

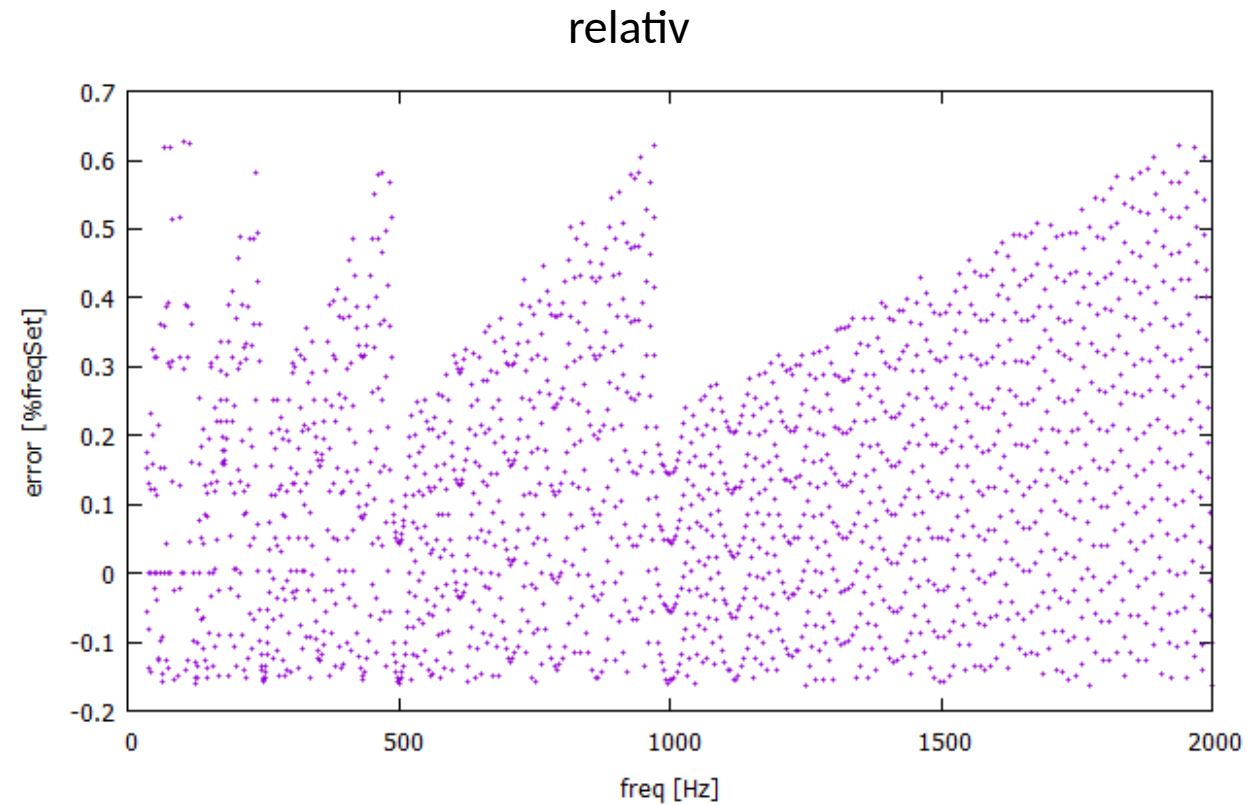
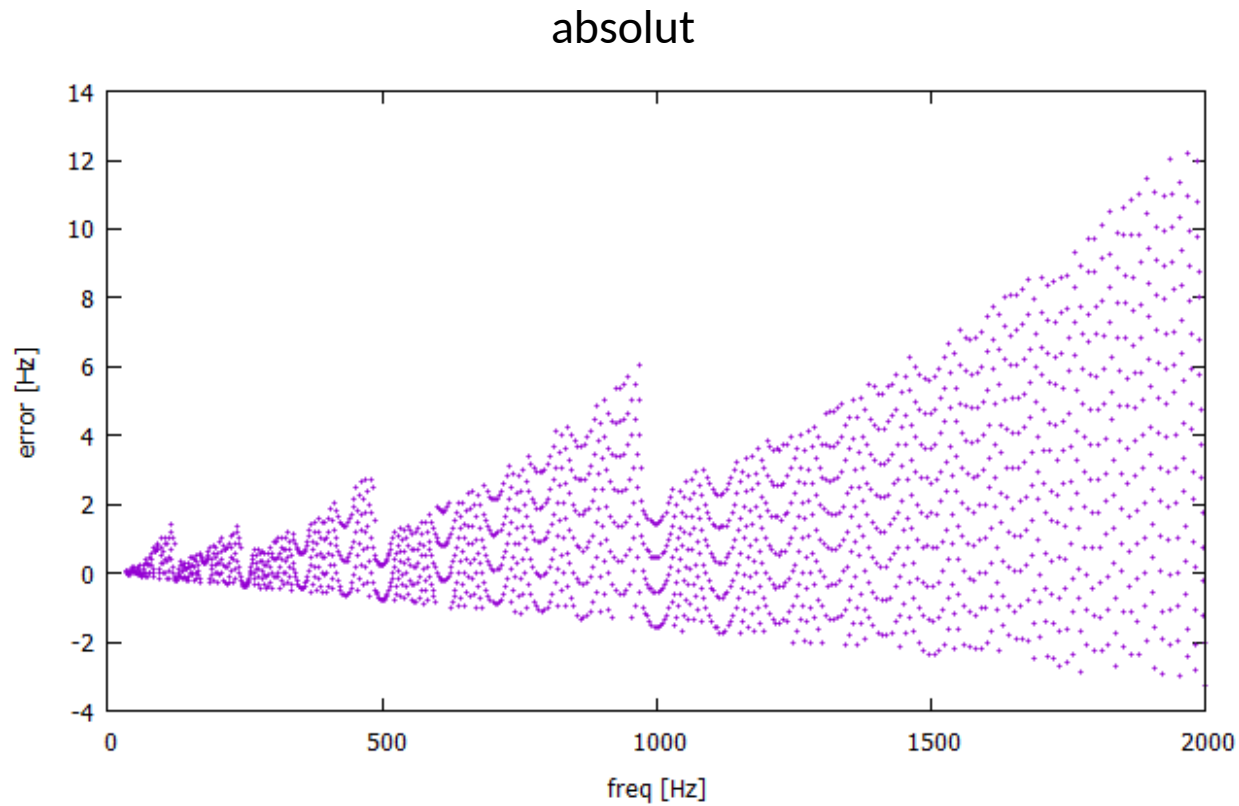
Accuracy PWM-Generator

