

When we see a Knock Sensor or Knock Control fault on our diagnostic equipment its not always clear as to whether the fault is coming from a faulty sensor, wiring, control unit or from other engine conditions! Here we take a look at a 2004 1.6 petrol Opel Zafira, which was logging P0325 Knock Sensor fault when put under load or hard acceleration

How it works!

The Knock Sensor acts as a microphone. It transmits a signal directly related to the noise produced in the engine to the ECU. When fuel pre-ignites (knock) a different sound is produced which the sensor picks up on and the signal is sent to the ECU. When the ECU receives a signal from the Knock Sensor the ECU then regulates the ignition timing and in some cases the amount of injected fuel in accordance. Retarding of the Ignition usually happens in steps of 3 degrees and can go up to 15-20 crank angle degrees.

The signal voltage from the sensor when Knock is active is 0.1 to 0.6 volts (across both terminals).

Most 4 cylinder engines will just have 1 Knock sensor but some engines may have 2 and a V engine can have from 2 to 4 Knock Sensors.

Testing the sensor.

On this car the sensor can be viewed in live data on the diagnostic tool in the form of ACTIVE or NOT ACTIVE as you can see in figure 1 and when the car was driven and the fault happened the reading was always showing NOT ACTIVE. In this case though with an intermittent fault this was not good enough as from this all we knew was that the signal was not reaching the ECU and at this point we had no way of knowing if it was a sensor fault, a wiring fault or a ECU fault.

As the sensor had already been replaced on the engine we were doubtful that the new sensor was faulty but to be sure we wanted to test the signal coming from it.

The next step was to connect the GMT0 oscilloscope to both sensor wires and use the pre-set test built into the database to test the sensors signal see figure 2

The scope was connected to the sensor wires at the ECU plug (instead of connecting to the sensor plug) so as to test not just the sensor but the wires also.

When the engine block was given a light tap with a bar we can see from figure 3 the sensor creates the expected voltage on the oscilloscope. This told us that the sensor was functioning normally and the wiring from the sensor to the ECU was ok. Again as it was an intermittent fault I drove the car with the scope still connected to the Knock Sensor wires and using the GMT0,S recorder scope I managed to catch the signal from the sensor at the time of the fault code being logged and as expected there was a signal voltage created by the sensor meaning that the signal was getting to the ECU but the reading in the data stream was still showing NOT ACTIVE

This meant the only possible cause was a fault inside the ECU. The ECU is a common fault on the Opel petrol engines with internal circuit faults, but without the proper tests steps and equipment it would have been impossible to say for definite the ECU was at fault.

