



M30100T3-RPD-E

Emulation Pod for M16C/10 Series MCUs

User's Manual

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Warning: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

For inquiries about the contents of this document or product, fill in the text file the installer of the emulator debugger generates in the following directory and email to your local distributor.

\\SUPPORT\Product-name\SUPPORT.TXT

Renesas Tools Homepage <http://www.renesas.com/en/tools>

Preface

The M30100T3-RPD-E is an emulation pod for the M16C/10 Series of Renesas 16-bit MCUs. It's used with a PC4701 emulator (excluding PC4701L and PC4700L) and a pod probe.

This user's manual mainly describes specifications of emulation pod M30100T3-RPD-E and how to setup it. For details on the following products, which are used with the M30100T3-RPD-E, refer to each product's user's manual.

- Pod probe: Each User's Manual
- Emulator: PC4701 User's Manual
- Emulator debugger: User's manual of each emulator debugger for PC4701

All the components of this product are shown in "2.2 Package Components" (page 16) of this user's manual. 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". Be sure to read this chapter before using the product.

When using outside Japan



- When using in Europe, the United States, or Canada, be sure to use both the emulator and the emulation pod which meet local standards. EMI standards are not met when the M30100T3-RPD-E is used with the PC4700H emulator.

Contents

| | |
|--|----|
| Chapter 1. Precautions for Safety | 7 |
| 1.1 Safety Symbols and Meanings | 8 |
| Chapter 2. Preparation | 15 |
| 2.1 Package Components | 16 |
| 2.2 Other Tool Products Required for Development | 16 |
| 2.3 Name of Each Part | 17 |
| (1) System Configuration | 17 |
| 2.4 When Using the Emulator for the First Time | 18 |
| (1) Making the MCU File | 18 |
| (2) Setting the Work Area | 18 |
| (3) Downloading Firmware | 19 |
| (4) Self-check | 19 |
| Chapter 3. Setting Up | 21 |
| 3.1 Removing and Closing the Upper Cover | 22 |
| 3.2 Selecting Clock Supply and Replacing Oscillator Circuit Boards | 23 |
| (1) Clock Supply to the MCU | 23 |
| (2) Using the Oscillator Circuit on the Target System | 24 |
| (3) Changing the Internal Oscillator Circuit of the Emulation Pod | 25 |
| (4) Replacing the Oscillator Circuit Boards | 26 |
| 3.3 Jumper Switches JP1 and JP2 on the M30100T-PRT Board | 27 |
| 3.4 Connecting the PC4701 and Emulation Pod | 27 |
| (1) Connecting the Cable to the PC4701 | 27 |
| (2) Connecting the Cable to the Emulation Pod | 28 |
| 3.5 Connecting the Pod Probe | 29 |
| Chapter 4. Usage | 31 |
| 4.1 Turning On the Power Supply | 32 |
| (1) Checking Connections of the Emulator System | 32 |
| (2) Turning On the Power | 32 |
| (3) LED Display When the PC4701 Starts Up Normally | 33 |
| 4.2 Downloading Firmware | 34 |
| (1) When It is Necessary to Download Firmware | 34 |
| (2) Downloading Firmware in Maintenance Mode | 34 |
| 4.3 Self-check | 35 |
| (1) Self-check Procedure | 35 |
| (2) If an Error is Detected in the Self-check | 35 |

| | |
|--|----|
| Chapter 5. Specifications | 37 |
| 5.1 Specifications | 38 |
| 5.2 External Dimensions | 39 |
| (1) External Dimensions of the Emulation Pod | 39 |
| Chapter 6. Troubleshooting | 41 |
| 6.1 Flowchart to Remedy the Troubles | 42 |
| 6.2 When the Emulator Debugger Does Not Start Up Properly | 43 |
| (1) When the LED Display of PC4701 is Abnormal | 43 |
| (2) Errors Occur When Starting Up the Emulator Debugger (When the target system is connected) | 44 |
| (3) Errors Occur When Starting Up the Emulator Debugger (When the target system is not connected) | 45 |
| 6.3 Operation Differs from That of Actual MCUs | 45 |
| (1) Cannot Reset from the Target System | 45 |
| (2) Data Values of RAM Area at Power-on are Different | 45 |
| (3) When the A-D and D-A Conversion Values are Different from Expected Values | 45 |
| 6.4 How to Request for Support | 46 |
| Chapter 7. Maintenance and Guarantee | 47 |
| 7.1 Maintenance | 48 |
| 7.2 Guarantee | 48 |
| 7.3 Repair Provisions | 48 |
| 7.4 How to Request for Repair | 49 |

Terminology

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

Emulator system

This means an emulator system built around the PC4701 emulator. The PC4701 emulator system is configured with an emulator main unit, emulation pod, pod probe, host machine and emulator debugger.

Emulator main unit (Hereafter PC4701)

This means a generic name for emulators for 8 and 16-bit MCUs. For details on specific models of PC4701, visit the Renesas Tools Homepage at <http://www.renesas.com/en/tools>

This product does not support the PC4701L and PC4700L.

Emulation pod

This means the M30100T3-RPD-E (this product). This emulation pod is for the M16C/10 Series MCUs.

Pod probe

This means pod probe M301xxT-PRB for the M16C/10 Series MCUs ("x" denotes a number).

Emulator debugger

This means a software tool for M16C/60, M16C/30, M16C/Tiny, M16C/20 and M16C/10 Series MCUs. The M3T-PD30 controls the emulator from the host machine through various interfaces.

Host machine

This means a personal computer used to control the emulator and emulation pod.

Firmware

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

Target MCU

This means the microcomputer you are going to debug.

Target system

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

Evaluation MCU

This means the microcomputer mounted on the pod probe which is operated in the specific mode for tools.

*

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

Chapter 1. Precautions for Safety

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

| | |
|--|----|
| 1.1 Safety Symbols and Meanings | 8 |
| WARNING Warning for Installation | 9 |
| Warnings for Use Environment | 9 |
| CAUTION Caution to Be Taken for Modifying This Product | 9 |
| Cautions to Be Taken for Handling This Product | 9 |
| Cautions to Be Taken for Turning On the Power | 9 |
| IMPORTANT Note on Malfunctions in the PC4701 System | 10 |
| Notes on Downloading Firmware | 10 |
| Notes on the Self-check | 10 |
| Note on Quitting the Emulator Debugger | 10 |
| Note on Final Evaluation | 10 |
| Notes on Power Supply to Target System | 10 |
| Notes on Clock Supply to the MCU | 11 |
| Note on Version of Emulator Debugger | 11 |
| Note on Making the MCU File | 11 |
| Notes on Setting the Work Area When Starting Up the Emulator Debugger | 11 |
| Note on Stack Area | 11 |
| Notes on MAP References and Settings | 11 |
| Note on RESET* Input | 12 |
| Note on Operation When Not Executing the User Program | 12 |
| Notes on Maskable Interrupts | 12 |
| Notes on Address-Match Interrupt | 12 |
| Note on BRK Instruction and BRK Instruction Interruption | 12 |
| Notes on Software Breaks and Hardware Breaks | 13 |
| Note on Stop and Wait Modes | 13 |
| Notes on Watchdog Function | 13 |
| Note on Accessing Address 00000h | 13 |
| Note on Differences between the Actual MCU and Emulator | 14 |
| Note on Instructions that Access the Single-step Interrupt Vector Area | 14 |

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 Installation:



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

Warnings for Use Environment:



- The emulation pod is air-cooled with the ventilation slot. Therefore, do not block the ventilation slot. When heated to high temperatures, the emulation pod may not work properly.
- 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

Caution to Be Taken for Modifying This Product:



- Do not disassemble or modify this product. Disassembling or modifying this product can cause damage. Disassembling and modifying the product will void your warranty.

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 the emulation pod main unit by the flexible cable (FLX120-RPD) for connecting to the emulator main unit or the flexible cable (FLX64, FLX100 or FLX160) for connecting the target system. The cable may cause a break.
- Flexible cable (FLX120-RPD) for connecting to the emulator main unit and the flexible cable (FLX64, FLX100 or FLX160) for connecting the target system are different from earlier models. The slits make them more flexible. However, excessive flexing or force may break conductors.
- 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.

Cautions to Be Taken for Turning On 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.
- Do not leave either the emulator or target system powered on, because of leakage current the internal circuits may be damaged.
- When turning on the power again after shutting off the power, wait about 10 seconds.

IMPORTANT

Note on Malfunctions in the PC4701 System:

- If the emulator malfunctions because of interference like external noise, do the following to remedy the trouble.
 - (1) Press the RESET button 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.

Notes on Downloading Firmware:

- Before using this product for the first time, it is necessary to download the dedicated firmware (control software for the emulation pod built into the PC4701). Please note that, to do this, it is necessary to start up the PC4701 in the maintenance mode. For firmware download procedures, see "4.2 Downloading Firmware" (page 34). 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.
- Be sure to disconnect the target system before downloading the firmware.

Notes on the Self-check:

- If the self-check does not result normally (except target status errors), the product may be damaged. Then, contact your local distributor.
- Be sure to disconnect the target system before executing the self-check. For details on the self-check, see "4.3 Self-check" on page 35.

Note on Quitting the Emulator Debugger:

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

Notes on Power Supply to Target System:

- Pin Vcc 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.
- Keep target system power supply voltage within the MCU's specified range.
- Do not change the voltage of the target system after turning on the power.
- Before powering on your emulator system, check that the host machine, the emulator main unit, the converter board and target system are all connected correctly. Next, turn on the power to each equipment following the procedure below.
 - (1) Turn ON/OFF the target system and the PC4701 emulator as simultaneously as possible.
 - (2) When the PC4701 and emulator debugger start up, check the target status LEDs on the emulator main unit's front panel to see if this product is ready to operate.
 - Is the power supplied? Check that target status LED (POWER) is ON.
For details, see "Chapter 4. Usage" (page 31).

IMPORTANT

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 emulation pod 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.
- It is necessary to use an oscillator circuit board with this product.

Note on Version of Emulator Debugger:

- Be sure to use the emulator debugger M3T-PD30 V.8.20 Release 1 or later.

Note on Making the MCU File:

- To debug an MCU which has any other size of memory (SFR, ROM, RAM), be sure to make an MCU file for it. For details on making the MCU file, see "2.4 (1) Making the MCU File" on page 18. For memory maps of each MCU, refer to the datasheet of the MCU.

Notes on Setting the Work Area When Starting Up the Emulator Debugger:

- With this product, the emulator uses 32 bytes as a work area in emulation memory. Set the work area address at 8000h.
- The top address of the work area should be an even-numbered address.
- Set the work area as MAP=INT.

For example, if the work area is set at 8000h, the emulator uses 32-byte area of 8000h to 801Fh.

Note on Stack Area:

- With this product, a maximum 7 bytes of the user stack is consumed. Therefore, ensure the +7 bytes maximum capacity used by the user program as the user stack 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 a work area. Using areas like this is a cause of user program crashes and destabilized emulator control.

