

## Overview

Tekmos makes replacements for many different types of microcontrollers. Some of the original version microcontrollers used EPROM technology, which is One Time Programmable (OTP). This EPROM technology used an obsolete process which is no longer available.

Tekmos replaced the EPROM in these devices with an internal 5 volt flash memory. The devices behave identically in the application, but are programmed differently. The Tekmos parts are 5 volt parts, including the programming.

**NOTE:** Existing Freescale, NXP or Intel programmers cannot be used to program the Tekmos parts. The EPROM technology typically required applying 15 volts to program a part. Since the Tekmos parts are 5 volt parts, the application of 15 volts to the Tekmos parts will severely damage them. Tekmos now offers microcontroller programmers or use with its products. This

instruction guide presents a short explanation of the differences between programming the Tekmos TK89C668 and the earlier microcontrollers they replace.

This procedural document is to be used for ISP programming (In System Programming) of the TK89C668 using the Flash Magic Tool, There are other options for programming the TK89C668 including having Tekmos do the programming for you. Please consult Tekmos if information is needed for programming using other methods.

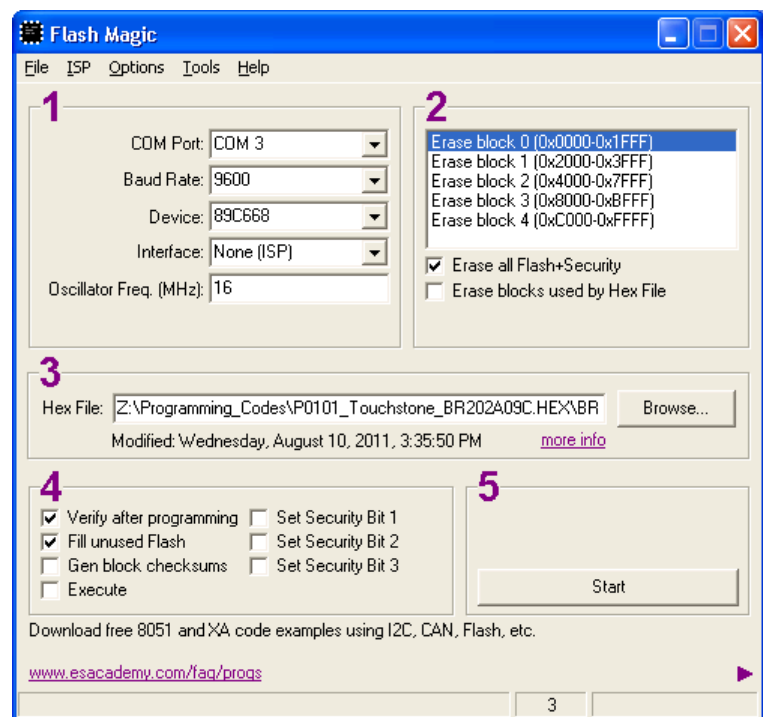
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## Programming

For first time programming the TK89C668, perform the following steps:

- 1) Run the Flash Magic tool.
- 2) In Step 1, set the COM Port, Baud Rate, Device fields.
- 3) In Step 2, Set "Erase All Flash + Security" box.
- 4) In Step 3, Browse for hex file to program.
- 5) In Step 4, Set the "Verify, Fill Unused Flash, and Set Security" boxes as desired.
- 6) Press Start.

This will erase the device, verify erasure, program the device, verify programming and then set security bits.

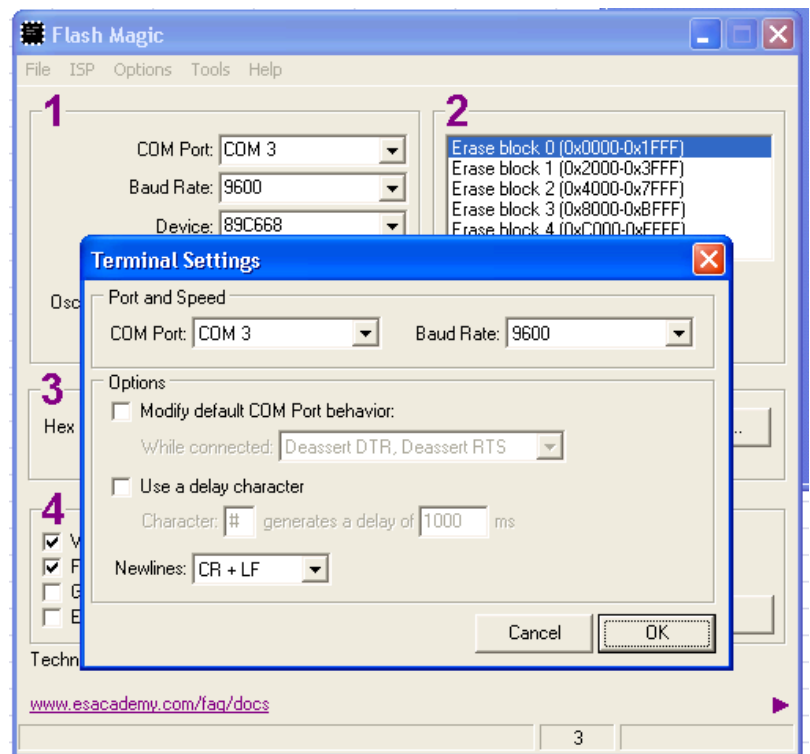


## Setting Clock Speed, Changing Parameters

The Tekmos TK89C668 programs the clock speed into a Flash memory location only accessible via a proprietary method. It may be programmed by a proprietary parallel method or by In-System Programming (ISP).

