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User's Manual

M16C Flash Starter

User's Manual

RENESAS MICROCOMPUTER
M16C FAMILY / R8C FAMILY / 740 FAMILY

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Rev.3.50 2009.04

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Preface

Thank you for purchasing Renesas's Flash Starter.
This manual describes how to use the hardware and software products included with Flash Starter.
To other tools, look other tools's manuals.

Chapter 1. Outline

1.1. M16C Flash Starter

M16C Flash Starter (FlashSta.exe) is the software to operate on M16C, R8C and 38000/740series microcomputers that contain internal flash memory or from a Windows version personal computer (PC/AT). It has modes of operation

1.1.1. Internal Flash Memory Mode

In this mode, the software operates on an M16C, R8C and 38000/740series microcomputer that contains internal flash memory to program or erase its internal flash memory.

[Caution]

- **Flash Starter cannot ERASE/PROGRAM/READ the DATA area (or Data Block).**
- **Please supply the power supply which fulfills both the specifications of the Flash Program/Erase voltage of target MCU and the operating voltage of RS-232C driver to your target board. Incidentally, the MF_Ten-Nine cable which contains RS-232C driver can be used by 3.0V to 5.5V voltage range.**

1.1.2. The operating environment

The following shows the operating environment for M16C Flash Starter.

(1) IBM PC/AT-compatible computer running Windows 95/98(SE)/2000/XP (not used Windows Vista)

(2) 1 serial port

1.2. Pin Settings

M16C Flash Starter requires an RS-232C serial communications cable and a voltage converter circuit that can convert voltage to the cable's output level. (A separate volume "Example Circuit")

The table below shows the supported types of microcomputers and how to set the related pins required for writing data.

Table 1 Pin Settings (M16C family)

MCU Type / Pin Name	Internal Flash	Function
	M16C/62A, M16C/62M, M16C/62N, M16C/62P, M16C/6N, M16C/80, M32C/83, M32C/85, M32C/87, M16C/30P	
BUSY(RTS1)	Open	Operation monitoring pin
CLK1	"L" input	Switch to M16C Flash Starter
RxD1	PC TxD	Serial data input
TxD1	PC RxD	Serial data output
CNVss	Vcc input	Mode entry
$\overline{CE}$	Vcc input	Mode entry
$\overline{EPM}$	"L" input	Mode entry
$\overline{RESET}$	Reset input	Reset input
VCC	Vcc	Power input
Vss	GND	GND

Table 2 Pin Settings (38000/740 series)

MCU Type / Pin Name	Internal Flash				Function
	7516 3850/3850A/3851	3803L/3804L	38D2	38D5	
BUSY	Open	Open	Open	Open	Operation monitoring pin
CLK	"L" input				Switch to M16C Flash Starter
SCLK		"L" input(*)	"L" input(*)	"L" input(*)	Switch to M16C Flash Starter
RxD	PC TxD	PC TxD(*)	PC TxD(*)	PC TxD(*)	Serial data input
TxD	PC RxD	PC RxD(*)	PC RxD(*)	PC RxD(*)	Serial data output
Vpp	Vpp input(*)				Mode entry
CNVss		Vcc input(*)	Vcc input(*)	Vcc input(*)	Mode entry
P4_1	Vcc input				Mode entry
$\overline{\text{RESET}}$	Reset input	Reset input(*)	Reset input(*)	Reset input(*)	Reset input
VCC	Vcc	Vcc	Vcc	Vcc	Power input
Vss	GND	GND	GND	GND	GND

*: Refer to flash microcomputer datasheets for details.

Table 3 Pin Settings (R8C family)

MCU Type / Pin Name	Internal Flash		Function
	R8C/10,11,12,13	R8C/14, 15, 16, 17, 18, 19, 1A, 1B, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29,2A,2B,2C,2D	
RxD(*)	PC TxD	PC TxD	Serial data input
TxD(*)	PC RxD	PC RxD	Serial data output
MODE	"L" input	"L" input	Mode entry
CNVss	"L" input		Switch to M16C Flash Starter
$\overline{\text{RESET}}$	Reset input	Reset input	Reset input
VCC	Vcc	Vcc	Power input
IVcc	(*)		IVcc
Vss	GND	GND	GND

*: Connect a capacitor (0.1uF) between this pin and Vss.

