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EC450

3/2/15

HW4

Procedure:

I connected the P1.1 PIN to the red wire of the oscilloscope and the black wire to the ground pin. I then ran the sample program “clocktuneFast.c” in order to get my numbers.

1. For this part, I just ran the program as is without changing any of the numbers. What I get on the oscilloscope was 976Hz which was for one full period. The data as linked by [here](http://people.bu.edu/roscoe/ec450/hw/hw4/DCO%20Parameters%20from%205-clock-module.pdf) is in terms of every edge change. The data obtained from the oscilloscope is also off by 512 since the example program divided the source by 512. Therefore, in order to get the real frequency from what was measured from the oscilloscope, I multiplied the number obtained by 2 (since I want it to be every edge change instead of a full period) and by 512 (since it was divided by 512). The result was 999.424 kHz with the default values.
2. Here, the question was the max frequency. Therefore, I increased the DCOCTL and RSEL numbers so that it’d be the highest they can be (DCOCTL = 11101011, RSEL = 1111). The lower 5 bits of the DCOCTL does not really matter when the upper 3 bits are 111. The result was 18.9 kHz on the oscilloscope, giving a final number of 19.35MHz for my board.
3. Since I want 4.0 MHz, I did the reverse of what I did earlier in order to see what I would want as a value on the oscilloscope. I got 3.91 kHz. I then looked on the graph from the manual to get an idea of what the RSEL and DCO values should be. I played with the RSEL, starting at 7, then increasing until the frequency was too high. Then I played with the DCO bits, and finally MOD bits until it was the correct 3.91. The resulting bits was DCOCTL = 11010001, RSEL = 1010.

Results:

1. 976 Hz \* 2 \* 512 = 999.424 kHz

I believe this should have been 1 MHz flat so my board is only off by 0.576kHz or 576Hz. In comparison to the fact that this is on the scale of Mhz, it’s minor.

1. 18.9 kHz \* 2 \* 512 = 19.35 MHz

The calculated frequency should have been more than 20,000 kHz instead of 19.35 MHz based on looking at the graph. I think the graph is also on a logarithmic scale so in that case, it’s fairly inaccurate.

1. 3.91 kHz \* 2 \* 512 = 4.0 MHz

DCOCTL = 11010001

RSEL = 1010

This is a bit hard to tell how accurate this is because again, the graph is on a log scale. I think I had to go higher than it should be in order to get the 4.0 MHz just based on the fact that I had such a low max on part 2.