

Testing of Rev I3 TIU Using Hantek DSO

12-25-19

All testing done as follows except as noted:

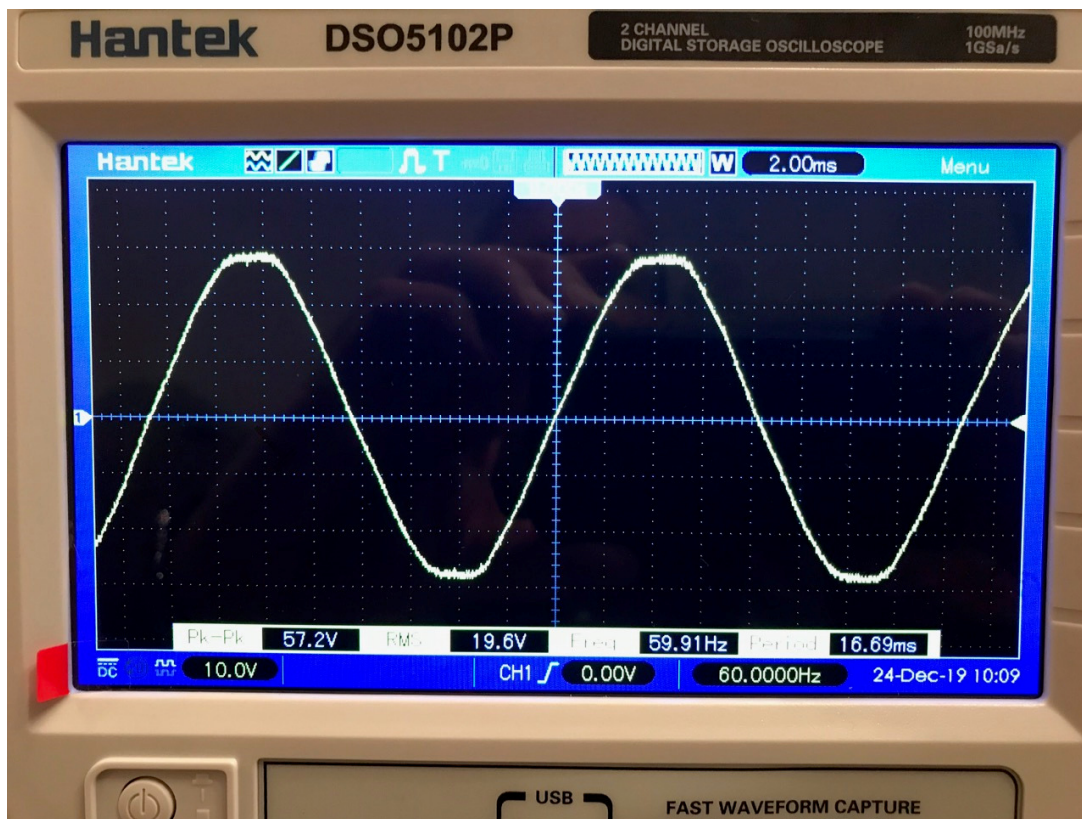
TIU Rev I3 remotely powered 12 VDC

Z-1000 brick supplying channel power; 20 VAC nom

No track connected

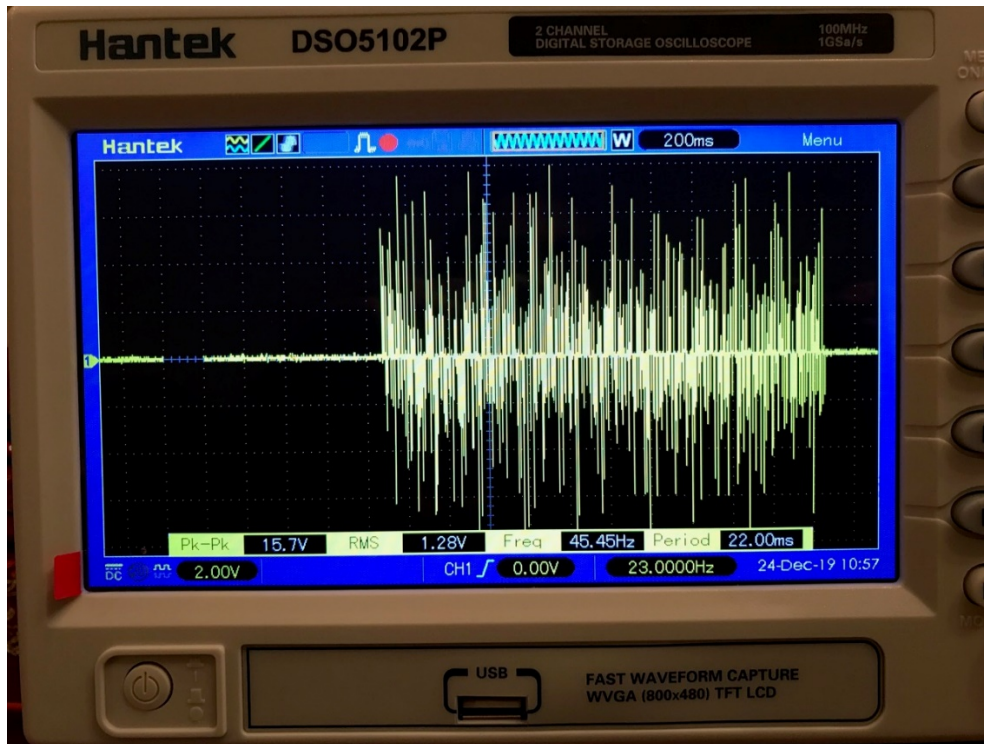
4 stage R-C filter used for signal isolation (OGR-Adrian)

1. Filter test. To determine how many stages is optimum/necessary. Vertical set to 200 mv/D. No discernable pattern after 1,2,3, or 4 stages. No difference. Flat line with some minor noise/spikes. Conclude that really only one stage is necessary.
