**California State University, Northridge**

**College of Engineering & Computer Science**

**Electrical and Computer Engineering Department**

**ECE 443L Digital Electronics Laboratory Report 6**

**CMOS based Astable Multivibrator Circuit Design, Simulation and Experimental Test as well as Analysis**

**By Evan Thomas, Haroutun Haroutunian,**

**Clayton Lawton**



**Professor: Sequare Daniel-Berhe**

**Abstract:**

An astable multivibrator is a cross-coupled transistor with an astable output state as the input states transition from high to low. Main utilizations of astable multivibrators can be found in pulse position modulation and frequency modulation. The construction of such circuit is simple, as the most difficult part would be to calculate the input frequency and time constant.

**Key Terms:**

Astable, multivibrator, modulation, pulse, time constant (0.7\*R\*C)

**Simulation and Experimental Result:**

Diagram, schematic

Description automatically generated

Figure 6.1: Case 1 CLAYTON Astable Multivibrator Schematic @ 100kHz

**A picture containing diagram

Description automatically generated**

**Table

Description automatically generated**

Figure 6.2: Case 1 CLAYTON Astable Multivibrator Waveform @ 100kHz

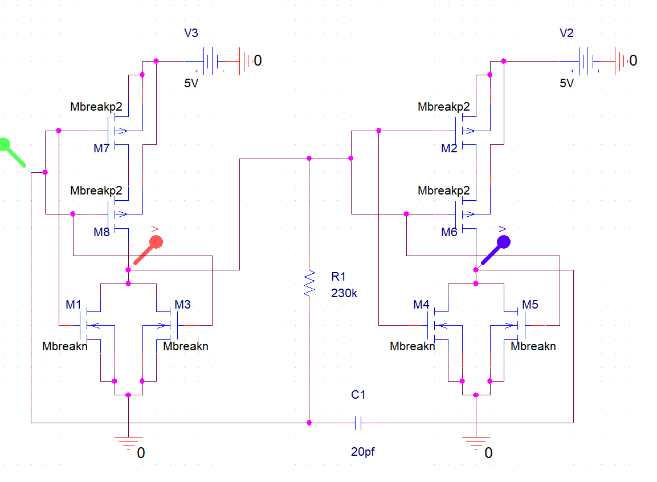


Figure 6.3: Case 1 EVAN Astable Multivibrator Schematic @ 111kHz

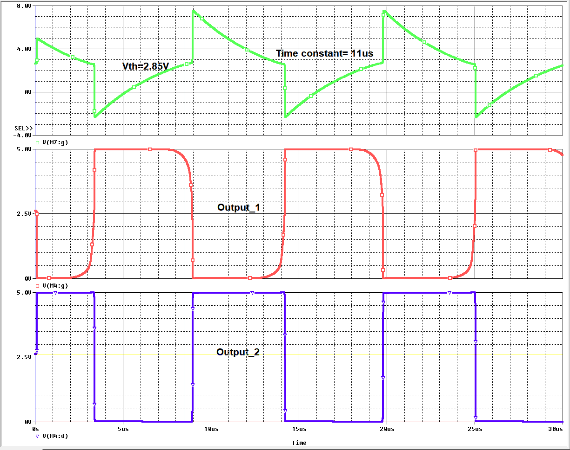


