FUJITSU

FUJITSU FLASH MCU Programmer for F^2MC-16LX

Specifications

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Specifications
Version 2.20 6 September 2004
Software version: V01L13

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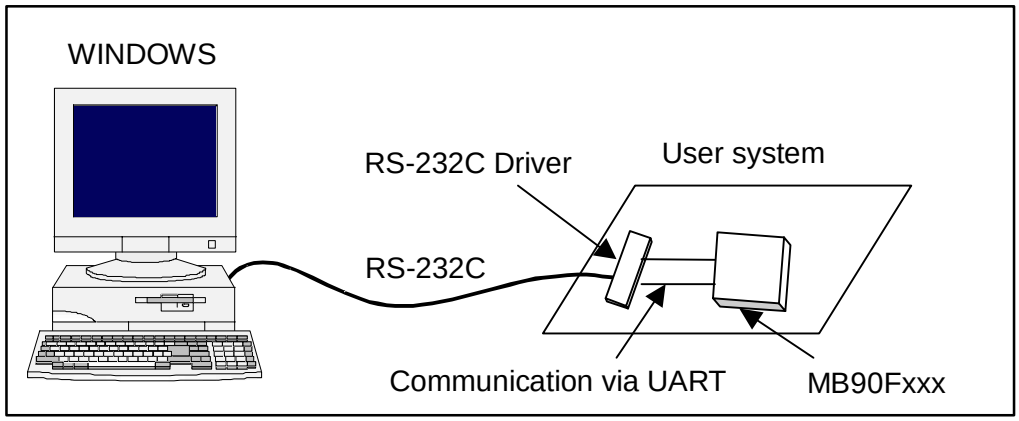
1. CONFIGURATION DIAGRAM



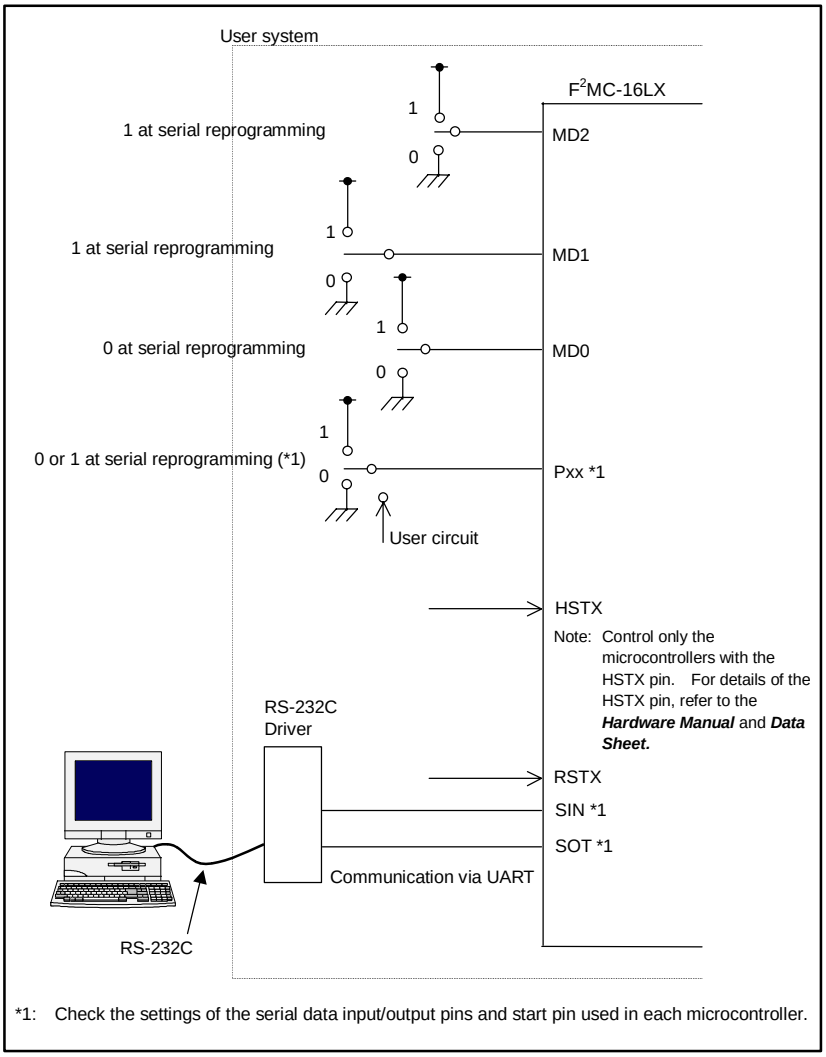
Using RS-232C cable connected to the personal computer (Windows PC), flash memory data in the microcontroller mounted in the user system can be reprogrammed. Note that the user system must have an RS-232C driver for communication with the microcontroller UART.

