PCB 111000: Fuse settings for the Atmega devices

Fuse settings enable users to configure certain elements of the Atmega hardware (HW) at programming time. Once these choices have been made they stand until the device is reprogrammed. The following configuration choices have been made for the project and programmer devices:

The System Clock:

The internal 8MHz RC oscillator is selected
No clock prescaling is implemented
No clock output is implemented.
The start up timer (SUT) is either set to 65mS or is disabled.

Note
The SUT holds the device in reset to give the dc supply and clock frequency time to stabilize.
The SUT can be disabled if the brown out detector (BOD) selected. The BOD holds the device in reset until the dc supply reaches a preset level.

BOD detector
This is implemented for the project pcb so that it can safely be used with batteries.
The brown out voltage level is set to 2.7V ± 0.2V.

Note:
The BOD uses an internal 1.1V reference which it shares with the Analogue to digital converter (ADC).
The ADC which is disabled is set to use AVCC as its voltage reference.
The BOD protects memory that can become corrupted if the dc supply momentarily dips by putting the chip into reset.

The boot partition (implemented on the project pcb Atmega 328).
This is implemented by:
Setting the size of the boot partition to 2048 words (4096 (0x1000) bytes)
Setting the reset vector to location 0x7000 (the start of the boot partition).

Note: Where no bootloader code is required the reset vector is set to location 0x0.
In this case the size specified for the boot partition is not important and the application code can use the entire 0x8000 byte memory space.

Other settings

External reset	Enabled
Debug wire	Not used
Serial programming	Enabled
Watch dog timer (WDT)	Under programmer control
EEPROM memory	Survives chip erase
Memory lock bytes	No memory lock features are enabled. This byte is always set to 0xEB

Note: Users should never need to change the Configuration bytes

PCB 111000: Fuse settings for the Atmega devices

Project PCB fuse settings for the Atmega 328

Extended fuse byte 0xFD
bit 7-3 These bits are not used, and are each set to 1 (their default value)
bit 2-0 These bits (101) set the brown out voltage to 2.7V.

Fuse byte high 0xD0

bit 7	1	External reset enabled
bit 6	1	Debug facility disabled
bit 5	0	Serial programming enabled
bit 4	1	Watch dog timer under programmer control
bit 3	0	EEPROM memory preserved during chip erase.
Bit 2	0	Bits 1 and 2 set the size of the boot partition
bit 1	0	A setting of 00 gives 2048 words the maximum possible size
bit 0	0	Sets the reset vector to location 0x7000 (the start of the boot partition)

Fuse byte 0xC2

bit 7	1	Divide clock by 8 disabled
bit 6	1	No external clock output
bit 5	0	Bits 5 & 4 define the Start up time (SUT)
bit 4,3	0	SUT is disabled since brown-out detector is set
bit 2	0	Bits 3-0 select clock
bit 1	1	These settings select
bit 0	0	the 8MHz internal oscillator

Note: When only running a single application or when loaded onto a programming pcb the following changes are made to the Atmega 328 fuse bytes:

The extended fuse byte becomes 0xFF	The DOB is disabled
The fuse byte high becomes 0xD7	The reset vector is location 0x0. Bits 1&2 are non-critical
The fuse byte becomes 0xE2	SUT is set to 65mS

Fuse settings for the Atmega 168 when running projects
Extended fuse byte 0xFF
bit 7-3 These bits are not used, and are each set to 1 (their default value)
bit 2-1 These bits are used to set the size of the boot partition. Here their settings are not critical.
Bit 0 This bit sets the reset vector to location 0x0.

Fuse byte high 0xD5 **U**se D7 when running Programmer V2.29A (no BOD)

bit 7	1	External reset enabled
bit 6	1	Debug facility disabled
bit 5	0	Serial programming enabled
bit 4	1	Watch dog timer under programmer control
bit 3	0	EEPROM memory preserved during chip erase.
Bit 2	1	
Bit 1	0	Bits 0 – 2 set the brown-out level to 2.7V.
Bit 0	1	

Fuse byte C2 (The settings are identical to those of the Atmega 328)
Use E2 when running Programmer V2.29A (65mS SUT)