User's Manual

# RENESAS

# Renesas Flash Programmer V2.04

Flash memory programming software

User's Manual: Common

Renesas Electronics
www.renesas.com

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# How to Use This Manual

**Target Readers**    This manual is intended for users who are using the flash programmer in designing and developing a system that employs a Renesas Electronics microcontroller equipped with on-chip flash memory.

**Purpose**    This manual is intended to give users an understanding of the basic specifications and correct use of the Renesas flash programmer.

**Organization**    This manual includes the following sections.

- Overview
- Installation
- Unique code embedding function
- Troubleshooting
- Cautions
- Messages
- Supplementary information

**How to Read This Manual**    It is assumed that the readers of this manual have general knowledge of electricity, logic circuits, and microcontrollers.

**Conventions**    **Note**:  Footnote for item marked with **Note** in the text.
**Caution**:  Information requiring particular attention
**Remark**:  Supplementary information
Numeral representation:       Binary ... xxxx or xxxxB
                              Decimal ... xxxx
                              Hexadecimal ... 0XXXXX or xxxxH
" ":  Any character or item on the screen that can be selected or input
[    ]:  Name of button
[    ]:  Name of commands, dialog boxes, options, or areas on the screen

**Terminology**  The meanings of the terms used in Renesas Flash Programmer manual are as follows:

(1/2)

| Term | Meaning |
|---|---|
| RFP | Abbreviation of the Renesas Flash Programmer software for programming flash memory |
| E1/E20 | Abbreviation of the E1 emulator / E20 emulator |
| MINICUBE2 | Nickname used for the main unit of QB-MINI2, the on-chip debug emulator with programming function |
| Tool used | General term for the tool used by the customer, which is E1, E20, or MINICUBE2. |
| Utility | Software used for self-diagnosis of the tool used and to update the MINICUBE2 firmware. |
| Target microcontroller | The Renesas Electronics on-chip flash memory microcontroller used by the user |
| Target system | User-designed board on which the target microcontroller is mounted |
| Program adapter[Note 1] | Conversion adapter used to write programs to the target microcontroller |
| Device information file | Device information files contain parameter information required for writing programs to the flash memory in the target microcontroller.  These files have the extension *.prm, *.pr5, or *.fcf.  Do not change the data in the device information files.  If the data is changed, RFP might not operate properly. |
| Workspace file | The workspace is where projects are stored.  There is always at least one project in the workspace. Some workspaces allow multiple projects to be registered.<br><br>In RFP, workspace files have the extension *.rws.<br><br>Caution: Use workspace files that correspond to the version of the generated RFP. An error occurs when the RFP reads files from other RFP versions. In such cases, create new workspace files. |
| Project file | Project files store the data required to write programs.  In RFP, a project file stores the settings related to the programming environment, such as target microcontroller settings and command option specifications.  In RFP, project files have the extension *.rpj. |
| Signature | Information about the microcontroller. |
| rfp.ini | This file is where the RFP settings are saved.  The settings are saved when RFP is terminated. |
| OCD security ID[Note 3] | A security feature related to on-chip debugging of a microcontroller. |
| Flash options[Note 3] | General term for MCU operations such as security settings. |
| Option data[Note 3] | General term for flash options, wide-voltage mode, and full-speed mode[Note 2] |
| ID code[Note 3] | Authentication code used in the ID authentication mode and in OCD. For details, refer to the user's manual of the microcontroller. |
| Lock bit[Note 3] | One of the security functions of the microcontroller. For details, refer to the user's manual of the microcontroller. |
| HEX file | Program file without option data |
| HCUHEX file | A program file that integrates option data and that is generated by using the HEX Consolidation Utility (HCU), which is used to generate ROM code for flash memory products whose flash memories are pre-written by Renesas Electronics. |

| Term | Meaning |
|---|---|
| Program file | The program file refers to the file that contains the program to be written to the microcontroller.   The following program file formats are supported by RFP when writing to an RL78, 78K, or V850 microcontroller: <br><br> a. HEX files in Intel HEX format <br><br> b. HCUHEX files in Intel HEX format <br><br> c. HEX files in Motorola S format <br><br> d. HCUHEX files in Motorola S format <br><br> The following program file formats are supported by RFP when writing to an RX, or RH850 microcontroller: <br><br> a. HEX files in Intel HEX format <br><br> b. HEX files in Motorola S format <br><br> **Caution   An empty area will be supplemented with FFH.** <br><br> **Notes 1. Blank areas are complemented by FFH when reading is performed.** <br><br> **2. For details on the format, refer to the information on how to order ROM codes (C10302J).** <br><br> **3. The only supported character code is ASCII (one byte). Unicode (two bytes) is not supported.** |
| COMx | COMx is a serial interface port incorporated in the host PC. <br><br> When writing data to the target system by using the serial interface incorporated in the host PC, select COMx as the tool used.   Any value from 1 to 256 can be specified for $x$. |
| USB Direct | USB Direct is a method to write in the microcontroller in the USB boot mode by using the USB interface port of the host PC. When writing data by using the USB interface of the host PC, select USB Direct as the tool used. |
| FINE | FINE is a single or dual line communications interface operating through the FINE pin of microcomputers.   Select RX100 and RX200 as the microcomputer to be used and E1 or E20 as the tool to be used. |
| User/data area | Target area of the flash memory to which the program file is written. <br><br> For the RL78, 78K, and V850: Code flash and data flash <br> For the RX: User area and data area <br> For the RH850: Code area and data area |
| User boot area | Target area of the flash memory to which the program file is written. <br><br> For the RL78, 78K, V850, and RX100: None <br> For the RX200 and RX600: User boot area <br> For the RH850: User boot area or extended user area |
| Basic mode | This mode is mainly for writing in mass production, and the focus is on basic rewriting processing. |
| Full mode | The full mode is mainly for the use of microcontrollers in development, and facilitates the control of multiple projects and the checking of setting information. |
| ID authentication mode | One of the security functions of the microcontroller. For details, refer to the user's manual of the microcontroller. |
| Command protection mode | One of the security functions of the microcontroller. For details, refer to the user's manual of the microcontroller. |
| OTP | One of the security functions of the microcontroller. For details, refer to the user's manual of the microcontroller. |
| OFS | One of the security functions of the microcontroller. For details, refer to the user's manual of the microcontroller. |

**Notes 1.** The program adapter is a product of Naito Densei Machida Mfg. Co., Ltd.
If you have any questions about the FA adapter board, contact Naito Densei Machida Mfg. Co., Ltd.
(Tel: +81-42-750-4172).
   **2.** The functions that can be used differ depending on the target microcontroller.
   **3.** Refer to the user's manual of the target device for more information.

**Related documents** When using this manual, also refer to the following documents.
The related documents indicated in this publication may include preliminary versions.
However, preliminary versions are not marked as such.

Documents related to development tools

| Document name | Document number |
|---|---|
| Renesas Flash Programmer V2.04 Common | This manual |
| Renesas Flash Programmer V2.04 RL78, 78K, V850 | R20UT2907E |
| Renesas Flash Programmer V2.04 RX100, RX200, RX600 (Except RX64x) | R20UT2908E |
| Renesas Flash Programmer V2.04 RH850, RX64x | R20UT2909E |
| E1 Emulator R0E000010KCE00 E20 Emulator R0E000200KCT00 | R20UT0398E |
| QB-MINI2 On-Chip Debug Emulator with Programming Function | R20UT0449E |
| MINICUBE2 Diagnosis Tool | U18588E |

**Caution** The related documents listed above are subject to change without notice.
Be sure to use the latest version of each document for designing, etc.

**Term replacement** When the RX100 is used, some terms in this manual should be replaced as shown in the table below.

| Term | To be replaced with |
|---|---|
| Flash shield window | Area protection |
| USB Direct | USB interface mode |
| Get Flash options | Access window read |
| Set Security | Access window program |

# CONTENTS

# RENESAS

## Renesas Flash Programmer V2.04
### Flash memory programming software

R20UT2906EJ0100
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## CHAPTER 1 OVERVIEW

Renesas Flash Programmer (hereafter referred to as RFP) is software that erases, writes, and verifies programs on the target system on which a Renesas Electronics single-chip microcontroller with on-chip flash memory is mounted by using an E1 emulator (hereafter referred to as E1), E20 emulator (hereafter referred to as E20), or the on-chip debug emulator with programming function, QB-MINI2 (hereafter referred to as MINICUBE2), or a serial interface.

### 1.1 Features

- Writing controlled by the host PC
- Writing settings can be saved in a workspace file
- Microcontroller-specific information required for writing is included in the product package as a device information file. Such information of the generic device should be obtained by the query.
- Two types of writing operation windows (Basic mode and Full mode)
- Execution of scripts
- Embedding of unique codes

### 1.2 Writing Quality

Thoroughly confirm, verify and evaluate the following points before using RFP, in order to improve the writing quality.
- Design circuits as described in the user's manual for the target microcontroller, E1, E20, and MINICUBE2.
- Use the microcontroller and RFP as described in the user's manual of the target microcontroller, RFP, E1, E20, and MINICUBE2.
- Make sure that the power supplied to the target microcontroller is stable.

### 1.3 Supported Microcontrollers

Microcontrollers supported by RFP are listed on the following websites:

http://www.renesas.com/rfp

## 1.4   System Overview

An overview of the RFP system is illustrated in the following diagram.

**Figure 1-1.  RFP Connection Image**
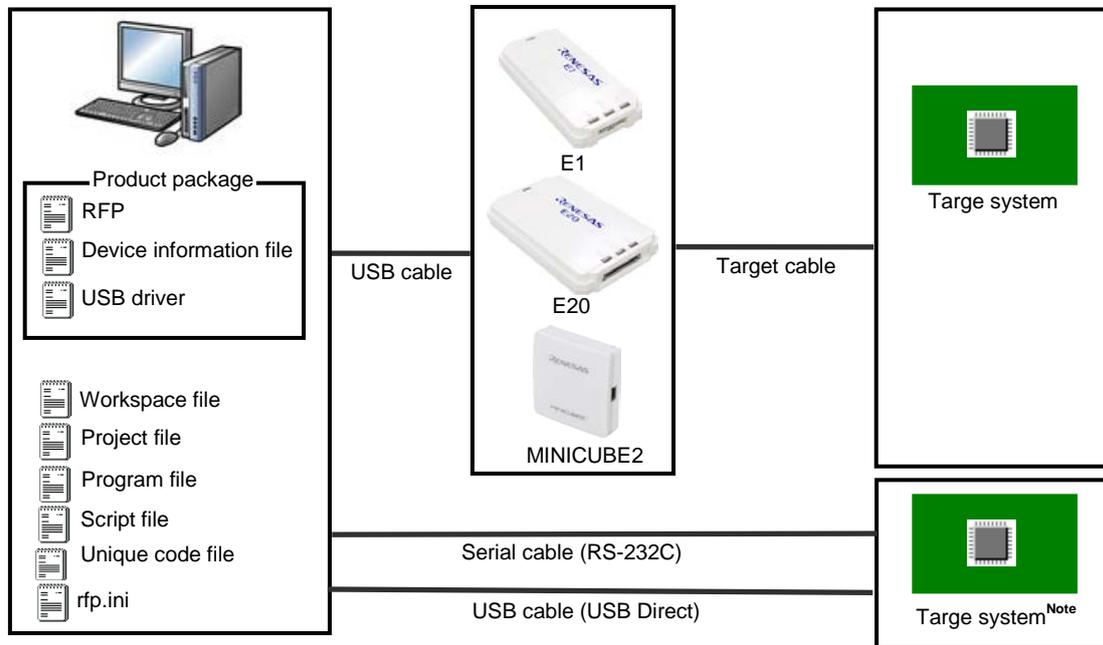


**Note**      To write data to the target system by using the serial interface incorporated in the host PC, a writing circuit is required in the target system.  See the sample circuit shown on the following websites:

   http://www.renesas.com/rfp

**Remark**   Do not modify or delete the folder and file configuration of the RFP.

**RFP operation overview**

The following operations can be performed by using RFP.  The settings on the host machine are saved in an `rfp.ini` file.

