Programme d'essais et réglages moteur Atomix v2.0

Tests and engine setup schedule Atomix V2.0

This document sums up all the testing procedure in order to finalize the engine setup on the DTA S60 ECU.

Content

I) Engine MAP Atomix v0.14

This map is the result of dyno testing and is not perfect because of lambda sensor issues. Therefore, it can be improved trough testing and data analysis.

The first aim will be to get a target lambda at 0.88 (which is the point where the engine will be the most powerful, without being efficient though). After this sessions, we will concentrate on a target lambda value between 0.88 (most powerful) and 1.25 (most efficient).

A) Injection time map

Throttle % ->	0	4	8	13	18	25	33	41	50	59	68	77	86	95
1500	2,50	2,50	2,70	2,80	2,85	3,00	3,00	3,10	3,20	3,30	3,40	3,50	3,60	3,70
2000	2,50	2,50	2,70	2,80	2,85	3,00	3,00	3,10	3,20	3,30	3,40	3,50	3,60	3,70
2500	2,50	2,50	2,70	2,80	2,85	3,00	3,00	3,10	3,20	3,30	3,40	3,50	3,60	3,70
3000	2,50	2,50	2,70	2,80	2,85	3,00	3,00	3,10	3,20	3,30	3,40	3,50	3,60	3,70
4000	2,50	2,50	2,50	2,53	2,85	3,00	3,00	3,10	3,20	3,30	3,40	3,50	3,60	3,70
5000	2,50	2,50	2,50	2,53	2,85	2,90	3,40	3,60	3,80	3,90	3,70	3,90	4,00	3,70
6000	2,50	2,50	2,50	2,43	2,54	2,80	3,45	3,60	3,80	4,05	4,25	4,18	4,00	3,92
7000	2,50	2,50	2,50	2,40	2,54	2,70	3,45	3,60	3,80	4,10	4,12	4,18	4,30	4,15
7500	2,50	2,50	2,00	2,35	2,54	2,60	3,45	3,50	3,80	4,10	4,12	4,18	4,30	4,25
8000	2,50	2,50	2,00	2,30	2,10	2,50	3,10	3,40	3,80	3,90	3,90	4,10	4,15	4,10
8500	2,50	2,00	1,80	1,98	1,98	2,47	2,99	3,30	3,80	3,90	3,90	4,10	4,15	4,10
9000	2,50	2,00	1,80	1,95	1,95	2,35	2,85	3,20	3,70	4,00	3,90	3,90	4,00	4,10
9500	2,00	2,00	1,80	1,95	1,95	2,35	2,85	3,20	3,30	3,50	3,95	3,85	4,30	4,10
10000	2,50	2,00	1,80	1,93	1,93	2,35	2,82	2,90	3,20	3,45	3,85	3,90	4,20	4,10
10500	2,00	2,00	1,80	1,91	1,91	2,26	2,70	2,80	2,90	3,10	3,50	3,80	3,90	4,10
11000	2,00	2,00	1,80	1,90	1,90	2,22	2,72	2,60	2,75	3,15	3,20	3,80	3,90	4,10
11500	2,00	2,00	1,80	1,90	1,90	2,22	2,67	2,70	2,75	3,45	3,50	3,80	3,90	4,10
12000	2,00	2,00	1,80	1,90	1,90	2,22	2,62	2,70	2,75	3,50	3,50	3,80	4,20	4,00
13000	2,00	2,00	1,80	1,90	1,90	2,22	2,62	2,70	2,75	3,55	3,50	3,80	4,00	3,90
14000	2,00	2,00	1,80	1,90	1,90	2,22	2,62	2,70	2,75	3,45	3,50	3,80	3,80	3,80

Figure 1 Injection time map for Atomix v0.14

After a few runs with this map, the conclusion is the following: There's a lot to work on about the transient, and after a gear shift. There's also work about stabilized values, but the first testing we had do not allow us to have a clean conclusion.

II) Testing programm

A) Stabilized values

In order to get a complete view of the combustion happening with this map, we will conduct different runs.

The aim is to see what's happening for all the situations of the map, so we will have try to come from as low as possible in RPM to as high as possible in RPM for different throttle values : 25%, 50%, 75%, and 100%.

