



Embedded Software CS 145/145L



Caio Batista de Melo

CS145 - Spring '22



If you're not using Microchip Studio or MPLAB X (and you don't know anyone that is, and can set fuse bits for you), you'll need to use a program called avrdude to do that.





If you set the wrong fuse bits in your microcontroller, you might get locked out! (i.e., it won't work or connect to your computer) So double/triple check everything before running any commands!

If you *do* get locked out, **DO NOT** try doing the same thing with your 2nd chip!! Instead, use that one to fix your locked chip:

- <u>https://www.avrfreaks.net/forum/help-need-help-resetting-clock-fuse-atmega32a</u>
- https://www.avrfreaks.net/forum/tutsoft-recovering-locked-out-avr





- <u>https://github.com/avrdudes/avrdude</u>
- https://formulae.brew.sh/formula/avrdude





avrdude

- -p (platform):
 - m32 (ATmega32)
- -c (programmer):
 - atmelice_isp (ATATMEL-ICE-BASIC)
- -P (port):
 - usb

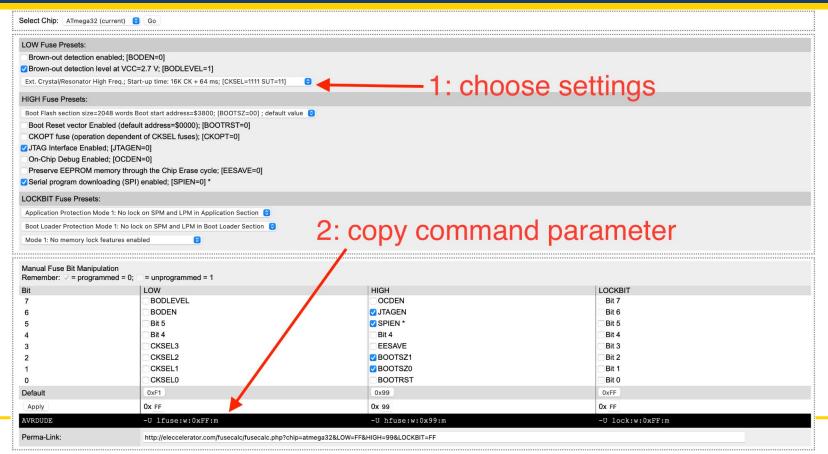


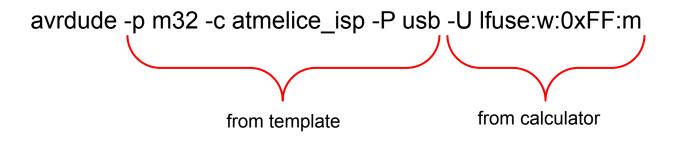


- <u>http://eleccelerator.com/fusecalc/fusecalc.php?chip=atmega32</u>
- https://www.engbedded.com/fusecalc/



Example (Ext. Crystal) - Calculator





Note that since we only modified the <u>Low</u> <u>Bits</u> in the calculator, we only set those!

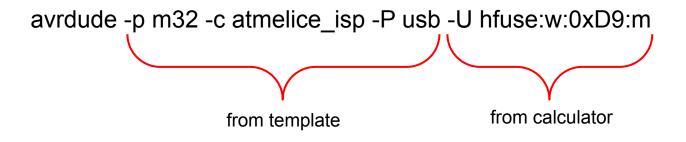


Example (JTAG) - Calculator

Select Chip: ATmega32	! (current) 🕤 Go			
LOW Fuse Presets:				
Brown-out detection	enabled; [BODEN=0] level at VCC=2.7 V; [BODLEVEL=1]			
Ext. Crystal/Resonator H	ligh Freq.; Start-up time: 16K CK + 64 ms; [CKSEL=1111 SUT=11]	Θ		
HIGH Fuse Presets:				
Boot Reset vector Er CKOPT fuse (operati JTAG Interface Enab On-Chip Debug Enat Preserve EEPROM n		1: choose se	ettings	
LOCKBIT Fuse Presets	s:			
Application Protection N	lode 1: No lock on SPM and LPM in Application Section 😌			
Boot Loader Protection	Mode 1: No lock on SPM and LPM in Boot Loader Section 👴			
Mode 1: No memory lock	k features enabled 🕞			
		0		
Manual Fuse Bit Manipulation Remember:		2. cop	2: copy parameter	
Bit	LOW	HIGH	LOCKBIT	
7	BODLEVEL		Bit 7	
6	BODEN	JTAGEN	Bit 6	
5	Bit 5	SPIEN *	Bit 5	
4	Bit 4	Bit 4	Bit 4	
3	CKSEL3	EESAVE	Bit 3	
2	CKSEL2	✓ BOOTSZ1	Bit 2	
1	CKSEL1	✓ BOOTSZ0	Bit 1	
0	CKSEL0	BOOTRST	Bit 0	
Default	0xF1	0x99	0xFF	
Apply	Ox FF	Ox D9	Ox FF	
AVRDUDE	-U lfuse:w:0xFF:m	-U hfuse:w:0xD9:m	-U lock:w:0xFF:m	
Perma-Link:	http://eleccelerator.com/fusecalc/fusecalc.php?chip	http://eleccelerator.com/fusecalc/fusecalc.php?chip=atmega32&LOW=FF&HIGH=D9&LOCKBIT=FF		



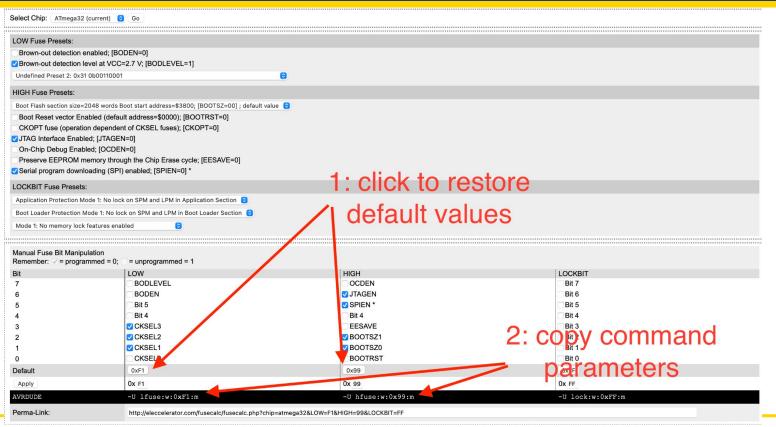
Example (JTAG) - Resulting Command



Note that since we only modified the <u>High</u> <u>Bits</u> in the calculator, we only set those!

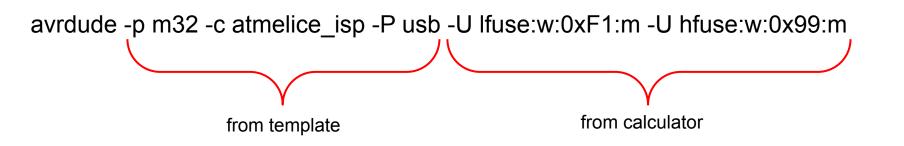


Example (Defaults) - Calculator





CS145 - Spring '22



Note that in this case we can set both high and low fuse bits with a single command.



See you next time :)

Q & A