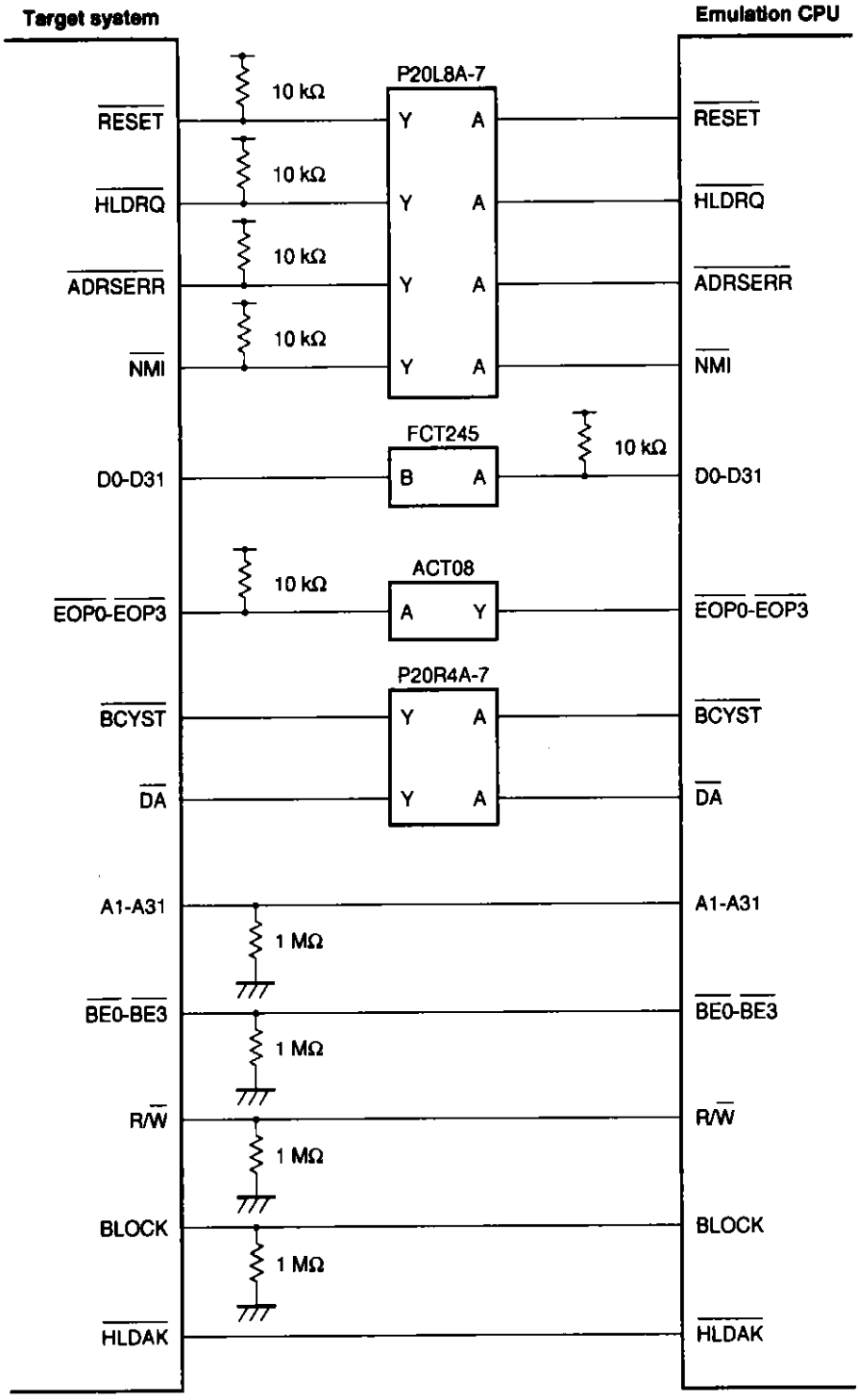


Figure 4-2. Interface Circuit between Emulation CPU and Target System (3/4)