Table 4 Pin Settings (740 series)

MCU Type / Pin Name	Internal Flash	Function
	7542	
BUSY	Open	Operation monitoring pin
P06/SCLK2	"L" input(*)	Serial data input and Switch to M16C Flash Starter
RxD	PC TxD(*)	Serial data input
TxD	PC RxD(*)	Serial data output
CNVss	"H" input(*)	Mode entry
P32/CMP3	"H" input(*)	Mode entry
P37/INT0	"L" input(*)	Mode entry
$\overline{\text{RESET}}$	Reset input(*)	Reset input
VCC	Vcc	Power input
Vss	GND	GND

*: Connect a capacitor (0.1uF) between this pin and Vss.

Table 5 Pin Settings (M16C/Tiny series)

MCU Type / Pin Name	Internal Flash	Function
	M16C/26, 26A, 28, 29	
BUSY(RTS1)	Open	Operation monitoring pin
CLK1	"L" input	Switch to M16C Flash Starter
RxD1	PC TxD	Serial data input
TxD1	PC RxD	Serial data output
CNVss	Vcc input	Mode entry
$\overline{\text{CE}}$(*)	Vcc input	Mode entry
$\overline{\text{RESET}}$	Reset input	Reset input
VCC	Vcc	Power input
Vss	GND	GND
$\overline{\text{RP}}$(*)	Vss input	Mode entry
P1_6(*)	Vcc	Mode entry

*: Set following either or both

-> Connect the $\overline{\text{CE}}$ pin to Vcc

-> Connect the $\overline{\text{RP}}$ pin to Vss and the P1_6 to Vcc.

M16C Flash Starter can communicate with the target microcomputer in the range of main clock input oscillation frequencies shown below.

2MHz to the maximum input oscillation frequency

Chapter 2. Startup

2.1. The starting method

In order to start M16C Flash Starter, it moves to the place where M16C Flash Starter is stored. "FlashSta.exe" is double-clicked after movement.

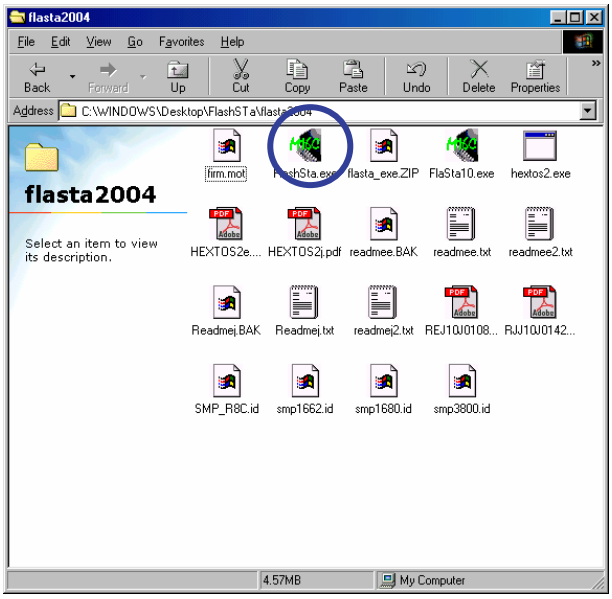

Fig 1 Flashsta.exe

2.2. Startup

Execute **M16C Flash Starter (FlashSta.exe)**, and the environment setup screen shown below will appear.

Use this screen to choose program mode and serial port.

After selecting the above, go to each program mode.

When select "OK" button, it will take a few seconds until next screen appears.