Notes on MAP References and Settings:

- For details on referencing and setting MAP information, see the user's manual of emulator debugger M3T-PD30.
- The initial map settings of this product are as shown below. Use this product with the initial settings.

00000h--003FFh: "EXT"
00400h--FFFFFFh: "INT"

IMPORTANT

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 PC4701's front panel is lit).

Note on Operation When Not Executing the User Program:

- With this product, bit 7 of processor mode register 1 (wait bit PM17) is forcibly set to "1" (with wait) when the user program is not executed (e.g. when the program is stopped or when run-time debugging is being performed). Therefore, if the external area set to 0 wait is accessed by other than the user program (such as debugging operation), one wait is inserted. However, when wait bit PM17 is referenced by the dump window etc. the value set during user program execution is displayed.

Notes on Maskable Interrupts:

- Even if a user program is not being executed (including when run-time debugging is being performed), the evaluation MCU keeps running so as to control the emulation probe. Therefore, timers and other components do not stop running.

If a maskable interrupt is requested when the user program is not being executed (including when run-time debugging is being performed), the maskable interrupt request cannot be accepted, because the emulator disables interrupts. The interrupt request is accepted immediately after the user program execution is started.

- Take note that when the user program is not being executed (including when run-time debugging is being performed), a peripheral I/O interruption is not accepted.

Notes on Address-Match Interrupt:

- To debug address-match interrupts, set a software breaks or hardware break at the top address of the address-match interrupt process. If you set a software breaks or hardware break at an address where an address-match interrupt occurs, the program will run out of control.
- When an address at which an address-match interrupt occurs is executed in one-step mode, the program stops after executing the first instruction after returning from the address-match interrupt processing.

Note on BRK Instruction and BRK Instruction Interruption:

- With this emulator system, BRK instructions and BRK instruction interruptions are exclusively used for software break functions. Therefore, you can not use them for your program.

IMPORTANT

Notes on Software Breaks and Hardware Breaks:

- The software break is a debugging function which breaks a program immediately before the system executes an instruction at a specified address. The instruction at the preset address will not be executed.
- The hardware break is a debugging function which breaks a program by setting the detection of an execution of an instruction at a specified address as a break event. The program will break after the instruction at the specified address is executed.
- The software break generates BRK interrupts by substituting the proper instruction to the BRK instruction. Therefore, when referencing the result of a trace in bus mode, "00h" is displayed for the instruction fetch address where a software break is set, and when referencing in disassemble mode, "BRK" instruction is displayed.
- It is not possible to use a software break and a hardware break at the same time. If doing so, it may not operate normally.
- In the area where the MAP setting is EXTERNAL, software breaks cannot be used.

Note on Stop and Wait Modes:

- Do not perform step execution at addresses in the stop or wait mode. It may cause communication errors.

Notes on Watchdog Function:

- The MCU's watchdog timer can be used only while programs are being executed. To use it otherwise, disable the timer.
- If the reset circuit of the target system has a watchdog timer, disable it when using the emulator.

Note on Accessing Address 00000h:

- With the M16C/10 Series MCUs, when a maskable interrupt is generated, the interrupt data (interrupt No. and interrupt request level) stored in address 00000h is read out. Also, the interrupt request bit is cleared when address 00000h is read out. Consequently, when the address 00000h readout instruction is executed or when address 00000h is read out in the cause of a program runaway, a malfunction occurs in that the interrupt is not executed despite the interrupt request, because the request bit of the highest priority interrupt factor enabled is cleared.

For this malfunction, when the reading out to the 00000h address is generated excluding the interrupt, the yellow LED lights up to alarm. When this LED lights, there is a possibility of wrong access, therefore check the program. This LED is turned off by the RESET switch of the emulator main unit.

IMPORTANT

Note on Differences between the Actual MCU and Emulator:

- Operations of the emulator system differ from those of actual MCUs as listed below.

(1) Reset condition

Set the rise time ($0.2 V_{CC} = 0.8 V_{CC}$) to 1 μ s or less.

(2) Initial values of internal resource data at power-on

(3) Internal memories (ROM and RAM) capacities, etc.

With this emulator system, "INT" (emulation memory ON) is the default for mapping areas other than the SFR area (addresses 000h--3FFh). For this reason, the emulation memories can be read and written into in an area other than the SFR, internal RAM or internal ROM area.

(4) Oscillator circuit

- Make note of the fact that in the oscillator circuit where an oscillator is connected between pins X_{IN} and X_{OUT}, 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}).

- For notes on when using the oscillator circuit on the target system, refer to "3.2 (2) Using the Oscillator Circuit on the Target System" (page 24).

(5) DBC, single-step and BRK instruction interrupt vector table addresses

It is possible to download to DBC, single-step and BRK instruction interrupt vector table addresses. However, because the emulator system uses these areas, data different from the expected value is read out (see Table 1.1).

Table 1.1 Vector table addresses for the emulator

| Factor to interrupt | Vector table addresses | Data for reading |
|---------------------|------------------------|------------------|
| DBC*1 | FFFF4h--FFFF7h | Indefinite |
| Single-step*1 | FFFECh--FFFEFh | Indefinite |
| BRK instruction | FFFE4h--FFFE7h | Indefinite |

*1: Interrupts used for the debugger only

(6) A-D conversion

The characteristics of A-D converter differ from those of an actual MCU because there are a flexible cable, pitch converter and other devices between the evaluation MCU and the target system. Make the final evaluation of the A-D converter with the actual MCU.

(7) D-A conversion

The characteristics of D-A converter differ from those of an actual MCU because there are a flexible cable, pitch converter and other devices between the evaluation MCU and the target system. Make the final evaluation of the D-A converter with the actual MCU.

Note on Instructions that Access the Single-step Interrupt Vector Area:

- Do not perform the below debugging operations with the single step interrupt vector area (addresses FFFECh--FFFEFh).

(1) Step execution of instructions that access the single step interrupt vector area

(2) Program execution from the instruction accessing the single step interrupt vector area when a software breakpoint is set at the instruction

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 Package Components | 16 |
| 2.2 Other Tool Products Required for Development | 16 |
| 2.3 Name of Each Part | 17 |
| (1) System Configuration | 17 |
| 2.4 When Using the Emulator for the First Time | 18 |
| (1) Making the MCU File | 18 |
| (2) Setting the Work Area | 18 |
| (3) Downloading Firmware | 19 |
| (4) Self-check | 19 |

Chapter 2. Preparation

2.1 Package Components

The M30100T3-RPD-E package consists of the following items. When unpacking, check to see if your M30100T3-RPD-E contains all of these items.

Table 2.1 Package components

| Item | Quantity |
|--|----------|
| M30100T3-RPD-E emulation pod main unit | 1 |
| FLX120-RPD flexible cable for connecting PC4701 | 1 |
| OSC-3 16MHz oscillator circuit board for main-clock (preinstalled) | 1 |
| OSC-2 oscillator circuit board (bare-board) | 1 |
| Hardware tool user registration FAX sheet (English) | 1 |
| Hardware tool user registration FAX sheet (Japanese) | 1 |
| M30100T3-RPD-E supplementary document (English) | 1 |
| M30100T3-RPD-E supplementary document (Japanese) | 1 |
| M30100T3-RPD-E user's manual (this manual) | 1 |
| M30100T3-RPD-E user's manual (Japanese) | 1 |

Please keep the M30100T3-RPD-E'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 the M30100T3-RPD-E.

If any of these items are missing or found faulty, please contact your local distributor. Also, if there is any question or doubt about the packaged product, contact your local distributor.

2.2 Other Tool Products Required for Development

To bring forward programs development on the M16C/10 Series MCUs, the products listed below are necessary in addition to those contained package above. Get them separately.

Table 2.2 Other tool products

| | |
|-----------------------|--|
| Emulator main unit | PC4701 (excluding PC4700L and PC4701L) |
| Emulator debugger | M3T-PD30 V.8.20 Release 1 or later |
| Pod probe | M301xxT-PRB |
| Pitch converter board | Required according to the MCU package |

* "x" denotes a number.

* To purchase these products, contact your local distributor.

2.3 Name of Each Part

(1) System Configuration

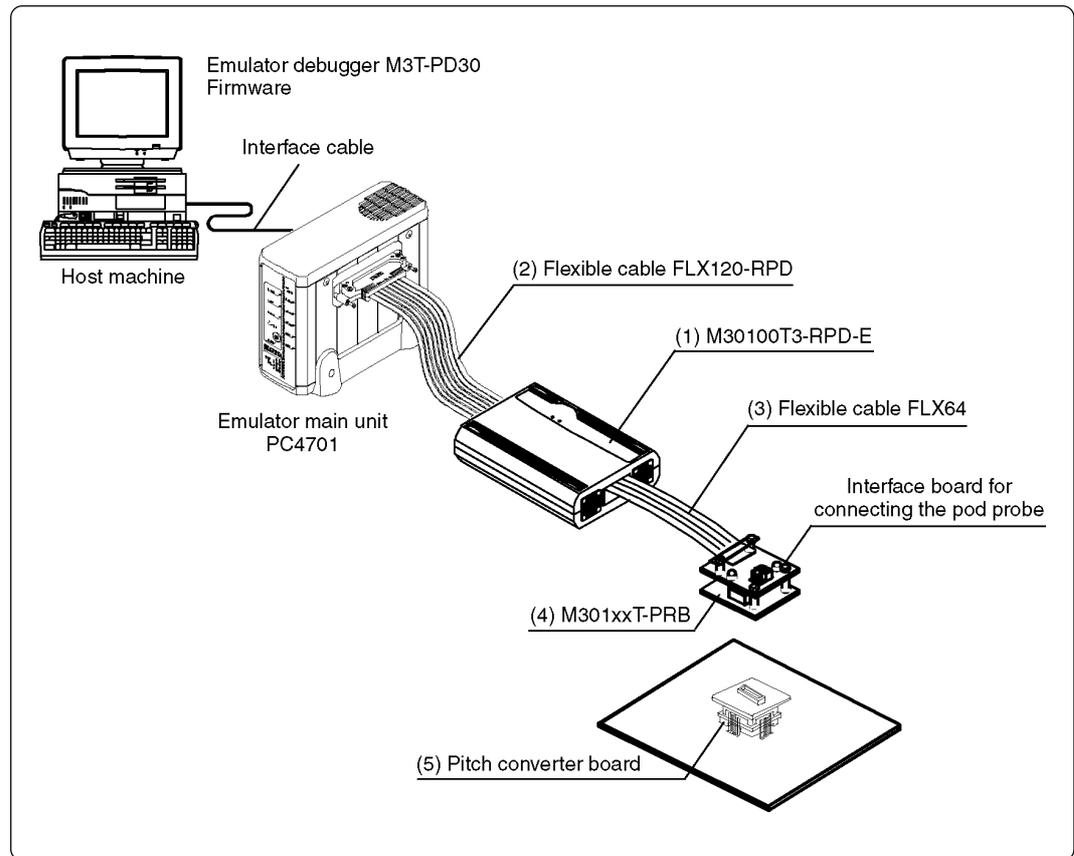


Figure 2.1 System configuration

(1) to (3) in Figure 2.1 are included in this product package.

