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Problem Set 1, Question 2 – The Hartley Oscillator

Introduction

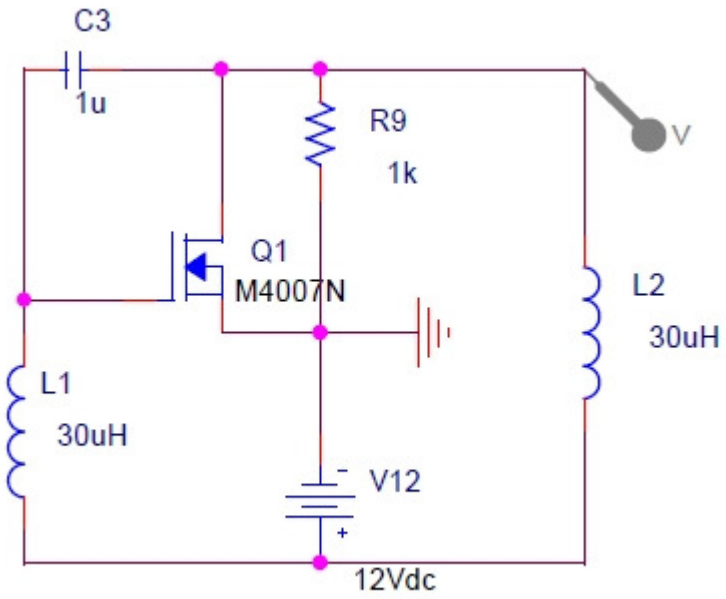
The Hartley oscillator was developed in the early 1900s to produces sine waves for RF systems. Back then it used a vacuum tube, but for the implementation below, a 4007 MOSFET was used.

The oscillation frequency is defined by: $$f_0 = \frac{1}{2\pi\sqrt{(L_1 + L_2)C}}$$

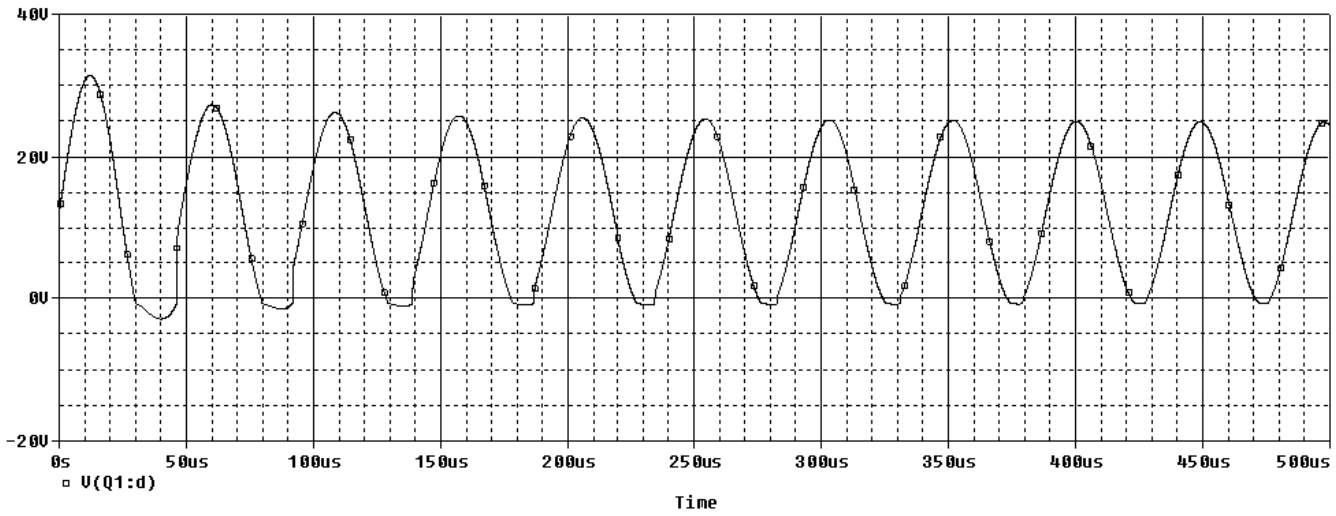
Specifications:

Oscillation Frequency: 20kHz
Capacitor value: 1uF
Resistor value: 1k
Inductor values: 30uH

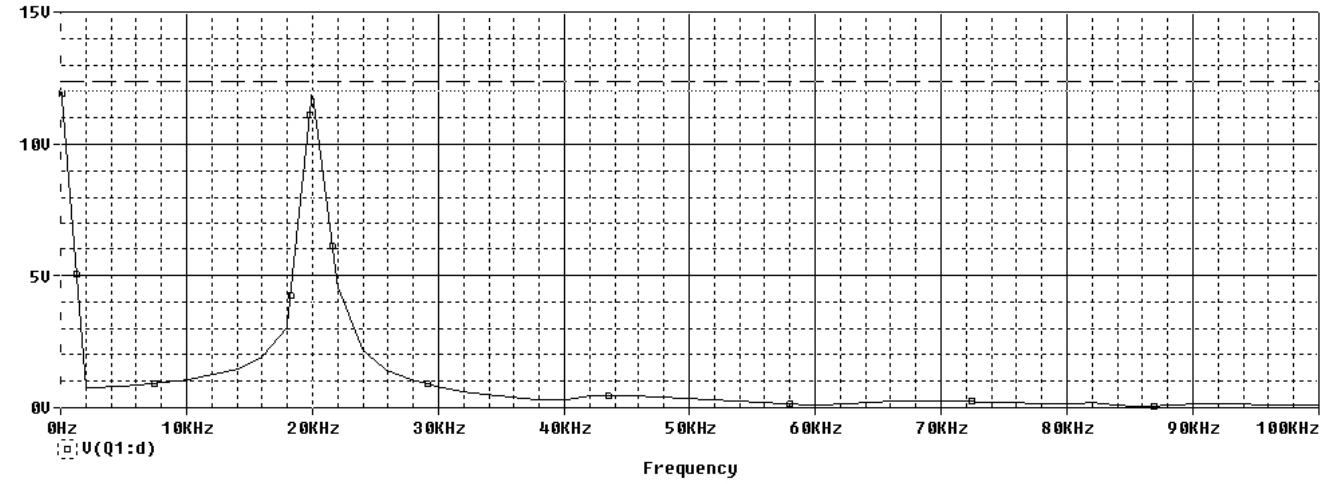
Schematic:



Voltage over Time measured at resistor:



FFT of signal showing the center oscillation frequency at 20kHz:



Note: For anyone who's interested, the pspice files can be downloaded from: www.ece.umd.edu/mog/hartley.zip