End of Universe Countdown Timer

Objectives:

The goal of this lab was to create a special circuit timer to be used to count down to the end of the universe.

      Design practice - timer circuit design
      Review simulation via Multisim
      Practice breadboard and test

Procedures:

Pre-Lab: Reviewed timer operation and obtained parts from the Tech Center
Design: Determined timer requirements based on available resources and approximate count down
      timing
      Developed design equations
      Schematic capture
      DC, transient simulation
Test: Breadboard layout
      AD2 clock input – 100KHz
      AD2 oscilloscope measurements

Results:

At first my counter would not operate. After comparing my breadboard to my schematics (simulation worked) I found I was using an active low reset in the simulations and an active high reset on the board. I fixed the board and the counter operated as expected.

At 100KHz the individual counter stages settled in a little more than half the clock period, indicating I could speed up the clock if required.

All listed design parameters were met.

Simulation 1 and 2 show the dc sweep and transient results
Waveform plots 1 and 2 show the actual waveforms for the dc sweep and transient operation

Observations and Conclusions:

This was good review of design, simulation and test. The particular solution I chose (ECL) provided for plenty of speed but cost more power than other solutions. I also was reminded that we ALWAYS use an active low reset. My design met all of the design criteria.
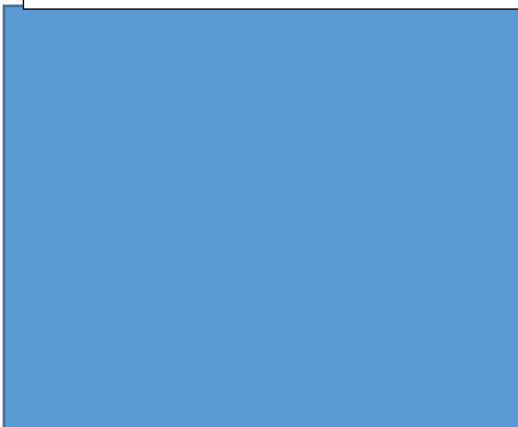
Appendix and References:
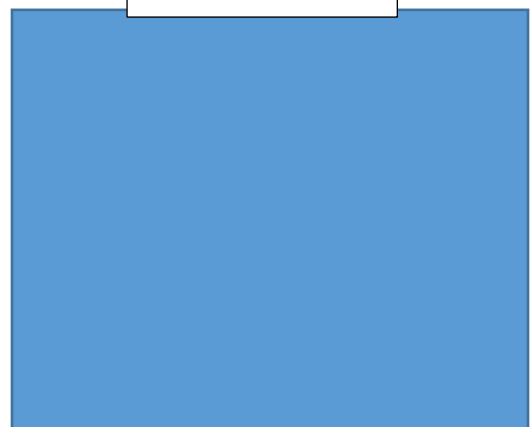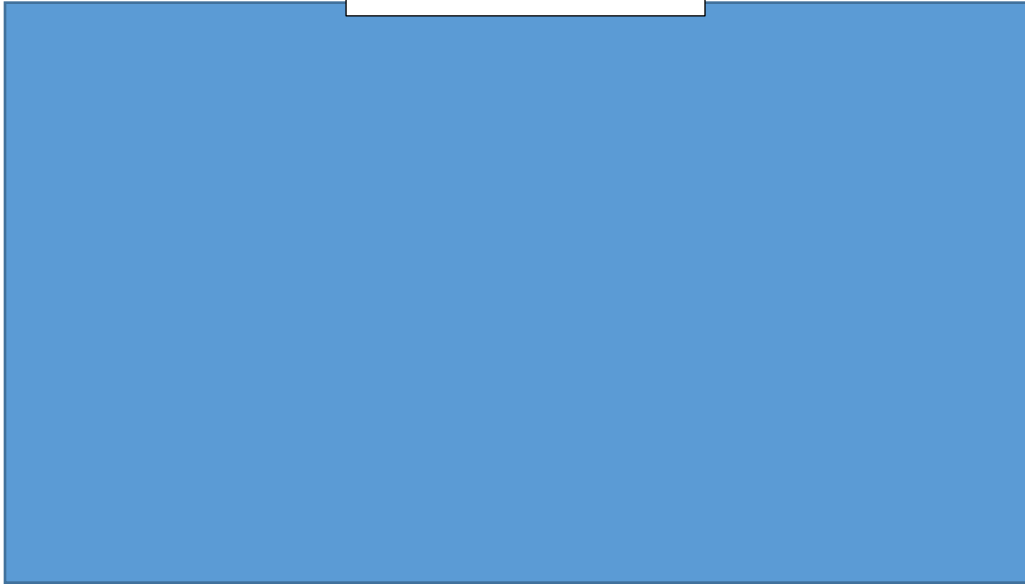
Design Equations
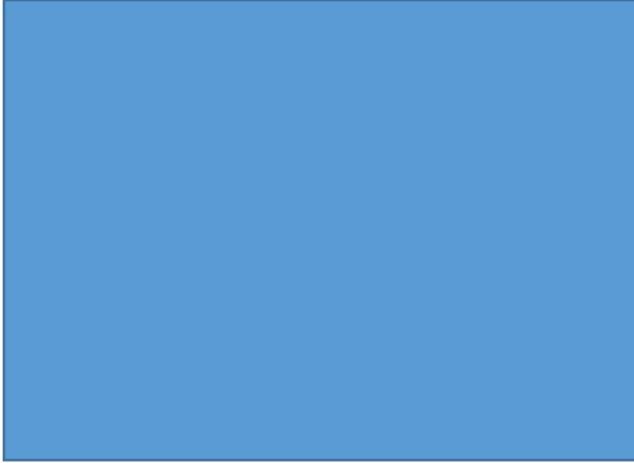
Schematic

Simulation 1 – dc sweep

Simulation 2 - transient

Breadboard

Waveform plot1

Waveform plot 2