(1) Emulation pod main unit M30100T3-RPD-E

This emulation pod contains emulation memory and circuit to feature the debugging functions.

(2) Flexible cable FLX120-RPD

This 120-pin flexible cable connects the PC4701 emulator and the emulation pod.

(3) Flexible cable FLX64

This 64-pin flexible cable connects the emulation pod and the pod probe.

(4) Pod probe

An evaluation MCU is mounted on it.

(5) Pitch converter board

This is a pitch converter board for connecting to the target system.
For details, refer to the user's manual of the pod probe.

2.4 When Using the Emulator for the First Time

(1) Making the MCU File

It is necessary to make an MCU file to use this product with the emulator debugger M3T-PD30. According to the MCU you use, change the contents of the MCU file. Make the MCU file following the description below using a text editor and store it in the "mcufiles" folder in the directory where the emulator debugger is installed.

The MCU file contains information such as, SFR area, internal RAM area, internal ROM area, firmware file name. The contents of the MCU file when using the M16C/1N Group (3KB RAM, 64KB ROM) are as follows:

| | | | |
|---------|---|--|---------------|
| 0 | : | SFR area | Start address |
| 3FF | : | | End address |
| 400 | : | Internal RAM | Start address |
| FFF | : | | End address |
| F0000 | : | Internal ROM | Start address |
| FFFFF | : | | End address |
| M30620P | : | Name of firmware (Do not change.) | |
| 0 | : | Expansion No. M3T-PD30 V.4.00 or later required (Do not change.) | |

Note that the seventh line is "M30620B" for M30100T-RPD-E but "M30620P" for M30100T3-RPD-E.

(2) Setting the Work Area

With this product, the emulator uses 32 bytes as a work area in emulation memory. Set the work area address at 8000h.

The area used as a work area (32 bytes) is specified in the F/W and Work Area tab of the INIT dialog box of the emulator debugger M3T-PD30. And set the work area as MAP=INT.

(3) Downloading Firmware

If you have purchased this emulation pod newly, it is necessary to download the firmware. The download procedure is given in Figure 2.2.

Before attempting to download the firmware, check the emulator debugger is installed and the emulator is connected to the host machine. For more information, see each user's manual of the emulator debugger and the PC4701.

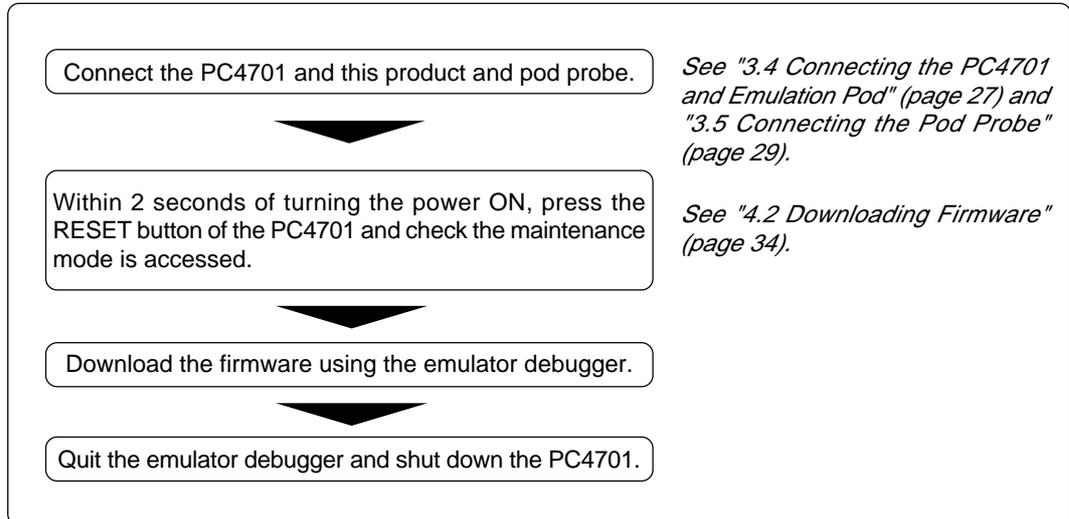


Figure 2.2 Firmware download procedure when using the emulator for the first time

(4) Self-check

To confirm that your emulation pod works properly, execute the self-check after downloading the firmware. The self-check procedure is given in Figure 2.3.

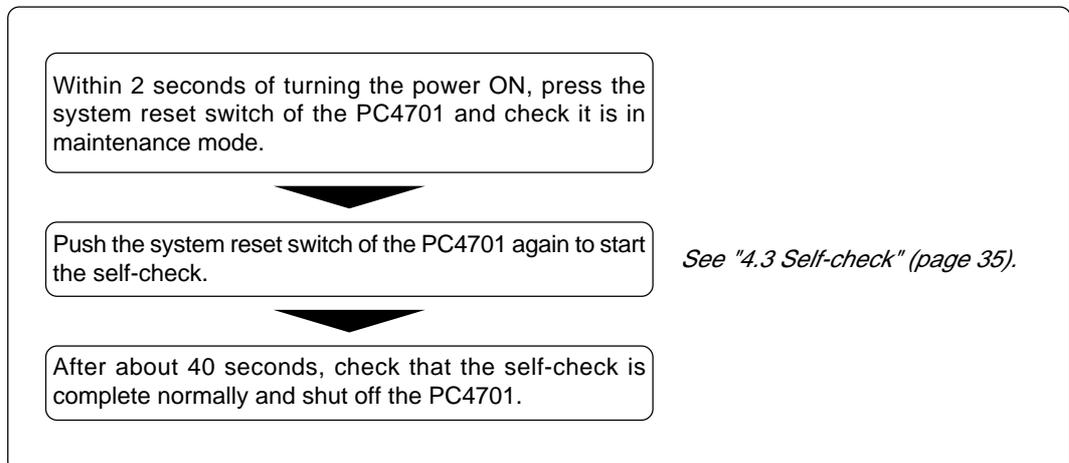


Figure 2.3 Self-check procedure

MEMO

Chapter 3. Setting Up

This chapter describes switch settings required for using this product and how to connect this product to the PC4701 and the target system.

| | |
|--|----|
| 3.1 Removing and Closing the Upper Cover..... | 22 |
| 3.2 Selecting Clock Supply and Replacing Oscillator Circuit Boards | 23 |
| (1) Clock Supply to the MCU | 23 |
| (2) Using the Oscillator Circuit on the Target System | 24 |
| (3) Changing the Internal Oscillator Circuit of the Emulation Pod..... | 25 |
| (4) Replacing the Oscillator Circuit Boards | 26 |
| 3.3 Jumper Switches JP1 and JP2 on the M30100T-PRT Board | 27 |
| 3.4 Connecting the PC4701 and Emulation Pod | 27 |
| (1) Connecting the Cable to the PC4701 | 27 |
| (2) Connecting the Cable to the Emulation Pod | 28 |
| 3.5 Connecting the Pod Probe | 29 |

Chapter 3. Setting Up

To use this emulation pod with your application system, it is necessary to make a setting as follows. Change the setting after removing the upper cover.

- Change the oscillation frequency in the emulation pod.

3.1 Removing and Closing the Upper Cover

- (1) To open the upper cover, remove the four screws of both sides of this product and lift off the upper cover (see Figure 3.1).
- (2) To close the upper cover, attach the upper cover and secure the four screws of both sides of this product.

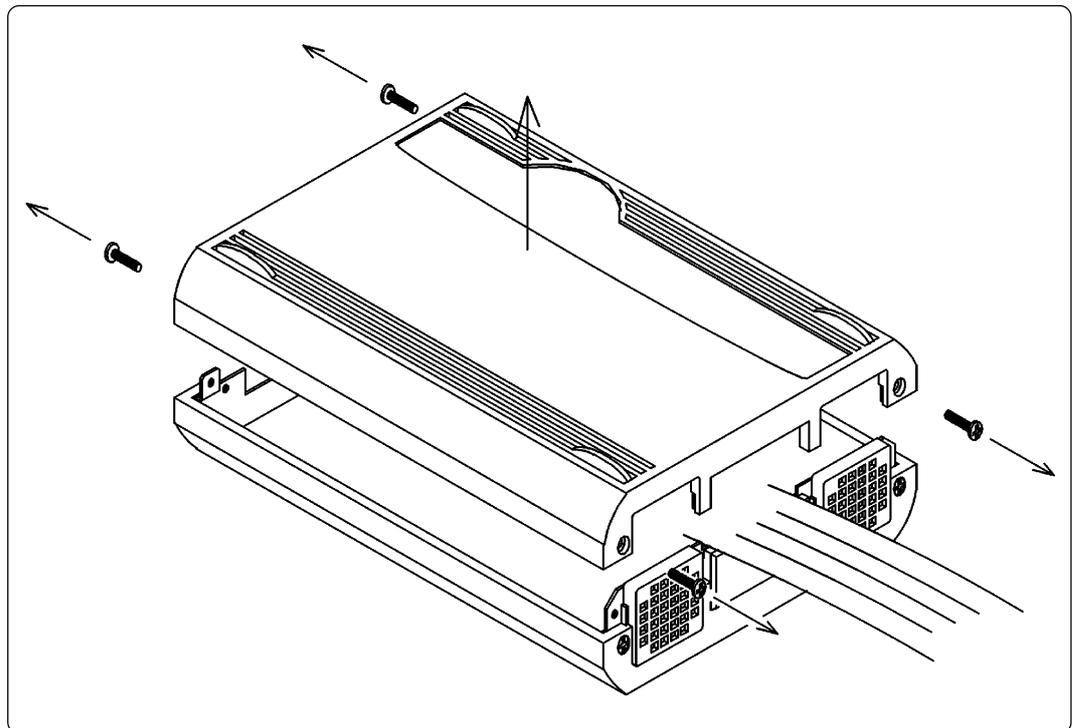


Figure 3.1 Removing the upper cover

CAUTION

When Removing and Closing the Upper Cover:

- Always shut OFF power when removing the upper cover or setting the switches.
- Do not touch the connector pins of the emulator main unit and pod probe. Static electricity may damage the internal circuits.

3.2 Selecting Clock Supply and Replacing Oscillator Circuit Boards

(1) Clock Supply to the MCU

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

Table 3.1 Clock supply to the MCU

| Clock | Description | Display of emulator debugger | Factory-setting |
|-------------------------------------|--|------------------------------|-----------------|
| X _{IN} -X _{OUT} | Internal oscillator circuit of emulation pod (OSC-3: 16 MHz) | Internal | Yes |
| | Target system | External | - |
| X _{CIN} -X _{COUT} | Internal oscillator circuit of emulation pod (32.768 KHz) | Internal | - |
| | Target system | External | Yes |

IMPORTANT

Notes on Changing the Clock Supply:

- For pins X_{CIN}-X_{COUT}, it is necessary to set the switches on the FLX64-PRB board. For details, refer to the user's manual of pod probe.

(2) Using the Oscillator Circuit on the Target System

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 pin X_{IN} . And pin X_{OUT} should be open.

