

User's Manual

IE-703102-MC

In-circuit Emulator

Target device
V850E/MS1TM

[MEMO]

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INTRODUCTION

- Readers** This manual is intended for users who design and develop application systems using V850E/MS1™ products.
- Purpose** Debugging can be performed efficiently with this emulator (IE-703102-MC) connected to a dedicated optional board when designing and developing application systems using V850E/MS1 products. The purpose of this manual is to describe the proper operation of the IE-703102-MC and its basic specifications.
- Organization** This manual is broadly divided into the following parts.
- Overview
 - Names and functions of parts
 - Connections of parts
- How to Read This Manual** It is assumed that the reader of this manual has general knowledge in the fields of electrical engineering, logic circuits, and microcontrollers.
- To learn about the basic specifications and operation
- Read this manual in the order listed in **CONTENTS**.
- To learn the operation methods, command functions, etc., of the IE-703102-MC
- Read the user's manual of the debugger (optional) that is used.
- Conventions**
- Note:** Footnote for item marked with **Note** in the text
- Caution:** Information requiring particular attention
- Remark:** Supplementary information
- Numeral representation: Binary ... xxxx or xxxxB
Decimal ... xxxx
Hexadecimal ... xxxxH
- Prefixes representing the powers of 2 (address space, memory capacity):
- K (kilo): $2^{10} = 1024$
M (mega): $2^{20} = 1024^2$
- Terminology** The meanings of terms used in this manual listed below.

Target device	Device that is emulated.
Target system	The system (user-built system) to be debugged. This includes the target program and hardware configured by the user.
Evaluation chip	Device that performs emulation of the target device in the IE-703102-MC.

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

○ **Documents related to V850E/MS1**

Document Name	Document Number
V850E/MS1 User's Manual – Hardware	U12688E
V850E/MS1 User's Manual – Architecture	U12197E
μPD703100-40, 703101-33, 703102-33 Data Sheet	To be prepared
μPD703100-A40, 703101-A33, 703102-A33 Data Sheet	To be prepared
μPD70F3102-33 Data Sheet	U13844E
μPD70F3102-A33 Data Sheet	U13845E

○ **Documents related to development tools (User's Manuals)**

Product Name		Document Number
IE-703102-MC (In-circuit emulator)		This manual
IE-703102-MC-EM1, IE-703102-MC-EM1-A (In-circuit emulator optional board)		U13876E
CA850 (C compiler package)	Operation UNIX™ based	U12839E
	Operation Windows™ based	U12827E
	C language	U12840E
	Assembly language	U10543E
ID850 (Integrated debugger)	Operation Windows-based	U13716E
RX850 (Real-time OS)	Basics	U13430E
	Technical	U13431E
	Installation	U13410E
RX850 Pro (Real-time OS)	Fundamental	Under preparation
	Technical	U13772E
	Installation	U13774E
RD850 (Task debugger) ^{Note}		U11158E
RD850 (Ver. 3.0) (Task debugger)		U13737E
AZ850 (System performance analyzer) Operation		U11181E

Note Supports ID850 (Ver. 1.31 only).

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CHAPTER 1 OVERVIEW

The IE-703102-MC is an in-circuit emulator that efficiently debugs hardware and software of systems under development using V850E/MS1 products.

It incorporates functions such as a break/trace function using events, a coverage function for program performance evaluation, and a timer/counter function.

To perform debugging, the optional board (sold separately) corresponding to the relevant V850E/MS1 product must be connected.

1.1 Hardware Configuration

In-circuit emulator (IE-703102-MC)

Separately sold hardware

Optional board (IE-703102-MC-EM1 IE-703102-MC-EM1-A)	The IE-703102-MC can be used as an in-circuit emulator of V850E/MS1 product by connecting these boards.
Extension probe (SC-xxxSDA ^{Note 1})	General-purpose extension probe. Product of TOKYO ELETECH CORPORATION.
PC interface board (IE-70000-xx-IF-B IE-70000-xx-IF-C IE-70000-PCI-IF IE-70000-CD-IF-A)	These boards are used to connect the IE-703102-MC to personal computer. These boards are added into the expansion slot of a personal computer. xx: 98 (for PC-9800 series C bus) ^{Note 2} PC (for IBM PC/AT TM compatible ISA bus) ^{Note 2} IE-70000-PCI-IF : for PCI bus IE-70000-CD-IF-A : for PCMCIA socket
Network module (IE-70000-MC-SV3)	This module is used when workstation controls the IE-703102-MC via Ethernet TM .
Power adaptor (IE-70000-MC-PS-B)	AC adaptor dedicated to the NEC in-circuit emulator.

Notes 1. For further information, contact Daimaru Kogyo., Ltd.

Tokyo Electronic Components Division (TEL +81-3-3820-7112)

Osaka Electronic Components Division (TEL +81-6-244-6672)

2. These interface boards cannot be used for the PC98-NX series.

1.2 Features

- Maximum operation frequency of 40 MHz and operating voltage of 3.3 V (DC) are realized.
- Extremely lightweight and compact
- Higher equivalence with target device can be achieved by omitting buffer between signal cables.
- Following pins can be masked.
RESET, NMI, WAIT, HLD $\overline{\text{RQ}}$
- Dimensions and environmental conditions for operation are as follows.

Parameter		Value
Maximum operating frequency		40 MHz
Supply voltage (DC)		5 V
Operating voltage (DC)		V _{DD} = 3.3 V, HV _{DD} = 3.3/5.0V
Power dissipation		11 W (operating frequency: 40 MHz) ^{Note}
External dimensions (Refer to APPENDIX DIMENSIONS)	Height	56 mm
	Length	353 mm
	Width	90 mm
Weight		500 g
Operating temperature range		0 to 40°C
Storage temperature range		0 to 45°C
Ambient humidity range		10 to 80%RH

Note The power dissipation is 11.4 W when the optional board is connected to the IE-703102-MC.

1.3 Function Specifications

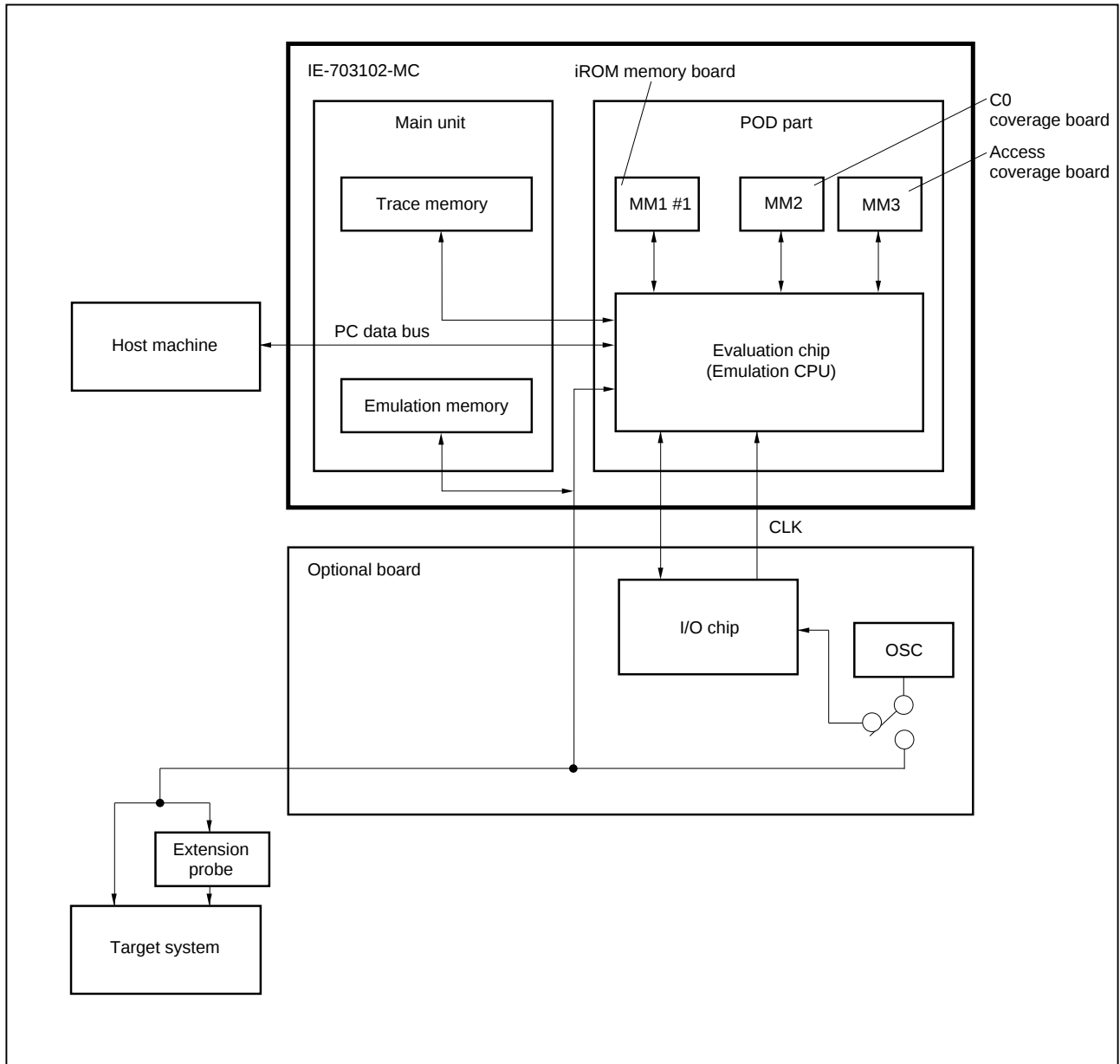
Item			Specification
Emulation memory capacity	Internal ROM		512 Kbytes
	External memory		2 Mbytes
Execution/Pass detection coverage memory capacity	Internal ROM		512 Kbytes
	External memory	In ROM-less mode	2 Mbytes
		When using iROM	1 Mbyte
Memory access detection coverage memory capacity	External memory		1 Mbyte
Trace memory capacity			168 bits × 32 Kframes
Time measurement function			Measurement enabled with time tag or three timers
External logic probe			8-bit external trace possible
			Trace/Break event setting possible
Break function			Event break
			Step execution break
			Forced break
			Fail safe break • Illegal access to peripheral I/O • Access to guard space • Write into ROM space

Caution Some of the functions may not be supported depending on the debugger used.

1.4 Hardware Configuration

The basic hardware configuration of the IE-703102-MC is as follows.

