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April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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User's Manual

M30800T-CPE

User's Manual

Compact Emulator for M16C/80 Series

Renesas Electronics
www.renesas.com

Rev.1.00 2003.11

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Preface

The M30800T-CPE is a compact emulator for the M16C/80 Series of 16-bit MCUs, which is operated only in the single-chip mode with the real-time trace function.

This user's manual mainly describes specifications of the M30800T-CPE and how to set up and operate it. For details on the following products, which are used with the M30800T-CPE, refer to each product's online manual.

- Emulator debugger M3T-PD308M
- C compiler M3T-NC308WA (entry version)
- Integrated development environment TM

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.

Terminology

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

• Emulator

This means the M30800T-CPE (this product).

• Emulator system

This means an emulator system built around the M30800T-CPE emulator. The M30800T-CPE emulator system is configured with an emulator, host machine and emulator debugger.

• Host machine

This means a personal computer used to control the emulator.

• Emulator debugger

This means a software tool, M3T-PD308M to control the emulator from the host machine through an communications interface.

• Evaluation MCU

This means the microcomputer mounted on the emulator which is operated in the specific mode for development tools.

• Target MCU

This means the microcomputer you are going to debug.

• Target system

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

• *

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

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Chapter 1. Precautions for Safety

This chapter describes precautions for using this product safely and properly. For precautions for the emulator debugger, refer to 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. Spilling water or some other liquid into the main unit can cause an unrepairable damage.

Warning for Use Environment:

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

⚠CAUTION

Caution to Be Taken for Modifying This Product:

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

Cautions to Be Taken for 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 directly. Static electricity may damage the internal circuits.
- Do not pull the compact emulator main unit by the serial cable for connecting to the target system. The cable may cause a break.
- Do not use inch-size screws for this equipment. The screws used in this equipment are all ISO (meter-size) type screws. When replacing screws, use same type screws as equipped before.
- The IC6 regulator may get hot. Do not touch it to prevent burn injuries. And, do not apply a voltage other than the specified voltage of the product (5.0 V ±5%), because it may cause burn injuries and the failure of internal circuits.

IMPORTANT

Note on Malfunctions in the System

- If the emulator malfunctions because of interference like external noise, shut OFF power to the emulator once and then reactivate it.

IMPORTANT

Notes on Differences between the Actual MCU and Emulator:

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

  (1) Reset condition

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

  (2) Data values of RAM and ROM areas at power-on

  When power is turned on, the internal ROM area of the emulator are defaulted to DE_{16}. The internal RAM area is indefinite (the emulator system does not default this area).

  (3) Register values when power is turned on

  When power is turned on, the emulator's register values default to 0. However, the ISP register defaults to 500_{16} and the program counter defaults to the reset vector value ($FC0000_{16}$) initialized by the emulator.

  (4) Internal memory (RAM and ROM) capacity, etc.

  Because the internal memories (RAM and ROM) are emulated by the emulation memory, the capacity and assignment of the emulator's internal memories differ from those of the actual MCU.

  (5) MCU function

  Some MCU functions cannot be used in the emulator system. For details, refer to "Notes on MCU Functions That Cannot Be Used with This Emulator" (page 11).

- As 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 a CS (Commercial Sample) version MCU.

IMPORTANT

Note on MCU Functions That Cannot Be Used with This Emulator:

- The following MCU features cannot be used with this emulator.

(1) Debugging cannot be done with this emulator in the memory expansion mode or microprocessor mode.
This emulator is specifically designed for use in the single-chip mode. For this reason, debugging is not possible in the memory expansion mode or microprocessor mode.

- When using this emulator, normally set the processor mode bit in the processor mode register to the "single-chip mode".
- When using this emulator, set the CNVSS and BYTE pins to "L" level.

(2) Oscillation circuits that use a resonator cannot be used.
Because a control gate array is situated between the evaluation MCU and the target system, oscillation circuits that connect a resonator between the X_{IN} and X_{OUT} pins will not oscillate. The same applies to the sub-clock oscillation circuit (X_{CIN}, X_{COUT}): oscillation circuits with a resonator cannot be used. See "3.5 Selecting Clock Supply" (page 29).

(3) Watchdog timers cannot be used.
MCU watchdog timers can only be used during program execution (free running). Disable watchdog timers in all other program operations (break, dump, forced stop, etc.). However, under the condition below, it is not possible to use the program execution.

- When setting the watchdog timer selection bit (CM06) of the system clock control register 0 to "1".

Also, if the target system has a watchdog timer in its reset circuit, disable it, too, when using the emulator.

(4) Single step interrupts (debug interrupt) cannot be used.
Single step interrupts cannot be used. The vector address of a single step interrupt is normally indicated in the emulator work area, and the vector address value cannot be changed.

(5) The BRK2 interrupt (debug interrupt) cannot be used.
The BRK2 interrupt cannot be used. The vector address of the BRK2 interrupt is normally indicated in the emulator work area, and the vector address value cannot be changed.

(6) Software reset function cannot be used.
Do not use the software reset function.

(7) A-D input group select function is unusable.
The A-D input group select function (M16C/80T Group-only function) cannot be used.

(8) MCUs with more than 10 KB of internal RAM cannot be debugged.
Because this product incorporates an MCU of a 10KB internal RAM version, MCUs whose internal RAM size exceeds 10 KB cannot be debugged. The reserved internal area ($002C00_{16}$ through $007FFF_{16}$) cannot be used either.

(9) Flash memory and EPROM modes are not emulated.
This emulator does not emulate the flash memory and EPROM modes. Also, the emulator does not emulate the CPU rewrite function in the flash memory mode.

IMPORTANT

Note on Restrictions in Using the Emulator (1/2):

- The following restrictions apply to this emulator.

(1) Debug command execution when the BCLK is stopped
When the BCLK is stopped, debug commands (break, dump, single-step, forced stop, etc.) cannot be executed. The BCLK can stop in the following cases.

- When the target clock is not oscillating
- When the target MCU is on hold
- When the target MCU is in the stop mode

(2) MCU status during program hold
With this product, the program is stopped with a loop program to a specific address. Note that, in this case, peripheral circuits are still operating.

(3) Interrupts during single step execution
Interrupts are disabled during single step execution. Accordingly, interrupt processing is not performed even if an interrupt request is sent.

(4) Address matched interrupt

- Do not set software breaks for an address for which an address matched interrupt is set.
- In step execution, do not execute addresses that generate address matched interrupts.
- Do not set hardware breaks within 4 instructions before an address that generate address matched interrupts. Otherwise, the program will run out of control.

(5) Stop and wait modes

- Do not use a single step for the command that shifts to the stop mode.
- Operation does not shift to the wait mode when the command that shifts to the wait mode is executed as a single step.

(6) Stack area
With this emulator, user stacks specified by ISP consume 12 bytes. If there isn't enough user stack area, using other areas not designed for use as stacks (SFR area, RAM area that stores data or ROM area) can damage the user program or destabilize emulator control. Therefore, ensure a maximum +12 bytes of the area used by the user program as user stack area.

(7) Trace results for addresses that set software breaks
Software breaks replace the original command with the BRK command "08_{16}" that generates the BRK interrupt. When trace results are viewed in the bus display, "08_{16}" is displayed by fetching (by command) the address that sets the software break, however in the reverse assembly display, the "BRK" command is displayed.

(8) Protect register (PRC2)
When the protect register (PCR2) that enables writing in the port P9 direction register (address $3C7_{16}$) and the function selection register A3 (address $3B5_{16}$) is changed in the following way, the protect is not cancelled.

1) When the "command that sets PRC2 to '1' is executed (step execution)"
2) When the program is executed with a break point set between the "command that sets PRC2 to '1'" and "when the register to be protected is set"
3) When "PRC2 is set to '1'" in the Dump or Script windows

(9) Debug command execution while running the user program
If a dump or any other debug command is executed while running the user program, the real-time capability of the user program cannot be guaranteed.

(10) Access-inhibited areas

- The emulator control registers (000020_{16} to $00003F_{16}$) in the SFR area are inhibited against read and write. Accessing these registers makes the emulator uncontrollable.
- The address $FFFFFF_{16}$ in this product cannot be read and written normally.

IMPORTANT

Note on Restrictions in Using the Emulator (2/2):

- The following restrictions apply to this emulator.

(11) Reset vector area

- For the reset vector area, the emulator's internal memory is always selected.
- The reset vector area can only be modified while the program remains idle, and cannot be modified while the program is running.

(12) DMA transfer

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

- DMA2 transfer counter register DCT2 (R0)
- DMA3 transfer counter register DCT3 (R1)
- DMA2 memory address register DMA2 (A0)
- DMA3 memory address register DMA3 (A1)

IMPORTANT

Note on Controlling MCU Pins:

- Some MCU pins are controlled by the emulator.

  (1) 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 of the emulator is lit).

  (2) NMI* input

  The NMI* input from the target system is accepted only while a user program is being executed (only while the RUN status LED of the emulator is lit).

Notes on the Target System (power supply, order of powering on):

- When the target system is connected, be sure to set the JP1 of the emulator to "EXT".
- This emulator cannot supply the power to the target system. Therefore design your system so that the target system is powered separately.
- This emulator consumes max. 500 mA of electric current from the target system.
- The voltage of the target system should be within the range of 4.5 to 5.5 V.
- Before powering on your emulator system, check that the host machine, the emulator, 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 emulator as simultaneously as possible.

  (2) When the emulator debugger starts up, check the target status LEDs on the emulator to see if this product is ready to operate.

  Is the power supplied?: Check that target status LED (POWER) is ON.*[1]

  Is the clock supplied?: Check that target status LED (CLOCK) is ON.

  *[1] When the target system is not connected, the target status LED (POWER) is not lit.

1.2 Declaration Concerning EMC Directive

RENESAS TECHNOLOGY EUROPE LTD
DUKES MEADOW, MILLBOARD ROAD, BOURNE END
BUCKINGHAMSHIRE, SL8 5FH, UNITED KINGDOM

Declaration concerning EMC Directive

and UK EMC regulations No. SI 2372 including amendments SI 3080 & SI 3180

The **M30800T-CPE** is only intended for use in a laboratory or classroom environment. It does however meet the emission requirements of EN 55022:1995 Class A.