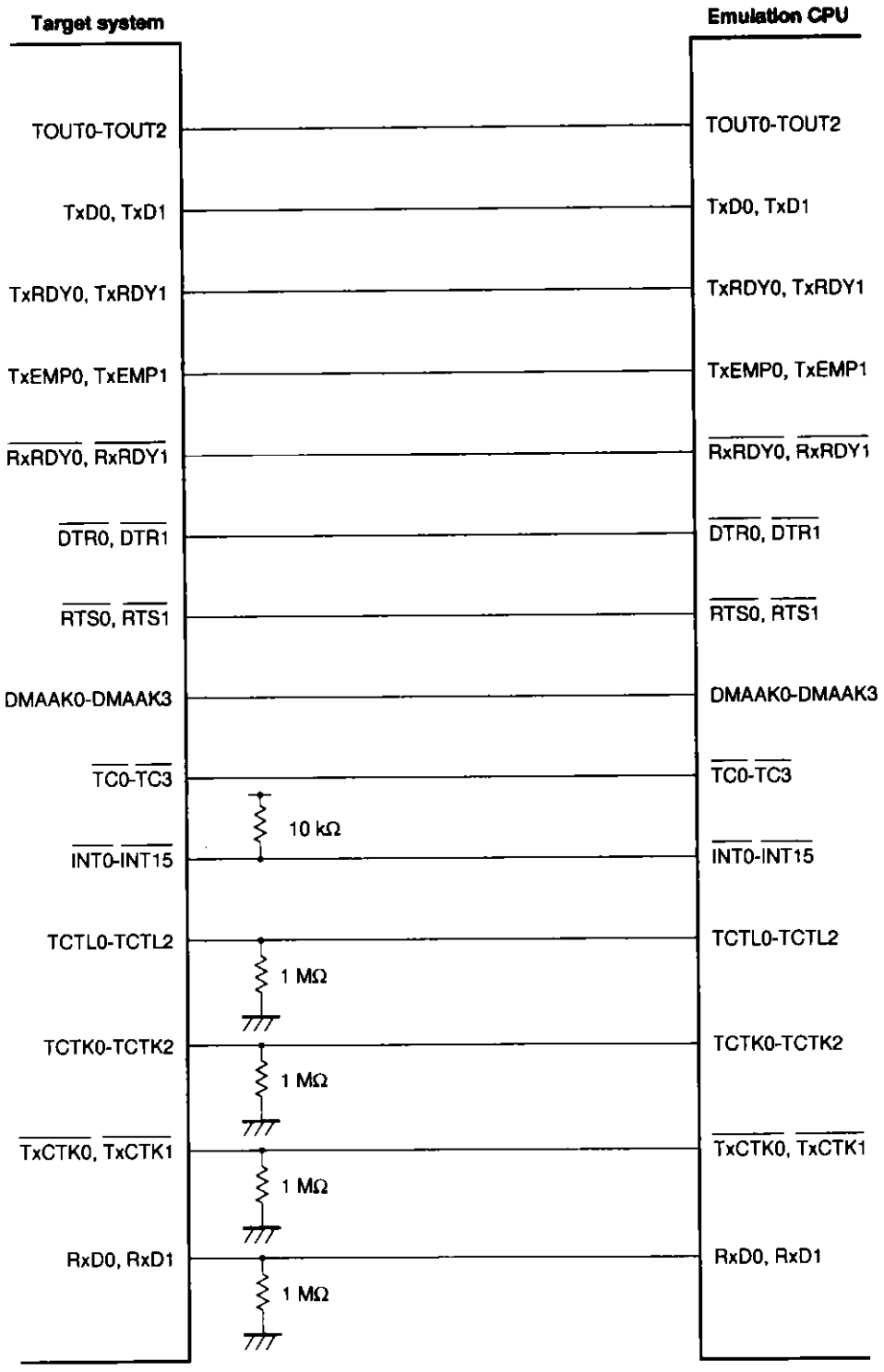
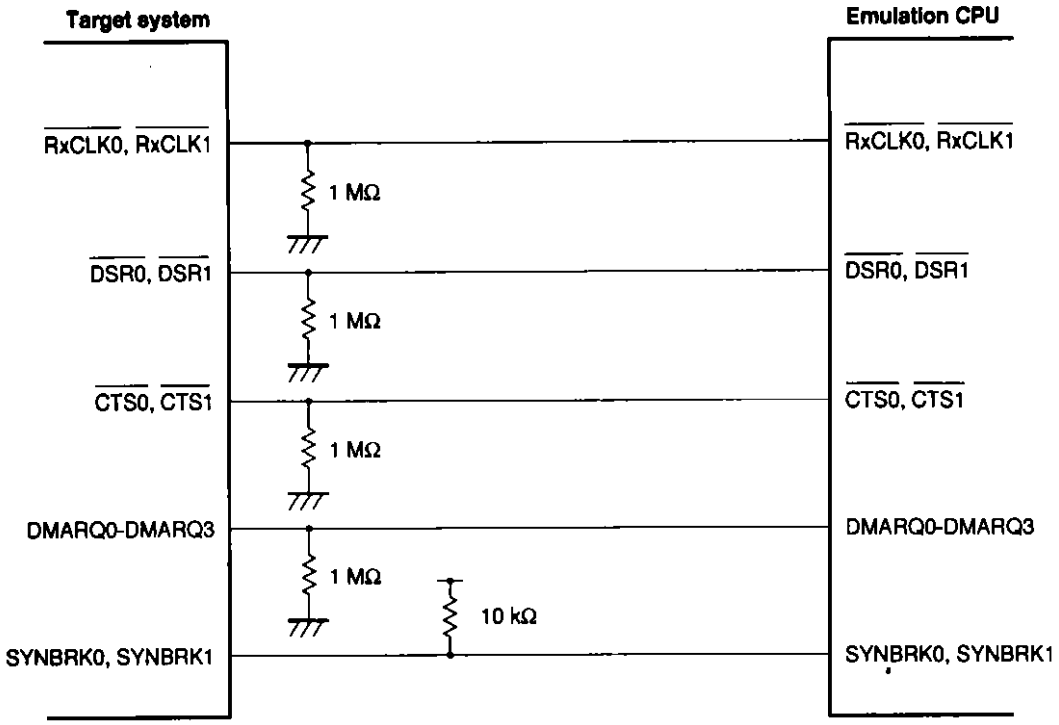


