M30100T-RPD-E

Emulation Pod for M16C/10 Series MCUs

User's Manual

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\SUPPORT\Product-name\SUPPORT.TXT

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Preface

The M30100T-RPD-E is an emulation pod for the M16C/10 Series of Renesas 16-bit MCUs. It's used with a PC4701 emulator.

This user's manual mainly describes specifications of emulation pod M30100T-RPD-E and how to setup it. For details on the following products, which are used with the M30100T-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 an emulator debugger for PC4701

All the components of this product are shown in "2.2 Package Components" (page 17) 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 M30100T-RPD-E is used with the PC4700H or PC4700L emulator.

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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.

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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 unrepairable 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.

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.

IMPORTANT

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.

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 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).

Notes on Stack Area:

- With this product, a maximum 8 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 +8 byte maximum capacity used by the user program as the user stack area.

IMPORTANT

Note on When Starting Up the Emulator Debugger:

- With the M30100T-RPD-E, it is necessary to execute the following when starting up the emulator debugger. Otherwise, the M30100T-RPD-E may not operate properly.

  Custom command

  Execute custom command RESET_10 every time you start up the emulator debugger.

- When you execute custom command RESET_10, if "RESET_10 is done!" is displayed instead of "RESET_10 (Ver.2) is done!", a custom command program file of a previous version is used. Replace the old custom command program file reset_10.p with the "reset_10.p" file in the floppy disc included with this product, and re-execute custom command RESET_10.

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--FFFFFh: "INT"

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 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 oscillation circuit board with this product.

IMPORTANT

Notes on Interrupts:

- Even while the user program is not being executed (when the user program is paused or while debug programs are running), the evaluation MCU is operating for controlling debug programs. Therefore, take note that timers and other functions are not stopped while the user program is not being executed.
- When a maskable interrupt is generated in user program execution (when the user program is paused or while debug programs are running), the interrupt cannot be accepted, because the emulator disables interrupts. If an interrupt is requested while a user program is not being executed and the user program allow the interrupt, the interrupt is accepted immediately after the user program execution is started.

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.

Note on Stop and Wait Modes:

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

Note on Software Reset:

- Do not use a software reset.

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.

Notes on Address-Match Interrupt:

- Do not set software breaks at the same addresses as address-match interrupts as the program may run out of control.
- Do not set a hardware break within 4 instructions before an address at which an address-match interrupt occurs. If you do set a hardware break in this range, 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.

IMPORTANT

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

Notes on Software Breaks and Hardware Breaks:

- Software breaks generate 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 reverse assemble 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.

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 Changing the Setting of Memory Area:

- To debug an MCU whose memory size is different, be sure to change the setting of the memory area (see 3.5 Procedure for Making an MCU File for the M3T-PD30 on page 30). For details on memory maps of each MCU, refer to the user's manual of each MCU.

Note on Self-checks:

- With this product, the self-checks of the emulator main unit PC4701 does not work properly.

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 Vcc = 0.8 Vcc) to 1 μs 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 (1) 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 XIN Input Frequency:

- The emulation pod operates with the XIN to the evaluation MCU divided in the following cycles.
  - Some instructions before a program is stopped by "Stop" or "Event Break"
  - Some instructions before a run-time debug (debugging operations such as executing a dump command during a program execution)
  - Stepped instructions
  - Start instruction when a program starts from an instruction where a software break point is set.

In other cases and when a program is stopped by a software break, XIN is not divided.

Chapter 2. Preparation

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

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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 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

Emulation pod

This means the M30100T-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).

Host machine

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

Emulator debugger

This means a software tool M3T-PD30 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 EEPROM. 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 rise/fall edge of the signal entered from the external trace cable. The former break function is called data 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 microcomputer mounted on the emulation pod which is operated in the specific mode for tools.

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.

*****

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

2.2 Package Components

The M30100T-RPD-E package consists of the following items. When unpacking, check to see if your M30100T-RPD-E contains all of these items.

Table 2.1 Package components

Item	Quantity
M30100T-RPD-E emulation pod main unit	1
FLX120-RPD flexible cable for connecting PC4701	1
OSC-2 oscillator circuit board (bare-board)	1
Floppy disk (Custom command RESET_10)	1
Hardware tool user registration FAX sheet (English)	1
Hardware tool user registration FAX sheet (Japanese)	1
M30100T-RPD-E user's manual (this manual)	1
M30100T-RPD-E user's manual (Japanese)	1

Please keep the M30100T-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 M30100T-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.

2.3 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

Pod probe	M301xxT-PRB
Emulator main unit	PC4701
Emulator debugger	M3T-PD30

* "x" denotes a number.
* To purchase these products, contact your nearest distributer.

2.4 Name of Each Part

(1) System Configuration

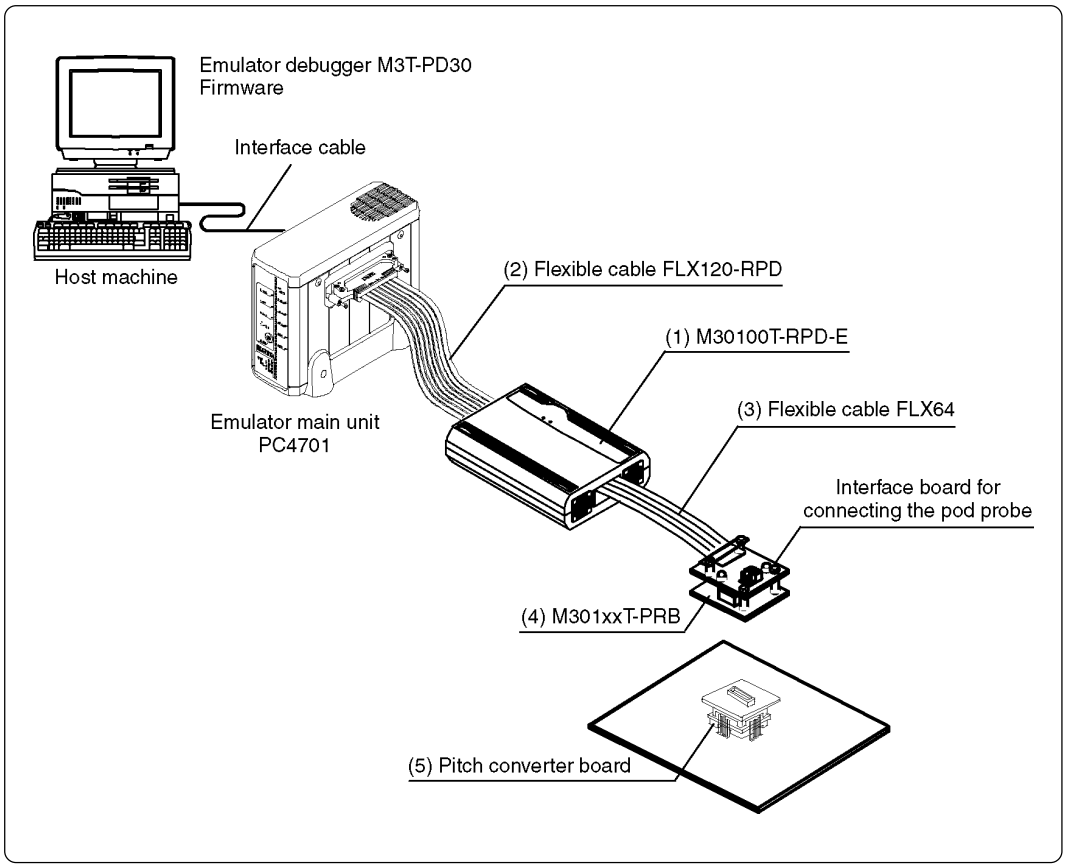


Figure 2.1 System configuration

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

(1) Emulation pod main unit M30100T-RPD-E

This emulation pod contains an evaluation MCU, 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.