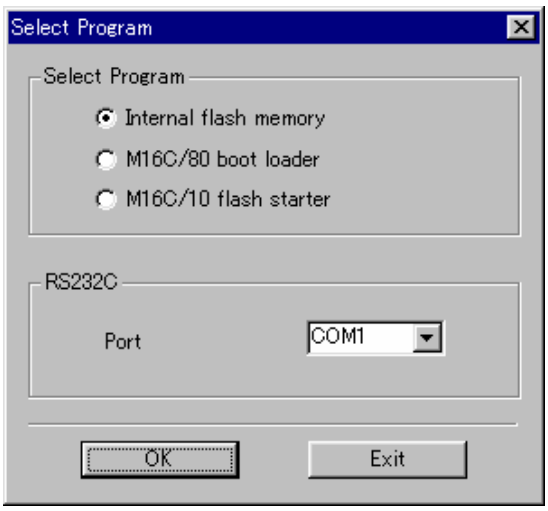

Fig 2 Environment Setup Screen

Chapter 3. Internal Flash Memory Mode

The following explains how to operate in internal flash memory mode.

3.1. File Path

After selecting program mode, an ID Check dialog box is displayed. From this dialog box, choose the program file to be operated on, enter ID code, and choose the type of MCU used.

(Input the file name in the **File Path field box** and the ID code in the **ID field box**.)

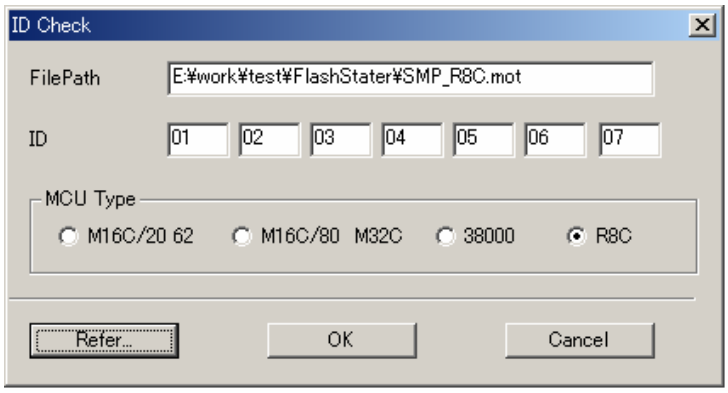

Fig 3 ID Check Dialog Box

[Refer…] Clicking on the button will display file names for your referral and selection. If the ID file is in the same folder (Refer to"4.1 About ID Check"), the ID code is loaded when the file is selected. If the microcomputer is a blank product, you do not need to enter ID.

Files in only Motorola S2 format can be selected. Files in any other formats cannot be selected.

In case of 38000/740 series, Renesas's assembler SRA74 generates Intel HEX format files. So please convert Intel HEX format into Motorola S2 format. The conversion software **"HEXTOS2 creates a Motorola S format machine language file (extension .s2) from an Intel HEX format machine language file (extension .hex) that was created in LINK74".** (Refer to Section4.3," Renesas MCU Technical Information")

The ID code you need to enter is the code currently written in flash memory.

After referencing files, choose the MCU Type.

i) In case of M16C/6N Group, choose the "M16C/20 62" of the MCU Type.

ii) In case of M32C/83, choose the "M16C/80 M32C" of the MCU Type.

[OK] Clicking on the button will start the ID check. After the check, the M16C Flash Starter window will open up, from where device commands can be executed. If an ID matching error occurs, the M16C Flash Starter window will open up just the same, but it will be preceded by an error message and the commands will be inoperable. In such case, recheck your ID code.

[Cancel] Clicking on the button will open the M16C Flash Starter window without running an ID check. When it is canceled, a device command can't be operated. (Refer to Section "3.3 Device Command")

If communication with the microcomputer results in an error, reset the target system following the messages and then set up communication back again. And input an ID code again.

3.2. Communications Setup

From the Set baud rate dialog box, set the rate with which to communicate with the microcomputer and the time interval at which to send data.

