



# Engine Management Worksheet

## For Catalytic Converter Operation

**Detailed Instructions on back.**

- **Be certain the engine is at operating temperature and in closed loop.**
- **Use ONLY OBD II scan tools in Global or Generic mode – no VIN entry. Raw, uninterpreted data is required here.**

### Readings taken at Idle

	<u>Short Term Fuel Trim</u>		<u>Long Term Fuel Trim</u>
Bank #1	_____	Bank #1	_____
Bank #2	_____	Bank #2	_____

### Readings Taken at 2500 RPM

	<u>Short Term Fuel Trim</u>		<u>Long Term Fuel Trim</u>
Bank #1	_____	Bank #1	* _____
Bank #2	_____	Bank #2	* _____

**MAF reading (if equipped) in grams per second at dead idle (no A/C or accessories on)**

\_\_\_\_\_ g/s                      Idle RPM \_\_\_\_\_

**\*If long term trim values don't change between Idle and 2500 RPMs, take the vehicle on a road test with scanner attached to see if the values Change.**

*More data may be necessary to locate the cause of the trouble.*

**When you suspect a failed catalytic converter for ANY reason,  
follow these steps precisely before replacing the converter:**

- 1) Hook up your OBD II scan tool in **Global** mode. Do not use vehicle specific (vin entry) mode or OEM scan tools. You want the rawest possible data, *not* data that has been interpreted by the vehicle's PCM, and you must retrieve the data as prescribed below.
- 2) If *any other codes are present* address them first before continuing to diagnose for converter failure.
- 3) If the vehicle is equipped with a Mass Air Sensor, do a quick check of the values at idle.  
  
(Very Important: the vehicle must be at operating temperature at *dead idle*. NO ACCESSORIES ON). Proper reading at idle will be very close to 1 gram of air per second (g/s) per liter of engine displacement.
- 4) Next, navigate to Long Term and Short Term fuel trim readings. A value of zero is perfect, any deviation from zero indicates the vehicle's computer is adjusting the injector pulse width to maintain proper air/fuel ratio. Some adjustment is normal, but too much can either quickly cause damage to a catalytic converter, or possibly cause a *false* catalyst code to be set when in fact the converter may be in perfect working condition. A properly running vehicle should exhibit fuel trims within 5% of zero at most times.

Now, with the vehicle in closed loop and at idle and the transmission in park or neutral, record the Long Term and Short Term fuel trims for each bank (write them down!).

Next, bring the engine RPM to 2,500 and hold it there for about 15 seconds. While maintaining 2,500 RPMs, record the Long Term and Short Term fuel trims.

- 5) Now, analyze the data. If either the Long Term or Short Term trim is near or above 10% or near or below negative 10%, or if the combined trims on any bank are near these numbers, there is a problem that needs to be corrected before replacing *any* catalytic converter.

Additionally, if the "spread" between Long Term and Short Term trims on any one bank is near or above 10%, there is a problem. For instance, LTFT B2 = positive 7% and STFT B2 = negative 8%, overall trim would be -1% which is very close to zero, however the issue is LTFT is adding fuel while STFT is taking it away at a large rate. The spread between the two is 15%. This is a problem that needs to be corrected.

**Hint:**

If fuel trims are high at idle but get closer to zero at 2,500 RPMs, it is likely there is unmetered air entering the engine (possible vacuum leak).

If fuel trims are close to zero at idle but rise at 2,500 RPMs, it is likely there is a fuel delivery problem (clogged filter, low fuel pressure, restricted injectors, etc...).

**Positive fuel trims** near or above 10% will likely cause "false" catalyst codes. Repairing the issue will often cure the converter code.

**Negative fuel trims** indicate a rich air/fuel ratio. Over-fueling like this is the number one cause of catalytic converter damage due to carbon build up and/or overheating the converter substrate.