- Creating, saving, and reading workspace files
- Reading program files and device information files
- Target command execution
- Checksum calculation for program files
- Creating and saving multiple project files in workspace files (only full mode)
- Executing script commands
- Embedding unique codes

## 1.5   Operating Environment

This section explains the following items with respect to the operating environment:
- Hardware environment
- Software environment

### 1.5.1   Hardware environment

**(1) Host PC**
- PC/AT$^{TM}$ compatible
- Processor: 1 GHz or higher
- Main memory: 1 GB or more (2 GB or more when using 64-bit Windows); 2 GB or more recommended
- Display: Resolution of 1,024 x 768 or higher and 65,536 or more colors
- Interface: USB 2.0 (when using E1, E20, MINICUBE2, USB Direct)
                    Serial interface (RS-232C) (when using COMx)

**(2) Tools used**
- E1
- E20
- MINICUBE2

### 1.5.2   Software environment

- Windows Vista (32-bit and 64-bit)
- Windows 7 (32-bit and 64-bit)
- Windows 8/8.1 (32-bit and 64-bit)
- Microsoft .NET Framework 4
- Microsoft Visual C++ 2010 Redistributable Package (x86)

## 1.6    Handling of HCUHEX Files

An HCUHEX file is required for ordering flash memory products whose flash memories are pre-written by Renesas Electronics.  After being generated by the HEX Consolidation Utility (HCU), operation based on the HCUHEX file must be verified by using the flash memory programmer.  Because RFP handles the HCUHEX file as master data, the user can check the settings specified for writing and option data.

Some RL78, 78K, V850, and RH850 microcontrollers support HCUHEX files.  If a microcontroller supports HCUHEX files, it is written in the user's manual of the microcontroller. (SH, RX, and R8C microcontrollers do not support HCUHEX files.)

For details, see the description on each feature in this manual.  For details about the HCU, see the user's manual of the HCU or the target microcontroller.  The HCU user's manual is available on the following website:

http://www.renesas.com/support/downloads/download_results/ods/other/hcu_gui.jsp

**Figure 1-2.  Example of Using RFP and HCUs**
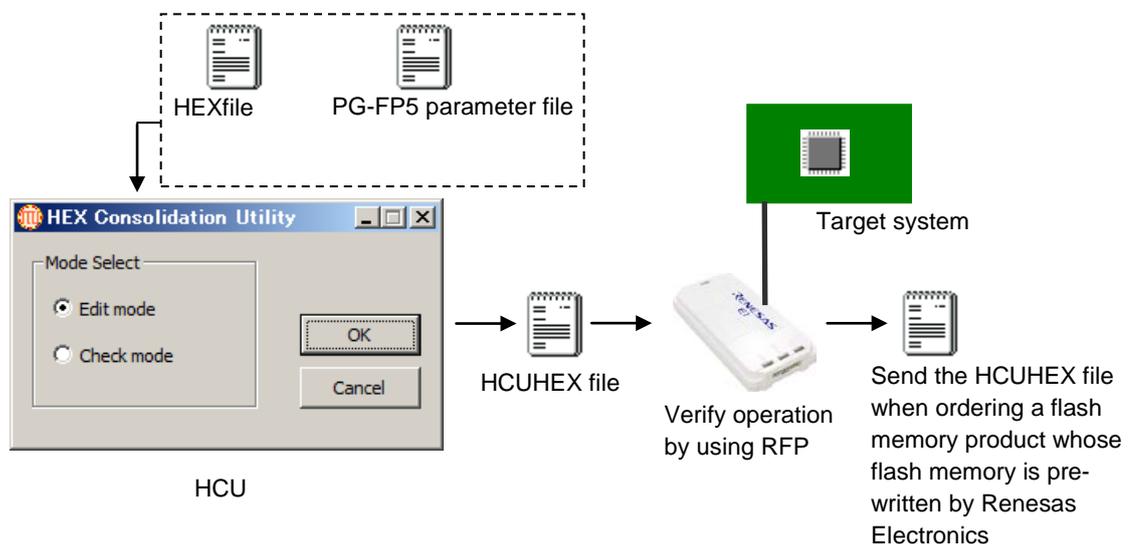
**CHAPTER 2   INSTALLATION**


This chapter describes installation.

## 2.1   Installation

To install the product package (RFP, USB driver, and device information file), insert the CD into the host PC to start the installer.  Install as instructed by the installer program.

After the product package is installed, the folders are organized as follows:

```
C:\
  └── \Program Files                    ⎫  Folder structure for which installation is specified
  ┊    ├── \Renesas Electronics         ⎭
  ┊    ┊    ├── \Programming Tools           Folder where RFP, device information files, documents,
  ┊    ┊    ┊    ├── \Renesas Flash Programmer V1.01  ◄──── and utilities are stored
  ┊    ┊    ┊    └── \Renesas Flash Programmer V1.02
  ┊    ┊    ┊
  ┊    ┊    └── \CubeSuite+ Drivers
  ┊    ┊         ├── \E-SeriesUSB       ◄────── Folder where the USB driver for E1 and E20 is stored
  ┊    ┊         ├── \MINICUBE2         ◄────── Folder where the USB driver for MINICUBE2 is stored (32-bit Windows)
  ┊    ┊         ├── \USB Driver x64    ◄────── Folder where the USB driver for MINICUBE2 is stored (64-bit Windows)
  ┊    ┊         └── \HMSEUSB           ◄────── Folder where the USB driver TYPE A for USB boot is stored
  ┊    ┊
```

## 2.1.1   Notes on installation

(1) Multiple versions of RFP can be installed on a single host PC.  Although we recommend using the latest version of any development tool, leaving a previous version on your host PC and then installing the latest version lets you easily switch the development environment.  Note that the Vx.yy part of the version notation (Vx.yy.zz) reflects the ability to install multiple versions (installation of multiple versions with different Vx.yy parts is supported).  When more than one version having the same Vx.yy is installed, the last version to be installed overwrites the previous version.

(2) You might be asked to reboot your computer after installing the RFP.  Be sure to close all other applications before rebooting your computer.

(3) You must have administrator privileges to install the RFP.

(4) The RFP can only be installed in a folder that is named using ASCII characters.  (Note that the 11 characters / * : < > ? | " \ ; , and character strings that begin and end with a space cannot be used.)  The RFP might not operate correctly if installed in a folder that is named using other characters.

(5) The RFP cannot be installed from a network drive or on a network drive.

(6) The installer does not specify environment variable paths.  If these paths are required, add them after installation.

(7) Using the RFP requires the Microsoft .NET Framework, language packs, and Microsoft Visual C++ Runtime Library provided by Microsoft Corporation. Processing by the CD that accompanies an RFP product the user has purchased or by an RFP the user has downloaded from the website includes processing to install the above tools. Note that the host PC must be connected to the network to install the free evaluation versions in a Windows XP or Vista environment if the above tools are not installed. To proceed with setting up on a PC that is not connected to the network, start by setting up the programming GUI after installing Microsoft .NET Framework 4 with reference to the Microsoft download center website.

(8) The following folders created after installation (including the files under the folders) contain files required for the tools to operate.  Do not delete them.
    (Windows is the 32-bit edition and the system drive is C:)
    C:\Program Files\Common Files\Renesas Electronics CubeSuite+\
    (Windows is the 64-bit edition and the system drive is C:)
    C:\Program Files (x86)\Common Files\Renesas Electronics CubeSuite+\

(9) To change the folder of the installed tools, uninstall all the CubeSuite+ related software and the programming GUI for RFP, and install them again.

(10) In the environment where the CubeSuite+, RFP, E1, E20, MINICUBE2 and USB driver for USB Boot are installed, the RFP, E1, E20, MINICUBE2 and USB driver for USB Boot are included in the target software of the CubeSuite+ integrated uninstaller.  If you don't want to delete them, remove them from the uninstallation targets.

(11) If the installer is started on a non-Japanese version of Windows, then if the path contains multi-byte characters it will cause an error, and the installer will not start.

(12) If a CubeSuite+ instance launched via Rapid Start is in the notification area (system tray) during installation, the following error will appear. Exit the application, and run the installer again.

**Figure 2-1 [Question (Q0140035)] Dialog Box**
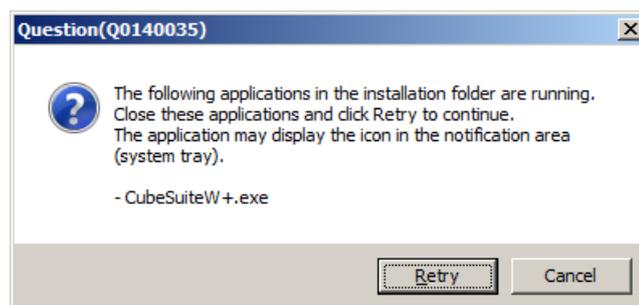
## 2.2   Uninstallation

To uninstall the RFP package (RFP, USB driver, and device information file), use "Add or Remove Programs" (or "Programs and Features") on the Control Panel.  The CubeSuite+ integrated uninstaller can also be used to uninstall the RFP package.

## 2.3   Updating RFP and Firmware

The firmware is a program embedded in the microcontroller for controlling E1, E20, or MINICUBE2.  Updating RFP and the firmware enables the following:

- Addition of newly supported functions or microcontrollers
- Correction of restrictions

For RFP and the firmware, use of the latest version is recommended to ensure correct operation of E1, E20, and MINICUBE2.

The latest version of the firmware for RFP and MINICUBE2, and MINICUBE2 Diagnostic Tools can be checked and obtained at the following websites:

http://www.renesas.com/rfp

How to check the firmware version and configure and update your system are described below.

For the E1 and E20, check that the RFP has the correct versions of the E1 and E20 firmware.  If the firmware does not match, the firmware will automatically be updated.

For MINICUBE2, see **MINICUBE2 Diagnostic Tools User's Manual (U18588E)** for how to check the firmware version, and configure and update your system.

## CHAPTER 3   UNIQUE CODE EMBEDDING FUNCTION

This chapter explains the unique code embedding function.

### 3.1   Overview

The unique code embedding function embeds a unique code in the specified area in the loaded program file. To enable this function, describe unique codes and a specified area in the unique code file and configure the setting in the [Unique code setting(U)] dialog box. A unique code file can specify one specified area and multiple unique codes. Each unique code has an index. When [Program] command or [Autoprocedure] command (for RL78, 78K, V850 only) finishes normally, the index is updated to the next index. When [Verify] command or [Checksum] command finishes normally, the index is not updated.

### 3.2   [Unique code setting] dialog box

This dialog box is used to configure the settings for a unique code (the enable/disable status of the unique code embedding function, definition file, start/end positions of the definition file, and the action when there is a conflict with the program file code).

**Figure 3-1.  [Unique Code Setting] Dialog Box**
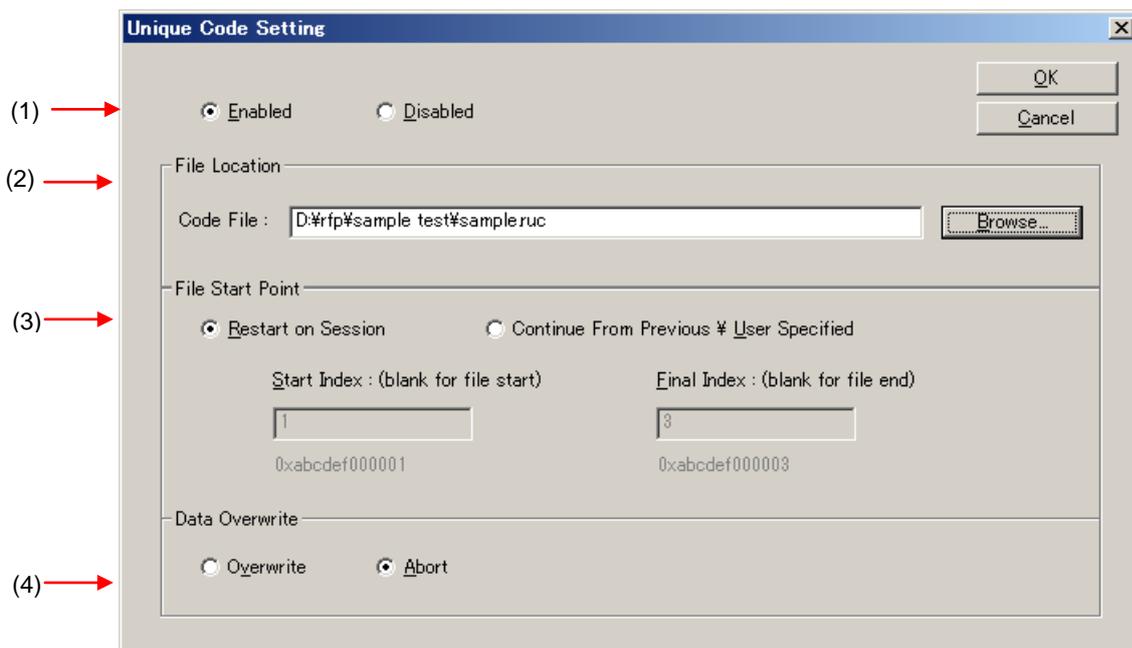


#### (1)   [Enabled/ Disabled] option button

Specifies whether to enable/disable the unique code embedding function.