In programming the ClockSpeed or if the ClockSpeed, Status Byte or Boot Vector should become corrupted, one of the ways to set or clear the parameters to the unprogrammed condition is to perform a full Flash erase. These are the instructions for performing that function:

- 1) Prepare for ISP programming on target device. This entails holding the EA, ALE PSEN, P17 and P16 in a particular state and generating a RESET to the 89C668 device. (Generally just requires grounding the PSEN pin.)
- 2) Launch FlashMagic program and enter COM Port settings.
- 3) Go to Tools/terminal window and enter COM Port settings, the press OK.
- 4) After entering the settings Options setting. This brings up a UART Input and Output windows that may be used to communicate with the target device. (See next page.)
- 5) After resetting the target device to ISP mode, type uppercase 'U' character four times into the Input window. The 'U' character should appear in the Output window as the device echoes the entered code.



- 6) The TK89C668 device performs an 'autobaud' function that figures out the baud rate being used by the transmitting device and uses that rate for communication.
- 7) Cut and paste the following line of characters into the Input window:

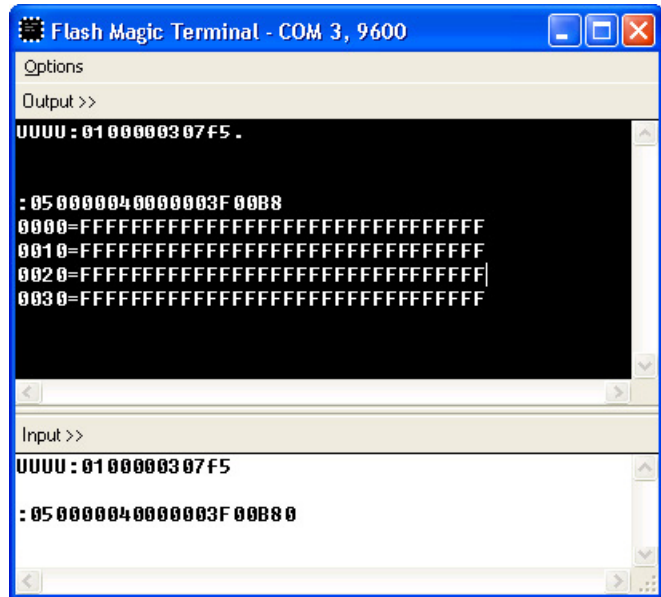
:0100000307F5

This should cause a full chip erase that will clear the clock speed, security bits, Status Byte and Boot Vector. The TK89C668 should respond by echoing the string and then generating a '.' character to verify that the Full Flash Erase has been completed. Should take a few seconds. An 'R' character indicates a failure.

- 8) On the input window enter the following code:  

```
:050000040000003F00B8
```

This will dump the first 40(hex) locations in the memory. It should be all F's.
- 9) Go back to FlashMagic Home screen (first window above) and enter user program in the **Hex File:** field. Press Start. This will program the device with the correct hex file.
- 10) If you want to set the security bits, check the "Set Security Bit n" boxes in the main window under STEP 4 before programming.



- 11) The following hex codes can also be entered by hand into the Terminal window via cut and paste:

:050000040000003F00B8	Dump 0 - 3f
:020000050000F9	Read MFG ID should be 15h
:020000050001F8	Read Dev ID 1 should be C2h
:020000050002F7	Read Dev ID 2 should be 81h
:020000030505F1	Set Clock to 12x (slow speed)
:0100000308F4	Set Clock Back to 6x (fast speed)
:020000030500F6	Set Security Bit 0
:020000030501F5	Set Security Bit 1
:020000030502F4	Set Security Bit 2
:020000030500F6	Read Security Bits
:0100000307F5	Full Chip Erase
:05000004000007FF00F1	Dump Full Chip
:020000050003F6	Read Clock Bits 00 = 12 FF = 6
:020000050700F2	Read Security Bits
:020000050701F1	Read Status Vector
:020000050702f0	Read Boot Vector
:030000030600FFF5	Write Status Byte
:030000030601FCF7	Write Boot Vector

If using Write Status Byte or Write Boot Vector, compute the last byte Checksum by hand.  
 For instance, Write Boot Vector CKSUM = 200 - ( 03 + 00 + 00 + 03 + 06 + 01 + FC ) = F7.

## Contact Information

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## Revision History

Date	Revision	Description
4/24/2016	1.0	Initial release

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