Setup:

- Arduino Uno for PWM generation
- Calibrated muBoard for measurement of frequency and duty cycle
- Measurement range 1Hz..2kHz (16-bit timer), 32Hz..2kHz (8-bit timer)
- Test 1: Arduino pin D3 (=OC2B; 8-bit TIM2) with [PWM Library](#) by Sam Knight
- Test 2: Arduino pin D3 (=OC2B ; 8-bit TIM2) with custom-SW (with “fast PWM” mode)
- Test 3: Arduino pin D9 (=OC1A; 16-bit TIM1) with [PWM Library](#) by Sam Knight
- Test 4: Arduino pin D10 (=OC1B; 16-bit TIM1) with [PWM Library](#) by Sam Knight

Test 1: Arduino pin D3 (=OC2B ; 8-bit TIM2) with [PWM Library](#) by Sam Knight

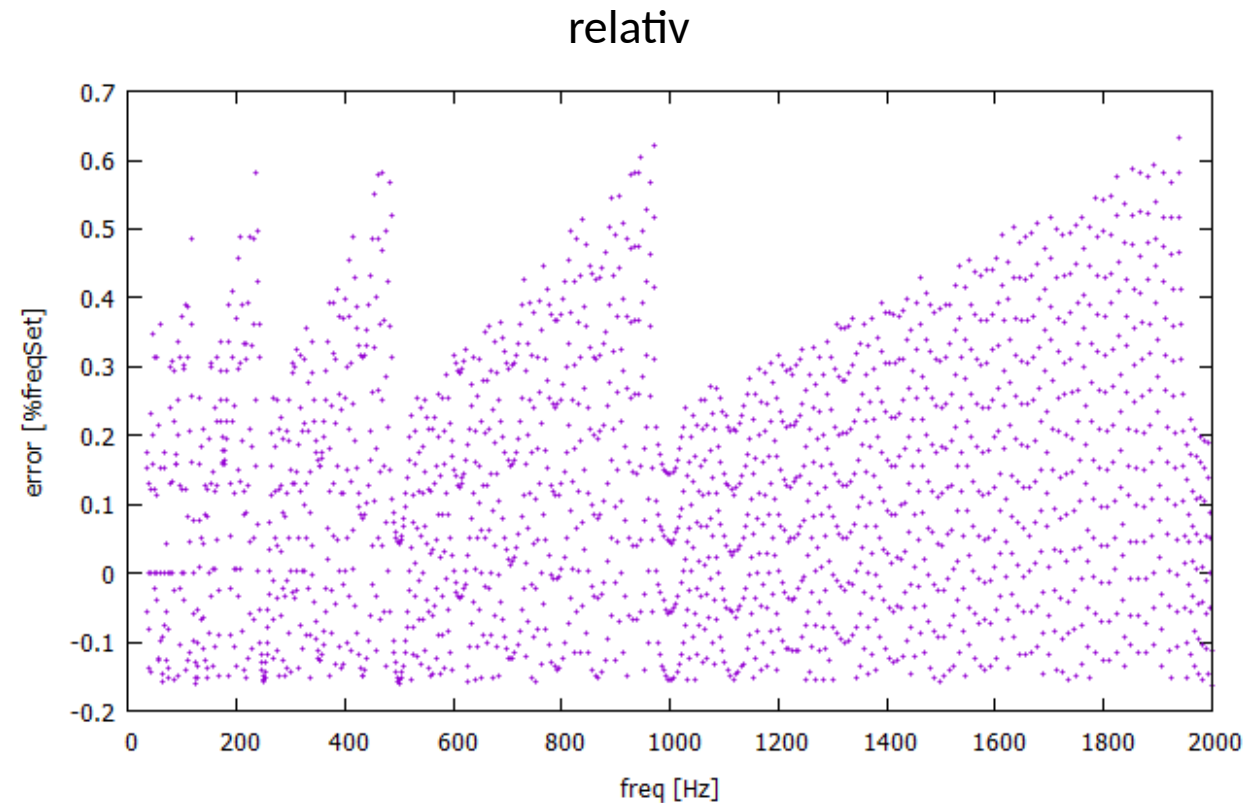
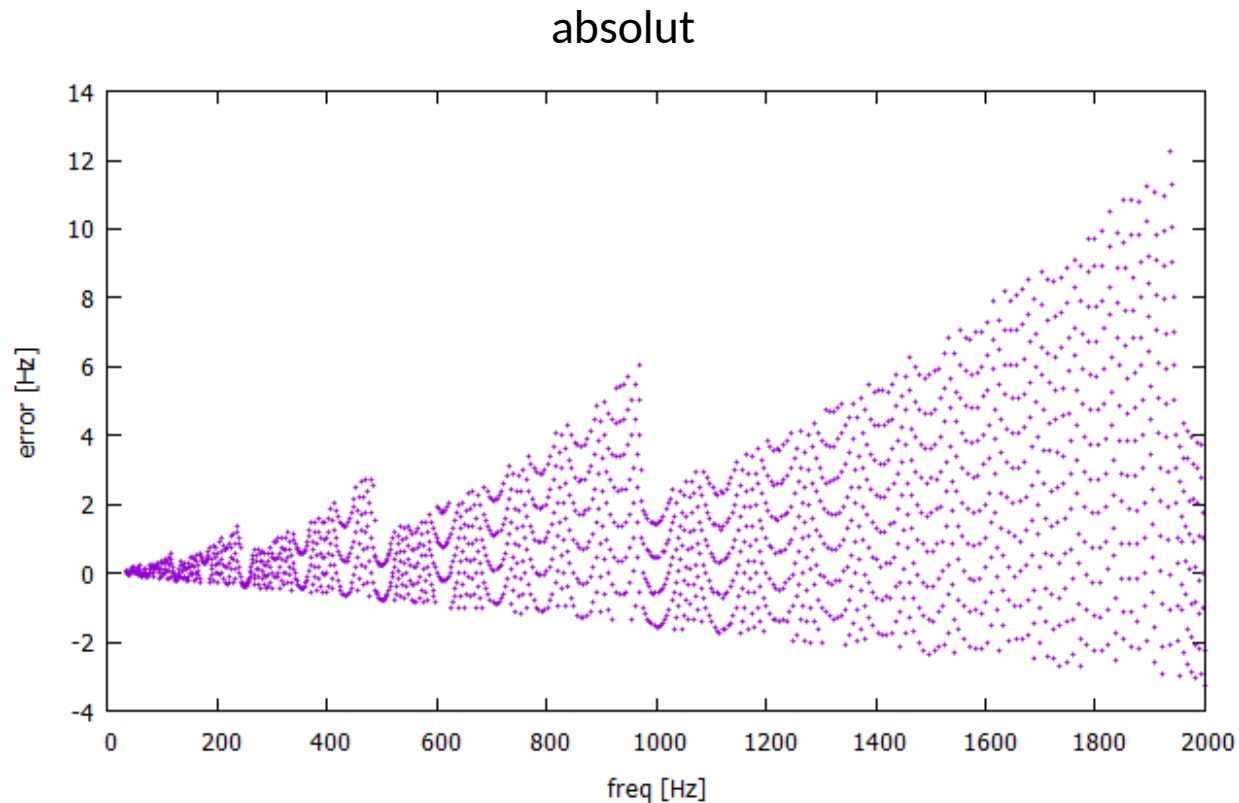
error set vs. generated frequency