Its use outside the classroom, laboratory, study area or similar such area invalidates conformity with the protection requirements of the Electromagnetic Compatibility Directive (89/336/EEC) and could lead to prosecution (ref SI2080).

Everywhere you imagine.

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MEMO

Chapter 2. Usage

This chapter describes how to operate this product.

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Chapter 2. Usage

2.1 Name of Each Part

(1) System Configuration

Figure 2.1 shows the system configuration for this emulator.

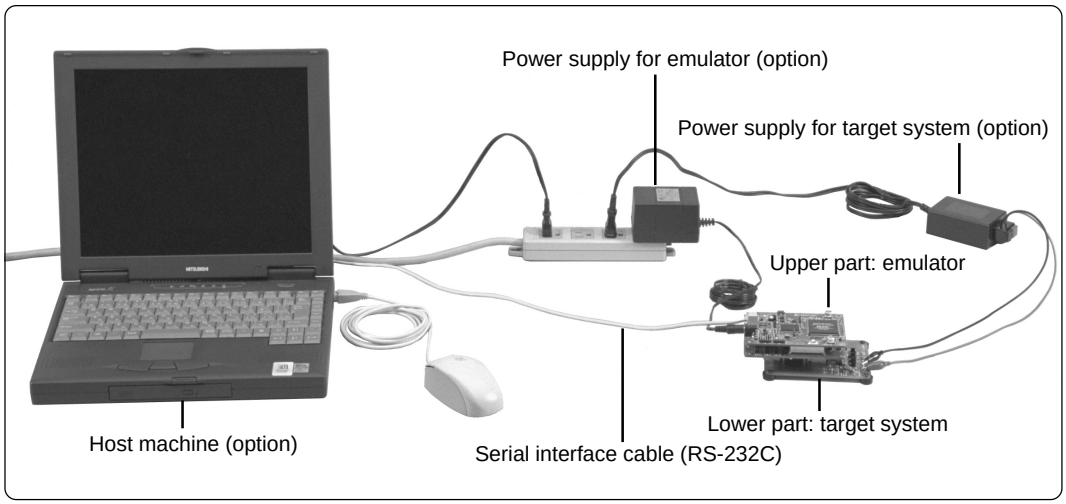


Figure 2.1 System configuration

(1) Emulator M30800T-CPE (included)

This is a compact emulator for the M16C/80 Series of 16-bit MCUs which is operated only in the single-chip mode with the real-time trace function (hereafter, emulator).

(2) Serial interface cable (included)

This is an interface cable for the host machine and the emulator.

(3) Power supply for emulator

This is a power supply for the emulator. Supply 5.0 V ±5% (DC).
Prepare the power supply separately. The power cable is included with this product.

* With some AC adapter, the power voltage may be changed significantly by the load. The switching power supply AC adapter or stabilized power supply are recommended.

(4) Target system

This is your application system. This emulator can be used without the target system.

(5) Power supply for the target system

This is a power supply for the target system. As this emulator cannot supply the power to the target system, supply the power to the target system separately from the emulator.

(6) Host machine

This is a personal computer for controlling the emulator.

(2) Name of Each Part of Emulator

Figure 2.2 shows the name of each part of the emulator.

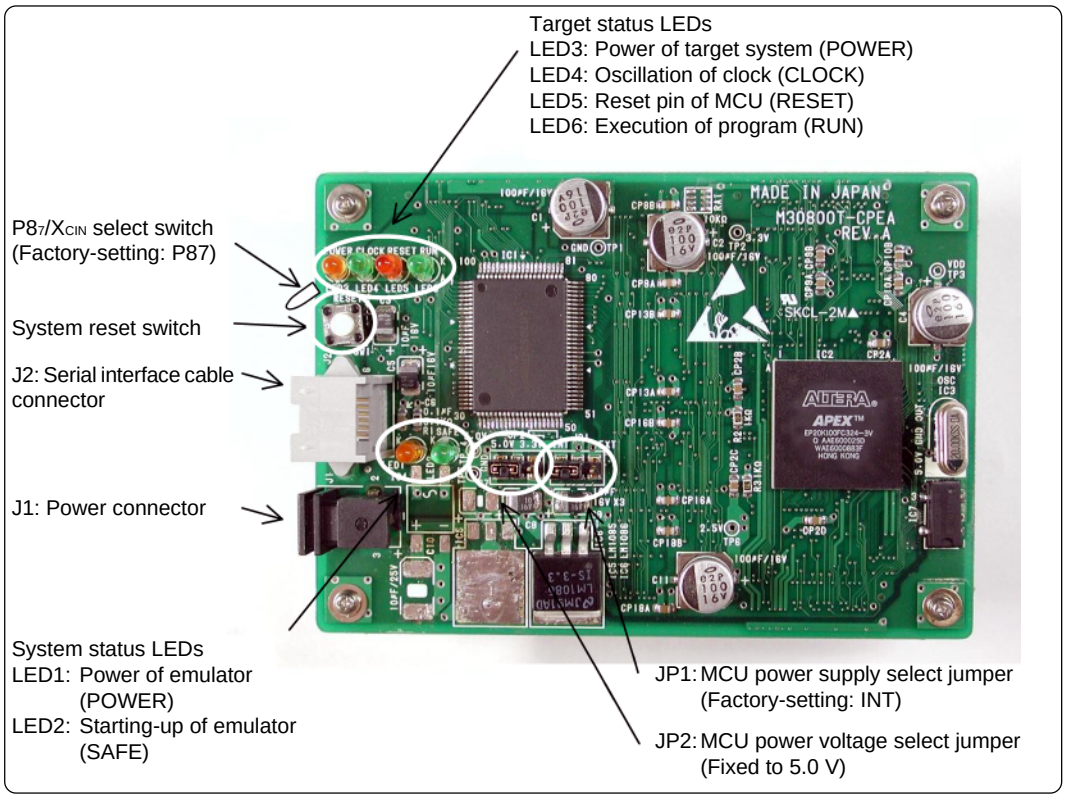


Figure 2.2 Name of each part of emulator (top view of M30800T-CPE)

(1) System status LEDs

The system status LEDs indicate the emulator main unit's power supply. Table 2.1 lists the definition of system status LED.

Table 2.1 Definition of system status LED

Name	Number	Color	Status	Function
POWER	LED1	Orange	ON	Power is supplied to the emulator.
			OFF	Power is not supplied to the emulator.
SAFE	LED2	Green	ON	Emulator started up normally.
			OFF	Emulator did not start up normally.

(2) Target status LEDs

The target status LEDs indicate the target MCU's power supply and operating status. Table 2.2 lists the definition of each target status LED.

Table 2.2 Definition of target status LEDs

Name	Number	Color	Status	Function
POWER	LED2	Orange	ON	Power is supplied to the target MCU.
			OFF	Power is not supplied to the target MCU.
CLOCK	LED3	Green	ON	BCLK is output from the target MCU.
			OFF	BCLK is not output from the target MCU.
RESET	LED4	Red	ON	Target MCU is being reset.
			OFF	Target MCU is not being reset.
RUN	LED5	Green	ON	User program is being executed.
			OFF	User program has been halted.

(3) System reset switch

By pressing the system reset switch, you can initialize the emulator system. Table 2.3 shows the functions of the system reset switch depending on the state of emulator.

Table 2.3 Functions of the system reset switch

State of Emulator	Function
When the user's program is halted	Initializes the emulator and waits for commands from the emulator debugger.
When the user's program is executed	Stops the user's program, initializes the emulator, and waits for commands from the emulator debugger.

⚠ CAUTION

Note on System Reset Switch:

- After pressing the system reset switch, reboot the emulator debugger M3T-PD308M. Otherwise the display of emulator debugger and the actual value (in the emulator) may not match.
- When the emulator debugger does not start up normally even after rebooting, turn off the emulator and then turn on again.

2.2 Starting Up the Emulator

The procedure for starting up the emulator is shown in Figure 2.3. For details, refer to each section hereafter. And, when the emulator does not start up normally, refer to "Chapter 5. Troubleshooting" (page 37).

