**CDX Distance Learning**

**Exercise #39**

**Oxygen Sensor and Fuel Trim Assessment**

**Student Name:** Click or tap here to enter text.

Viewing [**this animation**](http://144.137.28.1/Animations/GFanim/GF_O2FT_Ass03_C1/GF_O2FT_Ass03_C1.html) will be required to answer the following questions correctly. The attached animation has a throttle slider located at the bottom of the screen. As you move the slider from idle to wide-open throttle (WOT), the values on the scanner change. Carefully read the following questions to understand what each one is asking and follow the specific directions to answer the questions.

1. When the engine is operating at idle, the requirement for fuel is less than when the engine at 2000 rpm. When diagnosing drivability issues, the technician can determine which area to investigate by utilizing engine sensor information and PCM outputs. Move the throttle slider in the animation to the idle position. Which of the indicated parameter identification information helps with understanding what the PCM is changing?
   1. The B1S1 voltage
   2. The B1S2 voltage
   3. Injector milliseconds on-time
   4. The LTFT
2. Keep the throttle slider at the idle position. Which of the following statements is true about the B1S2 mV output?
   1. The B1S2 oxygen sensor monitors the efficiency of the engine.
   2. The B1S2 oxygen sensor monitors the ability of the catalyst to convert CO, N2O, and HCs into CO2, N2 and H2O.
   3. The B1S2 oxygen sensor output affects the fuel injector on-time because it reads the direct output of the engine.
   4. The B1S2 oxygen sensor evaluates the temperature output of the catalytic converter, which it uses to evaluate the operation of that unit.
3. When the engine is near the middle at the cruise location on the slider, which of the following should the LTFT % be doing?
   1. The LTFT % should be moving vary sporadically as it is a reading of what is happening in real time with the engine exhaust output.
   2. The LTFT % is a projection created by the ECM based on current engine operation STFT % and other senor inputs.
   3. The LTFT % is a reading that represents how the catalyst is converting engine emission output into harmless fumes out of the tail pipe.
   4. The LTFT % is the amount of ignition timing the ECM is taking away from the engine to control the rpm while the engine is operating.
4. When you look at the STFT % with the engine in the idle position, what is this percentage telling you about what is happening in the engine?
   1. The STFT % is a calculated reading that the ECM determines primarily based on the upstream or front oxygen sensor reading.
   2. The STFT % is a value that is the direct result of the combustion event and is measured by the injector milliseconds (INJ ms).
   3. The STFT % is calculated based on the ignition dwell inside each of the ignition coils present on the vehicle.
   4. The STFT % is a preprogramed value that is part of the ECM’s calibration which will adapt to any engine situation.
5. When the throttle slider is in the cruise position, what should the B1S1 wideband AF sensor voltage read as the throttle is at a steady cruise?
   1. It should be below 2.5 V as that is where cruise readings should stabilize.
   2. It should read slightly above 3 V as that is where the stoichiometric ratio is just about perfect for gasoline.
   3. The voltage should be around the 0.45 V, which is what the cell within the sensor will produce when the exhaust is at equilibrium state.
   4. The PCM controls the sensor output and it should be at whatever the catalyst will allow the sensor to operate.
6. Using the throttle slider on the animation, move the slider to WOT. Notice the injector millisecond (INJ ms). What is this graph indicating when you compare it to idle?
   1. The injector on-time slowly climbs to a new normal as that is how the engine rpm is gradually increased.
   2. The injector on-time is not a way to understand what is happening with increased engine rpm.
   3. The injector on-time stays steady indicating adequate fuel delivery to support the increased rpm.
   4. There is a sharp incline indicating the injector on-time that coincides with the rapid increased rpm of the engine.
7. When looking at the scanner data, what can you determine about the differences between a wideband air-fuel (AF) sensor and a zirconia oxygen sensor?
   1. A wide band AF sensor operates on a much higher voltage scale than a zirconia oxygen sensor.
   2. A zirconia oxygen sensor operates on a higher voltage scale than a wideband AF sensor.
   3. A wide band AF sensor operates on the same voltage scale as a zirconia oxygen sensor.
   4. The zirconia oxygen sensor requires power to generate a signal, unlike a wideband AF sensor.
8. When looking at the three-way catalytic converter in the animation, the position of the oxygen sensor’s signal will be affected by which of the following?
   1. A damaged tailpipe near the back of the vehicle
   2. A damaged catalytic converter that has a puncture within the housing
   3. A damaged muffler that has a hole rusted through the outside housing
   4. A damaged exhaust hanger holding the catalytic converter in position
9. When looking at the rear oxygen sensor on most OBD II applications, which of the following is common on almost all vehicles?
   1. Most rear or downstream oxygen sensors do not need to be heated as they are made of a self-heating material.
   2. Most rear or downstream oxygen sensors heat up using the air that passes over them as the vehicle moves down the road.
   3. Most rear or downstream oxygen sensors have a heater built into them to get them up to temperature faster than by waiting on the exhaust to heat up.
   4. The rear or downstream oxygen sensor uses the difference between the hot exhaust and the cold outside air to generate power, unlike an AF sensor
10. Look at the B1S1 amperage on the scanner data with the throttle slider on idle. Why is the amperage (mA) so low?
    1. The mA is not low as it is higher than what it is with the throttle slider in the WOT position.
    2. The mA is rising based on voltage output of the AF sensor and works in correlation with the voltage output from the sensor.
    3. The mA is low because of the voltage output of B1S2 within the exhaust system.
    4. The mA is low because of Ohm’s law. The amperage is related to the amount of voltage that the sensor is providing to the PCM.