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M30830T-EPB

User's Manual

Emulation Pod for M32C/81, 82 and 83 Groups

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\\SUPPORT\Product-name\SUPPORT.TXT

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Preface

The M30830T-EPB is an emulation probe for M32C/81, 82 and 83 Groups of Renesas MCUs. The M30830T-EPB is used by connecting to the PC7501 emulator main unit.

This user's manual mainly describes specifications of the M30830T-EPB emulation probe and how to setup it. For details on the following products, which are used with the M30830T-EPB, refer to each product's user's manual.

- Emulator: PC7501 User's Manual
- Emulator debugger: M3T-PD308F User's Manual

All the components of this product are shown in "Table 2.1 Package components" (page 19). If there is any question or doubt about this product, contact your local distributor.

To use the product properly

Precautions for Safety:



- In both this user's manual and on the product itself, several icons are used to insure proper handling of this product and also to prevent injuries to you or other persons, or damage to your properties.
- The icons' graphic images and meanings are given in "Chapter 1. Precautions for Safety" (page 7). Be sure to read this chapter before using the product.

Contents

Chapter 1. Precautions for Safety	7
1.1 Safety Symbols and Meanings	9
Chapter 2. Preparation	17
2.1 Terminology	18
2.2 Package Components	19
2.3 Other Tool Products Required for Development	19
2.4 Name of Each Part	20
(1) System Configuration	20
(2) Names and Functions of PC7501 Upper Panel LEDs	20
2.5 When Using the Emulator for the First Time	22
Chapter 3. Setting Up	23
3.1 Removing the Upper Cover	24
3.2 Selecting Clock Supply	25
(1) Using the Oscillator Circuit on the Target System	26
(2) Changing the Internal Oscillator Circuit of the Emulator	27
(3) Replacing the Oscillator Circuit Boards	28
3.3 Setting Switches	29
3.4 A-D Conversion Bypass Capacitor	32
3.5 Connecting the PC7501	33
3.6 Connecting the Target System	34
(1) Connecting 100-pin LCC Socket	35
(2) Connecting 100-pin 0.65-mm-pitch Foot Pattern (Part 1)	36
(3) Connecting 100-pin 0.65-mm-pitch Foot Pattern (Part 2)	37
(4) Connecting 100-pin 0.65-mm-pitch Foot Pattern (Part 3)	38
(5) Connecting 100-pin 0.5-mm-pitch Foot Pattern (Part 1)	39
(6) Connecting 100-pin 0.5-mm-pitch Foot Pattern (Part 2)	40
(7) Connecting 100-pin 0.5-mm-pitch Foot Pattern (Part 3)	41
(8) Connecting 144-pin 0.5-mm-pitch Foot Pattern	42
Chapter 4. Usage	43
4.1 Turning On the Power	44
(1) Checking the Connection of the Emulator System	44
(2) Turning ON/OFF the Power	44
(3) LED Display When PC7501 Starts Up Normally	45
4.2 Downloading Firmware	46
(1) When It is Necessary to Download Firmware	46
(2) Downloading Firmware in the Maintenance Mode	46

4.3 Starting Up the Emulator Debugger (Setting EMEM Dialog Box)	47
(1) Setting the Debug Monitor Bank Address	48
(2) Selecting the Processor Mode	48
(3) Setting the Emulation Memory	49
(4) Emulation Memory Allocation as Expansion Area	49
(5) Referring MCU STATUS	51
4.4 Self-checks	51
(1) Self-check Procedure	51
(2) If an Error is Detected in Self-checks	51
Chapter 5. Specifications	53
5.1 Specifications	54
5.2 Connection Diagrams	55
5.3 External Dimensions	57
(1) External Dimensions of the Emulation Probe	57
(2) External Dimensions of the Converter Board (M30800T-PTC)	58
(3) External Dimensions of the Converter Board (M3T-FLX-144NSD)	59
Chapter 6. Troubleshooting	61
6.1 Flowchart to Remedy the Troubles	62
6.2 When the Emulator Debugger Does Not Start Up Properly	63
(1) When the LED Display of the PC7501 is Abnormal	63
(2) EMEM Dialog Box is Not Displayed When the Emulator Debugger Starts Up (When the target system is connected)	64
(3) EMEM Dialog Box is Not Displayed When the Emulator Debugger Starts Up (When the target system is not connected)	65
(4) Errors Occur When the Emulator Debugger Starts Up (When the target system is connected)	65
Chapter 7. Maintenance and Guarantee	67
7.1 Maintenance	68
7.2 Guarantee	68
7.3 Repair Provisions	68
7.4 How to Request for Repair	69

M30830T-EPB Repair Request Sheet

Technical Support Communication Sheet

MEMO

Chapter 1. Precautions for Safety

This chapter describes precautions for using this product safely and properly. For precautions for the emulator main unit and the emulator debugger, refer to each user's manual included with your product.

1.1 Safety Symbols and Meanings	9
WARNING Warning for Handling This Product	10
Warning for Installation	10
Warning for Use Environment	10
CAUTION Cautions for Powering On	10
Cautions to Be Taken for Handling This Product	10
Caution to Be Taken for Malfunctions	10
IMPORTANT Notes on Downloading Firmware	11
Note on When the Emulator Debugger Ends	11
Note on Final Evaluation	11
Notes on Target System	11
Note on RESET* Input	11
Note on RDY* Input	11
Note on HOLD* Input	11
Note on NMI* Input	12
Notes on Interruption	12
Note on Clock Supply to the MCU	12
Notes on Access Prohibited Area	12
Notes on Stack Area	12
Notes on Reset Vector Area	13
Notes on EMEM Dialog Box	13
Note on S/W Break	14
Note on Differences between Actual MCU and Emulator	14
Notes on Watchdog Function	14
Notes on A-D Input Selection Function	15
Note on DMA Transfer	15
Note on DMAC II Transfer Completion Interrupts	15
Note on Protect Resistor	15



Note on Downloading Programs	16
Note on On-chip Oscillator	16
Note on PLL Clock	16
Notes on Address-Match Interrupt	16
Note on Operating Frequency	16
Note on Support for M32C/81 and 82 Groups	16
Notes on Service-Life of the MCU's Internal Flash ROM	16

Chapter 1. Precautions for Safety


In both the user's manual and on the product itself, several icons are used to insure proper handling of this product and also to prevent injuries to you or other persons, or damage to your properties.


This chapter describes the precautions which should be taken in order to use this product safely and properly. Be sure to read this chapter before using this product.


1.1 Safety Symbols and Meanings


	WARNING	If the requirements shown in the "WARNING" sentences are ignored, the equipment may cause serious personal injury or death.
	CAUTION	If the requirements shown in the "CAUTION" sentences are ignored, the equipment may malfunction.
	IMPORTANT	It means important information on using this product.


In addition to the three above, the following are also used as appropriate.


 means WARNING or CAUTION.

Example:  **CAUTION AGAINST AN ELECTRIC SHOCK**

 means PROHIBITION.

Example:  **DISASSEMBLY PROHIBITED**

 means A FORCIBLE ACTION.

Example:  **UNPLUG THE POWER CABLE FROM THE RECEPTACLE.**

The following pages describe the symbols "WARNING", "CAUTION", and "IMPORTANT".

WARNING

Warning for Handling This Product:



- Do not disassemble or modify this product. Disassembling or modifying this product can cause damage.

Warning for Installation:



- Do not set this product in water or areas of high humidity. Spilling water or some other liquid into the main unit can cause an unreparable damage.

Warning for Use Environment:



- This equipment is to be used in an environment with a maximum ambient temperature of 35°C. Care should be taken that this temperature is not exceeded.

CAUTION

Cautions for Powering On:



- Turn ON the power of the emulator and target system as simultaneously as possible.
- Turn OFF the power of the emulator and target system as simultaneously as possible.
- When turning ON the power again after shutting OFF the power, wait 10 seconds.

Cautions to Be Taken for Handling This Product:



- Use caution when handling the main unit. Be careful not to apply a mechanical shock.
- Do not touch the connector pins of the emulator main unit and the target MCU connector pins. Static electricity may damage the internal circuits.
- Do not pull this product by the flexible cable for connecting to the emulator main unit and emulation probe. The cable may cause a break.
- Do not flex the flexible cable for connecting to the emulator main unit and emulation probe excessively. The cable may cause a break.
- Do not use inch-size screws for this equipment. The screws used in this equipment are all ISO (meter-size) type screws. When replacing screws, use same type screws as equipped before.

Caution to Be Taken for Malfunctions:



- If the emulator malfunctions because of interference like external noise, do the following to remedy the trouble.
 - (1) Press the RESET switch on the emulator front panel.
 - (2) If normal operation is not restored after step (1), shut OFF power to the emulator once and then reactivate it.

IMPORTANT

Notes on Downloading Firmware:

- Before using this product for the first time, it is necessary to download the dedicated firmware (control software built into the PC7501). Please note that, to do this, it is necessary to start up the PC7501 in the maintenance mode. For firmware download procedures, see "4.2 Downloading Firmware" (page 46). Once the firmware has been downloaded, the product can be used by simply turning on the power.
- Do not shut off the power while downloading the firmware. If this happens, the product will not start up properly. If power is shut off unexpectedly, redownload the firmware.
- Except when a target status error occurs, if self-checks are not completed successfully, there may be trouble with the product. In such case, contact your sales representative. However, perform self-checks while not connecting the target system.

Note on When the Emulator Debugger Ends:

- To restart the emulator debugger after it ends, always shut power to the emulator module off once and then on again.

Note on Final Evaluation:

- Be sure to evaluate your system with an MCU for evaluation purposes. Before starting mask production, evaluate your system and make final confirmation with a CS (Commercial Sample) version MCU.

Notes on Target System:

- The V_{cc} pin of emulator is connected to the target system to observe the voltage of the target system. Therefore design your system so that the emulator MCU is powered by the target system.
- The voltage of the target system should be within 3.0 - 3.6 V, 4.2 - 5.5 V.
- Do not change the voltage of the target system after turning on the power.

Note on RESET* Input:

- The reset input from the target system is accepted only while a user program is being executed (only while the RUN status LED on the PC7501's upper panel is lit).

Note on RDY* Input:

- Be sure to input "L" to the RDY* pin of the target system during the user program executing (only while the RUN status LED on the PC7501's upper panel is lit). Inputting "L" to the RDY* pin during the user program stopping may cause a malfunction of the emulator.

Note on HOLD* Input:

- Be sure to input "L" to the HOLD* pin of the target system during the user program executing (only while the RUN status LED on the PC7501's upper panel is lit). Inputting "L" to the HOLD* pin during the user program stopping may cause a malfunction of the emulator.

IMPORTANT

Note on NMI* Input:

- NMI* input from the target system is accepted only while a user program is being executed (only while the RUN status LED on the PC7501's upper panel is lit).

Notes on Interruption:

- Even when the user program is not being executed (when the user program is paused or when run-time debugging is being performed), the evaluation MCU is operating for debugging purposes. Therefore, take note that timers and other functions are not stopped when the user program is not being executed.
- Even if a maskable interrupt is generated when the user program is not being executed (when the user program is paused or when run-time debugging is being performed), the interrupt cannot be accepted, because the emulator disables interrupts. If an interrupt is requested when a user program is not being executed and the user program allow an interrupt, the interrupt is accepted immediately after the user program execution is started.
- When the user program is not being executed (when the user program is paused or when run-time debugging is being performed), a peripheral I/O interruption is not accepted. Take note that when the user program is not being executed, a request a peripheral I/O interruption can be cleared.

Note on Clock Supply to the MCU:

- Clock can be supplied to the evaluation MCU in one of the following two ways. This is determined by emulator debugger clock selection.
 - (1) When Internal is selected:

The clock generated by the oscillation circuit in the PC7501 is supplied to the evaluation MCU. The clock is continually supplied to the evaluation MCU regardless of "target system clock status" and "user program execution status".
 - (2) When External is selected:

Clock supply to the evaluation MCU depends on oscillation status (oscillate/off) of the target system.

Notes on Access Prohibited Area:

- The emulator control register (000020h - 00003Fh) in the SFR is read and write-protected. When this register is accessed, emulator control cannot be utilized.
- With this product, address FFFFFFFh cannot be read or written in correctly.

Notes on Stack Area:

- With this product, a maximum 20 bytes of the user stack is consumed as work area.
- If the user stack does not have enough area, do not use areas which cannot be used as stack (SFR area, RAM area which stores data, or ROM area) as work area. Using areas like this is a cause of user program crashes and destabilized emulator control. Therefore, ensure the +20 byte maximum capacity used by the user program as the user stack area.
- With this product, the interrupt stack pointer (ISP) is set to 0500h and used as stack area after the reset is released.

IMPORTANT

Notes on Reset Vector Area:

- For a reset vector area, memory of the emulator is always selected regardless of the setting of EMEM dialog. Therefore when setting the microprocessor mode, to use a ROM of the target system etc. as an area including a reset vector area, set a reset vector using a dump window etc.
- The reset vector area can be changed only when a program is stopped. When a program is executed, the area can not be changed.

Notes on EMEM Dialog Box:

Observe the following when setting up EMEM dialog box of the emulator debugger.

(1) Debug Monitor Bank Address

- When "F0" is specified, 64 KB of area starting from F00000h are allocated for use by the debug monitor.
- The 64 KB allocated to the debug monitor cannot be used.
- The below areas cannot be set for the debug monitor.
 - (1) MCU internal resources (ROM/RAM/SFR area)
 - (2) DRAM area or multiplex area
 - (3) Interrupt vector area
- It is not possible to view or set the content of the specified area. Even on the dump window or in the reverse assemble area of the program/source windows, the content of this area is not displayed correctly though it can be displayed.

(2) Processor Mode

- Set the target MCU to the processor mode.
- To set the single-chip mode or memory expansion mode, the CNVSS pin used with MCU status must be "L". MCU status indicates pin level of the target system.
- To set the microprocessor mode, the CNVSS pin used with MCU status must be "H".
- To set the memory expansion mode or microprocessor mode, the RDY* and HOLD* pins used with MCU status must be "H".
- When the target system is not connected, all modes are available.

(3) Emulation Memory Allocation

- The 4MB memory mounted in the PC7501 can be allocated out.
- When the single chip mode and memory expansion mode are set by specifying the processor mode, ROM area is automatically allocated to the internal Flash ROM of MCU. Therefore, it is not necessary to deliberately specify the emulation memory as expansion area in order to allocate the ROM area.
- Except for the SFR, RAM, ROM and internally reserved areas, all areas other than the set area are externally accessible.
- MCU internal resources are automatically selected for SFR, RAM and ROM areas regardless of settings.
- Be careful that the specified areas do not overlap one another.
- Set memory allocation so that the total of the 4 length values does not exceed the emulation memory size (4 MB).
- Do not set unusable areas for memory allocation.
- Emulator main unit's memory is automatically selected as a reset vector area regardless of settings.

IMPORTANT

Note on S/W Break:

- S/W breaks generate break interruptions by forcibly inserting a BRK instruction "08h" instead of an instruction code. Therefore, when referencing the result of a trace in bus mode, "08h" is displayed for the instruction fetch address where a S/W break is set.

Note on Differences between Actual MCU and Emulator:

- Operations of the emulator differs from those of mask MCUs as listed below.

- (1) Reset condition
- (2) Initial values of internal resource data at power-on
- (3) Interrupt stack pointer (ISP) after releasing reset
- (4) Internal memories (ROM and RAM) capacities, etc.

This emulator system has an MCU with 31KB RAM (0400h - 7FFFh). In single-chip mode or memory expansion mode, emulation memory for internal flash memory is automatically allocated in the area between F80000h through FFFFFFFh, and it can be read and written into.

- (5) Oscillator circuit

- Make note of the fact that in the oscillator circuit where a resonator is connected between the X_{IN} and X_{OUT} pins, oscillation does not occur because a flexible cable, buffer IC and other devices are used between the evaluation MCU and the target system. It is same for sub-clock oscillators (X_{CIN} and X_{COUT}).
- For notes on when using the oscillator circuit on the target system, refer to "3.2 (1) Using the Oscillator Circuit on the Target System" (page 26).

- (6) A-D conversion

As a converter board and other devices are used between the evaluation MCU and the target system, some characteristics are slightly different from those of the actual MCU.

- (7) Port P15

As a part of I/O port (P15) is connected to the target system through the analog switch circuit, electric characteristics slightly differ from those of an actual MCU.

Notes on Watchdog Function:

- When using the watchdog function, check the box of "Use Watch Dog Timer" in the MCU tab of the Init dialog box.
- When not using the watchdog function, do not check the box of "Use Watch Dog Timer" in the MCU tab of the Init dialog box.
- Take note that when the following two conditions are satisfied, programs can not be executed.
 - (1) The watchdog timer function selection bit (CM06) of the system clock control register 0 is set to "1".
 - (2) The HOLD function is used while the watchdog timer is operating.
- If the reset circuit of the target system has a watchdog timer, disable it when using the emulator.

IMPORTANT

Notes on A-D Input Selection Function:

- To use A-D input group selection function, it is necessary to set the direction register of port P15 to input. Port 15 corresponds to the pin that performs A-D conversion.

Example: To select A-D input for P00-P07, set the direction register of P150-P157 and P00-P07 to input.

Also, when the port P0 group and port P2 group are selected for A-D input, port P15 cannot be used as an I/O port.

- Because a flexible board and other elements exist between the evaluation MCU and target system, the A-D converter operates differently than the actual MCU. Perform final evaluations of the A-D converter with the actual MCU.

Note on DMA Transfer:

- With this product, the user program is stopped with a loop program to a specific address. Therefore, if a DMA request is generated by a timer or other source while the user program is stopped, DMA transfer is executed. However, make note of the fact that DMA transfer while the program is stopped may not be performed correctly. Also note that the below registers have been changed to generate DMA transfer as explained here even when the user program is stopped.

DMA0 transfer counter register DCT0

DMA1 transfer counter register DCT1

DMA0 memory address register DMA0

DMA1 memory address register DMA1

DMA2 transfer counter register DCT2 (R0)

DMA3 transfer counter register DCT3 (R1)

DMA2 memory address register DMA2 (A0)

DMA3 memory address register DMA3 (A1)

Note on DMAC II Transfer Completion Interrupts:

- You can use DMAC II transfer completion interrupts during program execution only. Do not generate DMAC II transfer completion interrupts when you use any function but program execution.

Note on Protect Resistor:

- Make note of the fact that the protect is not canceled when protect register 3 (PRC2), which enables writing in the port P9 direction register and the pin output function select register, is changed with the below procedure.

(1) Step execution of the instruction for setting ("1") PRC2

(2) Setting the break point from the instruction for setting ("1") PRC2 to when the port P9 direction register or pin output function select register 3 is set

(3) Setting ("1") PRC2 from the dump window or script window during user program execution

IMPORTANT

Note on Downloading Programs:

- When specifying a DRAM refresh interval, take note that when setting downloading a program to an internal ROM area and setting software breaks, the main clock operates in the divide-by-8 mode.

Note on On-chip Oscillator:

- Take note that you can not debug a program using the oscillation stop detection function (on-chip oscillator). If you use the function, be sure to evaluate a system with an actual MCU.

Note on PLL Clock:

- The PLL clock can be used as a clock for peripheral functions only. You can not debug your program using it as a CPU clock. To use the PLL clock as a CPU clock, be sure to evaluate your system with an actual MCU.

Notes on Address-Match Interrupt:

- Do not single-step an address where an address-match interrupt occurs.
- When using the address-match interrupt, do not check the box of "Use Address Interrupt Break" in the MCU tab of the Init dialog box. When not using the address-match interrupt, check the box.
- When you use address-match interrupt breaks, if a low reset is input during a user program execution, a debug monitor program (about 100 cycles) is executed after the reset is released. Take note that it has effects on the user program execution time and the result of a trace.

Note on Operating Frequency:

- You can not use the M30830T-EPB with a main clock (XIN-XOUT) less than 1 MHz. Contact your nearest distributor to use it under the condition.

Note on Support for M32C/81 and 82 Groups:

- The M30830T-EPB has the M30835FJGP of M32C/83 Group as an evaluation MCU. Because of the differences of ROM and RAM sizes and peripheral functions, to develop a program for an M32C/81 or 82 Group MCU, refer to the User's Manual of M32C/81, 82 Group MCUs.

