O2 Sensor Testing

If your engine has unexpectedly started to run poorly, an O2 Sensor Test should be performed.

IMPORTANT: Testing the O2 sensors using the procedures below REQUIRES that the engine will idle normally and with reasonable stability. This must be achieved by loading the original base map or a known good base map and clearing ALL learned conditions.

After reloading the base map and clearing all learned conditions, if the engine does not idle reasonably well, the probability is VERY HIGH that there is a mechanical or electrical issue on the motorcycle causing the problem.

Refer to: Trouble Shooting Basics if engine will not idle properly

How to Trouble Shoot Basic Problems

Diagnosing a problem in the O2 sensor system

1. Load the original "un-modified" base map to the module.
2. Clear "Learned Fuel Adjustments"
3. Clear "Learned Idle Adjustments"
4. Perform module initialization of Key ON 20 sec, Key OFF 20 sec….repeat 5 times.
5. Start engine and let idle to operating temperature.

AFR readings while the engine is idling normal and stable

AFR value is constantly 19.36 on "one cylinder only". Other cylinder AFR reads normal.

- O2 sensor is faulty.
- Wire harness is damaged.

AFR value is constantly 19.36 on "both cylinders".

- O2 module is faulty.

AFR value is constantly 22.05 on "both cylinders".

- O2 sensors NOT plugged in.
- O2 module not connected to DATA PLUG properly.
- O2 module DATA PLUG not receiving 12V power.
- Accessory fuse blown or corroded.
- O2 module Faulty

AFR values (any value) always EXACTLY the same on "both cylinders".

- O2 sensors NOT plugged in.
- O2 module not connected to DATA PLUG properly.
- O2 module DATA PLUG not receiving 12V power.
- Accessory fuse blown or corroded.
- O2 module Faulty

AFR value varies less than 0.5 (Example: 14.20 – 14.70) when throttle is twisted and released.

- O2 sensor faulty
- O2 sensor wiring damaged
- Factory OEM sensors are PLUGGED IN

AFR value periodically indicates 19.36 or 22.05 on one cylinder.

- O2 sensor plugs NOT securely SNAPPED together
- O2 sensor harness plug wires pulled from plug. (Firmly pull on EACH wire at the connector)
- O2 sensor faulty
- O2 sensor connection broken
- O2 sensor wire damaged (Melted by exhaust, rubbed through by drive belt, abrasion damage)

AFR value for ONE cylinder reads LEAN (AFR = 16.00 or greater always but engine idles good)

- Exhaust gasket leak.
- Weld at O2 sensor leaking (Use Soapy Water test to determine)
- Crack in affected cylinder's exhaust pipe

Verify your O2 Module Connection.

Make sure you have the plug completely seated and screwed in tightly.

NOTE: Screws should be slightly 'countersunk' into rubber.

Determine which is bad, O2 Sensor or O2 Harness

A basic "Swap and Test" procedure can be used to isolate "which" component is faulty, the O2 Sensor or the O2 Harness.

Determine which cylinder AFR reading, Front or Rear, is bad.

Swap Test Example: FRONT cylinder AFR reading bad.

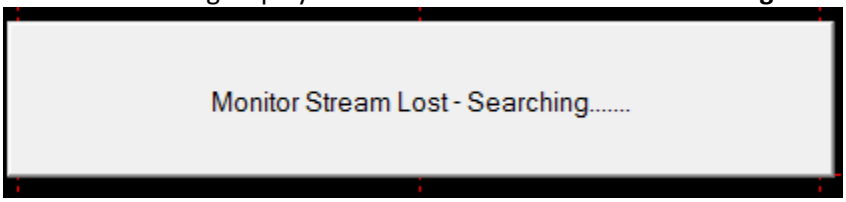
1. Disconnect the O2 harness connectors from the Front and Rear O2 sensors.
2. Connect the O2 harness connector marked "Front" to the REAR O2 sensor.
3. Connect the O2 harness connector marked "Rear" to the Front O2 sensor.
4. Start the engine and verify AFR readings for both cylinders.
5. If the FRONT AFR reading is "STILL" in error, the O2 Harness is at fault.
6. If the REAR AFR reading is "NOW" in error, the FRONT O2 Sensor is faulty.
7. If the FRONT and REAR AFR readings now are GOOD, a harness, wiring or connector issue exists.

Swap Test Example: REAR cylinder AFR reading bad.

1. Disconnect the O2 harness connectors from the Front and Rear O2 sensors.
2. Connect the O2 harness connector marked "Front" to the REAR O2 sensor.
3. Connect the O2 harness connector marked "Rear" to the Front O2 sensor.
4. Start the engine and verify AFR readings for both cylinders.
5. If the REAR AFR reading is "STILL" in error, the O2 Harness is at fault.
6. If the FRONT AFR reading is "NOW" in error, the REAR O2 Sensor is faulty.
7. If the FRONT and REAR AFR readings now are GOOD, a harness, wiring or connector issue exists.

Initialization Test of O2 Sensors
Throttle by Cable, SmartLink Software

1. Connect computer interface cable to the module.
2. Turn ignition switch ON.
3. Link to the module.
4. Select **'Monitor'** to begin monitoring.
5. Turn ignition switch OFF
6. Wait until a dialog displays….. **"Monitor Stream Lost – Searching…."**



7. Locate and watch AFR values in both Front and Rear cylinders.
8. Turn ignition switch ON.
9. Verify both AFR values now change to 22.05.
10. Verify that after several seconds both values change to 19.36
11. Start the engine.
12. Verify that after the engine starts, both Front and Rear AFR values become quickly changing values (approximately AFR values of 11.00 – 15.00).

If the above conditions are displayed then the O2 sensors appear to be working normally.

**If either the FRONT or REAR or BOTH sensors do not meet the above initialization test, then an O2 Sensor system fault is occurring.

**Proceed to investigate further.

- Reference **AFR readings while the engine is idling normal and stable**
- Reference **Determine which is bad, O2 Sensor or O2 Harness**

If you are getting a constant AFR reading of 9.30 on both cylinders, the ECM is not getting a signal from the Data Port on the O2 Module.

How to Check:

- **Check plug for connectivity**- Make sure to use dielectric grease and that it is 'Snapped' together securely.

- **Make sure it is plugged into the correct plug on the harness**-Wires should be Black, Gray, Green w/ Violet Stripe

- **Test to make sure plug has 12 volts**- Using a Voltage Tester, attach *Positive* clip to **GRAY**, and *Negative* clip to **BLACK(ground)**.

Note: You must use the 'Ground' inside the plug to properly test plug.