

Tech of - MAF –

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Introduction

MAF stands for Mass Air Flow. When this term is used in relation to fuel injected cars. It is another iteration of measuring the incoming air to determine the fuel requirements. Some earlier methods were Manifold Absolute Pressure (MAP) and Vane Air Flow (VAF). All V8 mustangs since 1989 used MAF.

The MAF consist of several parts working together. The more important of the two being the MAF sensor and the MAF housing. When hearing of “upgraded” or “modified” MAF it is usually in reference to the design of the housing or the stock sensor. Before performing such an upgrade it is import to understand what each piece was intended to do and what an upgraded MAF actually does or claims to do in the name of performance.

Background

Both the MAF and the MAP served the same function but in two different ways. The MAP measured the increase in manifold pressure and the MAF measures the mass of air without needing corrections for temperature or pressure. This is accomplished by using a “hot-wire” system. The MAF sensor contains two wires. One wire’s temperature is the ambient temperature and the other is 200°C hotter.

The system works by air first passing over both wires. When the wires cool the computer senses the change in temperature and increases the voltage to the “hot-wire” to keep it at the 200°C difference from the ambient wire or “cold-wire”. Since the computer sent the signal to increase the voltage to the “hot-wire” and it knows when the wire is 200°C hotter than the ambient tempature of the "cold wire" the computer can determine the mass of air flow through the MAF housing from the change in voltage and using a transfer function in the EEC.

Performance Applications

One of the upgrades done to FI engines is an upgraded MAF. Several different companies offer 80-85-90mm and all in between MAF’s. However it is import to understand what the new MAF actually is doing to your engine. It is an incorrect assumption to make that the 10mm larger MAF is going to allow more air into your engine thus giving you more power. The stock MAF is not maxed out by any way shape or form and it will take a lot of work to max it out.

Different companies offering MAF’s tackle the same problem trying to achieve the same results but in different ways. In the case of C&L they simply offer a “calibrated” MAF housing. They claim that through the design of the housing and

the location of the MAF sensor wires their MAF sends calibrated MAF sensor readings to the stock computer. In the case of Pro-M they actually offer a new MAF housing and a modified sensor. They took the opposite approach and actually modify the signal that the sensor sends to the EEC.

Both of these MAF systems work to alter the Air Fuel A/F ratio. In both cases the MAF system come calibrated to lean out you A/F ratio. This causes the computer to supply less fuel to the combustion in hopes of producing more power. Air Fuel ratio is simply the Mass of Air / Mass of Fuel. The leaner the A/F is the less fuel is being mixed with the incoming air. This creates more power but you are more prone to detonation during the combustion process. This can be a major problem in application where a power adder is being used (Nitrous/Super/Turbocharger). A lean mixture is anything greater than 14.7 while a rich mixture is anything less than 14.7. A ratio of 14.7 is considered to a Stoichiometric Ratio where all of the air and fuel is burned in the cylinder.

Conclusion

Your question now may be which system is better. Well there is really no way to tell without extensive testing. Both manufactures say theirs is better and people who own one or the other say theirs is better. So far I have just not been able to find an answer for this question. I chose to go with the C&L which you can read about in the projects section because I eventually plan on getting an EEC tuner of some sort and I can change the way the computer will interoperate the signal coming from it and not have to worry about modified electronic sensors sending me signals that I do not understand. Others have chosen to go the Pro-M route and use EEC tuners and change the computers around the modified electronics. I will let you decided which route you prefer.