Figure 6.4: Case 1 EVAN Astable Multivibrator Waveform @ 111kHz

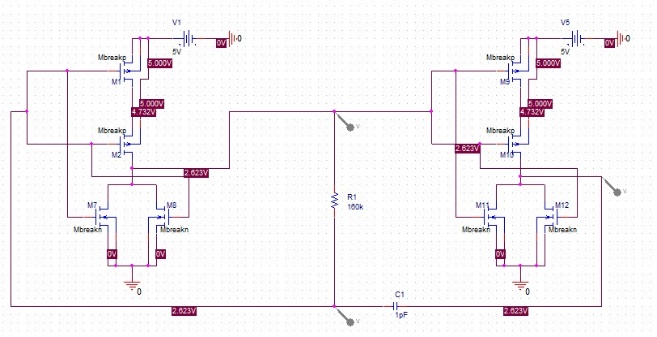


Figure 6.5: Case 2 HAROUTUN Astable Multivibrator Schematic @ 500kHz

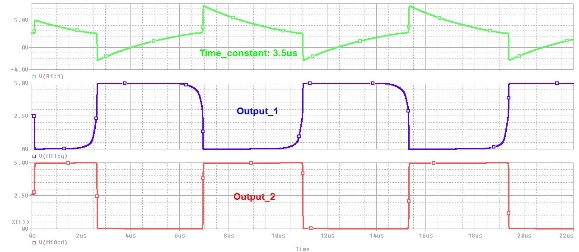


Figure 6.6: Case 2 HAROUTUN Astable Multivibrator Waveform @ 500kHz

Diagram, schematic

Description automatically generated

Figure 6.7: Case 3 CLAYTON Astable Multivibrator Schematic @ 670kHz

**Graphical user interface

Description automatically generated with medium confidence**

**Graphical user interface, table

Description automatically generated**

Figure 6.8: Case 3 CLAYTON Astable Multivibrator Waveform @ 670kHz

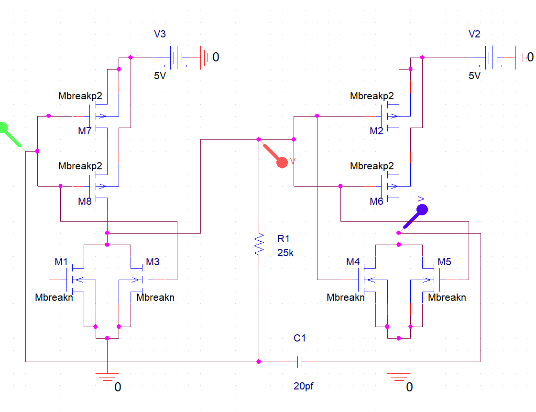


Figure 6.9: Case 3 EVAN Astable Multivibrator Schematic @ 800kHz

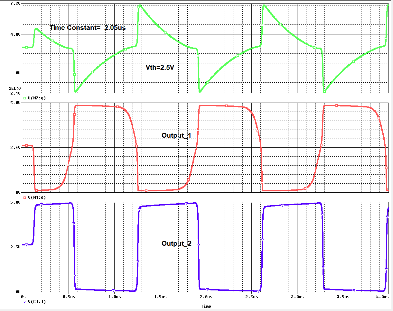


Figure 6.10: Case 3 EVAN Astable Multivibrator Waveform @ 800kHz

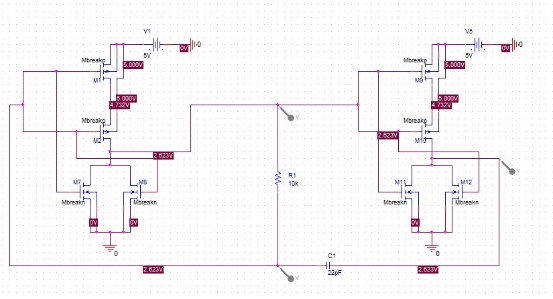


Figure 6.11: Case 4 HAROUTUN Astable Multivibrator Schematic @ 1Mhz

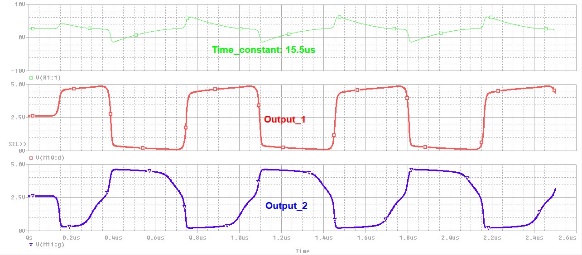


Figure 6.12: Case 4 HAROUTUN Astable Multivibrator Waveform @ 1Mhz

**Conclusion:**

Astable Multivibrators, although aren’t found in everyday electronics, are very useful within the medical field. Such circuits are utilized in heartbeat sensor machines and any modulation device. Pulse synchronization is a common area for such circuits.