2.5 When Using the Emulator for the First Time

(1) 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.

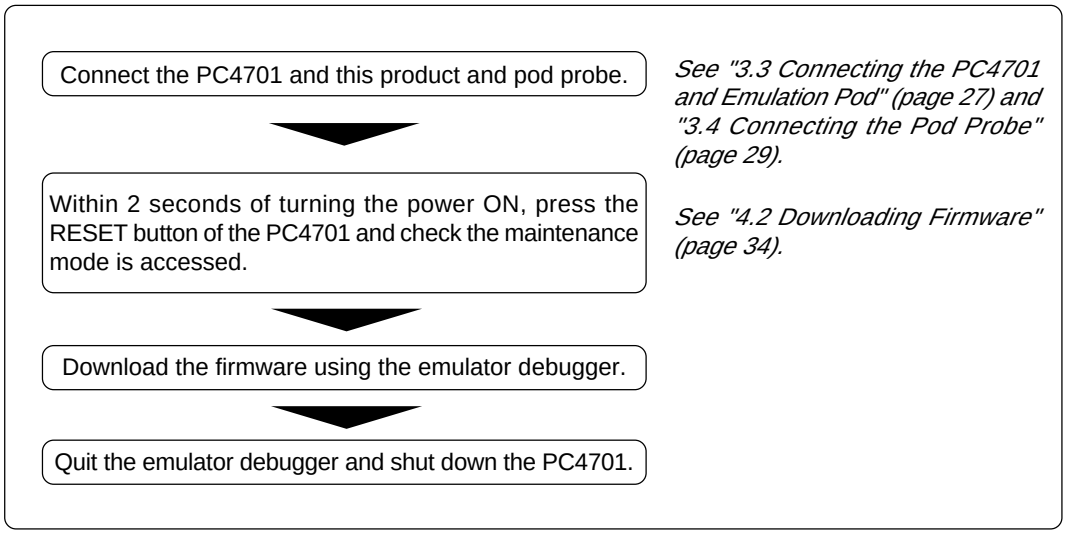


Figure 2.2 Firmware download procedure when using the emulator for the first time

(2) How to Use Custom Command RESET_10

When using the M30100T-RPD-E, it is necessary to execute custom command RESET_10 whenever starting up the M3T-PD30. Incorporate custom command RESET_10 into the M3T-PD30 in line with the procedure given below. Once you incorporate it, it is not necessary to incorporate it again.

How to incorporate RESET_10 into the M3T-PD30

1. Copying files

   Copy reset_10.p (the program file of custom command RESET_10) to the directory in which the execution file (pd30.exe) of the M3T-PD30 is stored.

2. Specifying the pass where the custom program is stored

   Open the M3T-PD30's script window, and execute the script command given below.

   MacroPATH *absolute directory where reset_10.p has been copied*

   The MacroPATH command is a script command used to register an argument-specifying command in the M3T-PD30.

3. Registering custom command RESET_10

   Open the M3T-PD30's script window, and execute the script command given below.

   MACRO RESET_10

   The macro command is used to register an argument-specifying command in the M3T-PD30. This allows you to register custom command RESET_10 in the M3T-PD30. Henceforth it turns possible to execute custom command RESET_10 from the command input area within the script window in a manner similar to using a script command. For the input format etc., see "Specifications of custom command RESET_10" below.

   Once you register a custom command, you do not need to register it again until you delete its registration by use of either delmacro or delmacroall.

4. Assigning a script file for startup

   Copy ini_reset_10.scr (a sample of script file for startup) in a suitable directory.

   Then, open the M3T-PD30's Init dialog box and assign ini_reset_10.scr to the Init File: area within the Init dialog box.

   The Init File: area within the Init dialog box is used for assigning a script file to be executed at the time of starting up the M3T-PD30. Effecting this assignment causes custom command RESET_10 described in the script file to be automatically executed the next time the M3T-PD30 is started up and afterward.

   If you have already assigned another script file to the Init File: area within the Init dialog box, put the same description line as the content of the ini_reset_10.scr file at the beginning of the script file.

5. Restarting the M3T-PD30

   After carrying out steps 1 through 4, restart the M3T-PD30.

Specifications of custom command RESET_10

Input format: RESET_10

Functions: Initial settings of the M30100T-RPD-E, setting the Work Area Start Address of the M3T-PD30 at 8000h, and execution of a reset.

Examples of command execution:

(Example 1)
```
> RESET_10 <Enter>
Work Area Start Address : 8000H
RESET_10 (Ver.2) is done!!
>
```

In cases, such as a typing mistake of a command, errors of communications with the emulator and so on, an error message corresponding to the error is displayed.

<Enter> means to hit the enter key on your keyboard.

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 the Upper Cover 22
3.2 Selecting Clock Supply 23
(1) Using the Oscillator Circuit on the Target System 24
(2) Changing the Internal Oscillator Circuit of the Emulation Pod 25
(3) Replacing the Oscillator Circuit Boards 26
3.3 Connecting the PC4701 and Emulation Pod 27
(1) Connecting the Cable to the PC4701 27
(2) Connecting the Cable to the Emulation Pod 28
3.4 Connecting the Pod Probe 29
3.5 Procedure for Making an MCU File for the M3T-PD30 30

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 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 oscillation frequency in the emulation pod as described in "3.2 Selecting Clock Supply" on pages 23 to 26.
(3) Replace the upper cover and secure the four screws.