Figure 4-2. Interface Circuit between Emulation CPU and Target System (4/4)



4.3 I/O Signals of Emulator

(1) Figure 4-3 and Table 4-1 show the delay of the clock of the target system and internal clock of the emulator.

Figure 4-3. Delay of Target System Clock and Emulator's Internal Clock

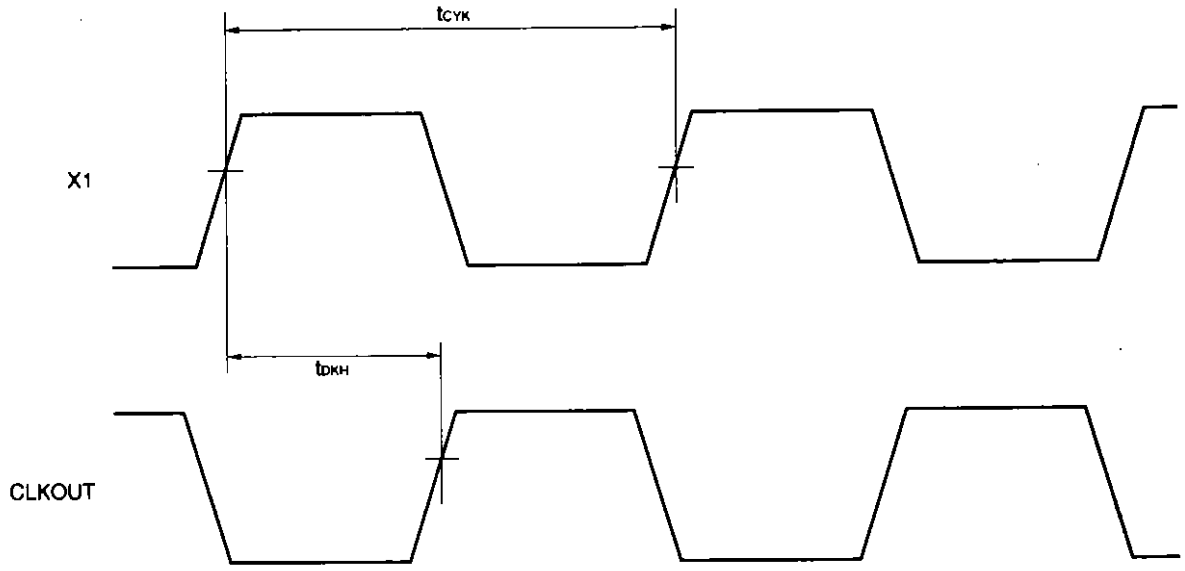


Table 4-1. Delay Value of Target System Clock and Emulator's Internal Clock

(T_A = 25 °C, V_{DD} = 5 V)

Symbol	Parameter	f = 25 MHz
		TYP. (ns)
t_{CYK}	Clock cycle	40
t_{DKH}	Clock rising delay	26

(2) Figure 4-4 and Table 4-2 show the output delay to the target system when only target memory is used.