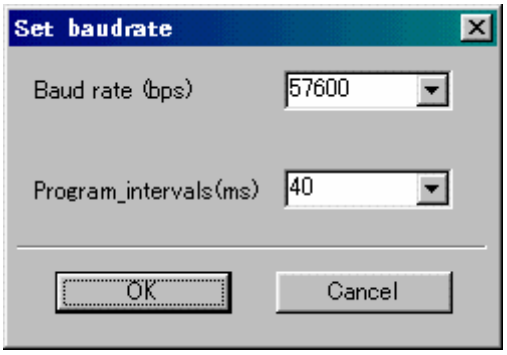

Fig 4 Communications Setup

Baud rate (bps) Set a communication rate for Baud rate (bps). At the M16C Flash Starter startup, communication status is set at 9600 bps. After that, the previously set baud rate is used. Before exiting the programmer, return MCU communications to 9600 bps. Baud rate can be selected from the below speeds.

9600, 19200, 38400, 57600, *115200 (bps)

***: 115200 bps is supported for only M16C/80, M32C series and R8C family.**

Program_intervals (ms) For Program_intervals (ms), set a time interval from one page of data transferred to the next page of data transferred when executing program commands. As you change the time interval, the program commands execution time changes. The time interval is set to 40 ms when the program starts. It can be selected from the values listed below.

5 ms to 50 ms : intervals of 5 ms

Depending on the microcomputer's operating frequency or MCU type, the time in which data is written to flash memory varies. If a communication error occurs when executing program commands, increase the time interval.

Depending on the microcomputer's main clock input oscillation frequency or MCU type, the selected baud rate may result in communication error. In such a case, choose another baud rate.

Table 6 Communicable Baud Rates at Each Frequency (Reference)

Baud rate (bps) / Xin (MHz)	9600	19200	38400	57600	115200
32	O	O	O	O	O
30	O	O	O	O	O
25	O	O	O	O	O
20	O	O	O	O	O
16	O	O	O	O	
10	O	O	O	O	
8	O	O	O	O	
6	O	O	O	X	
4	O	O	X	X	
3	O	O	O	X	
2	O	X	X	X	

O: Communicable

X: Not communicable

3.3. Device Command

The **Device command dialog box** is for executing device commands.

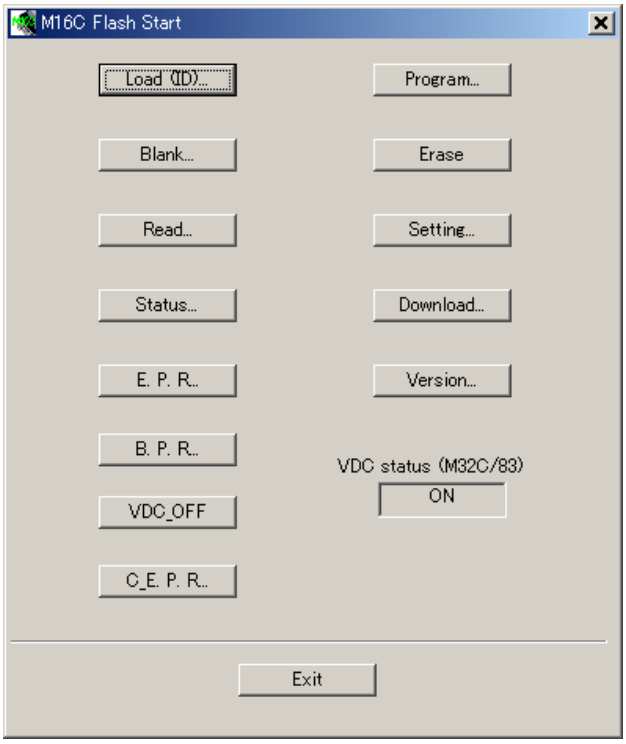

Fig 5 Device Command Dialog Box

If the ID check has not been completed, only the [Load (ID)], [Status], [Setting] and [Version] commands can be used.