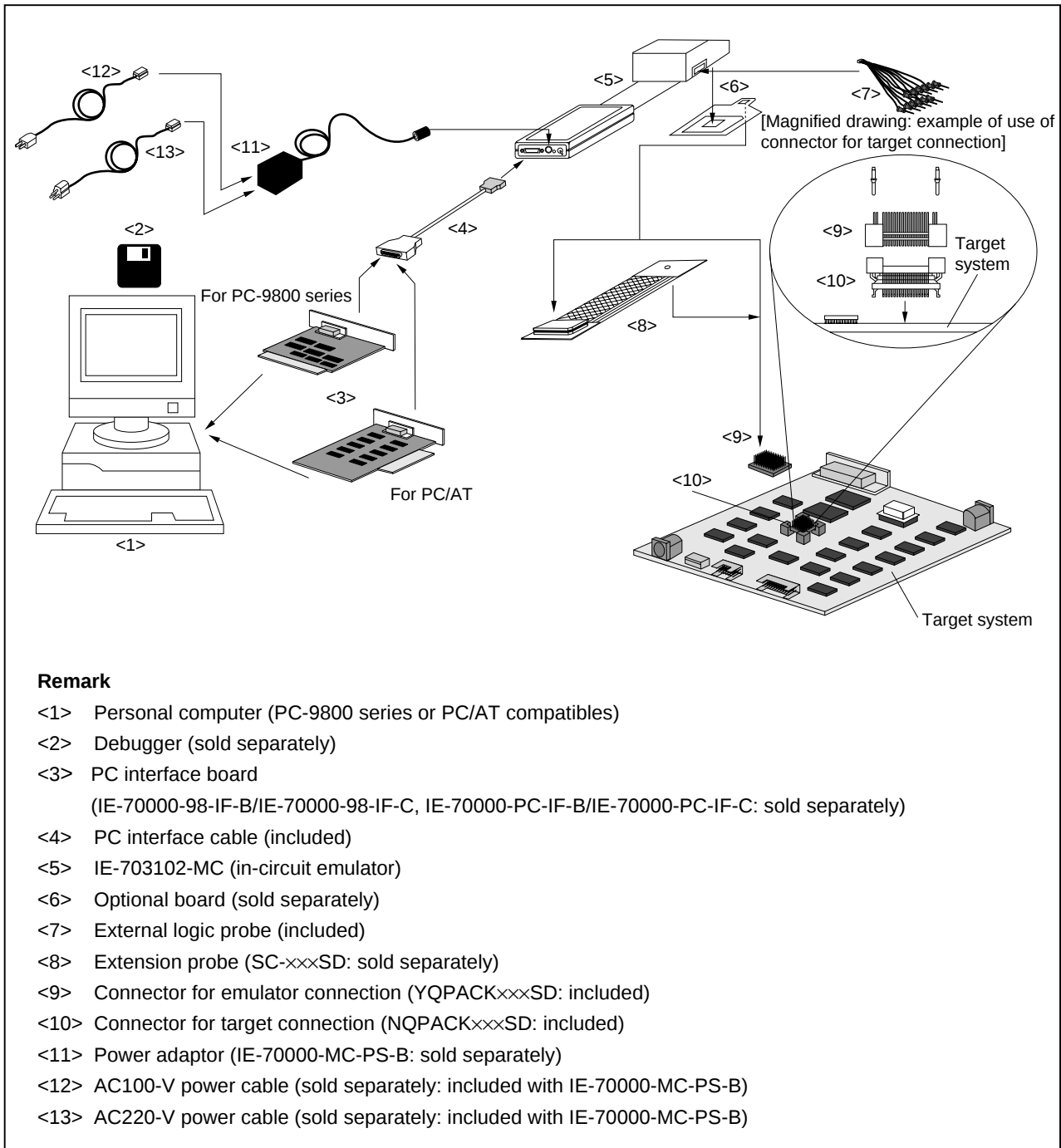
Figure 1-1. Basic Hardware Configuration



1.5 System Configuration

The system configuration when connecting the optional board to the IE-703102-MC, which is then connected to a personal computer (PC-9800 series or PC/AT compatibles) is illustrated below.

Figure 1-2. System Configuration

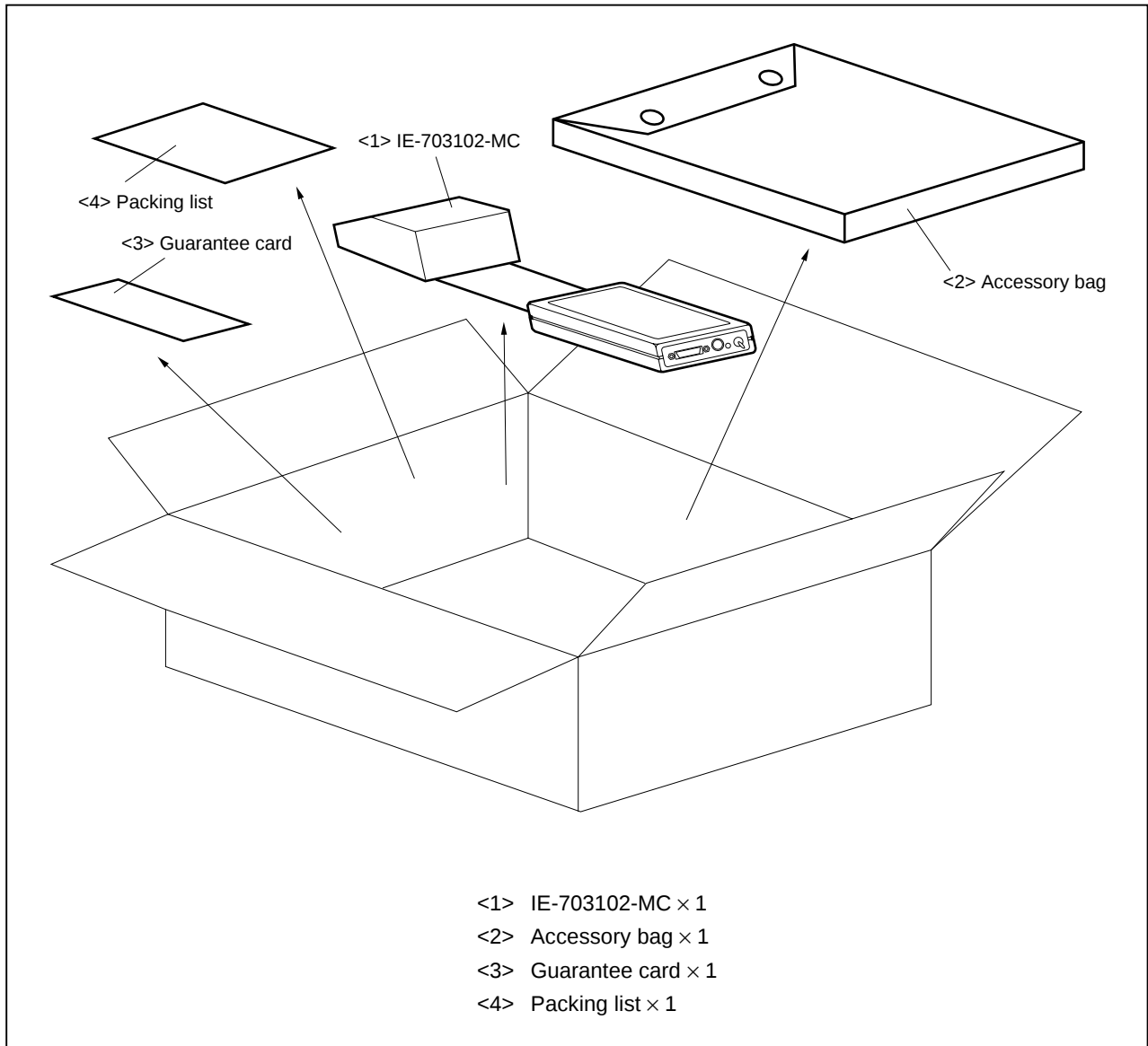


1.6 Contents in Carton

The carton of the IE-703102-MC contains a main unit, guarantee card, packing list, and accessory bag.

Make sure that the accessory bag includes this manual and cables. In case of missing or damaged contents, please contact an NEC sales representative or an NEC distributor.

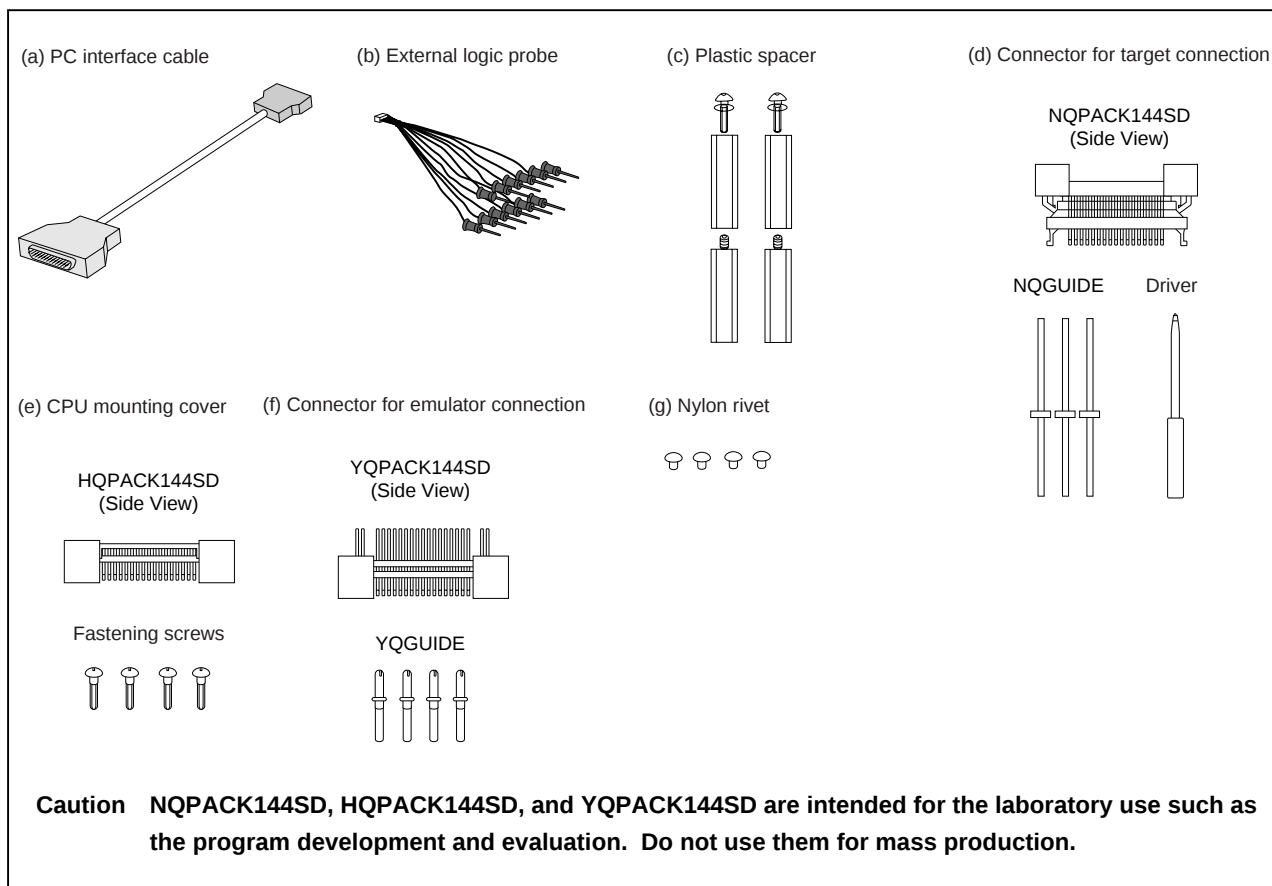
Figure 1-3. Contents in IE-703102-MC Carton



Check that the accessory bag contains this manual, an accessory list, and the following accessories.

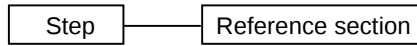
- (a) PC interface cable × 1
- (b) External logic probe × 1
- (c) Plastic spacer × 2
(including 2 plastic screws and 2 washers)
- (d) Connector for target connection (NQPACK144SD) × 1
(including 3 NQGUIDEs and 1 driver)
- (e) CPU mounting cover (HQPACK144SD) × 1
(including 4 fastening screws)
- (f) Connector for emulator connection (YQPACK144SD) × 1
(including 4 YQGUIDEs)
- (g) Nylon rivet × 4

Figure 1-4. Accessories



1.7 Setup

The following two system configurations for the IE-703102-MC are possible, depending on the purpose.
This section describes the setup procedure according to each purpose as follows.