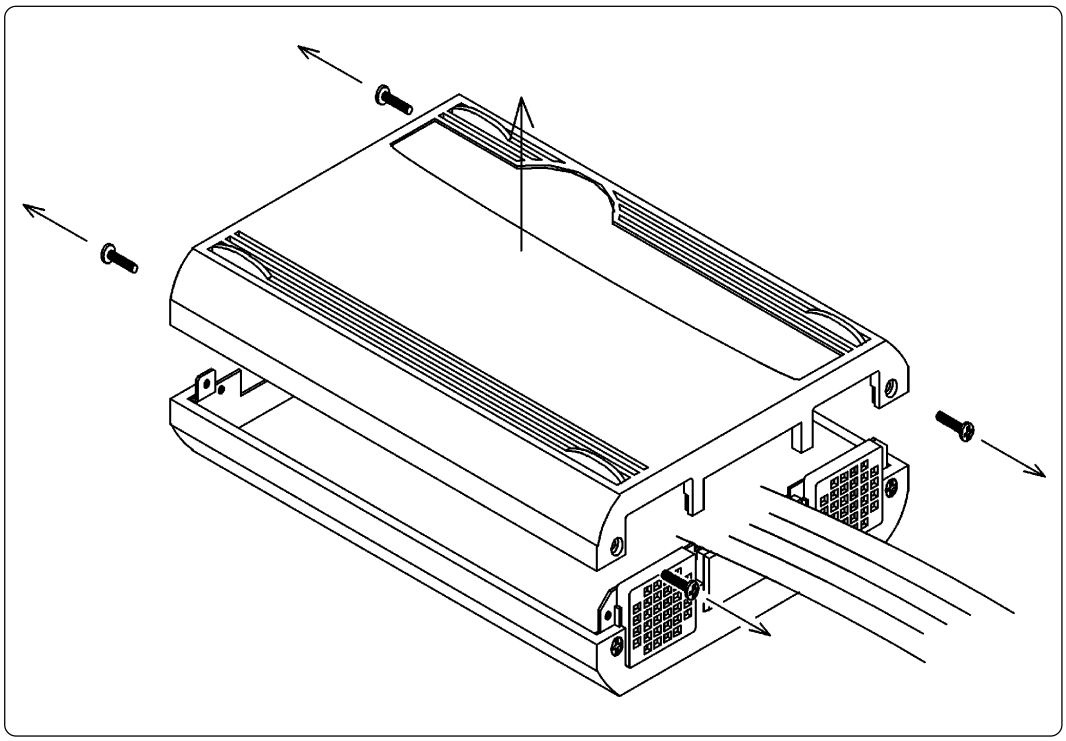


Figure 3.1 Removing the upper cover

⚠ CAUTION

When Removing the Upper Cover:

- Always shut OFF power when removing the upper cover or 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

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.

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	Yes
	Target system	External	-

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 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.

(1) Using the Oscillator Circuit on the Target System

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

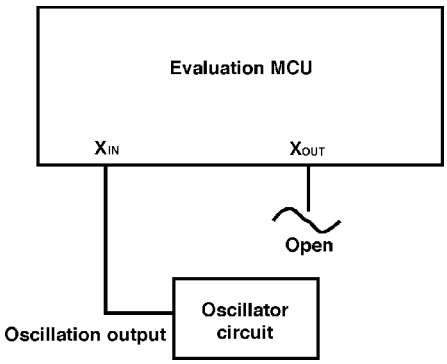


Figure 3.2 External oscillator circuit

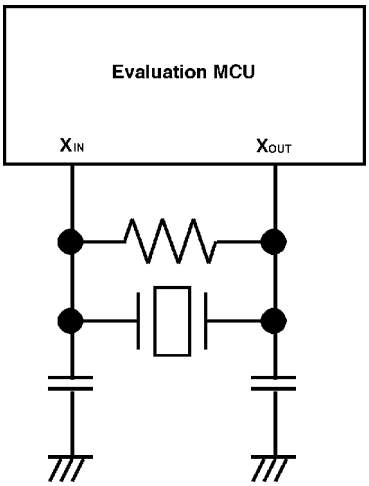


Figure 3.3 Circuit in which oscillation does not occur (same for X_{CIN}-X_{COUT})

IMPORTANT

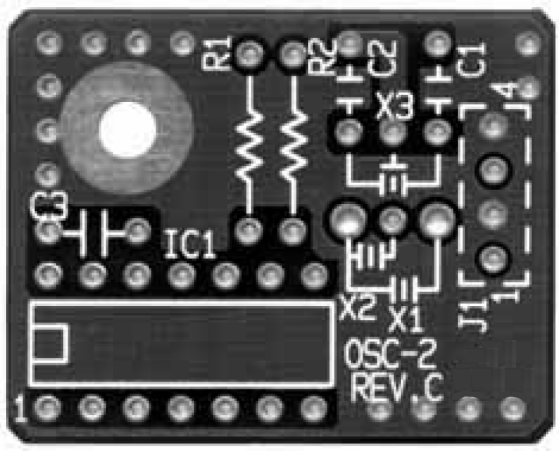
Notes on External Clock:

- To operate the emulation pod 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 XIN. And pin XOUT should be open.
- Make note of the fact that in the oscillator circuit shown in Figure 3.3 where a resonator is connected between pins XIN and XOUT, oscillation does not occur because a flexible cable, buffer IC and other devices are used between the evaluation MCU and the target system.

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

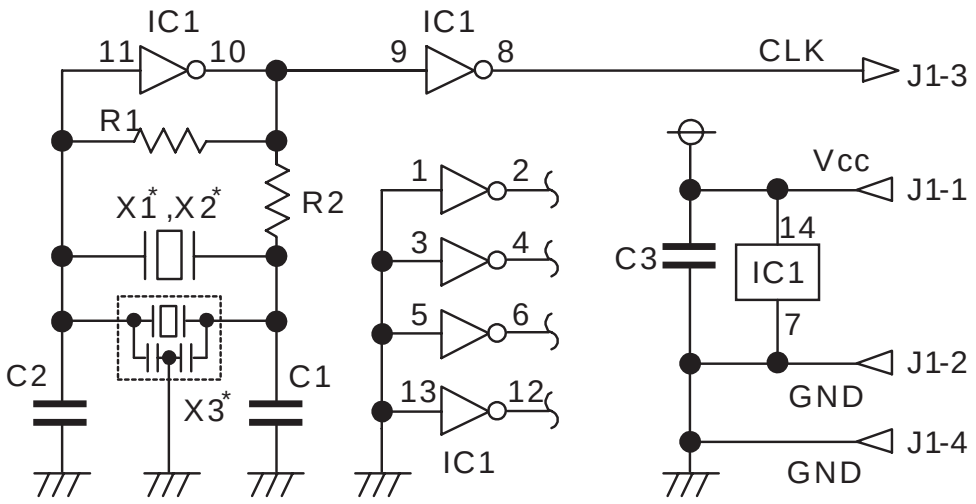
An oscillator circuit board (OSC-3) for 16 MHz is mounted on this product. To use the emulation pod at a frequency other than 16 MHz, build the desired oscillator circuit on the included OSC-2 oscillator circuit board (bare board) and replace the board installed in the emulation pod when shipped from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



J1-4: GND
J1-3: Oscillator output
J1-2: GND
J1-1: Vcc

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



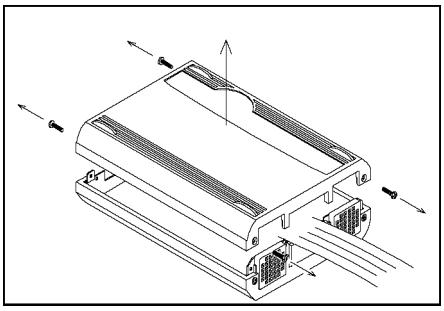
*** X1: 5.08-mm-pitch 2-pin oscillator**
X2: 2.54-mm-pitch 2-pin oscillator
X3: 2.54-mm-pitch 3-pin oscillator

IC1: Inverter (Unbuffer)

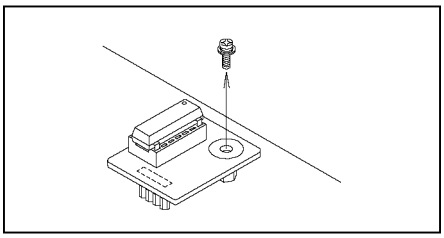
Figure 3.5 Circuit of the oscillator board (OSC-2)

(3) Replacing the Oscillator Circuit Boards

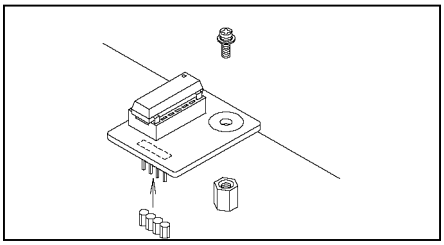
Figure 3.6 shows how to replace the oscillator circuit boards.



