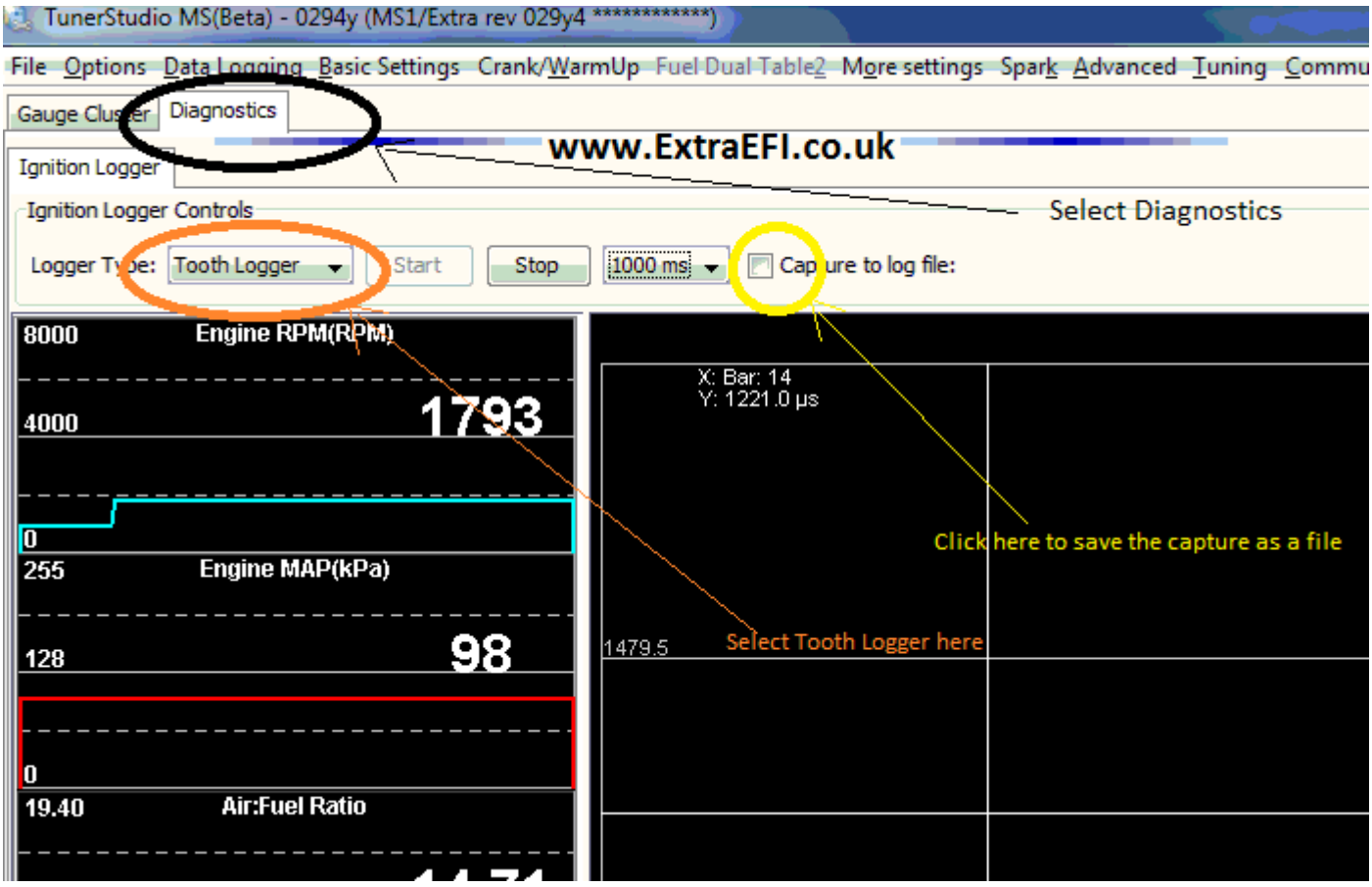
Toothed Wheel Log Viewer using Tuner Studio