Figure 4-4. Output Delay to Target System When Only the Target Memory Is Used

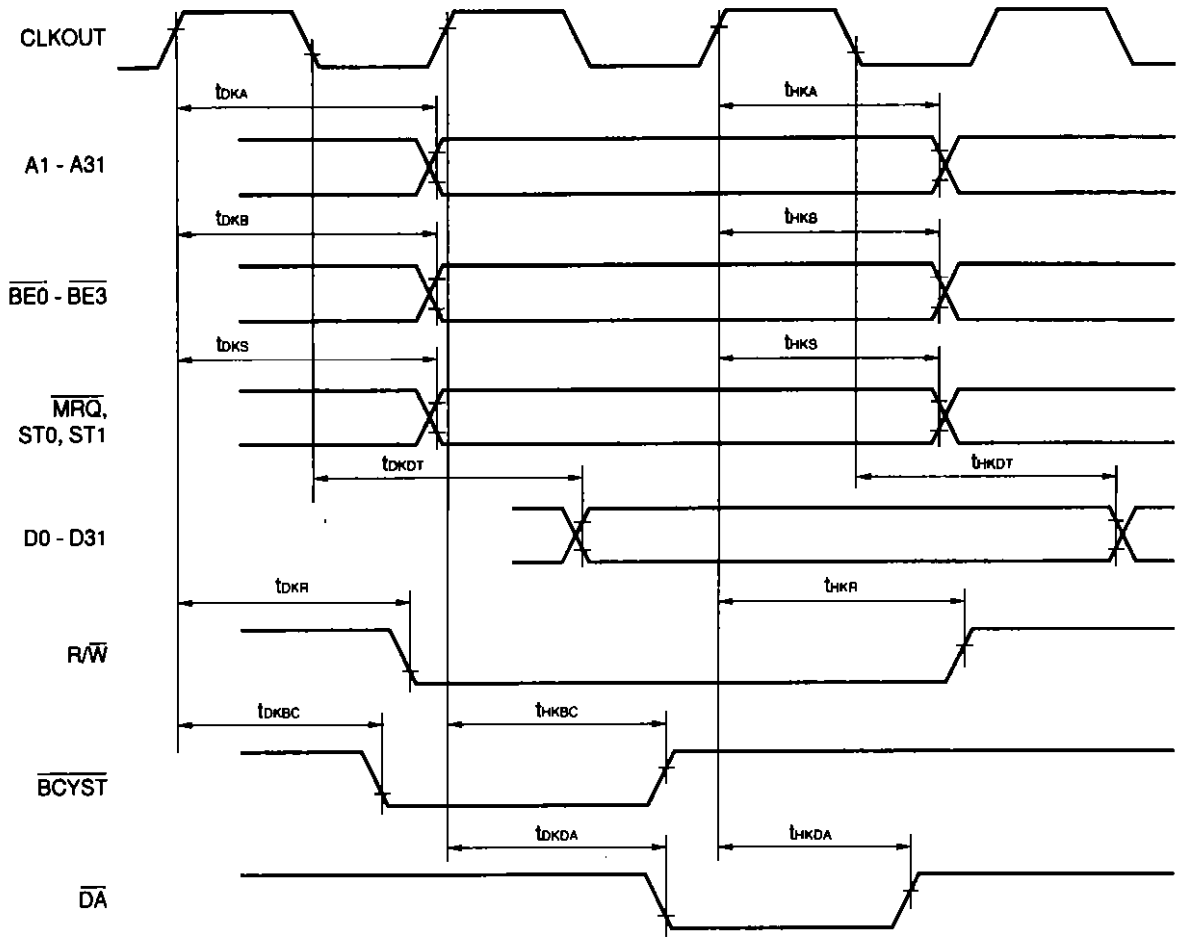


Table 4-2. Output Delay Value to Target System When Only Target Memory Is Used

(T_A = 25 °C, V_{DD} = 5 V)