→ max. frequency error -0.15/+0.65% ~ 1/127 caused by to 7-bit resolution in worst case

Test 2: Arduino pin D3 (=OC2B ; 8-bit TIM2) with custom-SW (with “fast PWM” mode)

error set vs. generated frequency

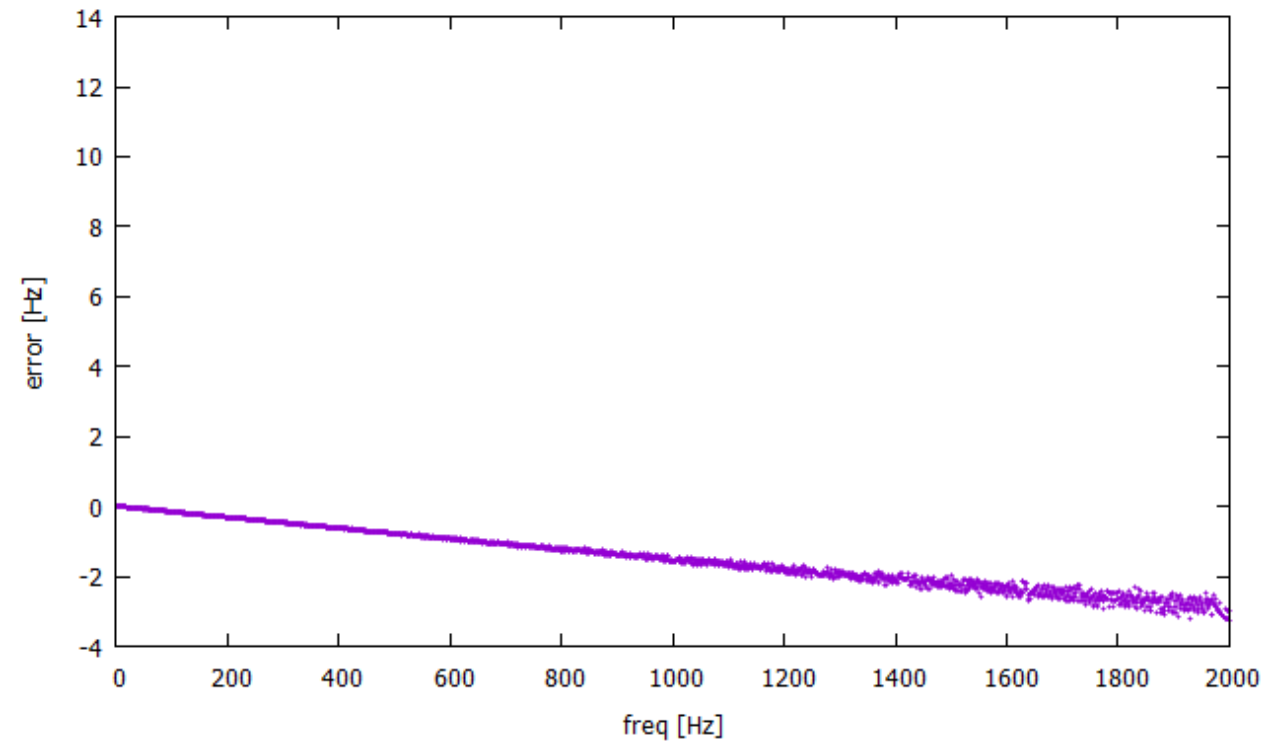


→ max. frequency error -0.15/+0.65% ~ 1/127 caused by to 7-bit resolution in worst case