If you havent already done so, install **Tuner Studio** onto your laptop, downloadable from http://www.ideasandsolutions.biz/tunerstudio/ this is also on the CD I provide, but that may need updating, which is done automatically. This is the latest tuning software for MegaSquirt products and has a LOT of features that MegaTune (MT) doesn't have. It is similar in layout and function to MT, so that MT users can adapt to it easily. See the Tuner Studio Setup page HERE or the Tuner_Studio_Setup PDF file on the CD I provided.

Tooth Logger:

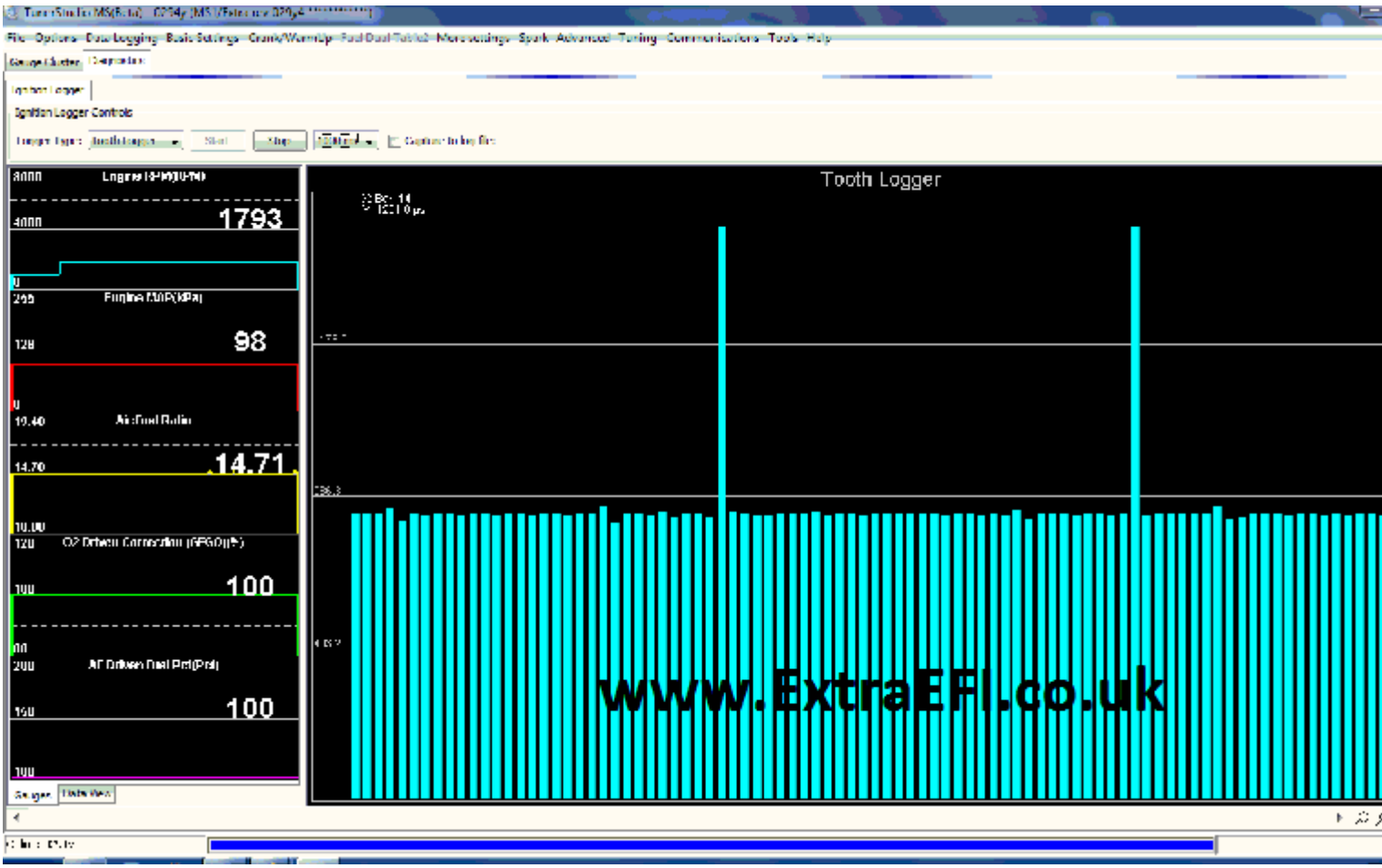
This can look daunting to start with, but once you get a feel for it its quite easy to grasp, so don't run away just yet!