Notes on Service-Life of the MCU's Internal Flash ROM:

- With the M30830T-EPB, programs are downloaded to the MCU's flash ROM when debugging in the single-chip mode and memory expansion mode. Because the number of write/erase cycles of this ROM is limited, the ROM must be replaced when at the end of its service-life.
- If the following errors occur frequently during program download, replace the emulation probe.

Flash ROM erase error ERROR (16258)

Flash ROM verify error ERROR (16259)

To purchase the product for replacement, contact your nearest distributor.

Chapter 2. Preparation

This chapter describes the package components, the system configuration and the preparation for using this product for the first time.

2.1 Terminology	18
2.2 Package Components	19
2.3 Other Tool Products Required for Development	19
2.4 Name of Each Part	20
(1) System Configuration	20
(2) Names and Functions of PC7501 Upper Panel LEDs	20
2.5 When Using the Emulator for the First Time	22

Chapter 2. Preparation

2.1 Terminology

Some specific words used in this user's manual are defined as follows:

Emulator system

This means an emulator system built around the PC7501 emulator. The PC7501 emulator system is configured with an emulator main unit, emulation probe, host machine and emulator debugger.

Emulator main unit (Hereafter PC7501)

This means an emulator main unit for M16C Family MCUs.

Emulation probe

This means the emulation probe (this product) for the M32C/81, 82 and 83 Group MCUs.

Host machine

This means a personal computer used to control the emulator main unit and emulation probe.

Emulator debugger

This means a software tool M3T-PD308F to control the emulator from the host machine through an interface.

Firmware

Program that analyzes contents of communication with the emulator debugger and controls the emulator hardware. This program is installed in the flash memory in the emulator main unit. This program is downloadable from the emulator debugger to upgrade the firmware or to support other MCUs.

Software break

A software break is a function to break the program before the system executes an instruction at the specified address. The instruction at the preset address will not be executed.

Hardware break

A hardware break is a function to break the program when the system detects a write/read of data to/from memory or a leading/trailing edge of the signal entered from the external trace cable. The former break function is called address break; and the latter break function is called trigger break. While the instruction at the address where the software break is set is not executed, a hardware break is performed after the specified instruction is executed.

Evaluation MCU

This means the MCU mounted on the emulation probe which is operated in the specific mode for tools.

Target MCU

This means the MCU you are going to debug.

Target program

This means the program you are going to debug.

Target system

This means a user's application system using the microcomputer to be debugged.

*

In this user's manual, this symbol is used to show active Low. (e.g. RESET*: Reset signal)

2.2 Package Components

The M30830T-EPB package consists of the following items. When unpacking, check to see if your M30830T-EPB contains all of these items.

Table 2.1 Package components

Item	Quantity
M30830T-EPB emulation probe	1
M30800T-PTC converter board for 100-pin LCC	1
IC61-1004-051 100-pin LCC socket made by Yamaichi Electronics Co., Ltd.	1
Hardware tool user registration FAX sheet (English)	1
Hardware tool user registration FAX sheet (Japanese)	1
M30830T-EPB user's manual (this manual)	1
M30830T-EPB user's manual (Japanese)	1

* Please keep the M30830T-EPB's packing box and cushion material in your place for reuse at a later time when sending your product for repair or other purposes. Always use these packing box and cushion material when transporting this product.

* If any of these items are missing or found faulty, please contact your distributor.

* If there is any question or doubt about the packaged product, contact your distributor.

* For purchasing the IC61-1004-051 or for technical information, contact Yamaichi Electronics Co., Ltd.

<http://www.yamaichi.co.jp/e/index.shtml>

2.3 Other Tool Products Required for Development

To bring forward programs development on the M32C/81, 82 and 83 Group MCUs, the products listed below are necessary in addition to those contained package above. Get them separately.

Table 2.2 Other tool products required for development

Product	Product name	Notes
Emulator main unit	PC7501	Required
Emulator debugger	M3T-PD308F	Required
Converter boards	144-pin 0.5-mm-pitch LQFP (144P6Q-A)	M3T-FLX-144NSD
	100-pin 0.5-mm-pitch LQFP (100P6Q-A)	M3T-100LCC-QSD
		M3T-100LCC-DMS + M3T-FLX-100NSD
		M3T-F160-100NSD
	100-pin 0.65-mm-pitch QFP (100P6S-A)	M3T-100LCC-DMS + M3T-DUMMY100S
		M3T-100LCC-DMS + M3T-DIRECT100S
M3T-100LCC-DMS + M3T-FLX-100NRB		
		Required according to the foot pattern of the target system (see "3.6 Connecting the Target System" on page 34)

* To purchase these products, contact your nearest distributor.

2.4 Name of Each Part

(1) System Configuration

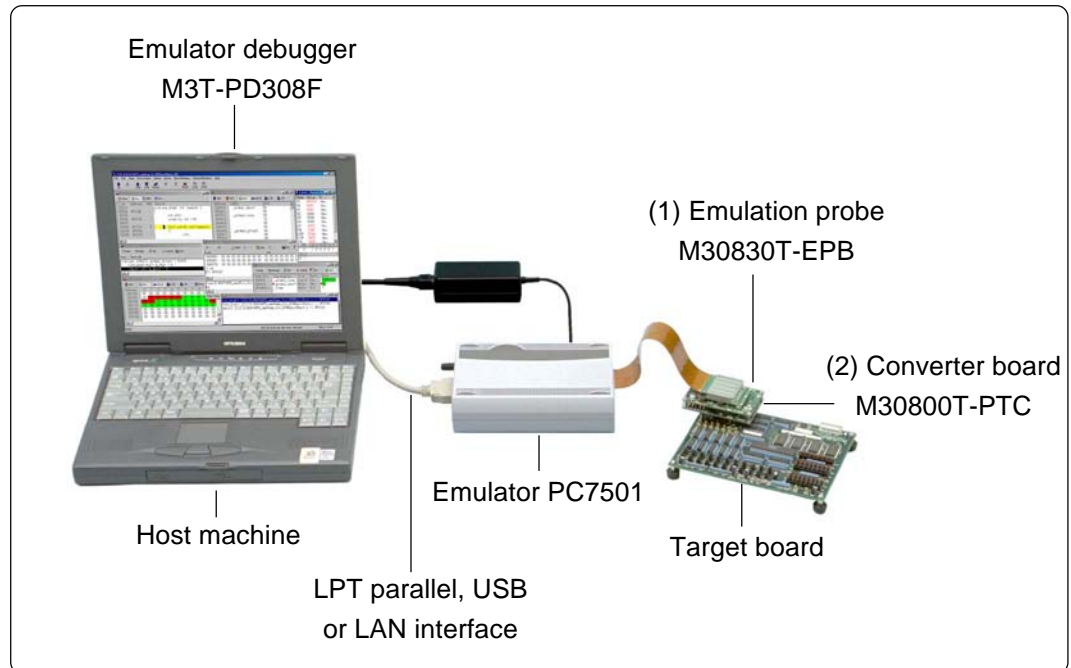


Figure 2.1 System configuration

(1) Emulation probe (M30830T-EPB)

This emulation probe contains an evaluation MCU.

(2) Converter board (M30800T-PTC)

This is a converter board for connecting to the target system (for 100-pin 0.65-mm-pitch LCC socket). For details, refer to "3.6 Connecting the Target System" (page 34)

(2) Names and Functions of PC7501 Upper Panel LEDs

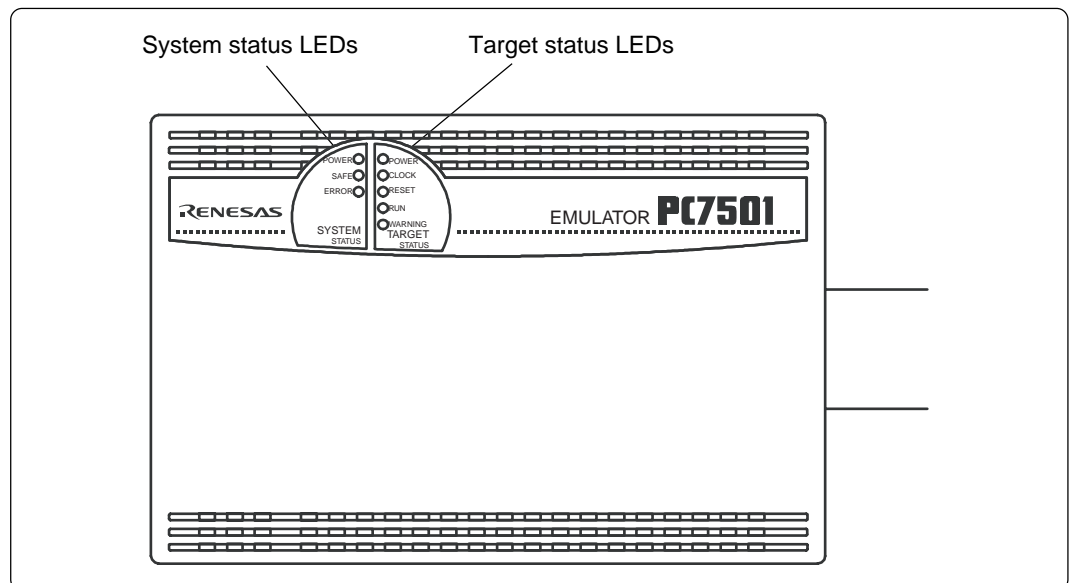


Figure 2.2 Names of PC7501 upper panel LEDs

(1) System Status LEDs

The system status LEDs indicate the emulator PC7501's power supply, firmware operating status, etc. Table 2.3 lists the definition of each system status LED.

Table 2.3 Definition of system status LEDs

Name	Status	Meaning
POWER	ON	Emulator system power supply is turned ON.
	OFF	Emulator system power supply is turned OFF.
SAFE	ON	Emulator system is operating normally.
	Flashing	Specific mode (maintenance mode) for downloading the firmware. The emulator system does not operate except for downloading firmware and self-check.
	OFF	Emulator system is not operating normally.
ERROR	ON	Emulator is not operating normally.
	Flashing	Downloading firmware
	OFF	Emulator is operating normally.

(2) Target Status LEDs

The target status LEDs typically indicate the target MCU's operating status and target board's power supply. Table 2.4 lists the definition of each target status LED.

Table 2.4 Definition of target status LEDs

Name	Status	Meaning
POWER	ON	Power is supplied to the target board.
	OFF	Power is not supplied to the target board.
CLOCK	ON	Target MCU clock is oscillating.
	OFF	Target MCU clock is not oscillating.
RESET	ON	Target MCU is being reset.
	OFF	Target MCU is not being reset.
RUN	ON	Target program is being executed.
	OFF	Target program has been halted.
WARNING	ON	Target MCU internal clock is not oscillating.
	OFF	Target MCU internal clock is oscillating.

CAUTION

Caution for Target Status POWER LED:

- If your MCU has two or more power supply terminals (Vcc), you need to supply power to all the terminals.

2.5 When Using the Emulator for the First Time

If you have purchased this emulation probe newly, it is necessary to download the firmware. The download procedure is given in Figure 2.3.

Before downloading the firmware, check the emulator debugger is installed and the PC7501 is connected to the host machine. For more information, see each user's manual of the emulator debugger and the PC7501.

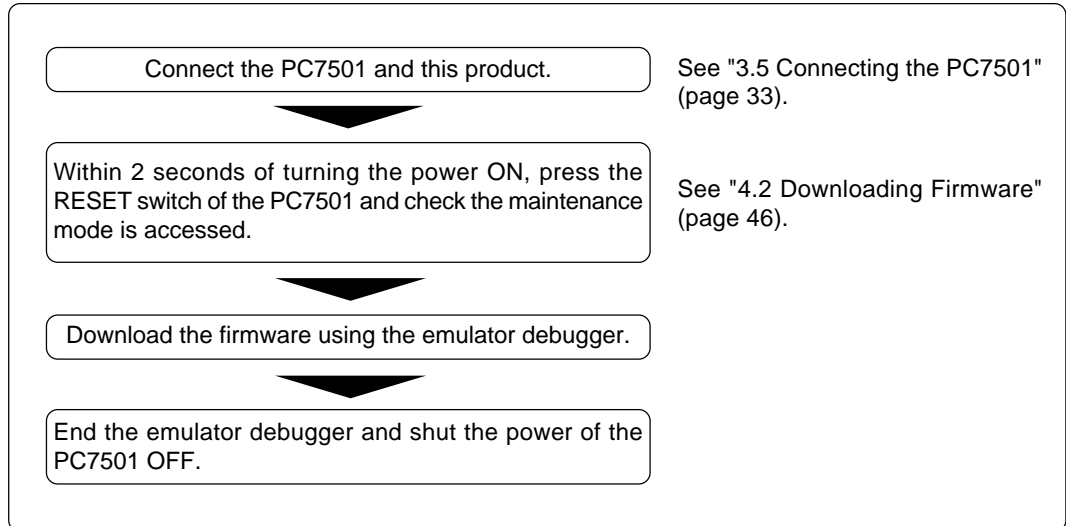


Figure 2.3 Firmware download procedure when the emulator is used for the first time

To make sure the emulation probe works properly, run the self-checks. For self-check procedures, see "4.4 Self-checks" (page 51).

Chapter 3. Setting Up

This chapter describes switch settings required for using this product and how to connect this product to the PC7501 and the target system.

3.1 Removing the Upper Cover	24
3.2 Selecting Clock Supply	25
(1) Using the Oscillator Circuit on the Target System	26
(2) Changing the Internal Oscillator Circuit of the Emulator	27
(3) Replacing the Oscillator Circuit Boards	28
3.3 Setting Switches	29
3.4 A-D Conversion Bypass Capacitor	32
3.5 Connecting the PC7501	33
3.6 Connecting the Target System	34
(1) Connecting 100-pin LCC Socket	35
(2) Connecting 100-pin 0.65-mm-pitch Foot Pattern (Part 1)	36
(3) Connecting 100-pin 0.65-mm-pitch Foot Pattern (Part 2)	37
(4) Connecting 100-pin 0.65-mm-pitch Foot Pattern (Part 3)	38
(5) Connecting 100-pin 0.5-mm-pitch Foot Pattern (Part 1)	39
(6) Connecting 100-pin 0.5-mm-pitch Foot Pattern (Part 2)	40
(7) Connecting 100-pin 0.5-mm-pitch Foot Pattern (Part 3)	41
(8) Connecting 144-pin 0.5-mm-pitch Foot Pattern	42

Chapter 3. Setting Up

To use this emulation probe with your target system, it is necessary to change the input frequency. Set the input frequency after removing the upper cover.

3.1 Removing the Upper Cover

The procedure of removing the upper cover is shown below.

- (1) Remove the four screws of both sides of this product and lift off the upper cover (see Figure 3.1).
- (2) Change the input frequency following the procedure.
- (3) Replace the upper cover and secure the four screws.

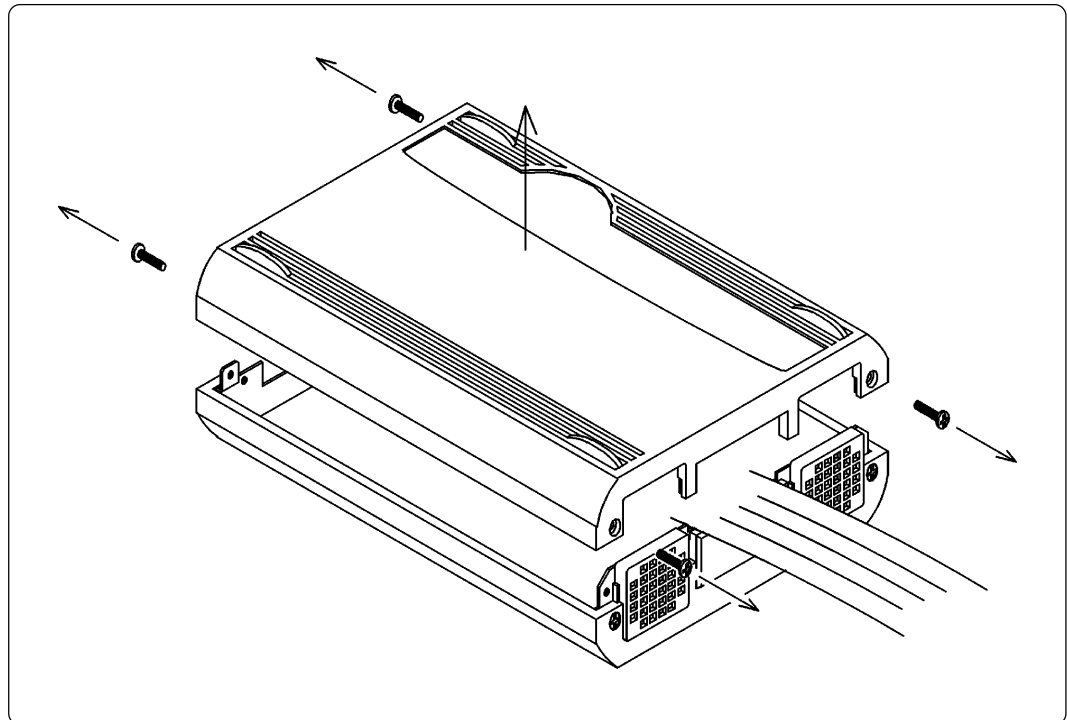


Figure 3.1 Removing the upper cover

CAUTION

When Removing the Upper Cover:

- Always shut OFF power when removing the upper cover or changing the input frequency.

3.2 Selecting Clock Supply

There are two ways to supply a clock to the MCU, using the oscillator circuit of the emulator or using the oscillator circuit on the target system. Table 3.1 lists the factory-settings of each clock supply.

Table 3.1 Clock supply to the MCU

Clock	Description	Display of emulator debugger	Default setting
X _{IN} -X _{OUT}	Internal oscillator circuit of emulator (OSC-3: 30 MHz)	Internal	Yes
	Target system	External	-
X _{CIN} -X _{COU} T	Internal oscillator circuit of emulator (OSC-2: 32.768 kHz)	Internal	-
	Target system	External	Yes

IMPORTANT

Notes on Changing the Clock Supply:

- The clock supply can be set by the Init dialog box when starting up the emulator debugger or inputting CLK command on the script window.
- For X_{CIN}-X_{COU}T, it is necessary to set switches in the emulator. For details, refer to "3.3 Setting Switches" (page 29).

(1) Using the Oscillator Circuit on the Target System

When turning on the power supply, the internal clock of emulator is selected to supply the clock to the MCU. To use the external clock on the target system, change the clock by the Init dialog box when starting up the emulator debugger or the CLK command on the script window (For details, refer to the user's manual of the emulator debugger).