Symbol	Parameter		f = 25 MHz (t_{CYK} = 40 ns)
			TYP. (ns)
t_{DKA}	Output active delay	(A1 through A31)	6
t_{HKA}	Output inactive delay	(A1 through A31)	6
t_{DKB}	Output active delay	($\overline{BE0}$ through $\overline{BE3}$)	8
t_{HKB}	Output inactive delay	($\overline{BE0}$ through $\overline{BE3}$)	8
t_{DKS}	Output active delay	(ST0, ST1)	13
t_{HKS}	Output inactive delay	(ST0, ST1)	13
t_{DKDT}	Output active delay	(D0 through D31)	11
t_{HKDT}	Output inactive delay	(D0 through D31)	11
t_{DKR}	Output active delay	(R/$\overline{W}$)	8
t_{HKR}	Output inactive delay	(R/$\overline{W}$)	8
t_{DKBC}	Output active delay	($\overline{BCYST}$)	14
t_{HKBC}	Output inactive delay	($\overline{BCYST}$)	14
t_{DKDA}	Output active delay	($\overline{DA}$)	12
t_{HKDA}	Output inactive delay	($\overline{DA}$)	12

(3) Figure 4-5 and Table 4-3 show the output delay to target system when emulation memory or guard area is used (in write cycle)

Figure 4-5. Output Delay to Target System When Emulation Memory or Guard Area Is Used (in write cycle)

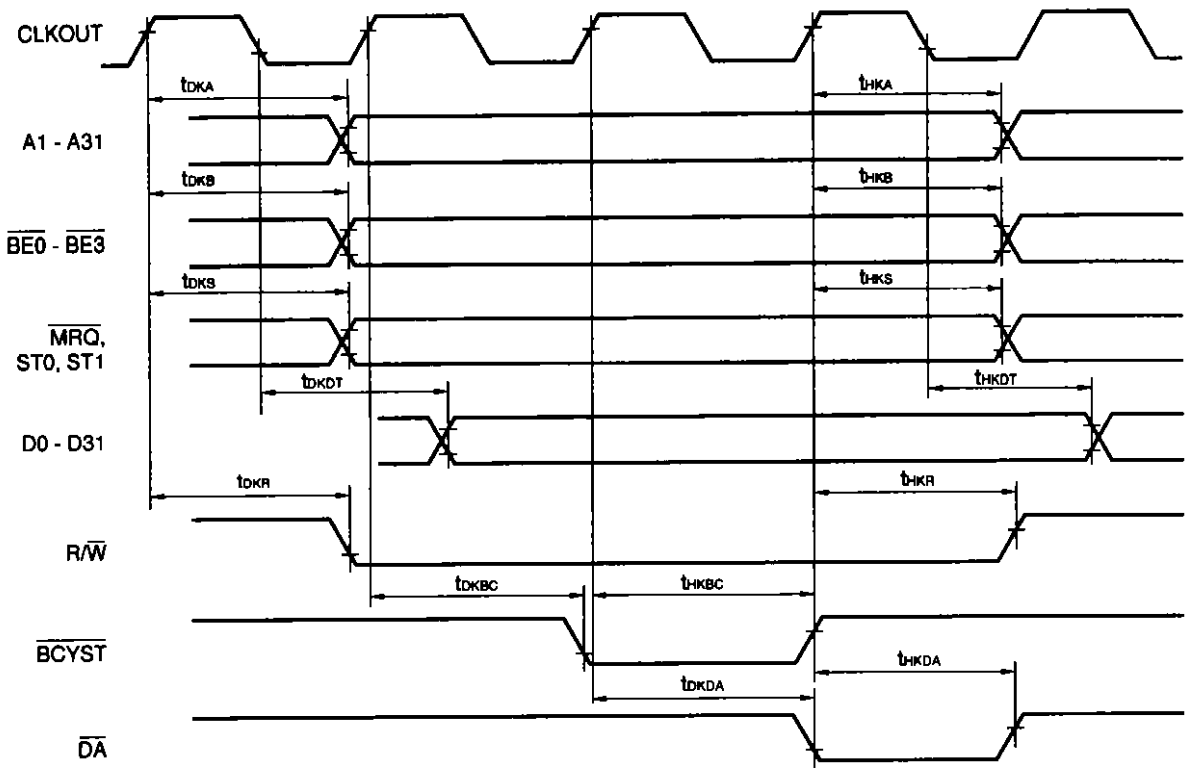


Table 4-3. Output Delay Value to Target System When Emulation Memory or Guard Area Is Used (In write cycle)