The main function of this feature is to see how the MS ECU is decoding the trigger wheel signals from the VR sensor (It could just as well be a hall sensor but it's unlikely to be). To get it running you need to select **Diagnostics - Tooth Logger:**



You can also save the log as a file if you want to share it or send it to me or the forums, by ticking on the **"Capture to Log File"**

Now try to start the engine or rev the engine untill you have the area of engine speed that is causing the rev limitting or rpm fluctuations. You will see a row of lines on the screen and a regular taller line:



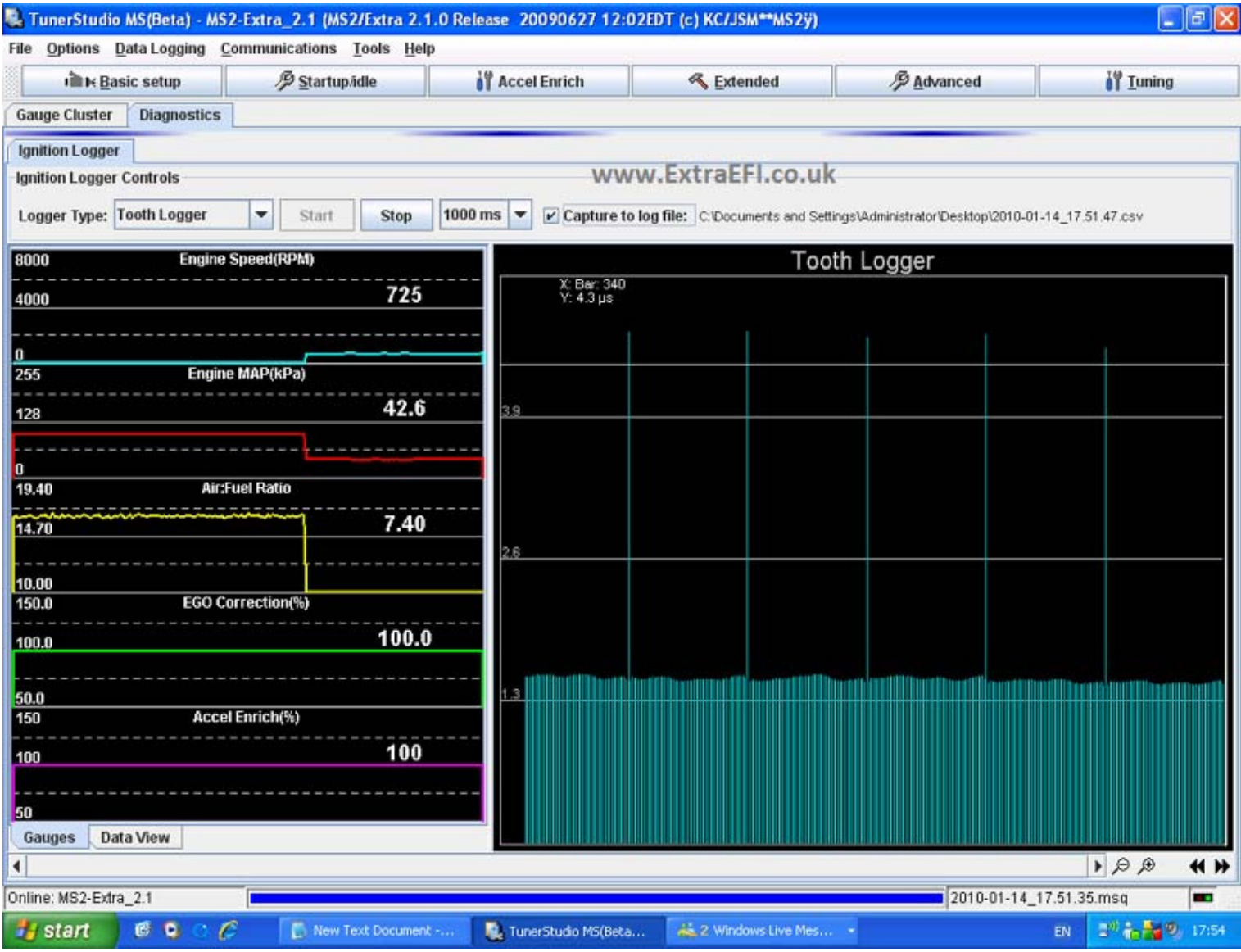
The above example is a **36-1 wheel** (Ford style). *Note: the above is a simulated pulse wave, a running engine will have larger peaks and troughs but should look very similar.*
Remember the 36-1 wheel has 35 teeth and a gap of one tooth for every crank rotation.
The log viewer above shows 34 short lines and then one taller line, followed by another 34 short lines, etc, etc.