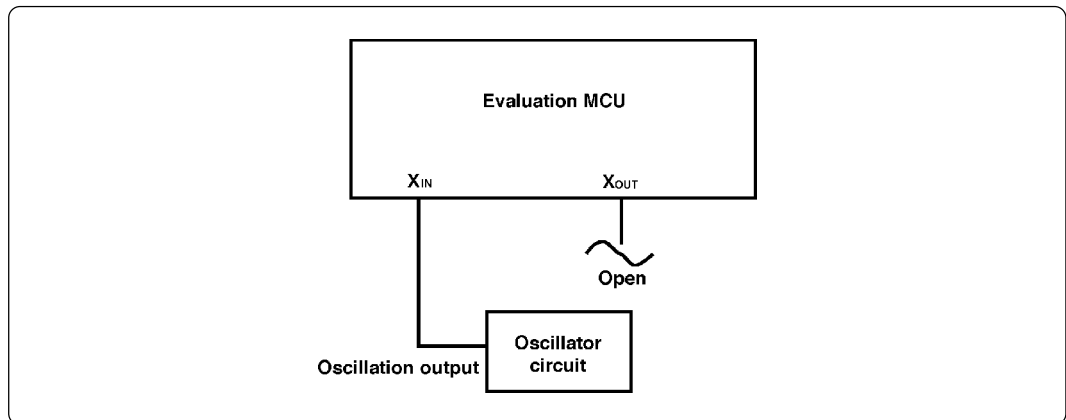


Figure 3.2 External oscillator circuit

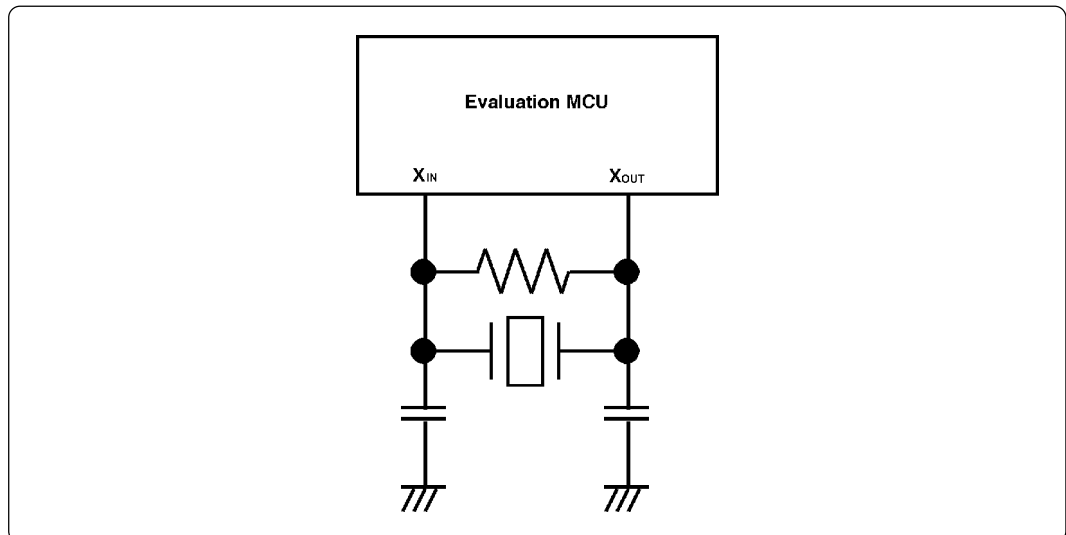


Figure 3.3 Circuit in which oscillation does not occur (same for X_{CIN}-X_{COUT})

IMPORTANT

Notes on External Clock:

- To operate this product with an external clock, construct the oscillator circuit as shown in Figure 3.2 in the target system and input the oscillator output at 50% duty (within the operating range of the evaluation MCU) into the X_{IN} pin. And the X_{OUT} pin should be open.
- Make note of the fact that in the oscillator circuit shown in Figure 3.3 where a resonator is connected between the X_{IN} and X_{OUT} pins, oscillation does not occur because a flexible cable, buffer IC and other devices are used between the evaluation MCU and the target system. It is same for sub-clock oscillator circuits (X_{CIN} and X_{COUT}).

(2) Changing the Internal Oscillator Circuit of the Emulator

An oscillator circuit board (OSC-3) for 30 MHz is mounted on the PC7501 emulator main unit. To use the emulation probe at a frequency other than 30 MHz, build the desired oscillator circuit on the included OSC-2 oscillator circuit board (bare board) and replace the board installed in the PC7501 emulator main unit when shipped from the factory.

Figure 3.4 shows a view of the OSC-2 oscillator circuit board (bare board) and where connector pins are located. Figure 3.5 shows the circuitry of the OSC-2 oscillator circuit board (bare board). Use the number of oscillator circuits recommended by the oscillator manufacturer.

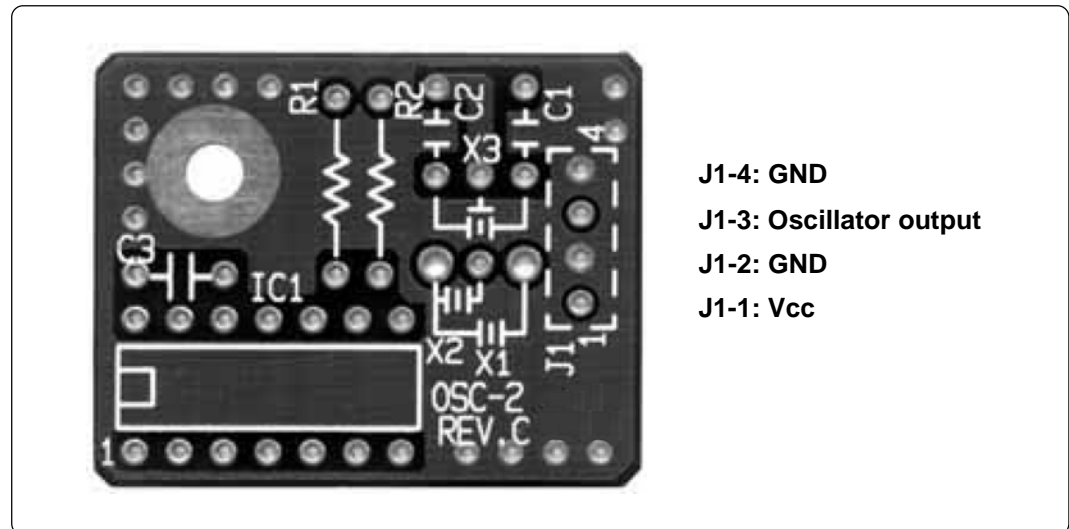


Figure 3.4 External view of the oscillator board (OSC-2) and connector pin assignments

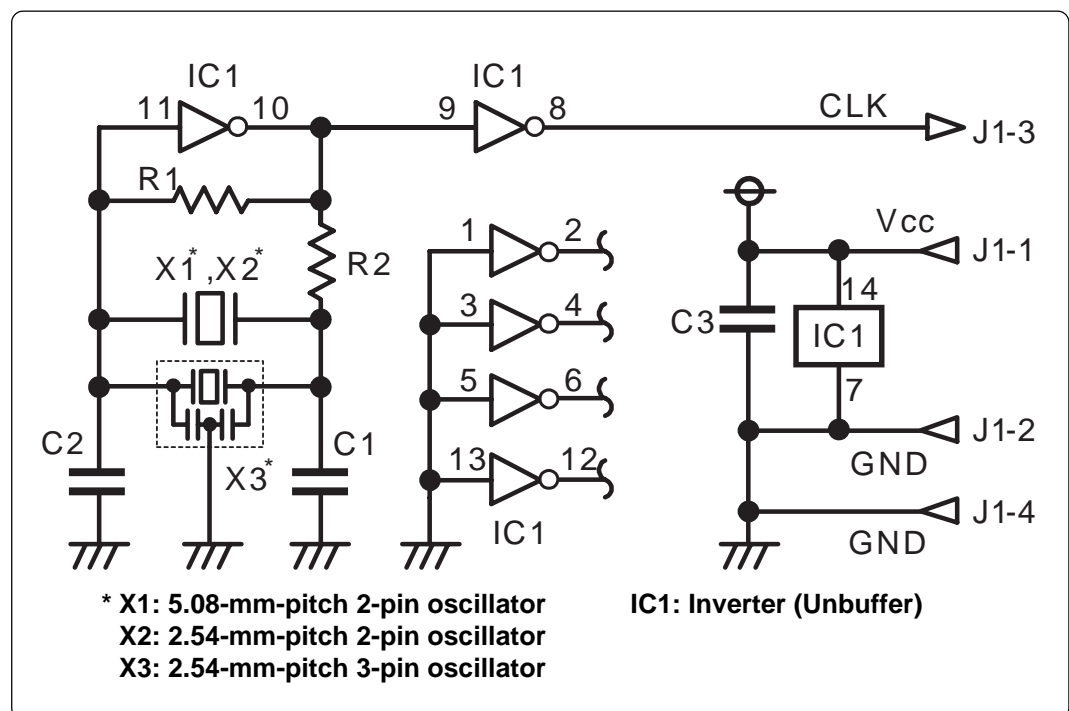


Figure 3.5 Circuit of the oscillator board (OSC-2)

(3) Replacing the Oscillator Circuit Boards

Figure 3.6 shows how to replace the oscillator circuit boards.

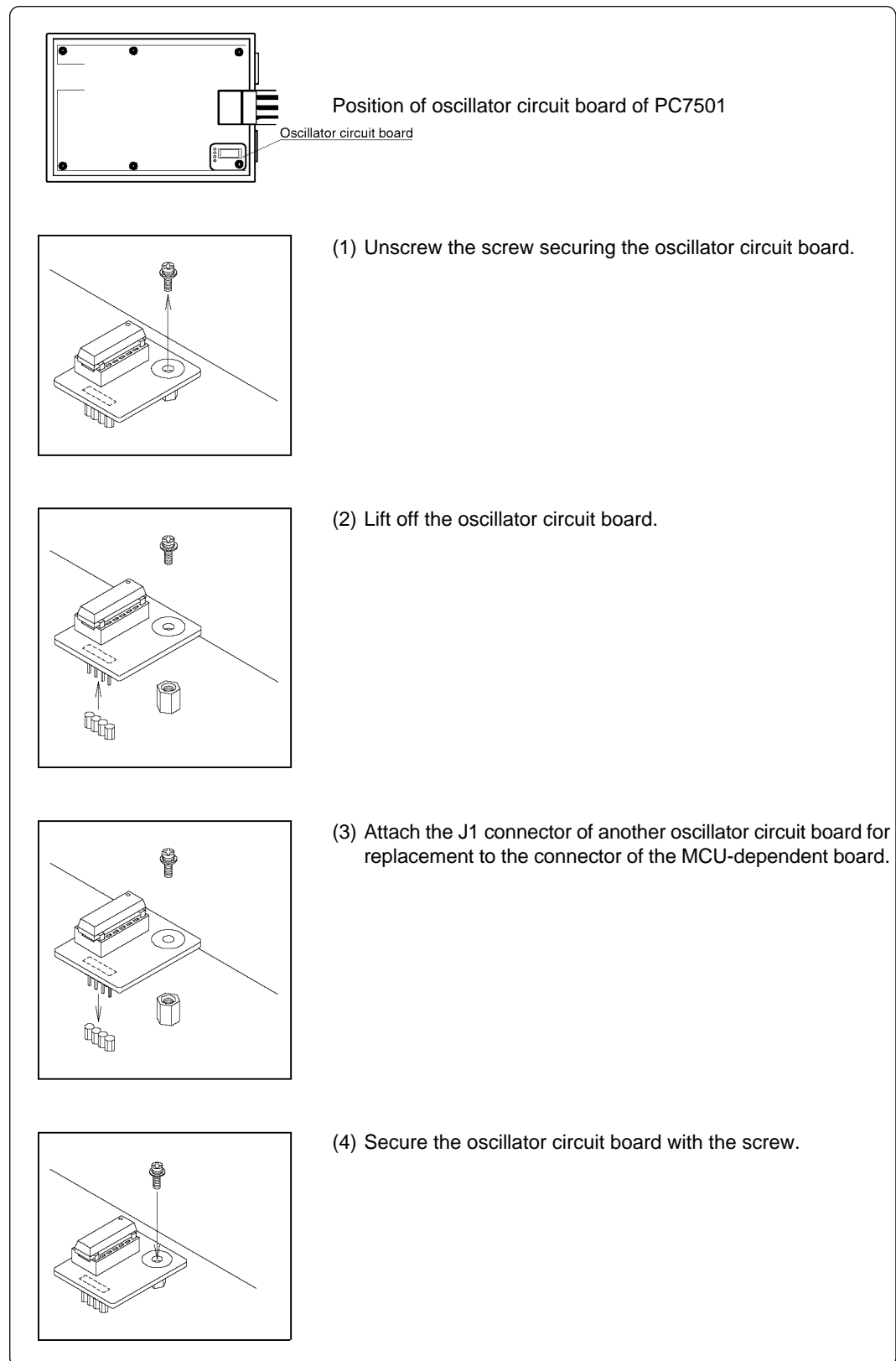


Figure 3.6 Replacing the oscillator circuit boards

3.3 Setting Switches

Figure 3.7 shows the positions of switches of the M30830T-EPBM. Tables 3.2 and 3.3 list how to set each switch.

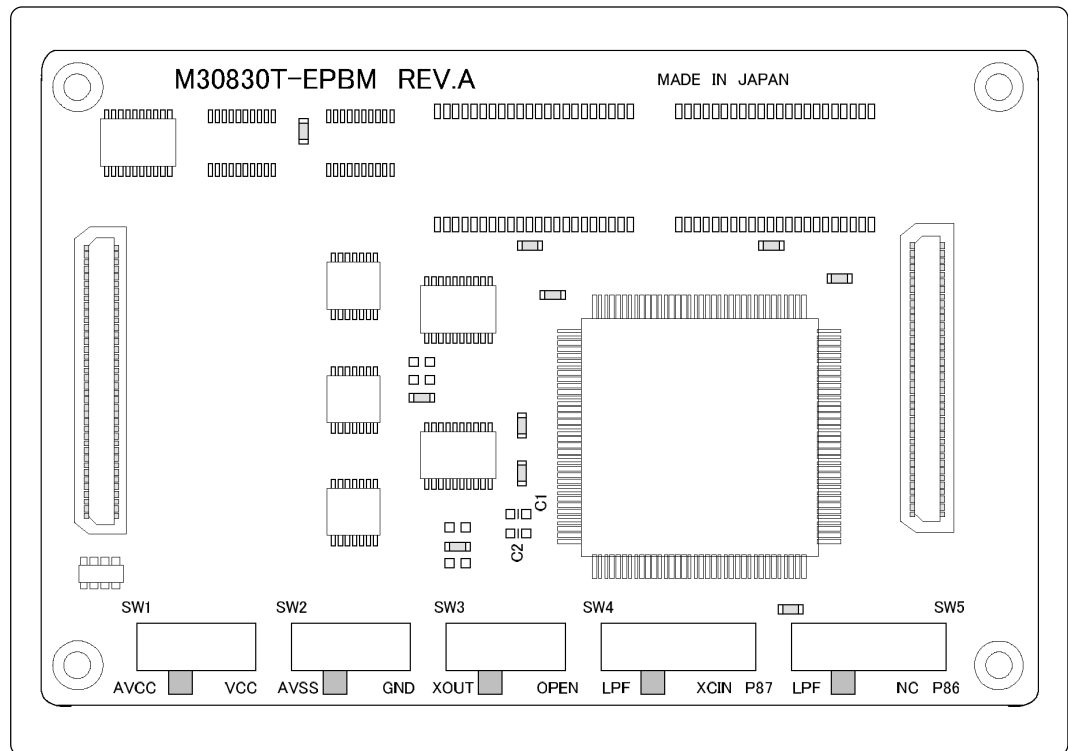


Figure 3.7 Positions of the switches

Table 3.2 Switch settings of the M30830T-EPBM (1/2)

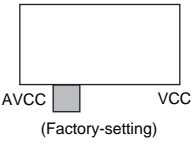
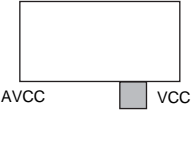


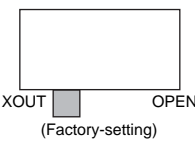
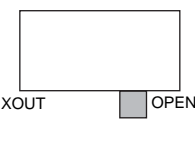
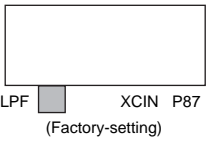
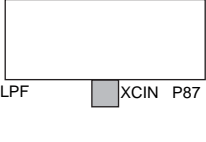


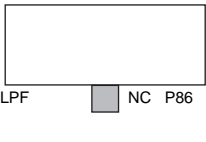

Signal	Switch	Setting	Description
AVCC	SW1	 <p>AVCC VCC (Factory-setting)</p>	Connects the AVCC pin of the MCU to the target system.
		 <p>AVCC VCC (Factory-setting)</p>	Connects the AVCC pin of the MCU to the internal power supply of the emulator.
AVSS	SW2	 <p>AVSS GND (Factory-setting)</p>	Connects the AVSS pin of the MCU to the target system.
		 <p>AVSS GND (Factory-setting)</p>	Connects the AVSS pin of the MCU to the internal GND of the emulator.
XOUT	SW3	 <p>XOUT OPEN (Factory-setting)</p>	Connects the X _{OUT} pin of the MCU to the target system.
		 <p>XOUT OPEN</p>	Does not connect the X _{OUT} pin.

Table 3.3 Switch settings of the M30830T-EPBM (2/2)

Signal	Switch	Setting	Description
P87/X _{CIN} / V _{CONT}	SW4	 <p>(Factory-setting)</p>	Connects the P87/X _{CIN} /V _{CONT} pin of the MCU to the LPF in the emulation probe (uses the P87/X _{CIN} /V _{CONT} pin as LPF for PLL).
			Connects the P87/X _{CIN} /V _{CONT} pin of the MCU to the sub-clock oscillator circuit (32.768 kHz).
			Connects the P87/X _{CIN} /V _{CONT} pin of the MCU to the target system (uses the P87/X _{CIN} /V _{CONT} pin as P87).
P86/X _{COU} T	SW5	 <p>(Factory-setting)</p>	Connects the P86/X _{COU} T pin of the MCU to the GND in the emulation probe (uses the P86/X _{COU} T pin as LPF for PLL).
			Does not connect the P86/X _{COU} T pin.
			Connects the P86/X _{COU} T pin of the MCU to the target system (uses the P86/X _{COU} T pin as P86).

3.4 A-D Conversion Bypass Capacitor

With this product, there is a foot pattern on the M30830T-EPBM board (surface) for mounting the bypass capacitor for the A-D conversion circuit. Mount a suitable bypass capacitor as occasion demands.

Figure 3.8 shows where the bypass capacitors are mounted.

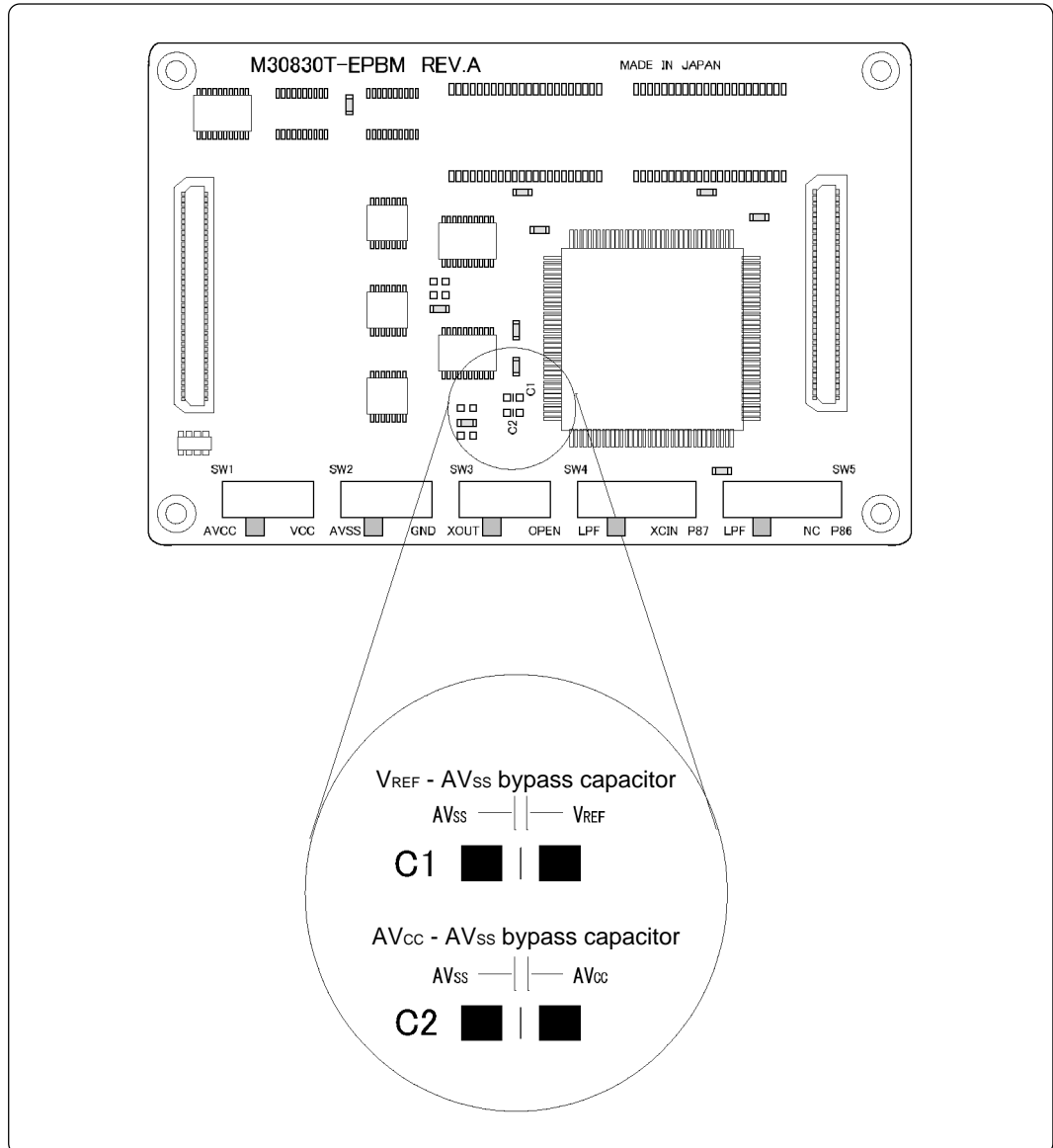


Figure 3.8 Foot pattern for the A-D conversion bypass capacitor

IMPORTANT

Note on the A-D Converter:

- Because a converter board, buffer IC, and other devices are used between the evaluation MCU and the target system, the A-D converter operates differently from the actual MCU. Make the final evaluation of the A-D converter from the actual MCU.