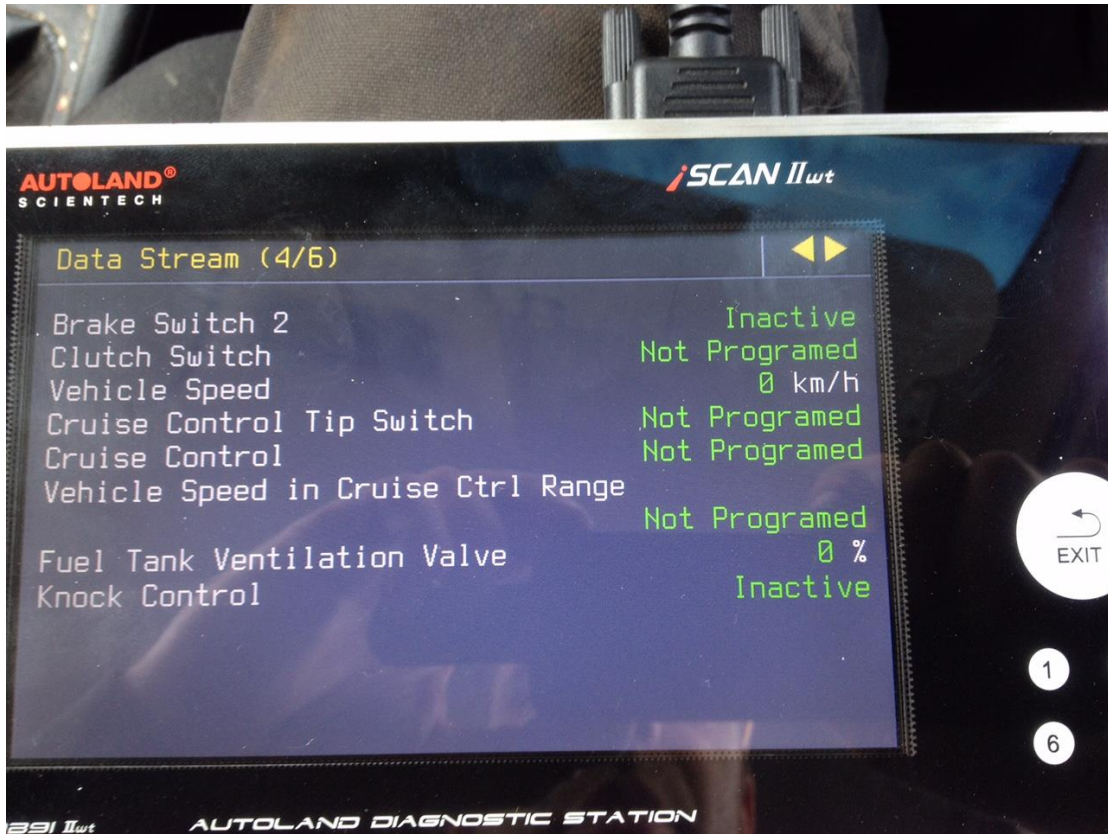


Figure 1

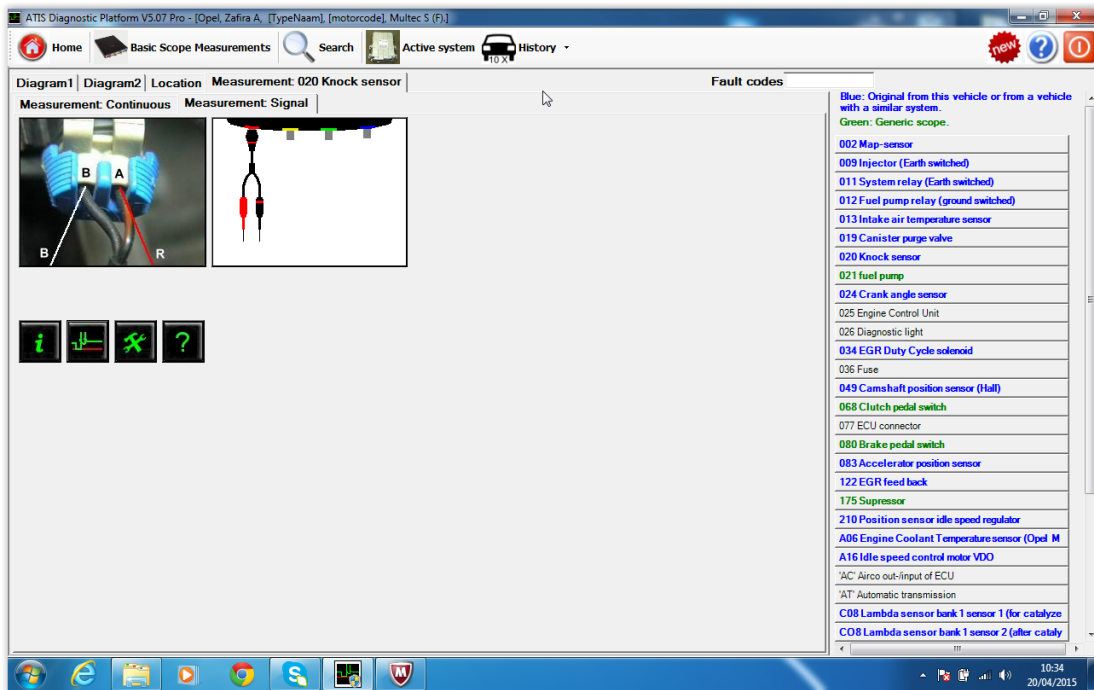


Figure 2

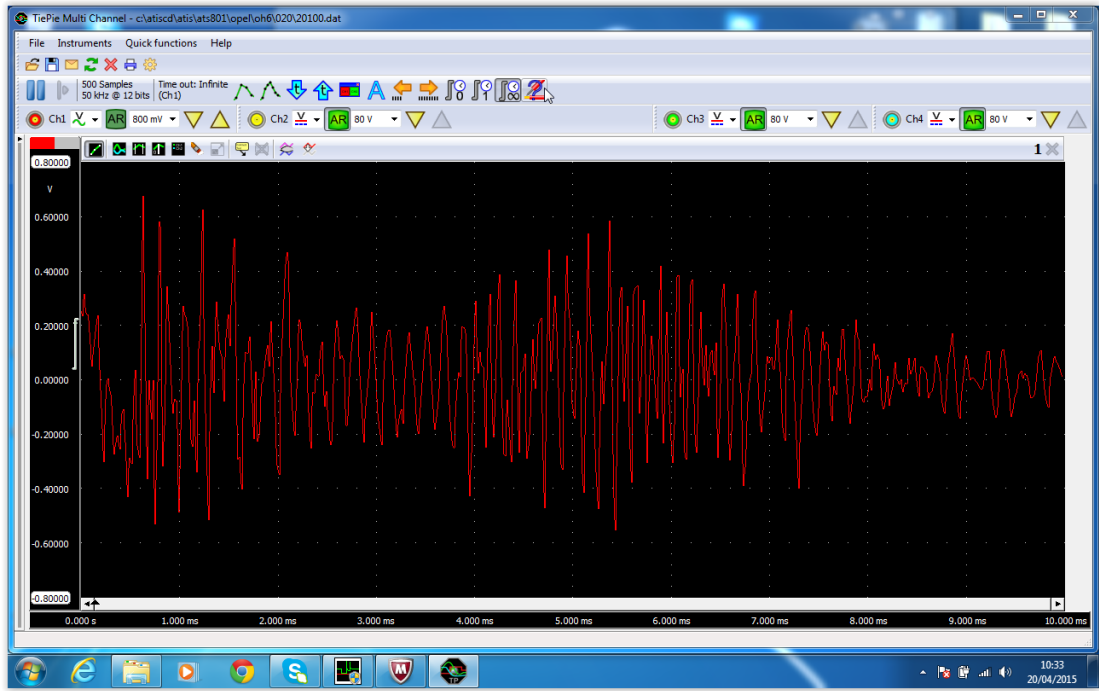


Figure 3