

Overview

The MC433G can be programmed one of two ways:

- Re-Program Motor Controller Flash using MC433Prog.exe.
- Re-Program GStep Controller Flash using MC433 Prog.exe.

Programming Motor Controller Flash overwrites the contents of the current Motor Controller Flash with a new program. A new program may add new features, fix bugs or update the main PWM control algorithm. Flash contents can only be changed by enabling Flash Programming Mode by installing a shorting jumper on connector J30 and downloading a new program using utility **MC433Prog.exe**. Changing Motor Controller contents must be done carefully to avoid damaging the AVR processors. Flashing the Motor Controller erases the content of EEPROM.

CAUTION: Once programming is complete the programming enable jumper must be removed. If the jumper is left in place and step/dir commands are sent to the controller the motor controllers will be reprogrammed with incorrect information and possibly damaged.

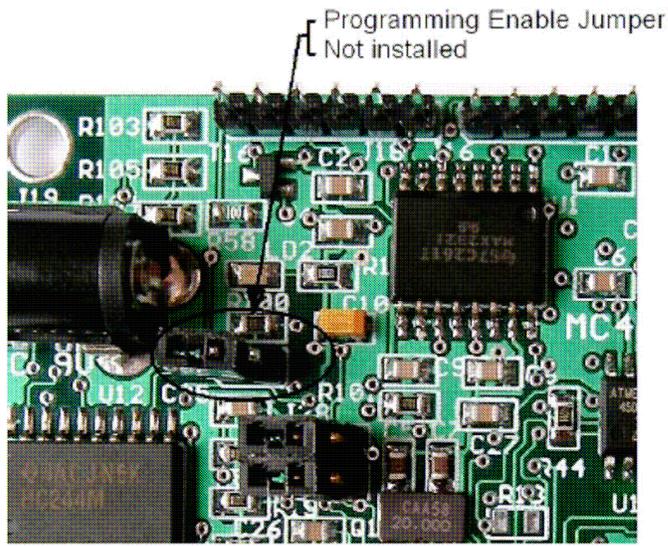
Updating EEPROM parameters such as chop rate, chop frequency, automatic shut off, etc is done by modifying the contents of Motor Controller EEPROM. Changing EEPROM contents requires loading a new EEPROM image using MC433Prog.exe. Flash Programming Mode shorting jumper.

Before attempting to Re-Flash the controllers or change EEPROM content turn motor power off. The programming procedure may turn on all Power MOSFETs - drawing significant power from the motor power supply.

Programming Motor Controller Flash

The MC433G Rev 1.1 and Rev 1.1b PCB's have a programming interface on the board. The Flash contents of the motor control processors and G Code processor can be re-programmed through the parallel port interface. Rev 1.1 and 1.1b are programmed the same way - there is no functional difference between Rev 1.1 and 1.1b PCBs except for the G Version - Rev 1.1b has an additional SPI Serial Flash device for on board G Code storage.

To enable Programming Mode the supplied shorting jumper must be installed on connector J30. J30 is located next to the DC Logic Power connector (see picture below). To download a new control program to the processors use programming utility **MC433Prog.exe** only - do not use any other programming utility. **MC433Prog.exe** is available on the SOC Machines web site on the MC433G product page. As soon programming mode is enabled all commands sent to the parallel port are interpreted as programming commands - sending any other command such as step/dir sequences will probably damage the control processors. Utility **MC433prog.exe** implements the AVR ISP programming protocol. Use of any other program or programming utility may damage or lock the processors from further programming. Remove the program enable jumper immediately after programming is complete. Do not remove or attach the parallel port cable with the programming enable jumper installed.



MC433Prog.exe is a command line program running under Windows98, 2000 and XP. The program emulates the operation of **ISProg.exe** (an AVR ISP programming utility) and is used to download new Flash and/or EEPROM files to the Motor Controllers and G Code Processor. **MC433Prog.exe** can be used to program each of the four processors individually or (using a command file) perform a sequence of programming functions on all four motor controllers in one pass.