1.7.1 When using the IE-703102-MC on a stand-alone basis for performing software debugging

- | (1) | Connect interface board to PC | 3.1 Connection to Personal Computer |
|-----|-------------------------------|-------------------------------------|
|-----|-------------------------------|-------------------------------------|

Before connecting, make sure that the power of the PC is off.

- | (2) | Connect optional board | Refer to the user's manual of optional board |
|-----|------------------------|--|
|-----|------------------------|--|

- | (3) | Set clock operation mode of IE-703102-MC | Refer to the user's manual of optional board |
|-----|--|--|
|-----|--|--|

Crystal oscillator with 8 MHz is mounted at factory shipment.

This crystal oscillator can be replaced with another oscillator with a frequency within the IE-703102-MC operating frequency range.

- | (4) | Set CPU operating voltage range | Refer to the user's manual of optional board |
|-----|---------------------------------|--|
|-----|---------------------------------|--|

Switch CPU operating voltage range.

- | (5) | Connect cables | 3.3 Cable Connections |
|-----|----------------|-----------------------|
|-----|----------------|-----------------------|

Connect power source adaptor and interface cable.

- | (6) | Power up IE-703102-MC, then PC | 3.4 System Power-on and Power-off |
|-----|--------------------------------|-----------------------------------|
|-----|--------------------------------|-----------------------------------|

1.7.2 When performing hardware debugging with target system

Caution Before turning on the power of the target system, make sure that the power of the IE-703102-MC is turned on.

If the target system is turned on while the IE-703102-MC is off, the target system or the IE-703102-MC may be damaged.

- | | | |
|-----|-------------------------------|-------------------------------------|
| (1) | Connect interface board to PC | 3.1 Connection to Personal Computer |
|-----|-------------------------------|-------------------------------------|

Before connecting, make sure that the power of the PC is off.

- | | | |
|-----|------------------------|--|
| (2) | Connect optional board | Refer to the user's manual of optional board |
|-----|------------------------|--|

- | | | |
|-----|---------------------------------------|--|
| (3) | Set clock operation mode IE-703102-MC | Refer to the user's manual of optional board |
|-----|---------------------------------------|--|

Crystal oscillator with 8 MHz is mounted at factory shipment.

This crystal oscillator can be replaced with another oscillator with a frequency within the IE-703102-MC operating frequency range.

- | | | |
|-----|---------------------------------|--|
| (4) | Set CPU operating voltage range | Refer to the user's manual of optional board |
|-----|---------------------------------|--|

Switch CPU operating voltage range.

- | | | |
|-----|----------------|-----------------------|
| (5) | Connect cables | 3.3 Cable Connections |
|-----|----------------|-----------------------|

Connect power source adaptor and interface cable.

- | | | |
|-----|---------------------------------------|---------------------------------|
| (6) | Connect IE-703102-MC to target system | 3.2 Connection to Target System |
|-----|---------------------------------------|---------------------------------|

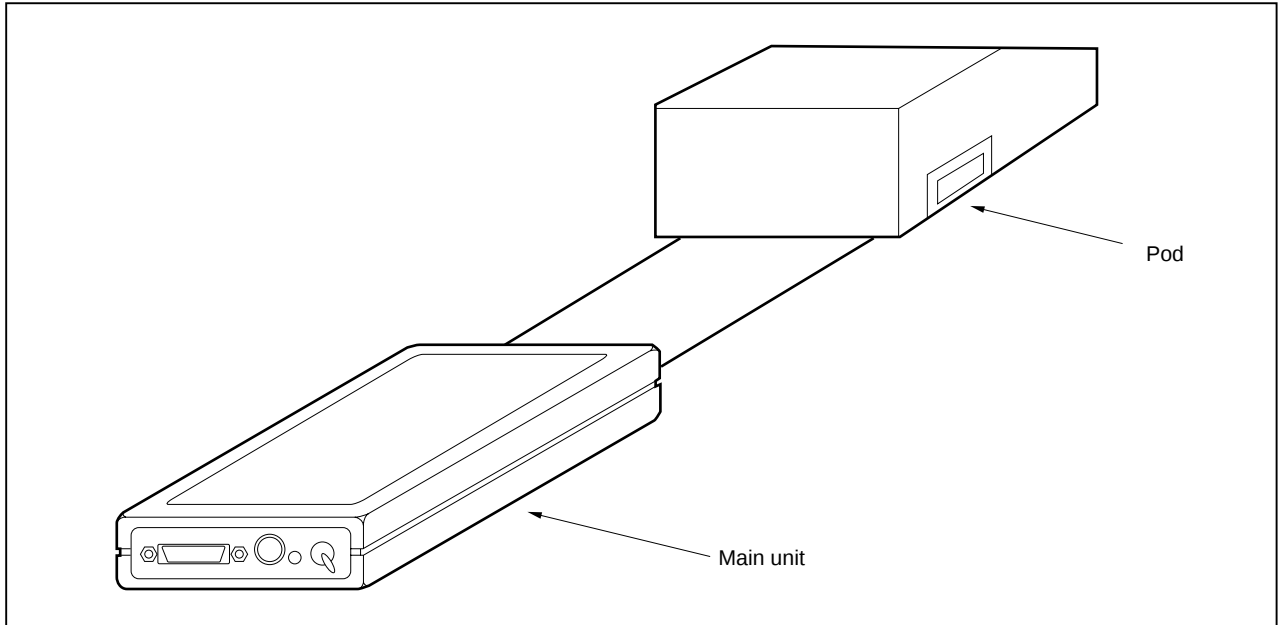
There are two connecting methods: connecting the connection tab of the optional board to the target system directly, and connecting the connection tab of the optional board to the target system via an extension probe (sold separately).

- | | | |
|-----|--|-----------------------------------|
| (7) | Power up IE-703102-MC, then PC, then target system | 3.4 System Power-on and Power-off |
|-----|--|-----------------------------------|

CHAPTER 2 PART NAMES AND FUNCTION

This chapter describes the name and function of each part of the IE-703102-MC, as well as switch settings.

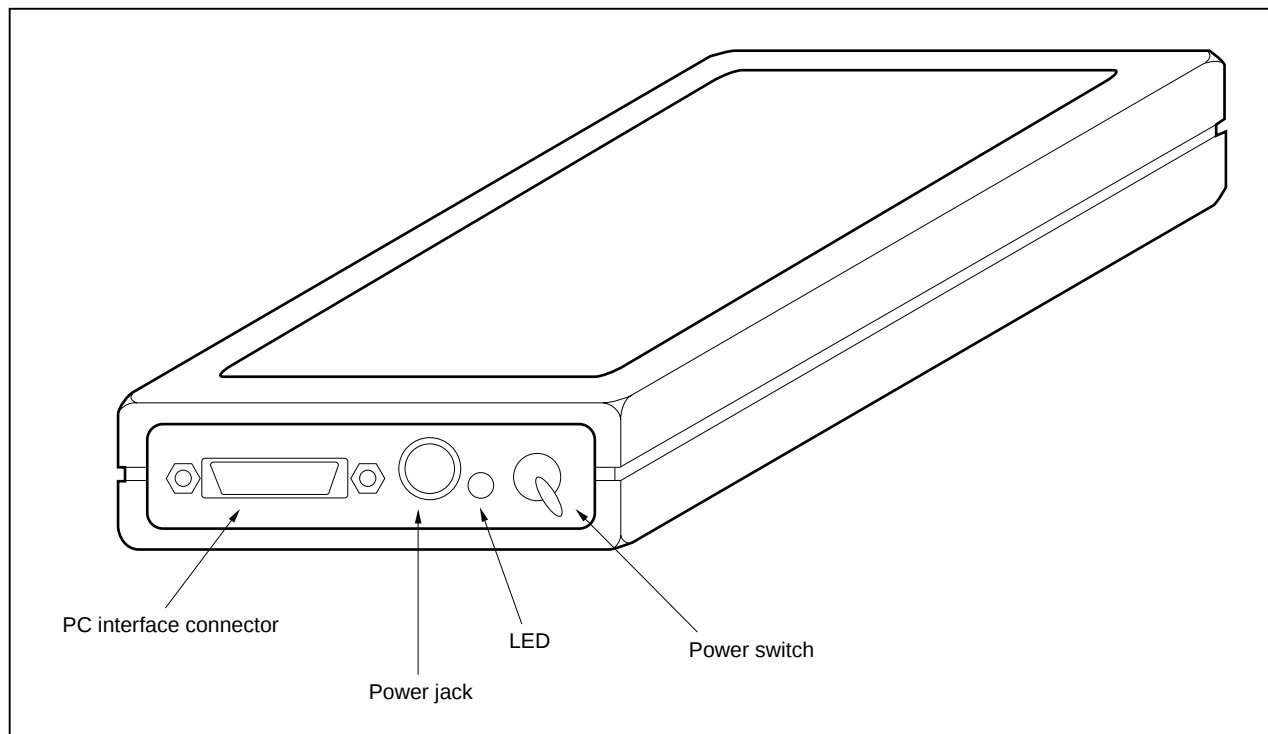
Figure 2-1. IE-703102-MC



2.1 Names and Functions

2.1.1 Names and functions of main unit

Figure 2-2. Main Unit



(1) Power switch

This is the main power ON/OFF switch of the IE-703102-MC.
ON/OFF is printed on the chassis of the main part.

(2) Power jack

Power adaptor (IE-70000-MC-PS-B: sold separately) is connected.