2. COMPATIBLE MICROCONTROLLERS

MB90F334	MB90F337	MB90F342A/CA/AS/CAS
MB90F345 A/CA/AS/CAS	MB90F347/C/S/CS	MB90F349 A/CA/AS/CAS
MB90F351	MB90F352/S	MB90F372
MB90F378	MB90F387/S	MB90F394/H
MB90F395H	MB90MF408	MB90F423GA/GB/GC
MB90F428GA/GB/GC	MB90F438L/LS	MB90F439/S
MB90F443G	MB90F455/S	MB90F456/S
MB90F457/S	MB90F462	MB90F474H/L
MB90F476/A	MB90F481	MB90F482
MB90F488	MB90F497/G	MB90F498G
MB90F523B	MB90F543/G/GS	MB90F546G/GS
MB90F548G/GS	MB90F549/G/GS	MB90F553A
MB90F562/B	MB90F568	MB90F574/A
MB90F583B/C/CA	MB90F584C/CA	MB90F591A/G
MB90F594A/G	MB90F598/G	MB90F654A
MB90F804	MB90F822	MB90F823
MB90F867	MB90F897/S	

Note: The software is not compatible with MB90F523/A.
Only MB90F523B in the MB90520 series has compatibility.

3. EXAMPLE OF CONNECTION FOR ON-BOARD REPROGRAMMING BY PROGRAMMER



The MD2, MD1, MD0 pins, and Pxx pins cannot be controlled by the PC and should be set in the user system. During serial programming, set the HSTX pin to “High” (only for microcontrollers with the HSTX pin).

When the RSTX pin is set from “Low” to “High” level after setting the MD2, MD1, MD0 pins, and Px0, Px1 pins, the microcontroller enters the serial reprogramming mode, enabling serial reprogramming from the PC.

After the reprogramming, control is shifted to the normally-used mode as for MD2, MD1 and MD0 pins and to the user circuit side as for Pxx pins. Then sitting from “Low” to “High” level executes user program.

Note: The port numbers and settings of the set Pxx pins and the port numbers of the SIN and SOT pins vary with the types of microcontrollers. See the ***Tables*** in ***Chapter 4*** for details. When programming data to mass-produced products using the Yokogawa Digital Computer serial programmer some time in the future, it is best to generate the patterns for serial clock pins on the printed circuit board according to the connection example for serial programming described in the ***Hardware Manual*** for each microcontroller.

4. PINS USED FOR ON-BOARD REPROGRAMMING

(1) Control pins for on-board programming

Function	Pin	Supplementary Explanation
Mode pins	MD2, MD1, MD0	Should be controlled in flash memory reprogramming mode When MD2 and MD1 are set to “H” and MD0 is set to “L”, they enter the reprogramming mode.
Starting pin for flash reprogramming mode	P00, P01 or P80, P81 or P30, P31 or P65, P66 or P60, P61	MB90F474H/L, MB90F476/A When the original oscillation is 4, 8, and 16 MHz, set P80 and P81 to “L”. When the original oscillation is 5, 10, and 20 MHz, set P80 to “H” and P81 to “L”.
		MB90MF408 Set P80 and P81 to “L”.
		MB90F481 When the original oscillation is 4, 8, and 16 MHz, set P80 and P81 to “L”. When the original oscillation is 6, 12, and 24 MHz, set P80 to “H” and P81 to “L”.
		MB90F482,MB90F488 When the original oscillation is 6, 12, and 24 MHz, set P80 and P81 to “L”. When the original oscillation is 5, 10, and 20 MHz, set P80 to “H” and P81 to “L”.
		MB90F387/S,MB90F455/S,MB90F456/S,MB90F457/S,MB90F897/S Set P30 and P31 to “L”.
		MB90F804 When the original oscillation is 4 MHz, set P65 and P66 to “L”. When the original oscillation is 6 MHz, set P65 to “H” and P66 to “L”.
		MB90F334,MB90F337 Set P60 and P61 to “L”.
		MB90F372,MB90F378 When the original oscillation is 4, 8, and 16 MHz, set P00 and P01 to “L”. When the original oscillation is 3, 6, and 12 MHz, set P00 to “H” and P01 to “L”.
		MB90F394/H,MB90F395H When the original oscillation is 4, 8, and 16 MHz, set P00 and P01 to “L”. When the original oscillation is 5, and 20 MHz, set P00 to “H” and P01 to “L”.
		MB90F342A/CA/AS/CAS, MB90F345A/CA/AS/CAS, MB90F347/C/S/CS, MB90F349A/CA/AS/CAS, MB90F351,MB90F352/S, MB90F867 When the original oscillation is 4, 8 and 16MHz set P00 and P01 to “L”. When the original oscillation is 5 and 10MHz set P00 to “H” and P01 to “L”.
		Other microcontrollers Set P00 and P01 to “L” in the flash reprogramming mode.
Reset pin	RSTX	Cancel reset after setting Starting pin and Mode pins to the flash reprogramming mode.
Serial data input pin	SIN	Note that the pin varies with the type of microcontroller.
Serial data output pin	SOT	Note that the pin varies with the type of microcontroller.
Hardware standby pin	HSTX	Input the “H” level during the flash reprogramming mode. Setting is not required for microcontrollers without HSTX pin.