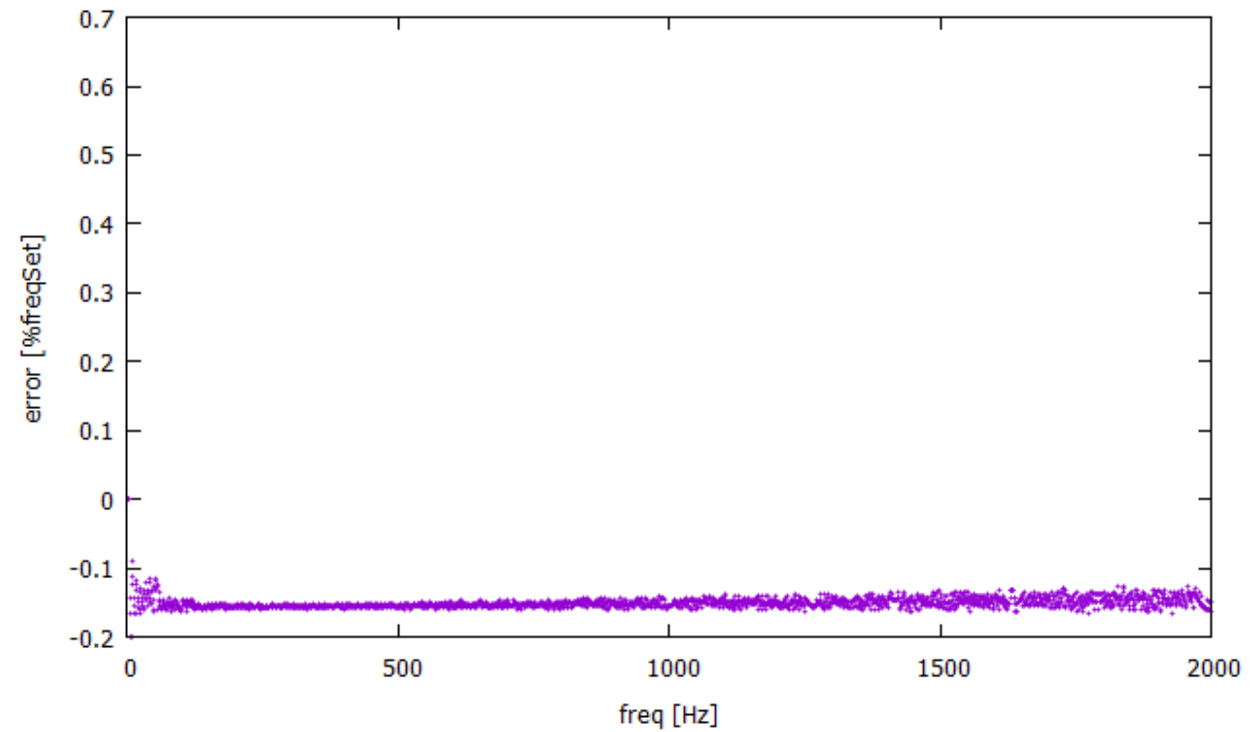
Test 3: Arduino pin D9 (=OC1A; 16-bit TIM1) with [PWM Library](#) by Sam Knight

error set vs. generated frequency

absolut



relativ

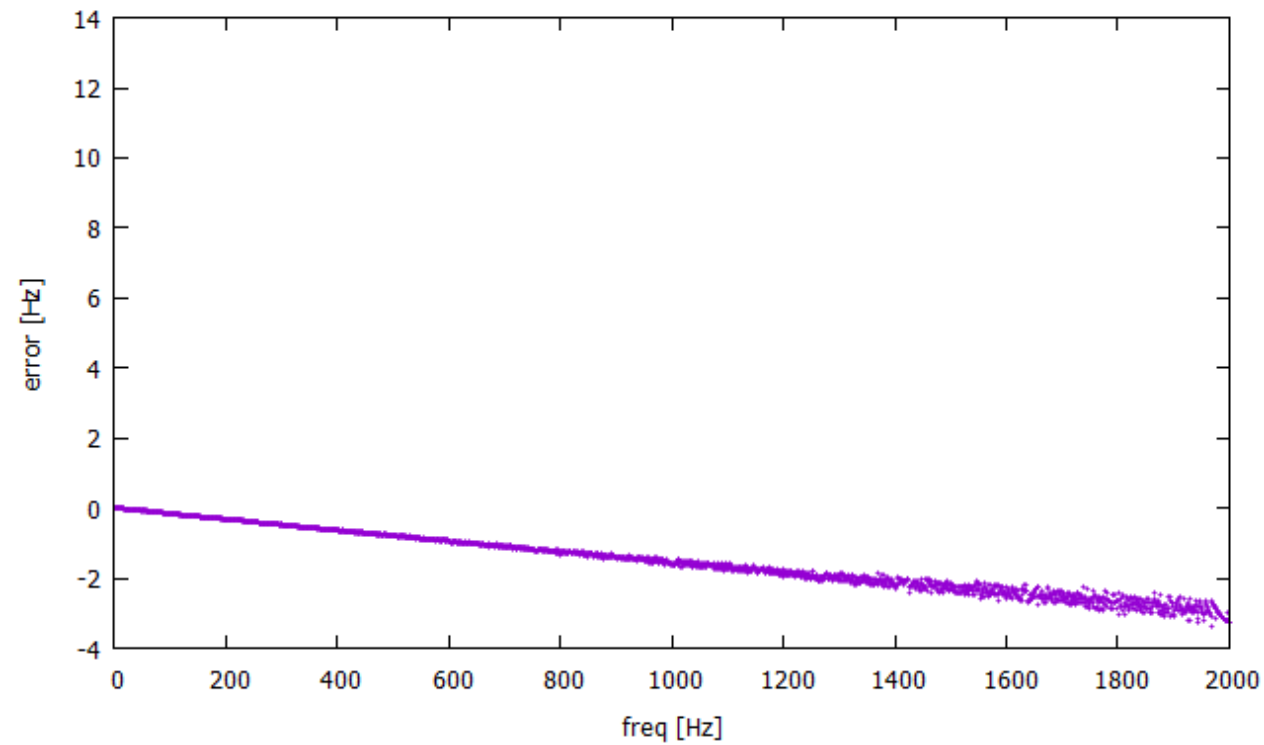


→ frequency error of -0.15% probably due to clock accuracy. Can be compensated by software