[Program] When the [Program] and other commands are selected, the Input Address dialog box opens up. Enter the address range to be operated on by the command. The default address input values are the upper-limit and lower-limit addresses in the file that was specified during ID check. (When no file is selected, the start and end addresses of M16C/62A flash memory are assumed.) Input an address within the setting range.

Caution: Flash Starter cannot ERASE/PROGRAM/READ the DATA area (or Block data).

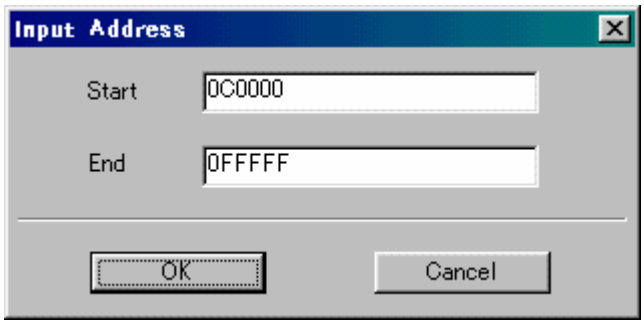

Fig 6 Input Address Dialog Box

[Load (ID)] Refer to Section “3.1 File Path”

[Blank] Checks internal flash memory for blank.

[Read] Compares the program file specified for Load (ID) with the content written in flash memory.

[Status] Displays the status of the flash memory.

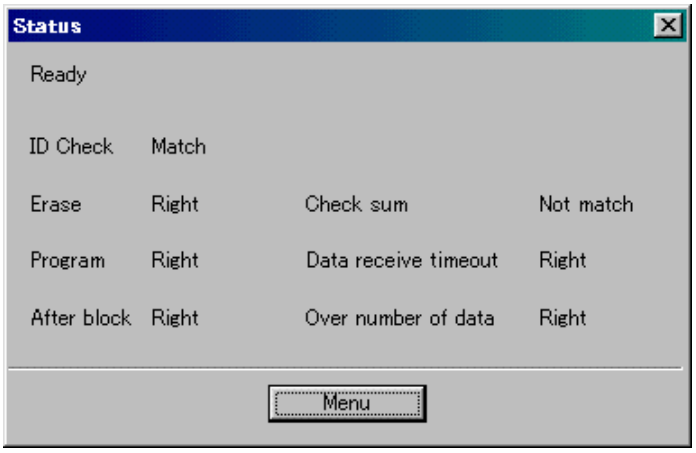

Fig 7 Status Display Screen

The table below lists the content of each item.

Table 7 Contents of Status

	Item	Content of Processing
1	Write state machine status (Sequencer status(*1))	Shows operating status of flash memory. [Ready] : Program/erase ready [Busy] : Program/erase in progress
2	ID check	Shows ID check status of flash memory. [Not Yet] : Not verified [Not match]: Verification mismatch [Match] : Verified
3	Erase	Shows erase status of flash memory. [Error] : Terminated in error [Right]: Terminated normally
4	Program	Shows programming status of flash memory. [Error] : Terminated in error [Right]: Terminated normally
5	After block(*2)	Shows excessive write status when writing pages. [Error] : Excessively written [Right]: No excessive write
6	Check sum	Shows boot program transfer result. [Match] : Checksum matched [Not Match]: Checksum mismatched
7	Data receive timeout	Shows time-out occurrence status when receiving data. [Time Out] : Time-out occurred when receiving [Right] : Received data normally

*1: 38000/740 series, *2: an invalid bit for 38000/740 series

[E.P.R] Sequentially executes erase, program, and read commands.

[B.P.R] Sequentially executes blank, program, and read commands.

[Program] Writes the program file specified for Load (ID) into flash memory.

[Erase] Unlocks each block of flash memory and then erases the entire area of flash memory.

[Setting] Refer to Section "3.2 Communications Setup".

[Download] Upgrades the control program version. The updating control program specified for Load (ID) is downloaded into the internal RAM of the microcomputer. When the download is completed, the program transferred into the internal RAM starts operating.