3.5 Connecting the PC7501

Figure 3.9 shows how to connect the PC7501 and the emulation probe.

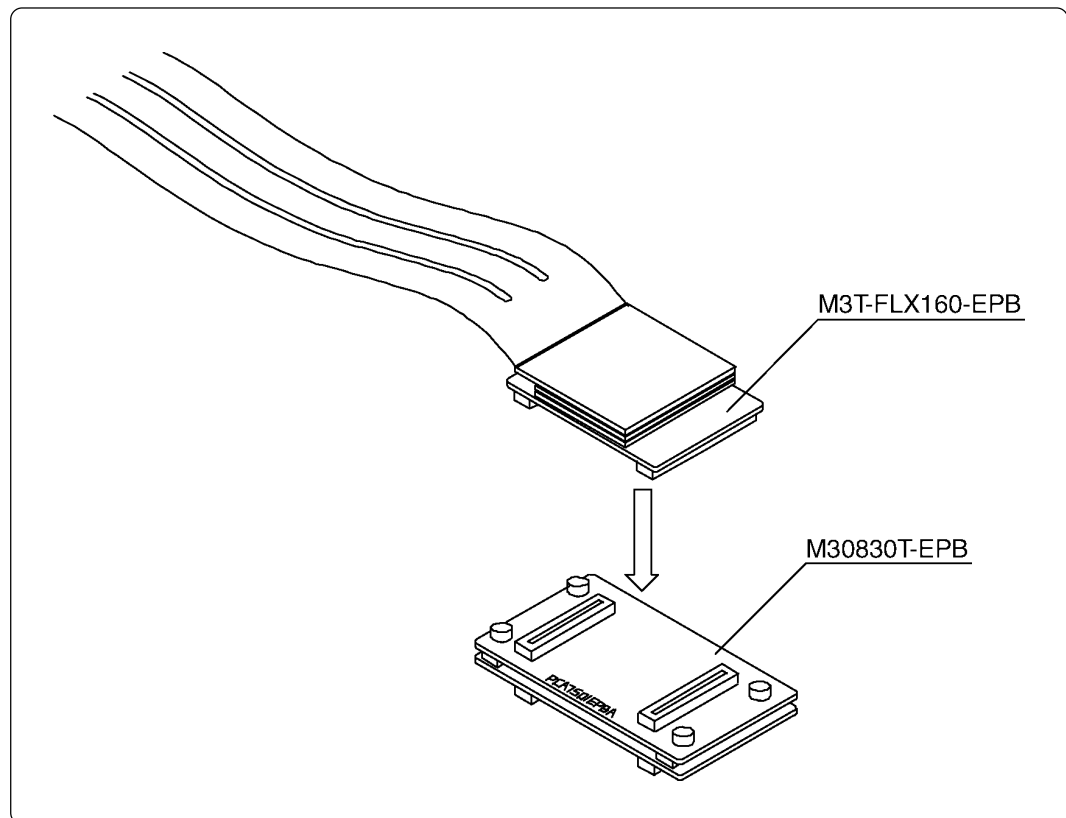


Figure 3.9 Connecting the PC7501 and emulation probe

CAUTION

Note on Connecting the Cable:

- When connecting the emulation probe, be sure to hold the both sides of the emulation probe horizontally and insert it directly.
- Always shut OFF power before connecting the emulation probe. The power ON state could destroy internal circuits.

3.6 Connecting the Target System

There are seven ways available to connect the emulator to target systems as shown in Figure 3.10.

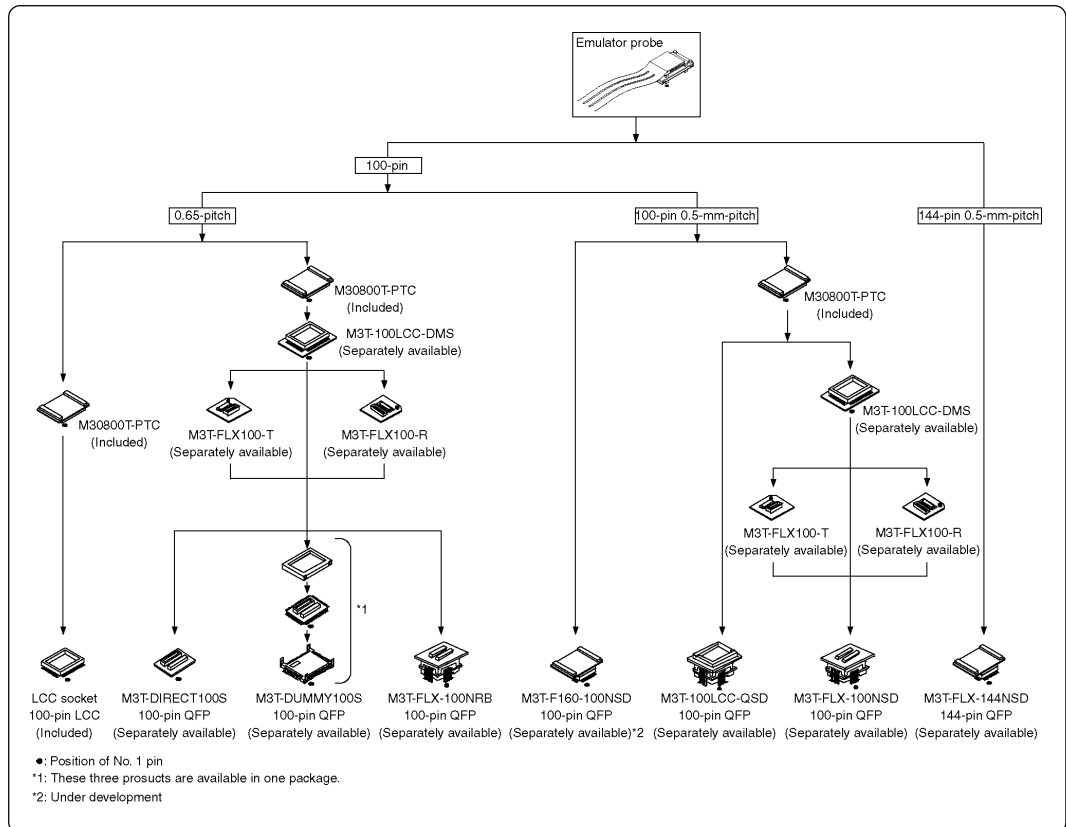


Figure 3.10 Connecting the target system

! CAUTION

Note on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulator.

(1) Connecting 100-pin LCC Socket

When connecting the emulation probe to the 100-pin LCC socket (Yamaichi Electronics Co., Ltd.: IC61-1004-051 etc.) on the target system, following the procedure below.

- (1) Attach the CN2 side of the M30830T-EPB to the CN2 side of the M30800T-PTC.
- (2) Attach the M30800T-PTC to the 100-pin LCC socket.

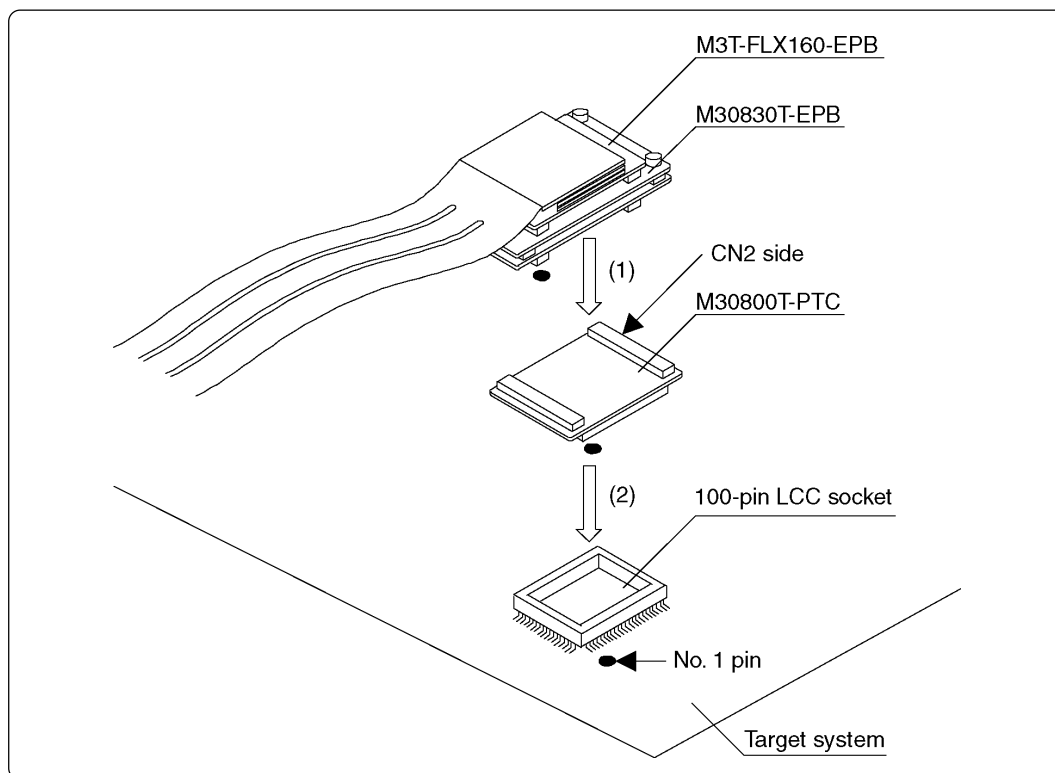


Figure 3.11 Connecting the emulation probe and 100-pin LCC socket

CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulator.
- The small connectors of the M30800T-PTC are guaranteed for only 50 insertion/removal iterations.
- For purchasing the IC61-1004-051 or for technical information, contact Yamaichi Electronics Co., Ltd.

<http://www.yamaichi.co.jp/e/index.shtml>

(2) Connecting 100-pin 0.65-mm-pitch Foot Pattern (Part 1)

Figure 3.12 shows how to connect the emulation probe to the 100-pin 0.65-mm-pitch foot pattern on the target system with the M3T-DUMMY100S (separately available), and here following is its procedure. For details on the M3T-100LCC-DMS and M3T-DUMMY100S, refer to each instruction manual.

- (1) Attach the M3T-DUMMY100S to the target system.
For details on how to attach the M3T-DUMMY100S to the target system, see the instruction manual of the M3T-DUMMY100S.
- (2) Attach the M3T-100LCC-DMS to the M3T-DUMMY100S.
- (3) Attach the M30800T-PTC to the M30830T-EPB.
- (4) Attach the M30800T-PTC to the M3T-100LCC-DMS.

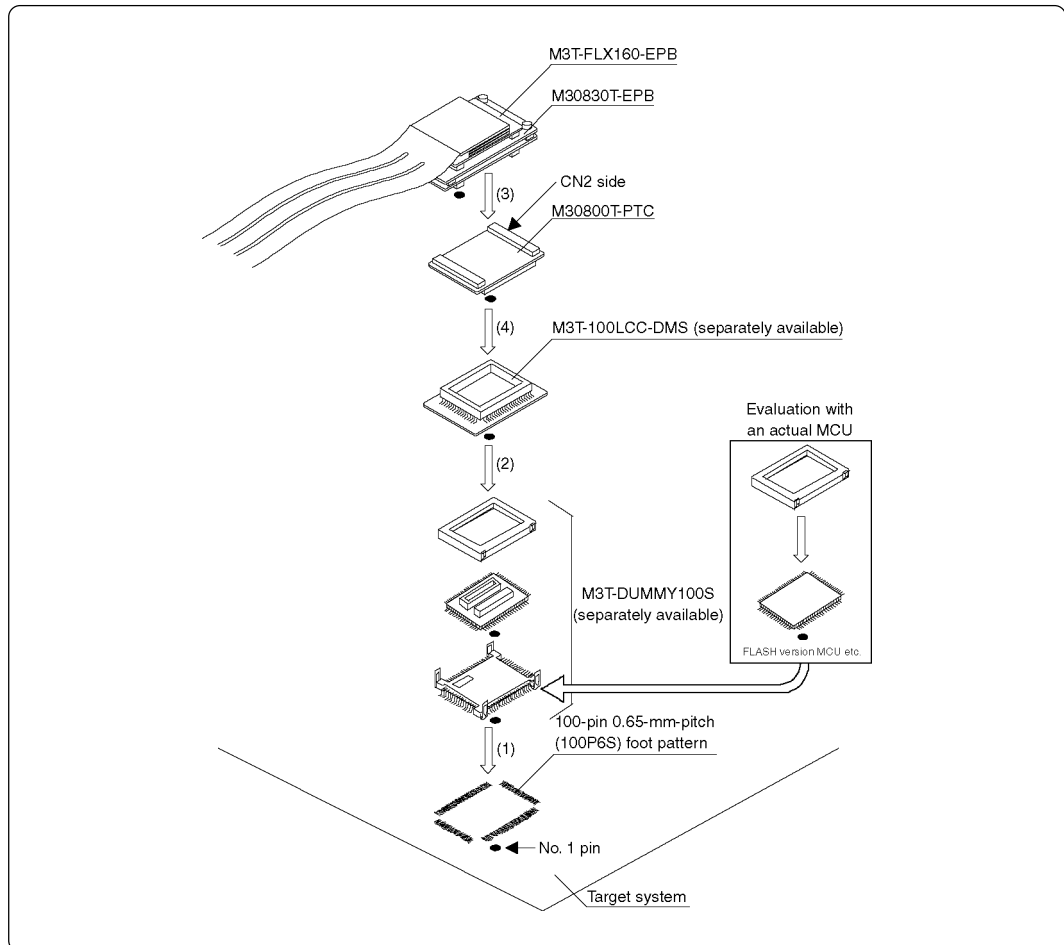


Figure 3.12 Connecting the emulation probe and 100-pin 0.65-mm-pitch foot pattern (1/3)

CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulator.
- The small connectors of the M3T-100LCC-DMS and M3T-DUMMY100S are guaranteed for only 20 insertion/removal iterations.
- The small connectors of the M30800T-PTC are guaranteed for only 50 insertion/removal iterations.

(3) Connecting 100-pin 0.65-mm-pitch Foot Pattern (Part 2)

Figure 3.13 shows how to connect the emulation probe to the 100-pin 0.65-mm-pitch foot pattern on the target system with the M3T-DIRECT100S (separately available), and here following is its procedure. For details on the M3T-100LCC-DMS and M3T-DIRECT100S, refer to each instruction manual.

- (1) Attach the M3T-DIRECT100S to the target system.
For details on how to attach the M3T-DIRECT100S to the target system, see the instruction manual of the M3T-DIRECT100S.
- (2) Attach the M3T-100LCC-DMS to the M3T-DIRECT100S.
- (3) Attach the M30800T-PTC to the M30830T-EPB.
- (4) Attach the M30800T-PTC to the M3T-100LCC-DMS.

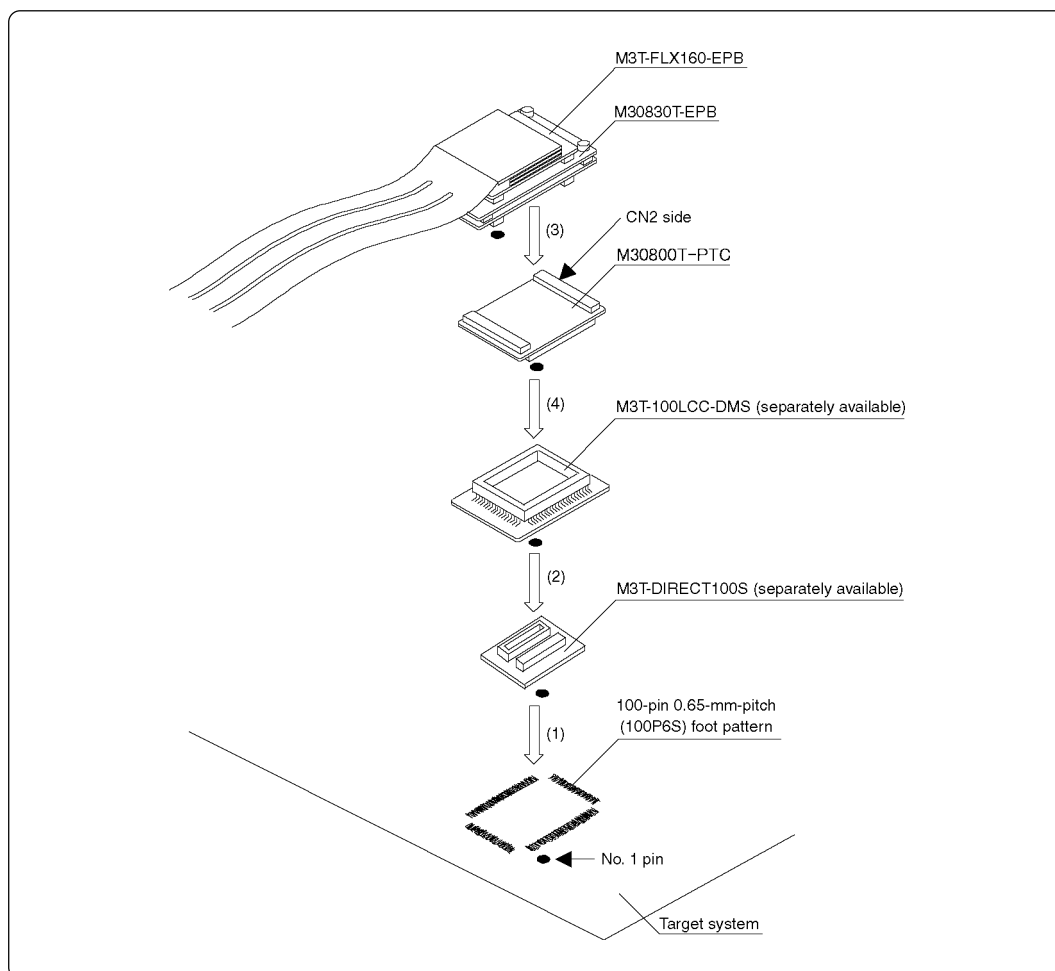


Figure 3.13 Connecting the emulation probe and 100-pin 0.65-mm-pitch foot pattern (2/3)

CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulator.
- The small connectors of the M3T-100LCC-DMS and M3T-DIRECT100S are guaranteed for only 20 insertion/removal iterations.
- The small connectors of the M30800T-PTC are guaranteed for only 50 insertion/removal iterations.

(4) Connecting 100-pin 0.65-mm-pitch Foot Pattern (Part 3)

Figure 3.14 shows how to connect the emulation probe to the 100-pin 0.65-mm-pitch foot pattern on the target system with the M3T-FLX-100NRB (separately available), and here following is its procedure. For details on the M3T-100LCC-DMS and M3T-FLX-100NRB, refer to each instruction manual.

- (1) Attach the M3T-FLX-100NRB to the target system.
For details on how to attach the M3T-FLX-100NRB to the target system, see the instruction manual of the M3T-FLX-100NRB.
- (2) Attach the M3T-100LCC-DMS to the M3T-FLX-100NRB.
- (3) Attach the M30800T-PTC to the M30830T-EPB.
- (4) Attach the M30800T-PTC to the M3T-100LCC-DMS.