(T_A = 25 °C, V_{DD} = 5 V)

Symbol	Parameter		f = 25 MHz (t_{CYK} = 40 ns)
			TYP. (ns)
t_{DKA}	Output active delay	(A1 through A31)	6
t_{HKA}	Output inactive delay	(A1 through A31)	6
t_{DKB}	Output active delay	($\overline{BE0}$ through $\overline{BE3}$)	8
t_{HKB}	Output inactive delay	($\overline{BE0}$ through $\overline{BE3}$)	8
t_{DKS}	Output active delay	(ST0, ST1)	0 (leads 27 ns)
t_{HKS}	Output inactive delay	(ST0, ST1)	0 (leads 27 ns)
t_{DKDT}	Output active delay	(D0 through D31)	0 (leads 7 ns)
t_{HKDT}	Output inactive delay	(D0 through D31)	0 (leads 7 ns)
t_{DKR}	Output active delay	($R/\overline{W}$)	8
t_{HKR}	Output inactive delay	($R/\overline{W}$)	8
t_{DKBC}	Output active delay	($\overline{BCYST}$)	17
t_{HKBC}	Output inactive delay	($\overline{BCYST}$)	17
t_{DKDA}	Output active delay	($\overline{DA}$)	12
t_{HKDA}	Output inactive delay	($\overline{DA}$)	12

CHAPTER 5 NOTES ON CORRECT USE

This chapter explains the points to be noted when using the IE-70742-BX.

5.1 Notes on DMAU Guard Area Break

If a guard area break occurs as a result of data transfer by means of DMA, the emulator forcibly makes the $\overline{\text{EOP0}}$ through $\overline{\text{EOP3}}$ pins low, and ends DMA transfer.

When the auto initialize function of DMA is used, however, DMA transfer may be started again even if the emulator forcibly makes the $\overline{\text{EOP0}}$ through $\overline{\text{EOP3}}$ pins low. If a guard area access takes place due to DMA while the auto initialize function is used, stop DMA by accessing the internal I/O.

5.2 Operation on Turning off Power to Target System

If power to the target system is turned off while the emulator is being used, the reset and hold signals are forcibly input to the CPU and the pins are made to go into a high-impedance state to prevent the latchup of the target system.

When power to the target system is turned on again (power-ON emulation), the CPU starts operating in response to the reset input from the target system.

5.3 Logic Mode Error

The V820 has a memory wait control function and can control memory wait without using the $\overline{\text{READY}}$ pin.

Because the IE-70742-BX guarantees the normal emulation memory access when the logic mode is set, a logic mode error occurs and break takes place if the number of wait cycles in accessing the emulation memory falls short. For example, if the number of memory wait cycles of the internal I/O is set to none in the user program under execution and the emulation memory is used, a logic mode error occurs.

For the memory wait when the emulation memory is used, refer to **5.4 Wait Control of IE-70742-BX**.

5.4 Wait Control of IE-70742-BX

This emulator has the following limitations on the wait cycles when it accesses the memory and I/O.

(1) Limitations on the wait cycle due to CPU's operating frequency
(2) Limitations on the wait cycle due to real mode/logic mode
(3) Limitations on the wait cycle when memory or I/O is accessed on break