**(2) [File Location] area**

Specifies the full path of the unique code file. Enter the file name in the [File name:] text box directly, or click the Browse... button and open the [Browse for folder] dialog box to specify the file.

**(3) [File Start Point] area**

Specifies the start/end positions for the indexes described in the unique code file.

[Start from the beginning of the file] option button

The lines from the first to the last are specified. When the RFP restarts, it starts at the first line.

[Start at the last position (start/end positions can be specified)] option button

Specifies the start/end positions. When the RFP restarts, it starts at the last position.

[Next position (blank if it is the beginning of the file)] box

The next position is displayed or specified. The unique code is displayed under the box.

[End position (blank if it is the end of the file)] box

The end position is displayed or specified. The unique code is displayed under the box.

**(4) [Data Overwrite] area**

Selects the action from the option buttons when data (other than FFh) exists in the area in the loaded program file where the unique code is to be embedded (that means a conflict exists). If [Overwrite] is selected, the unique code will overwrite. If [Abort] is selected, the error message is displayed and the command is aborted.

When the OK button is pressed, the settings are saved temporarily and the dialog box closes.
When the Cancel button or the X button is pressed, the settings are discarded and the dialog box closes.

## 3.3   Unique code file

This section describes a unique code file (file extension, file format, format and example).

**(1)   File extension**

*.ruc

**(2)   File format**

File format: text format

Newline: CR + LF

The only supported character code is ASCII (one byte). Unicode (two bytes) is not supported.

**(3)   Format**

| | |
|---|---|
| The first line | :format |
| The second line | :area |
| The third line | :address |
| The fourth line | :size |
| The fifth line | :index data |
| The sixth line and after | :index number and unique code |

The lines starting with // are comment lines and will be skipped.

Caution:      The index number should be incremented by 1.

**(4) Example**

```
//Sample unique code file
format hex
area user flash
address 0xf000
size 6
index data
000001 abcdef000001
000002 abcdef000002
000003 abcdef000003
```

## 3.4   Unique code definition

   This section describes the unique code definition described in a unique code file. The command interpreter is case-insensitive.

**Table 3-1.  Unique Code Definition**

| Function | Unique code definition |
|---|---|
|  | Description |
| Specify the format | format <hex \| ascii> |
|  | Specifies the format of the unique code. <br> <hex>: hexadecimal format <br> <ascii>: ASCII format (0x21-0x7e) |
| Specify the area | area <user flash \| data flash \| user boot flash> |
|  | Specifies the area of the flash memory. <br> <user flash>: User area <br> <data flash>: Data area <br> <user boot flash>: User boot area (only specifiable for the RX200, RX600, and RH850) |
| Specify the address | address <address> |
|  | Specifies the start address of the area where the unique code will be embedded. <br> <filename>: hexadecimal format starting with "0x" or "H" |
| Specify the size | size <size> |
|  | Specifies the size of the area where the unique code will be embedded. <br> <size>: the size in bytes is specified (range: 1-2048, integer) |
| Unique code declaration | index data |
|  | Declares the unique code data starts at the next line. |
| Index and unique code | <index> <unique code> |
|  | Specifies the Index and unique code. (Maximum: 17280) <br> <index> : the index is specified (range: 0-4294967295, integer) <br> <unique code>: the unique code is specified (big endian format, with specified format and size) |

## CHAPTER 4   TROUBLESHOOTING

This chapter explains how to troubleshoot RFP.

**Remark**    Using the diagnostic tool, the user can find out why RFP does not run normally, such as due to a defect in the tool used, or problems in other hardware.  For how to use the diagnostic tool, see the user's manual of the tool used.

## 4.1    Problems During Startup

This section explains how to troubleshoot problems that might occur in the process from installation to startup.

**(1)  When the tool is connected to the host PC via a USB interface, the driver is not recognized by Plug and Play.**
Cause:
   The USB connector might not be inserted properly into the USB port of the host PC.
Action:
   Check that the USB connector is fully inserted into the USB port of the host PC.  Alternatively, disconnect the USB connector, and then insert the USB connector again after a while.

**(2)  The USB driver file cannot be found at the specified location.**
Cause:
   The USB driver might not have been installed normally.
Action:
   See **CHAPTER 2  RFP INSTALLATION** and reinstall the USB driver.

**(3)  The tool is connected to the host PC but the power LED on the tool is not turned on.**
Cause:
   The USB port of the tool or the host PC might have a defect.
Action:
   Check a defect of the tool using the diagnostic tool for the tool used.  If a defect is found, consider repair.  If there is no defect, try connecting the tool to another host PC.

**(4)  The "Add New Hardware Wizard" screen appears when tool is connected with the host PC.**
Cause:
   If the USB connector of the tool is inserted into a port that differs from the one used during installation, the tool might be recognized as a new hardware item.
Action:
   Select "Search for a suitable driver for my device (recommended)" and install the USB driver.

## 4.2   Problems During Operation

This section describes the troubleshooting for problems that may occur during operation.

**Remark**   For causes and actions for the messages displayed in the internal error, fatal error, selection, and warning
dialog boxes, and output panel, see **APPENDIX A  MESSAGES**.

**(1)  One of the following errors is displayed on the output panel.**
Error (E1000001) : *E1/E20/MINICUBE2/COMx* communication time out.
Error (E1000009) : *E1/E20/MINICUBE2/COMx* communication error.

Cause 1:
The USB cable might not be connected properly or the USB driver might not have been installed normally.
Action 1:
See **4.1  Problems During Startup** and take an appropriate action.

Cause 2:
The installed USB driver is not displayed in the Device Manager.  Alternatively, the "!" or "×" is prefixed.
Action 2:
<1>  With RFP connected to the host PC, right-click the driver marked with the "!" or "×", and then click
[Uninstall].
<2>  Execute [Scan for hardware changes] in the Device Manager.
<3>  Reinstall the USB driver by Plug and Play.

Cause 3:
The tool might not have been recognized (when connected via a USB hub).
Action 3:
Try the following:
<1>  Disconnect the USB cable and then reconnect it.
<2>  Connect the USB connector to another port on the USB hub.
<3>  If the above measures do not resolve the problem, do not use the USB hub but directly connect the USB
connector to the USB port of the host PC main unit.

**(2)  The following message is displayed in the output panel and the flash memory programming mode cannot be entered.**
```
Error (E1002001) : No response from Target Microcontroller (FLMD).
Error (E1002002) : No response from Target  Microcontroller (RESET).
Error (E1002003) : No response from Target Microcontroller (FREQ).
```

Cause 1:
   If MINICUBE2 is used, the mode select switch might be specified incorrectly.
Action 1:
   Check the target microcontroller and the mode select switch setting.

Cause 2:
   If MINICUBE2 is used, the 78K0-OCD board might be connected.
Action 2:
   Remove the 78K0-OCD board.

Cause 3:
   The connection between the target cable and target system might be wrong.
Action 3:
   <1>  If 78K or V850 is used, connect the TxD and RxD signals from the target cable with TxD (SO) and RxD (SI) of the target microcontroller so that signal input/output are consistent.



   <2>  The signal lines used for programming must be isolated from other devices, using jumper switches or the like; otherwise, malfunction might occur.

Cause 4:
   The wrong microcontroller name might be selected in the [Create a new workspace] dialog box.
Action 4:
   Select the same name as that of the target microcontroller.

Cause 5:
   No clock might be able to be supplied to the target microcontroller.
Action 5:
   <1>  Check if the settings in the [Supply Oscillator] dialog box are correct.  For the correct settings, see the user's manual of the target microcontroller.
   <2>  Check the clock supply on the target system.

Cause 6:
   Power might not be supplied normally to the target microcontroller.
Action 6:
   <1>  Check the power supply setting.
   <2>  Check that the power is supplied on the target system.  If the power is supplied from the tool used, a power shortage might occur. In such a case, supply power from the target system.

Cause 7:
   For the RX, the I/O signal setting does not match the wiring of the target system.
Action 7:
   Check if the settings in the [Mode Pin Settings] dialog match the wiring of the target system.

**(3) The following message is displayed on the output panel and normal communication is not performed in the flash memory programming mode.**

```
Error (E1002004) : Communication failure or timeout.
```

Cause 1:

   The clock or power supply might not be stable.

Action 1:

   Confirm that the clock or power is stably supplied on the target system.


Cause 2:

   Communication might not be stable.

Action 2:

   &lt;1&gt;  Check that there is no noise on the communication line.

   &lt;2&gt;  Confirm that the tool used is properly connected with the target system.

   &lt;3&gt;  Confirm that unused pins are properly handled.

   &lt;4&gt;  Confirm that the correct clock and communication rate are selected.  Stable programming might be achieved by setting a lower value for the clock or communication rate.

**(4)  When the RX is selected, the driver for USB boot is not recognized in the [Select USB Device] dialog box.**

Cause:

A wrong driver may be recognized as the driver for USB boot.  Normally "Generic Boot USB Direct" should be recognized.

Action:

Install the correct driver in the following steps (Windows 7 is used in this example).

<1>   When a wrong driver is recognized, Windows Device Manager shows the following state.
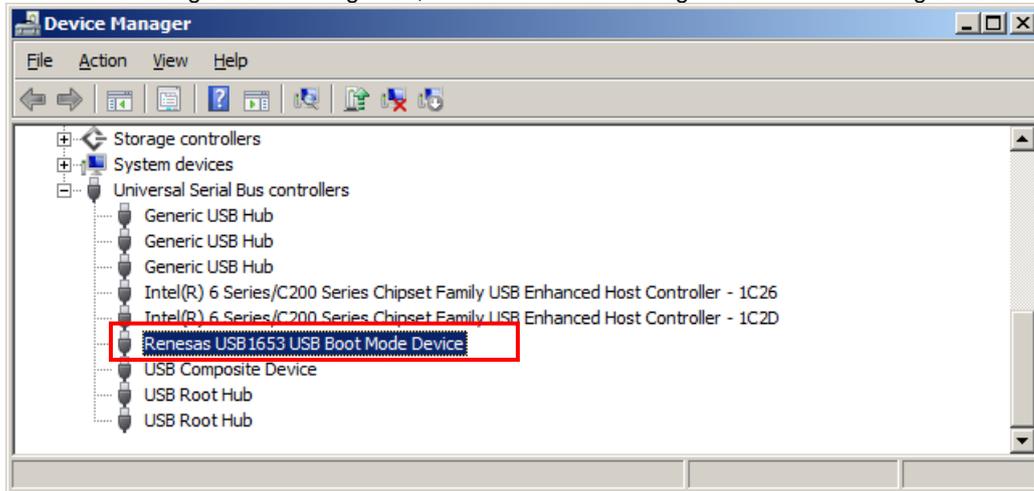


