Spectre MK0 Module Notes

**Spectre\_MK0\_Main**

This module is a wrapper for the project and other modules. The FSM, PWM\_M, and Accel modules are initialized here. Nothing related to the functionality of the Spectre MK0 system is executed in this module of the code.

**FSM**

This module executes the finite state machine (FSM) for the Spectre MK0 system. The sytem has three states at the time of writing: (1) system initialization and calibration, (2) system hold for arming, and (3) armed operation. The current state is passsed to the PWM module and will only begin actuating the canards if the armed state is reached. The armed state is set by triggering switch 15. The state can be exited when switch 15 is toggled again to the off position.

**PWM\_M**

The PWM module is responsible for generating the PWM signal to send to the servo motors. This module also was designing to handle calibrating the servos to their default position. Since an encoder is not present in the system, this step was necessary to retain the position of the servos after disconnecting the power. Due to the 100Mhz clock, a counter with length of 21 bits was selected to produce the desired 50 HZ frequency. While the counter is less than the target position indicated by the accelerometer values, the output on the pin is 5v. Otherwise the output will be 0v. When the counter reaches the specified length of the pulse period, it will reset to 0 generating the PWM signal.

**Accel**

The Accel module is a derivative of the in-class example we were given. Only the acceleration from the x and y values are retained here and scaled. Because the output from the accelerometer module is raw data, the values must be scaled by a integer value corresponding to the thresholds/resolution used by the sensor. Based on the data sheet, I experimented with a sensitivity value of 4 and 8 but found 4 to be more accurate. This produced a 10 bit number which was a rough approximation of how many g’s the accelerometer was experiencing in the y axis. A blue and red led are also utilized to indicate whether the load is negative or positive. A blue LED indicates that the load is negative and a red led indicates that the load is positive. The scaled x and y values are then processed by the PWM\_M module as a general orientation of the system. Switch 14 can also be activated to suspend all data from the accelerometer in case of an emergency.