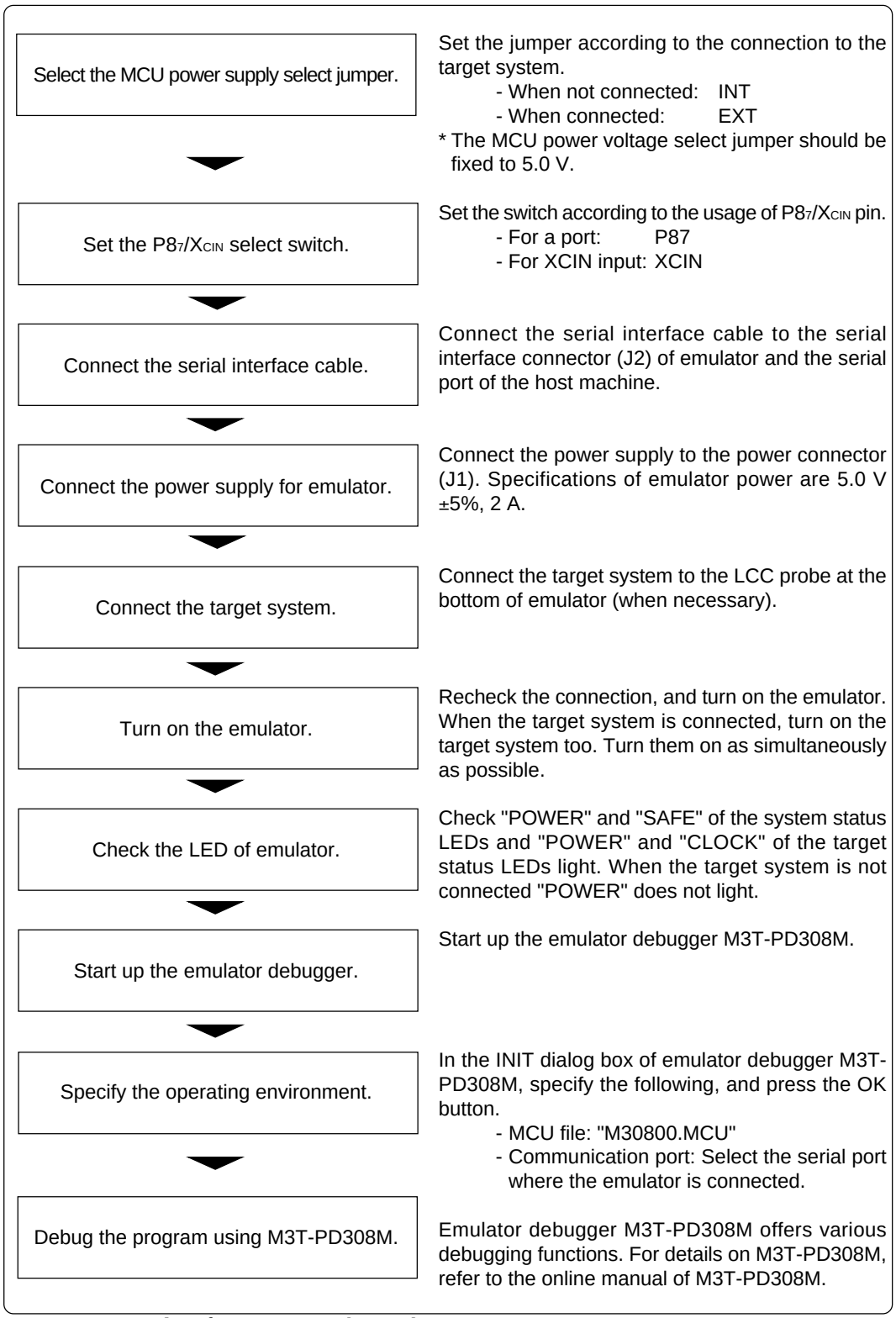


Figure 2.3 Procedure for starting up the emulator

2.3 Emulator Initial Setup

Set the MCU power supply select jumper, MCU power voltage select jumper and the P8$_7$/X$_{CIN}$ select switch of the emulator according to conditions of use.

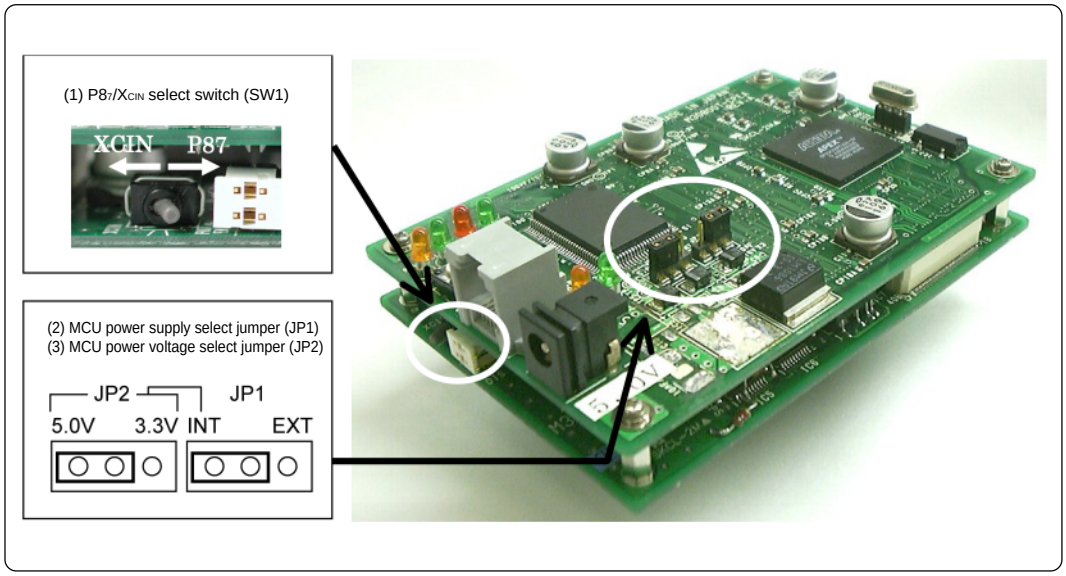


Figure 2.4 Emulator initial setup

(1) MCU Power Supply/Voltage Select Jumpers

These are the jumper switches to select power supply to the MCU. As shown in Table 2.4 below, set the switch according to the connection to the target system. Any settings not listed in Table 2.4 are not allowed.

Table 2.4 Setting MCU power supply select jumper and MCU power voltage select jumper

Connection to target system	MCU power supply select jumper (JP1)	MCU power voltage select jumper (JP2)	Description
Not connected	INT	5.0 V	Power of MCU is supplied from the emulator. MCU operating voltage is 5.0 V
		3.3 V (cannot be set)	Do not set as this combination. The operation is not be guaranteed.
Connected	EXT	Invalid	Power of MCU is supplied from the target system. This emulator consumes max. 500 mA of electrical current from the target system.

(2) P8$_7$/X$_{CIN}$ Select Switch

This is the switch to select the function of P8$_7$/X$_{CIN}$ pin. As shown in Table 2.5 below, set the switch according to the usage of P8$_7$/X$_{CIN}$ pin.

Table 2.5 Setting P8$_7$/X$_{CIN}$ select switch

Usage	P8$_7$/X$_{CIN}$ select switch
Using as a port	Set to "P87"
Using as XCIN input	Set to "XCIN"

⚠CAUTION

Note on Setting Switches and Jumper Switches:

- Always shut OFF when changing the setting of the switches and jumper switches, and connecting the cable.

2.4 Connecting the Emulator System

How to connect the cables to the emulator system is shown in Figure 2.5 below.

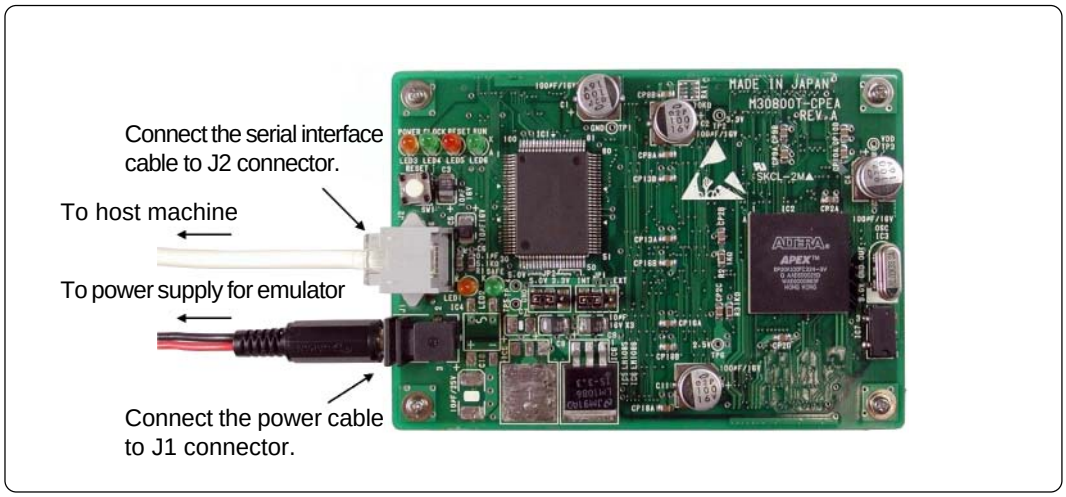


Figure 2.5 Connecting the emulator system

(1) Connecting the Serial Interface Cable

Connect the serial interface cable (included) to the serial interface connector (J2) and the serial port of the host machine (see Figure 2.5).

(2) Connecting the Power Cable

Connect the power supply for the emulator to the power connector (J1). The specifications of the power supply for the emulator are listed in Table 2.6.

Table 2.6 Specification of power supply of emulator

Power supply voltage	DC 5.0 V ±5%, 2 A

Figures 2.6 and 2.7 show the specifications of the power connector (J1) and the applicable plug, respectively.

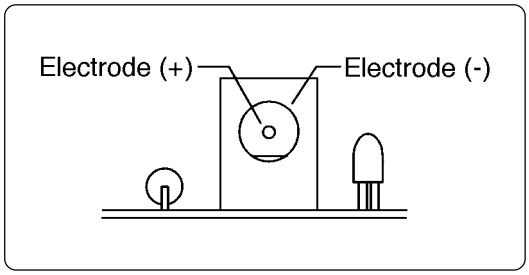


Figure 2.6 Specification of power connector

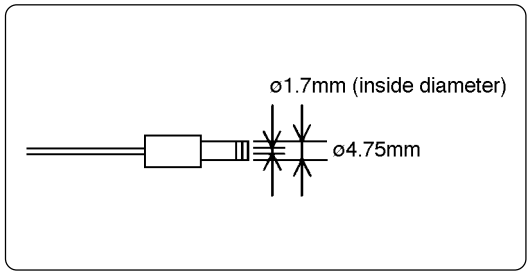


Figure 2.7 Specification of applicable plug

⚠ CAUTION

Notes on Connecting the Power Supply of Emulator:

- Be careful about the polarity of the power supply. Connecting to the wrong electrode could destroy internal circuits.
- The power cable included in this product package is colored red (+) and black (-).
- Do not apply a voltage other than the specified voltage of the product (5.0 V ±5%), because it may cause burn injuries and the failure of internal circuits.

2.5 Connecting Target System (as occasion demands)

Connect the LCC probe (M30800T-PTC) on the lower board of the emulator to the LCC socket (option) or the pitch converter board (option).

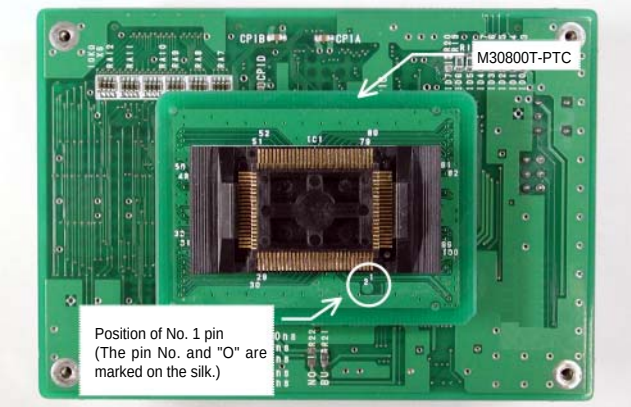


Figure 2.8 LCC probe on the lower board of the emulator

Some MCU packages need the pitch converter board (option) shown in Figure 2.9. When connecting it, be sure to check the position of No. 1 pin.