(2) Serial data I/O pins and start pins for each type of microcontroller(1/2)

Type	Serial Data Input Pin	Serial Data Output Pin	Starting Pin for Programming Program	Supply Voltage
MB90F334 MB90F337	P42/SIN0	P43/SOT0	P60=L, P61=L	3-V product
MB90F342A/CA/AS/CAS MB90F345A/CA/AS/CAS MB90F347/C/S/CS MB90F349A/CA/AS/CAS	P82/SIN0	P83/SOT0	P00=L, P01=L*1 P00=H, P01=L*2	5-V product
MB90F351 MB90F352/S	P12/SIN3	P13/SOT3	P00=L, P01=L*1 P00=H, P01=L*2	5-V product
MB90F372 MB90F378	P70/UI1	P67/UO1	P00=L, P01=L*1 P00=H, P01=L*3	3-V product
MB90F387/S	P40/SIN1	P42/SOT1	P30=L, P31=L	5-V product
MB90F394/H MB90F395H	P36/SIN0	P34/SOT0	P00=L, P01=L*1 P00=H, P01=L*2	5-V product
MB90MF408	P82/SI0	P84/SO0	P80=L, P81=L	3-V product
MB90F423GA/GB/GC	P03/SIN1	P04/SOT1	P00=L, P01=L	5-V product
MB90F428GA/GB/GC	P03/SIN1	P04/SOT1	P00=L, P01=L	5-V product
MB90F438L/LS MB90F439/S	P43/SIN1	P45/SOT1	P00=L, P01=L	5-V product
MB90F443G	P43/SIN1	P45/SOT1	P00=L, P01=L	5-V product
MB90F455/S MB90F456/S MB90F457/S	P40/SIN1	P42/SOT1	P30=L, P31=L	5-V product
MB90F462	P40/SIN0	P41/SOT0	P00=L, P01=L	5-V product
MB90F474H/L MB90F476/A	P70/SIN0	P71/SOT0	P80=L, P81=L*1 P80=H, P81=L*2	3-V product
MB90F481	P70/SIN0	P71/SOT0	P80=L, P81=L*1 P80=H, P81=L*3	3-V product
MB90F482 MB90F488	P70/SIN0	P71/SOT0	P80=L, P81=L*3 P80=H, P81=L*2	3-V product
MB90F497/G	P40/SIN1	P42/SOT1	P00=L, P01=L	5-V product
MB90F498G	P40/SIN1	P42/SOT1	P00=L, P01=L	5-V product

1*: The original oscillation is 4, 8 and 16 MHz.

2*: The original oscillation is 5, 10 and 20 MHz.

3*: The original oscillation is 3, 6, 12 and 24 MHz.

(3) Serial data I/O pins and start pins for each type of microcontroller(2/2)