This test session must occur in the same gear for each test, in order to focus on stabilized combustion and not on transients due to ignition cut for gear shift.

a) How to change the map

After these runs, we will be able to plot for each TPS value Lambda/RPM as seen in fig2

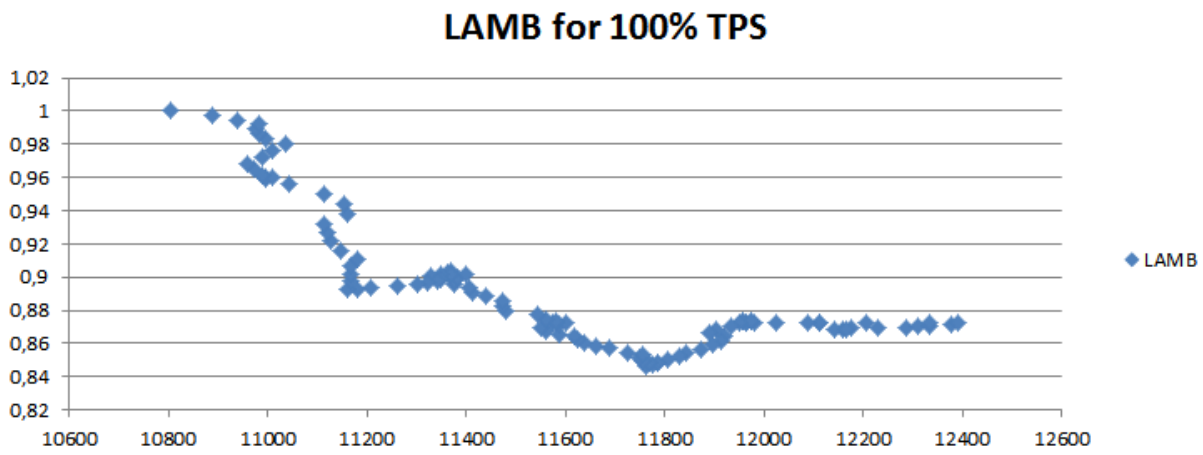

Figure 2 : Lambda/RPM for 100%TPS

With these values, the aim is to change the injection time to get to the target lambda.

For example, for 11 000 RPM, lambda value is 0.96, injection time is 4.10ms. As we want 0.88, the new injection time will be 4.10*0.96/0.88 = 4.47ms.

B) Transient values

There are two different values for transient. The first one, increase in fuel avec gear cut, appears after each gear shift. This value is found in DTASwim in the **Other Map Setting** Menu, in the Shift Cut **parameters**, named **Post Cut Fuel Increase**. The other one, increase fuel for throttle transient, appears with the derivate of the TPS value. These values are found in the **Essential Map Settings** menu, **Throttle transient.**

a) Gear shift modifications

In order to get a clean fuel increase value after a gear shift, the gear shift duration needs to be defined and stay the same for the rest of the use of the map.

Then, same process as before, if the lambda value is too high after a gear shift, it means that the engine doesn't have enough fuel, so you either increase the **Post Cut Fuel Increase** or the **Post Cut Fuel Duration**.

b) Throttle Transient

Same process as before, the driver is asked to brutally tip in. If the lambda value is too high, increase the **Increase in Fuel** or the **Duration in turns** values.

C) Temperature values

On a representative run for an endurance, check the temperature values. If the engine runs at more than 105°C, go to **Essential Map Settings**, and **Water Temp Compensations**, and increase the value of fuel by 5% at 105°C. For higher temperatures than 105°C, increase fuel by 5% each 5°C.

III) Runs needed

In order to achieve these settings, these are the runs that need to be done.

- 1 : Atomix v0.14 map, throttle at 25%, 100hz acquisition with lambda, TPS, RPM.

- 2 : Atomix v0.14 map, throttle at 50%, 100hz acquisition with lambda, TPS, RPM.
- 3 : Atomix v0.14 map, throttle at 75%, 100hz acquisition with lambda, TPS, RPM.
- 4 : Atomix v0.14 map, throttle at 100%, 100hz acquisition with lambda, TPS, RPM.

Then, change the values of the Injection Fuel Time map, and save them in Atomix v0.15 map.

- 5 : Atomix v0.15 map, throttle at 50%, 100hz acquisition with lambda, TPS, RPM.
- 6 : Atomix v0.15 map, throttle at 100%, 100hz, acquisition with lambda, TPS, RPM.

Check if the lambda values are the ones expected. If not, start again from run 1 with Atomix v0.15 map.

- 7 : Atomix v0.15 map, throttle at 100% with gear changes. Lower the gear shift time until satisfied.
- 8 : Atomix v0.15 map, throttle at 100% with gear changes, 100hz Acquisition with lambda, RPM, TPS, Shift cut.

Change the fuel increase as detailed before in order to get the right lambda value. Start again run 8 until satisfied.

- 9 : Atomix v0.15 map, throttle transient between 20% to 100%. 100hz acquisition with TPS, RPM, Lambda.

Change the fuel increase as detailed before in order to get the right lambda value. Start again run 9 until satisfied.

- 10 : Atomix v0.15 map, endurance simulation. 10hz acquisition with lambda, TPS, RPM, Water Temp.

Stop the run as soon as the water temp exceed 110°C. Increase the water temp compensation values as explained before of 5%. Start again run 10 until satisfied.