To use the external clock on the target system, set in the Init dialog box of the emulator debugger or by the CLK command on the script window. (For details, refer to the emulator debugger user's manual.)

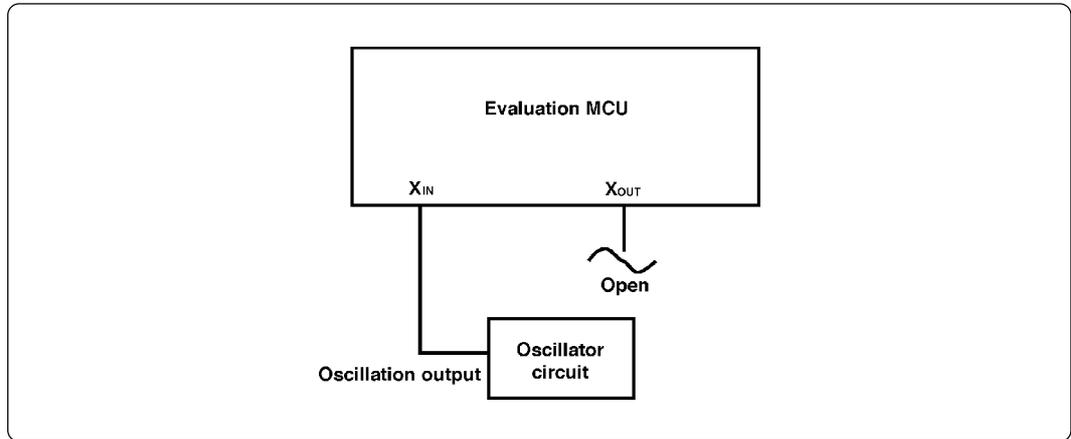


Figure 3.2 External oscillator circuit

Make note that in the oscillator circuit shown in Figure 3.3 where a resonator is connected between pins X_{IN} and X_{OUT} , oscillation does not occur because a converter board 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}).

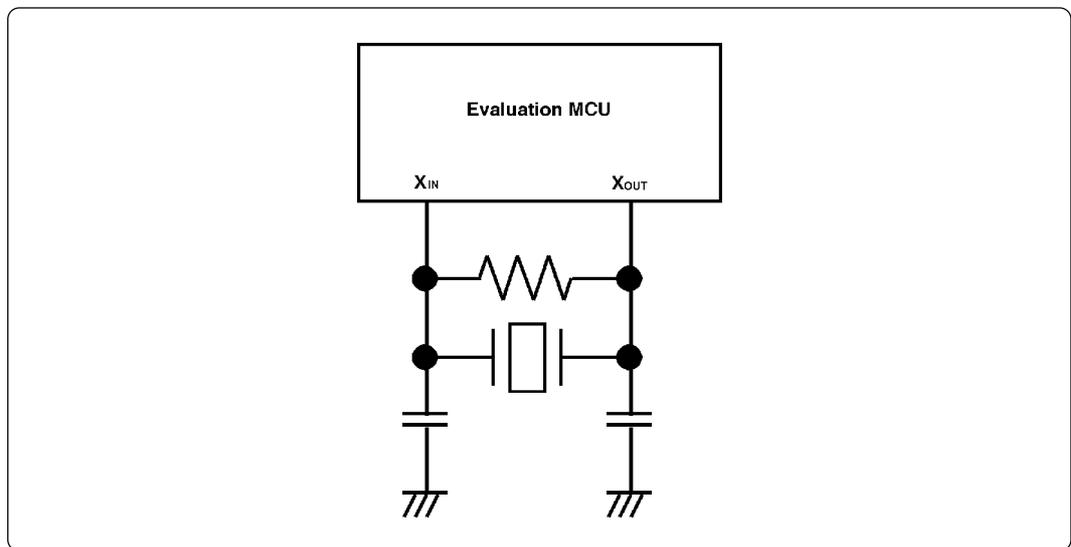


Figure 3.3 Circuit in which oscillation does not occur (same for X_{CIN} - X_{COUT})

(3) Changing the Internal Oscillator Circuit of the Emulation Pod

An oscillator circuit board (OSC-3) for 16 MHz is mounted on this product. To use the emulation pod at a frequency other than 16 MHz, build the desired oscillator circuit on the included OSC-2 oscillator circuit board (bare board) and replace the board installed in the emulation pod 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.

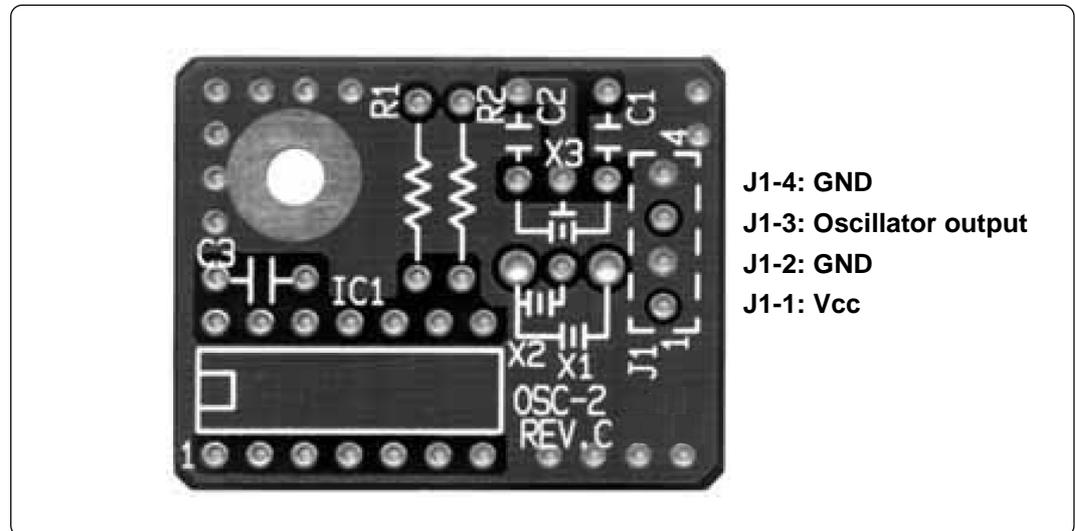


Figure 3.4 External view of the oscillator board (OSC-2) and connector pin assignments

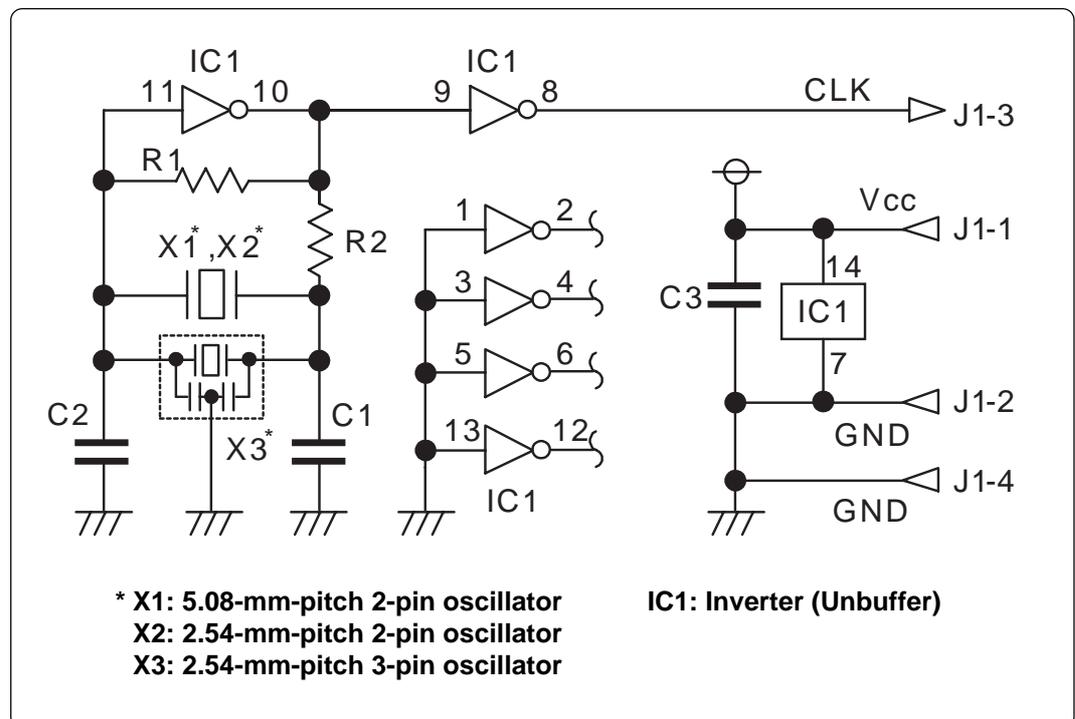


Figure 3.5 Circuit of the oscillator board (OSC-2)

(4) Replacing the Oscillator Circuit Boards

Figure 3.6 shows how to replace the oscillator circuit boards.