[Version] Outputs version information on the microcomputer's control program.

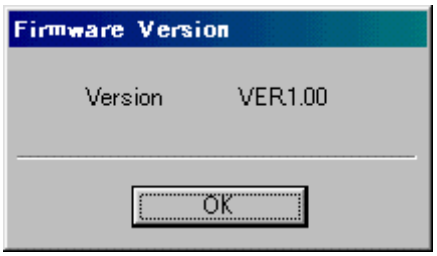

Fig 8 Version Information

[VDC OFF] When rewriting a flash by M32C/83 using the power supply voltage not more than 3.3V, before performing erase and a program, it is necessary to turn off VDC. Execution of this command turns off VDC. The state of VDC is displayed on a command selection dialog. (effective only in the case of M32C/83) Even if it turns off VDC, VDC returns to ON state after reset release of a target. When you turn off VDC, please execute this command again. In addition, as for this command, only M32C / 83 are effective. By M32C/83, except when you rewrite on the power supply voltage not more than 3.3V, please do not use it.

[C_E.P.R.] Sequentially executes standard time data, bit rate, ID code check function, erase, program, and read commands **[E.P.R]** command is performed, after performing processing of a communication environmental setup chosen at the time of program starting, file selection and ID collation, and a communication setup, if this command is executed. Please perform re-connection with a target, and reset release before executing this command. In addition, as for this command, only Internal flash memory mode are effective.

[Exit] Changes the communication rate to 9600 bps before quitting **M16C Flash Starter**.

Chapter 4. Appendix

4.1. About the ID Check

The ID check compares the ID code stored in the flash ROM against the ID code sent via serial communications. Unless the two ID codes match, certain commands are disabled. The table below lists the areas in which ID code is stored.

Table 8 ID Address

MCU Type	ID Address	ROM code protect information
M16C Family	0FFFDFh,0FFFE3h,0FFFEBh,0FFFEFh, 0FFFF3h,0FFFF7h,0FFFFBh	0FFFFFh
M16C/80 M32C	0FFFFDFh,0FFFFE3h,0FFFFEBh,0FFFFEFh, 0FFFFF3h,0FFFFF7h,0FFFFFBh	0FFFFFFh
38000/740	FFD4h,FFD5h,FFD6h,FFD7h, FFD8h,FFD9h,FFDAh	0FFDBh
R8C Family	0FFDFh,0FFE3h,0FFEBh,0FFEFh, 0FFF3h,0FFF7h,0FFFBh	0FFFFh

```
S2140FFFB0E8C5EEC5F4C5FAC500C606C60CC612C619
S2140FFFC018C61EC624C62AC630C636C63CC642C685
S2100FFFD048C64EC654C65AC660C665C664
S2140FFFDCCDC60F0050C70F00D8C70F00CFC80F00E5
S2140FFFEC13CA0F005BC80F004DCB0F004ECB0F0084
S2080FFFFC18CD0F00F9
S804000000FB
```

Fig 9 Motorola S2 File – ID Address (M16C/62A)

By creating an ID file with an ID code and ROM code protect information (ROM protect during parallel writing), the ID code is automatically loaded when your work file is selected in the ID Check dialog box (Refer to Section “3.1 File Path”).

The ID file can be created with the -ID option of LMC30 (LMC308). The ROM code protect can be set with the -protect option.

LMC30 (LMC308) is included in Renesas's NC30 (NC308) compiler and AS30 (AS308) assembler for M16C and are supported in following versions.

LMC30 ; V.3.10.00, LMC308 ; V.1.00.01, LMC8C ; V.4.00.01

In case of 38000/740 series, assembler(SRA74) cannot create an ID file, so please create one like that in Fig 9.

It is explained here following how to set IDs, create files and protect data with LMC30.