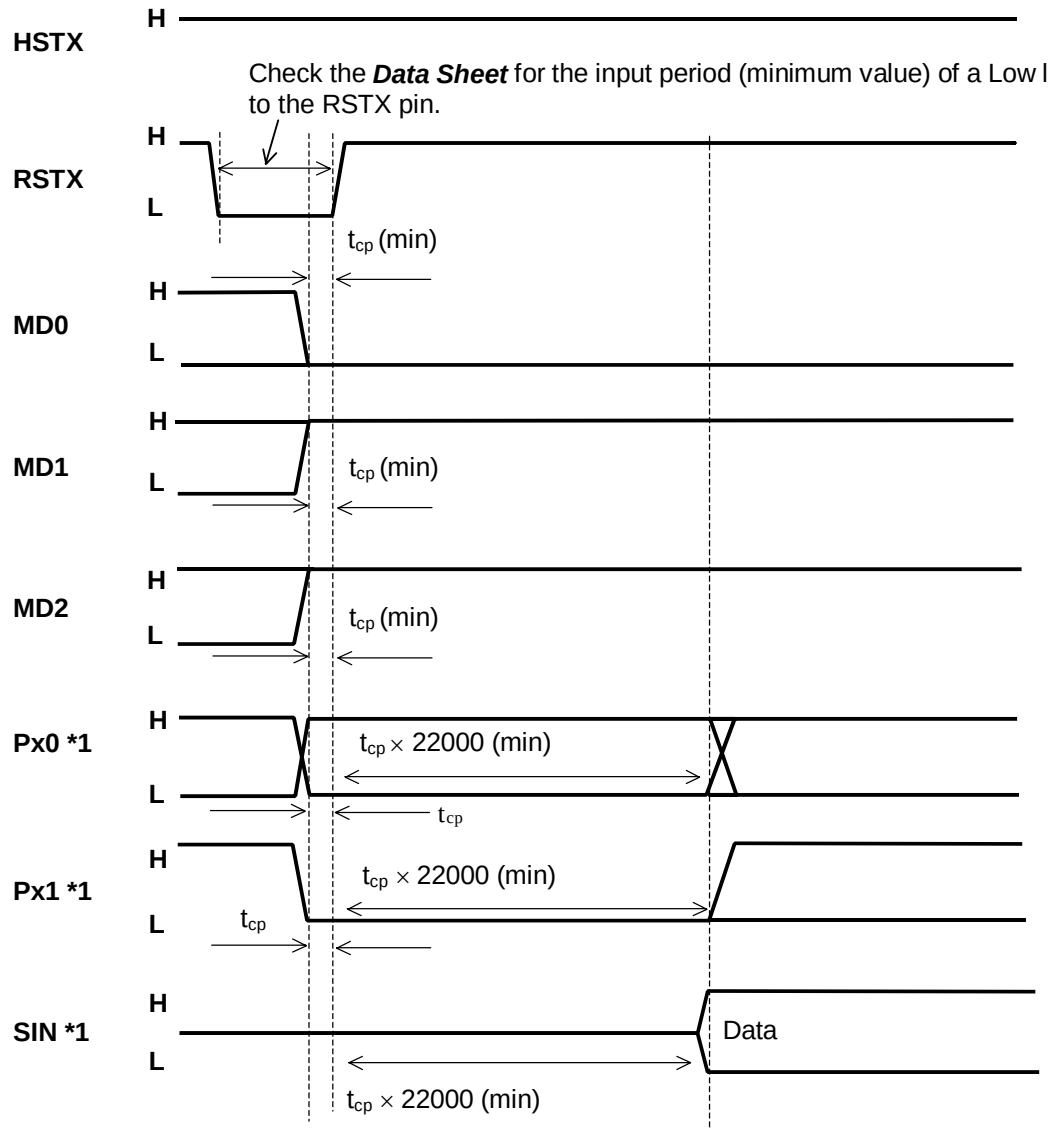
Type	Serial Data Input Pin	Serial Data Output Pin	Starting Pin for Programming Program	Supply Voltage
MB90F523B	P42/SIN0	P43/SOT0	P00=L, P01=L	5-V product
MB90F543/G/GS	P43/SIN1	P45/SOT1	P00=L, P01=L	5-V product
MB90F546G/GS	P43/SIN1	P45/SOT1	P00=L, P01=L	5-V product
MB90F548G/GS	P43/SIN1	P45/SOT1	P00=L, P01=L	5-V product
MB90F549/G/GS	P43/SIN1	P45/SOT1	P00=L, P01=L	5-V product
MB90F553A	P42/SIN	P41/SOT	P00=L, P01=L	5-V product
MB90F562/B	P60/SIN1	P61/SOT1	P00=L, P01=L	5-V product
MB90F568	P60/SIN1	P61/SOT1	P00=L, P01=L	3-V product
MB90F574/A	P40/SIN0	P41/SOT0	P00=L, P01=L	5-V product
MB90F583B/C/CA	P40/SIN0	P41/SOT0	P00=L, P01=L	5-V product
MB90F584C/CA	P40/SIN0	P41/SOT0	P00=L, P01=L	5-V product
MB90F591A/G	P36/SIN0	P34/SOT0	P00=L, P01=L	5-V product
MB90F594A/G	P36/SIN0	P34/SOT0	P00=L, P01=L	5-V product
MB90F598/G	P43/SIN1	P45/SOT1	P00=L, P01=L	5-V product
MB90F654A	P40/SIN0	P41/SOT0	P00=L, P01=L	3-V product
MB90F804	P54/SI0	P56/SO0	P65=L, P66=L*1 P65=H, P66=L*3	3-V product
MB90F822 MB90F823	P45/SIN0	P44/SOT0	P00=L, P01=L	5-V product
MB90F867	P82/SIN0	P83/SOT0	P00=L, P01=L*1 P00=H, P01=L*2	5-V product
MB90F897/S	P40/SIN1	P42/SOT1	P30=L, P31=L	5-V product

1*: The original oscillation is 4, 8 and 16 MHz.
2*: The original oscillation is 5, 10 and 20 MHz.
3*: The original oscillation is 3, 6, 12 and 24 MHz.

5. TIMING CHART FOR EACH PIN

Input data to each pin of the microcontroller with the following timing on the basis of the input of the RSTX pin.

Note: Control only the microcontrollers with HSTX pin. For details of the HSTX pin, refer to the ***Hardware Manual*** and ***Data Sheet***.



*1: Check the serial data I/O pins and start pins used for each type of microcontroller.