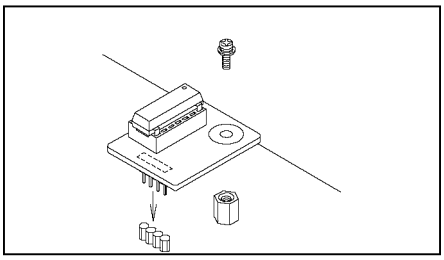
(1) Remove the four screws of both sides of this product and lift off the upper cover.



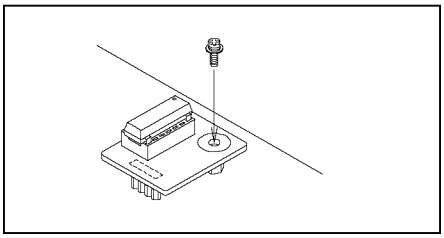
(2) Unscrew the screw connecting the oscillator circuit board.



(3) Lift off the oscillator circuit board.



(4) Attach the J1 connector of another oscillator circuit board for replacement to the connector of this product.



(5) Secure the oscillator circuit board with the screw, and replace the upper cover and secure the four screws.

Figure 3.6 Replacing the oscillator circuit boards

⚠ CAUTION

When Removing the Upper Cover:

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

3.3 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.

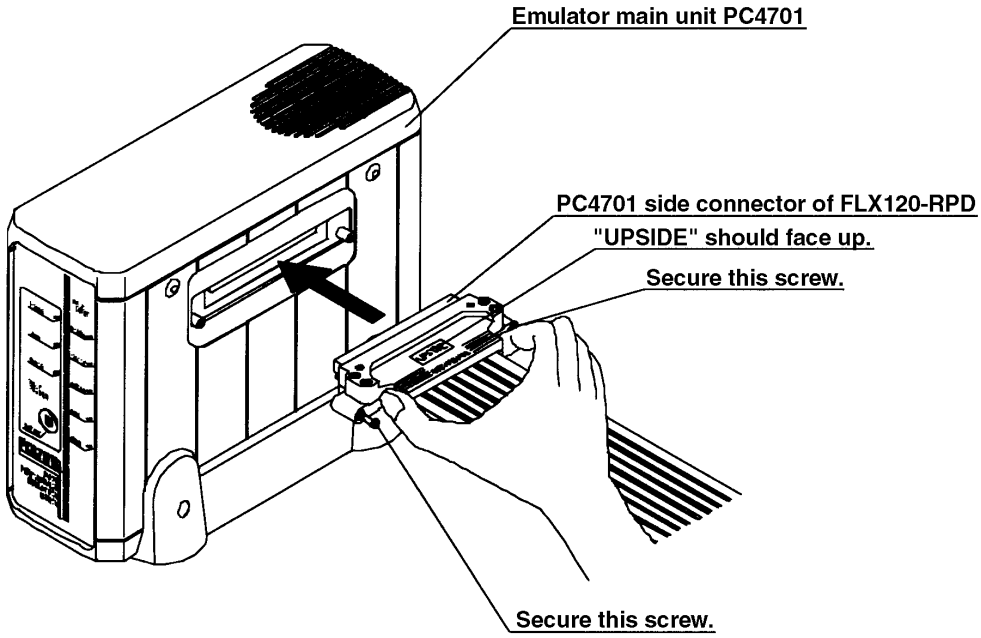


Figure 3.7 Connecting the PC4701 and FLX120-RPD

⚠ 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.

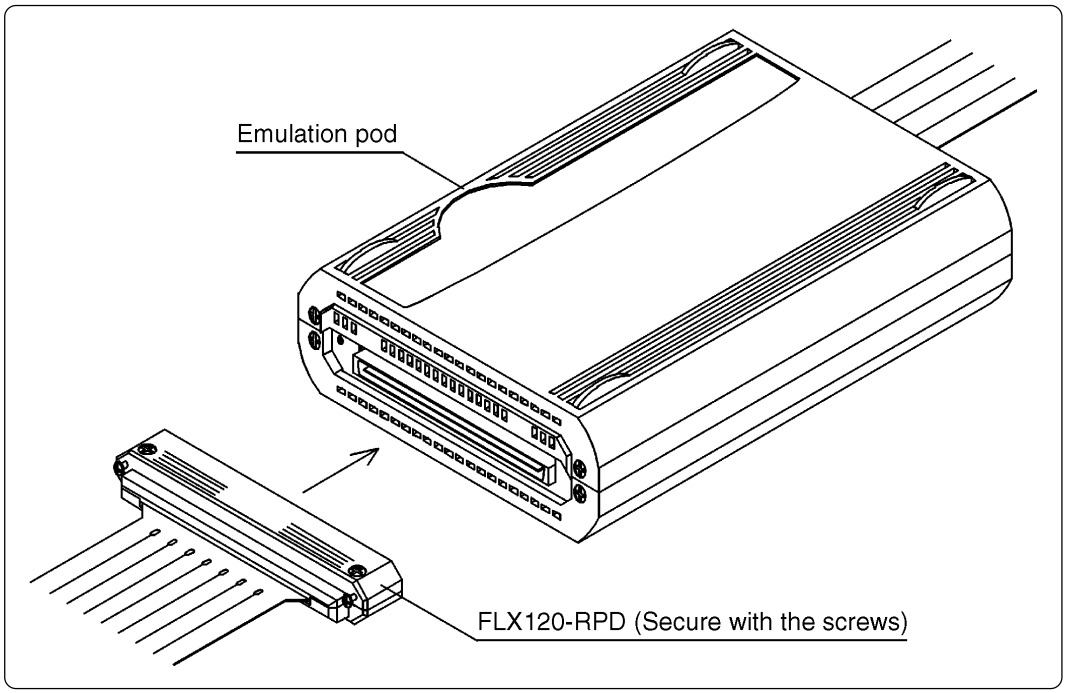


Figure 3.8 Connecting the emulation pod and FLX120-RPD

⚠ CAUTION

Note on Connecting the Cable:

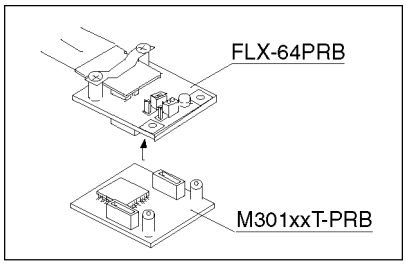
- Always shut OFF power before connecting the cable. The power ON state could destroy internal circuits.