(1) ID Setting

- The ID code is set with the -ID option. Only capital letters "ID" are accepted.
- Immediately after inputting "-ID", input an ID code as # plus a hexadecimal number or in single-byte alphabetic characters.
- "H" is not needed to indicate the hexadecimal number.
- An error occurs if the ID code exceeds 56 bits.
- To set an ID code as a hexadecimal number, add # after inputting "-ID". Numbered codes can be up to 14 digits long.
- To set an ID code in single-byte alphabet input the text string after inputting "-ID". Lettered codes can be up to seven characters long and must be single-byte ASCII code (30h - 39h, 41h - 5Ah and 61h – 7Ah).

Example: -ID#1234

The ID is 12340000000000. It is stored as "12h" in address FFFDFh, "34h" in address FFFE3h and "00h" in addresses FFFEBh, FFFEFh, FFFF3h, FFFF7h and FFFFBh.

Example: -IDCODE

The ID is 434F4445000000. It is stored as "43h" in address FFFDFh, "4Fh" in address FFFE3h, "44h" in address FFFEBh, "45h" in address FFFEFh and "00h" in addresses FFFF3h, FFFF7h and FFFFBh.

(2) ID File Output

When the -ID option is input, LMC30 creates a file containing the ID code and ROM code protect information (address FFFFFh), and names it with the HEX file (Motorola S2 format) ".id" extension.

Example: LMC30 -ID#1234 samp

A file with the below contents will be created under the name “samp.id”.

```
-ID1234
FFFDF :  12
FFFE3 :  34
FFFEB :  00
FFFEF :  00
FFFF3 :  00
FFFF7 :  00
FFFFB :  00
FFFFF :  FF
```

Fig 10 ID File Contents

*: The ID code input at LMC30 startup is output on the first line, while all of the ID addresses and the code values set for each are output on the following lines.

*: If the -protect option has been input, "-protect" is output on the first line.

(3) Protect Option

- The protect function is set using the -protect option. Only small case letters are accepted.
- At LMC30 startup, "30" is set for address FFFFFh if the -protect option is used. Otherwise, "FFh" is set for address FFFFFh.

  If LMC30 cannot create an ID file, create one like that in Fig 10.

4.2. Messages

The below messages are displayed when device commands are executed or errors occur.

Table 9 Messages (1)

Type	No.	Message	Description	Remedial action
Communication	1	Can not communicate.	Communications were not established with the target MCU.	Check the following. * That power to the target MCU is ON. * That the communications cable is correctly connected. * Whether SCLK and CNVss are correctly set.
	2	Can not communicate to outside.	Communications with the target MCU are not possible.	
	3	Timeout. Push RESET.	The target MCU did not reply before the communication time limit ran out.	
	4	Select port open error	The selected port cannot be opened.	Please choose another serial port which can be used.
	5	Communication error. Push RESET.	A communication error other than the above time-out has occurred.	The error could be caused by something other than this programmer.
	6	Can not set baud rate to 9600bps.	The baud rate was not returned to 9600 bps before exiting the programmer.	To continue using this programmer, reset the target MCU.
	7	Can not set default baud rate. Baud rate is last baud rate.	Baud rate could not be set to 9600 when the programmer was started up.	Reset the target MCU as instructed in messages.
	8	Can not set last obdurate. Baud rate is 9600bps. Now.	At startup, the last used baud rate could not be set. Baud rate remains the same 9600 bps for establishing communications.	
	9	Can not set new baud rate. Baud rate is last baud rate now.	The programmer could not update the baud rate.	Use a lower baud rate.
	10	Can not use the Micon. Close this program.	The target MCU did not reply during the communication check run at startup.	See Nos. 1- 3.
	11	This program is already runninig.0		-
Device command	12	Did not pass ID.	The ID code did not match that of the target MCU.	Run an ID check.
	13	Download Completed.	Downloading the selected file terminated normally.	-
	14	Download not completed. Please retry Download.	Error occurred when downloading the selected file.	Execute downloading the file again.
	15	Erase error.	The programmer could not erase the target MCU.	-
	16	Erase OK.	The programmer has finished erasing the target MCU.	-
	17	Find not blank at address [ADDRESS].	Blank check error. There is an area without an FFh address.	The ROM is already written. Erase it.