2. 60 Hz Sine Wave Test; Z-1000 brick output. Vert set 10v/D; Hor set 2 mv/s. P-P 57 v; TRMS=19.6
57 P-P = 20 VAC. The curve is not really a true sine wave; more like a sawtooth with rounded peaks and valleys. TRMS is lower than calculated nominal VAC of 20.2V.

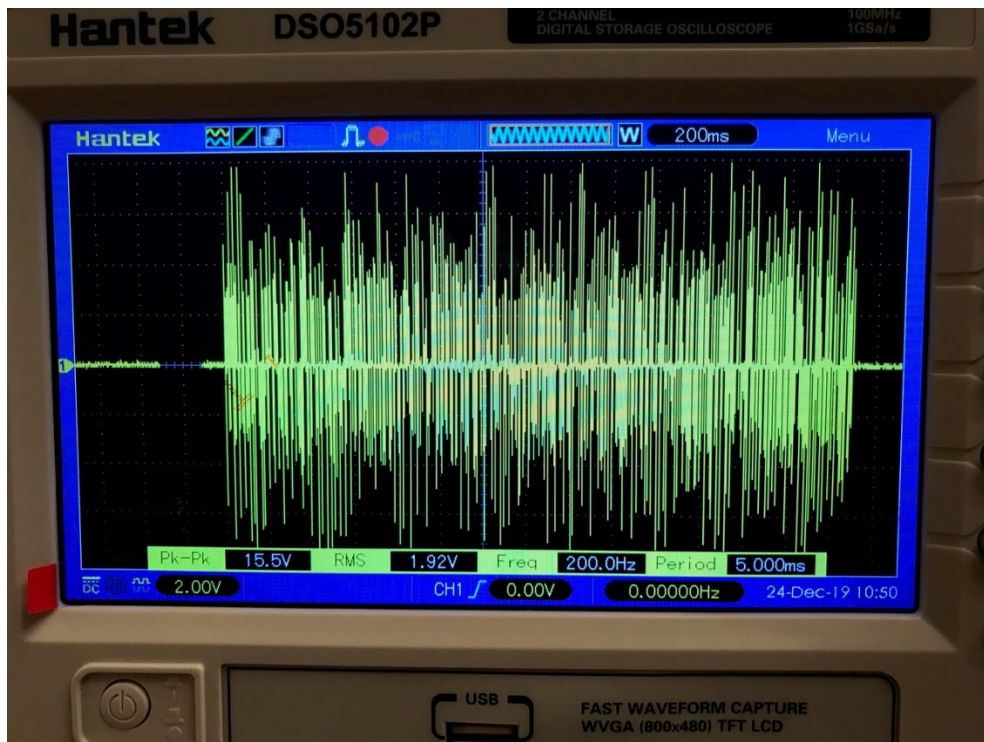


3. TIU Channel Output Test: Vert set 2 V/D.
All 4 channels showed ~15 V P-P.
All 4 channels deemed good.
No discernable pattern. Looks just like the engine search pattern shown below.