Note on Securing the Screws:

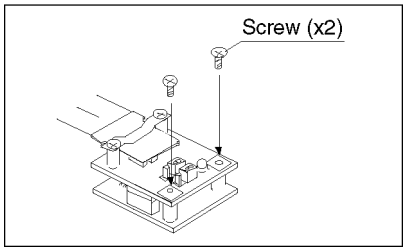
- After connecting the emulation pod to the cable, be sure to secure the screws.

3.4 Connecting the Pod Probe

The emulation pod for the M16C/10 Series MCUs consists of the two products, the M30100T-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.

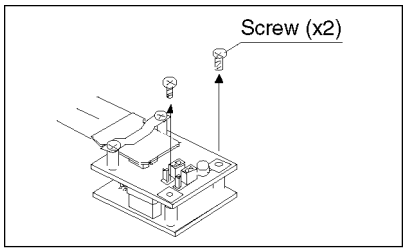


(1) Connect connectors J1 and J2 of the M301xxT-PRB to connectors J3 and J4 of the FLX64-PRB.

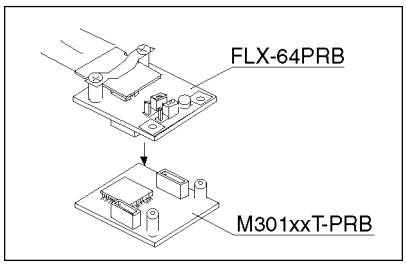


(2) Fix the FLX64-PRB by the two screws.

Figure 3.9 Connecting pod probe M301xxT-PRB



(1) Unscrew the two screws of the M301xxT-PRB.



(2) Remove the M301xxT-PRB from the FLX64-PRB. In this time, lift off the M301xxT-PRB horizontally. Otherwise, the connector may cause a break.

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.

3.5 Procedure for Making an MCU File for the M3T-PD30

It is necessary to change the contents of the MCU file according to the MCU to be developed. Make the MCU file M30100.MCU for M30100 Group and M30102.MCU for M30102 Group in the "mcufiles" folder in the folder where emulator debugger M3T-PD30 is stored. When you use M3T-PD30 Ver.4.10 or older, make an MCU file in the folder where your M3T-PD30 is stored.

The contents of the MCU file give the addresses of SFR area, internal RAM area, internal ROM area and the name of the firmware file. Change the contents of the MCU file according to the target MCU. Use your editor for changing the contents of the MCU file.

The examples of contents of the MCU file are as follows:

For 30100 Group, 1KB RAM, 24KB ROM (file name: M30100.MCU)

0:	SFR area	Start address
3FF:		End address
400:	Internal RAM	Start address
7FF:		End address
FA000:	Internal ROM	Start address
FFFFF:		End address
M30620B:	Name of firmware (Do not change.)	
0:	Expansion No.	M3T-PD30 V.4.00 or later required (Do not change.)

Use the MCU file "M30100.MCU" in the floppy disc included with this product.

Chapter 4. Usage

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

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(1) Checking the Connection of the Emulator System 32
(2) Turning On the Power Supply 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 the Maintenance Mode 34
4.3 Starting Up the Emulator Debugger 35
(1) Workflow When Starting Up the Emulator Debugger 35
(2) Settings in the Init Dialog Box 35
(3) Executing custom command RESET_10 35

Chapter 4. Usage

4.1 Turning On the Power Supply

(1) Checking the Connection of the Emulator System

Before turning the power ON, check the connection of the host machine, PC4701, emulation pod, converter board and target system.

(2) Turning On the Power Supply

Power ON/OFF the target system and the PC4701 as simultaneously as possible.

⚠ 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.

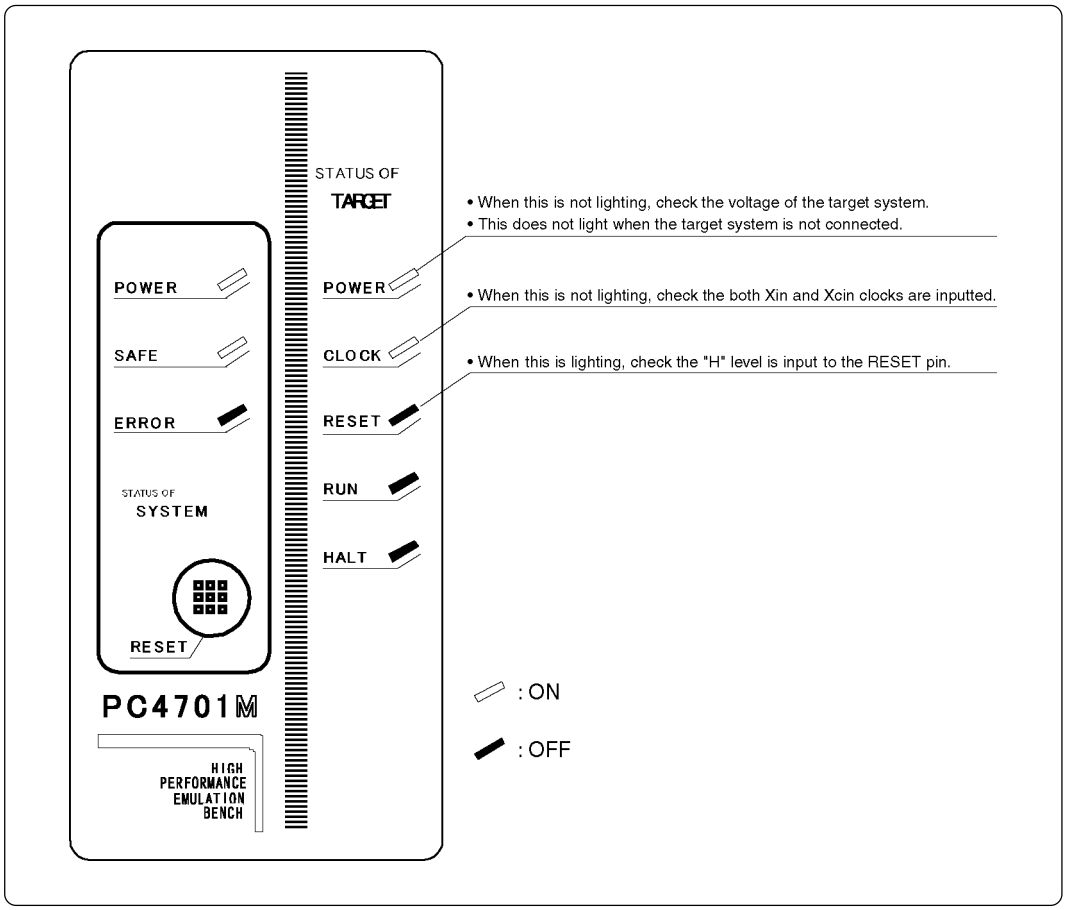

Figure 4.1 LED display when the power turned on

IMPORTANT

Note on CLOCK LED:

- If CLOCK LED does not turn on, check the following points:

  (1) Immediately after starting PC4701 (before starting the emulator debugger)

  --> Check if the oscillation circuit in the emulation pod oscillates normally.

