Experimental Objective: To investigate the correlation between position errors and temperature variation.

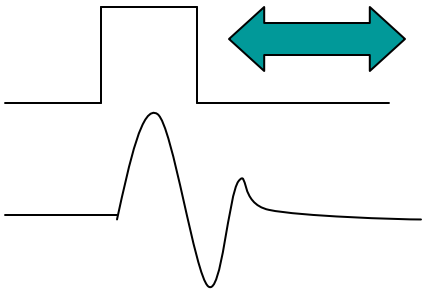
Hypothesis: Temperature excursions cause position drift in the presence of VFDG calibration offset.

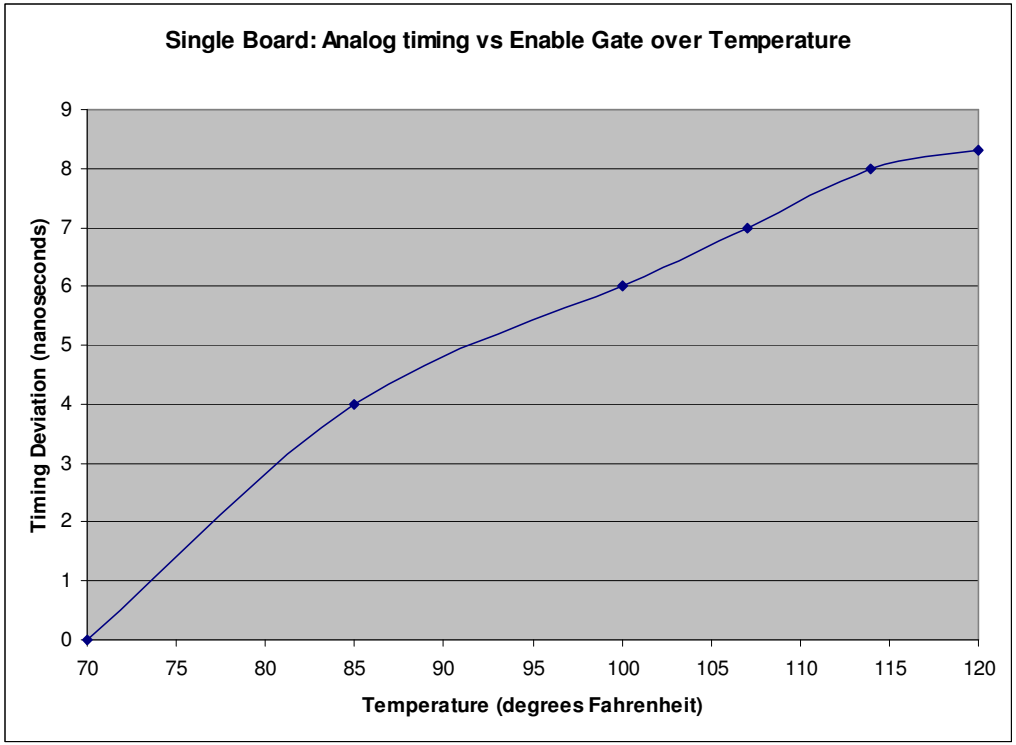
Method:

- Create position errors by introducing VFDG calibration offset.
- Vary temperature and observe position drift.
- Fix position drift by recalibrating VFDGs.
- **Isolate cause of position drift as timing related, or not.**
- **Investigate cause of timing drift (trigger or analog).**
- Verify that VFDG calibration does not change over temperature.

Test 1: Observe the timing deviation between the analog signal and the enable gate timing for a single board as the temperature varies.

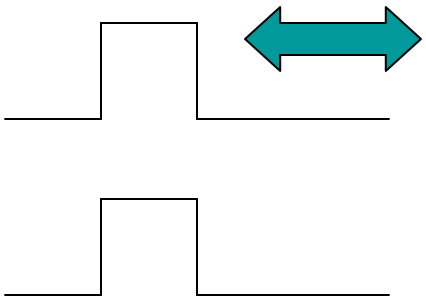
Result: The timing varied more than 8 ns over 50 deg Fahrenheit. In the first 15 degrees Fahrenheit, the timing varies 4 ns.

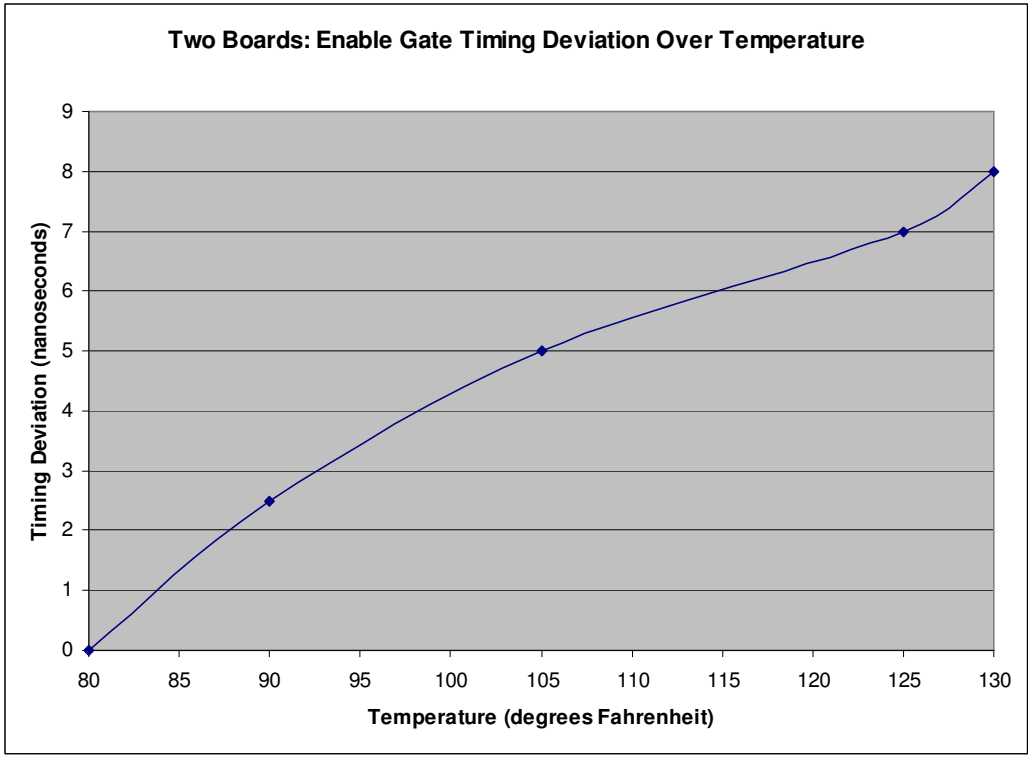




Test 2: Observe enable gate timing deviation between two boards as we vary the temperature of one board and hold the other board temperature constant.

Result: The timing varied between the two boards by 8 nsec over 50 degrees Fahrenheit. When using a freeze-spray, the offending component was a delay generator that establishes the enable gate signal.





Test 3: Calibrate VFDGs at a stable low temperature.
Warm up to a high stable temperature and recalibrate.
Observe differential change in VFDG calibration.

Result: The VFDG timing seems to be stable over temperature.
However, more testing needs to be performed.

Conclusion: The timing drifts dramatically over temperature. This timing shift causes position errors in conjunction with VFDG calibration error. The VFDG calibration is seemingly independent of temperature.