(3) PC interface connector

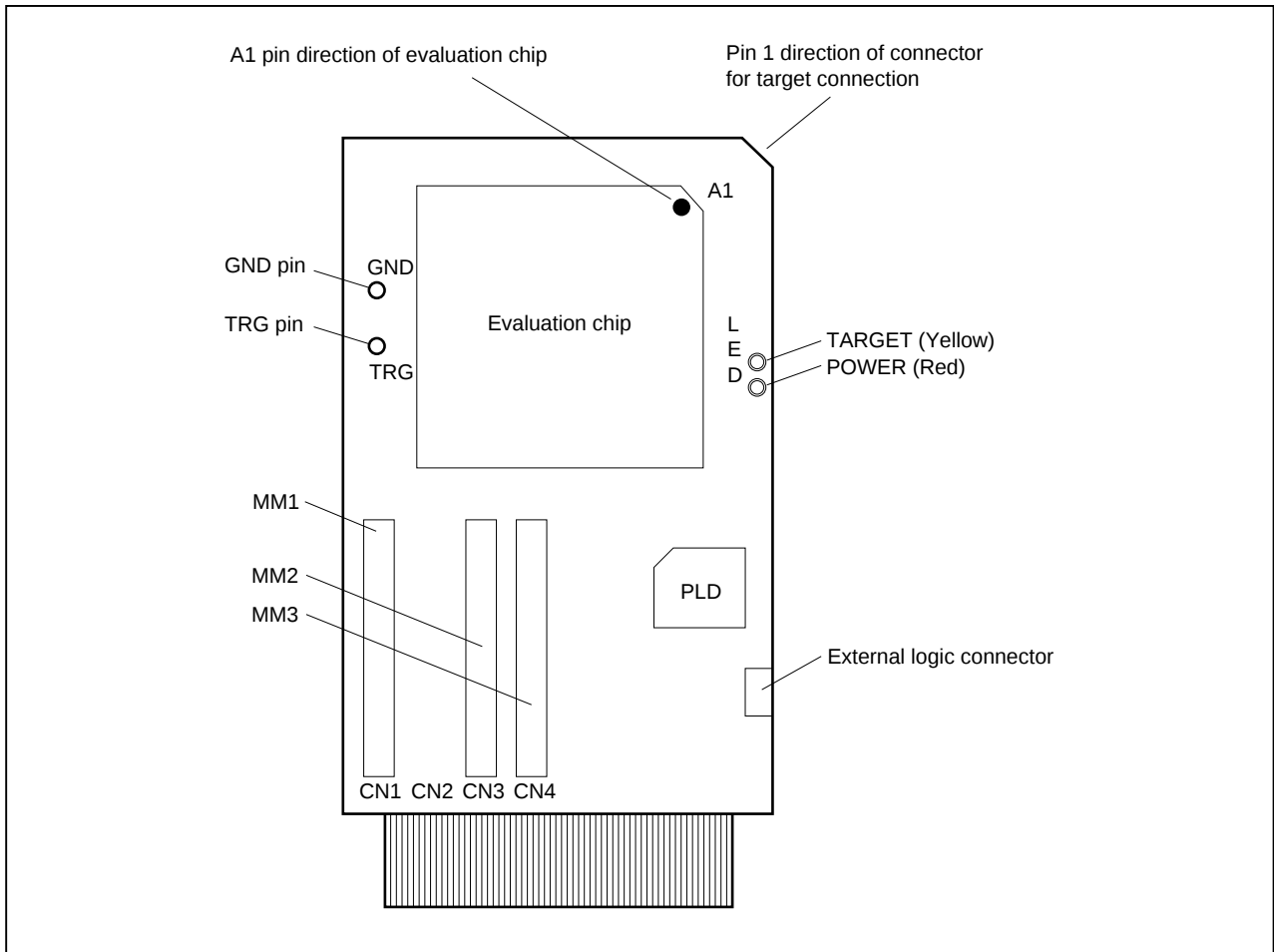
PC interface cable (included) is connected.

(4) LED

ON when the power is on, OFF when the power is off.

2.2 Names and Functions of Pod Part

Figure 2-3. Pod (Top View)



(1) TRG pin

Trigger signal output pin

(2) GND pin

GND pin used during trigger signal output

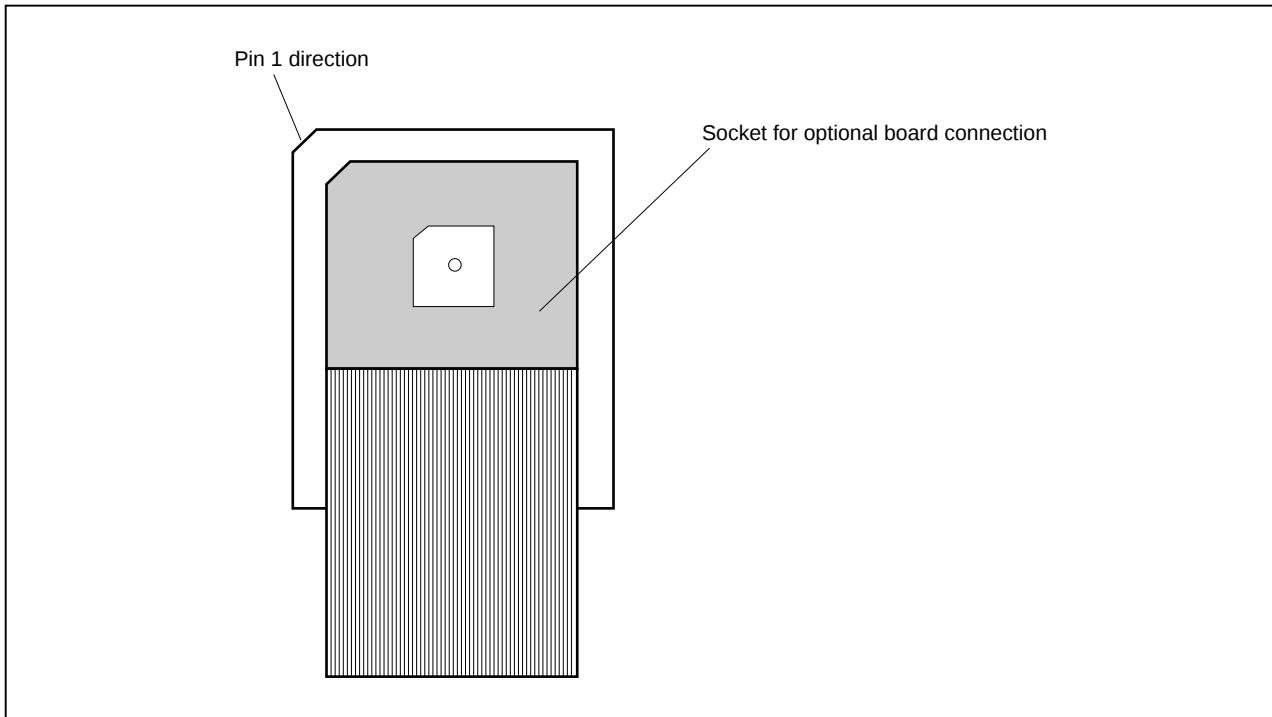
(3) External logic connector

Connects external logic probe (included).

(4) LED

Name	LED state	Description
TARGET (yellow)	ON	Power of target system = ON
	OFF	Power of target system = OFF
POWER (red)	ON	Power switch of main unit = ON
	OFF	Power switch of main unit = OFF

Figure 2-4. Pod (Bottom View)



(1) Socket for optional board connection

PGA socket to connect optional board (sold separately)

CHAPTER 3 CONNECTION OF COMPONENTS

The IE-703102-MC enables debugging and programming of target devices by connecting several components and configuring a desired system.

This chapter describes the various components and their connection. Read this chapter when connecting system components. For the sequence of system configuration, refer to **1.7 Setup**.

For the details on software start-up, refer to the user's manual of the debugger that is used.

3.1 Connection to Personal Computer

3.1.1 Overview of connection

The IE-703102-MC can use a personal computer (PC-9800 series or PC/AT compatibles) as the host machine. The connection to each type of personal computer is described below.

(1) PC-9800 series

When using a PC-9800 series computer, insert the PC interface board (IE-70000-98-IF-B or IE-70000-98-IF-C: optional) in the external expansion slot in the PC-9800 series and connect the computer to the IE-703102-MC.

(2) PC/AT compatibles

When using a PC/AT compatible, insert the following PC interface board in the external expansion slot of the PC/AT compatible and connect the computer to the IE-703102-MC.

- IE-70000-PC-IF-B/IE-70000-PC-IF-C : for ISA bus
- IE-70000-PCI-IF : for PCI bus (can also be used in PC98-NX series)

(3) Notebook-type personal computer

When using a notebook-type personal computer, insert the PC card interface (IE-70000-CD-IF-A: optional) in the PC card slot of the computer and connect the computer to the IE-703102-MC.

3.1.2 Connection procedure

(1) Powering off

Perform connection while the power of each unit is off.

If the power of the IE-703102-MC or the PC is on, turn off the power first.

(2) PC interface board setting

Be sure to read the following section because the board settings differs depending on the board that is used.

(a) IE-70000-98-IF-B

The I/O addresses are set with DIP switch 1 (SW1) and DIP switch 2 (SW2) on the PC interface board. SW1 and SW2 are the handshake bus address setting switches. Set switches No. 1 to No. 8 of SW1 as shown in Figure 3-1 and switches No. 5 to No. 8 of SW2 as shown in Figure 3-2 (Set 00D×H address). Set JP1 to NO_USE.

Figure 3-1. Setting of DIP Switch 1 (SW1) (IE-70000-98-IF-B)

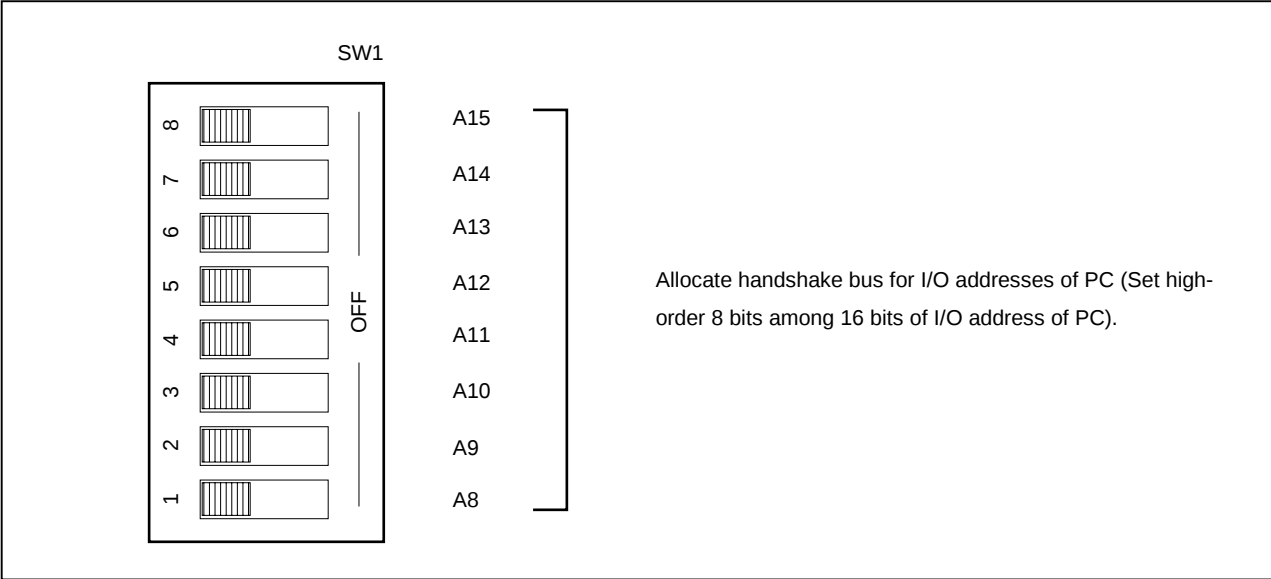
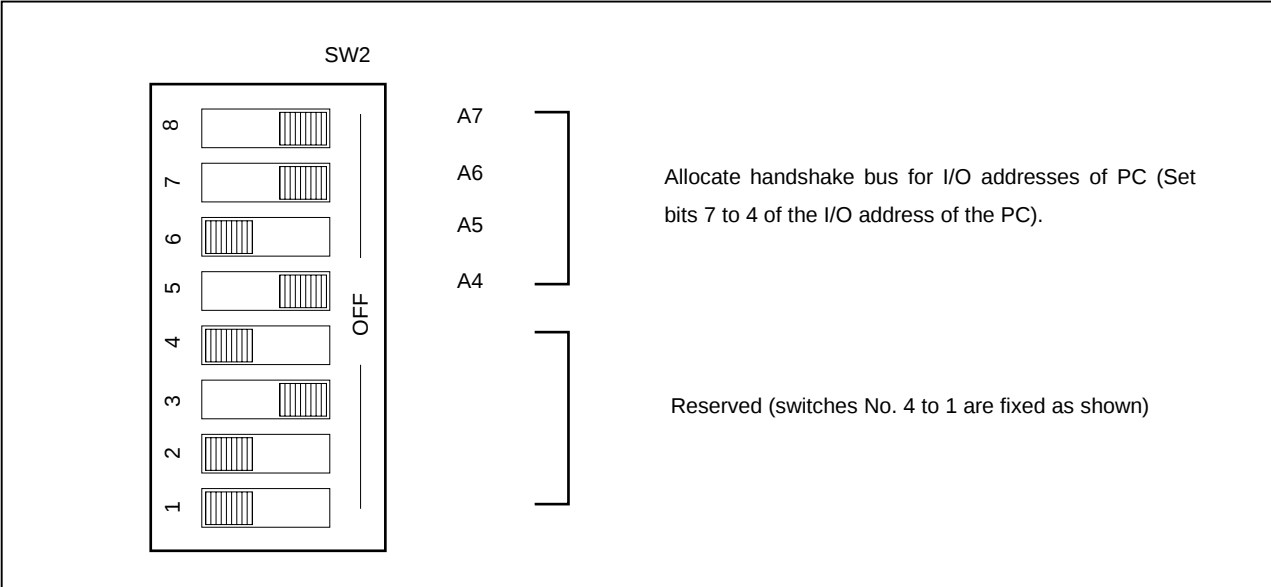