  (2) 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 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) use this product with the PC4701 which was used with other emulation pod before

(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) Within 2 seconds of activating power to the emulator, press the RESET button on the emulator front panel. This will switch the emulator to the maintenance mode.
(2) Start up the emulator debugger. When the Init dialog box setup is completed, 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.

- For serial interface: about minutes
- For parallel (including LPT parallel), USB interface: about 30 seconds

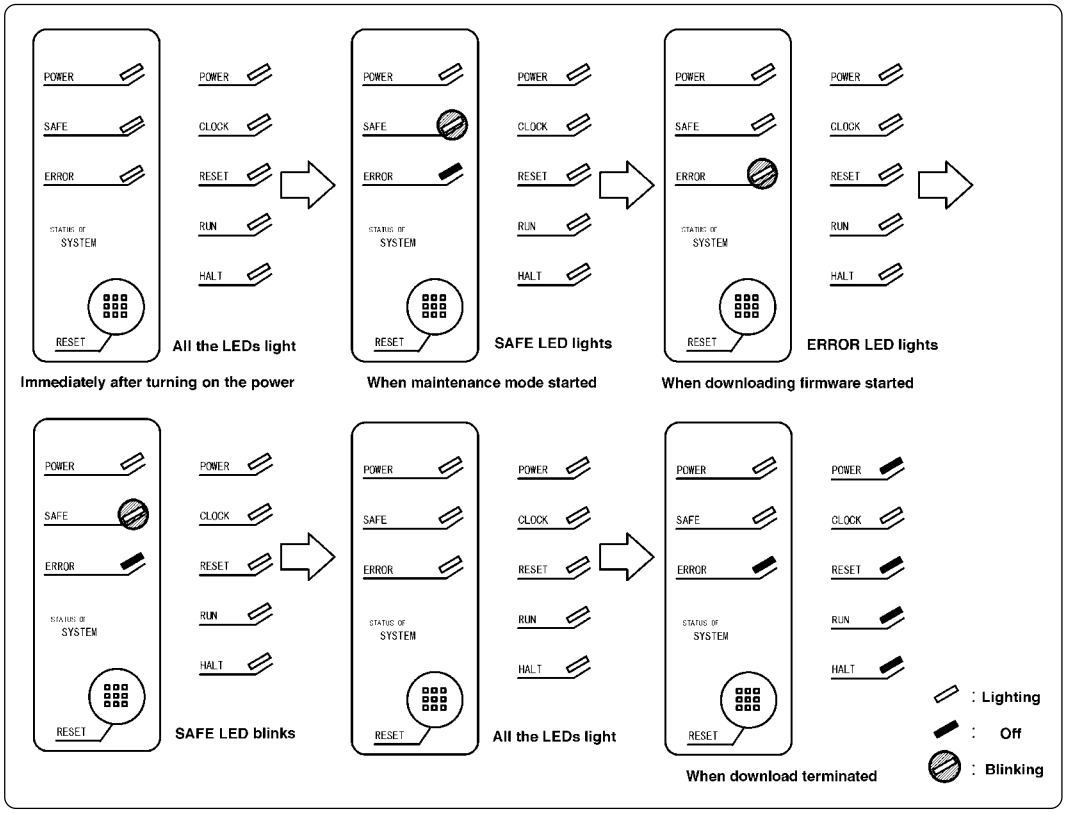

Figure 4.2 Downloading firmware in the maintenance mode

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 Starting Up the Emulator Debugger

(1) Workflow When Starting Up the Emulator Debugger

The workflow when starting up the emulator debugger is shown below.

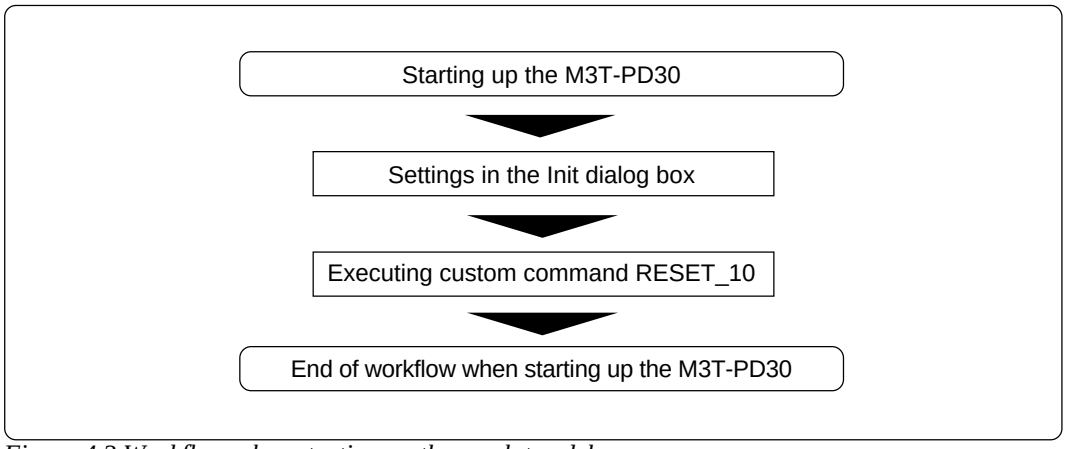

Figure 4.3 Workflow when starting up the emulator debugger

(2) Settings in the Init Dialog Box

When starting up the emulator debugger, the Init dialog box is displayed. In the box make environment settings such as MCU file, communication interface and firmware according to your system, and click "OK". For details on settings in the Init dialog box, refer to the user's manual of the emulator debugger. For making an MCU file, refer to "3.5 Procedure for Making an MCU File for the M3T-PD30" (page 30).

(3) Executing custom command RESET_10

With the M30100T-RPD-E you need to execute custom command RESET_10 every time you start up the emulator debugger. If the RESET_10 is set in the script file which is executed when the M3T-PD30 is started up, custom command RESET_10 is automatically executed. For details, refer to "2.5 (2) How to Use Custom Command RESET_10" on page 20.

If the RESET_10 is not set in the script file which is executed when the M3T-PD30 is started up, execute custom command RESET_10 in the script window.

IMPORTANT

Note on Version of Custom Command RESET_10:

- When you execute custom command RESET_10, if "RESET_10 is done!" is displayed instead of "RESET_10 (Ver.2) is done!", a custom command program file of a previous version is used. Replace the old custom command program file reset_10.p with the "reset_10.p" file in the floppy disc included with this product, and re-execute custom command RESET_10.

Note on Settings in the Init Dialog Box:

- The present version of custom command RESET_10 has a function to set a work area start address at 8000h. Therefore, you do not need to change the setting of the address with the Init dialog box.

MEMO

Chapter 5. Specifications

This chapter describes specifications of this product.

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5.2 External Dimensions 39
(1) External Dimensions of the Emulation Pod 39
(2) External Dimensions of the Interface Board for Connecting the Pod Probe 40

Chapter 5. Specifications

5.1 Specifications

Table 5.1 lists the specifications of the M30100T-RPD-E.