Minimum values of setup and hold times of each signal on rising edge of RSTX

6. INSTALLATION AND EXECUTION OF SOFTWARE

If the old software version is installed, uninstall it first before installation.

Starting the installer to operate as instructed will complete the installation. Note that the install might not be performed when a directory in a deep nest is specified as the install directory.

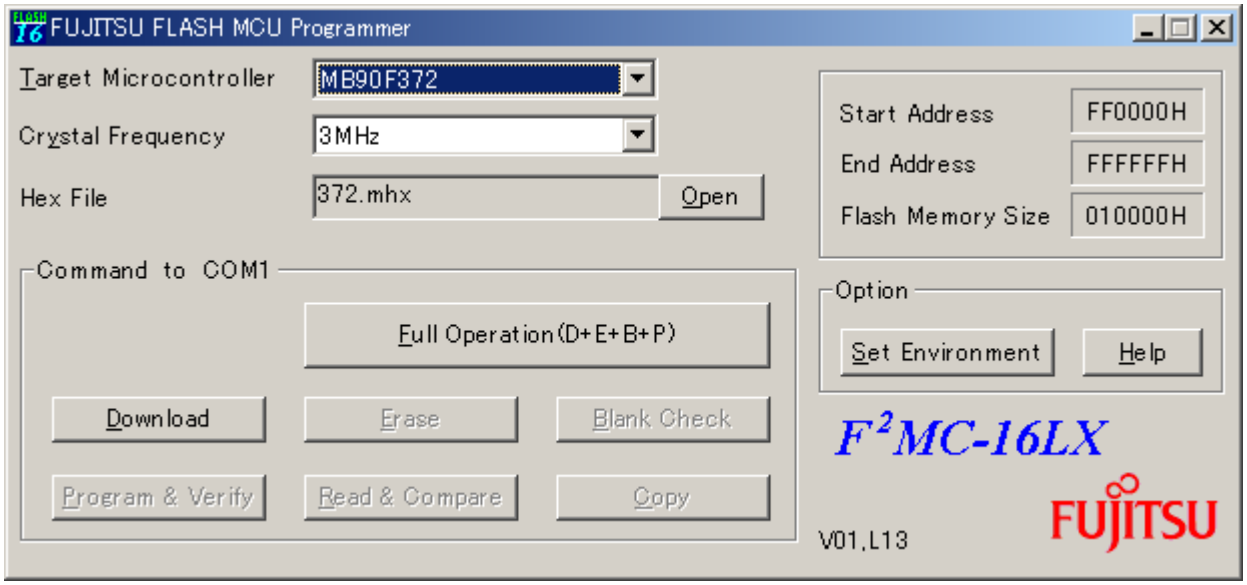
After installation, click the Windows ***Start*** button ***=> Program => FUJITSU FLASH MCU Programmer => FMC16LX*** to start the programmer software.

7. PROGRAMMER FUNCTIONS

Erase, Blank Check, Program & Verify, Read & Compare, and Copy can be executed for flash memory integrated into the microcontroller.

- Main dialog box

  Programmer software is started to open the dialog box as shown below.



- Overview of operating procedure

  First, complete setting of the user system (microcontroller board) that data is programmed to (see ***Chapter 3***). In starting or when setting has been changed, it is necessary to perform downloading (described later).

  After downloading terminates normally, perform procedures such as Erase and Programming.

7.1 Downloading

This section describes the operating procedure for downloading and the operating state of the program.

(a) Specify the type of microcontroller used in the user system in ***Target Microcontroller*** of the main dialog box.

The selectable types are:

MB90F334	MB90F337	MB90F342A/CA/AS/CAS
MB90F345 A/CA/AS/CAS	MB90F347/C/S/CS	MB90F349 A/CA/AS/CAS
MB90F351	MB90F352/S	MB90F372
MB90F378	MB90F387/S	MB90F394/H
MB90F395H	MB90MF408	MB90F423GA/GB/GC
MB90F428GA/GB/GC	MB90F438L/LS	MB90F439/S
MB90F443G	MB90F455/S	MB90F456/S
MB90F457/S	MB90F462	MB90F474H/L
MB90F476/A	MB90F481	MB90F482
MB90F488	MB90F497/G	MB90F498G
MB90F523B	MB90F543/G/GS	MB90F546G/GS
MB90F548G/GS	MB90F549/G/GS	MB90F553A
MB90F562/B	MB90F568	MB90F574/A
MB90F583B/C/CA	MB90F584C/CA	MB90F591A/G
MB90F594A/G	MB90F598/G	MB90F654A
MB90F804	MB90F822	MB90F823
MB90F867	MB90F897/S	

Note: To select the type of microcontroller, use the ***Tab*** key to move to ***Target Microcontroller***, select with the cursor keys ↑ and ↓ and then press the ***Enter*** key.