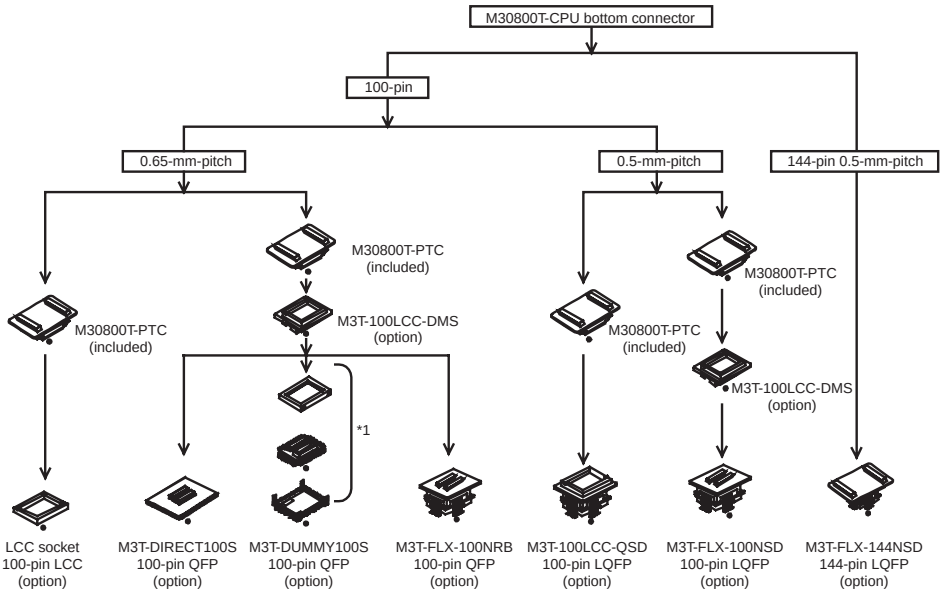


Figure 2.9 Connecting target system

⚠CAUTION

Notes on Connecting Target Systems:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulator.
- Always shut OFF power of the emulator and the target system when connecting and disconnecting the target system.

2.6 Turning On the Power

(1) Checking the Connection of the Emulator System

Before turning the power ON, check the connection of the host machine and the emulator main unit.

(2) Turning On the Power

Power ON the target system and the emulator main unit as simultaneously as possible.

⚠ CAUTION

Notes on Power Supply:

- As this emulator cannot supply power to the target system, provide the target system with a separate power supply from that of the emulator.
- This emulator consumes max. 500 mA of electrical current from target system. Therefore, set the power supply of the target system considering this consumption.
- Keep target system power supply voltage within the range of 4.5 to 5.5 V.
- Do not change target system power supply voltage after power has been activated.

(3) LED Display When the Emulator Starts Up Normally

After the emulator starts up, check the status of the LEDs to see whether the emulator operation is enabled or not.

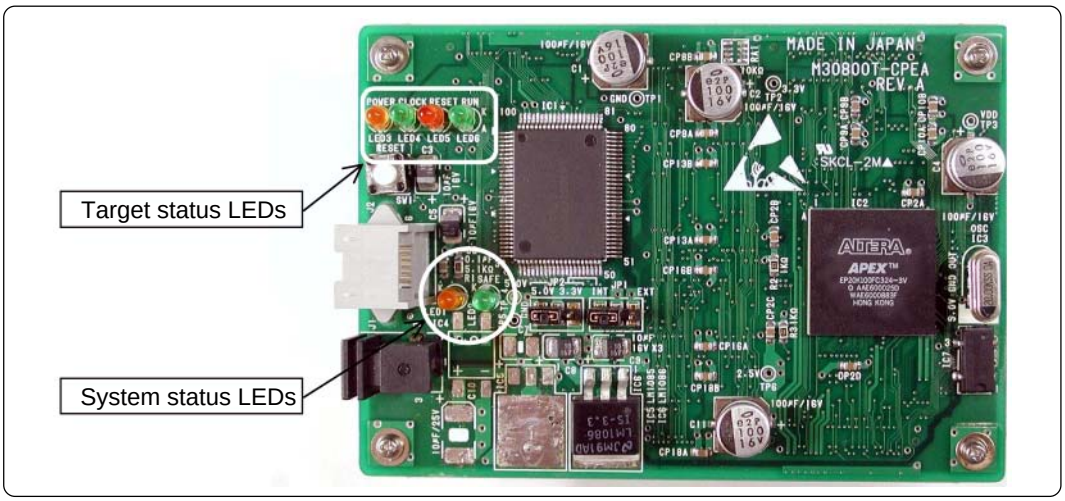


Figure 2.10 Positions of system status LEDs and target status LEDs

(1) System status LEDs

Check the POWER (LED1, orange) of the system status LED is lit immediately after the power is activated. If it is not lit, shut off the power for the emulator and check the power supply for the emulator is properly connected.

Next, check the SAFE (LED2, green) of the system status LED is lit within 5 seconds (when 20MHz internal clock of the emulator mounted) after the power is activated.

If the SAFE LED is not lit, the target status LEDs indicate the cause of the error. See "5.1 Troubleshooting Until the Emulator Starts Up" (page 38) and remedy the troubles.

(2) Target status LEDs

When the SAFE LED is lit, the target status LEDs indicate the state of the target system. The target status LEDs light as shown in Figure 2.11 when the target system is not connected and as shown in Figure 2.12 when a target system is connected.

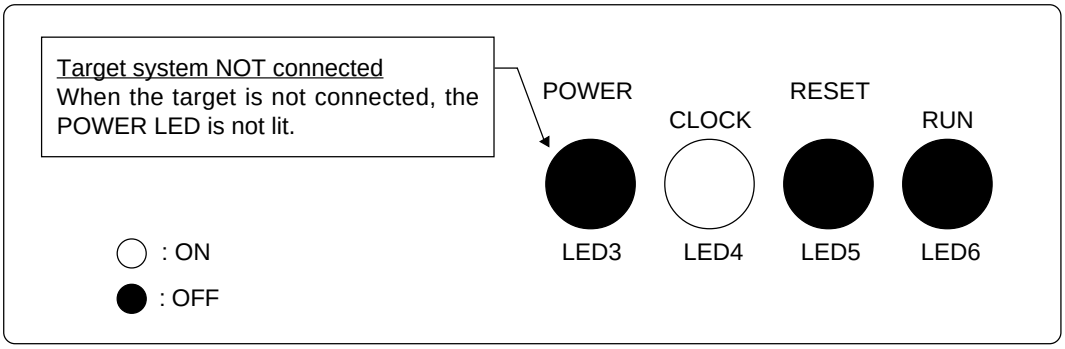


Figure 2.11 LED display when the emulator starts up normally (target system not connected)

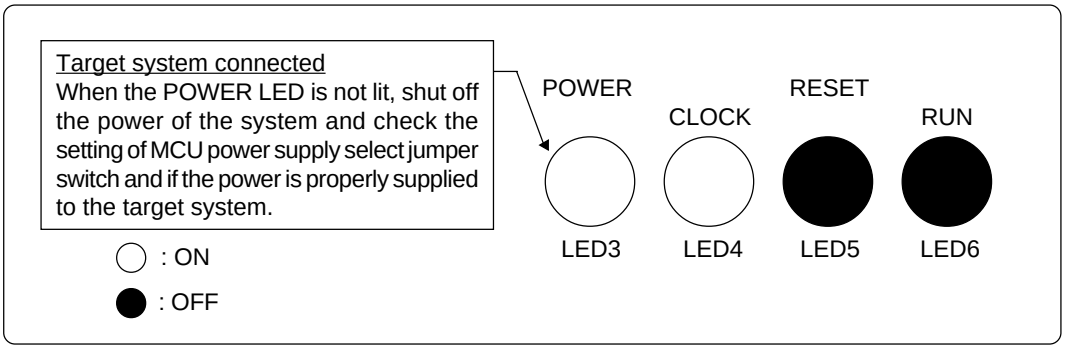


Figure 2.12 LED display when the emulator starts up normally (target system connected)

2.7 Starting Up Emulator Debugger M3T-PD308M

After checking the emulator has started up normally, start up emulator debugger M3T-PD308M.

For starting up emulator debugger M3T-PD308M, follow the steps below.

Click the start button of Windows.
And select Program (P) -> [RENESAS-TOOL] -> [PD308M V.1.10 Release 1*] -> [PD308M].

* Varies depending on the version of the emulator debugger.

2.8 Setting the Operating Environment of Emulator Debugger M3T-PD308M

After starting up M3T-PD308M, as the Init dialog box will open, set up as shown in Figure 2.13. For details on Init dialog box, refer to user's manual of M3T-PD308M.

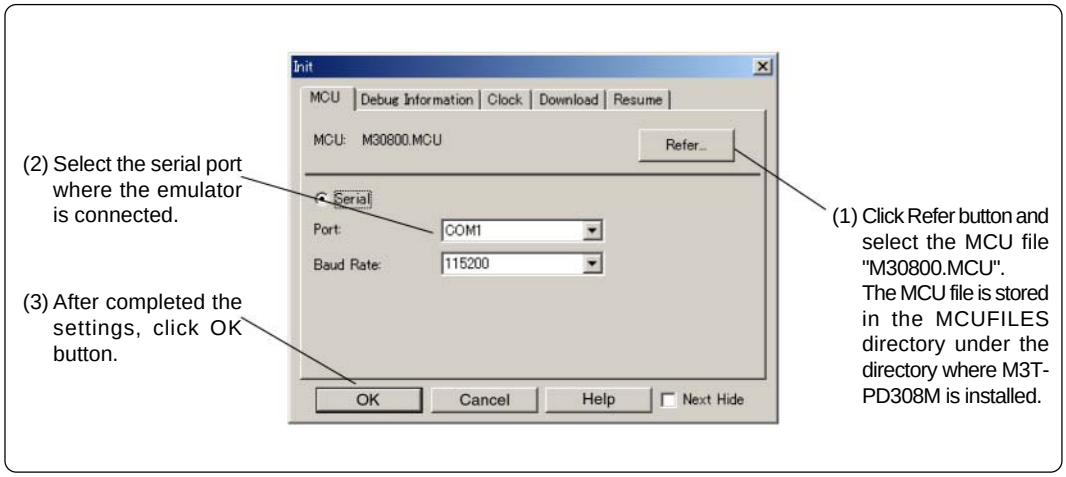


Figure 2.13 Setting Init dialog box

2.9 When Emulator Debugger M3T-PD308M Starts Up Normally

Figure 2.14 shows the window display when M3T-PD308M starts up normally.