Table 5.1 Specifications of the M30100T-RPD-E

Emulator	PC4701	
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_{COUT}	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

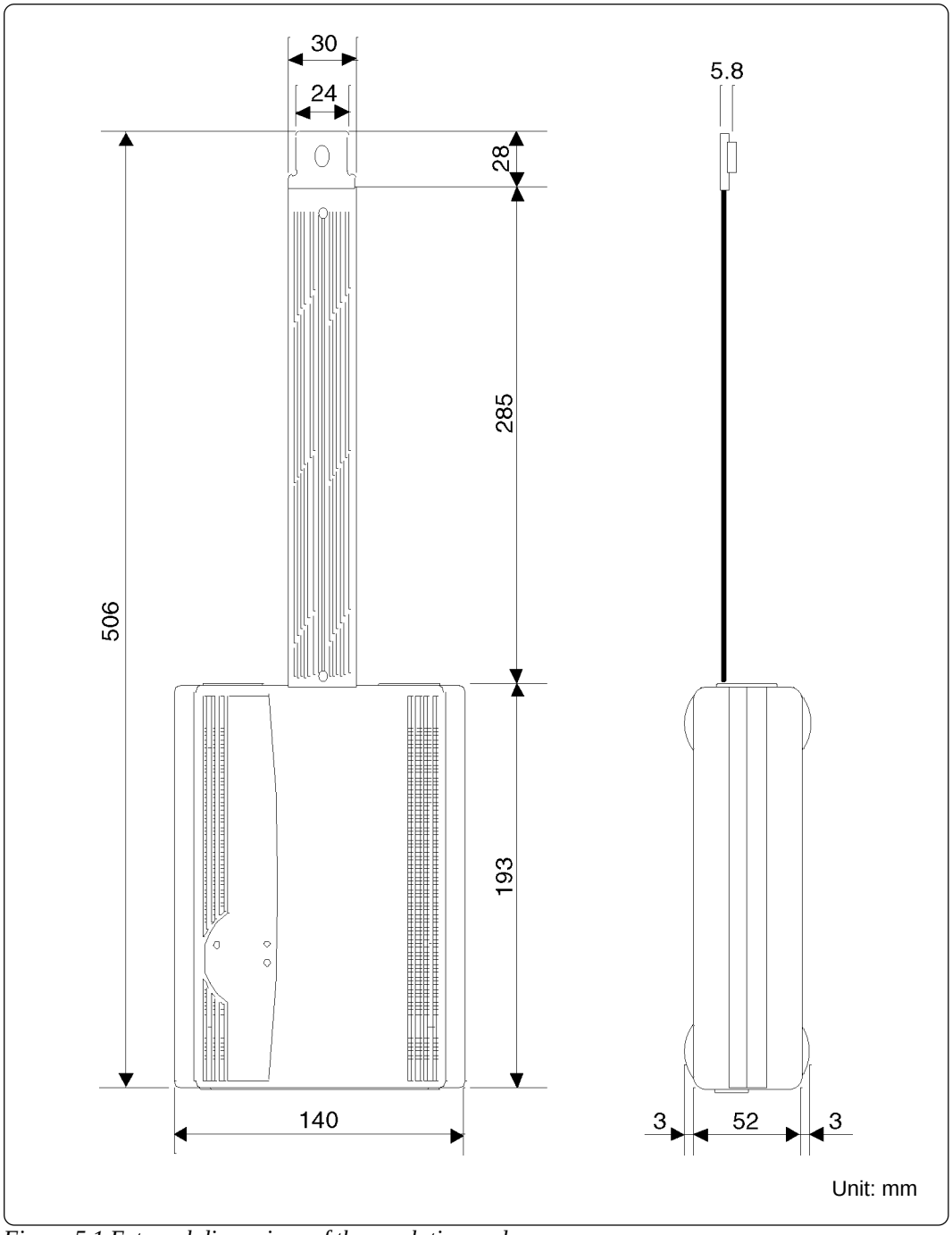

Figure 5.1 External dimensions of the emulation pod

(2) External Dimensions of the Interface Board for Connecting the Pod Probe

Figure 5.2 shows the external dimensions of interface board FLX64-PRB for connecting the pod probe.

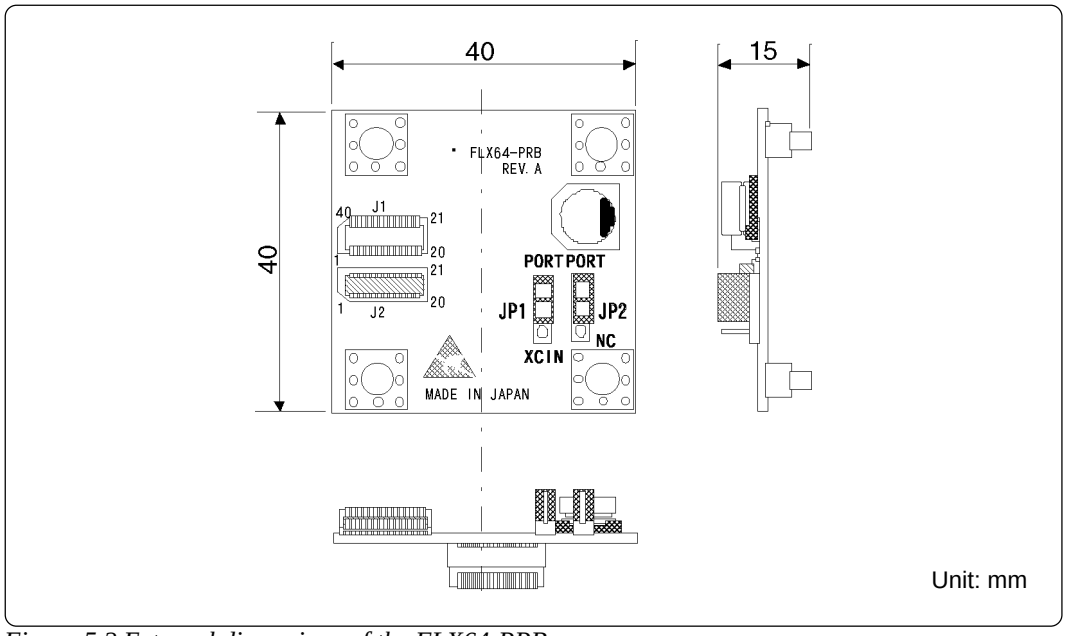

Figure 5.2 External dimensions of the FLX64-PRB

Chapter 6. Troubleshooting

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

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(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