(b) Specify the frequency of the crystal oscillator input to the microcontroller in ***Crystal Frequency*** of the main dialog box.

The frequency of the crystal oscillator that can be specified for each type of microcontroller is limited as follows.

Product Type	Frequency of Crystal Oscillator (MHz)
MB90F334 MB90F337	6
MB90F372	3, 4, 6, 8, 12, 16
MB90F387/S MB90F455/S MB90F456/S MB90F457/S MB90F897/S	4,8
MB90F394/H	4, 5, 8
MB90F423GA/GB/GC MB90F428GA/GB/GC	4
MB90F474H/L MB90F476/A	4, 5, 8, 10, 16, 20
MB90F481	4, 6, 8, 12, 16, 24
MB90F482 MB90F488	5, 6, 10, 12, 20, 24
MB90F378 MB90F804	4,6
MB90F395H	16, 20
MB90F342A/CA/AS/CAS MB90F345A/CA/AS/CAS MB90F347/C/S/CS MB90F349A/CA/AS/CAS MB90F351 MB90F352/S MB90F867	4,5,8,10,16
Other than the above	4, 8, 16

Notice: This program will not operate normally if the microcontroller uses a crystal oscillator frequency not listed in the above table.

(c) Select the COM port of the PC connected to the user system.

Click the ***[Set Environment]*** button in the main dialog box to open the setup window. When the ***[COM PORT]*** tab in the setup window is clicked, the specifying window is opened. Select any of the following COM ports.

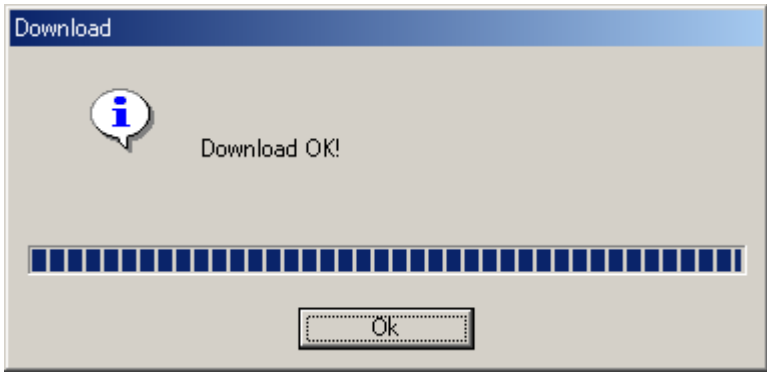
COM1, COM2, COM3, COM4, COM5, COM6, COM7, COM8

(d) Execution of downloading

Click the ***[Download]*** button.

If the following dialog window is opened, Input a reset signal to the microcontroller to start the program in the flash programming mode and then click the ***[OK]*** button

Downloading is performed to open the “Download” window. When downloading is completed normally, the following dialog window opens.



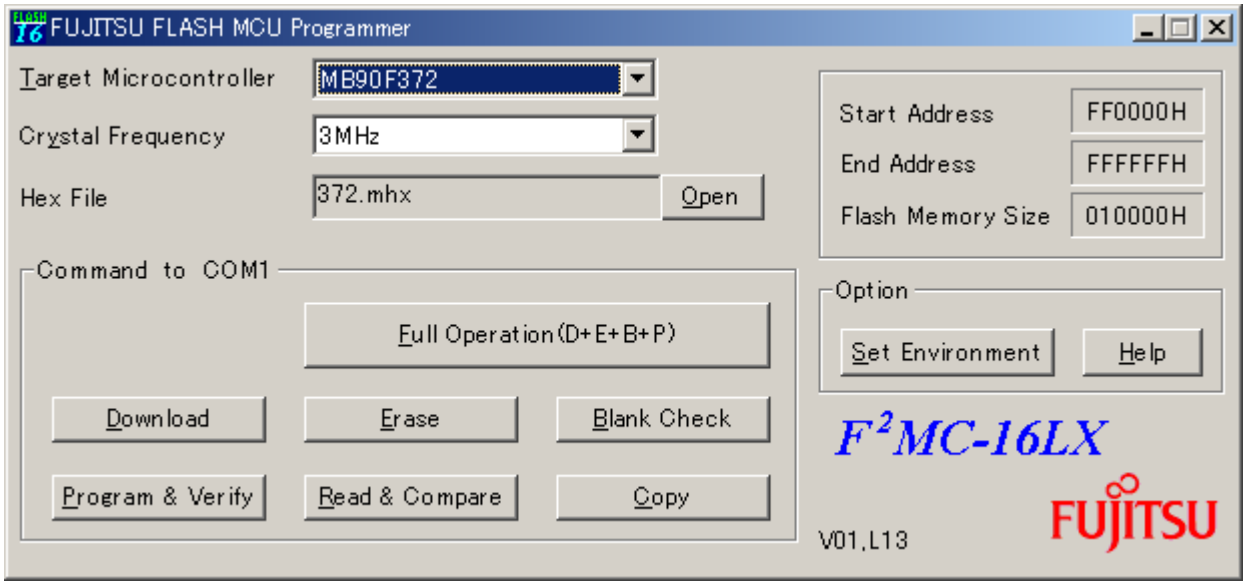
When the ***[OK]*** button is clicked to close the dialog window, the ***[Erase]***, ***[Blank Check]***, ***[Program & Verify]***, ***[Read & Compare]*** and ***[Copy]*** buttons are enabled.