If an error has been detected and M3T-PD308M has not started up, refer to "5.1 Troubleshooting Until the Emulator Starts Up" (page 38).

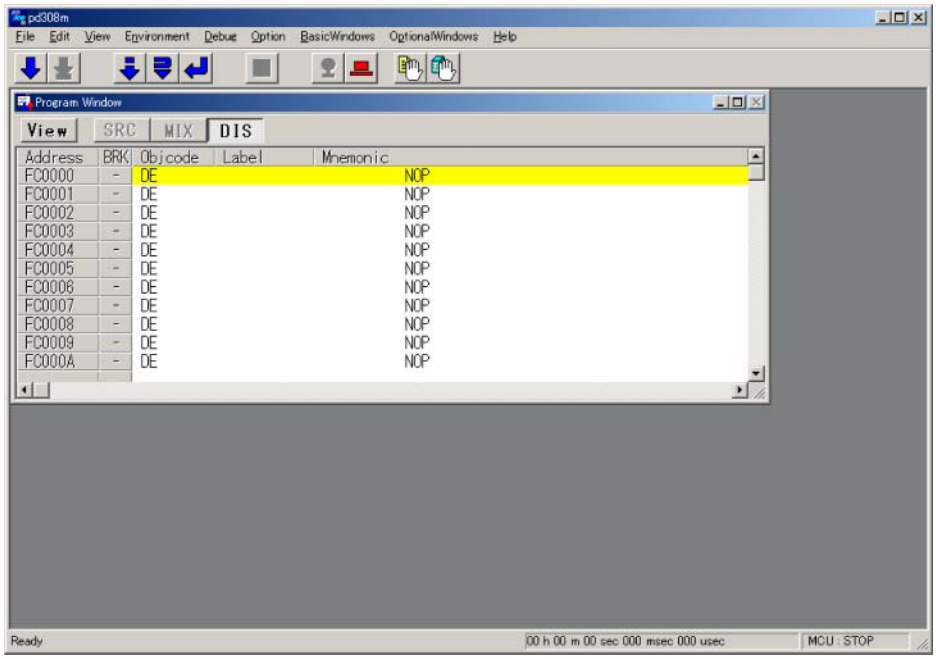


Figure 2.14 Window display of M3T-PD308M when it has started up normally

Chapter 3. Changing the Settings

This chapter describes how to change the setting of this product.

3.1 Using the Emulator without the Target System 30
3.2 Using the Emulator with the Target System 30
3.3 Using the P8$_7$/X$_{CIN}$ Pin as a Port 30
3.4 Using the P8$_7$/X$_{CIN}$ Pin as Sub-Clock Input 30
3.5 Selecting Clock Supply 31
(1) Selecting Clock Supply 31
(2) Using the Oscillator Circuit on the Target System 32
(3) Changing the Internal Oscillator Circuit of Emulator 33

Chapter 3. Changing the Settings

3.1 Using the Emulator without the Target System

How to use the emulator without the target system is shown below.

(1) Set the "MCU power supply select jumper" to INT side and "MCU power voltage select jumper" to 5.0 V side (see page 20).

The target MCU operates with 5.0 V of power supply voltage supplied from the emulator.

3.2 Using the Emulator with the Target System

How to use the emulator with the target system is shown below.

(1) Set the "MCU power supply select jumper" to EXT side (see page 20).

The setting of "MCU power voltage select jumper" is invalid.

(2) Connect the target system (see page 22).

Connect the LCC probe on the lower board of the emulator to the LCC socket (option) or the pitch converter board (option).

(3) Connect the power supply for the emulator (see page 23).

As the emulator cannot supply power to the target system, provide the target system with a separate power supply from that of the emulator.

3.3 Using the $P8_7/X_{CIN}$ Pin as a Port

How to use the emulator when using the $P8_7/X_{CIN}$ pin as a port is shown below.

(1) Set the "$P8_7/X_{CIN}$ select switch" to P87 side (see page 20).

3.4 Using the $P8_7/X_{CIN}$ Pin as Sub-Clock Input

How to use the emulator when using the $P8_7/X_{CIN}$ pin as sub-clock input is shown below.

(1) Set the "$P8_7/X_{CIN}$ select switch" to XCIN side (see page 20).

3.5 Selecting Clock Supply

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

Table 3.1 Clock supply to the MCU

Clock	Description	Display of emulator debugger	Default setting
XIN-XOUT (main clock)	Internal oscillator circuit of emulator (20 MHz)	Internal	Yes
	Target System	External	-
XCIN-XCOUT (sub-clock)	Internal oscillator circuit of emulator (32.768 kHz)	Internal	-
	Target System	External	Yes

IMPORTANT

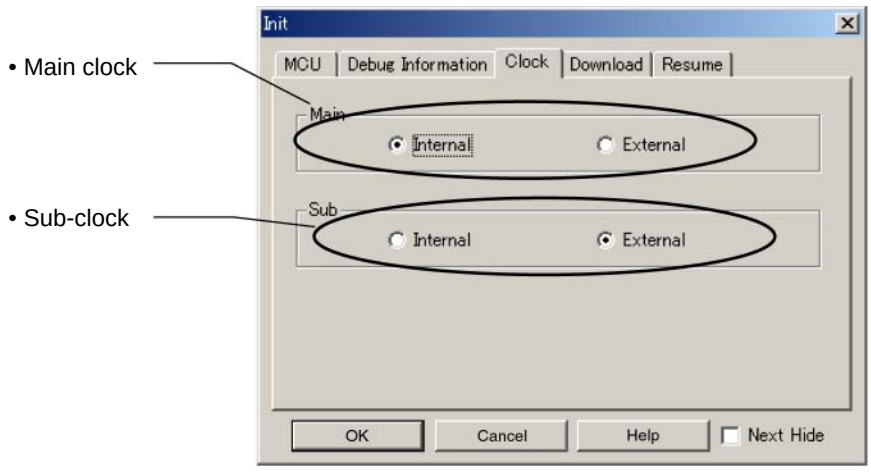
Note on Changing the Clock Supply:

- For using XCIN-XCOUT pins, it is necessary to set "P87/XCIN select switch" of the emulator to XCIN side. For how to set it, refer to "2.3 (2) P87/XCIN Select Switch" (page 20).

(1) Selecting Clock Supply

To select the clock supply, change the clock by the Clock tab of the Init dialog box when starting up the emulator debugger or the CLK command input on the Script window. For details, refer to user's manual of the emulator debugger.

(1) Selecting by Init dialog box



(2) Selecting by CLK command

An example of CLK command input by the Script window is shown below.

example 1 When XIN-XOUT (main clock) is supplied from internal (INT) and XCIN-XCOUT (sub-clock) is supplied from external (EXT):

CLK INT, EXT

example 2 When XIN-XOUT (main clock) is supplied from external (EXT) and XCIN-XCOUT (sub-clock) is supplied from internal (INT):

CLK EXT, INT

(2) Using the Oscillator Circuit on the Target System

To operate the compact emulator with the oscillator circuit on the target system, construct the oscillator circuit as shown in Figure 3.1 in the target system and input the oscillator output at 50% duty (within the operating range of the evaluation MCU) into the X_{IN} pin. And the X_{OUT} pin should be open. It is same for sub-clock oscillator (X_{CIN} and X_{COUT}).

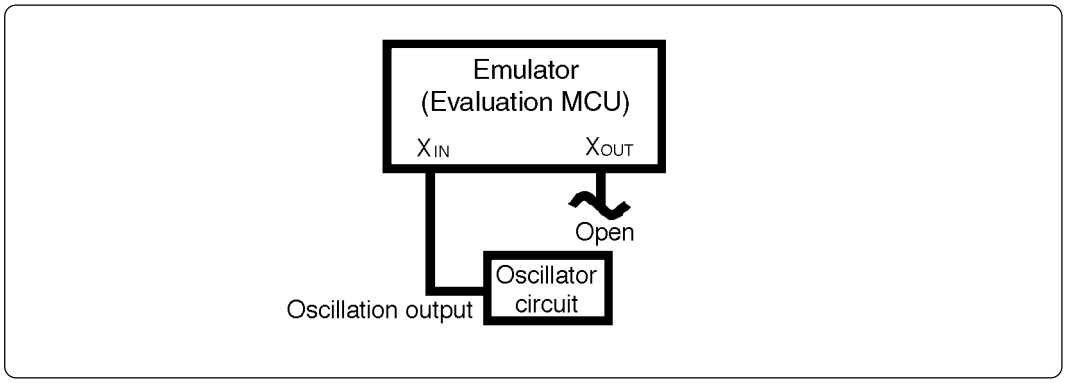


Figure 3.1 External oscillator circuit

Make note of the fact that in the oscillator circuit shown in Figure 3.2 where a resonator is connected between the X_{IN} and X_{OUT} pins, oscillation does not occur because an emulation circuit is used between the evaluation MCU and the target system. It is same for sub-clock oscillator circuits (X_{CIN} and X_{COUT}).

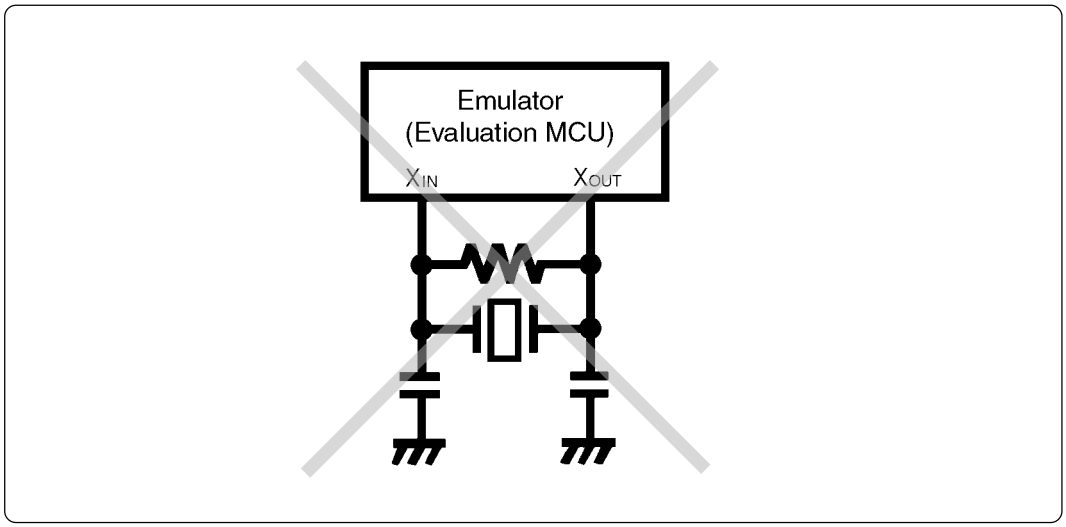


Figure 3.2 Circuit in which oscillation does not occur (same for X_{CIN}-X_{COUT})

(3) Changing the Internal Oscillator Circuit of Emulator

An oscillator circuit for 20 MHz is mounted on this product as an oscillator of a main clock (XIN) oscillator circuit when shipped from factory. When using with the operating frequency other than 20 MHz, it is possible to replace it with a commercially available oscillator circuit board. Figure 3.3 shows the position of the clock and the specifications of the circuit. Table 3.2 lists the recommended oscillator.