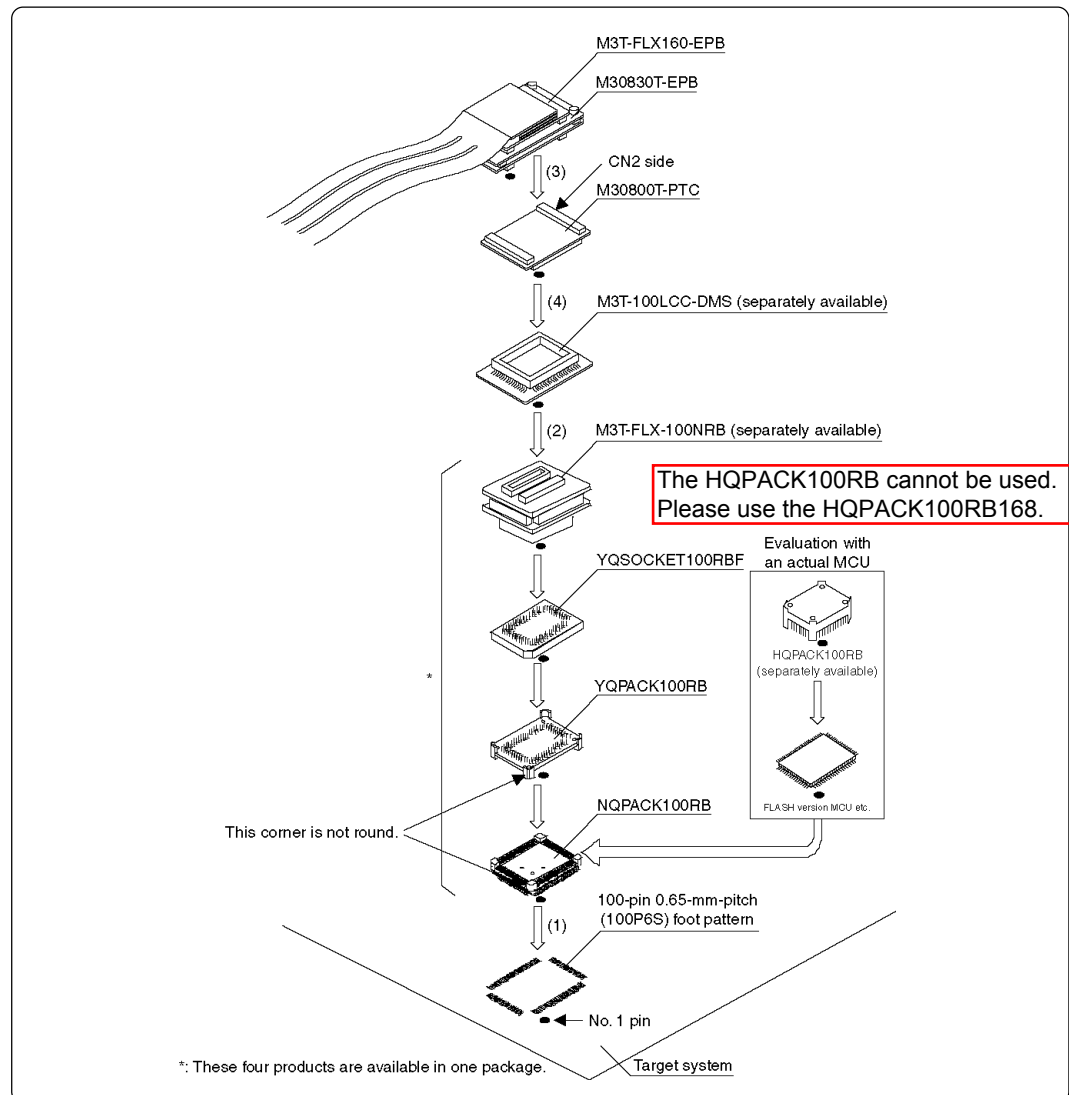


Figure 3.14 Connecting the emulation probe and 100-pin 0.65-mm-pitch foot pattern (3/3)

CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulator.
- The small connectors of the M3T-100LCC-DMS and M3T-FLX-100NRB are guaranteed for only 20 insertion/removal iterations.
- The small connectors of the M30800T-PTC are guaranteed for only 50 insertion/removal iterations.

(5) Connecting 100-pin 0.5-mm-pitch Foot Pattern (Part 1)

Figure 3.15 shows how to connect the emulation probe to the 100-pin 0.5-mm-pitch foot pattern on the target system with the M3T-100LCC-QSD (separately available), and here following is its procedure. For details on the M3T-100LCC-QSD, refer to its instruction manual.

- (1) Attach the M3T-100LCC-QSD to the target system.
For details on how to attach the M3T-100LCC-QSD to the target system, see the instruction manual of the M3T-100LCC-QSD.
- (2) Attach the M30800T-PTC to the M30830T-EPB.
- (3) Attach the M30800T-PTC to the M3T-100LCC-QSD.

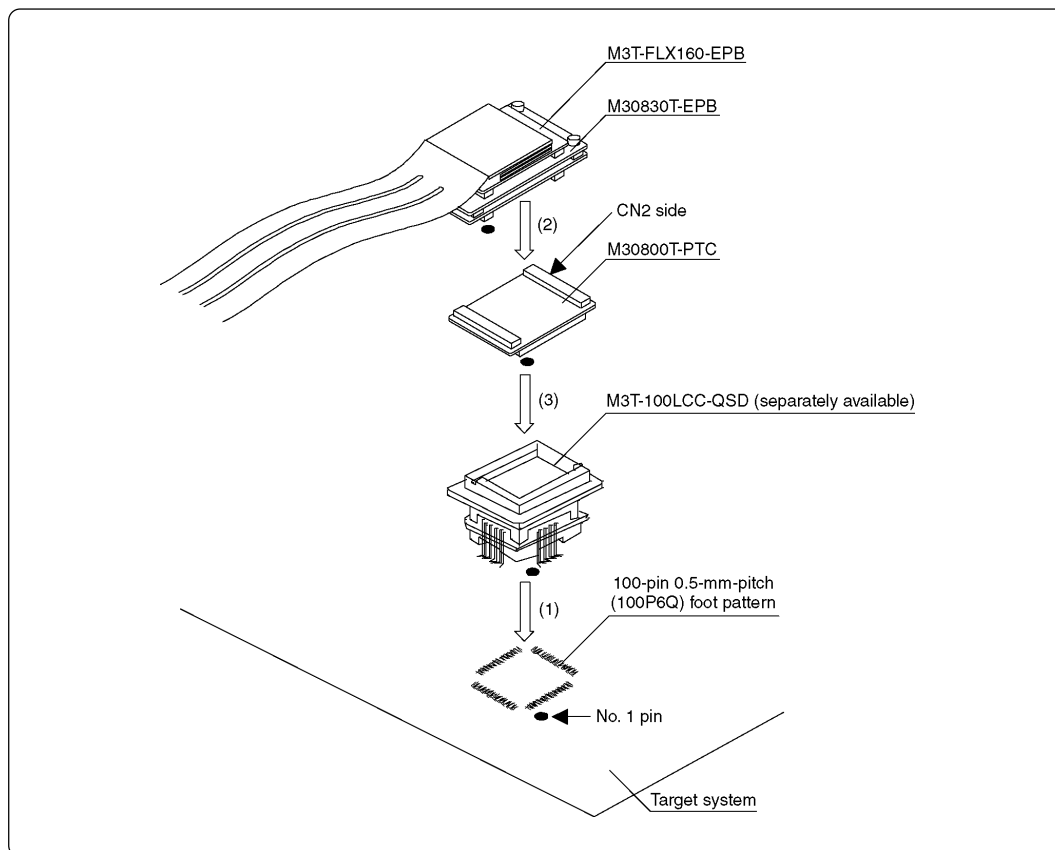


Figure 3.15 Connecting the emulation probe and 100-pin 0.5-mm-pitch foot pattern (1/3)

CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulator.
- The small connectors of the M30800T-PTC are guaranteed for only 50 insertion/removal iterations.

(6) Connecting 100-pin 0.5-mm-pitch Foot Pattern (Part 2)

Figure 3.16 shows how to connect the emulation probe to the 100-pin 0.5-mm-pitch foot pattern on the target system with the M3T-FLX-100NSD (separately available), and here following is its procedure. For details on the M3T-100LCC-DMS and M3T-FLX-100NSD, refer to each instruction manual.

- (1) Attach the M3T-FLX-100NSD to the target system.
For details on how to attach the M3T-FLX-100NSD to the target system, see the instruction manual of the M3T-FLX-100NSD.
- (2) Attach the M3T-100LCC-DMS to the M3T-FLX-100NSD.
- (3) Attach the M30800T-PTC to the M30830T-EPB.
- (4) Attach the M30800T-PTC to the M3T-100LCC-DMS.

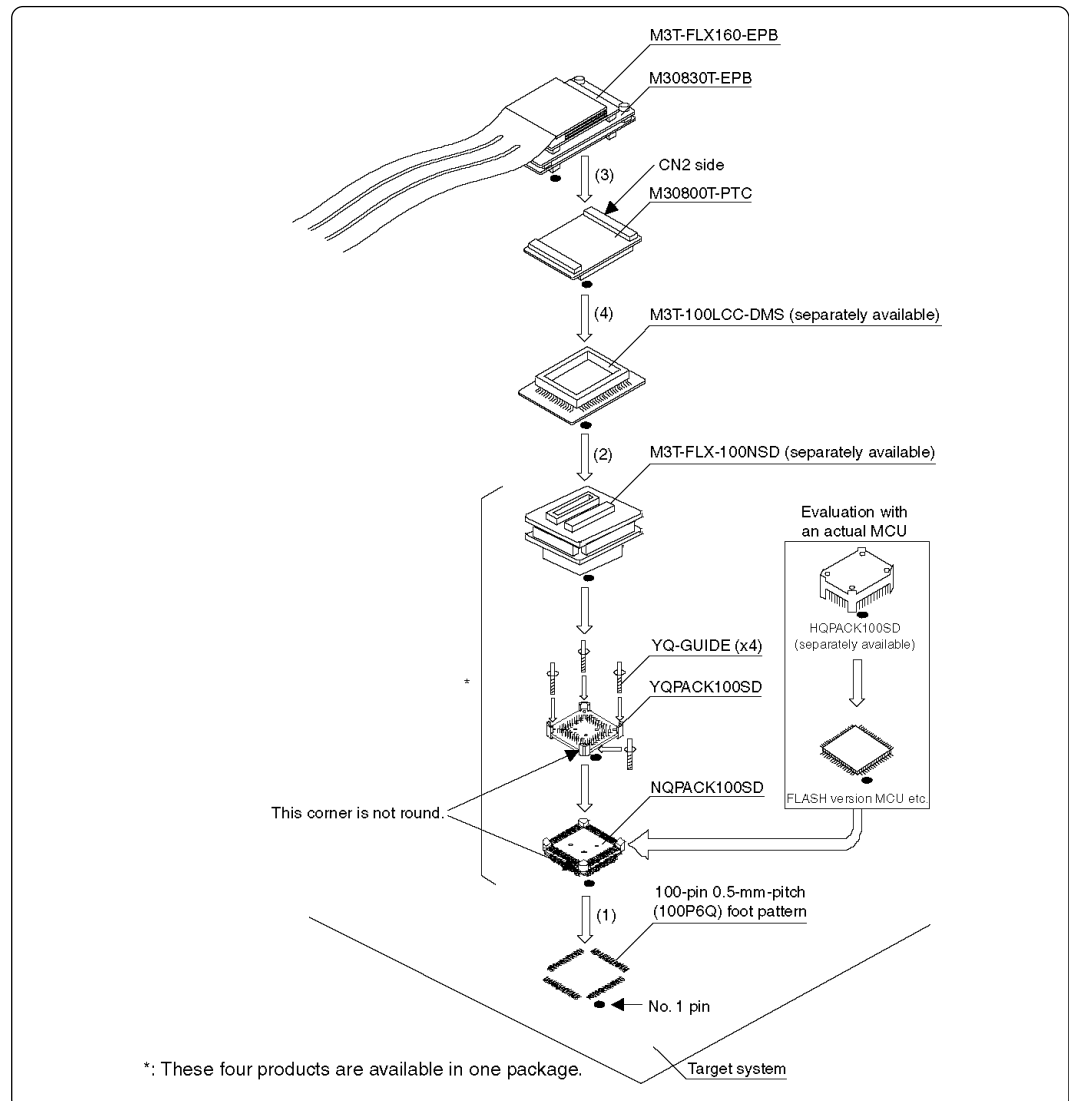


Figure 3.16 Connecting the emulation probe and 100-pin 0.5-mm-pitch foot pattern (2/3)

CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulator.
- The small connectors of the M3T-100LCC-DMS and M3T-FLX-100NSD are guaranteed for only 20 insertion/removal iterations.
- The small connectors of the M30800T-PTC are guaranteed for only 50 insertion/removal iterations.

(7) Connecting 100-pin 0.5-mm-pitch Foot Pattern (Part 3)

Figure 3.17 shows how to connect the emulation probe to the 100-pin 0.5-mm-pitch foot pattern on the target system with the M3T-F160-100NSD (separately available), and here following is its procedure.

- (1) Mount the NQPACK100SD included with the M3T-F160-100NSD to the target system.
For details on how to attach the M3T-F160-100NSD to the target system, see the instruction manual of the M3T-F160-100NSD.
- (2) Attach the YQPACK100SD included with the M3T-F160-100NSD to the NQPACK100SD.
- (3) Insert the YQ-GUIDE's included with the YQPACK100SD to the YQPACK100SD.
- (4) Attach the M30830T-EPB to the M3T-F160-100NSD.
- (5) Attach the M3T-F160-100NSD to the YQPACK100SD.

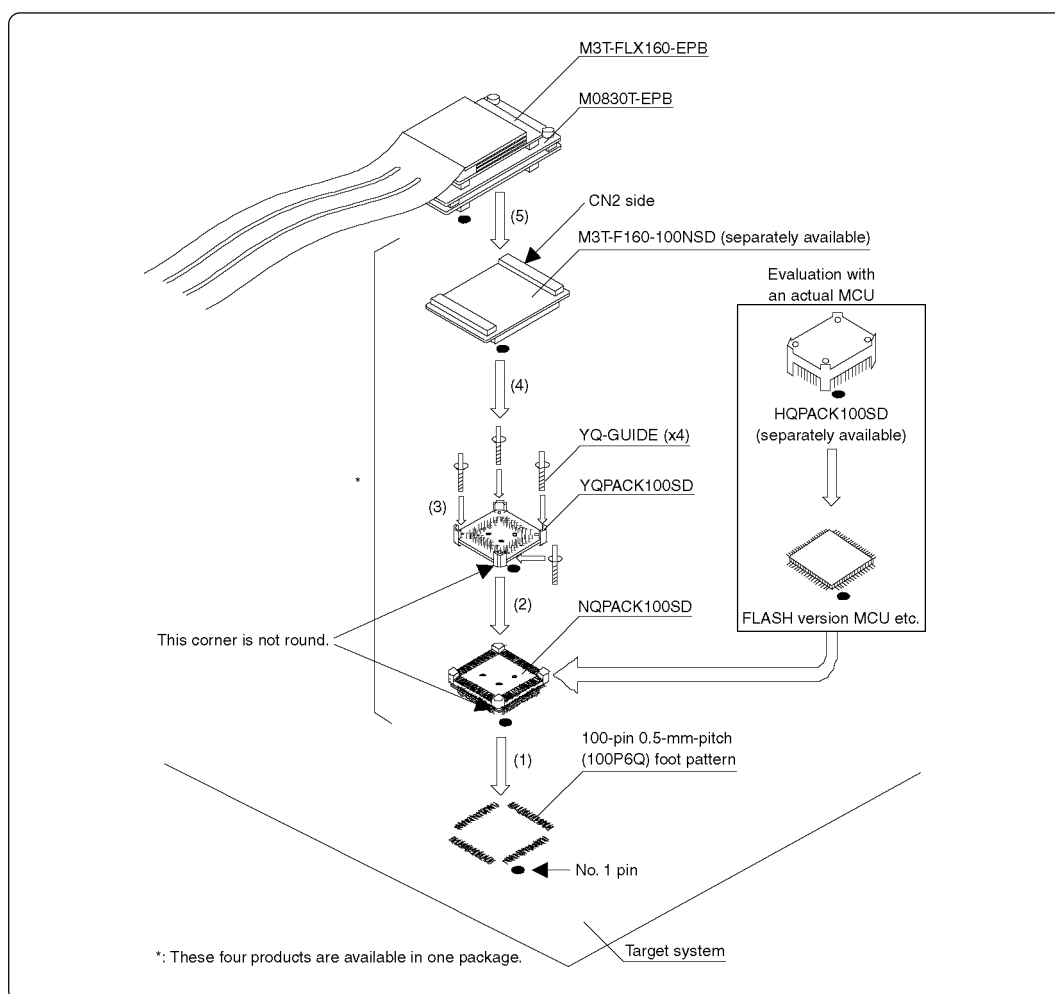


Figure 3.17 Connecting the emulation probe and 100-pin 0.5-mm-pitch foot pattern (3/3)

CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulator.
- The small connectors of the M3T-F160-100NSD are guaranteed for only 50 insertion/removal iterations.

(8) Connecting 144-pin 0.5-mm-pitch Foot Pattern

Figure 3.18 shows how to connect the emulation probe to the 144-pin 0.5-mm-pitch foot pattern on the target system with the M3T-FLX-144NSD (separately available), and here following is its procedure.

- (1) Attach the NQPACK144SD included with the M3T-FLX-144NSD to the target system.
For details on how to attach the M3T-FLX-144NSD to the target system, see the instruction manual of the M3T-FLX-144NSD.
- (2) Attach the YQPACK144SD included with the M3T-FLX-144NSD to the NQPACK144SD.
- (3) Insert the YQ-GUIDE's included with the YQPACK144SD to the YQPACK144SD.
- (4) Attach the M30830T-EPB to the M3T-FLX-144SD.
- (5) Attach the M3T-FLX-144NSD to the YQPACK144SD.

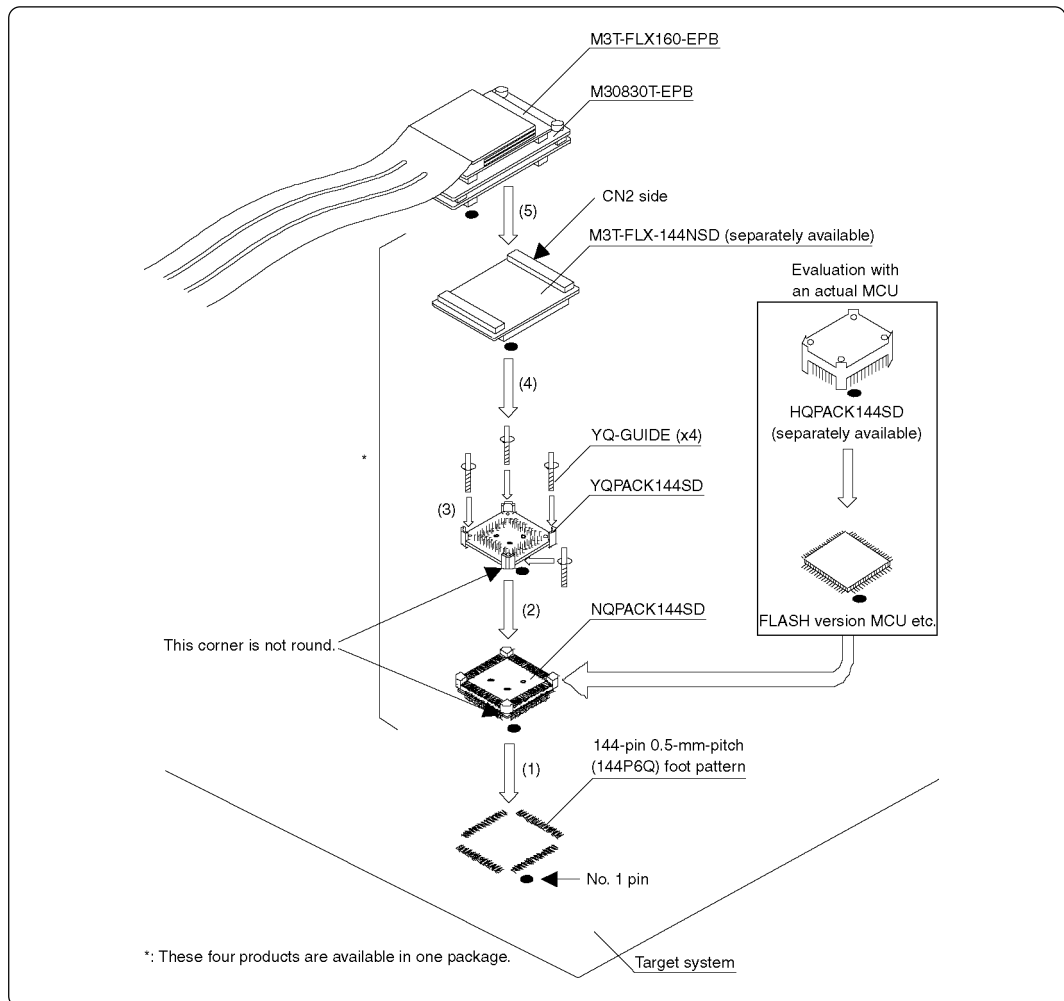


Figure 3.18 Connecting the emulation probe and 144-pin 0.5-mm-pitch foot pattern

CAUTION

Notes on Connecting the Target System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulator.
- The small connectors of the M3T-FLX-144NSD are guaranteed for only 50 insertion/removal iterations.