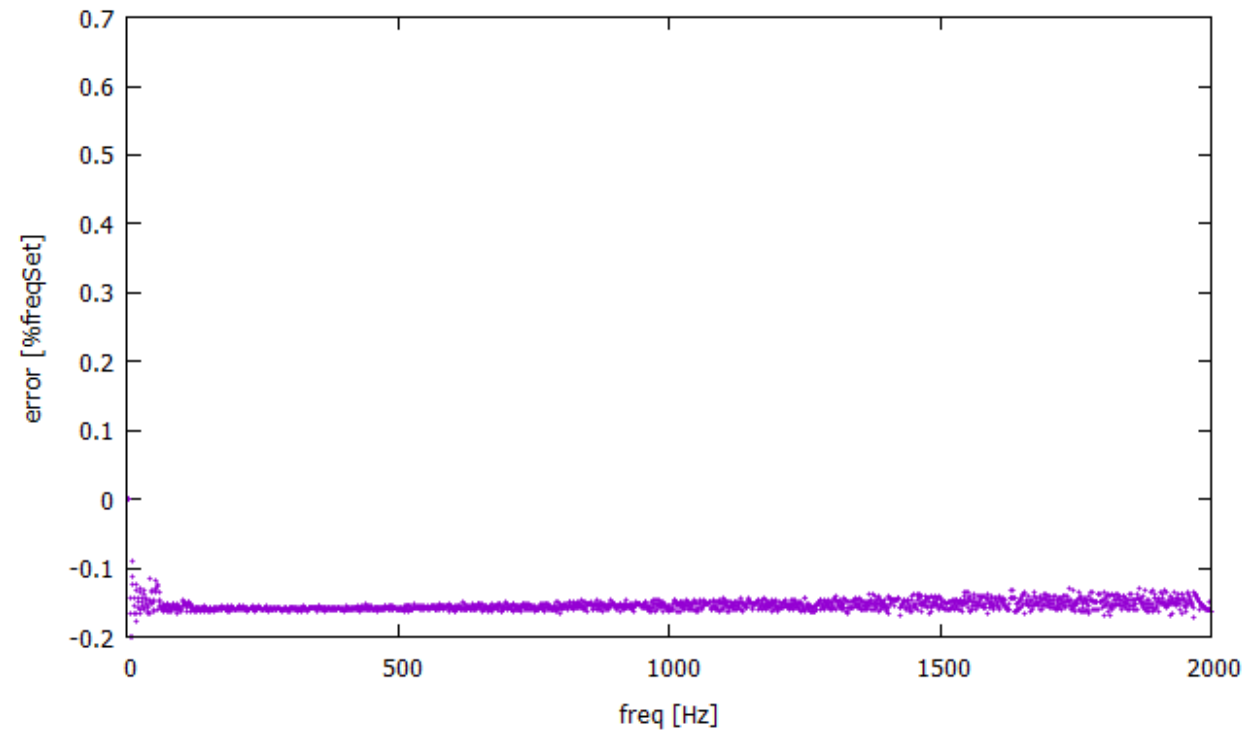
Test 4: Arduino pin D10 (=OC1B; 16-bit TIM1) with [PWM Library](#) by Sam Knight

error set vs. generated frequency

absolut



relativ

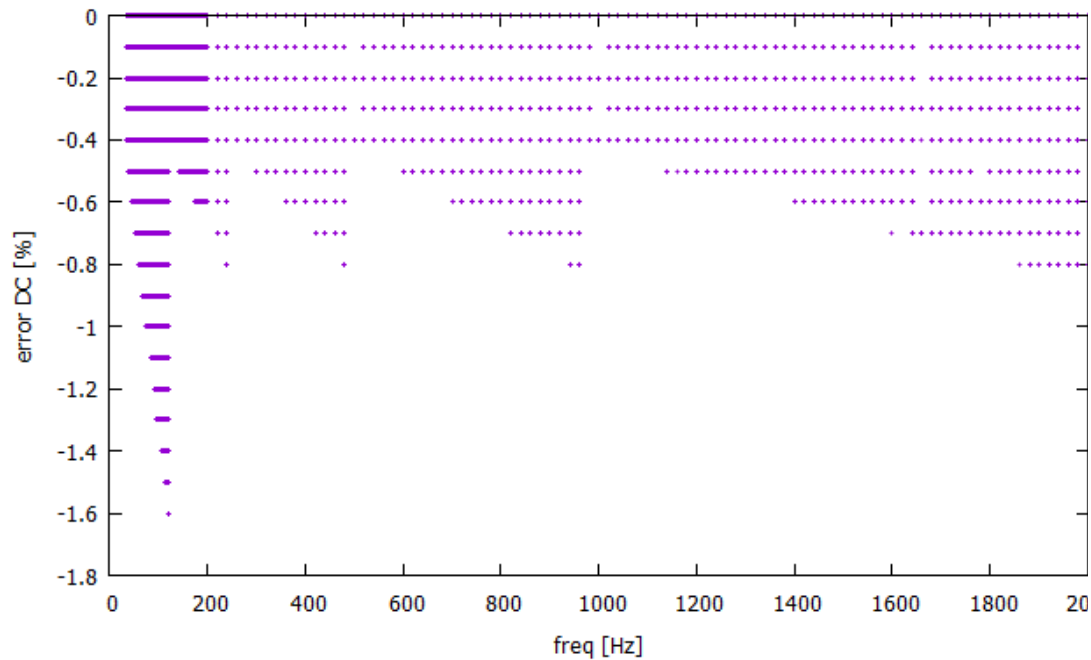


→ frequency error of -0.15% probably due to clock accuracy. Can be compensated by software