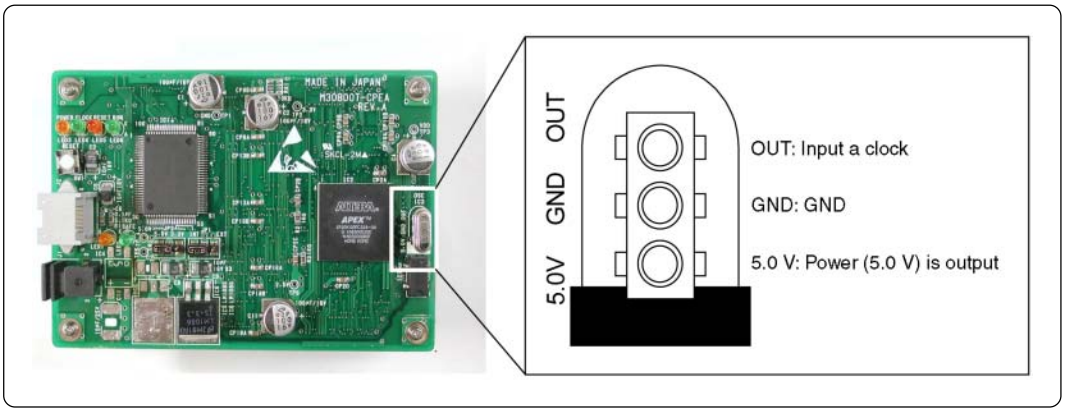


Figure 3.3 Position of the clock and the specifications of the circuit

Table 3.2 Recommended oscillator

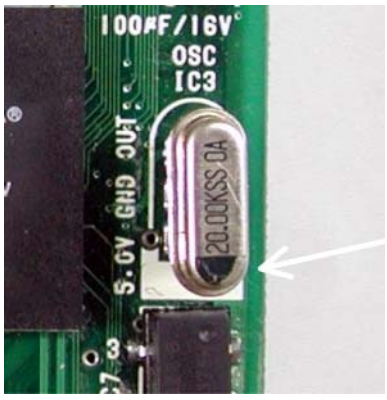
Manufacturer	Type name
KINSEKI, LIMITED	JXO-5 series

(1) Removing the oscillator

Remove the oscillator mounted on the emulator. The position of the oscillator, see Figure 3.3.

(2) Connecting the oscillator

Mount the oscillator with a desired operating frequency. In this time, care about the direction.



Match the power supply (black marking) of the oscillator and 5.0 V (white marking) of the board.

Figure 3.4 Direction for mounting the oscillator

IMPORTANT

Notes on Replacing Internal Clock of Emulator:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the compact emulator.
- Always shut OFF power of the emulator and the target system when connecting and disconnecting the target system.

MEMO

Chapter 4. Specifications

This chapter describes specifications of this product.

4.1 Specifications 36
4.2 Connection Diagram 37
4.3 External Dimensions of the Emulator 38

Chapter 4. Specifications

4.1 Specifications

Table 4.1 lists the specifications of M30800T-CPE.

Table 4.1 Specifications of M30800T-CPE

Applicable MCUs	M16C/80 Series	
Usable mode	Single-chip mode	
Evaluation MCU	M30802SGP	
Internal emulation memory	For internal RAM area: 10 KB For internal ROM area: 256 KB	
Clock supply	Main clock (X_{IN})	Clock mounted on emulator (20 MHz: pre-mounted) Switchable to external oscillator input.
	Sub clock (X_{CIN})	Clock mounted on emulator (32.768 kHz) Switchable to external oscillator input.
Maximum operating frequency	20 MHz (power voltage 4.5 to 5.5 V, divide-by-1, 0-wait)	
Minimum operating frequency	32.768 kHz	
Power voltage for MCU and power supply	With the target (set JP1 = EXT)	4.5 to 5.5 V (supplied through the LCC probe on the back of the emulator board from the target)
	Without the target (set JP1 = INT, JP2 = 5.0 V)	Fixed to 5.0 V (supplied from the emulator)
Basic debugging functions	Download, S/W break (max. 64 points), Program execution/stop (allows free-run execution supporting S/W breaks), Memory reference/setting (reference/setting C-variables, run-time execution), Register reference/setting, Disassemble display, C-level debugging, etc.	
Real-time tracing function	• 32K-cycle bus information is recordable (Address: 20 bits, Data: 16 bits, MCU status: 12 bits) • 2 trace modes are supported (Before Break mode/After Go mode)	
Hardware break function	1 point (address match/bus match/possible to set up to 256 times pass count)	
Execution time measurement function	Time between program start to stop is measurable	
Operating temperature	5 to 35°C (no dew)	
Storage temperature	-10 to 60°C (no dew)	
Connection to target system	Connect the LCC probe on the back of the emulator board with the LCC socket mounted on the target.	
Power supply for emulator	DC 5.0 V ±5%, 2 A supplied from external (prepare the power supply separately)	
Host machine interface	RS-232C serial interface (Max. 115.2 kbps)	

4.2 Connection Diagram

Figure 4.1 shows the connection diagram of M30800T-CPE. This connection diagram mainly shows the interface section, and the circuits which are not connected to the target system such as the emulator's control system are omitted.

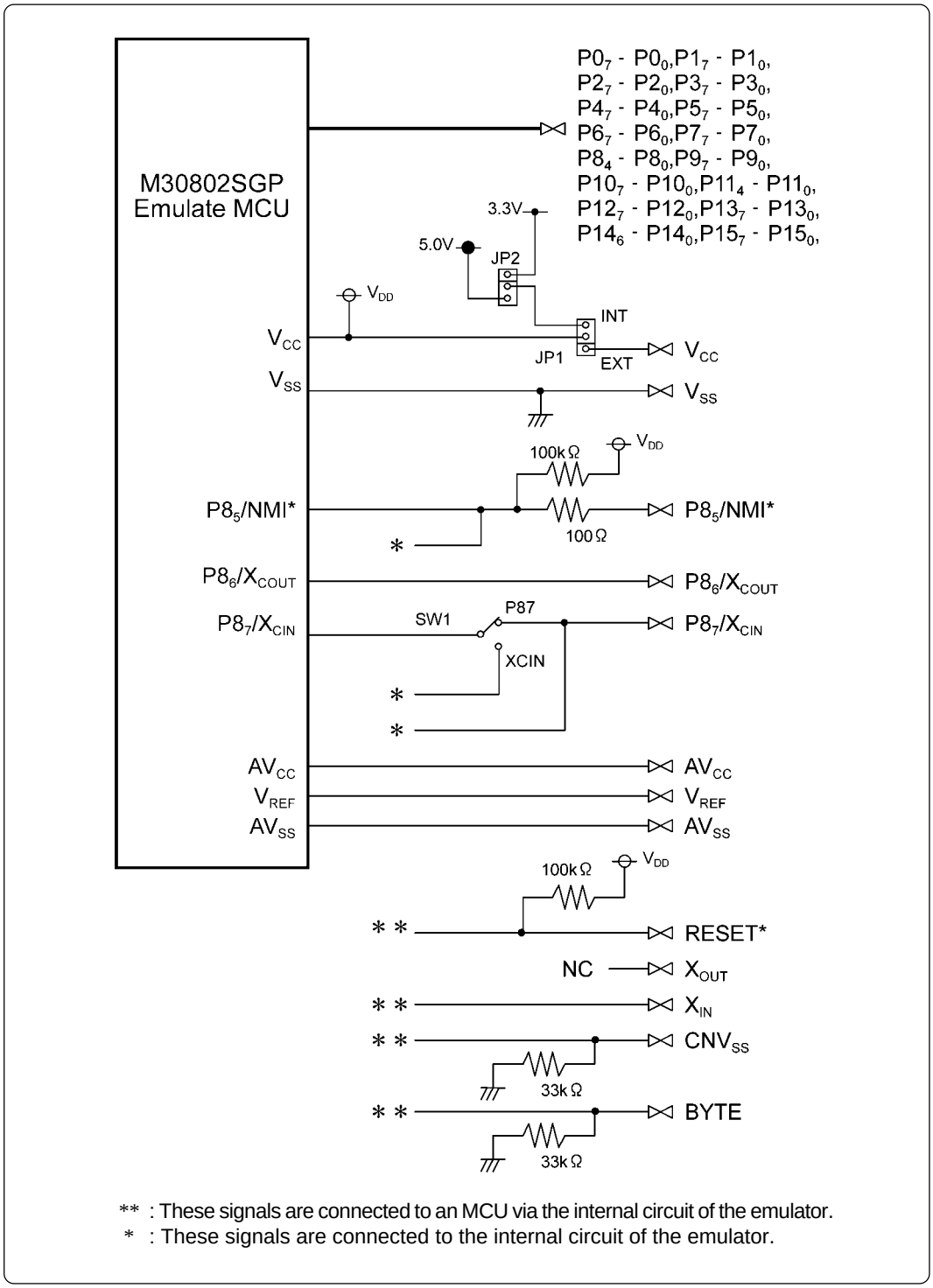


Figure 4.1 Connection diagram (emulation circuits)

4.3 External Dimensions of the Emulator

Figure 4.2 shows external dimensions of the emulator.

