Documentation: assignment6

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November 6, 2016

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1 Summary of Problem Specification

1.1 Abstract

Using a standard tuning frequency of 16.7MHZ (our initial condition), find the inductance of a circuit using the formula given below. After finding L, use the value to calculate F_{min} and F_{max}. Then, calculate new values of F_{max} by incrementing C_{min} by 15 picofarad until we surpass C_{max}, writing the values larger than 16.7MHZ to a random access file. If our largest F_{max} is larger than 16.7MHZ, increment L by 2% and store the new L in a new record. Then, using our new L, repeat the same steps as above, storing all our new values of F_{max} in the new record.

Each time we edit or do not edit the file, print out to console why. For example, if our F_{max} is larger than 16.7MHZ and we edit the file to include that new value, we should print to console that we have done so.

1.2 Assumptions

I use a pre-release version of Java 9. It is my assumption that the underlying changes in the language were nothing that would allow me to write something incompatible with the immediate previous release.

2 Formulae

Inductance is denoted with L and measured in henrys. Capacitance is denoted with C and measured in farads. Capacitance Minimum is denoted with C_{min}. Capacitance Minimum is denoted with C_{max}. Frequency is denoted with F and measured in hertz. Frequency Minimum is denoted with F_{min}. Frequency Minimum is denoted with F_{max}.

$$L = \frac{(\frac{2\pi}{F})^2}{C} \tag{1}$$

$$C = \sqrt{C_{min} * C_{max}} \tag{2}$$

$$F_{min} = \frac{2\pi}{\sqrt{L * C_{max}}} \tag{3}$$

$$F_{max} = \frac{2\pi}{\sqrt{L * C_{min}}} \tag{4}$$

3 Explanation of Components

3.1 Main.class

3.2 TuningCircuit.class

4 Notes

Equations (1–4) relate everything in terms of base units. That means we must convert F from megahertz to hertz (multiply by 10^6), and C from picofarad to farad (multiply by 10^{-12}).

Additionally, one can note that due to the structure of our formula for F_{max}, our values will shrink as we increment C_{min} (since we begin to divide by increasingly large numbers). This means that our first calculated F_{max} will be our largest. If we were looking for just the largest value, we would not calculate any other but the first, and save CPU cycles. However, we must calculate all F_{max} larger than our initial value of 16.7MHZ and store it in the random access file.

5 References

http://download.java.net/java/jdk9/docs/api/