Chapter 4. Usage

This chapter describes from turning on the power of this product to starting up the emulator debugger.

4.1	Turning On the Power	44
	(1) Checking the Connection of the Emulator System	44
	(2) Turning ON/OFF the Power	44
	(3) LED Display When PC7501 Starts Up Normally	45
4.2	Downloading Firmware	46
	(1) When It is Necessary to Download Firmware	46
	(2) Downloading Firmware in the Maintenance Mode	46
4.3	Starting Up the Emulator Debugger (Setting EMEM Dialog Box)	47
	(1) Setting the Debug Monitor Bank Address	48
	(2) Selecting the Processor Mode	48
	(3) Setting the Emulation Memory	49
	(4) Emulation Memory Allocation as Expansion Area	49
	(5) Referring MCU STATUS	51
4.4	Self-checks	51
	(1) Self-check Procedure	51
	(2) If an Error is Detected in Self-checks	51

Chapter 4. Usage

4.1 Turning On the Power

(1) Checking the Connection of the Emulator System

Before turning the power ON, check the connection of the interface cable with host machine, PC7501, emulation probe, and target system.

(2) Turning ON/OFF the Power

- Turn ON the power of the emulator and target system as simultaneously as possible.
- Turn OFF the power of the emulator and target system as simultaneously as possible.
- When turning ON the power again after shutting OFF the power, wait for 10 seconds.

IMPORTANT

Notes on Power Supply:

- The emulator's V_{CC} pin is connected to the target system in order to monitor target system voltage. For this reason, the emulator cannot supply power to the target system. Therefore, provide the target system with a separate power supply from that of the emulator.
- Keep target system power supply voltage within the MCU's specified range (3.0 - 3.6 V, 4.2 - 5.5 V).
- Do not change target system power supply voltage after power has been activated.

(3) LED Display When PC7501 Starts Up Normally

Figure 4.1 shows upper panel LED lighting status when the emulator started up properly. Check it when starting up the emulator system.

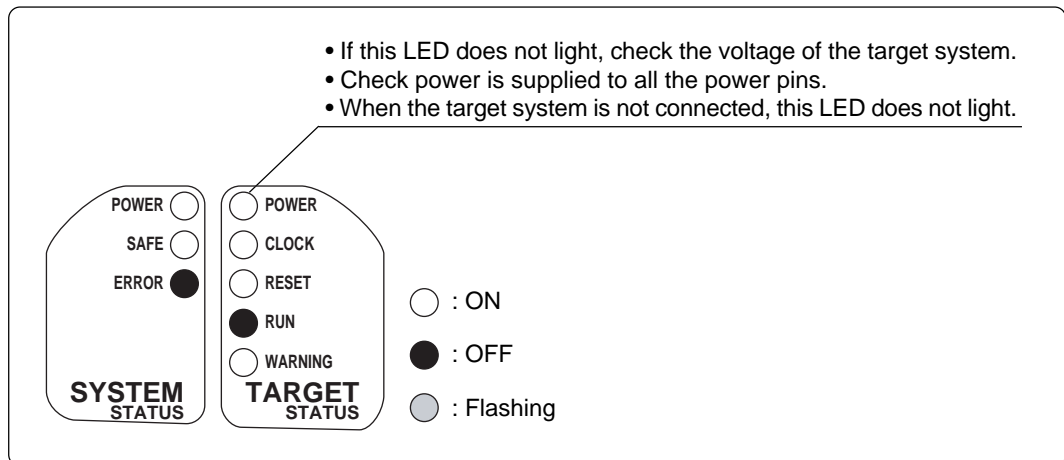


Figure 4.1 LED display when the power turned on

IMPORTANT

Note on Memory Expansion and Microprocessor Modes:

- To use the memory expansion or microprocessor mode, be sure to set the RDY*, HOLD* and NMI* pins so that they are not active at start-up. Otherwise the emulator system will not start up correctly.

Note on CLOCK LED:

- If CLOCK LED does not turn on, check the following:
 - (1) Immediately after starting PC7501 (before starting the emulator debugger)
--> Check if the oscillation circuit within the PC7501 emulator main unit oscillates normally.
 - (2) After starting the emulator debugger (after setting the Init dialog box)
--> Check the oscillation circuit set in the Init dialog box oscillates normally.

4.2 Downloading Firmware

(1) When It is Necessary to Download Firmware

It is necessary to download the firmware when:

- (1) you use this product for the first time
- (2) the firmware has been upgraded
- (3) the emulator debugger has been upgraded
- (4) you use this product with a PC7501 which was used with other emulation probe before

If downloading the firmware is not completed in the cases below, re-download the firmware as follows.

- When the power is unexpectedly shut down during a download from the emulator debugger
- When a communications interface cable is unexpectedly pulled out

(2) Downloading Firmware in the Maintenance Mode

Download the firmware in the maintenance mode as explained here following. The target system must not be connected when downloading the firmware.

- (1) Set the interface select switch on the rear panel of the PC7501 to the LPT side and connect the LPT parallel interface cable to the PC7501 and the host machine.
- (2) Within 2 seconds of activating power to the emulator, press the RESET switch on the PC7501 front panel to switch to the maintenance mode.

Switched to the maintenance mode, the SAFE SYSTEM STATUS LED begins to flash.

- (3) Start up the emulator debugger. When the Init dialog box setup is complete, the dialog which urges to download the firmware will appear. Download the firmware following messages. Required time for downloading the firmware is approx. 60 seconds.

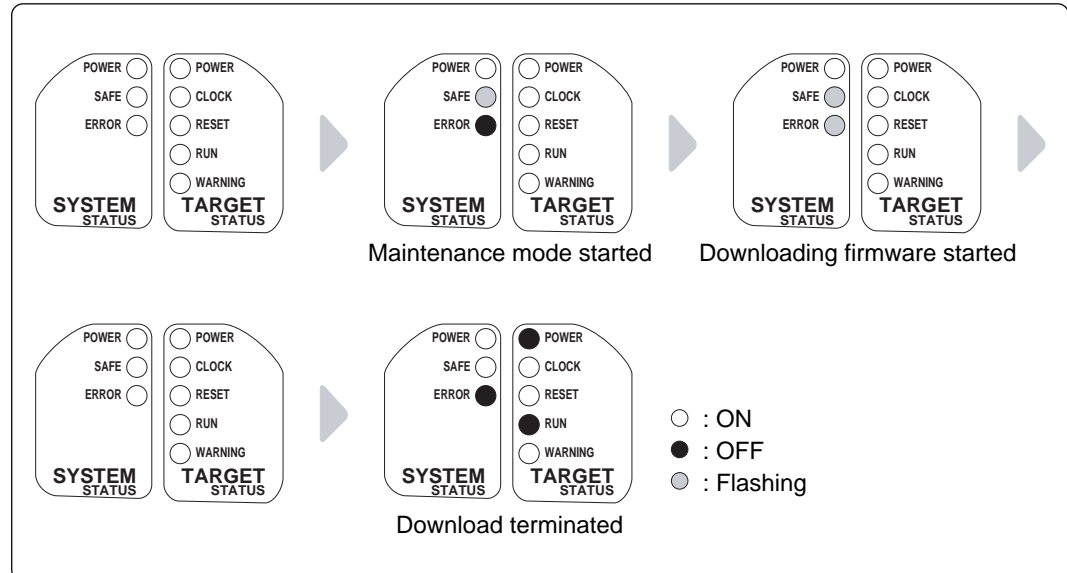


Figure 4.2 Downloading the firmware in the maintenance mode

CAUTION

Note on Downloading Firmware:

- Do not shut OFF power while the firmware is being downloaded. Doing so, the emulator will not start up properly. If power is shut OFF by mistake, redownload the firmware in the maintenance mode.

4.3 Starting Up the Emulator Debugger (Setting EMEM Dialog Box)

The EMEM dialog box will appear after setting the Init dialog box by starting up the emulator debugger or completing downloading the firmware. Here explains how to set the processor mode of the target MCU, allocate the emulation memory and set the emulator work area. Figure 4.3 shows the EMEM dialog box display.

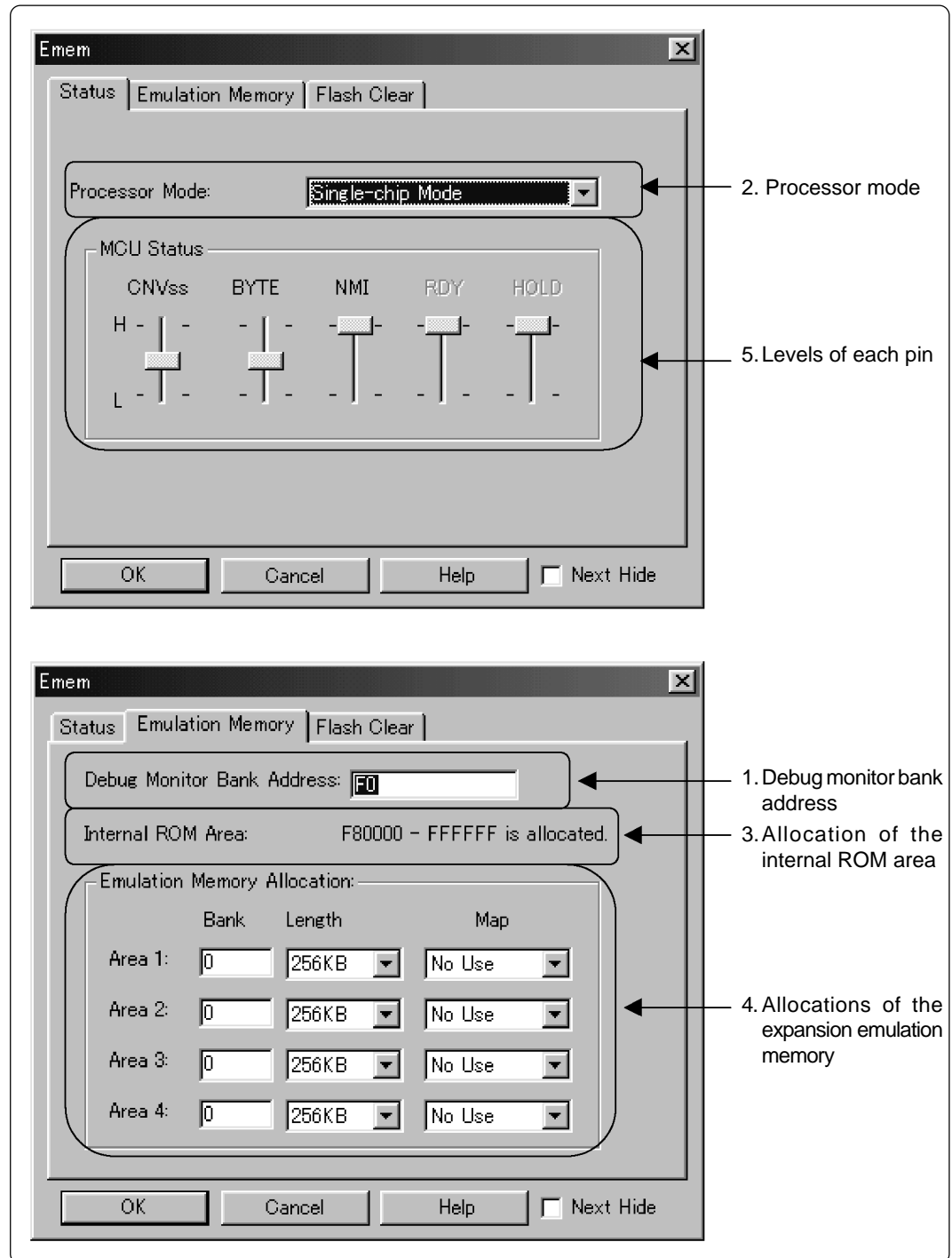


Figure 4.3 EMEM dialog box

(1) Setting the Debug Monitor Bank Address

With this product, consecutive 64 KB of the emulator's work area are allocated to the debug monitor. When "F0" is specified, 64 KB starting from address F00000h are allocated for use by the debug monitor. Specify an unused area.

IMPORTANT

Notes on Setting Debug Monitor Bank Address:

- It is not possible to view or set the content of the specified area. Even on the dump window or in the reverse assemble area of the program/source windows, the content of this area is not displayed correctly though it can be displayed.
- The below bank addresses cannot be set for the debug monitor.
 - (1) MCU internal resources (ROM, RAM and SFR areas)
 - (2) DRAM area and multiplex areas
 - (3) Interrupt vector area

(2) Selecting the Processor Mode

Here explains about the setting of processor modes. Selectable modes are listed in Table 4.1.

Table 4.1 Selecting the processor mode

Processor mode	Select from the list
Single-chip mode	Single-chip Mode
Memory expansion mode	Memory Expansion Mode 8 Bit
	Memory Expansion Mode 16 Bit
Microprocessor mode	Microprocessor Mode 8 Bit
	Microprocessor Mode 16 Bit

IMPORTANT

Notes on Selecting the Processor Mode:

- When setting single-chip mode or memory expansion mode, the level of the CNVSS pin of the target system should be "L".
- When setting microprocessor mode, the level of the CNVSS pin of the target system should be "H".
- When setting memory expansion mode or microprocessor mode, the RDY* and HOLD* pins of the target system should be "H".
- When the target system is not connected, all modes are available.

(3) Setting the Emulation Memory

This product has two emulation memory and how to allocate is different depending on which processor mode is selected. Table 4.2 shows how to set the emulation memory for each processor mode.

Table 4.2 Setting the emulation memory

Processor mode	Internal flash memory	Emulation memory for expansion
Single-chip Mode	The area F80000h-FFFFFFh is allocated automatically.	Cannot be used.
Memory Expansion Mode	The area F80000h-FFFFFFh is allocated automatically.	Possible to specify the desired area between Area 1 and 4.
Microprocessor Mode	Cannot be used.	Possible to specify the desired area between Area 1 and 4.

(4) Emulation Memory Allocation as Expansion Area

This section explains about setting emulation memory for expansion purposes in the memory expansion mode and microprocessor mode. To use emulation memory as expansion area, set memory allocation as indicated here below. Emulation memory specifications are given in Table 4.3.

- (1) Setting bank address (Bank): Specify the bank address of the area to be allocated for expansion as a hexadecimal number.

For example, specifying "C0" allocates the bank from address C00000h.

When 256 KB is specified as the Length, bank addresses can be specified from 00, 04, 08 up to FC in 256KB blocks.

When 1 MB is specified as the Length, bank addresses can be specified from 00, 10, 20 up to F0 in 1MB blocks.

- (2) Specifying area size (Length): Specify the size of the specified expansion area. The area from the specified address to the size specified here is allocated as external area or internal area. Length can be specified as 256 KB or 1 MB.

- (3) Specifying area map (Map): Select whether the specified area is to be allocated as internal area (used as emulation memory) or external area (used by external device, etc.).

- When INTERNAL is specified: This bank is allocated as internal area and used for expansion.
- When EXTERNAL is specified: This bank is allocated as external area and used by the target system as an external resource.
- When No Use is specified: This bank is allocated as external area and used by the target system as an external resource.

Areas not specified here are allocated as external area. The only difference from the area specified as EXTERNAL area is download speed. Download to the area specified as EXTERNAL area is faster than to the other unspecified areas.

IMPORTANT

Notes on Using Emulation Memory for Expansion:

- When the single-chip mode or memory expansion mode is set by specifying the processor mode, internal ROM area is automatically allocated to the internal flash ROM. Therefore, it is not necessary to deliberately specify emulation memory as expansion area in order to allocate the internal ROM area.
- The 4MB memory mounted in the product can be allocated out. Set memory allocation so that the total of the 4 length values does not exceed the emulation memory size (4 MB). However, the emulation memory is 3.25 MB in the memory expansion mode.
- Be careful that the specified areas do not overlap one another.
- Do not set the following areas for memory allocation of the MCU. Set these areas referring the specifications of the MCU.
 - (1) Area allocated for DRAM connection
 - (2) Area allocated for multiplex bus
 - (3) Unusable area
- Memory in the emulator is automatically selected as reset vector area regardless of settings.
- Except for the SFR, RAM, ROM and internally reserved areas, all areas other than the set area are externally accessible.
- MCU internal resources are automatically selected as SFR and RAM areas regardless of settings.

Table 4.3 Specifications of expansion emulation memory

Maximum operating frequency	30 MHz, 1 wait
Number of area which can be set	Max. 4 areas
Area size	Successive 256 KB or 1 MB (Can be mixed)
Emulation memory size	Total of 4 areas: 4 MB
Possible banks to be set	(1) For 256KB area X0h, X4h, X8h, XCh bank e.g.) 20 bank, 64 bank, A8 bank, EC bank etc. (2) For 1MB area X0h bank e.g.) 20 bank, 40 bank, 80 bank, A0 bank etc.

IMPORTANT

Note on Memory Access:

- When setting the processor mode to the memory expansion mode, it may be changed to the memory expansion mode temporarily before the user program itself changes from the single-chip mode to the memory expansion mode.

Take due consideration on this phenomenon in the following cases:

- (1) Immediately before executing the program after setting a software break
- (2) Immediately after stopping the program when a software break is set

(5) Referring MCU STATUS

It is possible to confirm each level of BYTE, CNVSS, RDY*, HOLD*, NMI* pins on the target system.

IMPORTANT

Notes on MCU STATUS:

- The status of pins of MCU is displayed in the "MCU STATUS" of the EMEM dialog box. Confirm if it matches with the processor mode.
- Check that "RDY*" and "HOLD*" are set to "H". If they are set to the "L" level, the MCU itself is in the standby state. The emulator debugger displays an error message because it receives no response from the MCU.

4.4 Self-checks

(1) Self-check Procedure

To run the emulator self-checks, do so as explained here below. While self-checks are in progress, LEDs will change as shown in Figure 4.4.

- (1) When the target system is connected, disconnect it.
- (2) Within 2 seconds of activating power to the emulator, press the RESET switch on the emulator front panel to switch the emulator to the maintenance mode.
- (3) Check the "SAFE" LED starts flashing and then press the RESET switch again.
- (4) The self-checks will start. If the normal result is displayed in about 30 seconds, self-checks terminated normally.

(2) If an Error is Detected in Self-checks

If self-checks do not result normally (ERROR 1 to ERROR 4 in Figure 4.4), check the following.

- Recheck the connection of the emulation probe and PC7501.
- Redownload the proper firmware.

CAUTION

Note on Self-checks:

- If self-checks do not result normally (excluding target system errors), the emulation probe may be damaged. Then contact your local distributor.