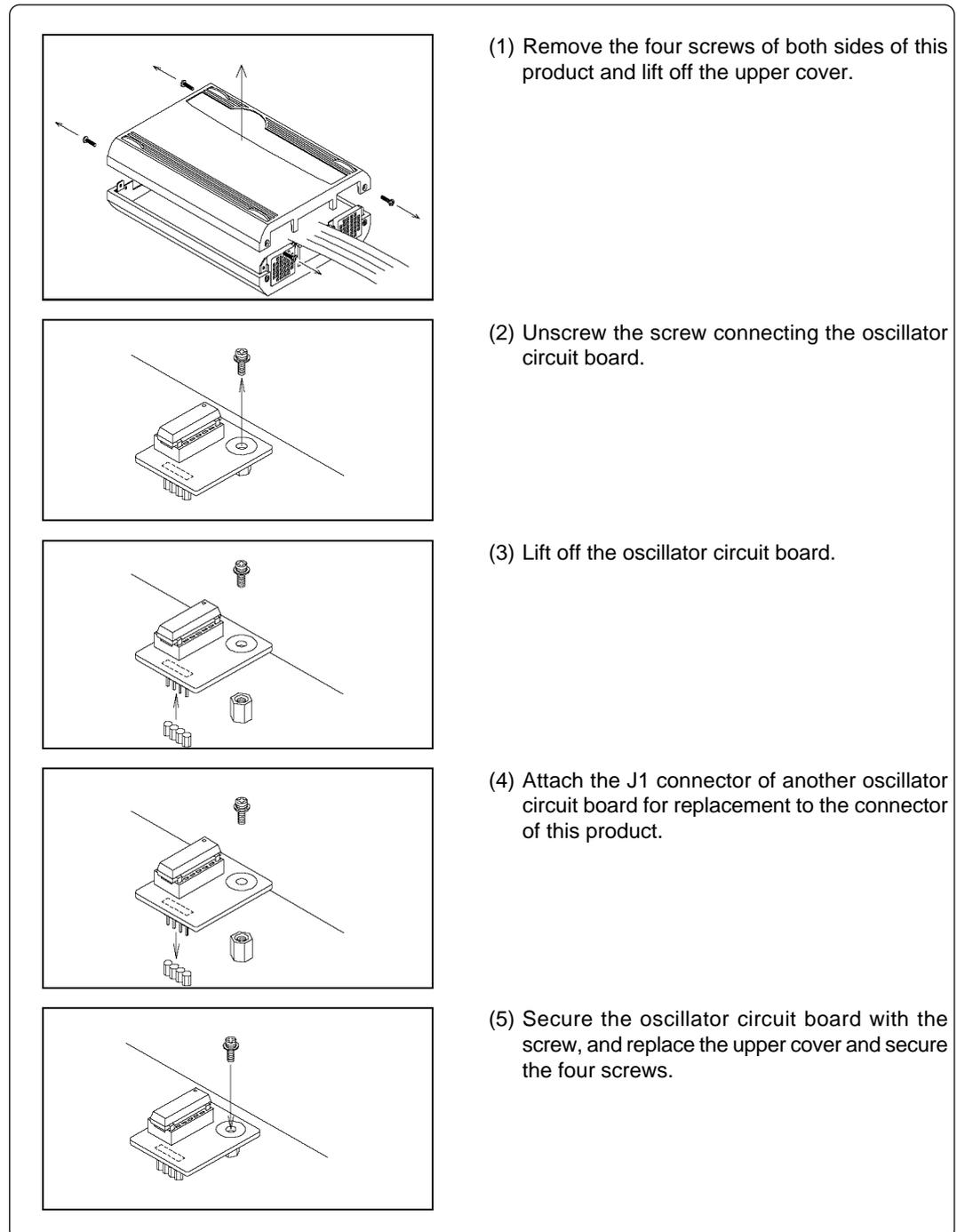


Figure 3.6 Replacing the oscillator circuit boards

CAUTION

When Removing and Closing the Upper Cover:

- Always shut OFF power when removing the upper cover or setting the switches.

3.3 Jumper Switches JP1 and JP2 on the M30100T-PRT Board

The jumper switches JP1 and JP2 on the M30100T-PRT board are set to "CSP" side and "Ons" side respectively when shipped from factory. When there is no instruction in the user's manual of your pod probe, set these switch to the default.

⚠ CAUTION

Note on Setting Switches:

- Always shut OFF power when changing the settings of the jumper switches.

3.4 Connecting the PC4701 and Emulation Pod

To connect the emulation pod to the PC4701, use the FLX120-RPD 120-pin flexible cable included in this product package.

(1) Connecting the Cable to the PC4701

Figure 3.7 shows how to connect the PC4701 and FLX120-RPD. To connect the FLX120-RPD, be sure to hold the both sides of the PC4701 side connector horizontally with the "UPSIDE" facing up. Then secure with screws.

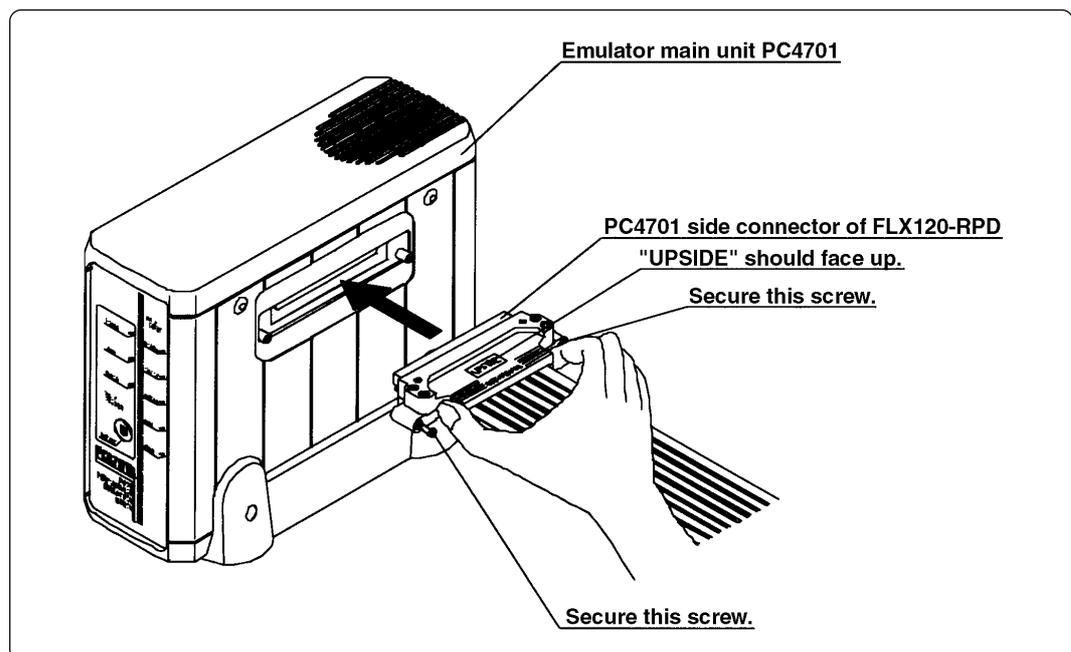


Figure 3.7 Connecting the PC4701 and FLX120-RPD

⚠ CAUTION

Note on Connecting the Cable:

- Before connecting the FLX120-RPD, always shut OFF power before connecting the cable. The power ON state could destroy internal circuits.

Note on Securing the Screws:

- After connecting the emulator main unit to the FLX120-RPD, be sure to secure the screws.

(2) Connecting the Cable to the Emulation Pod

Figure 3.8 shows how to connect the FLX120-RPD and the emulation pod.

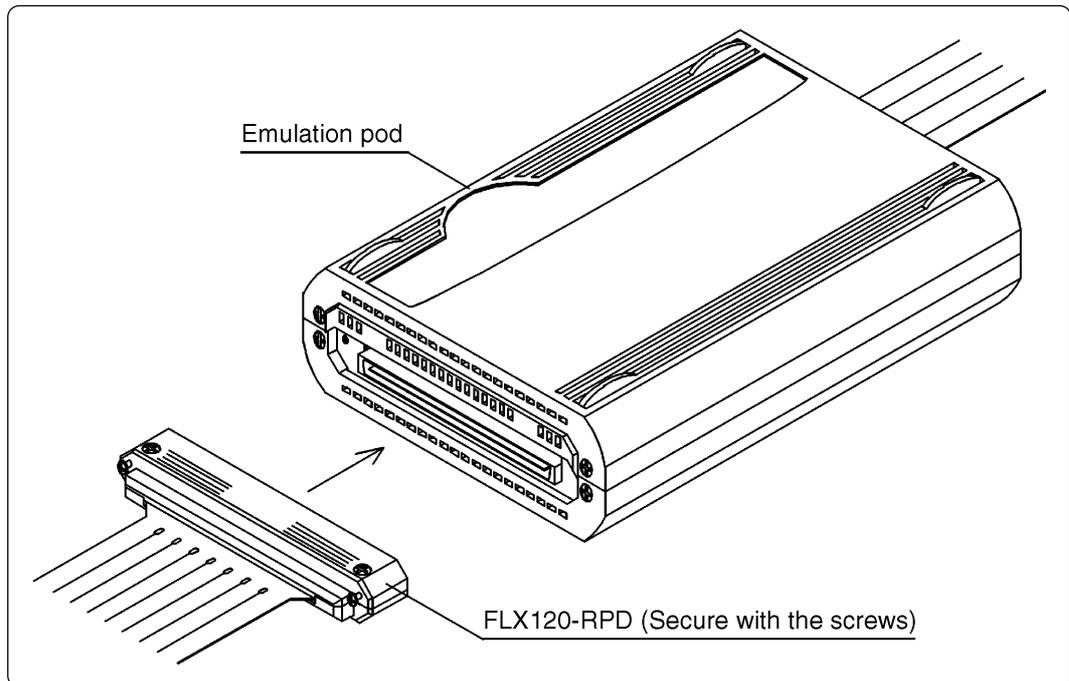


Figure 3.8 Connecting the emulation pod and FLX120-RPD

CAUTION

Note on Connecting the Cable:

- Always shut OFF power before connecting the cable. The power ON state could destroy internal circuits.

Note on Securing the Screws:

- After connecting the emulation pod to the cable, be sure to secure the screws.

3.5 Connecting the Pod Probe

The emulation pod for the M16C/10 Series MCUs consists of the two products, the M30100T3-RPD-E emulation pod main unit and the M301xxT-PRB pod probe ("x" denotes number). Figures 3.9 and 3.10 show how to connect the M301xxT-PRB and how to remove it, respectively.

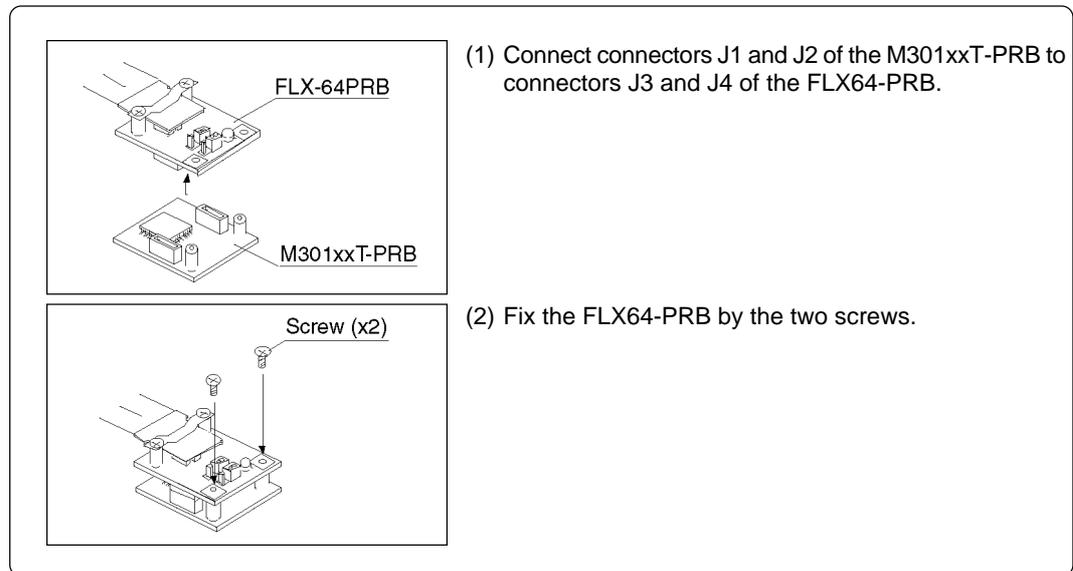


Figure 3.9 Connecting pod probe M301xxT-PRB

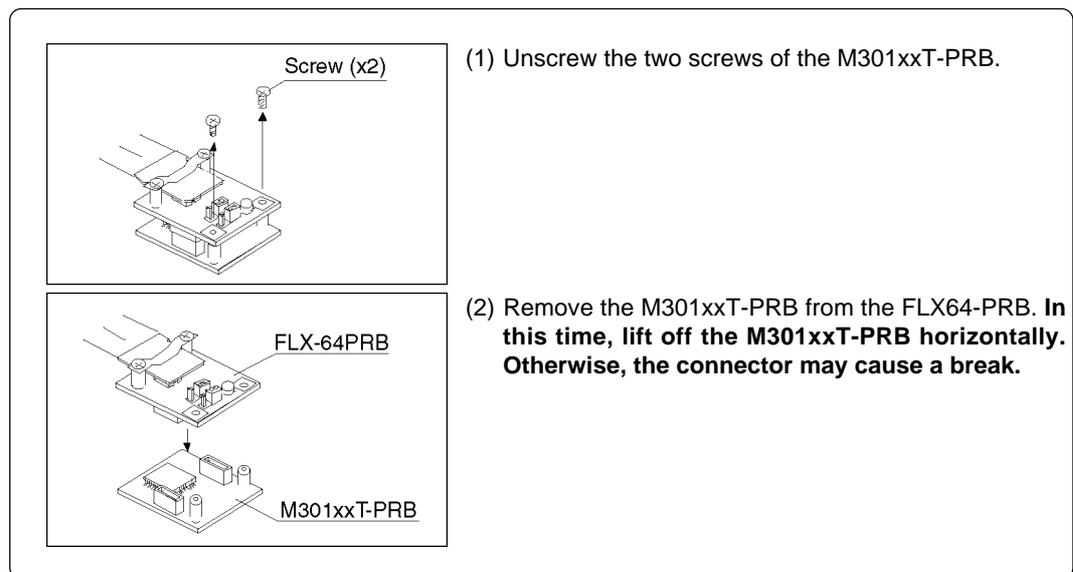


Figure 3.10 Removing pod probe M301xxT-PRB

CAUTION

When Connecting the Pod Probe:

- Be sure to turn off the power before making connections. Otherwise, the internal circuits may be damaged.
- The small connectors of the M301xxT-PRB (J1 and J2) and FLX64-PRB (J3 and J4) are guaranteed for only 50 insertion/removal iterations.

MEMO

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 Supply | 32 |
| (1) Checking Connections of the Emulator System | 32 |
| (2) Turning On the Power | 32 |
| (3) LED Display When the PC4701 Starts Up Normally | 33 |
| 4.2 Downloading Firmware | 34 |
| (1) When It is Necessary to Download Firmware | 34 |
| (2) Downloading Firmware in Maintenance Mode | 34 |
| 4.3 Self-check | 35 |
| (1) Self-check Procedure | 35 |
| (2) If an Error is Detected in the Self-check | 35 |

Chapter 4. Usage

4.1 Turning On the Power Supply

(1) Checking Connections of the Emulator System

Before turning the power ON, check the connections of the PC4701, emulation pod, pod probe, converter board and target system.

(2) Turning On 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.
- Do not leave either the emulator or target system powered on, because of leakage current the internal circuits may be damaged.
- When turning on the power again after shutting off the power, wait about 10 seconds.

CAUTION

Notes on Power Supply:

- The emulator's pin V_{CC} 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 (2.7 to 5.5 V).
- Do not change target system power supply voltage after power has been activated.

(3) LED Display When the PC4701 Starts Up Normally

After the emulator starts up, check the status of the LEDs on the front panel to see whether emulation pod operation is enabled or not. Figure 4.1 shows front panel LED lighting status when the emulator is turned ON.

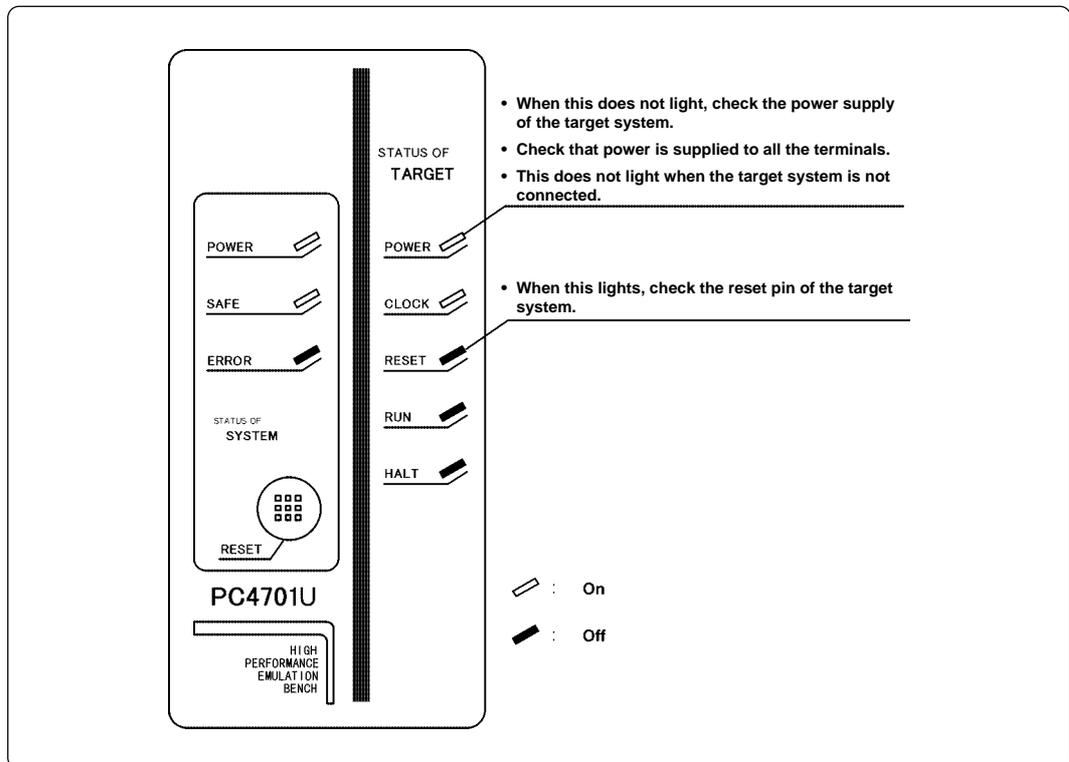


Figure 4.1 LED display when the power turned on

IMPORTANT

Note on the Target Status POWER LED:

- If the MCU has two or more Vcc terminals, the LED does not light unless power is supplied to all the terminals.

Note on CLOCK LED:

- If CLOCK LED does not turn on, check the following points:
 - Immediately after starting PC4701 (before starting the emulator debugger)
 - > Check if the oscillation circuit in the emulation pod oscillates normally.
 - After starting the emulator debugger (after setting the Init dialog box)
 - > Check the oscillation circuit selected 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 in the cases listed below. Normally, the following are automatically detected when the emulator debugger is started up, and the firmware is downloaded.

- (1) When you use this product for the first time
- (2) When the emulator debugger or firmware has been upgraded
- (3) When you use this product with a PC4701 which was used with another emulation probe before

If you use this product for the first time or have accidentally failed to download the firmware, redownload the firmware in maintenance mode.

(2) Downloading Firmware in Maintenance Mode

Download the firmware in maintenance mode as explained here following. Figure 4.2 shows LED display during firmware download. **The target system must not be connected when downloading the firmware.**

- (1) Within 2 seconds of activating power to the emulator, press the system reset switch on the emulator front panel to switch the emulator to maintenance mode. Then the system status SAFE LED will start blinking.
- (2) 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 depends on the connection of the interface.
 - USB and LPT interface about 20 seconds
 - Dedicated parallel interface about 30 seconds
 - Serial interface about 5 minutes

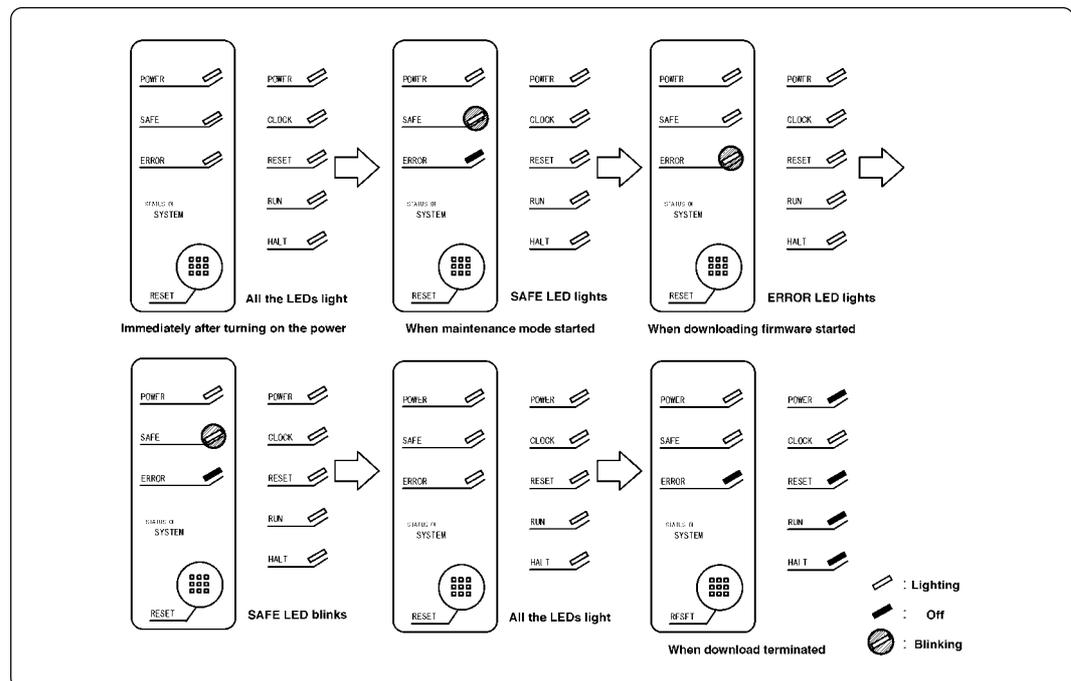


Figure 4.2 Downloading firmware in the maintenance mode

IMPORTANT

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 Self-check

(1) Self-check Procedure

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

- (1) Set the switches in the emulation pod to the factory settings as shown in Figure 4.3. If specified, set the switches according to your pod probe.
- (2) If the target system is connected, disconnect it.
- (3) Within 2 seconds of activating power to the emulator, press the system reset switch on the emulator front panel to switch the emulator to maintenance mode.
- (4) Check the SAFE LED starts blinking and then press the system reset switch again.
- (5) The self-check will start. If the normal result is displayed in about 40 seconds, the self-check has terminated normally.