<2>   When you select "Update Driver Software", the following dialog window is displayed.
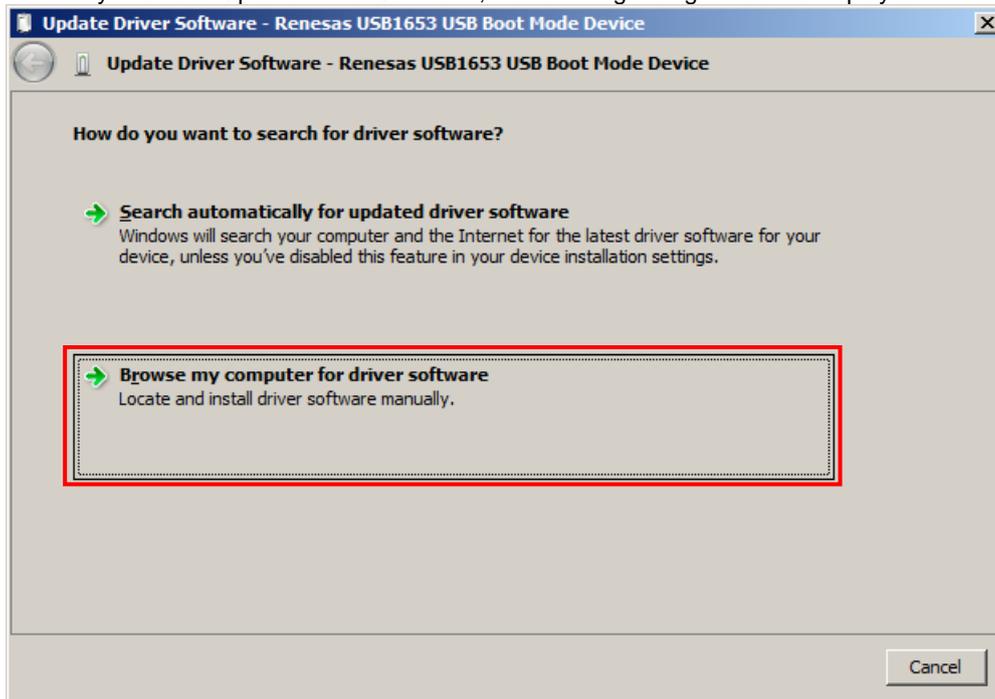
<3>   Select "Let me pick from a list of device drivers on my computer".
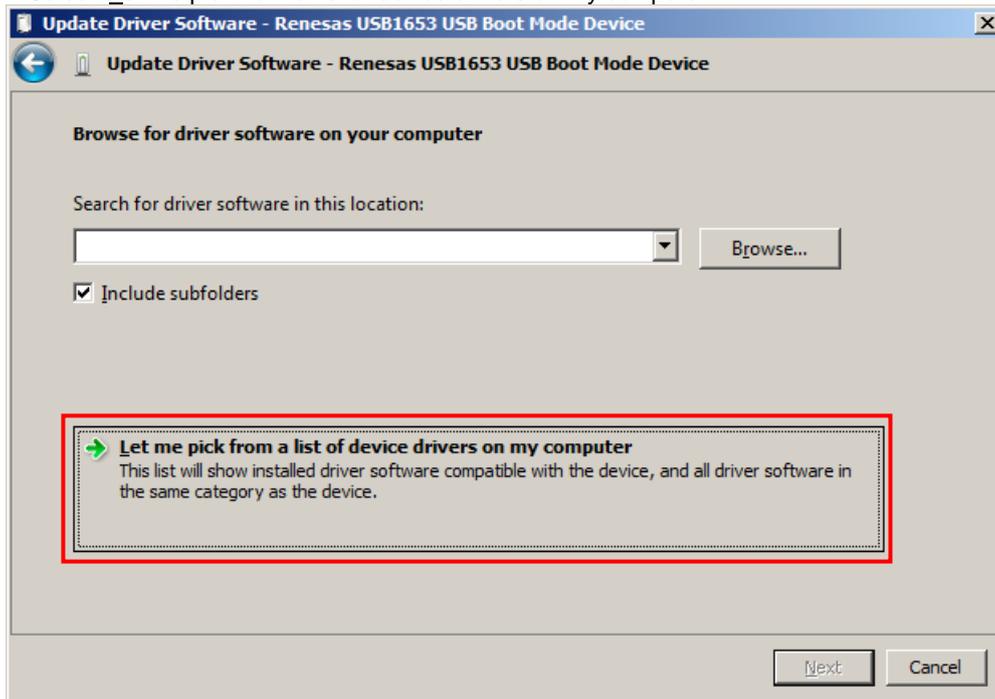


<4>   The dialog box below is shown. If "Generic Boot USB Direct" is not displayed, re-install the USB driver for the USB boot MCU Type A in the RFP installer.  Select "Generic Boot USB Direct" and click the Next > button.
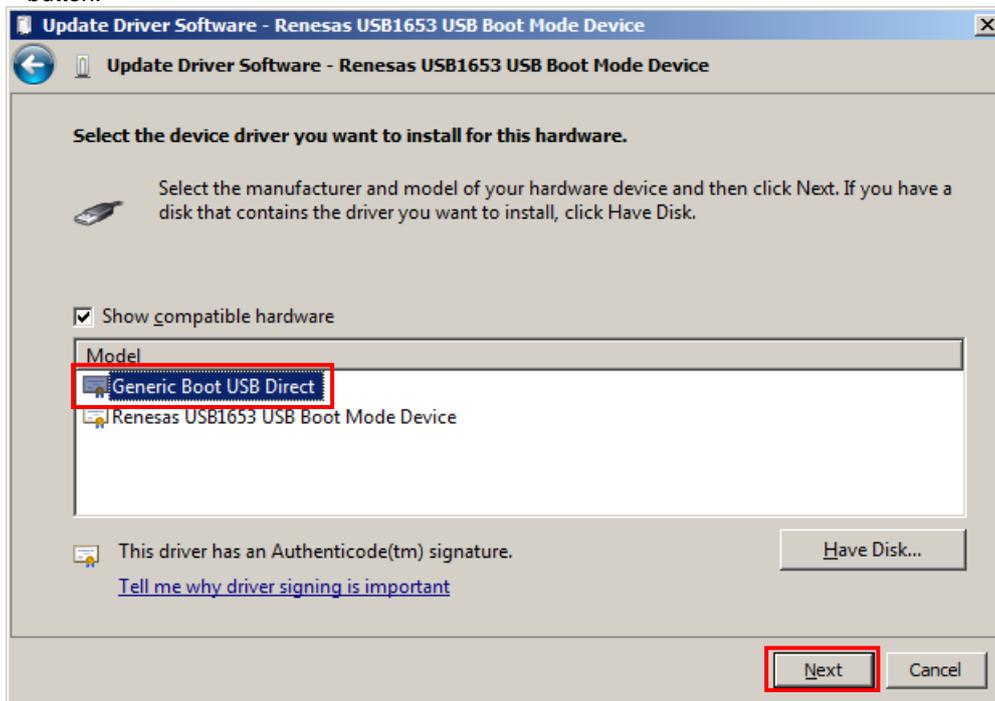
<5>   Installation of the driver for USB boot is finished.
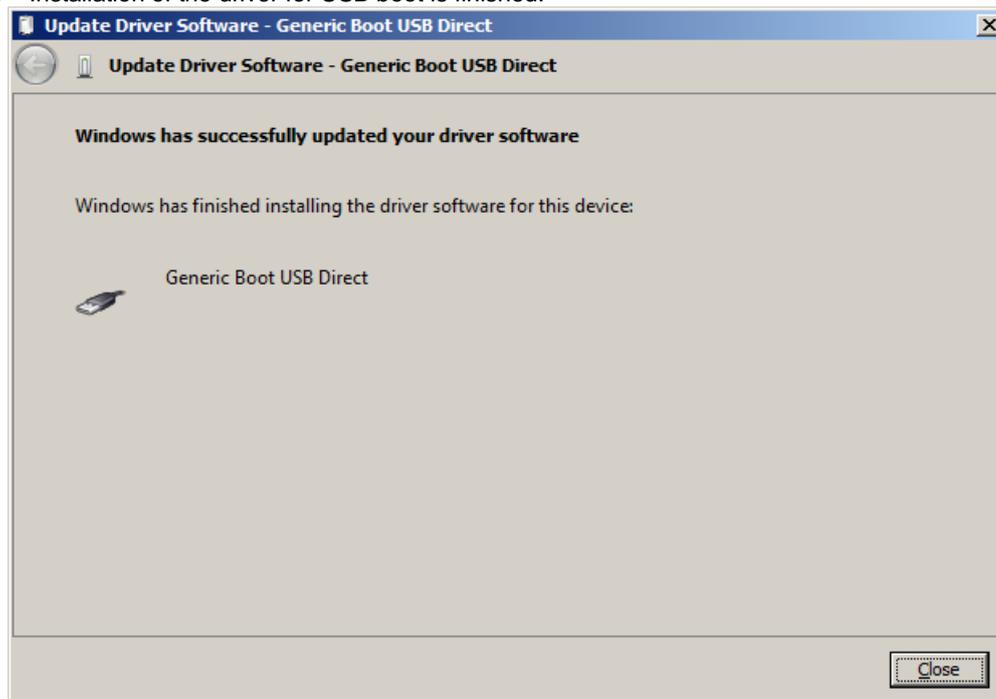


**(5)  When you forget the ID code of the RX.  Or when a wrong ID code is entered.**

Action:

Refer to the address in the program file to which the ID code was set.  For details, refer to the user's manual of the target device.

When the control code for the ID code is set so that the entire erasure is performed after entering a wrong ID code three times consecutively, you can write in the flash memory after another entry into boot mode.

**CHAPTER 5   CAUTIONS**

This chapter describes cautions of RFP.

## 5.1   Connecting Two or More E1s or E20s

**Applies to:** RX

The following restriction applies when two or more E1s or E20s are connected to a single host computer.  If the USB cable is connected to or disconnected from an E1 or E20 or the power for an E20 is turned on or off during communication, the RFP may encounter a communications error or be terminated.

## 5.2   Manipulating the User Boot Mat

**Applies to:** RX610

If none of the valid ID codes has been set before a generic boot device is connected (i.e. the device is not protected), manipulation of the user boot mat gets disabled on completion of the connection.  To enable manipulation of the user boot mat, set a valid ID code before connecting the generic boot device.

## 5.3 Mapping of Data Flash Memory

[Microcontroller] V850

Mapping of data flash memory might differ according to whether the MCU is in normal operation or flash memory programming mode. Refer to the user's manual of the microcontroller for more information on mapping in the flash memory programming mode.

# APPENDIX A   MESSAGES

## A.1   Message Format

Messages are displayed in the internal error, fatal error, selection, and warning dialog boxes and on the output panel.

**Figure A-1.  Internal Error Dialog Box**
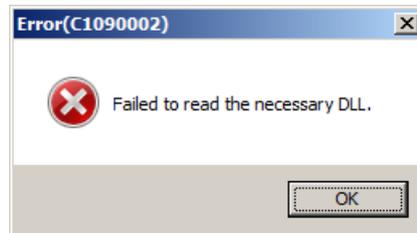


**Figure A-2.  Fatal Error Dialog Box**



**Figure A-3.  Selection Dialog Box**
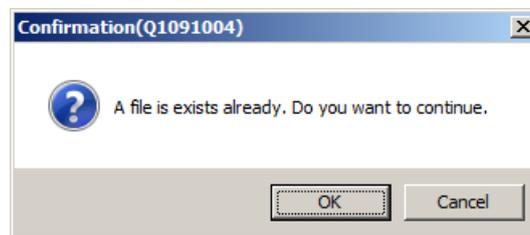


**Figure A-4.  Warning Dialog Box**
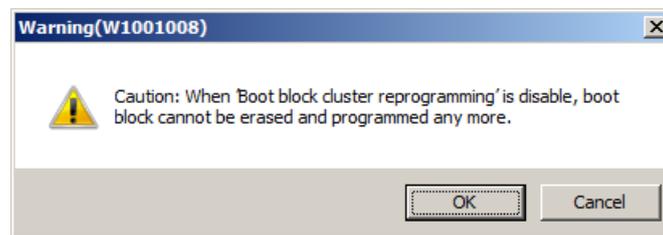


**Figure A-5.  Output Panel**
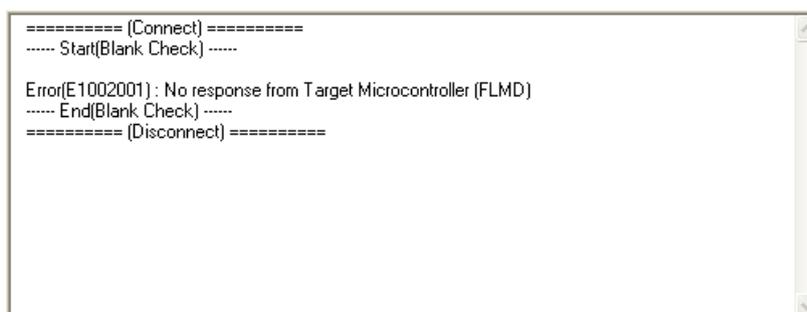
## A.2 Messages Displayed in Internal Error, Fatal Error, Selection, and Warning Dialog Boxes - Common -