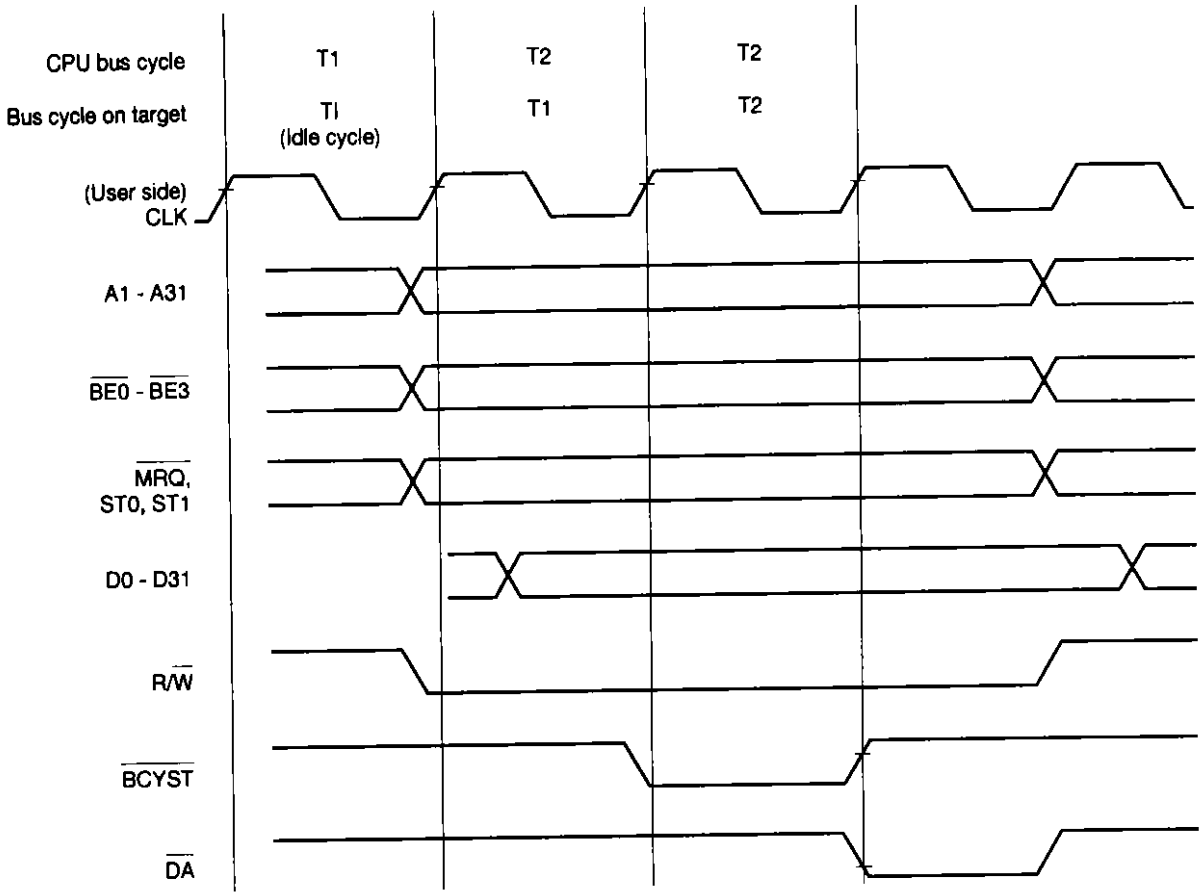
Table 5-1 shows the number of wait cycles inserted of the emulator, and Figure 5-1 shows the bus cycle output (in write cycle) to the target system when the emulation memory or guard area is used.

Table 5-1. Number of Inserted Wait Cycles of IE-70742-BX

Subject to Access		Real Mode (1-wait mode, 25 MHz MAX.)	Logic Mode (1-wait mode, 25 MHz MAX.)	Access on Break (1-wait mode, 25 MHz MAX.)
Standard emulation memory		Cannot be set	1	1
Expansion emulation memory		Cannot be set	1	1
Guard area		Cannot be set	1	1
Target memory		User wait	User wait + 1	User wait + 1
Target I/O		User wait	User wait + 1	User wait + 1
Internal I/O		V820 wait	V820 wait	V820 wait
Machine fault/halt acknowledge cycle	User ready control mode	User wait	User wait + 1	User wait + 1
	Forced ready control mode	2	2	2

Remark User wait: Number of wait cycles of external ready control by $\overline{\text{READY}}$ pin

Figure 5-1. Bus Cycle Output of Target System When Emulation Memory or Guard Area Is Used (In write cycle)



Because the BCYST and DA signals are delayed and output to the target system in the logic mode, it seems that an idle cycle is inserted at the beginning of the bus cycle on the target, and that the target wait cycle is inserted.