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/en/tools

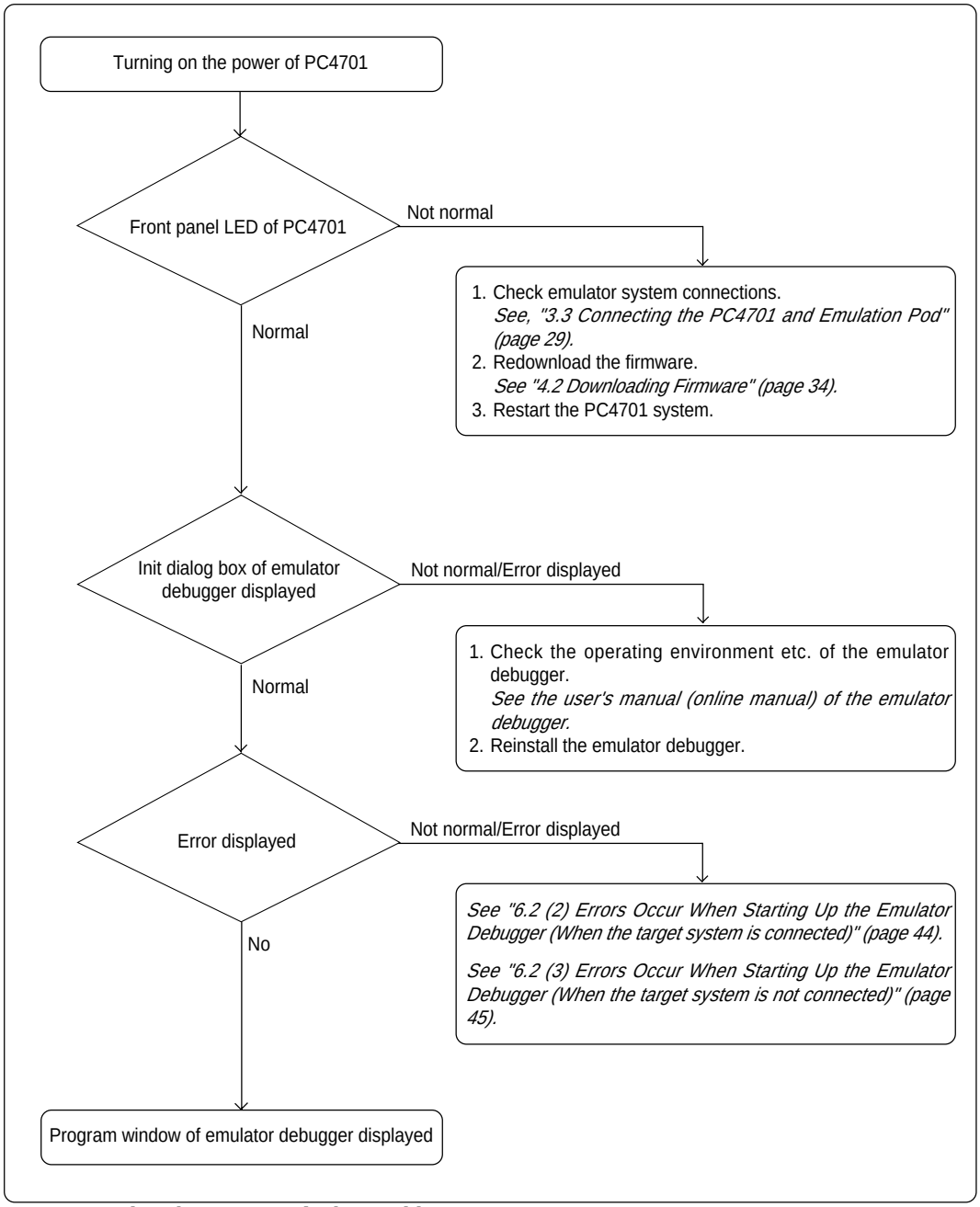

Figure 6.1 Flowchart to remedy the troubles

6.2 When the Emulator Debugger Does Not Start Up Properly

(1) When the LED Display of 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. *See the PC4701 User's Manual.*
All LEDs remain lit.	-	(1) Recheck that the connection between the PC4701 and this product. *See "3.3 Connecting the PC4701 and Emulation Pod" (page 27).* (2) Recheck that the connection between the PC4701 and the M30100T-RPD-E. *See "3.4 Connecting the Pod Probe (page 29).*
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". *See the CLK command of the emulator debugger.* (2) Check that the oscillation circuit in the M30100T-RPD-E is oscillating. *See "3.2 Selecting Clock Supply (page 23).*
	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. *See the user's manual of pod probe.*
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
Target MCU runaway.	Check that when the emulator debugger is started up, custom command RESET_10 is executed and the second line of the display shows "RESET_10 (Ver.2) is done!". Otherwise, restart the emulator debugger. *See "1.1 Note on When Starting Up the Emulator Debugger" (page 11).*
Communication ERROR Data is not sent to the target	Check that all emulator debugger settings, interface cable connections and switches on the rear of the PC4701 match. *See the user's manuals of the PC4701 and emulator debugger.*
Target system is not constructed properly	(1) Download the proper firmware. *See the user's manual of the emulator debugger.* (2) Recheck that the connection between the PC4701 and this product. *See "3.3 Connecting the PC4701 and Emulation Pod" (page 27).*
The version of M3T-PD30 and the firmware on the target system are not same	Download the proper firmware. *See "4.2 Downloading Firmware" (page 34).*
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. *See "1.1 Notes on MAP References and Settings" (page 11).*
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. *See MCU specifications.* (2) The program may be uncontrollable in areas where memory is not allocated. Recheck that the map setting. *See "1.1 Notes on MAP References and Settings" (page 11).*
Target clock is stopped	(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. *See the user's manual of pod probe.*
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) 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
Target MCU runaway.	Check that when the emulator debugger is started up, custom command RESET_10 is executed and the second line of the display shows "RESET_10 (Ver.2) is done!". Otherwise, restart the emulator debugger. *See "1.1 Note on When Starting Up the Emulator Debugger" (page 11).*
Communication ERROR Data is not sent to the target	Check that all emulator debugger settings, interface cable connections and switches on the rear of the PC4701 match. *See the user's manuals of the PC4701 and emulator debugger.*
Target system is not constructed properly	(1) Download the proper firmware. *See "4.2 Downloading Firmware" (page 34).* (2) Recheck that the connection between the PC4701 and this product. *See "3.3 Connecting the PC4701 and Emulation Pod" (page 27).*
The version of M3T-PD30 and the firmware on the target are not same	Download the proper firmware. *See "4.2 Downloading Firmware" (page 34).*
Target MCU cannot be reset	The program may be uncontrollable in areas where memory is not allocated. Recheck that the map setting. *See "1.1 Notes on MAP References and Settings" (page 11).*
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. *See MCU specifications.* (2) The program may be uncontrollable in areas where memory is not allocated. Recheck that the map setting. *See "1.1 Notes on MAP References and Settings" (page 11).*
Target clock is stopped	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.)

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Chapter 7. Maintenance and Guarantee

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

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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.

Customer

Fill in the Repair Request Sheet included with this product, then send it along with this product for repair to your local distributor. Make sure that information in the Repair Request Sheet is written in as much detail as possible to facilitate repair.

Distributor

After checking the contents of fault, the distributor should please send the faulty product along with the Repair Request Sheet to Renesas Solutions Corp.

Renesas Solutions

When the faulty product is repaired, it will be returned to the customer at the earliest convenience.

⚠ 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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M30100T-RPD-E User's Manual

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