Figure 3-2. Setting of DIP Switch 2 (SW2) (IE-70000-98-IF-B)



(b) IE-70000-98-IF-C

The I/O addresses are set with DIP switch 1 (SW1) and DIP switch 2 (SW2) on the PC interface board. SW1 and SW2 are the handshake bus address setting switches. Set switches No. 1 to No. 8 of SW1 as shown in Figure 3-3 and switches No. 5 to No. 8 of SW2 as shown in Figure 3-4 (Set 00D×H address). Set INT JP to NO_USE and WAIT JP to the short between 2 and 3.

Figure 3-3. Setting of DIP Switch 1 (SW1) (IE-70000-98-IF-C)

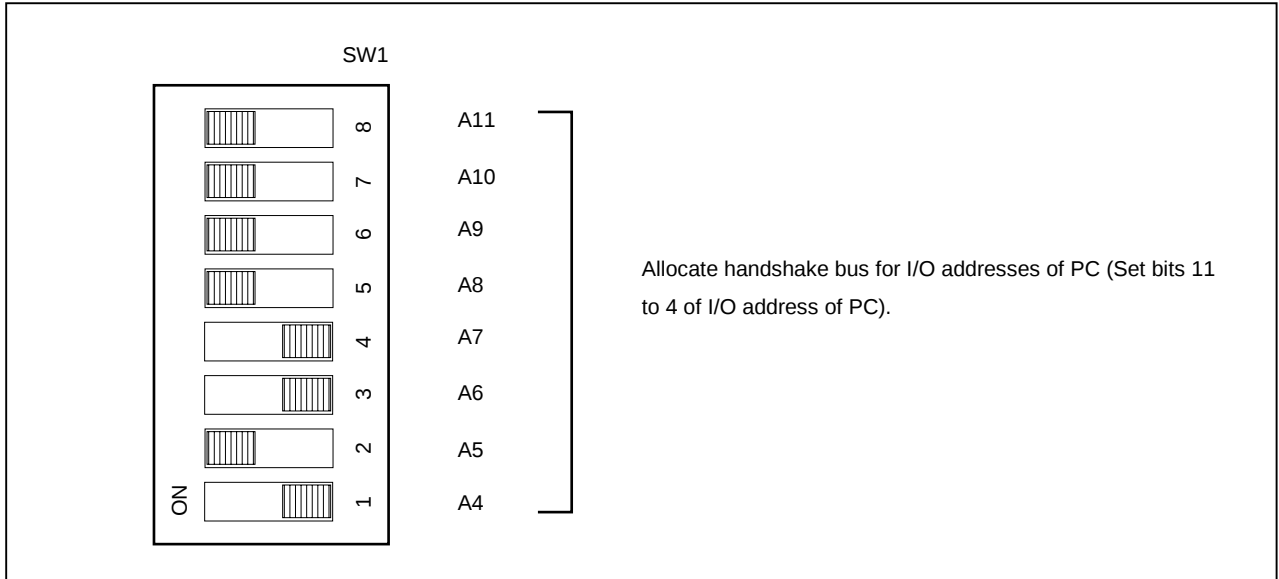
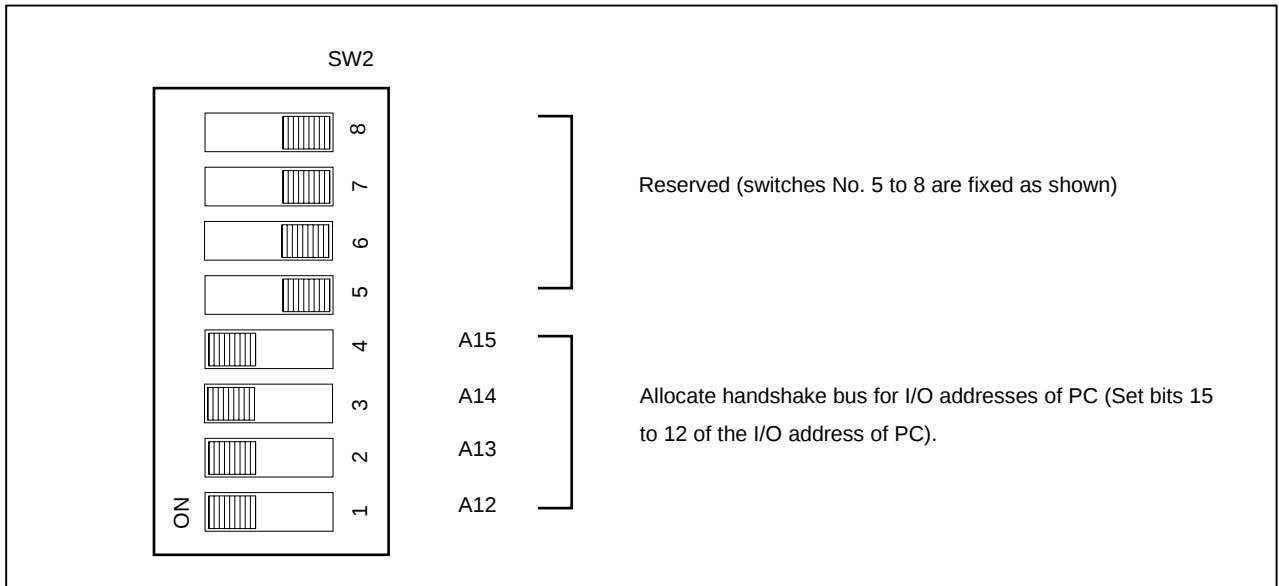


Figure 3-4. Setting of DIP Switch 2 (SW2) (IE-70000-98-IF-C)



(c) IE-70000-PC-IF-B

The I/O addresses are set with DIP switch 1 (SW1) and DIP switch 2 (SW2) on the PC interface board. SW1 and SW2 are setting switches of the handshake bus address. Set switches No. 1 to No. 8 of SW1 as shown in Figure 3-5 and switches No. 1 to No. 4 of SW2 as shown in Figure 3-6 (Set 022×H address). Set JP1 to NO_USE.

Figure 3-5. Setting of DIP Switch 1 (SW1) (IE-70000-PC-IF-B)

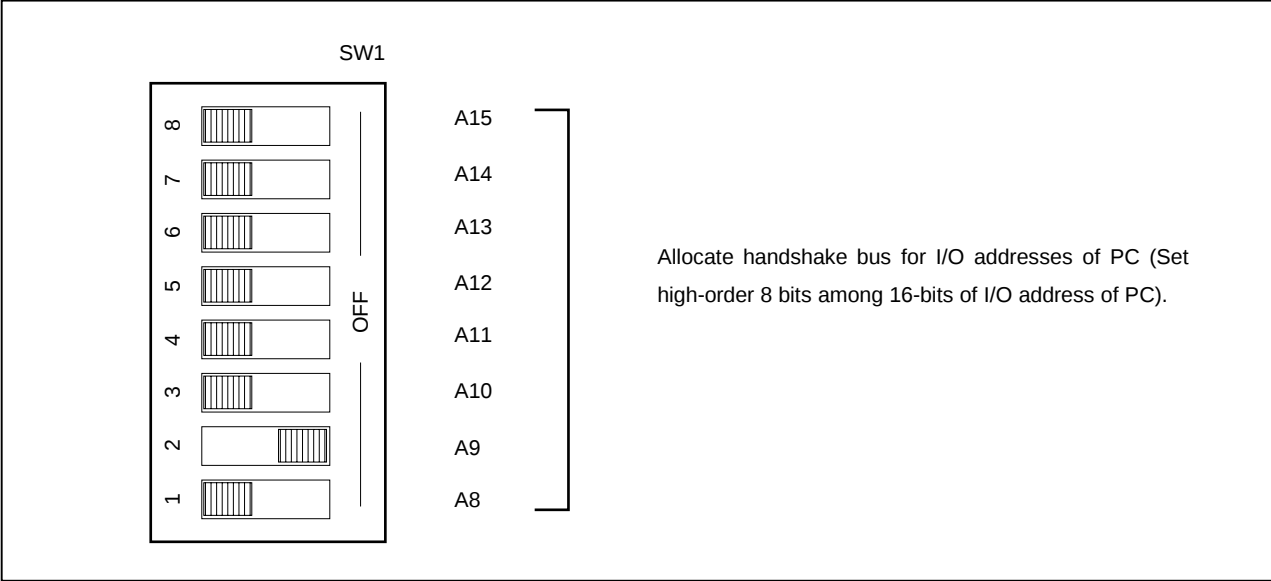
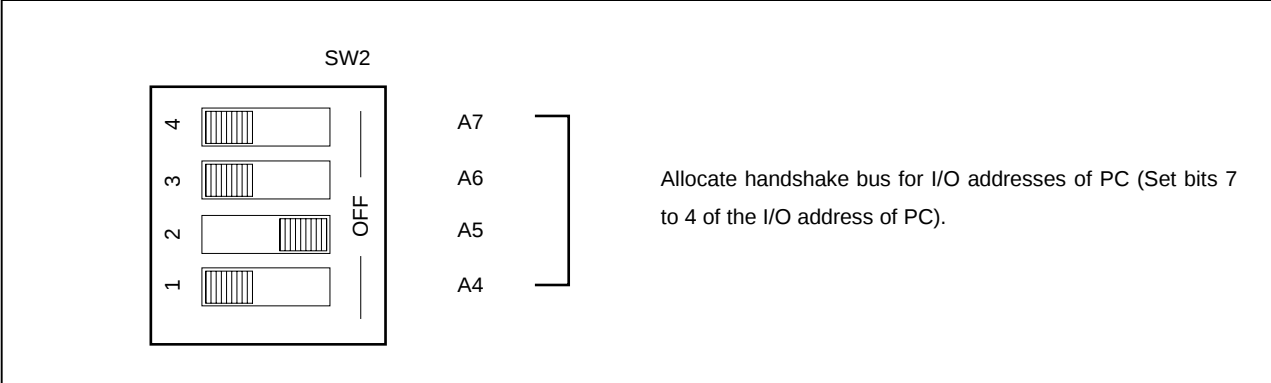


Figure 3-6. Setting of DIP Switch 2 (SW2) (IE-70000-PC-IF-B)



(d) IE-70000-PC-IF-C

The I/O addresses are set with DIP switch 1 (SW1) and DIP switch 2 (SW2) on the PC interface board. SW1 and SW2 are setting switches of the handshake bus address. Set switches No. 1 to No. 8 of SW1 as shown in Figure 3-7 and switches No. 1 to No. 4 of SW2 as shown in Figure 3-8 (Set 022×H address). Set INT JP to NO_USE and WAIT JP to the short between 2 and 3.