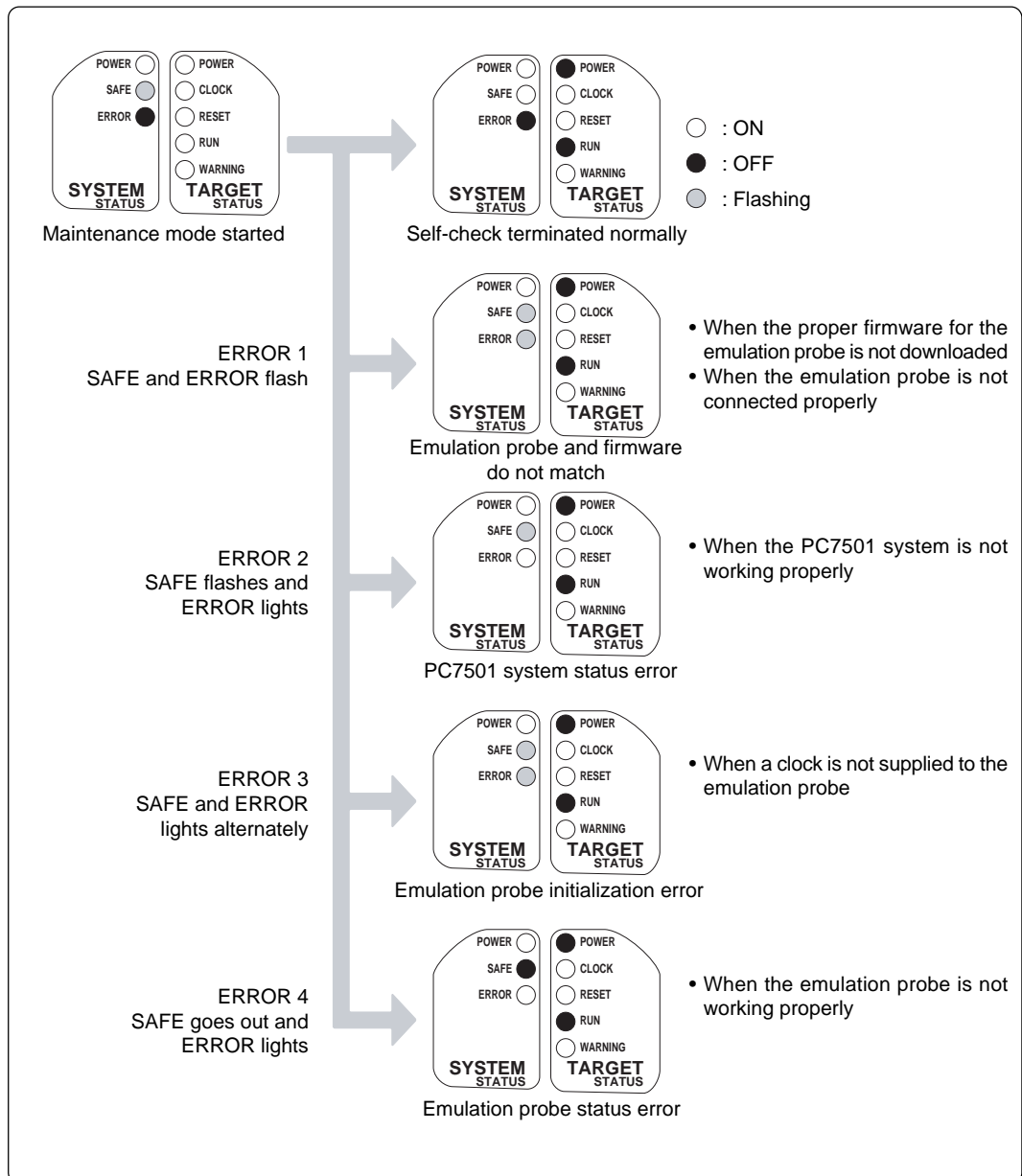


Figure 4.4 Self-check procedure

Chapter 5. Specifications

This chapter describes specifications of this product.

- 5.1 Specifications 54
- 5.2 Connection Diagrams 55
- 5.3 External Dimensions 57
 - (1) External Dimensions of the Emulation Probe 57
 - (2) External Dimensions of the Converter Board (M30800T-PTC) 58
 - (3) External Dimensions of the Converter Board (M3T-FLX-144NSD) 59

Chapter 5. Specifications

5.1 Specifications

Table 5.1 lists the specifications of the M30830T-EPB.

Table 5.1 Specifications of the M30830T-EPB

Emulator		PC7501
Applicable MCU	RAM: 31 KB ROM: 512 KB	M30833MJFP/M30833FJFP (100-pin 0.65-mm) M30833MJGP/M30833FJGP (100-pin 0.5-mm) M30835MJGP/M30835FJGP (144-pin 0.5-mm)
		Planning to support the M32C/81 and 82 Groups
Evaluation MCU	M30835FJGP (two pieces)	
Usable mode	Single-chip mode Memory expansion mode Microprocessor mode	
Emulation memory	(1) 512 KB for internal ROM of MCU (Fixed F80000h - FFFFFFFh, maximum operating frequency: 30 MHz, 0 wait) (2) 4 MB for expansion area (changeable) (Possible to allocate by 256 KB or 1 MB, maximum operating frequency: 30 MHz, 1 wait)	
Maximum operating frequency	30 MHz (Operating voltage: 4.2 to 5.5 V, divide-by-1) 20 MHz (Operating voltage: 3.0 to 3.6 V, divide-by-1)	
Clock oscillator	X _{IN} -X _{OUT}	Internal oscillator circuit board (OSC-3) Switchable to external oscillator input
	X _{CIN} -X _{COU} T	Internal oscillator circuit board (32.768 kHz fixed) Switchable to external oscillator input
Operating frequency	3.0 - 3.6 V, 4.2 - 5.5 V	
Operating temperature	5 to 35°C (no dew)	
Storage temperature	-10 to 60°C (no dew)	
Power supply to emulator	12 V supplied from AC adapter	
Connection to target system (see 3.6 "Connecting the Target System" on page 34)	<p>For 144-pin 0.5-mm-pitch LQFP (144P6Q-A): M3T-FLX-144NSD (separately available)</p> <p>For 100-pin 0.5-mm-pitch LQFP (100P6Q-A): (1) M30800T-PTC (included) + M3T-100LCC-QSD (separately available) (2) M30800T-PTC (included) + M3T-100LCC-DMS (separately available) + M3T-FLX-100NSD (separately available) (3) M3T-F160-100NSD (separately available)</p> <p>For 100-pin 0.65-mm-pitch QFP (100P6S-A): (1) M30800T-PTC (included) + M3T-100LCC-DMS (separately available) + M3T-FLX-100NRB (separately available) (2) M30800T-PTC (included) + M3T-100LCC-DMS (separately available) + M3T-DUMMY100S (separately available) (3) M30800T-PTC (included) + M3T-100LCC-DMS (separately available) + M3T-DIRECT100S (separately available)</p> <p>For 100-pin LCC socket: M30800T-PTC (included) + IC61-1004-051 (included)</p>	

5.2 Connection Diagrams

Figures 5.1 and 5.2 show the connection diagrams of the M30830T-EPB. These connection diagrams mainly show the interface section. The signals not shown in Figures 5.1 and 5.2 are connected to the evaluation MCU in the emulation probe and the target system directly. The circuits not connected to the target system such as the emulator's control system are omitted.

Table 5.2 lists the electrical characteristics of the IC used for the user interface. Refer to it when using the emulator.

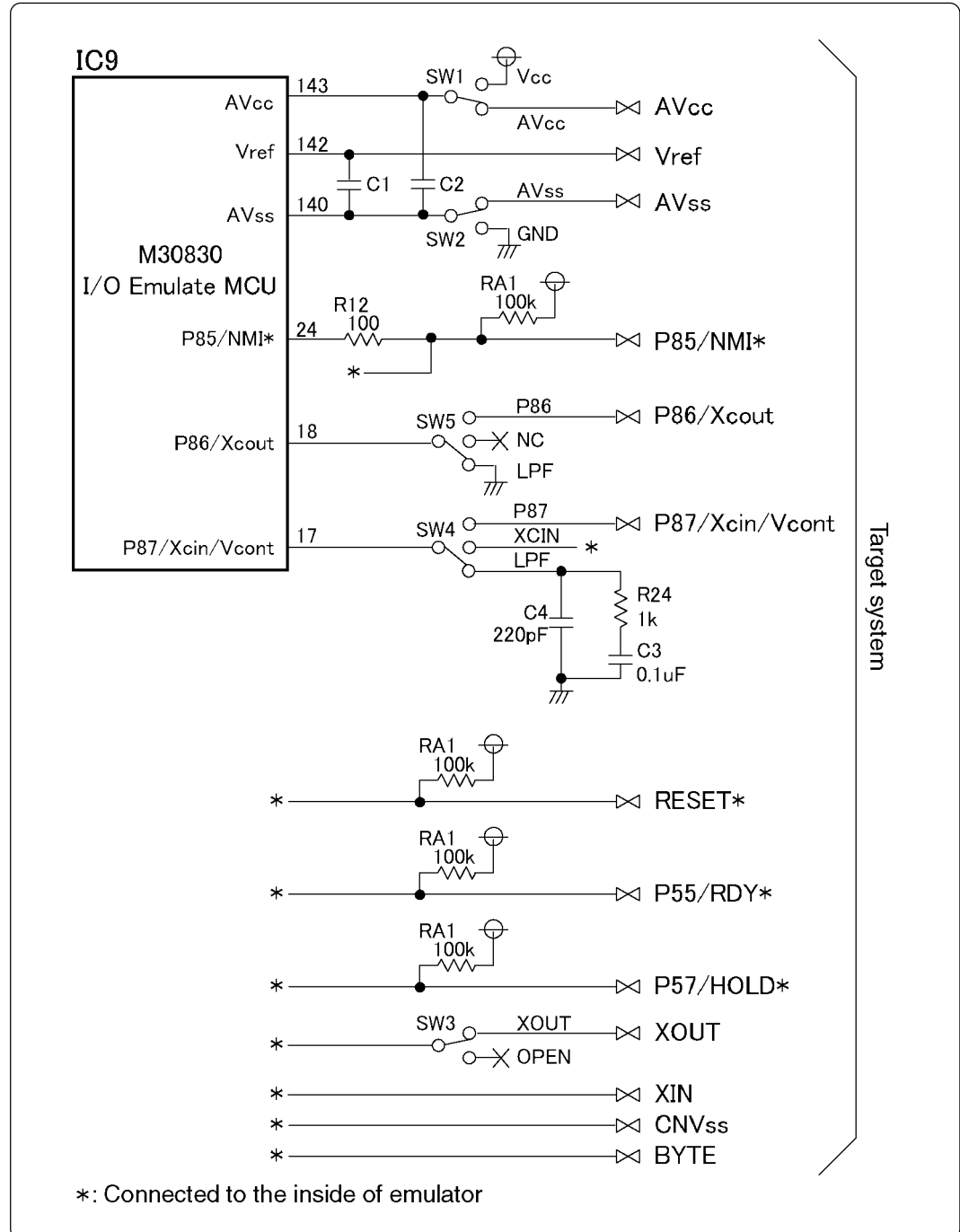


Figure 5.1 Connection diagram (1/2)

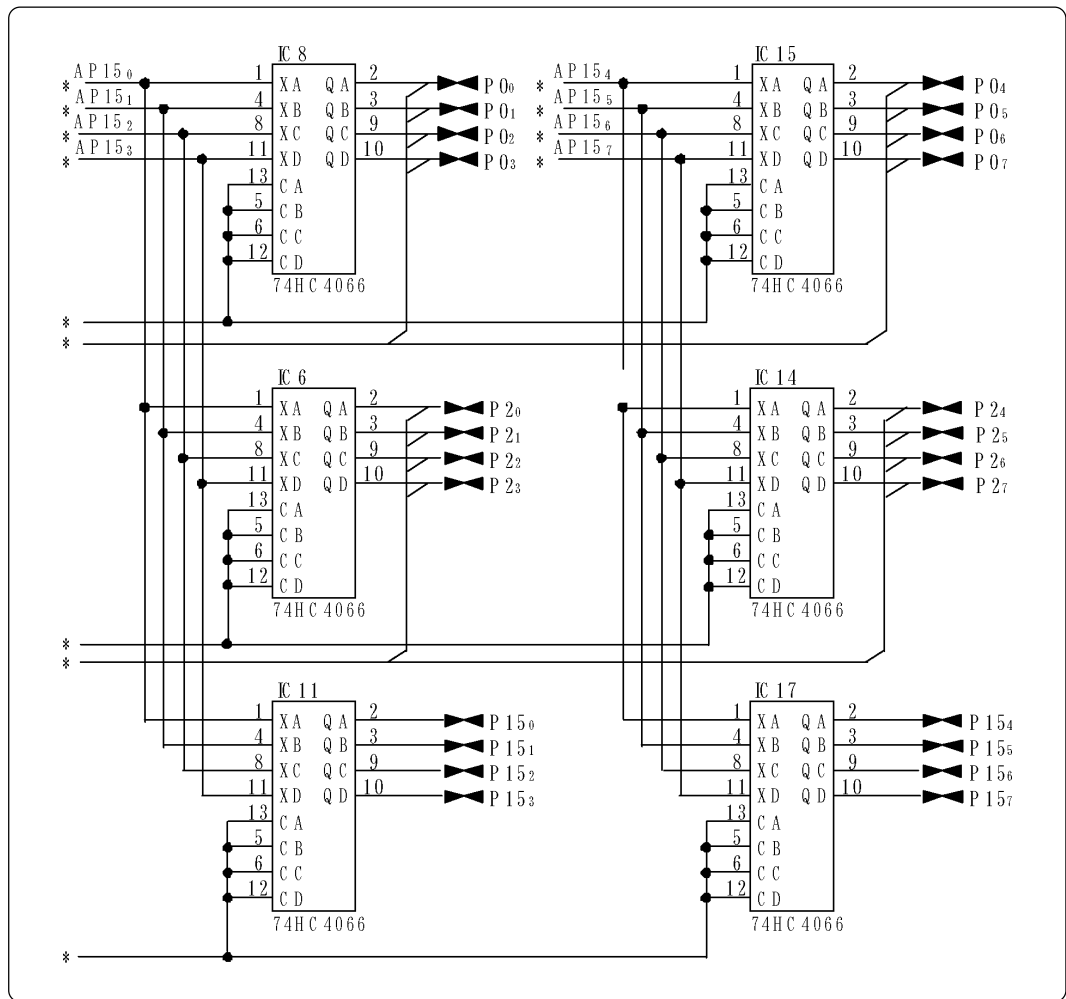


Figure 5.2 Connection diagram (2/2)

Table 5.2 Electrical characteristics of the 74HC4066

Symbol	Parameter	Measuring condition	Standard values			Unit
		Vcc	Min.	Standard	Max.	
R _{ON}	ON resistor	2.0	-	160	-	Ω
		4.5	-	70	100	
ΔR _{ON}	ON resistor difference	4.5	-	10	-	
I _{IN}	Switch input leak current	12.0	-	-	±100	nA

5.3 External Dimensions

(1) External Dimensions of the Emulation Probe

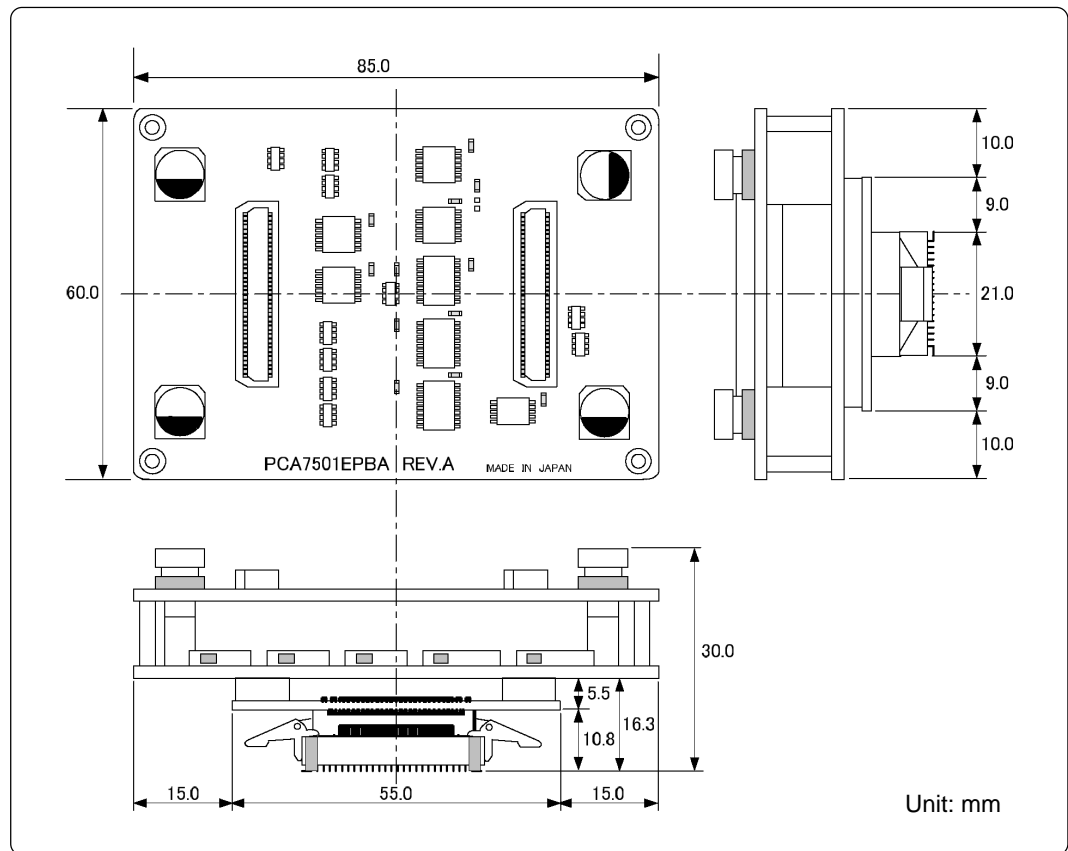


Figure 5.3 External dimensions of the emulation probe

(2) External Dimensions of the Converter Board (M30800T-PTC)

Figure 5.4 shows the external dimensions of the pitch converter board M30800T-PTC for 100-pin QFP (100P6N).