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| C1090002 | Message | Failed to read the necessary DLL. |
|---|---|---|
| | Action by user | Restart RFP. If this does not resolve the problem, reinstall RFP. |
| E1011001 | Message | Invalid Program File. |
| | Description | This error is displayed when the program file is invalid. Make sure that the file format is supported and a valid program file has been specified. |
| E1011002 | Message | Unique code: a conflict occurs at 0xxxxx. |
| | Description | This error is displayed when data already exists where the unique code is tried to be written. |
| E1011003 | Message | Unique code: invalid header (xxxx). |
| E1011004 | Message | Unique code: invalid area name (xxxx). |
| E1011005 | Message | Unique code: unique code address is outside the xxxx area. |
| E1011006 | Message | Unique code: unique code acquisition failed. |
| E1012001 | Message | Unrecognised code file syntax. |
| E1012002 | Message | The project information is not valid. |
| E1091002 | Message | Check whether the file or folder has been set to read-only. |
| | Description | This error occurs when the program fails to save project information. |
| | Action by user | Make sure that the folder or file is not read-only. |
| E1092005 | Message | The project file is broken. |
| | Description | This error occurs when the program fails to parse a file. |
| | Action by user | Specify a project file that is compatible with RFP. |
| E1092007 | Message | The project information cannot be restored. |
| | Description | This error occurs when the program fails to restore or convert project information. It will also occur if the program fails to extract the structure of a project to copy. This error is also output if a project file created by a newer RFP than the one currently used is selected. |
| | Action by user | Specify a project file that is compatible with RFP. |
| E1092008 | Message | This is not a valid project file. |
| | Description | This error occurs when the program fails to restore project information. |
| | Action by user | Specify a project file that is compatible with RFP. |
| E1092011 | Message | The project information is invalid. |
| | Description | This error occurs when the program fails to parse a file. |
| | Action by user | Specify a project file that is compatible with RFP. |
| E1093001 | Message | The specified file could not be opened. |
| | Description | This error occurs when a file could not be opened. |
| | Action by user | Make sure that the file exists and is not corrupt. |
| | | Check the access privileges to the file. |
| E1091026 | Message | Invalid workspace name. |
| | Description | The characters <, >, |, :, *, ?, \, /, and " cannot be used to specify workspace names. |
| | Action by user | Remove the illegal character (<, >, |, :, *, ?, \, /, or ") from the workspace name. |
| E1093002 | Message | The project with the same name already exists. |
| | Description | This error occurs if a project with the same name already exists in the currently opened workspace when a project is tried to be added in the Full mode. |
| | Action by user | Change the project name. Or, delete the existing project with the same name if necessary. |

| E1093003 | Message | A program file with the same name exists. |
|---|---|---|
| | Description | This error occurs if a program file with the same name already exists in the currently opened project when a program file is tried to be added in the Full mode. |
| | Action by user | Change the program file name. Or, delete the existing program file with the same name if necessary. |
| Q1091004 | Message | File already exists. Overwrite? |
| | Description | This message is used for various dialog boxes when the dialog box has a field to specify a filename. |
| | Action by user | [Yes]: The command is executed. The file is overwritten.<br>[No]: The command is canceled. The file is not overwritten and the focus will be returned to the original dialog box. |
| W1011001 | Message | Unique code: all data up to the last (Index xxxx) have been processed. |
| W1012001 | Message | No code file specified. |
| W1012002 | Message | Start value exceeds End value. |
| W1012003 | Message | Please enable Unique Code Setting to drop files. |
| W1012004 | Message | Cannot load multiple dropped files. |
| W1012005 | Message | Code file size does not match data list size. |
| W1012006 | Message | Invalid Index. |
| W1012007 | Message | Specified code file does not exist |

## A.3   Messages Displayed in Fatal Error, Selection, and Warning Dialog Boxes - RL78, 78K, V850 -

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| E1000001 | Message | E1/E20/MINICUBE2/COMx/USB Direct communication time out. |
| --- | --- | --- |
| | Description | After being connected to E1/E20/MINICUBE2/COMx/USB Direct, communication was not established and the process timed out. |
| | Action by user | Make sure that the connection to E1/E20/MINICUBE2/COMx/USB Direct is properly set up. |
| E1000002 | Message | MINICUBE2 Firmware version too old. |
| | Description | The MINICUBE2's firmware version might be outdated and unable to operate correctly. |
| | Action by user | Access the update service site, download the latest firmware, and update the utility. |
| E1000003 | Message | Program File not found. |
| | Description | Program File was not loaded correctly. |
| | Action by user | Specify a Program File. |
| E1000004 | Message | Device Information File not found. |
| | Description | The Device Information File was not loaded correctly. |
| | Action by user | Restart RFP. If this does not resolve the problem, reinstall RFP. |
| E1000005 | Message | Programmer software already started. |
| | Description | RFP might already be running, so execute the RFP command after terminating one of the RFPs. |
| E1000006 | Message | Related software already started. |
| | Action by user | A related tool (such as the self-diagnostics tool) might already be running, so execute the RFP command after terminating the tool. |
| E1000007 | Message | Detection error by 78K0-OCD adapter board. |
| | Action by user | Please remove the 78K0-OCD board. It is connected but cannot successfully communicate with the target. |
| E1000008 | Message | Reading error of Flash Programming Tool information from Project file. |
| | Description | An error occurred when trying to open the specified project file. |
| | Action by user | Specify a project file that is compatible with RFP. |
| E1000009 | Message | Unable to connect E1/E20/MINICUBE2/COMx/USB Direct. |
| | Description | E1/E20/MINICUBE2/COMx Direct could not be connected. |
| | Action by user | Make sure that the connection to E1/E20/MINICUBE2/COMx/USB Direct is properly set up. |
| E1001001 | Message | Invalid Device Information File. |
| | Description | The device information file might be invalid. |
| | Action by user | Restart RFP. If this does not resolve the problem, reinstall RFP. |
| E1001002 | Message | Not supported Device Information File. |
| | Description | There might be an unsupported device information file. |
| | Action by user | Access the Version-up Service website, download the latest firmware, and update the device information file by using the utility. |
| E1001003 | Message | Invalid Program File. |
| | Description | The file format might be unsupported, or an invalid program file might have been specified. |
| | Action by user | Specify a correct program file. |
| E1001004 | Message | Device Information File not found. |
| | Description | No device information file has been loaded. |
| | Action by user | - The project file cannot be read because the device information file has been changed. Create a new project file.<br>- Restart RFP. If this does not resolve the problem, reinstall RFP. |

| E1001005 | Message | Not specify Program File. |
|---|---|---|
| | Description | No program file has been loaded. |
| | Action by user | Specify a Program File. |
| E1001006 | Message | Illegal supply frequency setting |
| | Description | The frequency specified to be supplied to the target microcontroller might be incorrect. |
| | Action by user | Check the frequency setting, and make sure that the correct clock frequency and divider/multiplier values are set. |
| E1001013 | Message | Value is out of clock range |
| | Description | The frequency set to be supplied to the target microcontroller is incorrect. |
| | Action by user | See the microcontroller's manual, and set the correct clock frequency and divider/multiplier values. |
| E1001014 | Message | Can't Upload Read Data. |
| | Description | Files cannot be saved while the read command is running. The program file might be inaccessible (e.g. in use by another program). |
| E1001018 | Message | Illegal setting data. |
| | Description | The setting failed due to illegal (invalid) data. |
| | Action by user | Revise the setting. |
| E1001019 | Message | Error of reading the wireless registry. |
| | Description | The registry key for the wireless unit (QB-MINI2-RF) might be corrupted or not exist. |
| | Action by user | Start the MINICUBE2 RF utility, and make the setting. |
| E1001020 | Message | The all flash options of a target microcontroller aren't able to read because a protection error occurs. |
| | Description | This message appears when all Flash option settings could not be acquired, because a protection error occurred when executing the command to retrieve the Flash options. |
| E1001021 | Message | OCD Security ID setting is invalid. |
| | Description | The value entered in OCD security ID is invalid. |
| | Action by user | Make sure that the number of characters and value entered are correct. |
| E1001022 | Message | Option bytes setting is invalid. |
| | Description | The value entered in OPBT is invalid. |
| | Action by user | Make sure that the number of characters and value entered are correct. |
| E1001024 | Message | Value is out of Vdd range. |
| | Description | An incorrect value has been specified for the power to be supplied to the target microcontroller. |
| | Action by user | Specify a correct power supply value, referring to the user's manual of the microcontroller. |
| E1001025 | Message | HCUHEX file does not accord with flash range of target microcontroller. |
| | Action by user | Specify a correct program file. |
| E1001027 | Message | An operation was canceled. |
| E1002001 | Message | No response from Target Microcontroller (FLMD). |
| | Description | There might have been a problem switching to serial programming mode.<br>- Bad connection between utilizing tool and target microcontroller.<br>- The clock or power source is not supplied correctly.<br>- Bad target microcontroller. |

| E1002002 | Message | No response from Target Microcontroller (RESET). |
|---|---|---|
| | Description | There might have been a problem switching to serial programming mode. |
| | | - Bad connection between utilizing tool and target microcontroller. |
| | | - The clock or power source is not supplied correctly. |
| | | - Bad target microcontroller. |
| E1002003 | Message | No response from Target Microcontroller (FREQ). |
| | Description | There might have been a problem switching to serial programming mode. |
| | | - Bad connection between utilizing tool and target microcontroller. |
| | | - The clock or power source is not supplied correctly. |
| | | - Bad target microcontroller. |
| E1002004 | Message | Communication failure or timeout. |
| | Description | There might have been a problem establishing normal communications after switching to serial programming mode. |
| | | - The clock or power supply is unstable. |
| | | - Bad target microcontroller. |
| | | - There might be a fault in the communication port. |
| E1002005 | Message | Synchronization failure for baud rate. |
| | Action by user | See the microcontroller's manual, and select a supported baud rate. |
| E1002006 | Message | Invalid Signature reading. |
| | Description | The selected device information file does not match the target microcontroller. |
| | Action by user | Specify a correct microcontroller. |
| E1002007 | Message | Invalid Device Information file version. |
| | Action by user | The level of the selected device information file might be outdated. Download the latest RFP. |
| E1002008 | Message | Not Blank. |
| | Action by user | Make sure all data is erased and memory is blank before programming to the flash memory. |
| E1002009 | Message | Erasing operation failed. |
| | Description | There might have been an erase failure due to bad Flash memory. |
| E1002010 | Message | Programming operation failed. |
| | Description | An area already containing data might have been overwritten with different data. |
| | | There might have been a programming failure due to bad Flash memory. |
| E1002011 | Message | Verifying operation failed. |
| | Description | Different data might have been written to the program file and the target microcontroller. |
| | | There might have been a verification failure caused by a lead fault due to bad Flash memory. |
| E1002012 | Message | Security flag setting failed. |
| | Description | The security setting might have been changed from [Disabled] to [Enabled]. This setting only allows the chip to be erased. Some microcontrollers do not allow security settings to be added. Erase the chip, and then perform all settings at once. There might have been a failure to configure security due to bad Flash memory. |
| E1002013 | Message | Protection by security setting. |
| | Description | The specified command might have failed to execute because the security of the target microcontroller has already been configured. Although some security flags can be cleared by erasing with Chip mode, others cannot. See the microcontroller's manual for details. |
| E1002014 | Message | Check sum verification failed. |
| | Description | The data programmed to the target microcontroller might be different from the program file. |