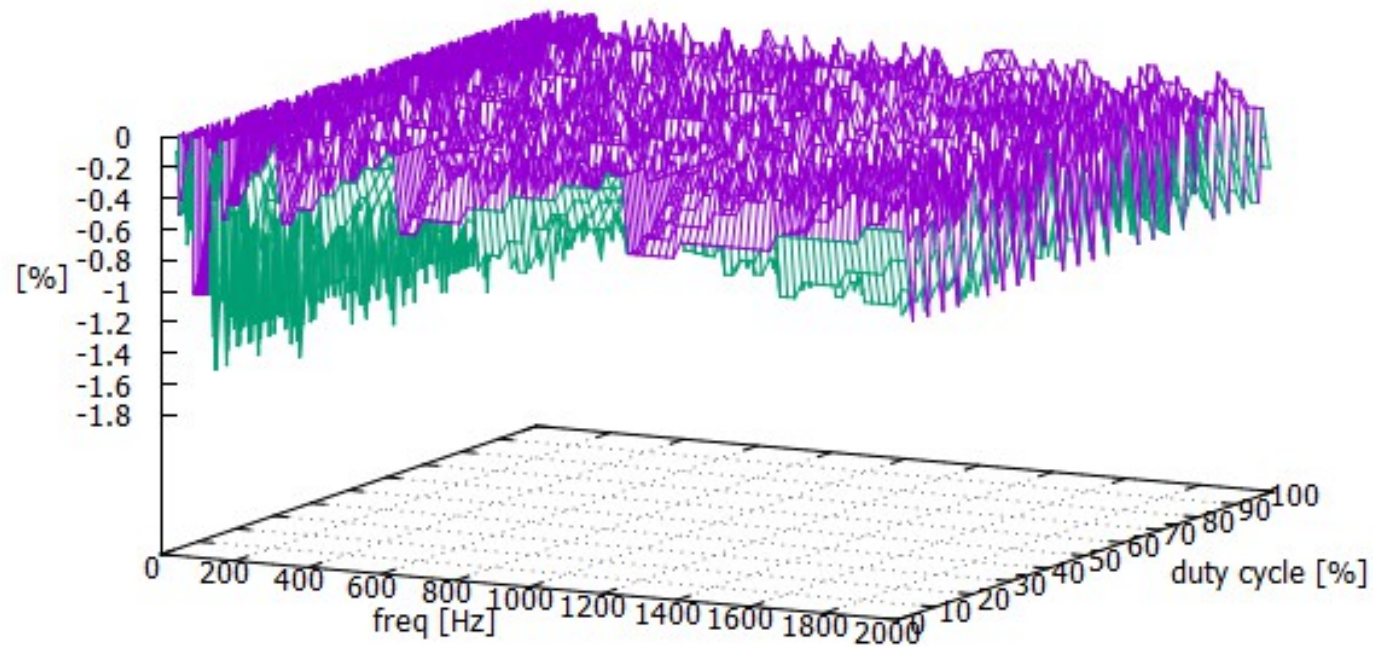
Test 1: Arduino pin D3 (=OC2B ; 8-bit TIM2) with [PWM Library](#) by Sam Knight

error set vs. generated duty cycle

overview



detail

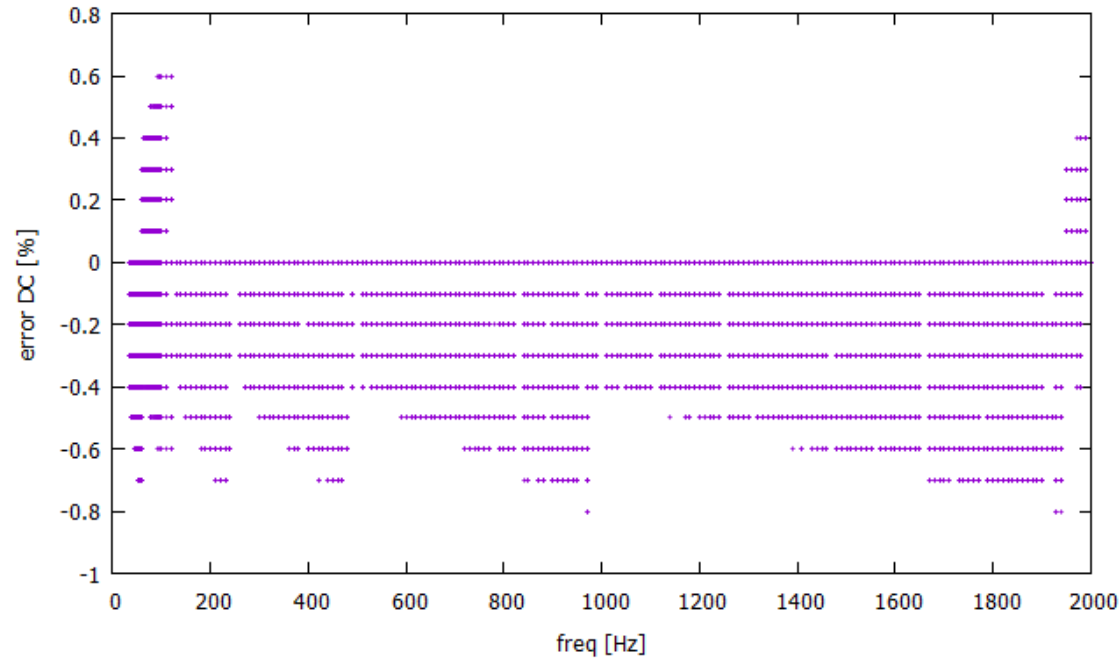


→ max. duty cycle error -1.6/+0% ~ 1/63 probably caused by 6-bit resolution due to center-alignment only

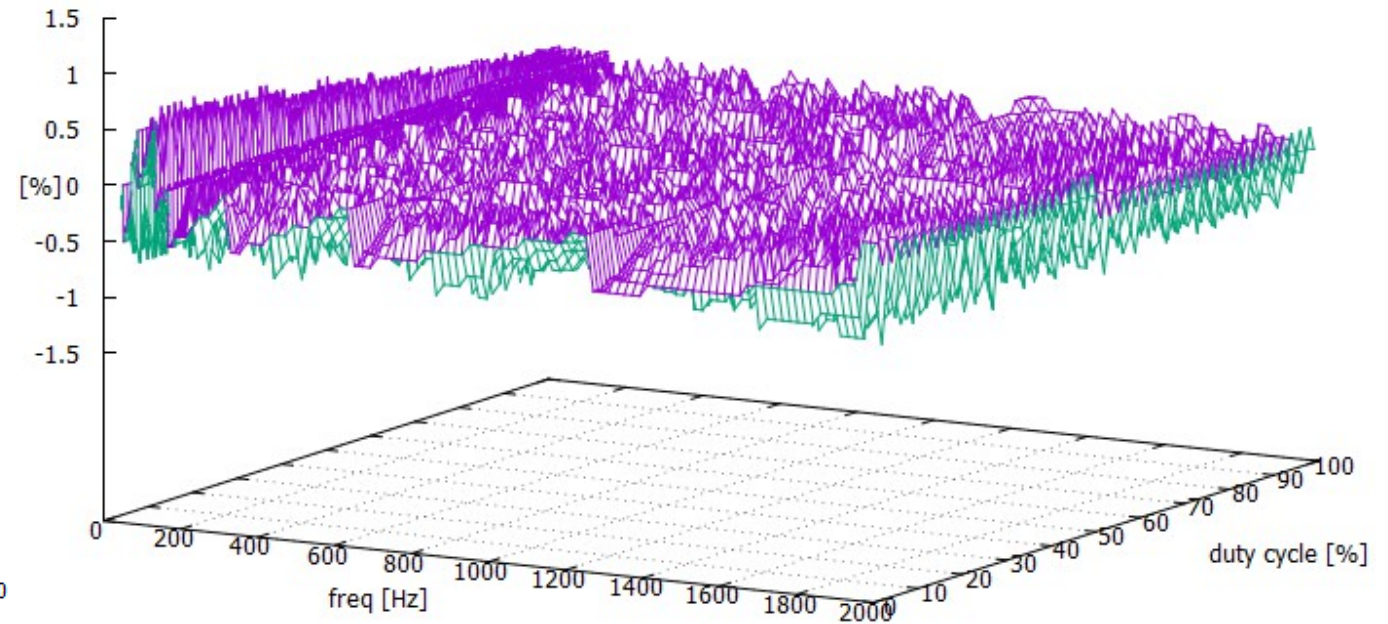
Test 2: Arduino pin D3 (=OC2B ; 8-bit TIM2) with custom-SW (with “fast PWM” mode)