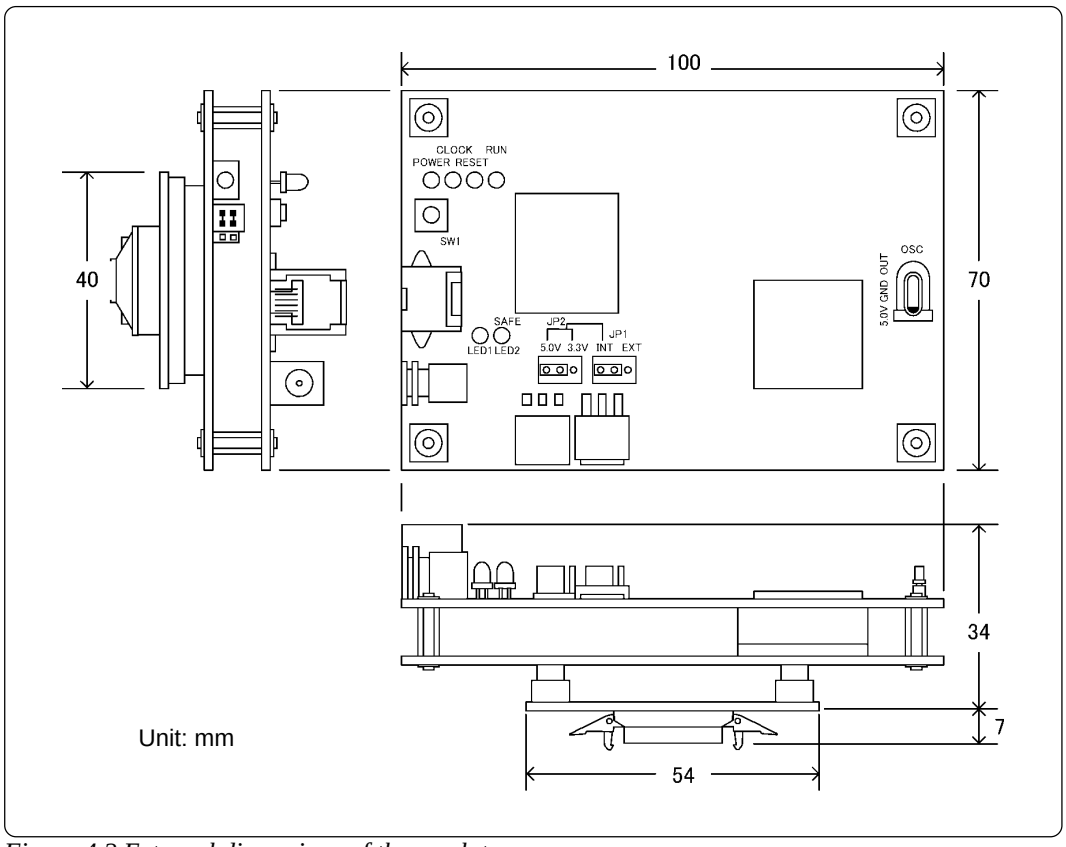


Figure 4.2 External dimensions of the emulator

Chapter 5. Troubleshooting

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

5.1 Troubleshooting Until the Emulator Starts Up 40
(1) Troubleshooting When the Emulator Starts Up 41
(2) Troubleshooting When Emulator Debugger M3T-PD308M Starts Up 42
5.2 Troubleshooting When Using Emulator Debugger M3T-PD308M 43
5.3 When the Operation of the Emulator is Abnormal 44
(1) Self-check Procedure in the Self-check Mode 44
(2) If an Error is Detected in Self-checks 45

Chapter 5. Troubleshooting

5.1 Troubleshooting Until the Emulator Starts Up

Figure 5.1 shows the flowchart to remedy the troubles from when power to the emulator is activated until the emulator debugger starts up.

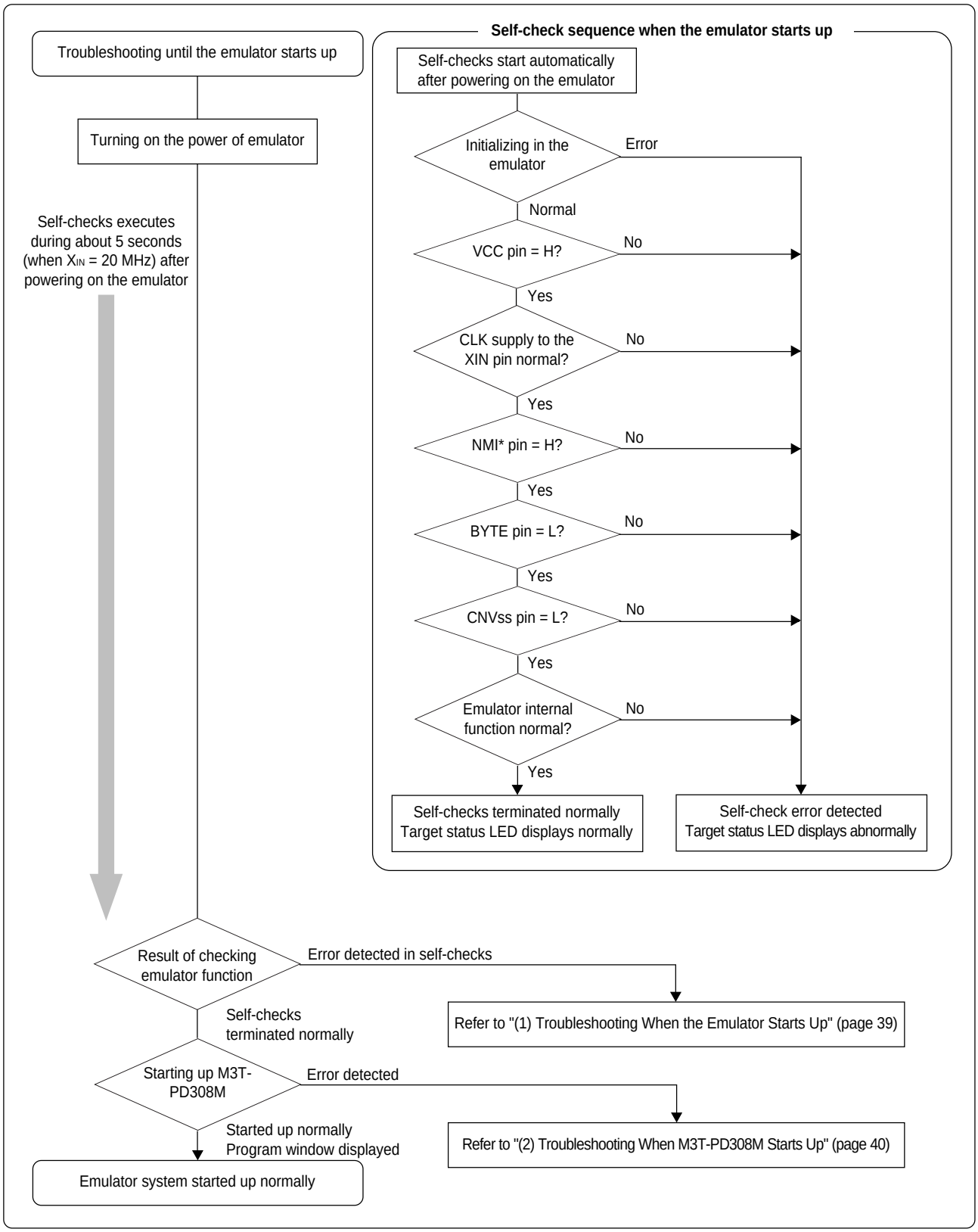


Figure 5.1 Flowchart to remedy the troubles

(1) Troubleshooting When the Emulator Starts Up

Tables 5.1 and 5.2 list how to remedy the troubles when the target LED of the emulator display is abnormal after powering on the emulator.

When an error is detected, shut off the power of the emulator and the target system and follow the steps in tables 5.1 and 5.2. Then, reactivate the power of the emulator and the target system.

Table 5.1 Error display and how to remedy it when starting up the emulator (1/2)

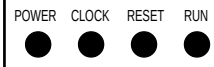
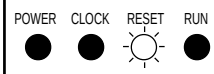
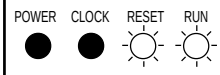
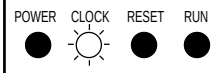
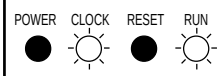
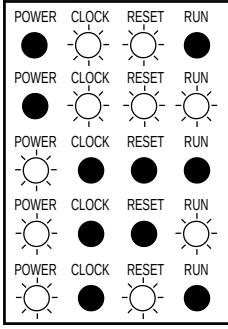
LED display ● : OFF ☼ : Blinking	Connection to the target system	Checkpoint
	-	Emulator does not work properly. *- Check power is being supplied to the emulator.* *- The emulator may be damaged. Contact your local distributor.*
	Connected	Emulator does not work properly because power is not being supplied to the target system. *- Check the power supply of the target system.*
	Not connected	Emulator does not work properly. *- Check JP1 (MCU power supply select jumper) is set to the INT side.*
	-	Internal clock (for XIN) of the emulator does not oscillate properly. *- Check the internal clock is mounted properly referencing "3.5 (3) Changing the Internal Oscillator Circuit of Emulator" (page 31).*
	Connected	Emulator does not work properly because the NMI pin is "L" level. *- Check the NMI pin is "H" level.*
	Not connected	Emulator does not work properly. *- The emulator may be damaged. Contact your local distributor.*
	Connected	Emulator does not work properly because the BYTE pin is "H" level. *- This emulator is specifically designed for use in the single-chip mode. Check the BYTE pin is "L" level.*
	Not connected	Emulator does not work properly. *- The emulator may be damaged. Contact your local distributor.*
	Connected	Emulator does not work properly because the CNVss pin is "H" level. *- This emulator is specifically designed for use in the single-chip mode. Check the CNVss pin is "L" level.*
	Not connected	Emulator does not work properly. *- The emulator may be damaged. Contact your local distributor.*

Table 5.2 Error display and how to remedy it when starting up the emulator (2/2)

LED display ● : OFF ☼ : Blinking	Connection to the target system	Checkpoint
	-	Emulator does not work properly. *- The emulator may be damaged. Report the state of target status LEDs to your local distributor.*

(2) Troubleshooting When Emulator Debugger M3T-PD308M Starts Up

Table 5.3 lists error messages and how to remedy them when starting up M3T-PD308M.