Note: Downloading can also be performed using the ***Tab*** key to move to the ***[Download]*** button and pressing the ***Enter*** key or pressing the ***ALT*** and ***D*** keys at the same time.

7.2 Erasing and Programming

This section explains how to specify ***Hex File*** and the processing and operation performed when the ***[Erase]***, ***[Blank Check]***, ***[Program & Verify]***, ***[Read & Compare]***, ***[Copy]*** and ***[Full Operation (D+E+B+P)]*** buttons are clicked.

Each execution can also be performed by pressing the key corresponding to the underlined character in the button name while pressing the ***ALT*** key. (***Hex File*** is a ***O*** character in ***Open*** button, click the ***ALT + O*** keys).



(a) ***Hex File***: Select the file to be programmed to flash memory

Specify the Motorola-S or Intel-HEX format file to be programmed to flash memory in the microcontroller. Although the specification method by drags and drops a direct file from Explorer etc. is recommended, it can specify also by the file appointed window displayed by pushing the ***[Open]*** button.

Hex File must be specified to execute ***[Program & Verify]***, ***[Read & Compare]*** and ***[Full Operation (D+E+B+P)]***. Since it is decoded at the head of these processings each time, even if the specified Motorola S or Intel-HEX format file changes specification of a file just before processing, it is OK.

(b) ***Erase***: Erase all flash memory areas

All flash memory must be in the erase state (0xff) when programming a new program to it. By pushing this button, a chip erase command is published to FLASH and elimination is performed.

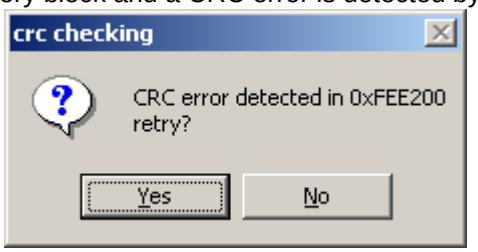
In addition, a blank check does not perform this command.

(c) ***Blank Check***: Check that all flash memory areas are blank

This button is clicked to check that all flash memory is in the erase state (0xff).

(d) ***Program & Verify***: Program data to flash memory

This button is clicked to program the Motorola-S or Intel-HEX format file specified in ***Hex File*** to flash memory in the microcontroller concurrently with verification. An error dialog is displayed, when writing is performed for 512 bytes of every block and a CRC error is detected by the block.



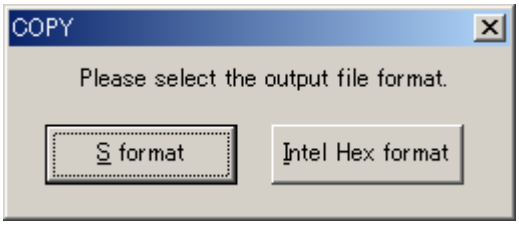
This dialog If YES is pushed, the block of an error will be resent and it will continue writing. A push on NO interrupts write-in processing.

(e) ***Read & Compare***: Compare ***Hex File*** with data in flash memory in microcontroller

This button is clicked to compare data in the Motorola-S or Intel-HEX format file specified in ***Hex File*** with data in flash memory in the microcontroller. Like the ***[Program & Verify]*** processing, The data of FLASH is transmitted for 512 bytes of every block, a CRC error check is performed, and comparison processing is performed.

(f) ***Copy***: Save data in flash memory in microcontroller to file

This button is clicked to read data from flash memory integrated into the microcontroller and save it as an Motorola-S or Intel-HEX format file. Like ***[Read & Compare]*** processing, FLASH memory reading is performed for 512 bytes of every block, and a CRC error check is performed similarly. When the ***[Copy]*** button is pushed, the following dialog window is opened.



This dialog If ***[S format]*** is pushed, data is saved as an Motorola-S format file. A push on ***[Intel Hex format]*** saves an Intel-HEX format file. A preservation place folder is specified, and if a file name is inputted and ***[Save]*** button is pushed, processing will begin.

(g) ***Full Operation (D+E+B+P)***: Automatic programming

Operation to ***[Download]*** to ***[Program & Verify]*** is performed by package.

In the case of a blank chip, processing is performed in order of ***[Download]***, ***[Blankcheck]***, and ***[Program & Verify]***. When it is not a blank chip, processing is performed in order of ***[Download]***, ***[Blankcheck]***, ***[Erase]***, ***[Blankcheck]***, and ***[Program & Verify]***.