error set vs. generated duty cycle

overview



detail

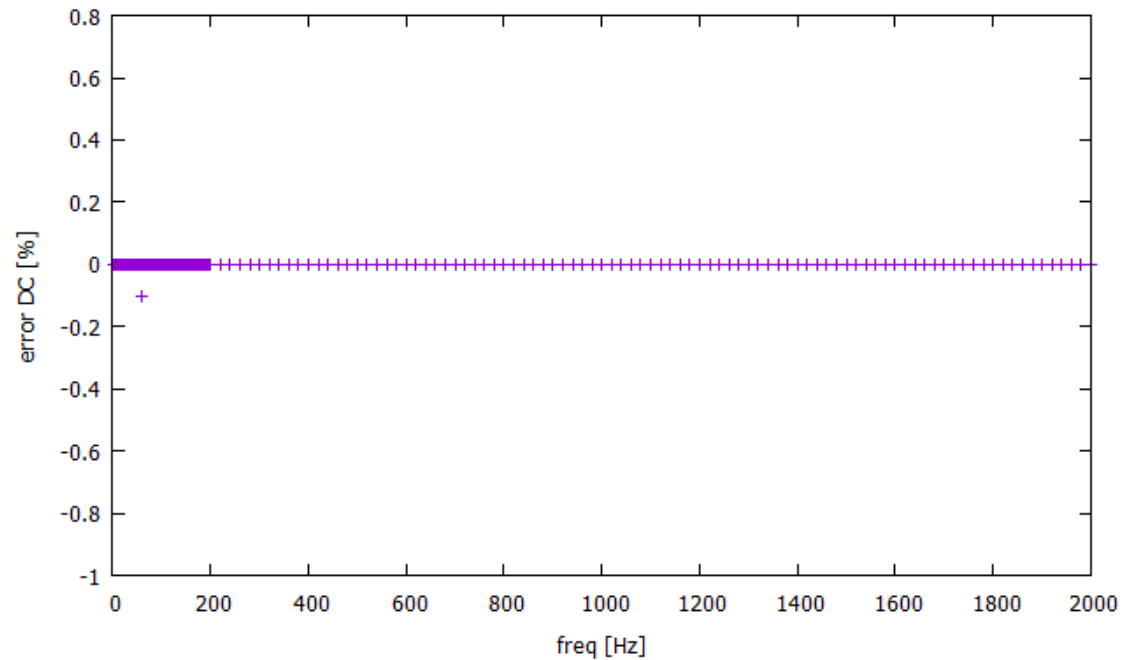


→ max. duty cycle error -0.8/+0.65% $\sim 1/127$ caused by 7-bit resolution in worst case

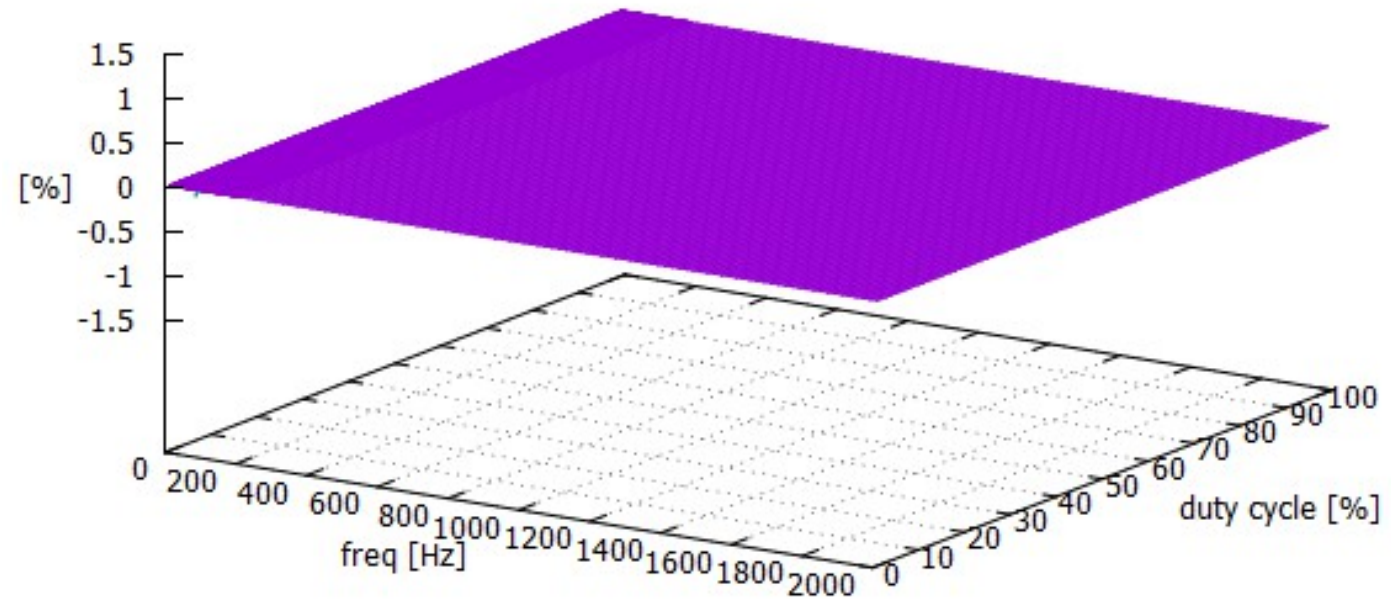
Test 3: Arduino pin D9 (=OC1A; 16-bit TIM1) with [PWM Library](#) by Sam Knight