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| E1002015 | Message | Retry status over. |
|---|---|---|
| | Description | The command operation has exceeded the specified number of retries. The microcontroller might be defective. |
| E1002016 | Message | Illegal status from Microcontroller. |
| | Description | The status code returned from the microcontroller is invalid (not a designated code). There might be a runaway process. Check the operating environment, and try running the command again.<br>The communication port might be unstable due to external factors. |
| E1002018 | Message | HEX file exceeds target device flash range. |
| | Description | The address range of the downloaded program file exceeds the range specified for [Operation mode] in the [Target] category. |
| E1009001 | Message | Not Initialized. |
| | Description | There might have been a failure to acquire working memory on startup, or a failure to start a thread process. |
| | Action by user | Try changing host PC and starting RFP again. |
| E1009002 | Message | Illegal parameter. |
| | Description | There might have been a failure to perform normal control due to an unstable USB communication port. |
| E1009003 | Message | Control failed. Please restart the Flash programming tool. |
| | Action by user | The tool used might be locked up. Disconnect the USB, and try connecting again. |
| E1009004 | Message | Wait status timeout. |
| | Action by user | The microcontroller might be defective. Replace it with a good sample. |
| E1090001 | Message | Unknown error occurred. |
| | Description | Illegal processing was detected. |
| | Action by user | Restart RFP. If this does not resolve the problem, reinstall RFP. |
| M1001027 | Message | The security setting state of a target microcontroller is as follows. |
| Q1001015 | Message | The security setting state of a target microcontroller is as follows. If you want to feedback them to the Target Security Settings, press OK button. |
| Q1001026 | Message | Turn on the power source for the target again. |
| W1000010 | Message | Check the voltage applied to the target system |
| | Description | USB VBUS (5 V) from the host PC is applied to the target system. Check if the voltage satisfies the specifications of the microcomputer |
| W1001007 | Message | Caution: When 'Chip Erase' is disable, chip cannot be erased and programmed any more. |
| | Description | This warning message appears when the "CHIP erase protection" security flag is set, to warn the programmer that it will not be possible to clear a flag. |
| W1001008 | Message | Caution: When 'Boot block cluster reprogramming' is disable, boot block cannot be erased and programmed any more. |
| | Description | This warning message appears when the "boot block area overwrite protection" security flag is set, to warn the programmer that it will not be possible to clear a flag. |
| W1001016 | Message | Caution: The latest program file exists. Program file is forced to update. |
| W1001023 | Message | If Disable Block Erase is specified and a security command is executed, the Security Release command cannot be executed and the target security setting cannot be cleared again. |

## A.4   Messages Displayed in Fatal Error, Selection, and Warning Dialog Boxes - RX, RH850 -

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| C1020001 | Message | Fatal error |
|---|---|---|
| E1010001 | Message | Access to the project file failed. |
| | Description | This error is displayed when the project file cannot be accessed. The file might be corrupted. Remake the project file. |
| E1010002 | Message | Generic device query failed. |
| | Description | This error is displayed when the device specification query fails for some reason. Make sure that the settings for the RFP and the target board are correct. |
| E1010003 | Message | Operation failed. |
| | Description | This error is displayed when an operation fails in program, erase, check sum, or blank check. |
| E1010006 | Message | Connection failed. |
| | Description | This error is displayed when connection to the microcontroller fails for some reason. Make sure that the settings for the RFP and the target board are correct. |
| E1010008 | Message | Erasing xx (0xxxxx - 0xxxxx) fails. |
| | Description | This error is displayed when erasing the indicated block failed. |
| E1010011 | Message | No data to compare. |
| | Description | This error is displayed when the file to compare does not have any data in the ROM address area of the microcontroller. |
| E1010012 | Message | Verification failed. |
| | Description | This error is displayed when the data in the file to compare does not match the ROM data in the microcontroller. |
| E1010013 | Message | Cannot verify. |
| | Description | This error is displayed when the verify data cannot be read for some reason. |
| E1010014 | Message | The operation is aborted. |
| | Description | This error is displayed when the operation is aborted by the user manually. |
| E1010015 | Message | Saving the read data failed. |
| | Description | This error is displayed when saving data failed. Make sure that the folder or file is not read-only. |
| E1010016 | Message | Reading data failed. |
| | Description | This error is displayed when data cannot be read from the ROM for some reason. |
| E1010017 | Message | Invalid parameter |
| E1010018 | Message | Invalid command |
| E1010019 | Message | Option bytes setting is invalid |
| E1010020 | Message | Verify command failed for 0xXXXX - 0xXXXX |
| E1010021 | Message | The project information cannot be restored. |
| E1010023 | Message | Set OTP failed |
| E1010024 | Message | Failed to validate ICU |
| E1010025 | Message | Failed to set command protection |
| E1010026 | Message | Failed to disable serial program |
| E1010028 | Message | Failed to export the ID code. (xxxx) |
| E1010029 | Message | Failed to import the ID code. (xxxx) |
| E1010030 | Message | Failed to load a module. |
| E1010031 | Message | This device is not a generic device |
| E1010032 | Message | The device sent an unrecognized reponse: 0xXX |

| E1010033 | Message | Failed to set ID code |
|---|---|---|
| E1010034 | Message | OFS setting is invalid |
| E1010035 | Message | Failed to set ID code (Command Protection Mode) |
| E1013001* | Message | This device is not a generic device. |
| E1013002* | Message | Selection of Device - Checksum error. |
| E1013003* | Message | Selection of Device - Invalid device code error. |
|  | Description | This error is displayed when the device code mismatches in the device specification query. Make sure that the correct product name for the microcontroller on the target board is selected. |
| E1013004* | Message | Selection of Device - Invalid response. |
| E1013005* | Message | The device sent an unrecognised response: 0xXX |
| E1013006* | Message | Selection of Clock mode - Checksum error. |
| E1013007* | Message | Selection of Clock mode - Invalid clock mode error |
| E1013008* | Message | Selection of Clock mode - No clock mode needed |
| E1013009* | Message | Selection of Clock mode - Invalid response. |
| E1013010* | Message | Unable to create temporary file. Generic query failed. |
| E1013011* | Message | The checksum received in response from a device is not consistent with the calculated checksum. |
| E1014001* | Message | The device sent an unrecognized reponse: xxxx. |
| E1014002* | Message | This device is not a generic device. |
| E1014003* | Message | The device does not support this command. |
| E1014004* | Message | Selection of Device - Checksum error. |
| E1014005* | Message | Selection of Device - Invalid device code error. |
|  | Description | This error is displayed if the device code mismatches when connecting to the microcontroller. Make sure that the correct product name for the microcontroller on the target board is selected. |
| E1014006* | Message | Selection of Device - Invalid response. |
| E1014007* | Message | Selection of Clock Mode - Checksum error. |
| E1014008* | Message | Selection of Clock Mode - Invalid clock mode error. |
| E1014009* | Message | Selection of Clock Mode - No clock mode needed. |
| E1014010* | Message | Selection of Clock Mode - Invalid response. |
| E1014011* | Message | Changing baud rate - Checksum error. |
| E1014012* | Message | Changing baud rate - Unable to set baud rate error. |
|  | Description | This error is the unable-to-set-baud-rate error (serial baud rate error too large) that occurs when the baud rate is changed. In [Setting Clock], [Clock supply] and [Multiplier for the main clock and peripheral clock] must be entered. The most frequently reported errors in those settings are regarding the multiplier of the peripheral clock. For those clock settings, see the hardware manual of the microcontroller. Also, check the clock of your target board (microcontroller). |
| E1014013* | Message | Changing baud rate - Input clock error. |
|  | Description | This error is displayed when the input frequency setting in [Setting Clock] exceeds the operating range of the microcontroller. In [Device Setting], [Input clock], [Multiplier for the main clock], and [Multiplier for the peripheral clock] must be entered. The most frequently reported errors in those settings are regarding the multiplier of the peripheral clock. For those clock settings, see the hardware manual of the microcontroller. Also, check the clock of your target board (microcontroller). |

| E1014014* | Message | Changing baud rate - Operating frequency error. |
|---|---|---|
| | Description | This error is displayed when the clock setting does not meet the operating frequency specification of the microcontroller. Based on the input conditions (input frequency and multiplier) from the RFP, only a range check (calculation only) for operating frequency is performed in the device side. Check the input conditions (input frequency and multiplier) of the RFP. |
| E1014015* | Message | Changing baud rate - Invalid multiplication ratio error. |
| E1014016* | Message | Changing baud rate - Invalid response. |
| E1014017* | Message | Unable to set baud rate value xxxx bps. |
| E1014018* | Message | End of Setting Data - Erase error. |
| | Description | This error is displayed when data erasure of the flash memory upon the startup of the microcontroller in the Boot mode was executed but failed. Possible causes of the error (failure to erase) include 1) Power supply voltage to the microcontroller is not applied properly (power supply from E1/power supply from the target board), 2) The microcontroller cannot operate properly because of the pin settings, and 3) The microcontroller has been damaged for some reason. Check the items 1) through 3) above. |
| E1014019* | Message | End of Setting Data - Invalid response. |
| | Description | This error is displayed when an invalid command is received in the state waiting for the data setting complete command. Check the product name of the microcontroller on the target board as well as the pin settings. |
| E1014020* | Message | Checking ID Code - Checksum error. |
| E1014021* | Message | Checking ID Code - Invalid ID error. |
| | Description | This error is displayed when an ID code different from the one set in the microcontroller to be programmed is entered. The ID code is written to a specific address on the ROM.  Check the value of the address of the written program. Operation is dependent on the control code. If you forgot the configured ID code, basically, you cannot read, write, or erase the microcontroller with a serial writer. |
| E1014022* | Message | Checking ID Code - Erase error. |
| E1014023* | Message | Checking ID Code - Invalid reponse. |
| E1014024* | Message | ID code check failure. |
| E1014025* | Message | Reading Lock Bit - Checksum error. |
| E1014026* | Message | Reading Lock Bit - Address error. |
| E1014027* | Message | Reading Lock Bit - Invalid response. |
| E1014028* | Message | Lock Bit Disable Failed. |
| E1014029* | Message | Lock Bit Enable Failed. |
| E1014030* | Message | Setting Lock Bit - Checksum error. |
| E1014031* | Message | Setting Lock Bit - Address error. |
| E1014032* | Message | Setting Lock Bit - Write error. |
| E1014033* | Message | Setting Lock Bit - Invalid response. |
| E1014034* | Message | Error during preparation of Erasing operation. |
| E1014035* | Message | Erasing Block - Checksum error. |
| E1014036* | Message | Erasing Block - Block number error. |

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| E1014037* | Message | Erasing Block - Erase error. |
|---|---|---|
| | Description | This error is displayed when data erasure of the flash memory of the microcontroller was executed but failed. Possible causes of the error (failure to erase) include 1) Power supply voltage to the microcontroller is not applied properly (power supply from E1/power supply from the target board), 2) The microcontroller cannot operate properly because of the pin settings, 3) The microcontroller has been damaged for some reason, and 4) Communication between the microcontroller and the PC failed** so the command was not executed. Check the items 1) through 4) above. \n\n ** Proper communication may not be expected when a USB-RS232C converter, a self-made cable, a self-made extension cable for connection with E1/E20, or the like is used. |
| E1014038* | Message | Erasing Block - Invalid response. |
| E1014039* | Message | Error during preparation of Writing operation. |
| E1014040* | Message | Reading Data - Checksum error. |
| E1014041* | Message | Reading Data - Address error. |
| E1014042* | Message | Reading Data - Length error. |
| E1014043* | Message | Reading Data - Invalid response. |
| E1014044* | Message | Writing Data - Checksum error. |
| E1014045* | Message | Writing Data - Address error. |
| E1014046* | Message | Writing Data - Write error. |
| | Description | This error is displayed when programming to the microcontroller cannot be done for some reason. It may be due to a wrong pin setting or power supply not being supplied to the microcontroller properly. |
| E1014047* | Message | Writing Data - Invalid response. |
| E1014048* | Message | Read Checksum mismatch. |
| E1014049* | Message | Checksum Read Error. |
| | Description | This error is displayed when the sum of the response data of the sum check command is invalid. In the protocol of some microcontrollers, a sum code (1 byte) is added to ensure the integrity of the command data (no error if the sum of the command data and the sum code is 0 [lower 1 byte]). This error means the sum of the response data (+ sum code) of the sum check command received from the device is not 0. A possible cause is that serial communication between the RFP and the microcontroller is unstable. Possible causes of unstable serial communication include improper handling of microcontroller pins (TxD/RxD pins not pulled up, wrong Vcl pin handling) and a long communication cable between the PC and the microcontroller (target). |
| E1014050 | Message | Get Flash options - Checksum error |
| E1014051 | Message | Security Setting - Checksum error |
| E1014052 | Message | Security Setting - Address error |
| E1014053 | Message | Security Setting - Write error |
| E1014054 | Message | Get Flash options - Invalid response |
| E1014055 | Message | Security Setting - Invalid response |