Table 10 Messages (2)

Type	No.	Message	Description	Remedial action
Device command	18	Find not match at address [ADDRESS].	Read verify error. The selected content is different from the written content.	-
	19	Not match ID.	The wrong ID code was input.	Input the correct ID code.
	20	Program error.	Programming has failed.	-
	21	Stop downloading.	Download operation has been suspended.	-
	22	Stop programming.	Programming has been suspended.	-
	23	Too higher end address (0x2A00).	The last address of the file to be downloaded exceeds address "2A00h."	Correct the file to be downloaded.
	24	Too small start address.	The start address is larger than the end address.	Set an effective address.
File opera Tion	25	Can not accept this file.	The selected file cannot be loaded.	The file is of the wrong format. Select a Motorola S2 file.
	26	Can not found the ID file.	The ID file was not found during the file check.	Check whether there is an ID file in the folder or not.
	27	Do not input filename.	A file was not selected for the ID check.	Input a file name.
	28	Do not match ID style.	The ID code is of the wrong style.	Input an ID code of the correct style.

4.3. Renesas MCU Technical Information

For information about **M16C Flash Starter** and Renesas MCU, please refer to “Renesas MCU Technical Information” Homepage.

M16C Family

http://www.renesas.com/en/m16c

R8C Family

http://www.renesas.com/r8c

38000/740 series

http://www.renesas.com/en/38000

REVISION HISTORY

Rev.	Date	Description	
		Page	Summary
1.00	1998.10.01	-	First edition issued
1.01	1999.12.15	-	Add M16C/20,80
1.02	2000.01.31	-	Add M16C/80 Boot Loader
1.03	2000.05.15	-	All the examples of a circuit were updated.
1.04	2000.09.30	-	Add memory map, example circuit, and pin assignment for M16C/80.
1.05	2001.06.30	-	Add memory map, example circuit, and pin assignment for M16C/20
1.06	2001.07.30	-	Add memory map, example circuit, and pin assignment for M16C/6N
1.07	2001.09.30	-	Add 740 Family
1.08	2001.12.15	-	All the examples of a circuit were updated. (add Oscillation circuit)
1.09	2002.03.15	-	Add M16C/62T,62U
1.10	2002.06.30	-	Add memory map, example circuit, and pin assignment for M16C/83
1.11	2002.09.30	-	Add memory map, example circuit, and pin assignment for M16C/10
1.12	2003.02.15	-	Add memory map, example circuit, and pin assignment for M16C/62P
2.00	2003.05.31	-	A new company name change
2.01	2003.07.31	-	Add memory map, example circuit, and pin assignment for R8C/Tiny Add “DC_OFF” command Window
3.00	2004.07.01	-	Renewal of renewal. The example circuit and pin assignment were used as the separate volume.
3.10	2005.03.16	-	Add “C_E.P.R” command
3.20	2006.02.01	-	Add of disclaimer to data area
			Add 18, 19, 1A, and 1B are added to the R8C/Tiny series.
3.21	2006.08.16	-	Change disclaimer to data area.
3.30	2006.12.01	-	Dell table-1 M16C/10, 20, 22 M16C/80 Boot Loader Add table-3 R8C/24,25,26,27,28,29 Dell Section-4 and Section-5
3.40	2008.02.16	P7	Add table-2 PIN setting 38000/740 series (38D2,38D5)
3.41	2008.03.16	P7	Change to table-2 PIN setting 38000/740 series
3.50	2009.04.01	-	R8C microcomputer name was renamed. (R8C family)
		P5	Notes about power supply were added.
		P11	Notes about communication baud rate were corrected. Wrong: “115200 bps is supported for only M16C/80 and M32C/83.” Correct: “115200 bps is supported for only M16C80, M32C series and R8C family.”

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