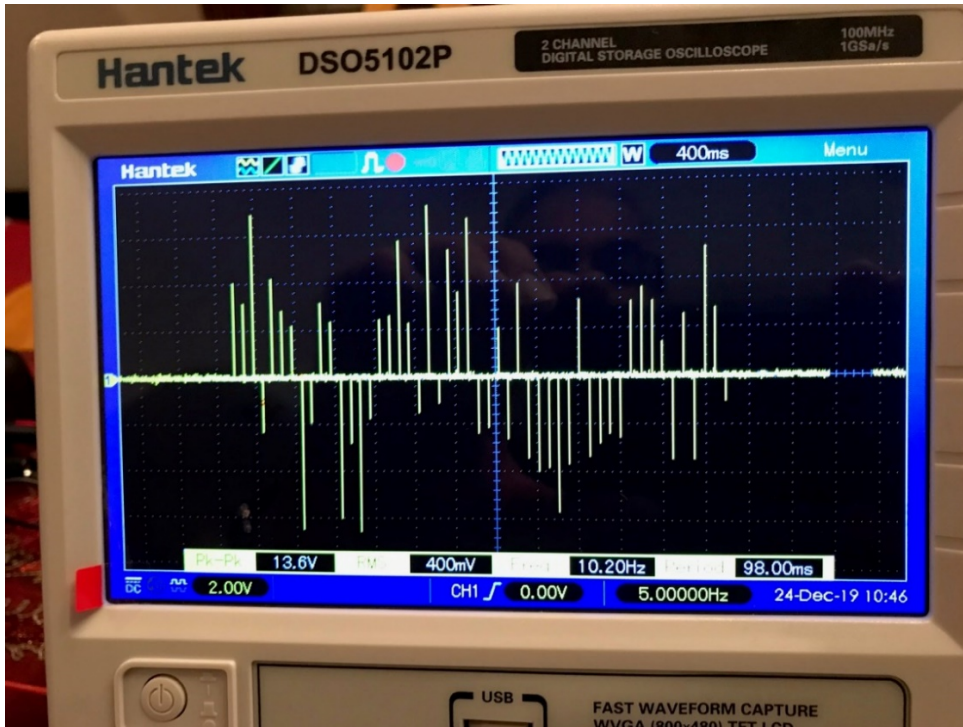
4. DCS Engine Search Pattern; Vert set to 2 V/D. Hor set to 200 ms/D.
Hash pattern ~15 V P-P. Lasted ~ 2.2 secs.



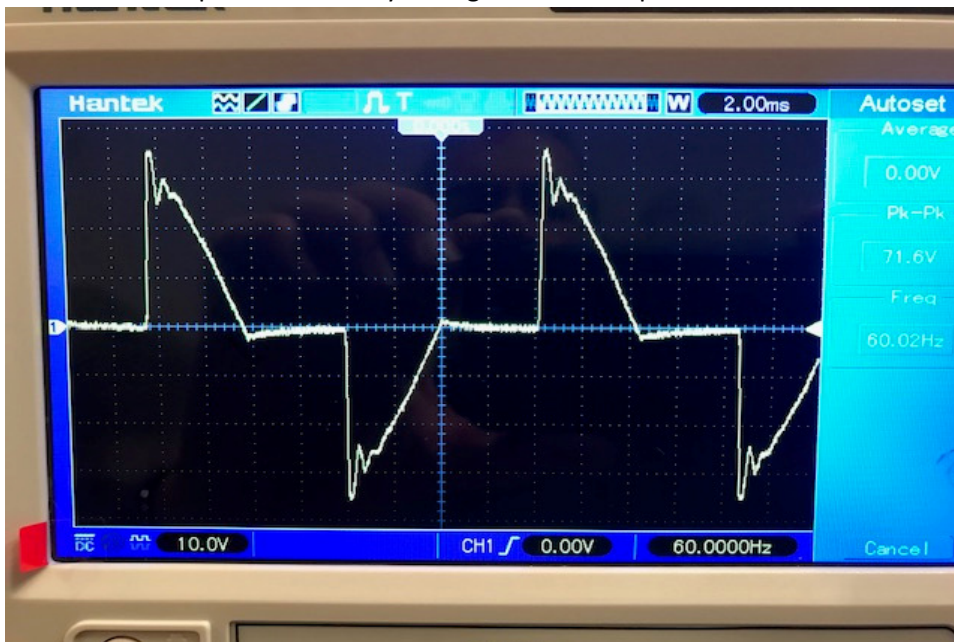
5. TIU Startup Burst; Vert set to 2 V/D; Hor set to 200 ms/s. Hash pattern ~15 V P-P lasting ~ 3 secs.
Only present when TIU is powered up with NO voltage supply to the channel inputs.
No idea what this is for?



