

ENEE 307 in Laboratory “Final” Spring 2016

This laboratory final involves the 555 timer.

The timers available are Fairchild LM555. PSpice model files for the 555 are available in the eval and anl_misc PSice libraries. The Fairchild data sheet is available at www.fairchildsemi.com/ds/LM/LM555.pdf while the equivalent TI one may be useful www.ti.com/lit/ds/symlink/nc555.pdf.

Note that to swamp parasitics the external capacitances should be greater than 500pFd and to limit internal currents R_A and R_B should be greater than 1kOhm; also $R_A+R_B < 3.3\text{MegOhm}$ is required (On some data sheets $R_A=R_1$ and $R_B=R_2$).

- a) Individually design, simulate in PSpice, and build on your own bread board using a 555 timer circuit to give a square wave pulse sequence with time high, T_h , and time low, T_l , designed for an “output waveform duty” cycle,
$$\text{Duty} = T_h / (T_h + T_l),$$
specified according to your name as provided by the TA. Do this for a repetition rate of 12 milliSeconds and an output maximum of 5V measured with respect to ground on an output resistor of 2KOhm.
- b) Obtain a “pulse-width modulated” output, by using as the trigger input the output signal of your circuit of part a) into another 555. Use as the modulating input a sinusoid of period corresponding to a racing heart beat rate of 110 beats per minute. Be sure to determine an input offset to allow modulation over the full period. See Figures 10 & 11 of the Fairchild LM555 data sheet.
- c) Design and test a linear ramp as per the Fairchild LM555 data sheet, Figures 14 & 15. For this see your TA for your individualized value of R_2 .
- d) Submit your work according to the TAs’ check list.

Your signature certifies that the work is solely your own; only signed submissions will be graded.

Note: PSpice path to eval models you may wish to use are in the library portion of the PSpice menu “Edit Simulation Profile, Configuration Files, Library” :

`\cadence\SPB_16.6\tools\pspice\library\eval.lib`