Table 5.3 Error message and how to remedy it when starting up M3T-PD308M

Error message	Connection to the target system	Checkpoint
Communication ERROR. Can't accept data.	-	- Check the emulator's target status LEDs. If flashing, the emulator is not working properly. Check the settings as explained in "(1) Troubleshooting When the Emulator Starts Up". - Check the connected serial port and the serial port settings in the Init dialog box match. - Try lowering the baud rate in the Init dialog box.
Not Compact Emulator.	-	- Check the connected serial port and the serial port settings in the Init dialog box match. - Check an emulator (such as PC4701M, PC4701HS or PC4701L) is not connected.
Target MCU is not given clock.	Connected	- If the Clock tab in the Init dialog box is set to "External", check the target system's oscillation circuit works properly.
	Not connected	- If the Clock tab in the Init dialog box is set to "External", change it to "Internal".
Target MCU is unable to reset.	Connected	- If the Clock tab in the Init dialog box is set to "External", check the target system's oscillation circuit works properly.
	Not connected	- If the Clock tab in the Init dialog box is set to "External", change it to "Internal".
The version of M3T-PD308M and the firmware on the target are not same.	-	- Contact your local distributor.
Please download the firmware to target.	-	- Contact your local distributor.

5.2 Troubleshooting When Using Emulator Debugger M3T-PD308M

When M3T-PD308M has started up normally, however, errors occurred while using it, remedy the troubles referring Table 5.4.

Table 5.4 Error message and how to remedy it when using M3T-PD308M

Error message	Connection to the target system	Checkpoint
Target clock is stopped	Connected	- If an external clock is being supplied, check the target system's oscillation circuit works properly. Also, if using the sub-clock, see "3.4 Using the $P8_7/X_{CIN}$ Pin as Sub-Clock Input" (page 28).
	Not connected	- If the external clock supply is set, change to internal supply. Also, if using the sub-clock, see "3.4 Using the $P8_7/X_{CIN}$ Pin as Sub-Clock Input" (page 28).
Target MCU is unable to reset.	Connected	- If an external clock is being supplied, check the target system's oscillation circuit works properly. Also, if using the sub-clock, see "3.4 Using the $P8_7/X_{CIN}$ Pin as Sub-Clock Input" (page 28).
	Not connected	- If the external clock supply is set, change to internal supply. Also, if using the sub-clock, see "3.4 Using the $P87/X_{CIN}$ Pin as Sub-Clock Input" (page 28).
Target MCU is reset state. Please reset target systems.	Connected	- The target MCU has been reset. Cancel the reset.
Target MCU is HOLD state.	Connected	- If an external clock is being supplied, check the target system's oscillation circuit works properly. Also, if using the sub-clock, see "3.4 Using the $P8_7/X_{CIN}$ Pin as Sub-Clock Input" (page 28). - The MCU may be in the stop or wait modes. Either reset the MCU or cancel the mode with an interrupt.
	Not connected	- If an external clock is being supplied, check the target system's oscillation circuit works properly. Also, if using the sub-clock, see "3.4 Using the $P8_7/X_{CIN}$ Pin as Sub-Clock Input" (page 28). - The MCU may be in the stop or wait modes. Either reset the MCU or cancel the mode with an interrupt.
Target MCU is not given power.	Connected	- Check the power supply and GND are properly connected to the target system.

5.3 When the Operation of the Emulator is Abnormal

Self-check is a function to check the state of the memory etc. mounted on the emulator. Self-check is executed when the emulator starts up, and detailed checks are executed by following the procedure below.

For this self-check, be sure to disconnect the target system. Set each switch as listed in Table 5.5.

Table 5.5 Switch setting when executing self-check

Switch	Setting
MCU power supply select jumper (JP1)	INT side
MCU power voltage select jumper (JP2)	5.0 V side
$P8_7/X_{CIN}$ select switch	XCIN side

(1) Self-check Procedure in the Self-check Mode

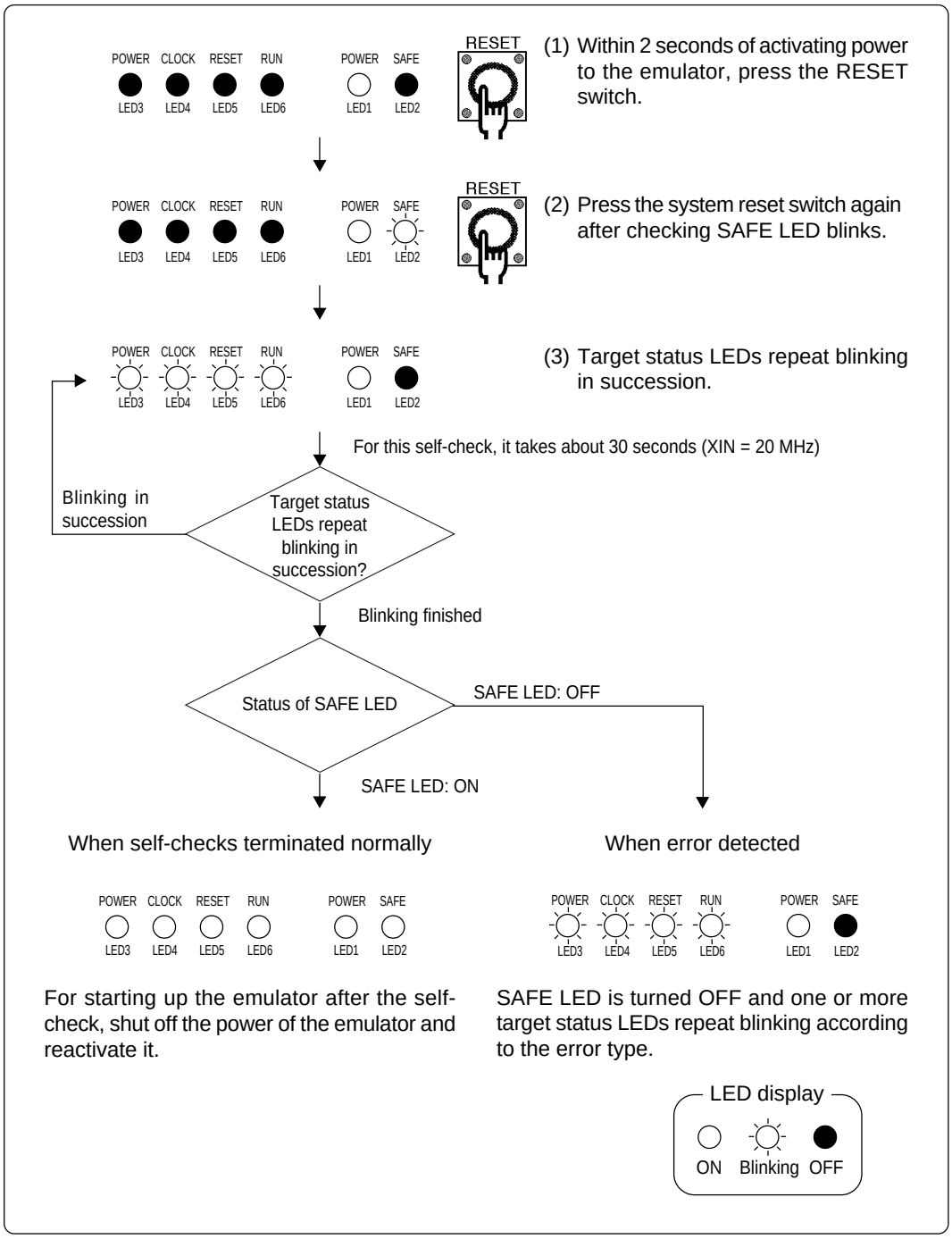


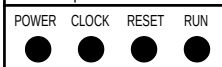
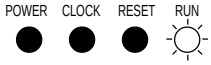
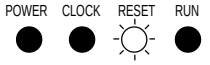
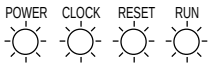
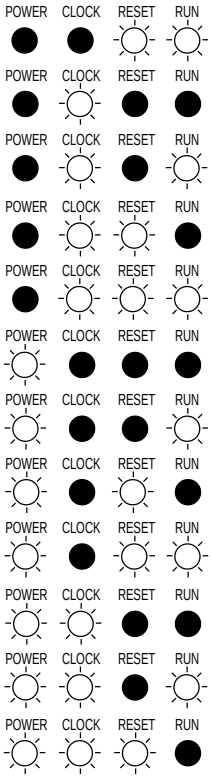
Figure 5.2 Self-check procedure

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

Table 5.6 lists how to remedy troubles if the target status LED display is abnormal in self-checks.

When an error is detected, shut off the power of the emulator and the target system and follow the steps in the Table 5.6. Then, reactivate the power of the emulator and the target system.

Table 5.6 Error display in self-checks and how to remedy it

LED display ● : OFF ☼ : Blinking	Checkpoint
	Emulator does not work properly. *- Check power is being supplied to the emulator.* *- If power is being supplied to the emulator, the emulator may be damaged. Contact your local distributor.*
	Emulator does not work properly. *- Check JP1 (MCU power supply select jumper) is set to INT side.*
	The internal clock (for XIN) of the emulator does not oscillate properly. *- Check the internal clock is mounted properly referencing "3.5 (3) Changing the Internal Oscillator Circuit of Emulator" (page 31).*
	The internal sub-clock of the emulator does not oscillate properly. *- Check P8₇/XCIN select switch is set to XCIN side.* *- If P8₇/XCIN select switch is set to XCIN side, the emulator may be damaged. Report the LED status to your local distributor.*
	Emulator does not work properly. *- The emulator may be damaged. Report the LED status to your local distributor.*

⚠ CAUTION

Notes on Self-checks:

- Be sure to disconnect the target system before executing self-checks.
- Check P8₇/XCIN select switch is set to XCIN side.
- If self-checks do not result normally, the emulator may be damaged. Then, contact your local distributor.

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Chapter 6. Maintenance and Guarantee

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

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6.2 Guarantee 48
6.3 Repair Provisions 48
6.4 How to Request for Repair 49

Chapter 6. Maintenance and Guarantee

6.1 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.

6.2 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.

6.3 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.

6.4 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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M30800T-CPE User's Manual

Rev.1.00
November 16, 2003
REJ10J0271-0100Z

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M30800T-CPE
User's Manual

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REJ10J0271-0100Z