New motor control programs and G Code programs are provided as Intel Hex files. New code releases will always include a master program configuration text file. **MC433Prog.exe** has been tailored to program the MC433 and MC433G only - do not use this utility to program AVR processors with the ISP10 programming adapter - use **ISProg.exe** instead.

An MC433G has five AVR processors identified as X1,X2, X3, X4 and X5. Each of these processors is either an ATmega168. The correct code must be loaded into each processor. The relationship between X number and motor axis is as follows:

Processor ID	Motor Axis
X1	G Code Processor
X2	Z
X3	A
X4	Y
X5	X

To select a specific processor enter the correct processor identifier at the command prompt - X1,X2, X3, X4 or X5 - subsequent programming commands are then sent to the selected processor. Note these identification numbers do not correspond to the motor drive connector numbers.

If the MC433G is to be re-programmed CONTROL MODE must be disabled first using the "cm"

command – this forces the ATmega644 to release control of the Step/Dir parallel port controls lines so **MC433Prog.exe** can control them. MC433G motor controllers can only be programmed correctly if the “**cm**” command is first sent via the RS-232 port – CONTROL MODE is re-enabled by sending the “**cc**” command.

Remove power from the MC433G DC Logic and Motor Power DCIN. Remove the Flash Programming Enable jumper (J30). Attach a parallel port cable to the controller and apply power. Now install the Flash Programming Enable jumper.

Start **MC433Prog.exe** by double clicking or starting it a cmd window – the first command to use is the “**xa**” command – this interrogates each processor to verify it’s type and fuse settings. Type “**h**” to show all commands – note that it is possible to send commands to the MC433G with **MC433Prog.exe** that will lock the board from further programming so please use the commands carefully. Contact the company If in doubt about how to proceed.

```
>MC433prog <CR>
MC433G Programming Utility V1.24
© Copyright 2010, SOC Robotics, Inc.
Type 'e' to exit or 'h' for help
-xa
Reset 1: Target not responding
Reset 2: Target ATmega168 responding - default fuses set
Reset 3: Target ATmega168 responding - default fuses set
Reset 4: Target ATmega168 responding - default fuses set
Reset 5: Target ATmega168 responding - default fuses set
-
```

Having confirmed all the processors are alive and talking new motor controller software can be downloaded to each motor controller by typing “**f**” followed by the name of the Program Configuration file.

```
-fMC433config_R99.txt<CR>
< contents of MC433config_R99.txt is executed >
```

The program will now program all four processors in turn loading the correct hex file from the MC433config_R95.txt text file.

Below is an example of the contents of Program Configuration file **mc433config_R99.txt**:

```
x2
dfmc433_motor_controller_R99z.hex
x3
dfmc433_motor_controller_R99.hex
x4
dfmc433_motor_controller_R99.hex
x5
dfmc433_motor_controller_R99.hex
xa
```

Exit **MC433Prog.exe** by entering the “**e**” command. Note processor X2 – Z Axis is loaded with a different program than the other three processors. X2 is unable to monitor ESTOP so must get this information from the other processors.

All Program Configuration files supplied by the company end with a Version Identification Number. In the example file above the VIN is R99 – Version 0.99.

After programming is complete **REMOVE** the programming enable jumper – the board does not need be powered down to remove the jumper. You are now ready to send new step/dir

commands to the controller.

Updating EEPROM Contents

Update Motor Controller EEPROM contents using **MC433Prog.exe**. A utility called **MC433Convert.exe** is used to create/modify motor parameters stored in EEPROM. Use **MC433Prog.exe** to upload EEPROM parameters.

MC433Convert.exe is a related application that converts a text file of setup configuration parameters into an Intel Hex file that is subsequently downloaded into each motor controllers EEPROM using **MC433Prog.exe**.

Post Programming Procedure

After completing the programming procedure it's good practice to interrogate the processors one more time with the "**xa**" command to ensure all Motor Controllers are responding. Motor controllers will only respond to **MC433Prog.exe** if the Flash Programming Enable jumper is installed.

One last thing:

DO NOT FORGET TO REMOVE THE FLASH PROGRAMMING ENABLE JUMPER BEFORE SENDING G CODE COMMANDS TO THE MC433.