Figure 3-7. Setting of DIP Switch 1 (SW1) (IE-70000-PC-IF-C)

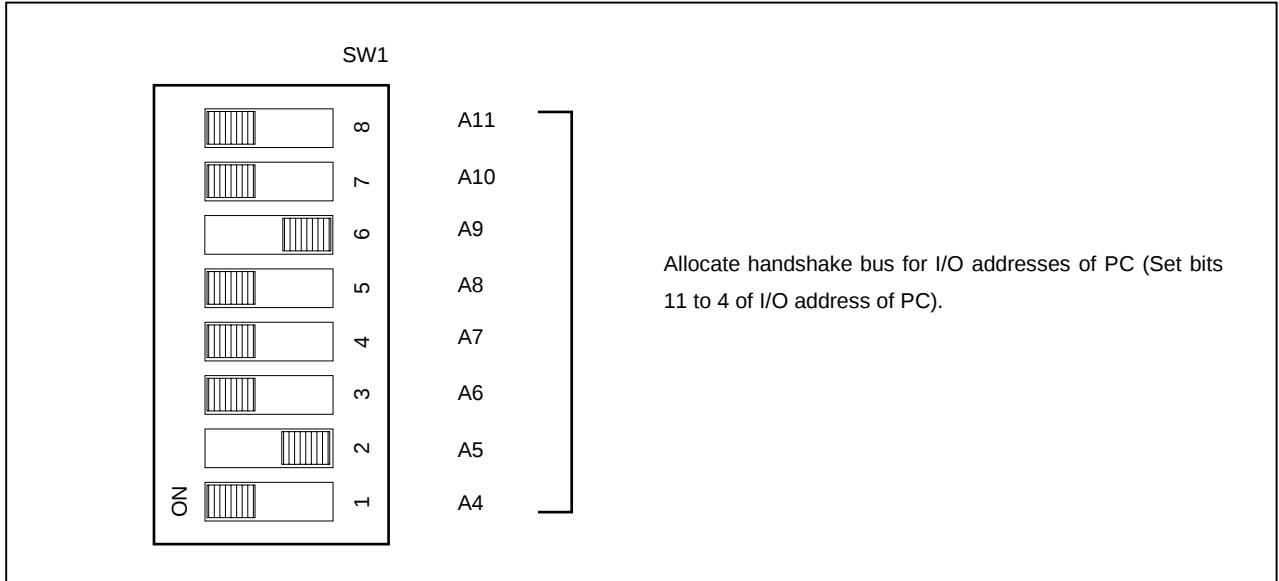
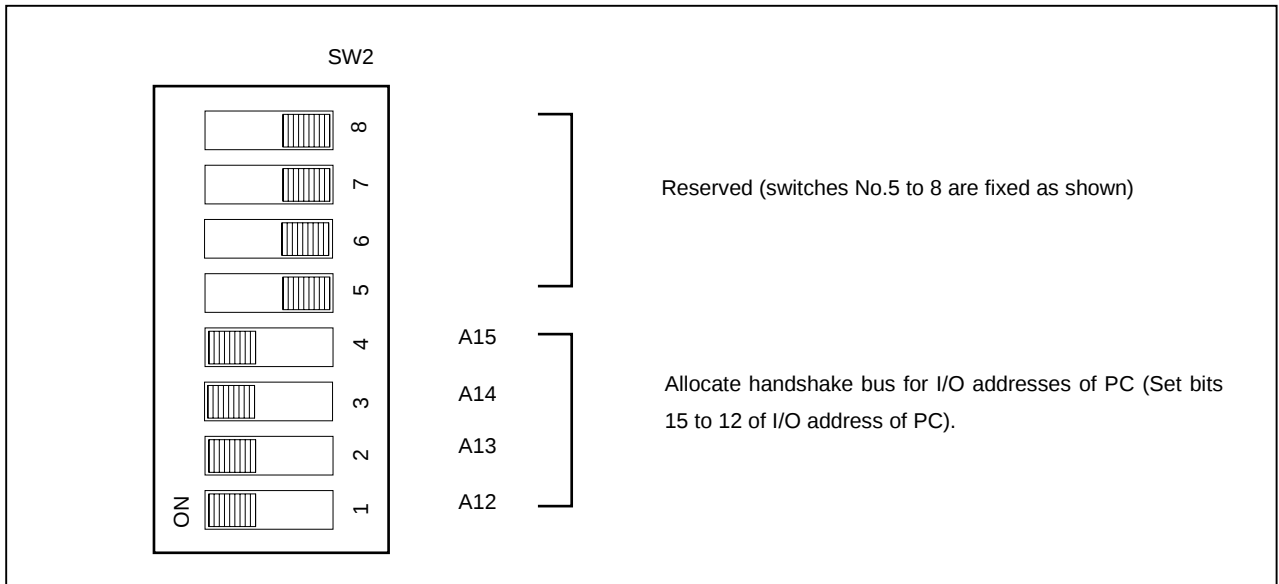


Figure 3-8. Setting of DIP Switch 2 (SW2) (IE-70000-PC-IF-C)

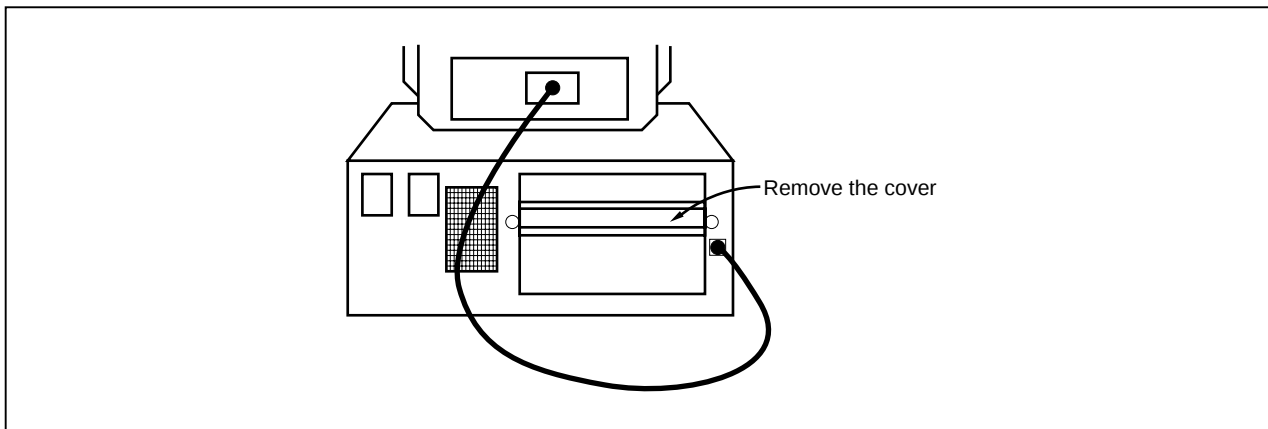


3.1.3 Personal computer setting

This section describes how to set and connect the interface board to the PC-9800 series computer add-on slot. Also refer to this section when connecting a PC/AT compatible.

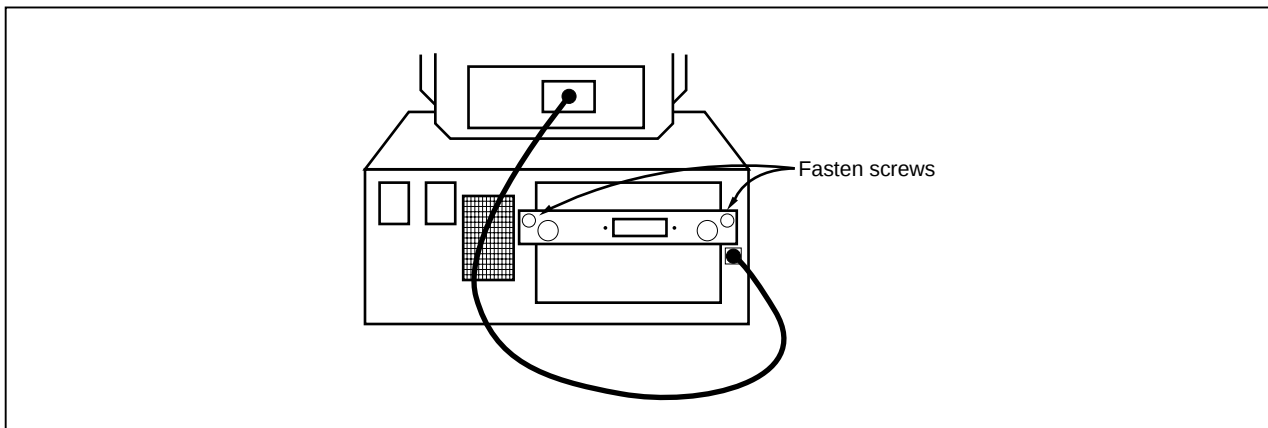
- (a) Make sure that the PC-9800 series power is off before starting installation.
- (b) Remove the cover of the add-on slot bus on the rear panel of the PC.

Figure 3-9. Rear Panel of PC-9800 Series



- (c) Insert the PC interface board.
- (d) Fasten the PC interface board with screws.

Figure 3-10. Insertion of PC Interface Board



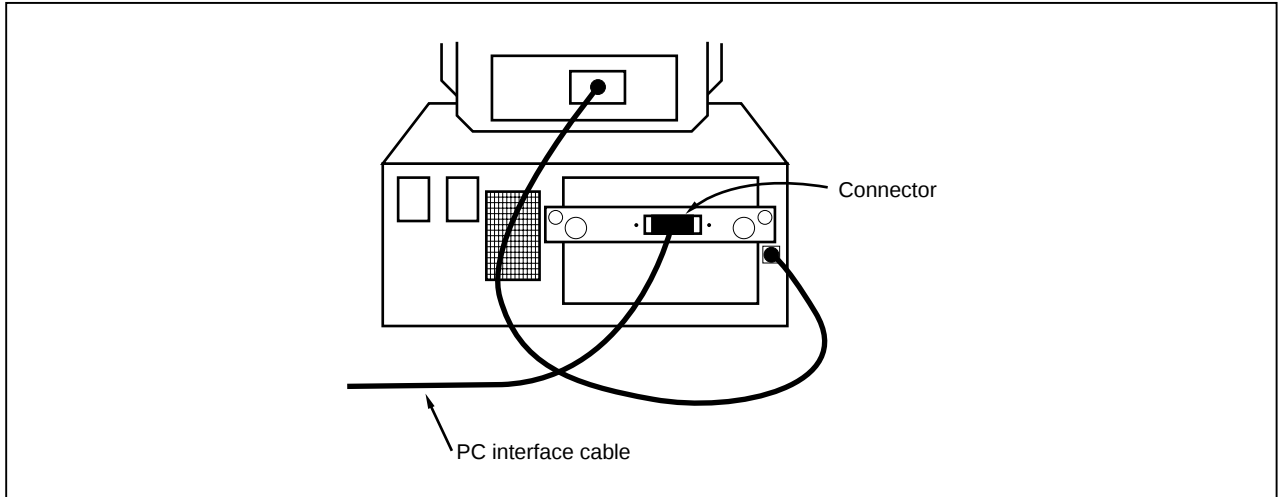
3.1.4 Connection of PC interface cable

Connect the PC interface cable to the interface board connector.