The height of the line is the time between the pulses sent to the ECU from the sensor. Knowing that the teeth are equally spaced off the wheel (36-1 has a tooth every 10deg) and with the engine running at a constant speed, the gap between the pulses to the ECU will be the same. Thats why the height of the pulses are all very similar. *Note: there will be a small variation in height (time) due to compression, etc on a running engine.*
BUT, when the missing tooth (teeth) passes the sensor, the time between pulses increases (the time between teeth doubles at the single missing tooth), that is why the line is twice the size of the previous lines (twice the lengt of time between pulses).

The log shown below is from a running engine with a 60-2 wheel (a VW VR6), you can see the slight variations in height looking like a wave. This is due to the deceleration (cylinders compressing) and

acceleration (cylinders firing) of the crank during its rotation. You can actually make out 3 waves between each gap of the wheel (the larger line)

As this is a 60-2 wheel it has 58 teeth (one every 6deg) with **two** missing, so the time between the last tooth and the first will be 3 times as long as the gap between the main teeth.



OK, so now you can see what a good one should look like you can compare your own with the above to see if you are losing any teeth signals or gaining any from noise. Remember, these pulses are what the ECU has decoded, so they are very real to the ECU.

Trigger Logger:

This is similar to the above but it simply shows the decoded Trigger events. The ECU will count all the teeth but will only act on the teeth that are relavent to an ignition event. So a 4cy wasted spark engine witha 36-1 will only use 2 of the 36-1 pulses. This is because it only fires the ignition twice during one crank rotation. A 6cy wasted will act on 3 of the pulses, etc. These Trigger events are what is shown in this mode.

MS2 V2.1.0 codes and above.

Composite Logger (MS2 V2.1.0 and above):

This is very similar to the Trigger Logger but it is used for dual trigger inputs, e.g. cam and crank signals.

Sync Error (MS2 V2.1.0 and above):

This is for checking if the ECU loses sync. The ECU is setup to look for a certain pattern from the crank sensor. So on a 60-2 wheel it will need to see 58 teeth (pulses) then a gap for the length of time it has taken for the last 2 pulses to have pasted. (As the 60-2 has a gap of 2 teeth) If the ECU misses a pulse before the gap then it will lose sync and the timing for the lost cycle will be compramised.