Tuning AFM

Posted by Sterling Doc - 30 Jul 2011 19:33

One thing I haven't seen explored much online is how and why to tune the AFM. I see Joe posted up a while back on the NASA Spec boards that removing the cat as we do can mess with A/F ratios, and that there is some benefit to fixing this with an AFM tune. I'm interested in what people have found with this. What A/F ratio are we shooting for? Do you guys adjust the wiper/track, the spring tension, or the air bypass screw on the AFM? How much does a click one way or the other change things? After we've found some lean issues in local cars, I've just put an AEM A/F ratio gauge, and will log this with the Traqmate. I'm happy to share what I find, when I do start checking things out.

Thougts & experiences?

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Re: Tuning AFM

Posted by Sterling Doc - 01 Nov 2012 14:38

But the lean condition happened with an uncracked/virgin AFM, on the first dyno run. The car had run all season in that configuration. Whatever adaptation was going to happen, would have by then. I'd think.

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Re: Tuning AFM

Posted by RangerGress - 01 Nov 2012 14:55

Sterling Doc wrote:

But the lean condition happened with an uncracked/virgin AFM, on the first dyno run. The car had run all season in that configuration. Whatever adaptation was going to happen, would have by then. I'd think.

You changed input variables in a system designed to be adaptable. Maybe you drew conclusions based on #'s prior to the new adaptation.

Also have to control for reset of LTFT. Every time we turn our kill switch LTFT is reset.

Is hard to know what a virgin AFM is these days. Can we really be assured that the remanufacturered AFMs are properly calibrated?

Don't get me wrong, I don't have any perfect answers. I've gotten to the point where I 100% trust almost nothing when it comes to testing and engine management.

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Re: Tuning AFM

Posted by Sterling Doc - 01 Nov 2012 15:04

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Here's some deep reading on this if anyone is interested. It would seem to imply the maps are static and the O2 sensor adjusts the output after it gets looked up on the fuel table.

Link is here: http://www.the944.com/lambda.htm , excepts below

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"Lambda Inside" by FR Wilk ©2002

How the Motronic DME monitors Oxygen levels in exhaust gases

This page is dedicated to how the Motronic functions by taking the raw Lambda input and converting this signal so that the computer can understand it. Some computer programming and flow charting will be discussed. 'Oxygen sensor' or 'O2 sensor' are other commonly used names for the Lambda sensor.

The Lambda is a minor system in the Motronic. It is an option, an add-on. As such, it is not a critical system. It is a smog device and in no way does it enhance an engines power. Just the opposite. All that it is doing is fine tuning the fuel to reach an ideal air/fuel ratio. This original value of fuel is read from maps just like it is without the Lambda system installed. It is only capable of making minor changes to the fuel level

The basis ML1.1 system, the early Euro 944, has no Lambda system. The air flow sensor and speed sensor are used to determine fuel flow from a map that is stored in system memory.

Next to it is the ML1.2 Lambda system flow chart, the early USA 944, which has a Lambda sensor (O2

sensor). The fuel level is a two level control process, map and Lambda control. The Lambda system also uses the air flow sensor and speed sensor to determine fuel flow from a map. The Lambda control makes positive or negative changes to the fuel level in order to fine tune the fuel output. The range of the Lambda control is quite limited which requires the fuel map to contain values very close to Lambda=1 (air/fuel ratio 14.7). Comparing the maps of a non-Lambda (Euro 944) and Lambda system, the Lambda maps will appear flat and unimpressive. The power is in the non-Lambda map.

The fuel map is always used with a Lambda system. One common but false saying is that the fuel map is no longer used when the car is equipped with an Lambda sensor. This is far from the truth. Where does the original fuel value come from? Is it a guess? No. Any change in load or engine rpm, the DME must go to the fuel map to get its initial value. Then the fine tuning begins. The Lambda sensor subroutines take charge and the fuel is continuously toggled back and forth. If the Lambda sensor is disconnected, the Motronic gets it fuel levels from the map only. It never just "goes rich to protect the engine" which is another famous and incorrect saying. When the Lambda is disconnected, it uses the fuel map.