Figure 3-11 illustrates how to connect the PC interface cable.

Caution Connect to CH1 connector when using IE-70000-xx-IF-C.

Figure 3-11. Connection of Cable to PC Interface Board



3.2 Connection to Target System

There are two connecting methods: connecting the connection tab of the optional board to the target system directly and connecting the connection tab of the optional board to the target system via an extension probe (optional).

- (1) Attach the connector for target connection (NQPACKxxxSD) and the connector for emulator connection (YQPACKxxxSD) to the target system.

Figure 3-12. Connection of Connector for Target Connection and Connector for Emulator Connection

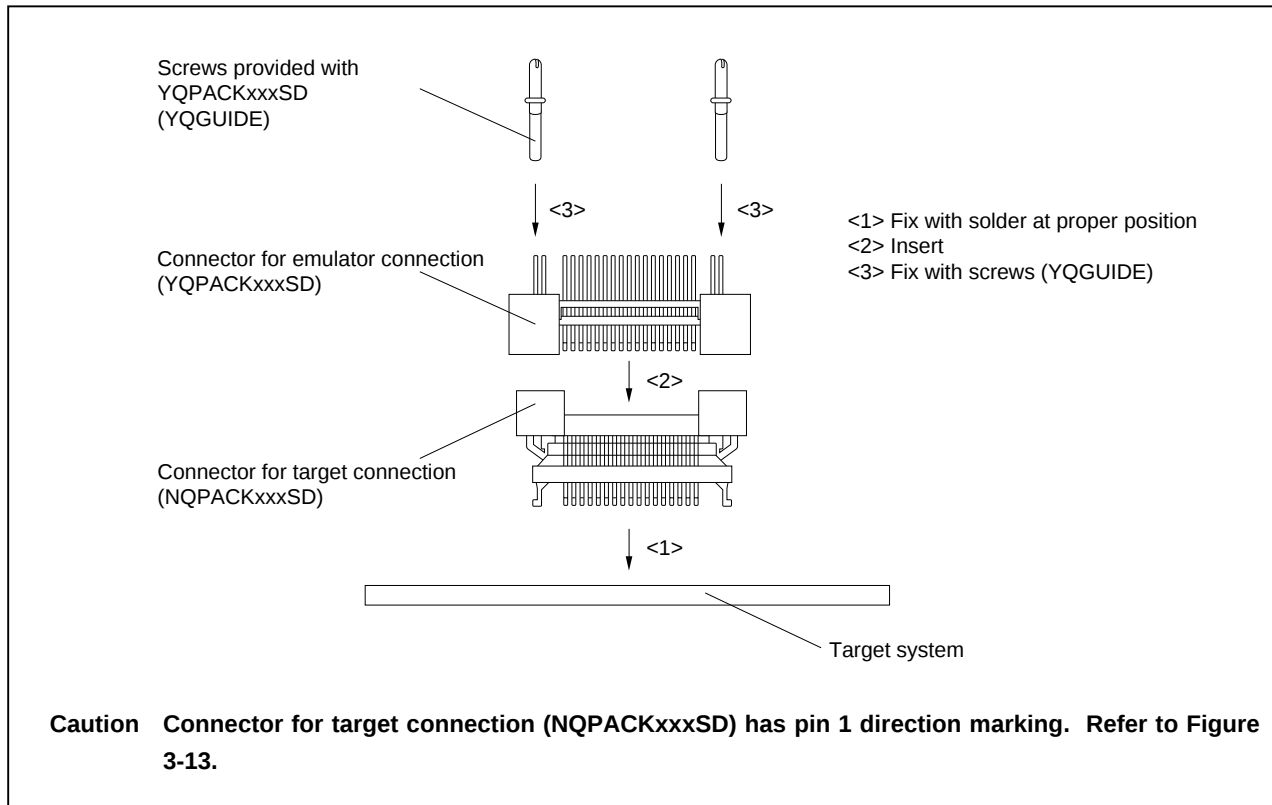
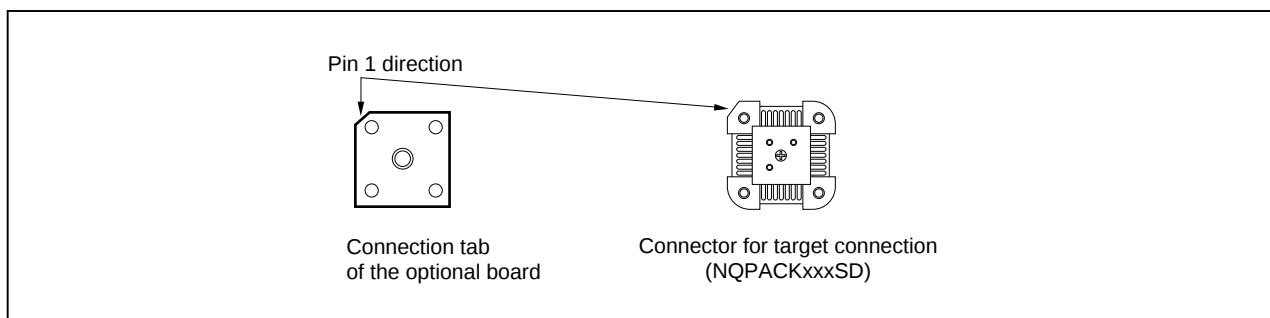


Figure 3-13. Pin 1 Direction Marking of Connector (Top View)



- (2) Connect the connection tab of the optional board to the target system directly or via the extension probe. In either case, make sure that the pin 1 position (cutout corner of connector) is aligned. The connection procedure is as follows.

Caution Be careful not to break or bend the pins of connector, socket, and extension probe when connecting.

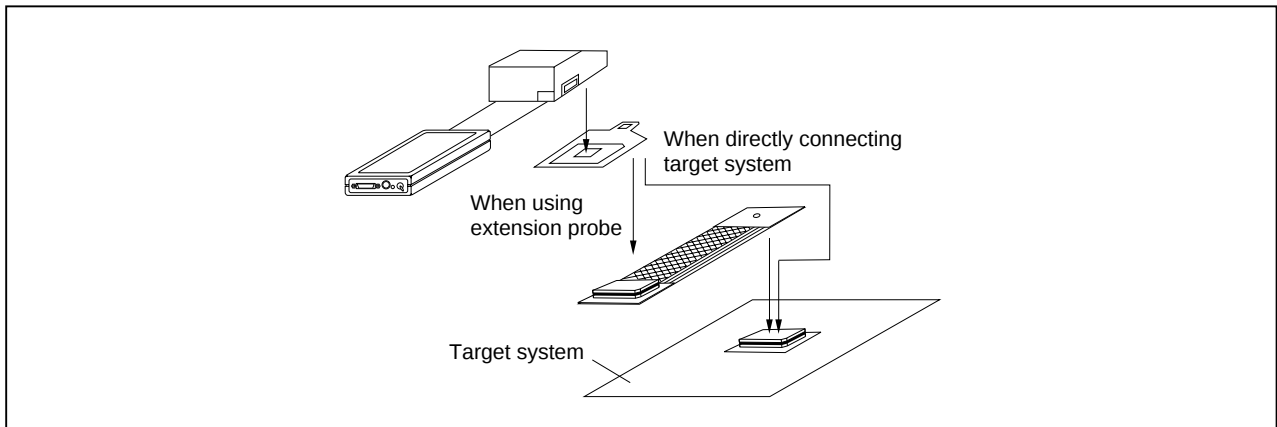
(a) When connecting to target system directly

- <1> Turn off the power of the IE-703102-MC (power switch OFF).
- <2> Connect the IE-703102-MC to the optional board.
- <3> Connect the connection tab of the optional board to the target system.

(b) When connecting to target system via extension probe

- <1> Turn off the power of the IE-703102-MC (power switch OFF).
- <2> Connect the IE-703102-MC to the optional board.
- <3> Connect the extension probe to the optional board.
- <4> Connect the top of the extension probe to the target system.

Figure 3-14. Connection of IE-703102-MC to Target System



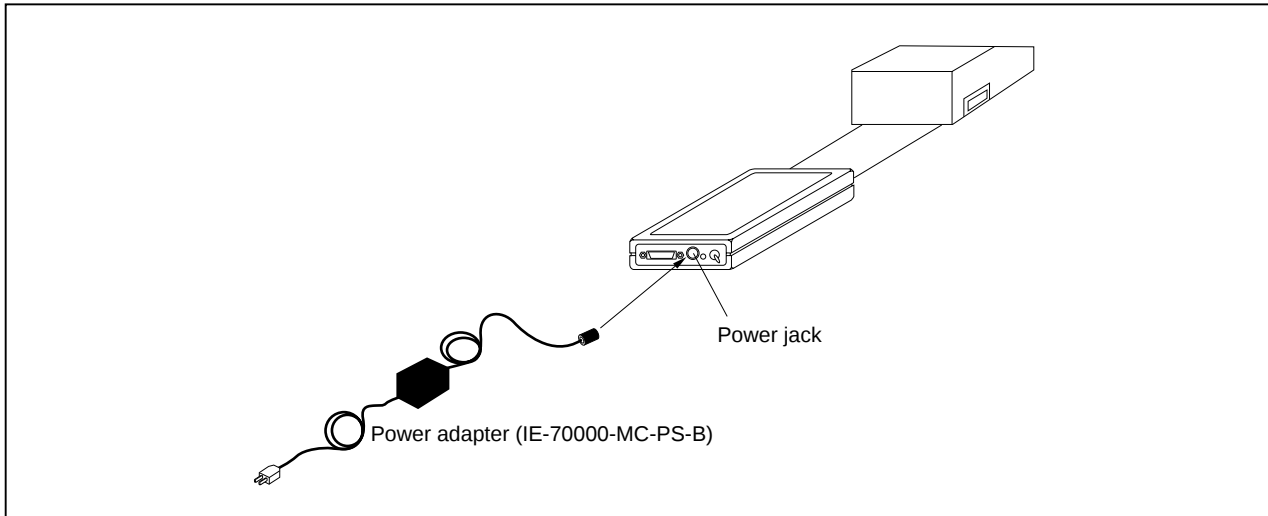
3.3 Cable Connections

3.3.1 Connection of power adaptor

Insert the cable of the power supply adaptor (IE-70000-MC-PS-B: optional) to the power jack of the IE-703102-MC main part.

Caution Use only the IE-70000-MC-PS-B for power supply. Use of other power supplies may damage the IE-703102-MC due to different power jack polarity and voltage.