7.3 Internal motorola S decoder specification

to be done.

7.4 Internal Intel HEX decoder specification

to be done.

7.5 Special specification

Now, there is no kind to which special specification is applied.

8. STATUS OF OPERATION CHECK

- Specifications for PC used for operation check

PC:	FMV 6450TX2
CPU:	Pentium 450 MHz
OS:	Japanese and English version of Windows 98 SE, Windows Me, Windows NT4.0 SP6, Windows 2000 SP3, Windows XP SP1
Memory:	192 MB

9. OTHERS

(A) Setting of voice output

The setting of voice generated when an error occurs and processing is terminated normally can be changed.

Select the ***[Sound]*** tab in the setup window that opens when the ***[Set Environment]*** button is clicked.

- To output sound, put a check in the ***Use sound*** checkbox.
- Next, the event to take out sound is chosen in the Event column, and the sound in the event is set up by specifying SundType and WaveFile under it in the state.
- Select ***Wave*** or ***Beep*** as the type of sound to be output in ***Sound type***.
- Set the voice file to be output in the ***Wave*** file column only when ***Wave*** is selected. When the ***[Open]*** button is clicked, the File Open window is opened. Select the ***Wave*** file to be output. The ***[Play]*** button is used to play the set ***Wave*** file. The ***[Stop]*** button is used to stop the ***Wave*** file.

(B) Setting of tooltips display

The tooltips display can be either “enabled” or “disabled”.

Select the ***[Tooltips]*** tab in the setup window that opens when the ***[Set Environment]*** button is clicked.

When a checkmark is put in the ***tooltips*** checkbox to move the mouse cursor over the contents such as buttons in the dialog window, simple help (the full path of a file for Hex File) is displayed.

(C) about error messages

Many error messages are displayed owing to the setting mistake of hardware and software.
the case where an error is outputted in addition even if it checks these in detail, please tell the person in charge of software acquisition origin a detailed condition.

No.	Item	Description
No.001	Message	Download error *1
	Cause	The response of download processing is unusual.
	Action	Please check connection and a setup of hardware.
No.003	Message	Timeout error
	Cause	The response of a command does not come on the contrary.
	Action	Please check connection and a setup of hardware.
No.006	Message	Unable to open COM port
	Cause	Another application is using COM.
	Action	Please check the use situation and port number of a COM port.
No.007	Message	Unable to open Download file
	Cause	**m_flash.xxx** not found
	Action	Please reinstall this software.
No.009	Message	Unable to gain COM port info
	Cause	It will be in the state where the target COM port can be used.
	Action	Please check the number of a COM port and setup to be used.
No.010	Message	Unable to change COM port setting
	Cause	A communication setup cannot be set as the target COM port.
	Action	Please inform support of condition.
No.011	Message	Communication error
	Cause	The unusual command response was received.
	Action	Please reperform by improving connection and a setup of hardware.
No.012	Message	Read error
	Cause	The response at the time of read&compare or copy processing is unusual.
	Action	Please reperform by improving connection and a setup of hardware.
No.013	Message	Program error
	Cause	The response at the time of Program&Verify processing is unusual.
	Action	Please reperform by checking whether a chip is blank.
No.015	Message	COM port write error
	Cause	There is the possibility of the abnormalities of a COM port driver or the port itself.
	Action	Please inform support of condition.

No.	Item	Description
No.016	Message	COM port read error
	Cause	There is the possibility of the abnormalities of a COM port driver or the port itself.
	Action	Please inform support of condition.
No.017	Message	File access error
	Cause	Access of a **m_flash.xxx** file went wrong.
	Action	Return the folder and file configurations to the installation defaults.
No.018	Message	Erase error *1
	Cause	The response at the time of erase processing is unusual. There is the possibility that a chip is poor.
	Action	Please improve a setup of hardware or exchange chips.
No.101	Message	Please set "hex file"
	Cause	“Hex file” not set
	Action	Set “hex file” in the dialog box.
No.207	Message	memory is not available
	Cause	Unable to allocate memory for execution
	Action	Quit any running application and retry.
*2	Message	Please redo from download operation

*1: “MCU xxH” is displayed if the error cause is returned from the microcontroller at a download error.

“MCU xxH” means:

MCU 02H → SUM error at downloading

MCU 04H → Abnormal termination at downloading

*2: This is an additional message. It is displayed as necessary after other messages are displayed.

10. CAUTIONS

No responsibility is taken about the problem which faced this software use.

The operation of this program is not assured on NEC PC98 series personal computers.

This software is not a thing aiming at the correspondence to mass-production writing.

When using this program, there are restrictions on frequencies that are input to the microcontroller as original oscillations. For details, see ***(b)*** of ***Section 7.1***.