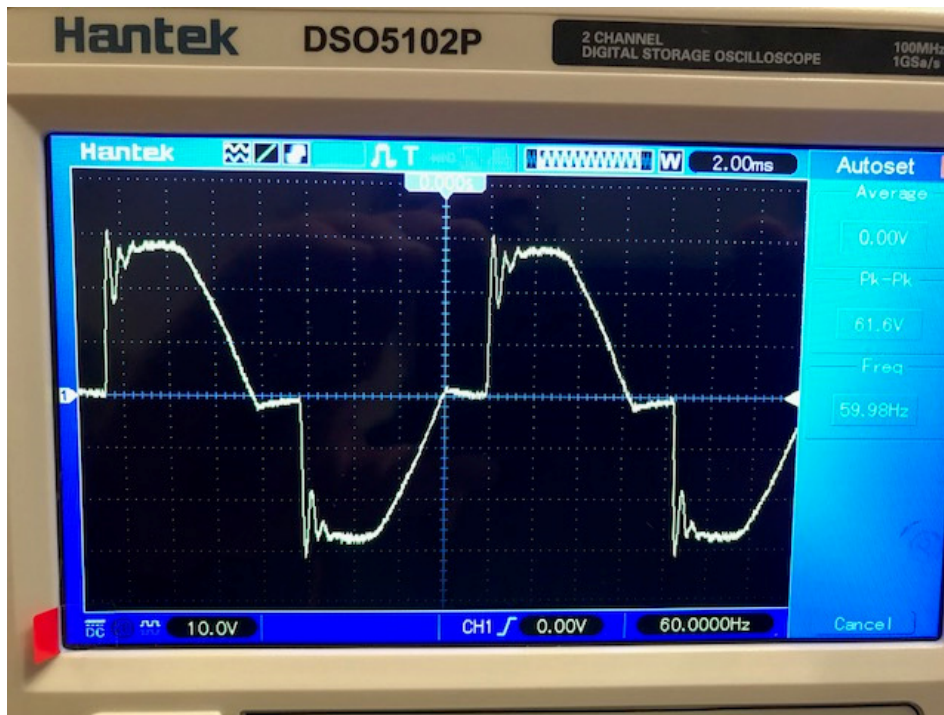
6. TIU Watchdog Signal; Vert set to 2 V/D. Hor to 400 ms/D. 10-12 V P-P.
 WD signal is sent if TIU remote power is connected, or if channel power is connected. Lasts about 5 seconds usually, BUT can be only about 1/2 as long; no pattern as to why (?)
 Timing is a single spike every 100 ms, total about 50 spikes, with open space between spikes, likely when the TIU listens for a reply. Spikes can be pos or neg, and of varying amplitude.
 If TIU is powered up w/no channel power, first is the startup burst, followed by the WD signal.



7. TIU V1/V2 Output Voltage Pattern. Vert set 10 V/D, Hor set 2 mv/D. 71 volts P-P.
 The variable outputs show a very strange “curve” output as shown below for 12 V on handheld:



Here is the pattern for 18 V output. 61 volts P-P



Note that the P-P voltage is 71 for the 1st case and 61+ for the 2nd!
Note also that as the voltage increases the curves become wider and the dead spot (zero) between becomes shorter. Thus the area under the curve increases, which effectively raises the voltage applied, though the **P-P voltage actually decreases**.

The two fixed outputs F1/F2 show exactly the same “sine” wave voltage output as the Z-4000 input in case 2 above, when no filter is used in the circuit.