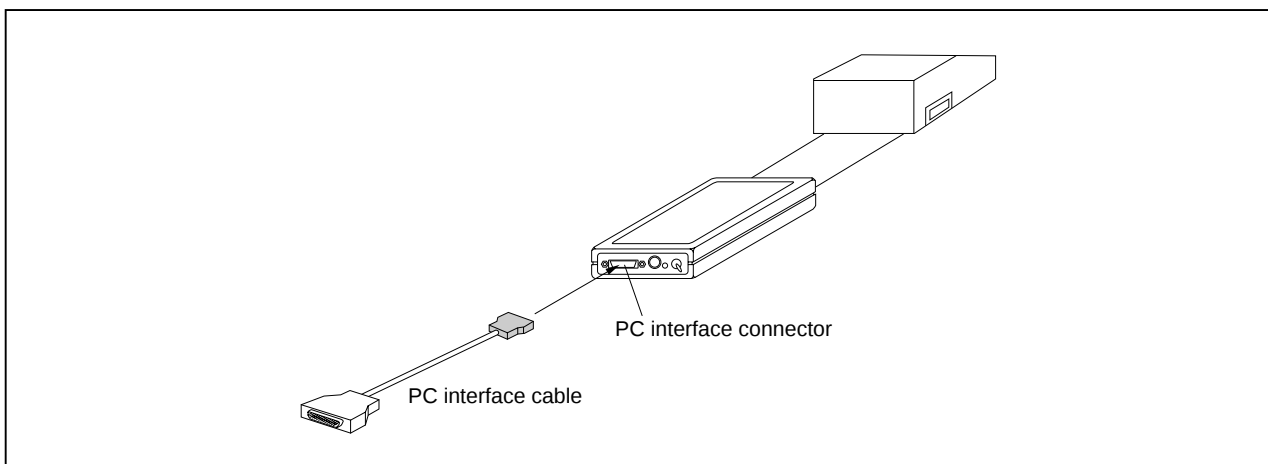
Figure 3-15. Power Adaptor Connection



3.3.2 PC interface cable connection

Connect the PC interface cable to the 36-pin connector of the IE-703102-MC.

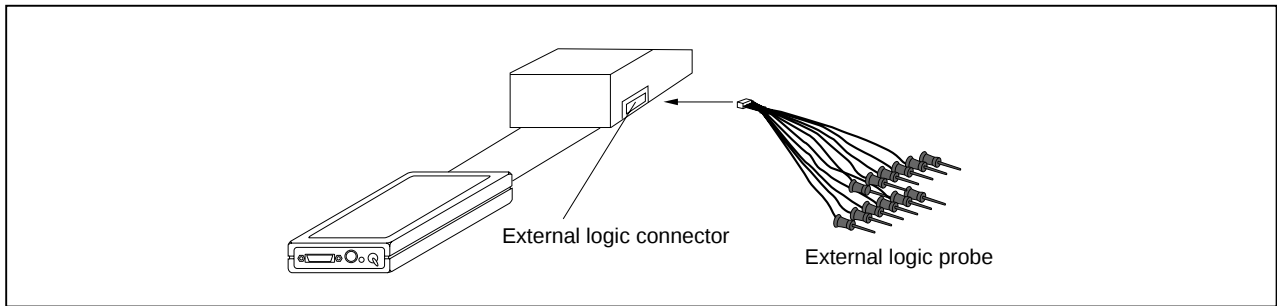
Figure 3-16. PC Interface Cable Connection



3.3.3 External logic probe connection

When using the external logic probe, connect to the 9-pin connector in the IE-703102-MC main unit.

Figure 3-17. External Logic Probe Connection



3.3.4 Additional information

The IE-703102-MC can perform real-time tracing of the evaluation chip bus cycle. In addition, external logic probes are provided for the following three functions.

For details on their use, refer to the debugger user's manual.

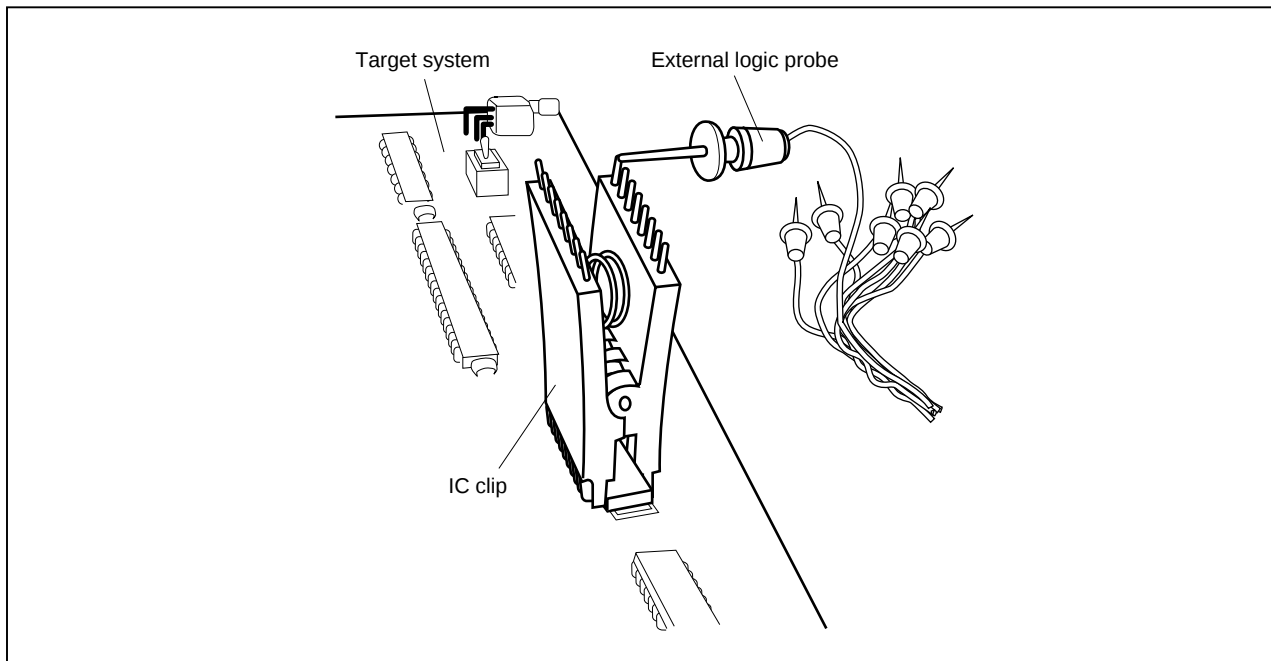
- (1) Any eight signals can be traced in real-time.
- (2) Tracer start/stop is enabled using any eight signals.
- (3) Break setting is enabled using any eight signals.

Cautions 1. Connect the external logic probe only to a TTL-level signal line. The high level and low level cannot be detected correctly if connected to lines other than TTL-level signal lines. Furthermore, the sensor of the IE-703102-MC may damage by an excessive voltage level.

2. When connecting the external logic probe, use commercially available IC clips.

Procedure

- (1) Turn off the power of the target system.
- (2) Turn off the power of the IE-703102-MC.
- (3) Attach IC clips to a device on the target system.
- (4) Connect the external logic probe to the included IC clips.
- (5) Connect the GND of the external logic probe to the GND of the target system.

Figure 3-18. External Logic Probe Connection (Using IC Clip)

3.4 System Power-on and Power-off

After the connection of the IE-703102-MC and each system component (PC, target system, etc.), start up and end the system using the following.

3.4.1 Power-on procedure

Cautions

1. Make sure that the IE-703102-MC is correctly connected to the PC.
2. In case the IE-703102-MC is powered on using a procedure other than the following one, the IE-703102-MC or the target system may be damaged.

(1) Turn on the power switch of the IE-703102-MC.

Set the power switch to "ON" after connecting the power adaptor to the power jack of the IE-703102-MC and the plug to the power outlet.

(2) Turn on the power switch of the PC.

(3) Turn on the power of the target system.

(4) Start the debugger.

3.4.2 Power-off procedure

(1) Terminate the debugger.

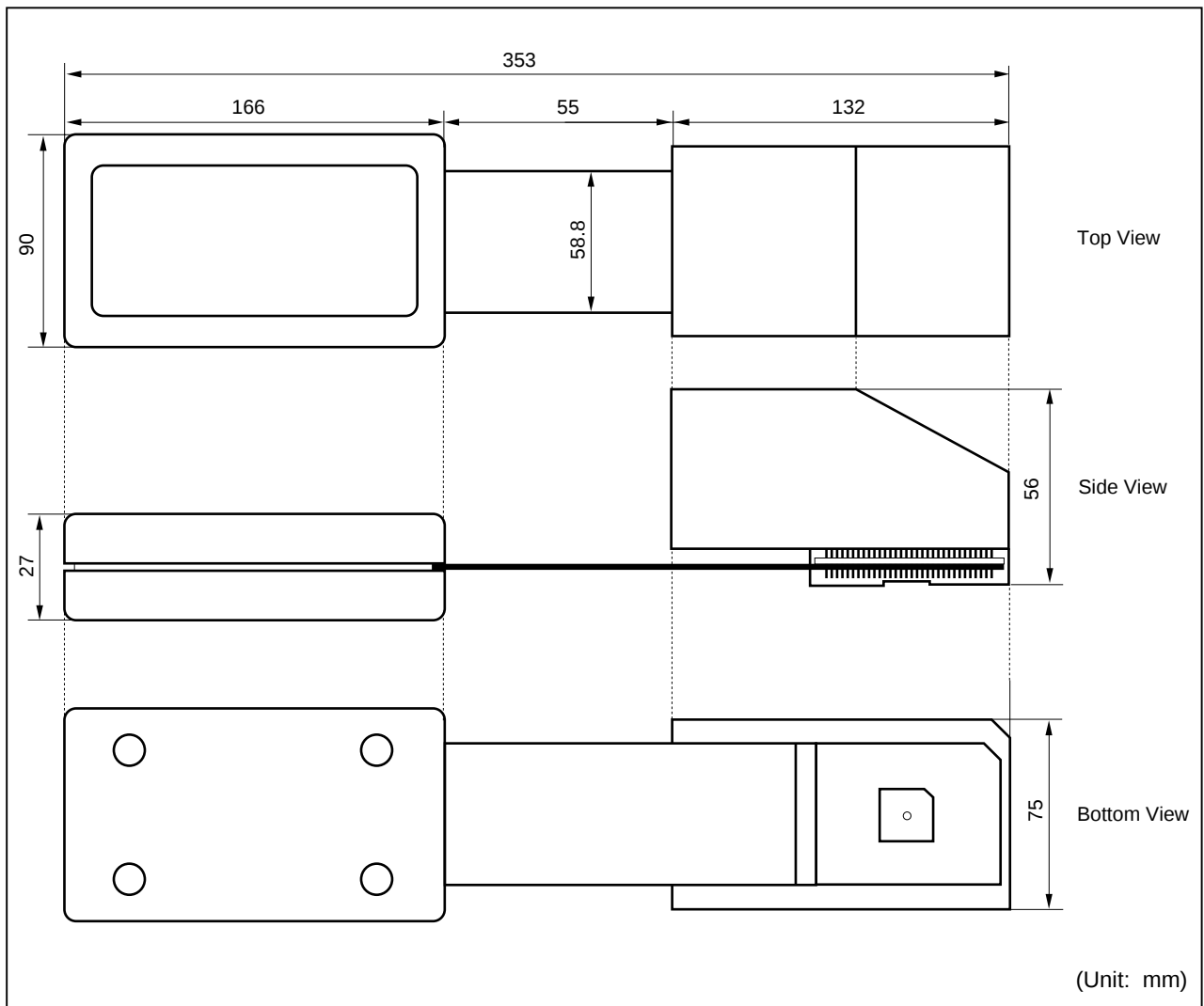
(2) Turn off the power switch of the target system.

(3) Turn off the power switch of the PC.

(4) Turn off the power switch of the IE-703102-MC.

[MEMO]

APPENDIX DIMENSIONS



[MEMO]

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