Spacers

- **What is an O2 sensor and how does it work?**
  - An O2 sensor, also known as an oxygen sensor, is a device in a car's exhaust system that measures the amount of unburned oxygen in the exhaust gases, sending this information to the engine control unit (ECU) which then adjusts the air-fuel mixture to optimize combustion and efficiency, ensuring the engine runs cleanly and with minimal emissions by maintaining the ideal air-to-fuel ratio
- **How is an O2 sensor used to determine if a catalytic converter is working?**
  - An O2 sensor measures catalytic converter efficiency by comparing the voltage signals from an upstream sensor (before the converter) to a downstream sensor (after the converter); if the downstream sensor shows significantly less voltage fluctuation, indicating a lower oxygen level, then the catalytic converter is considered efficient, as it is effectively removing oxygen from the exhaust gases; a large difference in voltage between the two sensors signifies a properly functioning converter, while a small difference suggests the converter is not working well and needs to be replaced.
- **What are O2 sensor spacers?**
  - An O2 sensor spacer is a device which increases the gap of the O2 sensor therefore skewing the readings of the sensor. They are used to trick the car's computer into thinking a bad catalytic converter is still good.
- **Are they illegal?**
  - Yes! They are illegal under the Clean Air Act and fail an emissions test due to tampering with the OBD system of a vehicle.
- **How do I know if a vehicle has one installed?**
  - Some spacers are easier to spot than others. A good general rule is that the hex head of the O2 sensor should be touching or almost touching the exhaust pipe. If there is a metal pipe/tube that separates the hex head from the pipe, there is a spacer installed.
  - The following image shows a properly installed O2 sensor. Notice there is no gap between the hex head and the pipe and it is at a perpendicular angle to the pipe.
    AD_4nXfq--KwZaGjgNYwWhP_wusUDZ5oe5PMUE6z_XwCdjYGb1hAX2frvDbd9ZvAhil3u8P6LSn
  - The following images show tampered O2 sensors with spacers installed. Notice how there are multiple hex heads and how it extends the sensor away from the exhaust pipe. Some extenders won't have any hex heads on them but you can see how the hex head on the 02 sensor is not next to the pipe and is extended away from it. Some of the spacers may even be curved or angled
    AD_4nXc7_KSl3GeIZOk5QFDQZltiirqjxJyduNH1hMLRvI-tqKHx4APbYzY7-669jU4FeNIg8V0cxV8-
    AD_4nXeCwxLHpnpUIMJtWIiOGJUIGCZBEnmuQsF4Rq_SyyR6-n9BdIWA2_jPwEC6nIQSHWibQoc
    AD_4nXf54_Ze7a70ijWd8efwUT2mcgou2crlXwsc6RiQ1uLcJH6DFu4WoW759EZXTvZ4fYobA9R
    AD_4nXeiBRUnRsCB6HPk5UPXyUh4s9ZNwexfGVmkz8E6yNiwDm17tPSfO9VZOEZv6xPCSgoD

- **Where are O2 sensors generally installed?**

1. O2 sensors are generally found before and after catalytic converters. Most cars will have 3 or 4 O2 sensors.
2. The O2 sensor after a catalytic converter is usually the one where a spacer is installed to trick the computer into thinking that oxygen was burned as exhaust passed through the catalytic converter

- **What do I do if I suspect a car has a modified O2 sensor or spacer?**
  1. Mark the OBD system as tampered and fail the vehicle. Take pictures of the tampered O2 sensor and submit with the test

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