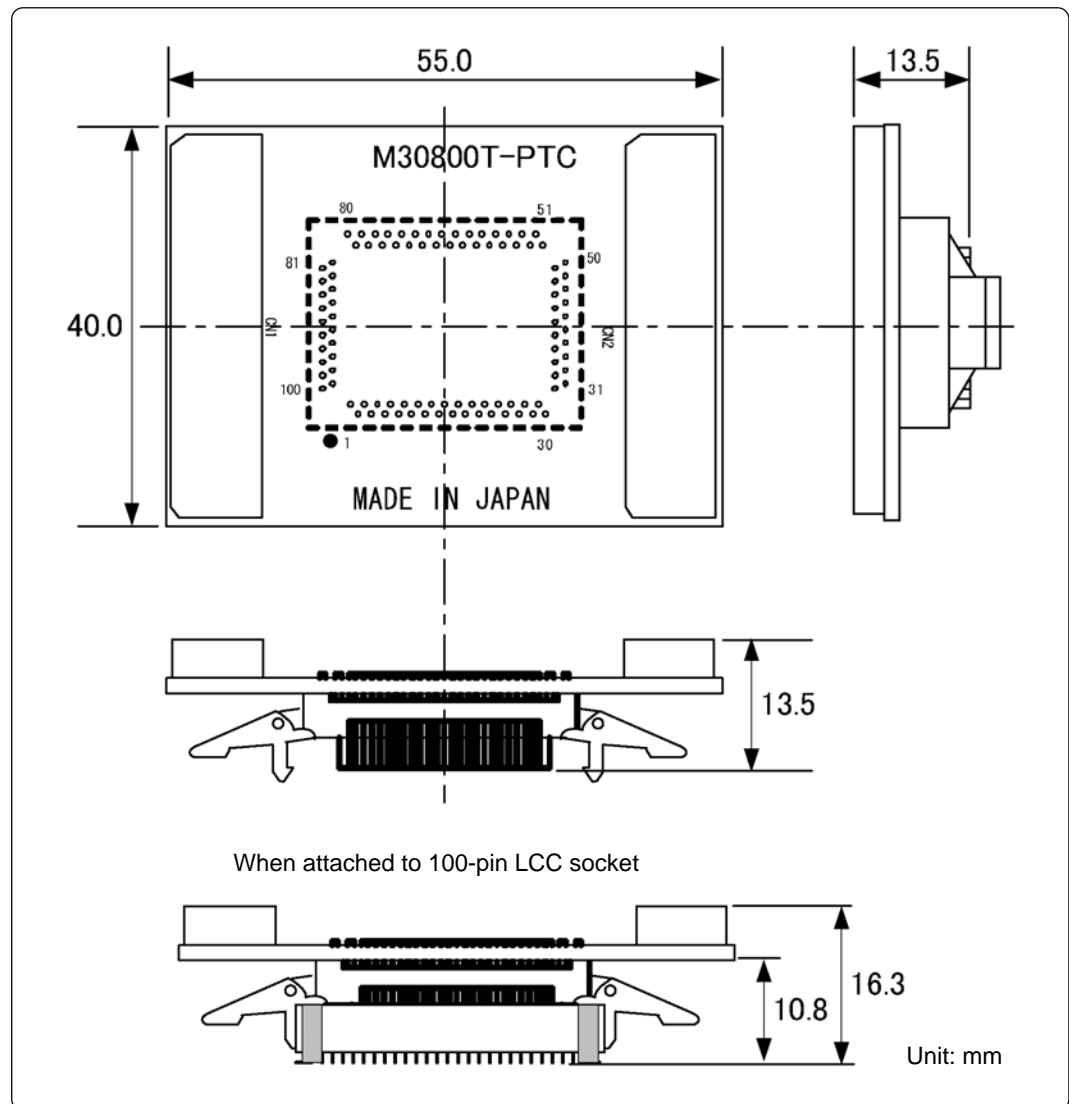


Figure 5.4 External dimensions of the pitch converter board (M30800T-PTC)

(3) External Dimensions of the Converter Board (M3T-FLX-144NSD)

Figure 5.5 shows the external dimensions and the sample foot pattern of the pitch converter board M3T-FLX-144NSD for 144-pin LQFP (144P6Q).

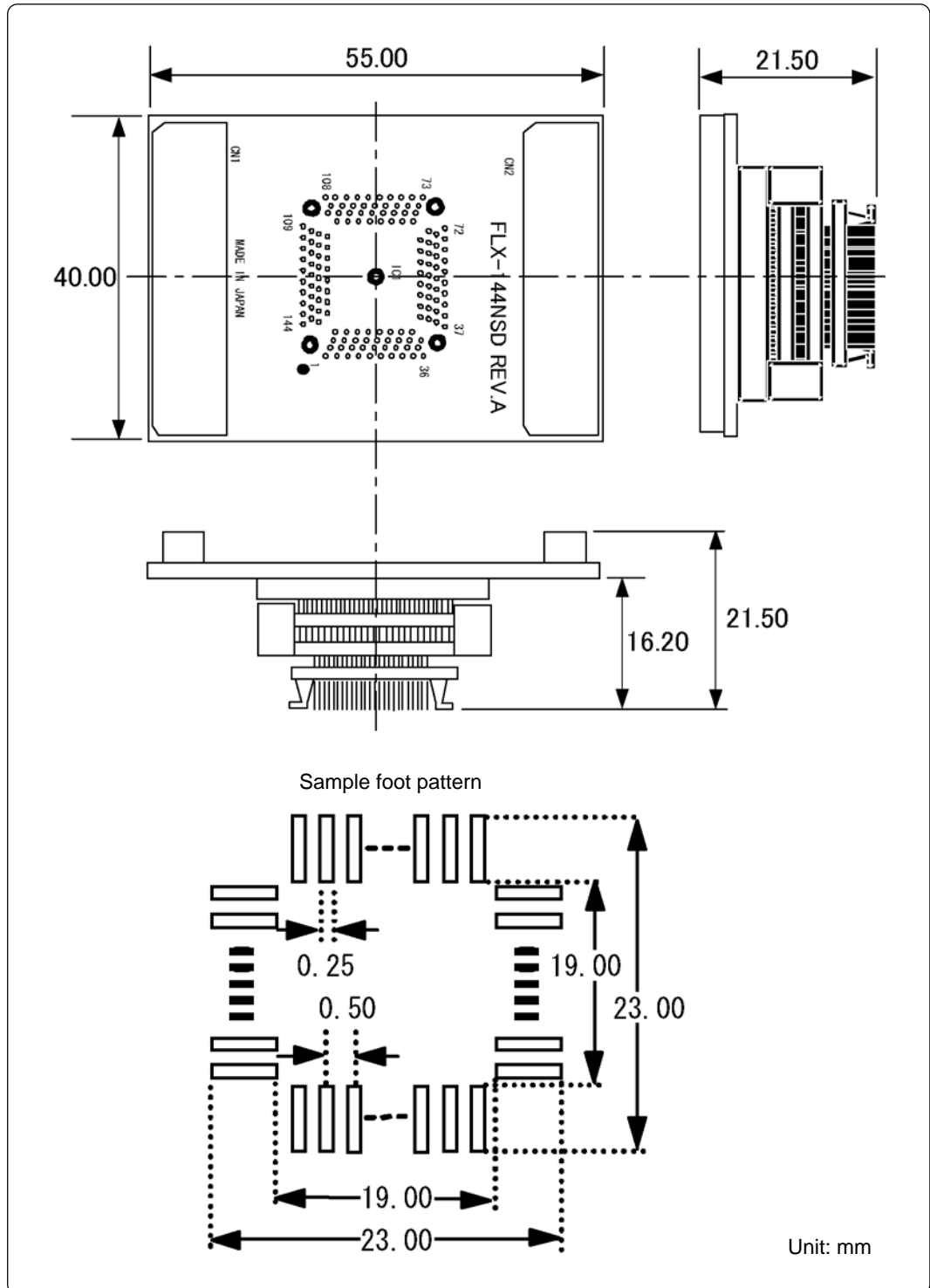


Figure 5.5 External dimensions of the pitch converter board (M3T-FLX-144NSD)

MEMO

Chapter 6. Troubleshooting

This chapter describes how to troubleshoot when this product does not work properly.

6.1 Flowchart to Remedy the Troubles	62
6.2 When the Emulator Debugger Does Not Start Up Properly	63
(1) When the LED Display of the PC7501 is Abnormal	63
(2) EMEM Dialog Box is Not Displayed When the Emulator Debugger Starts Up (When the target system is connected)	64
(3) EMEM Dialog Box is Not Displayed When the Emulator Debugger Starts Up (When the target system is not connected)	65
(4) Errors Occur When the Emulator Debugger Starts Up (When the target system is connected)	65

Chapter 6. Troubleshooting

6.1 Flowchart to Remedy the Troubles

Figure 6.1 shows the flowchart to remedy the troubles from when power to the emulator is activated until the emulator debugger starts up. Check this while the target system is disconnected. For the latest FAQs visit the Renesas Tool Homepage.

<http://www.renesas.com/en/tools>

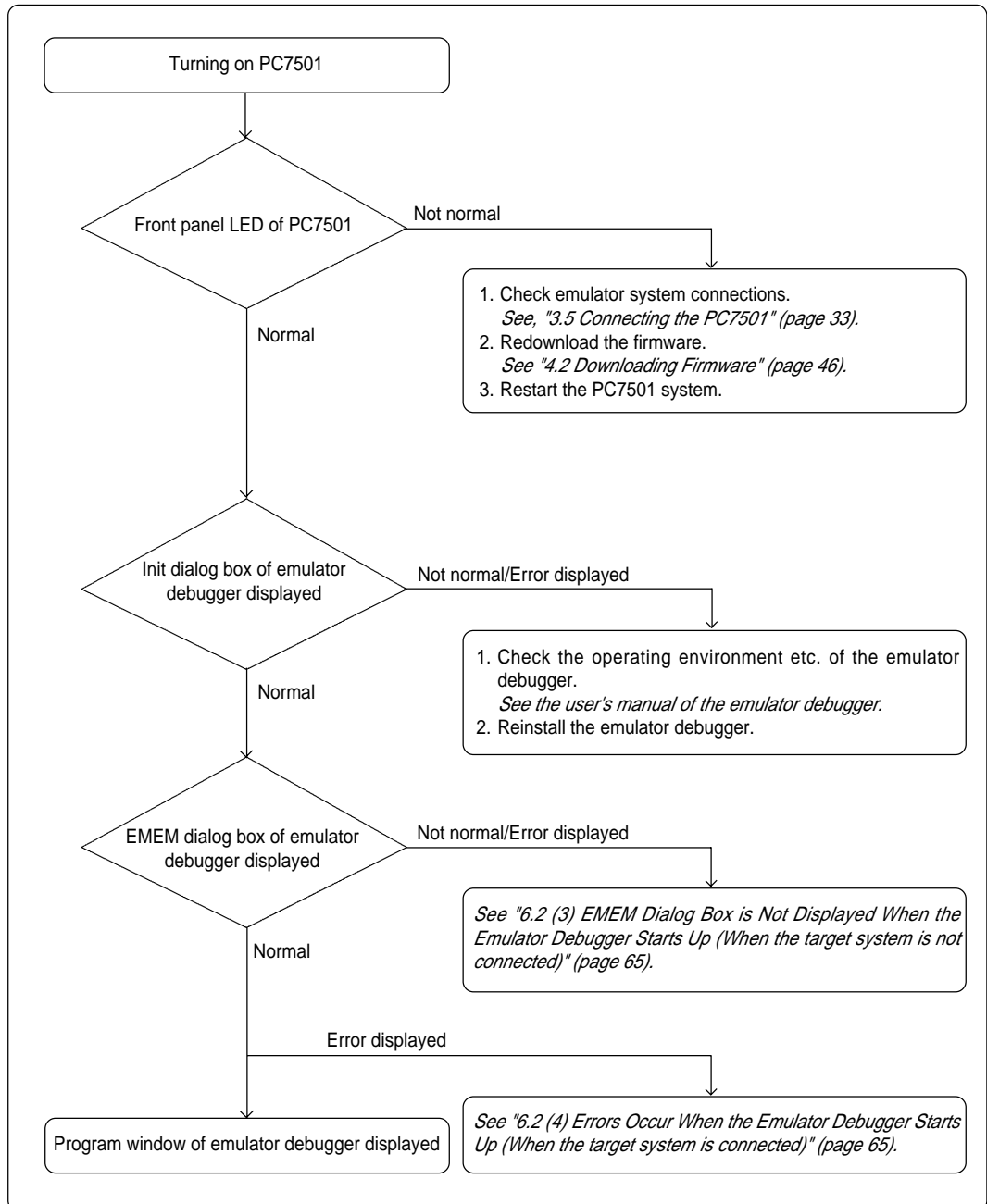


Figure 6.1 Flowchart to remedy the troubles

6.2 When the Emulator Debugger Does Not Start Up Properly

(1) When the LED Display of the PC7501 is Abnormal

Table 6.1 LED's abnormal display and its checkpoints

Error	Connection to the target system	Checkpoint
LEDs do not light up.	-	Recheck the power cable is connected to the PC7501. <i>See the user's manual of the PC7501.</i>
All LEDs remain lit.	-	Recheck the connection between the PC7501 and this product. <i>See "3.5 Connecting the PC7501" (page 33).</i>
The POWER LED of "STATUS OF TARGET" does not light up.	Connected	Check power is properly supplied to the target system and that the target system is properly grounded.
The CLOCK LED of "STATUS OF TARGET" does not light up.	Not connected	(1) Check that both the main and sub clocks of the emulator debugger are not set to "EXT". <i>See the CLK command of the emulator debugger.</i> (2) Check the oscillation circuit in the emulator is oscillating. <i>See "3.2 Selecting Clock Supply" (page 25).</i>
	Connected	(1) Check the oscillation circuit in the target system is oscillating. (2) Check the switches in the emulation probe are correctly set. <i>See "3.3 Setting Switches" (page 29).</i>
The RESET LED of "STATUS OF TARGET" does not go out.	Connected	Check the reset pin of the target system is pulled up.

**(2) EMEM Dialog Box is Not Displayed When the Emulator Debugger Starts Up
(When the target system is connected)**

Table 6.2 Checkpoints of errors when starting up the emulator debugger (target is connected)

Error	Checkpoint
Communication error occurred. Data was not sent to the target.	Check all emulator debugger settings, interface cable settings and switches on the rear of the PC7501 match. <i>See the user's manuals of the PC7501 and emulator debugger.</i>
Target system cannot be properly built.	(1) Download the proper firmware. <i>See "4.2 Downloading Firmware" (page 46).</i> (2) Recheck the connection between the PC7501 and this product. <i>See "3.5 Connecting the PC7501" (page 33).</i>
PD308F version is not the same version as the firmware in the target.	Download the proper firmware. <i>See "4.2 Downloading Firmware" (page 46).</i>
Target MCU is in the reset state.	(1) Check the reset pin of the target system is pulled up. (2) Check the reset pin of the target system has changed from "L" to "H" level.
Target MCU cannot be reset.	(1) Check the NMI* pin is held high. (2) If in memory expansion mode or microprocessor mode, check the RDY* pin and HOLD* pin are held high. (3) If the reset circuit of the target system has a watchdog timer, disable the timer. (4) Check that power is properly supplied to the target system and that the target system is properly grounded. (5) The program may be uncontrollable in areas where memory is not allocated. Recheck the map setting. <i>See "4.3 Starting Up the Emulator Debugger (Setting EMEM Dialog Box)" (page 47).</i>
Target is in "HOLD" state.	(1) The MCU is either in the stop mode or wait mode. Either reset the MCU or cancel the mode with an interrupt. <i>See MCU specifications.</i> (2) The program may be uncontrollable in areas where memory is not allocated. Recheck the map setting. <i>See "4.3 Starting Up the Emulator Debugger (Setting EMEM Dialog Box)" (page 47).</i>
Target clock is stopped.	(1) Check the oscillation circuit of the target system is oscillating properly. (2) Check the switches in the emulation probe are correctly set. <i>See "3.3 Setting Switches" (page 29).</i>
Target MCU is not receiving power.	Check that power is properly supplied to the target system and that the target system is properly grounded.

**(3) EMEM Dialog Box is Not Displayed When the Emulator Debugger Starts Up
(When the target system is not connected)**

Table 6.3 Checkpoints of errors when starting up the emulator debugger (target is not connected)

Error	Checkpoint
Communication error occurred. Data was not sent to the target.	Check all emulator debugger settings, interface cable settings and switches on the rear of the PC7501 match. <i>See the user's manuals of the PC7501 and emulator debugger.</i>
Target system cannot be properly built.	(1) Download the proper firmware. <i>See "4.2 Downloading Firmware" (page 46).</i> (2) Recheck the connection between the PC7501 and this product. <i>See "3.5 Connecting the PC7501" (page 33).</i>
PD308F version is not the same version as the firmware in the target.	Download the proper firmware. <i>See "4.2 Downloading Firmware" (page 46).</i>
Target MCU cannot be reset.	The program may be uncontrollable in areas where memory is not allocated. Recheck the map setting. <i>See "4.3 Starting Up the Emulator Debugger (Setting EMEM Dialog Box)" (page 47).</i>
Target is in HOLD state.	(1) The MCU is either in the stop mode or wait mode. Either reset the MCU or cancel the mode with an interrupt. <i>See MCU specifications.</i> (2) The program may be uncontrollable in areas where memory is not allocated. Recheck the map setting. <i>See "4.3 Starting Up the Emulator Debugger (Setting EMEM Dialog Box)" (page 47).</i>
Target clock is stopped.	Check the switches in the emulation probe are correctly set. <i>See "3.3 Setting Switches" (page 29).</i>

**(4) Errors Occur When the Emulator Debugger Starts Up
(When the target system is connected)**

Table 6.4 Checkpoints of errors when starting up the emulator debugger (target is connected)

Error	Checkpoint
Target MCU is uncontrollable.	(1) Check the NMI* pin is held high. (2) If in memory expansion mode or microprocessor mode, check the RDY* pin and HOLD* pin are held high. (3) The program may be uncontrollable in areas where memory is not allocated. Recheck the map setting. <i>See "4.3 Starting Up the Emulator Debugger (Setting EMEM Dialog Box)" (page 47).</i>

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Chapter 7. Maintenance and Guarantee

This chapter describes how to maintenance, repair provisions and how to request for repair.

7.1 Maintenance	68
7.2 Guarantee	68
7.3 Repair Provisions.....	68
7.4 How to Request for Repair	69

Chapter 7. Maintenance and Guarantee

7.1 Maintenance

If dust or dirt collects on any equipment of your emulation system, wipe it off with a dry soft cloth. Do not use thinner or other solvents because these chemicals can cause the equipment's surface coating to separate.

7.2 Guarantee

If your product becomes faulty within one year after its purchase while being used under good conditions by observing "Precautions for Safety" described in Chapter 1 of this user's manual, we will repair or replace your faulty product free of charge. Note, however, that if your product's fault is raised by any one of the following causes, we will repair it or replace it with new one with extra-charge:

- Misuse, abuse, or use under extraordinary conditions
- Unauthorized repair, remodeling, maintenance, and so on
- Inadequate user's system or misuse of it
- Fires, earthquakes, and other unexpected disasters

In the above cases, contact your local distributor. If your product is being leased, consult the leasing company or the owner.

7.3 Repair Provisions

(1) Repair with extra-charge

The products elapsed more than one year after purchase can be repaired with extra-charge.

(2) Replacement with extra-charge

If your product's fault falls in any of the following categories, the fault will be corrected by replacing the entire product instead of repair, or you will be advised to purchase new one, depending on the severity of the fault.

- Faulty or broken mechanical portions
- Flaw, separation, or rust in coated or plated portions
- Flaw or cracks in plastic portions
- Faults or breakage caused by improper use or unauthorized repair or modification
- Heavily damaged electric circuits due to overvoltage, overcurrent or shorting of power supply
- Cracks in the printed circuit board or burnt-down patterns
- Wide range of faults that makes replacement less expensive than repair
- Unlocatable or unidentified faults

(3) Expiration of the repair period

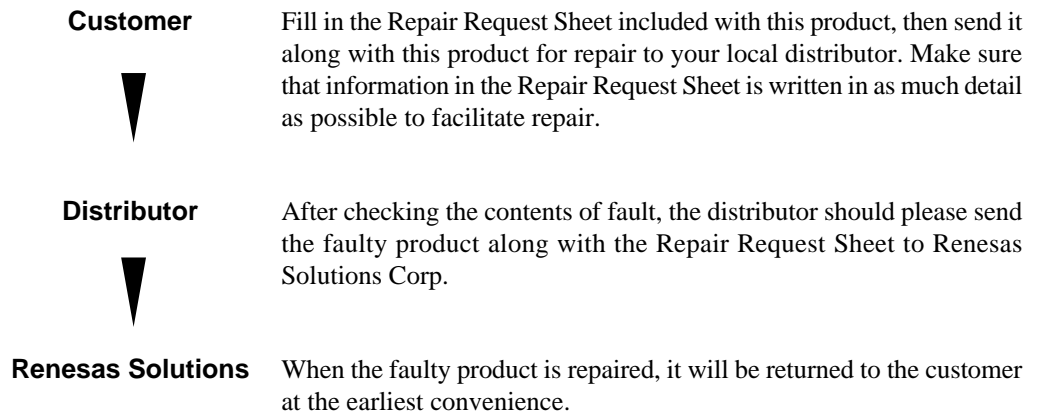
When a period of one year elapses after the model was dropped from production, repairing products of the model may become impossible.

(4) Transportation fees at sending your product for repair

Please send your product to us for repair at your expense.

7.4 How to Request for Repair

If your product is found faulty, follow the procedure below to send your product for repair.



CAUTION

Note on Transporting the Product:



- When sending your product for repair, use the packing box and cushion material supplied with this product when delivered to you and specify handling caution for it to be handled as precision equipment. If packing of your product is not complete, it may be damaged during transportation. When you pack your product in a bag, make sure to use conductive polyvinyl supplied with this product (usually a blue bag). When you use other bags, they may cause a trouble on your product because of static electricity.

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M30830T-EPB User's Manual

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M30830T-EPB User's Manual



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