| E1015001* | Message | Unable to open comms. |
|---|---|---|
| | Description | This error is displayed when the communication port cannot be recognized. Check the port setting of your PC. Frequently reported cases of this error include: the PC has no RS232C port and 1) a commercially-available USB-RS232C converter is used or 2) a self-made conversion circuit (board) using a USB-serial conversion IC is used. In both above cases, communication control timing is slightly slower because, unlike the case using a built-in RS-232 port on the PC, the port is driven via USB, and timing adjustment between the RFP and the microcontroller on the target board may not work properly. As a preventive measure, use a PC equipped with a RS-232 port, or use an E1/E20 emulator that can be connected with a PC via USB. |
| E1015003* | Message | Error in setting of configuration. |
| E1015004* | Message | Invalid receive buffers. |
| E1015005* | Message | Invalid command is supplied. |
| E1015006* | Message | Unable to transmit. |
| E1015008* | Message | Invalid transmission buffers. |
| E1015009* | Message | Unable to receive. |
| E1015011* | Message | Unable to close comms. |
| | Description | This error is displayed when the communication port cannot be recognized. Check the port setting of your PC. Frequently reported cases of this error include: the PC has no RS232C port and 1) a commercially-available USB-RS232C converter is used or 2) a self-made conversion circuit (board) using a USB-serial conversion IC is used. In both above cases, communication control timing is slightly slower because, unlike the case using a built-in RS-232 port on the PC, the port is driven via USB, and timing adjustment between the RFP and the microcontroller on the target board may not work properly. As a preventive measure, use a PC equipped with a RS-232 port, or use an E1/E20 emulator that can be connected with a PC via USB. |
| E1015012* | Message | Comms is already closed. |
| E1015013* | Message | COMx connection timed out |
| | Description | This error is displayed when a communication problem occurs between the microcontroller and the RFP (PC) for some reason, resulting in a timeout. The RFP allows you to set a baud rate, but communication cannot be done if the specified baud rate does not match the actual setting of the target board (microcontroller). Check the following points. (This error may be displayed along with "Generic device query failed.")  ■ Check the baud rate.  -　　　Check the operating frequency of the microcontroller to see if the baud rate exceeds the allowable communication rate and if the baud rate is appropriate.  ■ Check the clock setting.  -　　　Check if the operating frequency of the microcontroller set in the RFP and the clock of the target board (microcontroller) match.  ■ Check the connection between the target board (microcontroller) and the PC.  -　　　Proper communication may not be expected when a USB-RS232C converter, a self-made cable, or the like is used. |
| E1015014* | Message | Error in setting timeout configuration. |
| E1015015* | Message | Error setting Device Control Block. |
| E1015016* | Message | Unable to locate device. |

| E1015017* | Message | Device access is denied. |
|---|---|---|
| E1015018* | Message | Device has not been initialised. |
| E1015019* | Message | Invalid parameters supplied. |
| E1015020* | Message | Unable to create comms event. |
| E1016001* | Message | RComms.dll not found or incorrect version of DLL. |
| E1016002* | Message | USB Open error. |
| E1016003* | Message | USB connection timed out. |
| | Description | This error is displayed when a communication problem occurs between the microcontroller and the RFP (PC) for some reason, resulting in a timeout. Check the following points. (This error may be displayed along with "Generic device query failed.")<br>■ Check the clock setting.<br>-           Check if the operating frequency of the microcontroller set in the RFP and the clock of the target board (microcontroller) match. |
| E1016004* | Message | Failed to write the data. |
| E1016005* | Message | No data port is available. |
| E1017001 | Message | Sync mode is not supported. |
| E1017003 | Message | Configure file is invalid. |
| E1017004 | Message | Failed to load BFW file (xxx) |
| E1017005 | Message | Loading FPGA data failed. |
| E1017006 | Message | Failed to initialize FPGA. |
| E1017007 | Message | Failed to get Setup Information. |
| E1017008 | Message | Can't open xxxx. |
| E1017009 | Message | Invalid timeout (xxxx) |
| E1017010 | Message | E1/E20 communication error. |
| E1017012 | Message | Failed to start up MCU. |
| E1017013 | Message | No emulator chosen. |
| E1017014 | Message | Failed to set mode pin. |
| E1017015 | Message | Failed to reset target. |
| E1017018 | Message | Can not allocate memory. |
| E1017019 | Message | Adaptor update failed. |
| E1017020 | Message | xxx bps is invalid baudrate. |
| E1017021 | Message | E1/E20 transmit error. |
| E1017022 | Message | E1/E20 receive error |

| E1017023 | Message | E1/E20 connection timed out. |
|----------|---------|------------------------------|
|          | Description | This error is displayed when a communication problem occurs between the microcontroller and the RFP (PC) for some reason, resulting in a timeout. The RFP allows you to set a baud rate, but communication cannot be done if the specified baud rate does not match the actual setting of the target board (microcontroller). Check the following points. (This error may be displayed along with "Generic device query failed.")<br>■ Check the baud rate.<br>- Check the operating frequency of the microcontroller to see if the baud rate exceeds the allowable communication rate and if the baud rate is appropriate.<br>■ Check the clock setting.<br>- Check if the operating frequency of the microcontroller set in the RFP and the clock of the target board (microcontroller) match.<br>■ Check the connection between the target board (microcontroller) and the PC.<br>- Proper communication may not be expected when a self-made extension cable for connection with E1/E20** is used.<br>** When E1/E20 is used, operation is not guaranteed if an extension cable or the like except an attached cable is used. |
| E1017024 | Message | Target is already powered. |
| E1017025 | Message | Target is not powered. |
| E1017026 | Message | Description stating entry to the mode is incorrect (xxxx). |
| E1020001 | Message | Unsupported command error |
| E1020002 | Message | Packet error |
| E1020003 | Message | Checksum error |
| E1020004 | Message | Flow error |
| E1020005 | Message | Address error |
| E1020006 | Message | Input frequency error |
| E1020007 | Message | CPU clock frequency error |
| E1020008 | Message | Baud rate range error |
| E1020009 | Message | Baud rate margin error |
| E1020010 | Message | Sum check method error |
| E1020011 | Message | Endian error |
| E1020012 | Message | Data set error |
| E1020013 | Message | Protection error |
| E1020014 | Message | Serial programming ID-code discord error |
| E1020015 | Message | Serial programming Disable error |
| E1020016 | Message | Lock-bit unlock error |
| E1020017 | Message | OTP enable error |
| E1020018 | Message | Blank error |
| E1020019 | Message | Erase error |
| E1020020 | Message | Write error |
| E1020021 | Message | Verify error |
| E1020022 | Message | FCURAM Access error |
| E1020023 | Message | Sequencer error |
| E1020024 | Message | Configuration Data Access error |

| E1020025 | Message | Configuration Table Access error |
|----------|---------|----------------------------------|
| E1020026 | Message | OTP Access error |
| E1020027 | Message | Protection terminal Error |
| E1020028 | Message | Hardware access error |
| E1020029 | Message | Generic Code error |
| E1020030 | Message | Erase error |
| E1020031 | Message | Verify error |
| E1020032 | Message | Device information file is invalid! |
| E1020033 | Message | Unable to create temporary file. Generic query failed |
| E1020034 | Message | Invalid response error |
| E1020035 | Message | The device sent an unrecognized reponse: 0xXX |
| E1020036 | Message | The device does not support this command |
| E1020037 | Message | This device is not supported. |
| E1020038 | Message | No response from the device. |
| E1020039 | Message | Connection is failed. Click the back button. Please retry to connect to device. |
| E1020040 | Message | Fatal error! |
| Q1010001 | Message | The specified communication speed has more than xxxx% error. Do you want to continue? |
| Q1010002 | Message | Connecting to the device. Check the connection to the target board, power, and mode entry. |
| Q1010003 | Message | The device reports one or more erase blocks are currently locked\n\nShould RFP temporarily disable this locking to allow erase and program? |
| Q1010004 | Message | Unlocking blocks. The blocks will be erased due to this action. Do you want to continue? |
| Q1010005 | Message | The size of the xxxx file exceeds the flash ROM size of the xxxx device. Do you want to continue downloading? |
| Q1010006 | Message | The User Boot Area is not blank. Continue? |
| Q1010007 | Message | The specified communication speed has more than xxxx% error. Do you want to continue? |
| Q1010008 | Message | A block requires erasing. Do you want to continue? |
| Q1010009 | Message | The setting state of a target microcontroller is as follows. If you want to feedback them to the project settings, press OK button. |
| Q1010010 | Message | The entered communications speed is out of range. Do you want to continue? |
| Q1017003 | Message | xxxx requires updating. (The current version is xxxx, and the updated version is yyyy.) |
| W1010001 | Message | Enter the frequency. |
| W1010002 | Message | The entered frequency is out of range. Enter the value between xxxx and xxxx. |
| W1010004 | Message | The entered communication speed is out of range. Cannot connect at this speed. |
| W1010005 | Message | The entered communication speed is out of range. Cannot connect at this speed. |
| W1010006 | Message | Timeout must be set between 1 and 50 seconds. |
| W1010007 | Message | The downloaded xxxx file contains data that exceeds the flash ROM size of the xxxx device. |
| W1010008 | Message | Data cannot be read from the specified address because it is outside the area. |
| W1010009 | Message | Data at 0xxxxx does not match -> file: 0xxxxx, read: 0xxxxxx. |
| W1010010 | Message | The following file does not have valid data in the flash memory area (all H'FF). Or, the data lies outside the flash memory area. |
| W1010011 | Message | Size of file xxxx exceeds the flash ROM size of device xxxx. |
| W1010012 | Message | Blocks which have been set as OTP should be set again at disconnect. |
| W1010013 | Message | Blocks which will be written have not been selected. |
| W1010014 | Message | The communication speed has been changed to xxxx bps. |

| W1010015 | Message | If Disable Serial Program is set, RFP can not connect to the targete device again. |
|----------|---------|-----------------------------------------------------------------------------------|
| W1010016 | Message | If Disable Erase is set, RFP can not remove this set.                              |

* Those messages are displayed in the Output Panel only.

## APPENDIX B   SUPPLEMENTARY INFORMATION

**Figure B-1.  E1 and E20 Pins - RX -**

| Pin No. | E1 | E20 | |
|---|---|---|---|
| | Pin Name | Pin Name (14-pin Compatible) | Pin Name (38-pin) |
| 1 | io4 | io4 | io1 |
| 2 | GND | GND | io2 |
| 3 | io5 | io5 | io0 |
| 4 | io0 | io0 | – |
| 5 | SEND | SEND | UCONNECT (connected to GND of the target board) |
| 6 | io1 | io1 | – |
| 7 | io3 | io3 | – |
| 8 | UVCC (whether 3.3V or 5.0V is supplied or whether power is supplied to the target can be detected) | UVCC | io3 |
| 9 | UVCC2 | UVCC2 | RESET |
| 10 | io2 | io2 | – |
| 11 | RECEIVE | RECEIVE | SEND |
| 12 | GND | GND | – |
| 13 | RESET | RESET | – |
| 14 | UCONNECT (connected to GND of the target board) | UCONNECT (connected to GND of the target board) | UVCC |
| 15 | | | io4 |
| 16 | | | – |
| 17 | | | UVCC2 |
| 18 | | | – |
| 19 | | | RECEIVE |
| 20 | | | – |
| 21 | | | io5 |
| 22 | | | – |
| 23 | | | – |
| 24 | | | – |
| 25 | | | – |
| 26 | | | – |
| 27 | | | – |
| 28 | | | – |
| 29 | | | – |
| 30 | | | – |
| 31 | | | – |
| 32 | | | – |
| 33 | | | – |
| 34 | | | – |
| 35 | | | – |
| 36 | | | – |
| 37 | | | – |
| 38 | | | – |

"-" indicates an unused pin.