error set vs. generated duty cycle

overview



detail

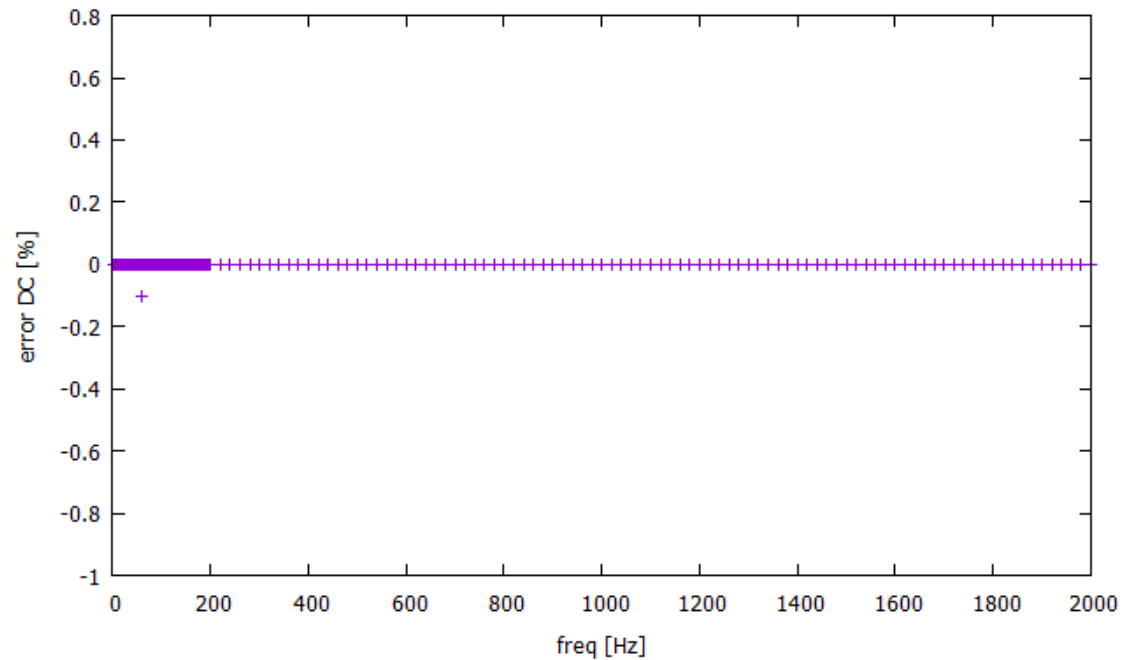


→ duty cycle error is negligible

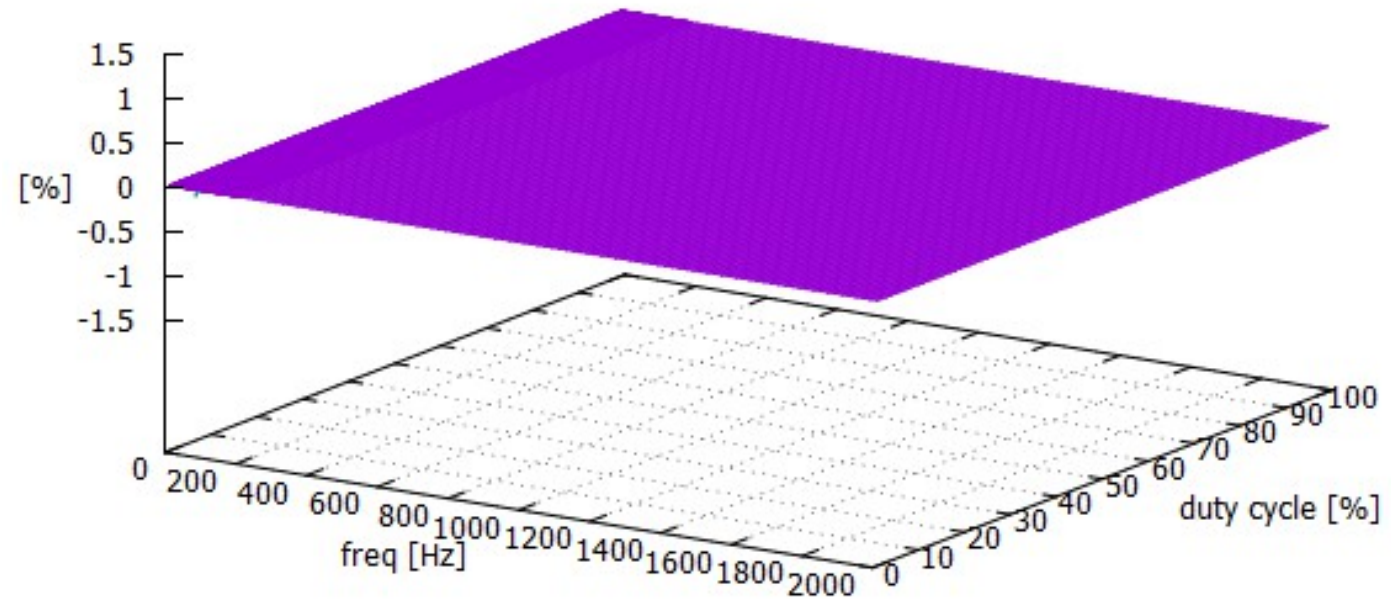
Test 4: Arduino pin D10 (=OC1B; 16-bit TIM1) with [PWM Library](#) by Sam Knight

error set vs. generated duty cycle

overview



detail



→ duty cycle error is negligible