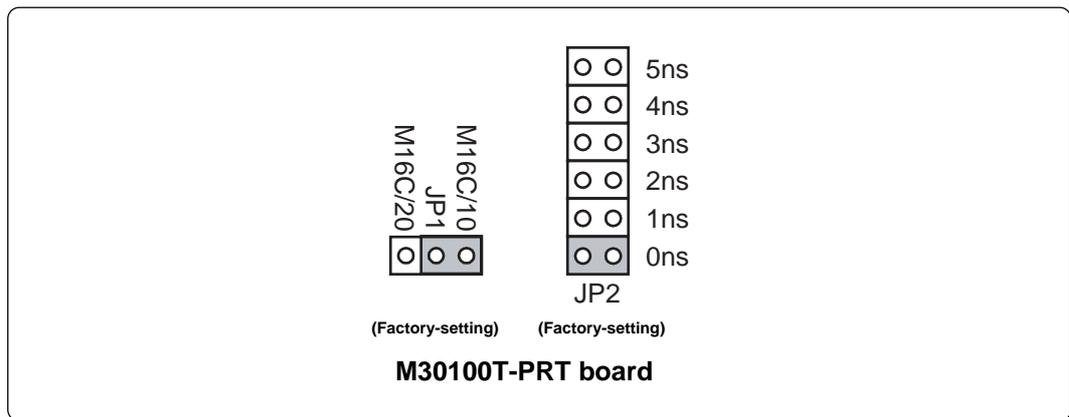


Figure 4.3 Switch settings (factory-settings) for the self-check

(2) If an Error is Detected in the Self-check

If the self-check does not result normally (system status error or target status error in Figure 4.4), check the following.

- Whether the emulation pod and PC4701 are connected properly
- Whether the proper firmware has been downloaded
- Whether the switch settings of this product are the factory settings (Figure 4.3). If specified, check whether the switches are set according to your pod probe.

IMPORTANT

Note on Self-check:

- If the self-check does not result normally (excluding target system error), the emulation pod may be damaged. Then contact your local distributor.

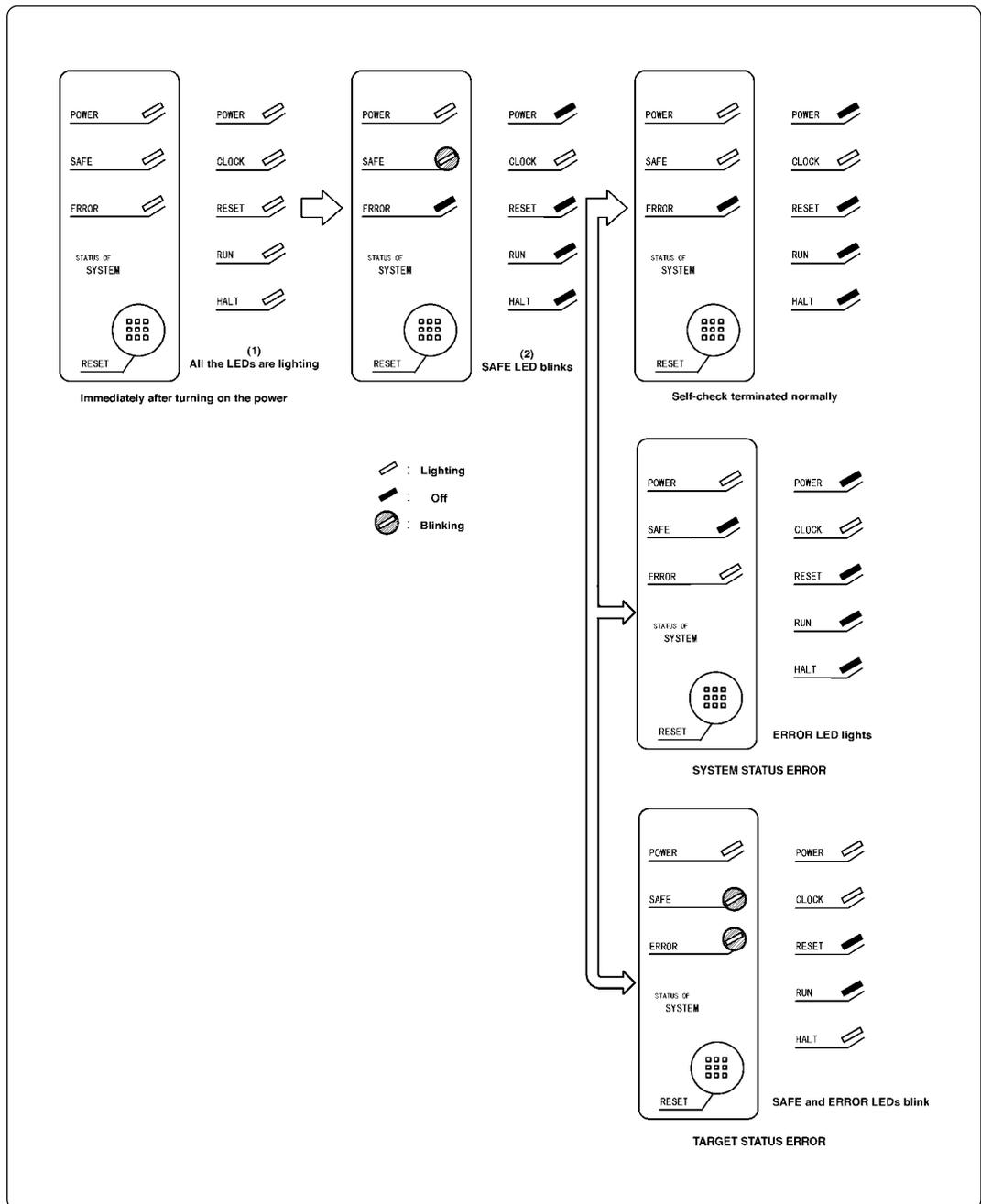


Figure 4.4 Self-check procedure

Chapter 5. Specifications

This chapter describes specifications of this product.

| | |
|--|----|
| 5.1 Specifications | 38 |
| 5.2 External Dimensions | 39 |
| (1) External Dimensions of the Emulation Pod | 39 |

Chapter 5. Specifications

5.1 Specifications

Table 5.1 lists the specifications of the M30100T3-RPD-E.

Table 5.1 Specifications of the M30100T3-RPD-E

| | | |
|--|---|--|
| Emulator | PC4701 (excluding PC4701L and PC4700L) | |
| Applicable MCUs | M16C/10 Series | |
| Usable mode | Single-chip mode | |
| Emulation memory | 1 MB | |
| Maximum operating frequency | 16 MHz | |
| Clock supply | X _{IN} -X _{OUT} | Internal oscillator circuit board (OSC-3) Switchable to external oscillator input |
| | X _{CIN} -X _{COU} T | Internal oscillator circuit Switchable to external oscillator input |
| Operating voltage | 2.7 to 5.5 V | |
| Operating temperature | 5 to 35°C (no dew) | |
| Storage temperature | -10 to 60°C (no dew) | |
| Power supply to emulation pod Connection to target system | Supplied from PC4701 | |
| Overseas standards | U.S. EMI standards (FCC part 15 Class A) CE marking (EN55022, EN55024) | |

5.2 External Dimensions

(1) External Dimensions of the Emulation Pod

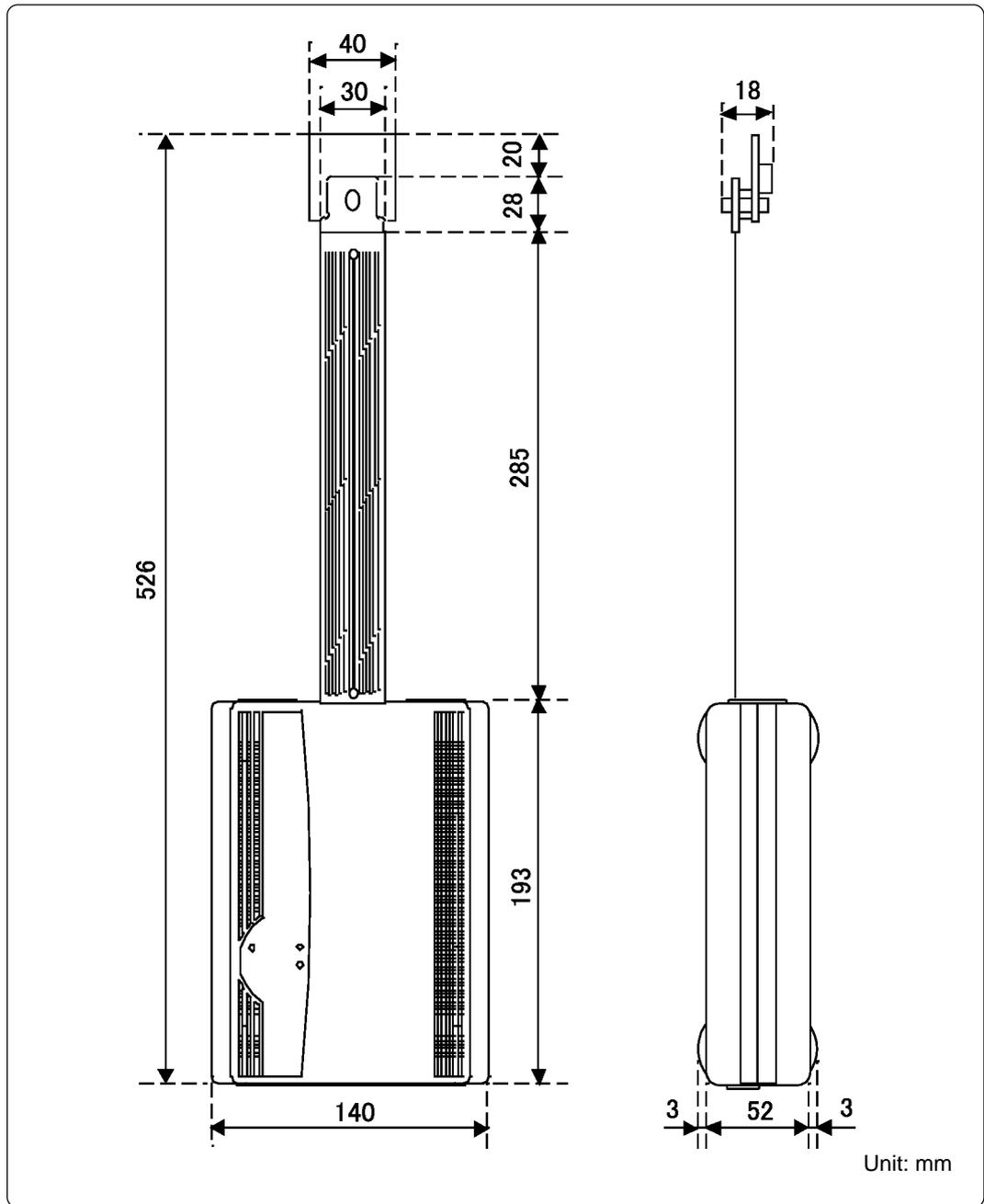


Figure 5.1 External dimensions of the emulation pod

MEMO

Chapter 6. Troubleshooting

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

| | | |
|-----|--|----|
| 6.1 | Flowchart to Remedy the Troubles | 42 |
| 6.2 | When the Emulator Debugger Does Not Start Up Properly | 43 |
| | (1) When the LED Display of PC4701 is Abnormal | 43 |
| | (2) Errors Occur When Starting Up the Emulator Debugger (When the target system is connected) | 44 |
| | (3) Errors Occur When Starting Up the Emulator Debugger (When the target system is not connected) | 45 |
| 6.3 | Operation Differs from That of Actual MCUs | 45 |
| | (1) Cannot Reset from the Target System | 45 |
| | (2) Data Values of RAM Area at Power-on are Different | 45 |
| | (3) When the A-D and D-A Conversion Values are Different from Expected Values | 45 |
| 6.4 | How to Request for Support | 46 |