**Figure B-2. 32-bit CRC Calculation Specifications**

```
/*  The generator polynomial used for this table is           */
/*  x^32+x^26+x^23+x^22+x^16+x^12+x^11+x^10+x^8+x^7+x^5+x^4+x^2+x^1+x^0  */
/*  according to Autodin/Ethernet/ADCCP protocol standards           */
/*  Binary: 0x04c11db7                                        */
const uint32_t CRC32_Tab [256]= {
    0x00000000, 0x04c11db7, 0x09823b6e, 0x0d4326d9, 0x130476dc, 0x17c56b6b, 0x1a864db2, 0x1e475005,
    0x2608edb8, 0x22c9f00f, 0x2f8ad6d6, 0x2b4bcb61, 0x350c9b64, 0x31cd86d3, 0x3c8ea00a, 0x384fbdbd,
    0x4c11db70, 0x48d0c6c7, 0x4593e01e, 0x4152fda9, 0x5f15adac, 0x5bd4b01b, 0x569796c2, 0x52568b75,
    0x6a1936c8, 0x6ed82b7f, 0x639b0da6, 0x675a1011, 0x791d4014, 0x7ddc5da3, 0x709f7b7a, 0x745e66cd,
    0x9823b6e0, 0x9ce2ab57, 0x91a18d8e, 0x95609039, 0x8b27c03c, 0x8fe6dd8b, 0x82a5fb52, 0x8664e6e5,
    0xbe2b5b58, 0xbaea46ef, 0xb7a96036, 0xb3687d81, 0xad2f2d84, 0xa9ee3033, 0xa4ad16ea, 0xa06c0b5d,
    0xd4326d90, 0xd0f37027, 0xddb056fe, 0xd9714b49, 0xc7361b4c, 0xc3f706fb, 0xceb42022, 0xca753d95,
    0xf23a8028, 0xf6fb9d9f, 0xfbb8bb46, 0xff79a6f1, 0xe13ef6f4, 0xe5ffeb43, 0xe8bccd9a, 0xec7dd02d,
    0x34867077, 0x30476dc0, 0x3d044b19, 0x39c556ae, 0x278206ab, 0x23431b1c, 0x2e003dc5, 0x2ac12072,
    0x128e9dcf, 0x164f8078, 0x1b0ca6a1, 0x1fcdbb16, 0x018aeb13, 0x054bf6a4, 0x0808d07d, 0x0cc9cdca,
    0x7897ab07, 0x7c56b6b0, 0x71159069, 0x75d48dde, 0x6b93dddb, 0x6f52c06c, 0x6211e6b5, 0x66d0fb02,
    0x5e9f46bf, 0x5a5e5b08, 0x571d7dd1, 0x53dc6066, 0x4d9b3063, 0x495a2dd4, 0x44190b0d, 0x40d816ba,
    0xaca5c697, 0xa864db20, 0xa527fdf9, 0xa1e6e04e, 0xbfa1b04b, 0xbb60adfc, 0xb6238b25, 0xb2e29692,
    0x8aad2b2f, 0x8e6c3698, 0x832f1041, 0x87ee0df6, 0x99a95df3, 0x9d684044, 0x902b669d, 0x94ea7b2a,
    0xe0b41de7, 0xe4750050, 0xe9362689, 0xedf73b3e, 0xf3b06b3b, 0xf771768c, 0xfa325055, 0xfef34de2,
    0xc6bcf05f, 0xc27dede8, 0xcf3ecb31, 0xcbffd686, 0xd5b88683, 0xd1799b34, 0xdc3abded, 0xd8fba05a,
    0x690ce0ee, 0x6dcdfd59, 0x608edb80, 0x644fc637, 0x7a089632, 0x7ec98b85, 0x738aad5c, 0x774bb0eb,
    0x4f040d56, 0x4bc510e1, 0x46863638, 0x42472b8f, 0x5c007b8a, 0x58c1663d, 0x558240e4, 0x51435d53,
    0x251d3b9e, 0x21dc2629, 0x2c9f00f0, 0x285e1d47, 0x36194d42, 0x32d850f5, 0x3f9b762c, 0x3b5a6b9b,
    0x0315d626, 0x07d4cb91, 0x0a97ed48, 0x0e56f0ff, 0x1011a0fa, 0x14d0bd4d, 0x19939b94, 0x1d528623,
    0xf12f560e, 0xf5ee4bb9, 0xf8ad6d60, 0xfc6c70d7, 0xe22b20d2, 0xe6ea3d65, 0xeba91bbc, 0xef68060b,
    0xd727bbb6, 0xd3e6a601, 0xdea580d8, 0xda649d6f, 0xc423cd6a, 0xc0e2d0dd, 0xcda1f604, 0xc960ebb3,
    0xbd3e8d7e, 0xb9ff90c9, 0xb4bcb610, 0xb07daba7, 0xae3afba2, 0xaafbe615, 0xa7b8c0cc, 0xa379dd7b,
    0x9b3660c6, 0x9ff77d71, 0x92b45ba8, 0x9675461f, 0x8832161a, 0x8cf30bad, 0x81b02d74, 0x857130c3,
    0x5d8a9099, 0x594b8d2e, 0x5408abf7, 0x50c9b640, 0x4e8ee645, 0x4a4ffbf2, 0x470cdd2b, 0x43cdc09c,
    0x7b827d21, 0x7f436096, 0x7200464f, 0x76c15bf8, 0x68860bfd, 0x6c47164a, 0x61043093, 0x65c52d24,
    0x119b4be9, 0x155a565e, 0x18197087, 0x1cd86d30, 0x029f3d35, 0x065e2082, 0x0b1d065b, 0x0fdc1bec,
    0x3793a651, 0x3352bbe6, 0x3e119d3f, 0x3ad08088, 0x2497d08d, 0x2056cd3a, 0x2d15ebe3, 0x29d4f654,
    0xc5a92679, 0xc1683bce, 0xcc2b1d17, 0xc8ea00a0, 0xd6ad50a5, 0xd26c4d12, 0xdf2f6bcb, 0xdbee767c,
    0xe3a1cbc1, 0xe760d676, 0xea23f0af, 0xeee2ed18, 0xf0a5bd1d, 0xf464a0aa, 0xf9278673, 0xfde69bc4,
    0x89b8fd09, 0x8d79e0be, 0x803ac667, 0x84fbdbd0, 0x9abc8bd5, 0x9e7d9662, 0x933eb0bb, 0x97ffad0c,
    0xafb010b1, 0xab710d06, 0xa6322bdf, 0xa2f33668, 0xbcb4666d, 0xb8757bda, 0xb5365d03, 0xb1f740b4
};


uint32_t CalcMemoryCRC32 (uint32_t address, uint32_t length)
{
        uint32_t i, rd_ptr, crc_accum;
        uint8_t  byte, data [16];

        crc_accum= 0xFFFFFFFF;       /* Init Pattern */
        for (i= 0, rd_ptr= 16; i < length; i++)
        {
                /* Check flash read buffer and fill if needed */
                if (rd_ptr == 16)
                {
                        Memory_Read (address, 16, data);
                        rd_ptr= 0;
                        address+= 16;
                }
                byte= ((crc_accum >> 24) ^ data [rd_ptr++]) & 0xFF;
                crc_accum= (crc_accum << 8) ^ CRC32_Tab [byte];
        }
        return crc_accum;

}
```

**Figure B-3.  16-bit CRC Calculation Specifications**

```
/* The generator polynomial used for this table is: */
/* x^16+x^12+x^5+x^0 according to CCITT-16 standard. */
/* Binary: 0x1021 */
const uint16_t CRC16_Tab [256]= {
        0x0000,0x1021,0x2042,0x3063,0x4084,0x50A5,0x60C6,0x70E7,
        0x8108,0x9129,0xA14A,0xB16B,0xC18C,0xD1AD,0xE1CE,0xF1EF,
        0x1231,0x0210,0x3273,0x2252,0x52B5,0x4294,0x72F7,0x62D6,
        0x9339,0x8318,0xB37B,0xA35A,0xD3BD,0xC39C,0xF3FF,0xE3DE,
        0x2462,0x3443,0x0420,0x1401,0x64E6,0x74C7,0x44A4,0x5485,
        0xA56A,0xB54B,0x8528,0x9509,0xE5EE,0xF5CF,0xC5AC,0xD58D,
        0x3653,0x2672,0x1611,0x0630,0x76D7,0x66F6,0x5695,0x46B4,
        0xB75B,0xA77A,0x9719,0x8738,0xF7DF,0xE7FE,0xD79D,0xC7BC,
        0x48C4,0x58E5,0x6886,0x78A7,0x0840,0x1861,0x2802,0x3823,
        0xC9CC,0xD9ED,0xE98E,0xF9AF,0x8948,0x9969,0xA90A,0xB92B,
        0x5AF5,0x4AD4,0x7AB7,0x6A96,0x1A71,0x0A50,0x3A33,0x2A12,
        0xDBFD,0xCBDC,0xFBBF,0xEB9E,0x9B79,0x8B58,0xBB3B,0xAB1A,
        0x6CA6,0x7C87,0x4CE4,0x5CC5,0x2C22,0x3C03,0x0C60,0x1C41,
        0xEDAE,0xFD8F,0xCDEC,0xDDCD,0xAD2A,0xBD0B,0x8D68,0x9D49,
        0x7E97,0x6EB6,0x5ED5,0x4EF4,0x3E13,0x2E32,0x1E51,0x0E70,
        0xFF9F,0xEFBE,0xDFDD,0xCFFC,0xBF1B,0xAF3A,0x9F59,0x8F78,
        0x9188,0x81A9,0xB1CA,0xA1EB,0xD10C,0xC12D,0xF14E,0xE16F,
        0x1080,0x00A1,0x30C2,0x20E3,0x5004,0x4025,0x7046,0x6067,
        0x83B9,0x9398,0xA3FB,0xB3DA,0xC33D,0xD31C,0xE37F,0xF35E,
        0x02B1,0x1290,0x22F3,0x32D2,0x4235,0x5214,0x6277,0x7256,
        0xB5EA,0xA5CB,0x95A8,0x8589,0xF56E,0xE54F,0xD52C,0xC50D,
        0x34E2,0x24C3,0x14A0,0x0481,0x7466,0x6447,0x5424,0x4405,
        0xA7DB,0xB7FA,0x8799,0x97B8,0xE75F,0xF77E,0xC71D,0xD73C,
        0x26D3,0x36F2,0x0691,0x16B0,0x6657,0x7676,0x4615,0x5634,
        0xD94C,0xC96D,0xF90E,0xE92F,0x99C8,0x89E9,0xB98A,0xA9AB,
        0x5844,0x4865,0x7806,0x6827,0x18C0,0x08E1,0x3882,0x28A3,
        0xCB7D,0xDB5C,0xEB3F,0xFB1E,0x8BF9,0x9BD8,0xABBB,0xBB9A,
        0x4A75,0x5A54,0x6A37,0x7A16,0x0AF1,0x1AD0,0x2AB3,0x3A92,
        0xFD2E,0xED0F,0xDD6C,0xCD4D,0xBDAA,0xAD8B,0x9DE8,0x8DC9,
        0x7C26,0x6C07,0x5C64,0x4C45,0x3CA2,0x2C83,0x1CE0,0x0CC1,
        0xEF1F,0xFF3E,0xCF5D,0xDF7C,0xAF9B,0xBFBA,0x8FD9,0x9FF8,
        0x6E17,0x7E36,0x4E55,0x5E74,0x2E93,0x3EB2,0x0ED1,0x1EF0
};


uint16_t CalcMemoryCRC16 (uint32_t address, uint32_t length)
{
        uint32_t i, rd_ptr;
        uint16_t crc_accum;
        uint8_t byte, data [4];

        crc_accum= 0x0000; /* Init Pattern */
        for (i= 0, rd_ptr= 0; i < length; i++)
        {
                /* Check flash read buffer and fill if needed */
                if (rd_ptr == 0)
                {
                        Memory_Read (address, 4, data);
                        rd_ptr= 4;
                        address+= 4;
                }
                byte= (crc_accum >> 8) ^ data [--rd_ptr];
                crc_accum= (crc_accum << 8) ^ CRC16_Tab [byte];
        }
        return crc_accum;

}
```

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