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 following URL.

http://www.renesas.com/eng/products/mpumcu/toolhp/faq/m16c/m16c_e.htm

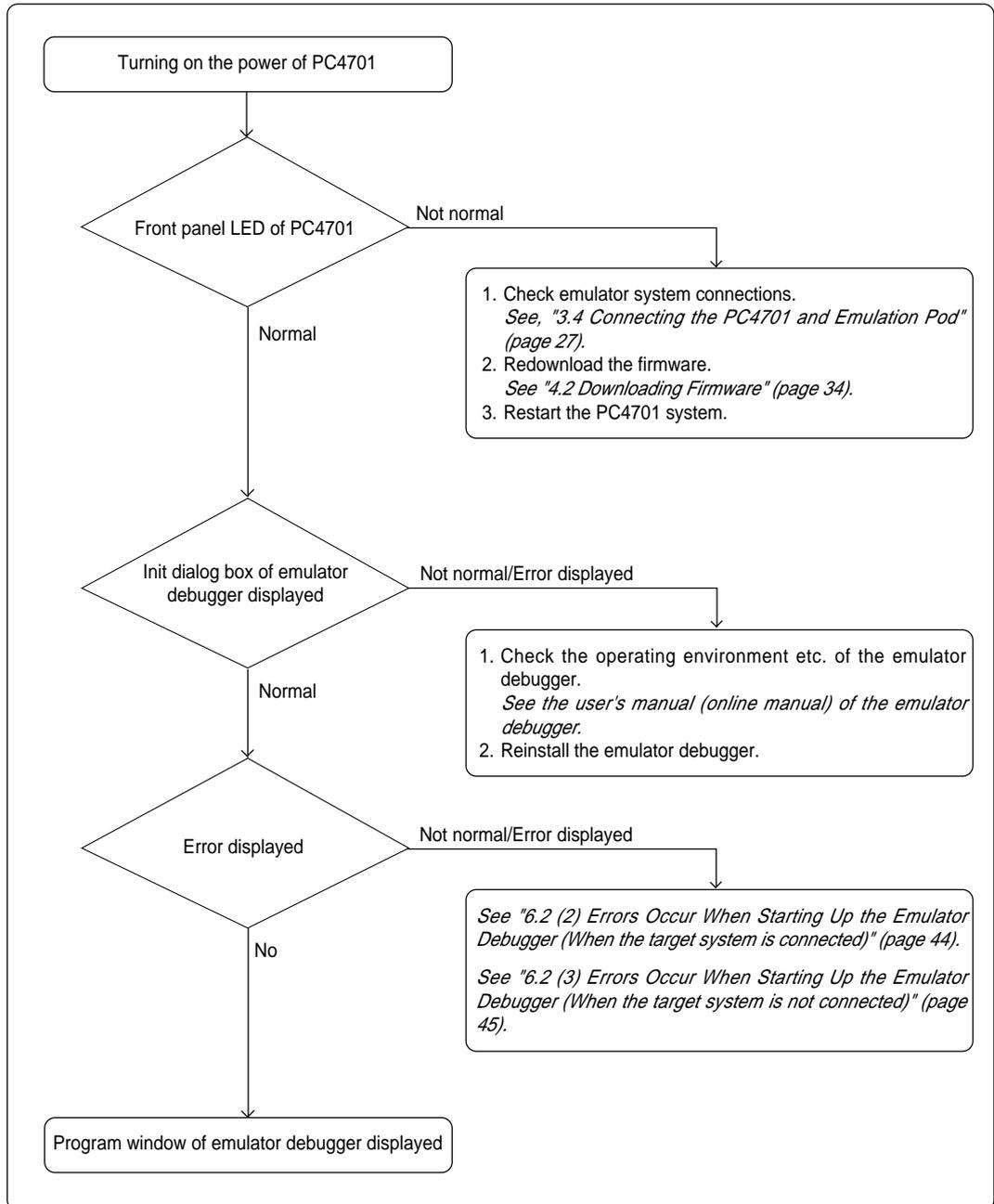


Figure 6.1 Flowchart to remedy the troubles

6.2 When the Emulator Debugger Does Not Start Up Properly

(1) When the LED Display of PC4701 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 that the power cable is connected to the PC4701. <i>See the PC4701 User's Manual.</i> |
| All LEDs remain lit. | - | (1) Recheck that the connection between the PC4701 and this product. <i>See "3.4 Connecting the PC4701 and Emulation Pod" (page 27).</i> (2) Recheck that the connection between the PC4701 and the M30100T3-RPD-E. <i>See "3.5 Connecting the Pod Probe (page 29).</i> |
| The POWER LED of "STATUS OF TARGET" does not light up. | Connected | Check that 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. | Disconnected | (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 that the oscillation circuit in the M30100T3-RPD-E is oscillating. <i>See "3.2 Selecting Clock Supply and Replacing Oscillator Circuit Boards (page 23).</i> |
| | Connected | (1) Check that the oscillation circuit in the target system is oscillating properly. (2) Check that the switches of the pod probe interface board are correctly set. <i>See the user's manual of pod probe.</i> |
| The RESET LED of "STATUS OF TARGET" does not go out. | Connected | Check that the reset pin of the target system is pulled up. |

**(2) Errors Occur When Starting Up the Emulator Debugger
(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. Can't send data. | Check that all emulator debugger settings, interface cable connections and switches on the rear of the PC4701 match. <i>See the user's manuals of the PC4701 and emulator debugger.</i> |
| Target system is not constructed properly. | (1) Download the proper firmware. <i>See the user's manual of the emulator debugger.</i> (2) Recheck that the connection between the PC4701 and this product. <i>See "3.4 Connecting the PC4701 and Emulation Pod" (page 27).</i> |
| The version of M3T-PD30 and the firmware on the target system are not same. | (1) Download the proper firmware. <i>See "4.2 Downloading Firmware" (page 34).</i> (2) Check that the descriptions in the MCU file are correct. <i>See "2.4 (1) Making the MCU File" (page 18).</i> |
| Target MCU is reset state. | Check that the reset pin of the target system has changed from "L" to "H" level. |
| Target MCU cannot be reset. | (1) Check that pin RESET* is "H" level. (2) If the reset circuit of the target system has a watchdog timer, disable the timer. (3) Check that power is properly supplied to the target system and that the target system is properly grounded. (4) The program may be uncontrollable in areas where memory is not allocated. Recheck that the map setting. <i>See "1.1 Notes on MAP References and Settings" (page 11).</i> |
| Target MCU 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 that the map setting. <i>See "1.1 Notes on MAP References and Settings" (page 11).</i> |
| Target MCU is not given clock. | (1) Check that the oscillation circuit in the target system is oscillating properly. (2) Check that the switches of the FLX64-PRB are correctly set. <i>See the user's manual of pod probe.</i> |
| Target MCU is not given power. | Check that power is properly supplied to the target system and that the target system is properly grounded. |

**(3) Errors Occur When Starting Up the Emulator Debugger
(When the target system is not connected)**

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

| Error | Checkpoint |
|--|--|
| Communication ERROR. Can't send data. | Check that all emulator debugger settings, interface cable connections and switches on the rear of the PC4701 match. <i>See the user's manuals of the PC4701 and emulator debugger.</i> |
| Target system is not constructed properly. | (1) Download the proper firmware. <i>See "4.2 Downloading Firmware" (page 34).</i> (2) Recheck that the connection between the PC4701 and this product. <i>See "3.4 Connecting the PC4701 and Emulation Pod" (page 27).</i> |
| The version of M3T-PD30 and the firmware on the target are not same. | (1) Download the proper firmware. <i>See "4.2 Downloading Firmware" (page 34).</i> (2) Check that the descriptions in the MCU file are correct. <i>See "2.4 (1) Making the MCU File" (page 18).</i> |
| Target MCU cannot be reset. | The program may be uncontrollable in areas where memory is not allocated. Recheck that the map setting. <i>See "1.1 Notes on MAP References and Settings" (page 11).</i> |
| Target MCU 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 that the map setting. <i>See "1.1 Notes on MAP References and Settings" (page 11).</i> |
| Target MCU is not given clock. | Check the oscillator in the emulation pod is oscillating properly. |

6.3 Operation Differs from That of Actual MCUs

(1) Cannot Reset from the Target System

Set the time for starting up (0.2 Vcc to 0.8 Vcc) 1 μs or less.

(2) Data Values of RAM Area at Power-on are Different

For this product, 04h is written into the RAM area at power-on. Therefore, the data values are different from those of an actual MCU.

(3) The A-D and D-A Conversion Values are Different from Expected Values

Because a pitch 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. Therefore, be sure to evaluate your system with an evaluation MCU. Before starting mask production, evaluate your system and make final confirmation with an CS (Commercial Sample) version MCU.

(For details, refer to "1.1 Note on Differences between the Actual MCU and Emulator" on page 14.)

6.4 How to Request for Support

Fill in the text file the installer of the emulator debugger generates in the following directory and email to your local distributor.

\SUPPORT\product name\SUPPORT.TXT

For prompt response, please specify the following information:

(1) Operating environment

Operating voltage: X.X [V]

Operating frequency: XX.X [MHz]

(2) Problem

Chapter 7. Maintenance and Guarantee

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

| | |
|-------------------------------------|----|
| 7.1 Maintenance | 48 |
| 7.2 Guarantee | 48 |
| 7.3 Repair Provisions..... | 48 |
| 7.4 How to Request for Repair | 49 |

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 twelve months 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 twelve months 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

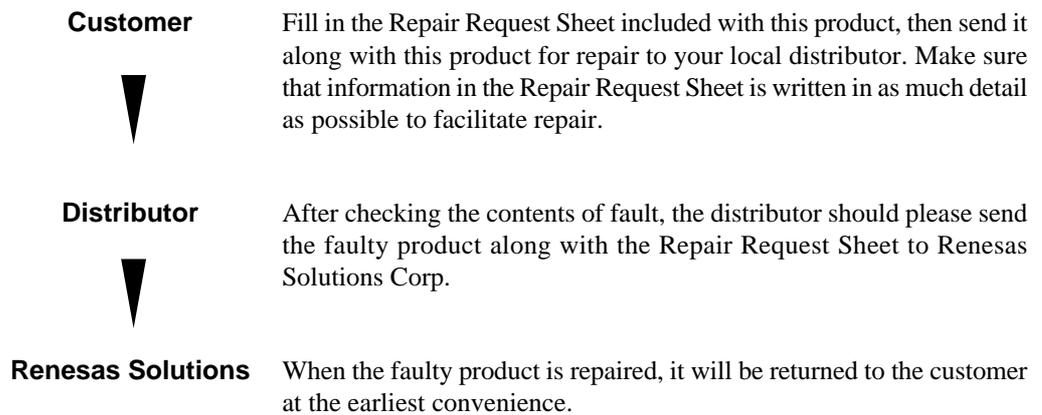
When a period of twelve months elapses after the model was dropped from production, repairing products of the model may become impossible.

(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.

MEMO

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